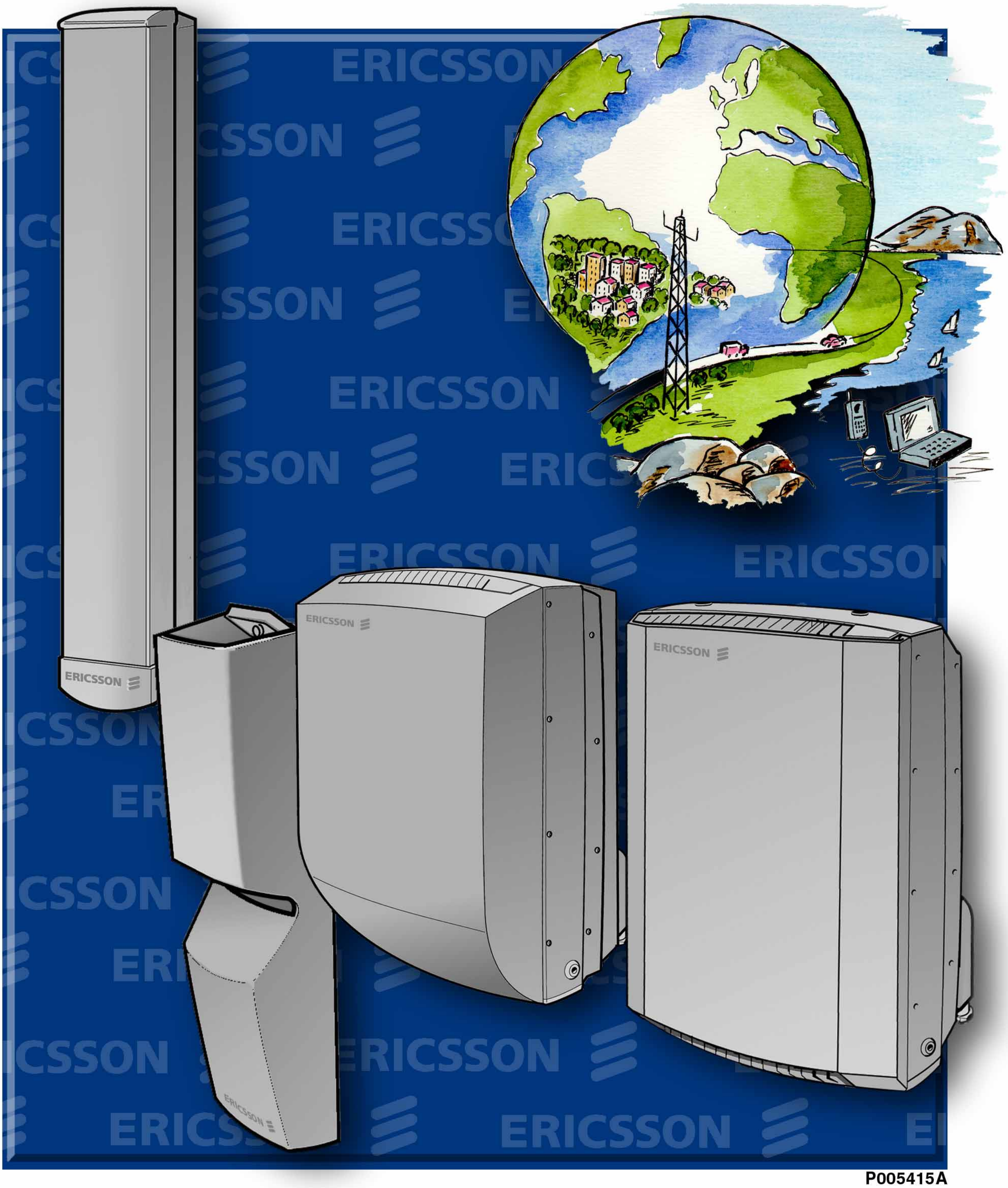

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Ericsson GSM System

Maxite™ User´s Guide

ERICSSON

LZN 302 75 R5A

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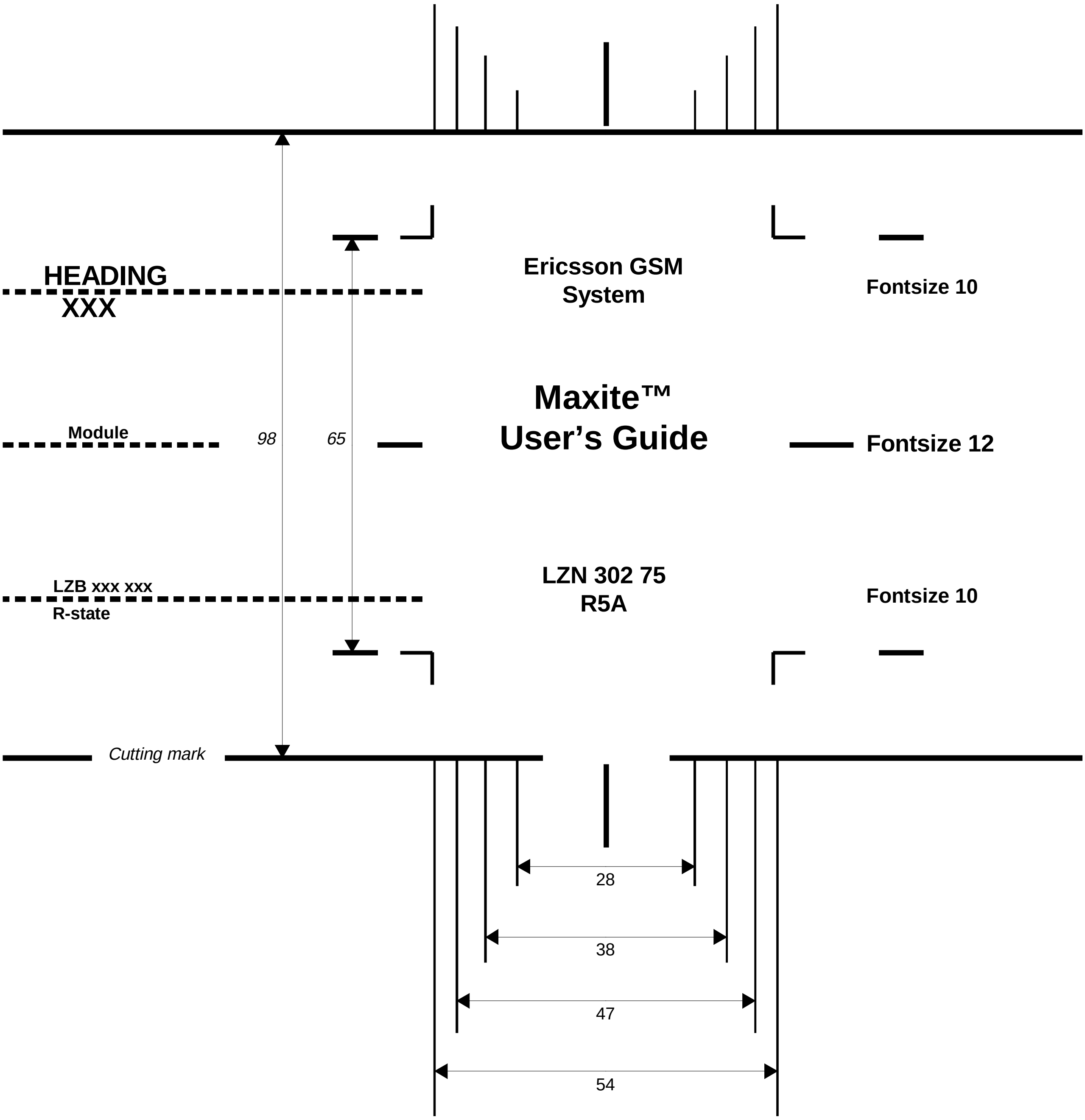

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CAPTION LIST

Document No.	
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Date 99-10-07	Rev B

Maxite™ User's Guide

Due to continued progress in methodology, design and manufacturing, the contents of this document are subject to revision without notice.

Contents

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1 Introduction

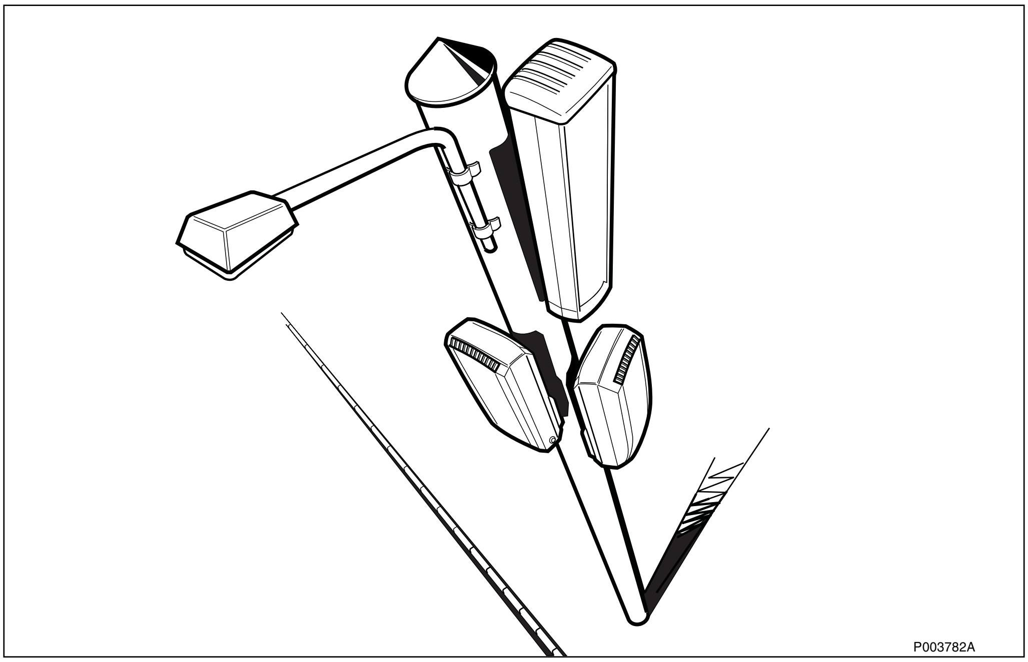

Figure 1 Mounting alternative for Maxite™

Today Ericsson has one of the smallest and most efficient micro base stations for micro and indoor cells, available on the market. RBS 2301 was the first product in the micro concept from Ericsson. Now the next step - using micro base stations for coverage in macro cells - is introduced with Maxite™.

- Maxite combines one of the smallest GSM two-transceiver base stations, RBS 2302, with an active antenna system and power supply with battery backup. This gives a micro RBS solution with a macro cell coverage that can be mounted practically anywhere.
- Maxite is a trademark owned by Telefonaktiebolaget L M Ericsson, Sweden.

The following is a brief summary of the chapters included in Maxite™ User's Guide:

Introduction

This chapter.

Safety

Contains information that shows the system used for presenting safety instructions.

Tools and Instruments

Contains lists of all recommended tools and instruments.

Site Planning and Requirements

Describes the Maxite installation engineering process.

Installation of Antenna Units

Describes activities for mounting the active antenna (GSM 1800, GSM 1900), and the coverage extension unit (GSM 900), on a pole or a wall.

Installation of Power and Battery Cabinet

Describes activities for the installation of the mounting base, connection of internal cables and mounting the battery cabinet on the mounting base.

Installation of RBS 2302

Describes activities for the installation of the mounting base, connection of internal cables and mounting the radio cabinet on the mounting base.

Installation of External Cables

Describes the activities for connecting all external cables and general installation instructions for external cabling.

Site Installation Tests

Describes the site specific tests that can be performed at site.

Optional Tests

Describes the optional site specific tests that can be performed at site with the BSC Simulator.

RBS Site Integration

Describes how to integrate a RBS site into a network.

Fault Handling

Contains helpful information when an error on site has occurred, for instance the total fault code list, fault tracing hints and information regarding trouble reports.

Maintenance

Describes first line Maintenance which means that swap repair is made at the site and that only replaceable units are handled.

Product Data

Technical data for Maxite parts.

Glossary

Contains abbreviations and acronyms used in the text.

Spare Parts Catalogue

Contains relevant information for ordering first line spare parts.

1.1 Target Group

The target group for this binder is all personnel involved in the Maxite activities.

The aim of the Maxite™ User's Guide is to present the information in a user-friendly way.

If you have any comments or questions regarding the usability or the contents, please contact your local Ericsson company.

Help Desk

For Ericsson internal use only:

Memo ERAC.GSMLIB

1.2 Radio Site Implementation Process

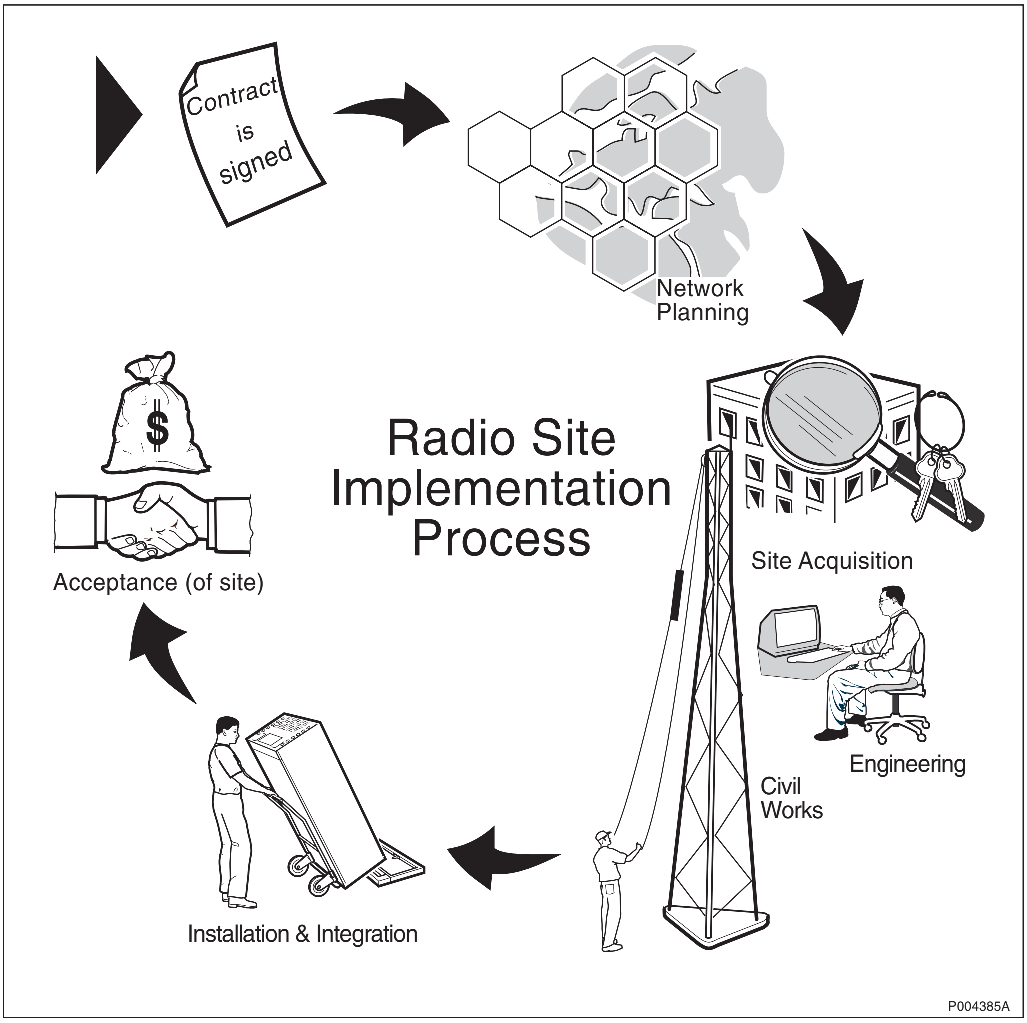

Figure 2 The Radio Site Implementation Process

The Installation and Integration process is part of the overall Radio Site Implementation process which covers the work from the beginning stages of getting an order and planning and designing the entire network down to installing the RBS sites and integrating them into the network.

For further information about the specific planning process, *see chapter Site Planning and Requirements.*

Network Planning Process

The Network Planning process consists of the following activities:

- Dimensioning of network.
- Dimensioning of equipment for radio, transmission, switching, operation and maintenance.
- Defining and ordering market adaptation products, for example programs for national signalling towards the public telephone network.
- Measuring of radio frequency and interference.
- Producing digital maps and data.

Site Acquisition

The Site Acquisition process is performed in close co-operation with the Civil Works process and to some extent with the Engineering process.

The Site Acquisition process consists of the following activities:

- Searching for sites and gaining a site appraisal.
- Outlining the site design and evaluating the cost.
- Negotiating and signing leasing contracts.
- Handling permits and arranging a hand-over to the Engineering personnel.

Civil Works

The Civil Works process is performed in close co-operation with the Site Acquisition process and to some extent with the Engineering process

The Civil Works process consists of the following activities:

- Preparing a detailed civil works design of the site.
- Updating the costs for the site construction.
- Arranging the site construction.
- Performing a site inspection and handing over an as-built document to the Engineering personnel.

Engineering

The Engineering process begins when the Site Acquisition process and Civil Works process are complete. The Engineering process consists of the following activities:

- Measuring and collecting information about the sites.
- Designing the antenna and radio configuration and producing cable drawings.

- Making drawings showing the position of antenna and RBS equipment.
- Defining areas of responsibility between the buyer and the contractor.
- Producing site specific information in the *Radio Site Installation Documentation.*

Installation and Integration

The work involved in this process is performed by Installation personnel and Test and Integration personnel.

Installation personnel are responsible for the following activities:

- Installing the RBS on the ground, on a wall.
- Earthing the RBS.
- Connecting a power supply to the RBS.
- Connecting the antenna system to the RBS.
- Installing cable ladders and cable ducts.
- Installing battery back-up.
- Installing PCM cables.

The Test and Integration personnel are responsible for the following activities:

- Performing the tests specified in the contract and integrating the site.
- Troubleshooting if tests indicate a fault.
- Documenting the test results in the *Radio Site Installation Documentation* which is returned to the Engineering personnel.

1.3 The Mobile Telephone System Overview

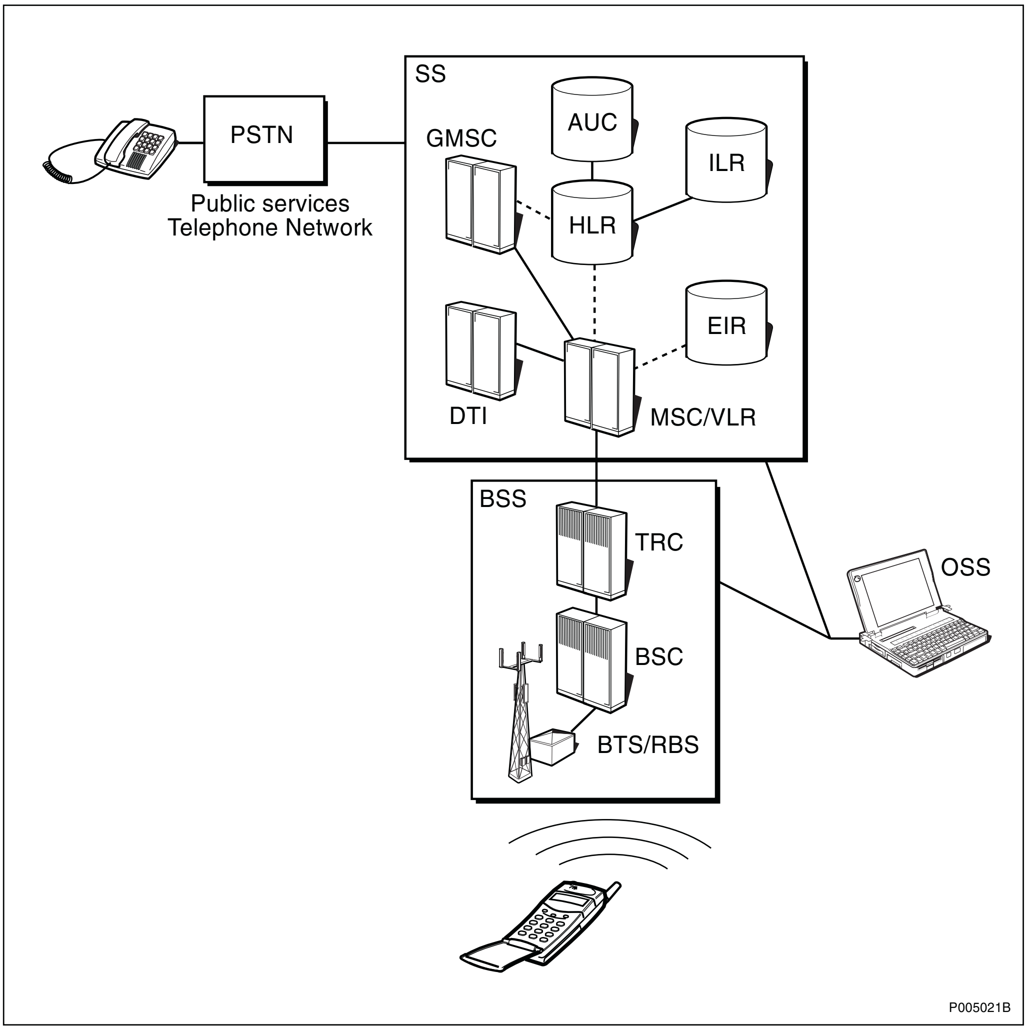

Figure 3 GSM System Overview

Ericsson's GSM System is a mobile telephone system containing the frequency bands GSM 900, GSM 1800 and GSM 1900.

The GSM network is divided up into three major systems:

- Switching System (SS)
- Base Station System (BSS)
- Operation and Support System (OSS)

1.3.1 Switching System (SS)

The *Switching System* consists of the following elements:

Mobile Services Switching Centre (MSC)

The MSC performs the telephony switching functions of the system. It controls calls to and from other telephone and data systems and other functions such as network interfacing, common channel signalling.

Gateway MSC

A Gateway is a node to interconnect two networks. The gateway is often implemented in an MSC.

Home Location Register (HLR)

The HLR is a database used for storage and management of subscriptions including a subscriber's service profile, location information and activity status.

Visitors Location Register (VLR)

The VLR is a database containing temporary subscribers information needed by the MSC to service visiting subscribers. The VLR is always integrated with the MSC. When a new mobile station roams into a new MSC area the VLR connected tot he MSC will request data about the mobile station from the HLR.

Authentication Centre (AUC)

The AUC provides authentication and encryption parameters that verify the user's identity and ensure the confidentiality of each call.

Equipment Identity Register (EIR)

The EIR is a database containing information about the mobile equipment identities that prevent calls from stolen, unauthorized or defective mobile stations.

Data Transmission Interworking Unit (DTI)

The DTI consists of both hardware and software and provides an interface to various networks for data communication. Through the DTI users can alternate between speech and data during the same call.

Interworking Location Register (ILR)

ILR makes inter—system roaming possible between the AMPS network and the GSM 1900 network . ILR consist of an AMPS HLR and parts of a GSM 1900 VLR.

1.3.2 Base Station System (BSS)

The *Base Station System* consists of the following elements:

Transcoder Controller (TRC)

The TRC provides the BSS with rate adaptation capabilities. A device which performs rate adaptation is called a transcoder. The bitrate per channel is decreased from 64 kbit/s to 16kbit/s. This saves transmission links between the MSC to the BSCs.

Base Station Controller (BSC)

The BSC provides all the control functions and physical links between the MSC and the BTS. It is a high capacity switch that handles functions such as: handover, cell configuration data, and control of radio frequency power levels in base transceiver stations. A number of BSCs are served by an MSC.

Base Transceiver Station (BTS)

The BTS handles the radio interface to the mobile station. The BTS is the radio equipment (transceivers and antennas) needed to serve each cell in the network. A group of BTSs are controlled by a BSC.

The Radio Base Station (RBS) includes all the radio and transmission interface equipment needed on one site.

1.3.3 Operation and Support System (OSS)

The *Operation and Support System (OSS)* is the functional entity from which the network operator monitors and controls the system. It is a two-level management function with a Network management Centre (NMC) and subordinate Operation and Maintenance Centres (OMC). NMC staff concentrate on system-wide issues whereas local personnel at each OMC concentrate on short-term regional issues.

The OSS is designed to provide a Management system which supports a number of other network elements, the MSC, BSC, BTS, VLR, HLR, EIR, AUC and Mobile Intelligent Network Nodes (IN).

1.4 Release History

Except editorial changes such as correction of spelling, grammar and layout, this manual has been revised as follows:

1.4.1 R1A to R2A

- Active Antenna Unit 1250 W EIRP for 1900 MHz included.

1.4.2 R2A to R3A

The following information of major importance has been added to the binder sections listed below:

Site Planning and Product Data

- Installation instructions for power connection according to NEC and CEC requirements (installations in USA and Canada).
- Reference to UL requirements regarding connection to power supply.
- AAU 500 W EIRP for GSM 1900.
- Optional lightning protection for AAUs.

Installation of Active Antenna Unit

- AAU 500 W EIRP for GSM 1900.
- Optional lightning protection for AAU 500 W EIRP, for GSM 1800 and GSM 1900.

Installation of Power and Battery Cabinet

- Dimension sketch included, showing the mounting plate and position of the mounted equipment.

Installation of RBS 2302

- Optional HDSL modem.
- 4 TRX and 6 TRX configurations.
- Optional Fan Unit.
- Dimension sketch included, showing the mounting plate and position of the mounted equipment.

Connecting External Cables

- Optional lightning protection for AAU 500 W EIRP, for GSM 1800 and GSM 1900.

Site Installation Tests

- New chapter “Handover Test”.
- 4 TRX and 6 TRX configurations.
- AAU data for GSM 1900.
- Optional HDSL modem.

Maintenance Manual

- New chapter “HDSL Modem”.
- New chapter “Fan Unit”.
- New section “AAU 500 W/GSM 1800”
- New section “Lightning Protection for AAU 500 W/GSM 1800”.
- New section “AAU 1250 W/GSM 1800”.
- New section “Lightning Protection for AAU 1250 W/GSM 1900”.

General Information

- “Fault Code List” updated.

Spare Parts Catalogue

- AAU 500 W EIRP for GSM 1900.
- Optional lightning protection for AAUs.
- Optional fan unit for RBS 2302.
- Optional HDSL modem for RBS 2302.

1.4.3 R3A to R4A

- Product number for Maxite™ User's Guide changed to LZN 302 75. (Previous product number: EN/LZB 119 3477).

The following changes of major importance have been made in the binder sections listed below:

- Information about Coverage Extension Unit (CEU) for GSM 900 has been added.

  Binder sections affected are:

  – Tools and Instruments
  – Site Planning and Product Data
  – Installation of Antenna Unit (Renamed)
  – Connecting External Cables
  – Site Installation Tests
  – Maintenance
  – Spare Parts Catalogue

- Information about Fan unit has been removed.

  Binder sections affected are:

  – Installation of RBS 2302
  – Site Installation Tests
  – Maintenance
  – Spare Parts Catalogue

- Information about antenna feeder cable 3/8″ has been included.

  Binder sections affected are:

  – Site Planning and Product Data
  – Connecting External Cables

- Binder section Site Installation Tests, in addition:

  – AC Mains Power Test included.

- Binder section Spare Parts Catalogue, in addition:

  – Product number changed to LZN 302 98. (Previous product number: EN/LZT 123 2775).

- Binder section General Information:

  – Connecting instructions for HDSL modem have been revised.

1.4.4 R4A to R5A

In this release of Maxite User's Guide the binder has been given consecutive page numbers. Also a major structural change has been done.

These changes, and other information of major importance that has been added, are listed below.

Introduction

- *Section Mobile Telephony Overview* has been updated and moved here from the chapter formerly called *Site Planning and Product Data*.
- Section Radio Site Implementation Process has been added.

Tools and Instruments

The *chapter Tools and Instruments* has been updated. Tools for mounting the GSM 1900 antenna added.

Site Planning and Requirements

The chapter formerly called *Site Planning and Product Data*has been divided into two separate chapters, *Site Planning and Requirements* and *Product Data*.

Installation of Antenna Units

New description how to mount the GSM 1900 antenna has been added, due to a change of the fixture.

Installation of Power and Battery Cabinet

Section Mounting the Installation Box Door has been added.

Installation of RBS 2302

- *Section Mounting the Installation Box Door* also describes the mounting of the HDSL door.
- *Section Mounting the Power Supply Adapter* has been added.
- *Section Connecting Internal Cables* also describes how to connect the HDSL transmission cable.
- *Section Lifting Device* has been moved here from the chapter formerly called *General Information*.

Installation of External Cables

- *Section HDSL* has been moved her from the chapter formerly called *General Information*.
- *Section Installing the Antenna Cables* has been updated due to an update on how to connect the jumper cables.
- *Section 4 and 6 TRX Configuration* has been updated.

Site Installation Tests

- *Section Flowchart* has been updated.
- *Section Antenna System Tests* has been updated and placed first of the tests.
- *Section Transmission Test* has been moved to *chapter RBS Site Integration*.
- *Section Network Integration Test* has been moved to *chapter RBS Site Integration*.
- The section formerly called *Test Setup* has been renamed to *Connecting the OMT*.
- *Section Check IDB* has been updated.
- *Section Maxite and External Alarm Tests/ARAE Fault Tests* has been updated.
- The section formerly called *Multidrop* has been updated and renamed to *Network Configuration*.
- The section formerly called *LBO Parameter Settings (T1)* has been replaced by the sections *Define PCM Parameters (E1, 120 ohm)* and *Define PCM Parameters (T1, 100 ohm)*.
- *Section HDSL Configuration* has been moved here from the chapter formerly called *General Information*.
- *Section Test Record* has been updated.
- *Section Fault Tracing Hints* has been moved to *chapter Fault Handling*.

Optional Tests

This chapter has been added in R5A.

It contains the optional tests that are performed with the BSC Simulator.

RBS Site Integration

This chapter has been added in R5A.

It describes how to integrate a RBS site into a network.

- *Section Transmission Test* has been moved here from *chapter Site Installation Tests*.
- *Section Network Integration Test* has been moved here from *chapter Site Installation Tests*.

Fault Handling

This chapter has been added in R5A.

- The *section Fault Tracing Hints* has been moved here from *chapter Site Installation Tests*.
- The sections *Fault Code List* and *Trouble Report* have been move here from the chapter formerly called *General Information*.

Maintenance

- In *section Fault Localization* the Fault Code List has been updated.
- In *section Maintenance Antenna Units* the corrective actions have been updated for all antennas.
- In *section Concluding Routines* the “Blue Tag” has been updated.

Product Data

This chapter has been extracted from the chapter formerly called *Site Planning and Product Data*. It contains the technical data for Maxite parts.

- Technical data for the HDSL modem has been added from the chapter formerly called *General Information*.

General Information

This chapter no longer exists.

- Technical data for the HDSL modem has been moved to *chapter Product Data*.
- The sections that describes how to connect the external cables for the HDSL modem have been moved to *chapter Installation of External Cables*.
- The section that describes the mounting and how to connect the transmission cable for the HDSL modem has been moved to *chapter Installation of RBS 2302*.
- The section that describes the configuration of the HDSL modem, as well as how to start-up, has been moved to *chapter Site Installation Tests*.
- *Section Fault Code List* has been moved to *chapter Fault Handling*.
- *Section Lifting Device* has been moved to *chapter Installation of RBS 2302*.
- *Section Trouble Report* has been moved to *chapter Fault Handling*.

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2 Safety Instructions

This chapter shows the system used for presenting safety information.

Note: Reduce the risk of accidents by studying all the instructions carefully before starting work. If questions arise regarding the safety instructions, contact the supervisor or the local Ericsson company.

Where local regulations exist, these are to be followed. The safety information in this manual is a supplement to local regulations.

It is the responsibility of the local project manager to make certain that local regulations are known and followed.

The relevant manual (including this safety information) and specific instructions supplied by Ericsson must be followed in any work performed on the Ericsson products or systems. A sufficient knowledge of English or of any of the other languages in which the manuals or instructions are printed is necessary.

The safety information in the relevant manuals presupposes that any person performing work on Ericsson products or systems has the necessary education, training and competence required in order to perform that work correctly. For certain work, additional training or special training may be required. For more precise information on the amount and content of the general and/or special training required for work on Ericsson products or systems, please contact the supervisor or the local Ericsson company.

2.1 Warnings

Warnings are used to indicate hazardous activities. The warnings are preceded by the common hazard symbol.

Figure 4 Hazard symbol

The following three warning levels, shown here in order of urgency, are used:

DANGER

Danger means that an accident may occur if the safety precautions are neglected. This type of accident is likely to be fatal.

WARNING

Warning means that an accident may occur if the safety precautions are neglected. This type of accident may be fatal or cause serious injury. It may also damage the product.

CAUTION

Caution means that an accident may occur if the safety precautions are neglected. This type of accident may cause injury or damage the product.

The following special symbols are used to indicate the risk of radio frequency radiation, electrical hazards and electrostatic discharge:


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Figure 5 Radio frequency radiation

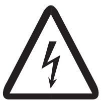
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Figure 6 Electrical hazard


P002646A

Figure 7 Electrostatic discharge

Warnings are used throughout this manual to alert the reader to special instructions concerning a particular task or operation that may be hazardous if performed incorrectly or carelessly. Therefore, read the instructions carefully.

Strict compliance with the special instructions while performing a task is the best way of preventing accidents.

2.2 Notes

Note: Notes are used to call the reader’s attention to key points that might otherwise be overlooked.

2.3 Electrical Hazards

High Voltage

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

- The AC installation must be carried out according to local regulations. These regulations may require the work to be carried out by a qualified and authorized electrician.
- Remove wrist watches, rings, bracelets, etc.
- Switch off the power if the cabinet is damp inside.

- Prevent damp entering the equipment during work in bad weather conditions.

DANGER

Improper electrical installation may cause fire or electrical shock. Approved circuit breakers for the AC mains and the cable's cross sectional areas must always be selected in accordance with local laws and regulations. Only a qualified and authorized electrician is permitted to install or modify the electrical installation.

Cable Markings

CAUTION

Verify that the cable markings correspond before connecting cables.

Faulty Electric Tools

WARNING

Do not repair a faulty electric tool yourself. Hand it over to your supervisor in exchange for a functioning tool.

Drilling

WARNING

Do not drill holes in the Radio Base Station. The drill bit may come into contact with live wires.

- Always use insulated protective gloves, such as the LYB 1032, when drilling where live wires might be hidden.
- Always use eye protectors (goggles) when drilling. Flying chips and dust may get into your eyes.

Thunderstorms

DANGER

Avoid working on electrical installations or towers/masts during thunderstorms.

Thunderstorms create strong electric fields. For that reason, and to avoid direct strokes of lightning, it is essential that the equipment is properly earthed for thunderstorm conditions.

2.3.1 Electrostatic Discharge, ESD

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

Electrical charges are generated by friction when a body moves, rubs against clothes, slides against a chair, when shoes rub against the floor, and when you handle ordinary plastics, etc. Such charges may remain for a considerable period of time.

Handling of printed board assemblies and IC components

Always use an approved antistatic bracelet to avoid damage to components mounted on printed board assemblies. The ESD wrist strap contains a resistor with an ohmic value greater than 1 MΩ in the cable to protect the operator. The resistance value is low enough to discharge the electrostatic voltage. Never replace the cable with any other cable. The ESD wrist strap must be connected to earth. Ericsson recommends wrist strap LYB 250 01/14.

Storing and Transporting printed board assemblies and IC Components

Use the original packaging. If this is not available, use a conductive material, or a special IC carrier that either short-circuits or insulates all leads of the components.

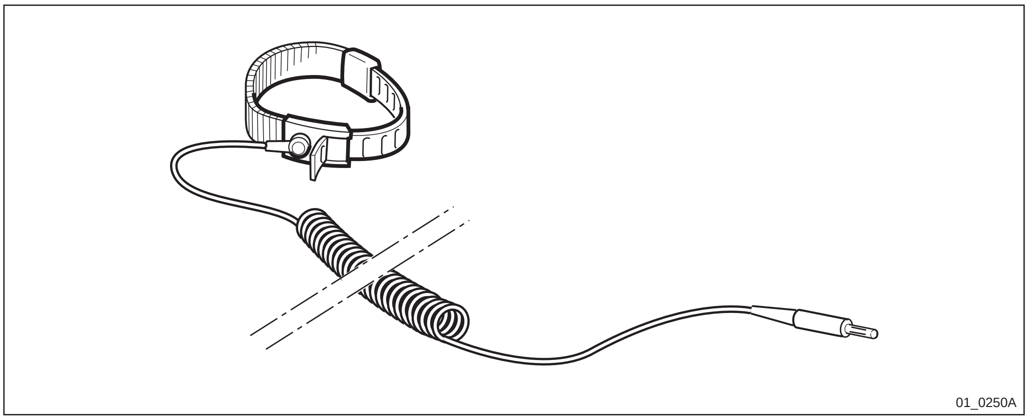

Figure 8 ESD wrist strap LYB 250 01/14

DANGER

To avoid potentially fatal circuits through the body to earth, wrist strap connections must include a resistor of at least 1 MΩ. Test the wrist strap regularly.

2.4 Working at Heights

WARNING

Some working areas involve the risk of accidents caused by falling objects.

For example, when working on a mast, tower or a roof, the following precautions must be taken:

- Personnel working at heights must have the appropriate training and medical certificate.
- Full body safety harness and safety helmet must be used.
- Adequate protective clothing is essential in cold weather.
- All lifting devices must be tested and approved.
- During work on a mast, all personnel in the area must wear helmets.

2.4.1 Rules and Advice for the Safe Use of Ladders

- Make sure that the ladder is undamaged and has been approved for use.

- Do not overload the ladder.

The following types of ladders must be guyed or otherwise secured

- Leaning ladder longer than 5m.
- Free-standing ladder with a platform and knee-support, and with over 2 meters height to the platform.
- Any other free-standing ladder longer than 3m.

Positioning the ladder

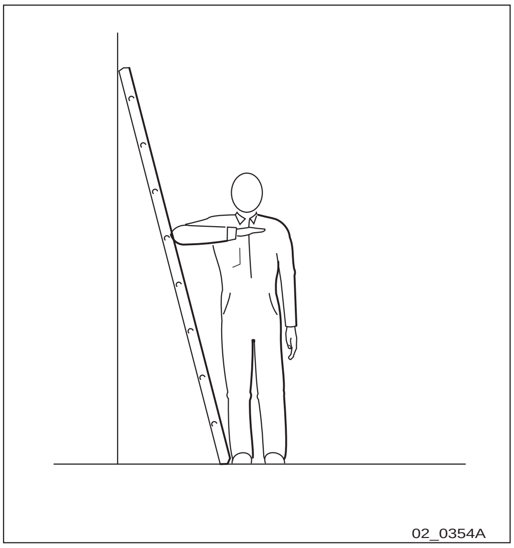

Figure 9 Checking the angle

- The ladder's inclination should be approximately 1:4 (75°). Position the ladder according to its gradation indicator (if there is one) or check the angle with your elbow.
- Use the ladder foot or a ladder support to reduce the risk of tipping over sideways.
- Always attach extension legs to a ladder that is to be used on a sloping base. Never prop up a ladder with boxes, stones or the like.
- Extend the ladder completely.
- Check that all four anti-slipping treads are firmly positioned on the base.

Climbing and using the ladder

Figure 10 Climbing the ladder

- Climb the ladder facing it.
- When you lean sideways, outward from the ladder, your navel should never be outside the edge of the ladder's frame.
- Always keep 3 points of contact (two feet and one hand, two hands one foot) with the ladder when working on it. This will reduce the risk of falling.
- Never climb the topmost four rungs of a ladder. If you have to climb up on a roof, the ladder should extend at least one meter above the eaves.

2.5 Radio Frequency Radiation

CAUTION

Radio frequency (RF) radiation from antenna systems can endanger your health.

Co-ordinate with all mast users to switch off the transmitters when working with, or near, antennas.

2.6 Other Hazards

Fire

WARNING

Fire may spread to neighboring rooms. When working on a radio base station you may have to open cable ducts, channels and access holes, thereby interfering with the fire sectioning of the building.

- Close the cable ducts and fire doors (if applicable) as soon as possible.
- After completing work on cables, seal the cable ducts according to the regulations for the building.
- Minimize the amount of inflammable material.
- Avoid storing empty packaging material on the site.
- Use a powder or carbon dioxide type of fire extinguisher due to the electric nature of the equipment inside the Radio Base Station.

Sharp Edges

WARNING

Wear protective gloves when handling the equipment. There may be sharp metal edges.

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3 Tools and Instruments

This section contains lists of all tools and instruments recommended for complete installation of the RBS 2302, the Power and Battery Cabinet (PBC), the Active Antenna Unit (AAU) and the Coverage Extension Unit (CEU).

Note: Only Instruments that are year 2000 compliant may be used.

3.1 Tools for Maxite Installation

For more information regarding tools see:

General Installation Instructions *LZN 302 49*

3.1.1 Installation Tools

Description	**Product No:**
Personal Installation Tool set	LTT 601 045/3
Personal Safety and Lifting Equipment Set for working at heights	LYB 921 22
RBS Common Installation Tool Set	LTT 601 044/3
RBS Antenna Feeder Installation Set	LTT 601 046/1
Assortment Set	NTM 201 1491/1
Cordless hammer drill machine tool set 220 V	LTT 601 12/2
Cordless hammer drill machine tool set 110 V	LTT 601 12/1
Crimping Tool Set	LTT 601 86
Dismantling Tool 1/2"	LDK 901 01/1
Dismantling Tool 3/8"	LDK 901 01/3
Crimping Tool for DC/DATA cable	LTT 601 98/1

Additional Tools for Active Antenna Unit, GSM 1900

The following socket sizes for spanner and torque wrench are required for the installation of the GSM 1900 Active Antenna Unit.

Description
9/16"
11/16", 2" deep well
3/4"

3.1.2 Accessories

Description	Product No.
Lifting Device Kit (Lifting Handle SXK 107 5775/1 included)	SXK 107 5723/1
Lifting Handle	SXK 107 5775/1
Lifting-eye bolts	SAR 201 080/03

The lifting device may be used for lifting the cabinet up to 5 m and for a weight up to 25 kg. The Power and Battery Cabinet can NOT be lifted equipped with batteries. The handle can be used to carry the cabinets. Lifting-eye bolts is used for lifting the Active Antenna Unit.

3.2 Tools required for Antenna Installation Tests

Table 1 GSM 900 Antenna Test

Description	Specification	Product No.	Qty
Antenna tester kit	Site Master S120A	LPK 102 101/2	1
Adapter A	7/16 plug to N jack	LTR 171 09/01	1
Adapter B	N plug to TNC jack	LTR 171 101/1	1

Table 2 GSM 1800/1900 Antenna test

Description	Specification	Product No.	Qty
Antenna tester kit	Site Master S235A	LPK 102 101/3	1
Adapter A	7/16 plug to N jack	LTR 171 09/01	1
Adapter B	N plug to TNC jack	LTR 171 101/1	1

3.3 Tools and Instruments for RBS Installation Test

Different test methods needs various instruments and cabling kits.

For example:

1. The Network Integration Test is marked with number 3 in Table 3 on page 35.
2. According to Table 4 on page 35 the test method number 3 requires index C.
3. According to Table 5 on page 36, the index C equals a TEMS kit. This table also gives you information about the product number and required quantity.

   Information regarding the parts included in the various kits, see Section 3.5 on page 37.

Table 3 Explanations for the different test methods

Test Method No	**Explanation**
1	Transmission Test 1.5 MBit/s (T1) or 2.0 MBit/s (E1)
2	MS-Call test on BSCSim II
3	Network Integration Test
4	Test Call with BSC connection
5	Antenna Installation Tests of External Antennas
6	OMT related tests
7	AC Mains Power Test

Table 4 Test method versus required Instruments & accessories

Test Method	**Instruments and Accessories**							
Index	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
1							X	
2			X	X	X	X		
3			X					
4			X					
5	X							
6		X						
7								X

Table 5 Explanations for Instruments & accessories

Index	Instrument/accessory	Product No.	Qty
A	Site Master S120A (GSM 900) or S235A (GSM 1800/1900)	LPK 102 101/2 (GSM 900) LPK 102 101/3 (GSM 1800/1900)	1
B	OMT Kit	NTM 201 2159/1 (R6) or NTM 201 2289/1 (R7)	1
	Cable, 4 x wire to RS 422 connector, 50 m (Extended OMT)	RPM 518 976/1	
	Cable, RS 422 connector to RS 232 connector, 2 m (Extended OMT)	RPM 518 964/1	
C	TEMS GSM 900	LPB 112 01/1	1
	TEMS GSM 1800	LPB 112 02/1	
	TEMS GSM 1900	LPB 112 03/1	
	TEMS GSM Dual Band	LPB 112 12/1	
D	BSCSim II	LPP 106 35/04	1
E	Filter Unit (Multi casting box), 2 units are required for 4 TRX, and 3 units is required for 6 TRX configuration.	KRF 201 439/1	1-3
F	Cable Kit (Test call), 2 units are required for 4 TRX, and 3 units is required for 6 TRX configuration.	NTM 201 2216/1	1-3
	Mobile Station Cable (1)	LPB 112 294/5	1
G	Loop Forward/Backward board	LPY 107 757/1	1
H	Fluke 8060 multimeter	LPK 102 024/1	1

(1) Used only with TEMS Dualband

Using the OMT SW and TEMS SW

A Lap Top PC is needed with following minimum requirements:

- Intel 486 processor
- 66 MHz
- 16 MB RAM
- MS Windows version 95/NT

3.4 Tools for Maintenance

General Maintenance Tools

The recommended tool set for maintenance is Personal Installation Tool set LTT 601 045/3 and Personal Safety and Lifting Equipment Set for working at heights LYB 921 22.

Special Maintenance Tools

The special tool for maintenance is the Loop Forward/backward board CB21, Product No. LPY 107 757/1, used during change of RBS 2302 mounting base or transmission board. The cover plate Product No: SXA 117 1926/1 is used to seal the RBS mounting base installation box. It is used if the RBS cabinet is changed and it takes time until the new cabinet is mounted. Cable RPM 518 964/1 is used for connecting extended OMT.

Item	Product no.
Loop forward/backward board, CB21	LPY 107 757/1
Cover plate for mounting base	SXA 117 1926/1
Cable, RS 422 connector to RS 232 connector, 2 m	RPM 518 964/1

Instrument for Calibrate Oscillator Product No. LPK 102 102/1

Pos	Description	Qty
1	Suitcase	1
2	Instrument Set	1
3	Cable, 1/4 Euro connector jack to 2x BNC plug	1
4	Cable, BNC plug to SMB jack	1

3.5 Kit specification

Cable Kit Product No. NTM 201 2216/1 (Test call)

List of including parts

Item	Description	Qty
C27	MS cable	1
Ad21	Adapter	1
A21	Attenuator 30 dB, 2 W	3

BSCSim II Kit Product No. LPP 106 35/04

Item	Description	Qty
1	BSCSim II platform	1
2	BSCSim II application software	1
3	Cable Kit for Maxite and RBS 2302	1
4	User’s Guide	1

OMT Kit Product No. NTM 201 2159/1for R6 software

Item

OMT 32 bit software

OMT Cable (RS 232)

User's Guide

OMT Kit Product No. NTM 201 2289/1 for R7 software

Item

OMT 32 bit software

OMT Cable (RS 232)

User's Guide

4 Site Planning and Requirements

This section describes the installation engineering process. Careful planning of preinstallation activities, such as antennas, cables, power etc. is essential for quick installation and commissioning of base stations. This section contains document rules that are applicable to Ericsson organisations only.

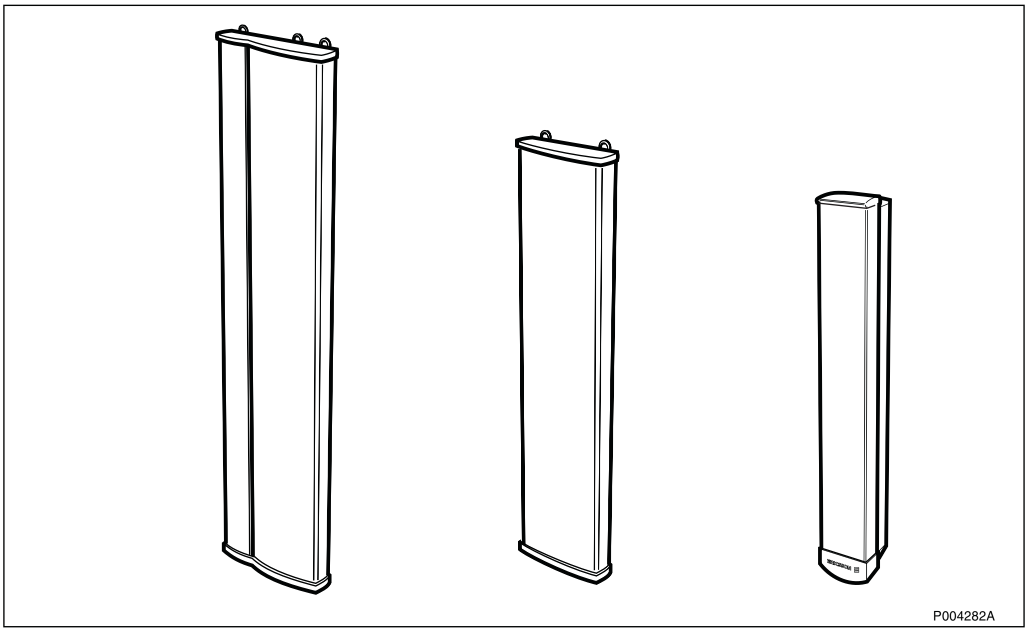

Figure 11 Maxite™ antenna types

Note: Although some of the figures in the general sections illustrates the 500 W antenna for GSM 1800, the same configurations are valid for all antennas used in the Maxite™ concept.

4.1 Competence requirement

In order to do site planning work according to this manual in a safe and professional way, the work shall be done by a skilled person.

The following qualifications are minimum requirements:

- Good understanding of radio and telephone engineering.
- Good understanding of engineering English.

4.2 Preconditions

The Preconditions section lists general documents needed for installation engineering.

4.2.1 Documents

Ordering Information for RBS 2000 Installation Material	*131 62-HRB 105 01/MA*
Rules and Methods for Installation Engineering	*EN/LZB 119 2935/6*
Standard Site Material Catalogue	*LZN 302 39*
General Installation Instructions	*LZN 302 49*

4.2.2 Tools and Instruments

See Chapter Tools and Instruments.

4.3 Ericsson Product and Document Numbering System

Two concepts or words - product and document - are used at Ericsson.

Products are numbered with a product number ("ABC number") which in its basic form consists of a three to five letter combination followed by a digit group of up to seven numbers. This number is called the Product Number. The three-letter group divides products into classes according to use, construction or other essential attributes.

The one or two letters for notation of origin are used when the design responsibility does not rest with a Swedish Ericsson company. (Reference document 1120-101 in Standard binder ST1B).

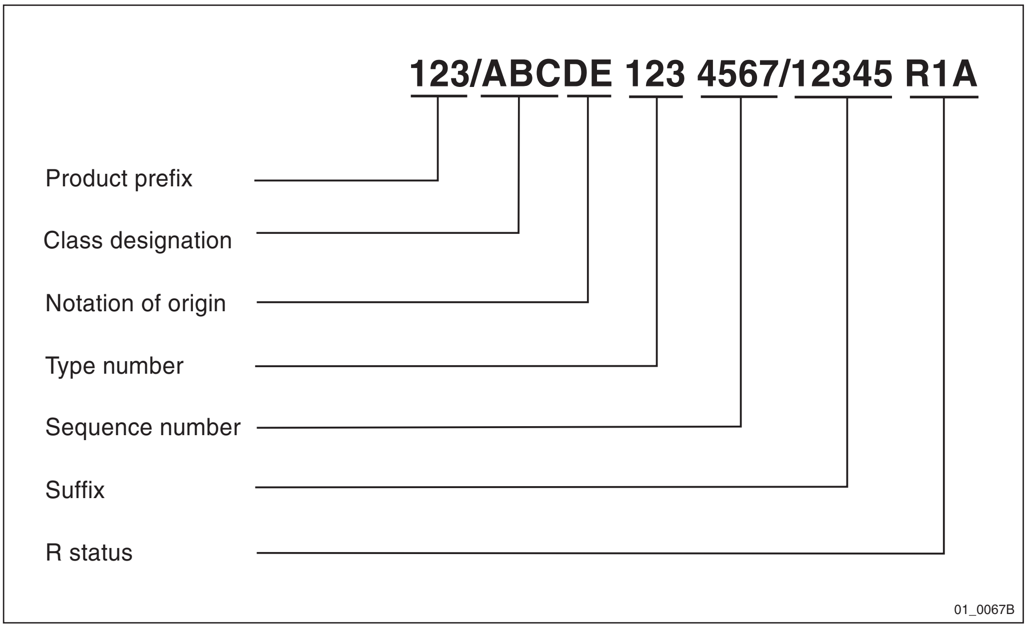

Figure 12 The complete product identity

Documents are numbered using the decimal classification system. A document number consists of a decimal class and the product number of the described product.

The decimal class consists of four or five digits that classify the information by activity and subject areas. A decimal class is defined in a decimal class information document that describes which kind of document the decimal class is used for, how the information is used and which document names are permitted. These documents are numbered 0011-XXXX Uen, (XXXX stands for the decimal class which is of interest.

Decimal class information documents are filed in the central archives of the company.

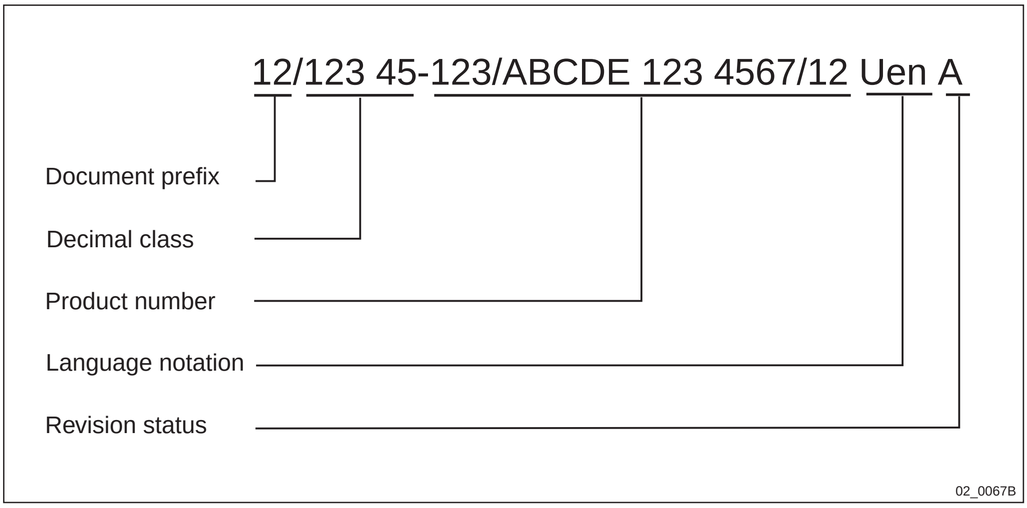

Figure 13 The complete document identity

4.3.1 Site Identity

In installation engineering the whole site is considered to be a product. The site is given a product number from the ABC class IPA (Plants)

Example: IPA 110 1001

4.3.2 Site Documentation

The build-up of the site is recorded with a number of site documents. The following is a list of suitable decimal classes for the site documents.

Decimal class	**Approved document name**	**Explanation**
127 11-	Plant specification	
127 04-	Configuation data	Site data
193 38-	Cell design data	Cell parameters
153 12-	Antenna placement information	Antenna and tower arrangement
153 38-	Situating plan	Site layout
193 05-	Floor plan drawing	
193 18-	Cable distribution diagram	
193 20-	Cabling information	Power supply
193 24-	Cable way drawing	
179 61-	Certificate of conformance	
152 83-	Test report	

A document showing the physical layout of the previous site, a situating plan, will be numbered as shown in the example below.

Example: 153 38-IPA 110 1001

A base station with integrated antennas will of course not need all the mentioned documentation, whereas a base station with a distributed antenna system might need a more detailed documentation.

4.4 Installation Planning Overview

The figure below is an overview of the Installation Planning process.

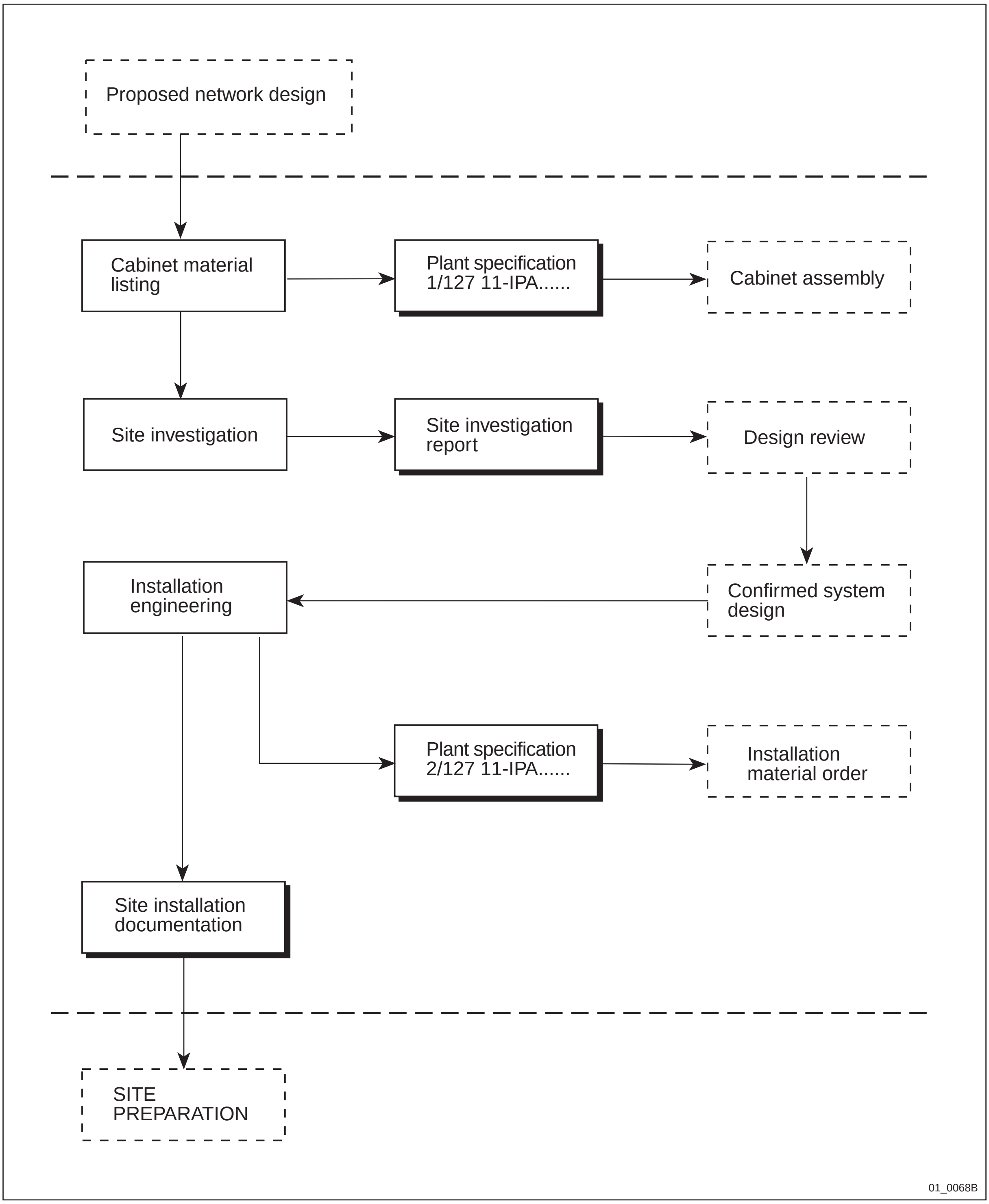

Figure 14 Planning overview

4.4.1 Basic Information

The necessary information for planning of a site is made up of:

- The technical specification in the contract regarding the base station.
- Information about the transmission network standard.
- Information about the network plan.

- Proposed network design (further explained below).

4.4.2 Proposed Network Design

The proposed network design, *see Figure 14 on page 43*, contains the results from the Radio Survey and the Propagation Predictions. Site Planning will make use of the following parameters to plan the site:

- Site location - giving the address or geographical coordinates for the desired site.
- Base station configuration - giving the base station configuration, for example, number of TRXs, antenna configuration or antenna gain.
- Number of cells - the number of cells at a particular site (1-sector, 2-sector or 3-sector) based on the desired traffic capacity at the site.
- Antenna directions - the actual direction of separate antennas.
- Antenna height - based on the coverage prediction a desired antenna height is given.

4.5 Site Investigation

The purpose of the site investigation is to investigate and record all factors that may have an influence on the project and to make a report that will be the basis for an agreement on the Confirmed System Design with the customer.

4.5.1 Preparations

The preparations start once the contract has been signed and include the following activities:

- Contact with the Network Design Department to obtain the proposed network design.
- Obtaining permission from the customer to visit the sites. Permits and other arrangements prescribed by security regulations must be requested through the customer.
- Collection of all necessary information about the project.
- Collection of all required equipment and documents.
    - A list of necessary survey tools is found in *Section 4.2 Preconditions on page 39*.
- Practical arrangements for visiting the sites.
- Obtaining a map to mark the sites on.

Prepare a site visit binder with dividers for each site. Prepare and insert checklists for each site. An example of a checklist can be found in:

Rules and Methods for Installation Engineering	*EN/LZB 119 2935/6*

Fill in the checklist with known data about the site.

4.5.2 Site Visits

The purpose of site visits is to collect and record, on the spot, all data that may have an influence on installation engineering and site preparation. The following actions should be taken on site:

- Fill in the address/location in the checklist.
- Locate the site on the map.
- Make a sketch of the premises/rooftop including existing structures. Take measurements.
- Indicate the north direction on the sketch.
- Select a location for the RBS equipment.
- If the RBS is to be located indoors, make a floor plan sketch and indicate north on the sketch.
- Note heights of supporting structures and buildings that are going to be used for the installation.
- Make a sketch of any existing tower or other supporting structures that are going to be used.
- Take measurements of tower legs, distances between legs, height, etc. Try to establish a suitable antenna location and note measurements of the tower at that location.
- Measure location of existing antennas.
- Measure the length of the cable way for antenna cables.
- Investigate from where the mains power can be supplied and if it has capacity for the increased load.
- Investigate from where the transmission network can be brought into the site.
- Investigate from where the base station can be earthed.
- Make a sketch of the layout of the earthing system and lightning protection system.
- Take photographs to back up the notes.

Measuring heights

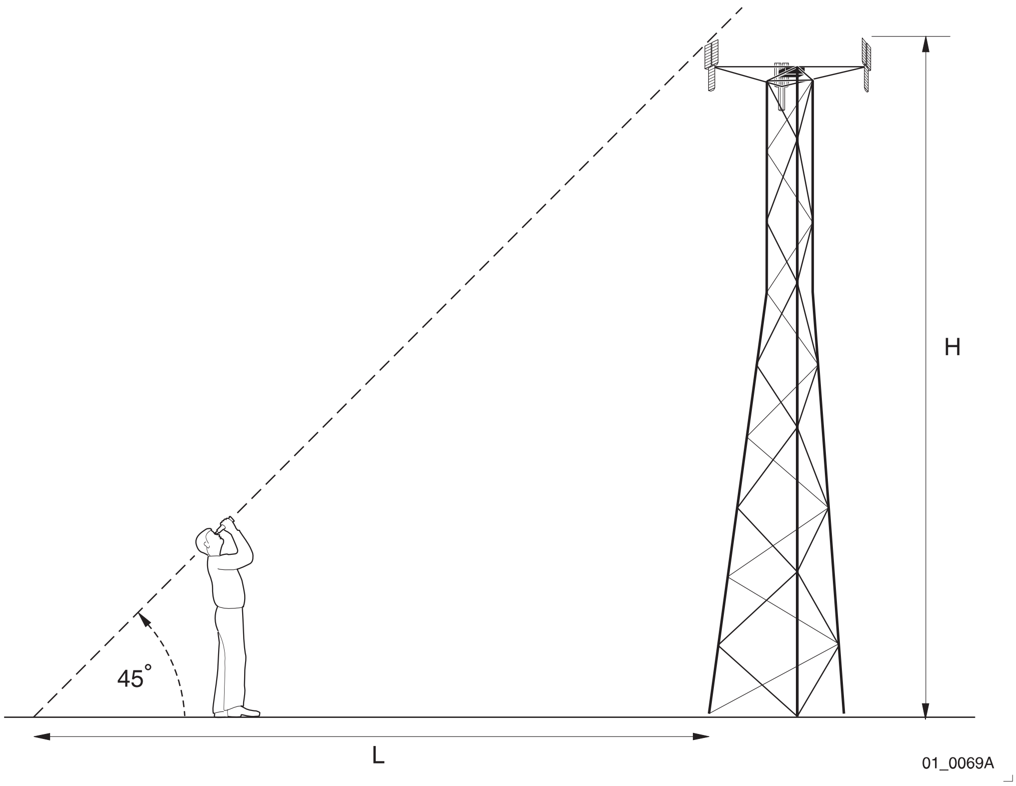

Figure 15   The 45° method of measuring a tower

To measure a height using the 45° method take the following steps:

Stretch out a measuring tape on the ground and walk along it until you reach the 45° angle (H=L). A height angle instrument usually shows "l" when you reach the 45° point. For other distances of L it will show the percentage of H/L. If the tower is equipped with a ladder inside you can estimate the height during climbing by counting the number of steps and measuring the distance between them. It is very difficult to make written notes during climbing and therefore the use of a small tape recorder is recommended instead.

WARNING

⚠

Working in towers can be dangerous if necessary safety precautions are not taken. Read the safety section regarding work at heights before commencing work.

4.5.3 Site Investigation Report

The Site Investigation Report consists of one or more binders with dividers for each site. The report consists of two parts:

- Site documents

- Site preparations

The Site Investigation Report is handed over to Design Review and will form the basis for a Confirmed System Design agreement with the customer.

Site Documents

Normally, the Site documents consist of:

- Site data (127 04 - Configuration data).
- A site layout drawing (153 38 - Situating plan).
- Antenna arrangement drawing (153 12 - Antenna placement information)
- Cabinet material list (1/127 11 - Plant specification).
- Floor plan drawing (193 05 - Floor plan drawing)
- Cable way drawing (193 24 - Cable way drawing)

The two last documents are normally only produced if the equipment is placed indoors, with antennas in a tower or mast.

4.5.4 Site Preparation

The Site Preparation document describes the scope of the civil engineering works needed on each site and who is responsible for them. As an example it will define the following responsibilities:

- Antenna tower
- Concrete foundation
- Roof reinforcements
- Earthing system
- AC mains power
- Transport network
- Necessary permits

4.6 Installation Engineering

The purpose of Installation Engineering is to produce site installation documentation. This documentation must correspond with the contract and the confirmed system design.

The site installation documentation is collected in one or more binders. When a site or the project is finished, the site installation documentation is updated with changes that may have been agreed upon during the installation phase. It then becomes "as-built" documentation to show the actual installation at each site.

4.6.1 Cabinet Material Listing

Instructions on how to list the equipment for Maxite are included in:

Ordering Information for RBS 2000 Installation Material — *131 62-HRB 105 01/MA*

Make sure that the document has the latest revision state and follow the instructions in the document.

The revision state can be checked in the Ericsson PRIM database.

Plant Specification

The list of equipment selected from the ordering information is put into a Plant Specification and labelled with the site number.

Example: 1/127 11-IPA 110 1001

In this case the document prefix indicates that this is part of a plant specification divided into several parts. This part is the RBS equipment, but there might also be need for a plant specification for the installation material or other auxiliary equipment, (2/127 11-.... etc.).

The plant specification should contain the following headings:

Item	Product denomination	Product number	Quantity

The Plant Specification is used for Site Investigation and Installation Engineering.

RBS equipment is factory equipped and tested to fit the actual site. In this case the Plant Specification is delivered to the Cabinet Assembly and Test process.

4.6.2 Installation Material

Based on the findings during the site investigation, any additional installation material and supplementary equipment has to be specified.

A helpful tool is:

Standard Site Material Catalogue — *EN/LZT 123 2737*

It contains a number of kits. Every site is individual and the contents of the various kits have to be verified against the actual site layout and requirements.

Installation Material List

Installation material is listed in a Plant specification, numbered with the site number.

Example: 2/127 11- IPA 110 1001

In this case, the document prefix indicates that this is part two of the plant specification (installation material).

4.6.3 Site Preparation

Any civil works such as modification of existing buildings, masts or antenna structures have to be specified and given to a contractor for design and execution.

4.6.4 Antenna Towers or Masts

If the site is without antenna tower or mast, this has to be supplied. Design data regarding the deflection requirements and loads from antenna equipment (including their supports and cables) must be given to the tower supplier. The configuration data document (127 04-) is a good input document for such specification.

Drawings for foundations must be ordered from the tower supplier as well as erection instructions.

4.6.5 Site Installation Documentation

The site installation documentation is collected in one binder per site and is given to Site Preparation. The binder is given a product number containing the prefix LZB.

Example: LZB/IPA 110 1001

The prefix LZB corresponds to ABC class LZB: Document collections, and will indicate that this is a document collection for the site IPA 110 1001.

How elaborate the documentation is will depend on the type of installation. The list below is an example of a complex installation:

- List of documents (001 51- Document list).
- Cabinet material list (1/127 11- Plant specification).
- Installation material list (2/127 11- Plant specification).
- Site data (127 04- Configuration data).
- Site layout (153 38- Situating plan). The earthing system must be indicated on this drawing for Site Preparation.
- Antenna layout (153 12- Antenna placement information).
- Acceptance certificate (179 61- Certificate of conformance) to be signed by the customer and Ericsson.
- Test report (152 83-) to be filled in by the tester.

4.6.6 Site Design Documentation

Changes that occur during installation are recorded on the drawings by the installer and given to Installation Engineering.

Installation Engineering incorporates these changes into the drawings and compiles an "as built" version of the Site Installation Documentation. This version is now called Site Design Documentation, and constitutes the reference documentation for this particular site.

4.7 Site Requirements

This part describes in general terms the requirements for the base station site.

Note: Requirements related to dimensions, power etc. for the equipment are described in *chapter Product Data* .

The proposed network design shows the site locations in general. The exact site position depends on available space and possibilities to place a site in that area. The cell plan, the site position and a topographic map should provide information regarding the configuration of equipment, antenna and mast height, antenna directions and compass headings.

Space requirements for RBS 2302 and PBC are detailed in *chapter Product Data*. Antenna placement guidelines are detailed in *Section 4.8 on page 53*.

The AAU or the CEU shall not be placed closer than 700 mm above the RBS or PBC.

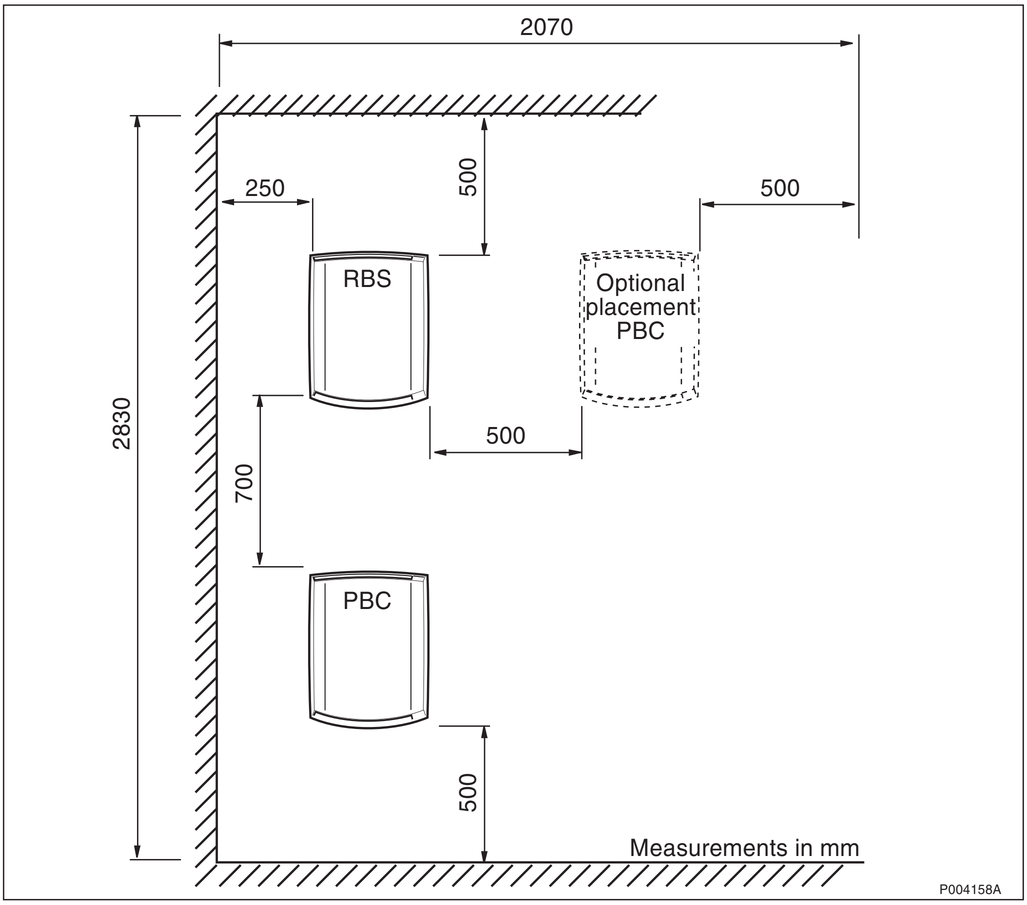

Figure 16 Total space requirements

This figure shows the total space required for one RBS and one PBC mounted above each other, or, as an option, beside each other.

Furthermore, the site must have the following facilities:

- Access to AC mains power
- Access to the transmission network
- Access to earth terminal

4.7.1 Permits

The need for planning permits from local planning authorities has to be investigated.

Masts or towers almost always require a planning permit and will in many cases also be subject to permits from civil aviation or military authorities. The need for an obstruction light will also be stated by these authorities.

A lease contract or permission to install the base station has to be agreed upon with the owner of the building structure that is going to be used.

Try to find out if there are any community or other building plans for the future that may block the radio propagation from the site.

4.7.2 Access Roads

The site must be made accessible to installation personnel and their trucks. Conditions depending on seasonal variations, such as snow or flooding have to be considered.

On roof sites, the access to the roof has to be investigated. Measurements of elevators, doorway openings and stairs have to fit the equipment.

4.7.3 Foundations

If a mast or tower has to be installed on ground, a foundation is required. Drawings for the foundation can be supplied by the manufacturer of the tower or a civil works engineer.

Foundation constructions on mud, slime or soft clay must be avoided. Water drainage and the location of slopes near the site have to be investigated to avoid flooding of the site.

If the site is located in an area subject to frost, the foundation design must be made to prevent frost heave.

4.7.4 Antenna support structures

An antenna support structure, capable of carrying the required quantity of equipment, has to be provided for the site. This may consist of several short pipes on a roof, a guyed mast or a self supporting tower. The term “tower” usually refers to a self supported structure, while the term “mast” refers to a structure supported with guy wires.

Load calculations must be performed on the antenna support structures. This is the responsibility of the owner of existing structures, or the supplier of new structures to be installed.

The antenna structure must survive a wind speed of 50 m/s, if nothing else is stated by local authorities or in the contract.

An operational wind speed is also defined. This is a wind speed of 20 m/s where the structure is not allowed to deflect more than $\pm 1°$.

Design data regarding the deflection requirements and loads from antenna equipment (including cables and mounting fixtures) must be given to the person responsible for the calculation. Wind load figures for AAU 1250 W EIRP for GSM 1900, PBC and RBS 2302 are given in *chapter Product Data*. The Configuration Data document (127 04-) must state this information. Drawings for foundations for new towers or masts can be ordered from the tower manufacturer, as well as erecting instructions.

If the site is within an area accessible to the public, a fence or climbing barrier or other means of access control must be installed. This is to protect the installation from being damaged or unauthorised person from being hurt.

New structures on a building

Supporting structures may consist of:

- Guyed mast on the roof
- Self supported tower on the roof
- Walls of the building
- Chimneys
- Any other suitable structure on the building

The choice between a mast or a tower is determined by available space for guy wires and the strength of the roof. Make sure that there is enough room for guy wires. Proper fixing points must be available for the guy wires to make sure they cannot be pulled out by wind force.

A new stress calculation may be necessary to determine if the roof needs to be reinforced to carry the additional load of an antenna structure.

The roof must be properly secured to the wall it is resting on, otherwise the roof might be lifted by the leverage of the wind force on the mast.

The building must have a proper lightning protection system installed and allow all new structures to be connected to it.

Existing structures on a building

The height of the structure is checked against the Configuration Data document, to ensure that the height is sufficient for the antenna.

The structure is checked to ensure that there is available space between existing installations for new equipment.

If the structure cannot handle the increased load, a new structure has to be installed.

The structure must have a proper lightning protection system installed and be in working condition according to rules and regulations.

New structures on ground

Mast cost less and can be built higher but require a larger ground area since the guy wires require a lot of space.

Both masts and towers require foundations, but masts also require guy wire anchors.

The structure must be equipped with a proper lightning protection system, *see Section 4.11 on page 62*.

Existing structures on ground

The owner must be contacted to check whether the structure can handle the heavier load and increased wind pressure from the additional equipment.

The height of the structure is checked against the Configuration Data document, to ensure that the height is sufficient for the antenna.

The structure is checked to ensure that there is sufficient space between existing installations for new equipment.

The structure has to be calculated for the increased forces applied when new equipment is installed.

4.8 Antenna Placement Guidelines

In every installation of base station antennas some general system requirements must be considered. These requirements are:

- Isolation between antennas, Tx - Rx and Tx - Tx
- Rx antenna separation if space diversity is used.
- Radiation patterns must not be distorted by obstacles or reflections nearby the antenna.

The Maxite antenna works with polarisation diversity and is used as a duplex antenna, which is why Tx - Rx and space diversity requirements do not have to be considered in this case.

The CEU for GSM 900 operates with passive sector or omnidirectional antennas. These guidelines are also applicable for these types of antennas.

4.8.1 Definitions

Isolation

The isolation between two antennas is defined as the attenuation from the connector on one antenna to the connector on the other antenna when the antennas are in their installation positions.

To avoid unwanted signals into the transceiver, the following isolation values between antennas are required: at least 30 dB between a transmitting and a receiving antenna or between two transmitting antennas.

Note: This is also valid for co-located systems (for example, GSM 900 and GSM 1800)

To obtain the required isolation values the antennas must be positioned at a certain minimum distance from each other. The distance depends on the antenna types and on the placement of the antennas. For instance, vertical separation requires less separation distance than horisontal separation.

The Maxite antenna operates in duplex mode, which means that the same antenna array is used both for transmitting and receiving. The internal isolation is taken care of by the design of the antenna. Isolation values are only to be considered when several Maxite antennas are placed close to each other

Diversity

When diversity for reception is used, the radio signal is received by two separate antenna arrays within a dual polarised antenna, or by two separate antennas as with space diversity. The output signal from the antennas normally varies strongly due to fading, but since they have different polarisation or they are separated in space, the variations are not fully correlated.

Nearby obstacles

The radiation pattern of an antenna will be distorted, if there are obstacles or reflecting surfaces close to the antenna. The radiation sector should be free from obstacles. The definition of the sector is:

- Horisontal: The sector covered by the antenna
- Vertical: The first fresnel zone. *See Section 4.8.3 Nearby obstacles on page 56*.

4.8.2 Separation requirements for isolation

Vertical separation

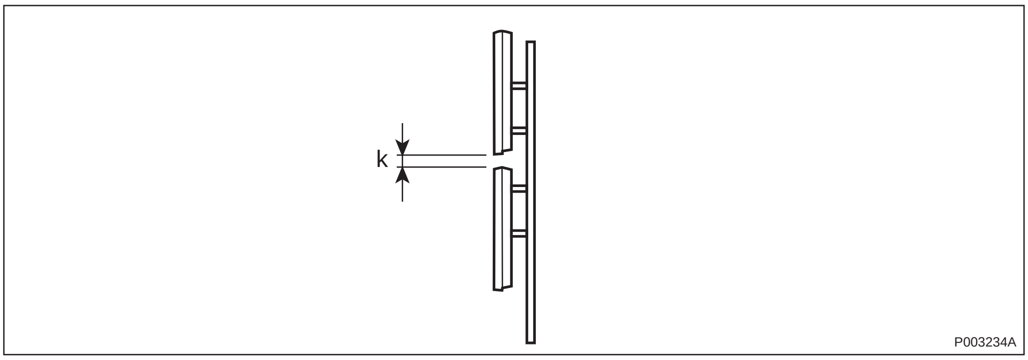

Figure 17 Vertical separation

The following is valid for 900 MHz, 1800/1900 MHz and co-located 900+1800/1900 MHz equipment.

Requirements:	Tx - Tx and Tx - Rx: 30 dB isolation
Pre-condition:	No influence from tower structure in the forward direction of the antennas.
Vertical separation:	Tx - Tx and Tx - Rx: Minimum 0.2 m (k in figure)

Additional information:

The 30 dB isolation will be achieved for a lower value than 0.2 m, but for practical reasons the 0.2 m is used. This value is valid for all types of directional antennas.

Horisontal separation

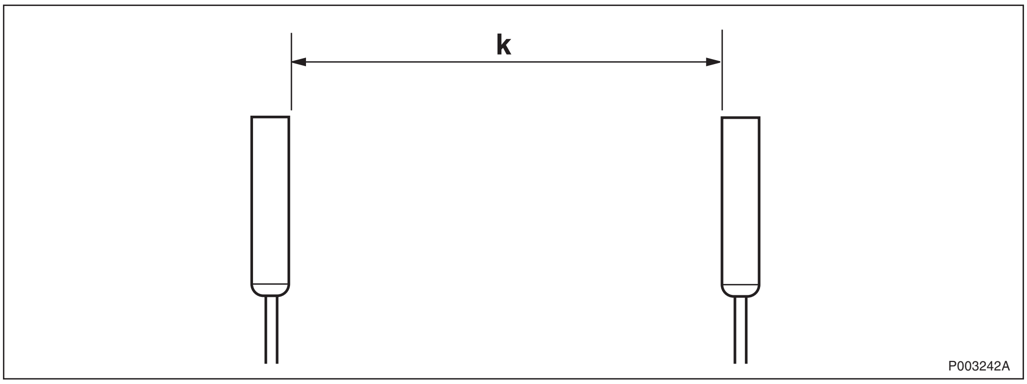

Figure 18 Horisontal separation

Requirements:	Tx - Tx and Tx - Rx: 30 dB isolation
Horisontal separation:	*See Table 6 on page 55.* The antenna gain has no noticeable influence.

Table 6 Horisontal separation (k in figure)

Horisontal beamwidth (-3 dB points)	**900 MHz**	**1800/1900 MHz**	**900 and 1800/1900 MHz**
$65^{\circ} \pm 10^{\circ}$	0.4 m	0.3 m	0.3 m
$90^{\circ} \pm 10^{\circ}$	1.0 m	0.5 m	0.5 m
360° (11 dBi)	5 m	2.5 m	1.0 m

Directional antennas on different cells need less separation distance. 20 mm is enough if the antenna directions differs 90° or more and the beam-width is 90° or less. *See Figure 19 on page 55.*

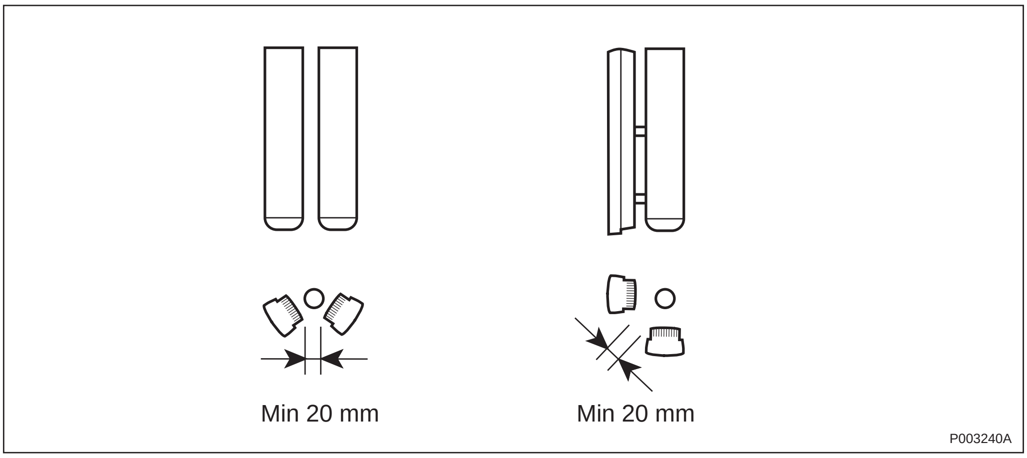

Figure 19 Antennas in different cells

Additional information

The horisontal distance between a Tx antenna and an Rx antenna or between two Tx antennas is dependent on the gain of the antennas in the 90 degrees direction if the antennas are on the same front-line. That means that an antenna with a broader beam requires a greater distance, due to the fact that the broad-beam antenna has more power radiating in the 90 degrees direction, compared to an antenna with a narrower beam.

Table 6 on page 55 is also valid if the antennas are installed as shown in *Figure 20 on page 56*.

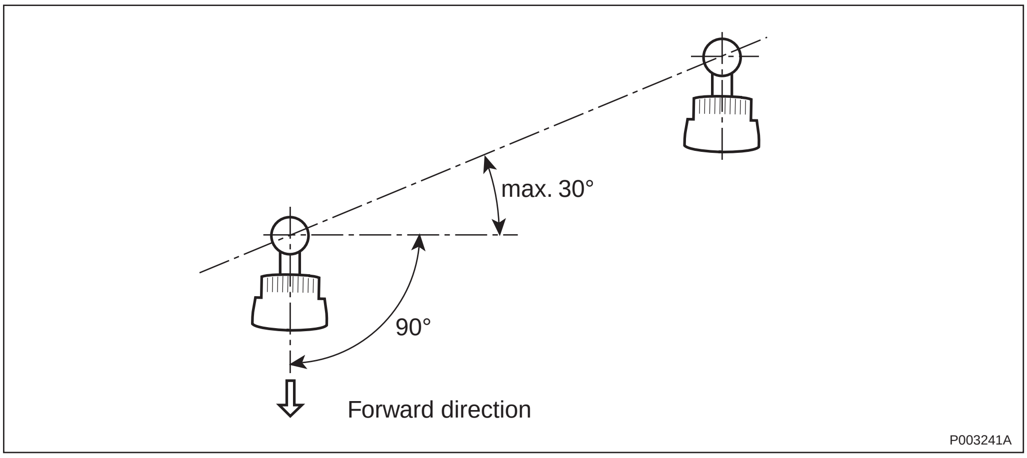

Figure 20 Directions not perpendicular to the mounting structure

Polarisation diversity

Polarisation diversity is the preferred form of diversity due to its installation advantages. One antenna housing with two connectors is used instead of two antennas separated by a few metres. The two antenna arrays within a dual polarised antenna are subject to the same isolation requirement of 30 dB between Tx - Tx and Tx - Rx. Approved dual polarised antennas fulfill this requirement.

The Maxite antenna is a dual polarised antenna.

Horisontal separation for diversity

Passive omnidirectional antennas do not have polarisation diversity. Two antennas are installed horisontally separated as shown in *Table 6 on page 55*to achieve diversity reception.

4.8.3 Nearby obstacles

Nearby obstacles are defined in this document as reflecting or shadowing materials that can obstruct the beam in a negative way. Only obstacles within 30 m distance are considered, in reality the building, if the antennas are to be installed on the roof of a building. Obstacles further away, for example, surrounding buildings close to the base station, can also act as reflecting or shadowing obstacles but are not considered here.

Roof mounting

The dominating obstacle is the roof itself. It is possible that the antenna beam will be distorted, if the antenna is too close to the roof. In other words, the antenna must be installed at a minimum height above the roof or other obstacles, *see Figure 21 on page 57*.

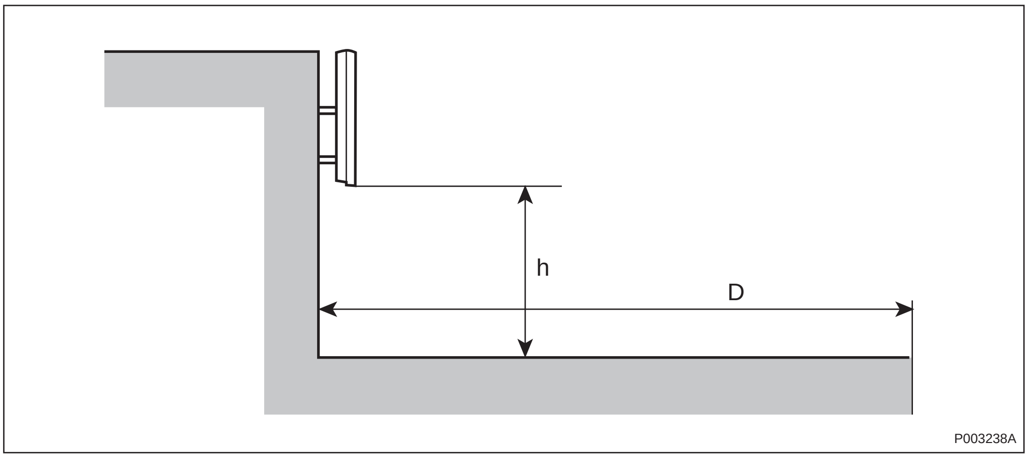

Figure 21 Height of antenna above roof

A practical planning rule is to keep the first fresnel zone free. For 900 MHz, the minimum recommended height above the roof is given in *Table 7 on page 57*. For 1800/1900 MHz the minimum height is given in *Table 8 on page 57*. These values are valid irrespective of antenna tilting.

Table 7 900 MHz, height of antenna above roof

Distance (D) to obstacle edge	Height (h) above roof (obstacle)
0 - 1 m	0.5 m(1)
1 - 10 m	2 m
10 - 30 m	3 m
>30 m	3.5 m

(1) If possible, use 2 m as the minimum height if there is a risk that people can walk close to the antenna.

Table 8 1800/1900 MHz, height of antenna above roof

Distance (D) to obstacle edge	Height (h) above roof (obstacle)
0 - 2 m	0.5 m(1)
2 - 10 m	1 m(1)
>10 m	2 m

(1) If possible, use 2 m as the minimum height if there is a risk that people can walk close to the antenna.

4.8.4 Wall mounted antennas

Directional antennas can be installed on a wall, if consideration is paid to the direction of the antennas. The ideal forward direction is when the antenna is perpendicular to the wall. *See Figure 22 on page 58*. If the front-to-back ratio of the antenna is good, say better than 20 dB for the ±45° backward direction, there is a low risk for distortion of the beam due to reflections.

It is also important that the cell sector is free. A safety margin of 15° should also be added on both sides of the sector borderlines. If this sector, ±75° for a standard 120° cell, is free and if the horisontal beamwidth is 105° or less, relative to the -3 dB-points, there is no risk for shadowing effects and beam distortion due to reflections.

For most of the wall mounted applications, the forward direction deviates from the perpendicular direction. The maximum acceptable deviation is 15° for a standard 120° cell. *See Figure 23 on page 58.* If the antenna is close to a corner of the wall and if the antenna is mounted at a certain distance from the wall, then more than 15° can be acceptable as long as the cell sector including the safety margin, is free from the wall. *See Figure 24 on page 59.*

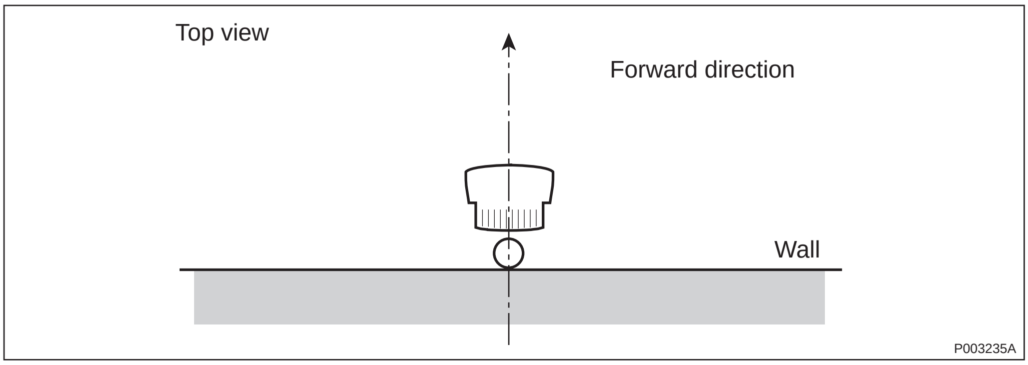

Figure 22 Ideal direction (perpendicular to the wall)

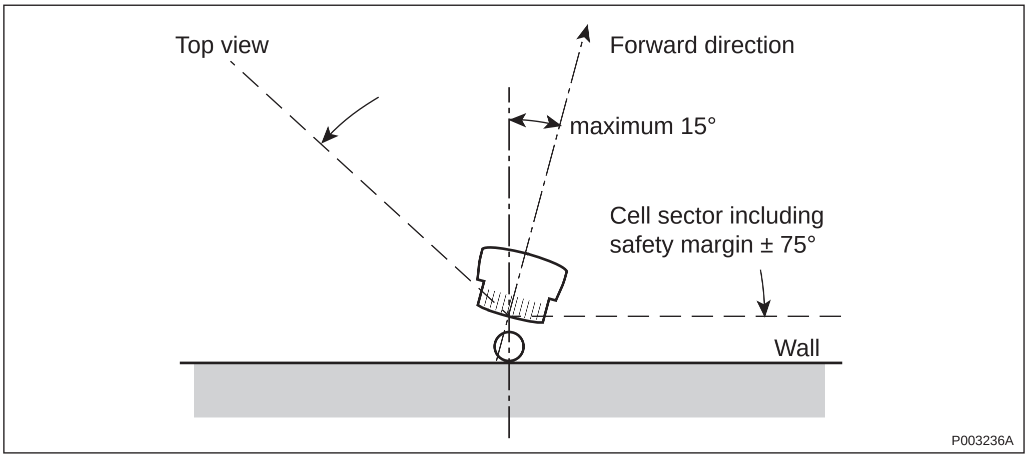

Figure 23 Accepted deviation

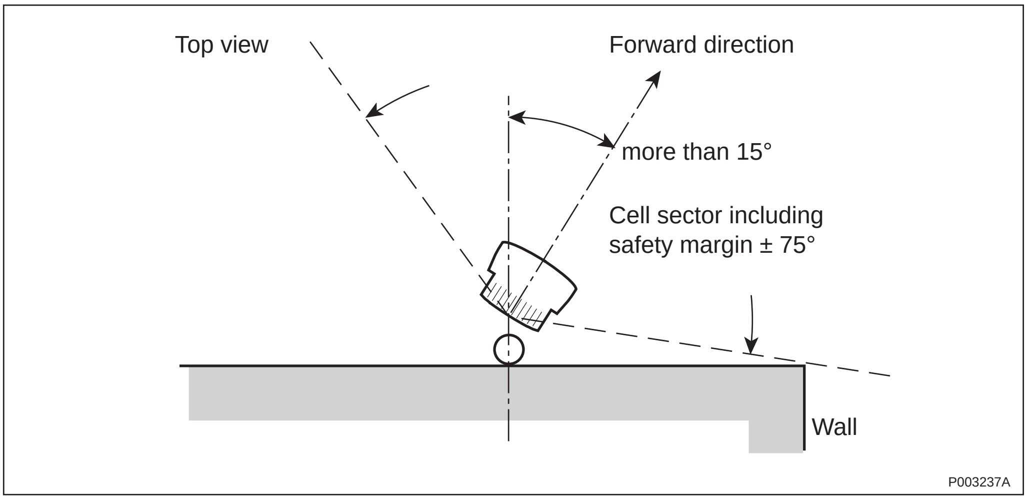

Figure 24 Antennas close to corner

4.9 Cable Distances

To ensure the full performance in Maxite, the total attenuation must not exceed 9 dB between the RBS 2302 and the CEU or not exceed 12 dB between the RBS 2302 and the AAU.

The table below shows actual cable attenuation and maximum cable length.

Please note, that the HISC in a highway configuration will introduce an additional attenuation of 3.5 dB. This is mainly caused by splitting the power into two parts (-3dB).

The DC/data cable must not exceed 100 m length.

Table 9 Cable distances between RBS and CEU (GSM 900)

Cable	**Atten/m (dB/m) at 900 MHz**	**Max Length (m)**	**Max Length w. HISC (m)**
1/2” coax (TZC 501 26)	0.076	100	70
10 mm coax (TZC 500 32)	0.15	80	35
3/8" coax (Prod-no: TZC 50082)	0.11	80	50
DC/data	-	100	100

Table 10 Cable distances between RBS and AAU (GSM 1800/1900)

Cable	**Atten/m (dB/m) at 1900 MHz**	**Max Length (m)**	**Max Length w. HISC (m)**
1/2” coax (TZC 501 26)	0.11	100	75
10 mm coax (TZC 500 32)	0.22	50	35
3/8" coax (Prod-no: TZC 50082)	0.16	75	50
DC/data	-	100	100

4.10 Power Supply

The base station shall be connected to the nominal mains supply voltages in *Table 11 on page 61*. One circuit is needed for each RBS 2302 and PBC.

The circuit shall be fused with single fuse if the circuit is between phase and neutral, and two fuses if the circuit is between two phases. A power distribution box is needed for this purpose, but this is not part of the Maxite delivery. The box and all installation must be ordered from a qualified electrician.

Note: All units must be connected to the same phase.

The power distribution cable shall have two power supply conductors and one protective earth conductor. Conductor size must be selected according to applicable electrical regulations.

Connections are made on wire terminals in the interface box on the mounting base. There are two terminals for connection to wires having a maximum area of 2.5 mm^2 and one separate screw terminal for Protective Earth.

The mains voltage is connected between two of the terminals. The third conductor must be connected to protective earth.

The cable gland has capacity for one power cable with an outer sheath diameter of 8 – 19 mm.

Note: A lockable mains switch must be provided close to the base station. It is also recommended that an AC mains outlet is mounted close to the base station, for installation and test equipment.

4.10.1 Requirements for USA and Canada installations

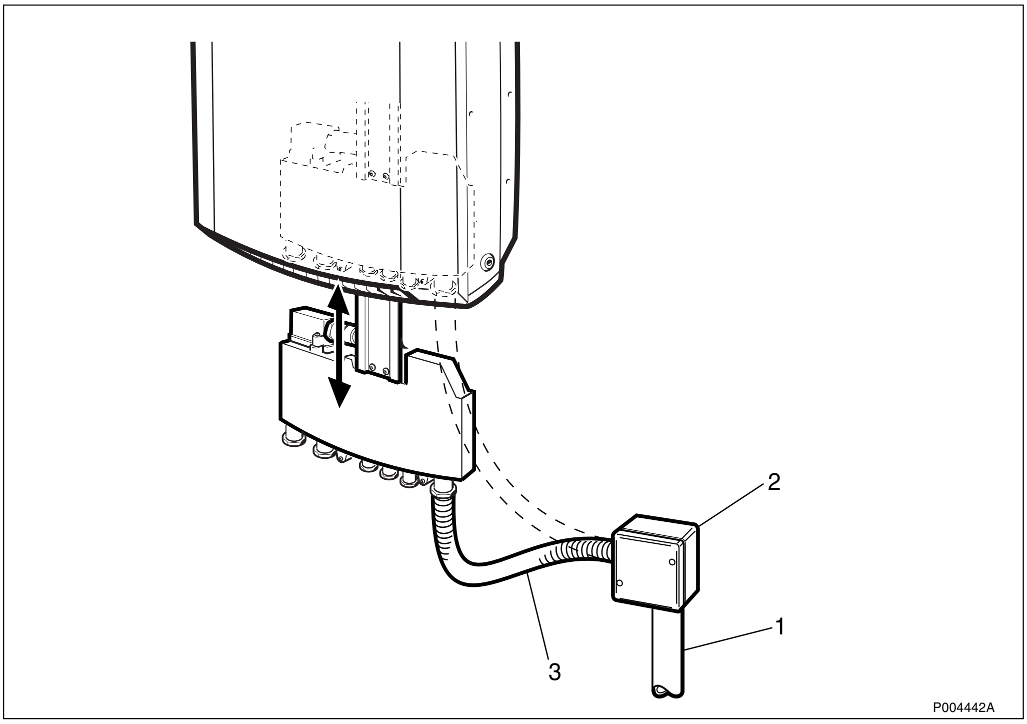

Figure 25 Connection in accordance with NEC and CEC

Connection shall be made in accordance with NEC and CEC.

In *Figure 25 on page 60*, the following numbers stands for:

1. Steel tube.
2. Junction box.
3. Flexible conduit for AC mains.

The flexible AC mains cable shall be NRTL-listed and have ratings and conductor size suitable for power connections according to local requirements.

A NRTL-listed flexible, liquid tight conduit with bushing is to be used and shall be suitable for tight connection to the interface box. The hole for the AC feed-through has a diameter of 22.5 mm.

A listed suitable junction box for outdoor use shall be used.

4.10.2 Supply Voltage

Table 11 Supply voltages

Voltage	**Tolerance**	**Frequency**
200 - 250 V AC	± 10 %	50 Hz ± 10 %, 60 Hz ± 8 %
100 - 127 V AC	± 10 %	60 Hz ± 8 %

Limiting Values for AC Mains Supply

Table 12 Limiting values

Non destructive range	**Value**
Permanent	0 V-280 V
Overvoltage < 10 ms	280 V-300 V
Pulses < 50µs	6 kV

4.10.3 Power Consumption

Power consumption figures are given below for one piece of each part of Maxite. The figures have to be multiplied for the actual configuration to get the total power requirement for the site.

Table 13 Power consumption

Operation	**One RBS 2302**	**One PBC (incl AAU or CEU)**
Normal operation[1)]	150 VA [(1)]	310 VA
Maximum power consumption[2)]	500 VA [(2)]	660 VA [(3)]

(1) Both transceivers transmitting on full output power.
(2) With activated heater.
(3) Antenna amplifiers at full gain and battery heater activated.

Table 14 Heat generation

Operation	**One RBS 2302**	**One PBC (incl AAU or CEU)**
Normal operation[1)]	150 W [(1)]	100 W
Maximum power consumption[2)]	500 W [(2)]	150 W

(1) Both transceivers transmitting on full output power.
(2) With activated heater.

4.11 Earthing and Lightning Protection

A lightning protection system according to IEC 1024-1 (Protection of structures against lightning) must be installed on the site.

A lightning protection system, designed and installed in accordance with this standard, cannot guarantee absolute protection to structures, persons or objects; however, application of this standard will significantly reduce the risk of damage caused by lightning to the structure protected by it.

Applicable protection level in this standard is defined by the statistical risk of lightning strikes weighed against an accepted number of strikes. Protection level 2 is recommended for an RBS site and described in this chapter.

If human, cultural or social losses are involved, the protection level is set by National committees.

The outer shell of RBS 2302, PBC and other units at the site must be bonded together and connected to a site earth electrode. The AAU or CEU must also be connected to site earth, if it is not earthed via the antenna supports.

4.11.1 Earth Electrode

The earth electrode is formed as a ring surrounding the entire site, constructed in accordance with IEC 1024-1, arrangement B. The mean radius *r* of the enclosed area must be at least 5 m.

The mean radius *r* of an irregular area *A* can be calculated in the following manner:

$$r = \sqrt{\frac{A}{\pi}} \text{ [m]}$$

P003058A

Figure 26 Mean radius equation

If arrangement B is not possible, arrangement A may be used, under the conditions that the area is inaccessible to the public and a warning sign provided:

DANGER

Burried lightning protection earth electrode. This area must not be accessed during thunderstorms.

Arrangement A is composed of radial (or inclined) electrodes. The minimum number of earth electrodes shall be two. The individual lengths of the radials are given by the following equations.

Note: L_r is the length of the additional horisontal radials.

L_v is the length of the additional vertical radials.

$$L_r = 5\text{-}r[m]$$

P003059A

Figure 27 Horisontal radials

$$L_V = \frac{5\text{-}r}{2}\ [m]$$

P003060A

Figure 28 Vertical electrodes

In areas with an earth resistivity above 3000 Ωm, the length of the additional horisontal or vertical electrodes must be increased:

$$\triangle L_r = (p\text{-}3000) / 100\ [m]$$

P003061A

Figure 29 Horisontal electrode

$$\triangle L_V = (p\text{-}3000) / 200\ [m]$$

P003062A

Figure 30 Vertical electrode

Note: ρ is the earth resistivity in Ωm

For a site with a very high resistivity, the calculated length of the earth electrodes might exceed what is possible. In that case a specialist should be involved to design the earth electrode.

The methods described above aims to design an earth electrode with an earth resistance less than 200 Ω.

4.11.2 Earth Resistivity

The table below gives values that can be used as guidelines to estimate soil resistivity.

Table 15 Earth resistivity

Material	**Resistivity ρ (Ωm)**
Granite	10^6
Dry concrete	10^5
Volcanic rock	10^4
Moraine, dry gravel	10^3
Fine sand (sweet water)	10^2
Clay, dry humus soil	50
Wet humus soil	10
Sea water	1

4.11.3 Installation of Earth Electrodes

The earth electrodes must be installed outside the space to be protected at a depth of at least 0.5 m and distributed as uniformly as possible to minimise electrical coupling effects in the earth. The ring earth electrode must run at least one meter outside all metallic objects and walls on the site.

The recommended material in the earth electrode is stranded or solid copper with an area of at least 50 mm^2. Aluminium is not allowed. If steel is chosen it must be hot dip galvanised, solid and with an area of at least 80 mm^2.

The joint shall be bonded with such methods as brazing, welding, crimping, screwing or bolting. Crimping, brazing or welding are the only methods allowed in joints covered by soil. Screwed or bolted joints must be protected against corrosion. Sharp bends on the conductor should be avoided.

4.11.4 Typical Earth Electrode on Ground

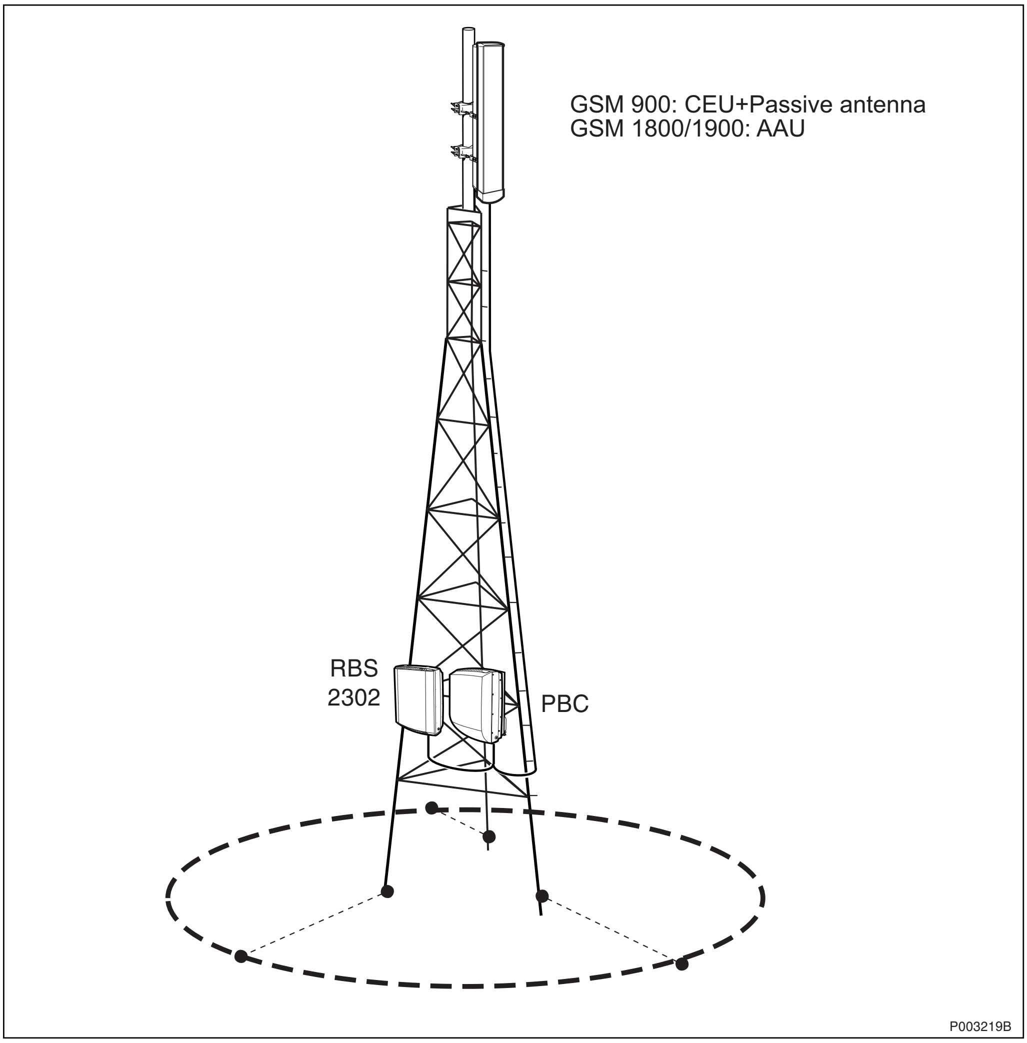

Figure 31 Typical ring earth electrode arrangement on ground

If nothing else is stipulated in local regulations, the following rules apply to an earthing system.

The tower must be bonded to the ring earth electrode by at least two conductors.

The ring earth electrode must run at least one metre outside all metallic objects on the site. Any fencing crossing the earth electrode must be bonded to the electrode. The mean radius r of the area enclosed by the ring earth electrode must not be less than 5 m.

If it is not possible to make such a large ring, a smaller ring may be used in combination with two 5 m long buried radial horisontal electrodes. It is still important to observe the one metre distance of the ring with respect to other metallic objects, and to place the radial electrodes in such a manner that a person cannot stand above them.

4.11.5 Typical Earthing on Roof

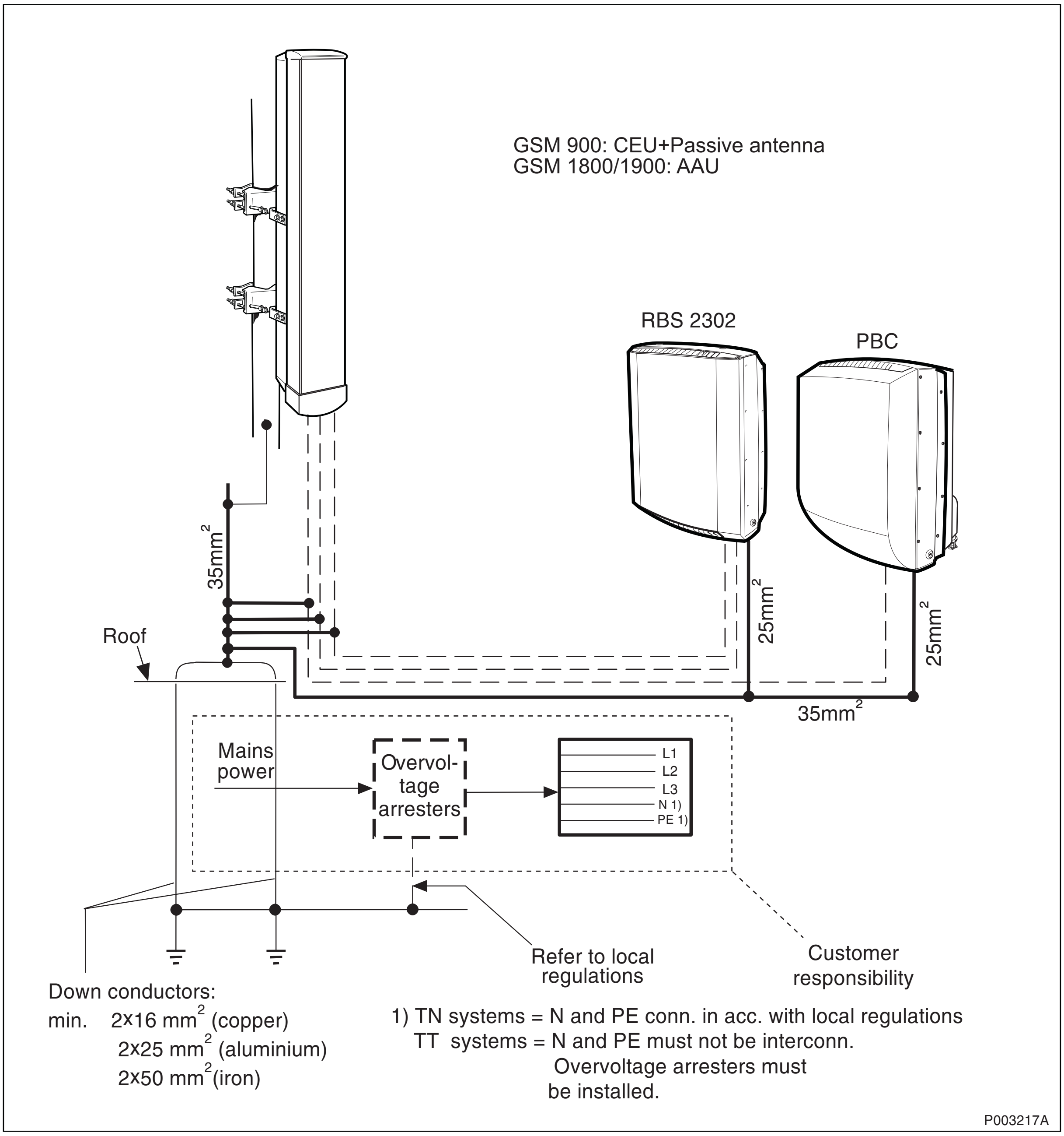

Figure 32 Block diagram outdoor earthing

A building with a site on its roof top must be provided with its own lightning protection system, and the site must be connected to this system. The tower must be bonded to the lightning protection system of the building by at least two conductors.

The building is presumed to have a lightning protection system installed that meet the requirements of IEC 1024-1 "Protection of structures against lightning" protective level 3 or higher.

The site is also protected by the tower itself acting as an air terminating system. The area protected is determined by a rolling sphere having a specified radius for each protection level.

The picture below illustrates "the rolling sphere" method to determine which objects are prone to a direct hit from lightning. The radius of the protective sphere is 30 m.

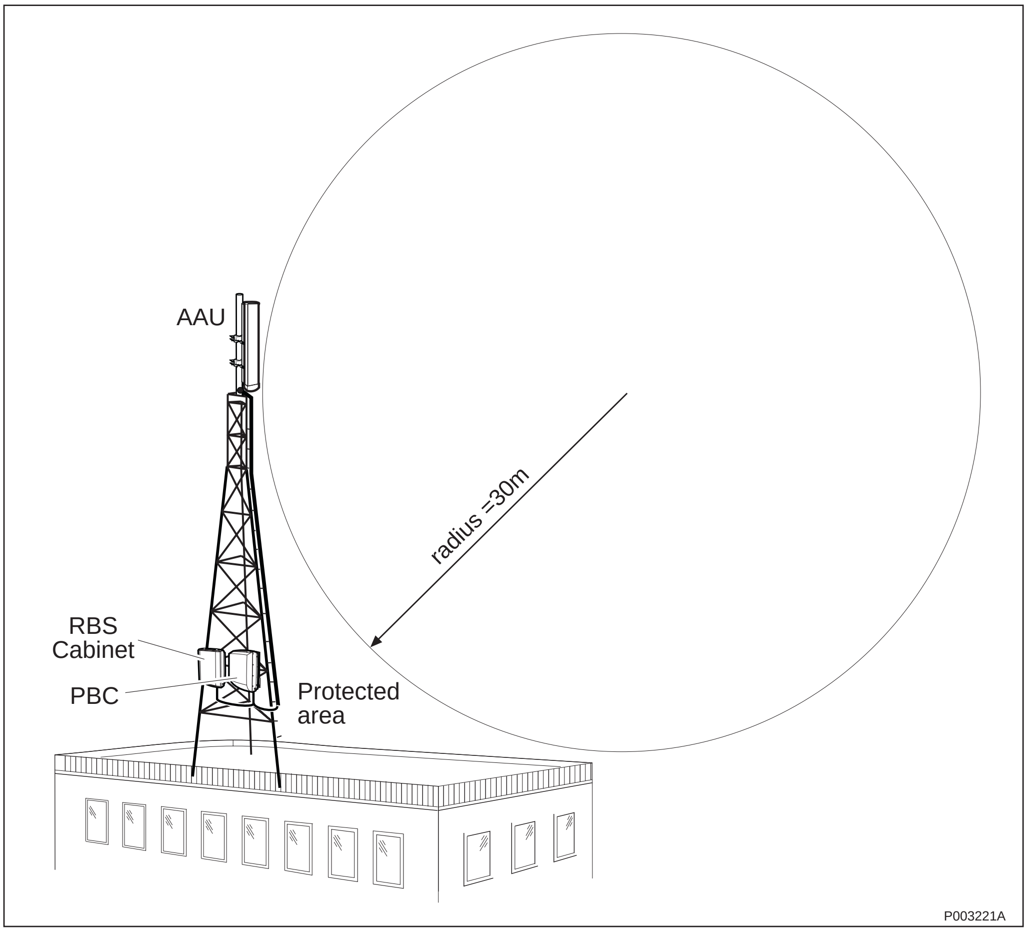

Figure 33 RBS in protected area

In order to avoid dangerous sparking when equipotential bonding cannot be achieved, a safety distance between the lightning protection system and metal installations must be observed.

The safety distance d can be calculated from the following formula:

$$d = \frac{0{,}15 \times L}{n} \text{ [m]}$$

P003063A

Figure 34 Safety Distance Formula

d = Safety distance

L = The length of the down conductor

n = Number of down conductors

The above example shows down conductors of copper. It is also possible to make down conductors of aluminium or steel. The minimum allowed dimensions are 16 mm² for copper, 25 mm² for aluminum and 50 mm² for steel.

Antenna cables (coaxial cable and DC/data cable) must be earthed to the support structure at the point where the cables leave the structure, if RBS 2302 and PBC are not mounted on this structure and electrically bonded to it.

If the cables are between 30 to 60 meters, they must have one extra earthing point at half their length.

If the cables are longer than 60 meters, they must have one extra earthing point for every 30 meters added. The distance between an end point and an earth point, or two earth points must not be more than 30 meters.

4.11.6 Typical Indoor Site Installation

The protective measure to prevent electrical fields inside the equipment room is to bond all large metallic parts together and connect them to the earthing system.

The principle for earthing is the same as for an outdoor installation. The earthing system is installed in the same manner as shown in *Figure 32 on page 66*.

4.12 Installation material

Except for the cables and connectors found in

	Ordering Information for RBS 2000 Installation Material	*131 62-HRB 105 01/MA*

the material described in this section is needed for fastening and earthing of the cables.

More details about the material and other suitable items for installation can be found in:

	General Installation Instructions	*LZN 302 49*

Feeder clamp for 1/2” cable

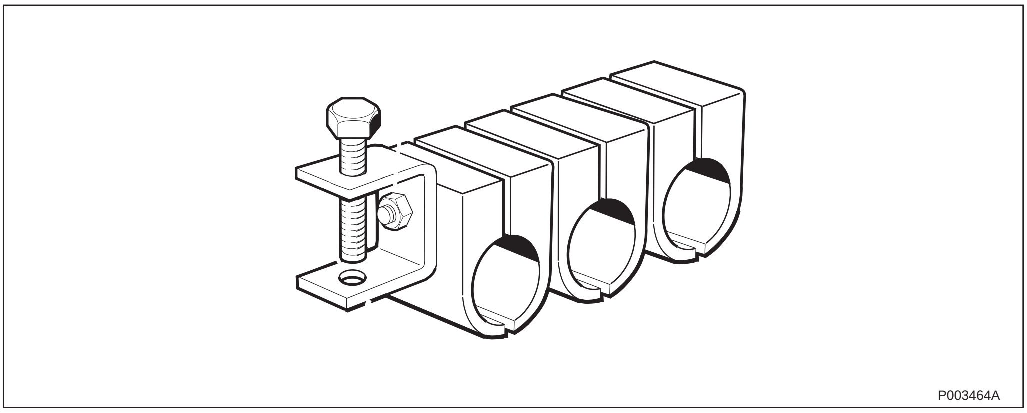

Figure 35 Clamp NTM 201 215/3

Cable clamp NTM 201 215/3 is used to clamp 1/2” coaxial cable and the DC/data cable on to masts/towers and on outdoor ladders. The cables must be clamped every 0.6 m.

Feeder clamp for 10 mm cable

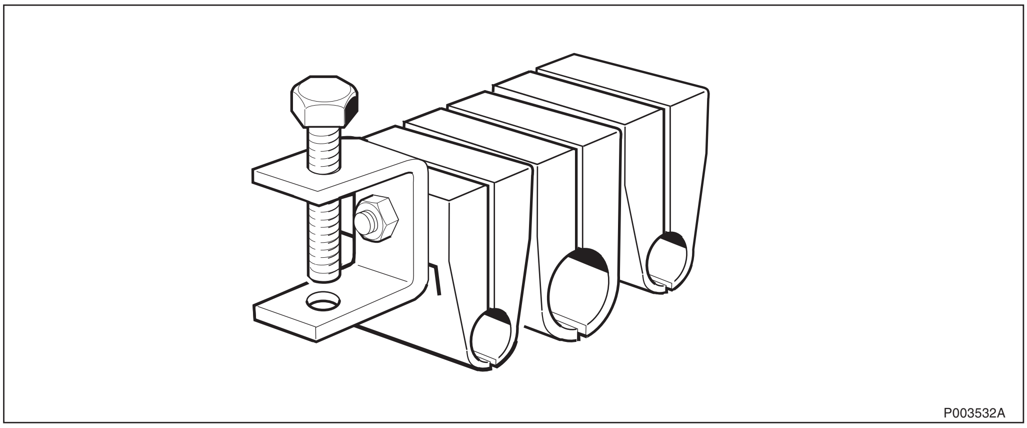

Figure 36 Clamp NTM 201 215/5

Cable clamp NTM 201 215/5 is used to clamp 10 mm coaxial cable and the DC/data cable on to masts/towers and on outdoor ladders. The cables must be clamped every 0.6 m.

Feeder clamp for 3/8” cable

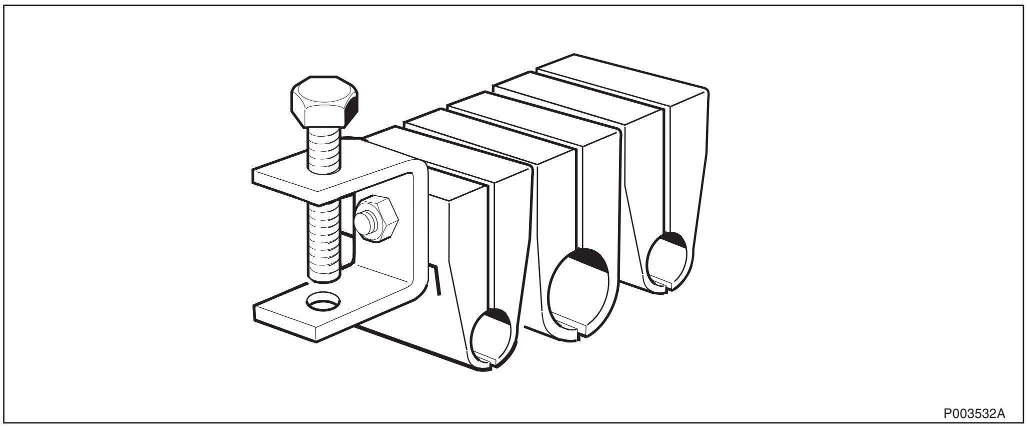

Figure 37 Clamp

Cable clamp *(product number not available at the time of the release of this manual)* is used to clamp 3/8” coaxial cable and the DC/data cable on to masts/towers and on outdoor ladders. The cables must be clamped every 0.6 m.

Jumper cables

Since the feeder cable used in Maxite has the same mechanical characteristics as conventional jumper cables, no separate jumpers are needed to connect the cable to the antenna.

A jumper cable is however needed on the RBS side, as only very thin cables can be inserted behind the sun-shields. The proper jumper to use is described in *chapter Product Data, section Radio Base Station RBS 2302, subsection Antenna Connections*.

Sealing set

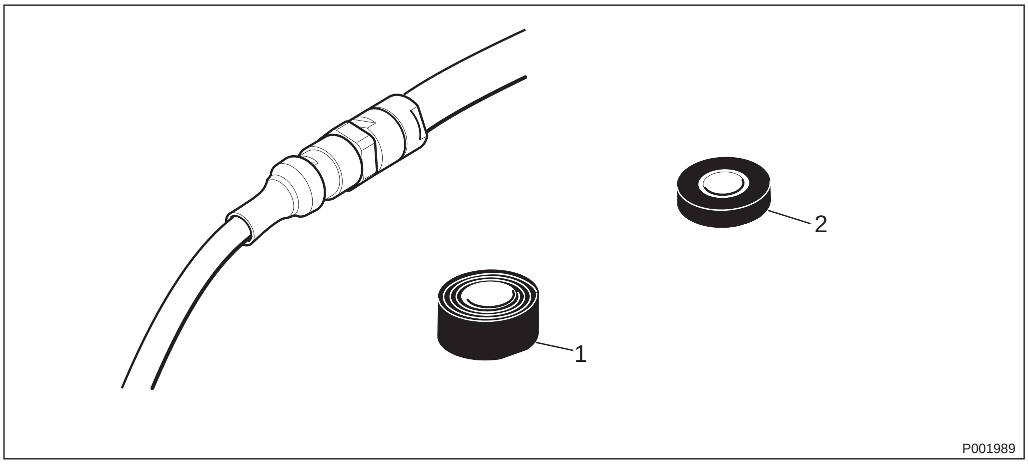

Figure 38 Sealing set NTM 201 2426

The sealing set NTM 201 2426 is used to seal outdoor mounted connectors and protect them from moisture and adverse weather conditions. Two sealing sets should be sufficient for one AAU.

Earthing set for cables

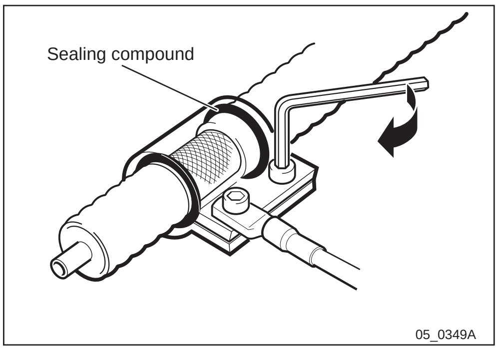

Figure 39 Earthing set NGT 211 04/2 and NGT 211 04/3

The earthing set NGT 211 04/2 is used to earth 1/2” coaxial cable and the DC/data cable. The earthing set NGT 211 04/3 is used to earth 3/8” coaxial cable. Required number of earthing sets is described in *Section 4.11.5 on page 66*.

Earthing set for 10 mm coaxial cable

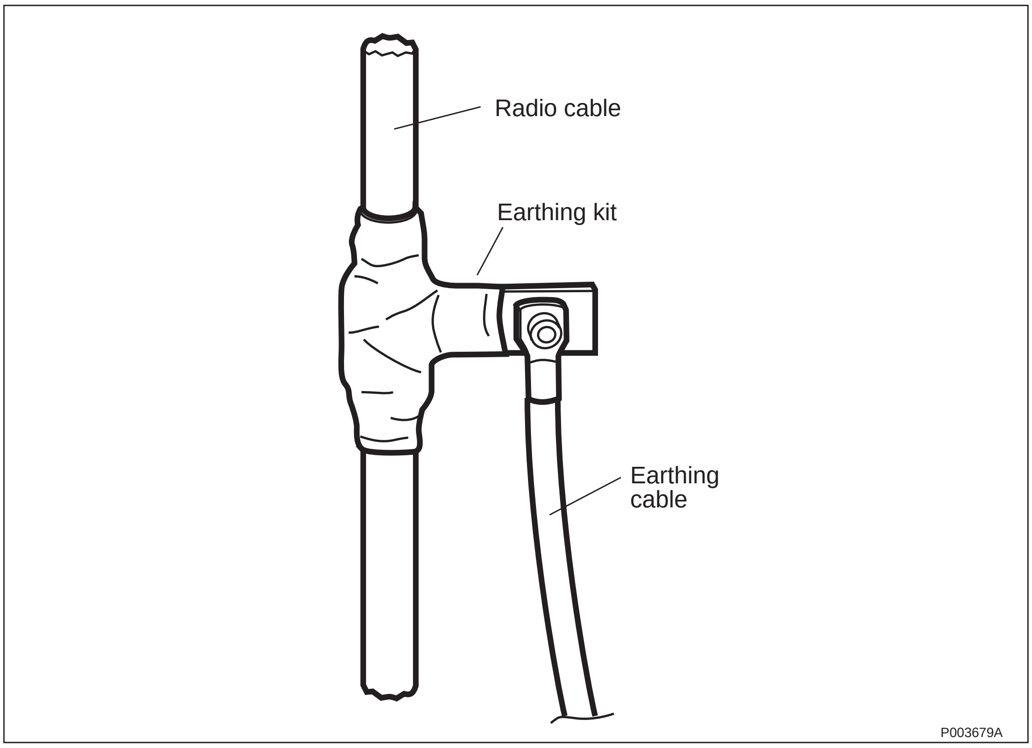

Figure 40 Earthing set SXK 111 528/1

The earthing set SXK 111 528/1 is used to earth the 10 mm coaxial cable. Required number of earthing sets is described in *Section 4.11.5 on page 66*.

Earthing set for equipment

Earthing set 5/NTM 202 201 consists of a 2 m long insulated copper cable with 25 mm² area. A cable lug is fitted at one end. The earthing set can be clamped to an 35 mm² wire with a supplied jointing sleeve.

Earthing set 9/NTM 201 230/1 consists of a 40 m long copper wire, area 35 mm², with accessories to connect to a lightning protection system as shown in *Figure 32 on page 66*.

4.13 Maxite™ Overview

Maxite is a complete package for a radio site. Maxite consists of the following main parts:

- Alternative options for GSM 900
  - Coverage Extension Unit (CEU)
  - Passive antenna
- Alternative options for GSM 1800/1900
  - Active Antenna Unit, 500 W EIRP for GSM 1800
  - Active Antenna Unit, 500 W EIRP for GSM 1900

- Active Antenna Unit, 1250 W EIRP for GSM 1900

- Radio Base Station, RBS 2302
- Power and Battery Cabinet, PBC

Active Antenna Unit, AAU — 500 W EIRP for GSM 1800

A conventional gain antenna contains a number of passive elements in an array, that focuses the antenna beam in the desired direction. The active antenna uses amplifiers to further increase the gain. The passive part of the AAU (also called APU, Antenna Passive Unit) is built-up of a patch antenna array.

Antenna diversity is built-in in the AAU. The traditional method of diversity reception is to use two antennas horisontally spaced. The AAU uses another diversity method: dual polarisation diversity. Two antennas are still needed but they can be housed in the same unit. The AAU contains two antenna arrays, one with +45° polarisation and the other with -45° polarisation. Receiver diversity is obtained between the two arrays when they are connected to separate receiver ports.

The active part of AAU is called AEU, Antenna Electrical Unit. The AEU works in duplex mode. Transmit and receive signals are separated with duplex filter and a circulator. The receive signals are amplified through one LNA (Low Noise Amplifier) per receive path.

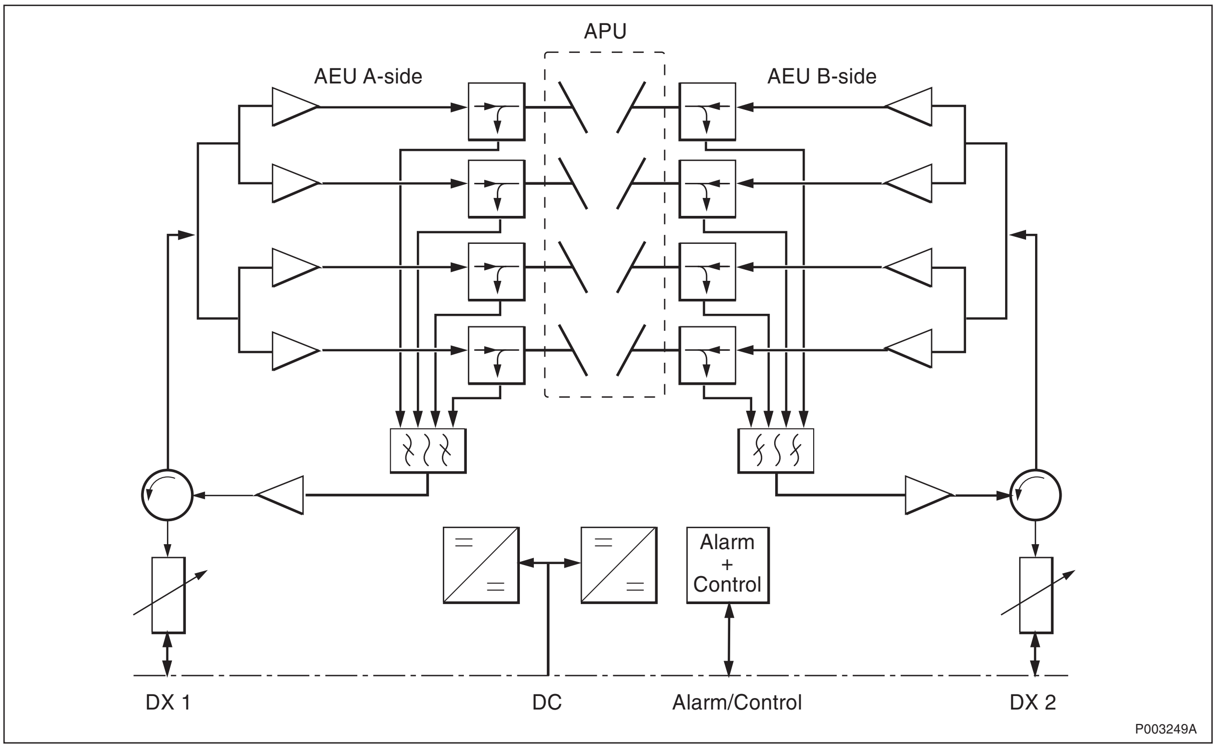

Figure 41 Block diagram Active Antenna Unit – 500 W EIRP for GSM 1800

The transmit part is built up of PAMs (Power Amplifier Modules), or rather “double-PAs”. Each module contains two amplifiers, one for each transmit channel. A number of PAs are connected to different parts of the passive antenna array in a way so that one faulty PA only causes a small deterioration in the performance.

The AEU is furthermore equipped with DC/DC-converters for the power distribution inside the unit. Alarm and control circuits are also built-in in the AEU.

Active Antenna Unit, AAU — 500 W EIRP for GSM 1900

The antenna is a self contained, pole mounted module containing a high gain Active Phased Array Aperture, distributed Power Amplifiers, distributed Low Noise Amplifiers, DC-DC Converters and Fault Reporting Circuitry. This module provides both a vertical polarisation transmit function for two carriers and a dual-polarisation receive function for two receiver branches. The receive function contains two independent paths, using orthogonal polarisation diversity (horisontal/ vertical).

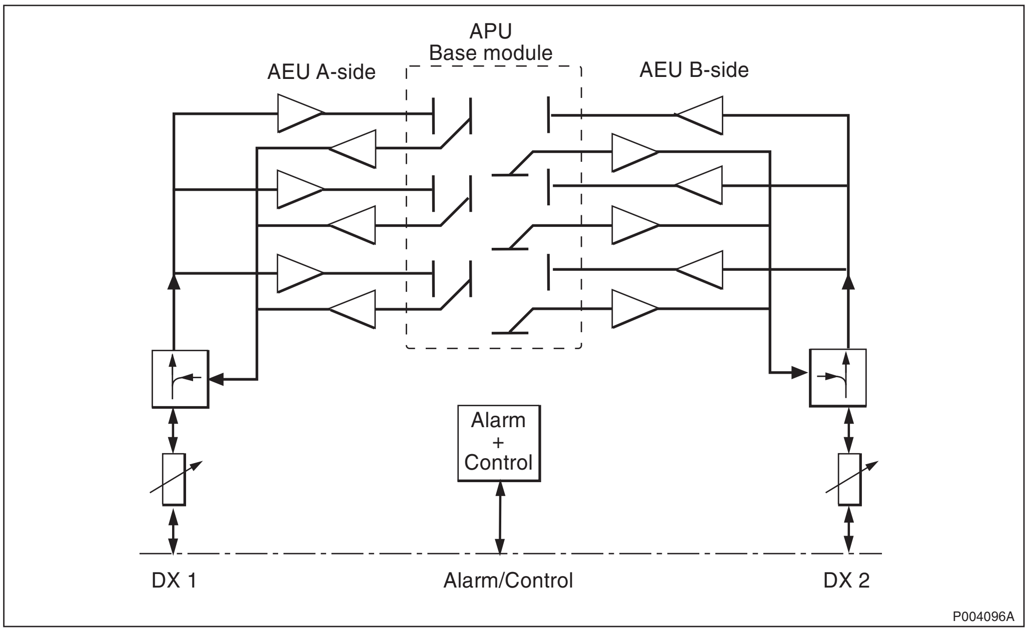

Figure 42 Block diagram Active Antenna Unit – 500 W EIRP for GSM 1900

Active Antenna Unit, AAU — 1250 W EIRP for GSM 1900

The architecture of the antenna is based on single carrier modules, referred to as the Base Module and the Transmit Module. The Base Module is a self contained, pole mounted module containing a high gain Active Phased Array Aperture, distributed Power Amplifiers, distributed Low Noise Amplifiers, DC-DC Converters and Fault Reporting Circuitry. This module provides both a vertical polarisation transmit function for a single carrier and a dual-polarisation receive function for two receiver branches. The receive function contains two independent paths, using orthogonal polarisation diversity (horisontal/ vertical). The Transmit Module is of the same design as the Base Module but only provides a single transmit function for one carrier.

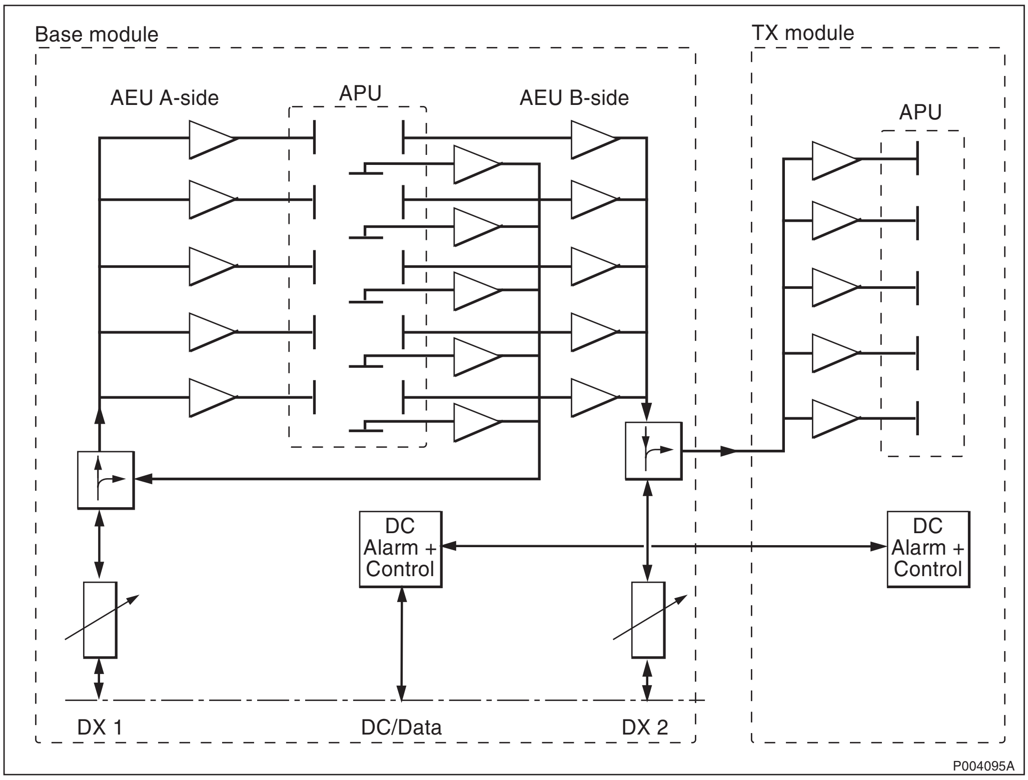

Figure 43   Block diagram Active Antenna Unit – 1250 W EIRP for GSM 1900

Coverage Extension Unit

The CEU is an up- and downlink amplifier for GSM 900. It contains two physical radio channels that each includes power amplifiers for the downlink and low noise amplifier for the uplink.

Used together with conventional passive antennas it will give an EIRP in the same range as with an active antenna.

Diversity reception is obtained by dual polarised antennas (or horisontally spaced antennas). The dual polarised antenna must have +45/-45 degree polarisation.

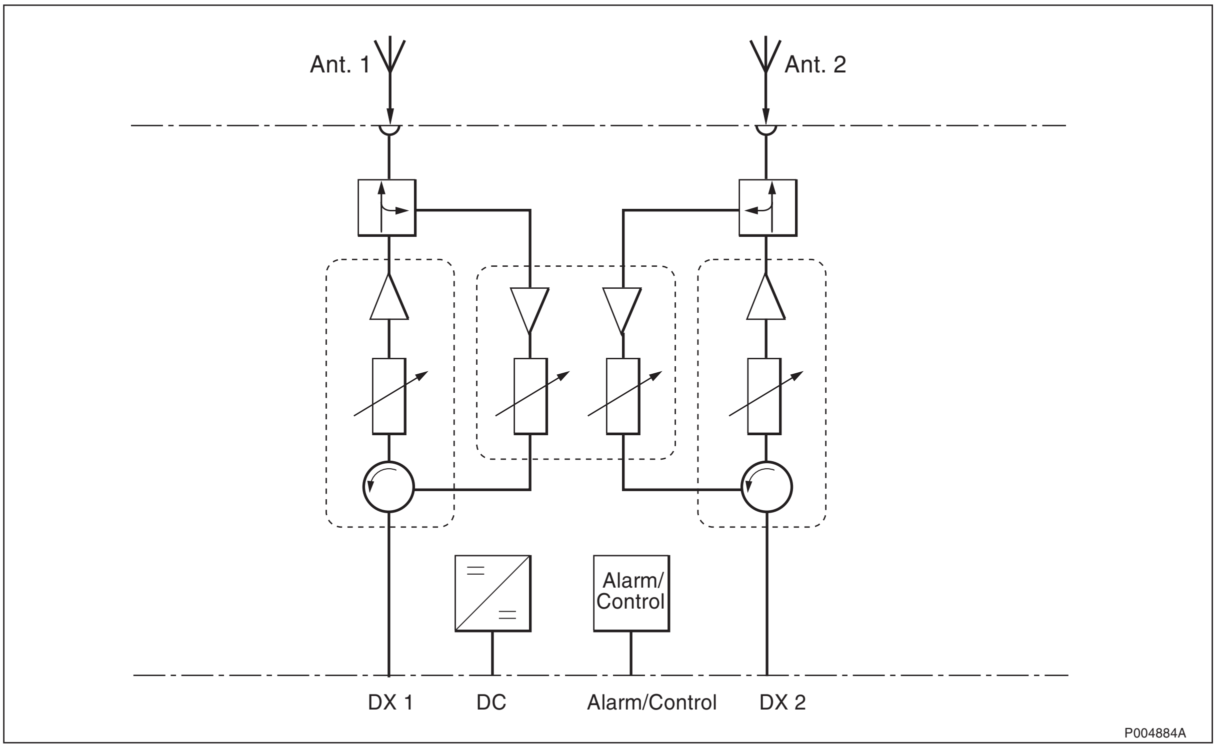

Figure 44 Block diagram Coverage Extension Unit for GSM 900

The base station RBS 2302

RBS 2302 is a member of the RBS 2000 family of base stations. It is a small “Micro base station” that can be placed in both outdoor and indoor environment. It contains two low power transceivers, and can be equipped with integrated antennas. The purpose of the RBS as a stand alone product is to supply “hot spot” capacity in small areas. Together with the Active Antenna in the Maxite configuration it will provide coverage equal to a conventional macro site.

Versions are available for the 900, 1800 and 1900 MHz bands.

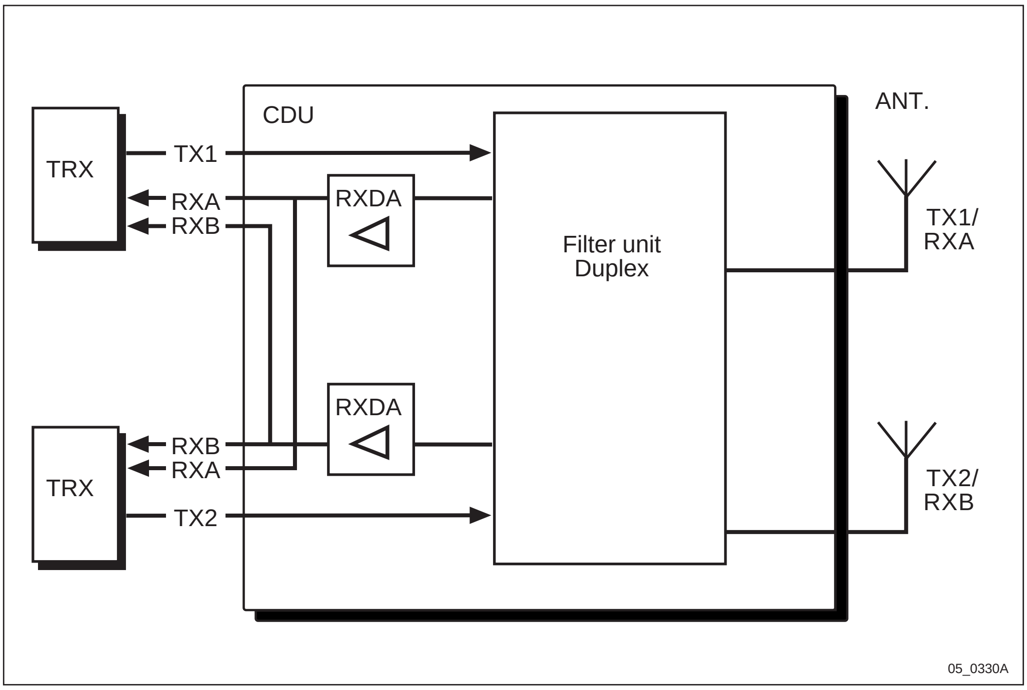

Figure 45 Block diagram of RBS 2302

Power and Battery Cabinet PBC

The Power and Battery Cabinet serves as a power supply for one active antenna, battery back-up for one RBS 2302 and an interface for alarms and supervision of the active antenna.

The PBC can supply one RBS 2302, one active antenna and a radio link with DC back-up during approximately two hours depending on traffic.

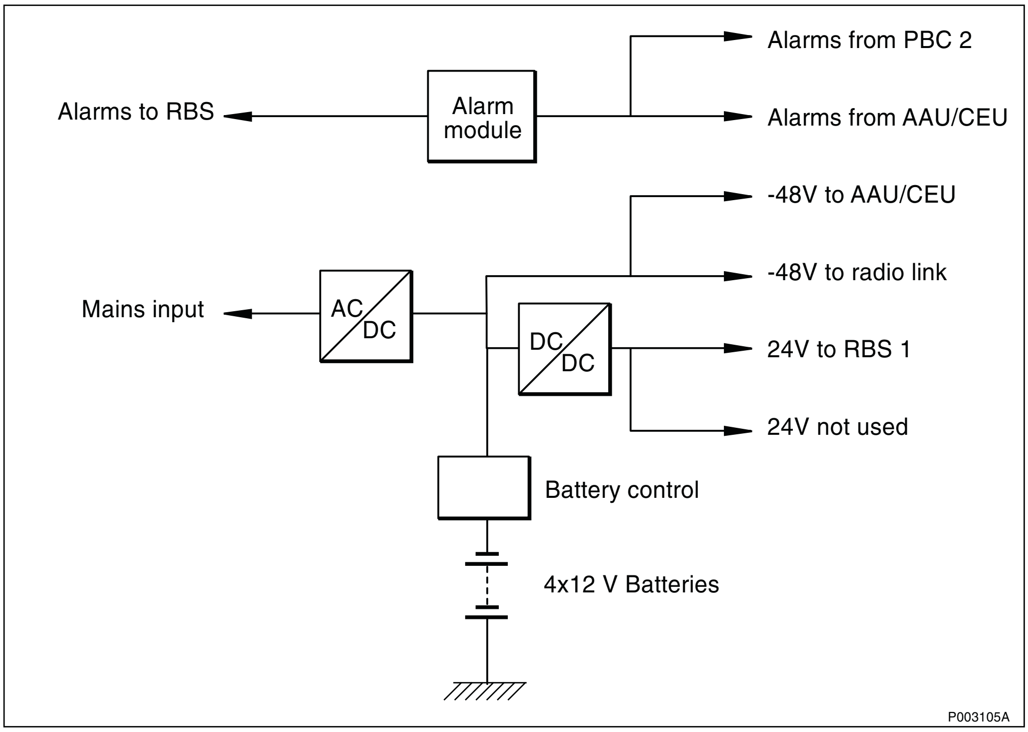

Figure 46 Block diagram of Power and Battery Cabinet

4.14 Configurations with CEU, GSM 900

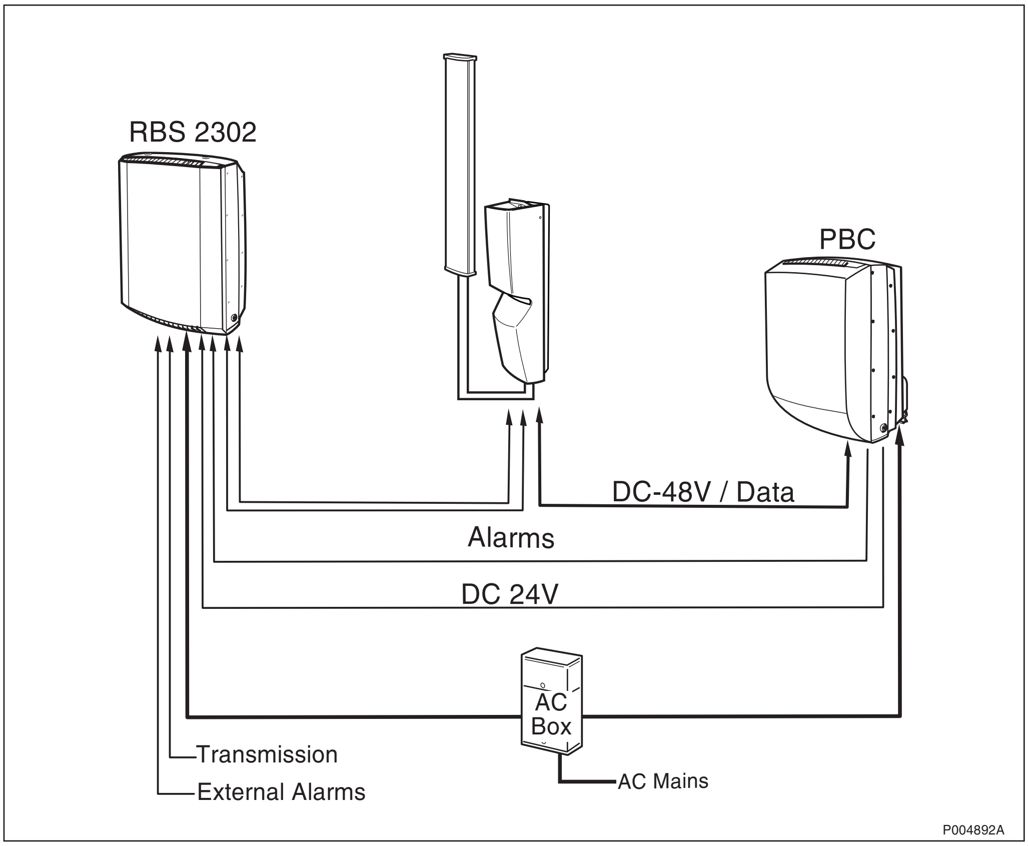

Figure 47 Configuration with 2 TRX

The basic Maxite configuration with CEU, Coverage Extension Unit, is a 2 TRX configuration and consists of:

- one CEU
- one dual polarised antenna
- one PBC
- one RBS 2302

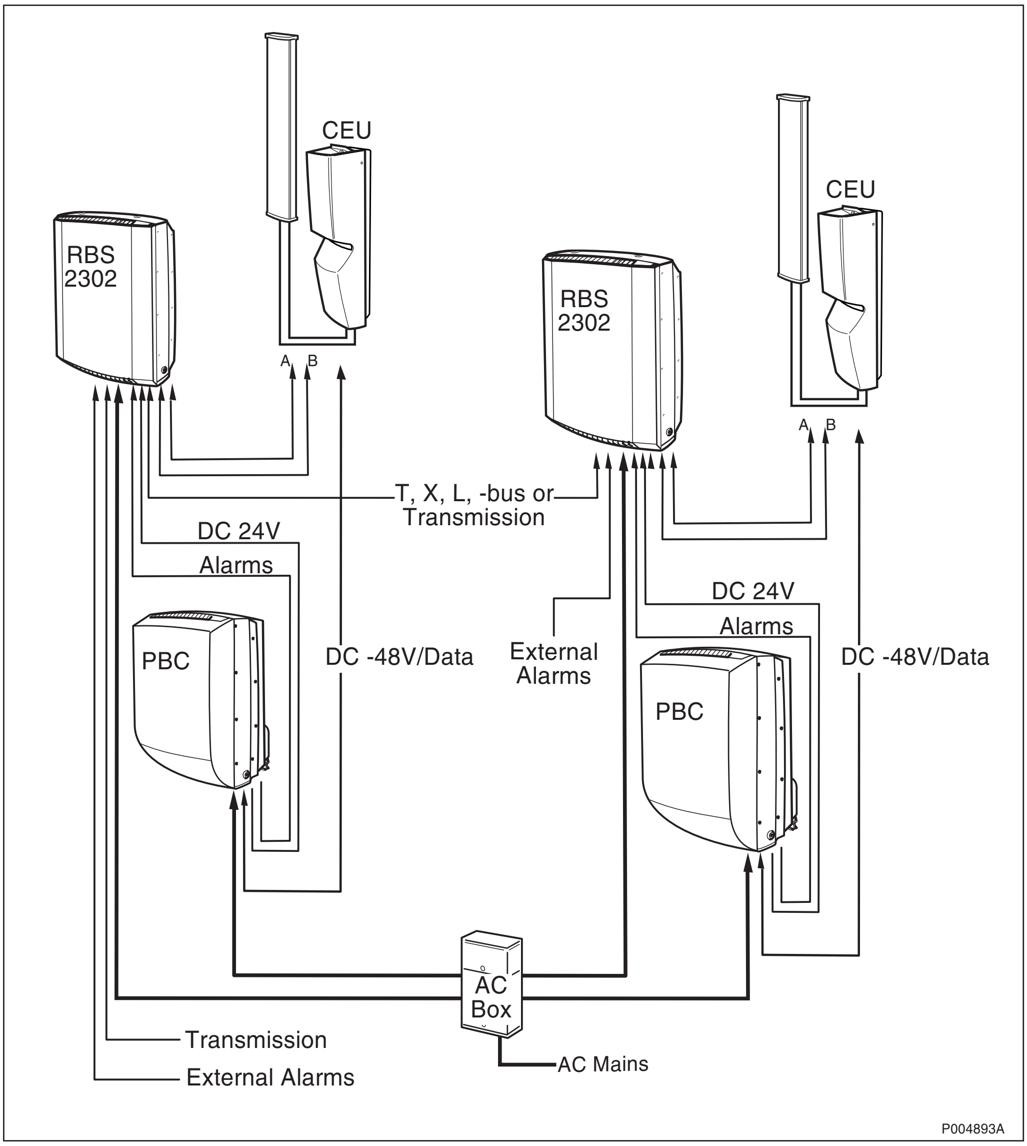

Figure 48 Configuration with 4 TRX

This configuration can be expanded to 4 TRX. The configuration will then consist of:

- two CEU
- two dual polarised antennas
- two PBC
- two RBS 2302

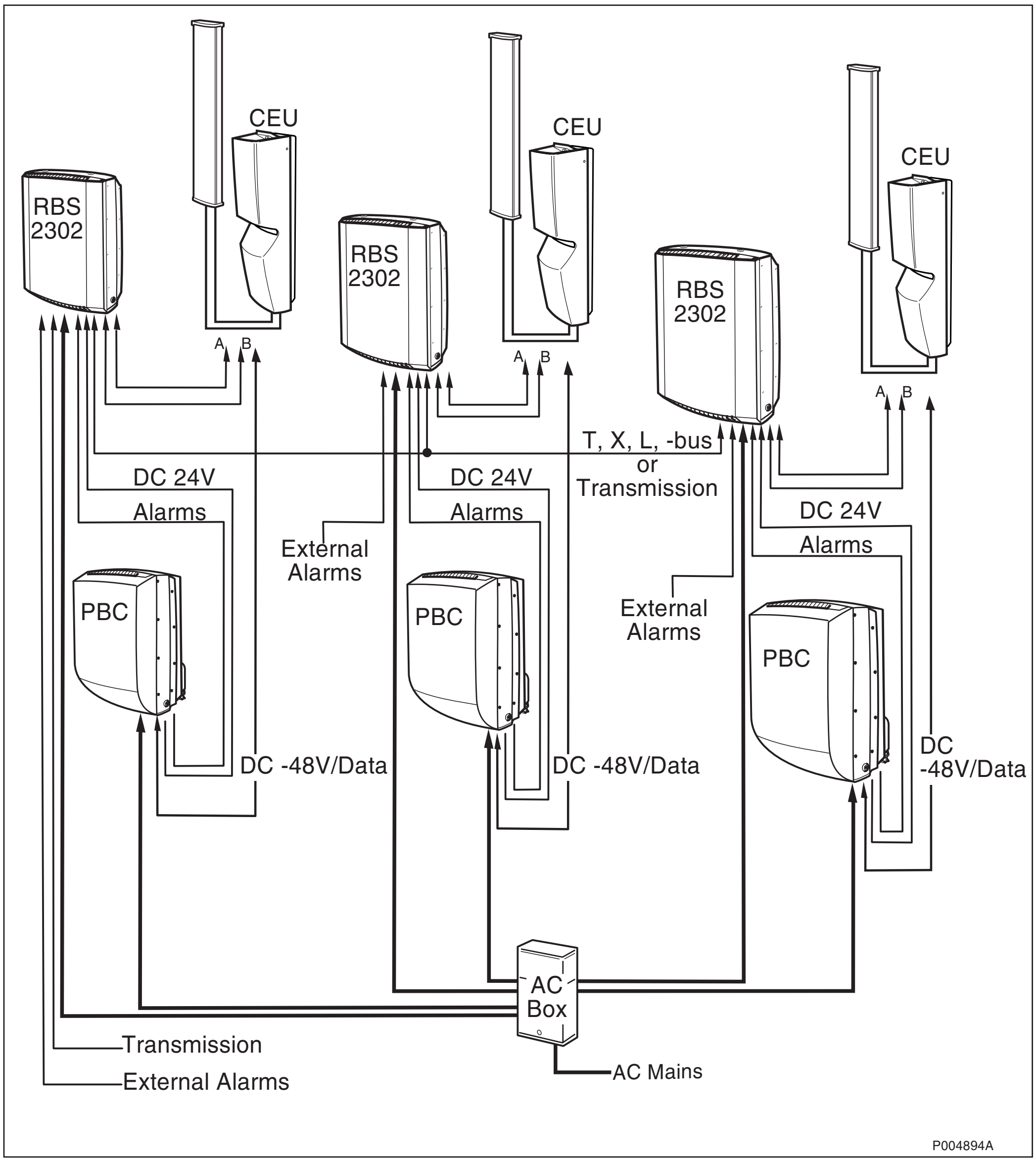

Figure 49   Configuration with 6 TRX

The maximum configuration will be a 6 TRX configuration. It will consist of:

- three CEU
- three dual polarised antennas
- three PBC
- three RBS 2302

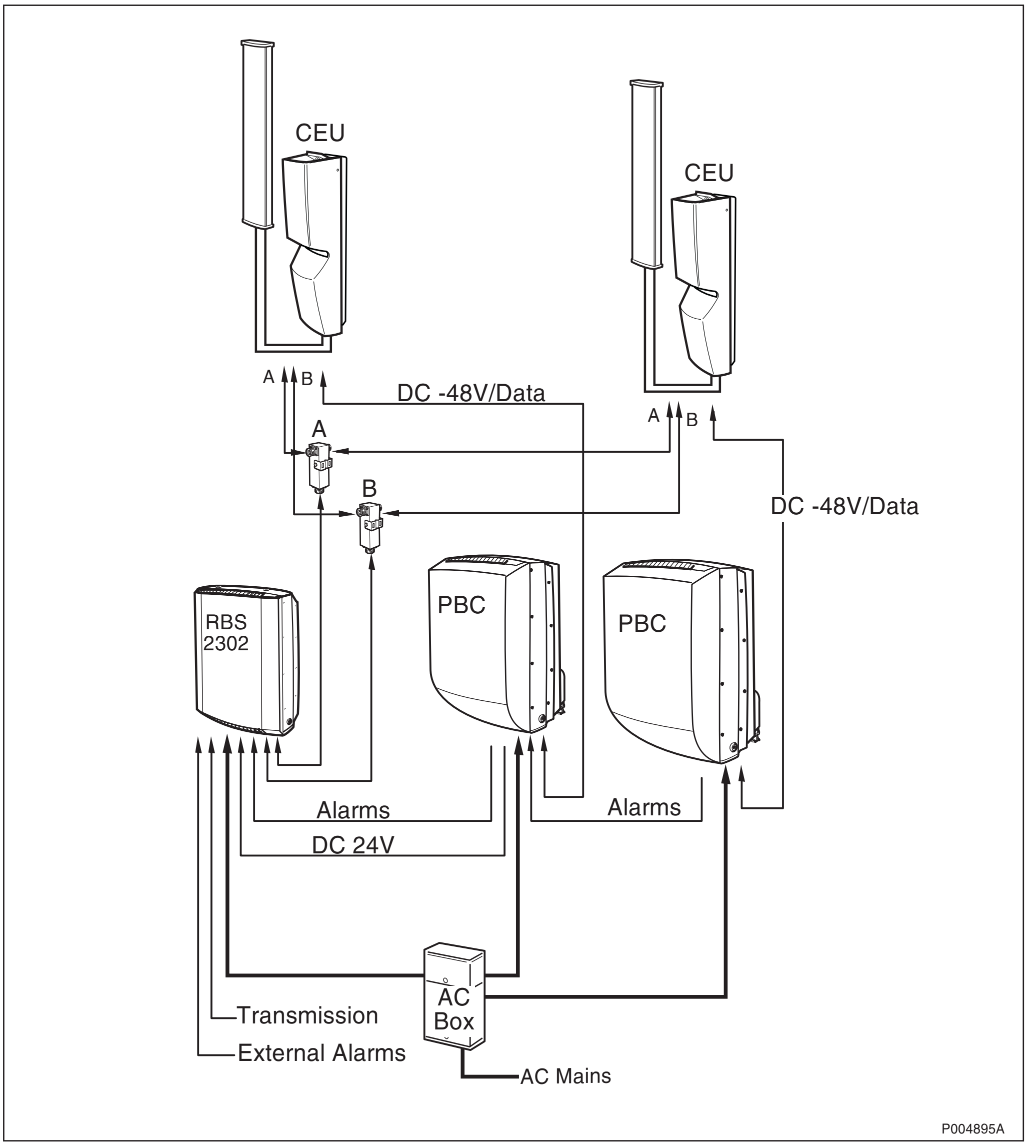

Figure 50 Highway configuration

A special configuration is a “highway” configuration. This means that the antenna signals from a two TRX configuration is distributed to two antennas mounted back-to-back.

The resulting coverage is something like a “figure-eight” that can cover, for instance, a country-side road. It will consist of:

- two CEU
- two dual polarised antennas
- two PBC
- one RBS 2302

4.15 Configurations with AAU, GSM 1800/1900

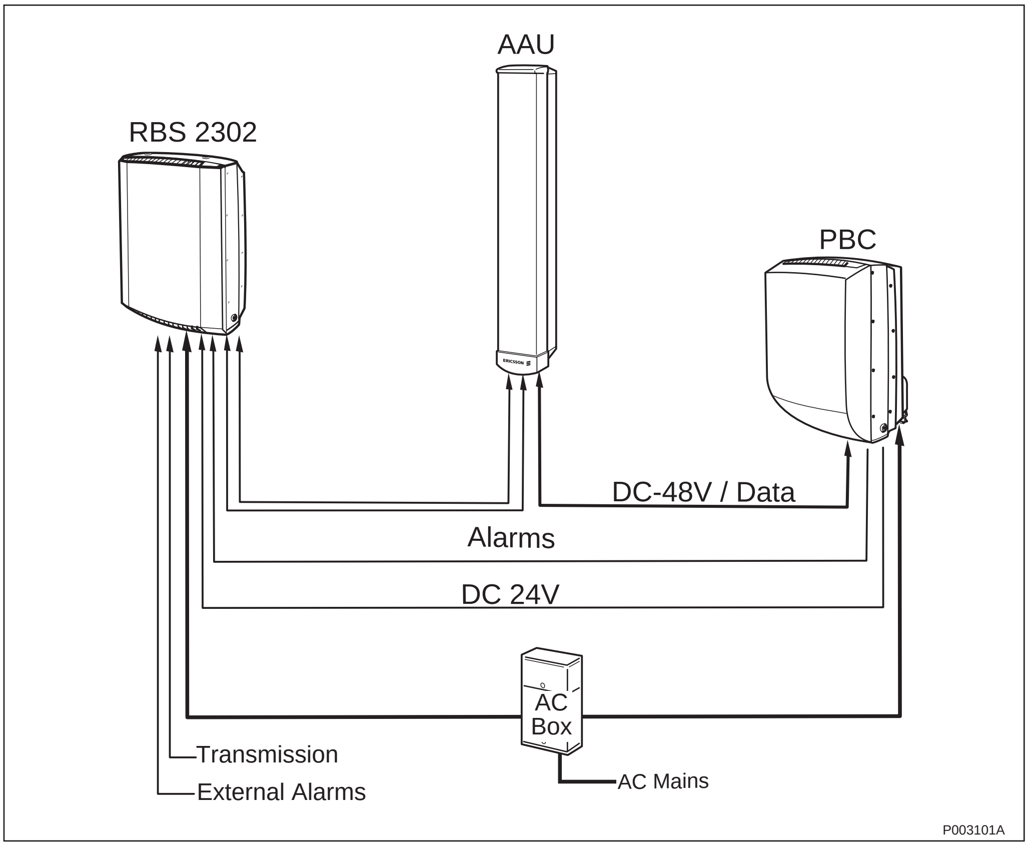

Figure 51 Configuration with 2 TRX

The basic Maxite configuration with AAU, Active Antenna Unit, is a 2 TRX configuration and consists of:

- one AAU
- one PBC
- one RBS 2302

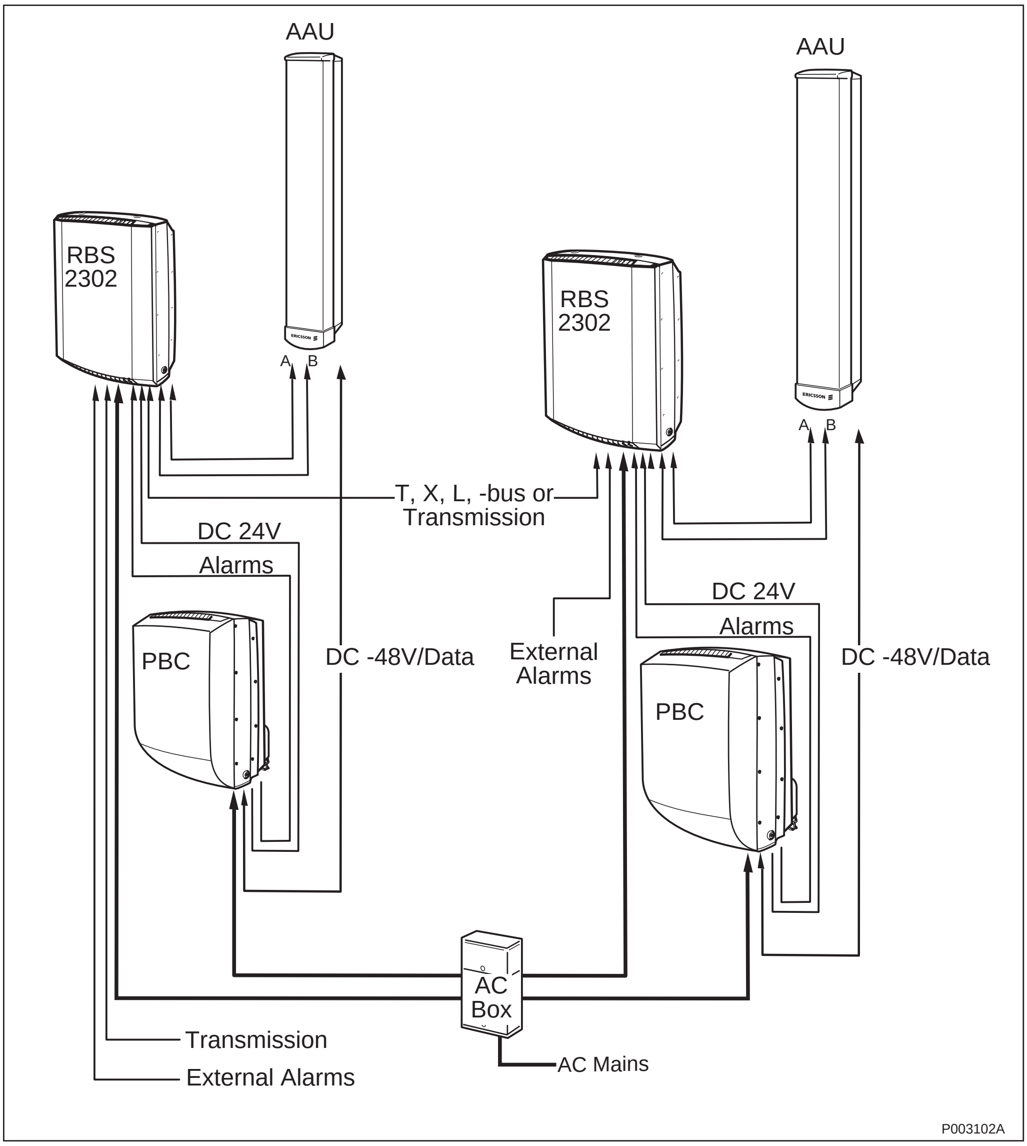

Figure 52 Configuration with 4 TRX

This configuration can be expanded to 4 TRX. The configuration will then consist of:

- two AAU
- two PBC
- two RBS 2302

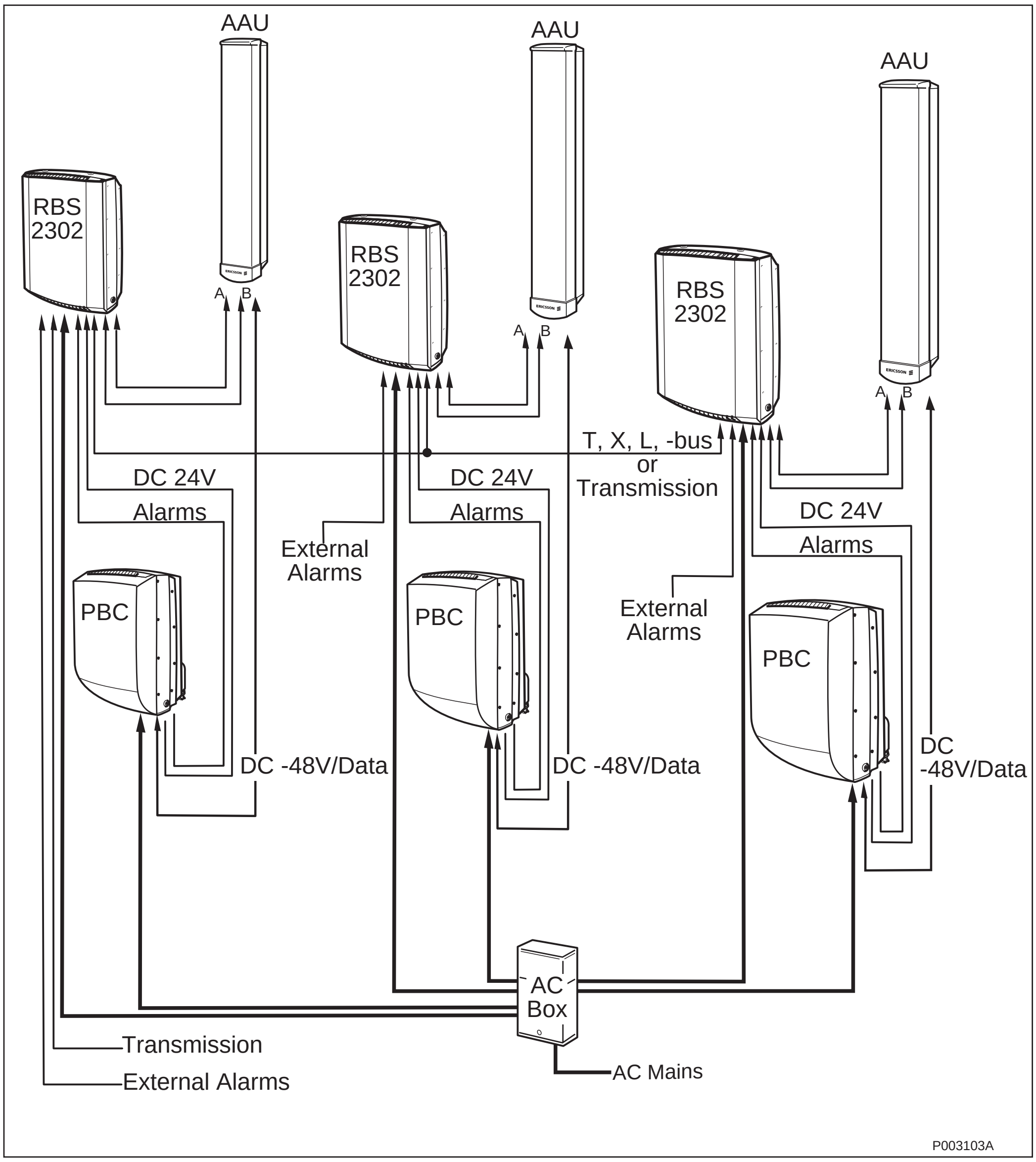

Figure 53 Configuration with 6 TRX

The maximum configuration will be a 6 TRX configuration. It will consist of:

- three AAU
- three PBC
- three RBS 2302

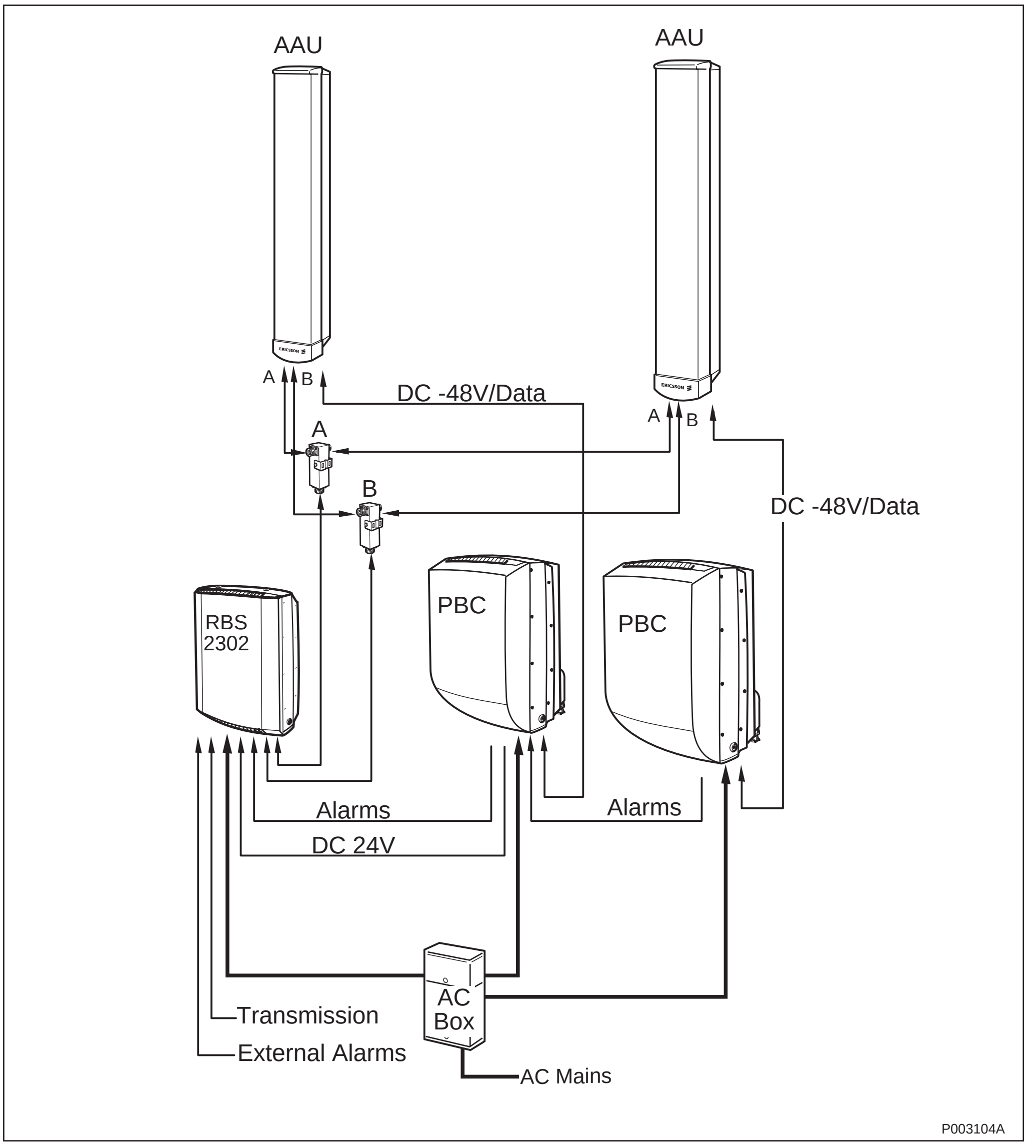

Figure 54 Highway configuration

A special configuration is a “highway” configuration. This means that the antenna signals from a two TRX configuration is distributed to two antennas mounted back-to-back.

The resulting coverage is something like a “figure-eight” that can cover, for instance, a country-side road. It will consist of:

- two AAU
- two PBC
- one RBS 2302

5 Installation of Antenna Units

5.1 Preconditions

5.1.1 General

Ensure that the following conditions are met:

- Permission to access the site has been granted.
- The ordered antenna equipment including accessories, specified tools and other facilities have been delivered.
- An earth point is available.
- The power supply installation is carried out in accordance with local requirements and, if applicable, in conformity with Canadian Electrical Code (CEC) and National Electric Code (NEC).

Note: When installed outdoors, the Active Antenna Unit (AAU) and Coverage Extension Unit (CEU) must not be left without power for more than 48 hours, in order to prevent damage by moisture.

5.1.2 Documents

Make sure that the following documents are available:

- Site Installation Documentation, prepared by the Installation Engineering Department.

General Installation Instructions *LZN 302 49*

5.1.3 Competence Requirements

In order to do the installation work according to this manual in a safe and professional way, the work shall be done by a skilled person.

The minimum competence requirements are:

- Basic workshop mechanics background.
- Ability to read assembly drawings and cable drawings.
- Basic understanding of technical English.
- Basic knowledge about electrical matters.

5.2 Coverage Extension Unit and Passive Antenna for GSM 900

5.2.1 Preconditions

In order to ensure sufficiant cooling of the CEU, it must be mounted in vertical position as shown in *Figure 55 on page 86*.

Wall-Mounted CEU

- Make sure that the selected fastener is suitable for the type of wall material, on which the CEU is to be mounted.
- Make sure that the wall surface is even.

Pole-Mounted CEU

- To mount the CEU, a vertical tube with a diameter of 60 - 120 mm, must be available.

Passive Antenna

- Passive antenna is not supplied with the CEU, but must be ordered separately or available at site.
- Example of suitable antennas are listed in *Table 16 on page 86*.
- Instruction for connecting antenna cables are included in *chapter Installation of External Cables*.

Table 16 Example of passive antennas

Description	Product Number	
	Ericsson	Manufacturer
Omnidirectional 11 dBi	KRE 101 1399/1	Kathrein 736 347
Dir. 65 deg. X-pol EDT0 15.5 dBi	KRE 101 1797/1	Kathrein 739 622
Dir. 65 deg. X-pol EDT0 17 dBi	KRE 101 1798/1	Kathrein 739 623
Dir. 65 deg. X-pol EDT0 18 dBi	KRE 101 1420/1	Kathrein 739 624

5.2.2 Installation Procedure Overview

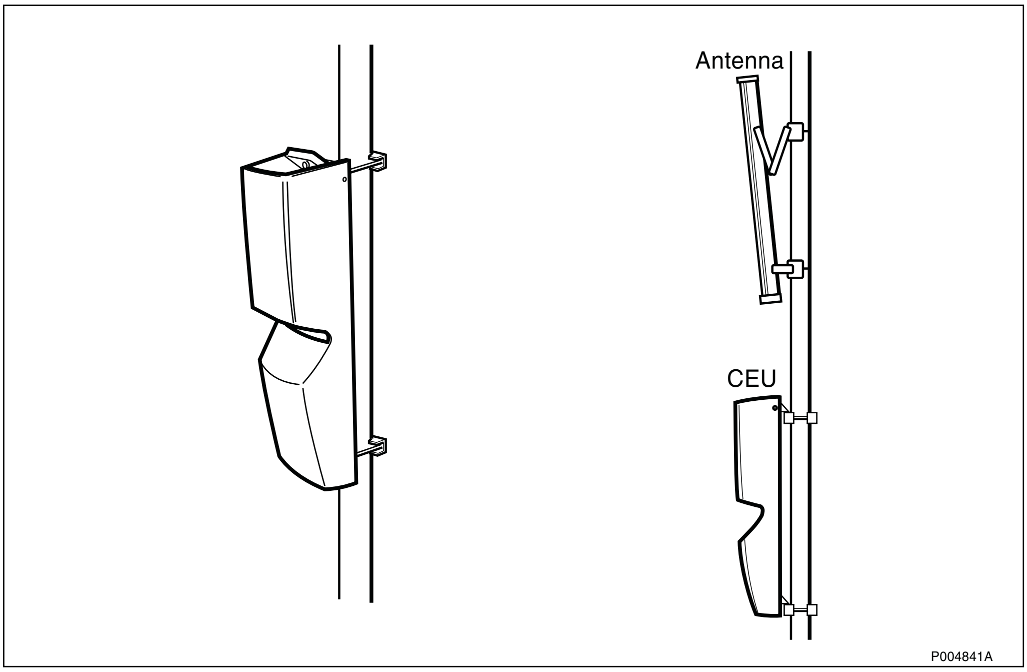

Figure 55 The CEU mounted on a pole

The recommended installation procedure includes the following actions:

- Unpack and then verify against the packing list, that the correct material has been delivered.
- Prepare the CEU for mounting.
- Mount the mounting fixture on a wall, pole or mast.
- Hoist the CEU.
- Mount the CEU on the mounting fixture.

5.2.3 Measures before Installation

Unpacking

Unpack and ensure that the correct material has been delivered. If the material is damaged, make an immediate complaint to the supervisor/ transport company.

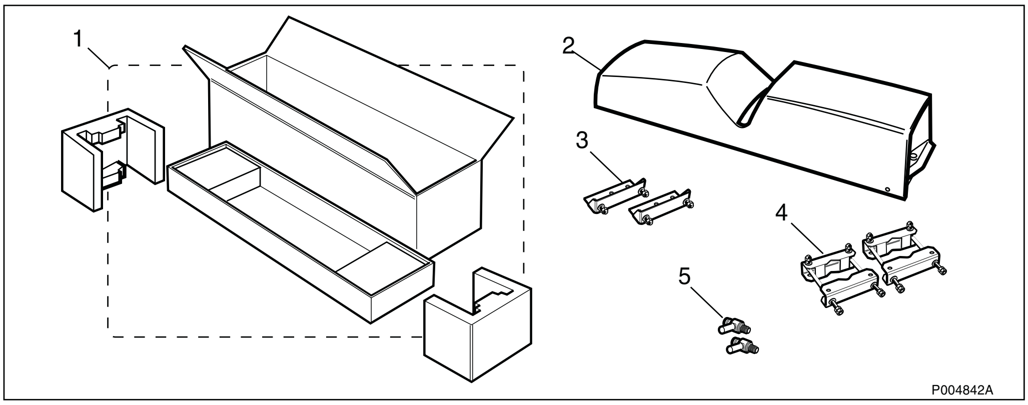

Figure 56 Contents of the CEU package

- Transport box
- Coverage Extension Unit (CEU)
- Upper and lower wall bracket (Optional)
- Mounting fixtures for pole mounting (Optional)
- RF Lightning protectors (Optional)

Handling the CEU

- Always handle the CEU with care.
- Do not place the CEU upright resting on its connectors.

5.2.4 Mounting the CEU

WARNING

⚠

Read the Safety chapter regarding handling of heavy goods.

WARNING

⚠

Some working areas involve the risk of accidents caused by falling objects.

Tools

The required tools for mounting the CEU are listed in *chapter Tools and Instruments*.

Tightening Torque

Tightening torque for screws and nuts:

Thread diameter	Torque		Remarks
	lbf-ft	Nm	
M8	15.5 ± 1.0	21 ± 1.3	Earthing screw[1)]
M10	30.2 ± 1.8	41 ± 2.5	Screws and nuts

1) *See chapter Installation of External Cables*

The CEU Prepared for Mounting

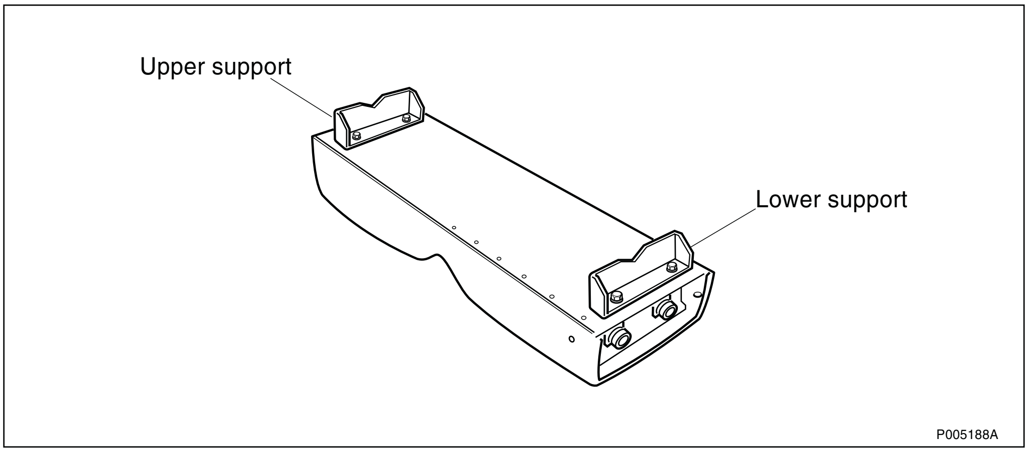

Figure 57 Definition of upper and lower angle support

Mounting the CEU on a Pole or Mast

1. Attach the lower mounting fixture to the lower angle support, and tighten the nuts. Tightening torque according to *page 88*.

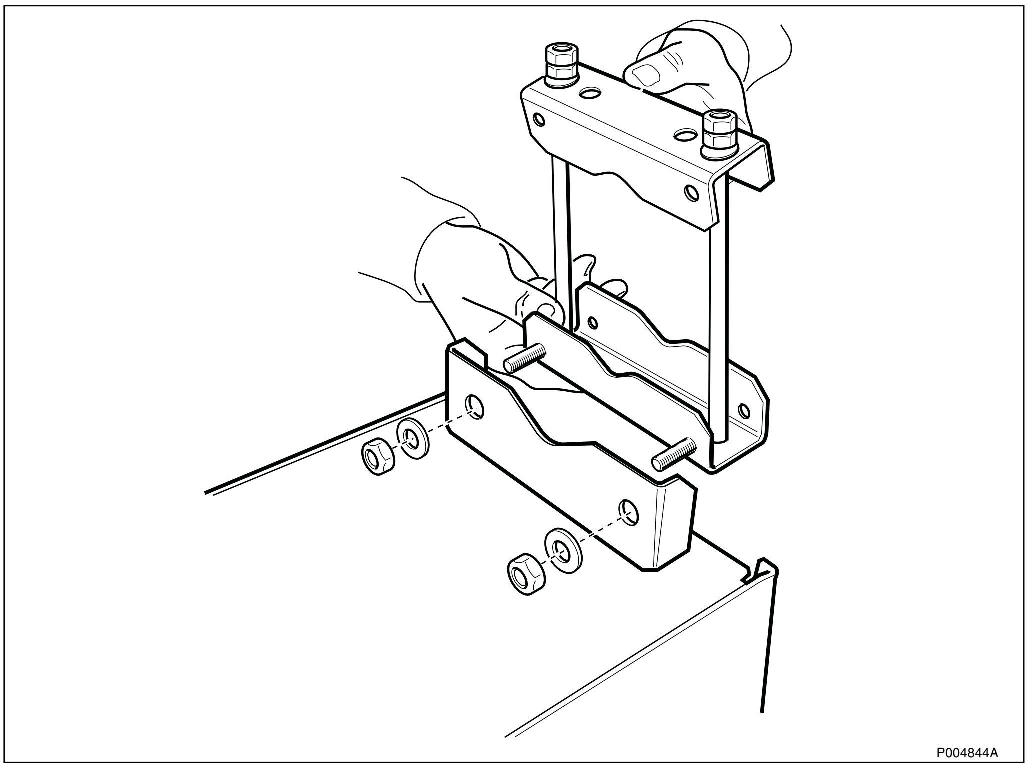

Figure 58 Mounting the lower mounting fixture with nuts and washers

2. Place the upper mounting fixture in correct position on the pole.

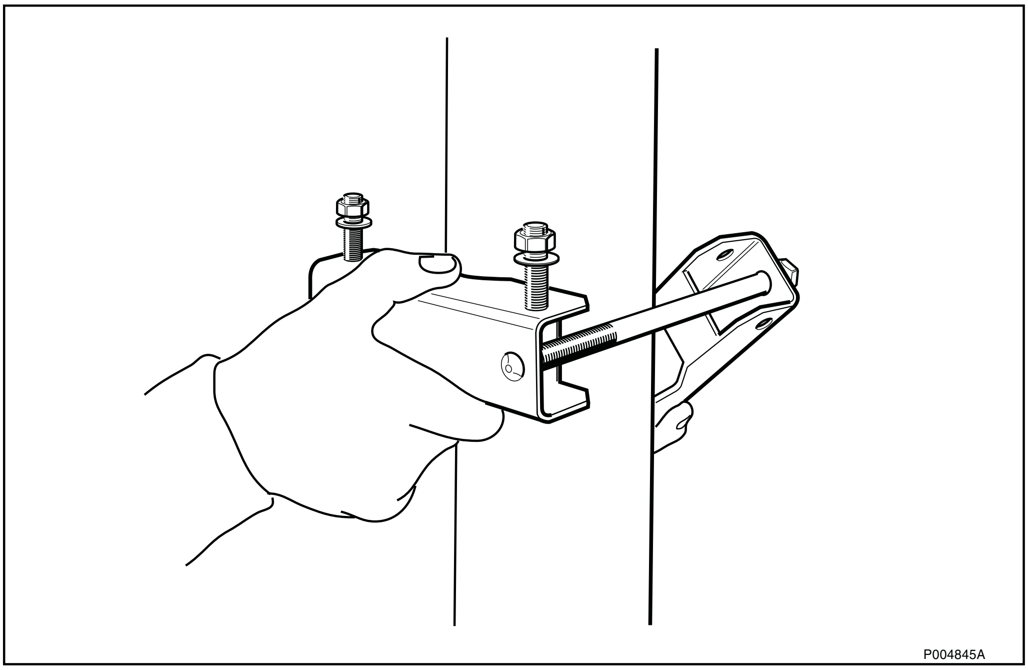

Figure 59 Placing the upper mounting fixture on the pole

3. Fasten the mounting fixture to the pole. Tightening torque according to *page 88*.

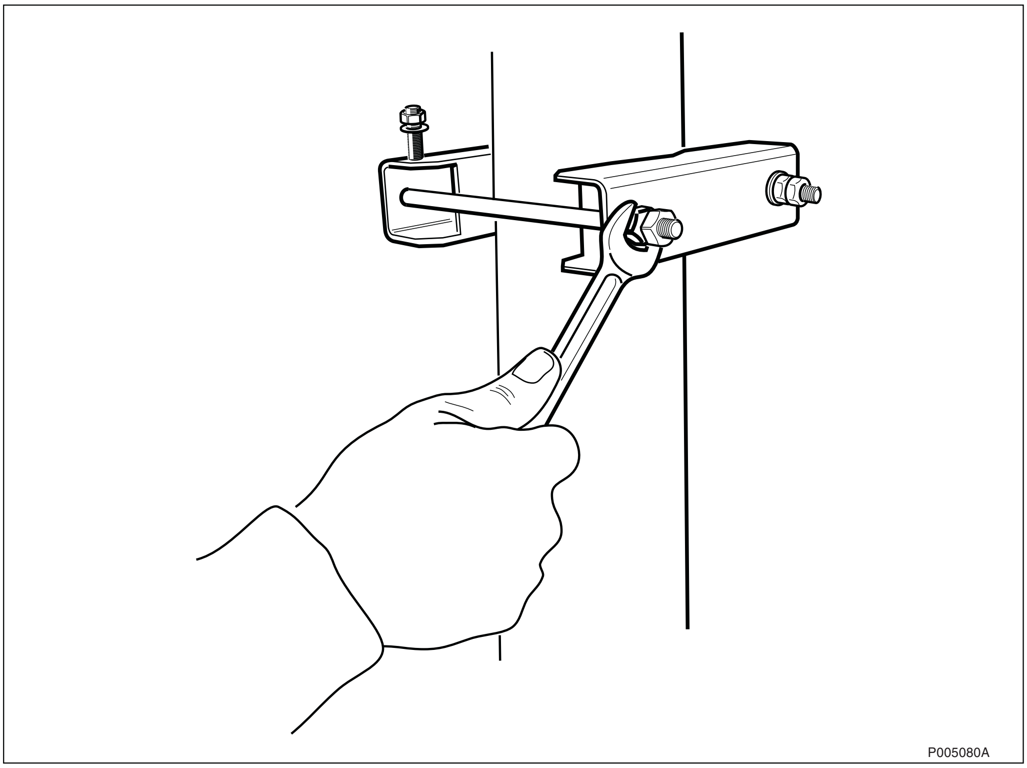

Figure 60 Fastening the upper mounting fixture

4. Prepare the CEU for hoisting by loosening the clamp on one of the clamp bolts.

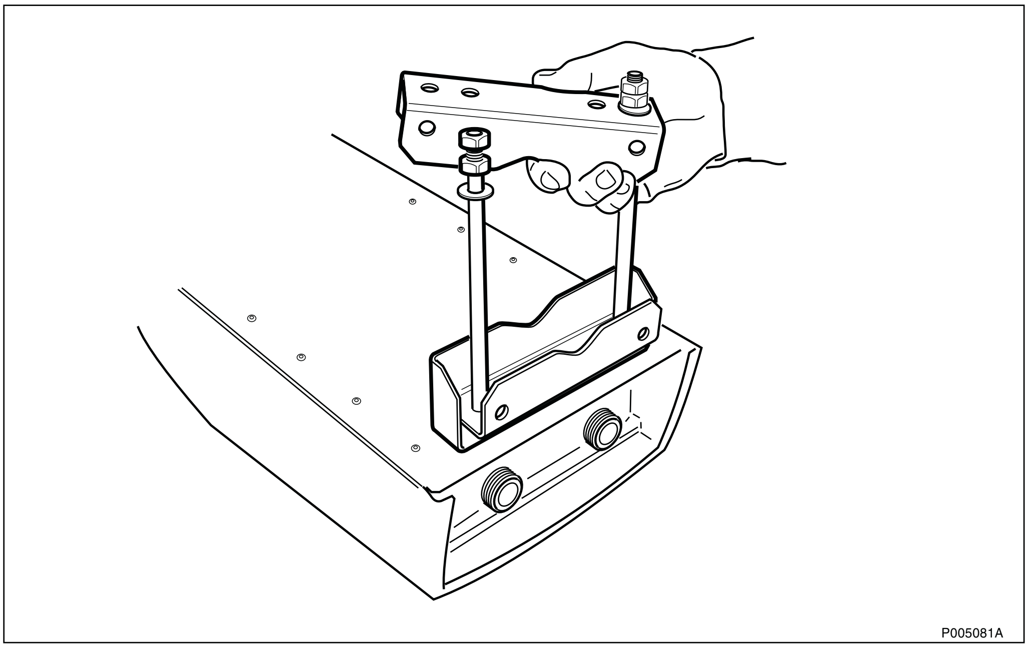

Figure 61 Preparing the CEU for hoisting

5. Connect a lifting rope to the handle bar at the upper end of the CEU, and a control rope to the lower end.

Note: Never use the handle bar in the middle of the CEU to hoist the unit.

6. Control the CEU, using the control rope, to avoid damaging contact with any object while the CEU is hoisted up.

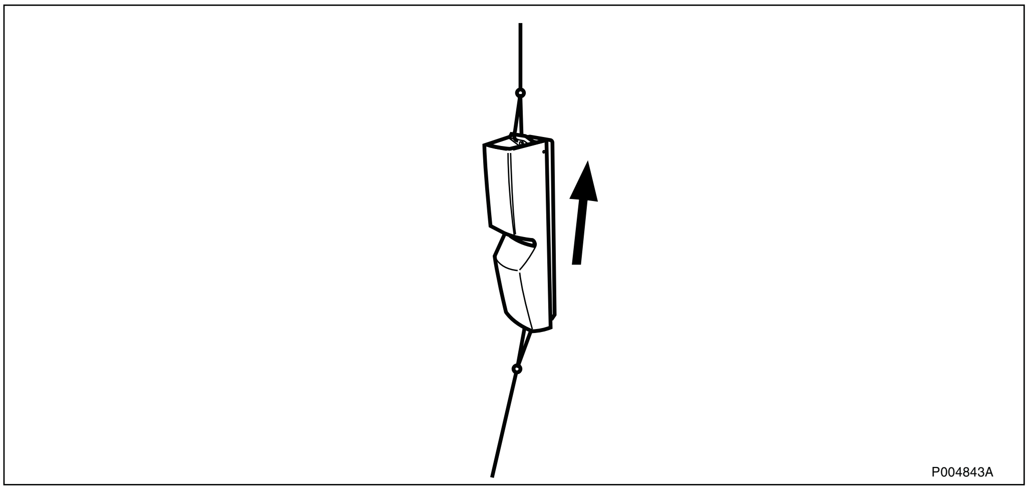

Figure 62 Using the control rope to control the CEU when hoisted

7. Placing the CEU on the upper mounting fixture:

1. Remove the nuts and washers from the stud bolts.
2. Hook on the CEU to the stud bolts.
3. Remount washers and nuts on the stud bolts.

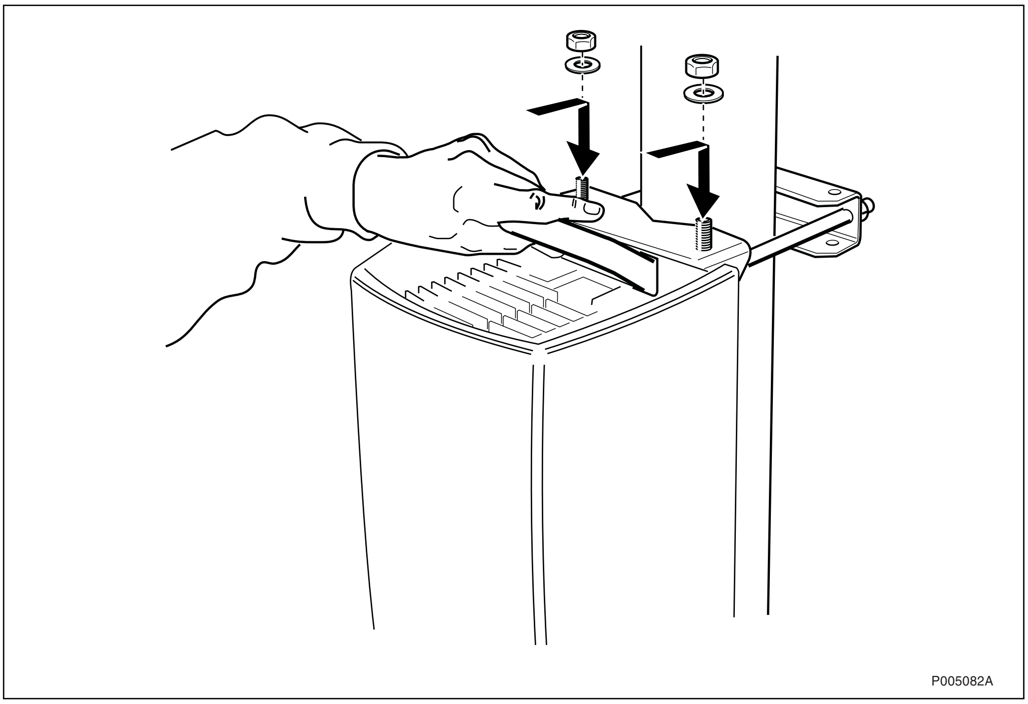

Figure 63 The CEU hooked on to the stud bolts on the upper mounting fixture

8. Mount the lower mounting fixture:

   1. Put the loose end of the clamp on the clamp bolt, and mount washer and nut.
   2. If necessary, adjust the position of the CEU.
   3. Tighten the nuts. Tightening torque according to *page 88*.

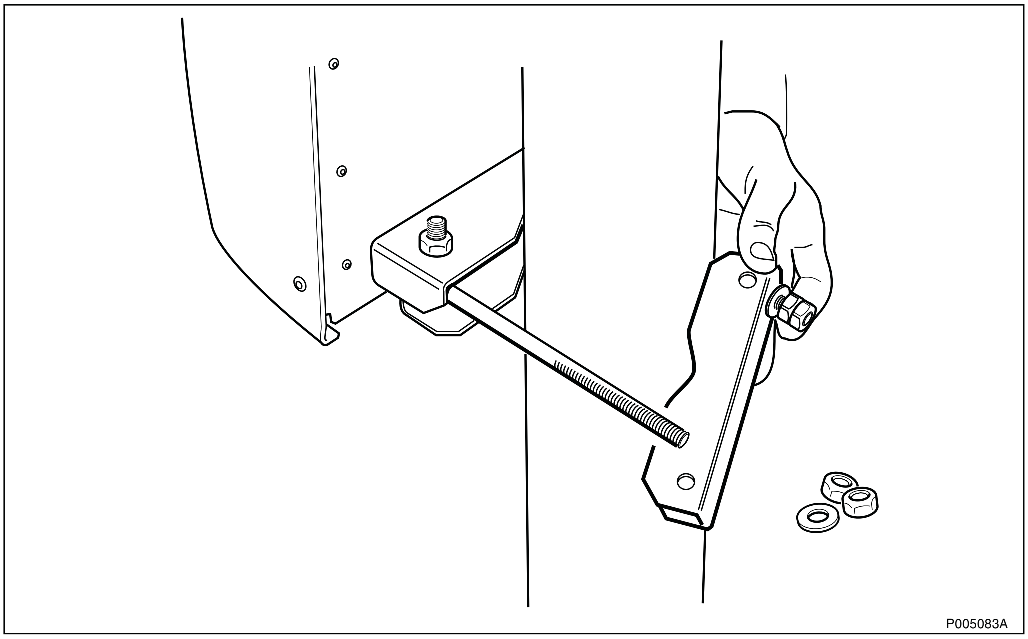

Figure 64 Putting the loose end of the lower mounting fixture clamp in place

9. Fasten the CEU to the upper mounting fixture. Tighten the nuts, tightening torque according to *page 88*.

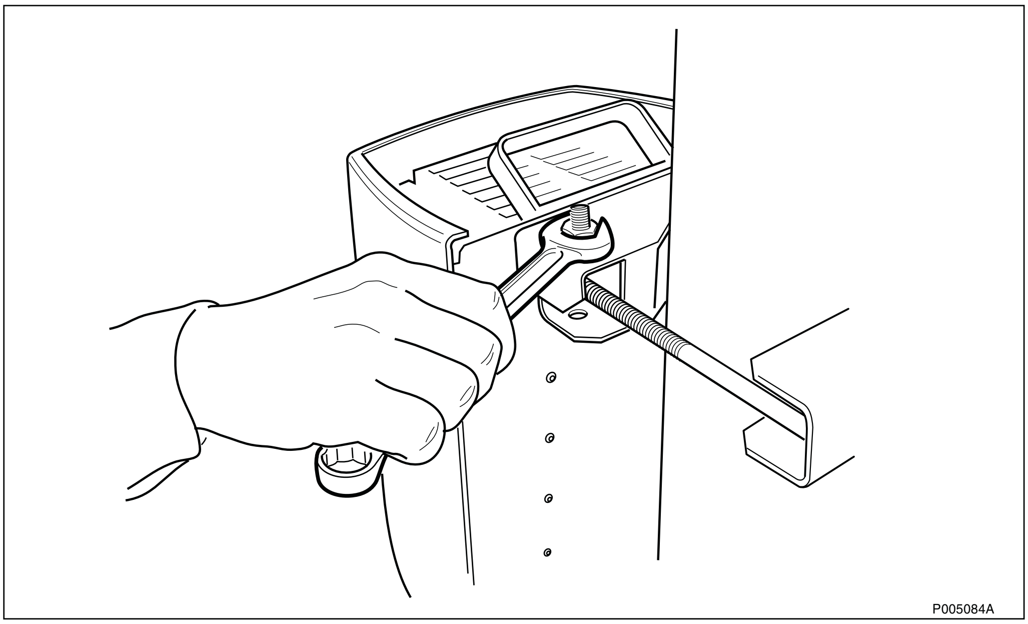

Figure 65 Fastening the CEU to the upper mounting fixture

For connecting the RF feeder cable, DC/Data cable and earthing cable, *see chapter Installation of External Cables*.

Mounting the CEU on a Wall

1. Place the upper wall bracket in the correct position, using a spirit level to ensure the bracket being mounted horisontally. Mark the position for the fasteners, using the bracket as a template.

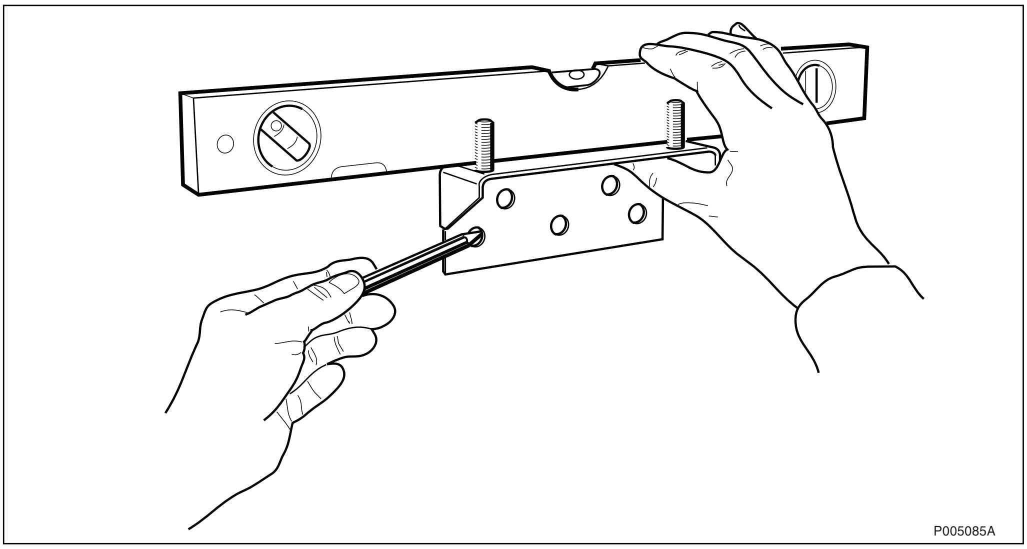

Figure 66 Positioning the upper wall bracket using a spirit level

2. Put away the bracket, and drill holes for the fasteners to be used.

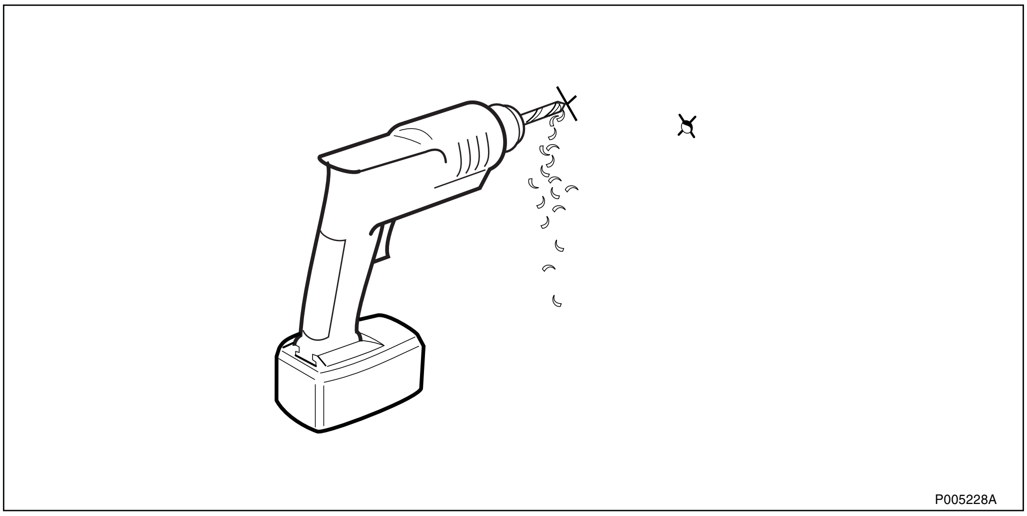

Figure 67 Drilling holes for the fasteners

3. Mount the fasteners for the upper wall bracket, and tighten the screws.

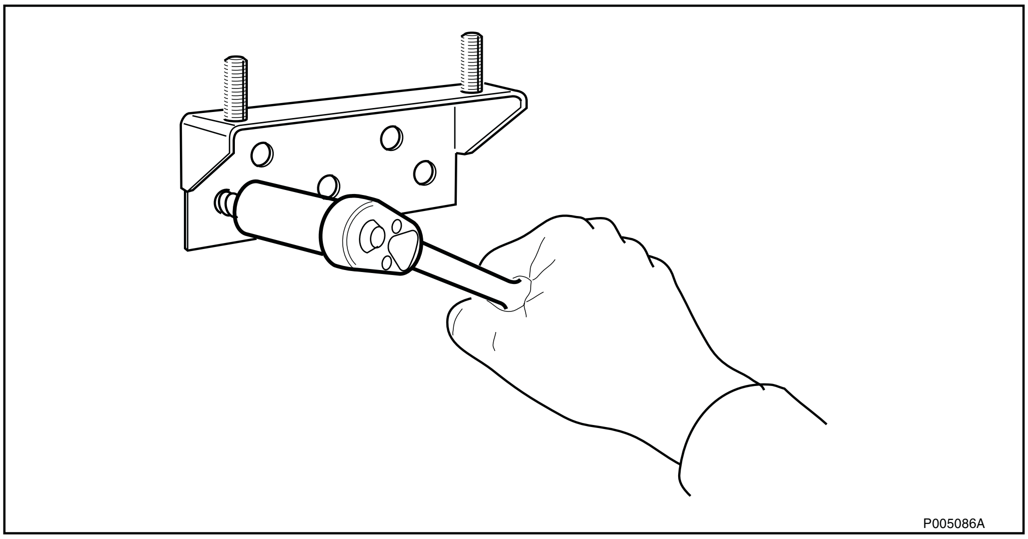

Figure 68 Fastening the upper mounting bracket to the wall

4. Fasten the lower wall bracket to the lower angle support of the CEU:

   1. Mount washer and nut on the two stud bolts on the bracket.
   2. Tighten the nuts according to *page 88*.

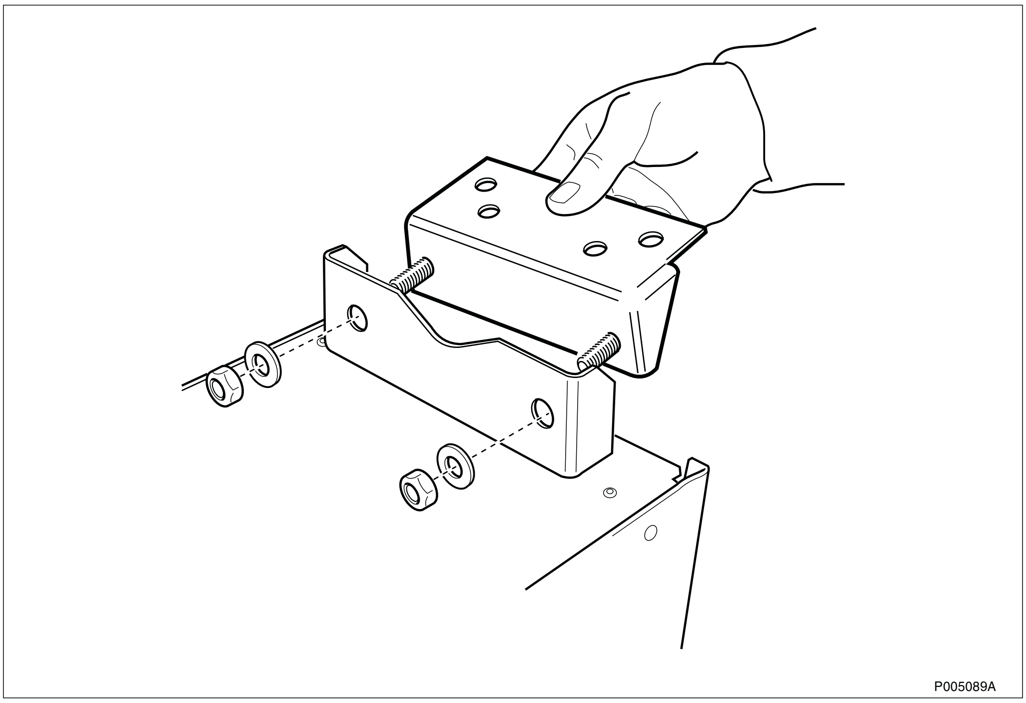

Figure 69 Mounting the lower mounting bracket on the CEU

5. Hook on the CEU to the stud bolts on the upper wall bracket.

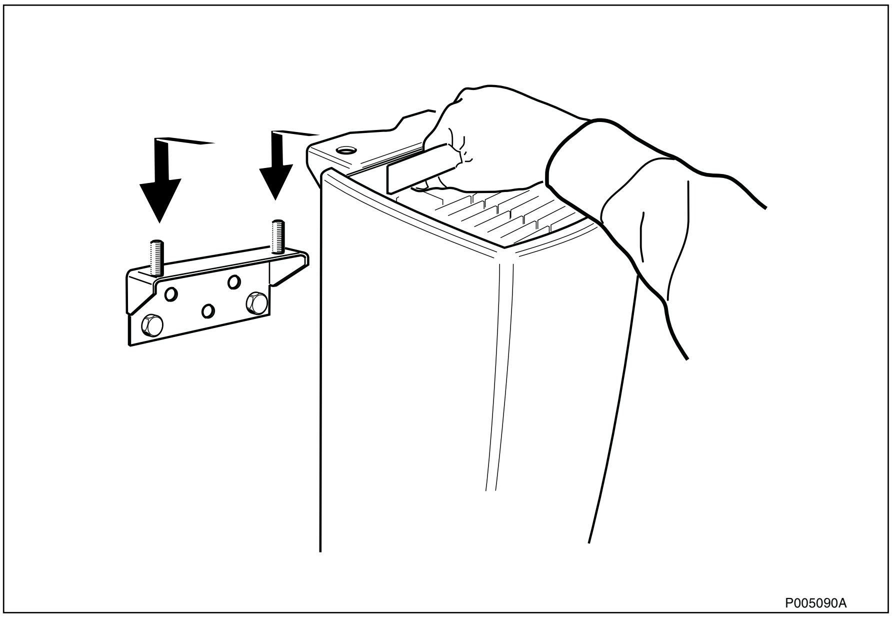

Figure 70 Placing the CEU on the wall bracket

6. Mark the position of the two most suitable holes in the bracket.

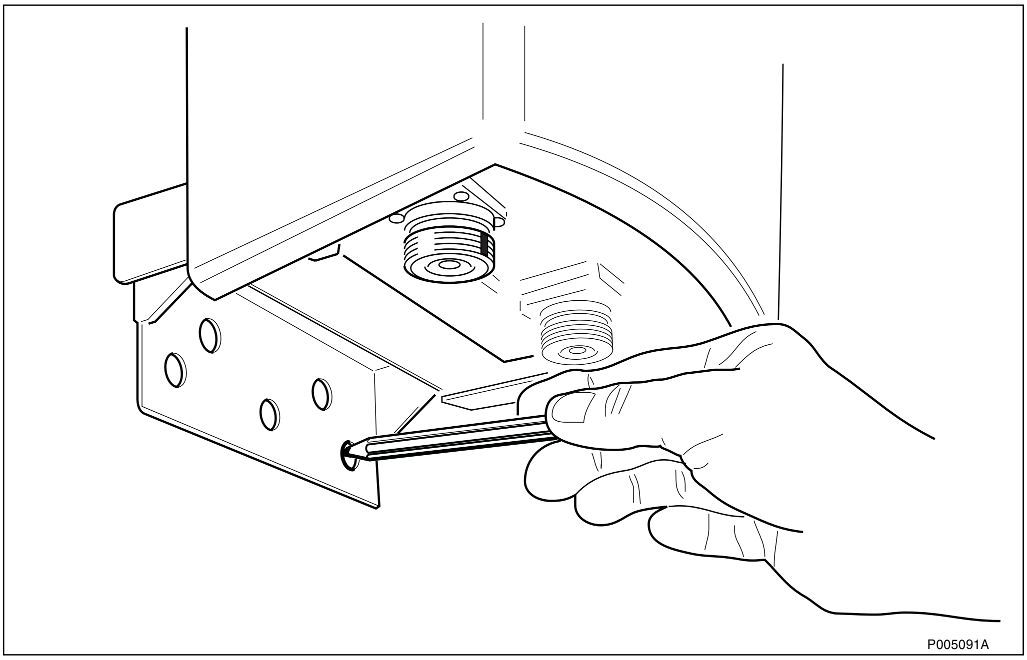

Figure 71 Using the lower wall bracket as a template

7. Take the CEU off the upper wall bracket.

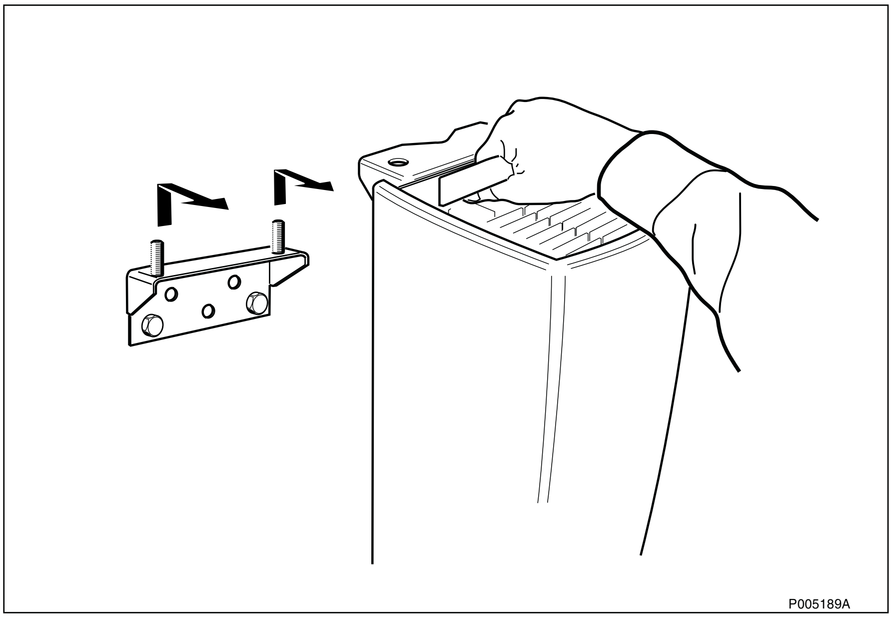

Figure 72 Removing the CEU from the wall bracket

8. Drill holes for the fasteners to be used for the lower wall bracket.

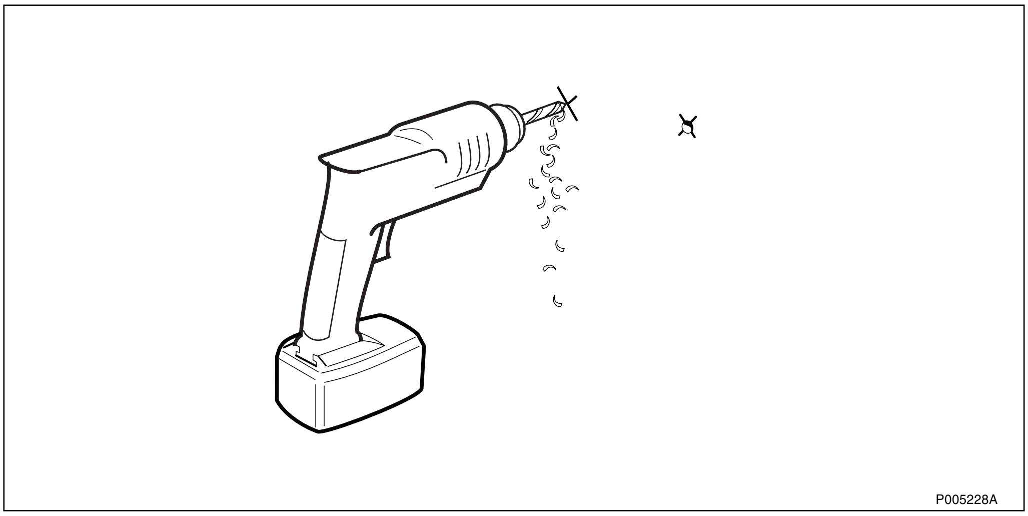

Figure 73 Drilling holes for the fasteners

9. Hook on the CEU to the stud bolts on the upper wall bracket.

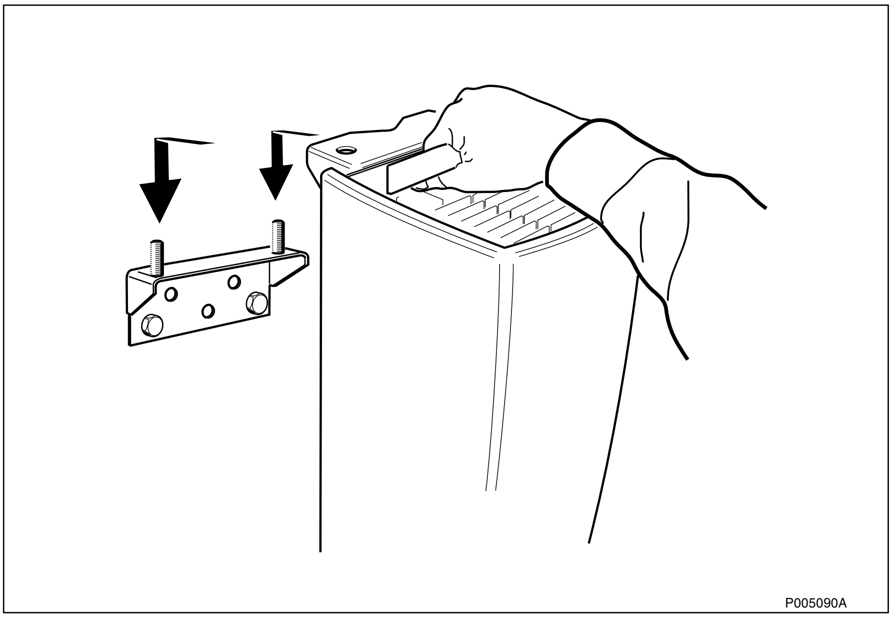

Figure 74 Placing the CEU on the upper wall bracket

10. Mount the fasteners for the lower wall bracket, and tighten the screws.

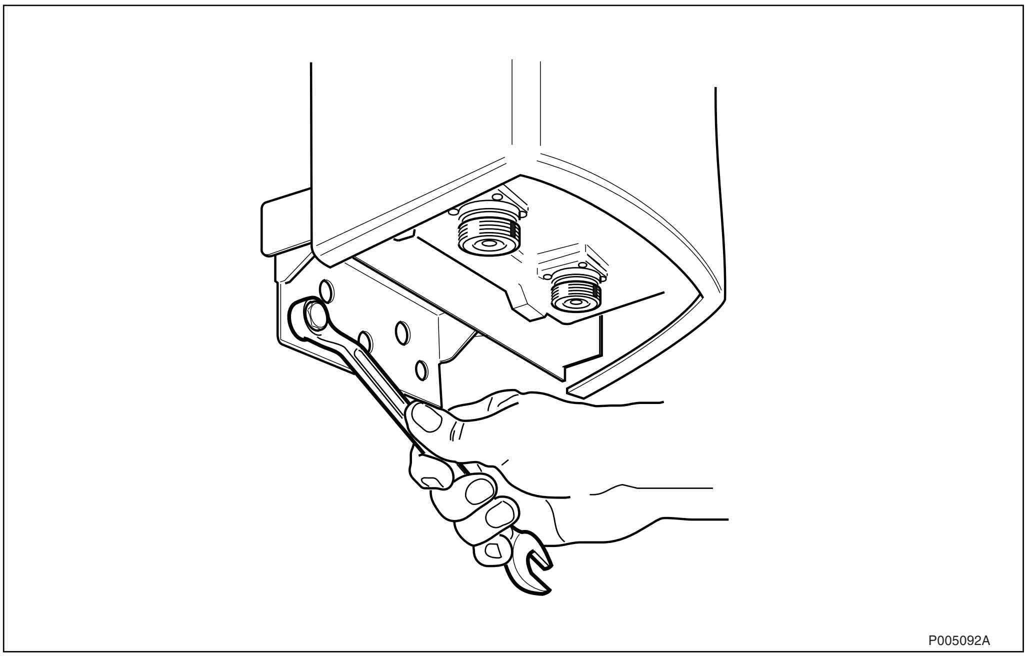

Figure 75 Fastening the lower wall bracket to the wall

11. Fasten the CEU to the upper wall bracket:

    1. Mount washer and nut on the two stud bolts on the bracket.
    2. Tighten the nuts according to *page 88*.

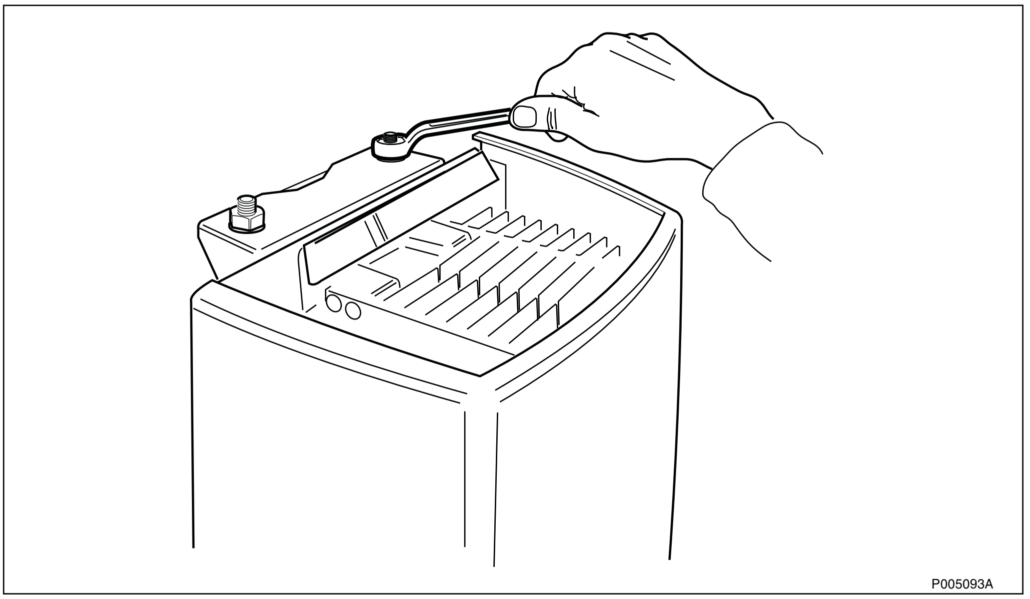

Figure 76 Fastening the CEU to the upper wall bracket

For connecting the RF feeder cable, DC/Data cable and earthing cable, *see chapter Installation of External Cables*.

5.2.5 Optional RF Lightning Protectors

1. Connect the two RF lightning protectors to the RF connectors on the CEU.

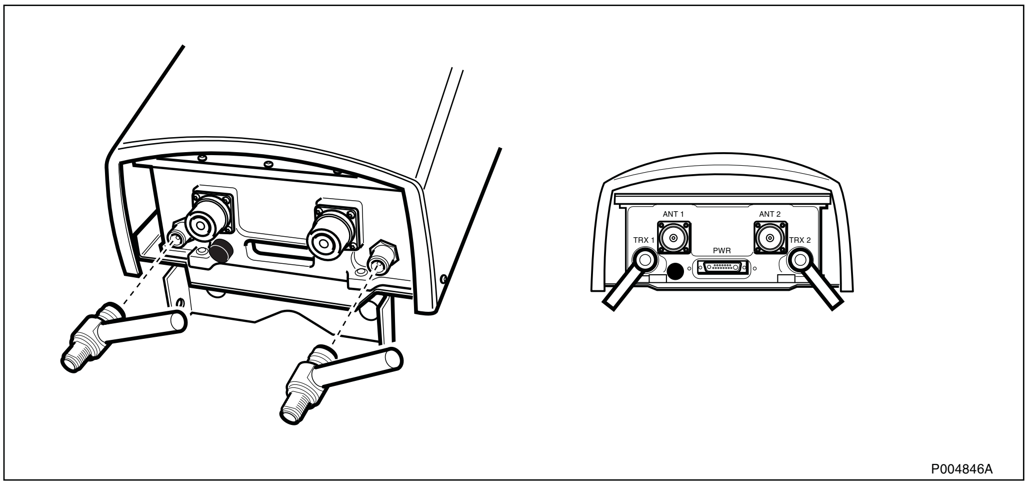

Figure 77 Connecting the RF lightning protectors

5.3 Active Antenna Unit (AAU) for GSM 1800, 500 W EIRP

5.3.1 Preconditions

Wall-Mounted Antenna

- Make sure that the selected fastener is suitable for the type of wall material, on which the antenna is to be mounted.
- Make sure that the wall surface is even.

Pole-Mounted Antenna

- To mount the antenna, a vertical tube with a diameter of 50 - 115 mm, must be available.

5.3.2 Installation Procedure Overview

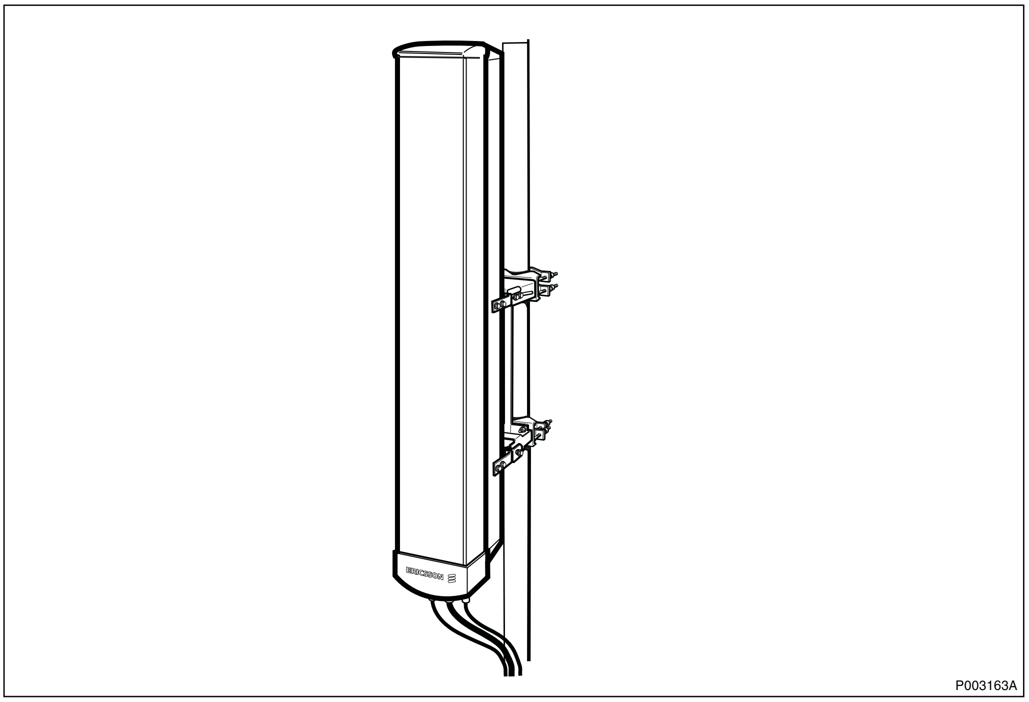

Figure 78 The antenna mounted on a pole

The recommended installation procedure includes the following actions:

- Unpack and then verify against the packing list, that the correct material has been delivered.
- Prepare the antenna for mounting.
- Mount the mounting fixture on a wall, pole or mast.
- Hoist the antenna.
- Mount the antenna on the mounting fixture.

5.3.3 Unpacking

Unpack and ensure that the correct material has been delivered. If the material is damaged, make an immediate complaint to the supervisor/ transport company.

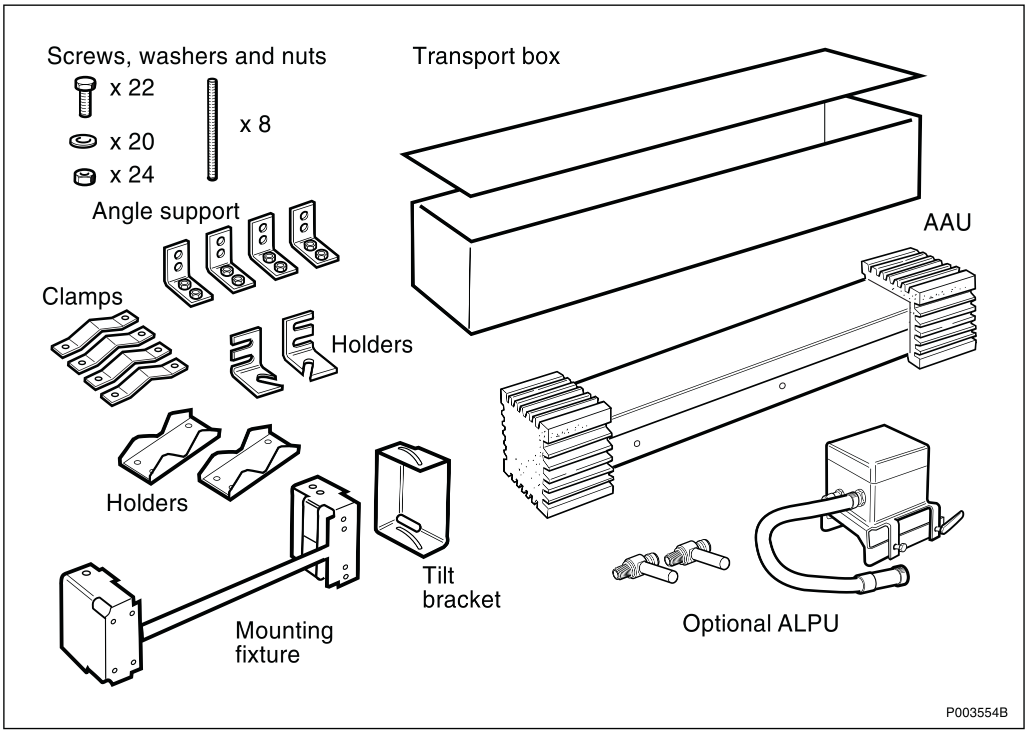

Figure 79   Contents of the antenna package

- Transport box
- Active Antenna Unit (AAU)
- Mounting fixture, complete with:
  - Tilt bracket
  - Angle supports
  - Holders
  - Screws, nuts and washers
  - Clamps
- Optional Antenna Lightning Protection Unit (ALPU)

5.3.4 Handling the Antenna

- The antenna radome is very soft and the antenna elements can be damaged if the radome is pressed against the elements.
- Do not place the antenna in an up-position so that it rests upon its own connectors.
- Keep the protective covers on the antenna ends as long as possible.
- Make sure the antenna is resting on a smooth surface, or is properly supported.

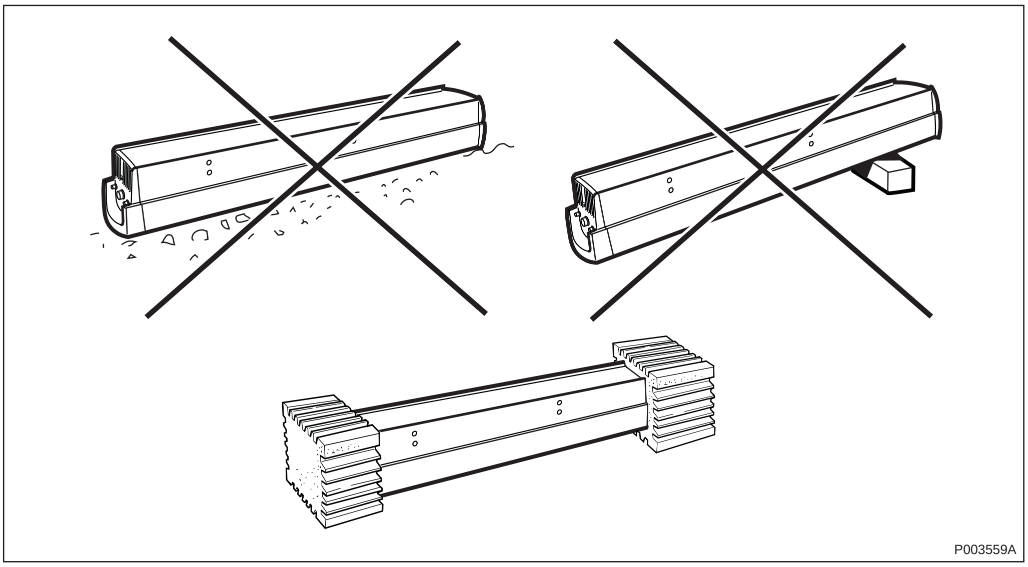

Figure 80 Handle the antenna with care

5.3.5 Mounting the Antenna

WARNING

⚠

Read the Safety chapter regarding handling of heavy goods.

WARNING

⚠

Some working areas involve the risk of accidents caused by falling objects.

Tools

The required tools for mounting the antenna, including eyebolts for lifting, are listed in *chapter Tools and Instruments*.

Tightening Torque

Tightening torque for screws and nuts:

Thread diameter	Torque		Remarks
	lbf-ft	Nm	
M8	15.5 ± 1.0	21 ± 1.3	Earthing screw, ALPU bracket
M10	30.2 ± 1.8	41 ± 2.5	Screws and nuts

Preparation of the Antenna, GSM 1800, 500 W EIRP

1. Lay the antenna in a horizontal position, and fasten the four angle supports with screws, as shown in the figure below. Tighten the screws. Tightening torque according to *page 102*.

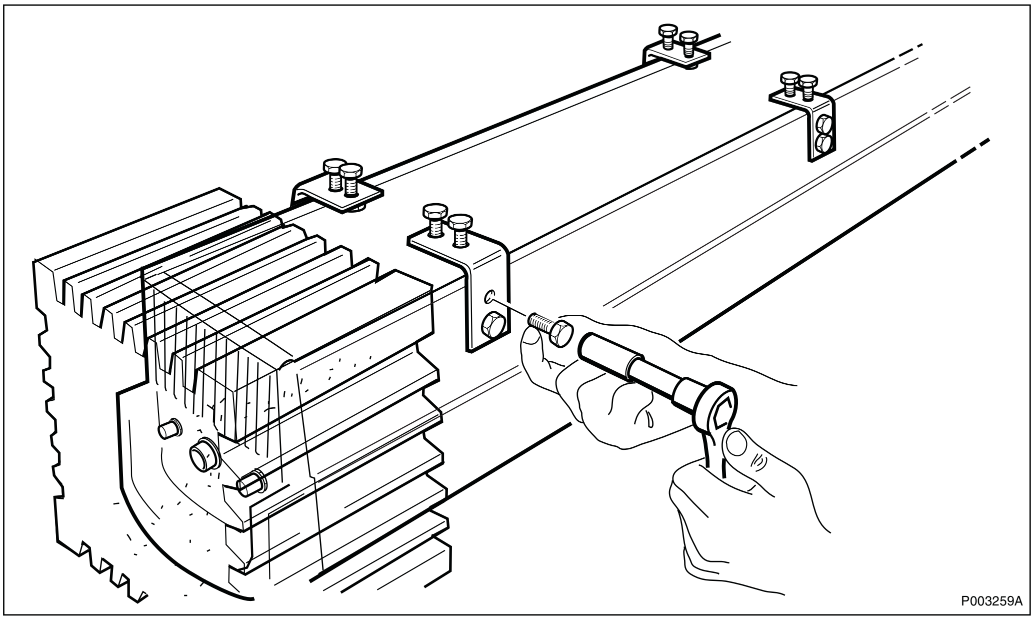

Figure 81 Attaching the angle supports to the antenna

2. Attach the two holders to the lower angle supports, and tighten the screws. Tightening torque according to *page 102*.

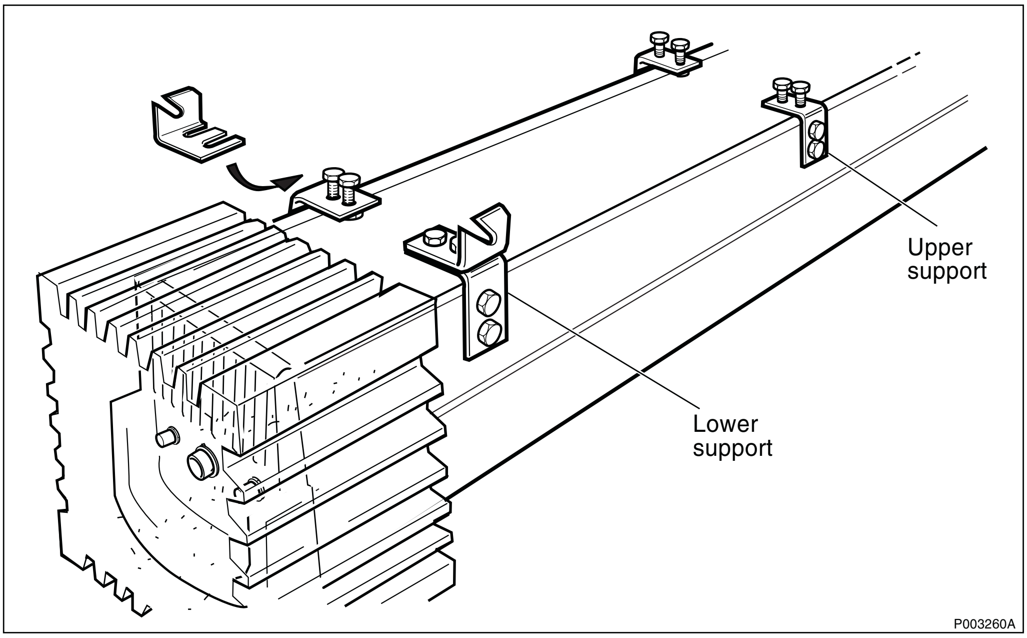

Figure 82 Attaching the two holders to the lower angle supports

3. Unscrew the M8 earthing screw, located on the lower end of the antenna, and screw on an eyebolt.

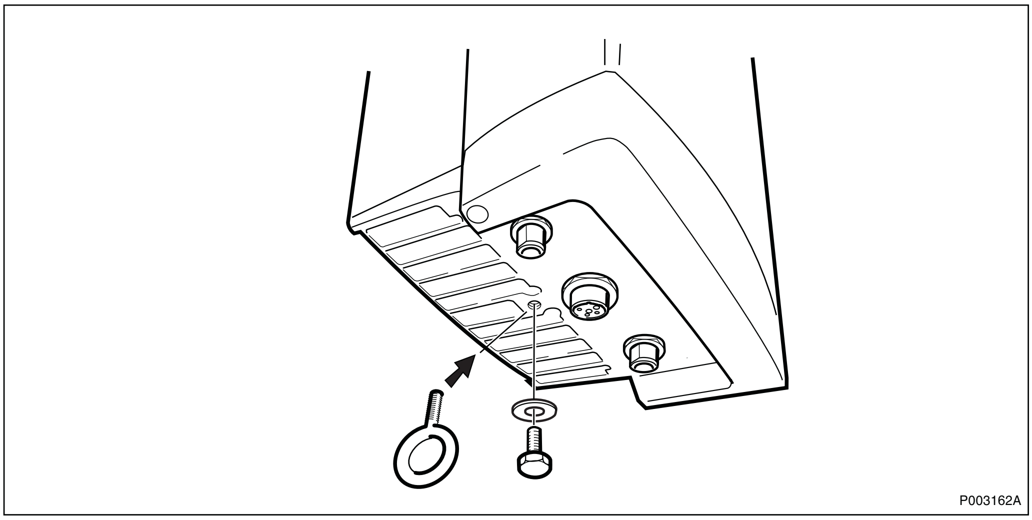

Figure 83 Preparing the lower end of the antenna for lift, by replacing the earthing screw with an eyebolt

4. Unscrew the sealing plug, located on the top of the antenna, and screw on an eyebolt.

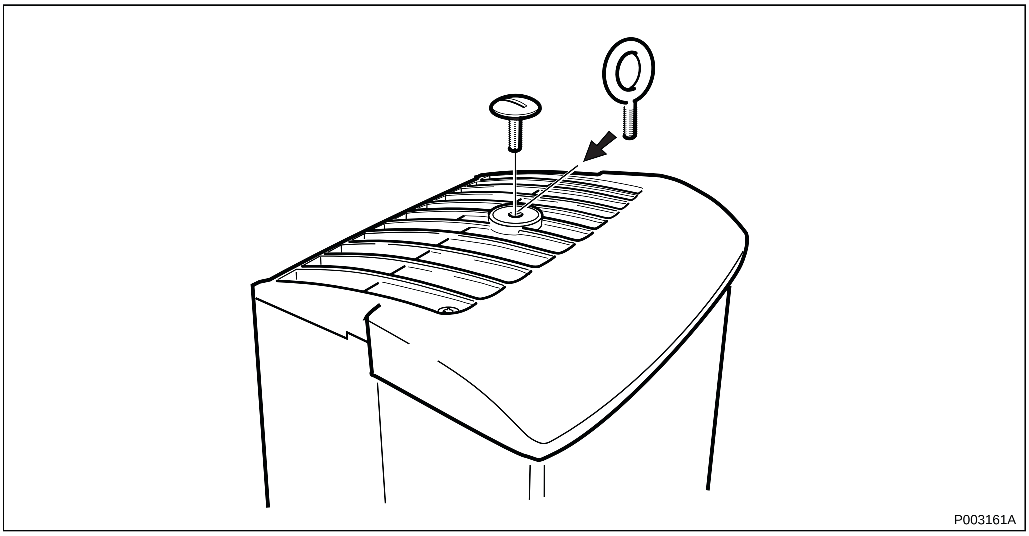

Figure 84   Preparing the upper end of the antenna for lift, by replacing the sealing plug with an eyebolt

Mounting the Mounting Fixture on a Wall

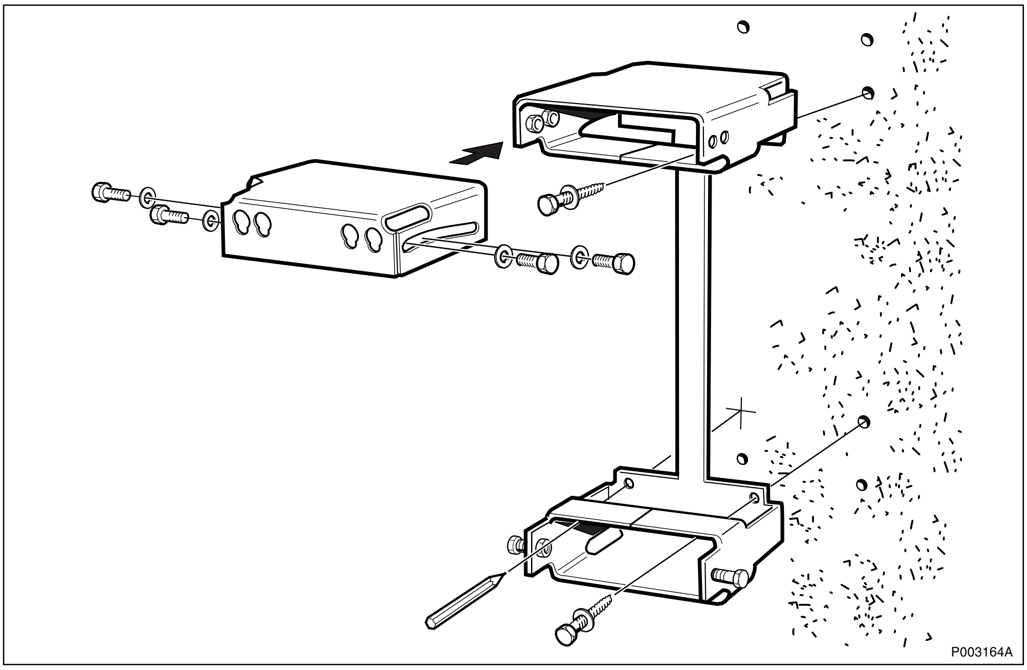

Figure 85   Mounting the mounting fixture assembly on a wall

1. Unscrew the tilt bracket, holders, clamps and the long pin bolts.
2. Stand the mounting fixture against the wall in the position in which it is to be mounted. Use a pen to mark the position of the holes.
3. Drill holes for the type of fasteners best suited for the wall material.
4. Fasten the mounting fixture to the wall.

Note: Ensure that the wall surface is flat. If not, use washers so that the mounting fixture is not mounted crooked.

5. Mount the tilt bracket on top of the mounting fixture. Tighten the screws just enough so that the tilt bracket does not move.

Mounting the Mounting Fixture on a Pole or Mast

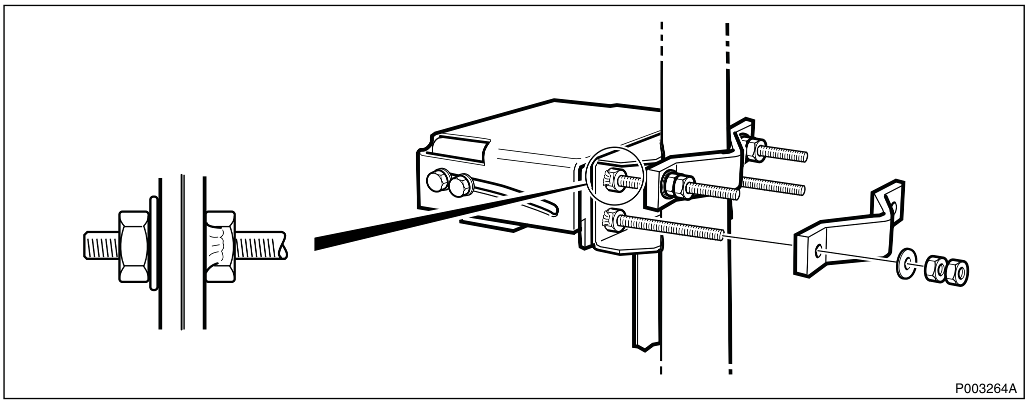

Figure 86 Fastening the mounting fixture using the clamps

Note: Ensure that the long pin bolts are tightened to the fixture before mounting. Tightening torque according to *page 102*.

1. Place the mounting fixture at the correct height on the pole.

2. Attach the mounting fixture to the pole using the clamps. Tighten the nuts alternately (left and right side) in order not to bend the screws. Tightening torque according to *page 102*.

Note: To meet safety requirements for vibrations, it is necessary to use two nuts.

Mounting the Antenna on the Mounting Fixture

Note: The instructions below are valid whether mounting the antenna on a pole, mast or wall (illustrations show a pole-mounted mounting fixture).

1. Connect a lifting rope to the eyebolt on the upper end of the antenna, and a control rope to the eyebolt on the lower end.

Note: Never use the eyebolt on the lower end to hoist the antenna. The number of threads and the material used cannot safely support the weight of the antenna.

2. Control the antenna, using the control rope, to avoid damaging contact with any object while the antenna is hoisted up.

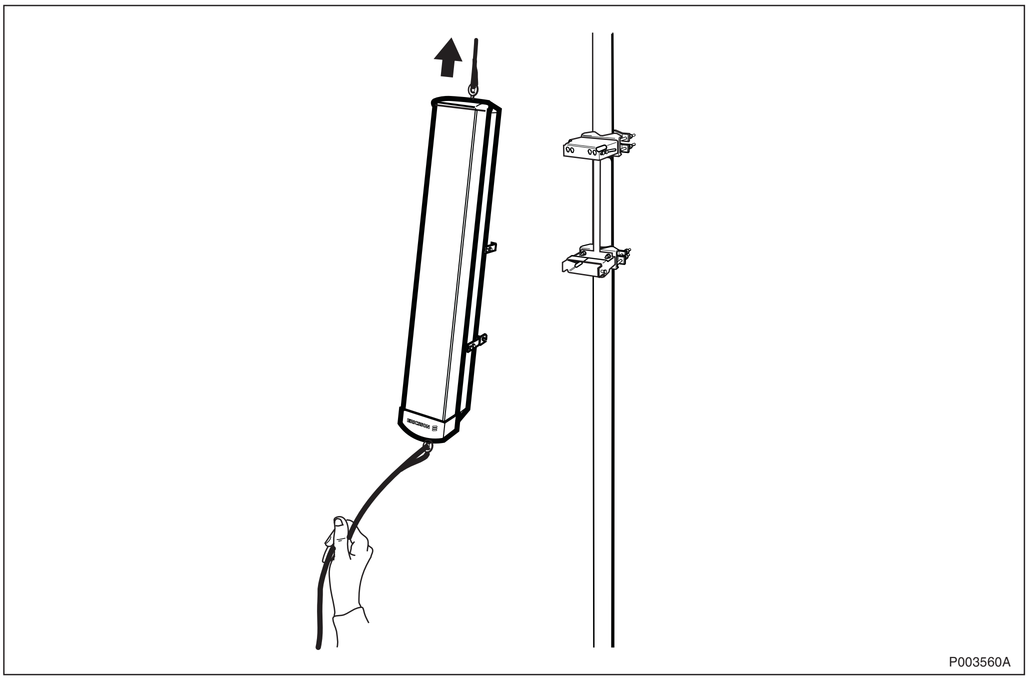

Figure 87 Using the control rope to guide the antenna when hoisted

3. Attach the antenna to the mounting fixture by letting it down slowly on to the supporting screws on the lower part of the mounting fixture.

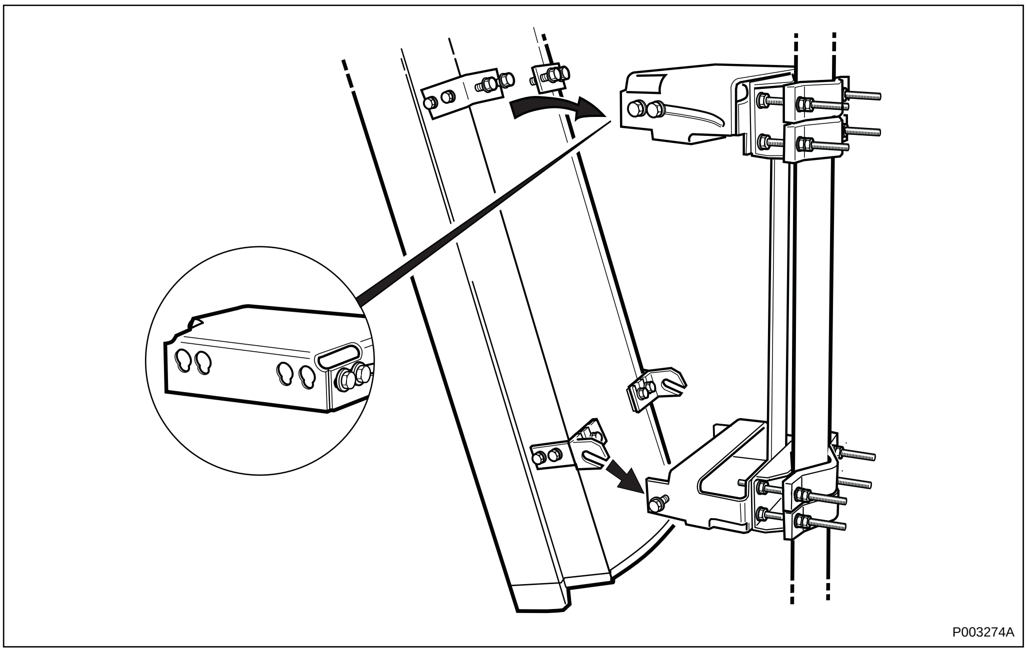

Figure 88 Attaching the antenna to the mounting fixture

4. Raise the antenna slightly, and push it towards the tilt bracket so that the screws slide into the keyholes.

5. If nothing else is stated, adjust the tilt angle of the antenna so that the antenna is vertical.

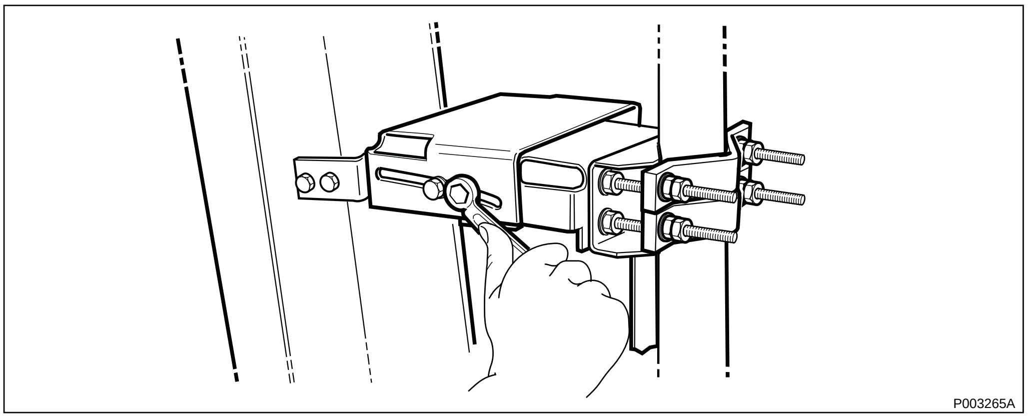

Figure 89 Adjusting the tilt angle

6. Tighten all M10 screws and nuts. Tightening torque according to *page 102*.
7. Replace the eyebolt on top of the antenna with the sealing plug.
8. Replace the eyebolt on the lower end of the antenna with the earthing screw. Tightening torque for the earthing screw according to *page 102*.

For connecting the antenna cables, *see chapter Installation of External Cables*.

5.3.6 Optional Antenna Lightning Protection Unit (ALPU)

The ALPU consists of lightning protectors for DC/Data and RF.

DC/Data Lightning Protector

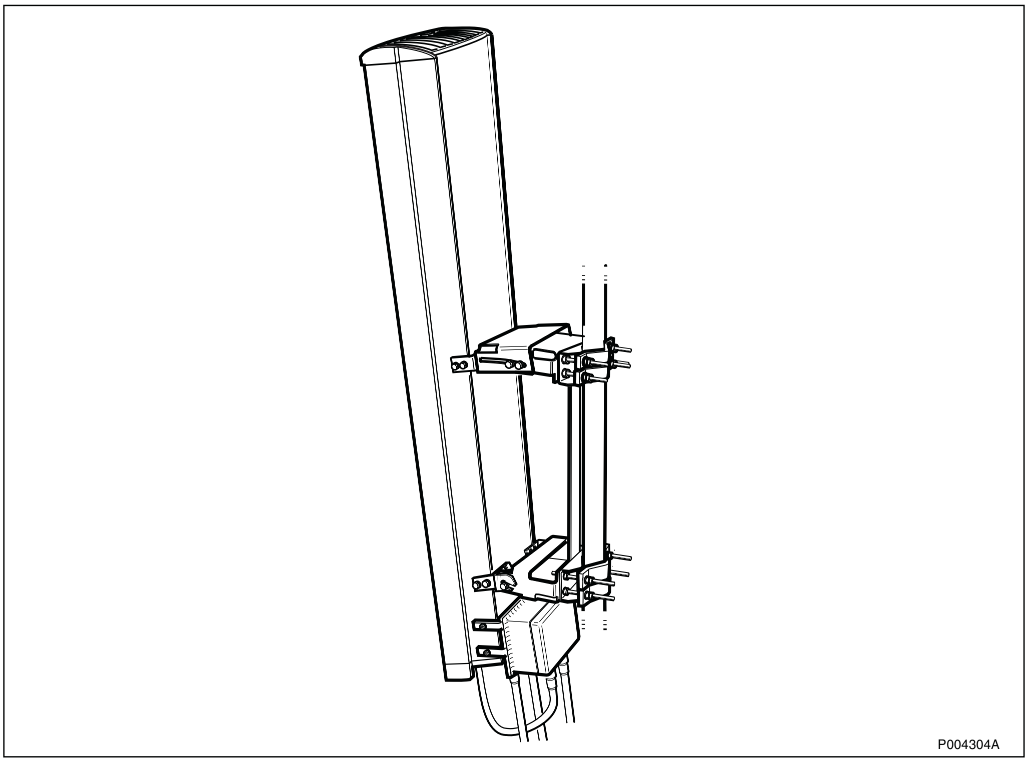

Figure 90 The DC/Data Lightning Protector mounted on the antenna

Note: The DC/Data Lightning Protector can be mounted on the antenna either before or after the antenna has been mounted in its correct position.

1. Remove the protective plastic tape from the mounting holes on the antenna.

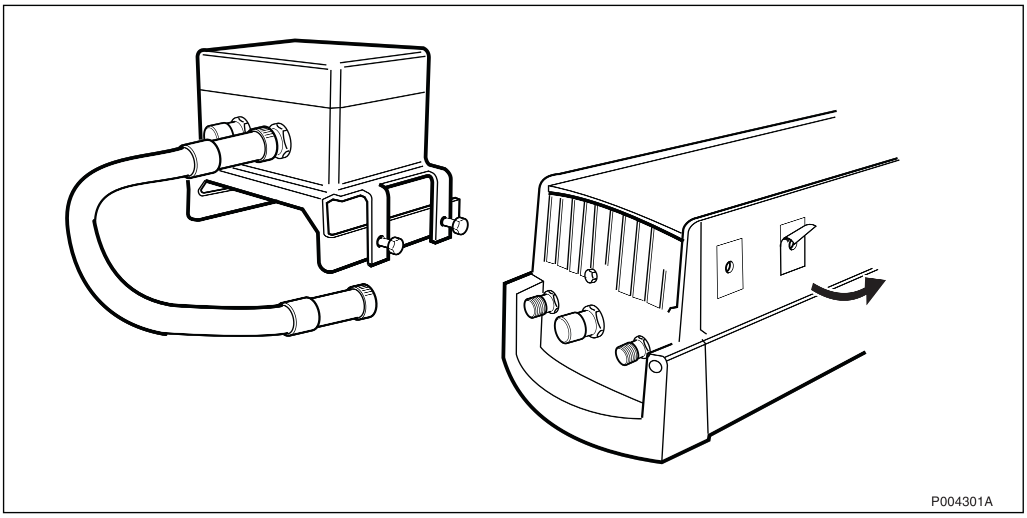

Figure 91 Removing the protective plastic tape

2. Slide the mounting brackets of the DC/Data Lightning Protector into the cooling flanges on the antenna.

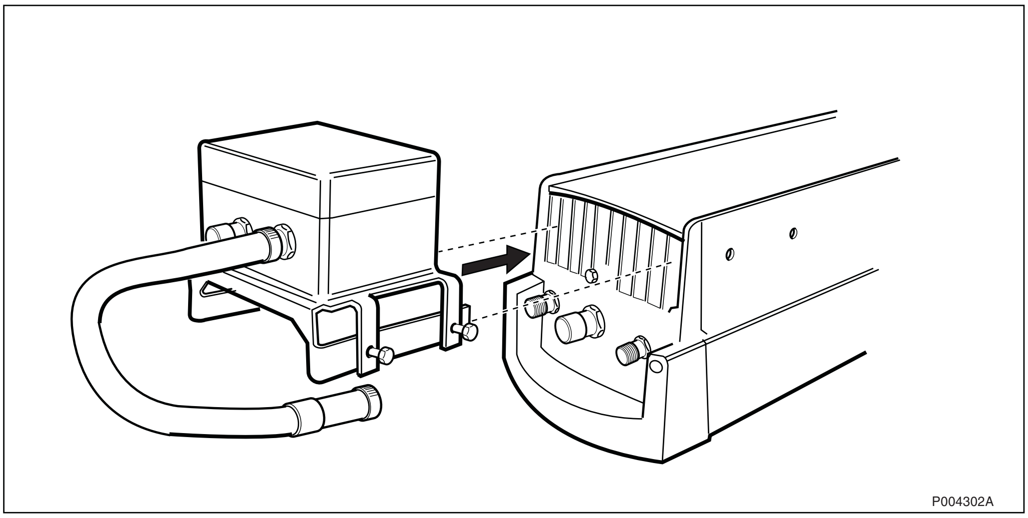

Figure 92 Sliding the DC/Data Lightning Protector into the cooling flanges

3. Align the holes in the mounting brackets to the holes in the cooling flanges so that the screws can be mounted.

4. Tighten the M8 screws. Tightening torque according to *page 102*.

5. Connect the DC/Data jumper cable to the DC/Data connector on the antenna.

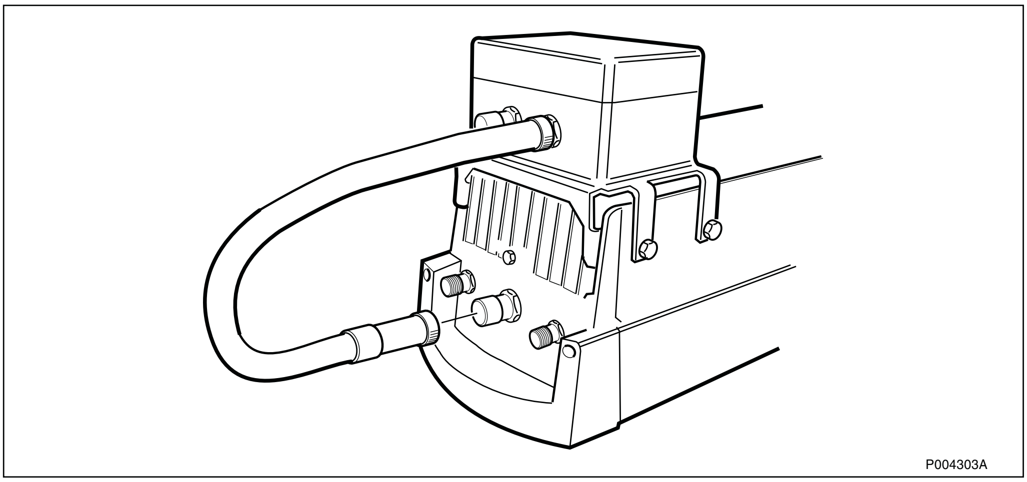

Figure 93 Tightening the screws and connecting the DC/Data jumper cable

For connecting the RF feeder cable and the earthing cable, *see chapter Installation of External Cables*.

RF Lightning Protectors

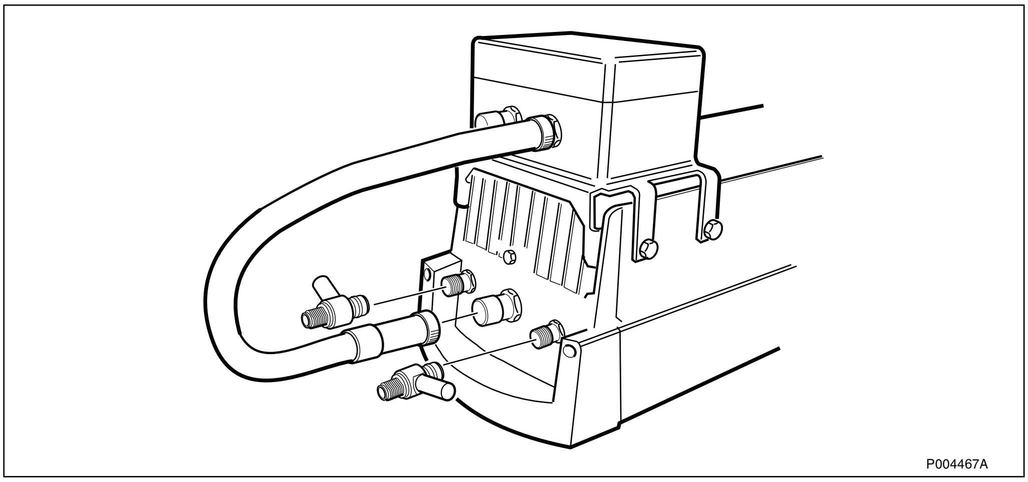

Figure 94 Mounting the RF lightning protectors

Connect the two RF lightning protectors to the RF connectors on the antenna.

5.4 Active Antenna Unit (AAU) for GSM 1900, 500 W EIRP and 1250 W EIRP

5.4.1 Preconditions

Wall-Mounted Antenna

- To mount the antenna on a wall, a vertical tube with a diameter of 60 to 120 mm (2 3/8″ to 4 3/4″), must be available.

Pole-Mounted Antenna

- To mount the antenna, a vertical tube with a diameter of 60 to 120 mm (2 3/8″ to 4 3/4″), must be available.

5.4.2 Installation Procedure Overview

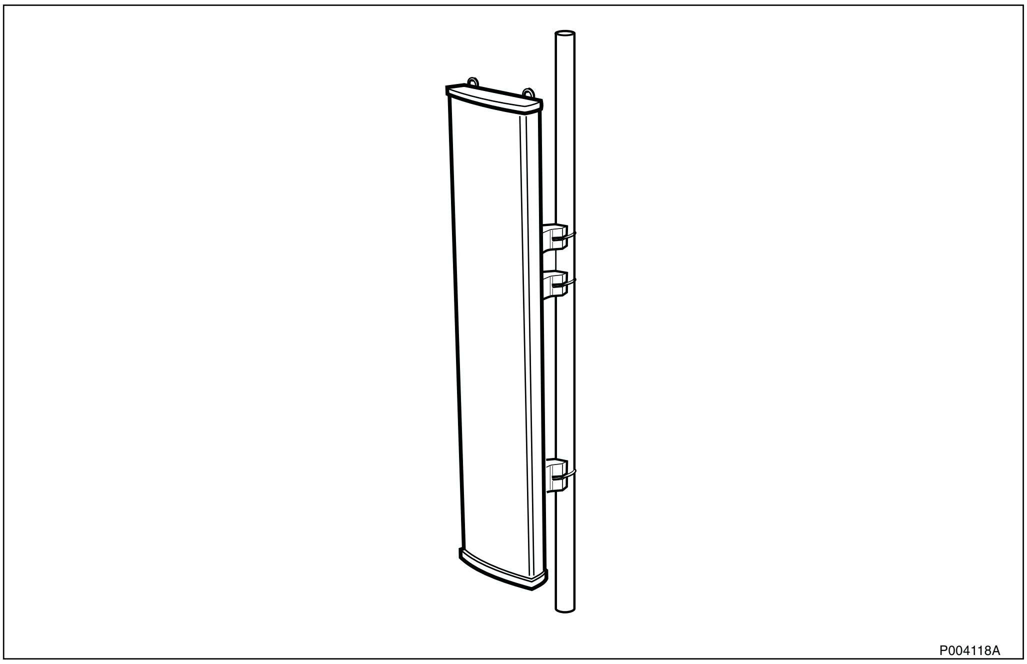

Figure 95 Antenna 500 W EIRP mounted on a pole

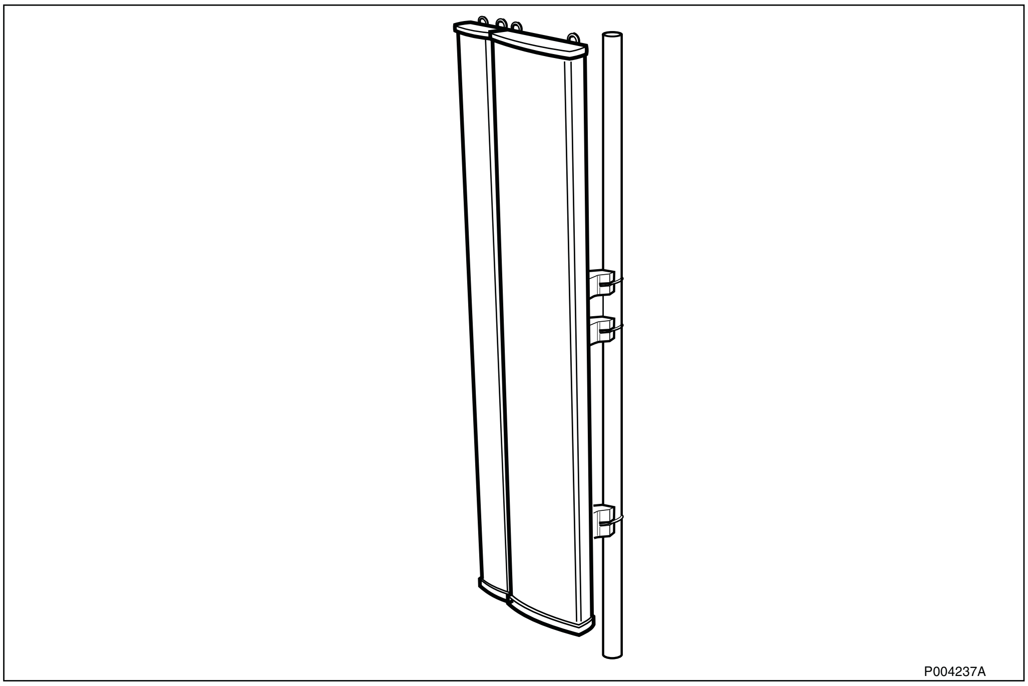

Figure 96 Antenna 1250 W EIRP mounted on a pole

The recommended installation procedure includes the following actions:

- Unpack and then verify against the packing list, that the correct material has been delivered.
- Prepare the Antenna for mounting.
- Mount the mounting fixture on the antenna.
- Adjust the length of the harness cables.

- Hoist the Antenna.
- Mount the Antenna.

5.4.3 Unpacking

Antenna 500 W EIRP

Unpack and ensure that the correct material has been delivered. If the material is damaged, make an immediate complaint to the supervisor or the transport company.

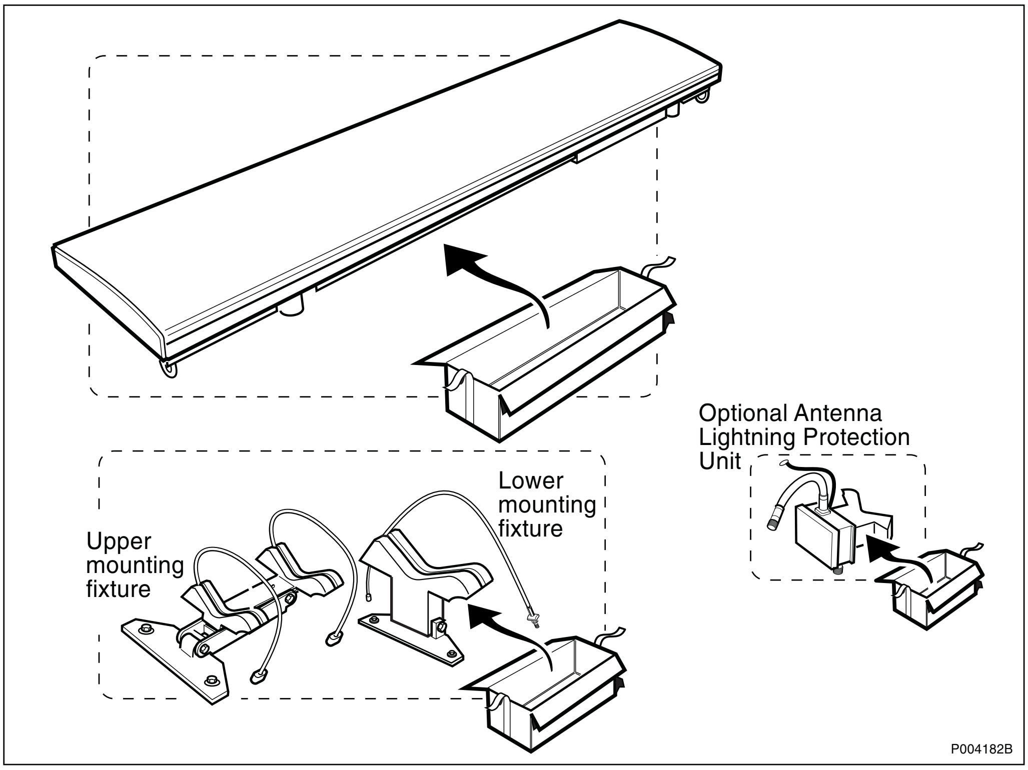

Figure 97 Contents of the AAU package for GSM 1900, 500 W EIRP

- Transport boxes
- Antenna
- Upper mounting fixture, including:
  - Upper mounting bracket
  - Upper pipe clamp and harness cables
  - Tilt linkage
- Lower mounting fixture, including:
  - Lower mounting bracket
  - Lower pipe clamp and harness cable
- Optional Antenna Lightning Protection Unit (ALPU)

Antenna 1250 W EIRP

Unpack and ensure that the correct material has been delivered. If the material is damaged, make an immediate complaint to the supervisor or the transport company.

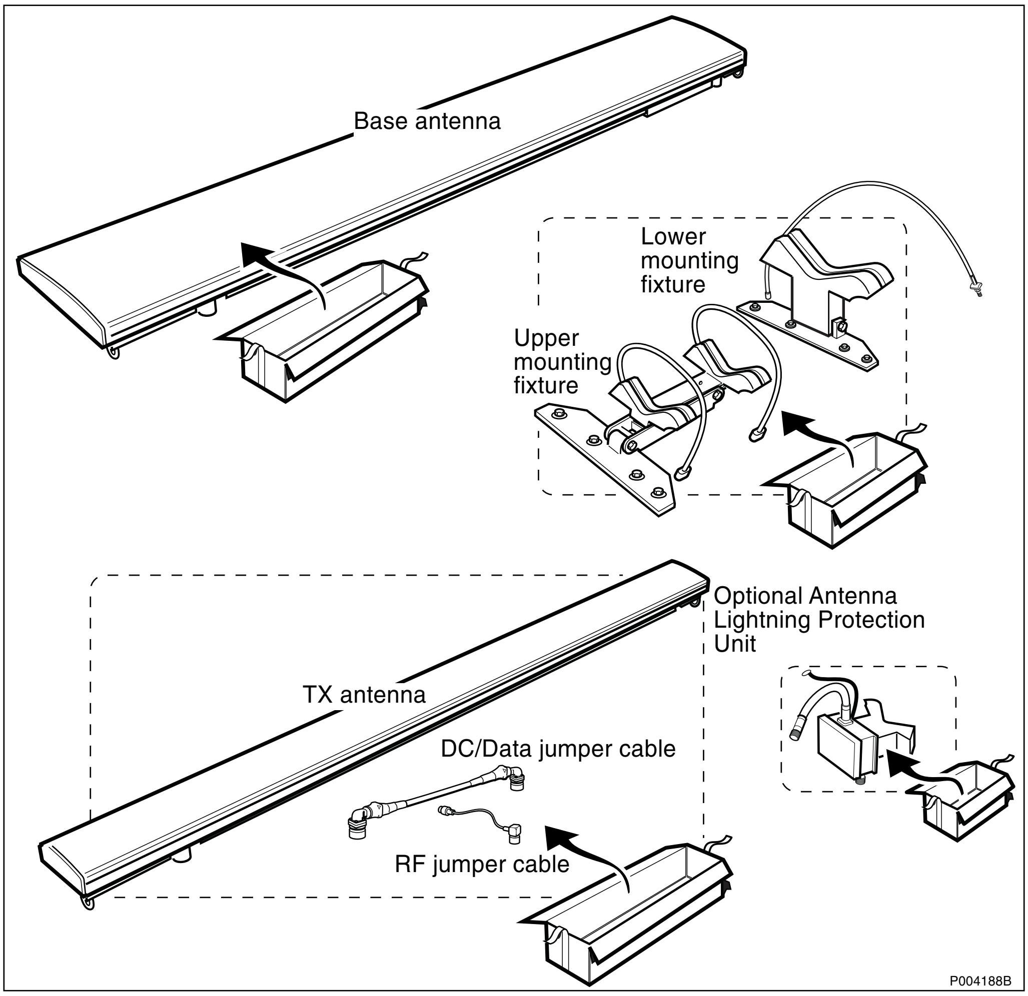

Figure 98 Contents of the AAU package for GSM 1900, 1250 W EIRP

- Transport boxes
- Base antenna
- TX antenna
- Cables:
  - DC/Data jumper cable
  - RF jumper cable
- Upper mounting fixture, including:
  - Upper mounting bracket
  - Upper pipe clamp and harness cables
  - Tilt linkage
- Lower mounting fixture, including:

  – Lower mounting bracket
  – Lower pipe clamp and harness cable

- Optional Antenna Lightning Protection Unit (ALPU)

5.4.4 Handling the Antenna

- Do not place the antenna in upright position, resting on its own connectors.
- Make sure the antenna is resting on a smooth surface, or is properly supported. The transport box cover can be used for this purpose.

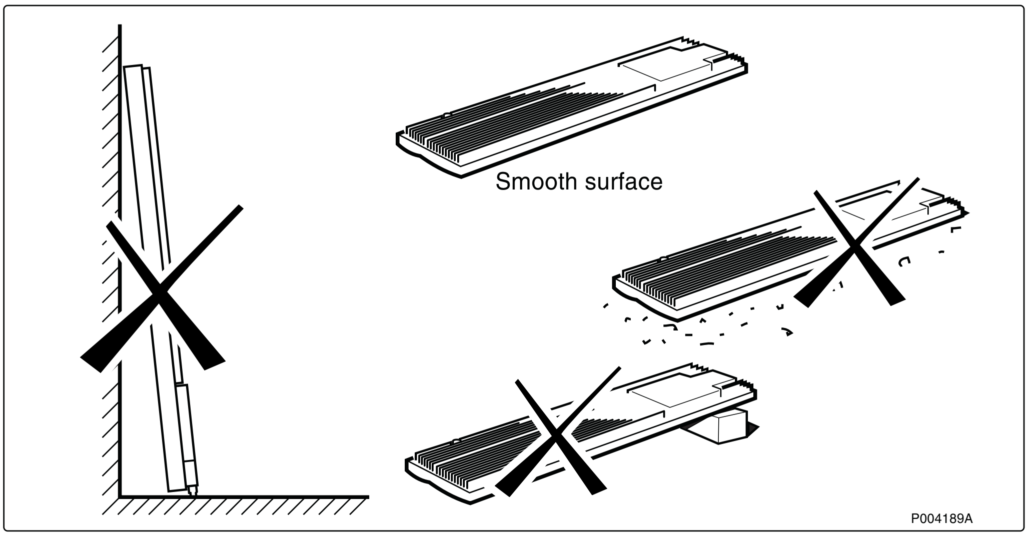

Figure 99 Handle the antenna with care (Antenna 1250 W EIRP shown)

5.4.5 Mounting the Antenna

Tools

The required tools for mounting the antenna are listed in *chapter Tools and Instruments*, except spanner sockets with measurement in inches, and the dummy pole/pipe (optional) described below.

The following socket sizes for spanner and torque wrench are required:

- 9/16 ″
- 11/16 ″, (2″ deep well)
- 3/4 ″

To simplify the mounting of the antenna, use a 1.5 m long dummy pipe section, of the same diameter as the pole/pipe the antenna will be mounted on, in order to align the axes of the pipe clamps for the upper and lower mounting fixtures, and to pre-set the length of the harness cables.

Tightening Torque

Tightening torque for screws and nuts:

Thread diameter	Torque		Remarks
	lbf-ft	Nm	
3/8"	35 ± 1.5	48 ± 2	
7/16"	35 ± 1.5	48 ± 2	Harness cable
1/2"	75 ± 3.8	102 ± 5	
M8	15.5 ± 1.0	21 ± 1.3	Earthing nut

Preparation of the Antenna, GSM 1900, 500 W EIRP and 1250 W EIRP

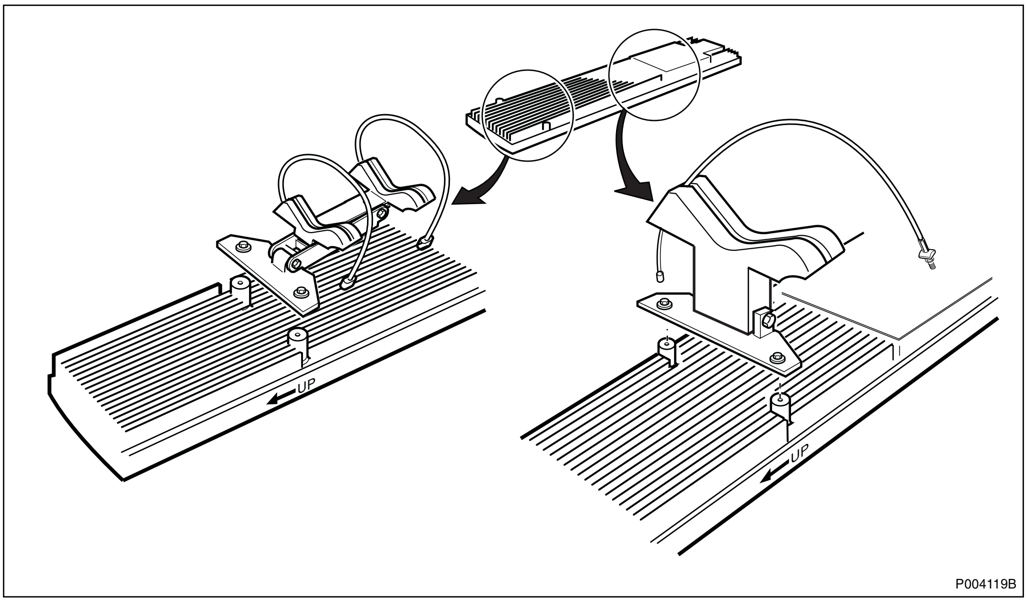

Figure 100 Attaching the upper and lower mounting fixture to the antenna (500 W EIRP)

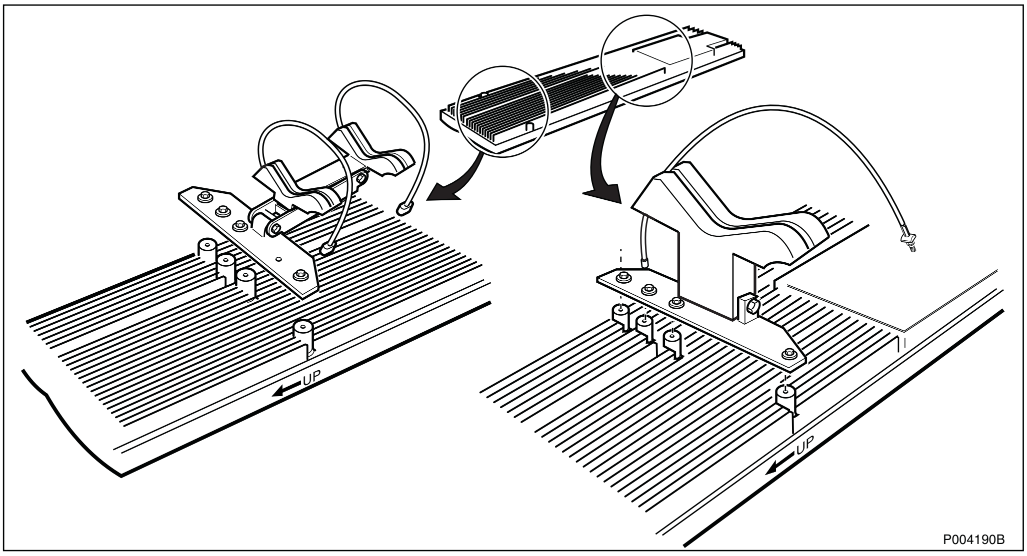

Figure 101 Attaching the upper and lower mounting fixture to the Base antenna and TX antenna (1250 W EIRP)

1. Attaching the mounting fixtures to the antenna.

   Antenna 500 W EIRP:

   1. Lay the antenna in a horizontal position.
   2. Attach the upper and lower mounting fixture to the antenna.

   Antenna 1250 W EIRP:

   1. Lay the Base antenna and the TX antenna in a horizontal position.
   2. Use the upper and lower mounting fixture to attach the TX antenna to the Base antenna, so they form one unit.

2. Place the pipe, used as dummy, on the pipe clamps.

Note: The use of the dummy pipe simplifies the mounting considerable.

3. Check that the upper and lower pipe clamp are aligned and in good contact with the pipe.
4. Tighten the fixing screws alternately for each mounting fixture: two screws for the 500 W antenna, and four screws for the 1250 W antenna.

   Tightening torque according to *page 116*.

5. Adjust the cable tightener so that only a few threads (2–3 mm) are visible.

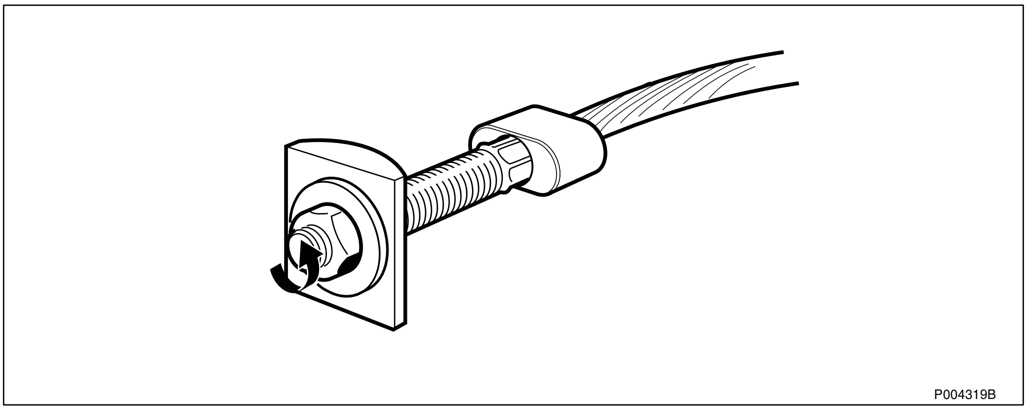

Figure 102 Adjusting the harness cable tightener

6. Loosen the two 3/8 ″ screws of the cable locking plate, according to the figure below.

7. Loop the cable completely around the pipe according to the figure below. Make sure that the cable runs in the trace on the pipe clamp.

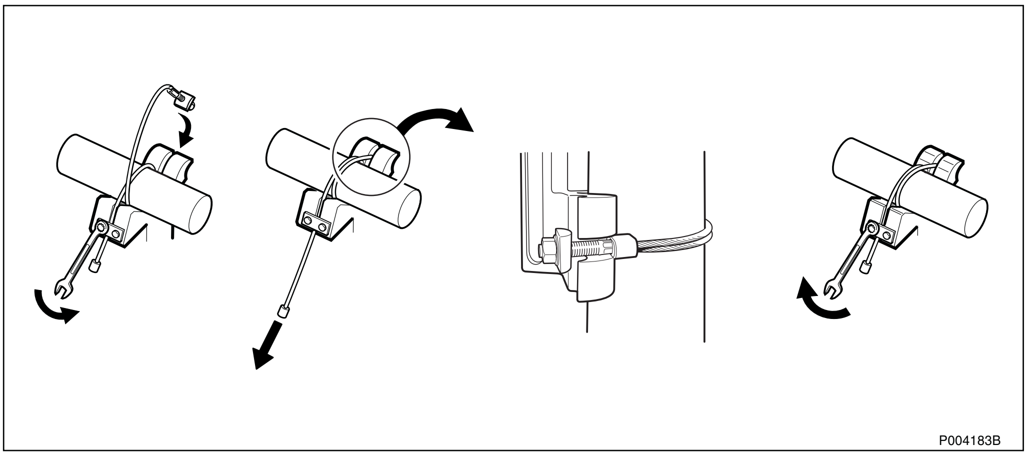

Figure 103 Loosening the locking plate and adjusting the harness cable

8. Adjust the length of the cable so that the cable screw can be inserted into the slot on the pipe clamp. The swivel must be positioned in the slot according to the figure above.

9. Tighten the screws on the locking plate. Tightening torque according to *page 116*.

Antenna 1250 W EIRP: Connecting the DC/Data and RF jumper cables

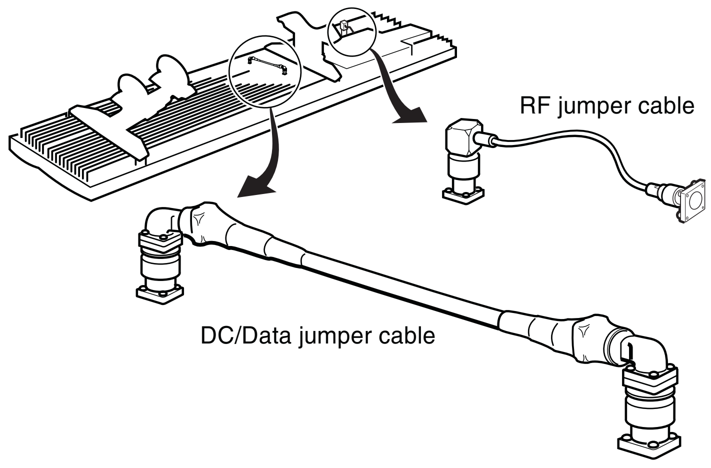

Figure 104 Connecting the DC/Data jumper cable and RF jumper cable to the antenna

Note: The protective plugs should be completely removed due to safety reasons.

1. Remove the protective plugs from the connectors marked TX2 on the Base and TX antenna, and attach the DC/Data jumper cable between the two connectors.
2. Remove the protective plugs from the two connectors marked TX2 RF on the Base and TX antenna, and attach the RF jumper cable between the two connectors.

Mounting the Antenna on a Pole

WARNING

⚠

Read the Safety chapter regarding handling of heavy goods.

WARNING

⚠

Some working areas involve the risk of accidents caused by falling objects.

1. Extend the lifting shackles and the control shackles.

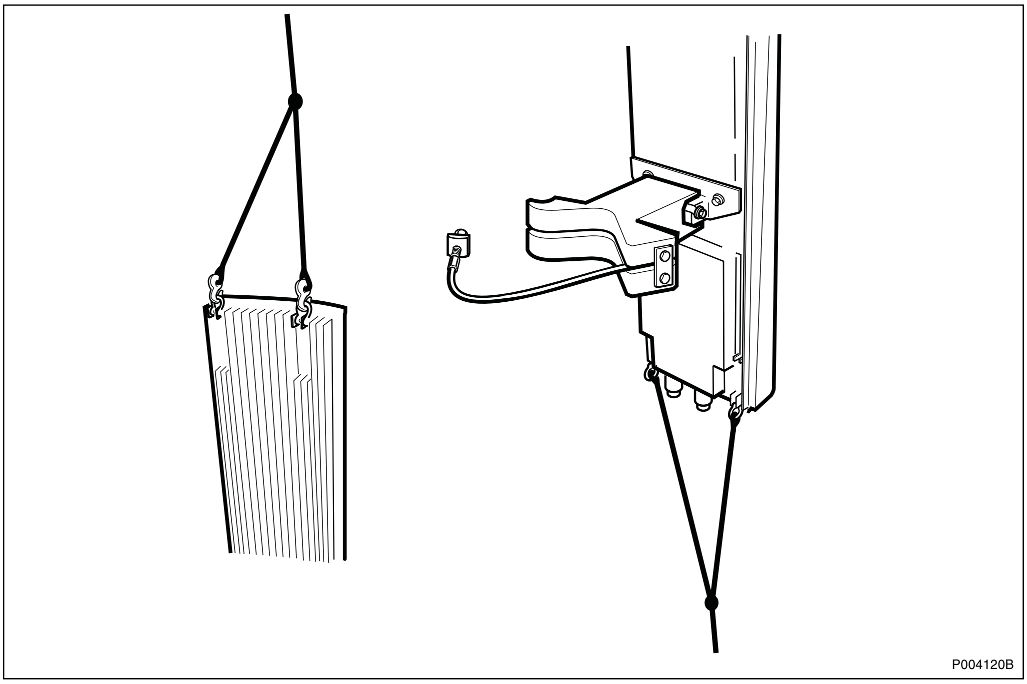

Figure 105 Upper lifting shackles and lower control shackles, antenna 500 W EIRP

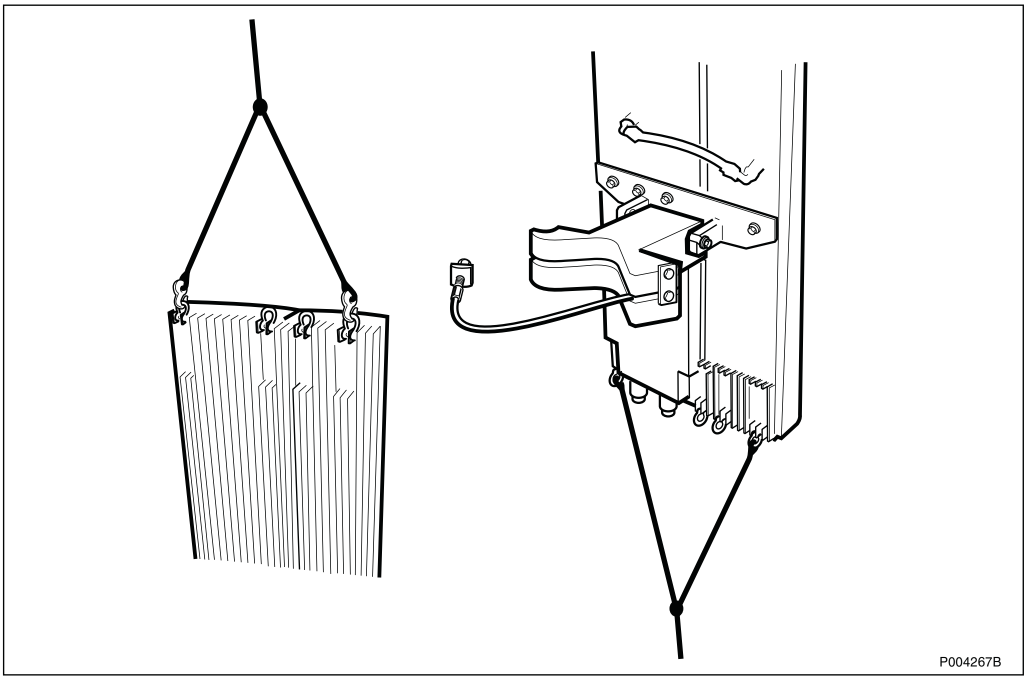

Figure 106 Upper lifting shackles and lower control shackles, antenna 1250 W EIRP

2. Attach lifting ropes to the upper lifting shackles, and attach control ropes to the lower control shackles.
3. Control the antenna, using the control rope, to avoid damaging contact with any object while the antenna is hoisted up.

Note: Always apply load vertically to antenna. Loads applied in any other direction may result in moments which could overload the shackle bolts.

4. When the antenna is in the correct position, loop the cables completely around the pole, starting from the top, and insert them into the clamp slots. Make sure that the cables run in the trace on the pipe clamps.

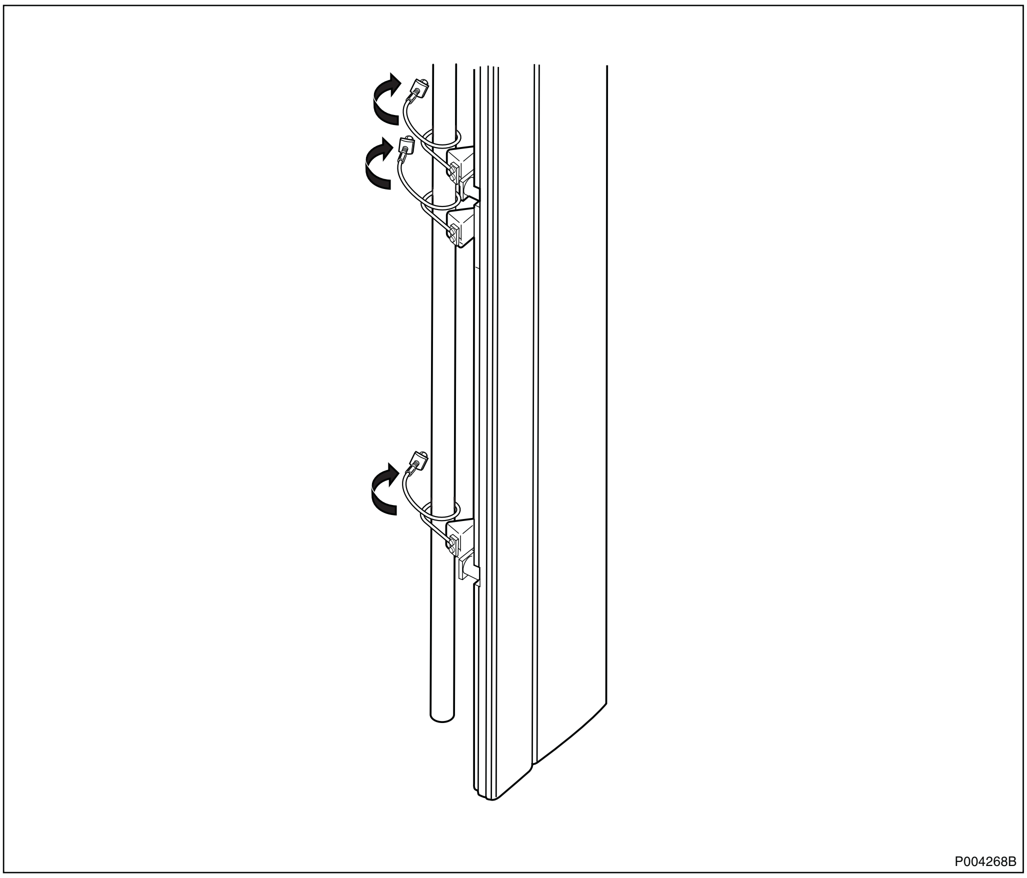

Figure 107 Pulling the cables around the pole (Antenna 1250 W EIRP shown)

5. Check that the threaded parts of the cable screws have sufficient length, and that the swivel is positioned in the slot according to the figure below.

6. Position the antenna in the correct direction, and tighten the 7/16″ nuts on the harness cable screws. Tightening torque according to *page 116*.

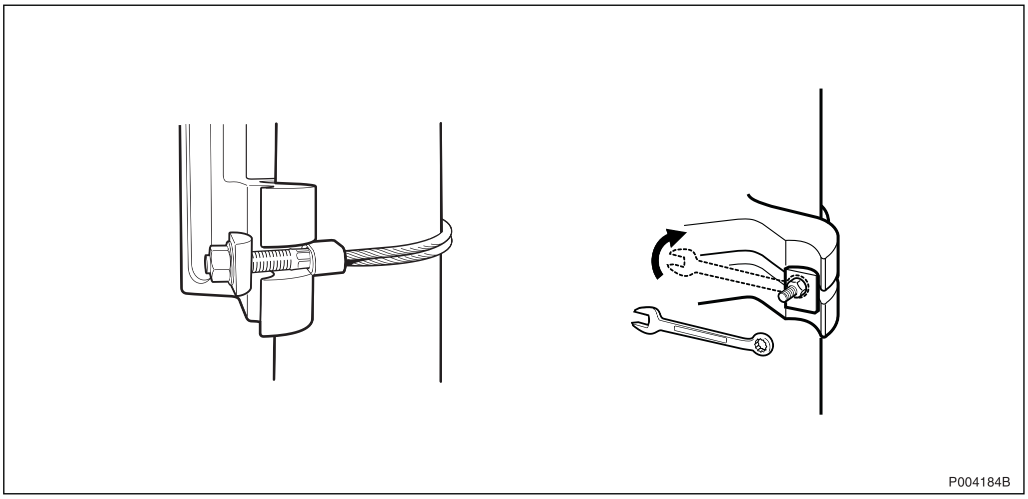

Figure 108 Tightening the harness cable

For connecting the RF feeder cable, DC/Data cable and earthing cable, *see chapter Installation of External Cables*.

Adjusting the Antenna Tilt Angle

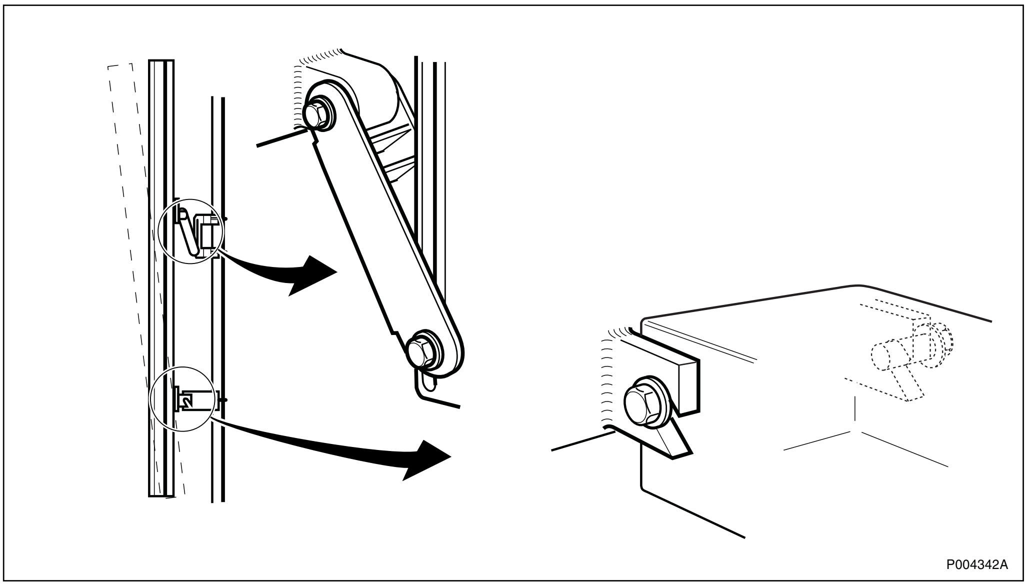

Figure 109 Fixing screws for the tilt linkage, and supporting screws on the lower pipe clamp

1. Loosen the two 1/2″ screws on the tilt linkage, and the two 1/2″ screws that support the antenna on the lower pipe clamp.
2. When the tilt angle is correct, tighten the screws. Tightening torque according to *page 116*.

5.4.6 Optional Antenna Lightning Protection Unit (ALPU)

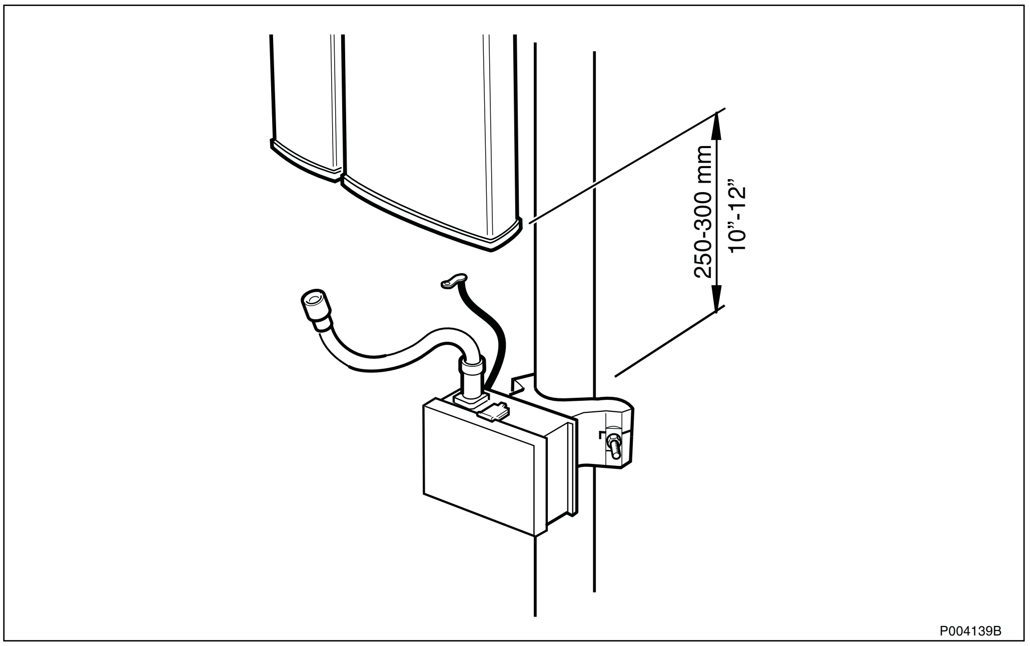

Figure 110 The ALPU mounted on the pole below the antenna (Antenna 1250 W EIRP shown)

1. Preset the harness cable length, using a dummy pipe, by following the instructions in step 5 on page 117 to step 9 on page 118.

Note: The use of the dummy pipe simplifies the mounting considerable.

2. Place the ALPU in the desired position on the pole, *see Figure 110 on page 123.* Loop the harness cable completely around the pole and insert it into the slot on the pipe clamp. Make sure that the cable runs in the trace on the pipe clamp.
3. Check that the threaded part of the cable screw has sufficient length, and that the swivel is positioned in the slot according to the figure below.
4. Tighten the 7/16″ nut on the harness cable screw. Tightening torque according to *page 116*.

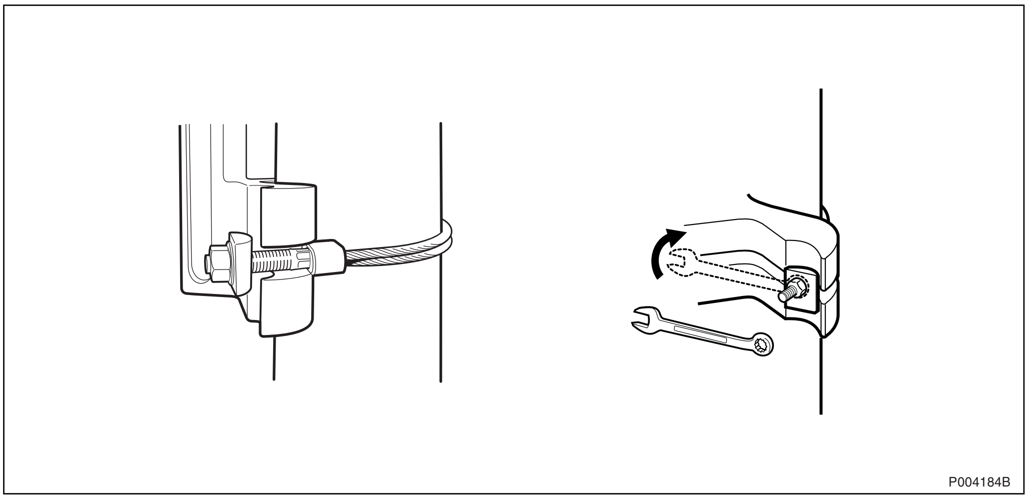

Figure 111 Tightening the harness cable nut

For connecting the DC/Data cables and earthing cable, *see chapter Installation of External Cables*.

6 Installation of Power and Battery Cabinet

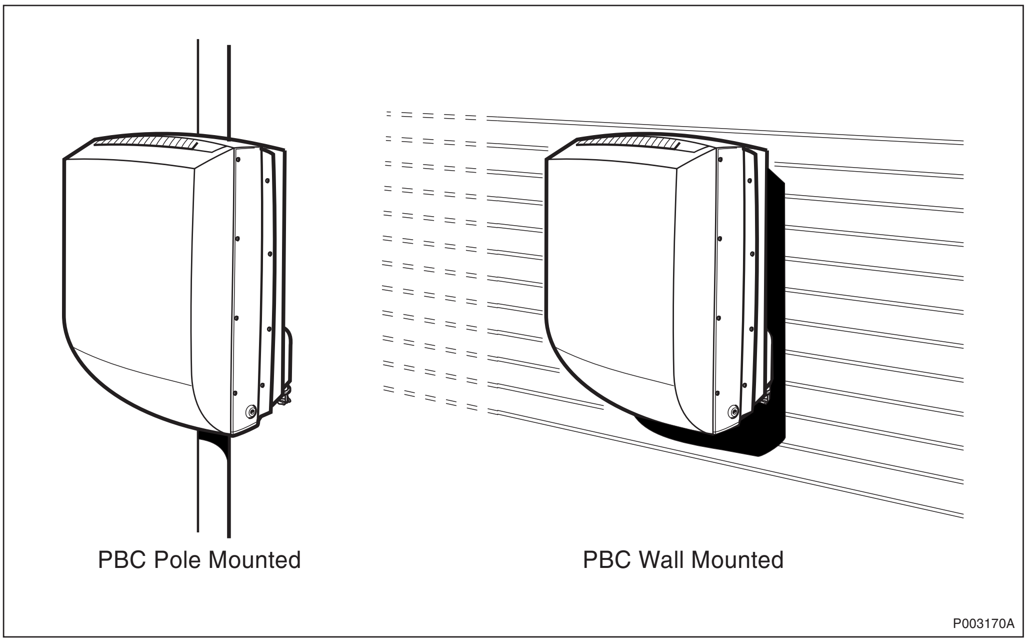

Figure 112 Installation alternatives

6.1 Competence requirement

In order to do installation work according to this manual in a safe and professional way, the work shall be done by a skilled person.

The following qualifications are minimum requirements:

- Good understanding of radio and telephone engineering.
- Good understanding of engineering English.

6.2 Preconditions

Ensure that the following conditions are met:

- When the cabinet is mounted outdoors, it must not be left without power for more than 48 hours. This requirement is caused by the risk of humidity damages
- Site access permission received.
- Ordered PBC, equipment, specified tools and other necessary facilities have been delivered.
- Earth Point is available
- Electrical ducting is ready and AC mains power is available.

6.2.1 Preconditions for wall-mounted PBC

- Make sure that the selected bolt is suitable for the type of wall material that the cabinet is to be mounted on.
- Make sure that the wall surface is even.

6.2.2 Preconditions for pole-mounted PBC

- The pole must have the required dimension (60–114 mm in diameter).

6.2.3 Documents

Ensure that the following documents are available:

- Filled in and approved record prepared during site preparation.
- Site installation documentation prepared by the Installation Engineering Department.

General Installation Instructions *LZN 302 49*

6.2.4 Tools and Instruments

The tools needed for Power and Battery Cabinet installation may be found in *chapter Tools and Instruments*.

Table 17 Recommended Torque

Dimen-sion	**Torque**				**Notes**
	Ncm	Nm	lbf-in	lbf-ft	
M3	110 +/- 7	-	9.7 +/- 0.6	-	
M3	80 +/- 7	-	7.1 +/- 0.6	-	Reduced for plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	
M4	190 +/- 15	-	16.8 +/- 1.3	-	Reduced for plastic covers
M5	540 +/- 30	-	47.8 +/- 2.6	-	Battery poles for battery cabinet
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	
M8	-	21 +/- 1.3	-	15.5 +/- 1	
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	

6.3 Overview

The recommended installation procedure includes the following activities:

- Unpack and verify against the packing list that the correct material has been delivered.
- Mount the PBC mounting plate.
- Mount the PBC mounting base.
- Connect earth and lightning protection.
- Mount the cabinet.
- Connect internal cables.

- Install the batteries.
- Mount the sunshields.

Note: Information regarding connecting external cables, *see chapter Installation of External Cables*.

6.4 Unpacking

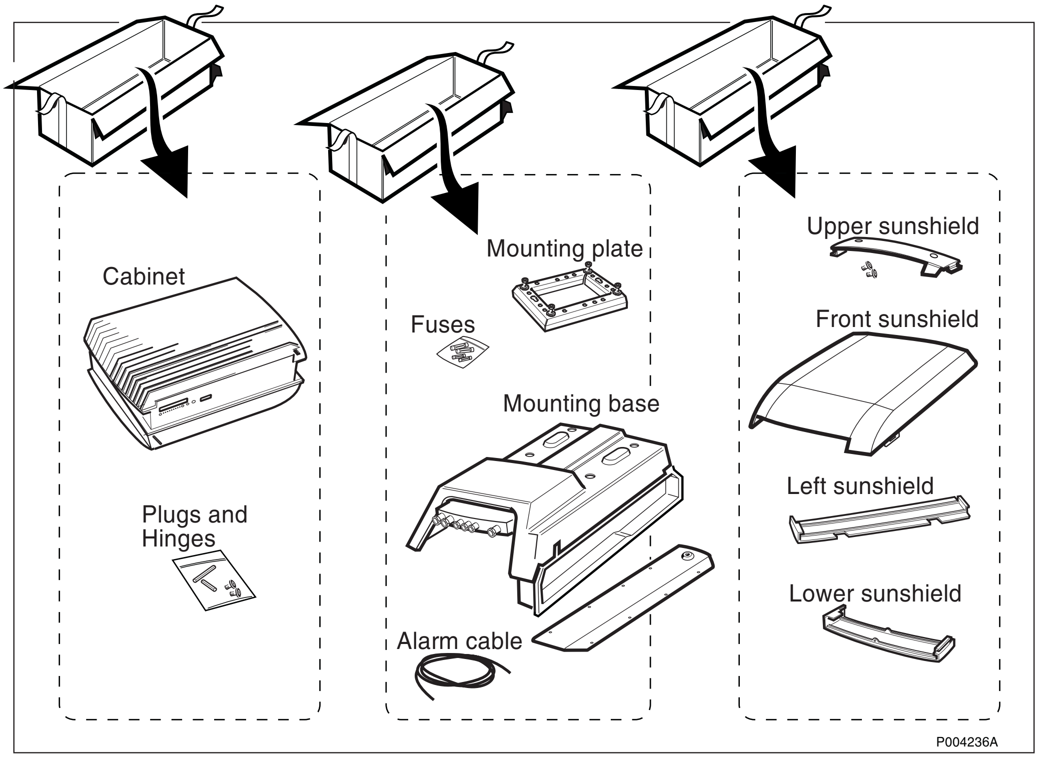

Figure 113 Unpacking the cabinet, mounting base and sunshields

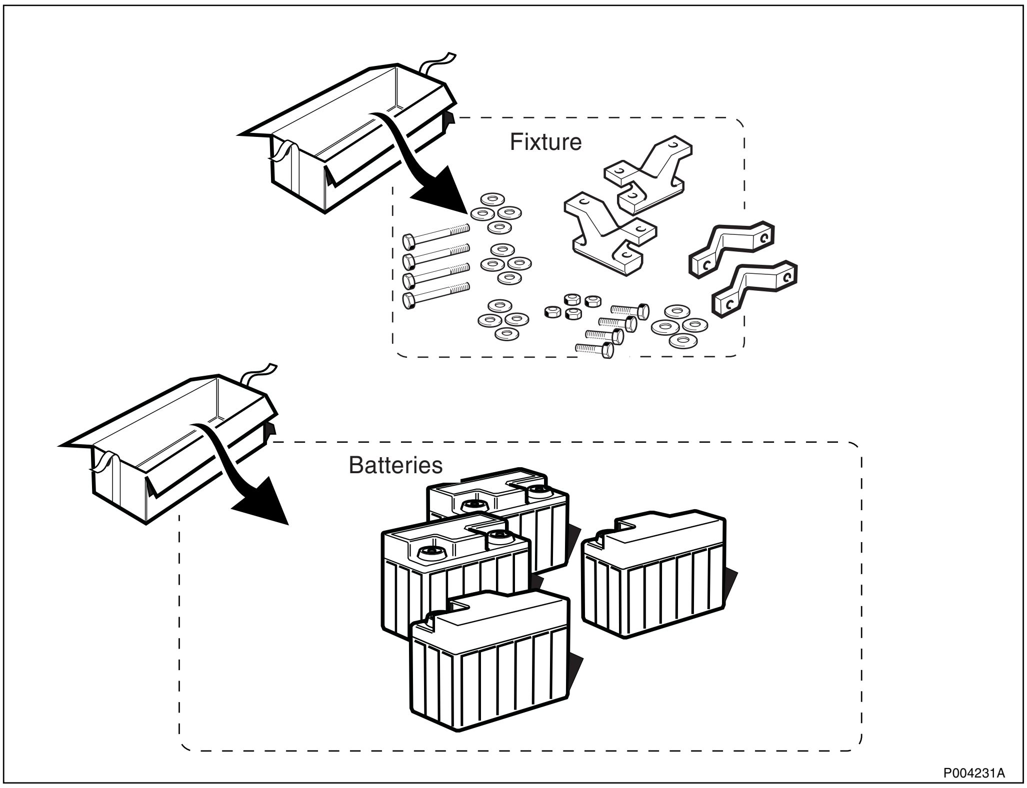

Figure 114 Unpacking the optionals

Unpack and ensure that the correct material has been delivered. If the material is damaged make an immediate complaint to the supervisor/ transport company.

6.5 Mounting the Mounting Plate

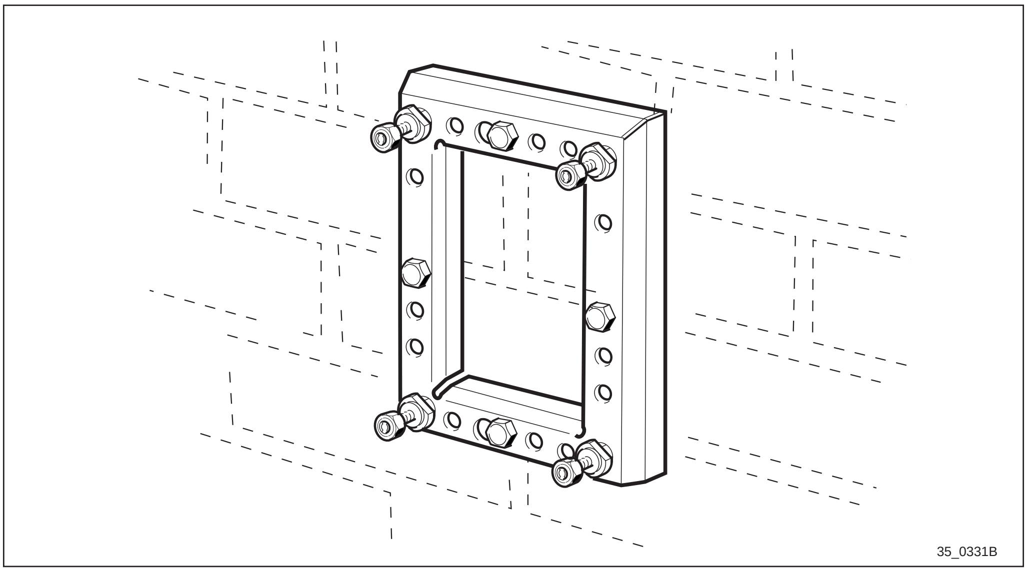

Figure 115 Mounting the mounting plate

If the installation site is at such height that work cannot be done without aid, a skylift or scaffold must be used. For safety reasons a step ladder should only be used as an exception.

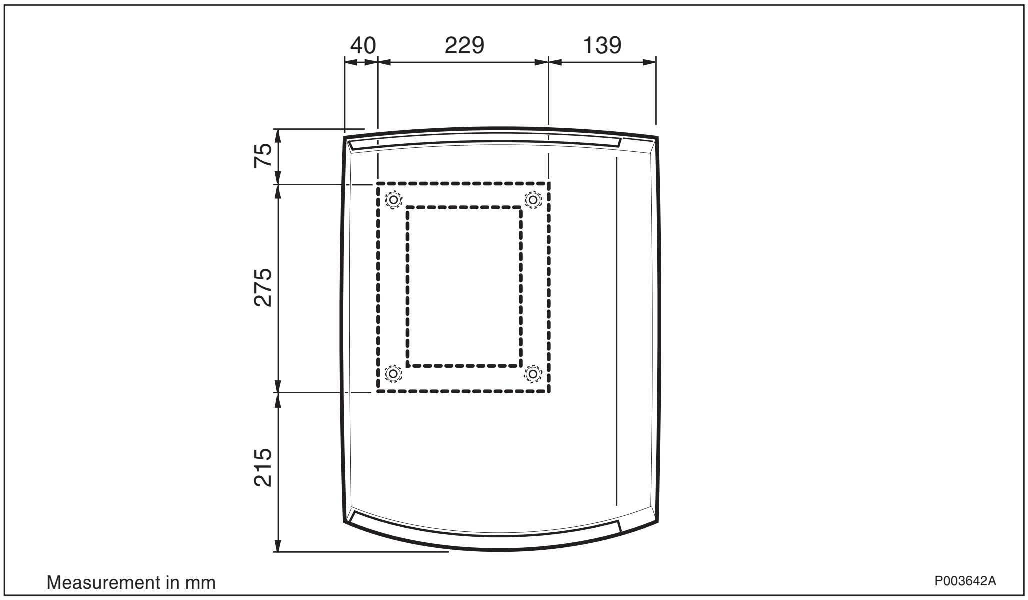

Figure 116 Mounting plate and equipment contour, front view

Figure 116 on page 129 shows the dimensions of the equipment in relation to the mounting plate. This is to determine a suitable alignment with several units or existing equipment. For more information *see chapter Site Planning and Requirements* and *chapter Product Data*.

6.5.1 Mounting the Mounting Plate on a Wall

1. Use the mounting plate as a marking template. An arrow on the mounting plate shows which side should face upwards.

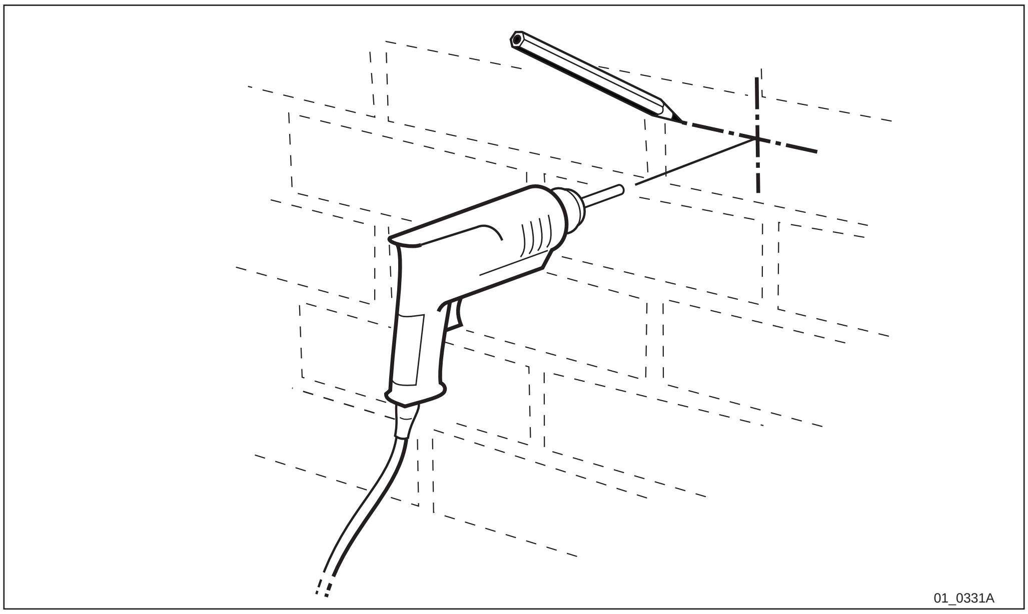

Figure 117 Marking the position of the mounting plate and drilling the hole

2. Hold the mounting plate against the wall in the position where the PBC is to be situated. Use a pen to mark the position of the upper keyhole.

3. Remove the mounting plate and drill a hole for the kind of fasteners best suited for the wall material.

Note: The mounting plate must not be used as a drilling template in order not to damage the rust protection surface.

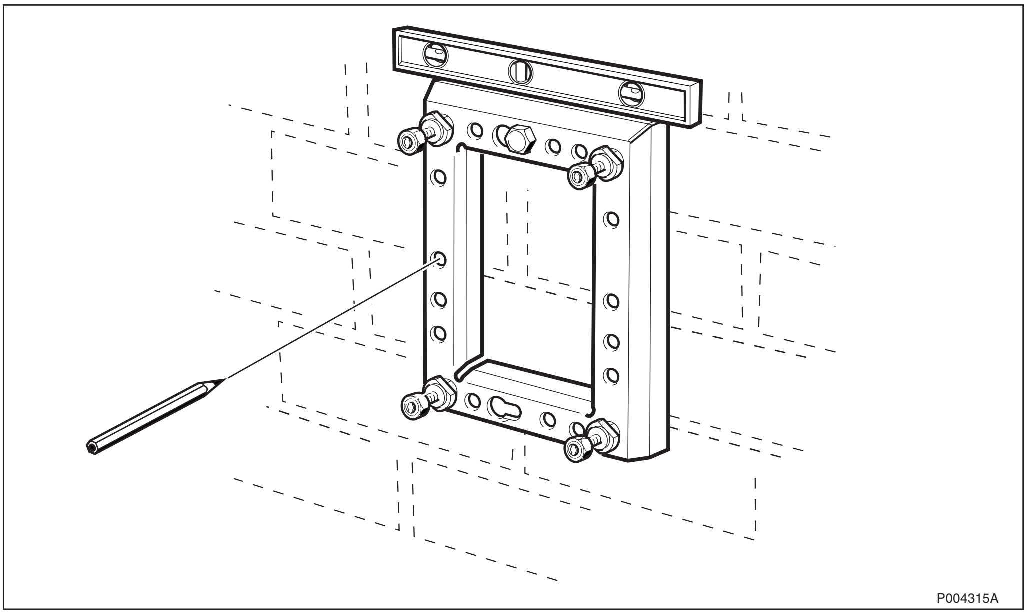

Figure 118 Marking the rest of the holes

4. Fasten the screw and mount the mounting plate. When the mounting plate is hanging in a horizontal position, check it with a spiritlevel, then mark the rest of the holes to be used. Remove the mounting plate and drill the rest of the holes.

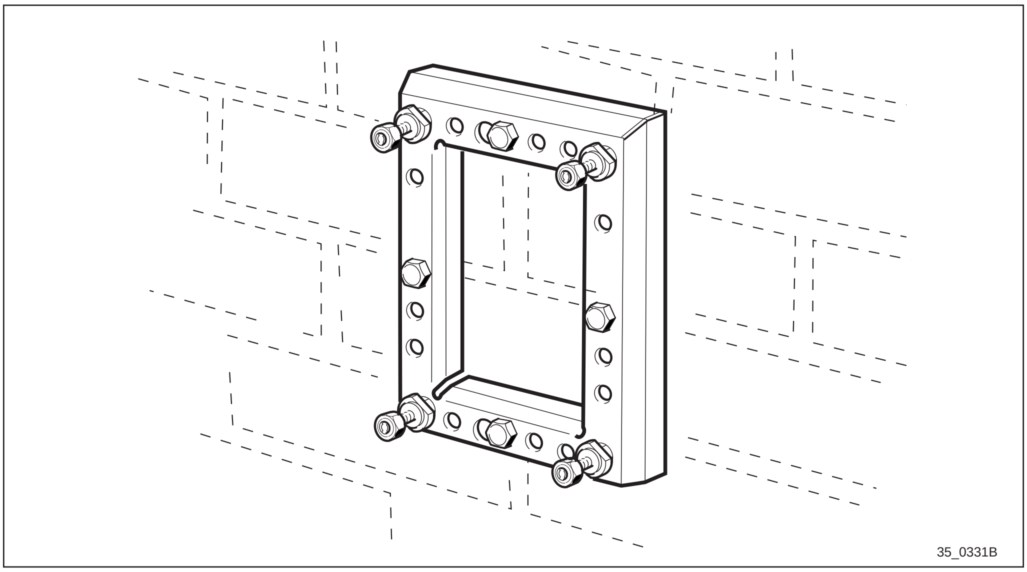

Figure 119 Mounting plate

5. Remount the mounting plate and secure it into position with all screws.

6. Unscrew the four nuts on which the mounting base is to be hung, until only a few threads remain.

6.5.2 Mounting the Mounting Plate on a Pole

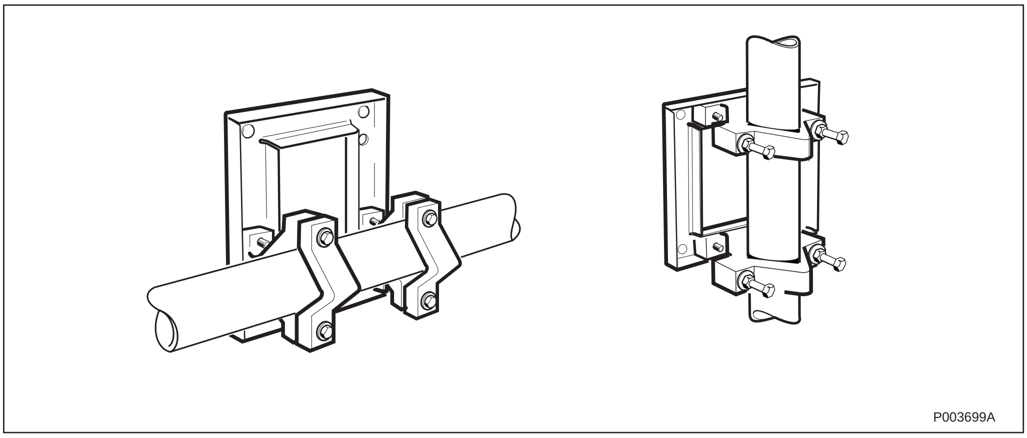

Figure 120 Mounting alternatives

The mounting plate may be mounted on a vertical or a horizontal pole by using different holes.

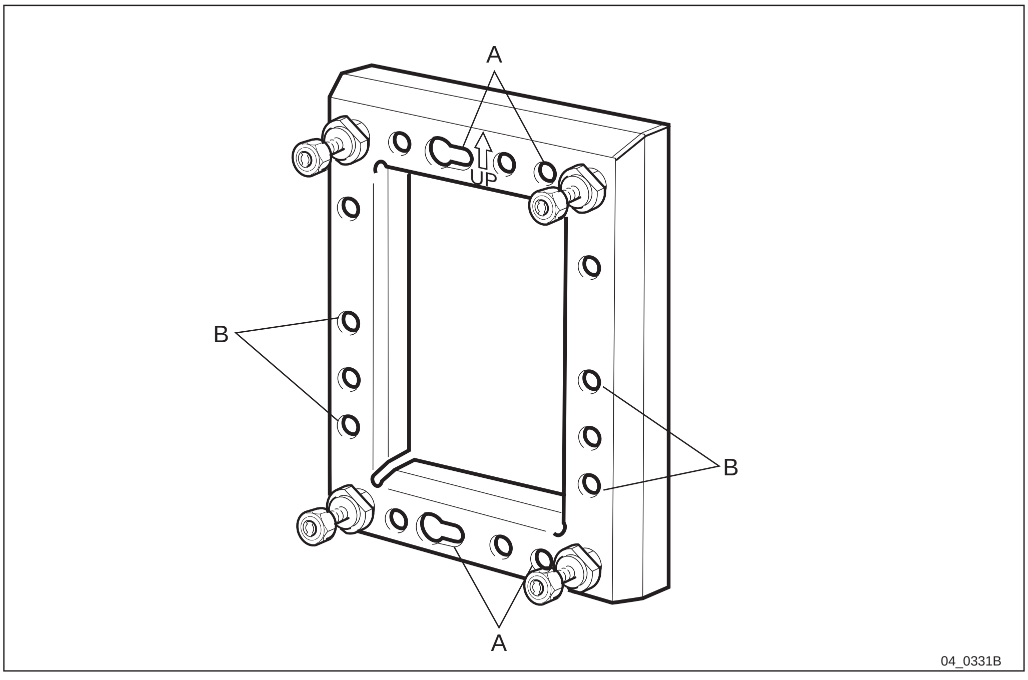

Figure 121 Choosing the appropriate holes

A Holes to be used for vertical pole

B Holes to be used for horizontal pole

1. Choose the appropriate holes (horizontal/vertical).

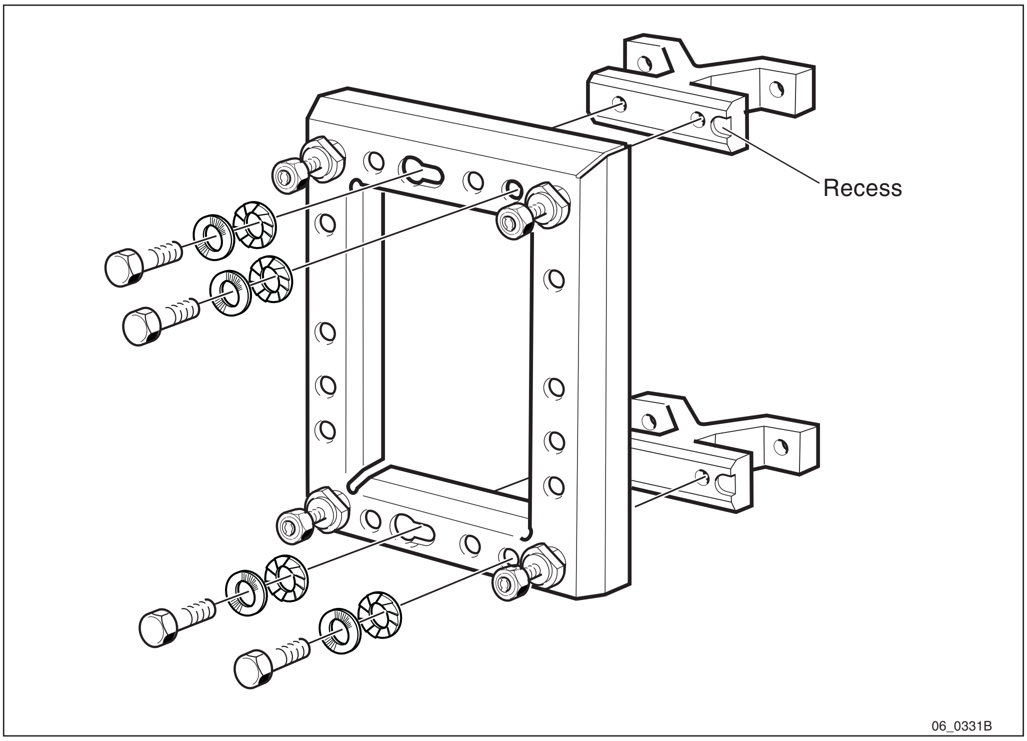

Figure 122 Fastening the clamps and mounting the washers

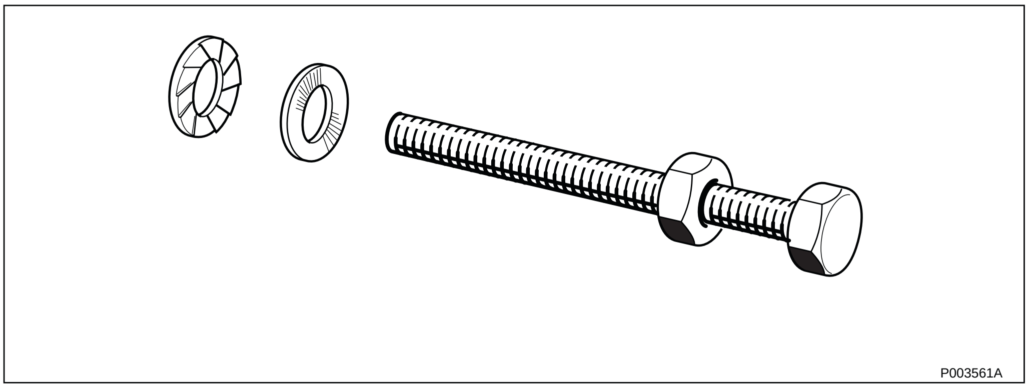

Figure 123 Mounting the washers

2. Make sure that the washers are mounted correctly, *see Figure 123 on page 132*.

3. Fasten the two clamps with the screws and washers. Ensure that the recess is attached at the correct place.

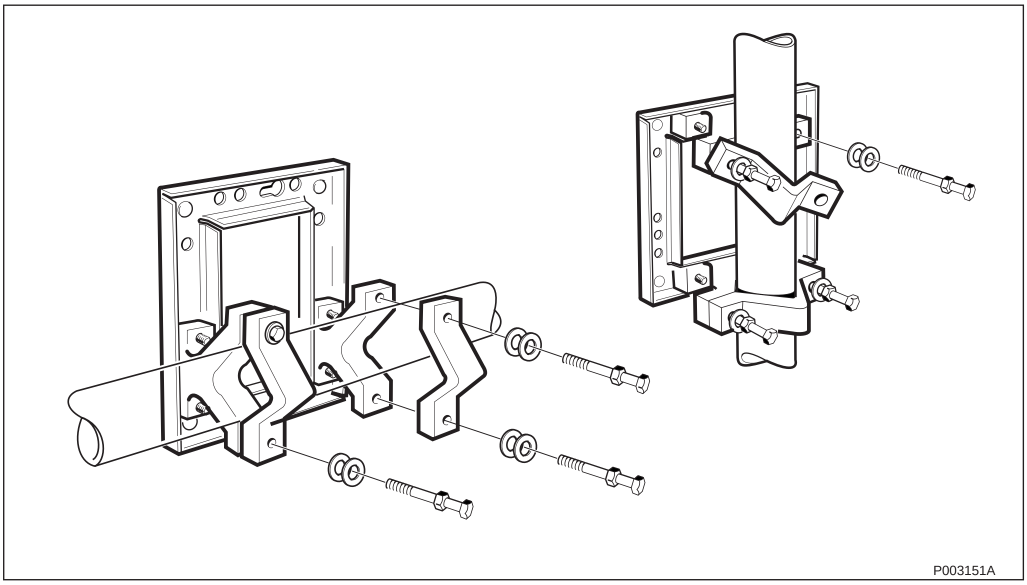

Figure 124 Placing the mounting plate correctly

4. Place the mounting base at the correct height on the pole and mount the clamp halves.
5. Make sure that the washers are mounted correctly, *see Figure 123 on page 132*.
6. Mount the screws and tighten them alternately (right and left side) in order to avoid bending the screws.

6.6 Mounting the Mounting Base

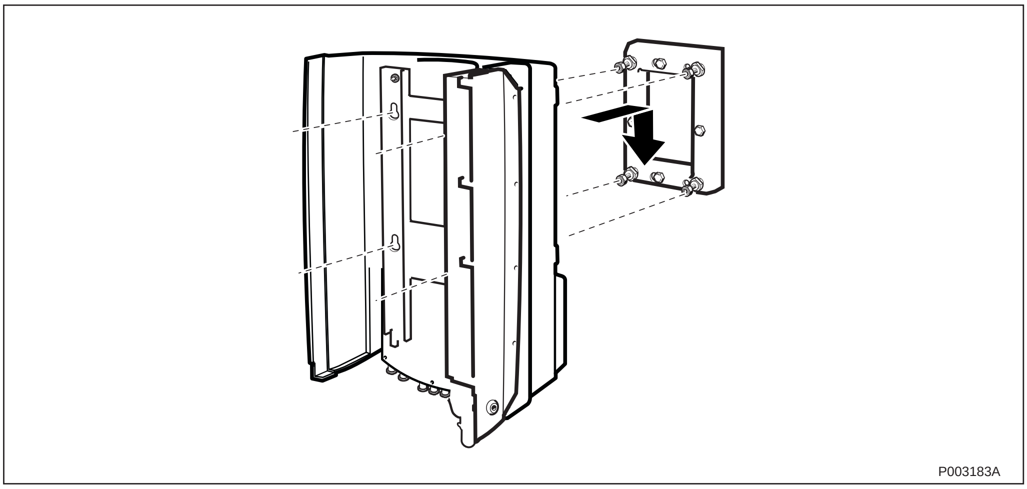

Figure 125 Mounting the mounting base on the mounting plate

1. Mount the mounting base on the four screws situated on the mounting plate. Ensure that the fastening screws are properly fitted in the key holes.

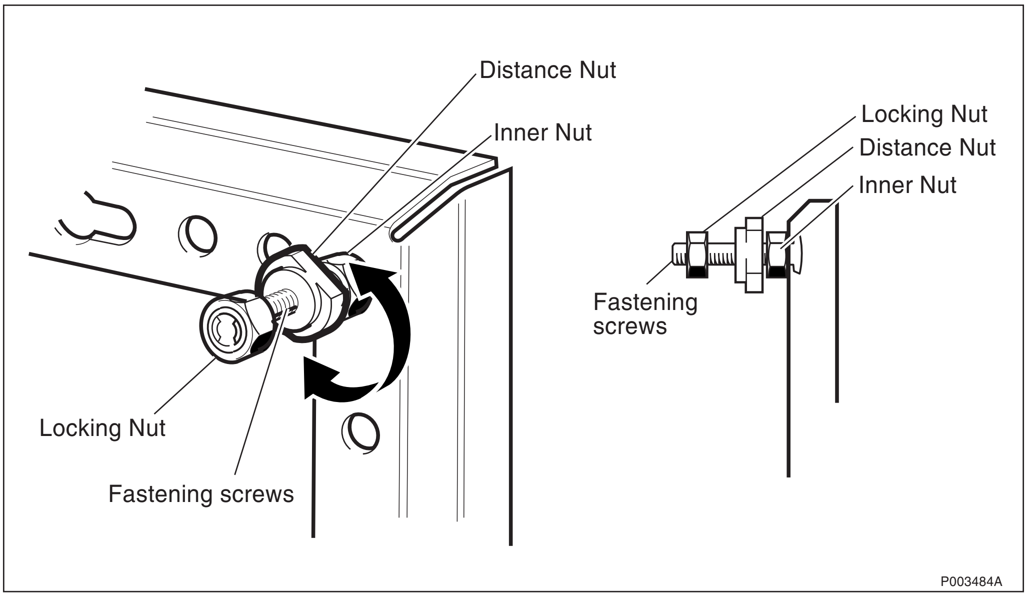

Figure 126 Adjusting the distance nuts

2. Alter the vertical inclination of the mounting base relative to the mounting plate, by adjusting the four distance nuts. This can only be done with the mounting base dismounted. The locking nuts may remain on the fastening screws.

Note: Do not loosen the inner nuts. The inner nuts secure the fastening screws in the mounting plate.

3. When the mounting base is correctly adjusted, tighten the four locking nuts.

6.7 Mounting the Installation Box Door

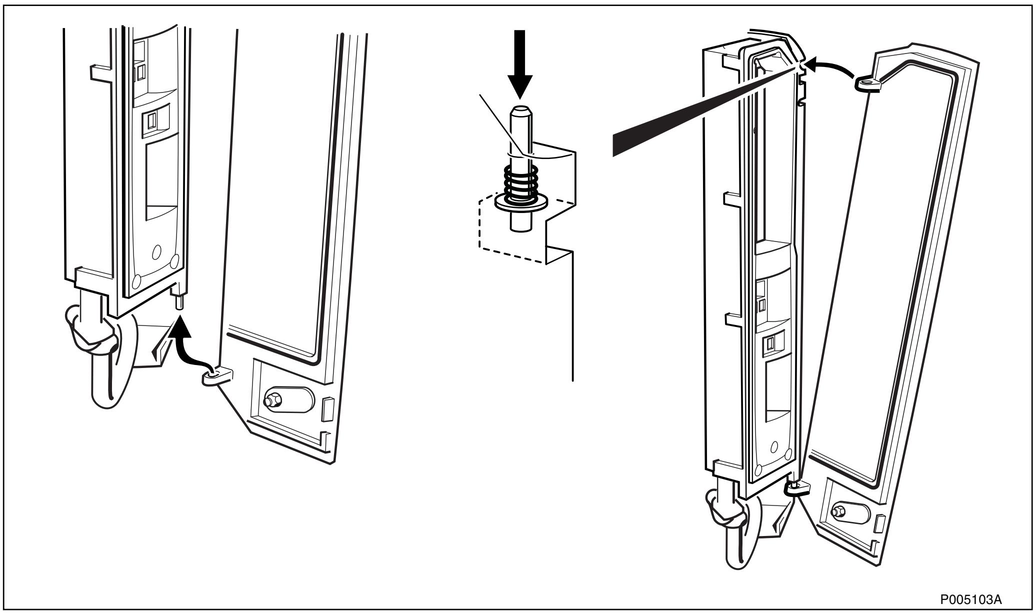

Figure 127 Mounting the installation box door

1. Hook the lower left hand corner of the door on to the installation box.
2. Press down the spring locking pin on the upper right hand corner of the installation box.
3. Insert the installation box door by pushing the upper left hand corner of the door into position. Make sure that the spring locking pin snaps into position.

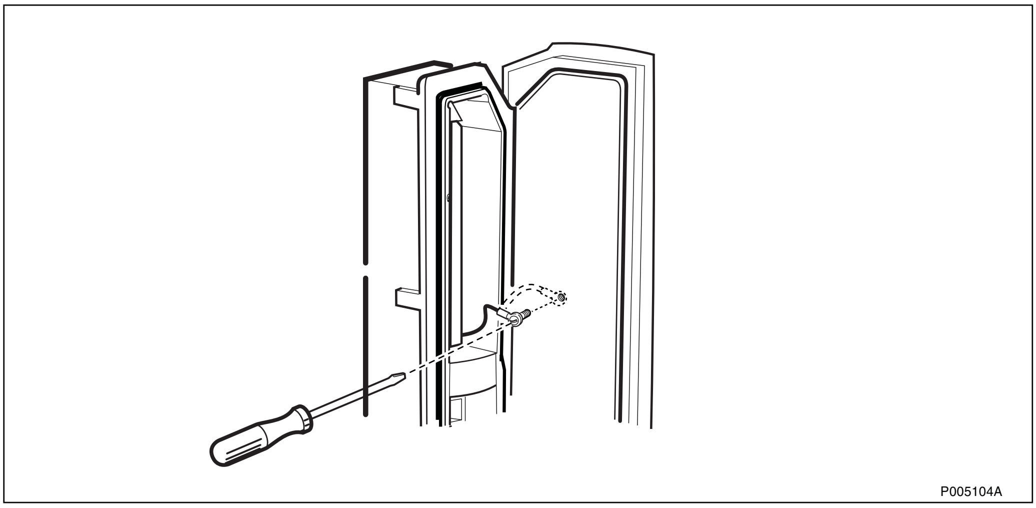

Figure 128 Mounting the earth cable

4. Mount the earth cable on the installation box door by screwing the torx screw into position.

6.8 Installation Box

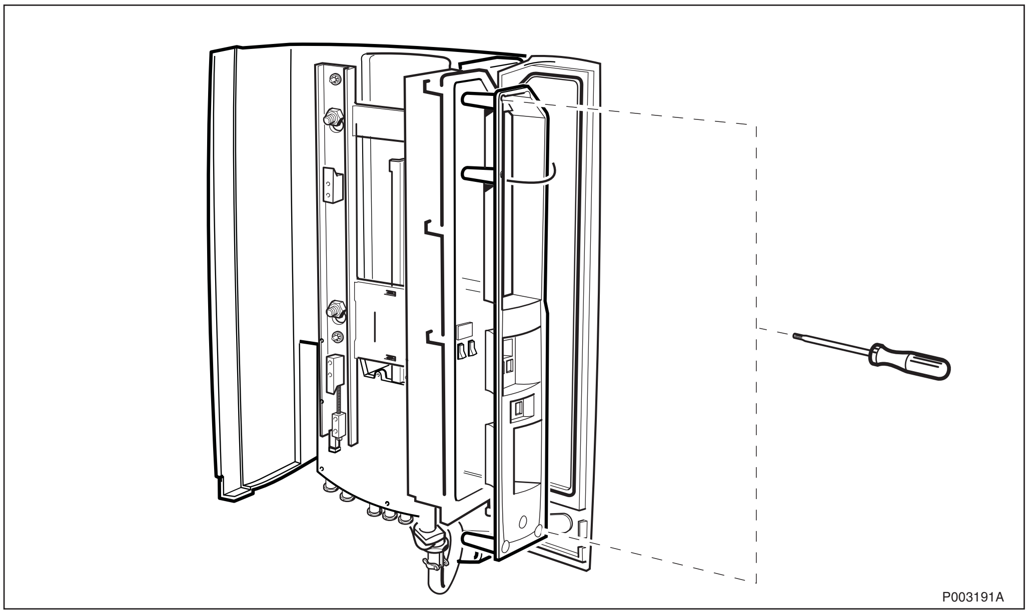

Figure 129 Removing the protection cover

1. Remove the protection cover by unscrewing the 2 torx screws and let the cover hang in the earth wire.

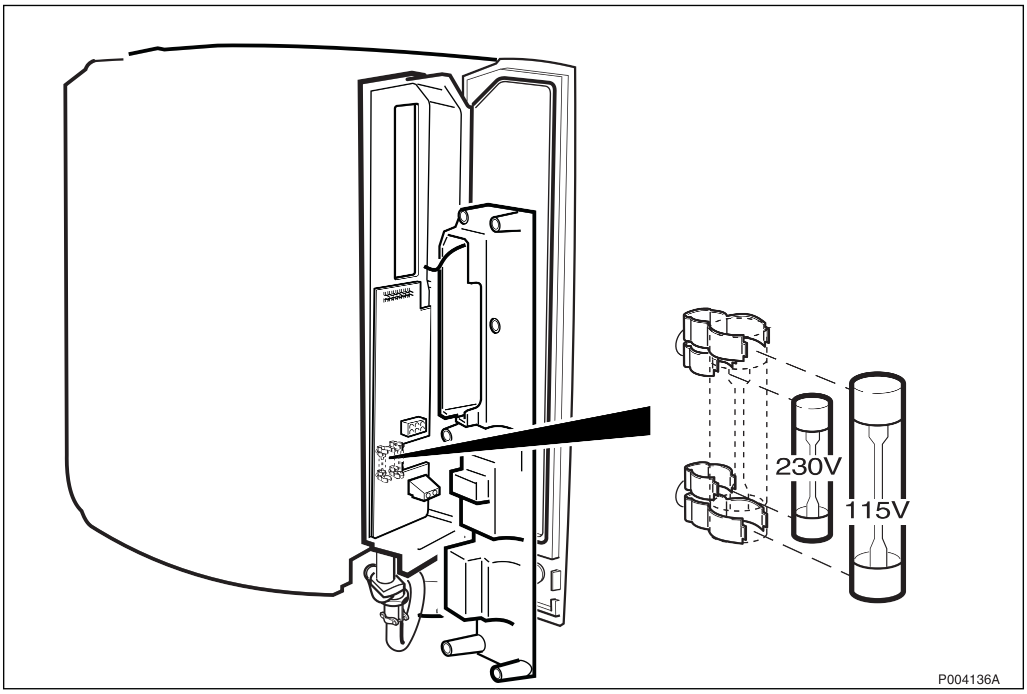

Figure 130 Installing the fuses

2. Install the recommended fuses.

Table 18

Voltage	Fuses Data	Dimension
100-127 V AC	Slow 8 A, 250 V	6.3x32 mm
200-250 V AC	Slow 4 A, 250 V	5x20 mm

6.9 Connecting Earth and Lightning Protection

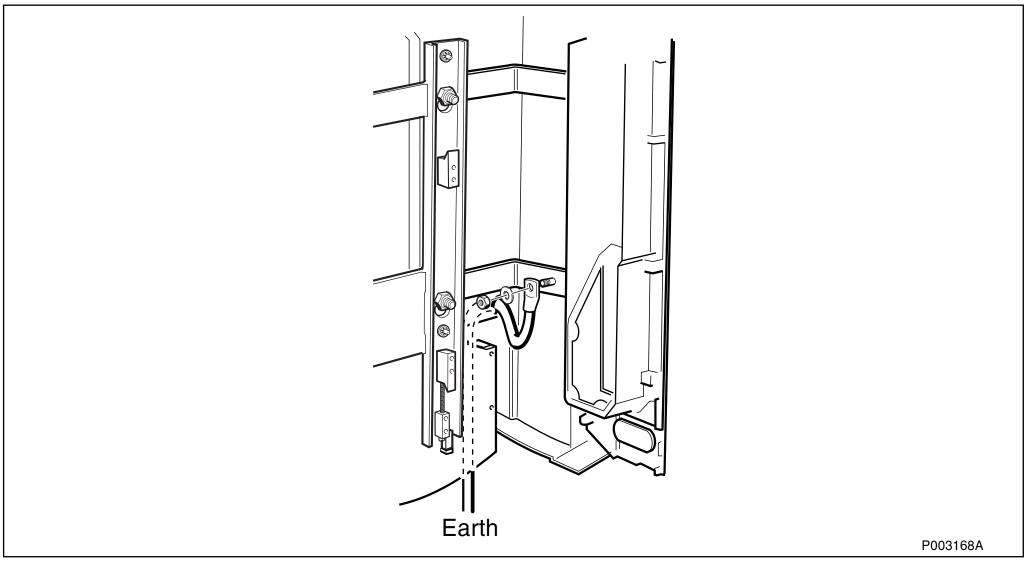

Figure 131 Connecting earth and lightning protection

If the site is located outdoors and is not protected from lightning by a house equipped with a lightning protection system, protect the equipment as follows:

1. Guide the earth cable through the cable inlet down right at the bottom of the rear sunshield.

2. Connect the earth cable on the mounting base. Use earthing kit, see:

General Installation Instructions *LZN 302 49*

3. Connect the other end of the earth cable to the existing lightning system close to the equipment.

Note: If there is no lightning protection system, use the earthing bar, see:

General Installation Instructions *LZN 302 49*

6.10 Mounting the Cabinet

To facilitate mounting, a lifting device may be used, *see chapter Installation of RBS 2302*.

Note: The lifting device is not dimensioned for the PBC assembled with batteries.

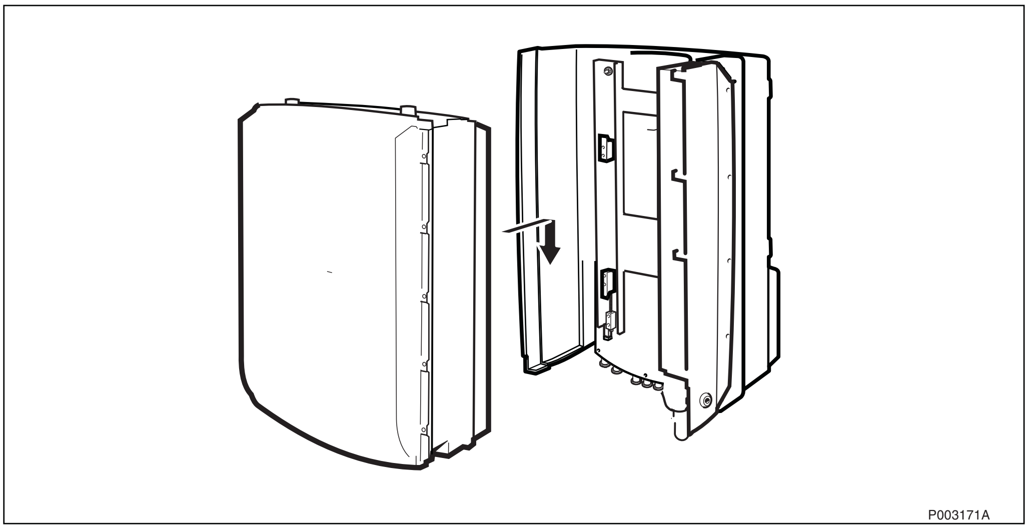

Figure 132 Mounting the cabinet

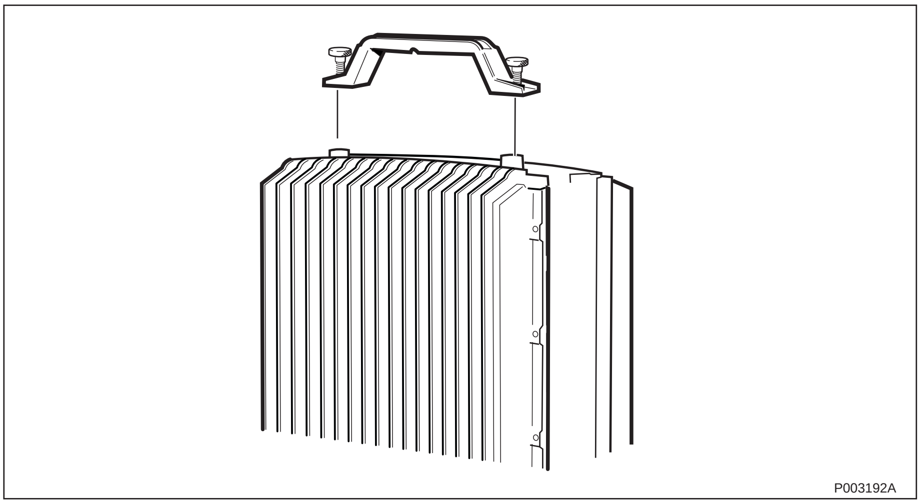

Figure 133 Mounting the lifting handle

1. If the lifting handle (optional) is to be used, mount it on the cabinet and lift the cabinet on to the mounting base.

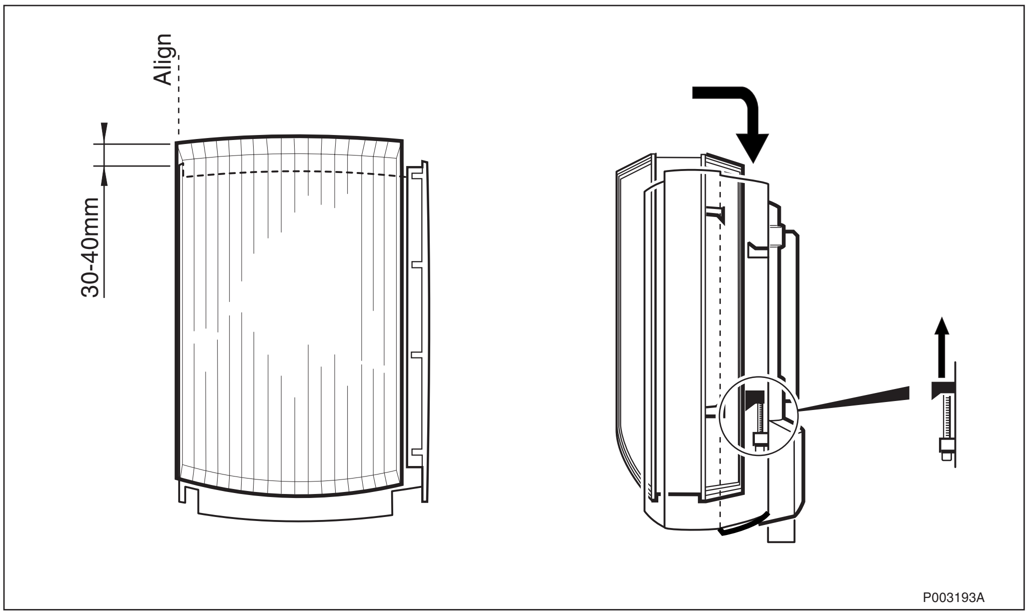

Figure 134 Hooking on the cabinet

2. Facilitate the mounting of the cabinet by aiming for the left side of the cabinet. Start by holding the cabinet a few centimeters above the mounting base. Make sure that the hooks are according to *Figure 134 on page 138*.

3. Hook on the cabinet by pushing it against the mounting base and lower the cabinet on to the hooks.

4. Make sure that the cabinet is properly mounted by verifying that the mounting screws in the installation box correspond to the holes in the cabinet.

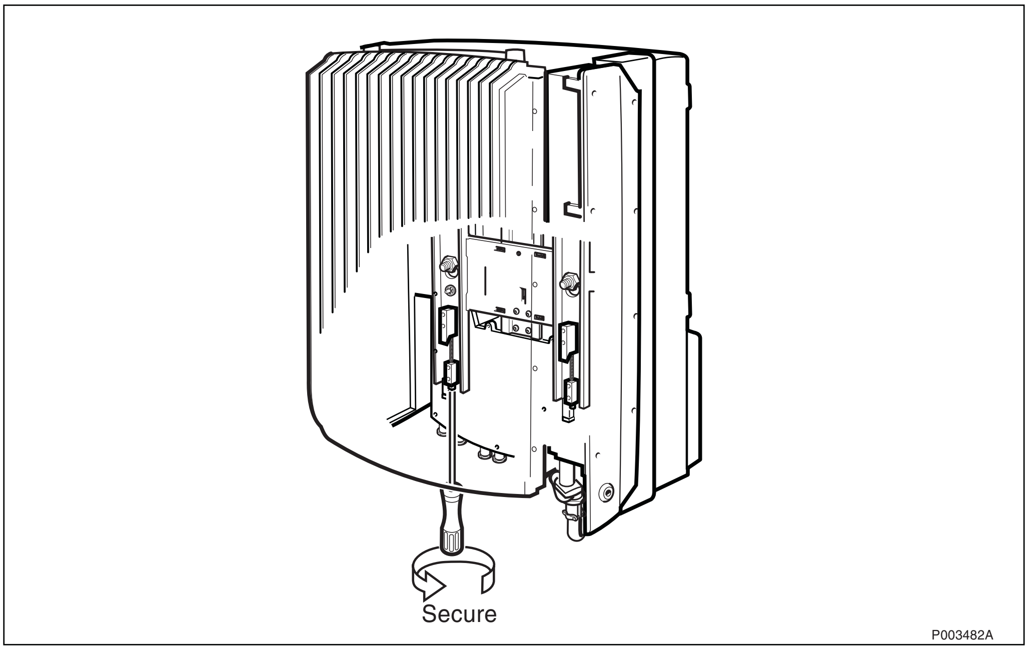

Figure 135 Securing the cabinet

5. Secure the locking cleat under/behind the cabinet by turning the torx screws clockwise until they stop.
6. If the lifting handle has been used, remove it.

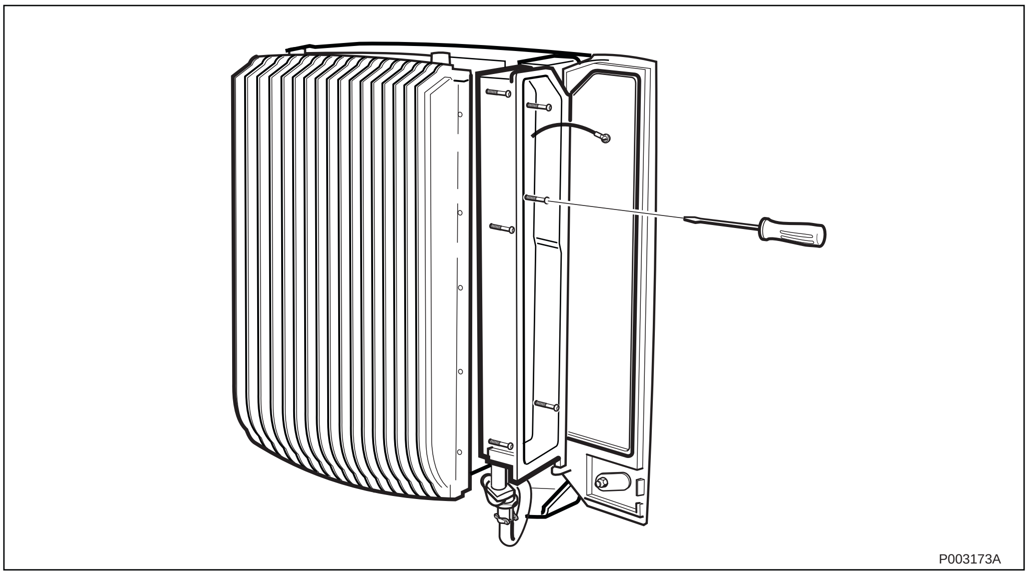

Figure 136 Fastening the installation box

7. Turn each of the 6 torx screws until they engage threads. When all 6 screws have engaged their threads, tighten them.

6.11 Connecting Internal Cables

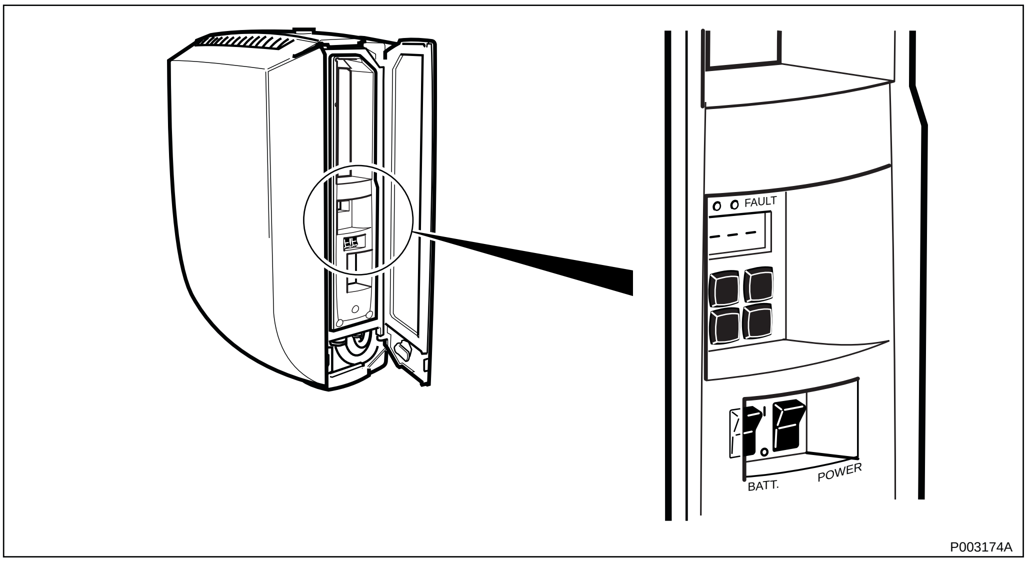

Figure 137 Position of the AC power and battery switches

1. Make sure that the AC power and battery switches are in the OFF position.

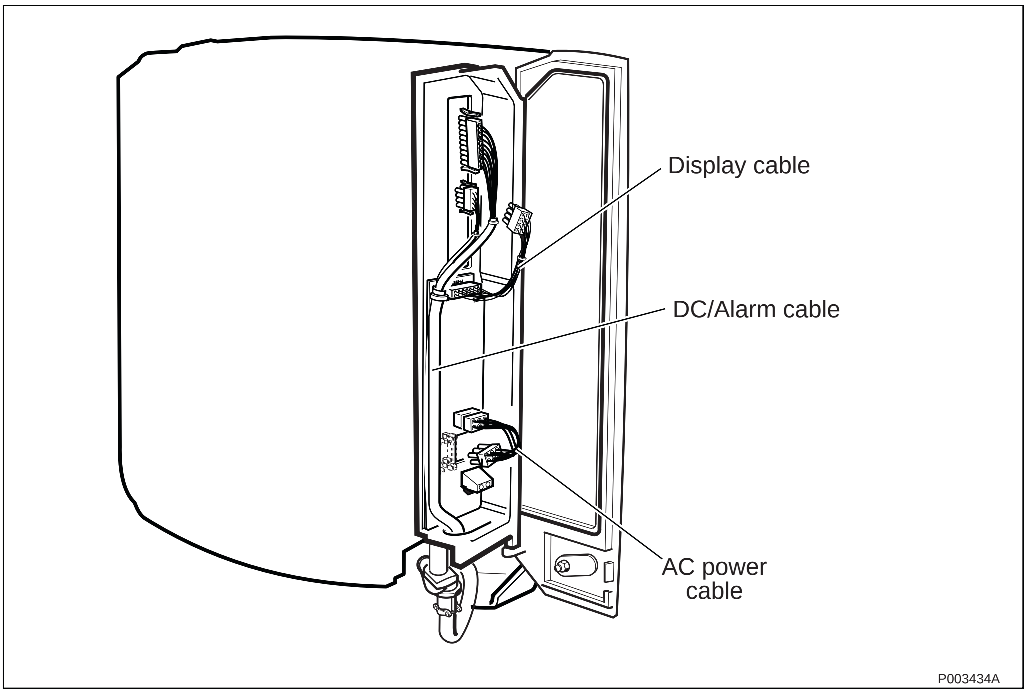

Figure 138 Connecting internal cables

2. Connect the AC power cable, display cable and DC/Alarm cable to the cabinet.
3. Remount the protection cover.

6.12 Installing the Batteries

DANGER

Read Safety instructions regarding handling and connecting batteries.

CAUTION

Short circuit can cause injury and/or damage. Although the battery voltage may be low, the released power can be extremely high.

Note: Batteries must comply with the specification document 1301-BKC 861 available from local Ericsson companies.

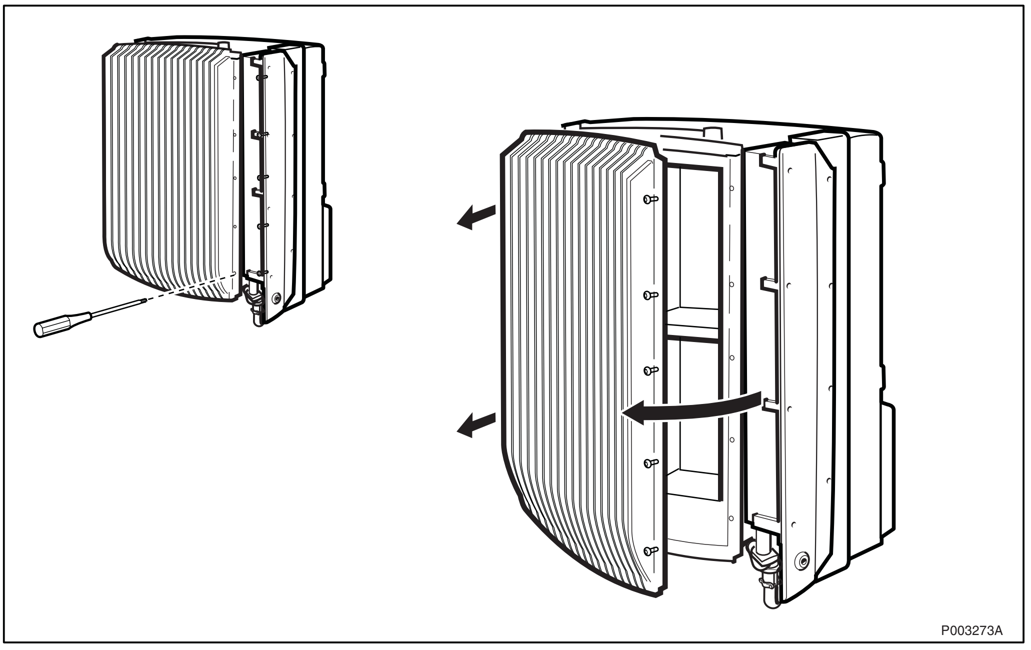

Figure 139 Opening the battery compartment

1. Unscrew the 18 torx screws and make sure that the screws are disengaged.
2. Open the PBC door. The ventilation hoses and battery jumper cables are now accessible.

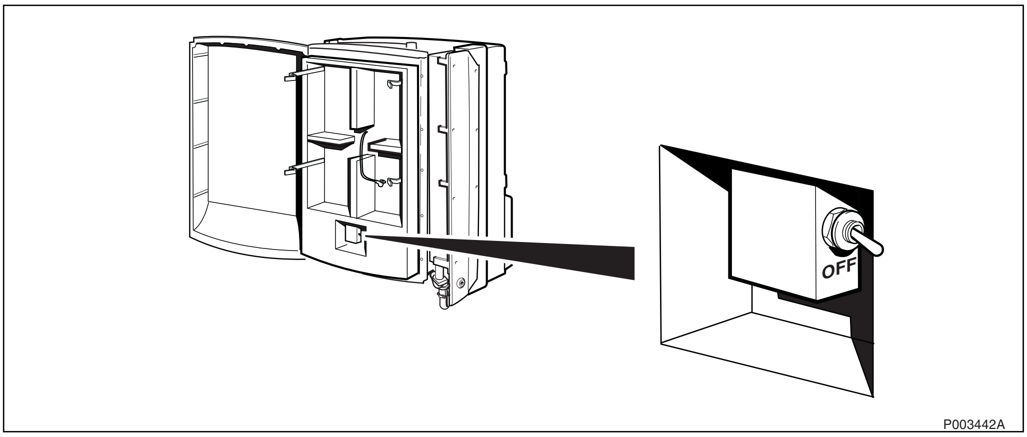

Figure 140 Battery switch position

Note: Ensure that the battery switch is in the OFF position.

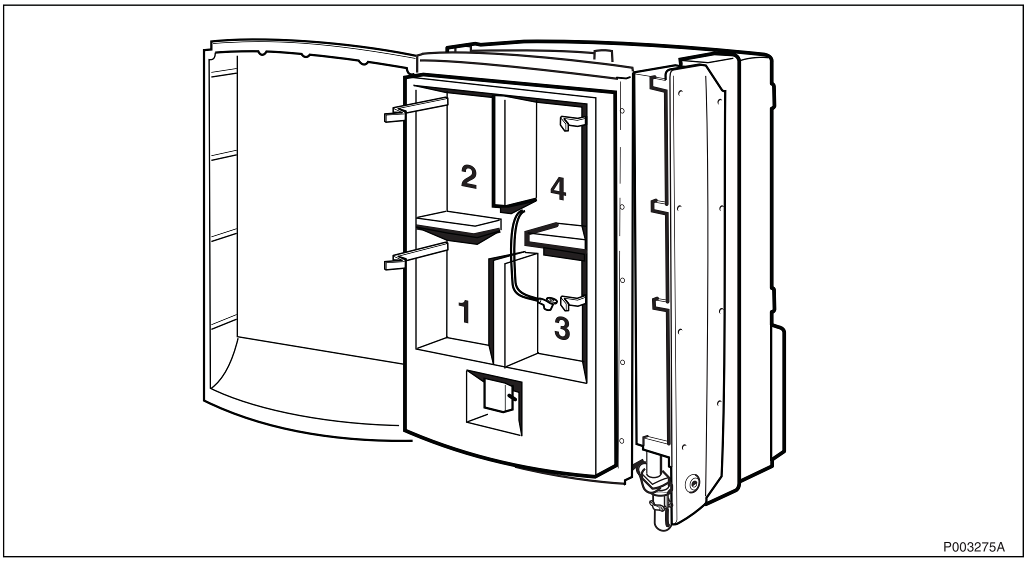

Figure 141 Battery numbering

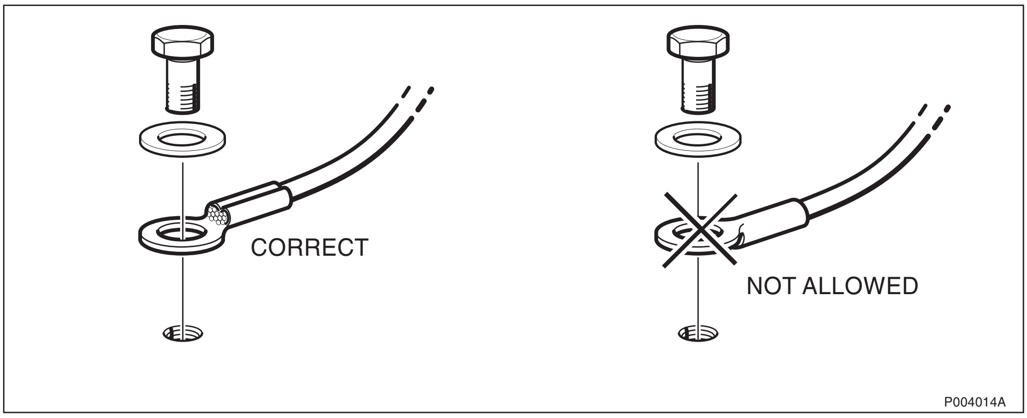

Figure 142 Connecting cable lugs to batteries

Note: Make sure that the cable lugs are properly mounted. If mounted incorrectly, the lugs may break.

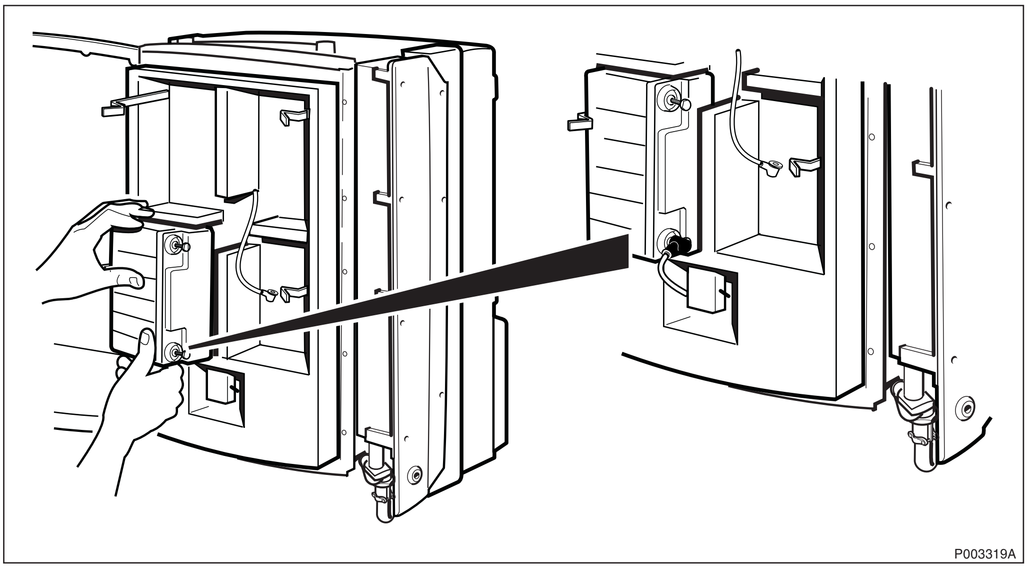

Figure 143 Inserting the battery 1

Note: Always remember to put on the protective caps to cover the battery poles after each connection.

Note: Remove the precutted tape covering the inlet to the ventilations hose on all batteries.

3. Insert battery 1 and connect the cable coming from the battery switch panel to the plus–pole (+).

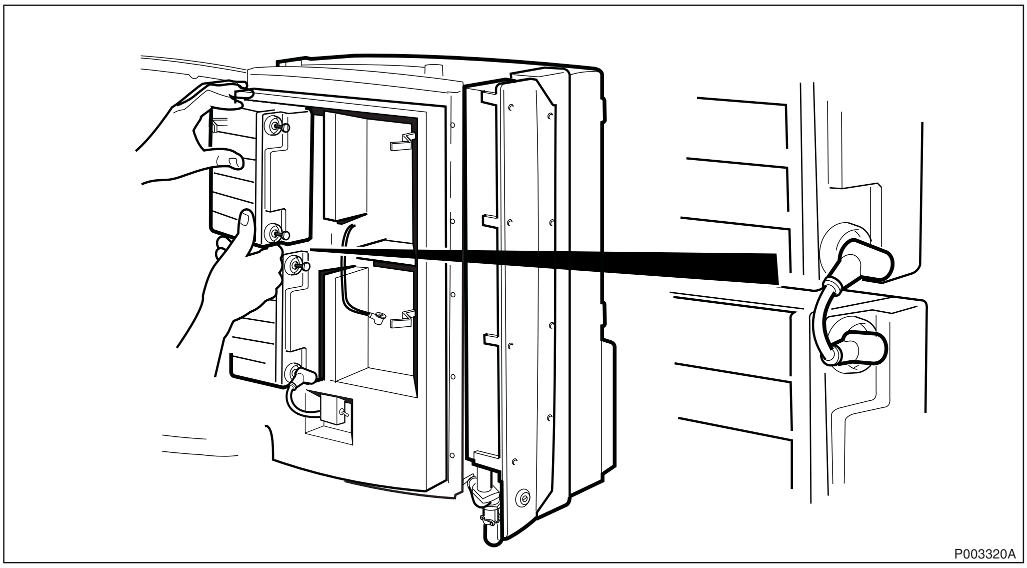

Figure 144 Connecting battery 1 and 2

4. Install battery 2.
5. Connect the battery jumper cable between battery 1 and battery 2.

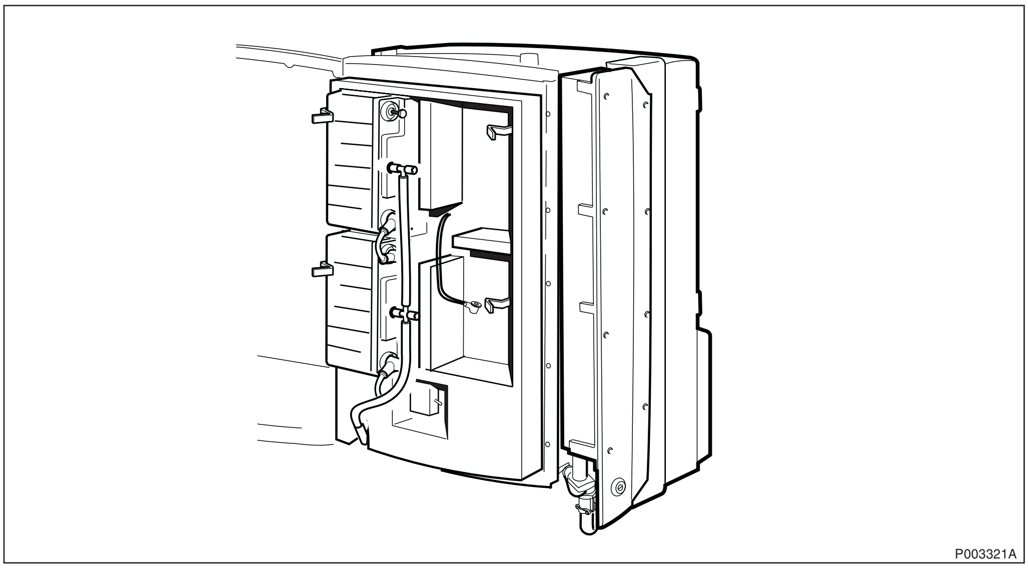

Figure 145 Connecting the ventilation hose

6. Connect the ventilation hose to battery 1 and 2 and guide it to the ventilation outlet down left at the bottom of the cabinet.

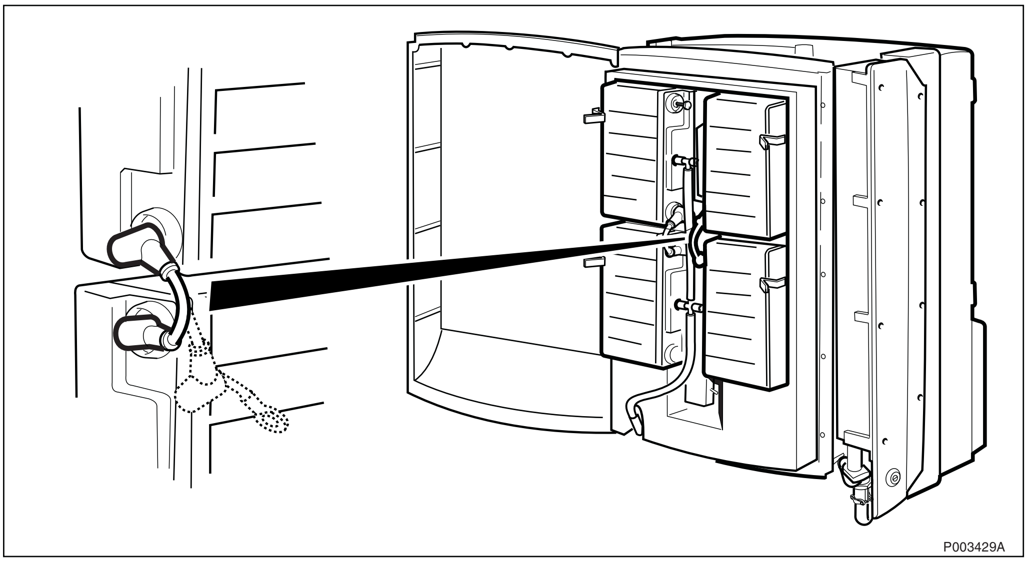

Figure 146 Connecting battery 3 and 4

7. Install battery 3 and 4.
8. Connect the battery jumper cable between battery 3 and 4.

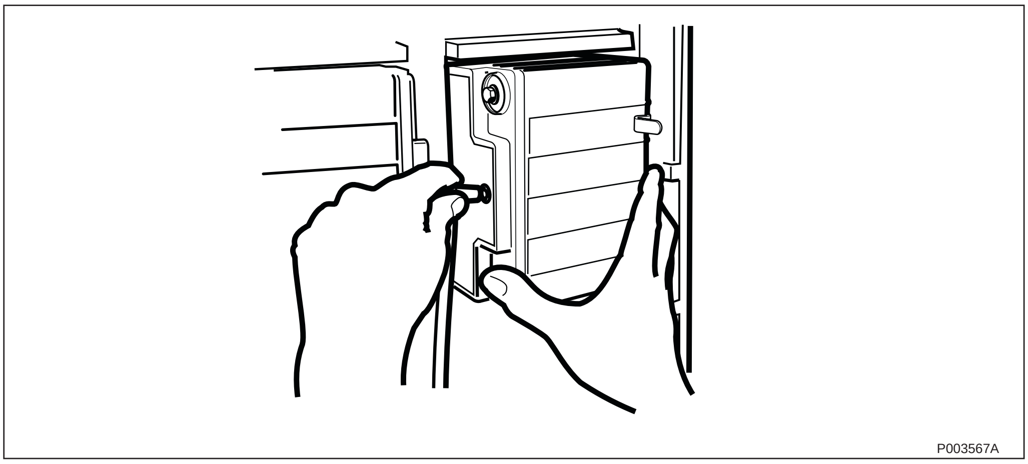

Figure 147 Connecting the ventilation hose to the battery

9. Connect the ventilation hose to battery 3 and 4.

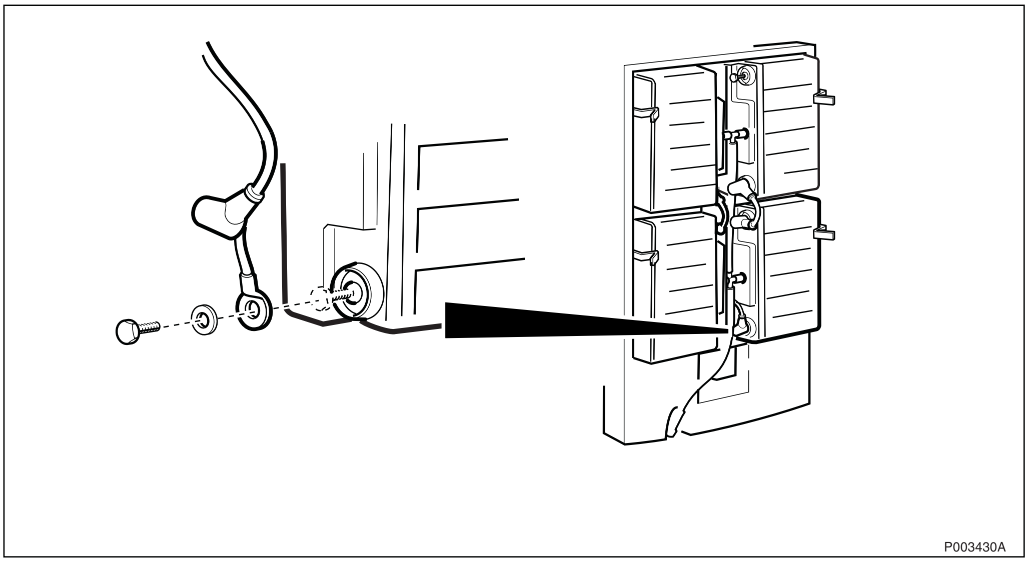

Figure 148 Connecting the minus-pole of battery 3

10. Connect the minus-pole (-) of battery 3.

Note: Ensure that the battery switch is in the OFF position.

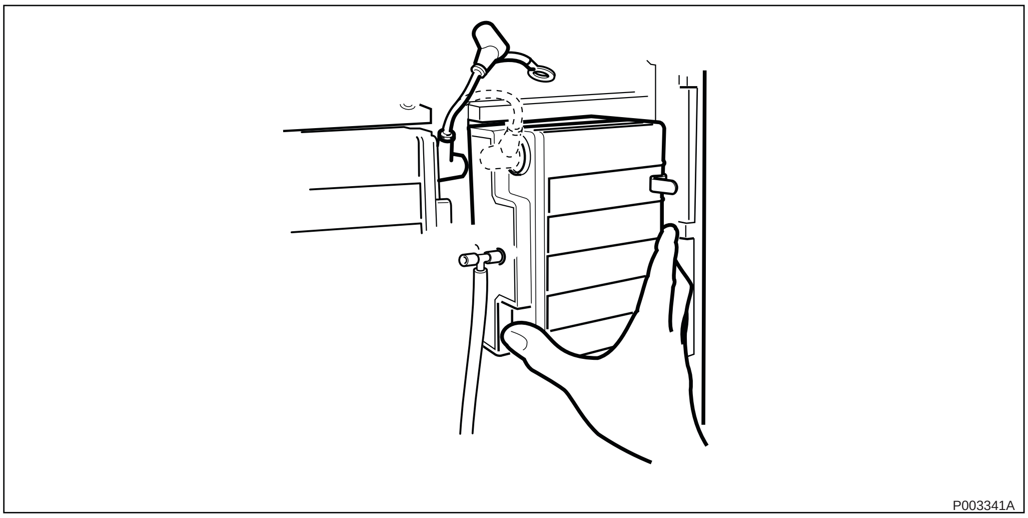

Figure 149 Connecting battery 2 and 4

11. Connect battery jumper cable to battery 2.
12. Connect battery jumper to battery 4.

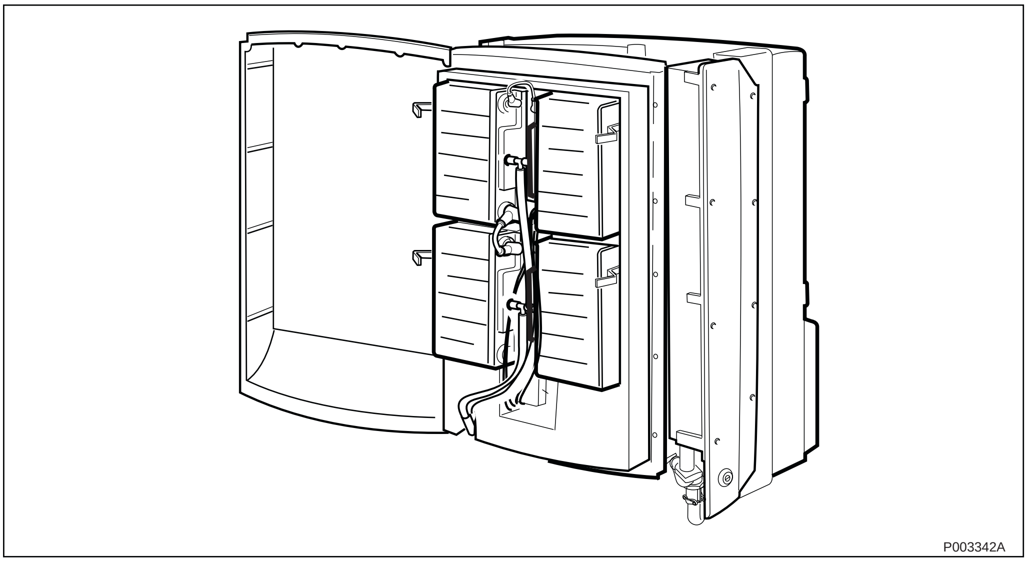

Figure 150 Power and Battery Cabinet

13. Ensure that all cables and hoses are in the correct position so that the door can be closed.
14. Ensure that all protective caps are mounted to cover the battery poles.
15. Ensure that the ventilation hoses are not blocked.
16. Put the battery switch in the ON position.
17. Close the PBC door and screw the 18 torx screws back into position.

6.13 Mounting the Sunshields

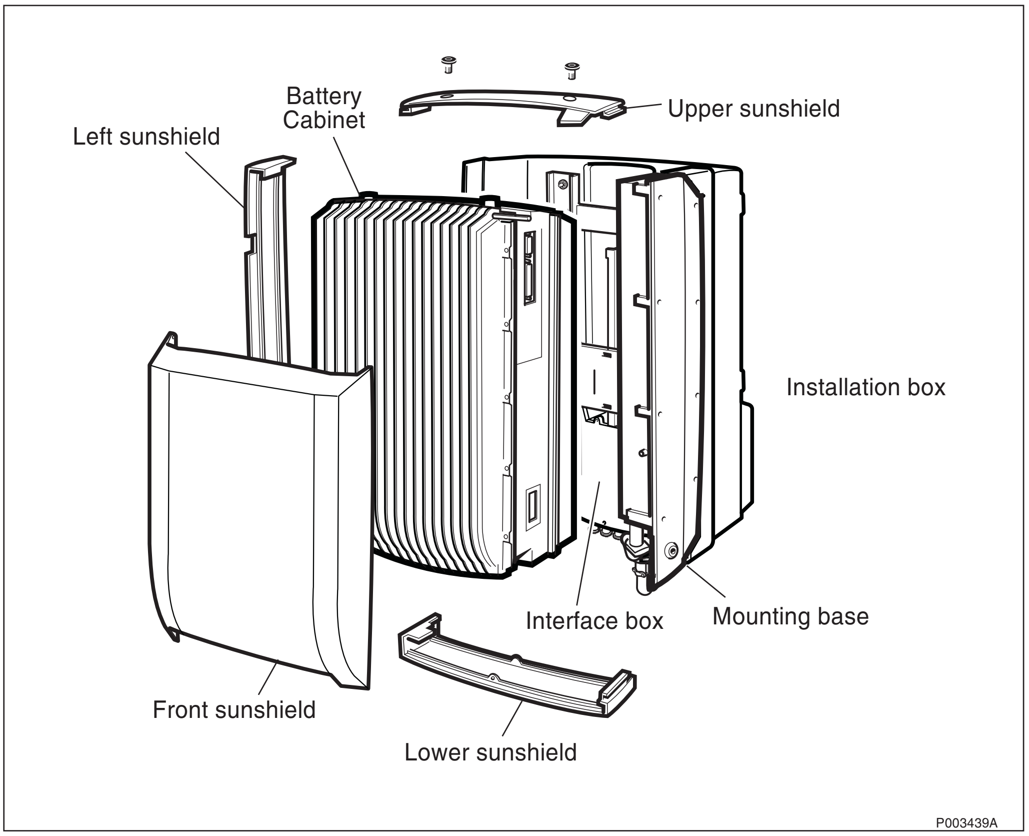

Figure 151 Main units

6.13.1 Upper Sunshield

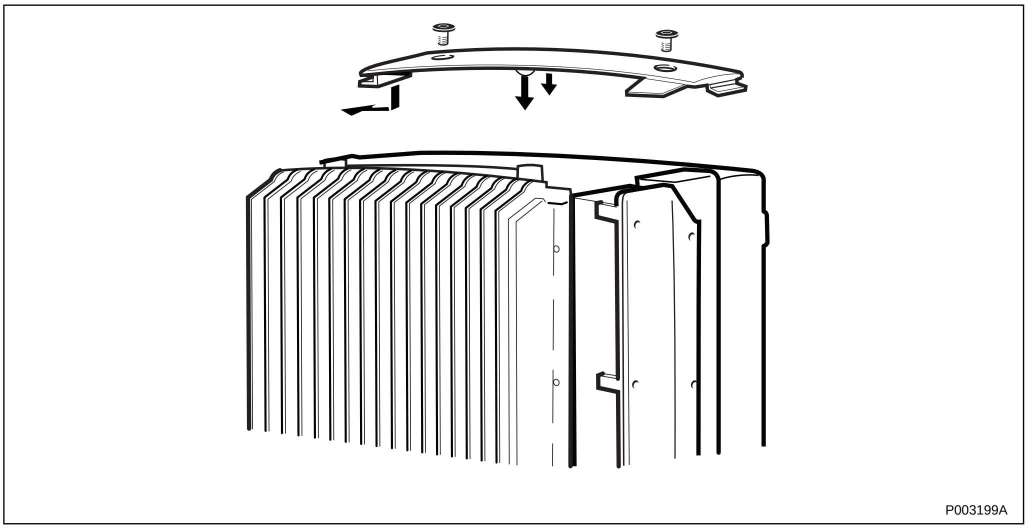

Figure 152 Hooking on the upper sunshield

1. Hook on the upper sunshield on the left side.
2. Push it down until it snaps into position.
3. Seal the two holes, intended for the handle with the supplied screw plugs.

6.13.2 Left Sunshield

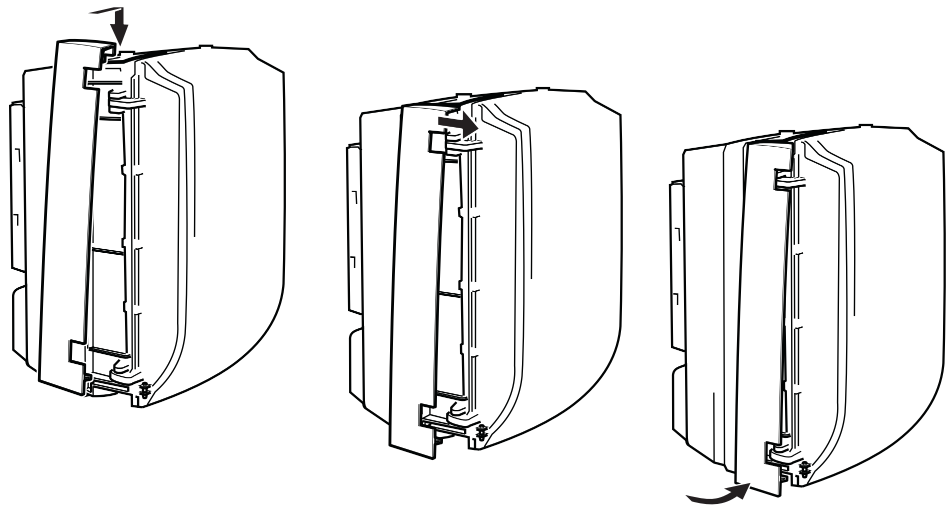

Figure 153 Mounting the left sunshield

1. Tilt the sunshield to the right and hook it on to the cabinet.
2. Push the sunshield forward so that it clears from the hinges.
3. Push on the lower left part of the sunshield until it snaps into position.

6.13.3 Lower Sunshield

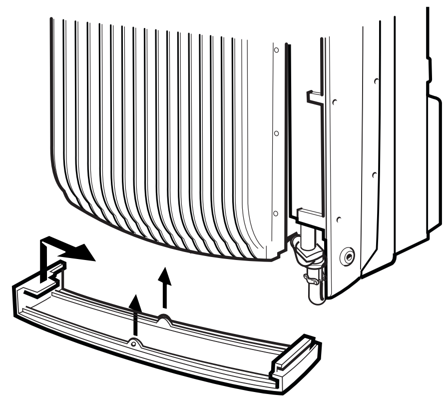

Figure 154 Hooking on the lower sunshield

Note: The lower sunshield can only be mounted if the left sunshield is mounted.

1. Hook on the lower sunshield on the cabinets left side.
2. Push it up until it snaps into the fasteners situated on the middle of the cabinet.

6.13.4 Front Sunshield

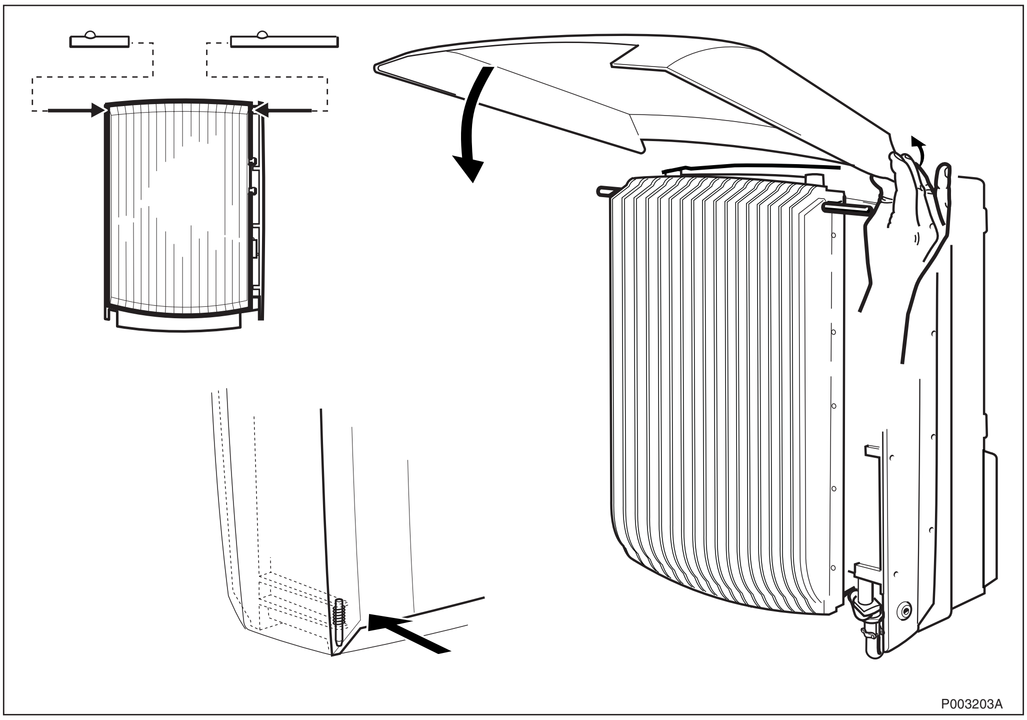

Figure 155 Mounting the front sunshield

1. Mount the short hinge-pin on the left side and the long hinge-pin on the right side.
2. Hook on the front sunshield on the hinges and fold down the cover.
3. Press on the lower left hand corner so that the spring locking pin snaps into position.

6.14 Before leaving the site

- Make sure that all cables are strapped and run in a proper way.
- Push up the interface box and tighten the screws.
- Make sure that all sunshields are in the position for being locked by the installation box door.
- Close the installation box door, tighten all screws and lock.
- Tidy up the site, remove the unnecessary materials and waste.

Note: The Site Installation Test should follow directly after the installation.

In case of ambient temperature changes between hot and cold, there is a risk of humidity damages of the components of the cabinet. To avoid this, the cabinet should not be left wihout power.

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7 Installation of RBS 2302

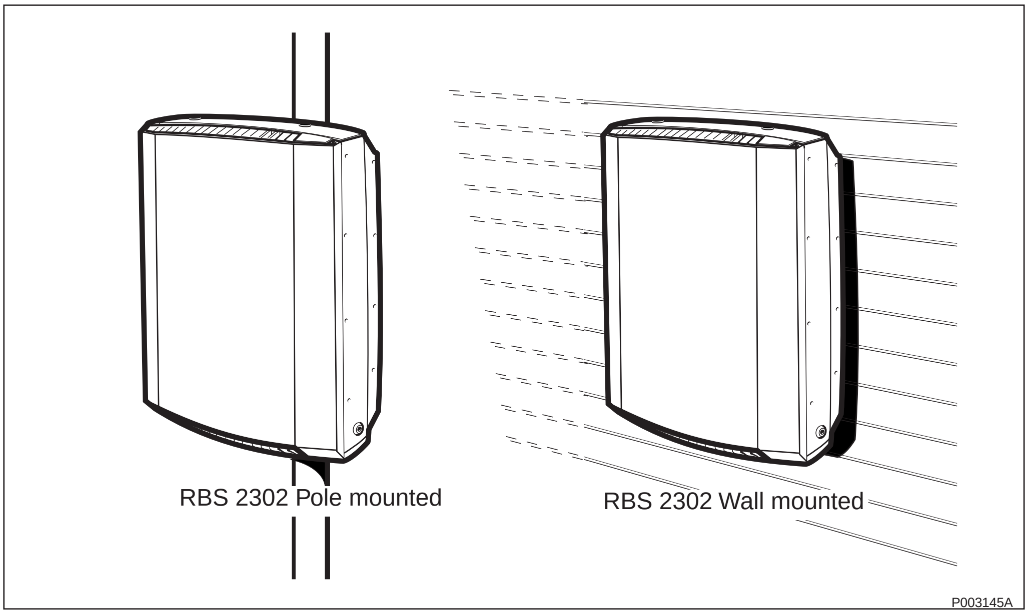

Figure 156 Installation alternatives

7.1 Competence requirement

In order to do installation work according to this manual in a safe and professional way, the work shall be done by a skilled person.

The following qualifications are minimum requirements:

- Good understanding of radio and telephone engineering.
- Good understanding of engineering English.

7.2 Preconditions

Ensure that the following conditions are met:

- When the cabinet is mounted outdoors, it must not be left without power for more than 48 hours. This requirement is owing to by the risk of humidity damages.
- Site access permission received.
- Ordered RBS 2302 and equipment, specified tools and other necessary facilities have been delivered.
- Earth Point is available.
- Electrical ducting is ready and AC mains power is available.
- Transmission line to BSC is available.

7.2.1 Preconditions for wall-mounted RBS 2302

- Make sure that the selected bolt is suitable for the type of wall material that the cabinet is to be mounted on.
- Make sure that the wall surface is even.

7.2.2 Preconditions for pole-mounted RBS 2302

- The pole must have the required dimension (60–114 mm in diameter).

7.2.3 Documents

Make sure that the following documents are available:

- Filled in and approved record prepared during site preparation.
- Site installation documentation prepared by the Installation Engineering department.

General Installation Instructions *LZN 302 49*

7.2.4 Tools and Instruments

The tools needed for RBS 2302 installation may be found in *chapter Tools and Instruments*.

Table 19 Recommended Torque

Dimension	**Torque**				**Notes**
	Ncm	Nm	lbf-in	lbf-ft	
M3	110 +/- 7	-	9.7 +/- 0.6	-	
M3	80 +/- 7	-	7.1 +/- 0.6	-	Reduced for plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	
M4	190 +/- 15	-	16.8 +/- 1.3	-	Reduced for plastic covers
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	
M8	-	21 +/- 1.3	-	15.5 +/- 1	
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	

7.3 Overview

The recommended installation procedure includes the following activities:

- Unpack and verify against the packing list that the correct material has been delivered.
- Mount the RBS 2302 mounting plate.
- Mount the RBS 2302 mounting base.
- Mount the Power Supply Adapter.
- Connect earth and lightning protection.
- Mount the cabinet.
- Connect internal cables.
- Mount the sunshields.

Note: Information regarding connecting external cables *see chapter Installation of External Cables*.

7.4 Unpacking

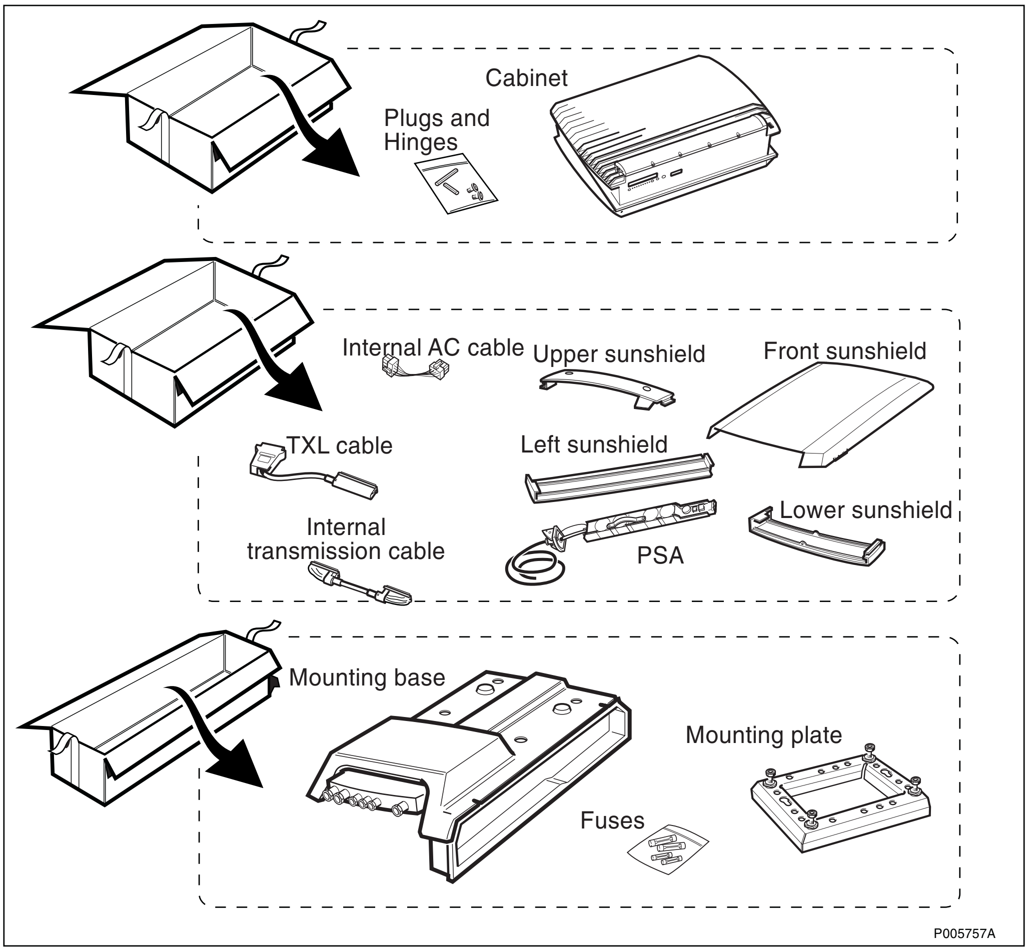

Figure 157 Unpacking the cabinet, sunshields and cables, and the mounting base

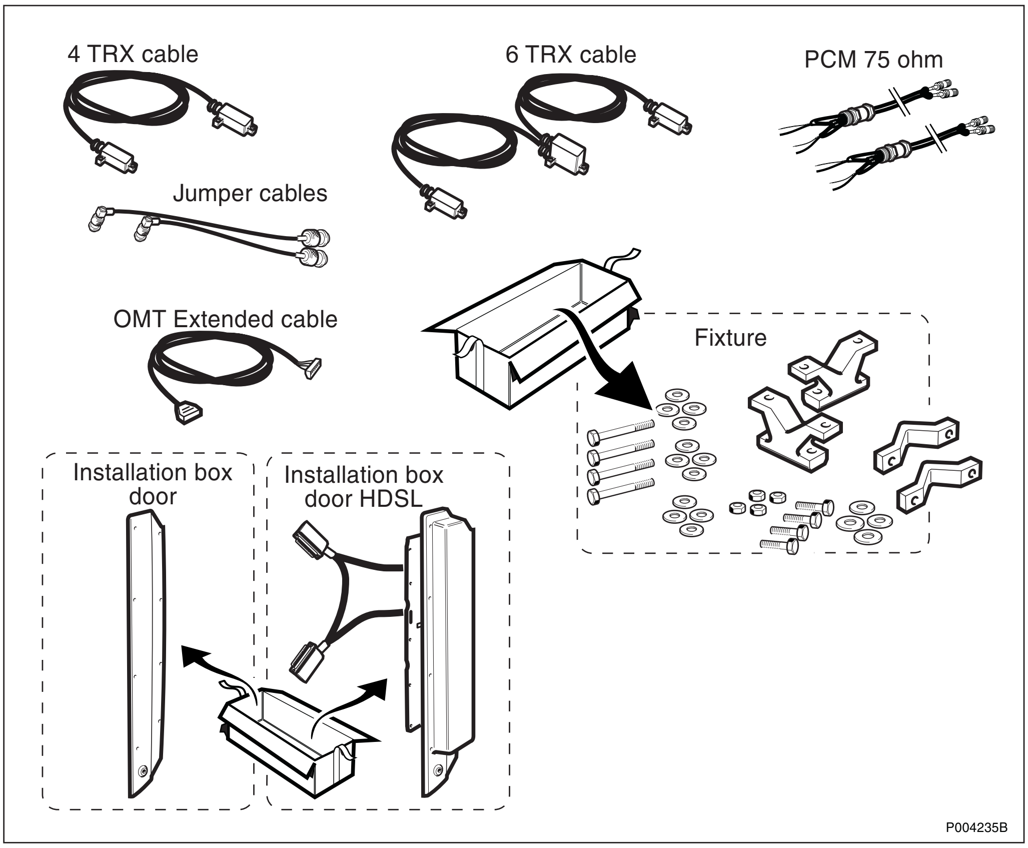

Figure 158 Unpacking the optionals

Unpack and ensure that the correct material has been delivered. If the material is damaged make an immediate complaint to the supervisor/ transport company.

7.5 Mounting the Mounting Plate

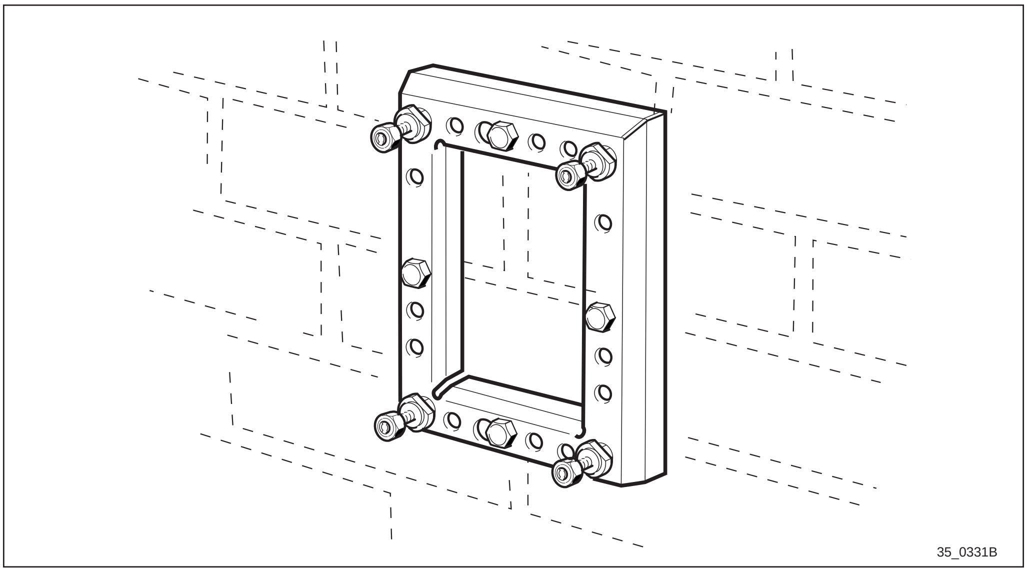

Figure 159 Mounting the mounting plate

If the installation site is at such height that work cannot be done without aid, a skylift or scaffold must be used. For reasons of safety a step ladder should only be used as an exception, in order to keep the installation safe.

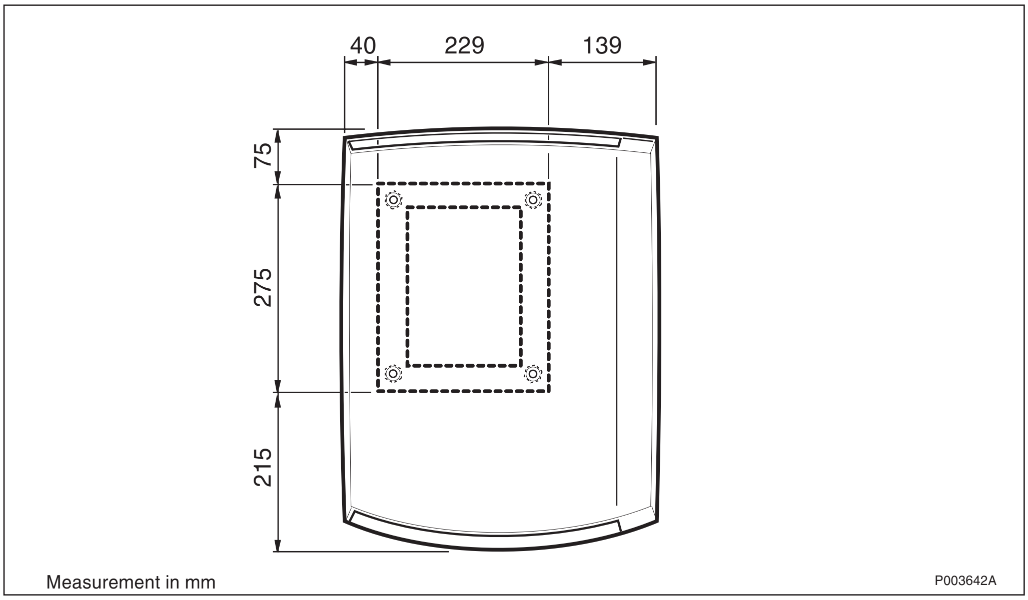

Figure 160 Mounting plate and equipment contour, front view

Figure 160 on page 155 shows the dimensions of the equipment in relation to the mounting plate. This is to determine a suitable alignment with several units or existing equipment. For more information *see chapter Site Planning and Requirements*and *chapter Product Data*.

7.5.1 Mounting the Mounting Plate on a Wall

1. Use the mounting plate as a marking template. An arrow on the mounting plate shows which side should face upwards.

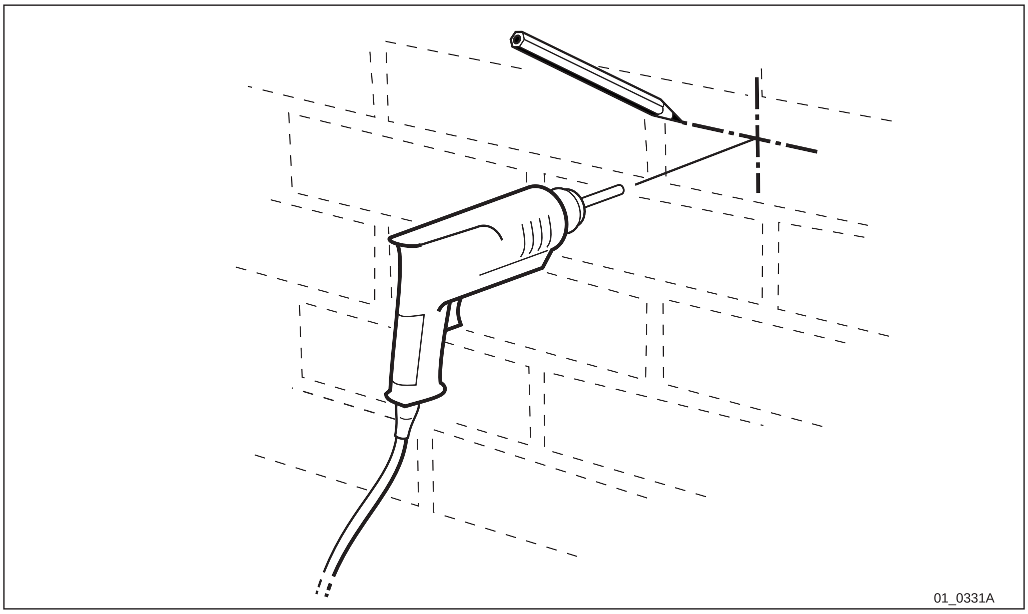

Figure 161 Marking the position of the mounting plate and drilling the hole

2. Hold the mounting plate against the wall in the position where the RBS 2302 is to be situated. Use a pen to mark the position of the upper keyhole.

3. Remove the mounting plate and drill a hole for the kind of fasteners best suited for the wall material.

Note: The mounting plate must not be used as a drilling template in order not to damage the rust protection surface.

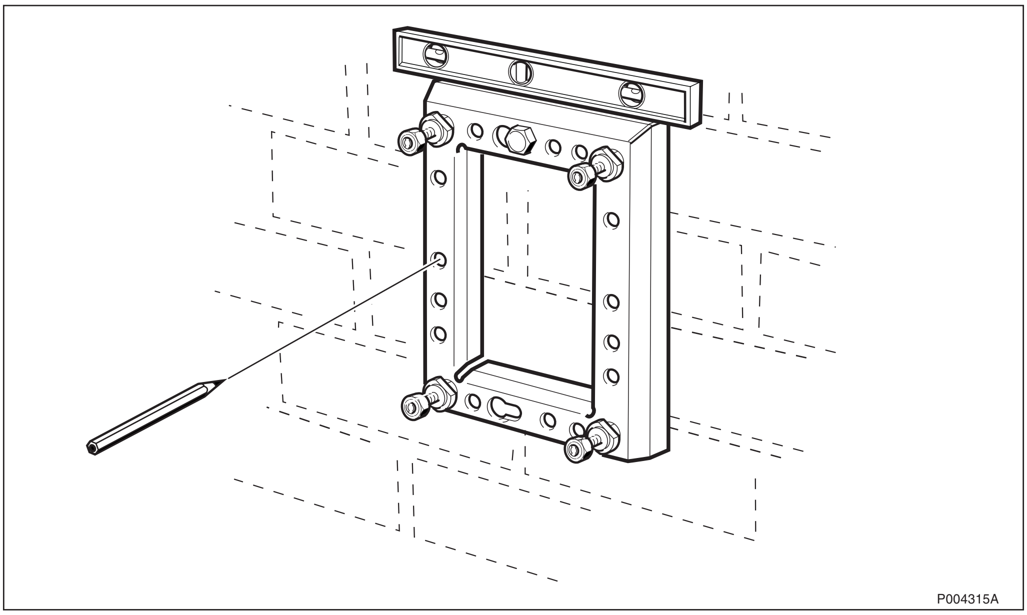

Figure 162 Marking the rest of the holes

4. Fasten the screw and mount the mounting plate. When the mounting plate is hanging in a horizontal position, check it with a spiritlevel, then mark the rest of the holes to be used. Remove the mounting plate and drill the rest of the holes.

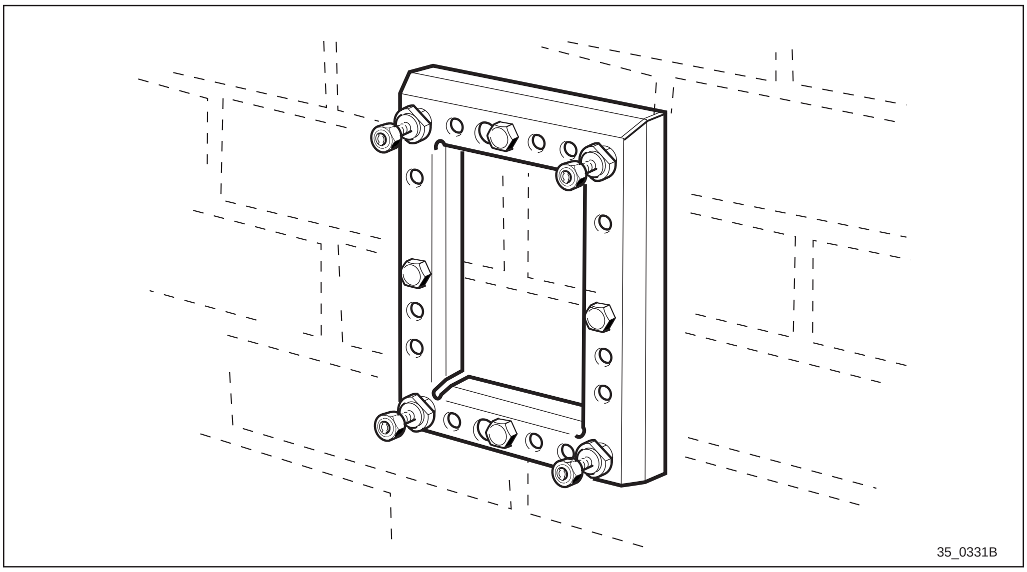

Figure 163 Mounting plate

5. Remount the mounting plate and secure it into position with all screws.
6. Unscrew the four nuts on which the mounting base is to be hung, until only a few threads remain.

7.5.2 Mounting the Mounting Plate on a Pole

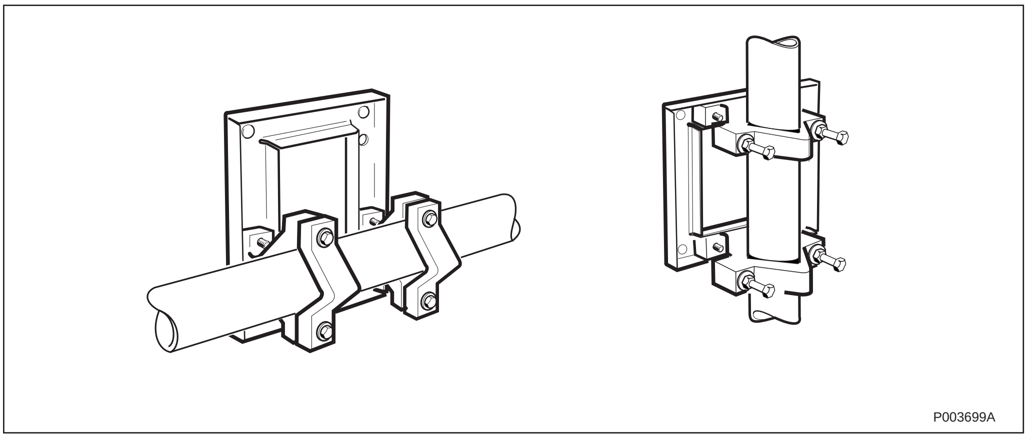

Figure 164 Mounting alternatives

The mounting plate may be mounted on a vertical pole or on a horizontal pole by using different holes.

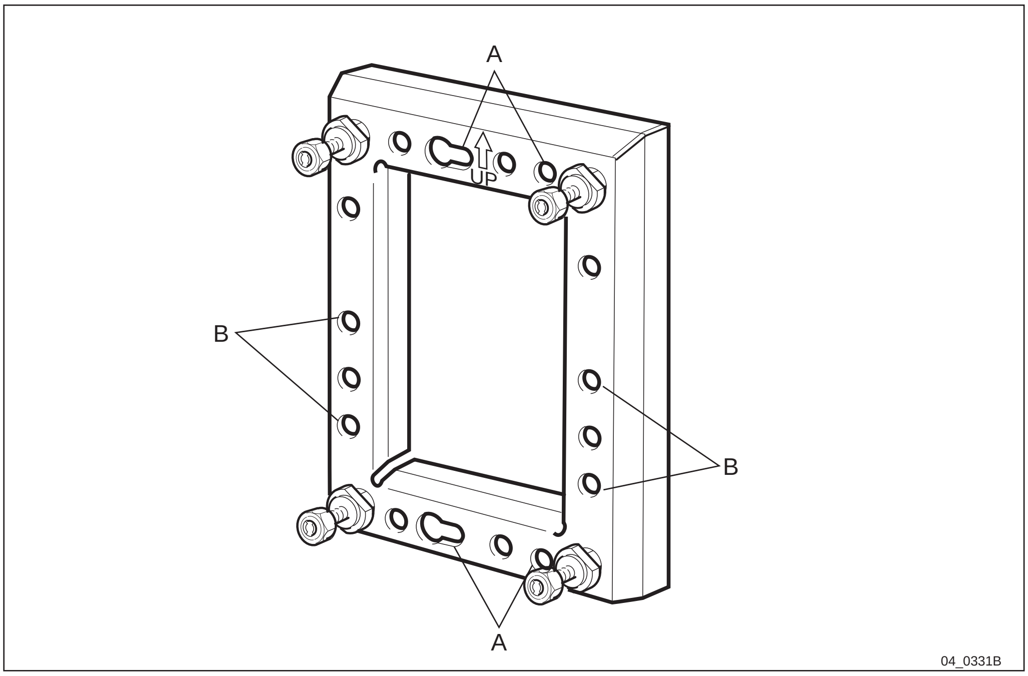

Figure 165 Choosing the appropriate holes

A	Holes to be used for vertical pole
B	Holes to be used for horizontal pole

1. Choose the appropriate holes (horizontal/vertical).

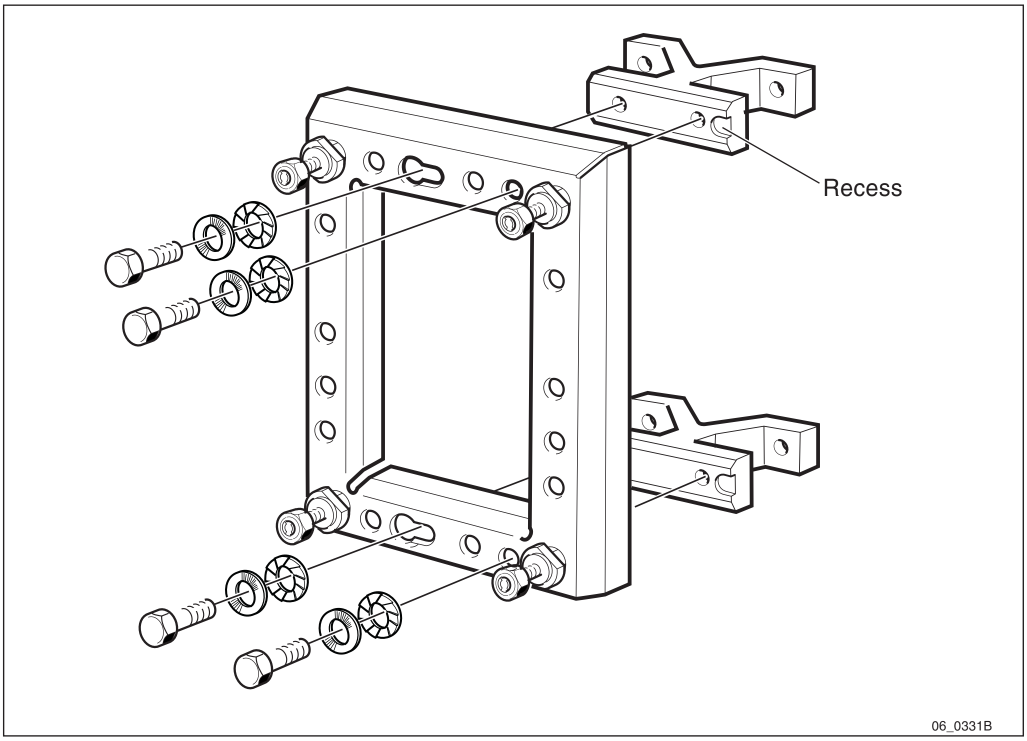

Figure 166 Fastening the clamps and mounting the washers

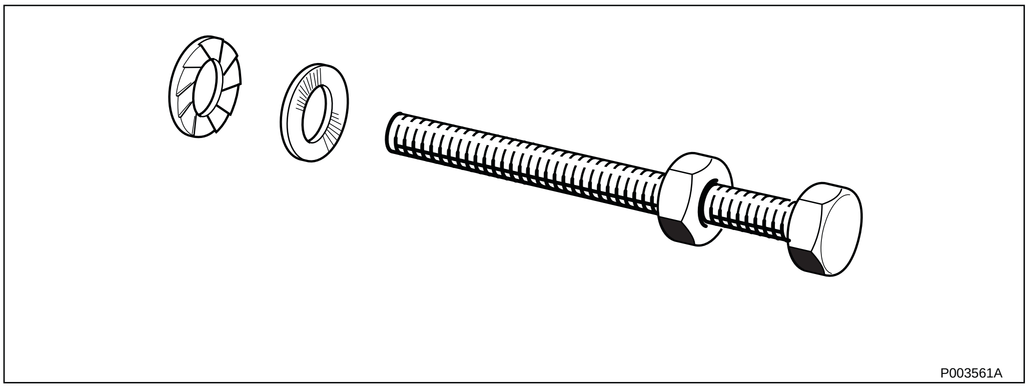

Figure 167 Mounting the washers

2. Make sure that the washers are mounted correctly see *Figure 167 on page 158*.
3. Fasten the two clamps with the screws and washers. Ensure that the recess is attached at the correct place.

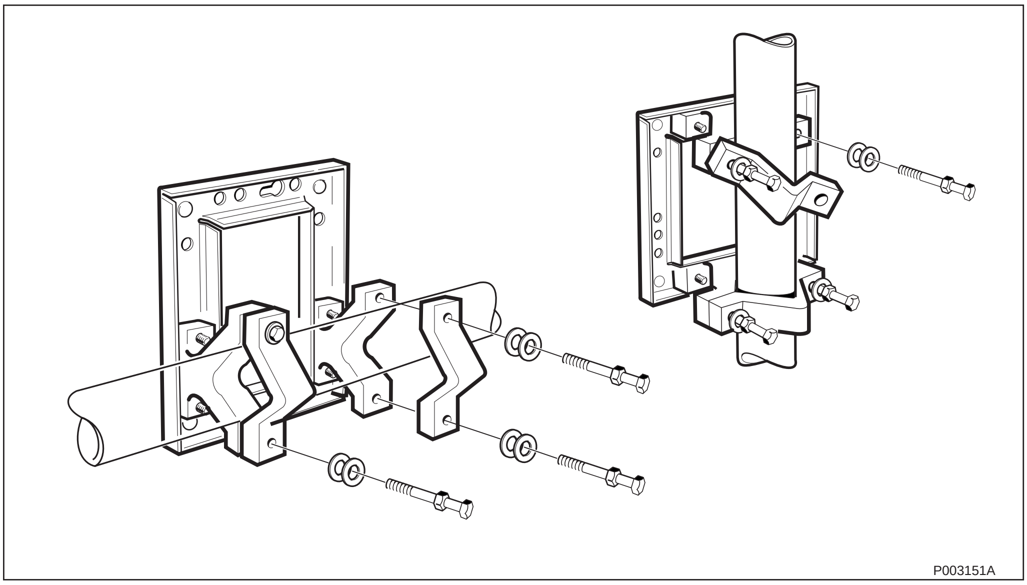

Figure 168 Placing the mounting plate correctly

4. Place the mounting plate at the correct height on the pole and mount the clamp halves.

5. Make sure that the washers are mounted correctly see *Figure 167 on page 158*.

6. Mount the screws and tighten them alternately (right and left side) in order to avoid bending the screws.

7.6 Mounting the Mounting Base

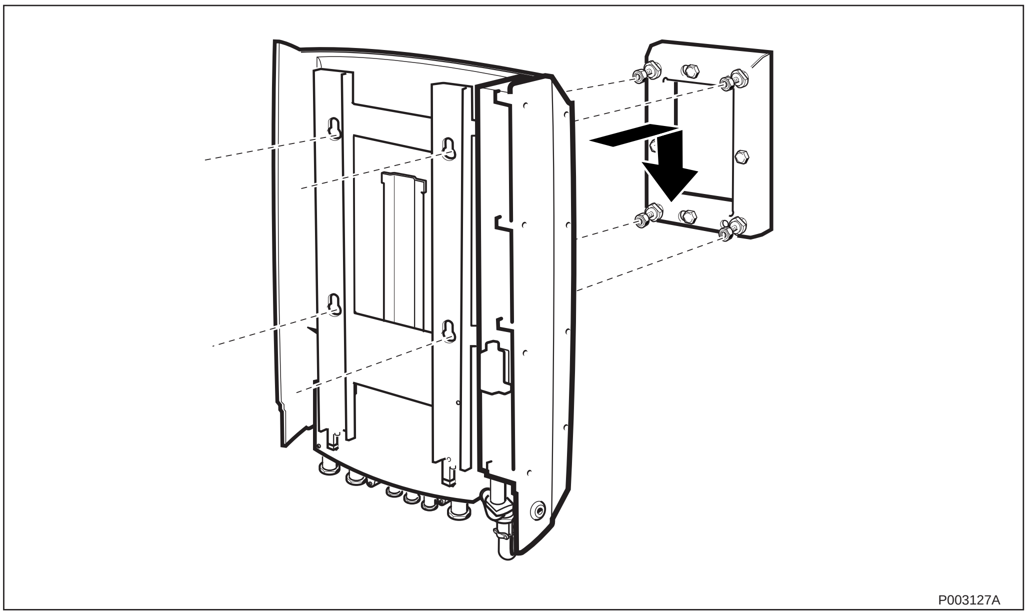

Figure 169 Mounting the mounting base on the mounting plate

1. Mount the mounting base on the four screws situated on the mounting plate. Ensure that the fastening screws are properly fitted in the key holes.

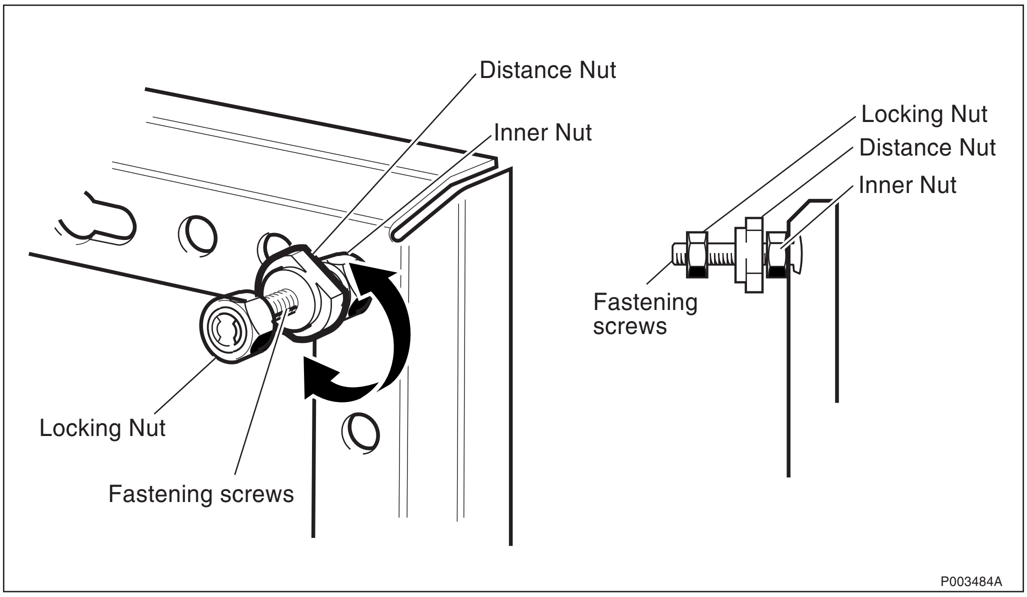

Figure 170 Adjusting the distance nuts

2. Alter the vertical inclination of the mounting base relative to the mounting plate, by adjusting the four distance nuts. This can only be done with the mounting base dismounted. The locking nuts may remain on the fastening screws.

Note: Do not loosen the inner nuts. The inner nuts secure the fastening screws in the mounting plate.

3. When the mounting base is correctly adjusted, tighten the four locking nuts.

7.7 Mounting the Installation Box Door

Note: This section is also applicable when a HSDL door is used.

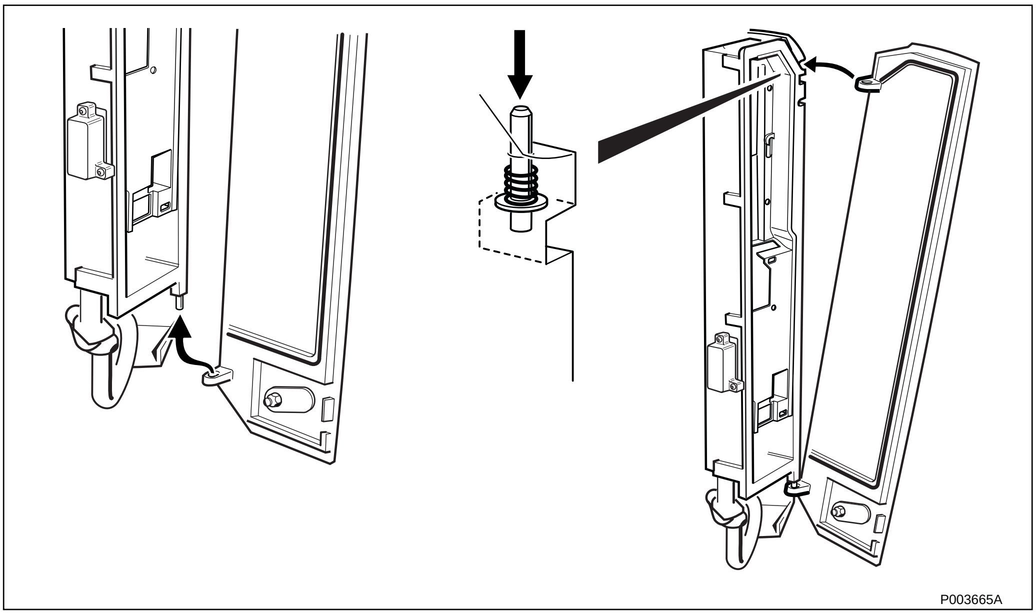

Figure 171 Mounting the installation box door

3. Hook the lower left hand corner of the door on to the installation box.

2. Press down the spring locking pin on the right hand corner of the installation box.

3. Insert the installation box door by pushing the upper left hand corner of the door into position. Make sure that the spring locking pin snaps into position.

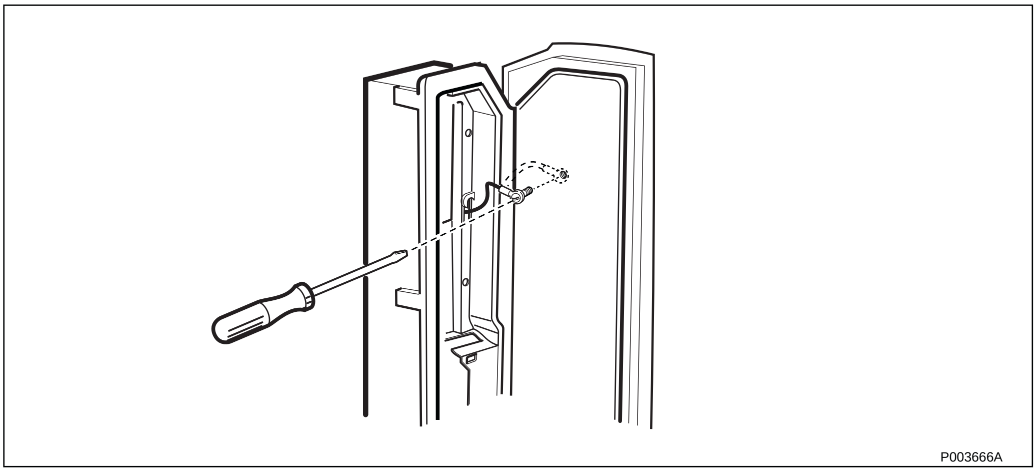

Figure 172 Mounting the earth cable, Installation Box Door without HDSL

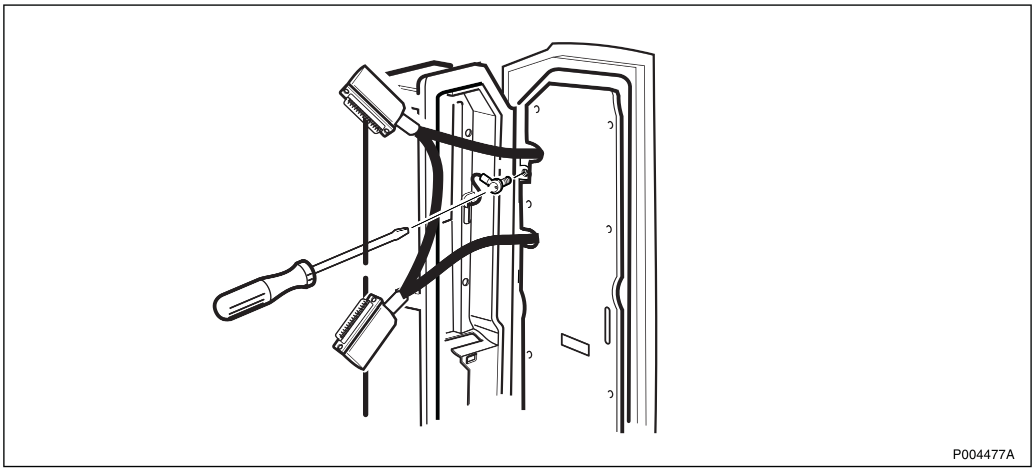

Figure 173 Mounting the earth cable, Installation Box Door with HDSL

4. Mount the earth cable on the installation box door by screwing the torx screw into position.

7.8 Installation Box

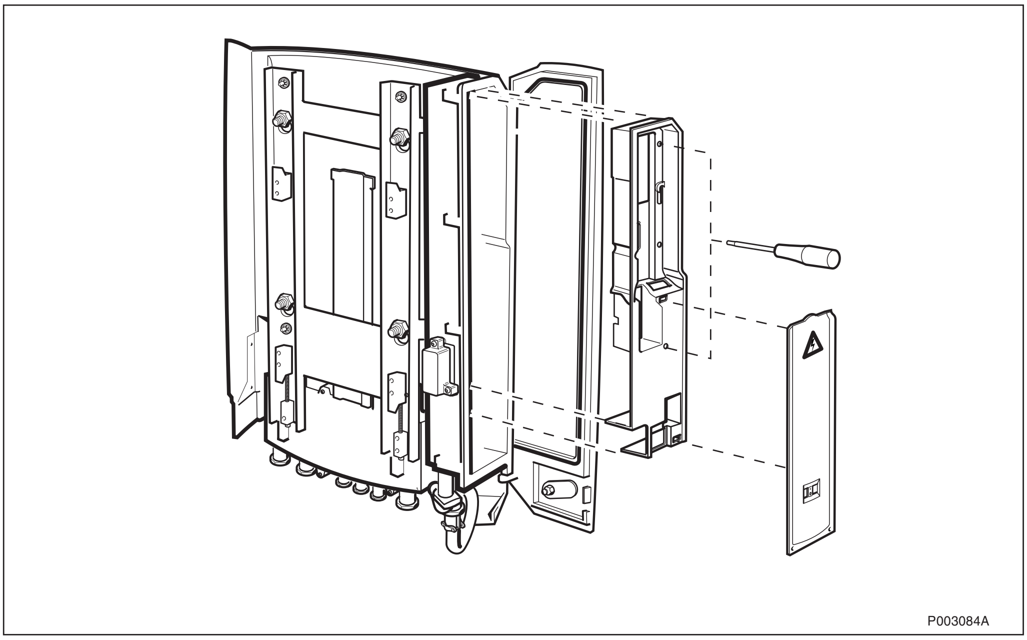

Figure 174 Removing the protection covers

1. Remove the outer protection cover by snapping it off, and let the cover hang in its cord.

2. Loosen the inner protection cover by unscrewing the 2 torx screws and let the cover hang in the earth wire. The fuses and voltage selector are now accessible.

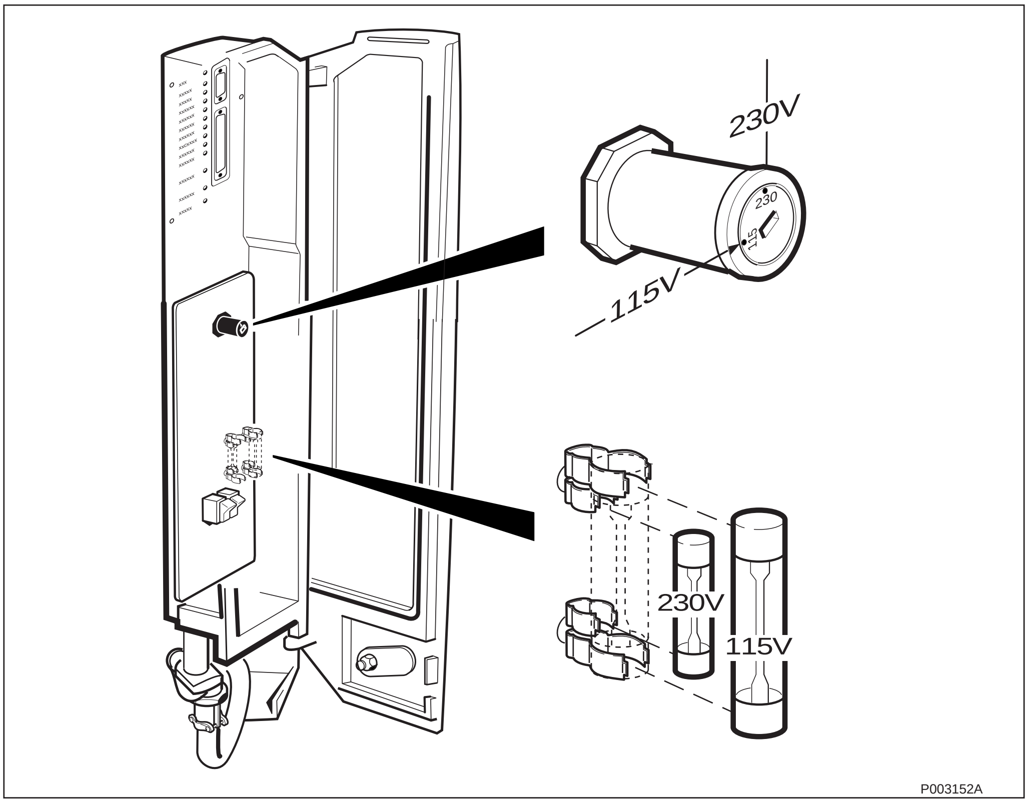

Figure 175 Installing the fuses and checking the voltage selector

3. Make sure that the voltage of the power that is to be connected is correct. Compare with the Site Documentation.

4. Install the recommended fuses.

Table 20

Voltage	Fuses Data	Dimension
100-127 V AC	Slow 8 A 250 V	6.3x32 mm
200-250 V AC	Slow 6.3 A 250 V	5x20 mm

5. Make sure that the voltage selector is set to the correct voltage.

6. Remount the inner protection cover.

7.9 Mounting the Power Supply Adapter

The RBS 2302 cabinet is delivered with a premounted internal battery. In order to set up a Maxite site the internal battery must be switched to a Power Supply Adapter (PSA).

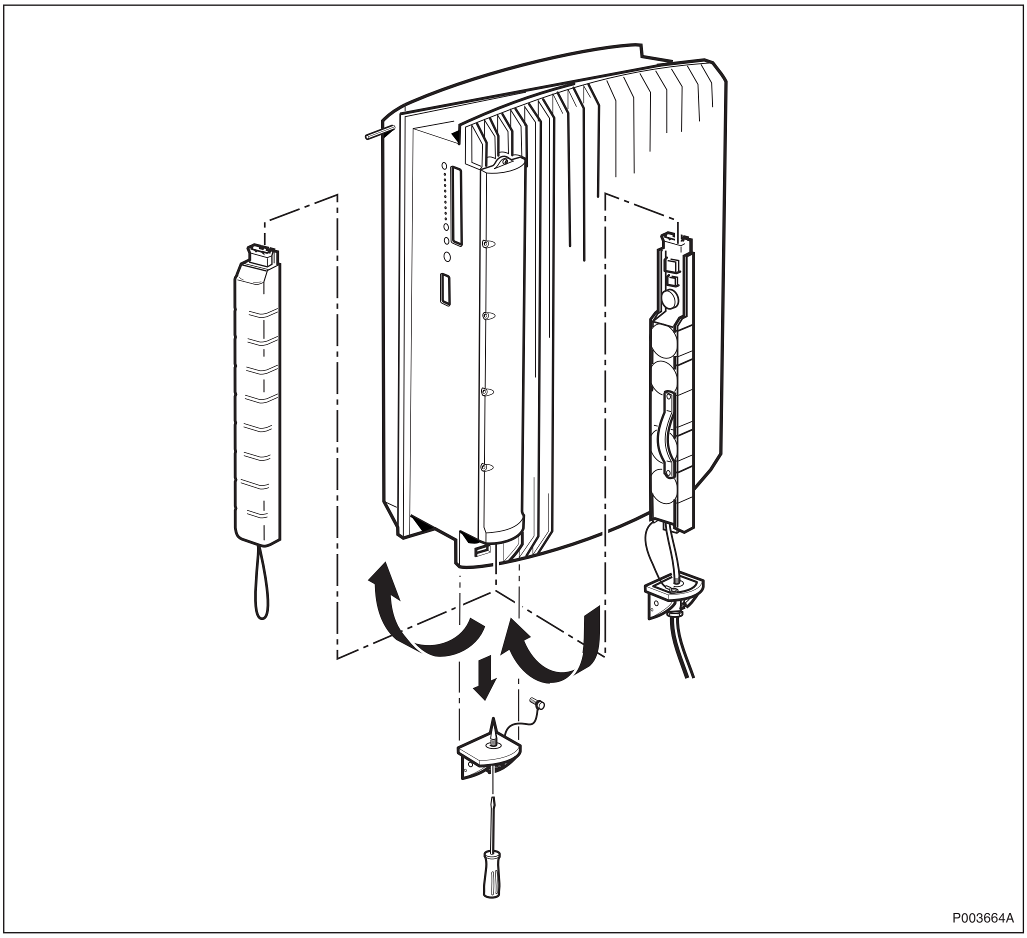

Figure 176 Switching the internal battery to the PSA

1. Open the internal RBS battery compartment by unscrewing the torx screw located on the cover.

2. Remove the internal battery.

3. Separate the cover from the cabinet by loosening the torx screw that holds the wire.
4. Insert the PSA into the battery compartment.
5. Place the lip on the cover in the mounting hole and push the cover gently into position. Make sure that the cables are not squeezed by the spring.
6. Tighten the torx screw and make sure there is no gap between the cover and the cabinet.

7.10 Connecting Earth and Lightning Protection

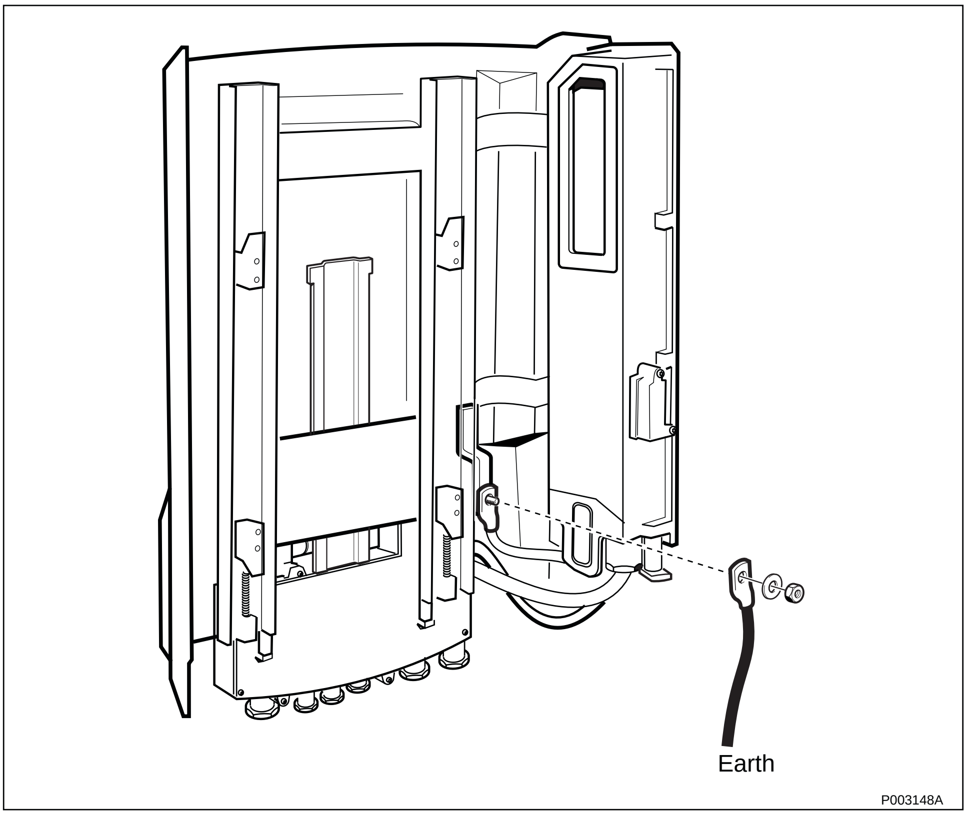

Figure 177 Connecting earth and lightning protection

If the site is located outdoors and is not protected from lightning by a house equipped with a lightning protection system, protect the equipment as follows:

1. Connect the earth cable on the mounting base. Use earthing kit, see:

General Installation Instructions *LZN 302 49*

2. Connect the other end of the earth cable to the existing lightning system close to the equipment.

Note: If there is no lightning protection system, use the earthing bar, see:

General Installation Instructions *LZN 302 49*

7.11 Mounting the Cabinet

To facilitate the mounting a lifting device may be used, *see Section 7.15 on page 174*.

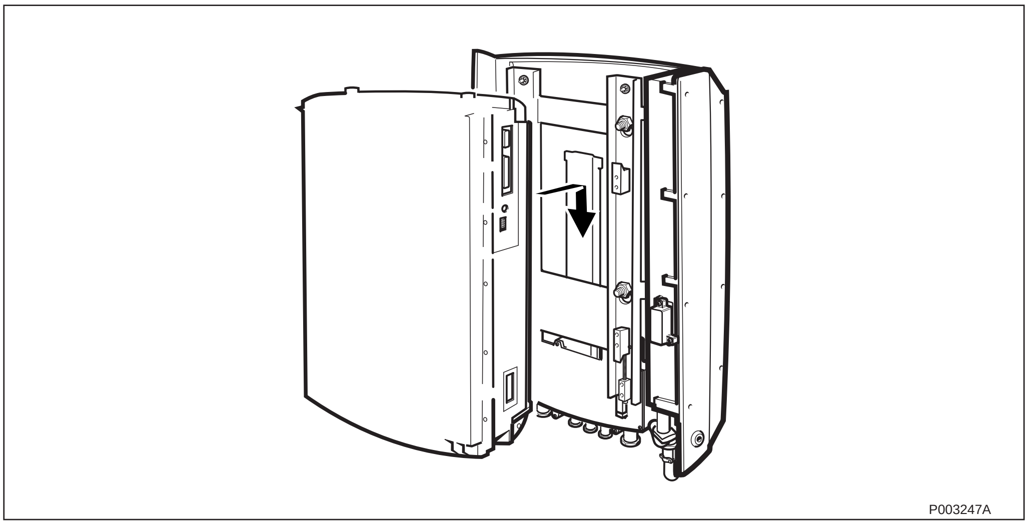

Figure 178 Mounting the cabinet

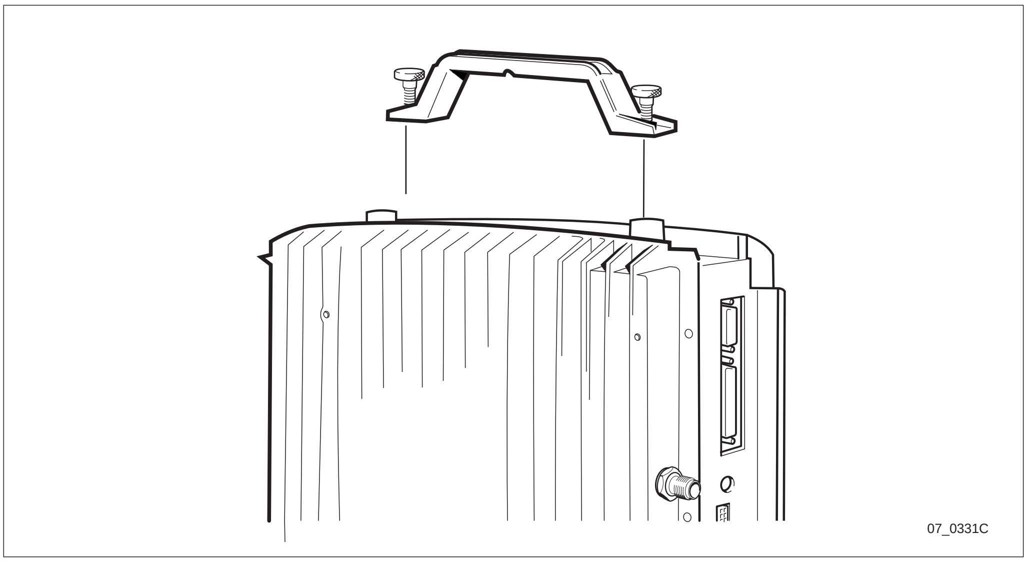

Figure 179 Mounting the lifting handle

1. If the lifting handle (optional) is to be used, mount it on the cabinet and lift the cabinet on to the mounting base.

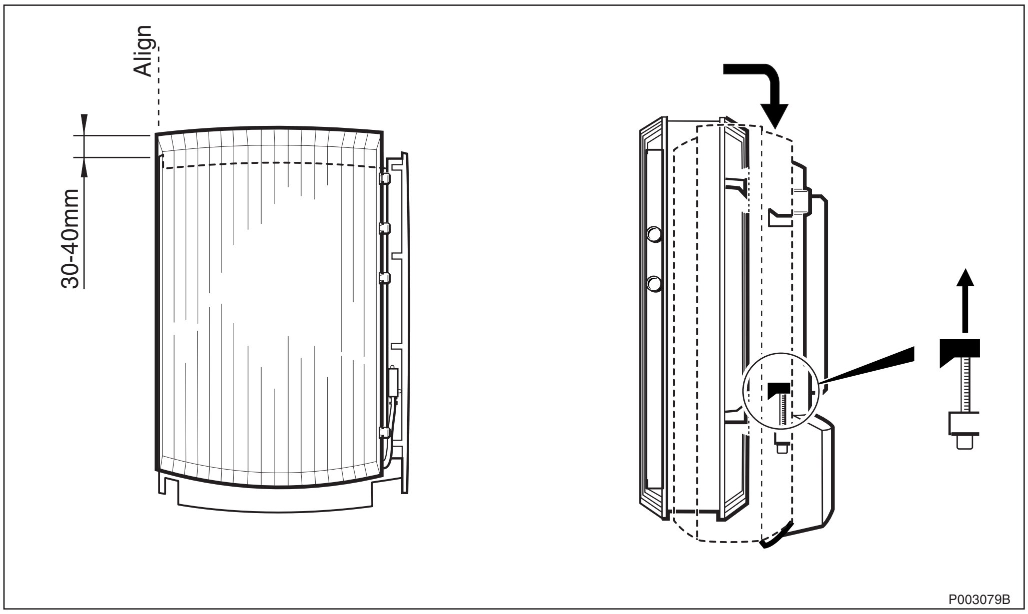

Figure 180 Facilitating mounting the cabinet on the mounting base

2. Facilitate the mounting of the cabinet by aiming for the left side of the cabinet. Start by holding the cabinet a few centimeters above the mounting base. Make sure that the hooks are according to *Figure 180 on page 166*.

3. Hook on the cabinet by pushing it against the mounting base and lower the cabinet on to the hooks.

4. Make sure that the cabinet is properly mounted by verifying that the mounting screws in the installation box correspond to the holes in the cabinet.

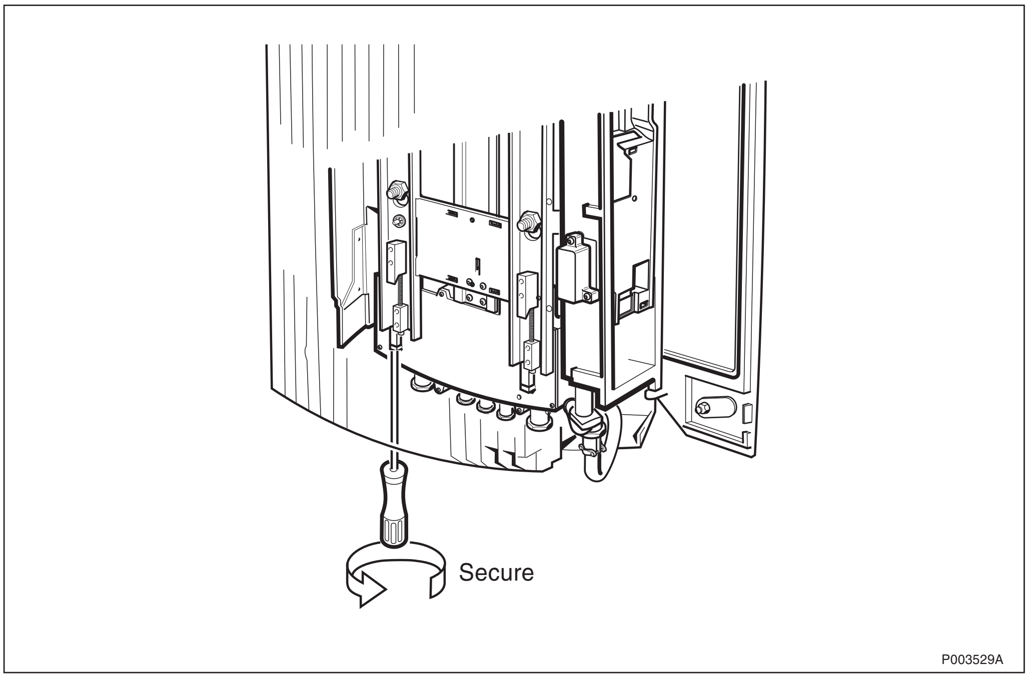

Figure 181 Securing the cabinet

5. Secure the locking cleat under/behind the cabinet by turning the torx screws clockwise until they stop.

6. If the lifting handle has been used, remove it.

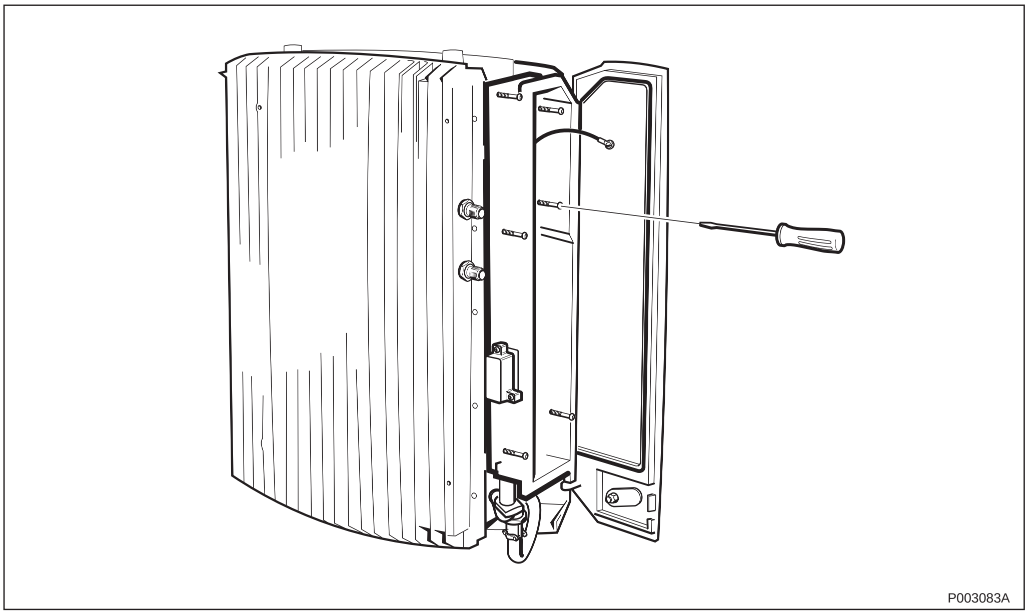

Figure 182 Fastening the installation box

7. Turn each of the 6 torx screws until they engage the threads. When all have engaged their threads, tighten all of them.

7.12 Connecting Internal Cables

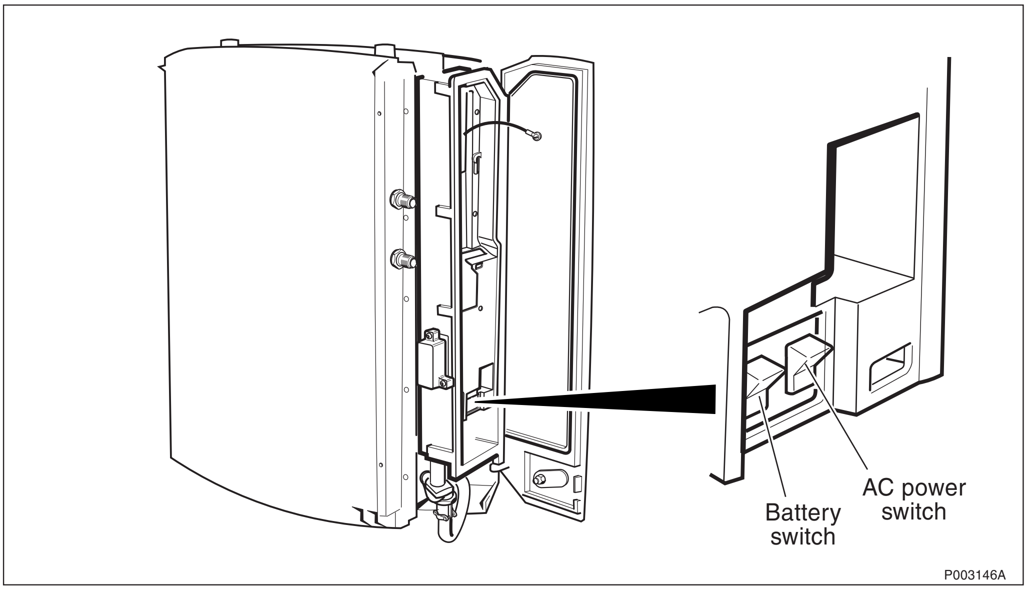

Figure 183 AC power and battery switches

1. Make sure that the AC power and battery switches are in the OFF position.

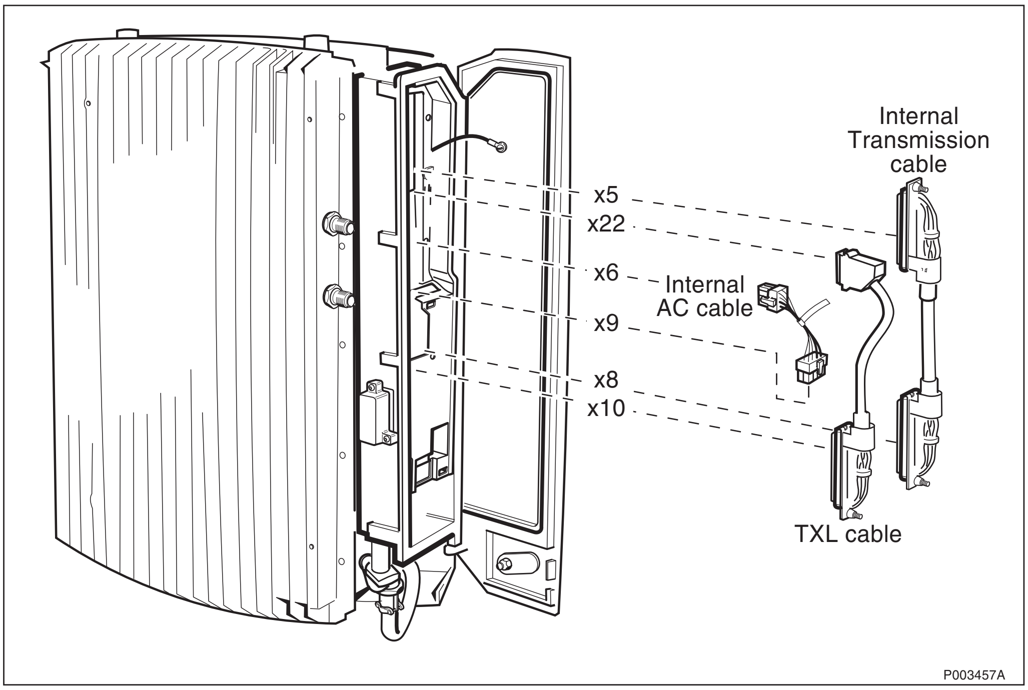

Figure 184 Connecting cables between cabinet and mounting base

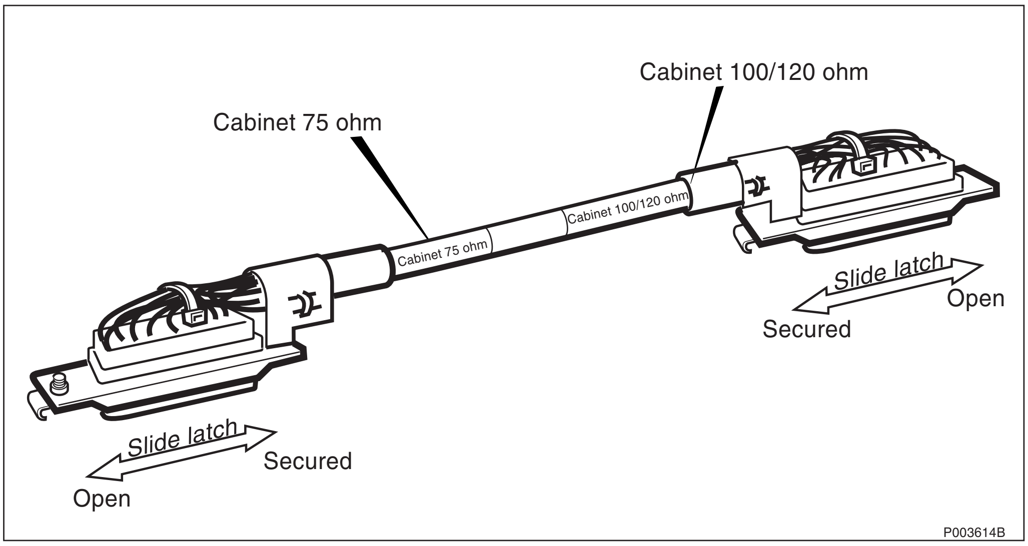

Figure 185 Transmission cable

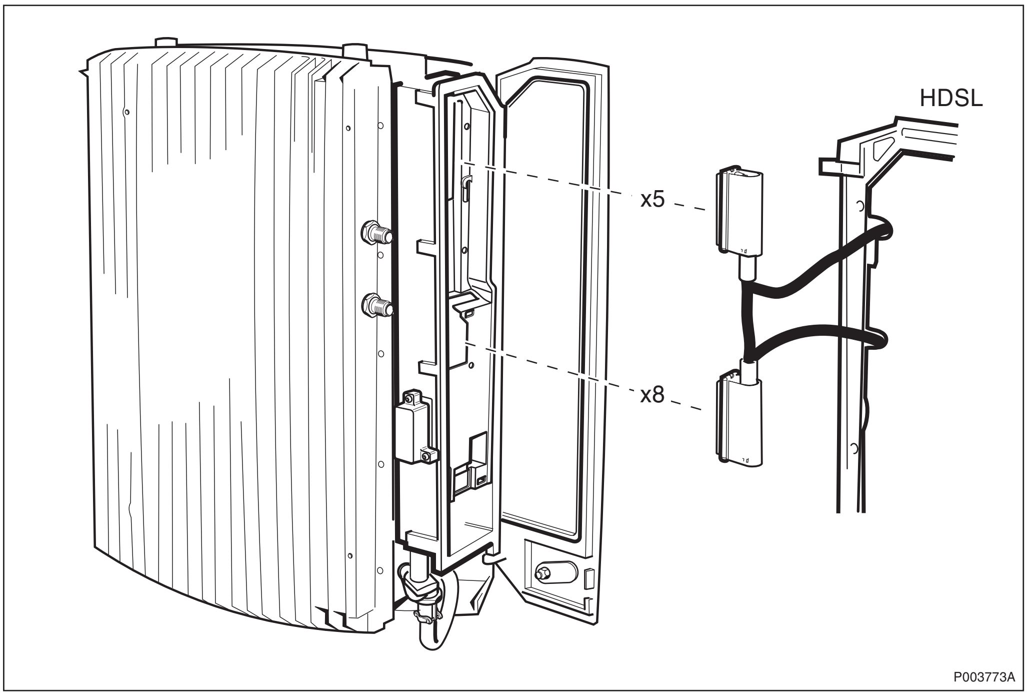

Figure 186 Connecting the HDSL modem cables

2. Connect the transmission cable:

   Without HDSL

   - Connect the transmission cable between the connection board and cabinet. If a 75 Ω transmission system is used, insert the cable end marked Cabinet 75 ohm into the cabinet. If a 100/120 Ω transmission system is used, insert the cable end marked Cabinet 120 ohm into the cabinet. Secure it with the slide latch. *See Figure 184 on page 168 and Figure 185 on page 168*.

   With HDSL

   - Connect the cables from the HDSL to the respective connector, X5 and X8. *See Figure 186 on page 169.*

3. Connect the internal AC cable between connection board and cabinet.

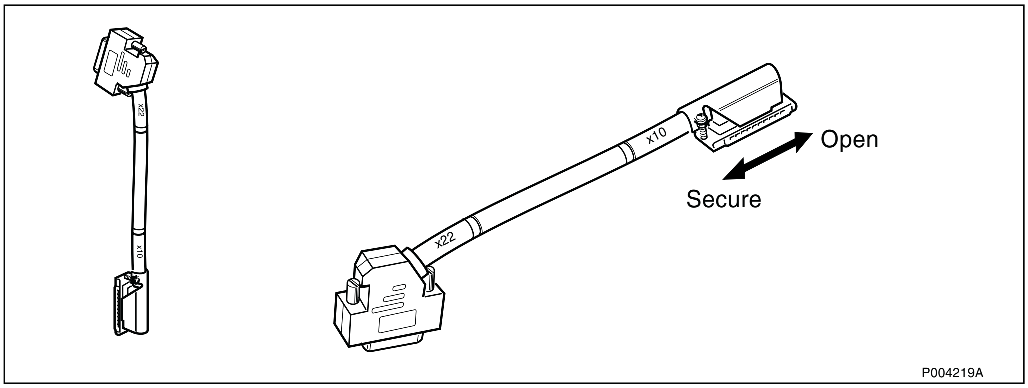

Figure 187 TXL cable

4. Connect the TXL cable between the connection board and the cabinet. Secure it on one side with the slide latch and on the other with the locking screw.

5. Remount the outer protective cover.

7.13 Mounting the Sunshields

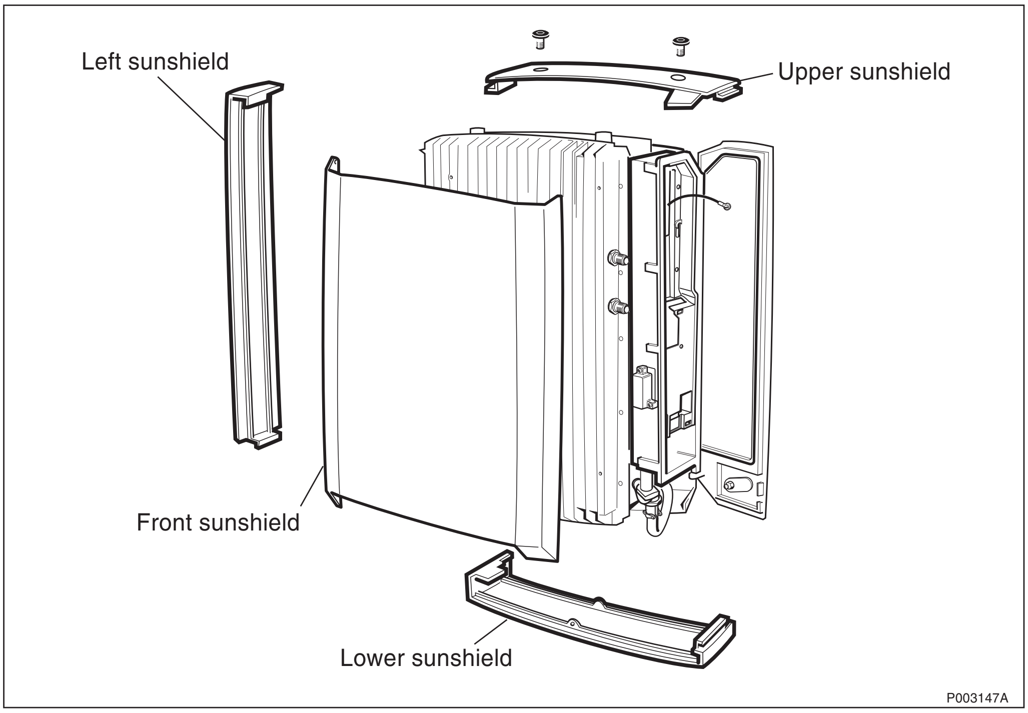

Figure 188 Main units

7.13.1 Upper Sunshield

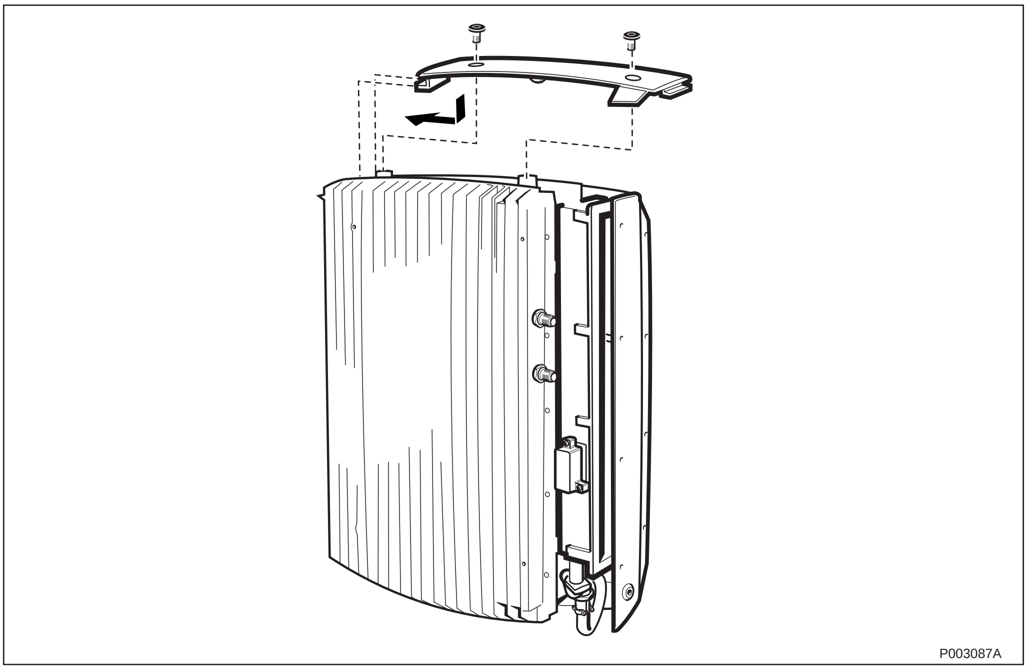

Figure 189 Hooking on the upper sunshield

1. Hook on the upper sunshield on the left side.
2. Push it down until it snaps into position.
3. Seal the two holes intended for the handle using the supplied screw plugs.

7.13.2 Left Sunshield

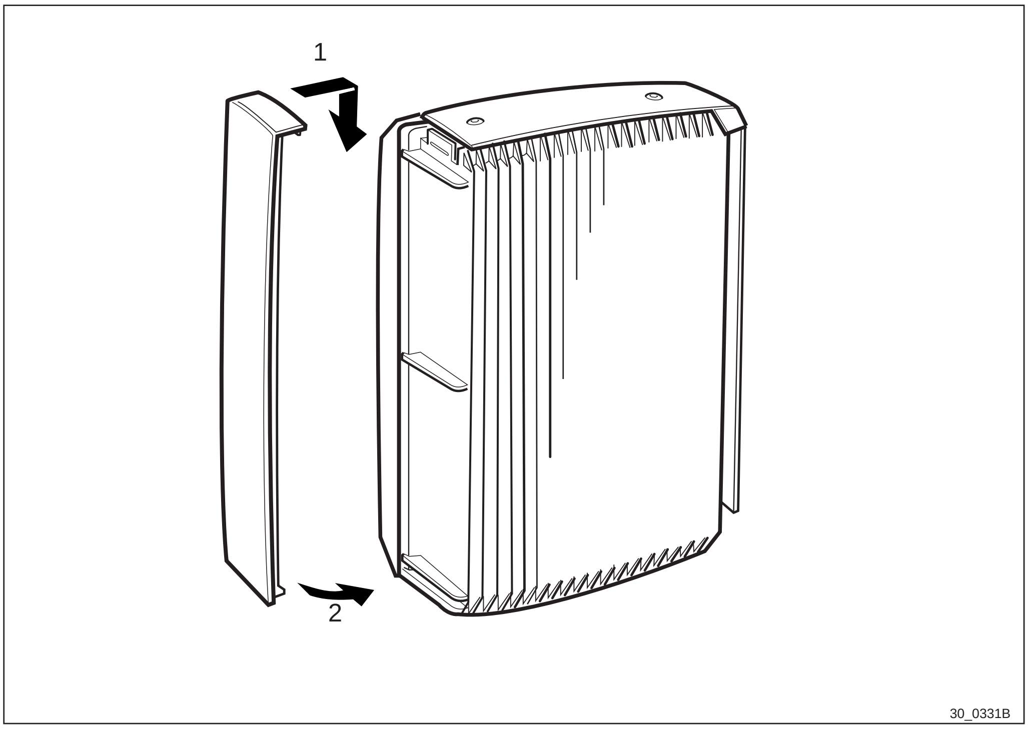

Figure 190 Hooking on the left sunshield

1. Hook on the left sunshield on the left side of the cabinet.
2. Push on the lower left part of the sunshield until it snaps into position.

7.13.3 Lower Sunshield

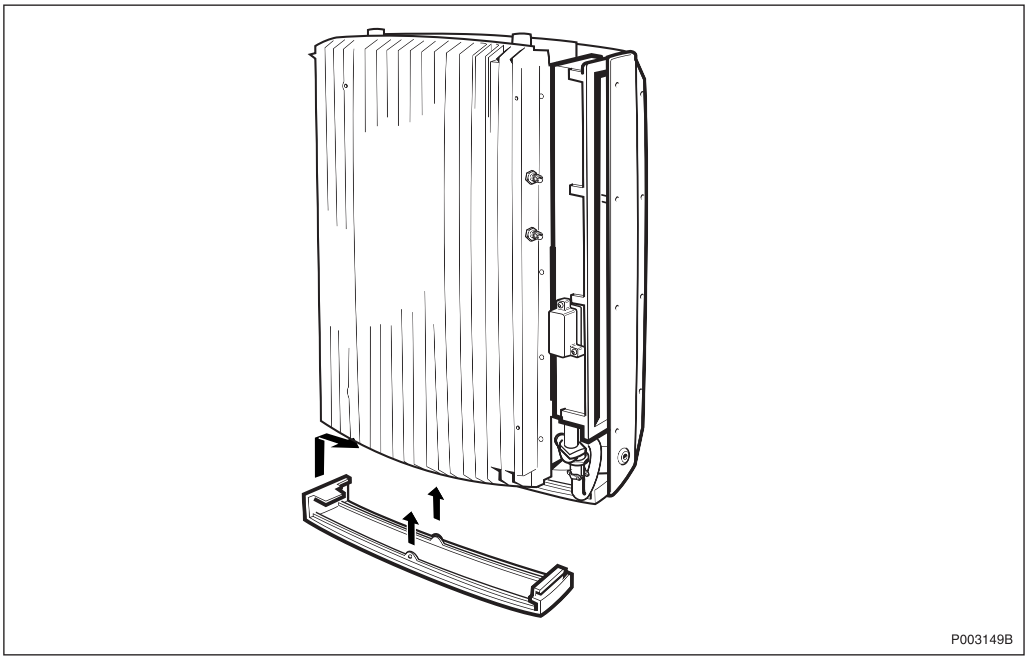

Figure 191 Hooking on the lower sunshield

Note: The lower sunshield can only be mounted if the left sunshield is mounted.

1. Hook on the lower sunshield on the left side of the cabinet.
2. Push it up until it snaps into the fasteners situated in the middle of the cabinet.

7.13.4 Front Sunshield

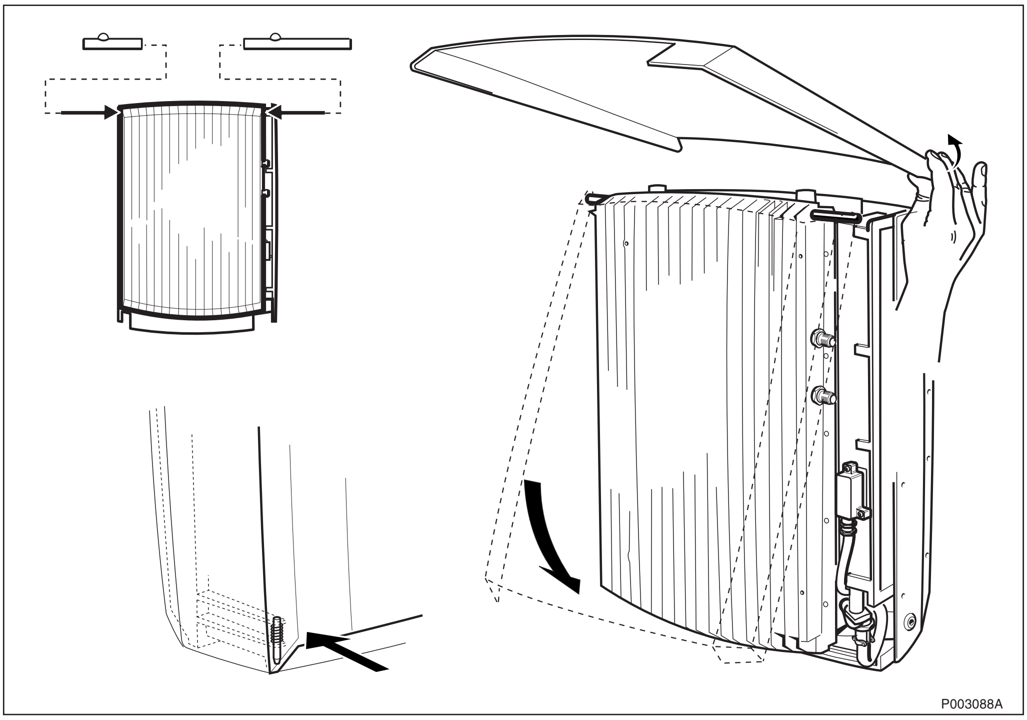

Figure 192 Mounting the front sunshield

1. Mount the short hinge-pin on the left side and the long hinge-pin on the right side.
2. Hook on the front sunshield onto the hinges and fold down the cover.
3. Press on the lower left hand corner so that the spring locking pin snaps into position.

7.14 Before leaving the site

- Make sure that all cables are strapped and run in a proper way.
- Push up the interface box and tighten the screws.
- Make sure that all sunshields are in the position for being locked by the installation box door.
- Close the installation box door, tighten all screws and lock.
- Tidy up the site, remove the unnecessary materials and waste.

Note: The Site Installation Test should follow directly after the installation.

In case of ambient temperature changes between hot and cold, there is a risk of humidity damages of the components of the cabinet. To avoid this, the cabinet should not be left without power.

7.15 Lifting Device (Optional)

The lifting device has a lifting capacity of 25 kg.

The following units can be lifted with this device:

- RBS 2301
- RBS 2302
- PBC

Note: The lifting device is not dimensioned for the PBC assembled with batteries.

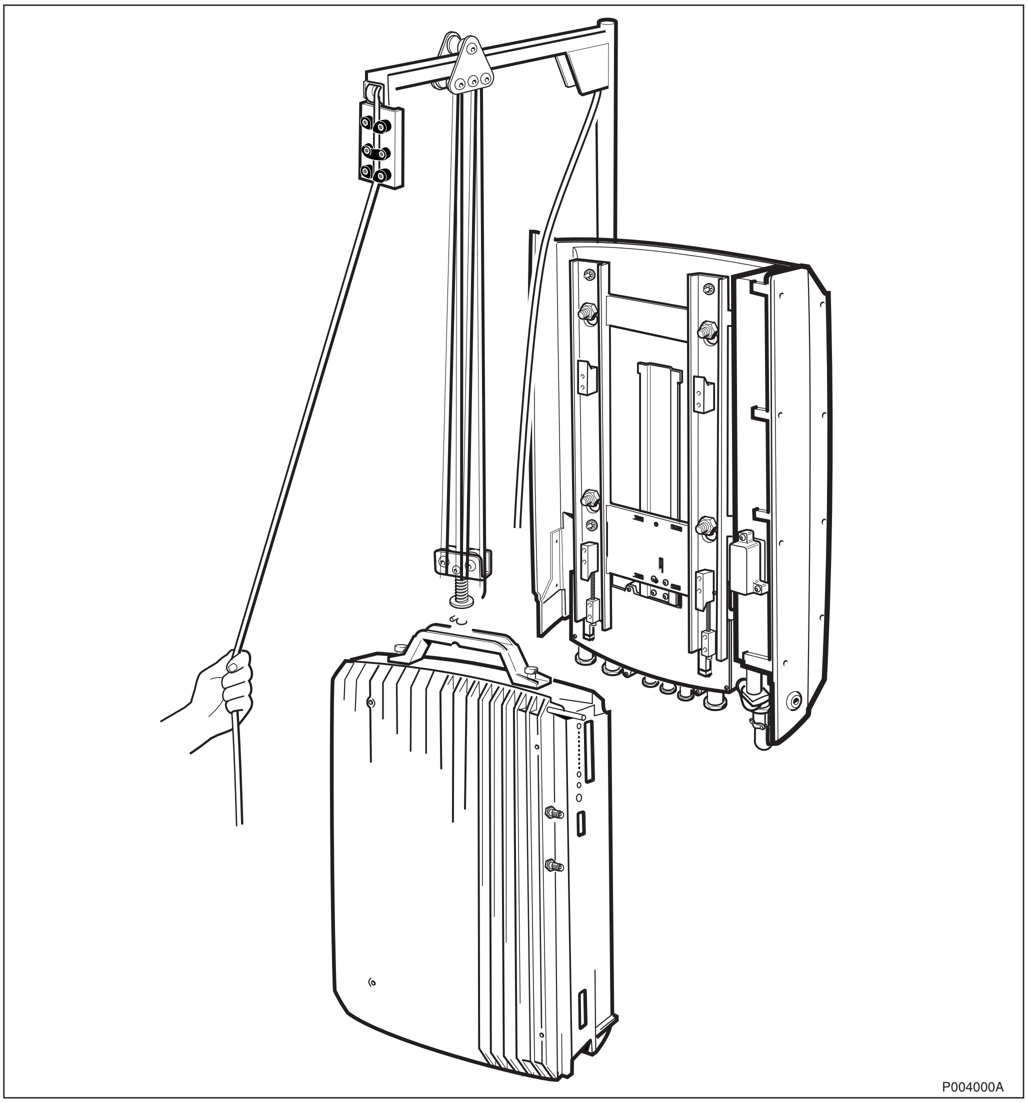

Figure 193 Lifting Device Overview

7.15.1 General

The lifting device is optional and has to be ordered separately.

The lifting device is mounted on the mounting plate only during the mounting of the cabinet. When the mounting of one cabinet is completed the lifting device is intended to be dismounted and used for the mounting of another cabinet.

The lifting device cannot be used for heights over 5 m since the rope is adjusted for a maximum height of 5 m. If a skylift or platform lift is available it is recommended to use that instead.

Check that the conditions for the lifting device work are fulfilled and that the ordered equipment, specified tools and other facilities have been delivered.

The lifting device serial number is on the stop ring.

Note: The lifting device may only be used by qualified field technician with good command of the English language.

Various Conditions

Before starting any kind of work ensure that the following conditions are met:

- Rope is undamaged
- Rope runs slightly through all the cleats.
- Inner rope has a security knot with a washer.
- Cleats are mounted and secures the rope.
- No parts have any defects or deformity.

  For example:

  - Hook spring
  - Locking pin
  - Tube bracket

- Mounting plate is mounted and secured. See the figure below regarding maximum wall loading values.

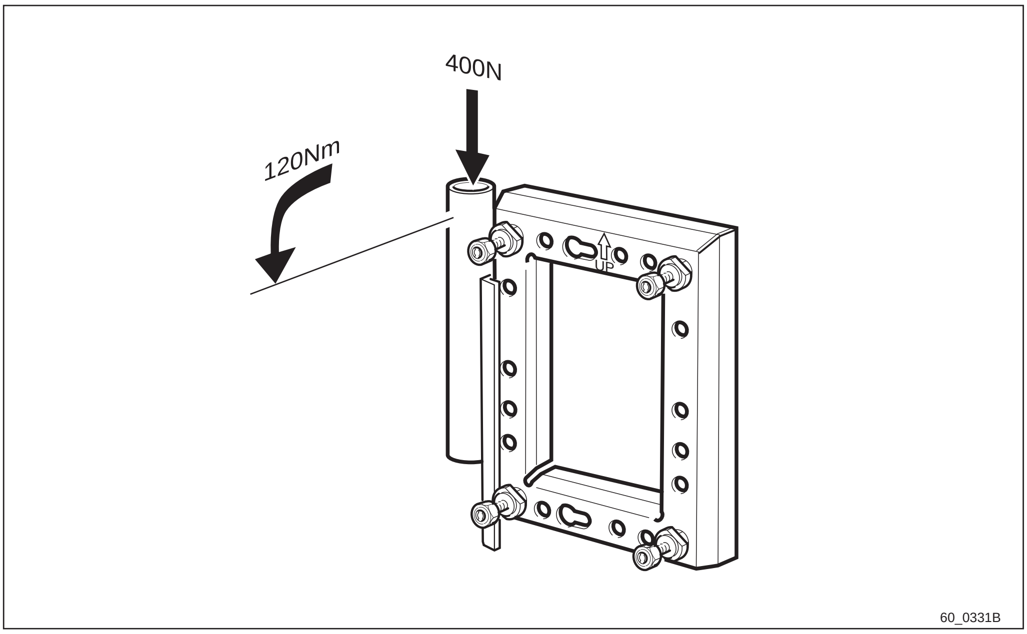

Figure 194 Maximum wall loading values

Note: Make a test lift before starting the real work.

Unpacking

If the packaging is damaged, make an immediate complaint to the transport company. The delivered equipment shall be checked against the packing list. Make sure that no parts have any defects or deformity.

> **WARNING**
>
> **Be confident that it is free area below during the hoisting. Risk of accidents caused by falling object.**

7.15.2 Handling the Lifting Device

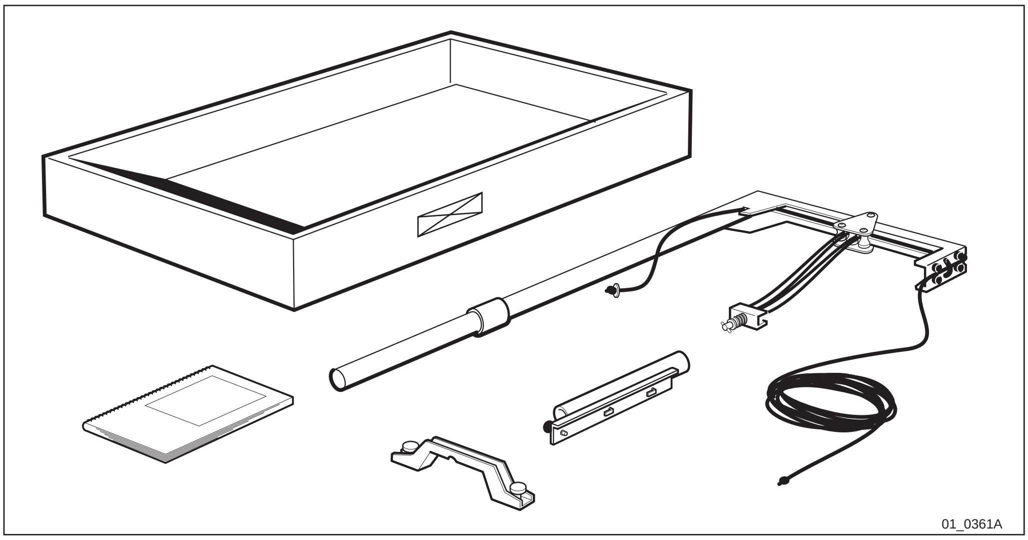

Figure 195 Equipment Overview

1. Check the delivered equipment against the packing list.

Figure 196 Label

2. Make sure that the lifting device is provided with a label.
3. Untangle the rope to facilitate the use of the lifting device.

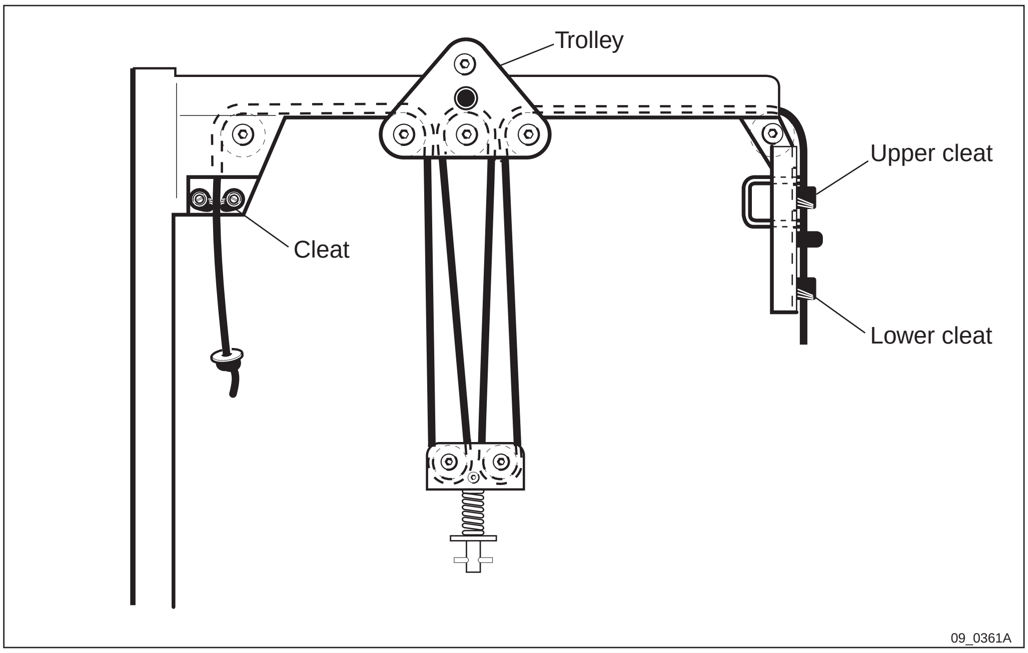

Figure 197 Rope wiring

4. Ensure that the rope is wired through the trolley and cleats in a suitable way.

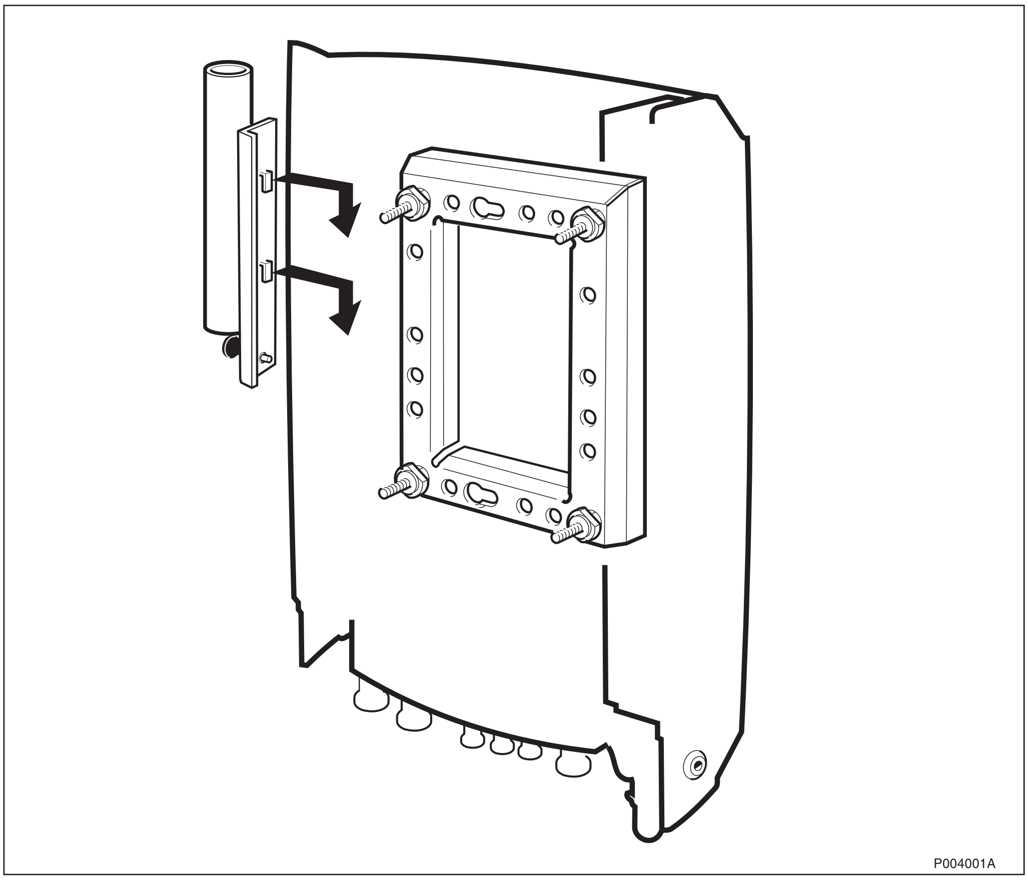

Figure 198 Mounting the lifting device

5. Mount the lifting device tube bracket on the left side of the mounting plate

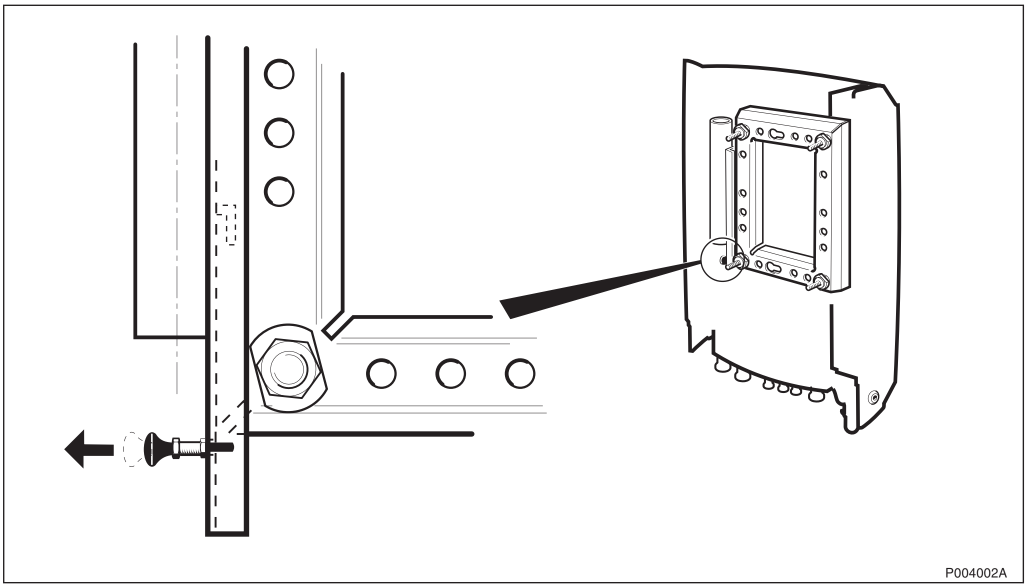

Figure 199 Locking pin position

6. Make sure that the locking pin is in the correct position.

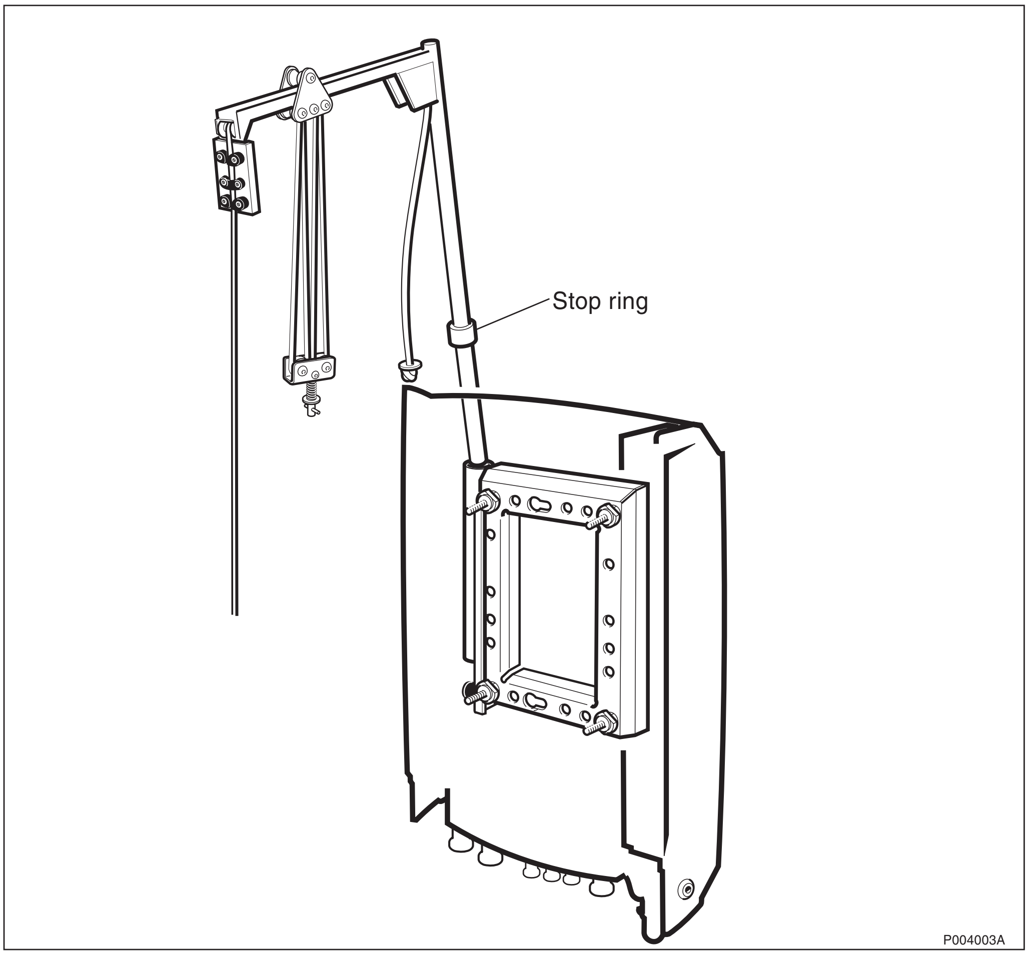

Figure 200 Inserting the lifting device in the tube-bracket

7. Insert the lifting device in the tube bracket. The stop-ring on the lifting device must have contact with the tube bracket.

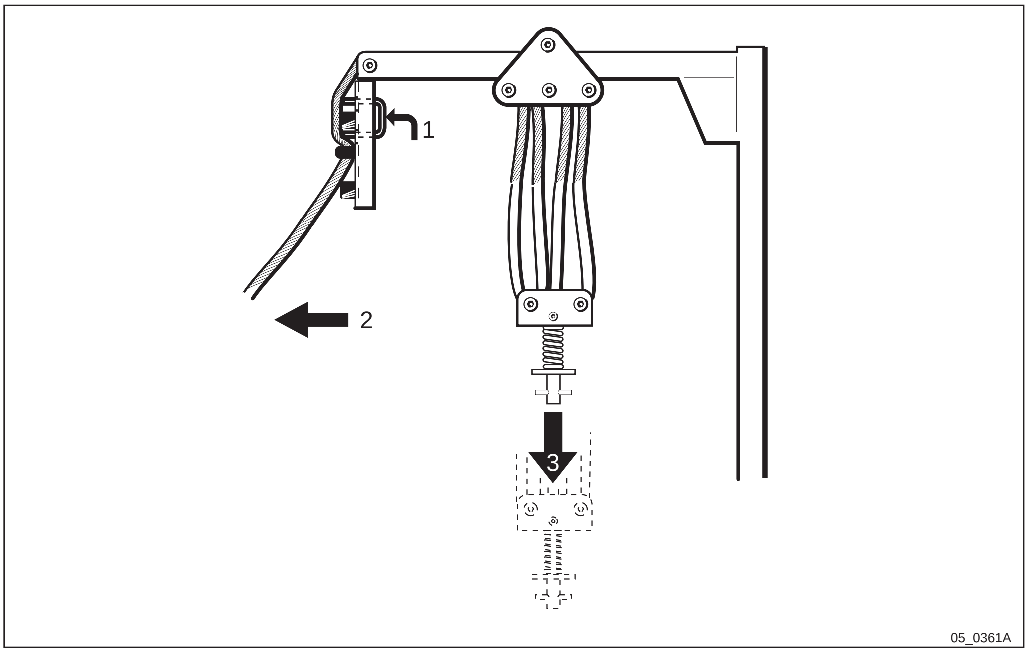

Figure 201 Loosening the rope

8. Loosen the rope from the upper cleat by first pressing up the release lever and at the same time pushing it against the rope.

9. Lower the hook by loosening the rope from the lower cleat.

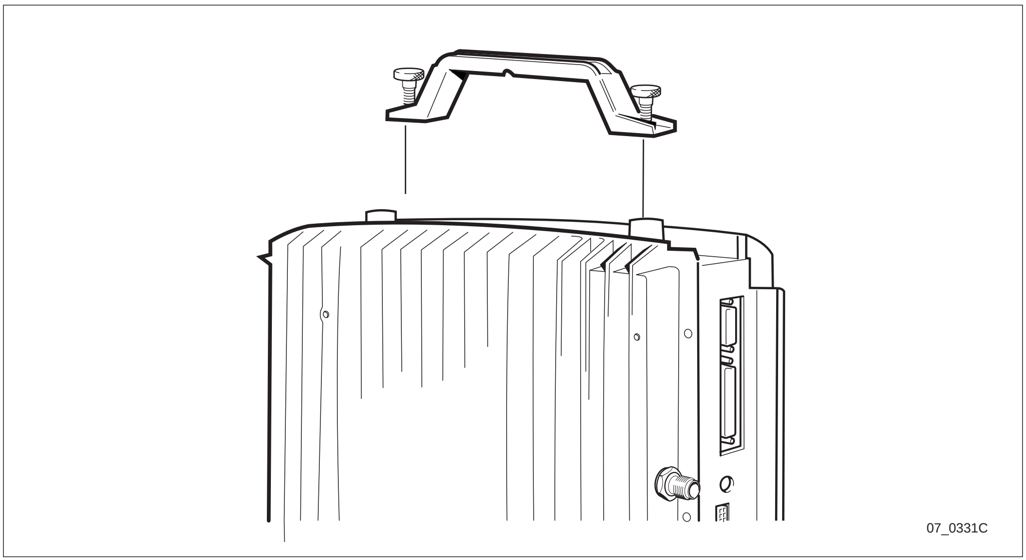

Figure 202 Mounting the handle

10. Mount the lifting handle on the cabinet.

WARNING

If a cabinet shall be dismounted, hold the lifting rope in one hand, before the cabinet is released from the mounting base. Automatic break not in operation.

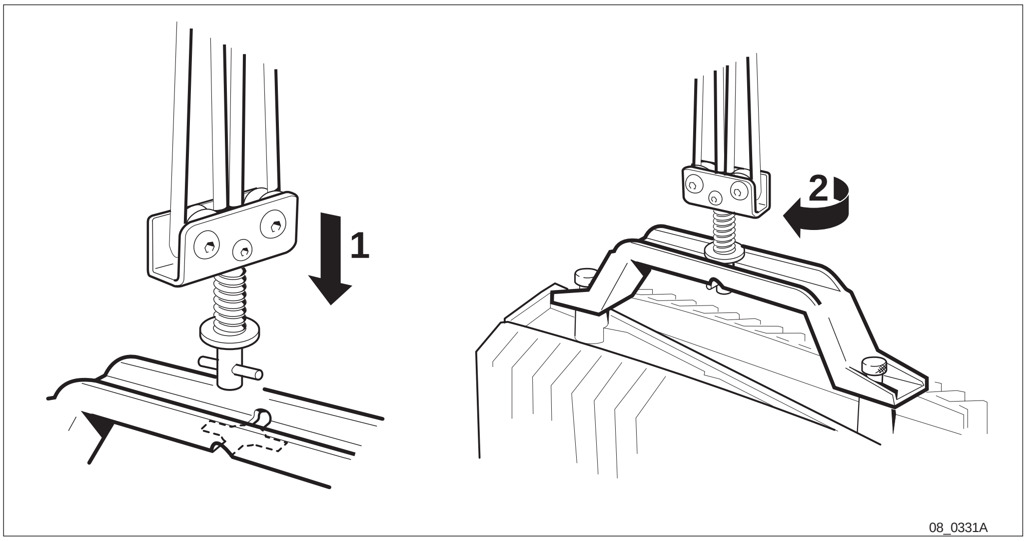

Figure 203 Securing the hook

11. Insert the hook and secure by turning 90°. Make sure that the hook is in the right position.

    If a PBC is to be lifted, make sure that the batteries are removed from the cabinet.

12. Hoist the cabinet to the same level as the rear sunshield.

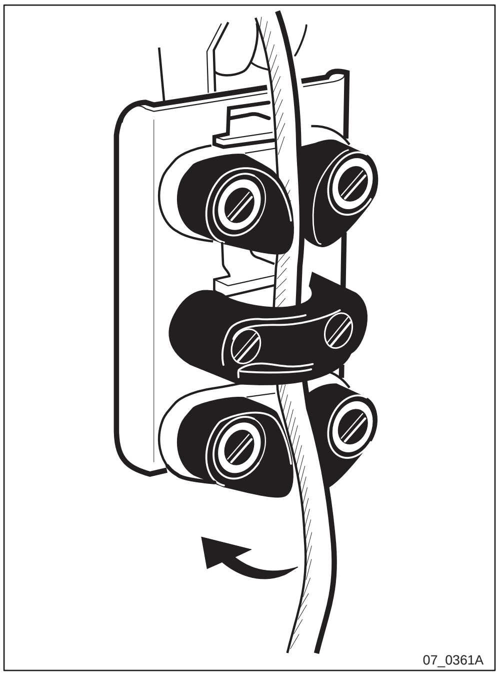

Figure 204 Fastening the rope

13. Fasten the rope in the lower cleat.

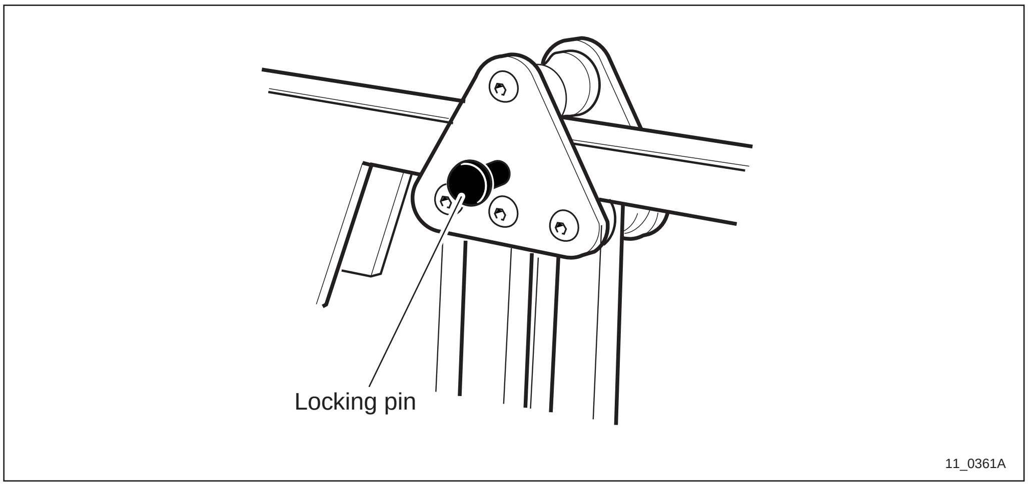

Figure 205 Releasing the trolley

14. Release the trolley by pulling out the locking pin.

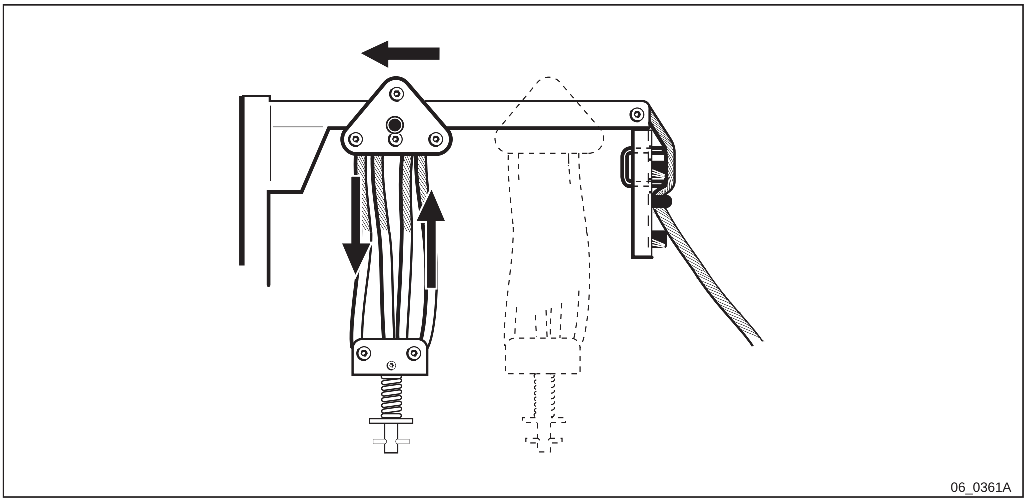

Figure 206 Moving the trolley

15. Move the trolley towards the mounting base by pulling the inner rope part down and the outer rope part up.

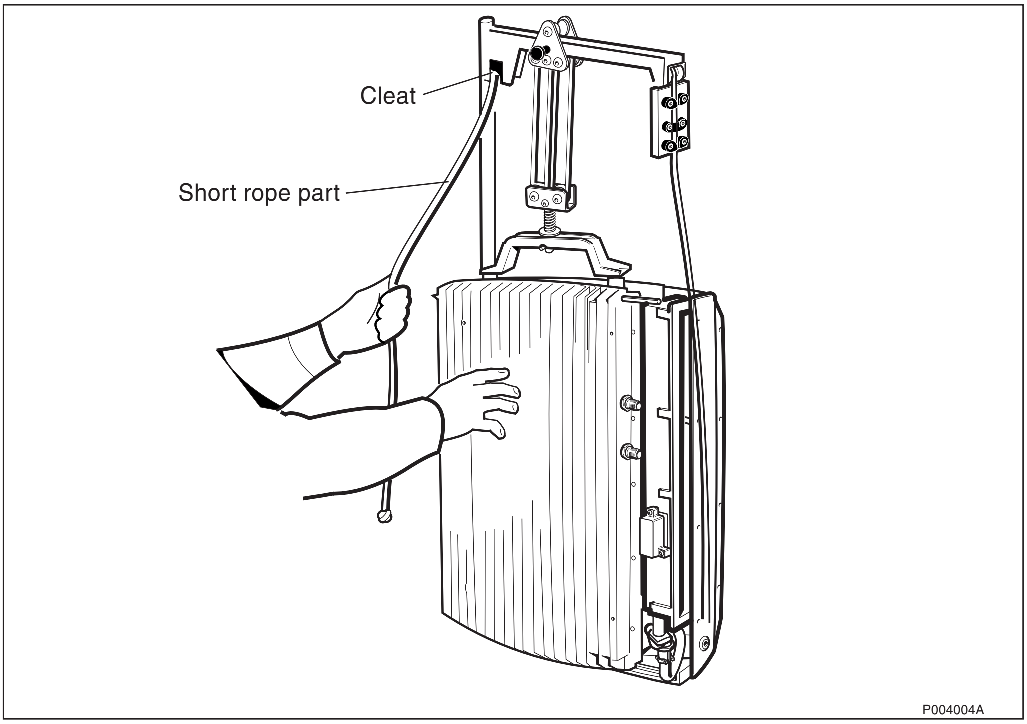

Figure 207 Adjusting the height

16. Loosen the inner rope part from the cleat and adjust the height.

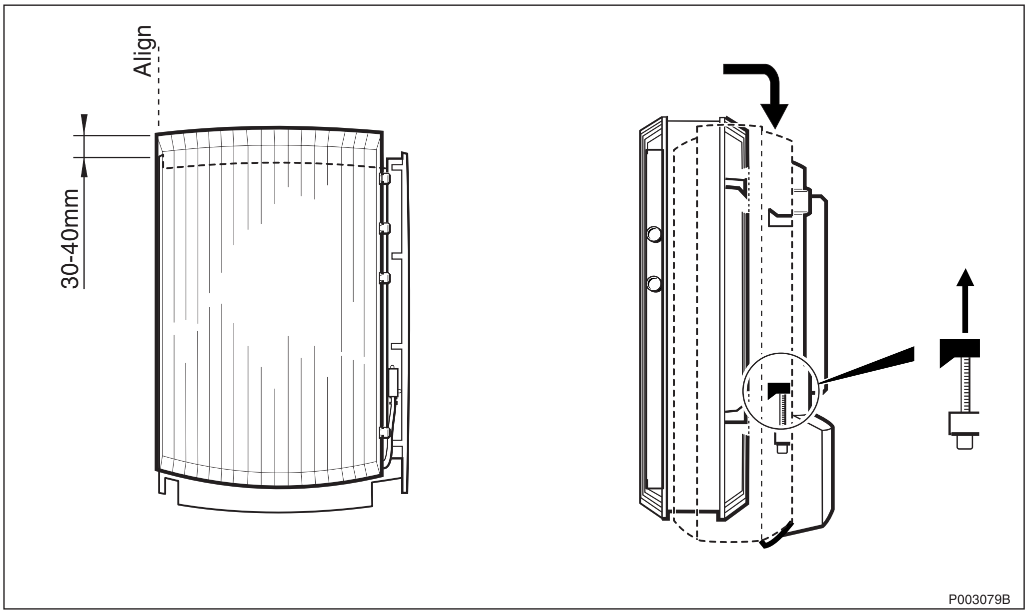

Figure 208 Hooking-on the cabinet

17. Facilitate the mounting of the cabinet by aiming for the left side of the cabinet. Start by holding the cabinet a few centimeters above the mounting base. Make sure that the hooks are according to *Figure 208 on page 184*.
18. Hook-on the cabinet by pushing it against the mounting base, and lower the cabinet on to the hooks.
19. Make sure that the cabinet is properly mounted by verifying that the mounting screws in the installation box corresponds to the holes in the cabinet.

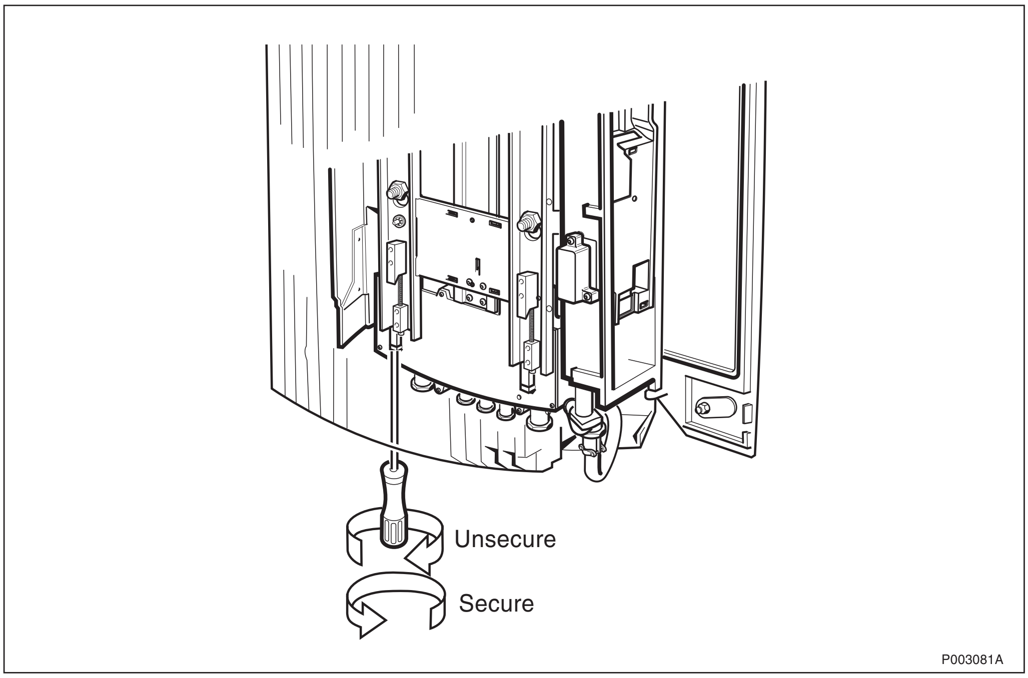

Figure 209 Securing the cabinet

20. Secure the locking device under/behind the cabinet by turning the Torx screws until they stop.
21. Remove the lifting device and tube bracket.
22. Remove the lifting handle from the cabinet.

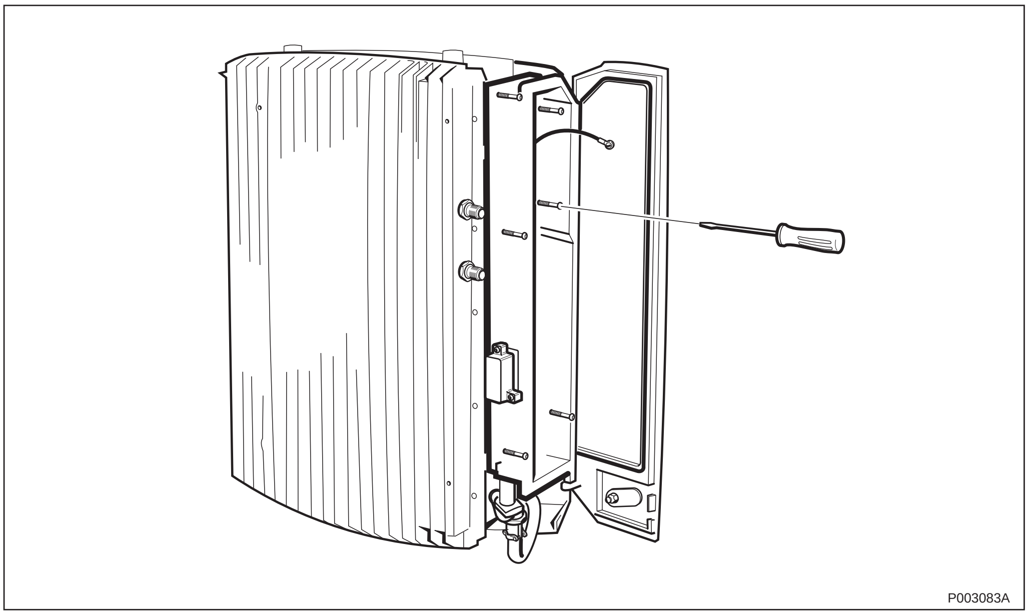

Figure 210 Fastening the installation box

23. Turn each of the 6 Torx screws until they engage the threads. When all 6 have engaged their threads, tighten all of them.

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8 Installation of External Cables

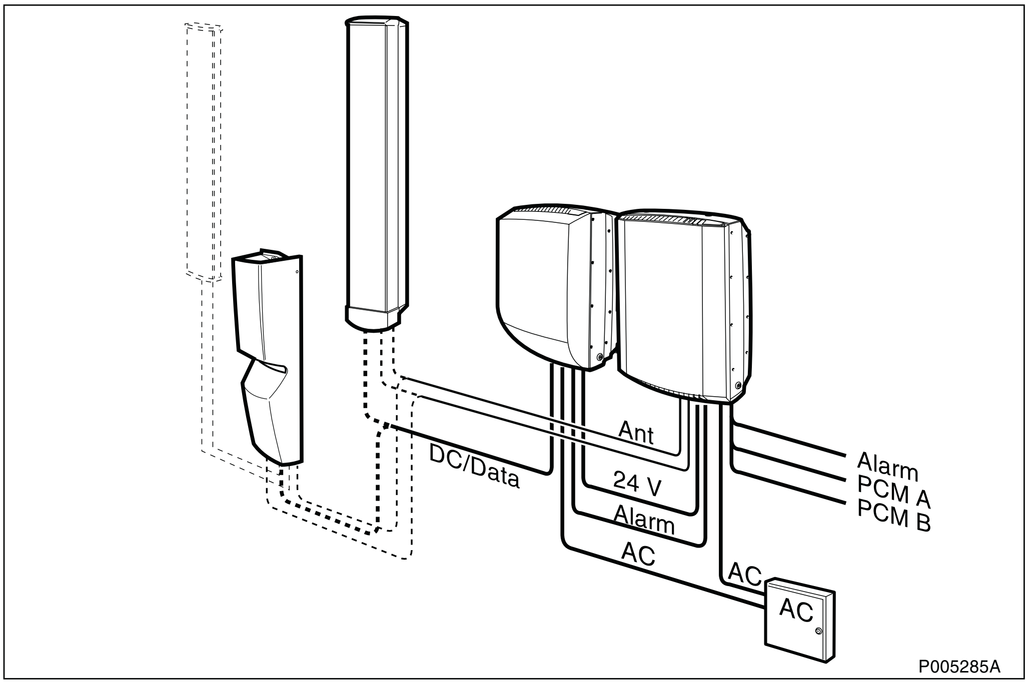

Figure 211 Basic Maxite configurations with Active Antenna Unit (AAU) or Coverage Extension Unit (CEU)

This section describes the procedure for connecting the separate parts into a working unit. The section also describes the procedure for mounting the connectors to the cables since the connectors are not mounted on the cables when the cables are delivered.

The DC/Data cable for the Active Antenna Unit (AAU) can be ordered with the connector mounted or be field mounted with a special crimping tool. The DC/Data cable for the Coverage Extension Unit (CEU) can only be ordered with the connector mounted.

This section is divided into separate subsections. The first covers the connection procedure for the Coverage Extension Unit (CEU), the second covers the Active Antenna Unit (AAU), the third covers the connection procedure for connecting the Power and Battery Cabinet (PBC) and the fourth covers the connection procedure for the RBS 2302.

8.1 Preconditions

The *chapter Installation of External Cables* supposes that the following preconditions have been fulfilled.

1. The radio cabinet is mounted on the mounting base. The mounting base is connected to protective earth (the earth connection cannot be accessed when the radio cabinet is mounted). The procedure for earth connection of the mounting base is described in *chapter Installation of the RBS 2302.*

2. The battery cabinet is mounted on the mounting base. The mounting base is connected to protective earth (the earth connection cannot be accessed when the battery cabinet is mounted). The procedure for earth connection of the mounting

base is described in *chapter Installation of Power and Battery Cabinet*.

3. The Coverage Extension Unit (CEU) or the Active Antenna Unit (AAU) is mounted on a pole, a mast or on a wall. The CEU or AAU earth connection can be accessed when the CEU or AAU is mounted.

8.1.1 Target Group

In order to perform the wiring work according to this manual in a safe and professional way the work shall be done with a skilled person.

The following qualifications are required:

- Good understanding of radio and telephone engineering.
- Good understanding of technical English.
- For AC Mains installation, qualified and authorized electrician.

8.2 Overview of Cabling

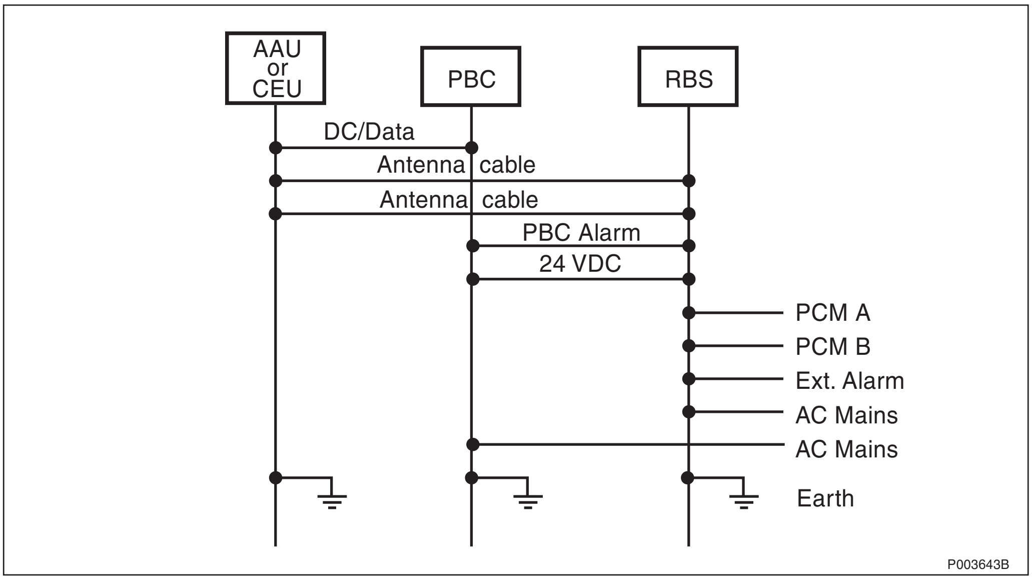

Figure 212 Basic Maxite cabling overview

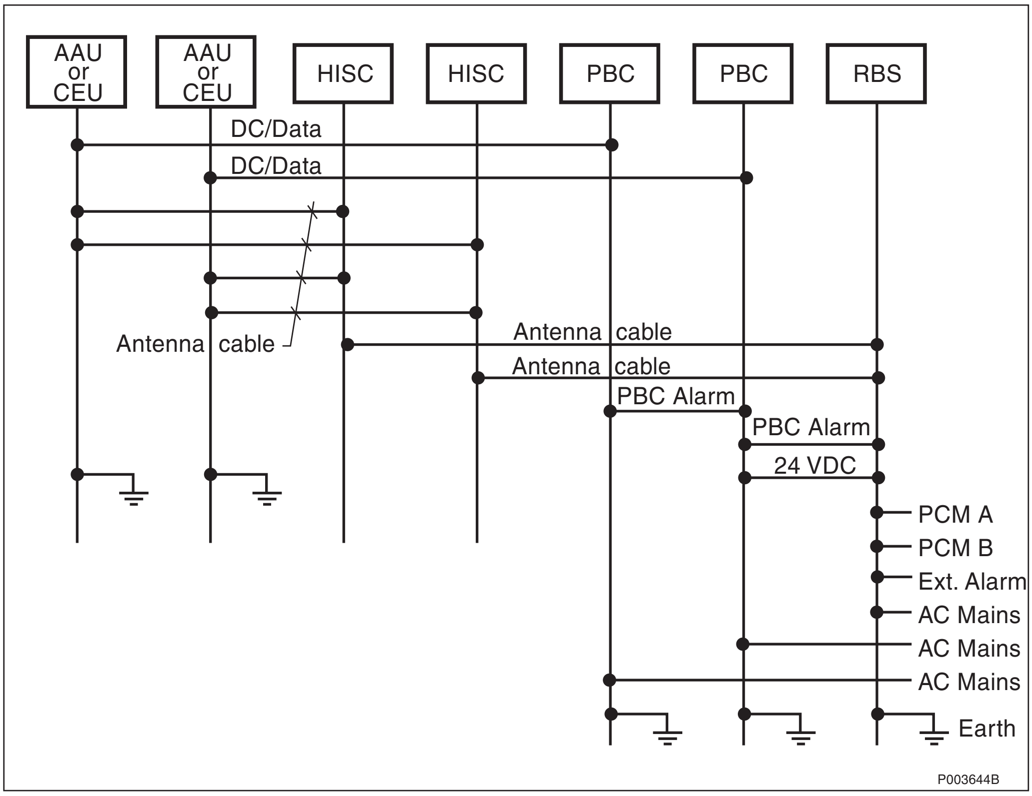

Figure 213 Mixed Highway cabling overview

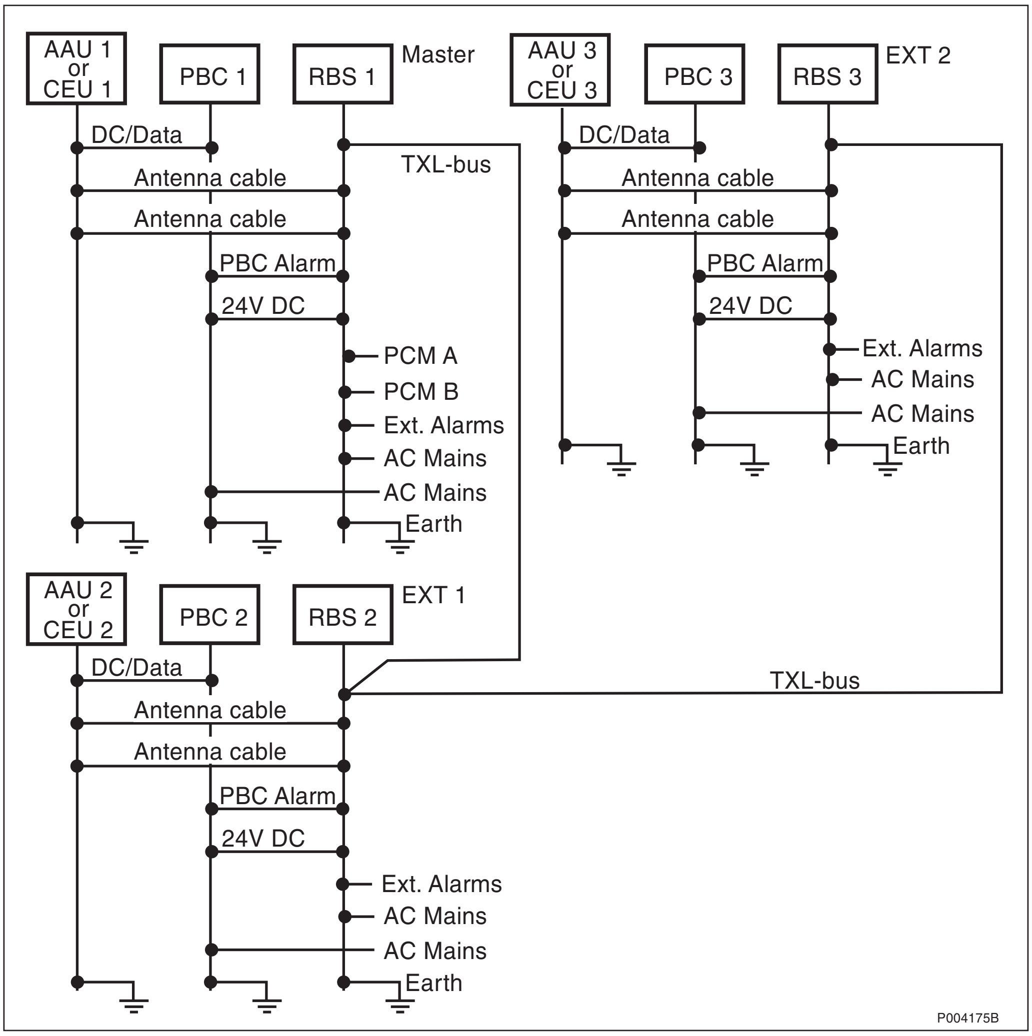

Figure 214 Maxite 4 and 6 TRX configuration

DC/Data cable

Power supply to the Coverage extension Unit (CEU) or Active Antenna Unit (AAU) together with control and data signalling. The Power and Battery Cabinet (PBC) supplies the CEU or AAU with -48 V DC and supervises the CEU or AAU.

Antenna Cable

These are coaxial cables for the radio signals between the CEU or AAU and RBS 2302. There are also coaxial cables between the CEU and the passive antenna.

PBC Alarm Cable

Transmission of alarms from the PBC to the RBS.

24 V DC Cable

This cable supplies the RBS with back-up power from the PBC in case of AC Mains supply failure. This cable is equipped with Power Supply Adaptor (PSA) in one end of the cable. The PSA is inserted into the battery compartment in the RBS, and replaces the ordinary small back-up battery in the RBS.

PCM_A Cable

This is the transmission line towards the BSC.

PCM_B Cable

This is the cascaded transmission line that can be used to forward unused timeslots to another RBS.

External Alarms Cable

This cable can be connected to maximum four alarm detectors. The alarm detectors may be other types of equipment on site that require monitoring from the mobile telephony systems.

AC Mains Supply Cable

The AC Mains Supply cable supplies the RBS and PBC with AC power.

Earth

All equipment must be bound to the site earth system.

Highway Configuration Cabling

The cabling for Highway configuration is a little more complex, since the radio signal is split in two directions and uses one AAU or CEU for each direction, *see Figure 213 on page 189*.

TXL-bus cable

An Internal bus between TRX-es, this is used for 4 and 6 TRX configuration.

8.3 Connecting the CEU (Coverage Extension Unit)

This section describes earthing of the CEU, the connection of the -48 V DC power supply/signal cable between the CEU and the Power and Battery Cabinet (PBC), the connection of the antenna feeder cables between the CEU and the Radio Base Station (RBS) and the antenna jumper cables between the CEU and the antenna.

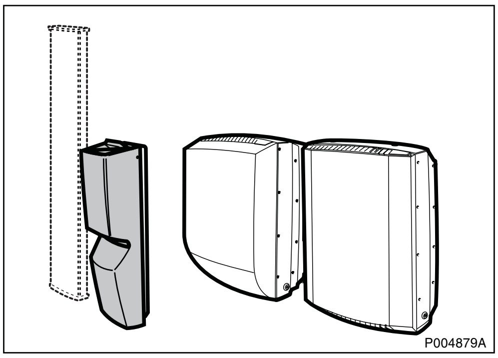

Figure 215 The CEU

8.3.1 CEU Connectors

In *Figure 216 on page 192* the connection field for the CEU is shown. There connections are described in the following subsections. The connector for the antenna jumper cables are of type N, the connector for the feeder cables are of type 7/16.

1. Earth: One screw is located on the bottom part at mounting fixture according to the *Figure 216 on page 192*. For connection, see further *Section 8.3.4 Earthing the CEU on page 193*.

2. PWR: One D-sub connector located according to the *Figure 216 on page 192*. For connection, see further *Section 8.3.5 Connecting the DC/Data Cable on page 194*.

3. TRX 1 and TRX 2: Two connectors of N-type located according to the *Figure 216 on page 192*. For connection, see further *Section 8.3.7 Connecting the Antenna Feeder Cables on page 195*.

4. ANT 1 and ANT 2: Two connectors of 7/16-type located according to the *Figure 216 on page 192*. For connection, see further *Section 8.3.8 Connecting the Antenna Jumper Cables on page 196*.

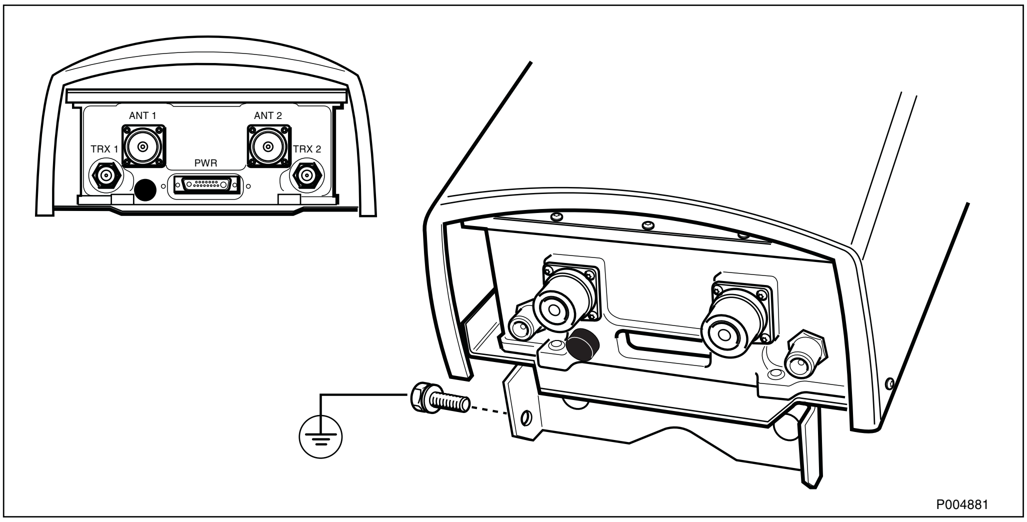

Figure 216 Connector overview of the CEU

8.3.2 Hoisting of Cables

Mount all the connectors to the cables to be hoisted. The mounting procedure for the coaxial connectors can be found in *Section 8.4.8 on page 208*, *Section 8.4.9 on page 211* or *Section 8.4.10 on page 213*.

1. Place the hoisting sleeve on the cable.
2. The required numbers of sleeves depends on the length of the cables. The recommendation is one sleeve for every 70 m.
3. Hook up the hoisting sleeves.
4. Hoist the cable to the antenna.

More information on hoisting the cables can be found in

General Installation Instructions *LZN 302 49*

Note: It is recommended to connect the cables to the CEU or AAU before connecting it to the RBS. Work “downwards” from the tower to avoid excess length of cables in the tower.

8.3.3 Cable marking

The antenna cables must be marked with self adhesive labels, corresponding to the marking of the antenna connectors. The recommended marking set is NTM 201 207/1. Mark one of the cables with DX1 at both ends and the other cable with DX2 at both ends. The cable marked DX1 shall be connected to TRX 1 and the cable marked DX2 shall be connected to TRX 2 on the CEU.

8.3.4 Earthing the CEU

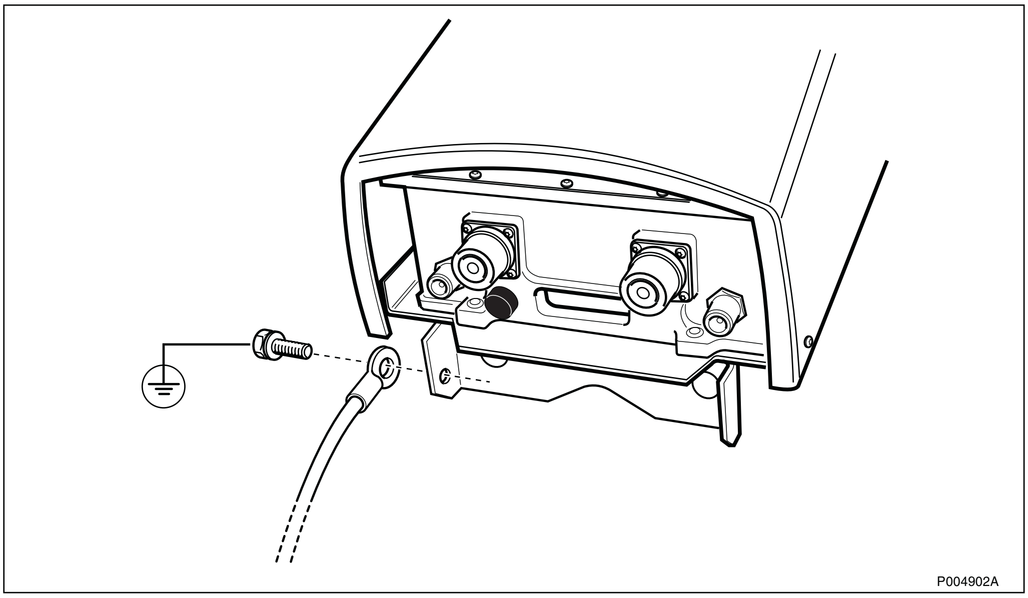

Figure 217 Earthing point of the CEU

The Site must be earthed to an earthing system that fulfills the IEC 1024/1 requirements, for more information regarding site earthing systems see:

	General Installation Instructions	*LZN 302 49*
	Installation of Earthing and Lightning Protection Material	*1531-ICM 103 413/2 Uen*

Use the earthing set 9/NTM 201 230/1 or 5/NTM 202 201 to connect the CEU to the earth point.

Connect the earth wire to the earth screw located underneath on the mounting fixture of the CEU. Make sure the earthing screw is properly mounted and tightened. The tightening torque can be found in *chapter Installation of Antenna Units*.

8.3.5 Connecting the DC/Data Cable

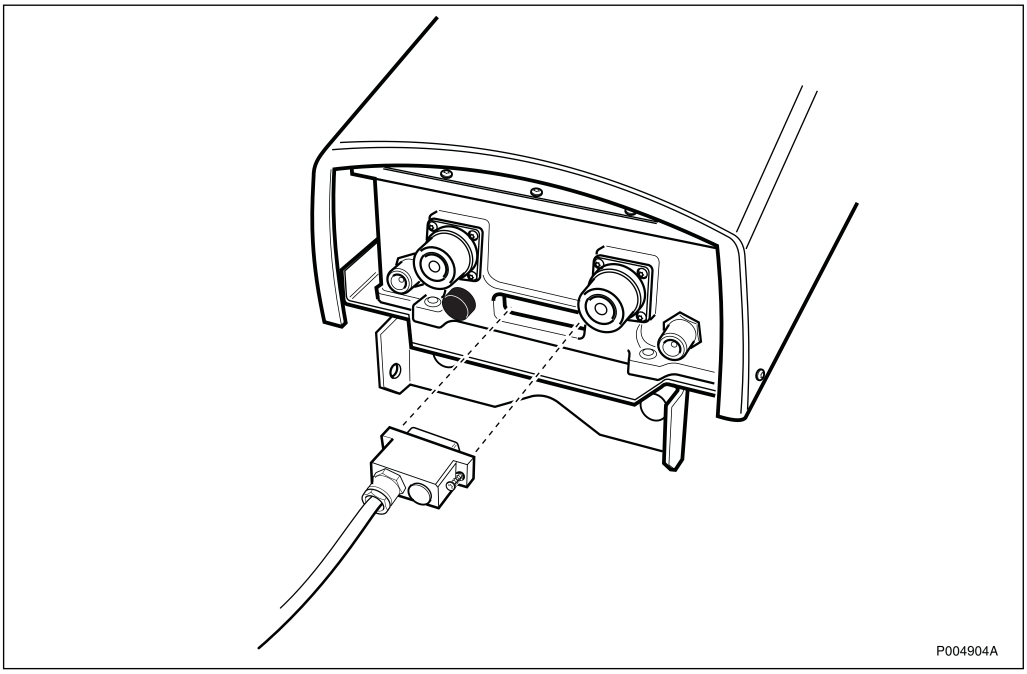

Figure 218 Connecting the DC/Data-cable

The DC/Data cable shall be connected according to the *Figure 218 on page 194.*

Note: It is recommended to install the DC/Data cable starting from the CEU.

The cable connector is preconnected. Field assembly of the connector is not possible.

8.3.6 Antenna Lightning Protection

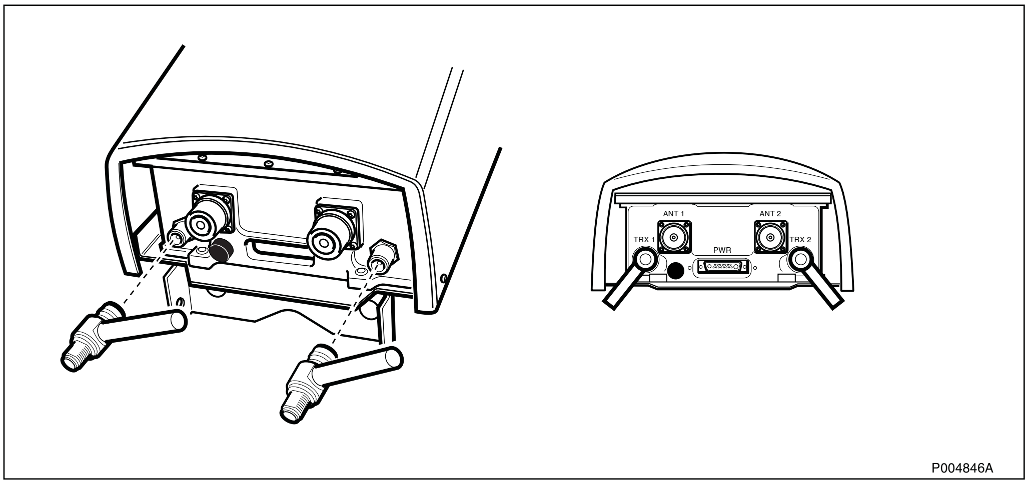

Figure 219 Connection of Lightning Protection

To protect the RF cable inputs from lightning strikes, lightning protectors are inserted between the CEU and the feeder cables, as shown in *Figure 219 on page 195*.

8.3.7 Connecting the Antenna Feeder Cables

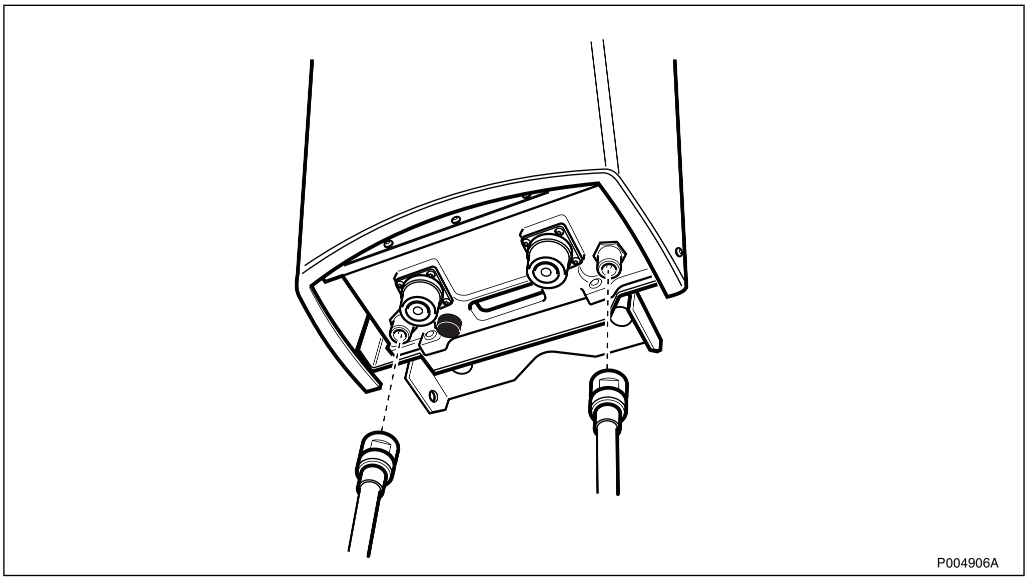

Figure 220 Connection of the Antenna Feeder Cables

The *Figure 220 on page 195* shows where to connect the Feeder cables on the CEU, that will be connected to the RBS. The feeder cables are available in three different types and are specified below.

Feeder cables, type 1/2”

The procedure for the mounting of the connector of N-type to the 1/2” antenna cable is described in *Section 8.4.8 on page 208*.

Feeder cables with diameter 10 mm

The procedure for the mounting of the connector of N-type to the 10 mm antenna cable is described in *Section 8.4.9 on page 211*. This cable type is allowed only for outdoor use.

Feeder cables, type 3/8”

The procedure for the mounting of the connector of N-type to the 3/8” antenna cable is described in *Section 8.4.10 on page 213*. This cable type is allowed for both indoor and outdoor use. It replaces the 10 mm cable.

8.3.8 Connecting the Antenna Jumper Cables

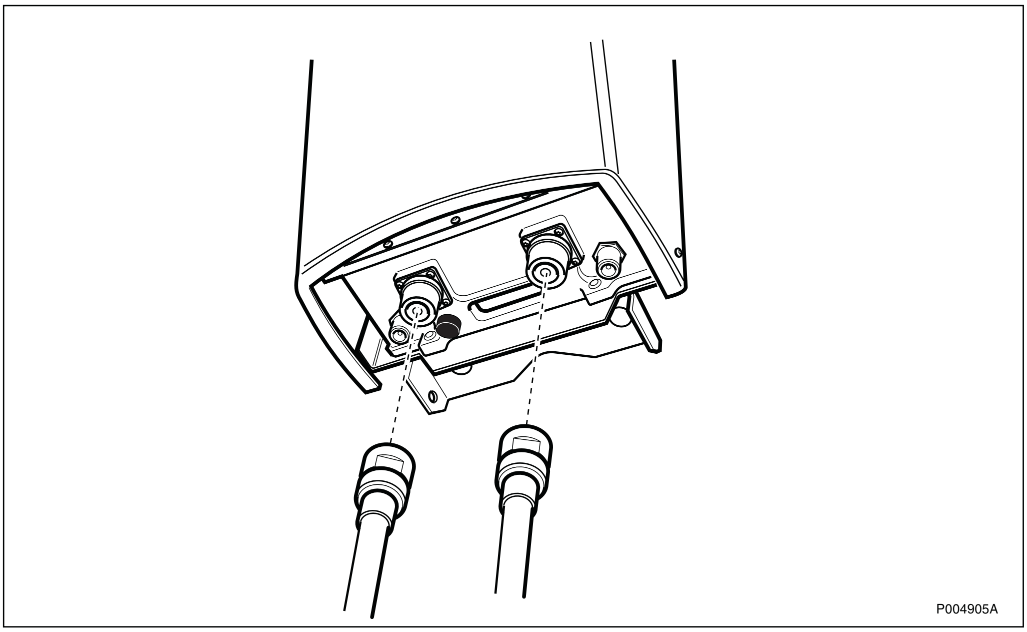

Figure 221 Connection of the Antenna Jumper Cables

The *Figure 221 on page 196* shows where to connect the jumper cables from the antennas on the CEU.

8.3.9 Connecting Highway Splitter Combiner (HISC)

Highway configuration means that two CEUs are fed from the same RBS. This is done with the Highway Splitter Combiner (HISC). The connection of coaxial cables is shown in *Figure 222 on page 197*. The HISC kits *KRF 201 436* are used.

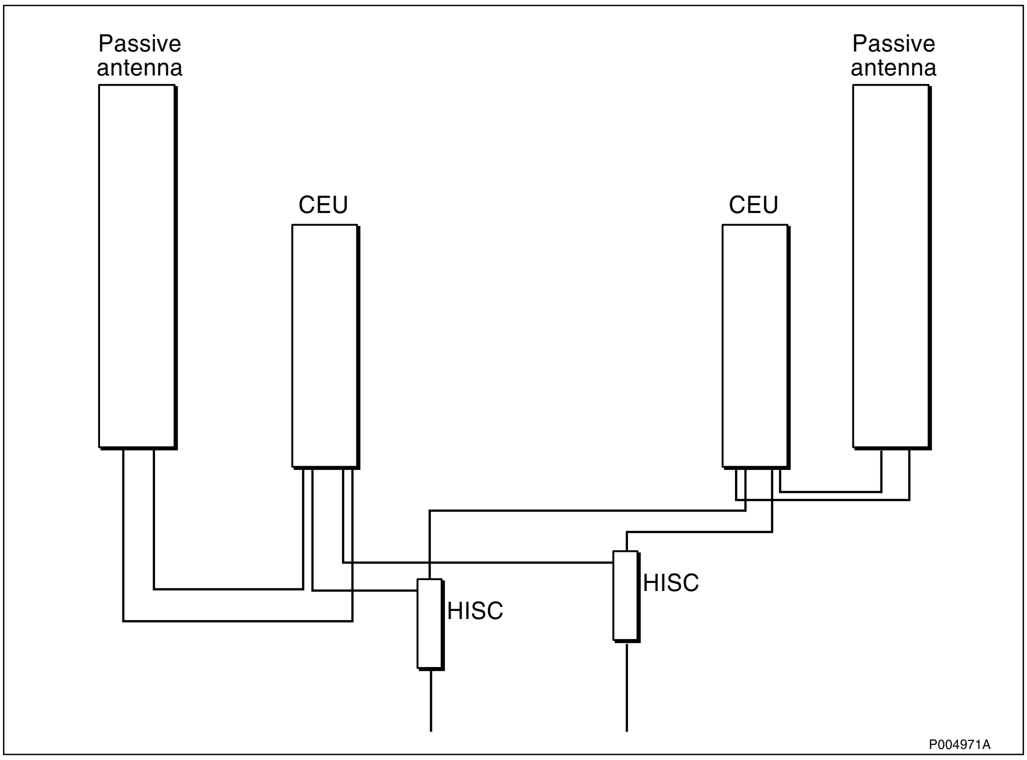

Figure 222 Connection of the HISC (Highway Splitter Combiner)

8.3.10 Earthing and Cable Routing

The principles of cable routing, earthing routines and sealing of the antenna and DC/Data cable, are described in *Section 8.4.12 on page 217*.

8.4 Connecting the AAU (Active Antenna Unit)

This section describes earthing of the AAU, the connection of the –48 V DC power supply and the signal cable between the AAU and the Power and Battery Cabinet (PBC), and the connection of the antenna cables.

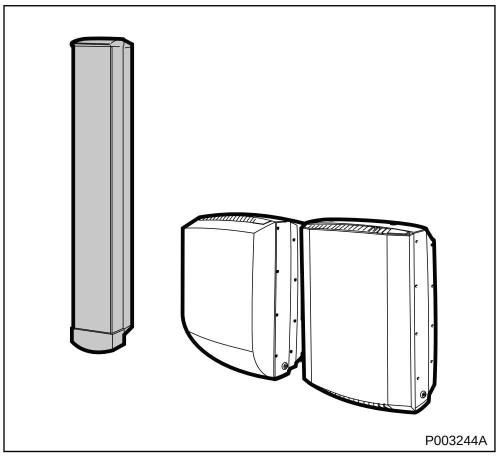

Figure 223 The AAU

8.4.1 Antenna Connector Overview

The Maxite™ can be used for antenna 500 W EIRP for GSM 1800, antenna 1250 W EIRP and 500 W EIRP for GSM 1900.

The connection field for the different antennas are different. The pictures below shows the different connector views

The connection pictures in the installation of the antennas only shows the GSM 1800 antenna.

GSM 1900 Antennas

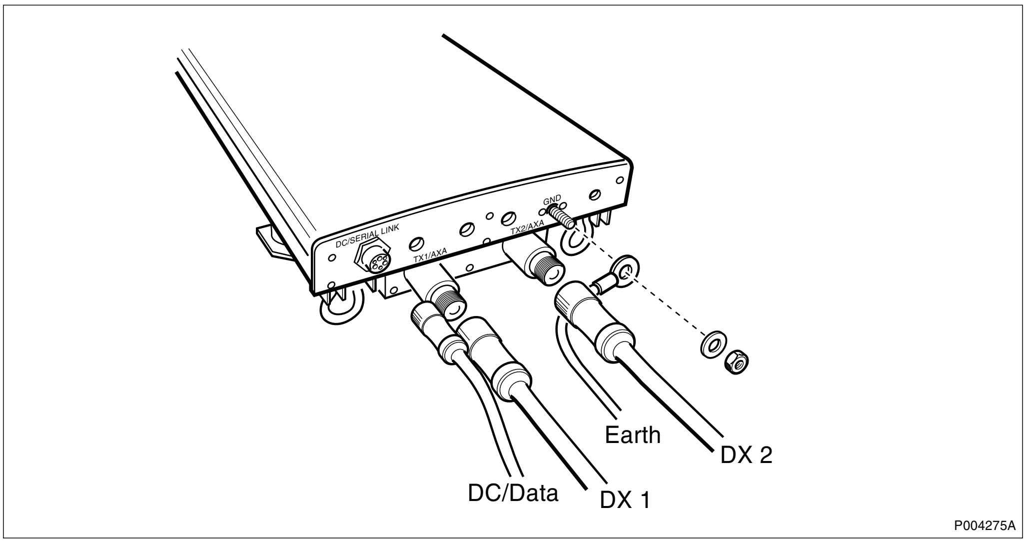

Figure 224 Connector overview of the GSM 1900 antenna 500 W EIRP

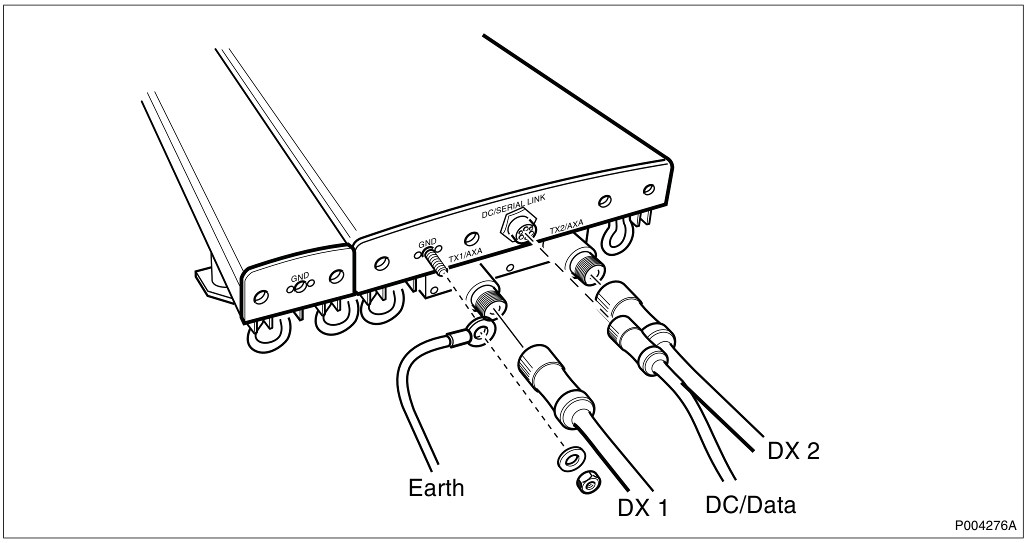

Figure 225 Connector overview of the GSM 1900 antenna 1250 W EIRP

GSM 1800 Antenna

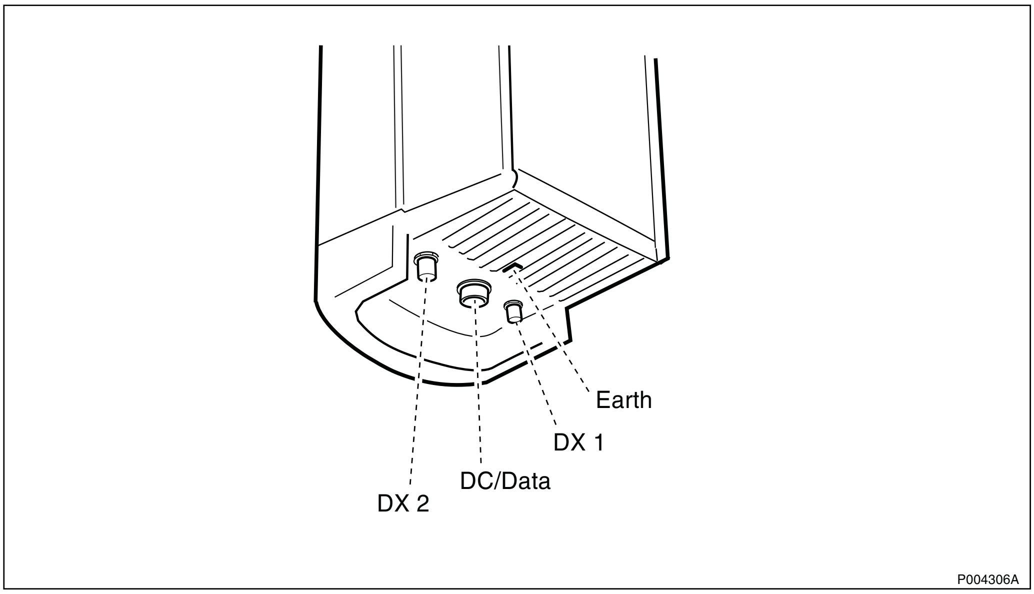

Figure 226 Connection overview of the GSM 1800 antenna 500 W EIRP

8.4.2 Hoisting of Cables

Mount all the connectors to the cables to be hoisted. The mounting procedure for the coaxial connectors can be found in *Section 8.4.8 on page 208*, *Section 8.4.9 on page 211* or *Section 8.4.10 on page 213*, and the mounting of the connector for DC/Data cable can be found in *Section 8.4.5 on page 200*.

1. Place the hoisting sleeve on the cable.
2. The required numbers of sleeves depends on the length of the cables. The recommendation is one sleeve for every 70 m.
3. Hook up the hoisting sleeves.
4. Hoist the cable to the antenna.

8.4.3 Cable marking

The antenna cables must be marked with self adhesive labels, corresponding to the marking of the antenna connectors. The recommended marking set is NTM 201 207/1. Mark one of the cables with DX1 at both ends and the other cable with DX2 at both ends. The cable marked DX1 shall be connected to DX1 and the cable marked DX2 shall be connected to DX2 on the AAU.

8.4.4 Earthing the Active Antenna Unit (AAU)

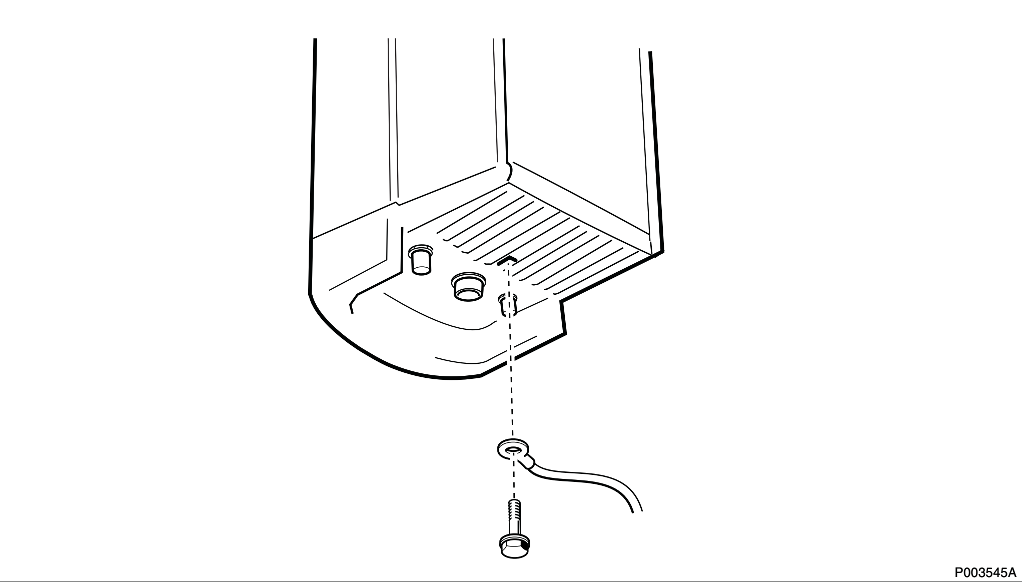

Figure 227 Earthing point of the AAU

The Site must be earthed to an earthing system that fulfills the IEC 1024/1 requirements, for more information regarding site earthing systems see:

General Installation Instructions	*LZN 302 49*
Installation of Earthing and Lightning Protection Material	*1531-ICM 103 413/2 Uen*

Use the earthing set 9/NTM 201 230/1 or 5/NTM 202 201 to connect the antenna to the earth point.

Connect the earth wire to the earth screw located underneath the AAU. Make sure the earthing screw is properly mounted and tightened. The tightening torque can be found in *chapter Installation of Antenna Units*.

8.4.5 Connecting the DC/Data Cable

The DC/Data cable is the middle connector on the bottom of the Active Antenna Unit. The Crimping tool overview below shows the crimping tools required for mounting the three contact pins.

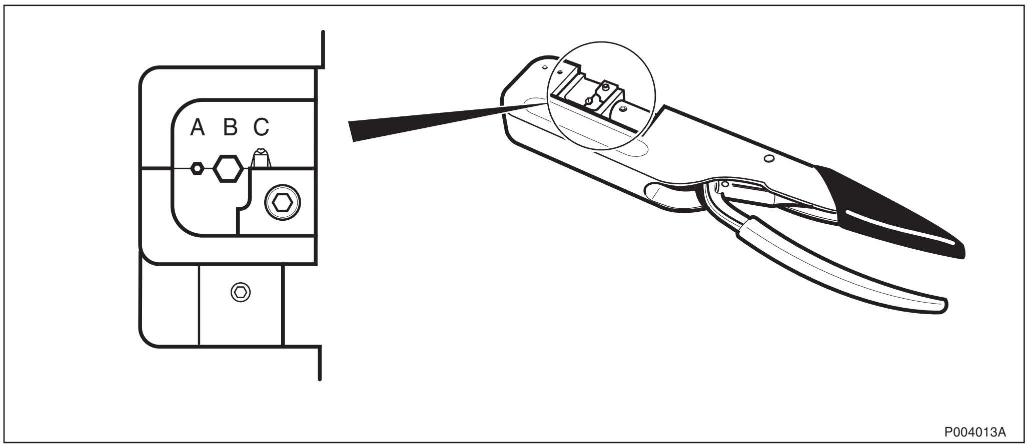

Figure 228 Crimping tool overview

This is the procedure for mounting the connector and connecting the DC/Data cable between the PBC and AAU.

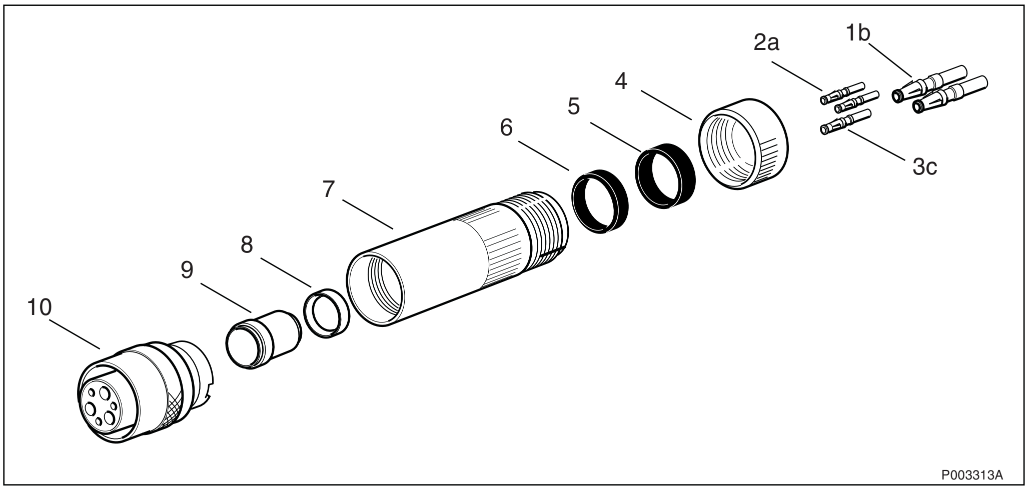

Figure 229 DC/Data connector

Table 21 Included details

A	RS485 contact pin	2 pcs
B	DC -48V contact pin	2 pcs
C	Data Shield (earth)	1 pcs
4	Clamp Nut	1 pcs
5	Compression Ring	black, 1 pcs
6	Grommet	red, 1 pcs
7	Body	1 pcs
8	Clamping ring	1 pcs
9	Clamping cone	1 pcs
10	Front connector body	Factory premounted
	Crimping tool for contact A, B, C	See chapter Tools & Instruments

Ensure that all parts are delivered together with the connector.

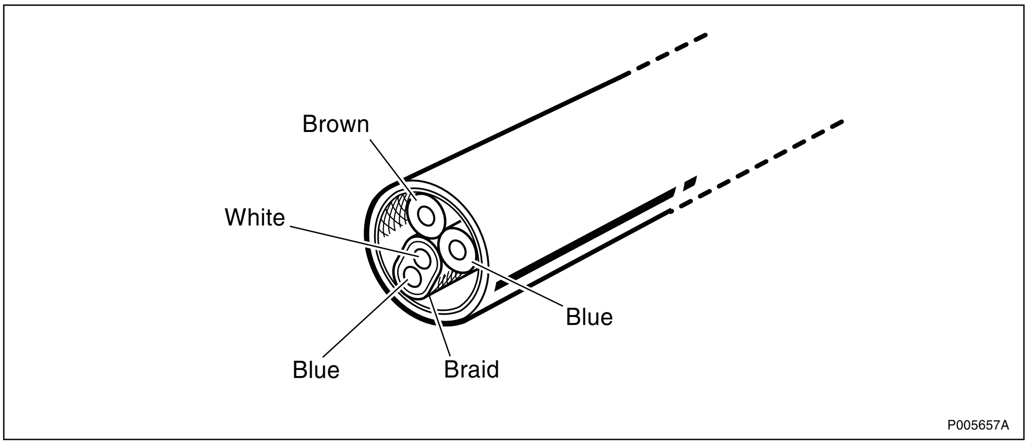

Figure 230 Ensure the wire position

Note: Ensure that the positions of the cables are exactly as shown above, otherwise the connector should be mounted at the other end of the cable.

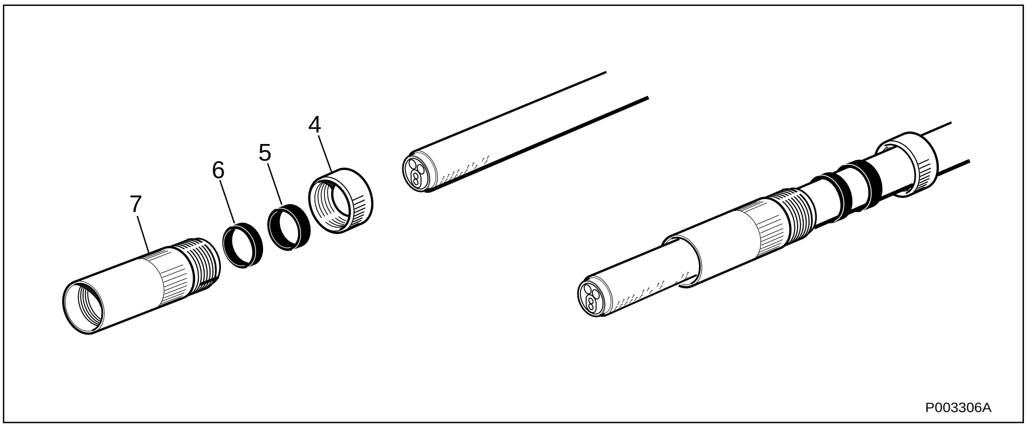

Figure 231 Assemble the items 4, 5, 6 and 7

1. Assemble the items (4, 5, 6, and 7) on to the cable.

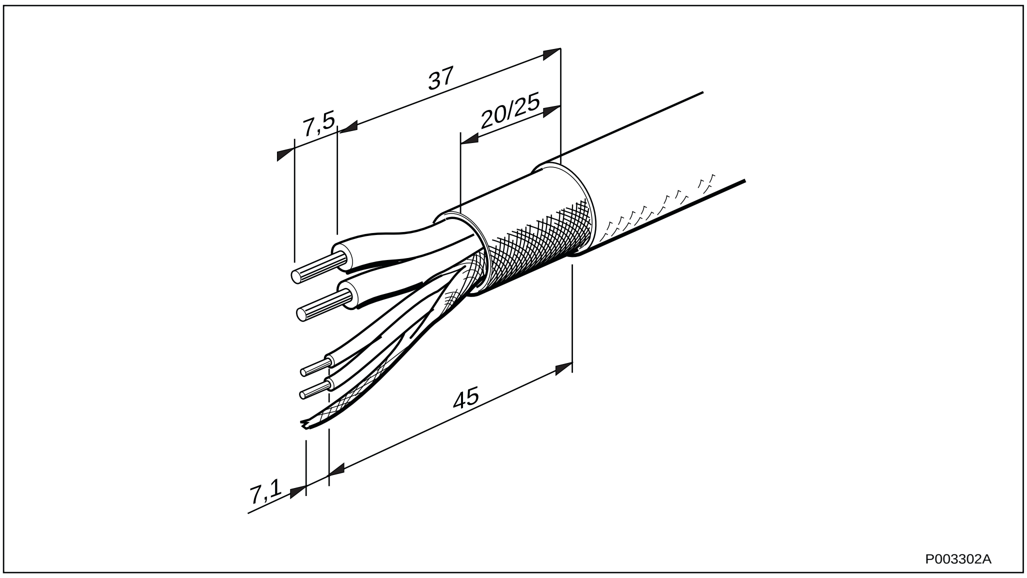

Figure 232 Cutting and stripping the DC/Data cable

2. Cut and strip the cable according to *Figure 232 on page 202*. The unit is mm.

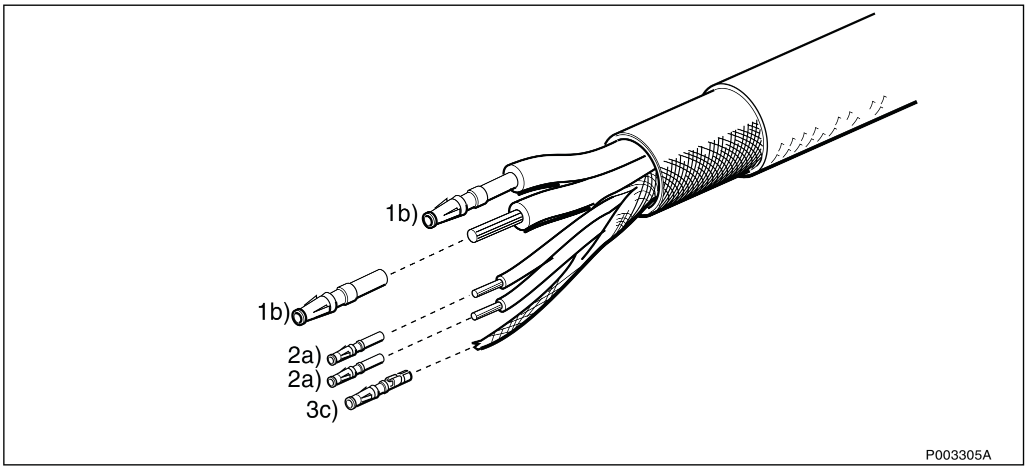

Figure 233 Crimping the contact pin

3. Crimp contacts 1, 2 and 3 on to the two cable wires and signal braid (earth). Use the corresponding crimping tool letter position A B and C.

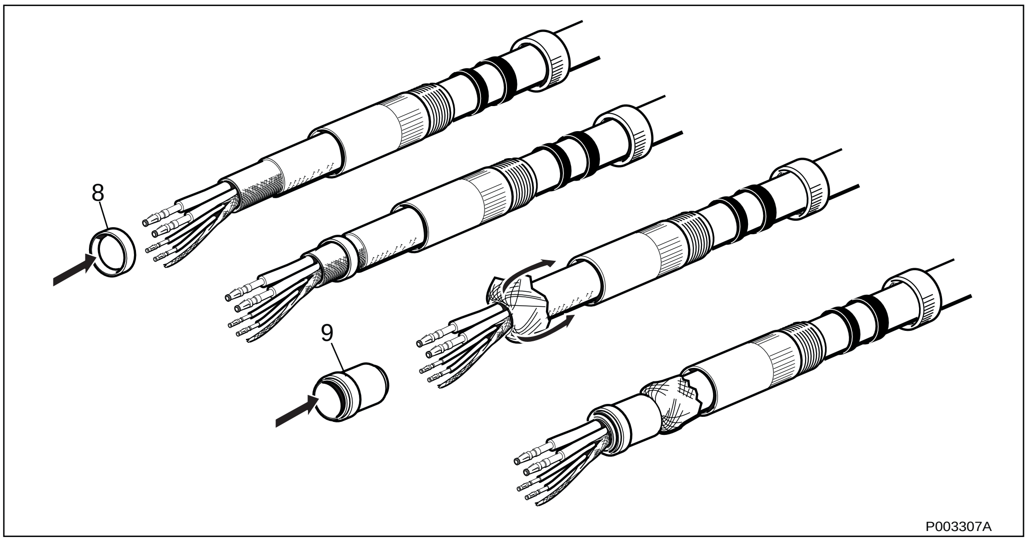

Figure 234 Fit the clamping ring and clamping cone

4. Fit clamping ring (8) over the outer braid and fold outer braid back over cable.

5. Fit clamping cone (9) over cable so that the outer brand is squeezed between clamping ring and clamping cone, *see Figure 234 on page 203.*

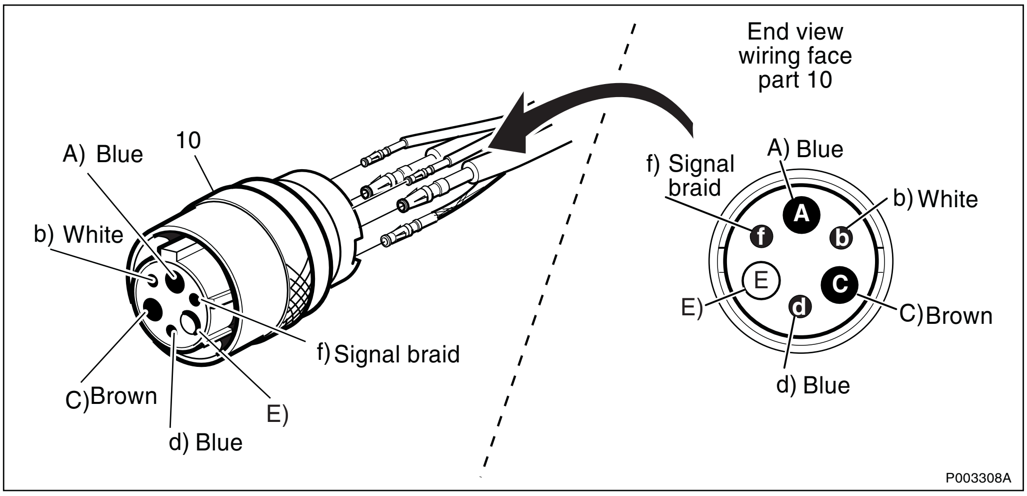

Figure 235 Connector pin overview

6. Insert the contacts into the cavities of the front connector body (10) according to *Figure 235 on page 204*.
7. Fold outer braid forward and fit it between clamping ring and cone.
8. Fit front connector body (10) to barrel sub connector body and tighten to a torque of 10 Nm.
9. Slide Grommet (6) and compression ring (5) inside rear of connector body, *see Figure 236 on page 204*.

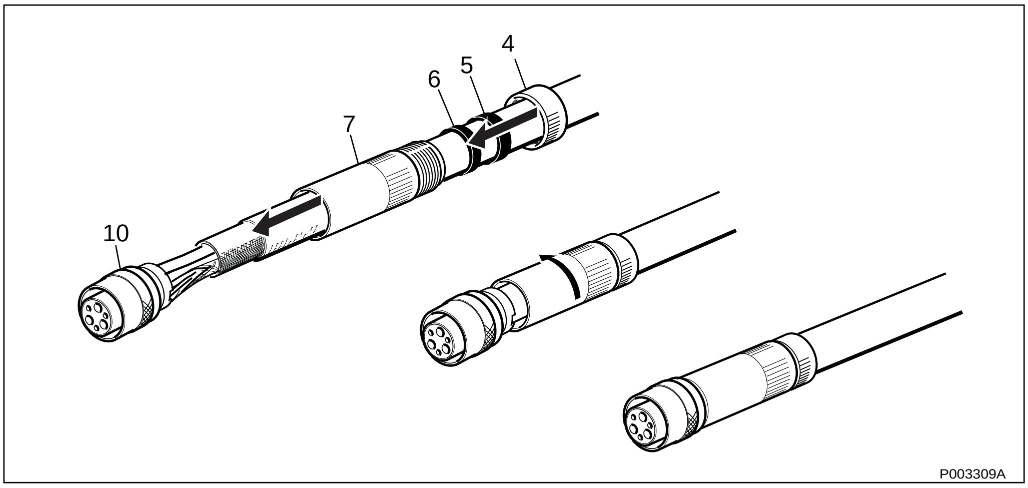

Figure 236 Securing the connector

10. Screw clamp nut (4) into the thread of the body and tighten to a torque of 10 Nm.
11. The connector is now ready to be mounted on the antenna.
12. Mount the DC/Data cable to the middle connector on the AAU.

For information regarding strapping and earthing of the DC/Data cable *see Section 8.4.12 on page 217* and

General Installation Instructions *LZN 302 49*

8.4.6 Antenna Lightning Protection GSM 1800 system

The GSM 1800 antenna can be supplied with additional lightning protection. The lightning protection kit consists of two antenna cable (RF) protection units and a DC/Data cable protection unit.

The antenna cables (RF) are connected to a lightning protection unit, the lightning protection unit is mounted on the antenna (RF) connector.

The DC/Data cable from the PBC is connected to the lightning protection box, a short premounted DC/Data cable from the antenna lightning box is connected to the antenna DC/Data connector.

The Site must be earthed to an earthing system that fulfills the IEC 1024/1 requirements, for more information regarding site earthing systems see:

General Installation Instructions	*LZN 302 49*
Installation of Earthing and Lightning Protection Material	*1531-ICM 103 413/2 Uen*

To connect the lightning protection follow this procedure:

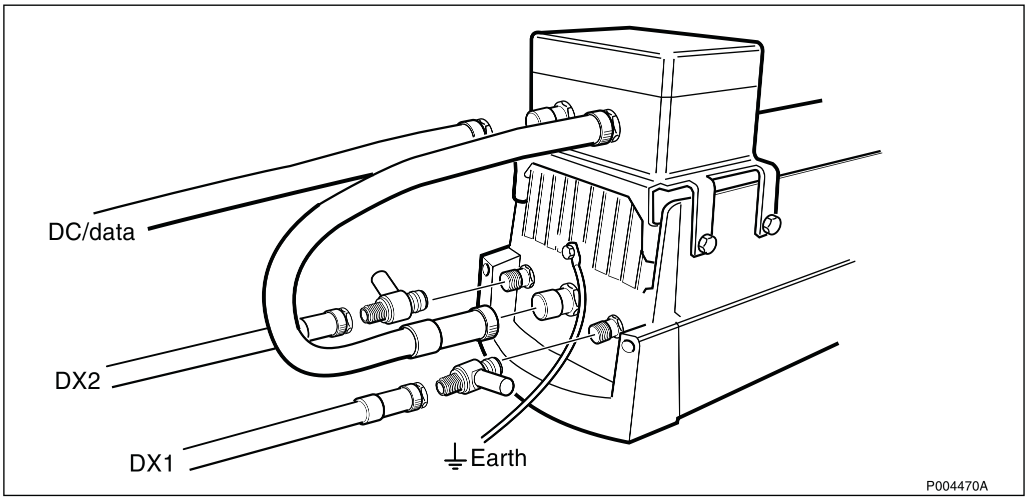

Figure 237 Connecting Lightning Protection for the GSM 1800 system

1. Make sure the earth connection to the antenna earth (M8) bolt is mounted.
2. Connect the DC/Data cable from the PBC to the DC/Data cable protection unit.
3. Connect the short premounted DC/Data cable from the lightning protection unit to the DC/Data connector at the antenna.
4. Mount the two antenna cable (RF) lightning protection units to the RF connectors at the antenna.

5. Connect the two antenna cables from the RBS to the antenna (RF) cable lightning protection units. For more information regarding connecting antenna cables *see Section 8.4.8 on page 208*, *Section 8.4.9 on page 211* or *Section 8.4.10 on page 213*.

Note: Seal the connectors after the Site Installation Test has been done.

6. Seal the DC/Data connectors, *see page 219*.

8.4.7 Antenna Lightning Protection Unit (ALPU) GSM 1900 System

The GSM 1900 antenna 1250 W and 500 W can be supplied with an additional Antenna Lightning Protection Unit (ALPU). The ALPU is mounted on the DC/Data cable and protects the Antenna from damage due to lightning strikes. The DC/Data cable from the PBC is connected to the ALPU, a short premounted DC/Data cable is mounted on the ALPU and connected to the DC/Data connector at the antenna.

The ALPU must be earth connected to antenna earthing point.

The Site must be earthed to an earthing system that fulfills the IEC 1024/1 requirements, for more information regarding site earthing systems see:

General Installation Instructions	*LZN 302 49*
Installation of Earthing and Lightning Protection Material	*1531-ICM 103 413/2 Uen*

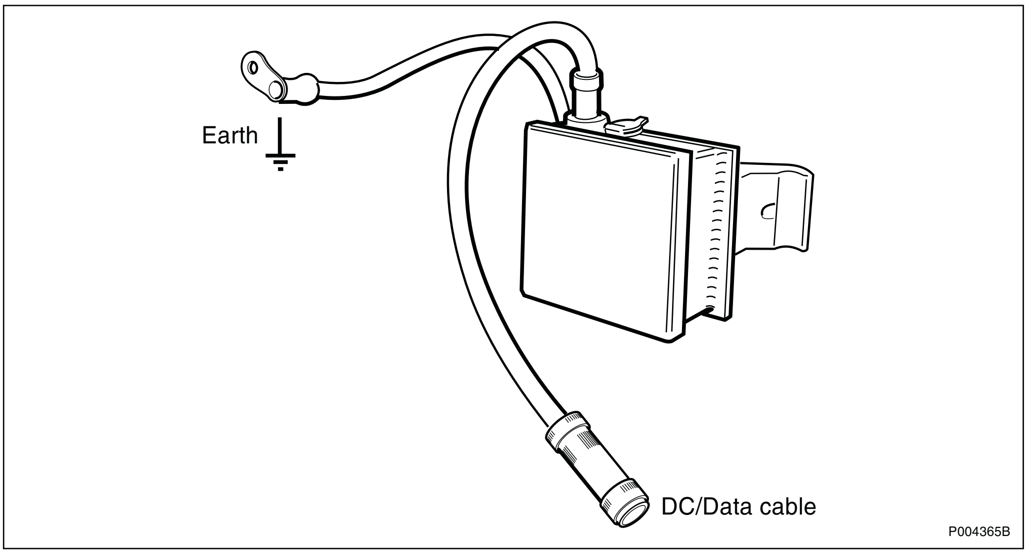

Figure 238 ALPU layout

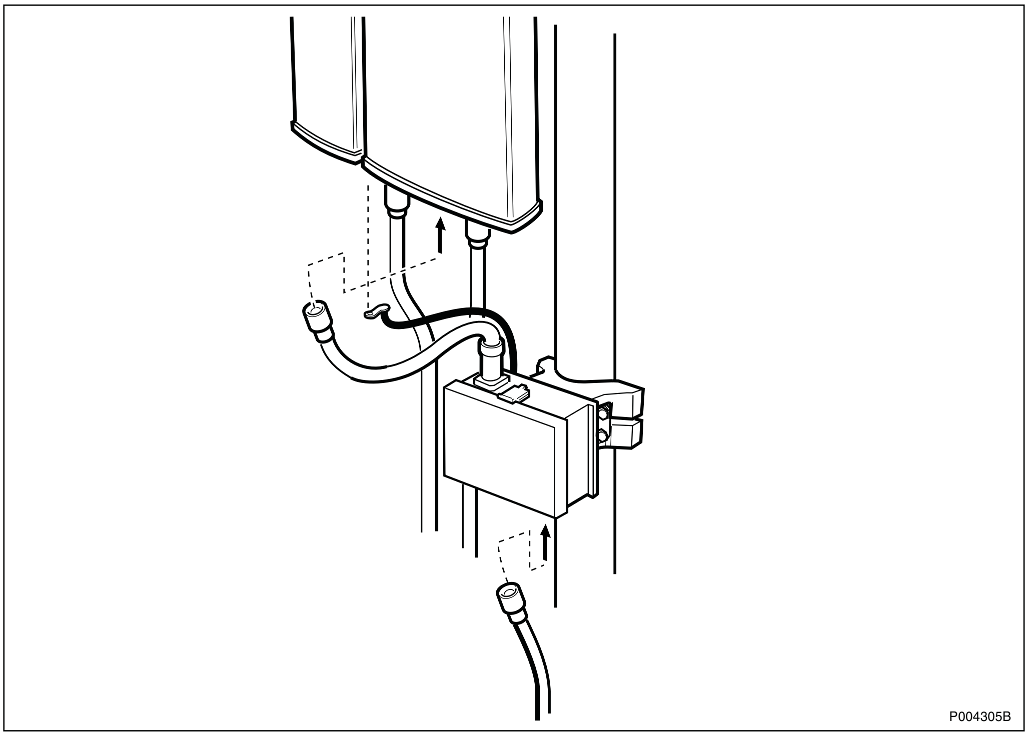

Figure 239 Connecting the ALPU (Antenna Lightning Protection Unit)

Follow this sequence to connect the ALPU.

1. Connect the Earth cable from the ALPU to the earth point at the antenna (M8 thread).
2. Connect the DC/Data cable from the Power and Battery Cabinet, to the DC/Data connector underneath the ALPU.
3. Connect the short premounted DC/Data cable from the ALPU to the antenna DC/Data connector.
4. Seal the DC/Data connectors, *see page 219*.

8.4.8 Connecting the Antenna Cables 1/2”

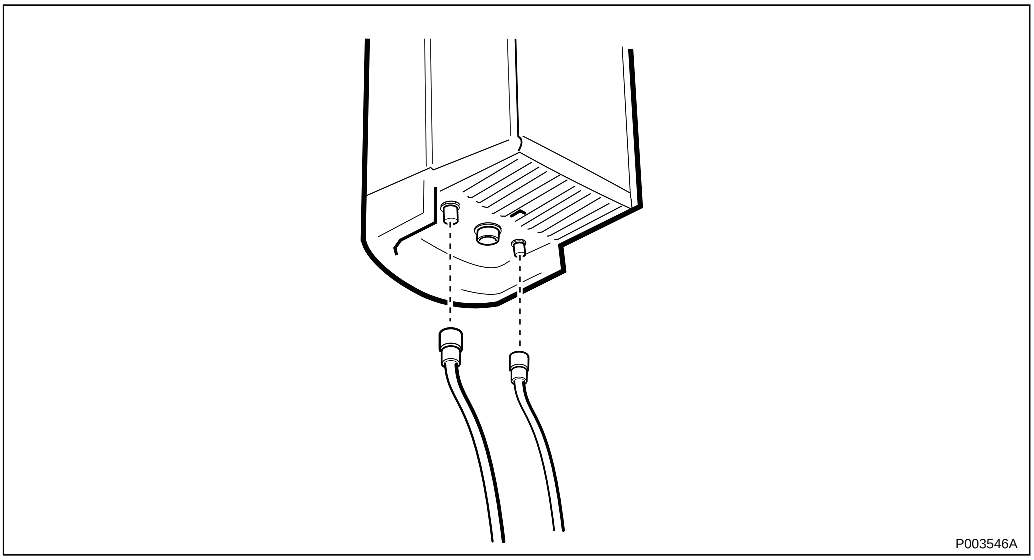

Figure 240 Antenna Coaxial connectors

This is the procedure for mounting the antenna connector and connecting the antenna cables to the antenna feeder.

1. Cut the antenna cable, dismantle the antenna cable approximately 5 mm so the following measurement can be performed.

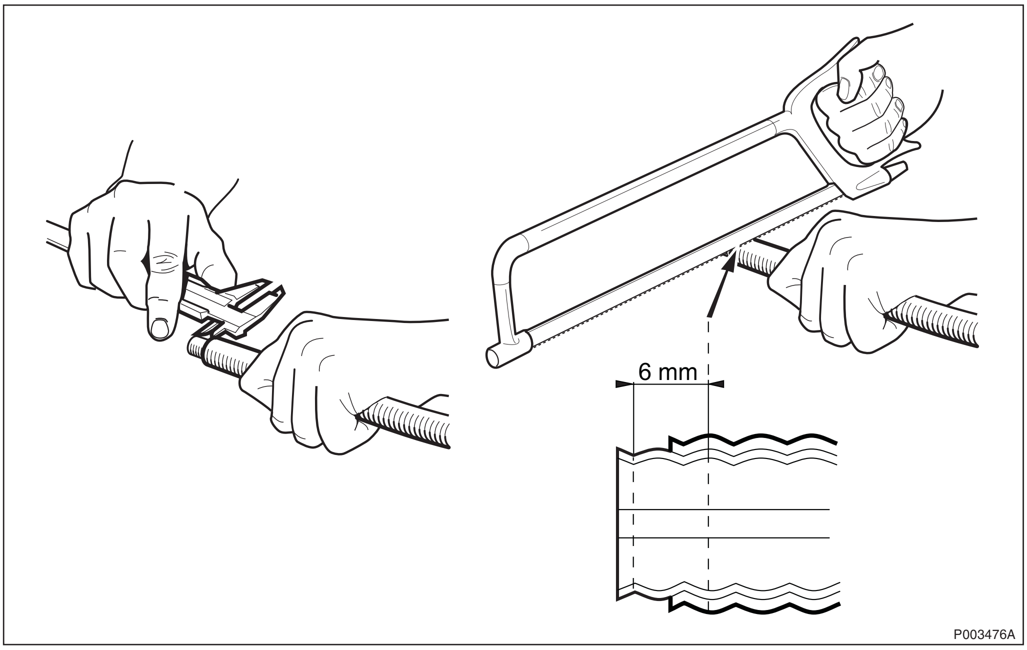

Figure 241 Measure and cut the cable

2. Measure 6 mm from a point closest to the mantle. This point must be the valley point of the corrugated copper.

3. Cut the cable again at the mantle (the cut must be as clean as possible to ensure that the connector can be mounted correctly).

4. If the measurement is accurate the cut is performed at the ridge of the corrugated copper screen.

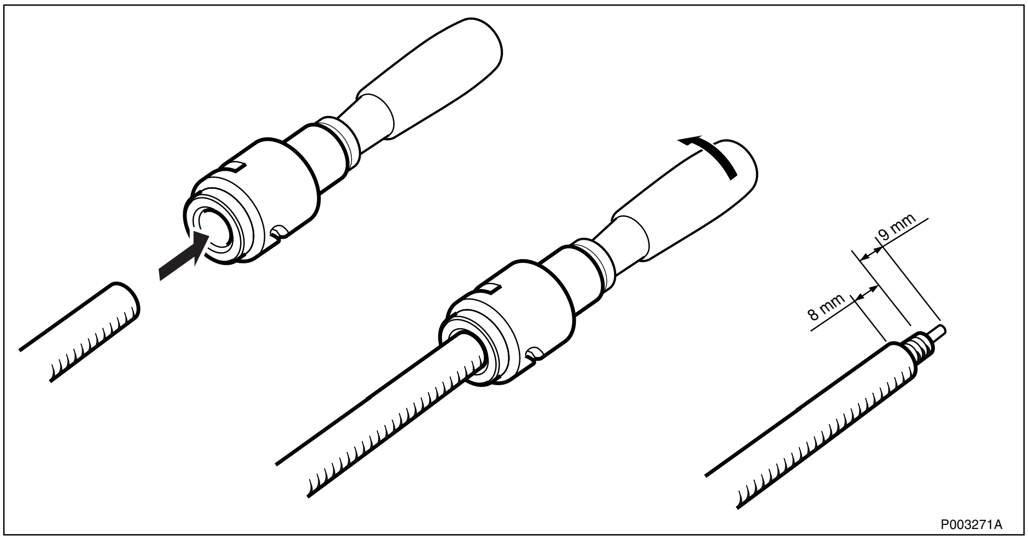

Figure 242 Dismantling the antenna feeder

5. Use the antenna feeder dismantling tool. See the *chapter Tools and Instruments*.

6. Turn the dismantling tool until it stops cutting.

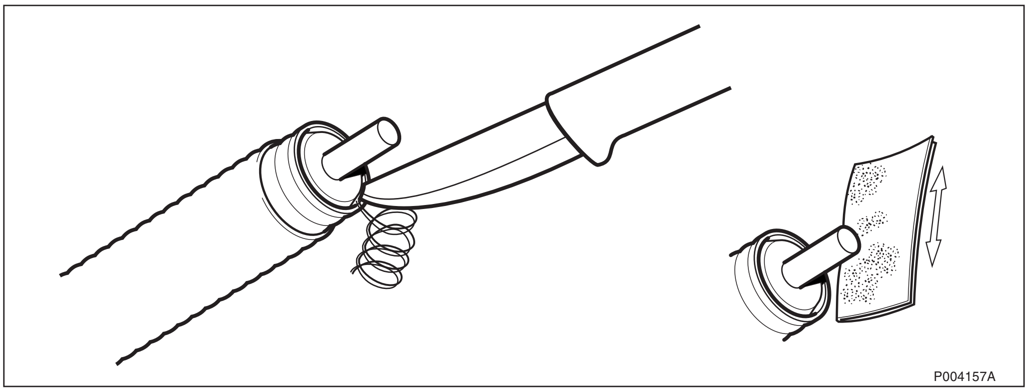

Figure 243 Loosening the dielectricum from the copper mantle

7. Use a knife and loosen the dielectricum from the copper shield, be careful so the inner conductor not get damaged.

8. Clean the inner conductor carefully with abrasive paper. All insulating materials and oxides must be removed.

The antenna feeder is now ready to have the connector fitted.

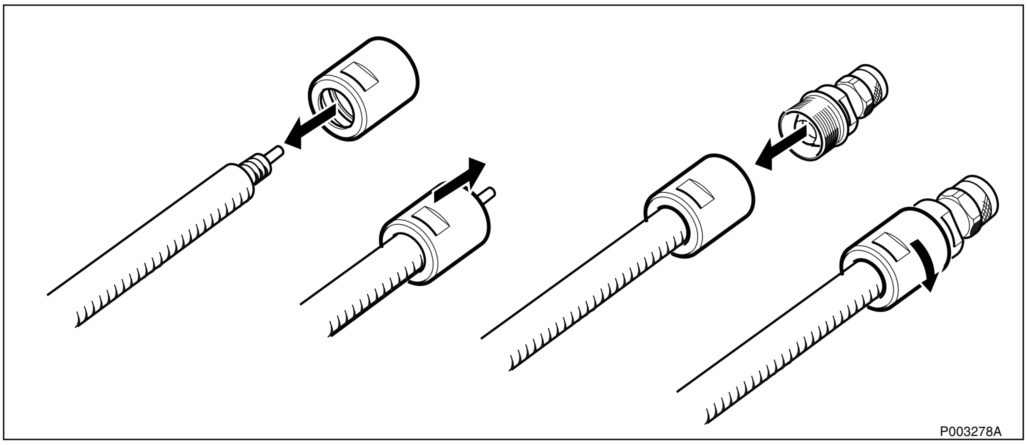

Figure 244 Mounting the antenna connector

9. Push the contact body so the inner moving part of the contact housing slides into the first trough.
10. Gently pull out the contact body.
11. Mount the outer contact body.
12. Tighten the inner and outer contact body by turning the inner contact body.

Note: Do not turn the outer contact body or the cable, this can cause intermittent contact of the antenna cable. Use U-ring spanners to tighten the connector.

13. Make sure the connector is properly tightened. Where to connect the cables is described in *Section 8.3.3 on page 193* for the CEU, in *Section 8.4.3 on page 199* and in *Section 8.6.11 on page 249*for the RBS.

Note: For GSM 1900 use, if applicable, adaptors.

14. Connect the antenna cable to the antenna and seal the antenna connector.

The procedure for sealing an antenna connector can be found in:

General Installation Instructions	*LZN 302 49*
Installation of Sealing Set NTM 201 2426	*1531-NTM 201 2426 Uen*

8.4.9 Connecting the Antenna Cable 10 mm diameter

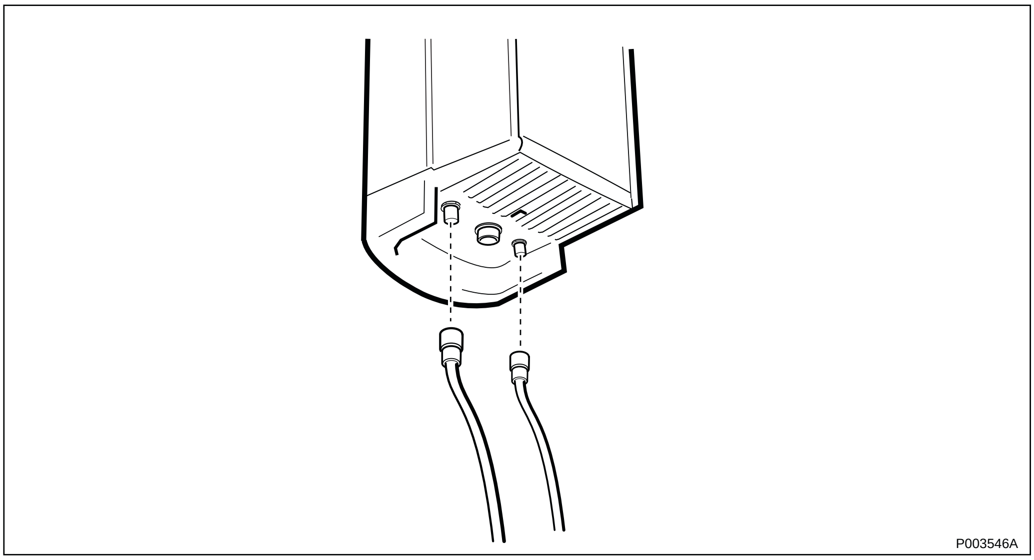

Figure 245 Antenna Coaxial connectors

This is the procedure for mounting the antenna connector RPT 368 800/ 2 to the 10 mm antenna cable.

1. Straighten out the cable end.

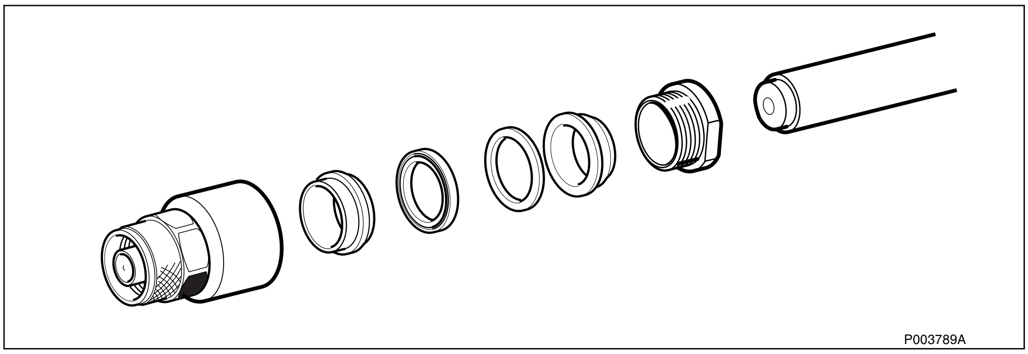

Figure 246 Mounting the connector

2. Mount all connector details except for the cable sheath clamp and front connector house (two last items).

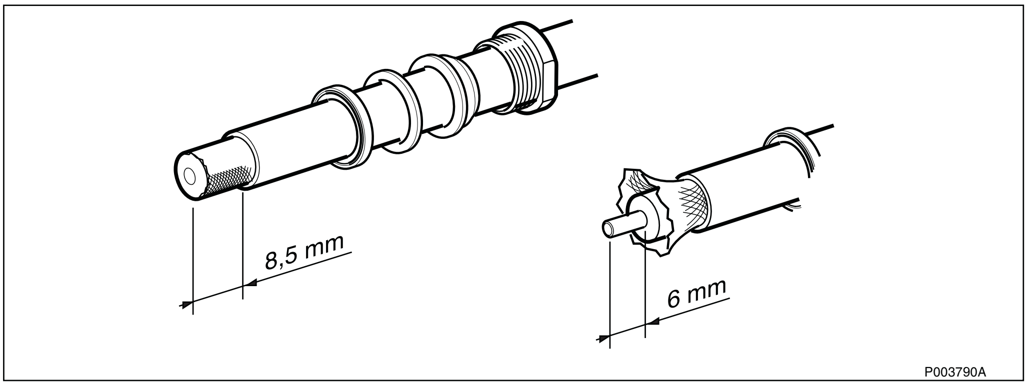

Figure 247 Dismantling the antenna cable

3. Dismantle the cable 8,5 mm.

Note: Do not damage the braid (cable sheath).

4. Push back the cable sheath and widen it slightly but do not comp it out. Cut the dielectric 6 mm from the cable end.

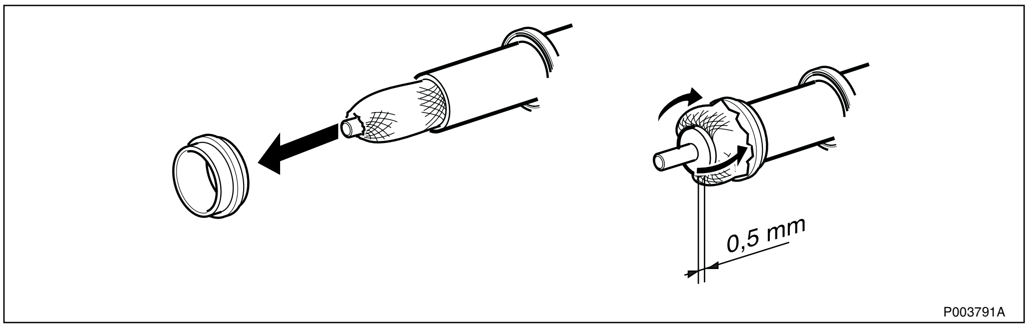

Figure 248 Mounting the braid clamp

5. Mount the braid clamp, ensure the braid clamp fits against the cable isolation.

6. Fold back the braid over the braid clamp, trim the overlapping braid.

7. Verify the measurement with a slide caliper, *see Figure 248 on page 212*.

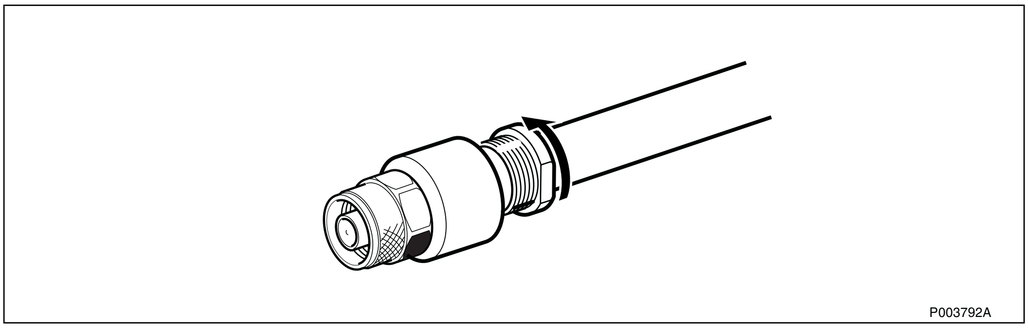

Figure 249 Mounting the front connector body

8. Push the front connector body and tighten the rear nut (11 Nm).

Note: Do not turn the cable in the connector body.

The connector is now ready to be connected to the antenna.

9. Connect the antenna cable to the antenna and seal the antenna connector. Where to connect the cables is described in *Section 8.3.3 on page 193*for the CEU, in *Section 8.4.3 on page 199* and in *Section 8.6.11 on page 249* for the RBS.

The procedure for sealing an antenna connector can be found in:

General Installation Instructions	*LZN 302 49*
Installation of Sealing Set NTM 201 2426	*1531-NTM 201 2426 Uen*

8.4.10 Connecting the Antenna Cables 3/8”

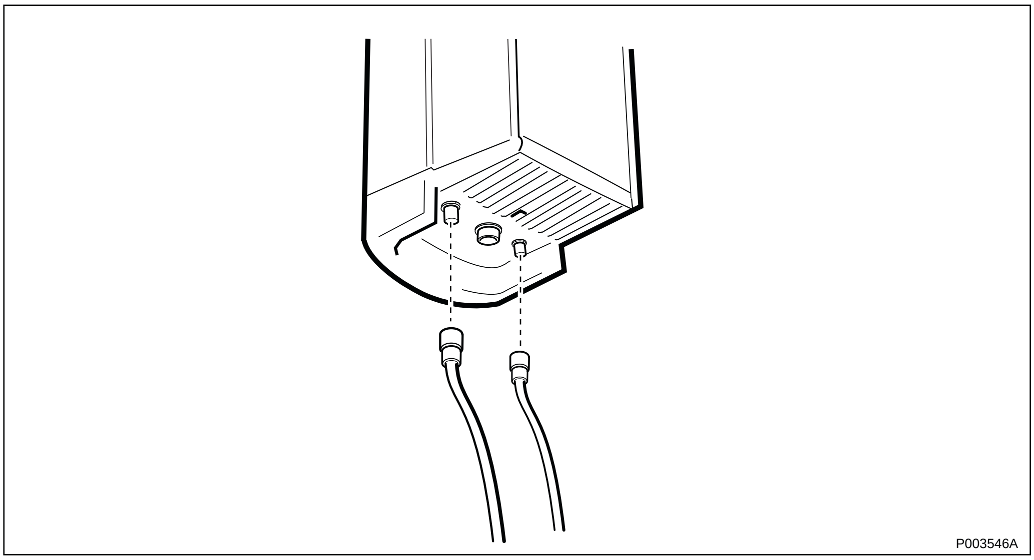

Figure 250 Antenna Coaxial connectors

This is the procedure for mounting the antenna connector and connecting the antenna cables to the antenna feeder.

1. Cut the antenna cable, dismantle the antenna cable approximately 5 mm so the following measurement can be performed.

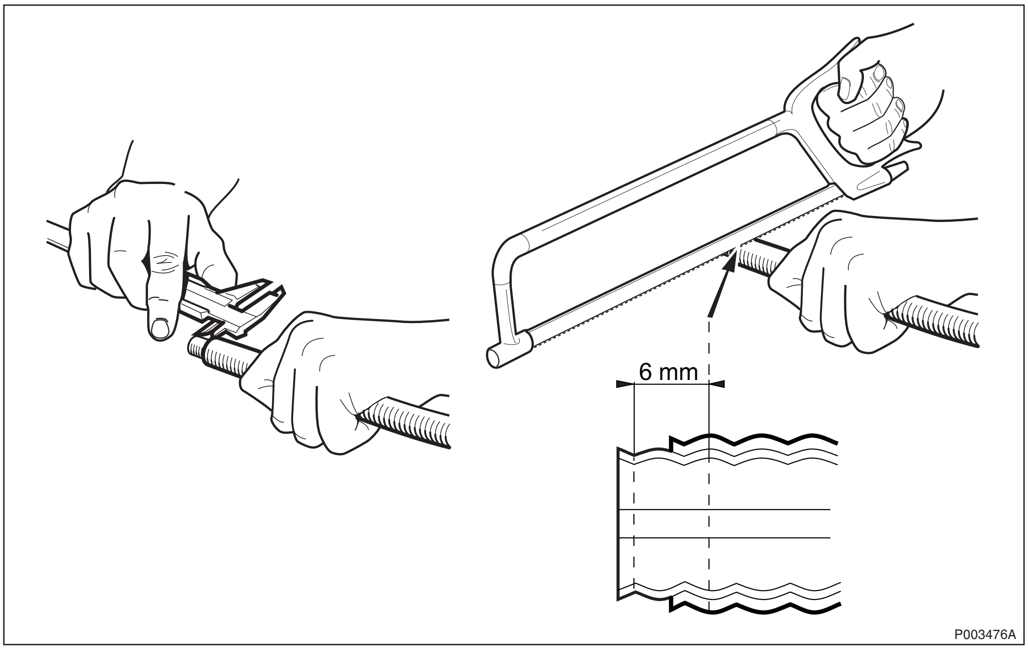

Figure 251 Measure and cut the cable

2. Measure 6 mm from a point closest to the mantle. This point must be the valley point of the corrugated copper.
3. Cut the cable again at the mantle (the cut must be as clean as possible to ensure that the connector can be mounted correctly).
4. If the measurement is accurate the cut is performed at the ridge of the corrugated copper screen.

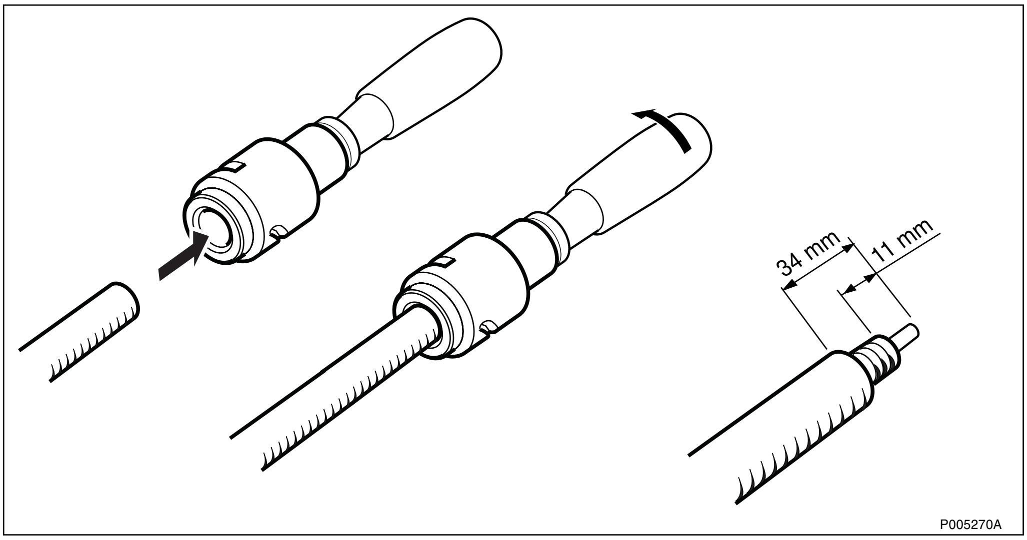

Figure 252 Dismantling the antenna feeder

5. Use the antenna feeder dismantling tool. See the *chapter Tools and Instruments*.

6. Turn the dismantling tool until it stops cutting.

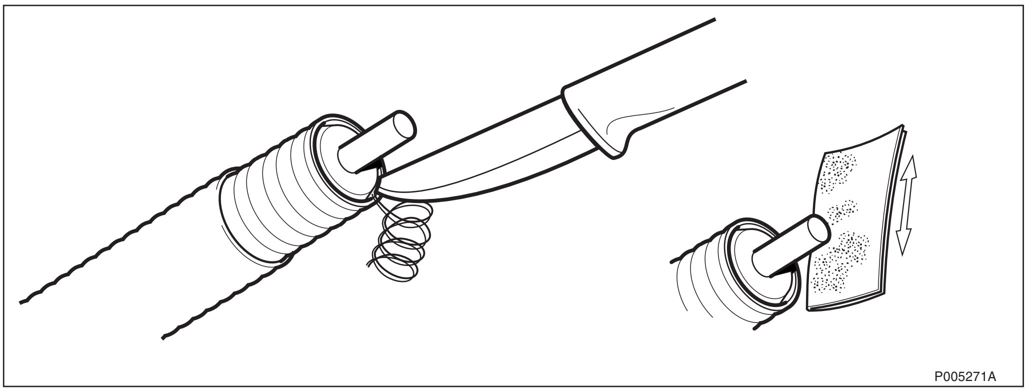

Figure 253 Loosening the dielectricum from the copper mantle and cleaning of the inner conductor with abrasive paper

7. Use a knife and loosen the dielectricum from the copper shield, be careful so the inner conductor not get damaged.

8. Clean the inner conductor carefully with abrasive paper. All insulating materials and oxides must be removed.

The antenna feeder is now ready to have the connector fitted.

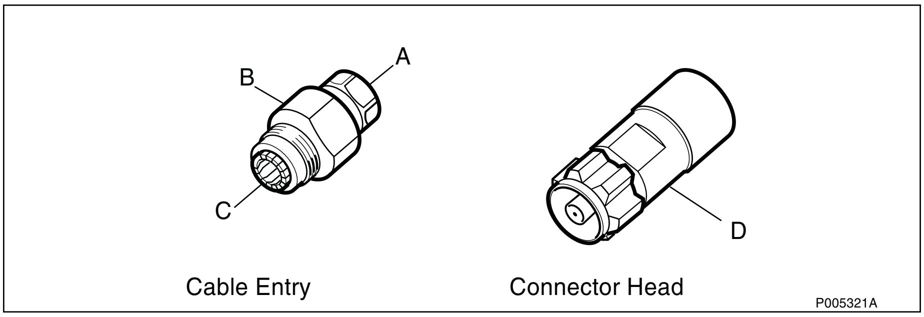

Figure 254 Connector parts

9. Screw off the connector head from the cable entry.

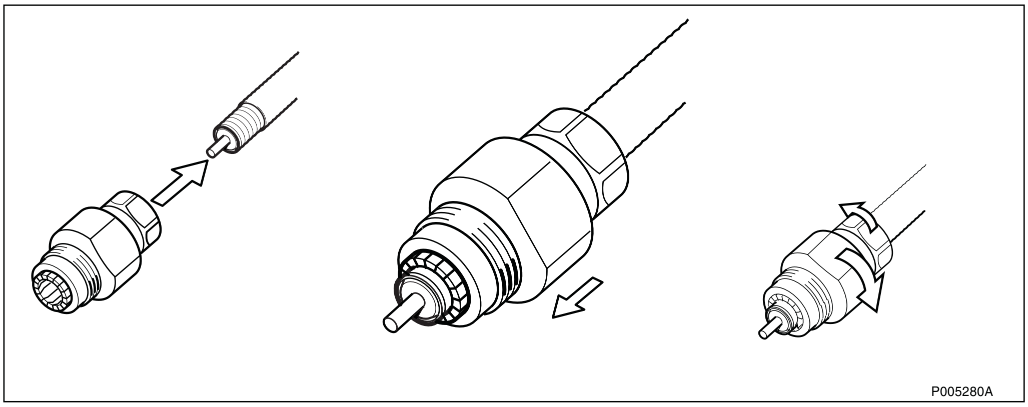

Figure 255 Mounting the cable entry

10. Push the cable entry over the cable until it stop. Be sure that the collet C grips in the first trough.

11. Pull back the cable entry somewhat so it will just cover the collet.

12. Tighten nibble A by hand.

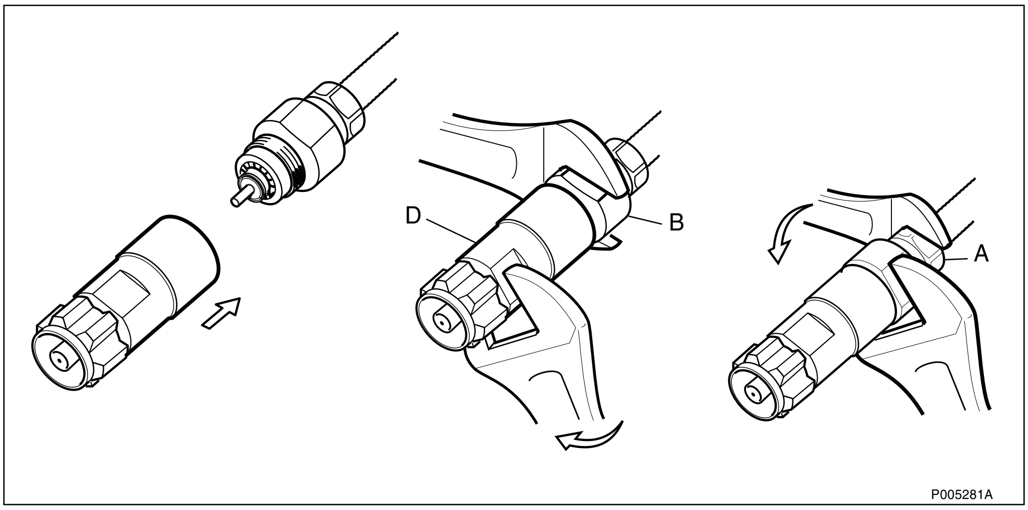

Figure 256 Mounting the connector head

13. Screw the connector head on the cable entry.

14. Hold B (do not rotate) and tighten D with approximately 15 Nm.

15. Tighten A with approximately 5 Nm.

    The connector is now ready to be connected to the antenna.

16. Connect the antenna and seal the antenna connector.

    Where to connect the cables is described in *Section 8.3.3 on page 193*for the CEU, in *Section 8.4.3 on page 199* and in *Section 8.6.11 on page 249* for the RBS.

The connector is now ready to be connected to the antenna.

8.4.11 Connecting Highway Splitter Combiner (HISC)

Highway configuration means that two antennas are mounted back-to-back, and fed from the same RBS. This is done with the Highway Splitter Combiner (HISC). The connection of coaxial cables is shown in *Figure 257 on page 217*.

Jumper cables with product number RPM 518 972/1 are used for connecting the HISC outputs to the antenna inputs for GSM 1800 system. Jumper cables Product No: RPM 518 985/2 are used for connecting the HISC outputs to the antenna inputs for GSM 1900 system. For the GSM 1800 system, the antenna and the HISC are supplied with N connectors. For the GSM 1900 system, the antenna and the HISC are supplied with 7/16 connectors.

Note: This picture shows the HISC connection to the GSM 1800 antenna. The connection procedure between HISC and antenna is the same for GSM 1900 antenna 1250 W and 500 W.

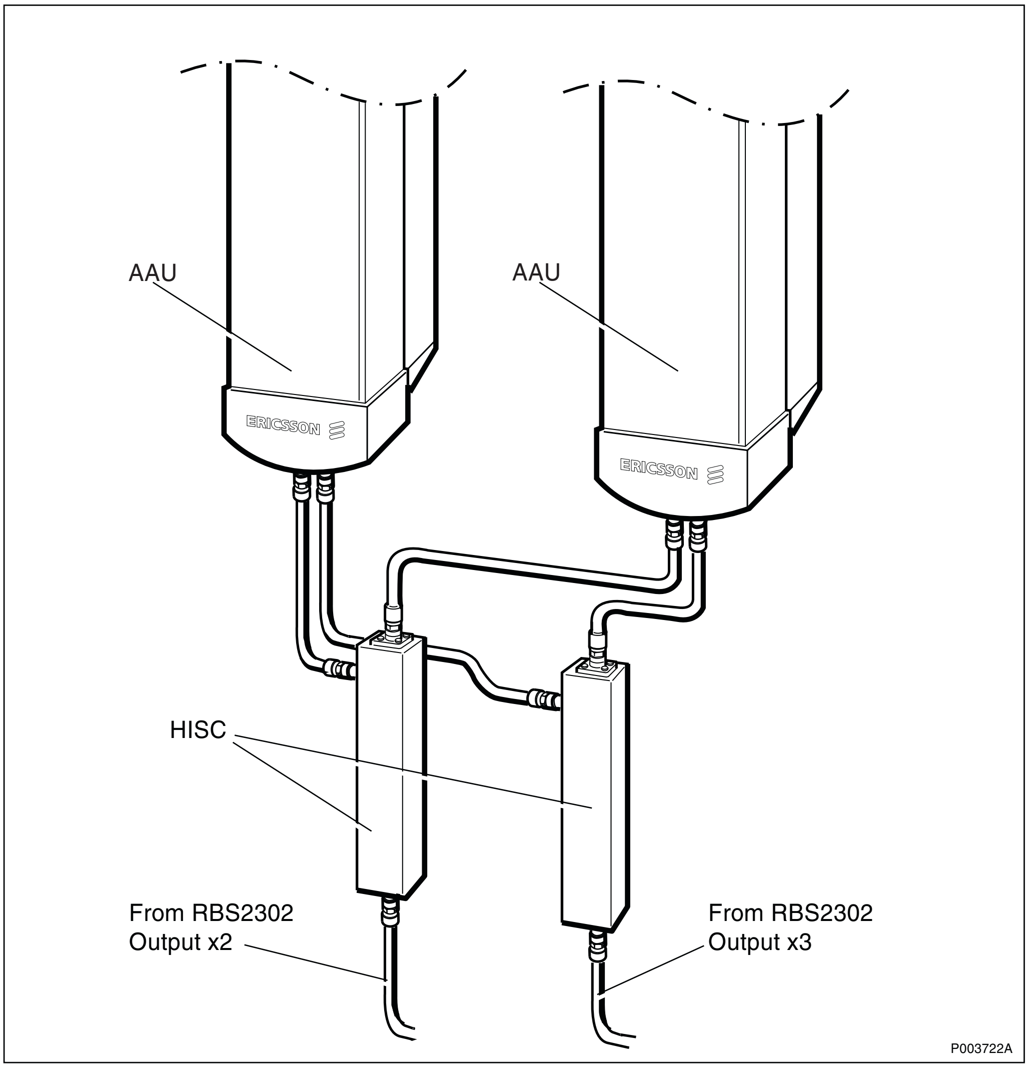

Figure 257 Connection of the HISC (Highway Splitter Combiner)

8.4.12 Earthing and Cable Routing

This chapter describes the principle of cable routing, earthing routines and sealing of the antenna and DC/Data cable.

Earthing Requirements

The antenna cable and the DC/Data cable must be earthed to the supported structure at the point where the cables leave the structure (this applies if the RBS 2302 and the PBC are not mounted on this structure and electrically bound to it).

If the cables are between 30 to 60 meters in length, they must have one extra earthing point at half their length.

If the cables are longer than 60 meters, they must have one extra earthing point for every 30 meters added. The distance between an end point and an earth point, or two earth points must not be more than 30 meters.

Earthing Set for Equipment

Earthing set 5/NTM 202 201 consists of a 2 m long insulated copper cable with an area of 25 mm². A cable plug is fitted at one end. The earthing set can be clamped to an earth wire with a supplied jointing sleeve.

Earthing set 9/NTM 201 230/1 consists of a 40 m long copper wire, area 35 mm², as well as accessories to connect to a lightning protection system.

Earthing Sets for Cables, Type 1/2”, 3/8” and DC/Data

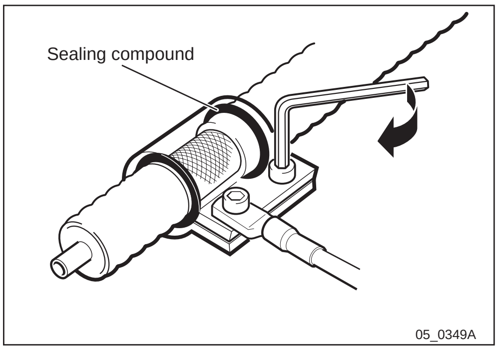

Figure 258 Earthing set NGT 211 04/2 and NGT 211 04/3

The earthing set NGT 211 04/2 is used to earth 1/2” coaxial cable and the DC/Data cable.

Note: For the DC/Data cable: Use also the sealing set NTM 201 246 to assure protection from moisture. The tapes shall be wrapped in a similar way that is shown in *Figure 259 on page 218*.

The earthing set NGT 211 04/3 is used to earth 3/8” coaxial cable. More information can be found in:

General Installation Instructions *LZN 302 49*

Earthing Set for 10 mm Coaxial Cable

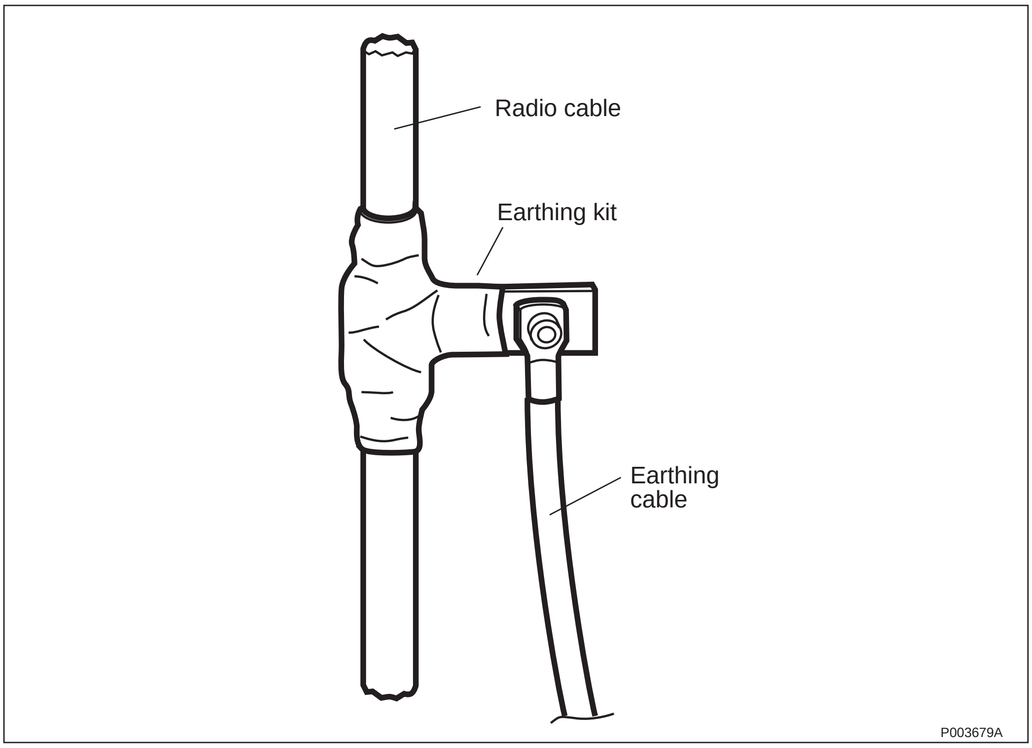

Figure 259 Earthing set SXK 111 528/1

The earthing kit SXK 111 528/1 is used to earth the 10 mm diameter coaxial cable. The installation instruction of the Earthing kit is included in the package of the kit.

Sealing set

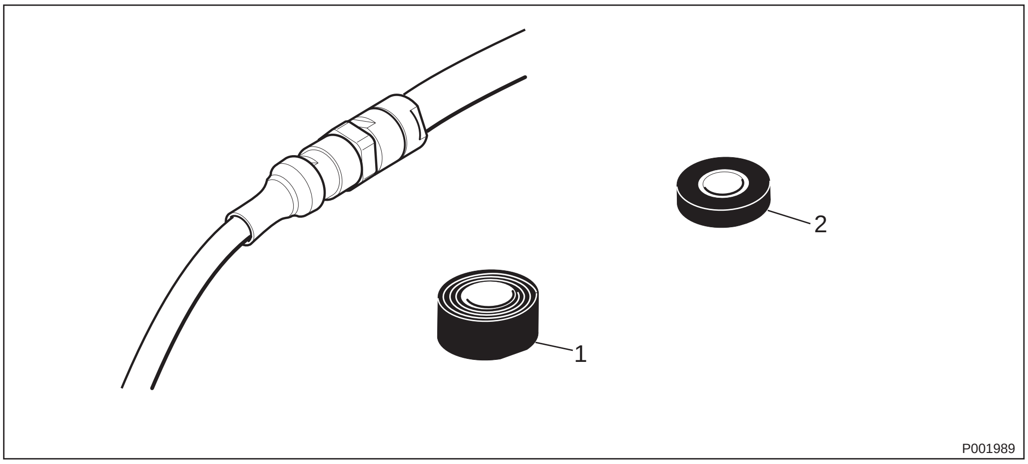

Figure 260 Sealing set NTM 201 2426

The sealing set NTM 201 2426 is used to seal outdoor mounted connectors to protect them from moisture and adverse weather conditions. Two sealing sets are sufficient for one AAU. More information about the sealing procedure can be found in:

General Installation Instructions *LZN 302 49*

Note: Seal all connectors after the Site Installation Test have been preformed.

Feeder Clamp for 1/2” Antenna Cable and DC/Data Cable

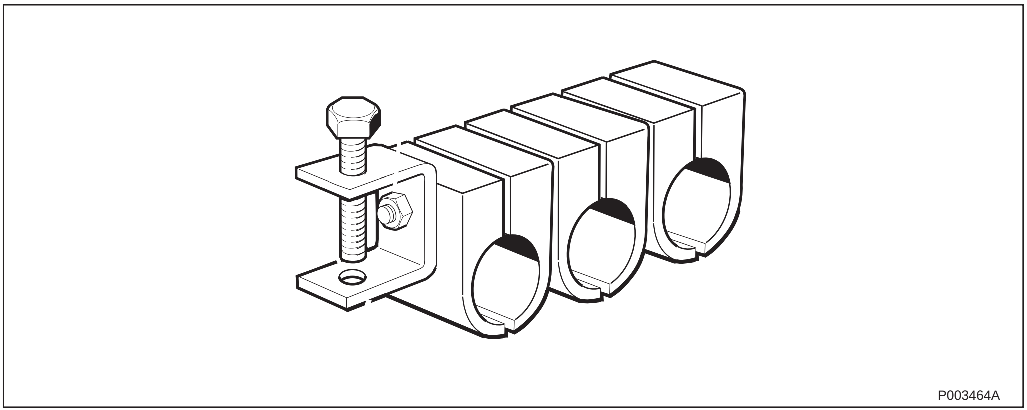

Figure 261 Cable Clamp NTM 201 215/3

The cable clamp NTM 201 215/3 is used for clamping the 1/2” coaxial cable and the DC/Data cable on to masts/towers and on outdoor ladders. The cables must be clamped every 0.6 m. More details about the material and other suitable items for installation can be found in:

General Installation Instructions *LZN 302 49*

Feeder clamp for 10 mm Antenna Cable

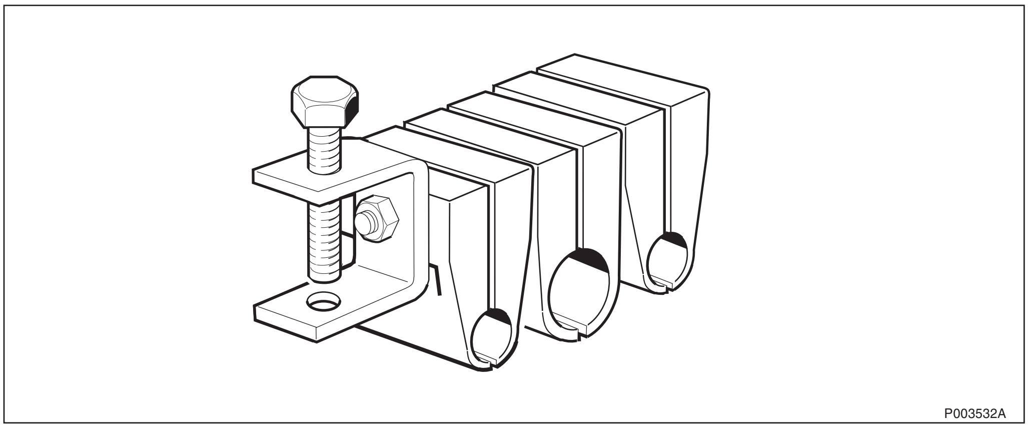

Figure 262 Cable Clamp NTM 201 215/5

The cable clamp NTM 201 215/5 is used for clamping the 10 mm diameter coaxial cable and the DC/Data cable on to masts/towers and on outdoor ladders. The cables must be clamped every 0.6 m. More details about the material and other suitable items for installation can be found in:

General Installation Instructions *LZN 302 49*

Feeder clamp for 3/8” Antenna Cable

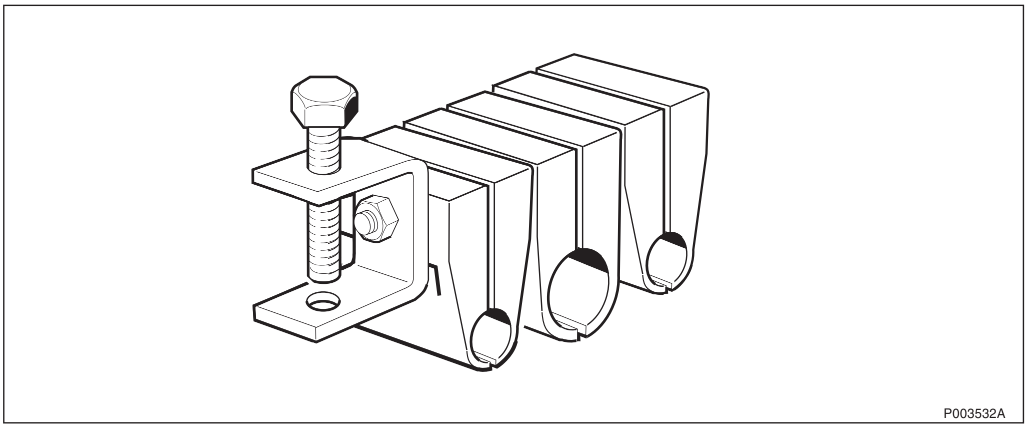

Figure 263 Cable Clamp

The cable clamp *(product number not available at the time of the release of this manual)* is used for clamping the 3/8” diameter coaxial cable and the DC/Data cable on to masts/towers and on outdoor ladders. The cables must be clamped every 0.6 m. More details about the material and other suitable items for installation can be found in:

General Installation Instructions *LZN 302 49*

8.5 Connecting the PBC (Power and Battery Cabinet)

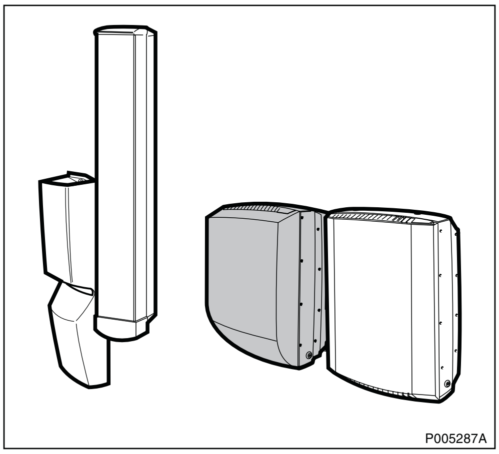

Figure 264 PBC

This section describes the mounting of connectors and connections to the Power and Battery Cabinet. The connection of the DC/Data cable to the Active Antenna Unit is described in the *Section 8.4 on page 197*. The connection of the DC/Data cable to the PBC is described in this chapter. Before the connection procedure can begin, the interface box has to be opened.

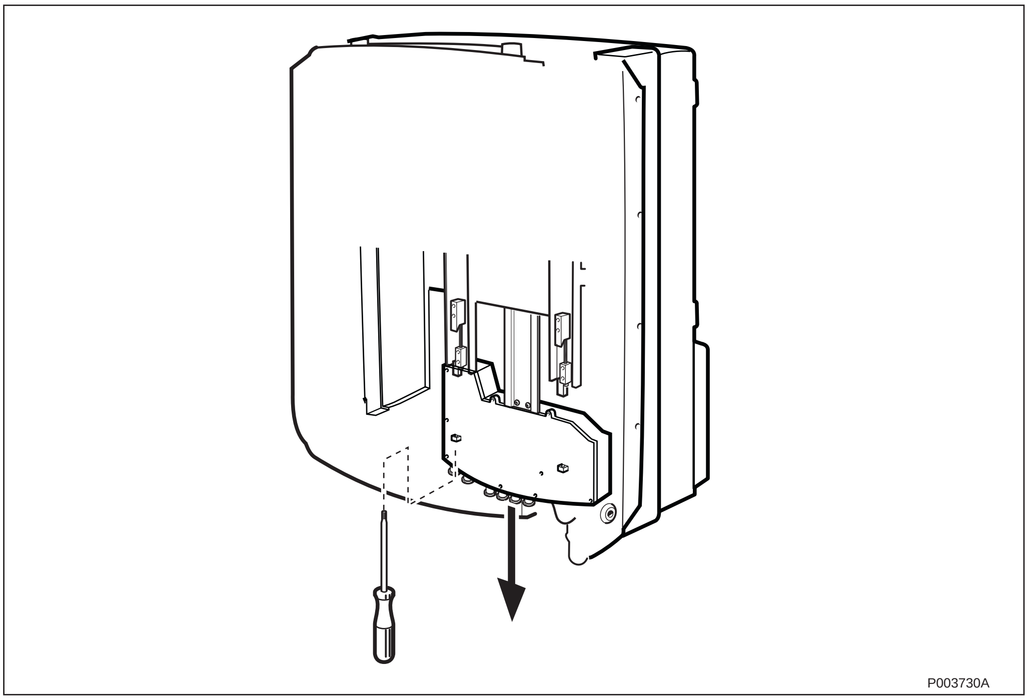

Figure 265 Pulling down the interface box

1. Loosen the screws securing the interface box placed underneath the PBC and pull down the interface box.

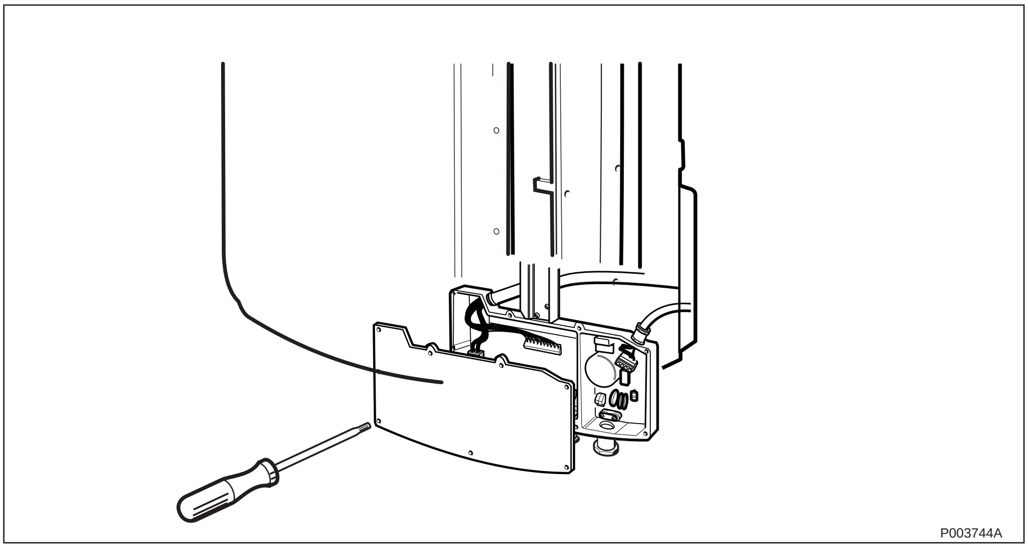

Figure 266 Loosening the interface box cover

2. Unscrew the 9 torx screws for the interface box cover. Let the cover hang in the strap.

8.5.1 Loosening the Gland Plate

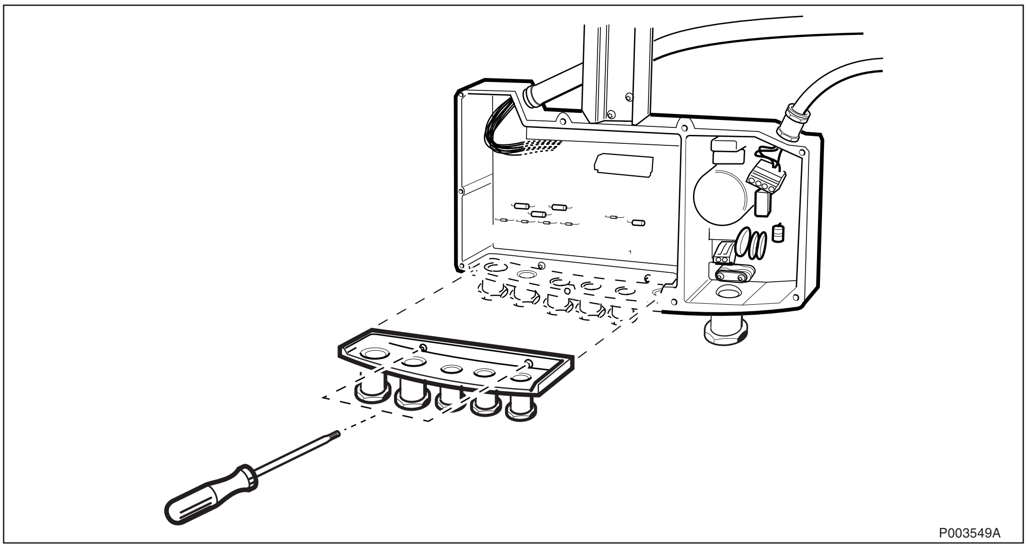

Figure 267 Loosening the gland plate

The gland plate can be loosened and removed, this is useful if the cable length is known. The mounting procedure for the termination block and the cable inlet can be performed indoor or at ground level.

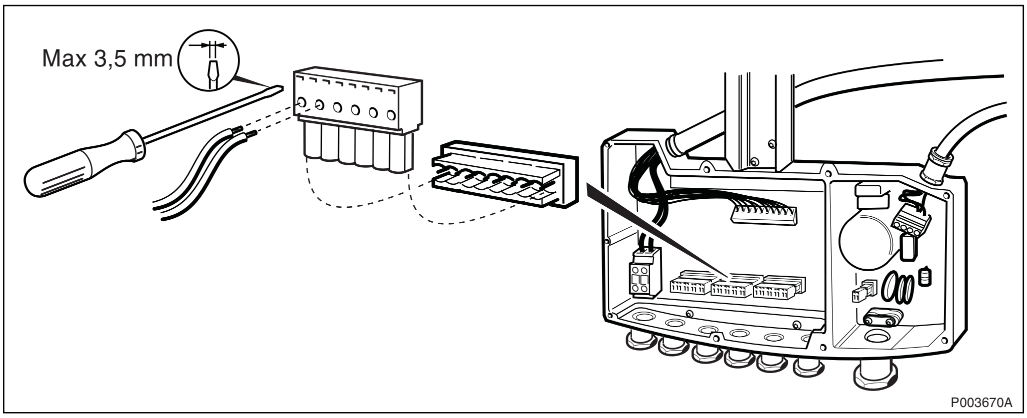

Figure 268 Loosening the termination block

8.5.2 Connecting the PBC to AC Mains

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

DANGER

Improper electrical installation may cause fire or electric shock. Approved circuit breakers for the AC mains and the cables cross sectional area must always be selected in accordance with local laws and regulations. Only a qualified and authorized electrician is permitted to install or modify the electrical installation.

Note: Make sure the AC Mains is switched off before beginning the AC installation procedure.

To install the AC follow this procedure:

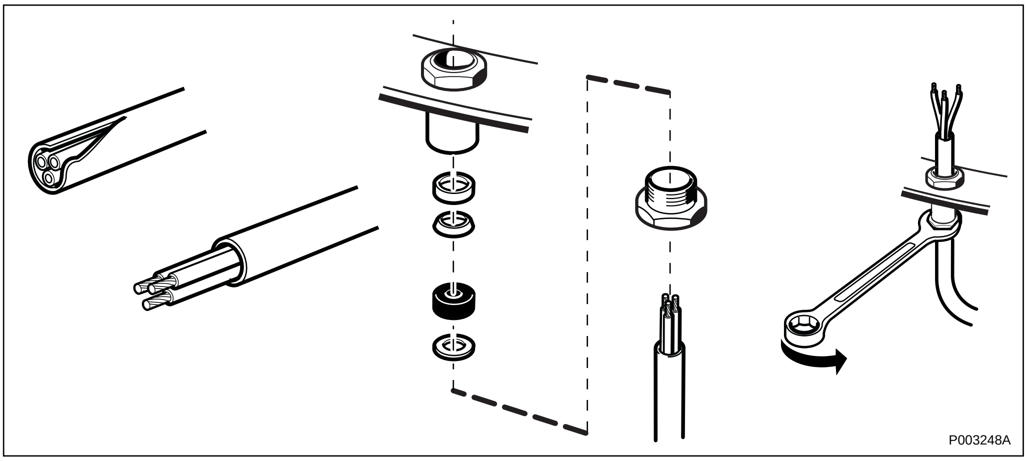

Figure 269 Dismantling and mounting the cable inlet

1. Route the cable so the interface box can be pushed into the cabinet.
2. Cut the cable to the appropriate length.
3. Cut the cable isolation.
4. Mount the cable inlet, *see Figure 269 on page 224*.

If a flexible conduit is used, replace the AC mains cable inlet (feed trough) with the flexible conduit and its fastening device, *see Figure 270 on page 225*.

5. Adjust the sealing grommet to the cable diameter by peeling off the pre-cut layers.

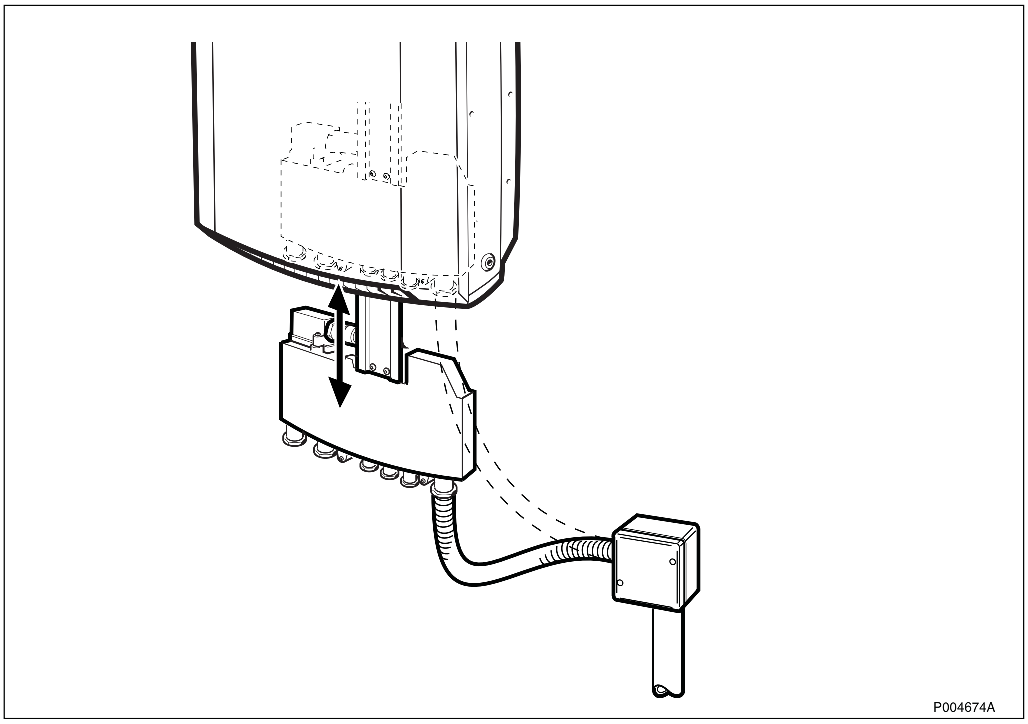

Figure 270 An example for AC Mains connection with flexible conduit

Protective Earth

A reliable incoming Protective Earth must be connected to the earth terminal when connecting power supply.

The earth terminal is located in the interface box and indicated by PE and the earth symbol, *see Figure 271 on page 225.*

Figure 271 Earth symbol

The Protective Earth connection is essential.

AC connection

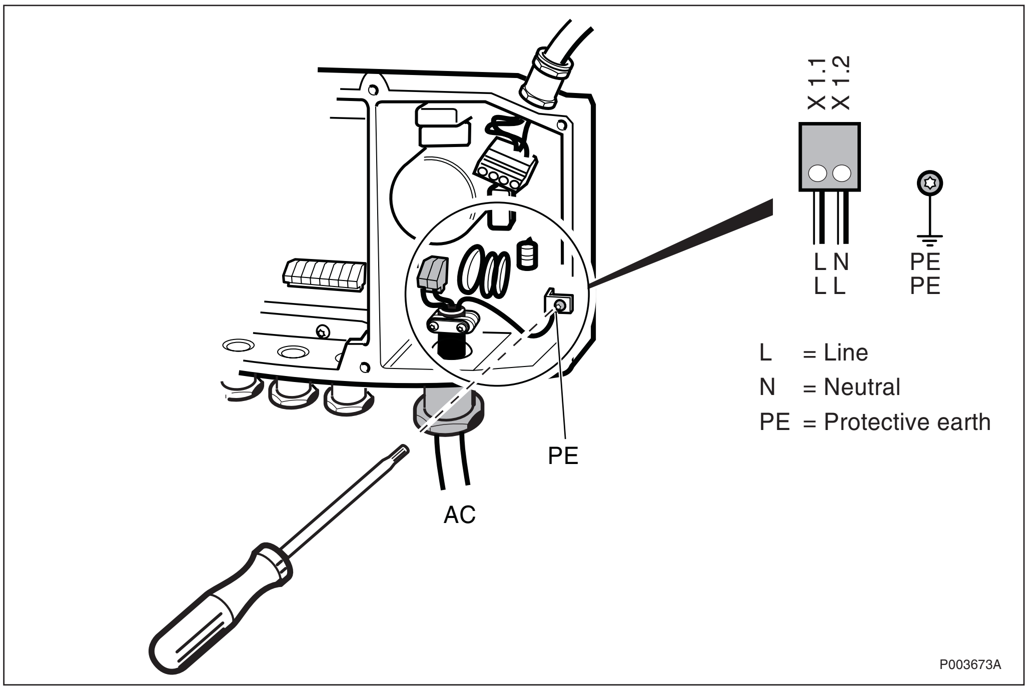

Figure 272 AC Mains power section in the interface box

1. Connect the cable wires to the termination block and earth screw. Make sure the PE (Protective Earth) is properly connected and tightened.

8.5.3 Connecting the DC/Data cable

The DC/Data supports alarms from the Active Antenna Unit and DC power supply to the antenna.

The DC/Data cable has to be earthed by the cable inlet *see Figure 273 on page 227*.

1. Route the cable so the interface box can be pushed into the cabinet and dismantle the cable.

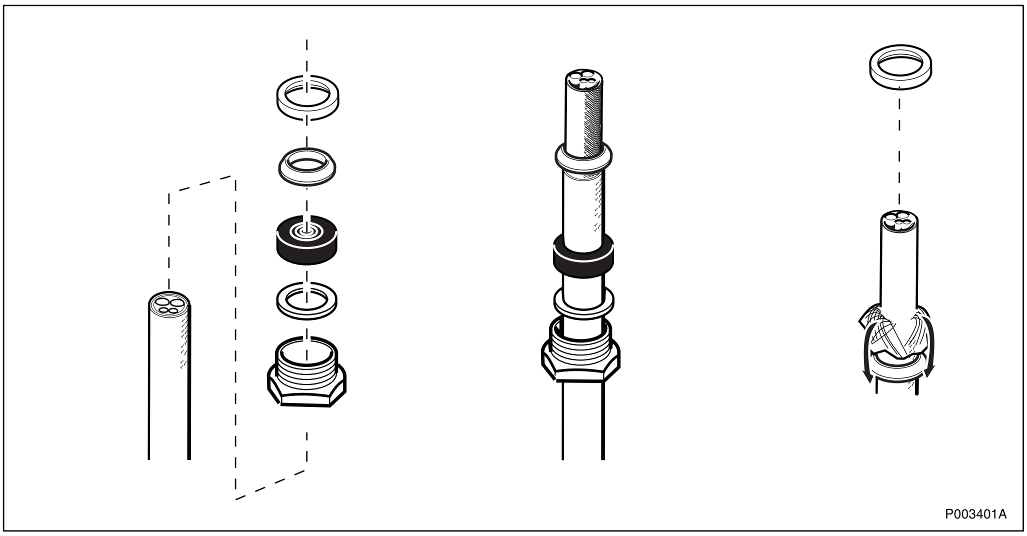

Figure 273 Mounting the cable inlet

2. Mount all cable inlet details, except for the last clamping cone.
3. Fold back the cable sheath.
4. Fit clamping cone over cable so that the cable sheath is squeezed between clamping ring and clamping cone.

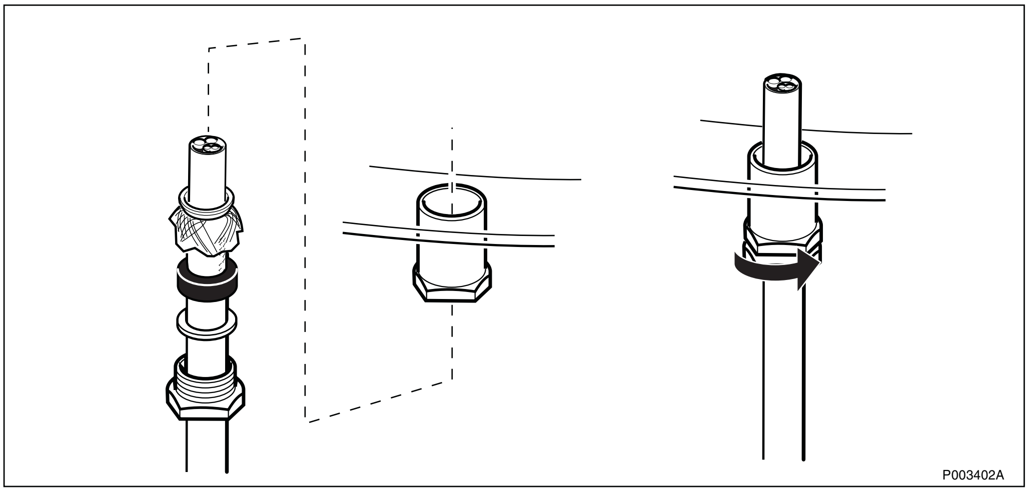

Figure 274 Mounting the cable inlet

5. Mount and tighten the cable inlet.

DANGER

⚠

Read Safety Instructions regarding handling and connecting batteries.

Note: Make sure the battery switch is in OFF position before working with the battery connection.

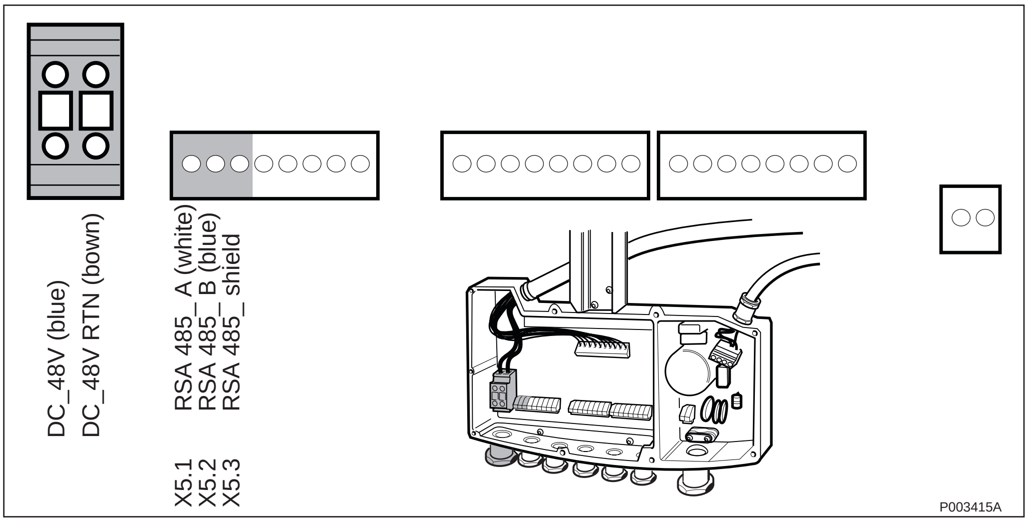

Figure 275 DC/Data termination block

6. Insert the cable wires in to the termination block.

8.5.4 Connecting the 24 V DC Power Supply Adapter

This is the procedure for connecting the PSA (Power Supply Adapter) 24 V DC backup to the radio cabinet. The cable (5 m) for the PSA is delivered with the PSA.

1. Route the cable so the interface box can be pushed into the cabinet.
2. Cut the cable to the appropriate length.
3. Dismantle the cable and mount the cable inlet, *see Figure 273 on page 227*.

DANGER

⚠

Read Safety Instructions regarding handling and connecting batteries.

Note: Make sure the battery switch is in OFF position before working with the battery connection.

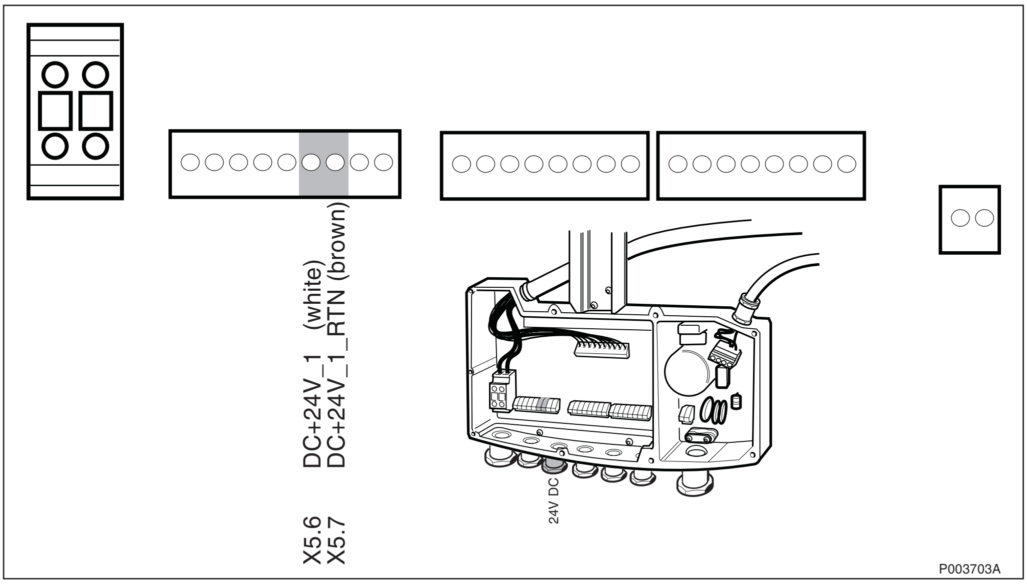

Figure 276 PSA termination block

4. Insert the cable wires in to the termination block.

8.5.5 Terminal X5.8 and X5.9

DC 24 V is present on this terminals.

DANGER

Read Safety Instructions regarding handling and connecting batteries.

Note: Make sure the battery switch is in OFF position before working with the battery connection.

8.5.6 Connecting the Alarm cable

Route the cable so the interface can be pushed into the cabinet.

1. Route the cable so the interface box can be pushed into the cabinet.
2. Cut the cable to the appropriate length.
3. Dismantle the cable and mount the cable inlet, *see Figure 273 on page 227*.

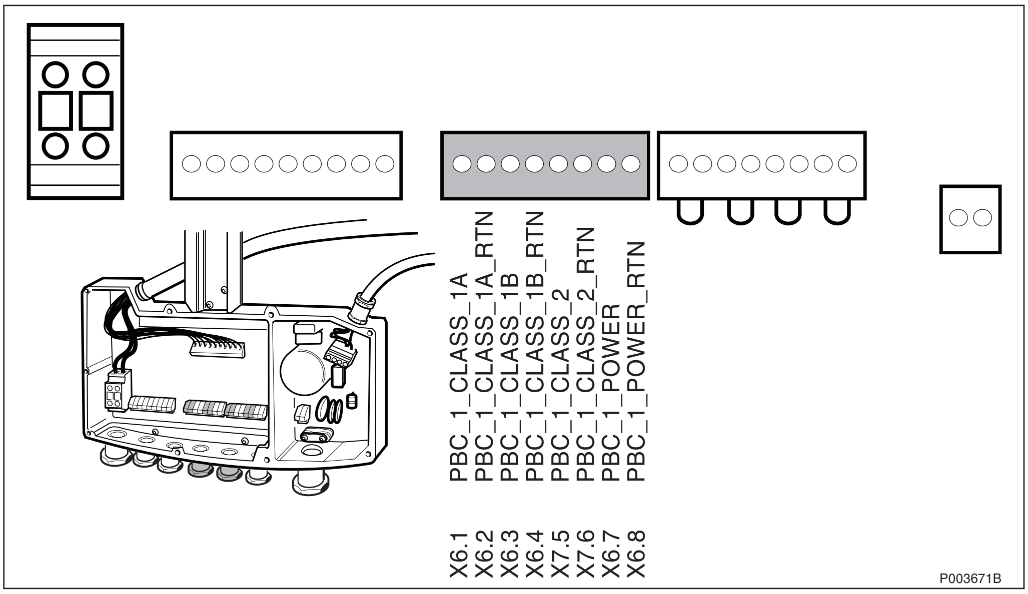

Figure 277 Alarm termination block

4. Insert the cable wires in to the termination block.

8.5.7 Connecting the Alarm cable 2 (Option)

If two PBCs are connected to the same RBS, the alarm from PBC 2 can be cascaded through PBC 1. That means the alarms from PBC 2 are connected to the PBC 1 and further to the RBS.

1. Route the cable so the interface box can be pushed into the cabinet.
2. Cut the cable to the appropriate length.
3. Dismantle the cable and mount the cable inlet, *see Figure 273 on page 227*.

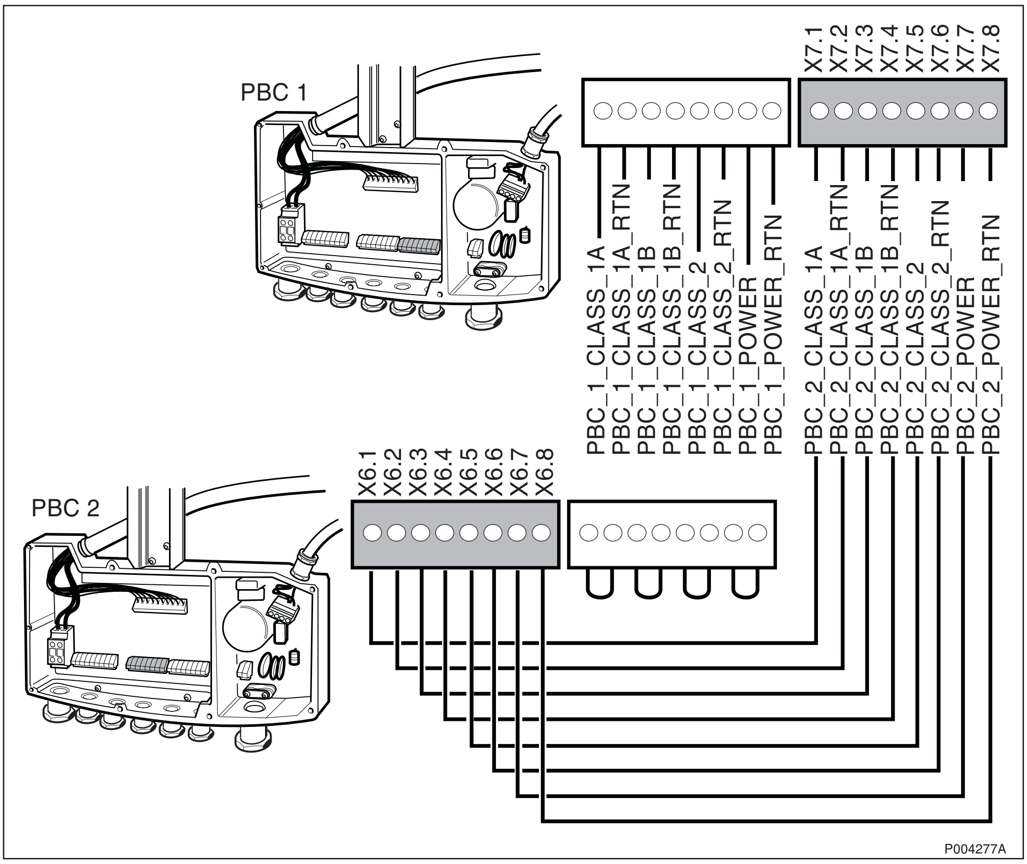

Figure 278 Alarm termination block PBC 2 to PBC 1 and further to the RBS

4. Insert the cable wires to the termination block.
5. If a third PBC is cascade connected, remove the termination jumpers from termination block X7 at PBC 2 and mount the termination jumpers at termination block X7 at PBC 3.
6. Mount the alarm wires from PBC 3 to PBC 2 the same way as picture above, *see Figure 278 on page 231*.

8.5.8 Connecting the –48 V DC to Radio Link equipment (Optional)

This is the procedure for connecting power supply to the optional radio link equipment. The PBC can supply –48 V DC to optional radio link.

1. Route the cable so the interface box can be pushed into the cabinet.
2. Cut the cable to the appropriate length.

3. Dismantle the cable and mount the cable inlet, *see Figure 273 on page 227*.

DANGER

Read Safety Instructions regarding handling and connecting batteries.

Note: Make sure the battery switch is in OFF position before working with the battery connection.

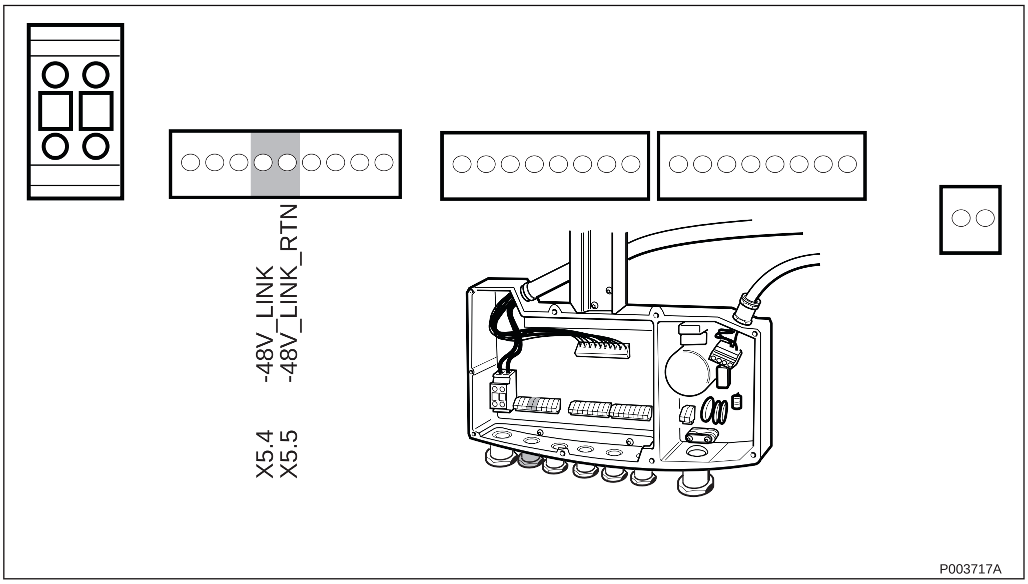

Figure 279 –48 V DC power supply to Radio Link equipment

4. Insert the cable wires in to the termination block.

8.6 Connecting the RBS 2302

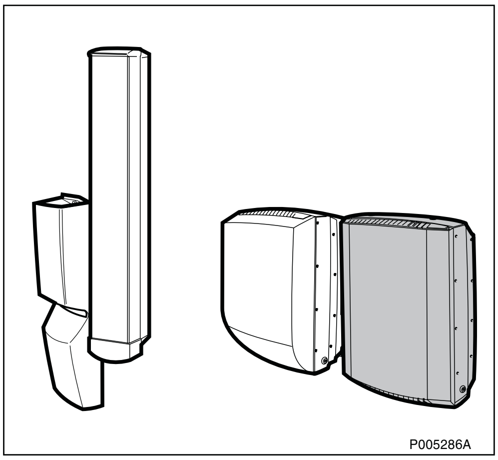

Figure 280 RBS 2302

This section describes the mounting of antenna connectors and connections to the PBC (alarm). This chapter also includes connection of PCM (Network) and the alarm cable to the BSC.

Before the connection procedure can begin the interface box has to be opened.

1. Loosen the screws securing the interface box placed underneath the RBS and pull down the interface box.

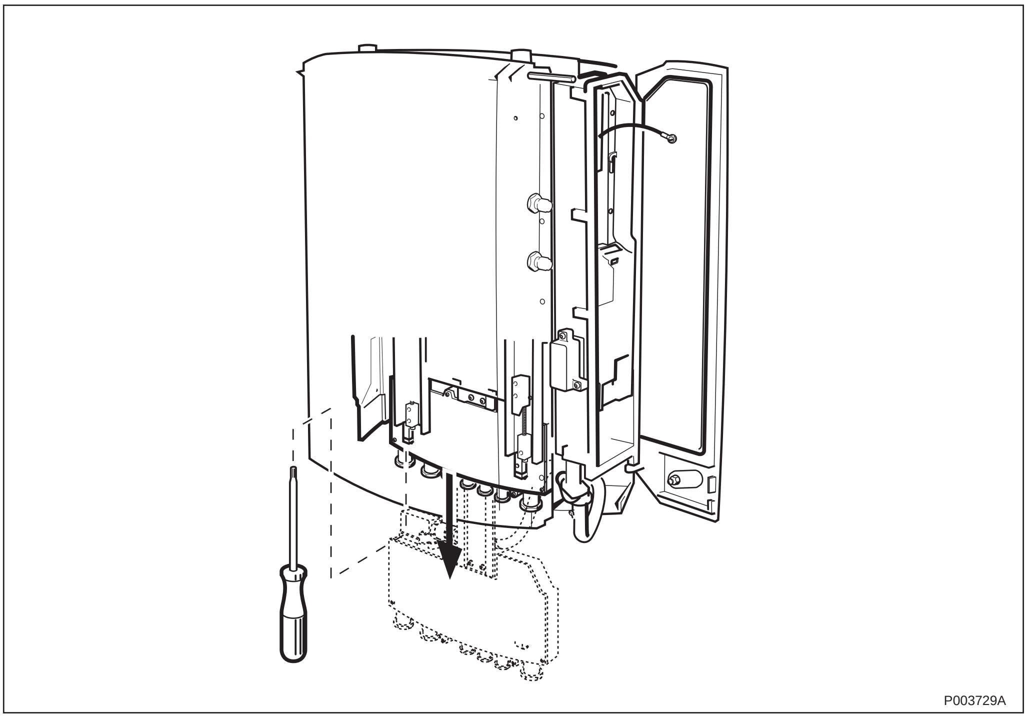

Figure 281 Pulling down the interface box

2. Unscrew the 8 torx screws on the interface box cover. Let the cover hang in the strap.

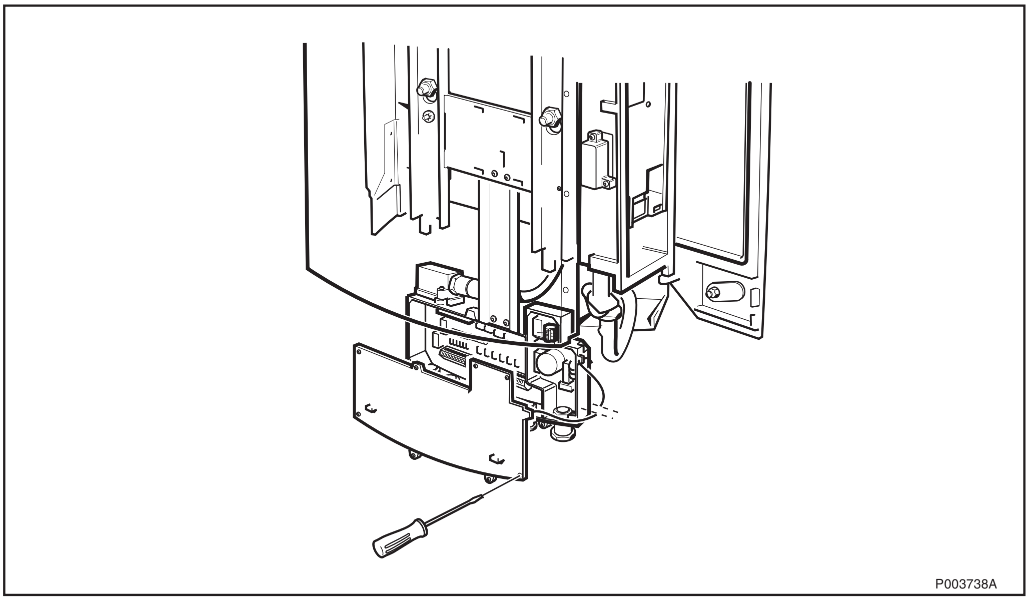

Figure 282 Loosen the interface box lid

8.6.1 Loosening the Interface Box Gland Plate

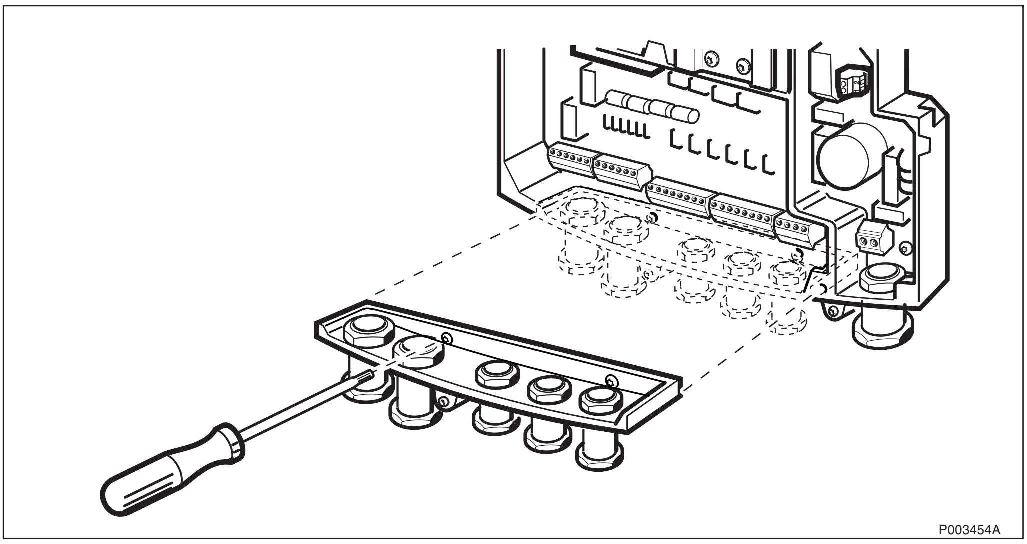

Figure 283 Loosening the gland plate

If the distance between the PBC and the radio cabinet is known as well as the estimated length of the cable, the termination block can be loosened together with the removable gland plate. It is easier to mount the cable inlet and the cable termination block at ground level instead of at a height, for example on a ladder.

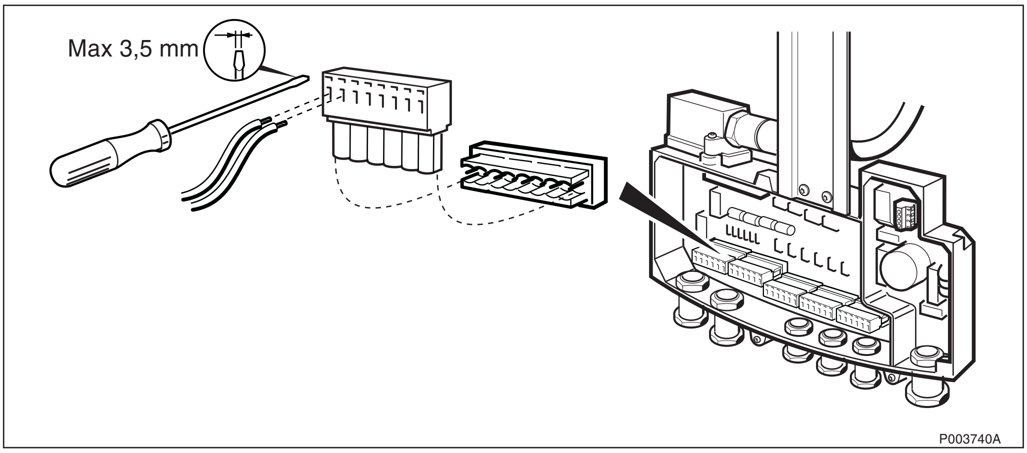

Figure 284 Loosening the termination block

8.6.2 Connecting the RBS to AC Mains

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

DANGER

Improper electrical installation may cause fire or electric shock. Approved circuit breakers for the AC mains and the cable’s cross sectional area must always be selected in accordance with local laws and regulations. Only a qualified and authorized electrician is permitted to install or modify the electrical installation.

The cable termination block for the AC cable cannot be mounted at ground level.

Note: Make sure the AC Mains is switched off before the AC installation procedure is begun.

To install the AC follow this procedure:

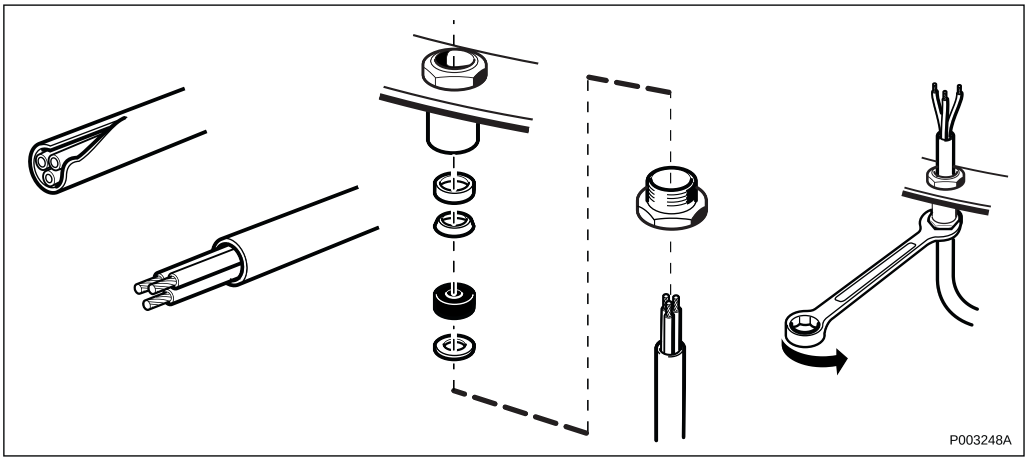

Figure 285 Mounting the cable inlet

1. Route the cable so the interface box can be pushed into the cabinet.
2. Cut the cable to the appropriate length.
3. Cut the cable isolation.

4. Mount the cable inlet, *see Figure 285 on page 235*.

If a flexible conduit is used, replace the AC mains cable inlet (feed trough) with the flexible conduit and its fastening device, *see Figure 270 on page 225*.

5. Adjust the sealing grommet to the cable diameter by peeling off the pre-cut layers.

Protective Earth

A reliable incoming Protective Earth must be connected to the earth terminal when connecting power supply.

The earth terminal is located in the interface box and indicated by PE and the earth symbol, *see Figure 286 on page 236*.

Figure 286 Earth symbol

The Protective Earth connection is essential.

Connecting AC

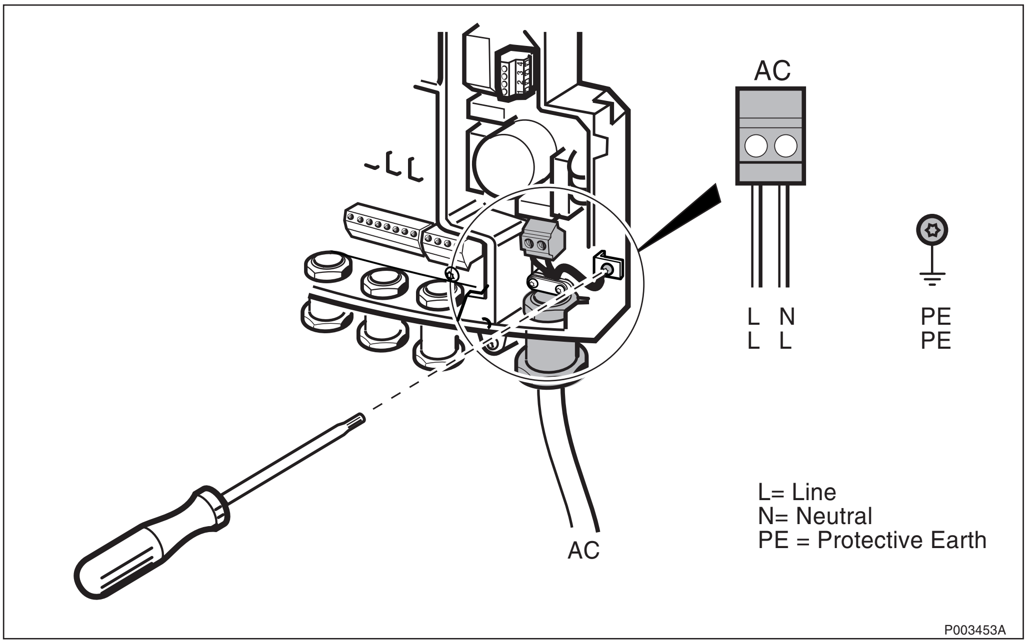

Figure 287 Connecting AC Mains Power

1. Connect the cable. Make sure the PE (Protective Earth) is properly connected and tightened.

8.6.3 Connecting the PCM A (twisted par 100 Ω and 120 Ω)

This is the procedure for connecting the PCM A cable.

1. Route the cable so the interface box can be pushed into the cabinet.

2. Dismantle the cable.

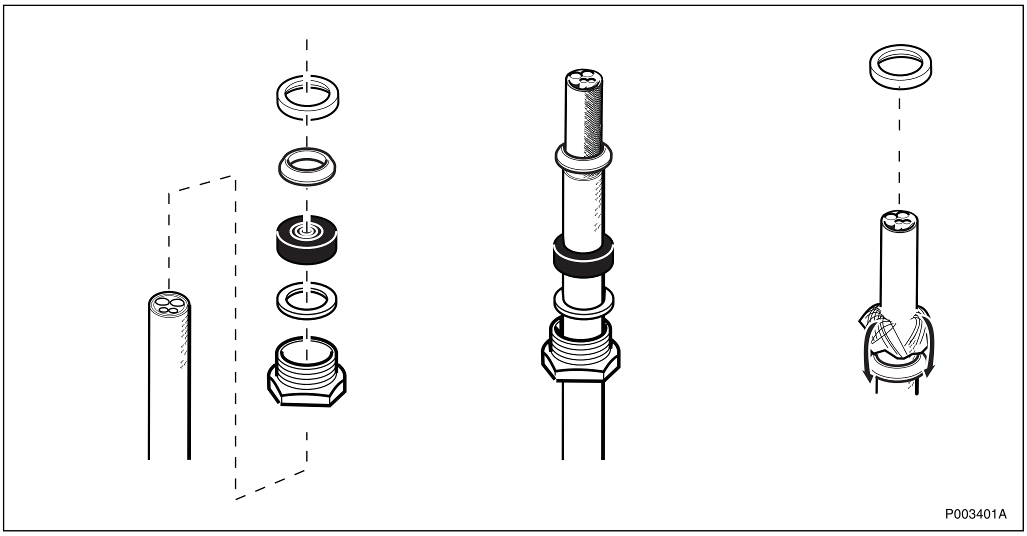

Figure 288 Earthing the cable inlet

3. Mount all cable inlet details except for the last clamping cone.
4. Fold back the cable sheath.
5. Fit the clamping cone over the cable so that the cable sheath is squeezed between the clamping ring and the clamping cone.

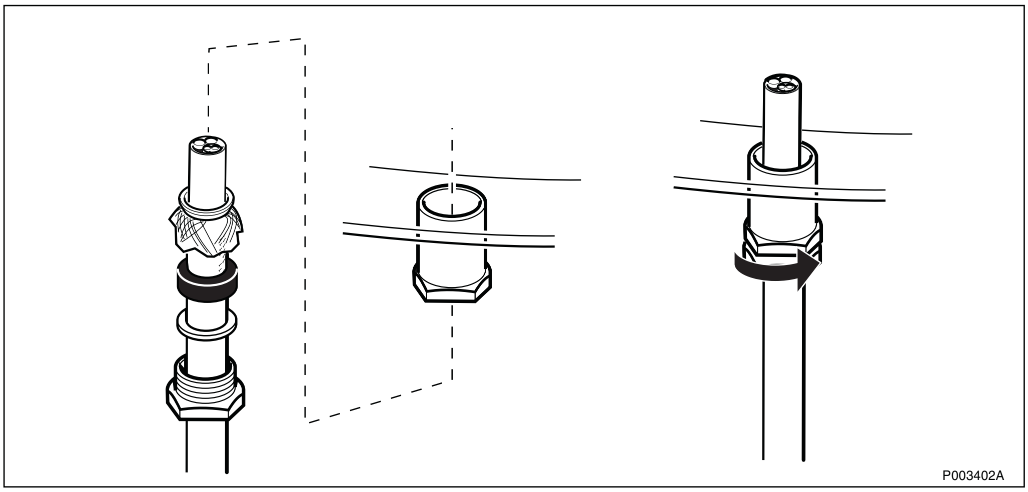

Figure 289 Mounting the cable inlet

6. Mount and tighten the cable inlet.

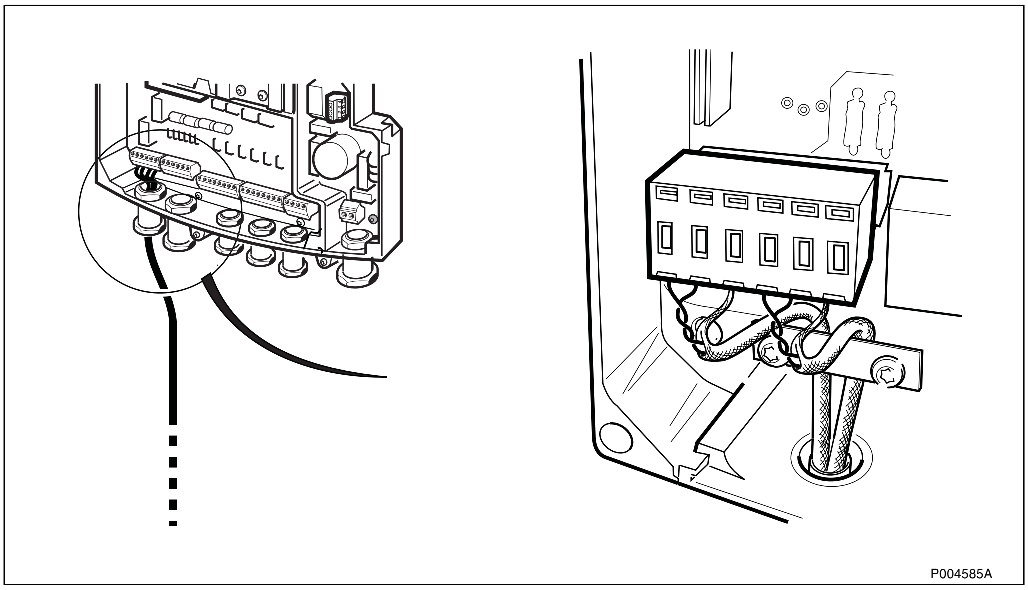

Figure 290 Principle of connecting twisted pair cable

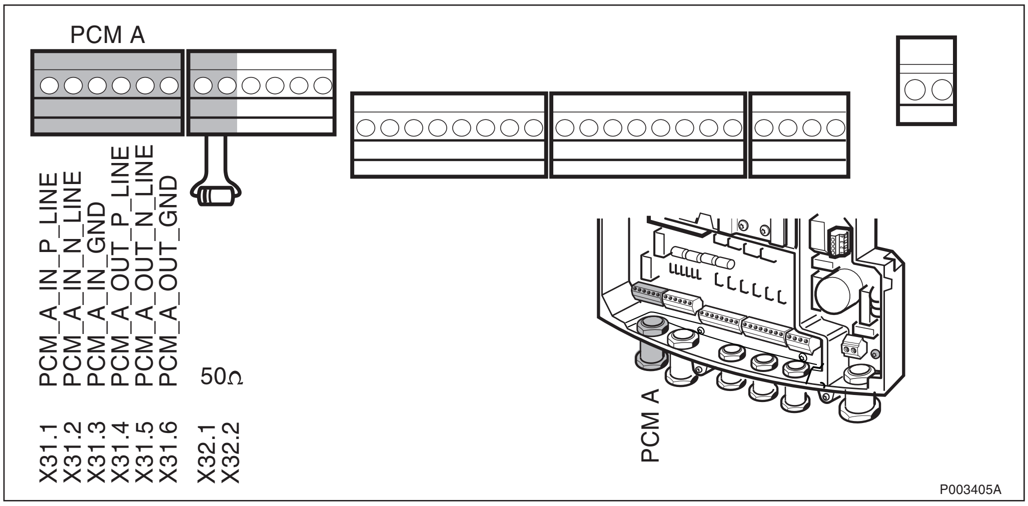

Figure 291 Connect the PCM A

7. Remove the jumper wire between X31.2 and X31.3, and the jumper wire between X31.5 and X31.6.

8. Mount the wires to the termination block.

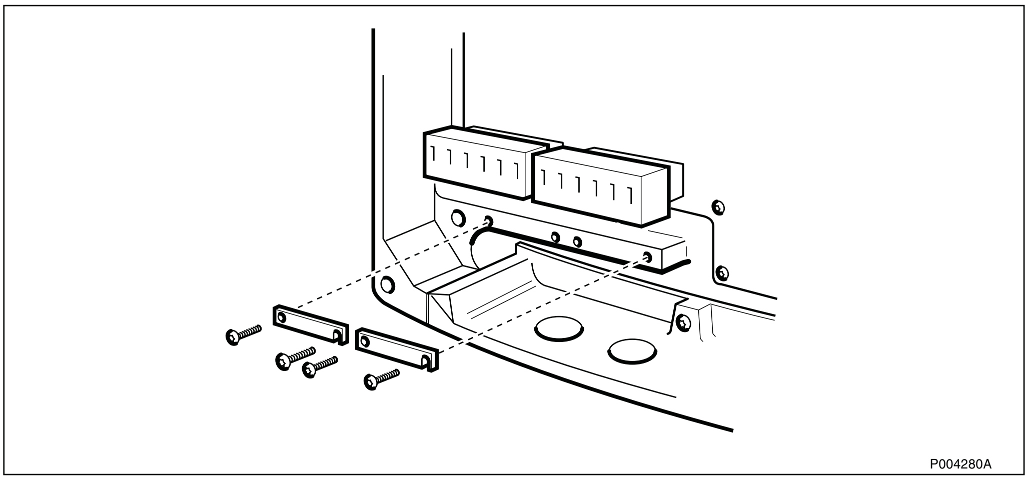

Figure 292 The PCM earthing connection

9. A pull-relief clamp (earth) is mounted between the cable inlet and the termination block. Place the cable underneath the washer and tighten, make sure the cable sheath has proper contact with the pull-relief clamp (earth).

Note: Due to the G-703 requirements the earth connection to the screen must be able to be opened, that means loosen the termination block connection X31.3. If the earth connection is opened the wire must be insulated so it will not come in contact with the termination block.

8.6.4 Connecting the PCM B (twisted par 100 Ω and 120 Ω) cascade connection

This is the procedure for connecting the PCM B cable, the PCM B is used for cascade connection of maximum five RBS 2302.

1. If the PCM B is used remove the termination resistor 50 Ω, between X32.1 and X32.2.
2. Route the cable so the interface box can be pushed into the cabinet.
3. Cut the cable to the appropriate length.
4. Dismantle the network PCM cable and mount the cable inlet, *see Figure 288 on page 237*.
5. See the *Figure 290 on page 238* to see the principle of connecting the twisted pair cable.

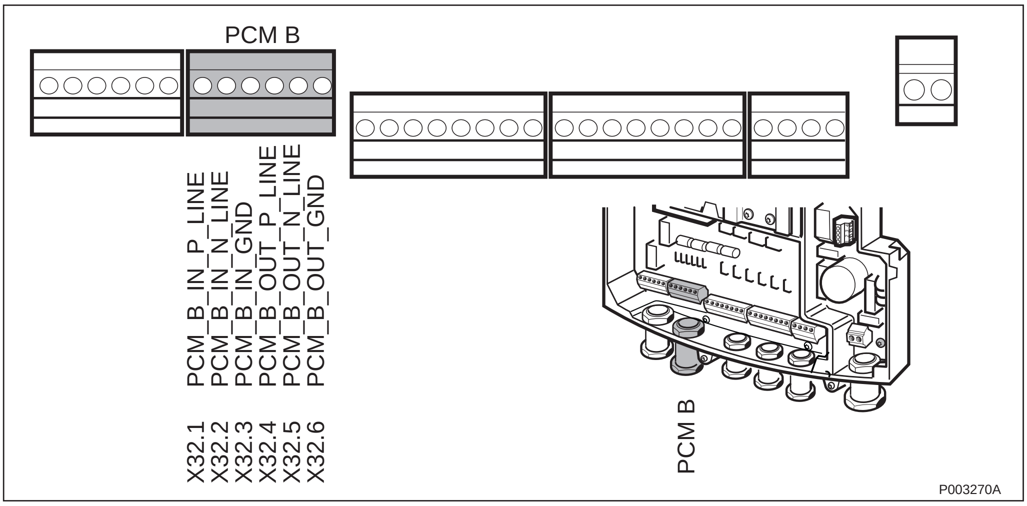

Figure 293 Connecting PCM B to the termination block (Cascade connection)

6. Remove the jumper wire between X32.2 and X32.3, and the jumper wire between X32.5 and X32.6.
7. Mount the wires to the termination block.
8. A pull-relief clamp (earth) is mounted between the cable inlet and the termination block. Place the cable underneath the washer and tighten, make sure the cable sheath has proper contact with the pull-relief clamp (earth), *see Figure 292 on page 239*.

Note: Due to the G-703 requirements the earth connection to the screen must be able to be opened, that means loosen the termination block connection X32.3. If the earth connection is opened the wire must be insulated so it will not come in contact with the termination block.

8.6.5 Connecting the PCM A (coaxial 75 Ω)

The connection cable for 75 Ω coaxial cable (RPM 518 974/1+) is delivered with the radio cabinet. the cable inlet is premounted so the only installation is to connect the termination block.

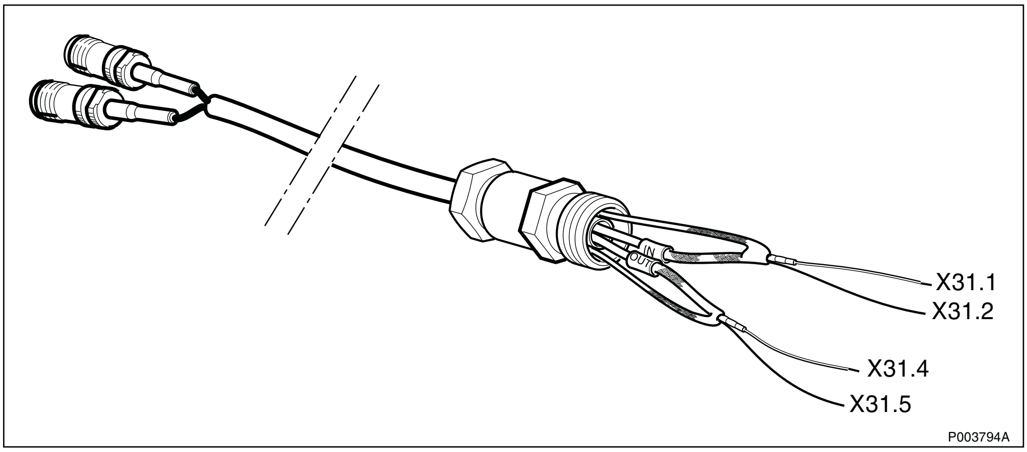

Figure 294 75 Ω PCM cable

1. Remove the old cable inlet from the interface box.

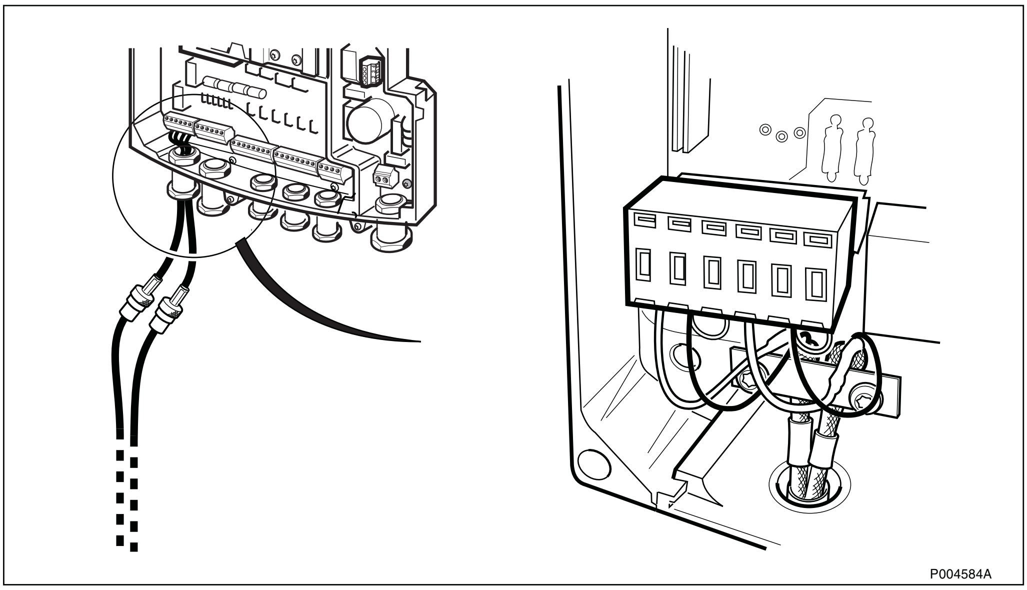

Figure 295 Principle of connecting coaxial PCM cable

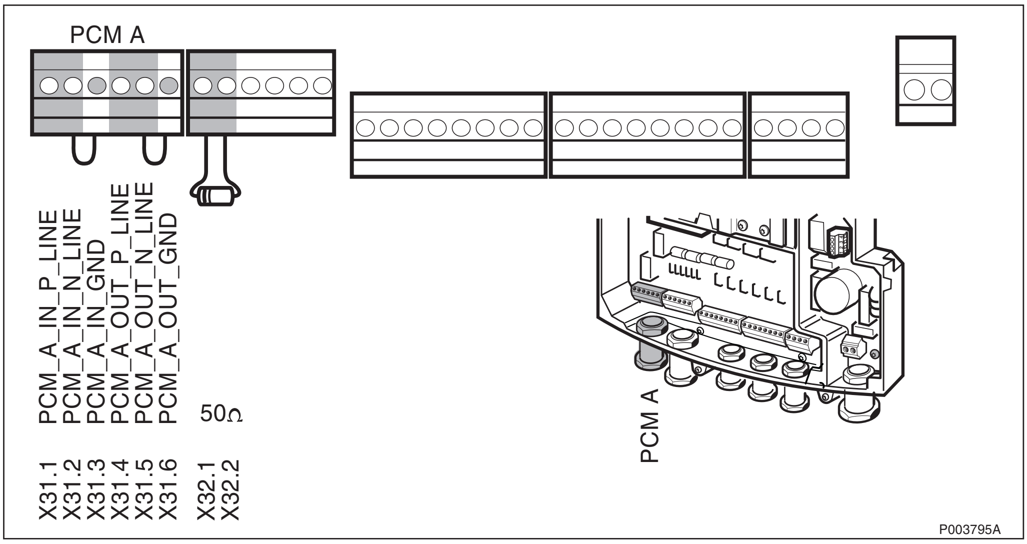

Figure 296 Connecting the 75 Ω PCM cable to the termination block

2. Tighten the cable inlet and connect the cables to the termination block.

Note: The PCM_A_IN_N_LINE and the PCM_A_OUT_N_LINE are the black wires.

Note: Ensure the cable marking “IN” and “OUT” is at the right position at the termination block.

3. A pull-relief clamp (earth) is mounted between the cable inlet and the termination block. Place the cable underneath the washer and tighten, make sure the cable sheath has proper contact with the pull-relief clamp (earth), *see Figure 292 on page 239*.

4. Make sure that a jumper wire is connected between X31.2 and X31.3. Make sure that another jumper wire is connected between X31.5 and X31.6, *see Figure 296 on page 241*.

8.6.6 Connecting the PCM B (coaxial 75 Ω) cascade connection

The connection cable for 75 Ω coaxial cable (RPM 518 974/1+) is delivered with the radio cabinet. the cable inlet is premounted so the only installation is to connect the termination block.

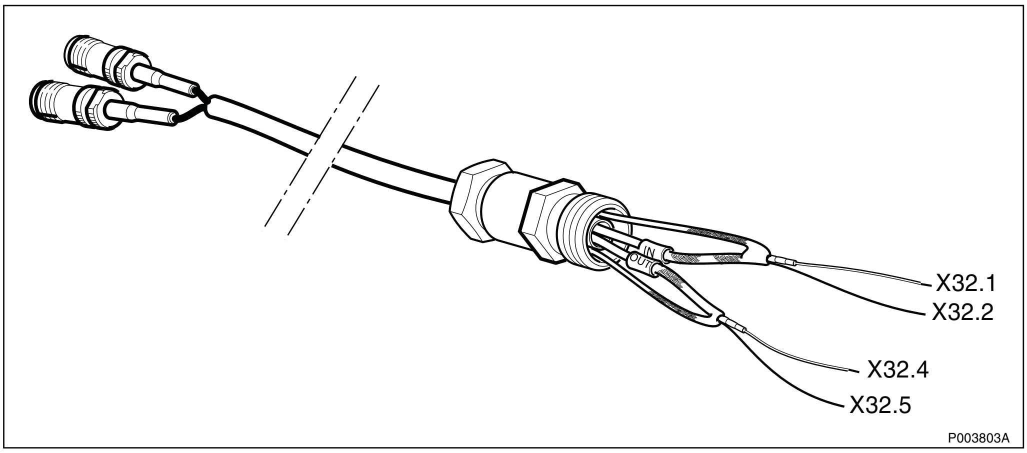

Figure 297 75 Ω PCM cable

1. If the PCM B is used remove the termination resistor 50 Ω.
2. Remove the old cable inlet from the interface box.
3. See the *Figure 295 on page 241* to see the principle of connecting coaxial PCM cable.

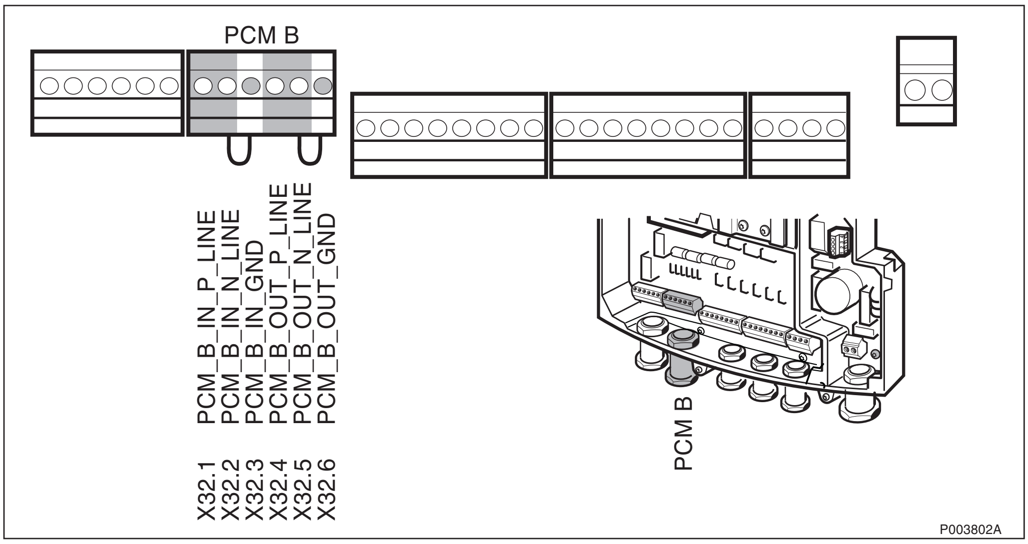

Figure 298 Connecting the 75 Ω PCM cable to the termination block (Cascade connection)

4. Tighten the cable inlet and connect the cables to the termination block.

Note: The PCM_B_IN_N_LINE and PCM_B_OUT_N_LINE are the black wires.

Note: Ensure the cable marking “IN” and “OUT” is at the right position at the termination block.

5. A pull-relief clamp (earth) is mounted between the cable inlet and the termination block. Place the cable underneath the washer and tighten, make sure the cable sheath has proper contact with the pull-relief clamp (earth), *see Figure 292 on page 239*.

6. Make sure that a jumper wire is connected between X32.2 and X32.3. Make sure that another jumper wire is connected between X32.5 and X32.6, *see Figure 298 on page 242*.

8.6.7 Connecting the PCM cable (coaxial) to the incoming PCM line

Connect the PCM cable connector, type TNC to the incoming PCM line. Seal the connector, *see page 219*.

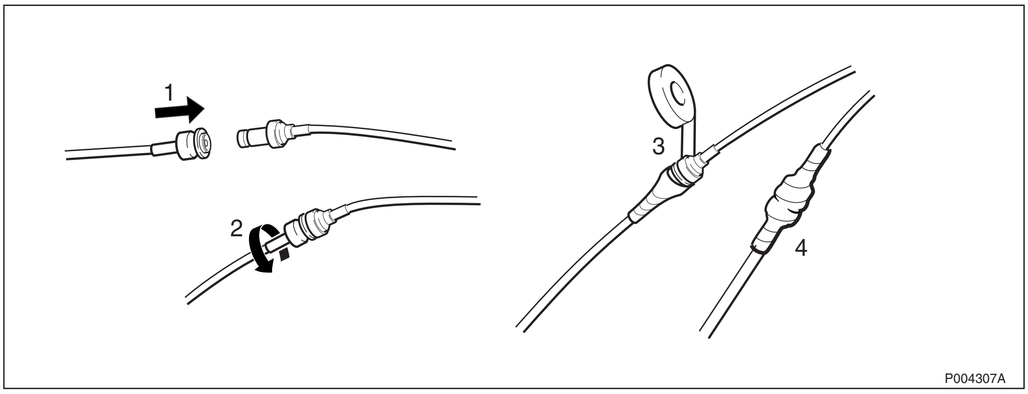

Figure 299 Connecting the and sealing the TNC connector for the PCM 75 Ω cable

8.6.8 HDSL (Optional)

For information regarding the mounting of the HDSL modem *see chapter Installation of RBS 2302*.

Definitions

Upstream	Connection from BSC or RBS
Downstream	Connection to next RBS

Connections to the Interface Box of the RBS 2302

Due to the configuration of the HDSL-modem, *see chapter Site Installation Tests*, the connections to the interface box to the RBS 2302 described in the following sections are possible.

HDSL Upstream, One Pair, Stand-Alone, Point-to-Point

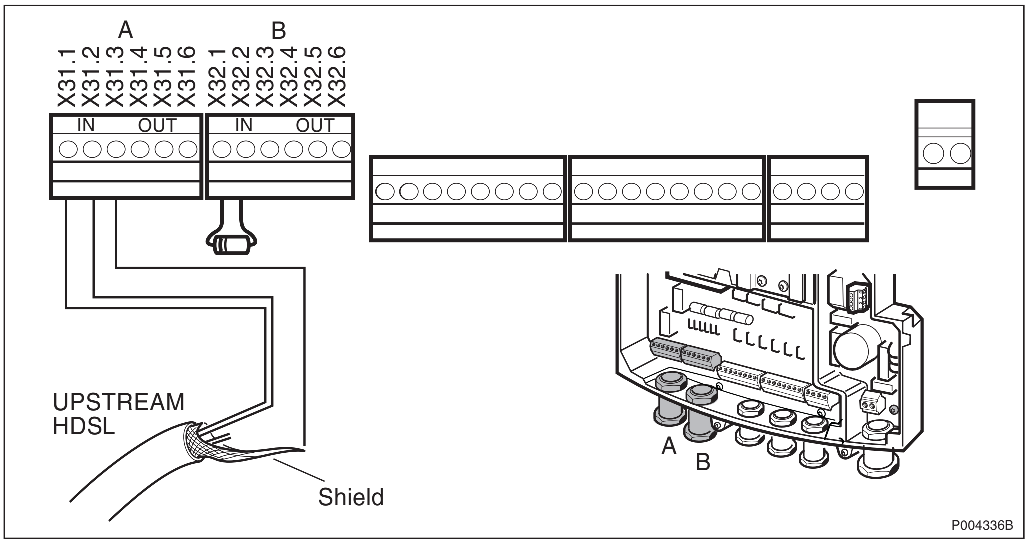

Figure 300

The pair is connected to the PCM A IN, i.e. X31.1 and X31.2.

Shield, if available, is connected to X31.3 (ground connection).

HDSL Upstream, Two Pairs, Stand-Alone, Point-to-Point

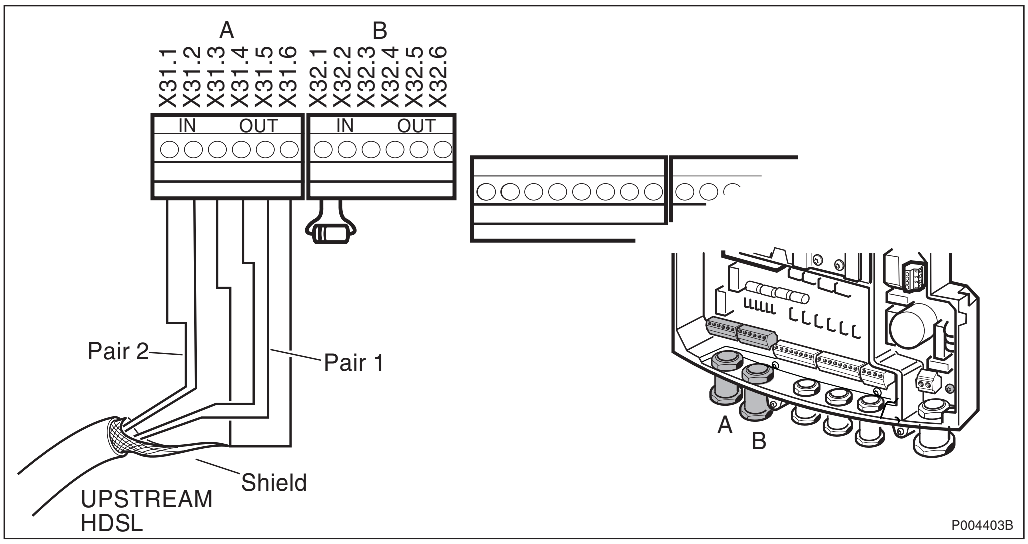

Figure 301

One pair is connected to the PCM A IN, i.e. X31.1 and X31.2.

One pair is connected to the PCM A OUT, i.e. X 31.4 and X31.5.

Shield, if available, is connected to X31.3 and X31.6 respectively (ground connections).

HDSL Cascading (Upstream One Pair, Downstream One Pair)

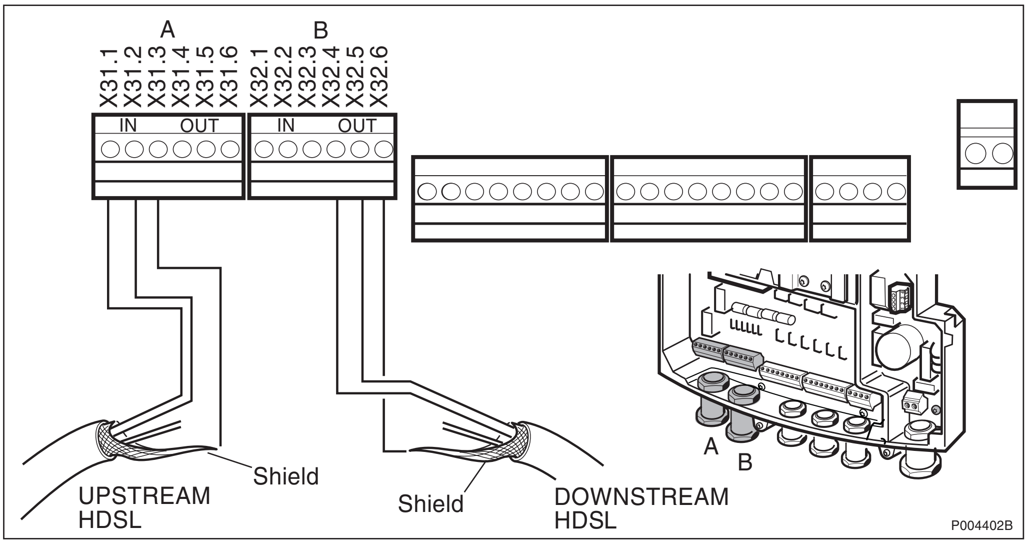

Figure 302

Upstream pair is connected to the PCM A IN, i.e. X31.1 and X31.2.

Shield, if available, is connected to X31.3 (ground connection).

Downstream pair is connected to the PCM B OUT, i.e. X32.4 and X32.5.

Shield, if available, is connected to X32.6 (ground connection).

PCM Upstream, HDSL Downstream, One Pair

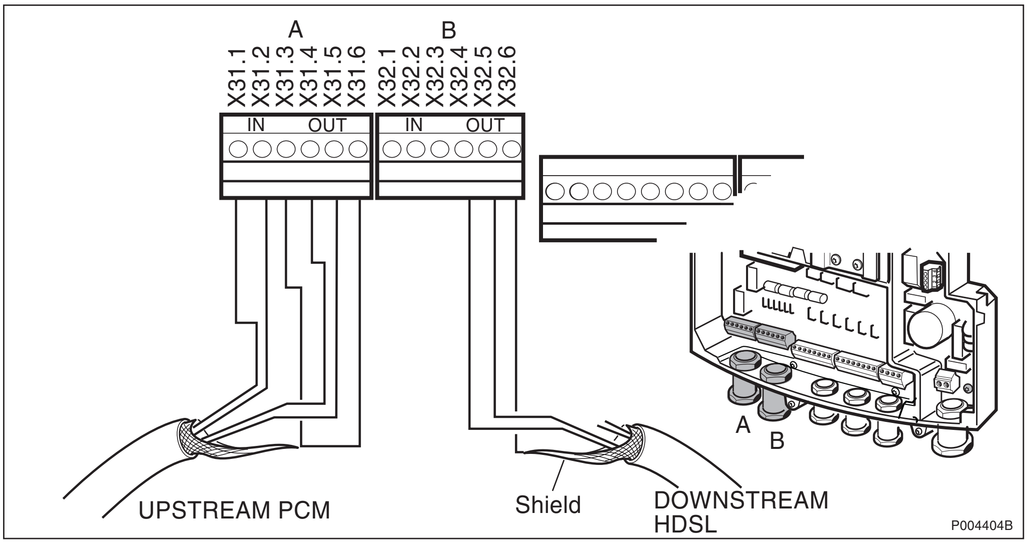

Figure 303

The HDSL-pair is connected to the PCM B OUT, i.e. X32.4 and X32.5.

Shield, if available, is connected to X32.6 (ground connection).

PCM Upstream, HDSL Downstream, Two Pairs

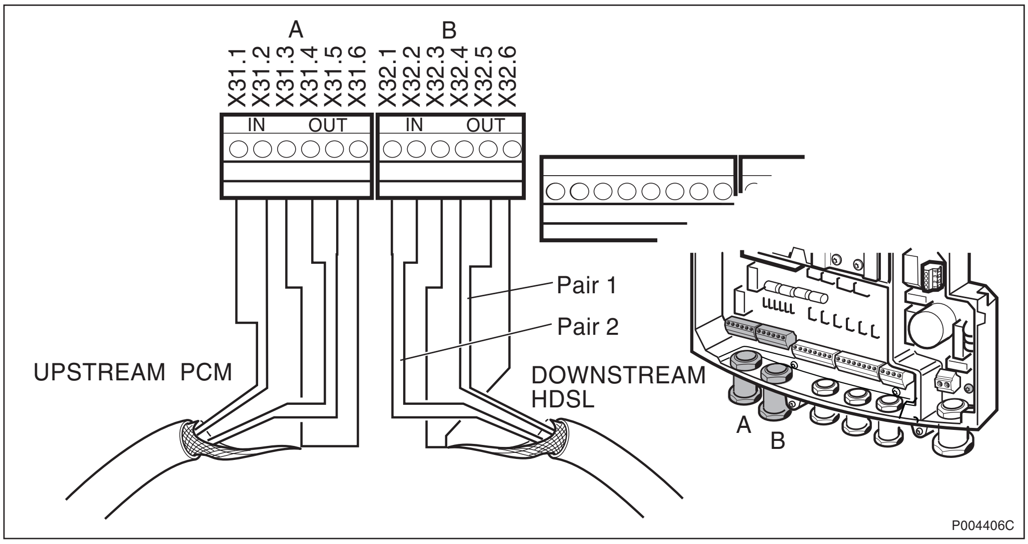

Figure 304

One HDSL-pair is connected to the PCM B IN, i.e. X32.1 and X32.2.

One HDSL-pair is connected to the PCM B OUT, i.e. X32.4 and X32.5.

Shield, if available, is connected to X32.3 and X32.6 (ground connections).

HDSL Upstream, One pair, PCM Downstream

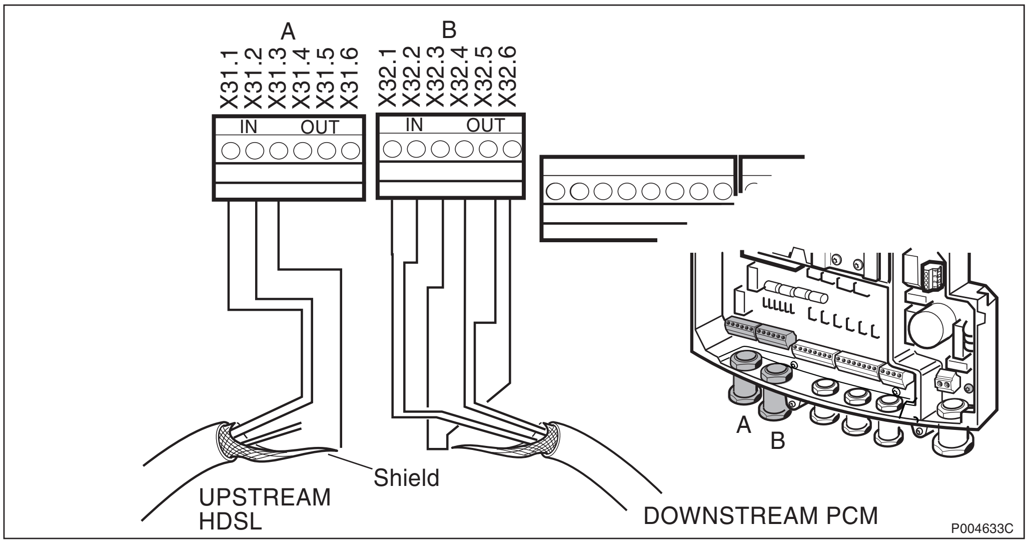

Figure 305

One HDSL-pair is connected to the PCM A IN, i.e. X31.1 and X31.2.

Shield, if available, is connected to X31.3 and X31.6 (ground connections).

HDSL Upstream, Two Pairs, PCM Downstream

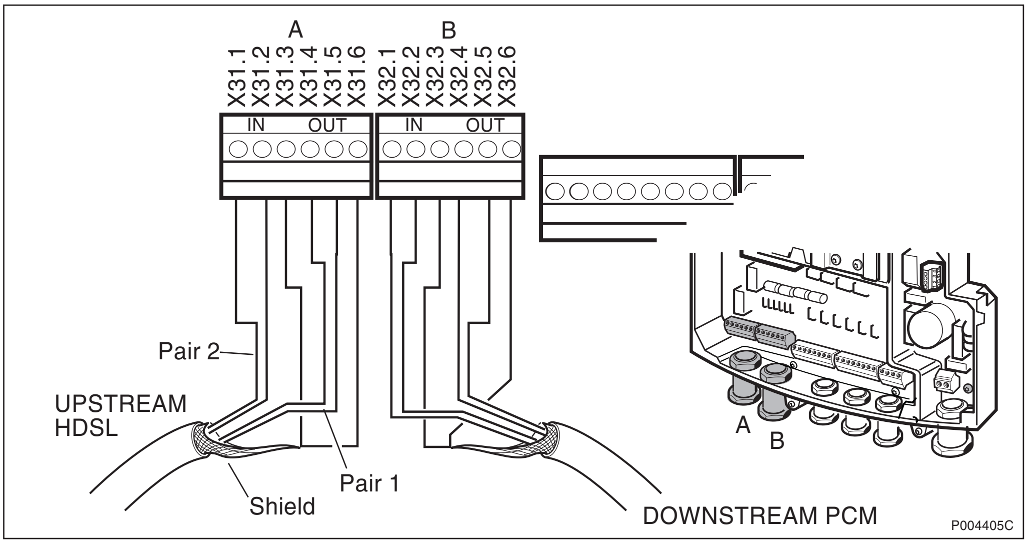

Figure 306

One HDSL-pair is connected to the PCM A IN, i.e. X31.1 and X31.2.

One HDSL-pair is connected to the PCM A OUT, i.e. X31.4 and X31.5.

Shield, if available, is connected to X31.3 and X31.6 (ground connections).

External Alarms of the RBS 2302 Used by the HDSL Modem Module

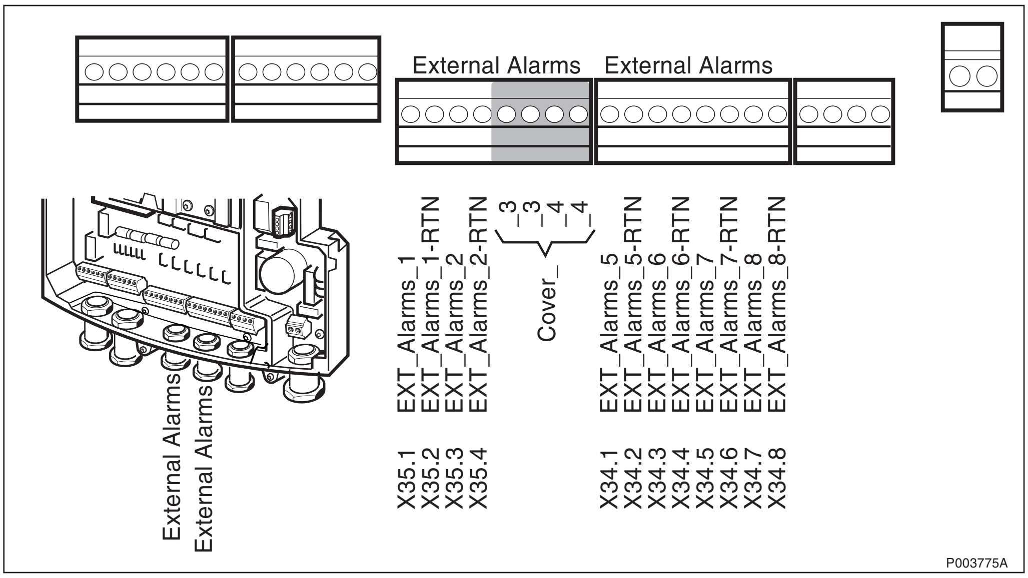

Figure 307 Covering of External Alarms

If the HDSL modem uses the RBS 2302 external alarms the number of customer available external alarms will be reduced by two.

1. If in use, disconnect the external alarms number 3 and 4.
2. Place a cover label to the termination block, position 3 and 4 to prevent other usage for these external alarms.

8.6.9 Connecting The external Alarms cable

The RBS 2302 has eight external alarm inputs. Four of the eight alarm inputs are reserved for the PBC. The alarm inputs are numbered from 1 to 8 on the RBS transmission board and it is up to the installation engineer to decide which inputs to use since they are defined in the IDB with the OMT. It is recommended to be consistent and use the same inputs for the PBC alarms for example 5 to 8 to simplify the installation and maintenance procedure.

The alarm cable has to be earthed by the cable inlet *see Figure 288 on page 237*.

1. Route the cable so the interface can be pushed into the cabinet.
2. Cut the cable to the appropriate length.
3. Dismantle the Alarm cable and mount the cable inlet, *see Figure 288 on page 237*.

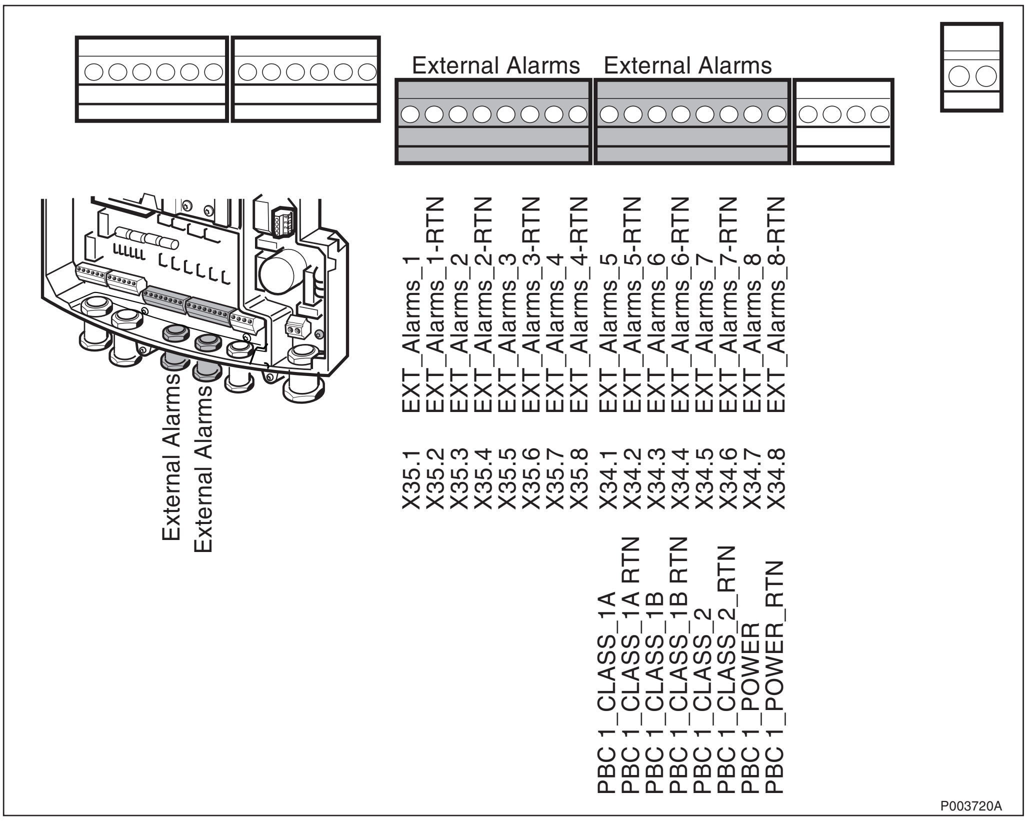

Figure 308 Examples of alarm input configurations

4. Mount the wires to the termination block.

8.6.10 Connecting the Extended OMT cable (optional)

The extended OMT is an option. With the extended OMT cable the RBS can be accessed without having to climb a ladder, if the RBS is mounted on a pole or mast.

1. Route the cable so the interface box can be pushed into the cabinet.
2. Cut the cable to the appropriate length.

3. Dismantle the extended OMT cable and mount the cable inlet, *see Figure 288 on page 237*.

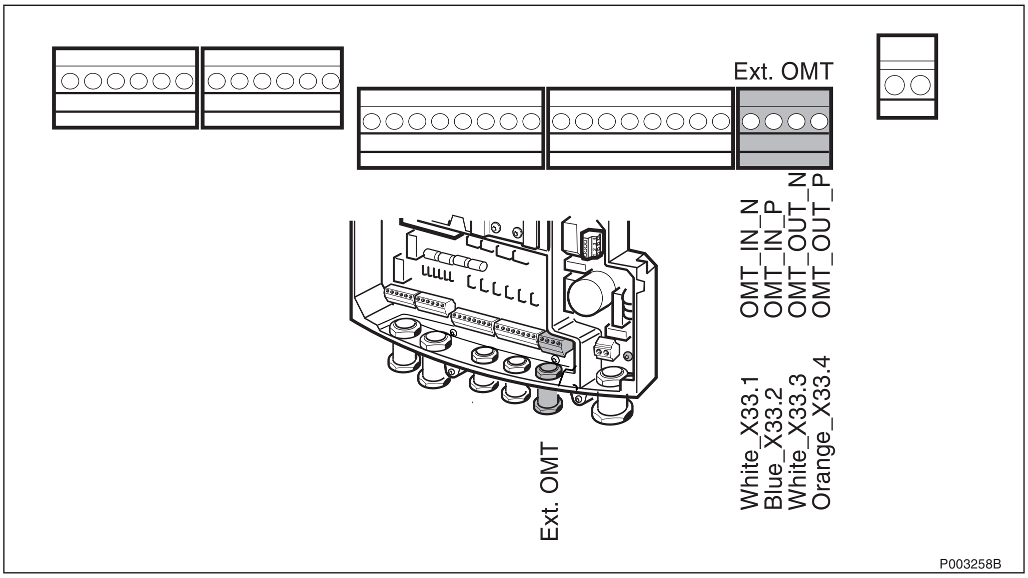

Figure 309 Extended OMT termination board (option)

4. Mount the wires to the termination block.

Note: The two white wires are from two different twin pairs and should not be mixed.

8.6.11 Installing the Antenna Cables

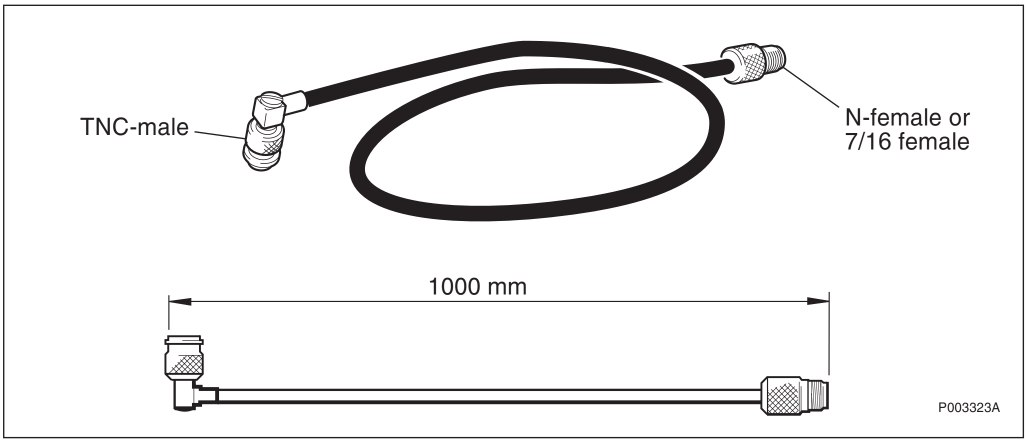

Figure 310 Recommended Antenna jumper cable

The area underneath the sunshield is narrow so the antenna connection to the cabinet requires an antenna jumper, *see Figure 310 on page 249*. The recommended antenna jumper with N connectors is RPM 11987/1. The recommended antenna jumper with 7/16 connectors is RPM 11987/2.

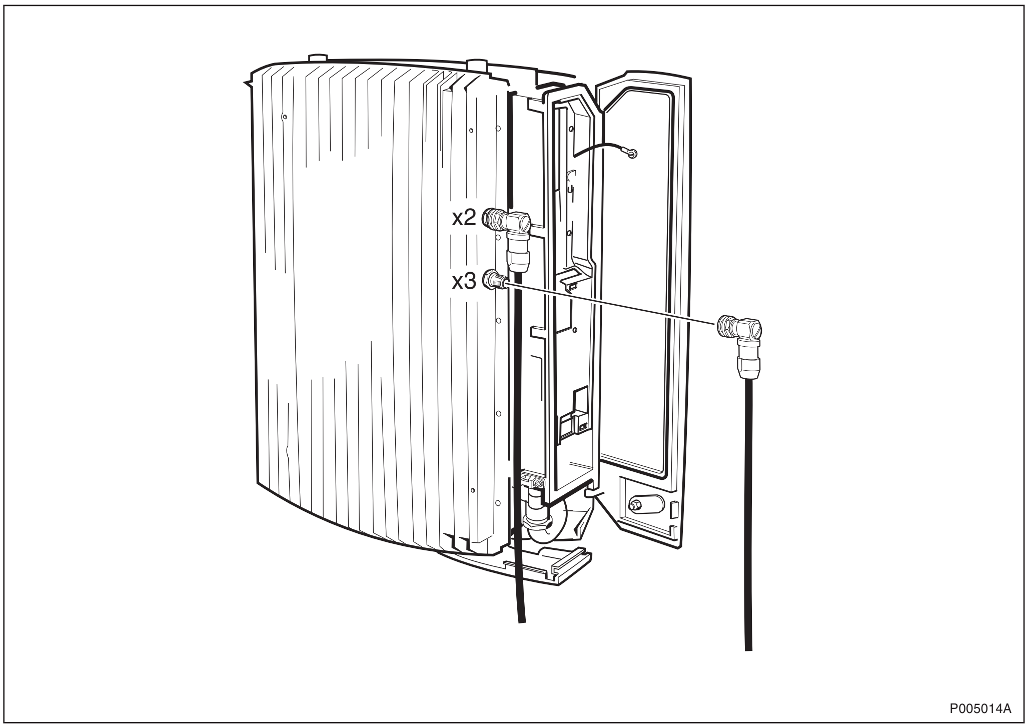

Figure 311 Connecting the antenna jumper cable to the RBS

For the sake of clarity the cabinet is shown without the sunshields.

1. Connect the antenna jumper cable to the connector labeled X2 on the RBS. The tightening of the nut will be done later.

2. Connect the antenna jumper cable to the connector labeled X3 on the RBS. The tightening of the nut will be done later.

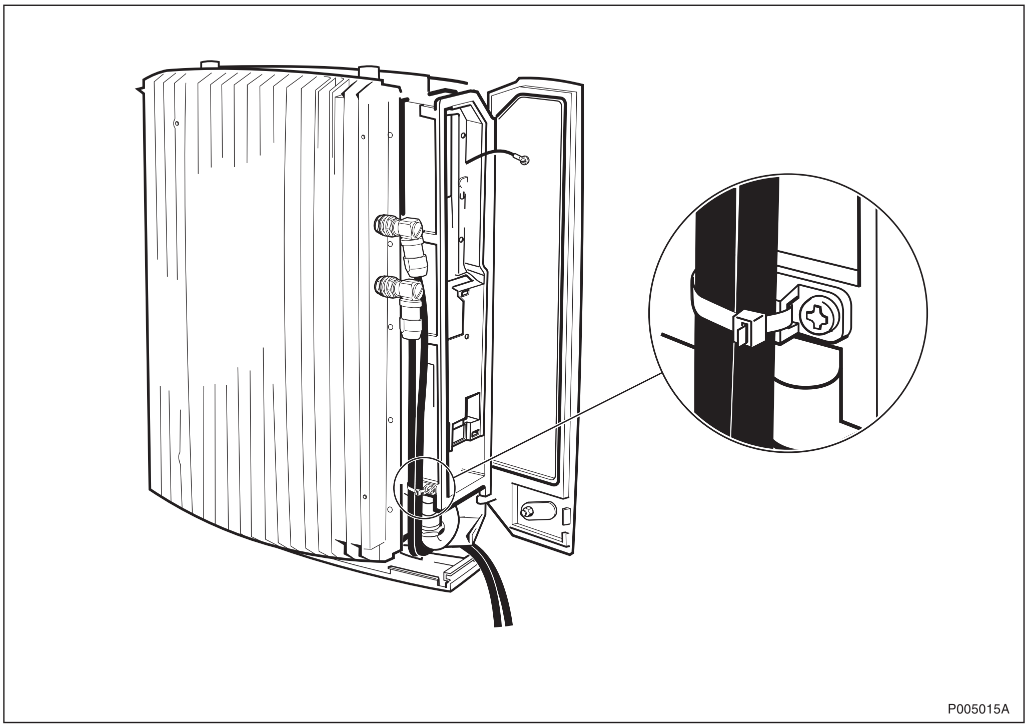

Figure 312 Installation of jumper cable

3. Route the antenna jumper between the lower sunshield and the mounting base, and strap the cable according to *Figure 312 on page 250*.

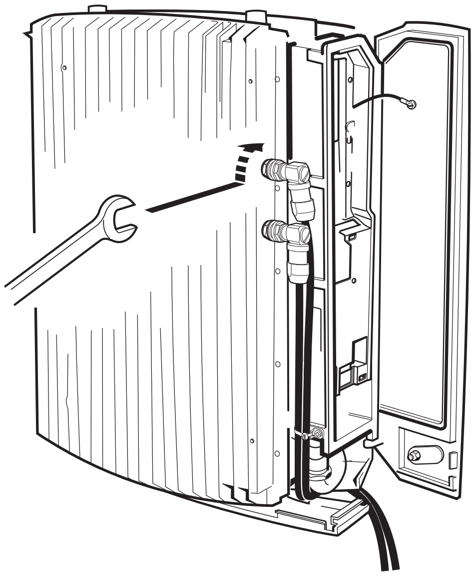

Figure 313 Tightening of the nuts for the connectors

4. Tighten the nuts for the connectors X2 and X3 on the RBS, according to the figure above.

5. Connect the feeder cable from the CEU marked DX1 to the jumper cable connected to X2 on the RBS.

6. Connect the feeder cable from the CEU marked DX2 to the jumper cable connected to X3 on the RBS.

7. Seal the connection from the jumper cable to the antenna feeder, after that the antenna cables are tested in *chapter Site Installation Tests*. *See page 219*.

8.7 4 and 6 TRX Configuration (Optional)

The Maxite configuration can supply an extension for both 4 and 6 TRX configuration. That means one or two additional RBSs. This is done to increase radio capacity. The PCM cable is connected to the Master radio cabinet. By a TXL-bus cable the Master radio cabinet is connected to the extension cabinet 1. For the 6 TRX configuration a second extension cabinet (extension cabinet 2) is connected. The length of the TXL-bus cable is 5 meters for the 4 TRX configuration and 5+5 meters for the 6 TRX configuration.

The RBS to PBC and AAU/CEU cabling for extension cabinet 1 and cabinet 2 is the same as for the basic Maxite cabling configuration. Four external alarms can be connected for each extension radio cabinet.

Follow this procedure to connect the TXL-bus cable.

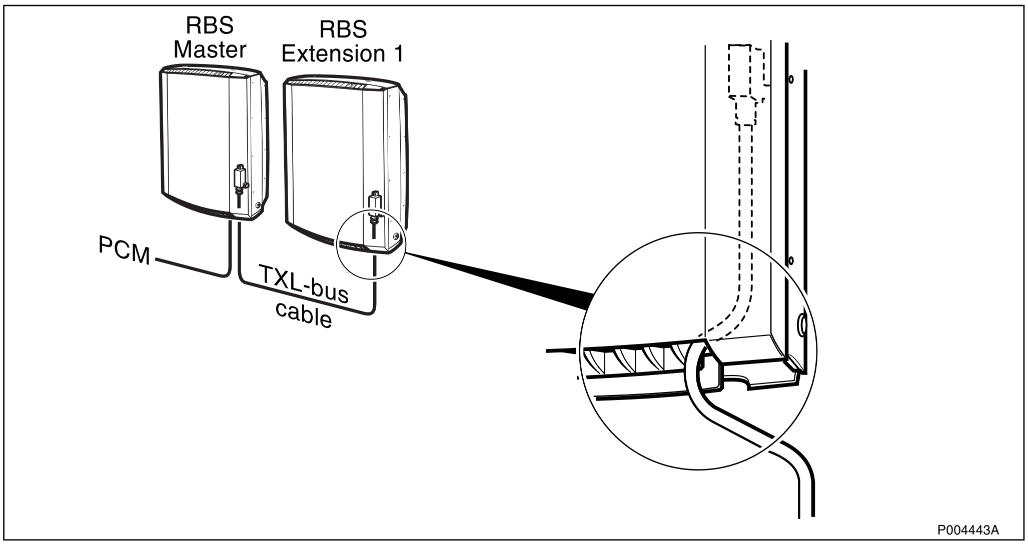

Figure 314 TXL-bus connection for 4 TRX configuration

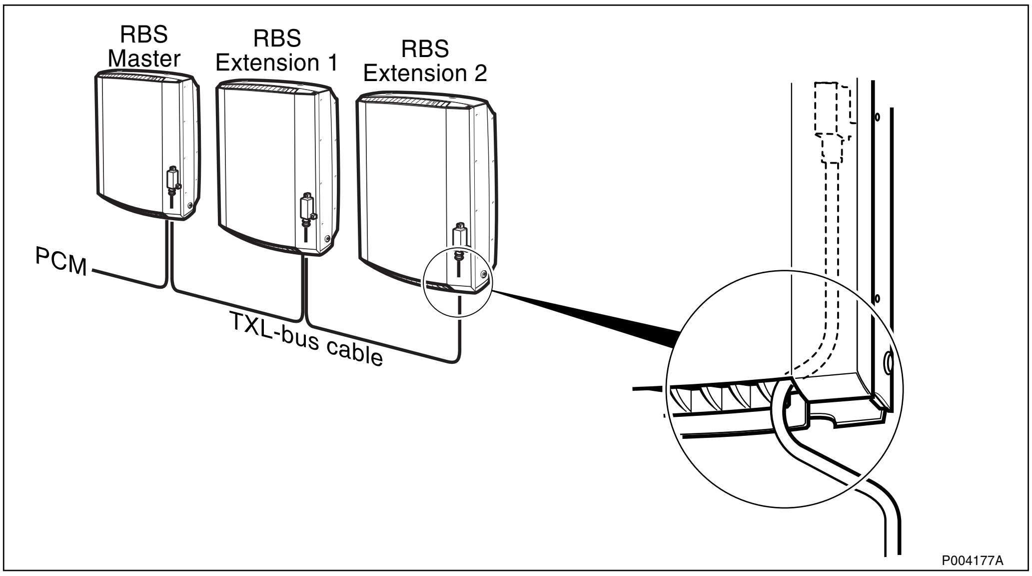

Figure 315 TXL-bus connection for 6 TRX configuration

1. Open the installation box door.
2. Open the front sunshield.
3. Remove the protection cap from the D-sub connector at the Master RBS.
4. Connect the TXL-bus cable connector marked Master to the RBS D-sub connector and secure the connection cover with two screws.
5. Pull out the cable at the frontside between the front sunshield and the first cooling flange (from right when facing the cabinet).
6. Route the cable to the next radio cabinet (Extension cabinet 1).
7. Route the cable between the front sunshield and the first cooling flange, into the Extension cabinet 1 and remove the protection cap from the D-sub connector.

8. Connect the TXL-bus cable connector marked RBS EXT 1, to the RBS D-sub connector and secure the connection cover with two screws.

   If 4 TRX configuration is used, continue to step 13.

   If 6 TRX configuration is used, continue with the instructions below to connect the Extension cabinet 2.

The 6 TRX cable have two cables attached to the D-sub connector marked RBS EXT 1.

9. Pull out the cable at the frontside between the front sunshield and the first cooling flange.

10. Route the cable to next cabinet (Extension cabinet 2).

11. Route the cable between the front sunshield and the first cooling flange, into the Extension cabinet 2 and remove the protection cap from the D-sub connector.

12. Connect the TXL-bus cable connector marked RBS EXT 2, to the RBS D-sub connector and secure the connection cover with two screws.

13. Fasten all front sunshields and close all installation box doors.

8.8 Before Leaving the Site

This section describes the concluding routines, cleaning up the site, removing all cable wrappings etc. Close the interface box cover and push the interface box upwards and secure the interface box with 2 screws. Remount the sunshields if any of them where removed.

The Site Installation Test should follow directly after the completion of the Installation of External Cables. Otherwise, the person responsible for the installation must see to that the equipment inside the cabinet is not subject to harmful climate conditions and contact the supervisor.

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9 Site Installation Tests

9.1 Preface

The radio cabinet has already been tested in the factory. This chapter describes the tests that must be performed to verify the installation of the radio cabinet.

9.1.1 About These Tests

The tests in this chapter are described roughly in the order in which they are to be performed. When the exit criteria are fulfilled, the tester should return to the flowchart for the next step in the process.

During the tests a test record should be filled in with the results, *see Section 9.20 Test Record on page 320*.

9.1.2 Testing Procedure

The flowchart in *Figure 323 on page 270* describes the recommended work order when testing Maxite. The work order can be altered, or tests can be removed due to local circumstances, but if so, an investigation of the consequences must be carried out. If the work order is changed or tests are removed, the department responsible for this manual must be notified and agree to the changes, or the responsibility is automatically transferred to the person making the changes.

9.2 Preconditions

9.2.1 Previous Records

Check that the RF Test Record (from factory) has been filled in.

9.2.2 Removal of Conducting Material

Note that all personal rings, wrist-watches and other metallic objects must be removed before working with the power system. Also follow carefully the safety instructions on power in the *chapter Safety*.

9.3 Radio Cabinet RBS 2302

9.3.1 Introduction

The purpose of this chapter is to familiarize the user with the RBS. The location of the Interface is shown, and an explanation on how to read the alarms is supplied.

9.3.2 Location of the RBS User Interface

The RBS user interface, including optical indicators, power switches and control buttons, is located behind the installation box door.

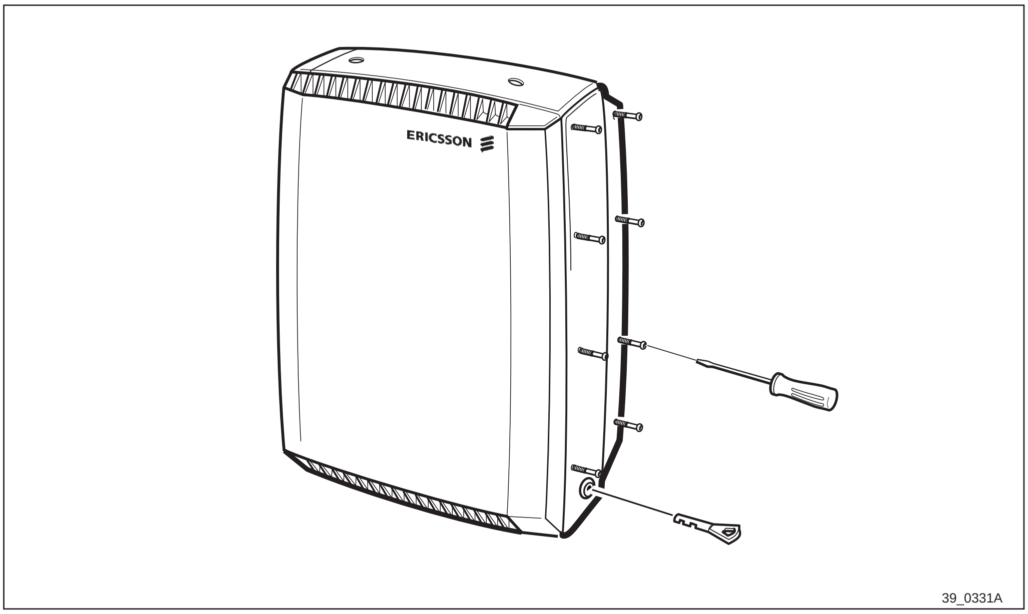


Figure 316 Sealing screws and key for the installation box door

To open the door: loosen the sealing screws and unlock with the key.

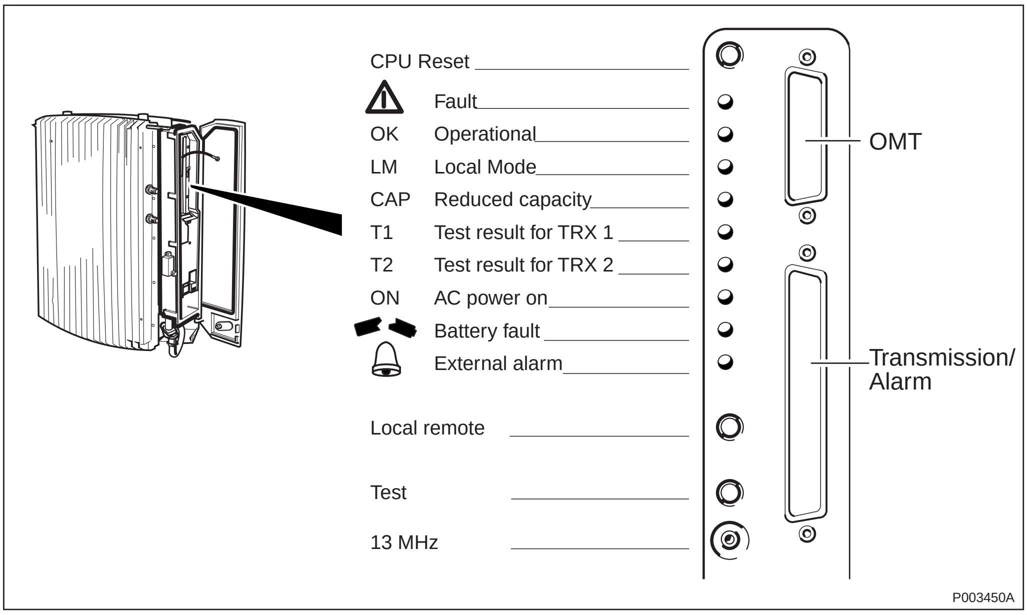


Figure 317 RBS user interface

9.3.3 Optical Indicators

The purpose of the optical indicators is to provide a quick way of indicating the operational status of the included equipment.

The general principles are:

Red:	A fault is located, check with OMT.
Yellow:	Operational (Local Mode, AC Power on).
	Faulty (Battery Fault, External Alarms, Reduced Capacity).
Green:	Operational.
Flashing indicators:	Wait, activity in progress.

The optical indicators can indicate that a fault/faults have been detected, and the OMT should therefore be used for more advanced fault localisation.

Explanation of the Indicators

Indicator	Mode	Description
Fault (Red)	**Generally:**	
	OFF	No fault(s) detected.
	ON	Fault(s) detected.
Fault (Red)	**2 TRX Sector Configuration:**	
	FLASHING	One of the following reasons: • IDB Database is missing, or wrongly configured. • Running on Base Application. • ARAE fault (BSS R7 or later) • Battery fault
Fault [1] (Red)	**4 TRX / 6 TRX Configuration:**	
	FLASHING (Master or Extension cabinet)	One of the following reasons: • IDB Database is missing, or wrongly configured. • Fault(s) detected in Extension cabinet(s) • Running on Base Application • ARAE fault (BSS R7 or later) • Battery fault
	ON (Extension cabinet) and FLASHING (Master cabinet)	• SW/HW fault in Extension cabinet and/or Master cabinet.

Indicator	Mode	Description
Operational[1] (Green)	OFF	Not operational, or change Local/Remote mode in progress.
	ON	When in local mode: • Operational, but not in traffic. When in remote mode: • Connected to BSC and considered operational by the BSC.
	FLASHING	One of the following reasons: • Receiving application software. Restart pending. • Configuration in progress (this may take more than 10 seconds to complete).
Local mode [1] (Yellow)	OFF	The RBS is in remote mode.
	ON	The RBS is in local mode.
	FLASHING	Change of mode in progress.
Reduced Capacity[1] (Yellow)	OFF	All TRXs are operational.
	ON	At least one TRX is not operational.
T1 Test result for TRX 1		Not used
T2 Test result for TRX 2		Not used
AC Power On[1] (Yellow)	OFF	AC power not available.
	ON	AC power available.
Battery Fault[1] (Yellow)	OFF	Battery connected.
	ON	Battery disconnected or faulty. Low battery DC voltage.
External Alarms [1] (Yellow)	OFF	No external alarm(s) active.
	ON	External alarm(s) active.
	ON (Extension cabinet) and FLASHING (Master cabinet)	External alarm on Extension cabinet(s).

[1] Indicated on all cabinets.

9.3.4 Switches and Connectors

Switches

Switch	Function
CPU reset button [(1)]	Reset of the RBS
Local remote button [(1)]	Change between Local/Remote mode
Test	Not used

[(1)] Configuration 4 TRX or 6 TRX: CPU reset and change of mode can be performed on both Master and Extension cabinet(s).

Connectors

Connector	Function
OMT [(1)]	Connector for the OMT cable
13 MHz	Connector for RF measurements and calibration

[(1)] Configuration 4 TRX or 6 TRX: all cabinets are controlled by the OMT connector on the Master cabinet.

9.4 Power and Battery Cabinet

9.4.1 Introduction

The purpose of this chapter is to familiarize the user with the Power and Battery Cabinet (PBC). The location of the control panel is shown, and an explanation on how to read the alarms and executed command on the PBC display is supplied.

9.4.2 Location of the PBC Control Panel

The PBC control panel, including optical indicators, power switches and control buttons, is located behind the installation box door.

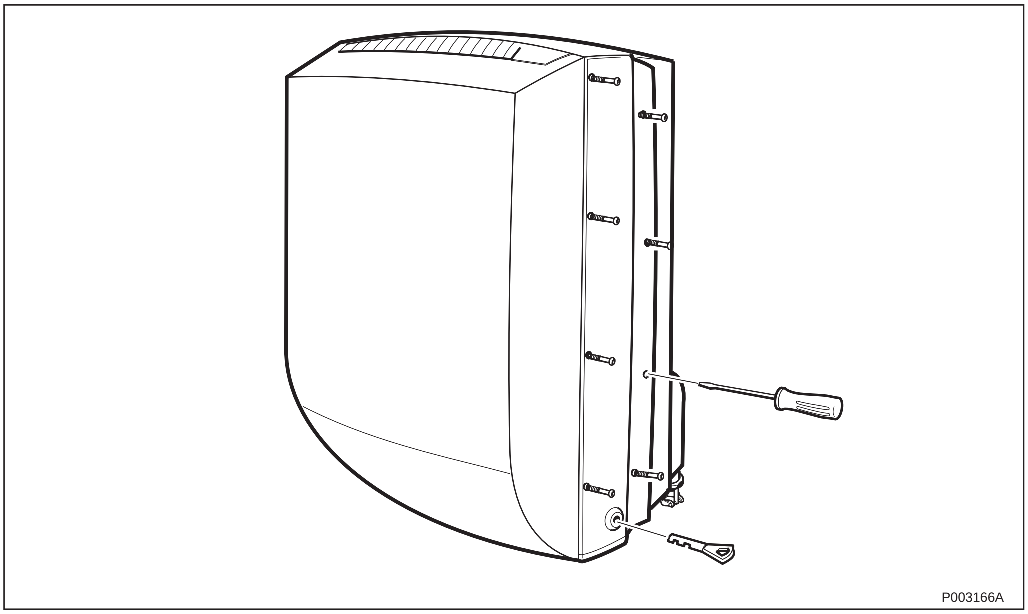


Figure 318 Sealing screws and key for the installation box door

To open the door: loosen the screws and unlock with the key.

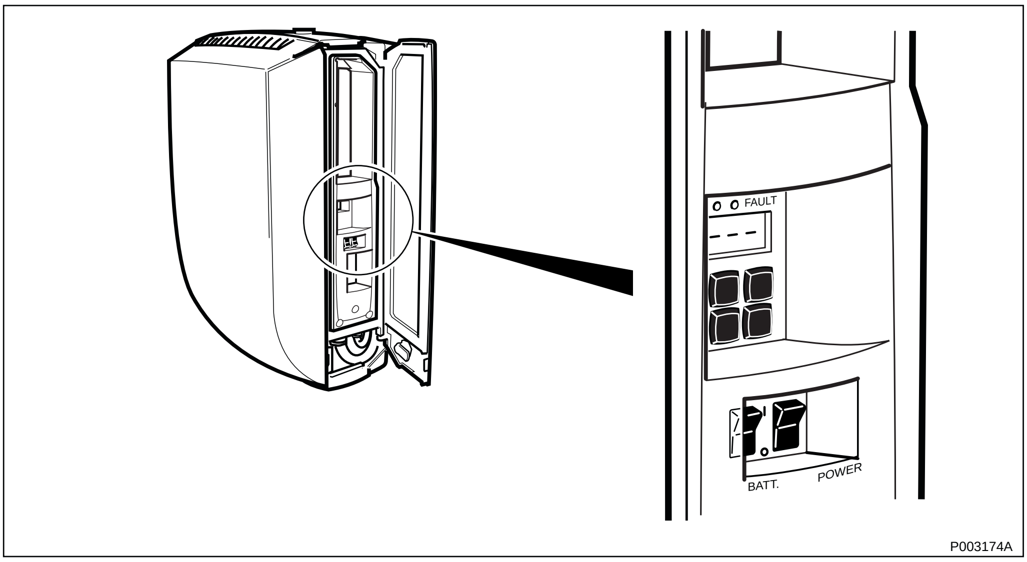


Figure 319 Location of the control panel in the PBC

9.4.3 Control panel

The description of the control panel is valid irrespective of whether Coverage Extension Unit (CEU) for GSM 900 or Active Antenna Unit (AAU) for GSM 1800, GSM 1900, is used.

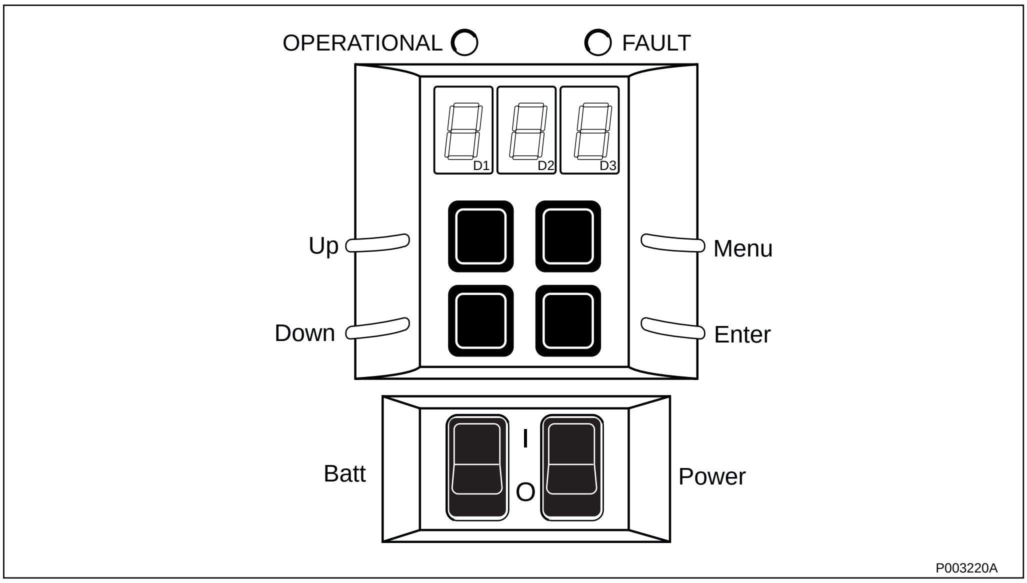


Figure 320 PBC control panel

Optical Indicators

The LED indicators give the following information on the current system status valid for CEU or AAU, and PBC alarms:

Table 22 Explanation of the LED indicators

Operational (Green)	Fault (Red)	Classification
ON	OFF	OK
OFF	ON	SEVERE
ON	ON	WARNING, POWER

Alarm Display

The alarms are shown as fault codes on the display. The display is divided into three display elements:

Element 1 (D1)	Unit number. The unit number in the alarm message, received from the AAU, CEU or PBC, is used to identify the faulty unit.
Element 2 (D2)	Alarm class. The alarm is classified according to the degree of severity. There are two Classified alarms, and one Not classified alarm: 0 = Not classified (used for historical alarms) 1 = Severe 2 = Warning
Element 3 (D3)	Fault code received from the AAU, CEU or PBC. *See Table 26 on page 267*. or Command that will be executed. *See Table 27 on page 268*.

Control Buttons

The push buttons on the display panel are used for:

– stepping through the fault codes.

– selecting commands.

Table 23 Control buttons on the display panel

Control button	Action
Up	Digit step up
Down	Digit step down
Menu	Activates command selection
Enter	Executes commands

Fault messages

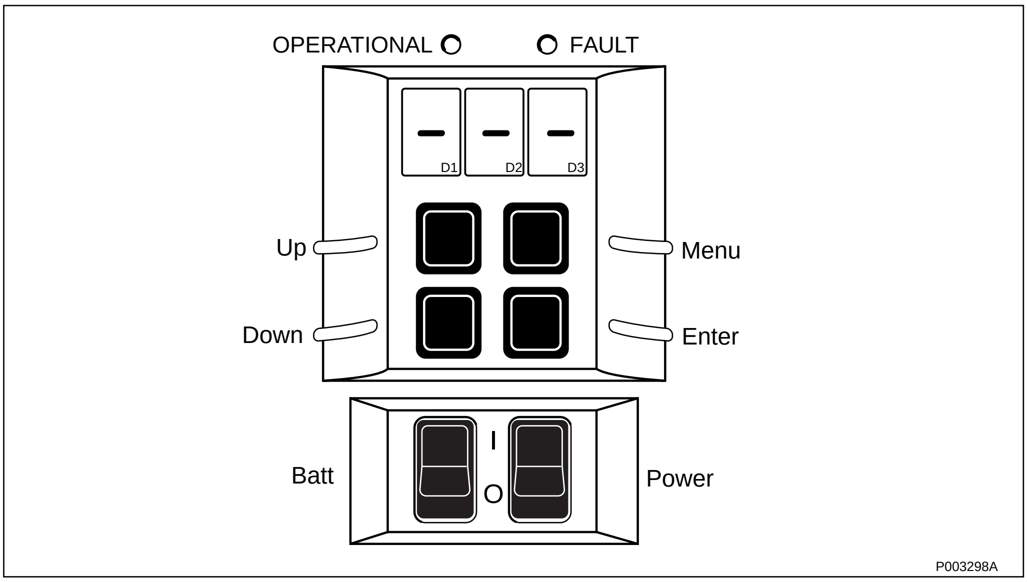


Figure 321 Display view if no faults are detected

- If there are no faults, this is indicated on the alarm display as shown in *Figure 321 on page 263*.
- If a fault occurs, the relevant fault code is automatically displayed, *see page 266*.
- To detect if there are several faults, step through the fault codes using the push buttons Up and Down, *see Table 23 on page 262*.

Except for temperature alarms, all alarm codes originate from active faults, that is, no fault history is stored.

9.5 Maxite™ Alarms and Commands

9.5.1 Introduction

The purpose of this chapter is to give an overall description of Maxite™ alarms, alarm codes, and the commands used for antenna installation.

9.5.2 Alarm System Overview

The Maxite alarm system provides the following functions, which are available in all Maxite configurations:

- Supervision of the antenna units alarm signals
- Communication between PBC and CEU (GSM 900), or between PBC and AAU (GSM 1800, GSM 1900).
- Supervision of the PBC alarm signals
- Signalling alarm to the RBS
- User interface for settings and alarm presentation

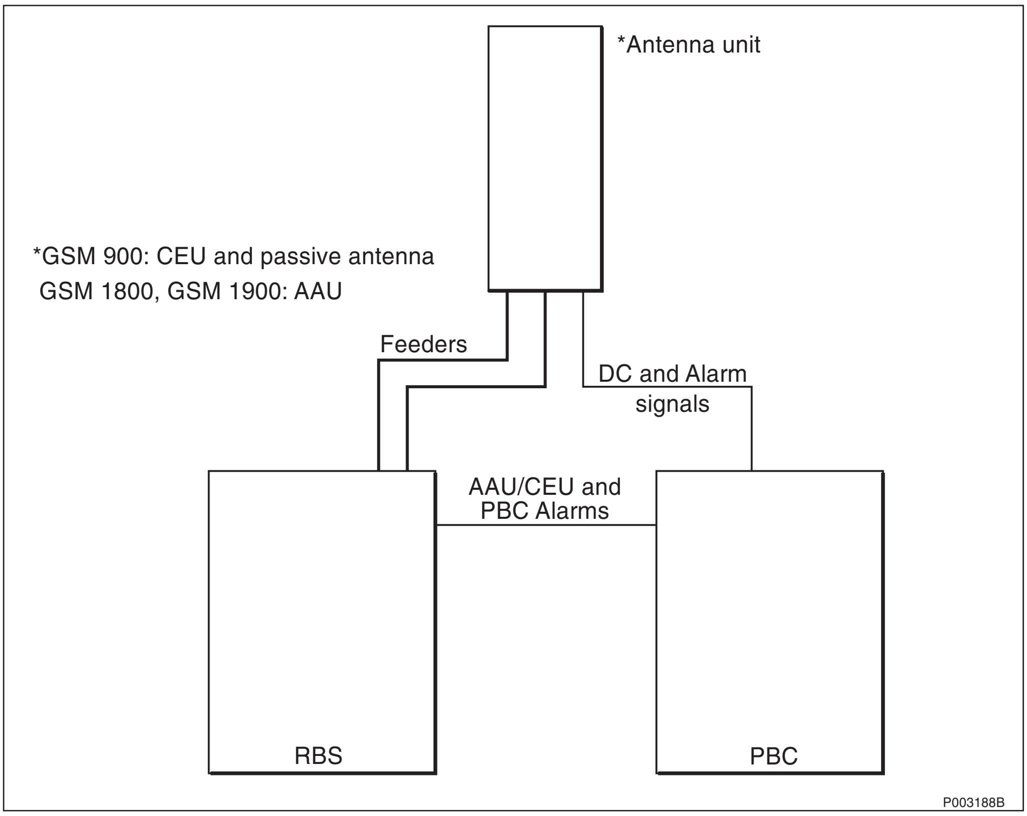


Figure 322 Overview of alarm system functions

9.5.3 Active Antenna Unit (AAU)

The AAU is used for GSM 1800 and GSM 1900.

Supervision by the AAU

The AAU supervises:

- Power Amplifier Units (TX)
- Low Noise Amplifier (RX)
- DC/DC modules (DC)
- Antenna temperature (GSM 1800 only)
- Surge suppression ALPU [1] (GSM 1900 only)

(1) ALPU (Antenna Lightning Protection Unit)

There is also a connection to the Feeder Duplex Unit to set the feeder attenuation value at installation. The default value for these attenuators is set to the maximum value.

9.5.4 Coverage Extension Unit (CEU)

The CEU, combined with a passive antenna, is used for GSM 900.

Supervision by the CEU

The CEU supervises:

- Power Amplifier Units (TX)
- Low Noise Amplifiers (RX)
- DC/DC modules (DC)
- Power Amplifier Temperature (GSM 900 only)

There is also a connection to set the feeder attenuation value at installation. The default value for these attenuators is set to the maximum value.

9.5.5 Power and Battery Cabinet (PBC)

Supervision of the PBC

The PBC alarms supervise:

- Main input AC power
- AC/DC converter
- DC/DC converter
- Battery unit
- Data link to an antenna unit
- Cabinet temperatures

Power up

When the power is switched on, the PBC display starts flashing. The power up takes about 5 seconds, then the active system status appears on the display.

PBC Originated Alarms to the RBS

All alarms transmitted to RBS are active alarms.

- Alarm terminals on the PBC

  The PBC has eight terminals for PBC alarms. Four of these are outgoing, used to connect the RBS. The remaining four terminals enable connection of incoming alarms from a second PBC.

- Alarms connected to the RBS

  The PBC alarms are connected to the RBS external alarm inputs, and generate the following alarms:

Alarm	GSM 900	GSM 1800, GSM 1900
SEVERE-A	CEU carrier A	AAU carrier A
SEVERE-B	CEU carrier B	AAU carrier B
WARNING	CEU carrier A or B	AAU carrier A or B
POWER, WARNING	PBC	PBC

Note: The external alarm inlets on the RBS must be defined accordingly at installation. The remaining four inputs will be defined individually for each site, depending on the equipment used. *See Section 9.12.4 on page 299*.

Cascaded PBCs

If there is a Maxite alarm, each PBC must be checked visually at the site.

Alarm Codes

The tables below explain the codes used on the three alarm display elements.

Table 24 Unit numbers on display element D1

Code	GSM 900	GSM 1800, GSM 1900
0	PBC	PBC
1	CEU 1	Antenna 1
2(1)	(CEU 2)	(Antenna 2)
3(1)	(CEU 3)	(Antenna 3)
5	Feeder A	Feeder A
6	Feeder B	Feeder B
7	Installation fault	Installation fault

(1) For future use

Table 25 Alarm classes on display element D2

Code	Alarm class
0	Not classified
1	Severe
2	Warning

Note: Display element D2 is also used for some fault codes and messages for the feeder values.

Table 26 Fault codes on display element D3

PBC		CEU (GSM 900) AAU (GSM 1800, GSM 1900)	
Code	**Fault**	**Code**	**Fault**
0	AC fault (no mains)	0	Data link transmission fail
1	AC/DC fault	1	DC fault
2	DC/DC overload	2	TXA fault
3	DC/DC fault	3	TXB fault
4	Battery fault	4	RXA fault
5	Battery disconnected	5	RXB fault
6	Battery voltage low	6	GSM 900, GSM 1800: Overtemp active GSM 1900: ALPU active
7	Overtemp active	7	GSM 900, GSM 1800: Overtemp historical GSM 1900: ALPU historical
8	Overtemp historical	P	Output power Off
9	PBC in standalone mode, antenna detected	H	Feeder attenuators set to max

Feeder installation	
Code	**Fault**
1	Feeder A fault
2	Feeder B fault

Commands

Table 27 on page 268 lists the command codes used.

Table 27 Command codes on display element D3

Code	Command
0	Read alarms
1	Set attenuators
2	Output power Off
3	Output power On
4	Reset feeder attenuators
5	GSM 900, GSM 1800: Clear historical overtemperature GSM 1900: Clear ALPU alarms
6	Set PBC in stand alone mode(1)
7	Exit PBC from stand alone mode

(1) Only for RBS 2302 with PBC, but without AAU/CEU.

Transmitting a Command

To transmit a command:

1. Press Menu.
2. Select the command code (on display element D3) with the Up or Down button.
3. Press Enter. The command is executed, and the display returns to active system status.

Clear Historical Temperature Alarms

There are two kinds of temperature alarms: active and historical.

The historical temperature alarms can be displayed in two ways:

- 0 0 8, indicating PBC Alarm, Overtemperature historical.
- 1 0 7, indicating Antenna Alarm:
  - Overtemperature historical (GSM 900, GSM 1800)
  - ALPU historical (GSM 1900)

To reset the historical alarms:

1. Press Menu
2. Select code 5 with the Up or Down button.
3. Press Enter. The command is transmitted to the CEU (GSM 900), AAU (GSM 1800, GSM 1900), or PBC.

9.6 Test Sequence

This chapter describes the recommended test sequence for the Site Installation Tests using the OMT software and TEMS.

OMT User's Manual	*LZN 302 01*
TEMS GSM User Manual	*LZT 123 2101/1*

Tools and instruments

For information about required test equipment and tools, *see chapter Tools and Instruments*.

9.6.1 Flowchart

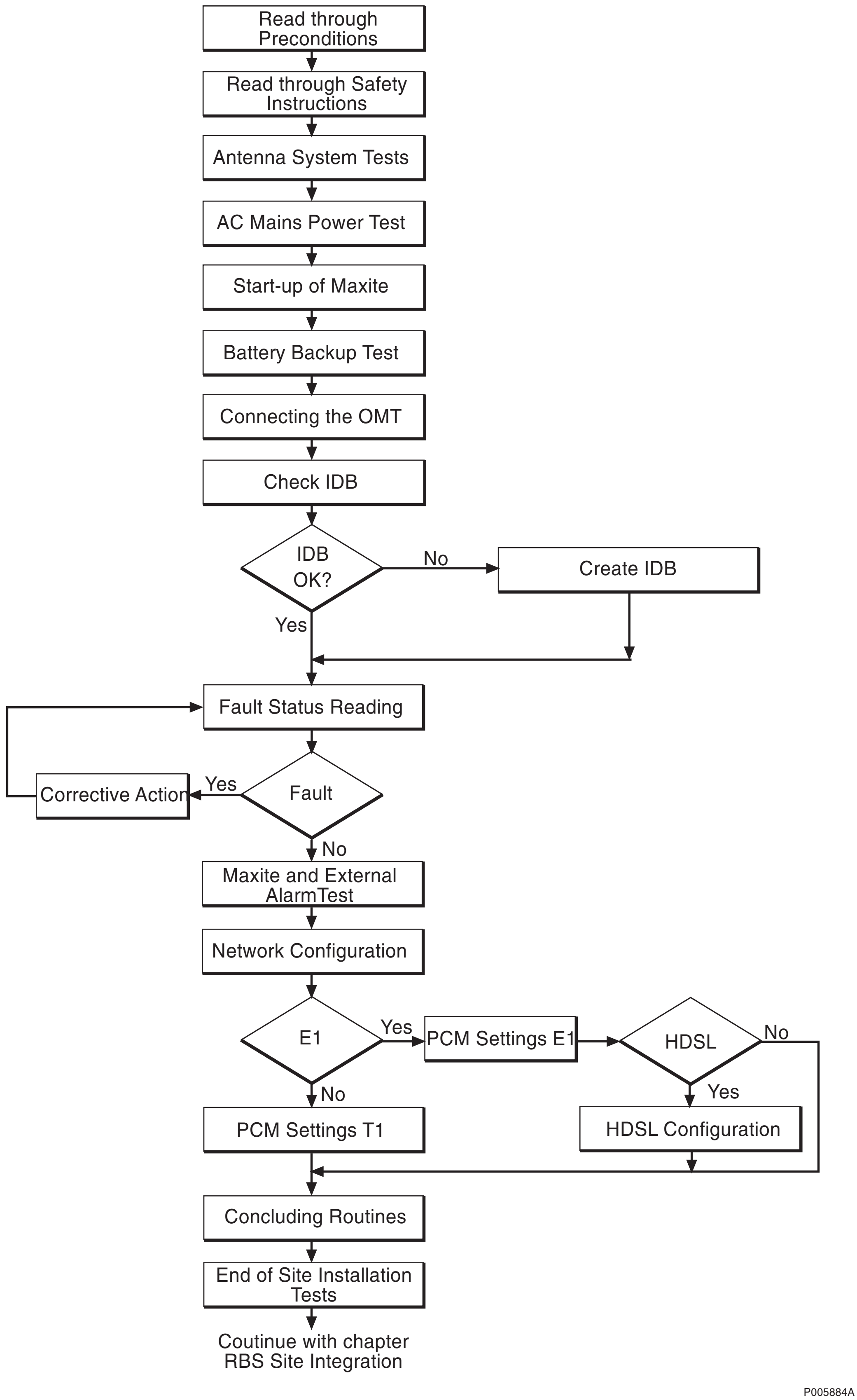


Figure 323 Flowchart

9.6.2 Preparations before Performing any Test

Before performing any test, the tester must read through the *chapter Safety*, and follow the relevant safety instructions.

9.7 Antenna System Tests

The purpose of these tests is to verify that the external antenna system is properly installed and fully operational. The tests include the feeders and jumpers.

The antenna system installation team must perform the tests during the installation process, to verify the workmanship and to check that the antenna system is operational.

Note: If no DTF (Distance to Fault) test record is available from the installation team, or if the test record was not approved in all respects, the tester must first perform a DTF test according to *Section 9.7.5 DTF Test on page 281*.

9.7.1 Installation Check

1. Verify that the installation is in accordance with the Site Installation Documentation.
2. Check visually that no cables or connectors are damaged and that all cables (feeders or jumpers) are properly marked.
3. Check that connectors are properly connected and tightened.
4. Verify the directions of directional antennas against the Site Installation Documentation. Consider magnetic influences from nearby metallic objects and deviation from the magnetic North when using the compass.
5. Check that the right cable is connected to the right antenna connector.
6. Record remarks, if any, in the test record and forward them to the person responsible for the site installation.

9.7.2 Summary of Test Procedure: 2 TRX Sector, 4 TRX and 6 TRX Configuration

2 TRX Sector Configuration

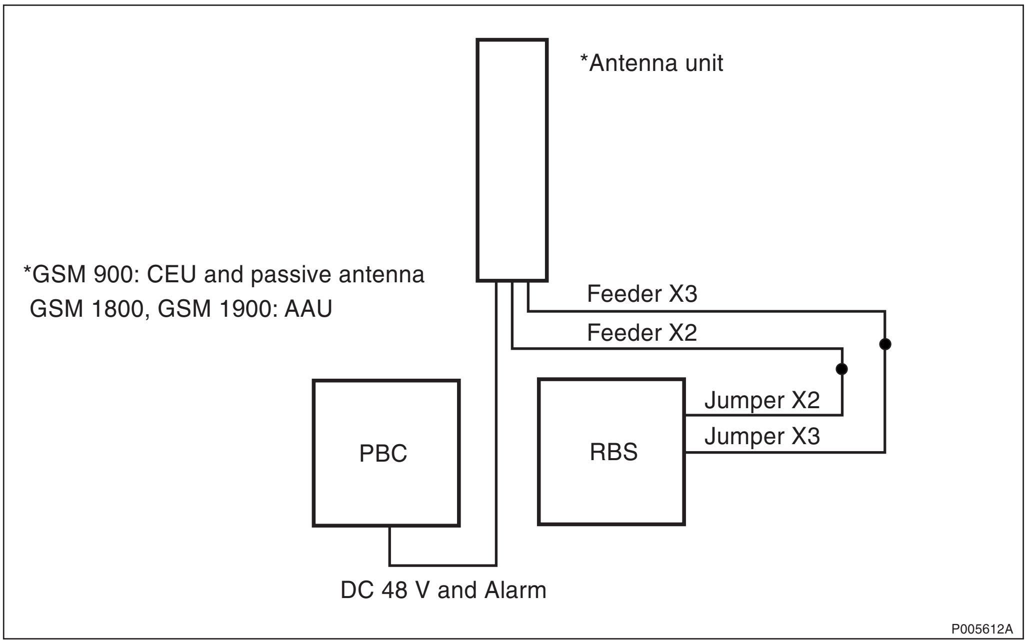


Figure 324 2 TRX Sector configuration

4 TRX Configuration

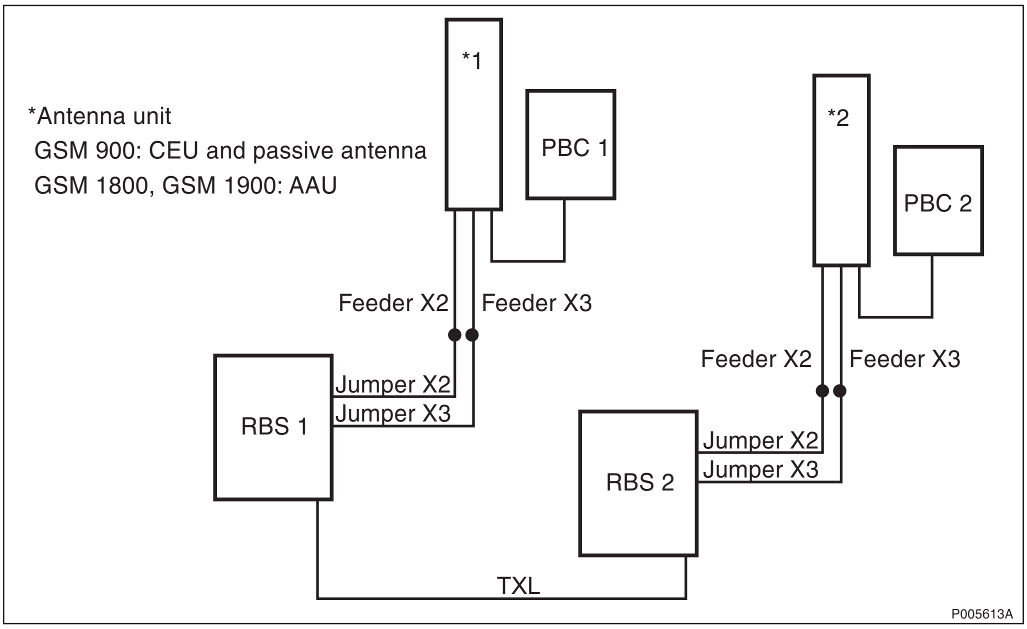


Figure 325 4 TRX configuration

6 TRX Configuration

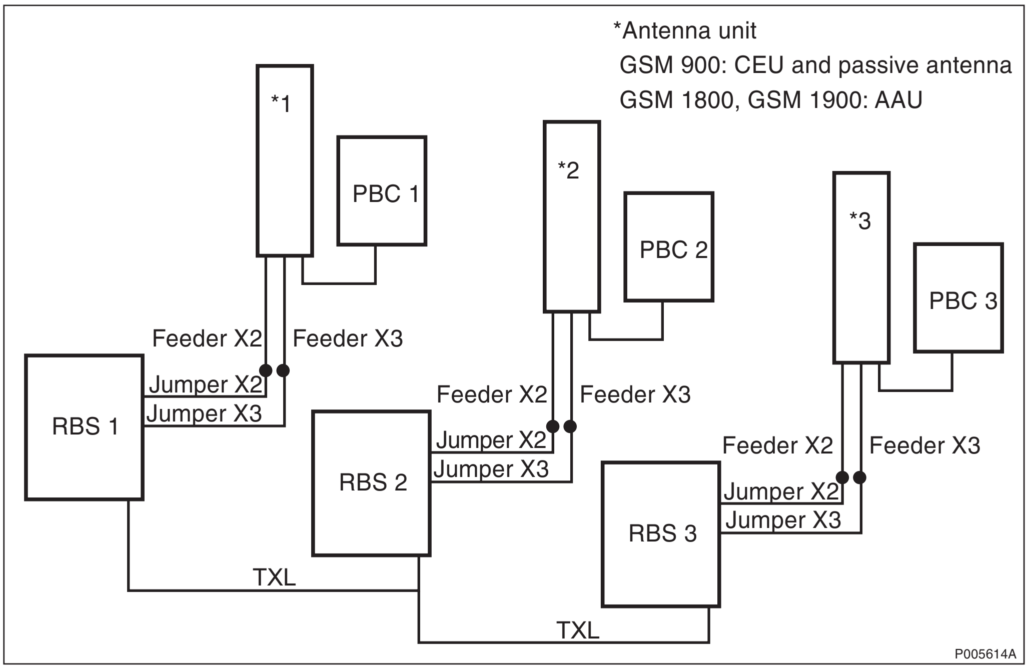


Figure 326 6 TRX configuration

Test Procedure

This test is to be performed for all feeders included in the configuration used.

1. Calculate the feeder attenuation according to *Section 9.7.6 on page 284*.

Attenuation calculated

	TX/RX Path	Attenuation	Action
GSM 900	Path X2(1)	≤ 9 dB	Go to step 3
		> 9 dB	Go to step 2
	Path X3(1)	≤ 9 dB	Go to step 3
		> 9 dB	Go to step 2
GSM 1800, GSM 1900	Path X2(1)	≤ 12 dB	Go to step 3
		> 12 dB	Go to step 2
	Path X3(1)	≤12 dB	Go to step 3
		> 12 dB	Go to step 2

(1) Including Feeder and Jumper

2. Check the preconditions and make necessary corrections.
3. Set the feeder attenuators and check the return values.

Attenuation measured

	TX/RX Path	Code displayed
GSM 900	Path X2(1) Path X3(1)	500 - 509 600 - 609
GSM 1800, **GSM 1900**	Path X2(1) Path X3(1)	500 - 512 600 - 612

(1) Including Feeder and Jumper

Measurement failed - Installation fault

TX/RX Path	Fault code displayed	Action
Path X2(1)	701	Go to step 5
Path X3(1)	702	Go to step 5

(1) Including Feeder and Jumper

4. Compare the calculated and measured attenuation values.

Difference between calculated and measured attenuation

Difference	Action
< 3 dB	Test completed
≥ 3dB	Go to step 5

5. Perform a new Distance To Fault test to detect possible faults, such as bad connectors, damaged feeders and so on, using Anritsu Site Master S235A, according to *Section 9.7.5 DTF Test on page 281*. Locate the fault and make necessary corrections. Also check the cable attenuation calculation to ensure a correct calculation. Then go back to step 3 and repeat the test procedure.

9.7.3 Summary of Test Procedure: 2 TRX Highway Configuration

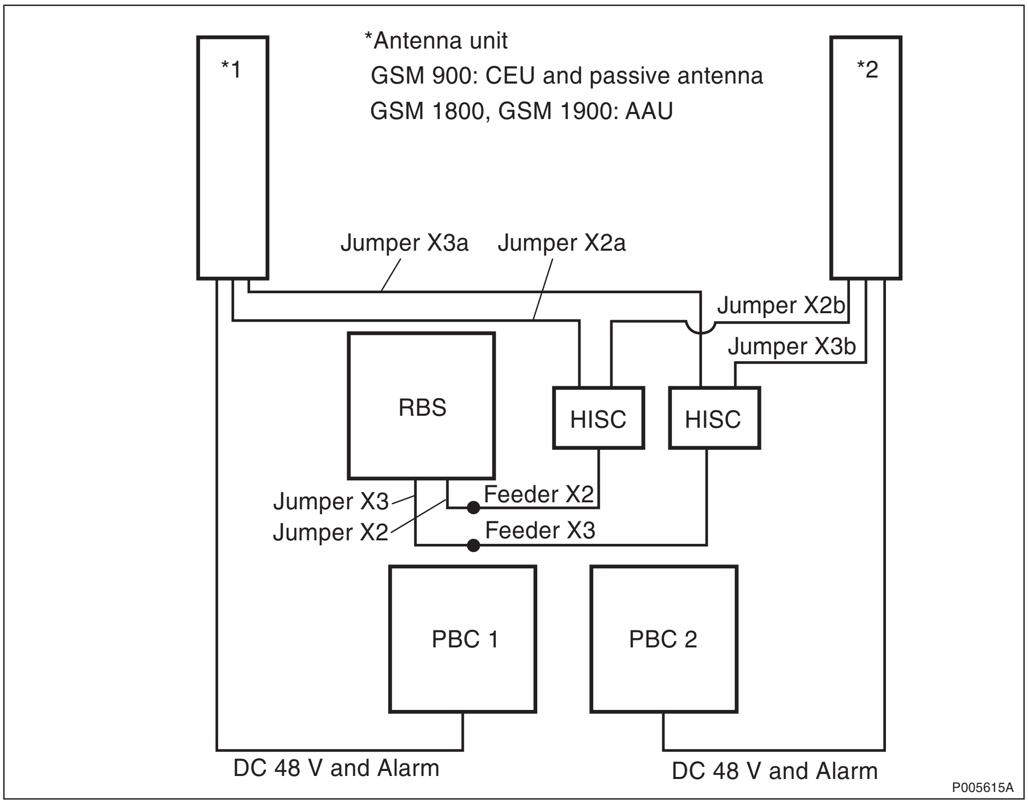


Figure 327 Highway configuration

TX/RX Path X2a, X2b and TX/RX Path X3a, X3b

Table 28 Definition of Path X2a, X2b and X3a, X3b

Component	Path X2a	Path X2b	Path X3a	Path X3b
Jumper X2 (RBS)	●	●		
Feeder X2	●	●		
Jumper X2a (AAU1, CEU1)	●			
Jumper X2b (AAU2, CEU2)		●		
Jumper X3 (RBS)			●	●
Feeder X3			●	●
Jumper X3a (AAU1, CEU1)			●	
Jumper X3b (AAU2, CEU2)				●
HISC	●	●	●	●
● = Included CEU: GSM 900 AAU: GSM 1800, GSM 1900				

Test Procedure

1. Calculate the feeder attenuation according to *Section Highway Configuration on page 285*.

Attenuation calculated

	TX/RX Path	Attenuation	Action
GSM 900	Path X2a, X2b	≤9 dB	Go to step 3
		> 9 dB	Go to step 2
	Path X3a, X3b	≤ 9 dB	Go to step 3
		> 9 dB	Go to step 2
GSM 1800, GSM 1900	Path X2a, X2b	≤ 12 dB	Go to step 3
		> 12 dB	Go to step 2
	Path X3a, X3b	≤12 dB	Go to step 3
		> 12 dB	Go to step 2

2. Check the preconditions and make necessary corrections.
3. Set the feeder attenuators and check the return values.

PBC 1 Attenuation measured

	TX/RX Path	Code displayed
GSM 900	Path X2a	500 - 509
	Path X3a	600 - 609
GSM 1800,	Path X2a	500 - 512
GSM 1900	Path X3a	600 - 612

PBC 1 Measurement failed - Installation fault

TX/RX Path	Fault code displayed	Action
Path X2a	701	Go to step 5(1)
Path X3a	702	Go to step 5(1)

(1) First, *see Table 29 on page 278* for corrective action.

PBC 2 Attenuation measured

	TX/RX Path	Code displayed
GSM 900	Path X2b	500 - 509
	Path X3b	600 - 609
GSM 1800,	Path X2b	500 - 512
GSM 1900	Path X3b	600 - 612

PBC 2 Measurement failed - Installation fault

TX/RX Path	Fault code displayed	Action
Path X2b	701	Go to step 5(1)
Path X3b	702	Go to step 5(1)

(1) First, *see Table 29 on page 278*.

4. Compare the calculated and measured attenuation values.

Difference between calculated and measured attenuation

Difference	Action
< 3 dB	Test completed
≥ 3dB	Go to step 5

5. Perform a new Distance To Fault test to detect possible faults, such as bad connectors, damaged feeders and so on, using Anritsu Site Master S235A, according to *Section 9.7.5 DTF Test on page 281*. Locate the fault and make necessary corrections. Also check the cable attenuation calculation to ensure a correct calculation. Then go back to step 3 and repeat the test procedure.

Table 29 Fault tracing hints

Inst. fault PBC 1		Inst. fault PBC 2		Action
Path X2a	**Path X3a**	**Path X2b**	**Path X3b**	
●				Check the antenna jumper X2a connections.
	●			Check the antenna jumper X3a connections.
		●		Check the antenna jumper X2b connections.
			●	Check the antenna jumper X3b connections.
●		●		Check the RBS jumper X2 connections.
	●		●	Check the RBS jumper X3 connections.
●		●		Perform a DTF test, *see Section 9.7.5 DTF Test on page 281*.
	●		●	Perform a DTF test, *see Section 9.7.5 DTF Test on page 281*.

9.7.4 Using Antenna Tester

This instruction describes how to perform a Distance To Fault (DTF) test on an antenna system with the Anritsu Site Master S120A or S235A. The tests cover the GSM 900, GSM 1800 and GSM 1900 systems.

After the results have been saved in the Site Master the tester can obtain hard copies by importing the wave forms to a PC. The necessary software and a serial cable are enclosed with the Site Master. For more information refer to:

Anritsu Site Master User's Guide

Test Equipment

To carry out this test, see the list of required test equipment in *chapter Tools and Instruments*.

Anritsu Site Master S120A and S235A

The keys mentioned in the instruction can be found in *Figure 328 on page 279*. In the instructions a "key" is marked with the matching text, while a "soft key" has its text displayed on the screen, next to the key.

Note: The REFL test port is transmitting (out). The TRANS test port is receiving (in).

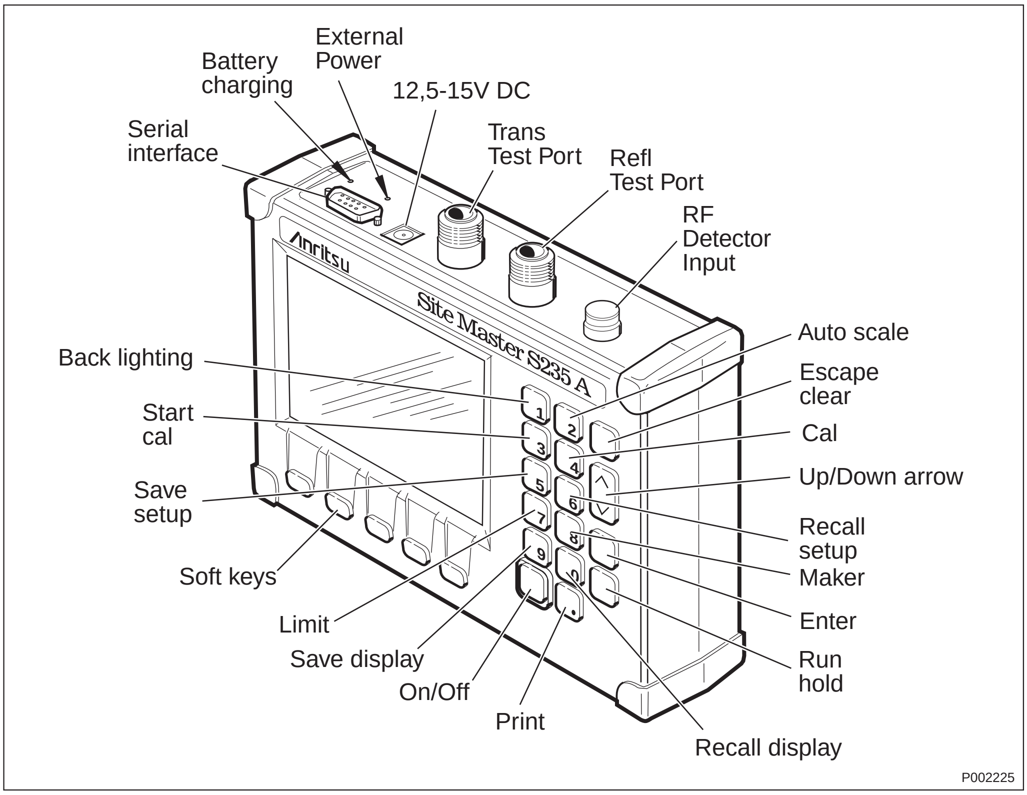


Figure 328 Anritsu Site Master S235A (exterior of S120A is similar to S235A)

Calibration and Adjustments

To achieve accurate results and compensate for measurement uncertainty, the Site Master must be calibrated.

The frequency range has to be selected before calibration.

Selecting a Frequency Range

1. Turn on the Site Master by pressing the ON-button.
2. Press the FREQ soft key, from the Main Menu.
3. Press the F1 soft key from the Frequency Menu.
4. Enter the ‘Lower’ frequency limit in MHz, from the table below, for the antenna system by using the keypad or the Up/Down arrow key and press ENTER.
5. Press the F2 soft key from Frequency Menu.
6. Enter the ‘Higher’ frequency limit in MHz, from the table below, for the antenna system and press ENTER.
7. Check that the FREQ (MHz) scale in the display area indicates the new frequency start and stop values.
8. Press MAIN soft key.

Table 30 Start and stop frequencies

System	RX/TX Band	
	Start freq. MHz	**Stop freq. MHz**
GSM 900	860	980
GSM 1800	1690	1900
GSM 1900	1830	2010

Performing a Calibration

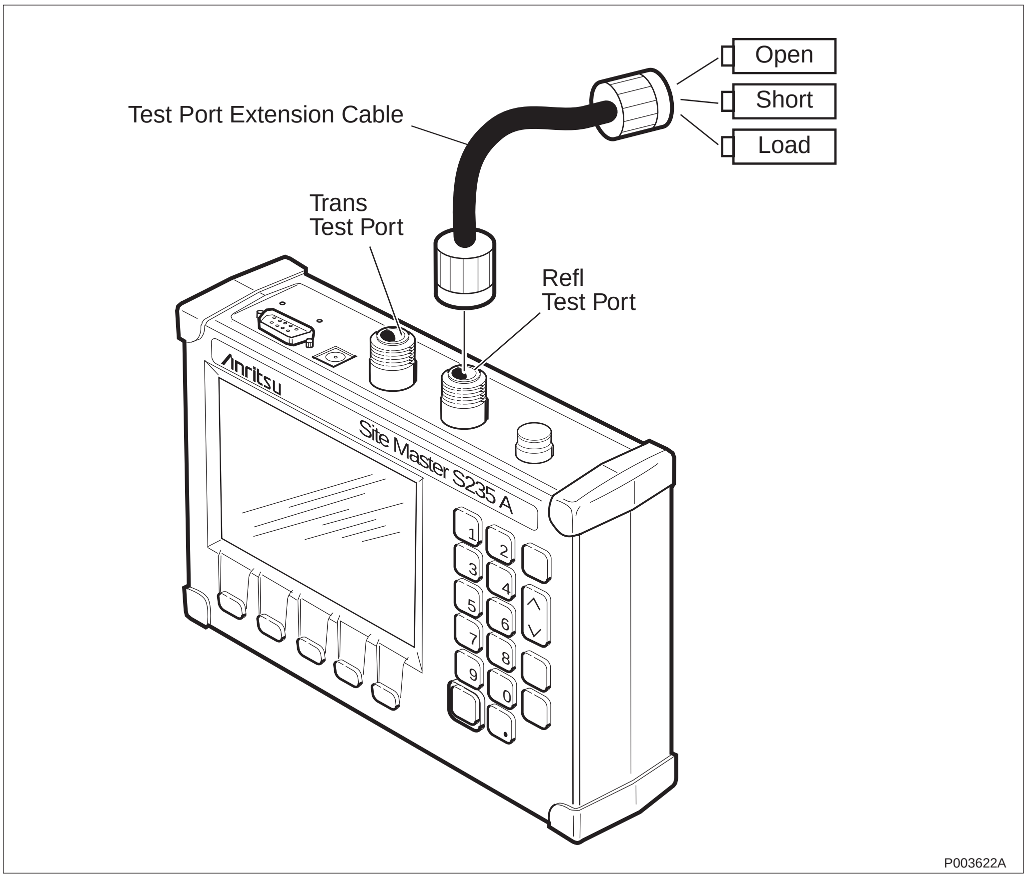


Figure 329 Different connections for calibration

Perform a measurement calibration, using the START CAL key. During the calibration there will be step-by-step instructions on the display throughout the procedure. One of the following messages "Measuring OPEN", "Measuring SHORT" or "Measuring LOAD" appears while the measurement is in progress.

Select calibration type OSL.

Required calibration component is OSL (PRECISION/OPEN/SHORT/ LOAD).

For the best calibration results, ensure that the Short/Open/Load is connected at the end of the Extension Testport Cable, at the same point where the RX/TX jumper will be connected.

1. Connect the Test Port Extension Cable to the Site Master Refl Test Port.

2. Press the START CAL key.
3. Select OSL and press ENTER.
4. Follow the instructions on the screen.
5. When the calibration is performed, disconnect the calibration equipment from the Test Port Extension Cable.

Entering Cable Parameters

1. Press MODE and select DTF-SWR, or DTF-return loss, with the Up/Down key. Press ENTER.
2. Press the DIST soft key.
3. Press the MORE soft key.
4. Press the LOSS soft key.
5. Enter the loss in dB per meter, *see Table 31 on page 286*, for the type of cable being tested and press ENTER.
6. Press the PROP V soft key.
7. Enter the relative velocity, *see Table 31 on page 286*, for the type of cable being tested and press ENTER.
8. Press the MAIN soft key to go back to the Main Menu.

9.7.5 DTF Test

Test Setup for GSM 900

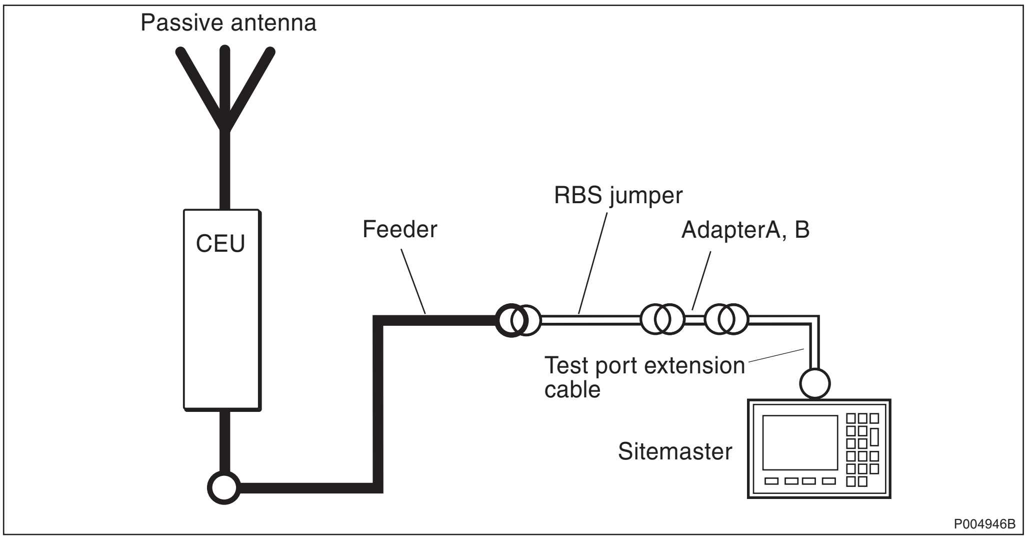


Figure 330 Test setup for GSM 900: Sector configuration with CEU and passive antenna

Connect the Adapter A, B to the Test Port Extension Cable. Adapter A, B consists of 7/16–N and N-TNC adapters

A complete test setup is shown in *Figure 330 on page 281*.

Test Setup for GSM 1800/1900

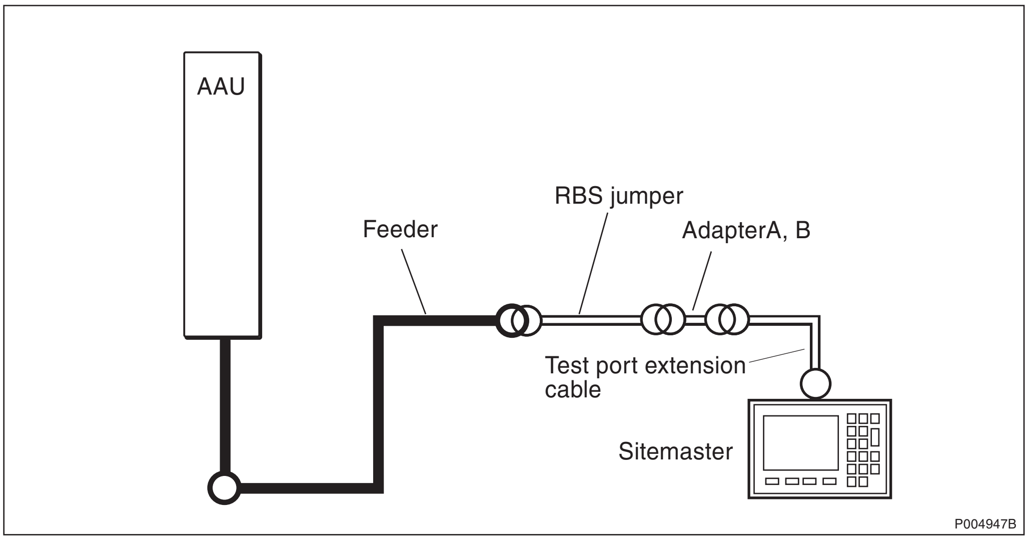


Figure 331 Test setup for GSM 1800, GSM 1900: Sector configuration with AAU

Connect the Adapter A, B to the Test Port Extension Cable. Adapter A, B consists of 7/16–N and N-TNC adapters

A complete test setup is shown in *Figure 331 on page 282*.

Test Setup Highway Configuration

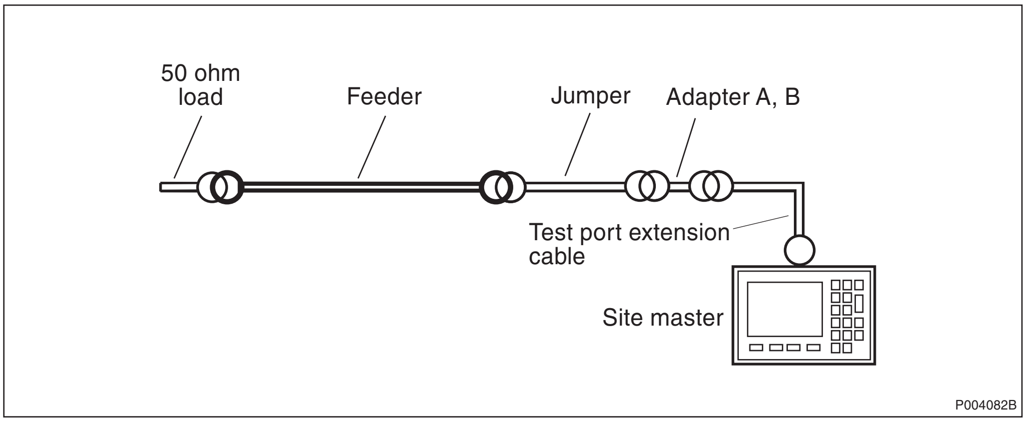


Figure 332 Test setup, Highway configuration

1. Connect the Test Port Extension Cable to the Refl Test Port on the Site Master.
2. Connect the Adapter A, B to the Test Port Extension Cable.
3. Connect one of the antenna system 'Lower jumper' to the Test Port Extension Cable with the Adapter A, B. Be sure to tighten all the connections properly.
4. Disconnect the feeder from the HISC.
5. Connect a 50 Ω load to the feeder.

A complete test setup is shown in *Figure 332 on page 282*.

Test Procedure

The purpose of this test is to verify that there are no bad connections or other faults (for example sharp bends) in the antenna feeder system.

1. Press the MODE soft key.
2. Select the DTF –SWR measurements using the Up/Down arrow key and press ENTER.
3. Calibrate the Site Master for this test setup. See *page 279*.
4. Connect the test equipment to the antenna system according to the test setup instructions for the configuration used.
5. Check that all connections are properly connected and tightened.
6. Press the DIST soft key.
7. Press the D1 soft key.
8. Enter the desired numerical start value (usually 0.0 m) from the keypad and press the ENTER key.
9. Press the D2 soft key.
10. Enter the desired numerical stop value (usually the total length of the antenna system) from the keypad and press the ENTER key.
11. Press the MORE soft key.
12. Press the MAIN soft key.
13. Press the SCALE soft key.
14. Press the TOP soft key.
15. Enter 1.2 for topscale and press ENTER.
16. Press the LIMIT soft key.

Note: Should not be in OFF-mode.

17. Enter 1.05 for a limit and press ENTER.
18. Wait while the Site Master is calculating (~ 8 sec.).
19. Observe the waveform and check that no reflections are over 1.05 SWR (31.5 dB RL). *See Table 32 on page 287*.
20. Save the display and enter Passed or Failed in the Test Record, *see Section Antenna System Tests on page 322*.

Note: The antenna may have a greater reflection than 1.05 SWR but the system is still approved as long as the cables are below the limit.

21. Save the measurement by pressing the SAVE DISPLAY key. Type in a non-used number (1 - 40) for the measurement and press ENTER. The saved display can later be used for cable attenuation calculation. *Section 9.7.6 on page 284*.
22. Press the MAIN soft key to return to the main menu.

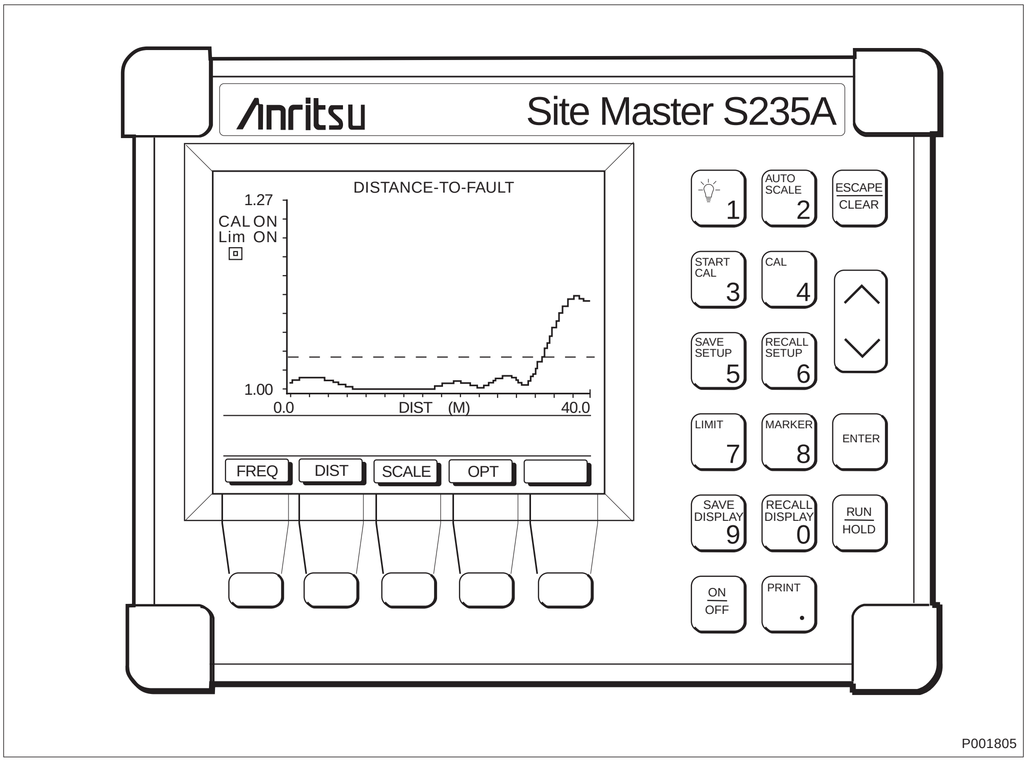


Figure 333 Measurement of an approved cable

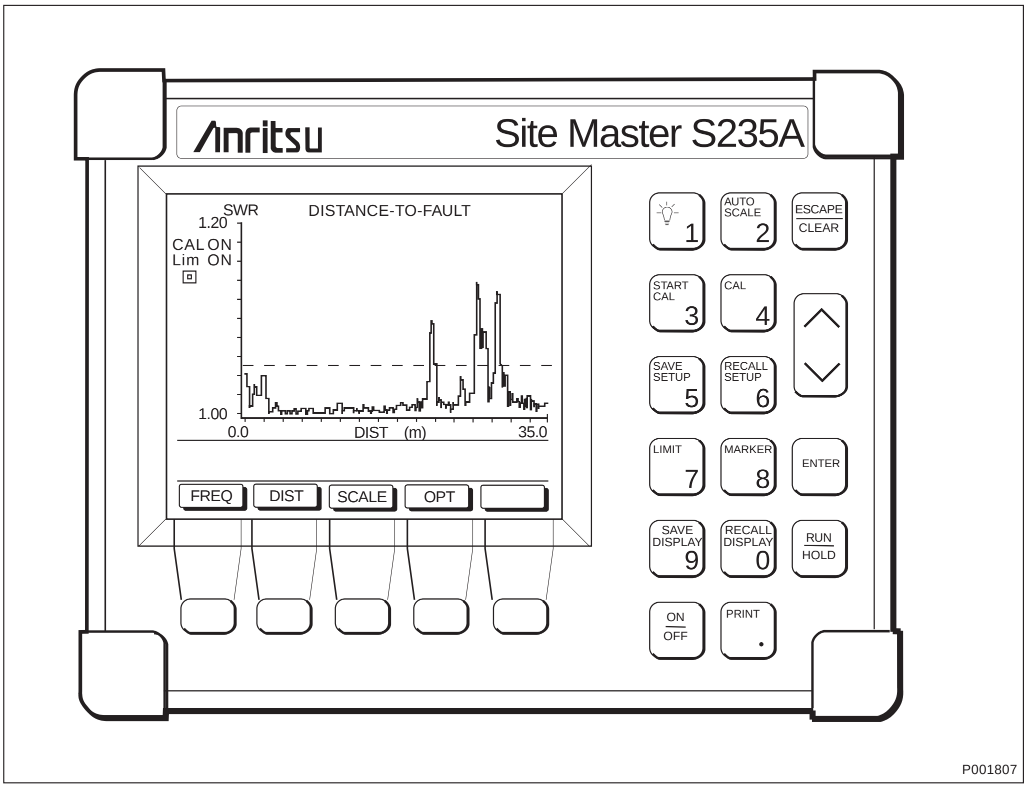


Figure 334 Example showing a bad adapter at the antenna

9.7.6 Cable Attenuation Calculation

Note: If the cable type is not found in *Table 31 on page 286*, values must be taken from the manufacturer's specifications.

2 TRX Sector, 4 TRX and 6 TRX Configuration

The purpose is to calculate the attenuation of the system, including antenna jumper, feeder and RBS jumper.

1. Calculate the total attenuation and record it in the test record. Total attenuation is calculated by multiplying the actual length in meters, given by the DTF test, by the attenuation per m. Each connector is assumed to add 0.1 dB.

   Example for GSM 900:

   Cable data below refer to *Table 31 on page 286*.

   - Feeder type LDF 4RN-50n (1/2″):

     Length = 63 m, attenuation per m = 0.07 dB.

     Two connectors = 0.2 dB.

     Actual attenuation = 63 x 0.07 + 0.2 = 4.6 dB.

   - RBS jumper type FSJ 1RN-50n (1/4″):

     Length 2 m, Attenuation per m = 0.19 dB.

     Two connectors = 0.2 dB.

     Actual attenuation = 2 x 0.19 + 0.2 = 0.58 dB.

   - Total attenuation = 4.6 + 0.58 = 5.18 dB.

Note: The calculated total attenuation must be ≤ 12 dB.

2. Repeat step 1 for all antenna feeders at the base station.

3. Enter the result of the calculation in the test record, *see Section Antenna System Tests on page 322*.

Highway Configuration

The purpose is to calculate the attenuation of the system, including antenna jumper, HISC (Highway Splitter Combiner), feeder and RBS jumper.

1. Calculate the total attenuation and record it in the test record. Total attenuation is calculated by multiplying the actual length in meters, given by the DTF test, by the attenuation per m. Each connector is assumed to add 0.1 dB.

Example for GSM 1800:

Cable data below refer to *Table 31 on page 286*.

- The attenuation in the HISC is approximately 3.0 dB.

  HISC jumper type FSJ 1RN-50n (1/4″):

  - Length =2 m, attenuation per m = 0.27 dB

  - Two connectors = 0.2 dB.

  Actual attenuation = 3.0 + 2 x 0.27 + 0.2 = 3.74 dB.

- Feeder type LDF 2RN-50n-nn (3/8″):

  - Length = 63 m, attenuation per m = 0.16 dB.

  - Two connectors = 0.2 dB.

  Actual attenuation = 63 x 0.16 + 0.2 = 10.28 dB.

- RBS jumper type FSJ 1RN-50n (1/4″):

  - Length 1 m, Attenuation per m = 0.27 dB.

  - Two connectors = 0.2 dB.

  Actual attenuation = 1 x 0.27 + 0.2 = 0.47 dB.

- Total attenuation = 3.74 + 10.28 + 0.47 = 14.49 dB.

Note: The calculated total attenuation must be ≤ 12 dB.

2. Repeat step 1 for all antenna feeders at the base station.

3. Enter the result of the calculation in the test record, *see Section Antenna System Tests on page 322*.

Cable Data

Table 31 Velocity factor (Vp) for different antenna feeders

Product No.	Supplier code	Velocity factor V_p	Attenuation, dB/m		
			GSM 900	GSM 1800	GSM 1900
TZC 500 80	Andrew LDF 4RN-50n(1) (1/2")	0.88	0.07	0.11	0.11
TZC 500 82	Andrew LDF 2RN-50n-nn(1) (3/8")	0.88	0.11	0.16	0.17
TZC 500 26	Andrew FSJ 1RN-50n(1) (1/4")	0.84	0.19	0.27	0.28

(1) The character symbolised by "n" is of no importance when selecting a cable.

Conversion Table

Table 32 Conversion table

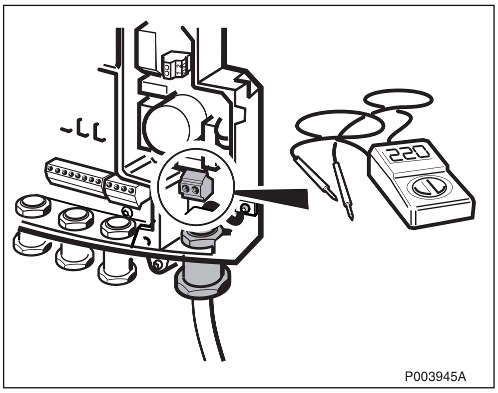
Return Loss (dB)	SWR	Return Loss (dB)	SWR	Return Loss (dB)	SWR
4.0	4.42	16.0	1.38	28.0	1.08
6.0	3.01	16.2	1.37	28.5	1.07
8.0	2.32	16.4	1.36	29.0	1.07
10.0	1.92	16.6	1.35	29.5	1.07
10.5	1.85	16.8	1.34	30.0	1.06
11.0	1.79	17.0	1.33	30.5	1.06
11.2	1.76	17.2	1.32	31.0	1.05
11.4	1.74	17.4	1.31	31.5	1.05
11.6	1.71	17.6	1.30	32.0	1.05
11.8	1.69	17.8	1.29	32.5	1.04
12.0	1.67	18.0	1.29	33.0	1.04
12.2	1.65	18.5	1.27	33.5	1.04
12.4	1.63	19.0	1.25	34.0	1.04
12.6	1.61	19.5	1.23	34.5	1.03
12.8	1.59	20.0	1.22	35.0	1.03
13.0	1.58	20.5	1.21	35.5	1.03
13.2	1.56	21.0	1.20	36.0	1.03
13.4	1.54	21.5	1.18	36.5	1.03
13.6	1.53	22.0	1.17	37.0	1.02
13.8	1.51	22.5	1.16	37.5	1.02
14.0	1.50	23.0	1.15	38.0	1.02
14.2	1.48	23.5	1.14	38.5	1.02
14.4	1.47	24.0	1.13	39.0	1.02
14.6	1.46	24.5	1.12	39.5	1.02
14.8	1.44	25.0	1.12	40.0	1.02
15.0	1.43	25.5	1.11	40.5	1.01
15.2	1.42	26.0	1.10	41.0	1.01
15.4	1.41	26.5	1.10	41.5	1.01
15.6	1.40	27.0	1.09	42.0	1.01
15.8	1.39	27.5	1.08	42.5	1.01

9.8 AC Mains Power Test

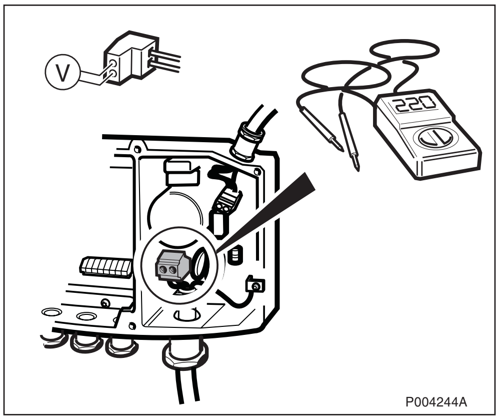
1. Make sure that the correct nominal AC mains voltage (115/230 V) has been selected. See description in *chapter Product Data*.

2. Switch on the incoming AC Mains Power. (Make sure that all external AC switches are in ON position).

3. Measure with a multimeter to verify that the RBS has correct voltage on the AC terminal in the interface box.



4. Measure with a multimeter to verify that the PBC has correct voltage on the AC terminal in the interface box.



9.9 Start-up and Shut-off

Location of power switches, *see Section 9.9.3 on page 290* (PBC), and *Section 9.9.4 on page 291* (RBS).

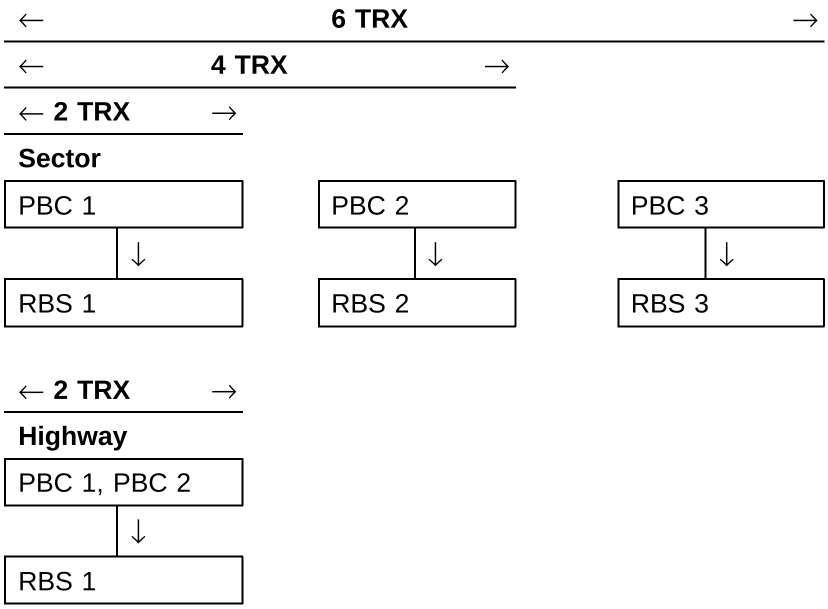
9.9.1 How to Start-up

Note: To avoid alarms from the CEU/AAU, the PBC must be started before starting the RBS. Otherwise the CEU/AAU will receive RF power without being connected to voltage.

Note: Wait five minutes to make sure that the CEU has been warmed up.

At extremely low temperature, the warming up of the RBS may take about half an hour. During this time the RBSs lets in the interface box will turn off.

Start-up Sequence Overview



1. Make sure everything is connected according to *chapters Installation of RBS 2302* and *Installation of Power and Battery Cabinet*.

Note: Make sure that the transmission cable is disconnected. If not, and the software versions of the RBS and the BSC differ, the BSC will copy its software version to the RBS, without any warning.

2. Start-up of the PBC:

   1. Switch on the AC power.

   2. Switch on the DC battery power.

   3. Check for PBC alarms, *see page 266.* If alarms are located, correct them before continuing.

Note: Code 11H indicates status (disappears when the antenna attenuators have been set).

3. Start-up of the RBS:

   1. Switch on the AC power.

   2. Switch on the DC battery power.

The RBS will automatically run a self-test. For information regarding optical indicators:

– for the RBS, *see Section 9.3.3 on page 256.*

– for the PBC, *see page 261*

9.9.2 How to Shut-off

Note: Always shut off the RBS before shutting off the PBC. If the antenna is to be dismounted, set the feeder attenuators to max. value. For further information, *see chapter Maintenance*.

Shut-off Sequence Overview

← **6 TRX** →

← **4 TRX** →

← **2 TRX** →

Sector

RBS 1	RBS 2	RBS 3
↓	↓	↓
PBC 1	PBC 2	PBC 3

← **2 TRX** →

Highway

RBS 1

↓

PBC 1, PBC 2

1. Shut-off of the RBS:
   1. Switch off the DC battery power.
   2. Switch off the AC power.
2. Shut-off of the PBC:
   1. Switch off the DC battery power.
   2. Switch off the AC power.

9.9.3 Power Switches in the PBC

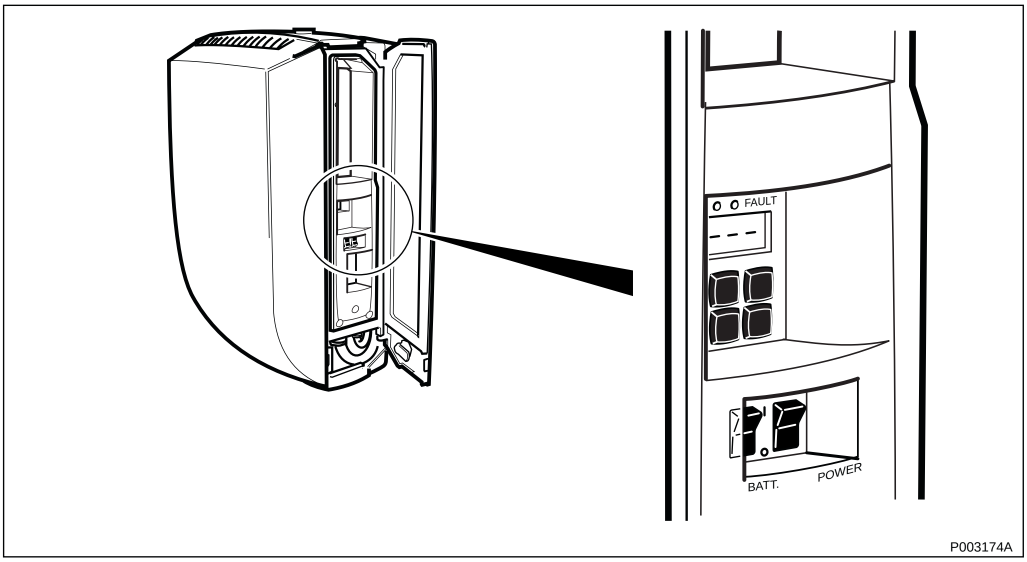


Figure 335 Location of power switches in the PBC

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

Note: When the AC power is turned off with the AC power switch in the PBC, there is still AC voltage both on the AC board in the interface box, and on the EMC board in the installation box up to the power switch.

9.9.4 Power Switches in the RBS

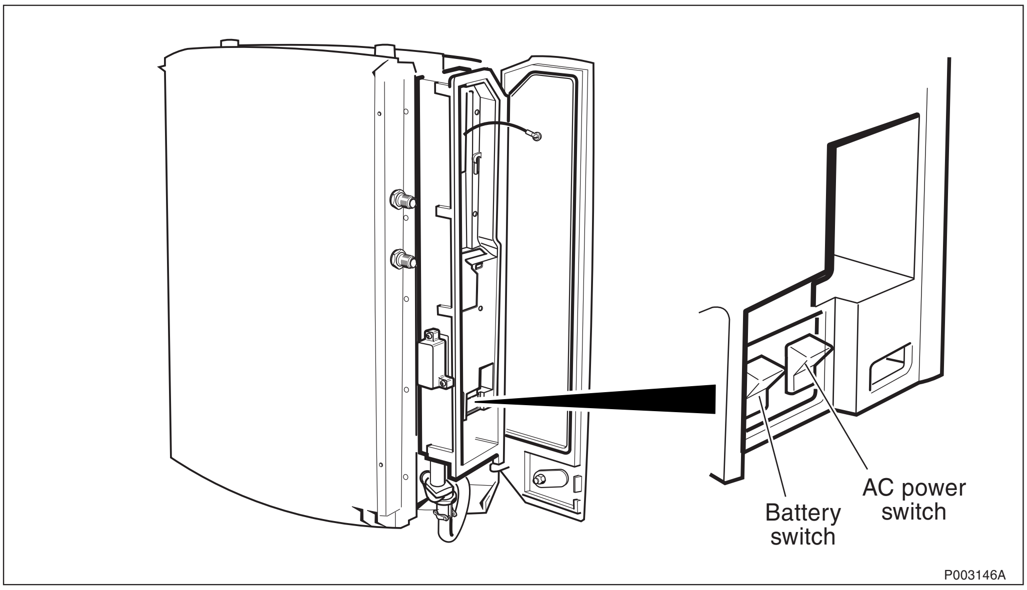


Figure 336 Power switches in the RBS

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

Note: When the AC power supply is turned off with the power switch in the RBS, there is still AC voltage both on the AC board in the interface box, and on the connection board in the installation box up to the AC power switch.

9.10 Battery Backup Test

The purpose is to test if the battery is able to supply DC when the AC is off.

Note: Make sure that the Battery Fault indicator is not active before performing any battery test.

- This test is to be performed for each set of RBS and PBC, which is included in the configuration used.
- The test is passed if the RBS still is running when the incoming AC for the RBS and the PBC has been switched off. (The Local Mode indicator is on, or flashing, when the RBS is running.)

Note: The battery backup time is approximately two hours, depending on traffic, for instance.

9.10.1 Configurations Overview

← 2 TRX Sector →

PBC 1, RBS 1

← 4 TRX →

PBC 1, RBS 1 | PBC 2, RBS 2

← 6 TRX →

PBC 1, RBS 1 | PBC 2, RBS 2 | PBC 3, RBS 3

← 2 TRX Highway →

PBC 1, PBC 2, RBS 1

9.10.2 Power Switch Settings, Before and After Test

Table 33 Switch settings, before and after test

Switch settings						**Switch**
PBC 1	**RBS 1**	**PBC 2**	**RBS 2**	**PBC 3**	**RBS 3**	
I	**I**	**I**	**I**	**I**	**I**	Power
I	**I**	**I**	**I**	**I**	**I**	Batt

9.10.3 Test Procedure, 2 TRX Sector Configuration

1. Make sure that the PBC has been powered up for at least 15 minutes before starting the test.

   After 24 hours the battery is fully charged.

2. Make sure that the battery power for the RBS and the PBC is switched on, and the Battery Fault indicator is off on the RBS. Ensure that no faults are displayed on the PBC.

3. Switch off the incoming AC for the RBS and the PBC, and check on the RBS that the indicator AC Power On is off. The PBC alarm 020 is indicated.

Table 34 Switch settings during test, 2 TRX Sector configuration

Switch settings		**Switch**
PBC 1	**RBS 1**	
O	**O**	Power
I	**I**	Batt

4. Switch on the incoming AC for the PBC and the RBS. Check on the RBS that the AC Power On indicator lights up (yellow). The PBC alarm 020 disappears.

9.10.4 Test Procedure, 4 TRX and 6 TRX Configurations

1. Make sure that the PBC has been powered up for at least 15 minutes before starting the test.

   After 24 hours the battery is fully charged.

2. Make sure that the battery power for the RBS and the PBC is switched on, and the Battery Fault indicator is off on the RBS. Ensure that no faults are displayed on the PBC.

3. Switch on the AC and battery power on all RBSs and PBCs.

6 TRX Configuration

RBS 3, PBC 3

4. Switch off the incoming AC for RBS 3 and PBC 3. (Power switch settings according to *Table 35 on page 293*.)

5. Check on the Master RBS (RBS 1) that the fault indicator, AC Power On, is not flashing. Flashing indicator means faulty battery for RBS 3, PBC 3. Alarm code 020 is displayed on PBC 3.

6. Switch on the incoming AC for RBS 3 and PBC 3, and check on RBS 1 and RBS 3 that the indicator AC Power On lights up (yellow). The PBC 3 alarm 020 disappears.

Table 35 Switch settings during test of RBS 3, PBC 3 (6 TRX configuration)

Switch settings						**Switch**
PBC 1	**RBS 1**	**PBC 2**	**RBS 2**	**PBC 3**	**RBS 3**	
I	**I**	**I**	**I**	**O**	**O**	Power
I	**I**	**I**	**I**	**I**	**I**	Batt

RBS 2, PBC 2

7. Switch off the incoming AC for RBS 2 and PBC 2. (Power switch settings according to *Table 36 on page 294*.)

8. Check on the Master RBS (RBS 1) that the fault indicator, AC Power On, is not flashing. Flashing indicator means faulty battery for RBS 2, PBC 2. Alarm code 020 is displayed on PBC 2.

9. Switch on the incoming AC for RBS 2 and PBC 2, and check on RBS 1 and RBS 2 that the indicator AC Power On lights up (yellow). The PBC 2 alarm 020 disappears.

Table 36 Switch settings during test of RBS 2, PBC 2 (6 TRX configuration)

Switch settings						**Switch**
PBC 1	**RBS 1**	**PBC 2**	**RBS 2**	**PBC 3**	**RBS 3**	
I	**I**	**O**	**O**	**I**	**I**	Power
I	**I**	**I**	**I**	**I**	**I**	Batt

RBS 1, PBC 1

10. Switch off the incoming AC for RBS 1 and PBC 1. (Power switch settings according to *Table 37 on page 294*.)

11. Check on RBS 1 that the Battery Fault indicator is off. Alarm code 020 is displayed on PBC 1.

12. Switch on the incoming AC for RBS 1 and PBC 1. Check on RBS 1 that the AC Power On indicator lights up (yellow). The PBC 1 alarm 020 disappears.

Table 37 Switch settings during test of RBS 1, PBC 1

Switch settings						**Switch**
PBC 1	**RBS 1**	**PBC 2**	**RBS 2**	**PBC 3**	**RBS 3**	
O	**O**	**I**	**I**	**I**	**I**	Power
I	**I**	**I**	**I**	**I**	**I**	Batt

4 TRX Configuration

1. Make sure that the PBC has been powered up for at least 15 minutes before starting the test.

   After 24 hours the battery is fully charged.

2. Make sure that the battery power for the RBS and the PBC is switched on, and the Battery Fault indicator is off on the RBS. Ensure that no faults are displayed on the PBC.

3. Switch on the AC and battery power on all RBSs and PBCs.

Perform the procedure for RBS 2 and RBS 1 as described above.

9.10.5 Test Procedure, 2 TRX Highway Configuration

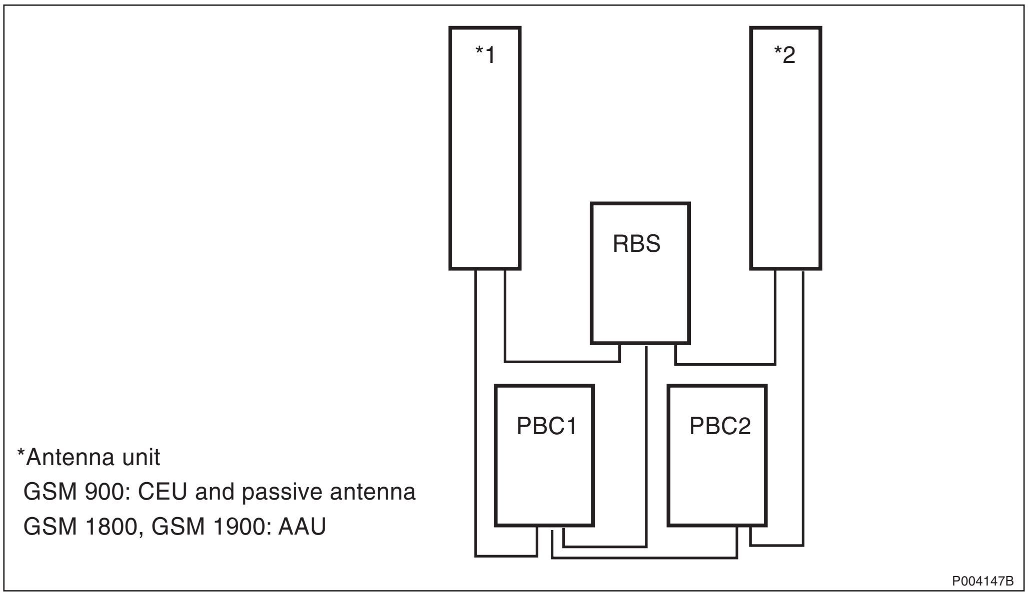


Figure 337 2 TRX Highway configuration

1. Make sure that the PBC has been powered up for at least 15 minutes before starting the test.

   After 24 hours the battery is fully charged.

2. Make sure that the battery power for the RBS, PBC 1 and PBC 2 are switched on, and the Battery Fault indicator is off on the RBS. Ensure that no faults are displayed on the PBC 1 and PBC 2.

3. Switch off the incoming AC for the RBS, PBC 1 and PBC 2, and check on the RBS that the indicator AC Power On is turned off. The PBCs indicate 020.

4. Switch on the incoming AC for the PBC 1, PBC 2 and the RBS. Check on the RBS that the AC Power On indicator lights up (yellow). The PBCs alarm 020 disappears.

Table 38 Switch settings, 2 TRX Highway configuration

Switch settings			**Switch**
PBC 1	**PBC 2**	**RBS**	
O	**O**	**O**	Power
I	**I**	**I**	Batt

9.11 Connecting the OMT

Connect the OMT cable (C26) from a PC COM-port to the RBS according to the figure below.

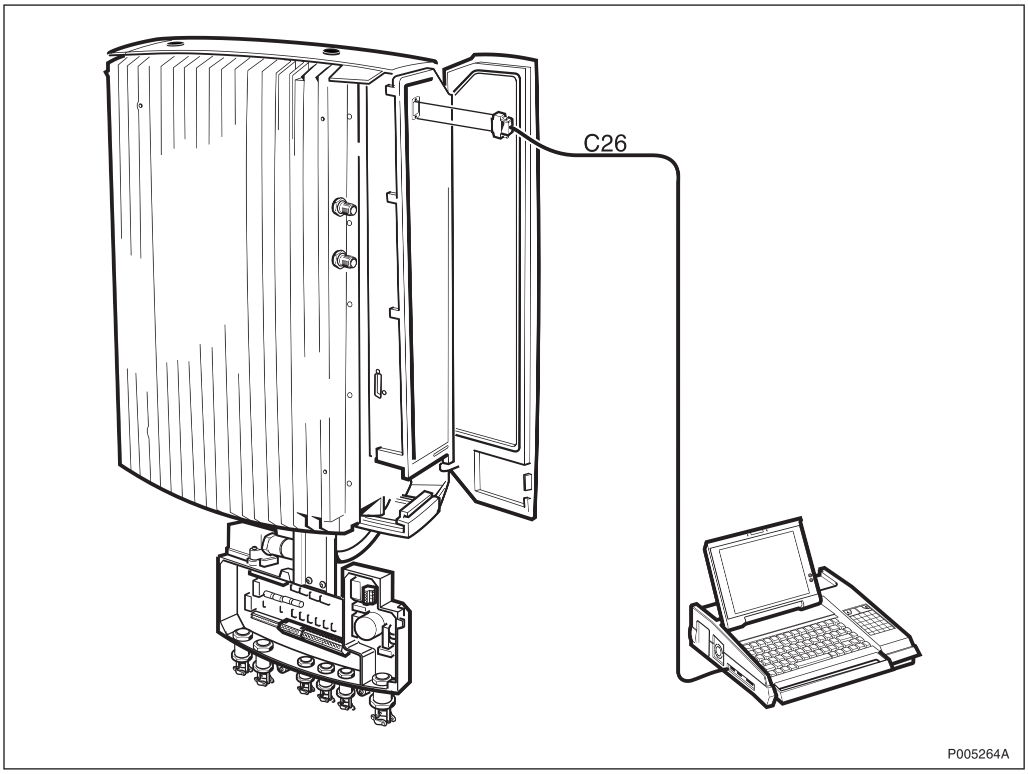


Figure 338 Connecting the OMT

Extended OMT cable (optional)

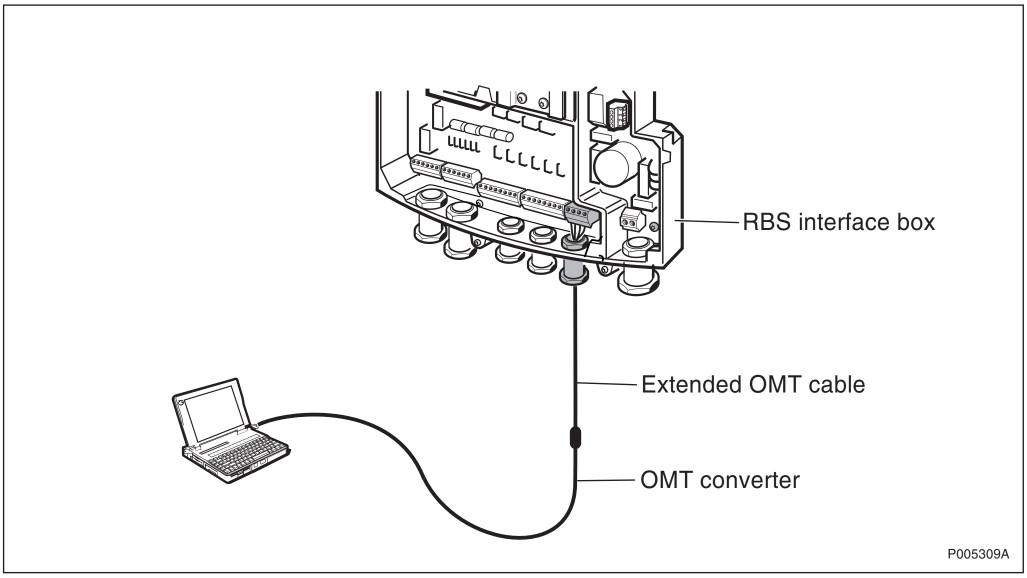


Figure 339 Test setup with extended OMT cable

An Extended OMT cable can be used for the 32 bits OMT, *see chapter Tools and Instruments*.

Connect the OMT converter between the Extended OMT cable and a PC, or BSC simulator, according to *Figure 339 on page 296*.

The OMT converter transforms the RS 422 standard to RS 232 standard.

9.12 Check IDB

Before starting any test, the RBS must have an Installation Database (IDB) that contains correct information about the equipment, and the configuration of the cabinet.

The IDB is essential to put the RBS into service.

9.12.1 OMT related actions. Overview

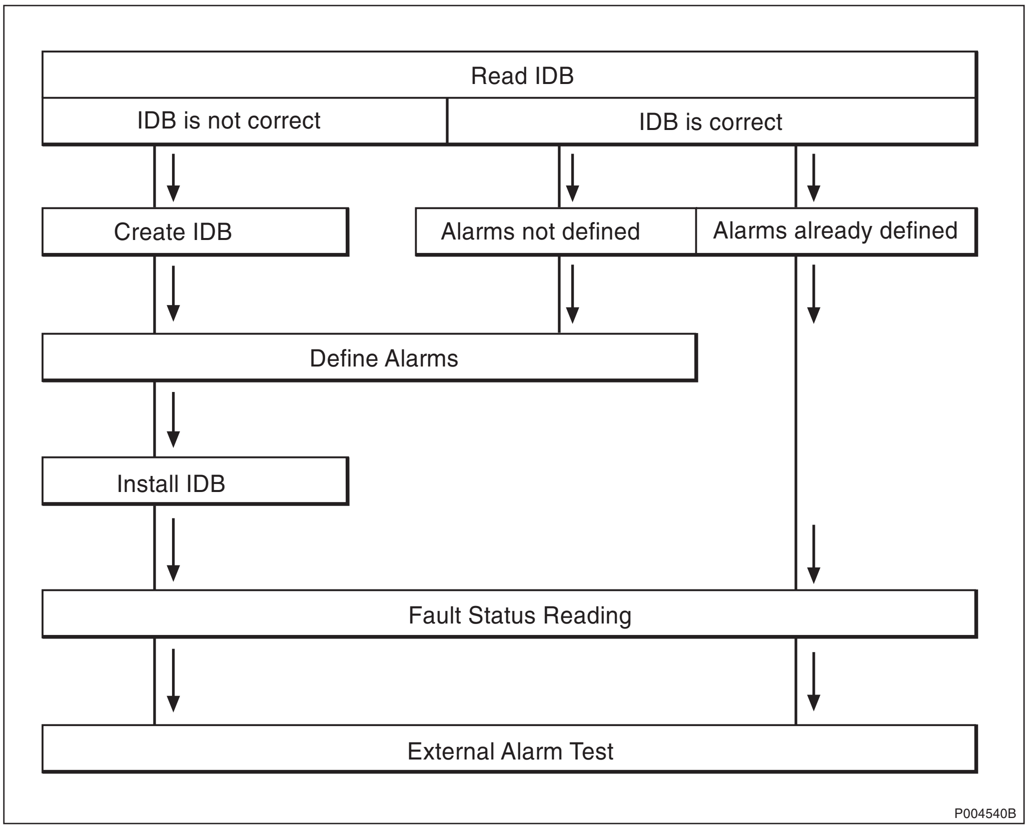


Figure 340 OMT related actions

9.12.2 Read IDB

Check with the OMT that the right IDB is installed in the RBS.

- If the IDB is correct, continue with *Section 9.13 Fault Status Reading on page 302*.
- If the IDB is incorrect, a new IDB must be created, see below.

9.12.3 Create IDB

The purpose is to create a new IDB if the current IDB is incorrect.

Example of parameters to be considered:

- Transmission Parameters (PCM)
- Cabinet Type
- Power System
- Frequency Band
- TEI value
- Antenna type
- Site Cell Configuration
- TNOM parameters(1)
- Alarm Inlets

(1) BSS R7 or later

1. Make sure that the OMT has been started and the IDB read. To create a new IDB the OMT must be in Disconnect mode.
2. Create IDB and define the setup parameters for the RBS. The description below explains how to define these parameters for 4 TRX and 6 TRX configurations.

Note: To be able to use 4 TRX or 6 TRX configuration the BSS R7 is needed.

4 TRX Configuration

- For 1x4 configuration, that is, one cell with two RBSs:

  Under Cabinet Setup, click New and define the first RBS. Click New again to define the second RBS.

  Under Antenna Sector Setup, click New only once and define the cell/sector.

- For 2x2 configuration, that is, two cells with one RBS in each cell:

  Under Cabinet Setup, click New and define the first RBS. Click New again to define the second RBS.

  Under Antenna Sector Setup, click New and define the first cell/sector. Click New again and define the second cell/sector.

6 TRX Configuration

- For 1x6 configuration, that is, one cell with three RBSs:

  Under Cabinet Setup, click New and define the first RBS. Click New again two times and define the second and the third RBS.

  Under Antenna Sector Setup, click New only once and define the cell/sector.

- For 2x3 configuration, that is, three cells with one RBS in each cell:

  Under Cabinet Setup, click New and define the first RBS. Click New again two times and define the second and the third RBS.

Under Antenna Sector Setup, click New and define the first cell/sector. Click New again two times and define the second and the third cell/sector.

Note: When using the SW Power Boost (TX-diversity) the OMT will show 2 TRXs, even though the RBS is to be considered as having only one TRX.

9.12.4 Define Maxite™ Alarms and External Alarms/ARAE Faults

Antenna Related Auxiliary Equipment (ARAE) only for BSS R7 or later.

Note: Make sure the RBS is in Local mode.

For R6

1. Make sure that the OMT is started, and IDB read.
2. Define the four Maxite alarms according to *Table 39 on page 299*(GSM 1800, GSM 1900):
   - Type
   - ID
   - Severity
   - Comment

Table 39 Maxite alarms (GSM 1800, GSM 1900)

Alarm Inlet Info(1)	Type	ID(2)	Severity	Comment
5	Breaking		Level 1	AAU carrier A, SEVERE-A
6	Breaking		Level 1	AAU carrier B, SEVERE-B
7	Breaking		Level 2	AAU carrier A or B, WARNING
8	Breaking		Level 2	PBC POWER, WARNING

(1) Recommended order.
(2) To be selected

3. If applicable: Define HDSL modem alarms according to *Section 9.12.5 on page 301*.
4. Define site specific alarm.

For R7

1. Make sure that the OMT is started, and IDB read.
2. Define the three Maxite alarms as ARAE faults according to *Table 40 on page 300*.

- Type
- Functionality
- Fault Class
- Antenna Instance

3. Define the PBC alarm as external alarm according to *Table 40 on page 300*.

Table 40 Alarms for 6 TRX configuration

Explanation of ARAE Alarms	
-/5	CEU/AAU alarm for carrier A (TRX0)
-/6	CEU/AAU alarm for carrier B (TRX1)
-/7	CEU/AAU alarm for part of carrier A or B

RBS 1 Maxite ARAE Alarms

Alarm Inlet Info(1)	Type	Functionality	Fault Class	Antenna Instance
0/5	Breaking	RX + TX	Class 1	0
0/6	Breaking	RX + TX	Class 1	1
0/7	Breaking	RX + TX	Class 2	0

PBC 1 Alarm (External Alarm)

Alarm Inlet Info(1)	Type	ID(2)	Severity	Comment
0/8	Breaking		Level 2	PBC POWER, WARNING

RBS 2 Maxite ARAE Alarms

Alarm Inlet Info(1)	Type	Functionality	Fault Class	Antenna Instance
1/5	Breaking	RX + TX	Class 1	2
1/6	Breaking	RX + TX	Class 1	3
1/7	Breaking	RX + TX	Class 2	0

PBC 2 Alarm (External Alarm)

Alarm Inlet Info(1)	Type	ID(2)	Severity	Comment
1/8	Breaking		Level 2	PBC POWER, WARNING

RBS 3 Maxite ARAE Alarms

Alarm Inlet Info(1)	Type	Functionality	Fault Class	Antenna Instance
2/5	Breaking	RX + TX	Class 1	4
2/6	Breaking	RX + TX	Class 1	5
2/7	Breaking	RX + TX	Class 2	0

PBC 3 Alarm (External Alarm)

Alarm Inlet Info(1)	Type	ID(2)	Severity	Comment
2/8	Breaking		Level 2	PBC POWER, WARNING

(1) Recommended order.
(2) To be selected.

4. If applicable: Define HDSL modem alarms according to *Section 9.12.5 on page 301*.

5. Define site specific alarm.

9.12.5 Define HDSL Modem External Alarm

If a HDSL modem is used, the HDSL alarm can be defined according to the table below.

Table 41 HDSL alarms

Alarm Inlet Info	Type	ID	Severity	Comment
3	Closing		Level 2	HDSL DEGRADATION DOWNSTREAM OR PAIR 1
4	Closing		Level 2	HDSL DEGRADATION UPSTREAM OR PAIR 2

9.12.6 Define Hardware Information for a Passive RU (Optional)

For information refer to:

OMT User's Manual *LZN 302 01*

9.12.7 Install IDB

If 4 TRX or 6 TRX configuration is used, the IDB must be installed in the Master RBS before switching on any Extension RBS (RBS 2, RBS 3).

Note: The RBS has to be in Local mode to accept a new or modified IDB.

If necessary, change mode by pressing the Local remote button.

1. Establish a link between the OMT and the RBS.
2. Install the IDB.
3. Check with the OMT that the defined alarms are properly installed.
4. Make sure that all RBSs are in remote mode.

9.13 Fault Status Reading

If any fault LED is lit, including the external alarms LED, the fault status must be read.

1. Make sure that the OMT is started, and IDB read.
2. Read the faults with the OMT.
3. If needed, *see chapter Fault Handling*, to decode the faults in the Event Monitor field.
4. Take corrective action.

9.14 Maxite™ and External Alarm Tests/ARAE Fault Tests

The purpose of this test is to make sure, by using the OMT, that the external alarms are recognised and handled correctly. The test is passed when all defined alarms are recognised.

Note: Make sure that the transmission cable is disconnected when the test is to be performed. If not, and a fault appears, the site will be shut down.

Note: If ARAE fault is to be tested, check with the OMT that the correct fault code has appeared.

The external alarms are specified individually for each site.

9.14.1 2 TRX Configuration

1. Activate an alarm by applying appropriate closing or breaking depending on definition. The alarm connectors are located in the interface box.

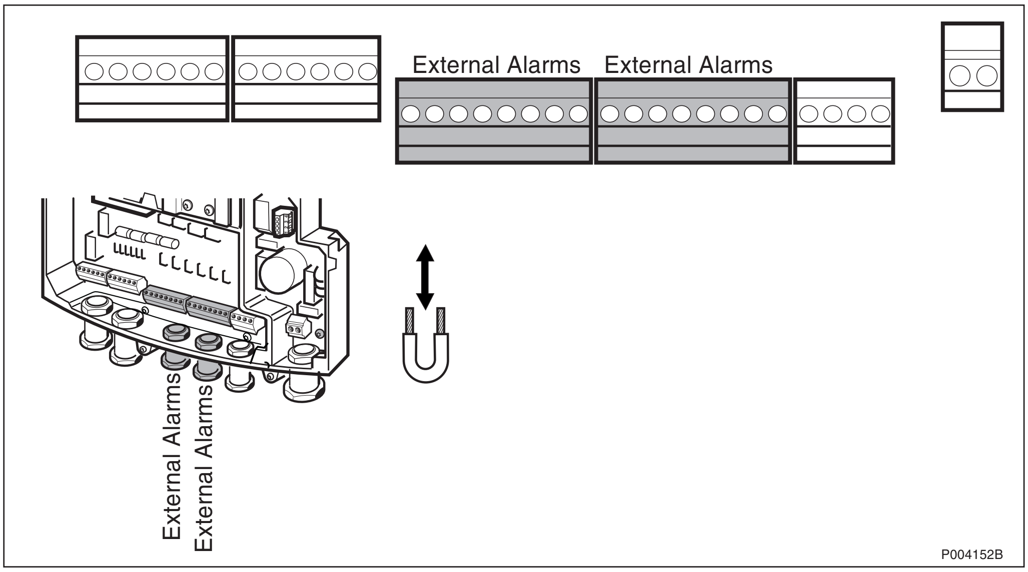


Figure 341 Test of closing alarm

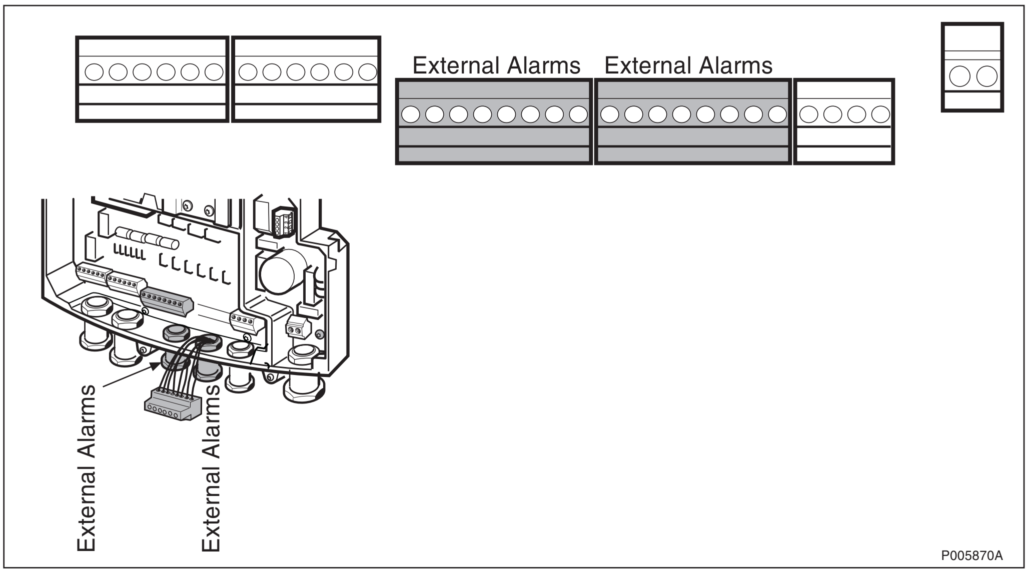


Figure 342 Test of breaking alarm

For an explanation of the indicators *see Section Explanation of the Indicators on page 257*.

2. External alarm:

   - The external alarm indicator will now be lit.

   ARAE fault:

   - The fault indicator will now be flashing

3. Check with the OMT that the appropriate alarm appears.
4. Deactivate the alarm applied in step 1 so that no faults are indicated.
5. External alarm:

- The external alarm indicator will turn off.

ARAE fault:

- The fault indicator will stop flashing

6. Repeat steps 1 to 5 for all alarms.

9.14.2 4 TRX and 6 TRX Configurations

External alarm test on RBS 1

1. Activate an alarm by applying appropriate closing or breaking depending on definition. The alarm connectors are located in the interface box.
2. External alarm:

   - The external alarm indicator on RBS 1 will now be lit.

   ARAE fault:

   - The fault indicator on RBS 1 will now be flashing.
3. Check with the OMT that the appropriate alarm appears.
4. Deactivate the alarm applied in step 1 so that no faults are indicated.
5. External alarm:

   - The external alarm indicator on RBS 1 will be off.

   ARAE fault:

   - The fault indicator on RBS 1 will stop flashing.
6. Repeat steps 1 to 5 for all alarms.

External alarm test on RBS 2

1. Activate an alarm by applying appropriate closing or breaking depending on definition. The alarm connectors are located in the interface box.
2. External alarm:

   - The external alarm indicator on RBS 1 will now be flashing and the external alarm indicator on the RBS that generates the fault will be lit.

   ARAE fault:

   - The fault indicator on RBS 1 will now be flashing and the fault indicator on the RBS that generates the fault will be lit.
3. Check with the OMT that the appropriate alarm appears.

4. Deactivate the alarm applied in step 1 so that no faults are indicated.
5. External alarm:

   - The external alarm indicator on RBS 1 will stop flashing and the external alarm indicator on the RBS that generated the fault will be off.

   ARAE fault:

   - The fault indicator on RBS 1 will stop flashing and the fault indicator on the RBS that generated the fault will be off.

6. Repeat steps 1 to 5 for all alarms.

External alarm test on RBS 3

Perform the same test procedure as described for RBS 2 above.

9.15 Network Configuration

The purpose is to configure the RBS for stand alone mode or cascade connection.

1. Start the OMT program.
2. Choose Connect in the OMT Connection menu.
3. Choose Read IDB in the OMT menu.
4. Enter the Define PCM dialog box in the OMT and define Transmission Interface, Network Topology, Sync Source and E1/T1 parameters.
5. Define TEI, see correct address in network data. Make sure the BSC has the corresponding TEI value.
6. Install the modified IDB.
7. Exit OMT.

When cascading two or more RBSs, more than one Transceiver Group (TG) is connected to the same DIP. Each TG, which is on the same dip, must have a unique CF TEI value. The TEI value must be changed with the OMT. See instruction in:

OMT User's Manual	*LZN 302 01*

9.16 Define PCM Parameters (E1, 120 ohm)

The purpose is to configure the RBS for stand alone mode or cascade connection and to define the E1 transmission parameters using the OMT.

For more information about how to use the OMT see:

OMT User's Manual *LZN 302 01*

The following parameters must be considered when defining the PCM transmission.

- Transmission Interface (E1)
- Network Topology
- Sync Source
- E1 Receiver Sensitivity Parameters (Short Haul/ Long Haul)

The purpose of Short Haul or Long Haul Receiver Sensitivity settings is to configure the RBS for Short Haul/Long Haul transmission to optimize the transmission line performance.

Note: This feature requires the RBS to be equipped with DXU-11.

Long Haul makes it possible to use longer cables for transmission between the RBS and the Far End or between RBSs in multidrop configurations.

The Long Haul functionality is accomplished by high sensitivity in the receiver. The receiver dynamic range is 0 to - 30 dB at 1024 Hz for 120 ohms twisted pair cables (0 dB = 6.0 Vp-p). With Short Haul the receiver sensitivity is - 6 dB. The maximum cable length is calculated as:

Max. cable length = Receiver sensitivity/Cable attenuation per metre.

To take advantage of the Long Haul function the Far End, for example a DXX, Mini DXC, BSC or another RBS must support Long Haul. If two equipments are connected together, the equipment with the least sensitive receiver determines the maximum attenuation of the cables that can be used.

The default value is Long Haul and can be used for all cable lengths (cable attenuation 0 - 30 dB). If cables used have an attenuation less than 6 dB, Short Haul can be used to avoid noise and cross talk to interfere with the signal.

9.17 Define PCM Parameters (T1, 100 ohm)

The purpose is to configure the RBS for stand alone mode or cascade connection and to define the T1 transmission parameters using the OMT.

For more information about how to use the OMT see:

OMT User's Manual *LZN 302 01*

The following parameters must be considered when defining the PCM transmission.

- Transmission Interface (T1)
- Network Topology
- Sync Source

- T1 LBO Parameters (Short Haul/ Long Haul)

The purpose of LBO parameter settings is to configure the RBS for Short Haul/Long Haul transmission to optimize the transmission line performance and to reach the signal level stated by the network operator.

Note: This feature requires the BTS to be equipped with DXU-11.

The choice between Short Haul and Long Haul is depending on the maximum input level at the Far End/Network Interface specified by the network operator and the length of the transmission line.

The Short Haul functionality includes the possibility to amplify the output signal. This is used to adapt the line signal to optimize the transmission line performance in the range 0 - 655 feet. The dynamic range of the receiver in Short Haul mode is + 3 to - 6 dB at 772 kHz.

The Long Haul functionality provides higher sensitivity in the receiver compared with Short Haul. The receiver dynamic range is 0 to - 30 dB at 772 kHz in Long Haul mode. In addition the output signal can be attenuated with an LBO (Line Build Out). The LBO can be used in manual or automatic mode. In both modes the output signal can be attenuated in standardized steps of 7.5 dB between 0 and - 22.5 dB.

9.17.1 Defining Short Haul parameters

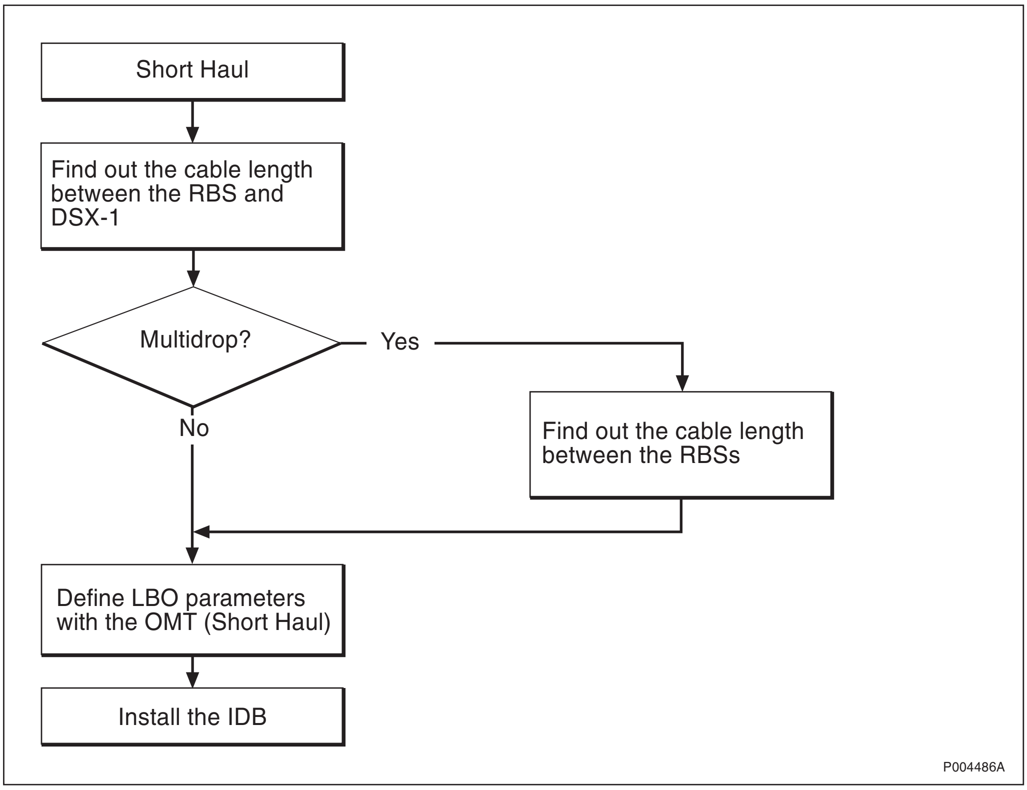


Figure 343 Defining Short Haul (0 - 655 feet)

The purpose of the Short Haul functionality is to reach a signal level of 0 dB at the DSX-1 cross-connect point.

The length of the cable between the RBS and the DSX-1 must be known to be able to perform Short Haul. If DSX-1 is not used, choose 0-133 feet.

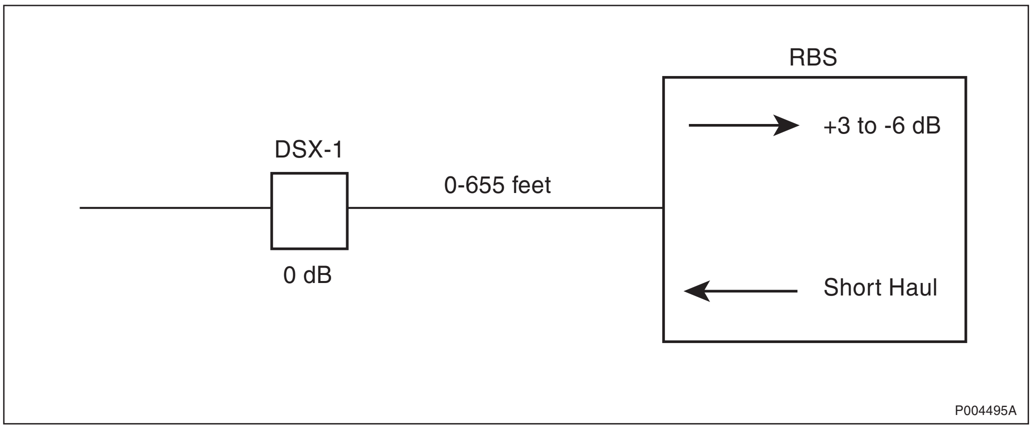


Figure 344 The Short Haul principle

In order to reach 0 dB at the cross-connect point (DSX-1 level), the PCM port output signal can be amplified in five different levels. In the OMT the signal level is chosen according to the cable length between the RBS and the DSX-1 interface. The reference cable is a multi-pair 22 AWG office cable with overall outer shield. The following values are supported:

- 0-133 feet
- 133-266 feet
- 266-399 feet
- 399-533 feet
- 533-655 feet

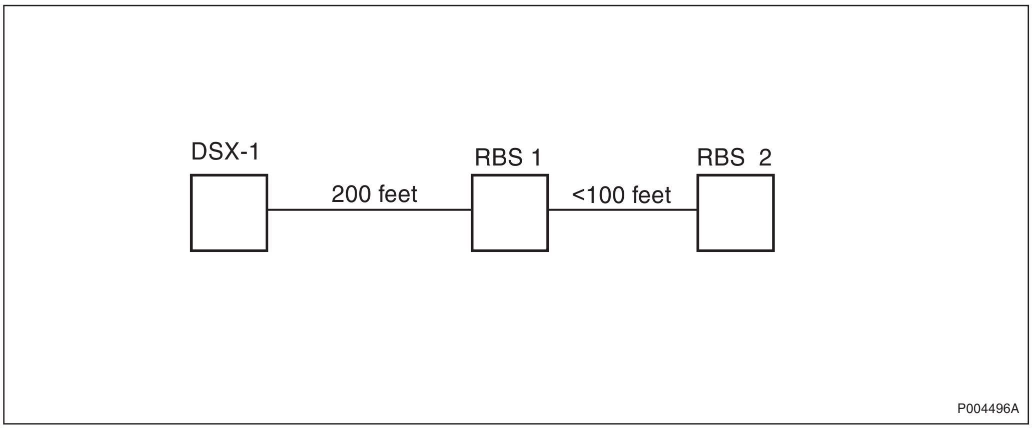


Figure 345 The Short Haul Multidrop principle

Example:

LBO parameters for RBS 1:

- LBO A: Short h; 133–266 feet
- LBO B: Short h; 0–133 feet

LBO parameters for RBS 2:

- LBO A: Short h; 266–399 feet
- LBO B: Short h; 0–133 feet

9.17.2 Defining Long Haul parameters

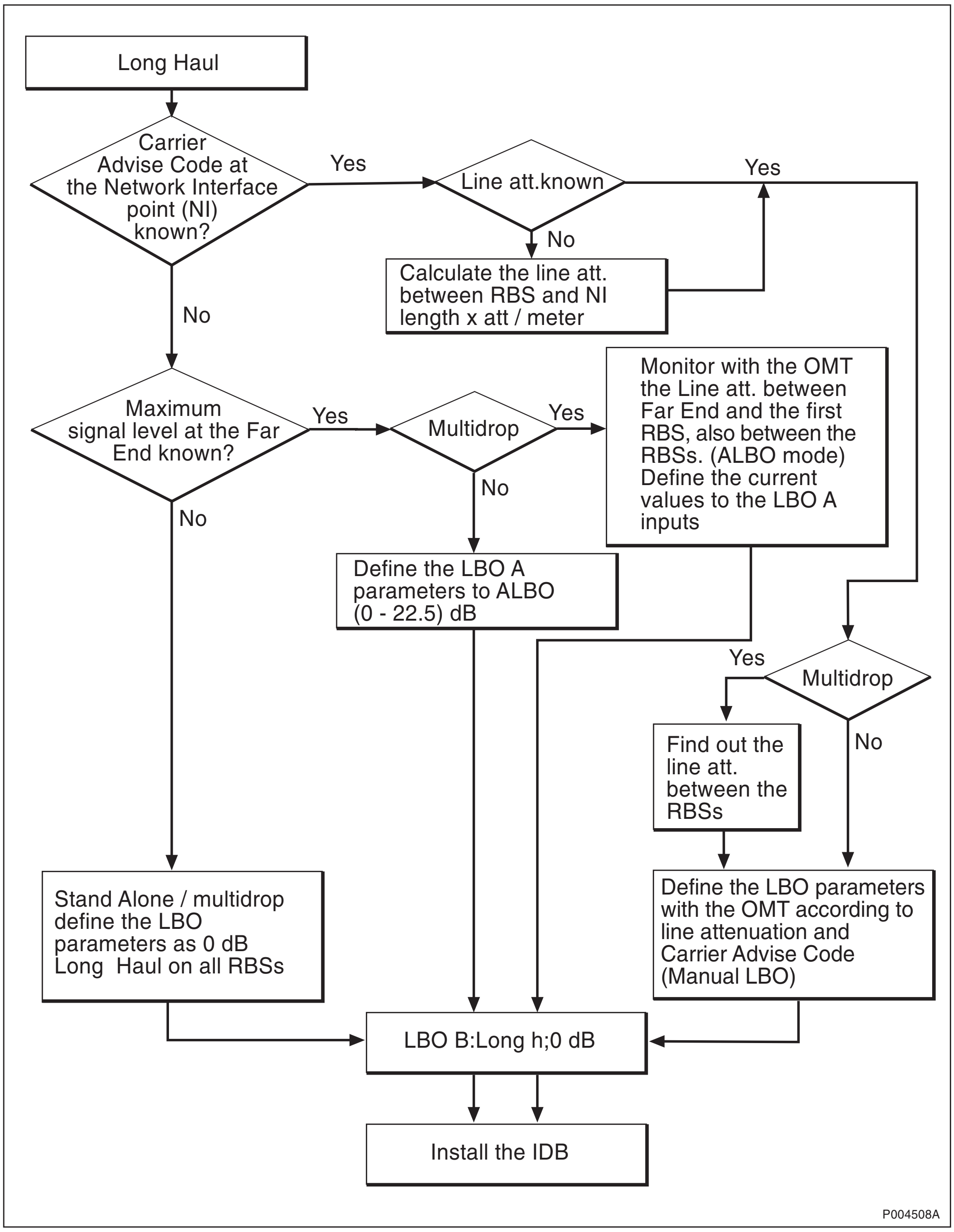


Figure 346 Defining Long Haul (> 655 feet)

The purpose of Long Haul is to optimize line performance.

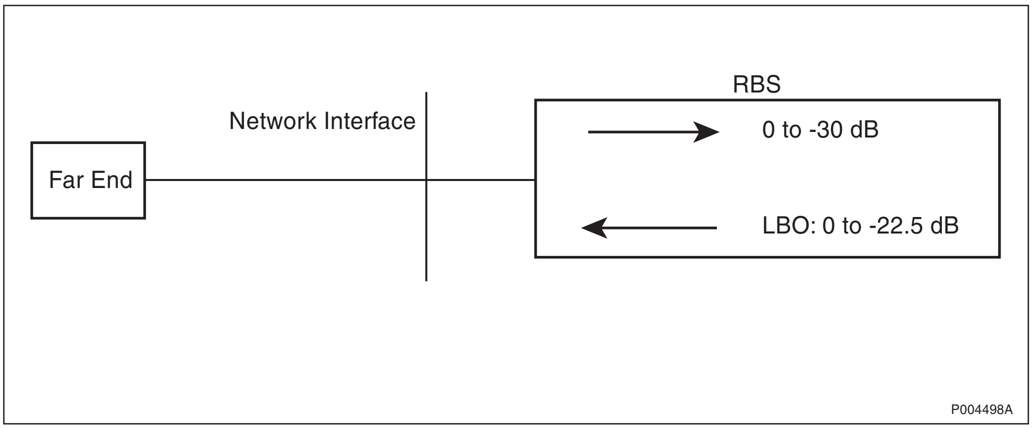


Figure 347 Long Haul

Long Haul makes it possible to transmit and receive over longer distances than Short Haul without additional transmission equipment.

The Long Haul functionality is accomplished by high sensitivity in the receiver. The receiver dynamic range is from 0 down to -30 dB. To cope with noise, a margin should be used.

For T1 it is also possible to attenuate the output signal with LBO.

LBO is used to avoid overloading the receiver at the Far End, and to minimise cross talk.

To take advantage of Long Haul the transmission equipment in both ends must support Long Haul functionality. If two equipments are connected together, the equipment with the least sensitive receiver determines the maximum attenuation of the cables that can be used.

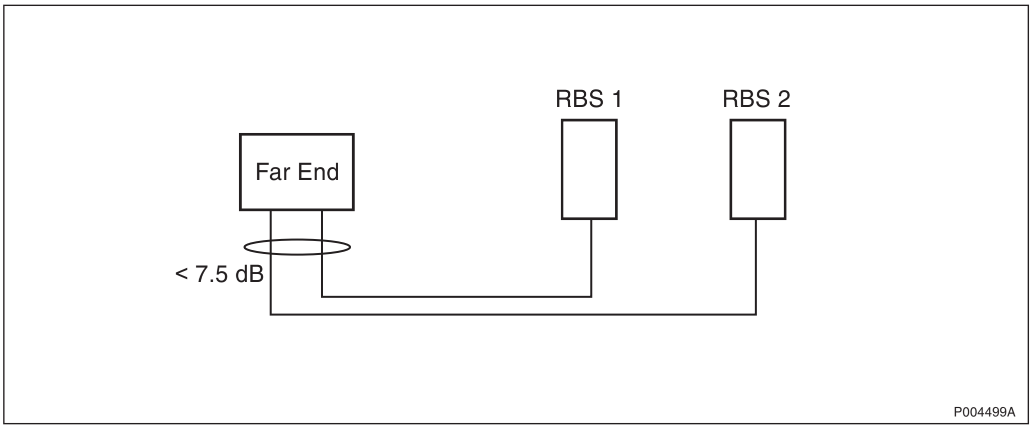


Figure 348 Line Build Out

Line Build Out is only used for T1 transmission interface in Long Haul cases.

Line Build Out should not be mixed up with LBO parameters, which are defined with the OMT.

Line Build Out is the possibility to attenuate the output signal sent from the RBS.

The purpose of Line Build Out is to reduce cross talk and to be able to send signals to different kind of Far Ends. For example, if two RBSs are at different distances from the Far End, the signal received from the closest RBS is to be much stronger than the signal received from the RBS far away. To minimise cross talk at the Far End, the output signal from the closest RBS is attenuated. With this, the input signal from both RBSs is kept at the same level at the Far End.

Manual LBO for Carrier Advised Code

In order to manually set the LBO attenuation values in the OMT, the operator has to know:

- Carrier Advised Code at the Network Interface (NI).
- Line attenuation for the customer cable between the RBS and the NI.

Example:

See Table 42 on page 311.

Carrier Advise Code at NI is -7.5 dB,

Line Attenuation between the RBS and the NI is 12 dB.

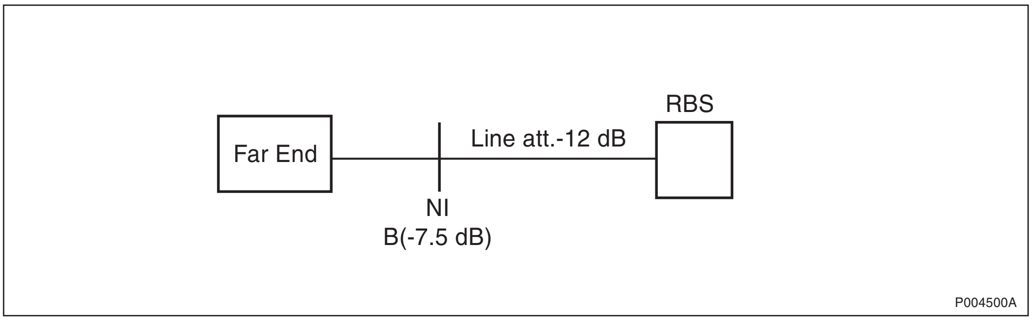


Figure 349

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

The port B outputs should always have LBO 0 dB (Long h., 0 dB) attenuation for all RBSs.

Table 42

Line Attenuation (dB)	Carrier Advise Code at NI (dB)			
	A (0 dB)	B (-7.5 dB)	C (-15 dB)	D (-22.5 dB)
0-5.5	0	-7.5	-15	-22.5
7.5-13	N/A	0	-7.5	-15
15-20.5	N/A	N/A	0	-7.5
22.5-	N/A	N/A	N/A	0

Manual LBO for maximum input signal level at the Far End

In order to manually set the LBO attenuation values in the OMT, the operator has to know:

- Maximum input signal level of the equipment at the Far End.

- Line attenuation between the RBS and the Far End.

The Line attenuation should be either calculated or measured. The LBO value is calculated as follows:

Maximum output level = Maximum input signal level at the Far End + Line attenuation.

The LBO standard value with the next higher attenuation is chosen.

Example:

Far End permits a signal level of max. -22.5 dB and the Line Attenuation has been measured to 9 dB. Max. output level from the RBS is - 22.5 + 9 = -13.5 dB. The LBO is set to -15 dB. See Table 43 on page 312.

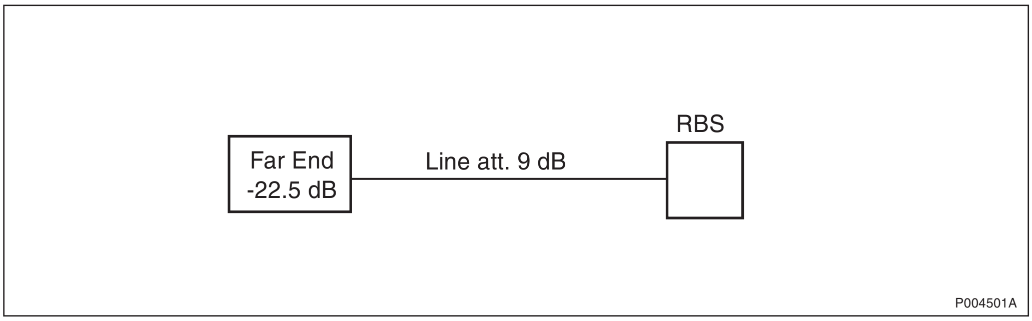


Figure 350

- LBO A: Long h; -15 dB
- LBO B: Long h; 0 dB

Table 43

Line Attenuation (dB)	Maximum signal level at Far End (dB)			
	0	-7.5	-15	-22.5
0 - 7.5	0	-7.5	-15	-22.5
7.5 - 15	0	0	-7.5	-15
15 - 22.5	0	0	0	-7.5
22.5 -	0	0	0	0

Example:

If none of the following are known, Carrier Advise Code, Line Attenuation or maximum input level at the Far End.

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

Automatic LBO for Long Haul

Automatic LBO (ALBO) is used for T1 transmission interface in Long Haul cases. If maximum input signal level at the Far End is known, use this value to set the ALBO in the OMT.

ALBO is to be used also when the Carrier Advised Code and Line attenuation are not known.

The received signal level is measured at the PCM port of the RBS. The output signal from the Far End is always assumed to be 0 dB.

1. The received signal is measured and the Line Attenuation is calculated in the RBS and can be monitored with the OMT. The displayed value is in deci dB (10 deci dB = 1 dB).
2. From the Line Attenuation and the maximum input signal level at the Far End appropriate LBO value is set automatically.

Example for Stand Alone:

The maximum input signal level at the Far End is: -15 dB, Line Attenuation is not known.

- LBO A: Long h; ALBO –15 dB
- LBO B: Long h; 0 dB

Example for Multidrop:

The maximum input signal level at the Far End is: -15 dB, Line Attenuation is not known.

Settings in order to find out the line attenuation between RBS 1 and RBS 2:

	RBS 1	RBS 2
LBO A	Long h; ALBO –15 dB	Long h; ALBO 0 dB
LBO B	Long h; 0 dB	Long h; 0 dB

To enable measuring the line attenuation, RBS 2 must be reset.

The measurement result can be monitored with the OMT.

When the measurement is completed, change to manual LBO and use the values according to Table 43 on page 312.

Manual LBO with Multidrop

The purpose of setting the LBO parameters in multidrop configurations is to assure that the signal level will not be affected if one, or several, of the RBSs are in Bypass State (powered off or reset), .

Automatic or manual LBO can be used between the Far End and RBS 1 port A as in the Stand Alone case. The LBO at port A in the other RBSs must be set manually.

The LBO parameter at port A of RBS 2 should be set as if RBS 1 was in Bypass State. For Carrier Advised Code at the Network Interface point, the Line Attenuation is the Line Attenuation between the NI and the RBS 1 added to the Line Attenuation between RBS 1 and RBS 2.

For a maximum input signal level at the Far End, the total Line Attenuation is the Line Attenuation between the Far End and the RBS 1 added to the Line Attenuation between RBS 1 and RBS 2.

The port A of RBS 3 is set as if RBS 1 and RBS 2 were in Bypass State, and so on.

The port B outputs should always have LBO 0 dB (Long h., 0 dB) attenuation for all RBSs.

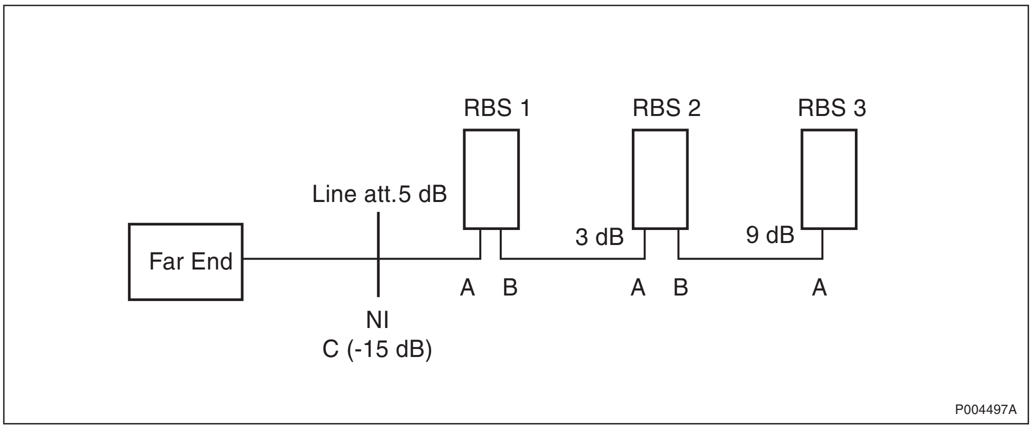


Figure 351

Example 1 of multidrop using manual LBO parameters:

RBS 1: Carrier Advise Code at NI (-15 dB) and Line Attenuation (5 dB).

RBS 2: Line Attenuation between RBS 1 and RBS 2 (3 dB) + Line Att. between RBS 1 and NI (5 dB) = 8 dB.

RBS 3: Line Attenuation between RBS 2 and RBS 3 (9 dB) + Line Att. between RBS 2 and RBS 1 (3 dB) + Line Att. between RBS 1 and NI (5 dB) = 17 dB.

See Table 42 on page 311.

LBO parameters for RBS 1:

- LBO A: Long h; –15 dB
- LBO B: Long h; 0 dB

LBO parameters for RBS 2:

- LBO A: Long h; – 7.5 dB
- LBO B: Long h; 0 dB

LBO parameters for RBS 3:

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

Example 2 of multidrop using LBO parameters:

When none of the following are known, Carrier Advise Code, and Line attenuation or maximum input signal at the Far End presume that the max. signal at the Far End is 0 dB. Use the following parameters for all RBSs:

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

9.18 HDSL Configuration

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

9.18.1 Link configuration

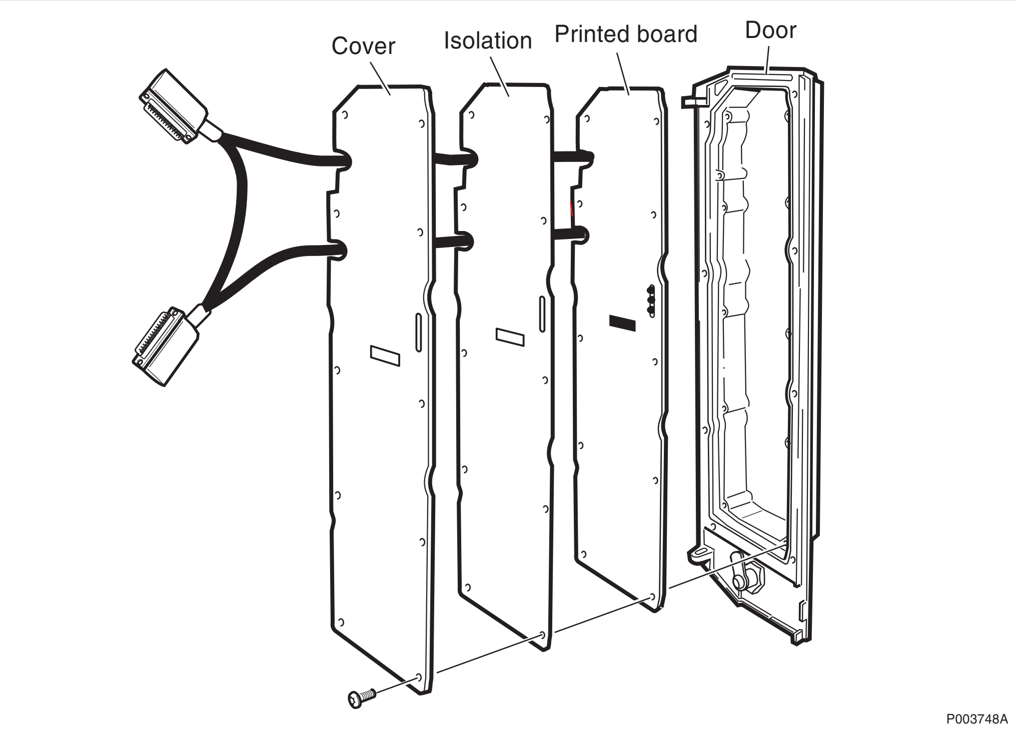


Figure 352 Mounting and demounting of HDSL modem module in the HDSL door

At pre-installation an HDSL link can be established upstream, downstream or in both directions. The other link is established with a PCM connection which is then directly bypassed from the radio cabinet G.703 interface to the RBS line interface. The choice or configuration is made by choosing one of the three possible connectors in both the line interface (J2, J4 and J6) and the G.703 interface (J1, J3 and J5) of the module. *Table 44 on page 316*states the link choice as a function of the selected connector.

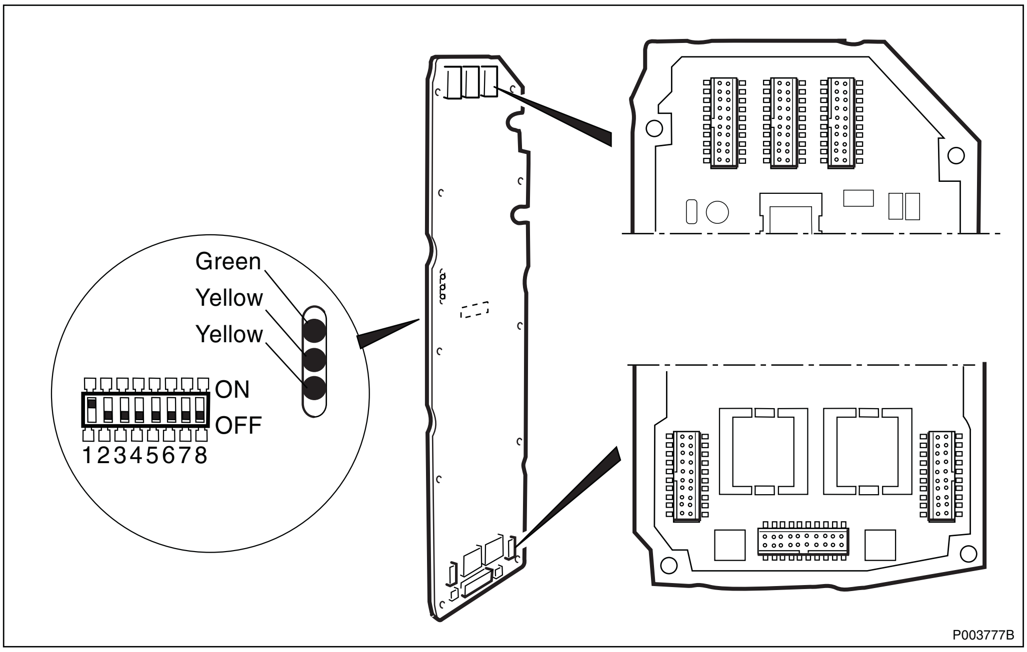


Figure 353 Location of DIP switches, LEDs and connectors

Table 44 Connector selections for the different link choices

	Selected Connectors	Upstream Type	No. of Pairs in upstream	Downstream Type	No. of Pairs in downstream
A	J3 and J4	HDSL	1	HDSL	1
B	J5 and J6	PCM	2 (=PCM)	HDSL	1 or 2 in point-to-point
C	J1 and J2	HDSL	1 or 2 in point-to-point	PCM	2 (=PCM)

Note: Default settings are J3 and J4.

Note: The HDSL 1+1 protection mode selection is independent from this link type selection but is only available in 2 pair mode (B and C in the table).

Note: If the configuration has been changed the marking of the cover must be updated.

9.18.2 LED Indicators

The LEDs of the HDSL Modem Unit has the following functions:

Table 45 The indications of the LEDs

LED	LED On		LED Off
	Steady Light	**Flashing Light**	
Green	Power ON	See note	Power OFF
Upper Yellow, downstream or Pair 1	Link operational	Filter tuning in progress	Link break or not in use
Lower Yellow, upstream or Pair 2	Link operational	Filter tuning in progress	Link break or not in use

Note: A faulty configuration (inconsistent settings of the DIP switches) will be indicated by flashing of all three LEDs simultaneously.

9.18.3 Strapping

Following tables summaries the settings of the DIP-switches in different modes.

Table 46 The chain (cascading) mode strappings

Function	Switch position			Parameter value
	SW 1			
Topology	OFF			chain
	SW 2	**SW 3**		
Line rate of master modem in chain mode	ON	ON		2320 kbit/s
	OFF	ON		1168 kbit/s
	ON	OFF		592 kbit/s
	OFF	OFF		reserved
	SW 4	**SW 5**	**SW 6**	
Running number of RBS in the chain mode	ON	ON	ON	RBS number 1
	OFF	ON	ON	RBS number 2
	ON	OFF	ON	RBS number 3
	OFF	OFF	ON	RBS number 4
	ON	ON	OFF	RBS number 5
	OFF	ON	OFF	RBS number 6
	ON	OFF	OFF	RBS number 7
	OFF	OFF	OFF	RBS number 8
	SW 7			
Reserved in chain mode	ON			Not applicable
	SW 8			
Usage of external alarm	ON			External alarms used by HDSL module
	OFF			External alarms

This table shows how the DIP-switches are set.

Table 47 The point-to-point DXX proprietary mode strappings

Function	**Switch position**		**Parameter value**
	SW 1		
Topology	ON		point-to-point
	SW 2	**SW 3**	
Line rate in point-to point DXX proprietary mode	ON	ON	2320 kbit/s
	OFF	ON	1168 kbit/s
	ON	OFF	592 kbit/s
	OFF	OFF	reserved
	SW 4		
HDSL operation in point-to-point mode	ON		Proprietary mode
	SW 5		
Number of pairs in point-to-point DXX proprietary mode	ON		1 pair used
	OFF		2 pairs used
	SW 6		
Protection in point-to-point proprietary mode	ON		No protection
	OFF		1 + 1 protection used
	SW 7		
Modem role in point-to-point mode	ON		HDSL Master
	OFF		HDSL Slave
	SW 8		
Usage of external alarm	ON		External alarms used by HDSL module
	OFF		External alarms

Table 48 The point-to-point ETSI compliant mode strappings

Function	**Switch position**		**Parameter value**
	SW 1		
Topology	ON		point-to-point
	SW 2	**SW 3**	
Line rate point-to point ETSI compilant mode	ON	ON	1 x 2 Mbit/s
	OFF	ON	2 x 1 Mbit/s asynchronous
	ON	OFF	2 x 1 Mbit/s synchronous
	OFF	OFF	2 x 1 Mbit/s partial
	SW 4		
HDSL operation in point-to-point mode	OFF		ETSI compliant mode
	SW 5		
Reserved in ETSI compliant mode	ON		Not applicable
	SW 6		
Reserved in ETSI compliant mode	ON		Not applicable
	SW 7		
Modem role in point-to-point mode	ON		HDSL Master
	OFF		HDSL Slave
	SW 8		
Usage of external alarm	ON		External alarms used by HDSL module
	OFF		External alarms

9.18.4 Start-up

After start-up of the RBS and the PBC, check that the green LED of the HDSL Modem will light steady. Wait for the yellow LEDs to go from flashing to steady light. One or two LEDs will light depending on the configuration according to the *Table 45 on page 317*.

9.19 Concluding Routines

The purpose is to save the configuration of the IDB on a diskette.

Save the IDB on a diskette. The name of the IDB file must be site specific.

Label the diskette according to *Table 49 on page 319*.

Table 49 IDB diskette label

Item	**Description**
<Date>	Current date (YYMMDD)
<rev>	Revision state of the product
<Site Name>	Site name for the RBS
<RBS serial number>	Serial number of the RBS
<backup date>	Date of backup (YYMMDD)

9.19.1 Before Leaving the Site

The following checklist is not mandatory but strongly recommended. Local procedures and safety regulations must be evaluated and included in this checklist.

Table 50 Checklist

Checklist		OK
1	Red fault indicators are off.	
2	All operational green LEDs light.	
3	Make sure the RBS is in remote mode (yellow indicator is off or flashing).	
4	Other yellow indicators are off, or flashing if no PCM link is connected.	
5	Test equipment has been disconnected from the RBS.	
6	Radio sub-cabinet and mounting base are free from foreign objects.	
7	All cables are undamaged.	
8	Backup copy of the RBS IDB has been saved on a floppy disk.	
9	All tools have been accounted for.	
10	The cabinet has been locked.	
11	External air intake is free from obstructions.	
12	Defective part packed for shipment (including Repair Delivery Note).	
13	All other necessary paper work has been completed.	

Signature	Date

9.20 Test Record

Example of a test record that is to be filled in during the tests.

9.20.1 Site Data

Site Hardware Status

Date.	Site Name:
Site No:	Cell configuration:
RBS type:	Testers Name:

Site Hardware Status

Unit	**Product No.**	**Serial No.**	**Rev.**	**Manufact. date**
RBS 1:				
-Radio cabinet				
-Mounting base				
-PSA				
-HDSL				
RBS 2:				
-Radio cabinet				
-Mounting base				
-PSA				
-HDSL				
RBS 3:				
-Radio cabinet				
-Mounting base				
-PSA				
-HDSL				
PBC 1				
-Battery cabinet				
-Mounting base				
PBC 2				
-Battery cabinet				
-Mounting base				
PBC 3				
-Battery cabinet				
-Mounting base				
AAU 1/CEU 1				
AAU 2/CEU 2				
AAU 3/CEU 3				

P005582A

Figure 354 Site Hardware Status

9.20.2 Test Result

Antenna System Tests

Test Record for Antenna System Tests

Date.	Site Name:
Site No:	Cell configuration:
RBS type:	Testers Name:

Instrument Used (Site Master)

Instrument — Serial Number

Anritsu Site Master S120A ________________________

Signatures

Responsible for the record — Date: __________ Name: ____________________

Customer acceptance — Date: __________ Name: ____________________

Test Results

Cell [ ]

Installation check

Visual check [ ]

Antenna direction [ ] Degrees

Remarks ____

____

____

DTF Test

DTF Test

(< 1.05 SWR) P/F

RBS 1		RBS 2		RBS 3	
X 2	X 3	X 2	X 3	X 2	X 3

Attenuation Test

Total attenuation

RBS 1		RBS 2		RBS 3		
X 2	X 3	X 2	X 3	X 2	X 3	
						dB

P005611A

Figure 355 An example of a test record

Note: When calculating the total attenuation for Highway Configuration the HISCs should also be included. Calculation of the total attenuation is exemplified in *Section Highway Configuration on page 285*.

Test Checklist

Test Record for Stand Alone Tests

NE Commissioning GSM -

Date.	Site Name:
Site No:	Cell configuration:
RBS type: 2302	Testers Name:

NE STAND ALONE TEST

		Remark
- Antenna System Tests	☐	
- AC Mains Power Test	☐	
- Start-up of Maxite	☐	
- Self-test check	☐	
- Battery Backup Test	☐	
- Check IDB	☐	
- Define Maxite and External Alarms/ ARAE faults	☐	
- Fault Status Reading	☐	
- Maxite and External Alarm Test	☐	

TEI Value

	RBS 1	RBS 2	RBS 3	RBS 4	RBS 5
Multidrop					
Stand Alone					

PCM Parameters Settings
Short Haul (feet)/Long Haul (dB)

	RBS 1	RBS 2	RBS 3	RBS 4	RBS 5
LBO-A					

Notes: ______

P005555A

Figure 356

	OK	Failed	Remarks
HDSL Modem			

9.20.3 Trouble Report

A trouble report should be written when system components are not operating as expected, or when disturbances occur repeatedly. It should not be written for occasional hardware failures.

When writing a trouble report, always include as much information as possible, such as log files and IDB. Write the trouble report as soon as possible, preferably at the RBS site.

An example of a filled-in trouble report, and a trouble report form, are included in *chapter Fault Handling*.

The trouble report should be sent to the nearest FSC (Field Support Centre) for resolution and registration in the Ericsson trouble report system MHS (Modification Handling System). The FSC should forward the trouble report via the node MHO ERA BTS.

9.20.4 Repair Delivery Note ‘‘Blue Tag’’

When a faulty unit is returned, it must always be accompanied by a repair delivery note. When the repair delivery note has been completed it must be attached to the faulty unit before sending it for repair.

The repair delivery note LZF 084 84 can be ordered from the local FSC. A repair delivery note is presented in *chapter Maintenance*.

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10 Optional Tests

10.1 Preconditions

All abbreviations for cables, adaptors, attenuators and splitters used in the figures are described in *chapter Tool and Instruments*.

10.1.1 Previous Tests

Before performing any optional test make sure all tests in *chapter Site Installation Tests* have been performed successfully.

10.1.2 Tester qualifications

This instruction is intended for testers with experience of using a BSC simulator. The tester should also have knowledge of the different types of base stations in the RBS 2000 family, and be familiar with the different cell and link configurations that the base stations might have.

10.2 MS Test Call using BSC Simulator

CAUTION

Radio frequency (RF) radiation from antenna systems can endanger your health.

The purpose of this test is to ensure that it is possible to make calls on the base station. The test is passed when a call has been made on all the TRXs.

For more information, refer to:

BSCSim II User’s Guide *EN/LZT 123 2771/1*

10.2.1 Prerequisites

Only one Timeslot needs to be tested in each TRX (the HW in the TRXs is common for all Timeslots).

10.2.2 Test Setup using the MS and BSC Simulator

Preparations

1. Connect the BSC simulator to the RBS.

   If 4 TRX or 6 TRX configuration is used:

   Connect the BSC simulator to the Master RBS (BSCSim II, R2A or later, is required).

2. Switch on the PBC, the RBS and the BSC simulator.

3. If HDSL modem is used:

    1. Disconnect the HDSL transmission/alarm cables from the installation box.
    2. Connect the internal transmission/alarm cable (product number RPM 518 959/1).

Note: This test is only for the RBS, not for the HDSL modem. If the HDSL modem is to be tested, an external HDSL modem (t.b.d.) is required.

    3. When the test is completed, reconnect the HDSL transmission/ alarm cables to the installation box

Test Setup Procedure: 2 TRX Configuration

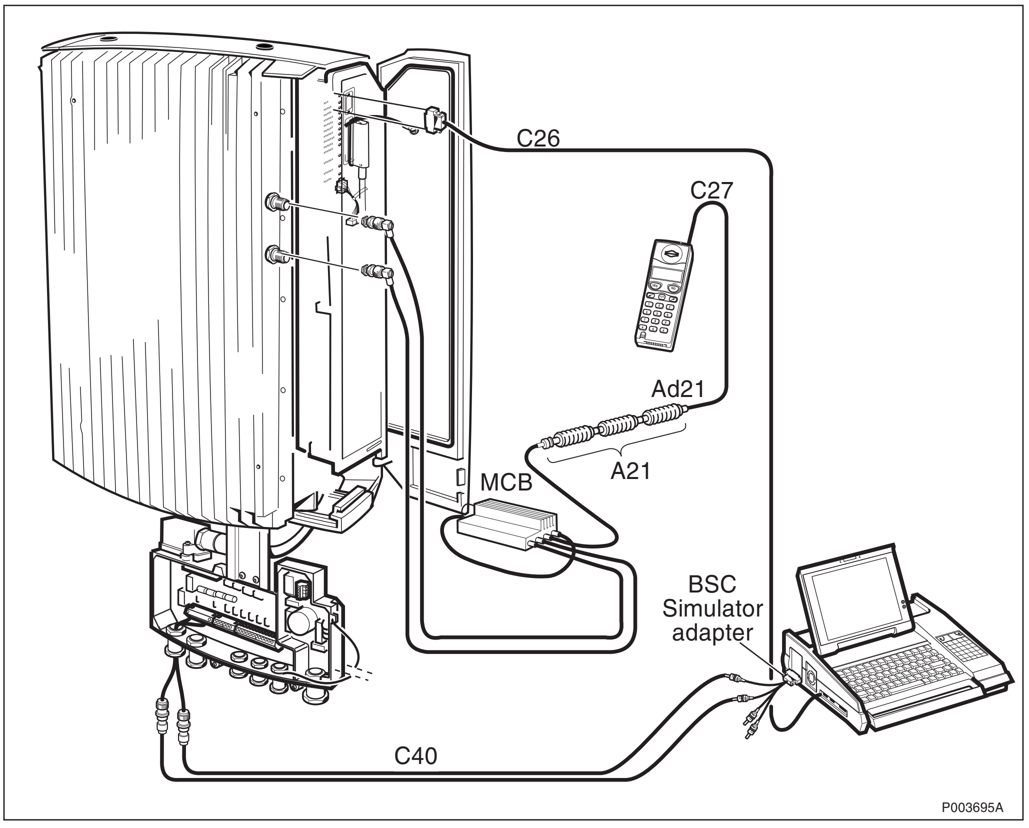

Figure 357 Test setup using BSC simulator: 2 TRX Sector and Highway configuration, E1 75 Ω (2.0 Mbit/s)

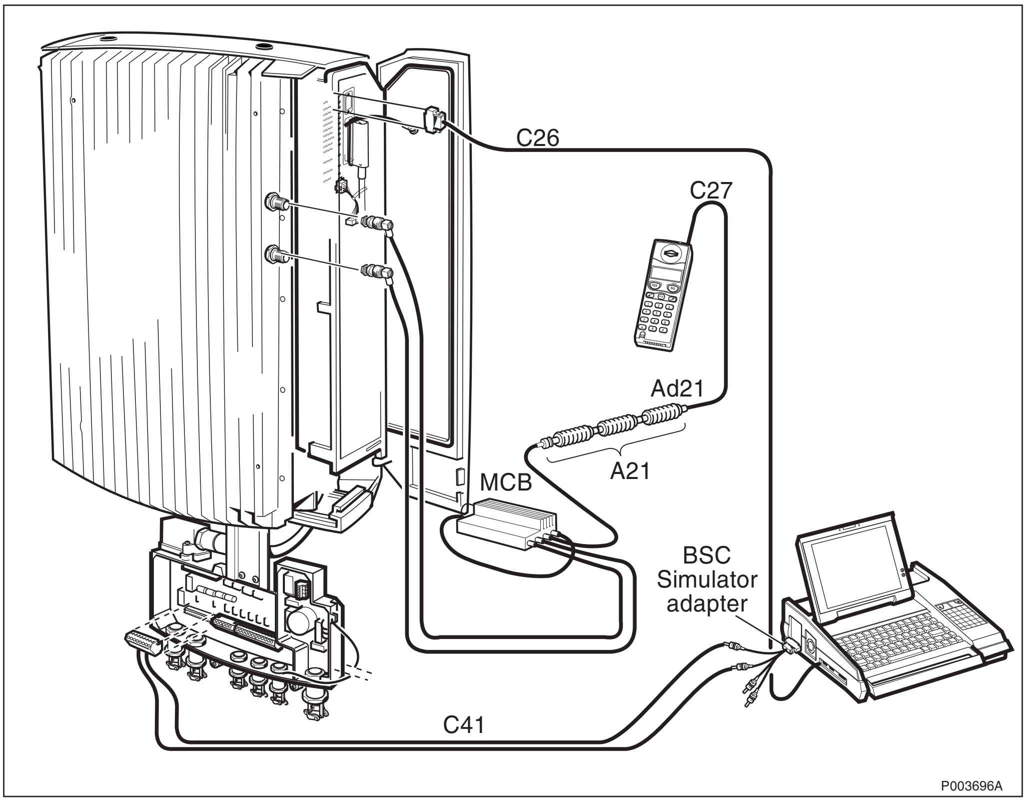

Figure 358 Test setup using BSC simulator: 2 TRX Sector and Highway configuration, T1 100 Ω (1.5 Mbit/s) and E1 120 Ω (2.0 Mbit/s)

1. Connect cable C26 to the COM1 port on the BSC simulator, and to the input inside the installation box marked OMT.
2. Connect the BSC Simulator adapter to the input on the BSC simulator.
3. Cables between the BSC simulator and the interface box (connecting TX to RX):

   For E1 75 Ω:

   1. Connect the cables C40 to the BNC connector on the BSC Simulator adapter.
   2. Connect the cables C40 to the PCM A cables that are connected to the interface box, *see Figure 357 on page 328*.

   For T1 100 Ω and E1 120 Ω:

   1. Remove the existing PCM A cables plug from the interface box.
   2. Connect the BNO connector on cable C41 to the BNO connector on the BSC Simulator adapter, and connect the C41 cables plug to the PCM A socket in the interface box, *see Figure 358 on page 329*.

4. Connect cable C27 to the antenna inlet on the mobile, and to the adapter Ad21.
5. Connect the adapter Ad21 to the first attenuator A21.
6. Connect the three attenuators A21 together.

7. Connect the third attenuator A21 to the Multicasting Box (MCB).
8. Connect the cables from the MCB to the antenna outputs:

   TX/RX Ant A to X2

   TX/RX Ant B to X3

Test Setup Procedure: 4 TRX and 6 TRX Configurations

When this test setup is used, one cell per RBS must be defined.

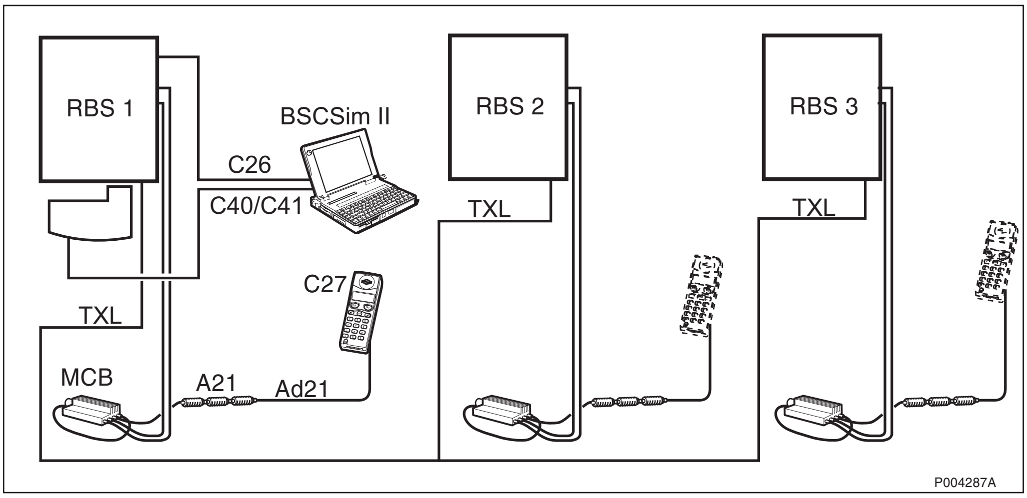

Figure 359 Test setup for 4 TRX and 6 TRX configurations

1. Master RBS: Follow the instructions in *Section Test Setup Procedure: 2 TRX Configuration on page 328.*
2. Extension RBSs: Assemble cable C27, adapter Ad21, attenuator A21 and MCB, and connect the assembly to each Extension RBS.
3. When making a test call, move the mobile to the actual RBS.

10.2.3 Change between Local and Remote Mode

Ensure that the RBS is in Remote mode. If not, change to Remote mode by pressing the Local remote button on the RBS.

The Local mode indicator starts flashing to indicate that the change to Remote mode is in progress.

10.2.4 Test Parameters

Before performing any test, the appropriate parameters must be considered when configuring the BSCSim II.

The following parameters should be considered:

- System type
- Network frequency
- RBS type
- Transmission type

- BTS Software
- Positioning of TRXs
- Cell
- LAC
- Diversity
- ARFCN
- Power

Test Sequence

Note: The time from start till the RBS is operational varies depending on ambient temperature. For example, it may take up to 15 minutes at (minus) -15 °C, and up to 30 minutes at (minus) –33 °C.

1. Start the RBS with diversity A.
2. Make a test call.
3. Reconfigure the RBS to diversity B.
4. Make a test call.

The test is passed when the following conditions are fulfilled:

- RXqual = 0.
- The tester is satisfied with the speech quality.
- The RX values do not differ more than 4 dB between TRXs, when comparing uplink and downlink repectively (provided that the test setup is the same).

10.3 Antenna Unit Attenuator Settings with BSC Simulator

Note: BSC simulator BSCSim II, R1B (or later) is required.

The test procedure in summary is described in *chapter Site Installation Tests, section Antenna System Tests*.

Feeder Attenuator

The feeder attenuator is an internal attenuator in the antenna unit, which is used to compensate for different cable lengths.

10.3.1 Test Setup

2 TRX Sector Configuration for E1 75 Ω (2.0 Mbit/s)

Test setup for GSM 900, *see Figure 360 on page 332*

Test setup for GSM 1800 and GSM 1900, *see Figure 361 on page 333*

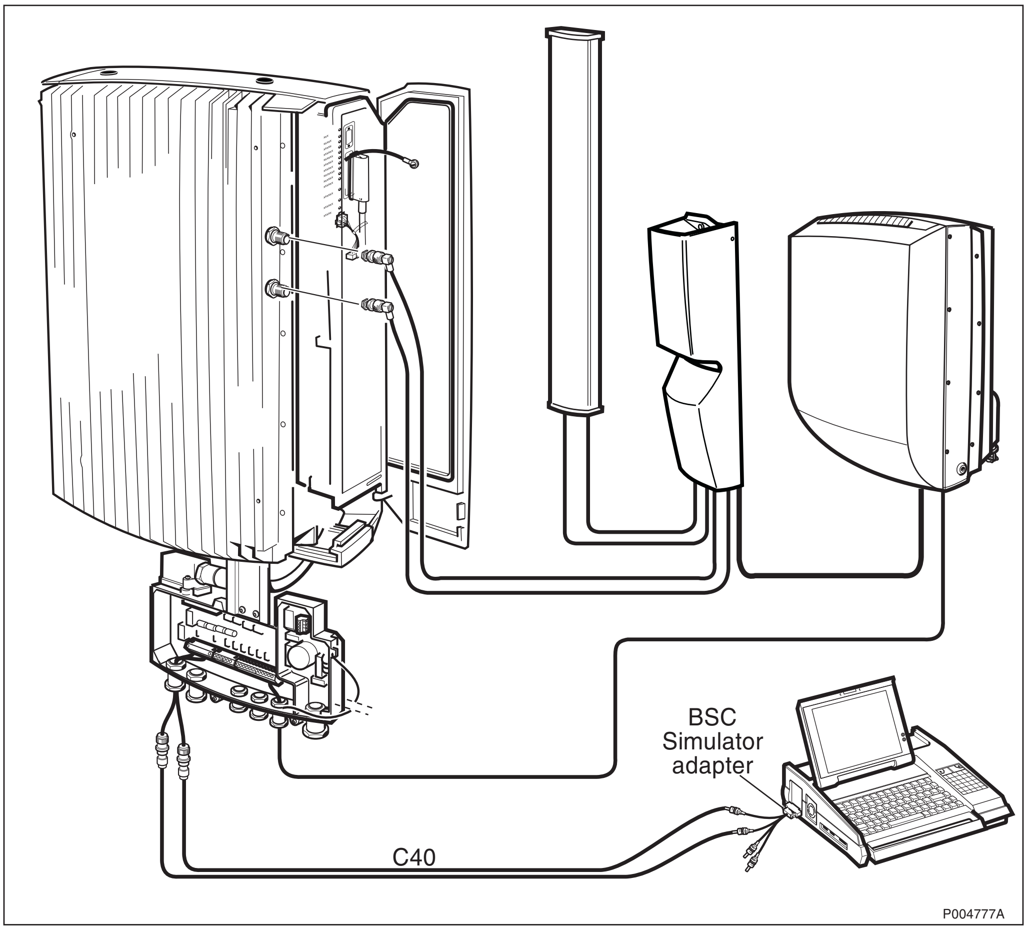

Figure 360 Test setup for GSM 900: 2 TRX Sector Configuration for E1 75 Ω (2.0 Mbit/s)

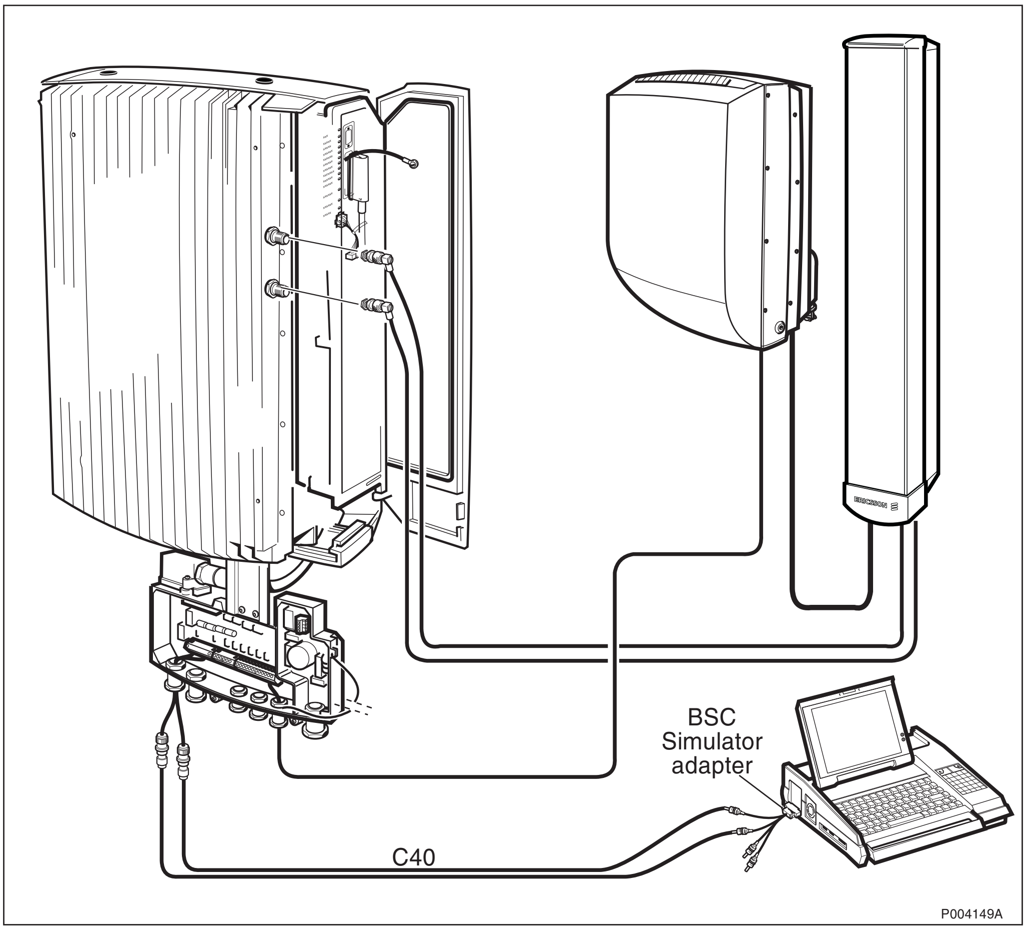

Figure 361 Test setup for GSM 1800 and GSM 1900: 2 TRX Sector Configuration for E1 75 Ω (2.0 Mbit/s)

1. Connect the cables C40 to the BNC connector on the BSC Simulator adapter.
2. Connect the cables C40 to the PCM A cables that are connected to the interface box.

2 TRX Sector Configuration for T1 100 Ω (1.5 Mbit/s) and E1 120 Ω (2.0 Mbit/s)

Test setup for GSM 900, *see Figure 362 on page 334.*

Test setup for GSM 1800/1900, *see Figure 363 on page 335.*

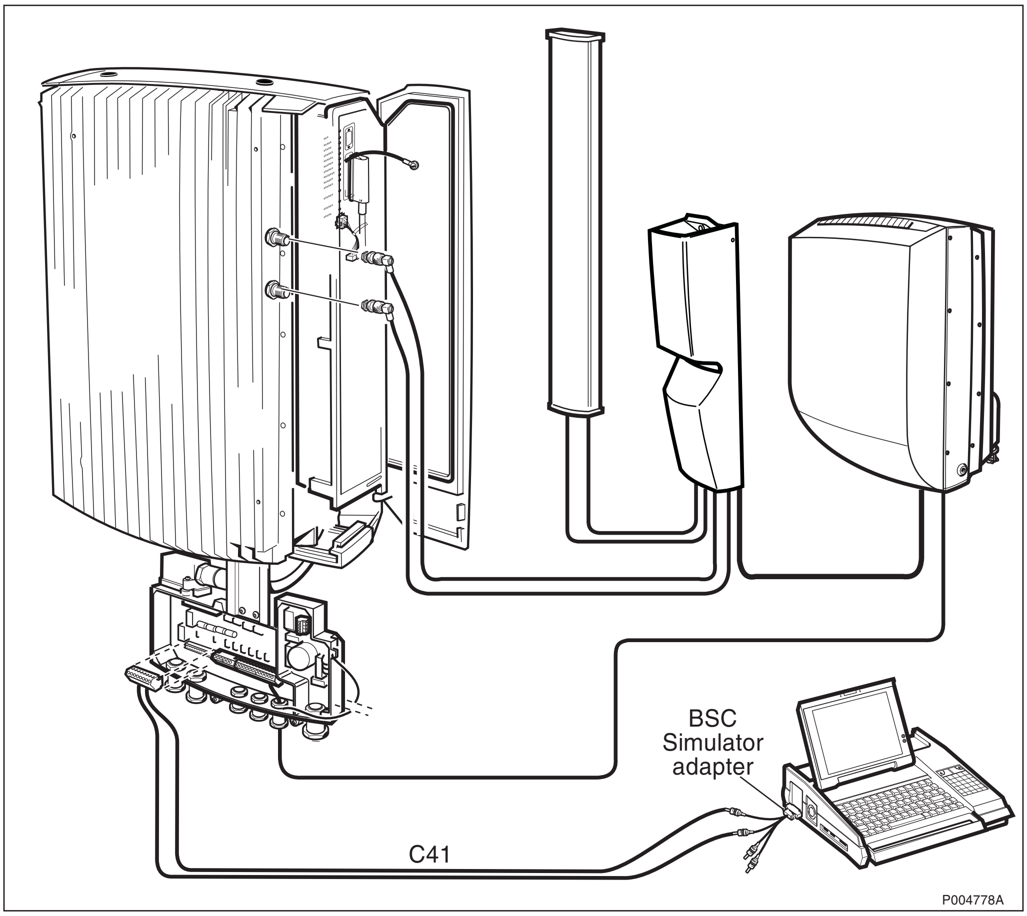

Figure 362 Test setup for GSM 900: 2 TRX Sector Configuration for T1 100 Ω (1.5 Mbit/s) and E1 120 Ω (2.0 Mbit/s)

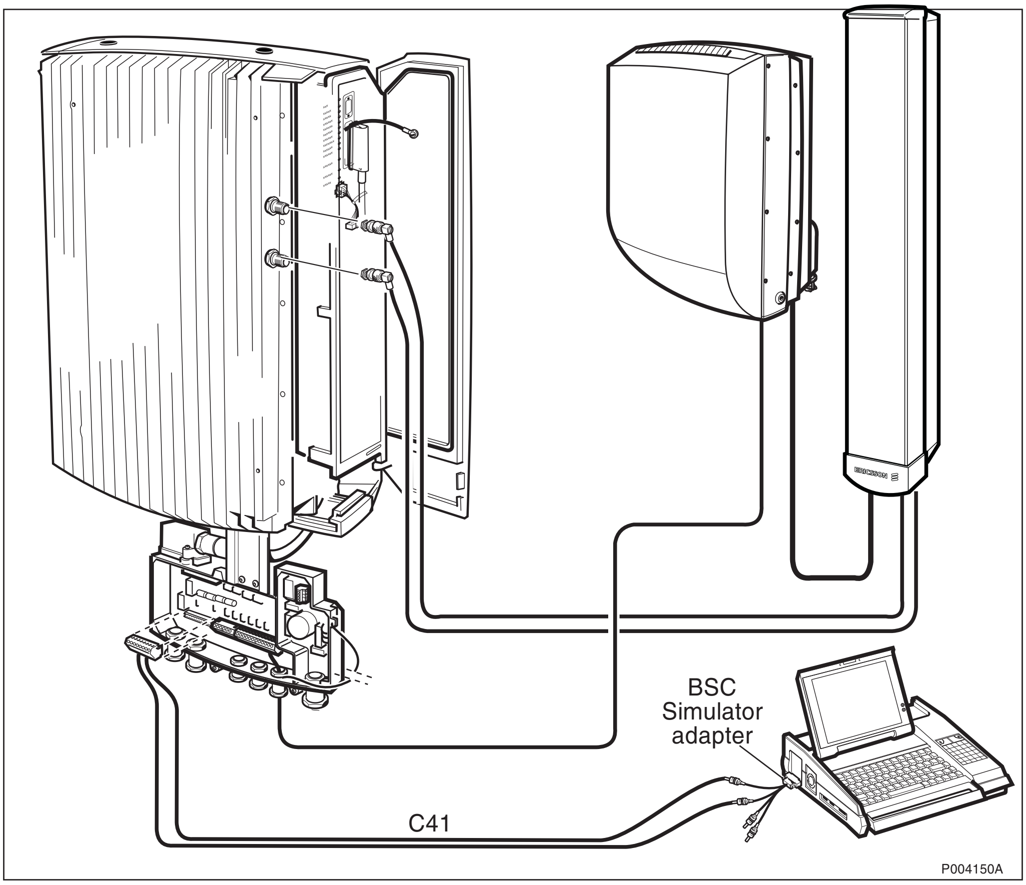

Figure 363 Test setup for GSM 1800 and GSM 1900: 2 TRX Sector Configuration for T1 100 Ω (1.5 Mbit/s) and E1 120 Ω (2.0 Mbit/s)

1. Remove the existing PCM A cables plug from the interface box.
2. Connect the BNO connector on cable C41 to the BNO connector on the BSC Simulator adapter, and connect the C41 cables plug to the PCM A socket in the interface box.

2 TRX Highway Configuration

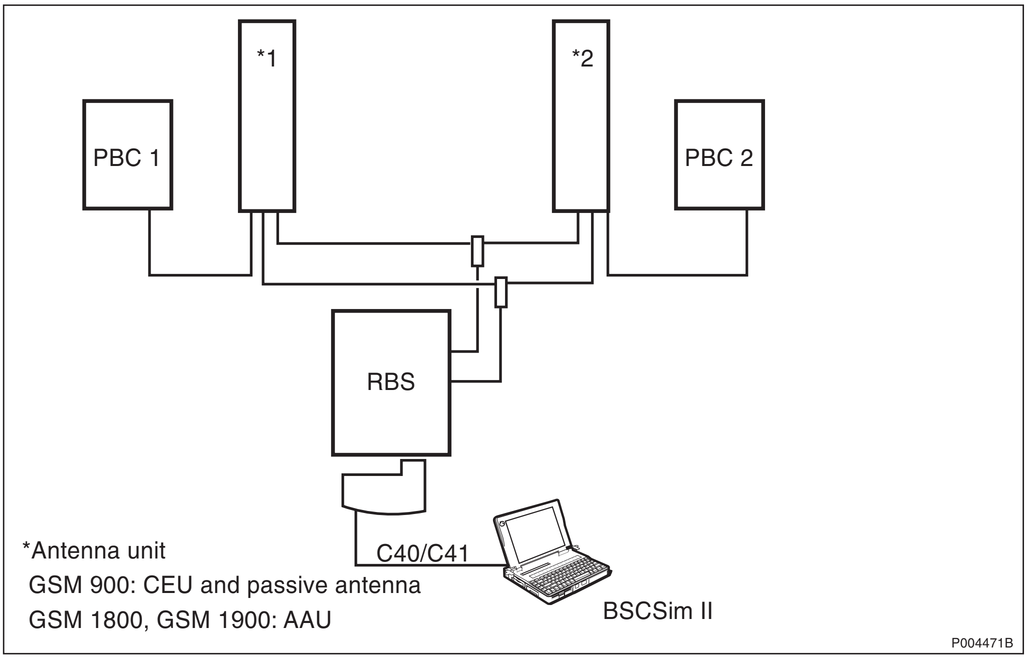

Figure 364 Test setup: 2 TRX Highway configuration

4 TRX and 6 TRX Configurations

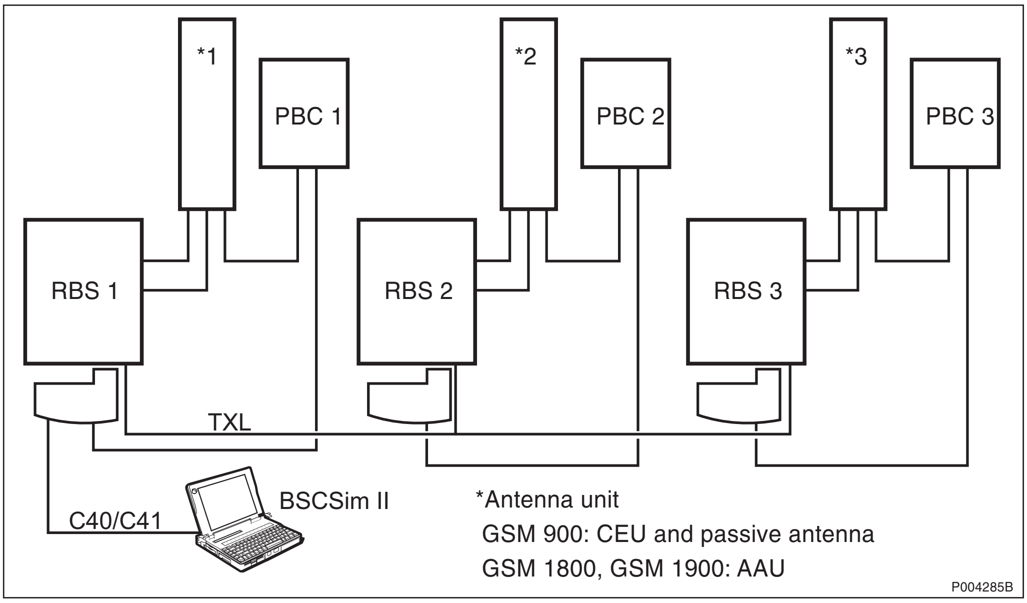

Figure 365 Test setup: 4 TRX and 6 TRX Configurations

10.3.2 Flowchart

Preparations before test:

- Start-up → *See chapter Site Installation Tests.*
- Feeder attenuation calculated → *See chapter Site Installation Tests.*

↓

Set feeder attenuators to max.

↓

Antenna output power off.

↓

Set test parameters on the BSC simulator.

↓

2 TRX Sector, 4 TRX and 6 TRX:	2 TRX Highway, GSM 900:
• Set CEU/AAU feeder attenuators.	• Set CEU 1/AAU 1 and CEU 2/AAU 2 feeder attenuators alternately.

↓

Installation OK? No → Take corrective action, *see chapter Site Installation Tests*.

↓ Yes

Difference between calculated and measured attenuation acceptable? No → Take corrective action, *see chapter Site Installation Tests*.

↓ Yes

Check with the operator whether the RBS is to be in traffic or shut off.

↓ Yes

Antenna output power on.

10.3.3 Configurations Overview

← **6 TRX** →

← **4 TRX** →

← **2 TRX Sector** →

RBS 1, PBC 1 CEU 1/AAU 1	RBS 2, PBC 2 CEU 2/AAU 2	RBS 3, PBC 3 CEU 3/AAU 3

← **2 TRX Highway(1)** →

RBS 1, PBC 1, PBC 2 CEU 1, CEU 2/AAU 1, AAU 2

(1) Perform the test alternately for PBC 1 and PBC 2

10.3.4 Test Procedure

The purpose of this test is to set the attenuators for the feeders and antennas in the PBC.

– GSM 900: Total attenuation = 9 dB

– GSM 1800, GSM 1900: Total attenuation = 12 dB

These attenuation values are predetermined and can not be changed.

The test is to be performed for each set of RBS, PBC and CEU (GSM 900) or AAU (GSM 1800, GSM 1900), which is included in the configuration used.

The instructions below refer to *chapter Site Installation Tests, section Power and Battery Cabinet*.

Set the attenuator values:

1. Set the feeder attenuators to max.:

Selected on PBC	Displayed	Explanation
Code 4	11 H	Max. feeder attenuation confirmed.

    1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
    2. Select code 4 on display element D3 with the Up or Down button.
    3. Press Enter.

2. Wait until the code message 11H appears on the display. This confirms that the feeder attenuators are set to maximum attenuation.

3. Antenna output power Off:

Selected on PBC	Displayed	Explanation
Code 2	11 P	Antenna output power off.

(This is done to avoid unnecessary disturbances of ongoing traffic.)

1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
2. Select code 2 on display element D3 with the Up or Down button.
3. Press Enter.

4. Wait until the fault code message 11P appears on the display. This message remains until the output power is switched back on.
5. Set all parameters on the BSC simulator according to the table below.

Parameter	GSM 900	GSM 1800	GSM 1900
SW Power Boost (TX Diversity)	Yes	Yes	Yes
ARFCN/Frequency:			
- Band 1	63/947.6 MHz	512/1805.2 MHz	561/1940 MHz
- Band 2	—	—	661/1960 MHz
- Band 3	—	—	761/1980 MHz
Max. output power	35 dBm(1)	35 dBm(1)	35 dBm(1)

(1) Max. output power 35 dBm is a BSC simulator command. In this case, the actual RBS power is 32.5 dBm (nominal value).

6. Restart the RBS with the BSC simulator.
7. Set the feeder attenuators for each feeder, including the attenuator in the antenna:

Selected on PBC	Displayed	Explanation
Code 1	5 x x	Feeder A attenuation value.
	6 x x	Feeder B attenuation value.

1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
2. Select code 1 on display element D3 with the Up or Down button.
3. Press Enter.

Note: While the attenuator setting is in progress, the display is flashing. The installation takes up to 3 minutes.

8. Wait for the feeder attenuation values to appear on the display: first feeder A (5 x x), then feeder B (6 x x). Enter the attenuation setting in *Section 10.4 on page 342*.

   The measured feeder attenuation is displayed:

– GSM 900: Measuring range 0 – 9 dB.

– GSM 1800, GSM1900: Measuring range 0 – 12 dB.

Each attenuation value is displayed for about 2 minutes (or until Enter is pressed), then the display returns to the active system status.

Example:

	Attenuation	**Code displayed**
Feeder A	4 dB	5 0 4
Feeder B	4 dB	6 0 4

If there is a feeder installation fault:

- Code message 11H is displayed.
- Sector configuration: perform a Distance To Fault test according to *chapter Site Installation Tests, section Antenna System Tests*.
- Highway configuration: *see Table 51 on page 341*.

Installation fault	**Code displayed**
Feeder A	7 0 1
Feeder B	7 0 2

9. Check that the measured value corresponds to the calculated value.

   If the difference between the measured and calculated value is 3 dB (or more):

- Sector configuration: perform a Distance To Fault test according to *chapter Site Installation Tests, section Antenna System Tests*.
- Highway configuration: *see Table 51 on page 341*.

10. Disconnect the BSC simulator.
11. Antenna output power On:

Selected on PBC	Displayed	Explanation
Code 3	- - -	Makes 11P disappear

   1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
   2. Select code 3 on display element D3 with the Up or Down button.
   3. Press Enter.

   This makes the fault code message 11P disappear.

12. If the RBS is not supposed to be in traffic, reset the RBS.

   The site is now ready to be started from the BSC.

Fault Tracing Hints

The jumpers are named according to the figure below.

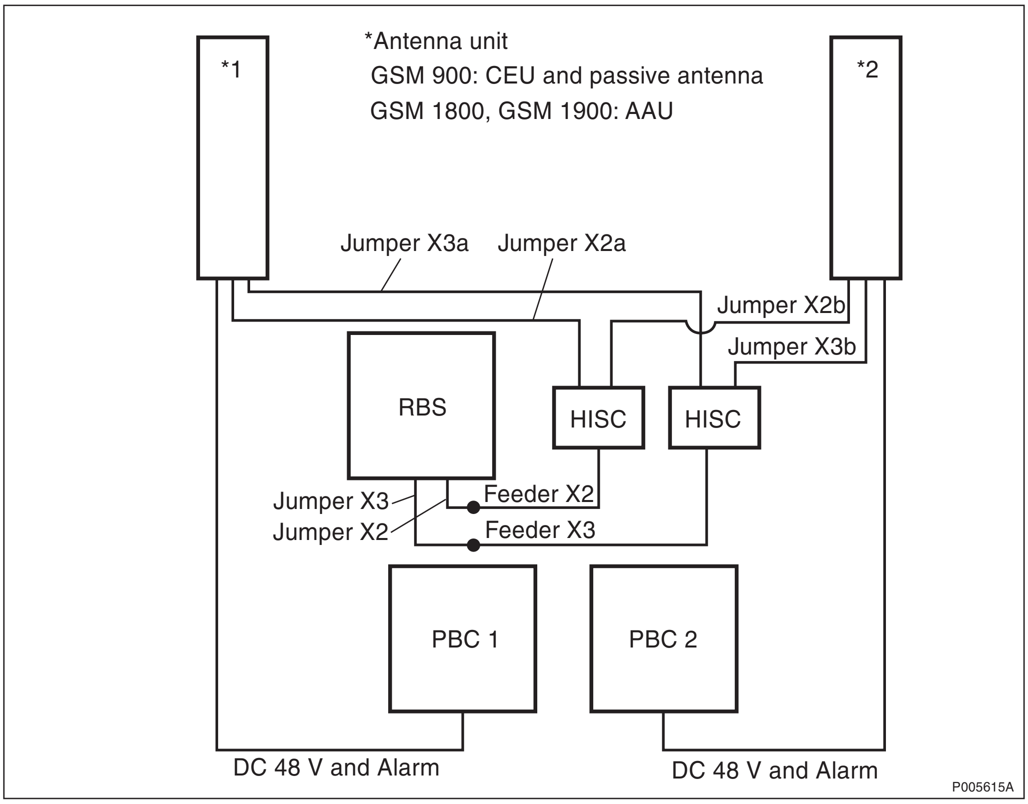

Figure 366 Jumper definition

Table 51 Fault tracing hints

Inst. fault PBC 1		**Inst. fault PBC 2**		**Action**
Feeder A1	**Feeder B1**	**Feeder A2**	**Feeder B2**	
●				Check the antenna jumper X2a connections.
	●			Check the antenna jumper X3a connections.
		●		Check the antenna jumper X2b connections.
			●	Check the antenna jumper X3b connections.
●		●		Check the RBS jumper X2 connections.
	●		●	Check the RBS jumper X3 connections.
●		●		Perform a DTF test, *see chapter Site Installation Tests*.
	●		●	Perform a DTF test, *see chapter Site Installation Tests*.

10.4 Test Record

Test Record for Optional Tests

NE Commissioning GSM -

Date.	Site Name:
Site No:	Cell configuration:
RBS type:	Testers Name:

MS CALL TEST

			RX A				RX B			
			RX Level		RX Quality		RX Level		RX Quality	
TRX	TS	TA	DL	UL	DL	UL	DL	UL	DL	UL
1										
2										
3										
4										
5										
6										

Attenuation Settings

	AAU1/CEU1	AAU2/CEU2	AAU3/CEU3
Feeder A			
Feeder B			

Remarks:

P005553A

Figure 367 Test Record for Optional Tests

11 RBS Site Integration

This test instruction describes the procedure for loading and test of the Base Transceiver Station (BTS) of RBS 2000 series type.

11.1 Introduction

This chapter contains information about how to integrate a RBS site into the Network and make it work.

11.1.1 Overview

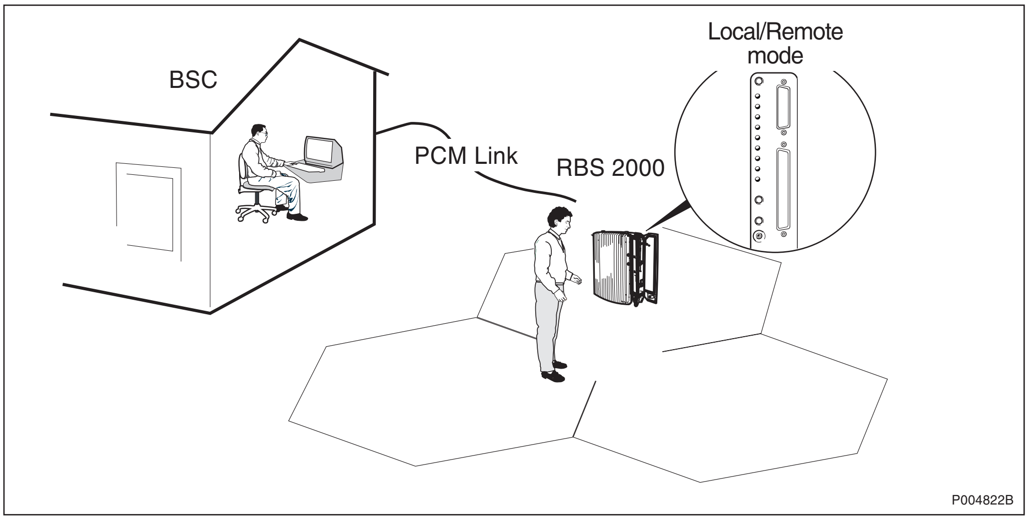

Figure 368 Integrating the BTS into the Network which is operated by the BSC

The integration of the RBS is performed with the RBS connected to the BSC and in close cooperation with the BSC personnel. The Man Machine Language (MML) commands within this chapter are performed from the BSC.

Throughout the instruction, the site specific parameters are referred to as x and y:

x	Transceiver group number
y	Transceiver number

All test results for the RBS should be documented in the Test Record by the RBS commission staff.

11.1.2 Range of Test

The RBS commissioning staff will switch the RBS from local to remote mode. Communication will then be established between BSC and RBS. The following managed objects are brought into service and deblocked by command from the BSC:

- TG - Transceiver Group
- CF - Central Functions
- IS - Interface Switch
- DP - Digital Path
- CON - LAPD Concentrator

- TF - Timing Function
- TRX - Transceiver
- TX - Transmitter
- RX - Receiver
- TS - Time Slot

During deblocking, the following actions are performed for every MO:

- Clearing any indication of faults.
- Performing a reset on the RBS Managed Object.
- Ensuring that the Managed Object instance in question has the correct software loaded. If this is not the case, the correct version will be loaded.
- Updating the equipment with it’s required operational data.

In addition to actions detailed above, a loop test will be performed for managed objects of class TS. This will verify that the managed object is capable of carrying traffic.

The cell is activated, e.g. radio equipment will be enabled. When the cell is active and configured, call tests will be made over the air interface. Tests will be performed on RXA and RXB separately if a tests with the BSC simulator has not already been performed. For information about tests with the BSC simulator, *see chapter Optional Tests.*

The external alarms will be tested by simulating alarms in the RBS and check that the correct alarm string is received in the BSC.

11.1.3 Flowchart

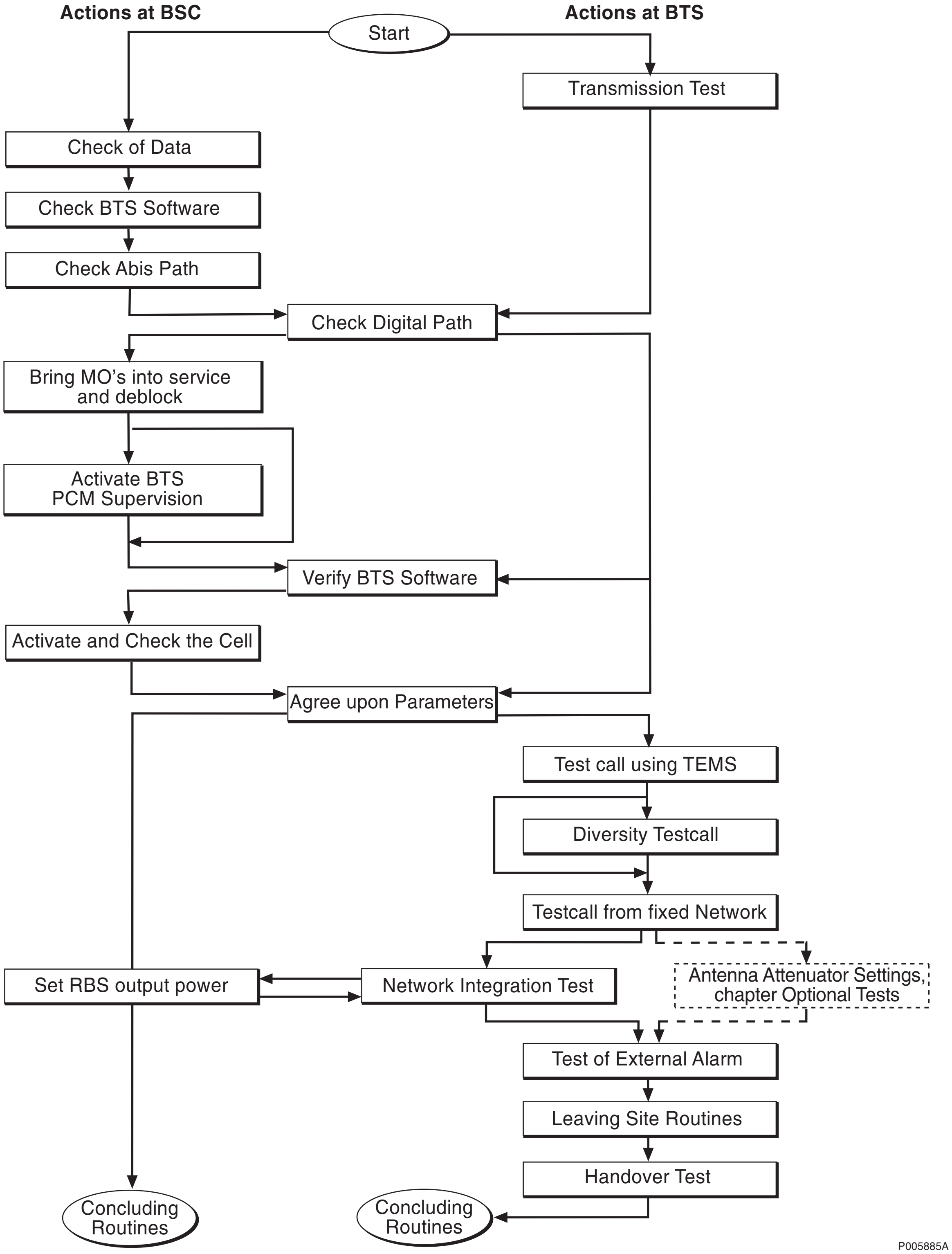

Figure 369 Flowchart that describes the BSC and BTS actions and the interactions between them

11.2 Preconditions

The preconditions are listed separately for the BSC and for the RBS on Site. The work can only begin when both those lists of preconditions have been fulfilled.

11.2.1 Preconditions for the BSC

- The NE (network element) tests for the BSC must have been performed.
- The integration test of MSC/VLR must have been performed, e.g. it must be possible to make calls.
- Exchange data for definition of Managed Objects, Cells and Abis paths must be loaded. For further information, *see Helpful Hints Section 11.11 on page 374.*
- The transmission to the RBS site must be working before performing the test calls.
- The correct RBS software must have been loaded into the IOG.

11.2.2 Preconditions for the RBS

- If Transport Modules (TM) are used, they must be loaded with the correct data.
- Make sure that the RBS is in remote mode.
- The RBS commissioning staff must have contact with the BSC staff.

11.3 Transmission Test

The purpose of this test is to ensure that the connection between RBS and BSC is working correctly.

11.3.1 Transmission Test E1

Note:

- This test does not include the transmission through the Mounting Base.
- The test is performed only when the RBS is directly connected to the BSC.
- The test is not performed if a transmission network is used.

1. Remove the PCM A cable plug from the transmission filter, located in the interface box.
2. Connect the PCM A cable plug to the loopback socket on the connector board CB21, *see Figure 370 on page 347*.

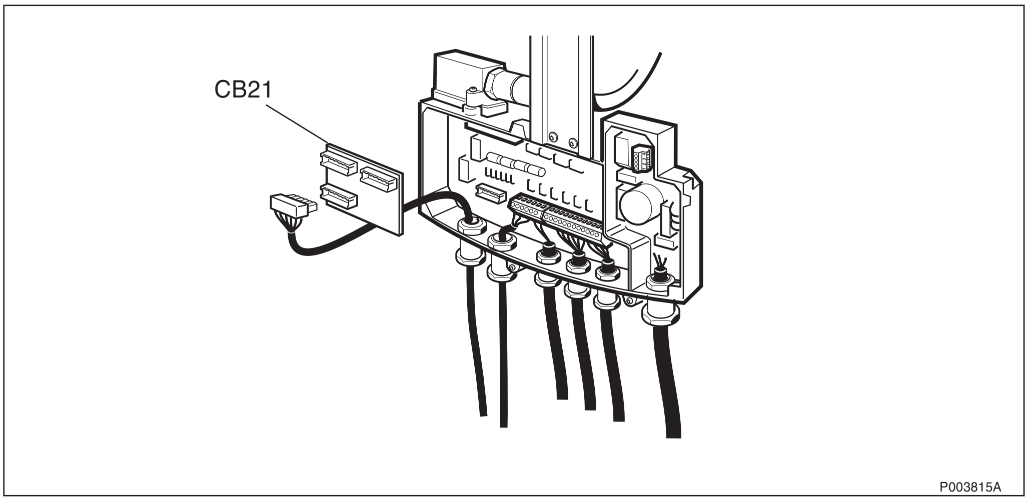

Figure 370 CB21 connector board

3. Request the BSC operator to check the digital path on the active RBLT. An appropriate command for this procedure is: <DTSTP:DIP=RBLT-XXX;

11.3.2 Transmission Test T1

A transmission test can be performed in two ways:

A. Perform the test according to *Section 11.3.1 on page 346*.

B. Request the BSC operator to use CSU functionality. The parameter is set (and cleared) with the OMT. The function is initiated during restart of the CMRU. For further information, refer to:

Reference Manual	*LZN 302 77*

11.3.3 Transmission Test E1 with HDSL

1. Check that the green LED indicator on the HDSL modem lights steadily.

2. Wait for the yellow LED indicators to change from flashing to steady light.

   The number of indicators engaged vary, depending on the configuration used.

For further information regarding the HDSL optical indicators, refer to *chapter Site Installation Tests*.

11.4 Preparations

11.4.1 Check of Data

Check with these commands that the correct data is loaded in the BSC and if not, load it. For further information about the DT-files, *see Helpful Hints Section 11.11 on page 374.*

Note: Only the most important data is listed.

1. Check definition for MO's.

Command:	**RXMOP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOCF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOCON-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXODP-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOIS-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOTF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOTRX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOTX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA

2. Check that BTS PCM Supervision DIP is defined.

Command:	**DTDIP :DIP=modip;**
Printout:	DIGITAL PATH

3. Check definitions for cell data.

Command:	**RLLBP;**
Printout:	LOCATING BSC DATA
Command:	**RLDEP:CELL=cell;**
Printout:	CELL DESCRIPTION DATA

Note: Make a note of the parameter BCCHNO's value and of the parameter BSIC's value, it will be needed during the Call Test.

Command:	**RLCFP:CELL=cell;**
Printout:	CELL CONFIGURATION FREQUENCY DATA

Note: Make a note of the parameter DCHNO's different values, it will be needed during the Call Test.

Command:	**RLCPP:CELL=cell;**
Printout:	CELL CONFIGURATION POWER DATA
Command:	**RLLOP :CELL=cell;**
Printout:	CELL LOCATING DATA
Command:	**RLLUP:CELL=cell;**
Printout:	CELL LOCATING URGENCY DATA
Command:	**RLLDP :CELL=cell;**
Printout:	CELL LOCATING DISCONNECT DATA
Command:	**RLLPP:CELL=cell;**
Printout:	CELL LOCATING PENALTY DATA
Command:	**RLMFP:CELL=cell;**
Printout:	CELL MEASUREMENT FREQUENCIES
Command:	**RLNRP :CELL=cell,CELLR=ALL;**
Printout:	NEIGHBOUR RELATION DATA

11.4.2 Check the BTS Software

1. Verify that the correct BTS software version is stored on the harddisc in the IOG11. It is one file with a number of subfiles which should be named "btsfilename-HEADER ". Check if it is defined and the SW is loaded.

   Example: For a RBS 2000 BTS SW in the CME 20 R6, the “btsfilename” should be B4311Rxxxx.

Command:	**INMCT :SPG=0;**
Printout:	:
Command:	**INFIP:FILE=btsfilename;**
Printout:	FILE ATTRIBUTES
Command:	**END;**
Printout:	:

2. Verify that the existing BTS software is defined for the TG.

Command:	**RXMOP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA

3. If the wrong software version is in use, activate the desired BTS software version.

Command:	**RXMSC:MO=RXOTG-x, SWVER=correct_btssoftware;**
Expected Result:	EXECUTED
Command:	**RXMSC:MO=RXOCF-x, SWVER=DEFAULT;**
Expected Result:	EXECUTED
Command:	**RXMSC:MO=RXOTRX-x-y&&-z, SWVER=DEFAULT;**
Expected Result:	EXECUTED

4. Verify that the new BTS software is defined for the TG.

Command:	**RXMOP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA

11.4.3 Check the Abis Paths

Check that the Abis paths are correctly defined, for example that the RBLT-devices are tied to the correct position in the IS. For further information, *see Helpful Hints Section 11.11 on page 374.*

Command:	**RXAPP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION ABIS PATH STATUS

11.4.4 Check the Digital Path

Check that the Digital Path used towards the BTS site is working.

Command:	**DTSTP:DIP=RBLTx;**
Printout:	DIGITAL PATH STATE

11.5 Connecting the RBS from the BSC

11.5.1 Bring MO’s into Service and Deblock

The DT-file 97xxx could be used for this. There are two ways for the BSC personnel to perform this step.

- **Case 1:** The BSC personnel works “online” with the RBS. That is if the transmission is working properly and that the RBS is set in Remote mode. The RBS engineer should be present on site, but that is not necessary, since this activity is performed from the BSC.
- **Case 2:** The other way is to prepare the RBS in Local mode. The MO’s will then logically be taken into service and deblocked. The

RBS engineer then sets the RBS into remote mode which will automatically configure the RBS.

During this procedure you can use the command "RXMSP:MO=mo...;" to check the current state of the MO. For information about the MO's different states, *see Helpful Hints Section 11.11 on page 374.*

1. Bring the managed object TG into service.

Command:	**RXESI:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

2. Bring the managed object CF into service.

Command:	**RXESI:MO=RXOCF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

3. Bring the managed object TF into service.

Command:	**RXESI:MO=RXOTF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

4. Bring the managed object IS into service.

Command:	**RXESI:MO=RXOIS-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

5. Bring the managed object CON into service.

Note: This MO is optional and should only be brought into service if it is included in the DT.

Command:	**RXESI:MO=RXOCON-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

6. Bring the managed object DP into service.

Note: This MO is optional and should only be brought into service if it is included in the DT.

Command:	**RXESI:MO=RXODP-x-a;** (a="0" or "1")
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

7. Deblock the managed object TG.

Command:	**RXBLE:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

8. Deblock the managed object CF.

Command:	**RXBLE:MO=RXOCF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

9. Deblock the managed object TF.

Command:	**RXBLE:MO=RXOTF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

10. Deblock the managed object IS.

Command:	**RXBLE:MO=RXOIS-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

11. Deblock the managed object CON.

Command:	**RXBLE:MO=RXOCON-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

12. Deblock the managed object DP.

Command:	**RXBLE:MO=RXODP-x-a;** (a="0" or "1")
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

13. Bring the managed objects TRX into service.

Command:	**RXESI:MO=RXOTRX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	MO NOT LOADABLE FROM THE BSC
Expected result (case 2):	NOT LOADED

14. Bring the managed objects TX into service.

Command:	**RXESI:MO=RXOTX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

15. Bring the managed objects RX into service.

Command:	**RXESI:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

16. Bring the managed objects TS 0 to TS 7 into service.

Command:	**RXESI:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

17. Repeat step 13 on page 353 to step 16 on page 353 for each TRX's.

18. Deblock the managed object TRX.

Command:	**RXBLE:MO=RXOTRX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

19. Deblock the managed object TX.

Command:	**RXBLE:MO=RXOTX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

20. Deblock the managed object RX.

Command:	**RXBLE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

21. Deblock the managed object TS.

Command:	**RXBLE:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

22. Repeat step 18 on page 354 to step 21 on page 354 for each TRX’s.

11.5.2 Activation of BTS PCM Supervision (Optional)

This should only be done if BTS PCM Supervision is used. That is if the Managed Object DP is defined, taken into service and deblocked.

1. Deblock the BTS PCM Supervision DIP.

Command:	**DTBLE :DIP=modip;**
Expected result:	EXECUTED

2. Check DIP state, the DIP should be working.

Command:	**DTSTP:DIP=modip;**
Printout:	DIGITAL PATH STATE

3. Check that the MO DP state is operational (OPER).

Command:	**RXMSP:MO=RXODP-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT STATUS

11.5.3 Verification of Downloaded RBS Software

This verification should be done both from the BSC and from the RBS.

1. Verify the software version from the RBS, use the OMT and its function "Display Software Versions". Make a note of the versions in the testrecord.
2. Verify the software version from the BSC.

Command:	**RXMOP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA

3. Compare that the software versions in the BSC and the BTS are the same. If they are not the same, information about unconditional download of software can be found in: *see Helpful Hints Section 11.11 on page 374.*

11.5.4 Activation and Check of Cell

1. Activate the cell.

Command:	**RLSTC:CELL=cell,STATE=ACTIVE;**
Printout:	CELL STATE CHANGE RESULT

2. Check that the Digital Path used towards the BTS site is working.

Command:	**DTSTP:DIP=RBLTx;**
Printout:	DIGITAL PATH STATE

3. Verify that logical channels are configured.

Command:	**RLCRP :CELL=cell;**
Printout:	CELL RESOURCES

4. Check that all equipment has been correctly configured.

Command:	**RXCDP :MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION CONFIGURATION DATA

5. Make a note of which timeslots are used for the SDCCH. This information will be needed during the test calls.

11.5.5 Agree upon Parameters

The BSC staff must inform the RBS staff about the value of the following parameters:

BCCHNO	Absolute Radio Frequency (RF) channel number for Broadcast Control Channel (BCCH)
DCHNO	Absolute RF Channel Number
BSIC	Base Station Identity Code
SDCCH	Stand Alone Dedicated Control Channel

These parameters will be used for testcalls with TEMS.

11.6 Test Calls on Air Interface

The tests are performed from the BTS site and are intended to verify that calls can be made on all TRX's in the cell. it is necessary to make a call on each timeslot to ensure full functionality. The test calls should be performed with a TEMS mobile and using the TEMS program (PC software).

Note: The Diversity Testcalls should only be performed if Antenna Diversity is supported and if The Stand Alone Test has not been performed.

The test calls should be performed at a distance of at least 50 meter from the RBS and with the door closed.

11.6.1 Test Calls using TEMS

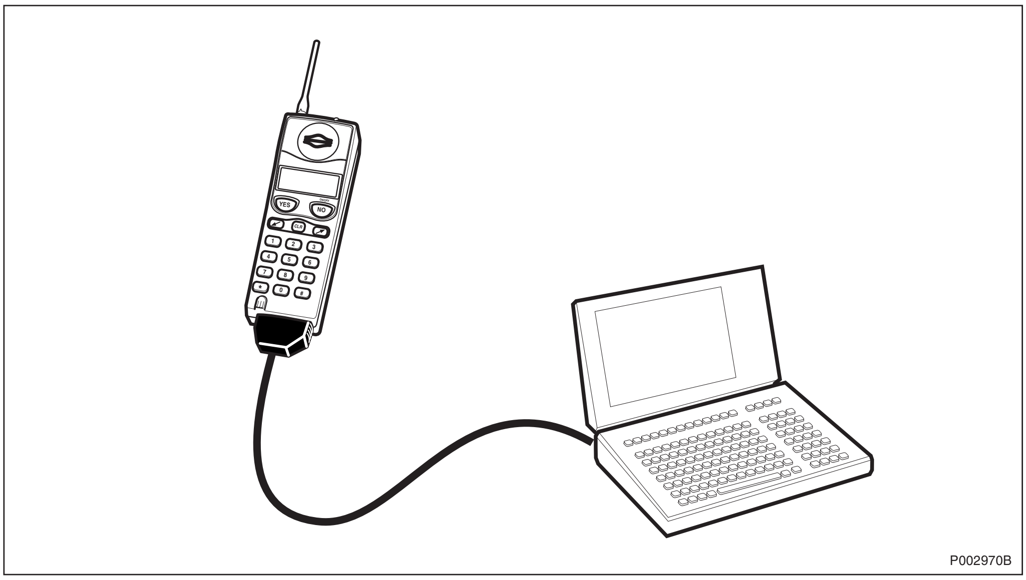

Figure 371 Connecting a PC to mobile

1. Connect the TEMS with a TEMS cable to a PC containing the TEMS program. Connect the cable to COM1.

2. Start the TEMS program and establish a connection between the MS and the PC. Choose “Enable connections” from the Externals menu.

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3. In the PC, define the COM1 for the MS 1 port. The other two ports should be set to “Not used”.
4. Start the function “Test of TCH” under Control.
5. Fill in the telephone number you use for the test, the Frequency number (ARCFN) for the Broadcast channel (BCCH) for the cell and the Frequency number for the Traffic channel (TCH). Note that for the first TRX in every cell the BCCH number is the same as the TCH number.
6. Fill in the boxes for the timeslots (TS). All the TS used for traffic should be tested. With that means every TS in every TRX except for the first TRX. In the first TRX there are two TS’s that are used for the BCCH (timeslot 0) and the SDCCH (timeslot determined by the BSC staff), and which can therefore not be tested.

   Choose Add and repeat for all TRX’s.
7. Choose start. The TEMS will now perform calls on all preset timeslots. The BTS commissioning staff will verify speech quality of each call and mark it Pass or Fail.

8.

The test is finished when all timeslots are passed. Note the results in the test record.

11.6.2 Diversity Testcall

This test do not need to be performed if the Stand Alone Test using the BSC Simulator has been done or if antenna diversity is not supported.

Configure RXD=A

1. If necessary, disable frequency hopping.

Command:	**RLCHC:CELL=cell, HOP=OFF;**
Printout:	EXECUTED

2. Make sure that the antenna system is connected.
3. Block all TS’s and RX’s in the TG and take the RX’s out of service.

Command:	**RXBLI:MO=RXOTS-x-y-0&&-7, FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

Command:	**RXBLI:MO=RXORX-x-y, FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

Command:	**RXESE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT OUT OF SERVICE RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

4. Configure diversity parameter to RXD=A for all RX's in the TG.

Command:	**RXMOC:MO=RXORX-x-y, RXD=A;**
Expected result:	EXECUTED

Repeat for all TRX's.

5. Bring all RX's in the TG into service and deblock the RX's and the TS's.

Command:	**RXESI:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result:	LOADED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

6. Check that the cell is configured with logical channels.

Command:	**RLCRP :CELL=cell;**
Printout:	CELL RESOURCES

Call test from MS on RXD=A

1. Block all TRX’s except for one.

Command:	**RXBLI:MO=RXOTRX-x-y,FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJEKT RESULT

2. Check that one TRX is configured with BCCH and SDCCH.

Command:	**RXCDP :MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION CONFIGURATION DATA

3. Make a call from the MS.
4. Check that one TCH is BUSY. Verify the speech connection.

Command:	**RLCRP :CELL=cell**
Printout:	CELL RESOURCES

5. Terminate the call.

Command:	**RLCRP :CELL=cell**
Printout:	CELL RESOURCES

Check that the TCH is released.

6. Deblock the blocked TRX’s.

Command:	**RXBLE:MO=RXOTRX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT

7. Repeat step 1 on page 359 to step 6 on page 359 until all TRX’s in the cell are tested. Note the results in the Test Record.

Configure RXD=B

1. Block all TS’s and RX’s in the TG and take the RX’s out of service.

Command:	**RXBLI:MO=RXOTS-x-y-0&&-7, FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJEKT RESULT
Expected Result:	EXECUTED

Repeat for all TRX’s.

Command:	**RXBLI:MO=RXORX-x-y,FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJECT RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

Command:	**RXESE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT OUT OF SERVICE RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

2. Configure diversity parameter to RXD=B for all RX's in the TG.

Command:	**RXMOC:MO=RXORX-x-y, RXD=B;**
Expected Result:	EXECUTED

3. Bring all RX's in the TG into service and deblock the RX's and the TS's.

Command:	**RXESI:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected Result:	LOADED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

4. Check that the cell is configured with logical channels.

Command:	**RLCRP :CELL=cell;**
Printout:	CELL RESOURCES

Call test from MS on RXD=B

1. Block all TRX's except for one.

Command:	**RXBLI:MO=RXOTRX-x-y,FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJECT RESULT

2. Check that one TRX is configured with BCCH and SDCCH.

Command:	**RXCDP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION CONFIGURATION DATA

3. Make a call to an MS in the cell.
4. Check that one TCH is BUSY. Verify the speech connection.

Command:	**RLCRP:CELL=cell;**
Printout:	CELL RESOURCES

Note: Verify ARFCN and TS with the TEMS mobile.

5. Terminate the call.
6. Check that the TCH is released.

Command:	**RLCRP:CELL=cell;**
Printout:	CELL RESOURCES

7. Deblock the blocked TRX's.

Command:	**RXBLE:MO=RXOTRX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT

8. Repeat step 1 on page 360 to step 7 on page 361 until all TRX's in the cell are tested. Document the results in the Test Records.

Restoration of Cell

1. Block all RX's in the TG and bring them out of service.

Command:	**RXBLI:MO=RXOTS-x-y-0&&-7, FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

Command:	**RXBLI:MO=RXORX-x-y,FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJEKT RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

Command:	**RXESE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT OUT OF SERVICE RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

2. Configure diversity parameter to RXD=AB, if diversity is supported.

Command:	**RXMOC:MO=RXORX-x-y,RXD=AB;**
	OR

Configure diversity parameter to RXD=A, if diversity is NOT supported. Repeat for all TRX's.

Command:	**RXMOC:MO=RXORX-x-y,RXD=A;**

Repeat for all TRX's.

3. Bring all RX's in the TG into service and deblock them.

Command:	**RXESI:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected Result:	LOADED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

4. If necessary, enable frequency hopping in the cell.

Command:	**RLCHC :CELL=cell, HOP=ON;**
Expected Result:	EXECUTED

5. Check the status of the cell. Logical channels should be configured.

Command:	**RLCRP :CELL=cell;**
Printout:	CELL RESOURCES

11.6.3 Test Call to MS from fixed Network

1. Check that one TRX is configured with BCCH and SDCCH:

Command:	**RXCDP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION CONFIGURATION DATA

2. Make a call from a fixed network phone (at the BSC) to the MS.
3. Check that one TCH is BUSY. Verify the speech connection.

Command:	**RXCRP:CELL=cell;**
Printout:	CELL RESOURCES

Note: Verify ARFCN and TS with the TEMS mobile.

4. Terminate the call.
5. Check that the TCH is released:

Command:	**RXCRP:CELL=cell;**
Printout:	CELL RESOURCES

6. Document the result in the Test Record.
7. Repeat for at least one TRX in every cell.

11.7 Network Integration Test

11.7.1 Antenna Attenuator Settings with BSC

This test is not necessary if the attenuators already have been set.

11.7.2 Feeder Attenuator

The feeder attenuator is an internal attenuator in the antenna, which is used to compensate for different cable lengths.

11.7.3 Test Procedure Overview

Preparations before test:		
• Start-up	→	*See chapter Site Installation Tests.*
• Feeder attenuation calculated	→	*See chapter Site Installation Tests.*
↓		
Set feeder attenuators to max.		
↓		
Antenna output power off.		
↓		
Set test parameters on the BSC.		
↓		
2 TRX Sector, 4 TRX and 6 TRX: • Set CEU/AAU feeder attenuators.	2 TRX Highway, GSM 900: • Set CEU 1/AAU 1 and CEU 2/AAU 2 feeder attenuators alternately.	
↓		
Installation OK?	No →	*Take corrective action, see chapter Site Installation Tests.*
↓ Yes		
Difference between calculated and measured attenuation acceptable?	No →	*Take corrective action, see chapter Site Installation Tests.*
↓ Yes		
Check with the operator whether the RBS is to be in traffic or shut off.		
↓ Yes		
Antenna output power on.		

11.7.4 Configuration Overview

← **6 TRX** →

← **4 TRX** →

← **2 TRX Sector** →

RBS 1, PBC 1 CEU 1/AAU 1	RBS 2, PBC 2 CEU 2/AAU 2	RBS 3, PBC 3 CEU 3/AAU 3

← **2 TRX Highway(1)** →

RBS 1, PBC 1, PBC 2 CEU 1, CEU 2/AAU 1, AAU 2

(1) Perform the test alternately for PBC 1 and PBC 2

11.7.5 Test Procedure

The purpose of this test is to set the attenuators for the feeders and antennas.

– GSM 900: Total attenuation = 9 dB

– GSM 1800, GSM 1900: Total attenuation = 12 dB

These values are predetermined and can not be changed.

The instructions below refer to *chapter Site Installation Tests, section Power and Battery Cabinet*.

The test is to be performed for each set of RBS, PBC and CEU (GSM 900) or AAU (GSM 1800, GSM 1900), which is included in the configuration used.

Set the feeder attenuator values:

Note: The time from start till the RBS is operational varies depending on ambient temperature. For example, it may take up to 15 minutes at (minus) -15 °C, and up to 30 minutes at (minus) -33 °C.

1. Set the feeder attenuators to max.:

Selected on PBC	Displayed	Explanation
Code 4	11 H	Max. feeder attenuation confirmed.

    1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
    2. Select code 4 on display element D3 with the Up or Down button.
    3. Press Enter.

2. Wait until the code message 11H appears on the display. This confirms that the feeder attenuators are set to maximum attenuation.

3. Antenna output power Off:

Selected on PBC	Displayed	Explanation
Code 2	11 P	Antenna output power off.

(This is done to avoid unnecessary disturbances of ongoing traffic.)

1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
2. Select code 2 on display element D3 with the Up or Down button.
3. Press Enter.

4. Wait until the fault code message 11P appears on the display. This message remains until the output power is switched back on.

5. Request the BSC operator to set the RBS to maximum output power for both carriers, according to the table below.

Note: Max. output power, stated in the table below, is a BSC command. Actual RBS power is 32.5 dBm (nominal value).

Table 52 Settings to reach maximum output power on the same frequency

TRX	Cell	ARFCN/Frequency, MHz					Max. output power, dB
		GSM 900	GSM 1800	GSM 1900			
				Band 1	Band 2	Band 3	
0	A	63/947.6	512/1805.2	561/1940	661/1960	761/1980	33
1	B	63/947.6	512/1805.2	561/1940	661/1960	761/1980	33

Alternatively, use the SW Power Boost.

- To activate SW Power Boost: *see Section How to Activate Software Power Boost (TX diversity) using BSC on page 368*.
- To deactivate SW Power Boost: *see Section How to Deactivate Software Power Boost (TX diversity) using BSC on page 369*.

6. Set the feeder attenuators for each feeder, including the attenuator in the antenna:

Selected on PBC	Displayed	Explanation
Code 1	5 x x	Feeder A attenuation value.
	6 x x	Feeder B attenuation value.

1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
2. Select code 1 on display element D3 with the Up or Down button.
3. Press Enter.

Note: While the attenuator setting is in progress, the display is flashing. The installation takes up to 3 minutes.

7. Wait for the feeder attenuation values to appear on the display: first feeder A (5 x x), then feeder B (6 x x). Enter the attenuation setting in the test record in *chapter Optional Tests*.

   The measured feeder attenuation is displayed:

   – GSM 900: Measuring range 0 – 9 dB.

   – GSM 1800, GSM 1900: Measuring range 0 – 12 dB.

   Each attenuation value is displayed for about 2 minutes (or until Enter is pressed), then the display returns to the active system status.

   Example:

	Attenuation	**Code displayed**
Feeder A	4 dB	5 0 4
Feeder B	4 dB	6 0 4

If there is a feeder installation fault:

- Code message 11H is displayed.
- Sector configuration: perform a Distance To Fault test according to *chapter Site Installation Tests*.
- Highway configuration: see *see Table 53 on page 370*.

Installation fault	**Code displayed**
Feeder A	7 0 1
Feeder B	7 0 2

8. Check that the measured value corresponds to the calculated value.

   If the difference between the measured and calculated value is 3 dB (or more):

- Sector configuration: perform a Distance To Fault test according to *chapter Site Installation Tests*.
- Highway configuration: *see Table 53 on page 370*.

9. Request the BSC operator to set the RBS to zero output power for both carriers.

10. Antenna output power On:

Selected on PBC	Displayed	Explanation
Code 3	- - -	Makes 11P disappear

    1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
    2. Select code 3 on display element D3 with the Up or Down button.
    3. Press Enter.

    This makes the fault code message 11P disappear.

11. Restart the RBS with the BSC.

How to Activate Software Power Boost (TX diversity) using BSC

In the instructions below yyy represents the Cell Id number and xxx represents the TG number.

1. Halt the cell.

    Command: **RLSTC:CELL=yyy, STATE=HALTED;**

2. Block the MOs for TRX1.

    Command: **RXBLI:MO=RXOTS-xxx-1-0&&-7;**
    RXBLI:MO=RXOTX-xxx-1;
    RXBLI:MO=RXORX-xxx-1;
    RXBLI:MO=RXOTRX-xxx-1;

3. Take the MOs for TRX1 out of service.

    Command: **RXESE:MO=RXOTS-xxx-1-0&&-7;**
    RXESE:MO=RXOTX-xxx-1;
    RXESE:MO=RXORX-xxx-1;
    RXESE:MO=RXOTRX-xxx-1;

4. Check that the parameter MPWR is at least 35 for TX0.

    Command: **RXMOP:MO=RXOTX-xxx-0;**

Note: Only execute the commands in step 5 if the MPWR is lower than 35. Else continue to step 6.

5. Block and take the TS and TX for TRX0 out of service.

    Change the MPWR to at least 35.

    Take the TS and TX for TRX0 into service and deblock.

Command: **RXBLI:MO=RXOTS-xxx-0-0&&-7;**
RXBLI:MO=RXOTX-xxx-0;
RXESE:MO=RXOTS-xxx-0-0&&-7;
RXESE:MO=RXOTX-xxx-0;
RXMOC:MO= RXOTX-xxx-0,MPWR=35;
RXESI:MO=RXOTX-xxx-0;
RXESI:MO=RXOTS-xxx-0-0&&-7;
RXBLE:MO=RXOTX-xxx-0;
RXBLE:MO=RXOTS-xxx-0-0&&-7;

6. Change nominal output power to 35 (35 is a code that tells the RBS to configure TX diversity).

   Command: **RLCPC:cell=yyy, BSPWRB=35,BSPWRT=35;**

7. Activate the cell.

   Command: **RLSTC:cell=yyy, STATE=ACTIVE;**

Note: If the Software Power Boost is to be permanent, change the LVA-parameter for TCH in the ’Cell Logical Channel Availability Supervision’, since the maximum number of available TCH have been reduced from 14 to 6.

Also confirm the value of NUMREQBPC.

How to Deactivate Software Power Boost (TX diversity) using BSC

In the instructions below yyy represents the Cell Id number and xxx represents the TG number.

1. Halt the cell.

   Command: **RLSTC:CELL=yyy, STATE=HALTED;**

2. Change the nominal output power to 33.

   Command: **RLCPC:cell=yyy, BSPWRB=33,BSPWRT=33;**

3. Take the MOs for TRX1 into service.

   Command: **RXESI:MO=RXOTRX-xxx-1;**
   RXESI:MO=RXORX-xxx-1;
   RXESI:MO=RXOTX-xxx-1;
   RXESI:MO=RXOTS-xxx-1-0&&-7;

4. Deblock the MOs for TRX1.

Command: **RXBLE:MO=RXOTRX-xxx-1;**
RXBLE:MO=RXORX-xxx-1;
RXBLE:MO=RXOTX-xxx-1;
RXBLE:MO=RXOTS-xxx-1-0&&-7;

5. Activate the cell.

Command: **RLSTC:cell=yyy, STATE=ACTIVE;**

Fault Tracing Hints

The jumpers and feeders are named according to the figure below.

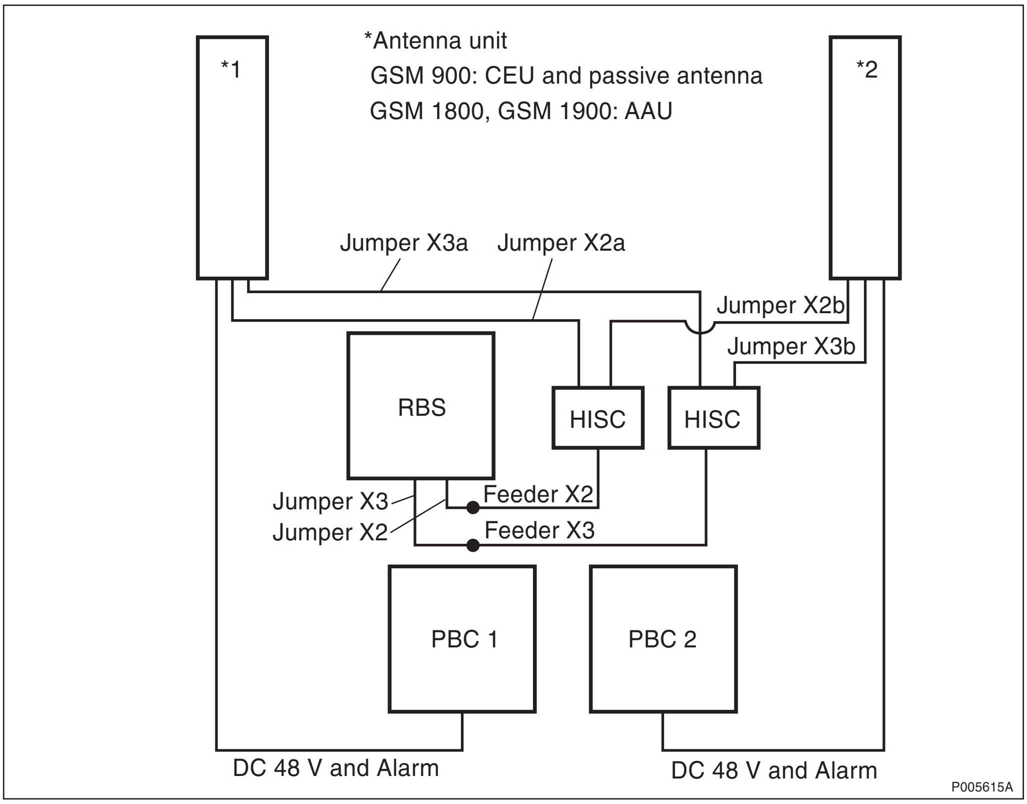

Figure 372 Jumper definition

Table 53 Fault tracing hints

Inst. fault PBC 1		Inst. fault PBC 2		Action
Path X2a	Path X3a	Path X2b	Path X3b	
●				Check the antenna jumper X2a connections.
	●			Check the antenna jumper X3a connections.
		●		Check the antenna jumper X2b connections.
			●	Check the antenna jumper X3b connections.
●		●		Check the RBS jumper X2 connections.
	●		●	Check the RBS jumper X3 connections.
●		●		Perform a DTF test, *see chapter Site Installation Tests*.
	●		●	Perform a DTF test, *see chapter Site Installation Tests*.

11.8 Test of External Alarms

The alarm strings are defined in the BTS with OMT by the BTS commissioning staff. The BTS commissioning staff will check that the correct alarm string is received in the RBS and sent to the BSC. If the alarm string received in the BSC corresponds to the alarm receiver in the BTS that was triggered, the definition is correct.

1. Check which AT that is used for alarm printouts (PRCA=64).

Command:	**IOROP;**
Printout:	IO PRINTOUT ROUTING DATA

2. Ask the BTS commissioning staff to simulate an alarm in the BTS site.

Note: Do not activate an alarm classified as severe.

3. Verify that the correct alarm is received in the BSC on the terminal obtained in step 1 on page 371
4. Repeat step 1 on page 371 to step 3 on page 371 for all defined alarms.

For more information about external alarm testing, *see chapter Site Installation Test.*

11.9 Leaving Site Routines

Save the IDB

The purpose is to save the configuration of the IDB on a diskette.

1. Save the configured IDB on the empty diskette.
2. Label the disc according to Table 54 on page 372.

Table 54 IDB diskette label

Item	Description
<Date>	Current date (YYMMDD)
<rev>	Revision state of the product
<Site Name>	Site name for the RBS
<RBS serial number>	Serial number of the RBS
<backup date>	Date of backup (YYMMDD)

Checklist

The following checklist is not mandatory but strongly recommended. Local procedures and safety regulations must be evaluated and included in this checklist.

Table 55 Checklist

Checklist		OK
1	Red fault indicators are off.	
2	All operational green LEDs light.	
3	Make sure the RBS is in remote mode (yellow indicator is off or flashing).	
4	Other yellow indicators are off, or flashing if no PCM link is connected.	
5	Test equipment has been disconnected from the RBS.	
6	Radio sub-cabinet and mounting base are free from foreign objects.	
7	All cables are undamaged.	
8	Backup copy of the RBS IDB has been saved on a floppy disk.	
9	All tools have been accounted for.	
10	The cabinet has been locked.	
11	External air intake is free from obstructions.	
12	Defective part packed for shipment (including Repair Delivery Note).	
13	All other necessary paper work has been completed.	

Signature	Date

11.10 Handover Test

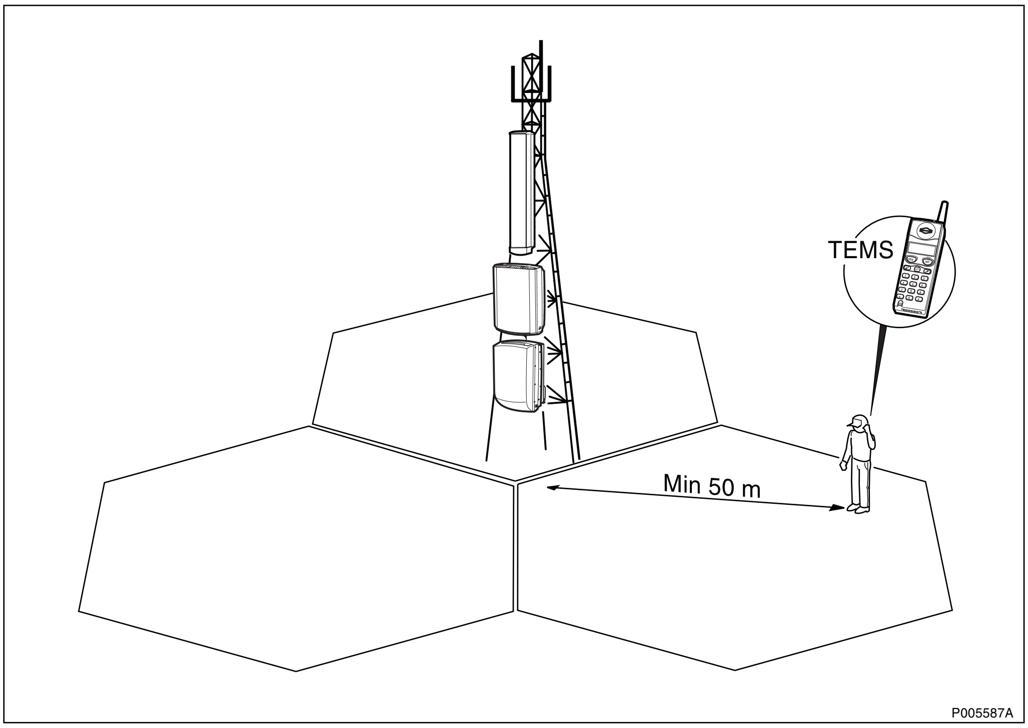

Figure 373 A forced handover test using the TEMS

Purpose: To verify that handovers between cells are functioning at a site.

The test will verify that the coverage of the cell is according to cell planning.

Note: The test should be performed at least 50 m from the BTS, but the driving is not necessary.

1. Start TEMS and establish a connection between the MS and the PC. Choose "Enable connections " from the Select Externals menu.
2. Choose the COM1 port for the MS.
3. Make a call from the test MS.

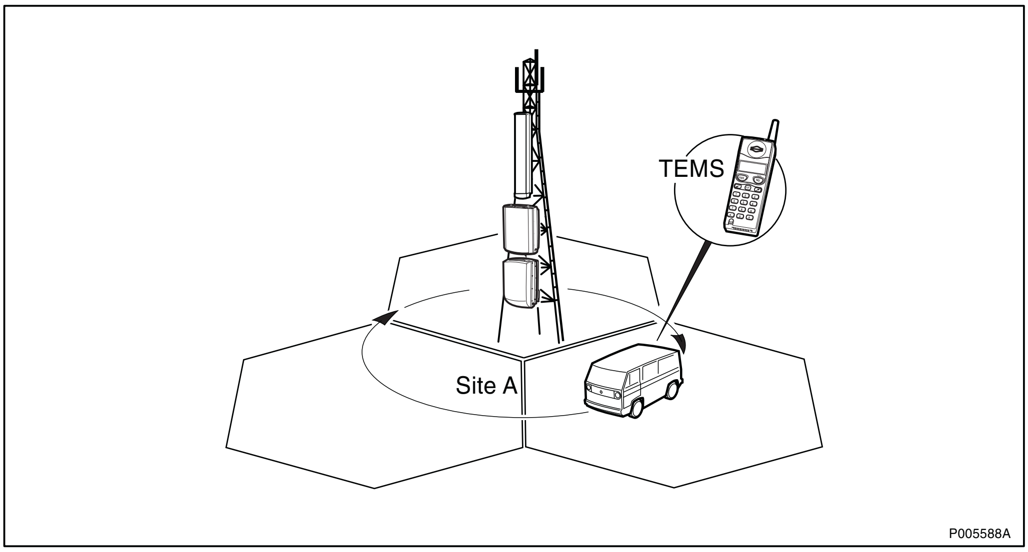

Figure 374 A drive test for checking that the call is handed over between the cells

4. Go between the cells, and check that the call does not disconnect.
5. Start a log by choosing “Start Log” from the “Log” menu.
6. Monitor the signal strength (RxLev) from the BTS with TEMS. Choose "Status information" from the Monitor menu. Select Serving + neighbouring cells.
7. Check that a handover occurs at the cell border.
8. Continue to move through the cells, and verify handover between the cells.
9. Note the result in the Test Record.
10. Close the log and save it.
11. If no handover occurs at a cell border, contact the BSC personnel

11.11 Helpful Hints

In this chapter you will find helpful information about:

- Setting the RBS in remote mode
- Reference DT-files
- Example of Exchange Data for a 6–TRU cabinet
- Example of Exchange Data for a 2–TRU cabinet
- LAPD Concentration Data
- BTS PCM Supervision
- Digital Path Data
- Installation of BTS Software in IOG
- Managed Object Hierarchy
- Managed Object States

11.11.1 Setting the RBS in remote mode

Follow this procedure if you want to set the RBS in remote mode:

- Push the Local/Remote button on the RBS to change mode.

  The Local/Remote mode indicator will start flashing to indicate that the mode has been changed and will keep flashing until contact has been established with the BSC (then the MO CF has been taken into service).

- Wait until contact has been established with the BSC, the Local mode indicator will then be turned off.
- If contact has not been established within ten minutes, turn off the power to the RBS and try again.
- The RBS commissioning staff must have contact with the BSC staff.

11.11.2 Reference DT-files

The initial data for all internal cells is in DT-file: 83000.

The external cell data is in DT-file: 83500.

Data for each cell and TG are in DT-files 85xxx and 87xxx, where xxx is a consecutive number, indicating the site.

Neighboring cell data for each cell are in DT-files 86xxx, where xxx is a consecutive number, indicating the site.

Data for definition of Abis paths is in the DT-file 94xxx.

11.11.3 Example of Exchange data for a 2-TRX cabinets

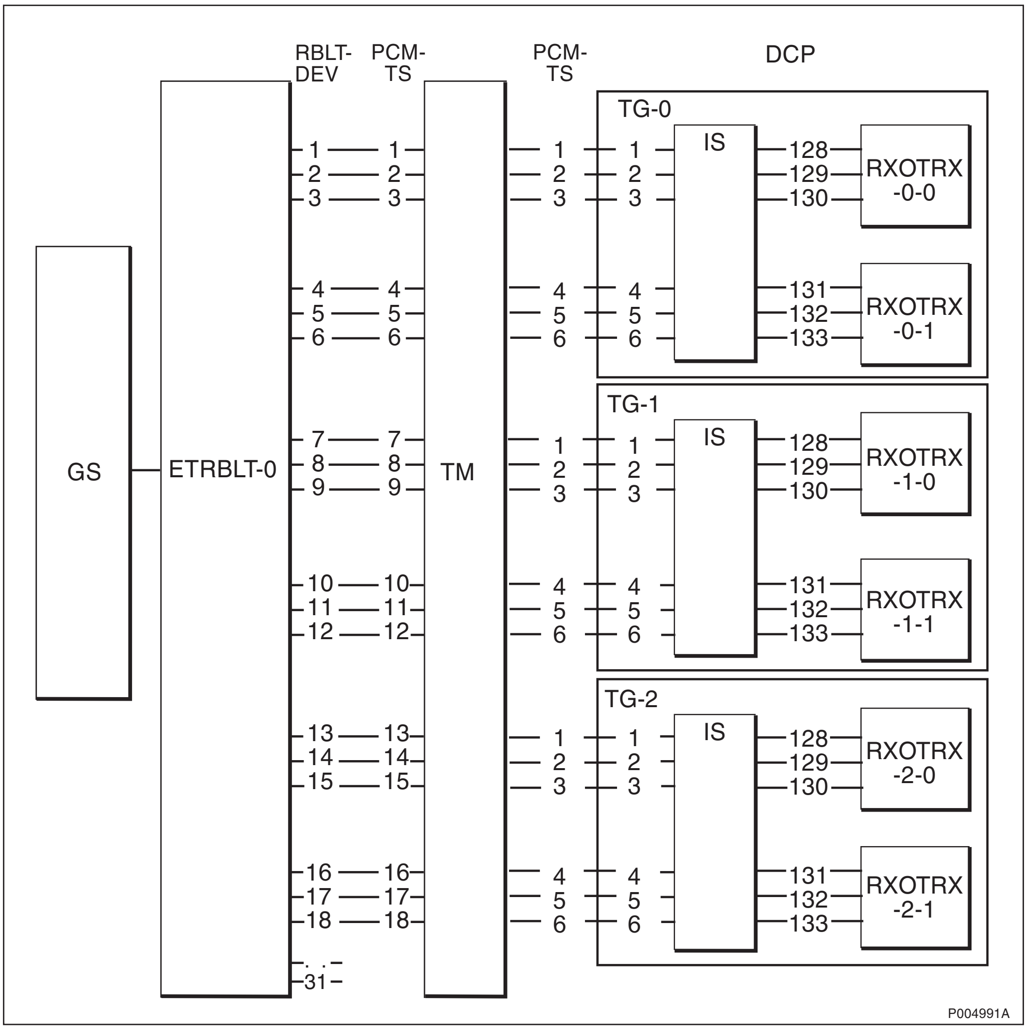

Figure 375 An example of a 2–TRX cabinet

This is an example of how the exchange data can be arranged for three cascade connected 2-TRX cabinets:

Definition of Managed Objects

Command:	**RXMOI:MO=RXOTG-0,COMB=HYB,RSITE=SITE1,SWVER=swver;**
Command:	**RXMOI:MO=RXOCF-0,TEI=62;**
Command:	**RXMOI:MO=RXOIS-0;**
Command:	**RXMOI:MO=RXOTF-0,TFMODE=SA;**
Command:	**RXMOI:MO=RXOTRX-0-0,TEI=0,DCP1=128,DCP2=129&130;**
Command:	**RXMOI:MO=RXOTRX-0-1,TEI=1,DCP1=131,DCP2=132&133;**

Command: **RXMOI:MO=RXOTX-0-0&-1,BAND=GSM,MPWR=40;**

Command: **RXMOI:MO=RXORX-0-0&-1,BAND=GSM,RXD=AB;**

Command: **RXMOI:MO=RXOTS-0-0-0&&-7;**

Command: **RXMOI:MO=RXOTS-0-1-0&&-7;**

Command: **RXMOI:MO=RXOTG-1,COMB=HYB,RSITE=SITE2,SWVER=swver;**

Command: **RXMOI:MO=RXOCF-1,TEI=62;**

Command: **RXMOI:MO=RXOIS-1;**

Command: **RXMOI:MO=RXOTF-1,TFMODE=SA;**

Command: **RXMOI:MO=RXOTRX-1-0,TEI=0,DCP1=128,DCP2=129&130;**

Command: **RXMOI:MO=RXOTRX-1-1,TEI=1,DCP1=131,DCP2=132&133;**

Command: **RXMOI:MO=RXOTX-1-0&-1,BAND=GSM,MPWR=40;**

Command: **RXMOI:MO=RXORX-1-0&-1,BAND=GSM,RXD=AB;**

Command: **RXMOI:MO=RXOTS-1-0-0&&-7;**

Command: **RXMOI:MO=RXOTS-1-1-0&&-7;**

Command: **RXMOI:MO=RXOTG-2,COMB=HYB,RSITE=SITE3,SWVER=swver;**

Command: **RXMOI:MO=RXOCF-2,TEI=62;**

Command: **RXMOI:MO=RXOIS-2;**

Command: **RXMOI:MO=RXOTF-2,TFMODE=SA;**

Command: **RXMOI:MO=RXOTRX-2-0,TEI=0,DCP1=128,DCP2=129&130;**

Command: **RXMOI:MO=RXOTRX-2-1,TEI=1,DCP1=131,DCP2=132&133;**

Command: **RXMOI:MO=RXOTX-2-0&-1,BAND=GSM,MPWR=40;**

Command: **RXMOI:MO=RXORX-2-0&-1,BAND=GSM,RXD=AB;**

Command: **RXMOI:MO=RXOTS-2-0-0&&-7;**

Command: **RXMOI:MO=RXOTS-2-1-0&&-7;**

Definition of Abis paths

Command: **RXAPI:MO=RXOTG-0,DEV=RBLT-1&&-6,DCP=1&&6;**

Command: **RXAPI:MO=RXOTG-1,DEV=RBLT-7&&-12,DCP=1&&6;**

Command: **RXAPI:MO=RXOTG-2,DEV=RBLT-13&&-18,DCP=1&&6;**

Note: Definition of Managed Objects DP and CON. (These two MO's are optional and described in*Section 11.11.4 on page 378 and Section 11.11.5 on page 378.*)

Note: In this case the Transport Modules (TM) must be loaded with the correct data. This should be done by the BTS Commissioning Staff.

11.11.4 LAPD Concentration Data

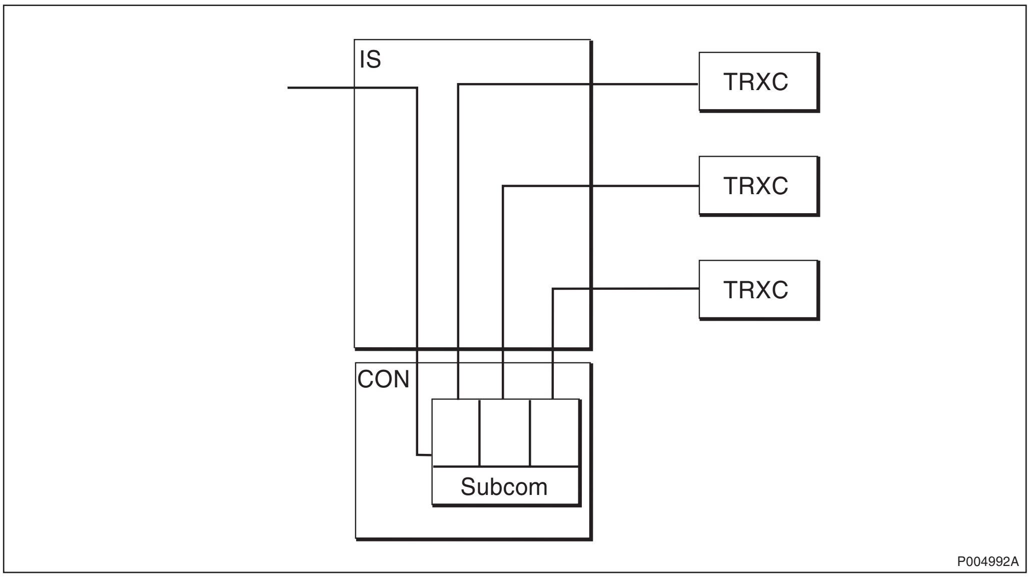

Figure 376 LAPD Concentration in RBS 2000

Command: **RXMOC:MO=RXOTG-0,CONFACT=confact;**

Command: **RXMOC:MO=RXOCF-0,SIG=CONC;**

Command: **RXMOI:MO=RXOCON-0,DCP=64&&87;**

11.11.5 BTS PCM Supervision

Command: **RXMOI:MO=RXODP-0-0,DEV=RXODPI-0;**

Command: **DTDII:DIP=modip,DEV=RXODPI-0;**

11.11.6 Digital Path Data

The Digital Path used towards an RBS 2000 site should be defined according to the following:

Command:	**DTDII:DIP=RBLTx,SNT=ETRBLT-x;**
Command:	**DTIDC:DIP=RBLTx,MODE=0,INACT=0, MULTFS=00,CRC=0;**

CRC=0	Cyclic Redundancy Check will NOT be performed
CRC=1	Cyclic Redundancy Check will be performed

If CRC=1, the BTS commissioning staff has to set a parameter in the BTS with OMT, otherwise CRC will NOT be performed. In CME20 R6 and later versions, it will not be possible to set the CRC parameter from the BSC.

Note: The parameter MODE should always be set to 0.

11.11.7 Installation of BTS Software in IOG

The number of subfiles may differ, usually 3-6 subfiles are used.

- btsfilename-HEADER
- btsfilename-LF1
- btsfilename-LF2
- btsfilename-LF3
- and so on...

It is delivered on a number of floppy or optical discs. Follow information provided with the BTS SW for information on how to load it. If such information is missing follow the following hints or look for a proper OPI.

1. Mount the disc(s) on the IOG with INVOL.
2. Create a file on the HD of the IOG.

Command:	**INMCT:SPG=0;**
Command:	**INFII:FILE=btsfilename,VOL=BTSVOLUMSW, RLENGTH=512, TYPE=SEQ, FCLASS=CMP, EXP=10, SIZE=1;**

3. Check which subfiles there are on the floppy’s.

Command:	**INFIP:FILE=FD0A1/FD0B1;**

4. Copy the files (Repeat for all subfiles on the diskettes).

Command: **INFET:FILE1=FHEADER,NODE1=A,IO1=FD-1,FILE2=btsfilename-HEADER;**

Command: **INFET:FILE1=FLF1,NODE1=A,IO1=FD-1,FILE2=btsfilename-LF1;**

Command: **INFET:FILE1=FLF2,NODE1=A,IO1=FD-1,FILE2=btsfilename-LF2;**

Command: **INFET:FILE1=FLF3,NODE1=A,IO1=FD-1,FILE2=btsfilename-LF3;**

5. Unload and dismount the disc(s).

Command: **INVOE;**

Note: Always repeat step 1 on page 379 and step 5 on page 380 every time you swap discs.

11.11.8 Managed Object Hierarchy

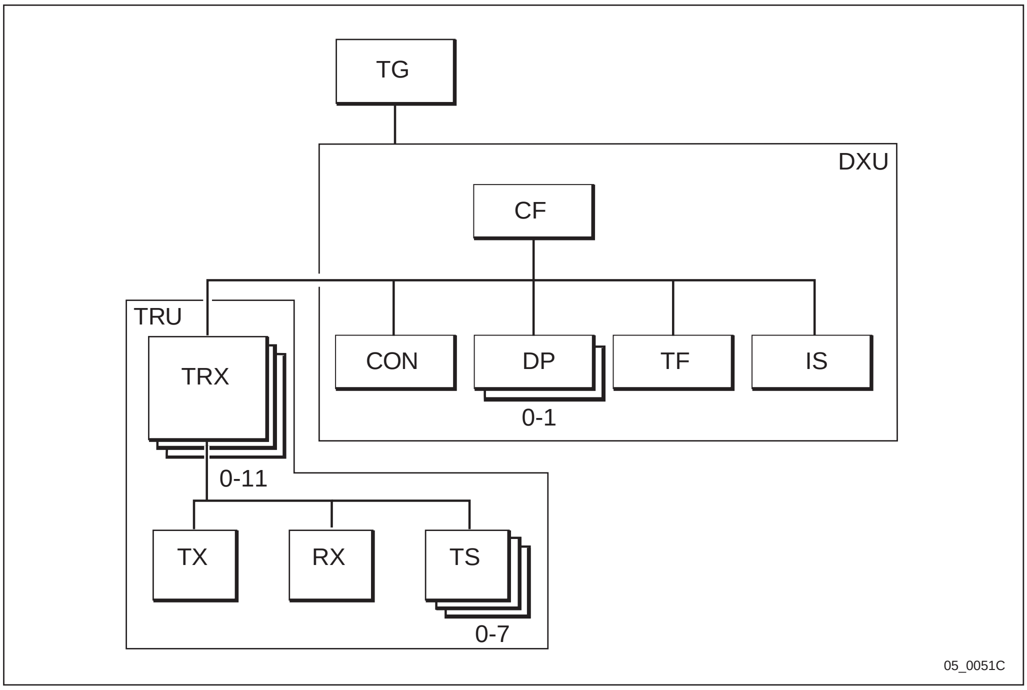

Figure 377 Managed Object (MO) hierarchy for RBS 2000 series

The Managed Objects CF, TF, DP, CON and IS corresponds to the hardware unit DXU in the BTS.

The Managed Objects TRX, TX, RX and TS corresponds to the hardware unit TRU in the BTS.

The Managed Object TG has no corresponding hardware in the BTS.

11.11.9 Managed Object States

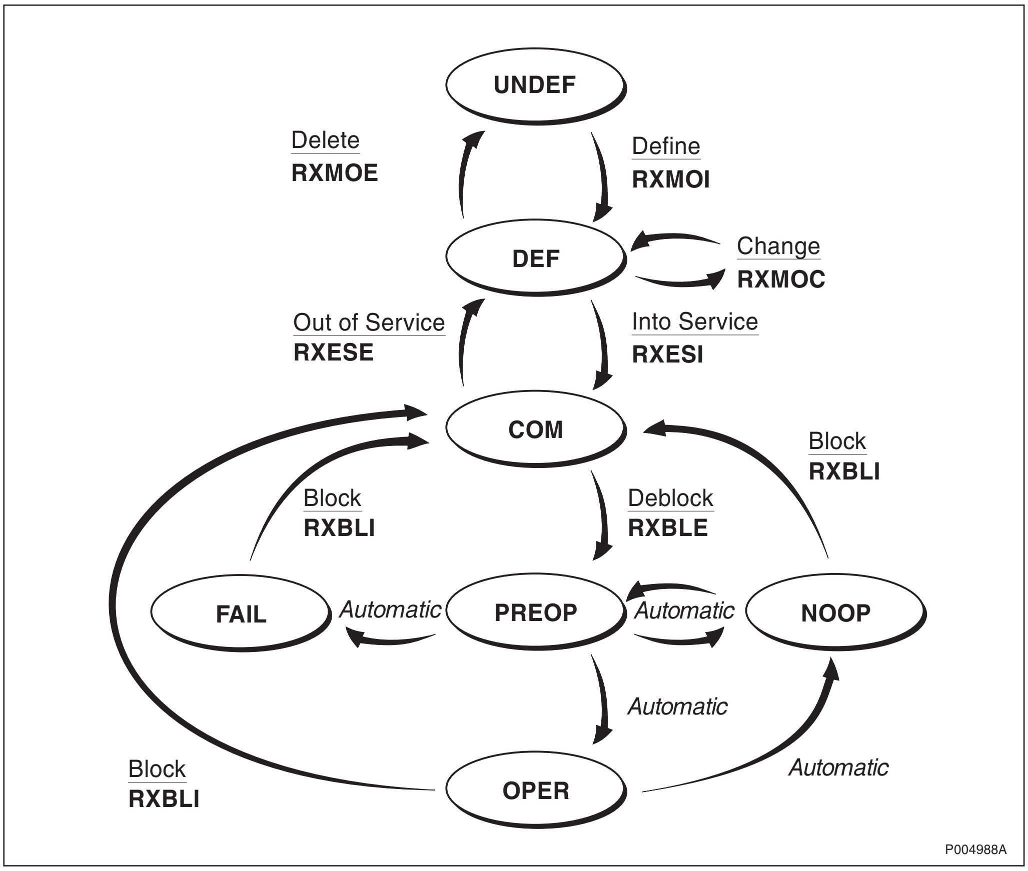

Figure 378 Description of the relation between the different managed object states

The current state of all MO's can be checked using the command:

Command:	**RXMSD:MO=mo;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT STATE

11.12 Test Records

11.12.1 Network Element Integration Test

NE Commissioning GSM -

Date.	Site Name:
Site No:	Cell configuration:
RBS type:	Testers Name:

NETWORK ELEMENT INTEGRATION TEST

AIR INTERFACE CALL TEST

TRX	Cell ID	ARFCH	BSIC	TS0	TS1	TS2	TS3	TS4	TS5	TS6	TS7
1											
2											
3											
4											
5											
6											

	Cell A		Cell B		Cell C	
Land to MS-Call	☐		☐		☐	
Handover test	☐ A to B	☐ A to C	☐ B to A	☐ B to C	☐ C to A	☐ C to B

External Alarm Test ☐

Concluding Routines ☐

1. Update and save the IDB
2. Check the Software version and note it below.
3. Checklist before ending test.

Init: ____________________ Appl: ____________________

Remarks: ____

____

P005554A

Figure 379 Test Record for the Network Element Integration

11.12.2 Network Element Acceptance Certificate

NETWORK ELEMENT ACCEPTANCE CERTIFICATE

This is to certify that Ericsson Radio Systems AB has delivered, installed and tested the Network Element .... as defined in contract ....

The Network element acceptance has been performed in accordance with the procedures described in above mentioned contract. Further reference should be made to the acceptance documents. The Network element passed acceptance with remarks per attached test report.

Number of remarks within Ericssons responsibilities, that has been made on this site:.............

Date:..........................

The Buyer	The Contractor
Company name:	Company name: Ericsson Radio Systems AB
Responsible Person:	Responsible Person:

P004631B

Figure 380 Example of a Network Element Acceptance Certificate

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12 Fault Handling

12.1 Fault Tracing Hints

Table 56 Fault tracing hints

Fault	Action
Fault LED is flashing.	• Reset the RBS (CPU Reset button). • Check BTS Software. • Install IDB.
The RBS cannot be integrated into the system.	• Make sure that the transmission cable between the RBS and the Installation Box is correctly connected.
The OMT will not install IDB.	• Push the local/remote button until the RBS is in local mode. • Push the CPU Reset button and try again.
The OMT will not read IDB.	• Check that the cable is correctly connected. • Reset the RBS (CPU Reset button).
The OMT will not define alarm inlets.	• Disconnect the OMT.
The RBS will not take CF into service (when using a BSC simulator to make a test call).	• Check that the cables are correctly connected. • Make sure that the RBS is in remote mode. • Reset the CPU (CPU Reset button).
Memory Corrupted.	Use the OMT. • For faults Non-Volatile Memory Corrupted and RBS Database Corrupted/Inconsistent, reset by installing a new IDB. • If this fault arises during Function change or Program Load, wait until the Function change or Program Load is completed. • If the RBS does not recover automatically, check the files and repeat the Function change or Program Load.
Wrong IDB.	• Install the correct IDB, using the OMT.
PCM fails when installing BTS SW with simulator.	• Check that the PCM cables are correctly connected. (The TX cable has voltage). • Shift the PCM cables.
Battery fault.	• Battery disconnected or faulty. • Low battery DC voltage.
PSA fault.	• If the RBS indicates Battery Fault, but the PBC shows no alarms, replace the PSA.
The PBC cannot start up.	• Make sure that all cables are correctly connected, and the fuses are not defective.

Fault	Action
Data link transmission fail.	• Check that the 48 V cable is connected. • Check that the signalling cables are correctly connected.
Installation fault (Fault code 701, 702)	• Check that the RBS is properly configured. • Set antenna attenuators • Perform a DTF test

12.2 Fault Code List

This chapter describes faults reported to the BSC and HW units suspected of causing the fault.

Where applicable, the fault code lists indicate faults with restricted validity for product release R6 and later in CME 20, and also for the micro RBSs: RBS 2301 and RBS 2302.

When using this chapter for CMS 40 the conversion table below applies.

Table 57 Relation of product releases in CME 20 and CMS 40

CME 20		CMS 40
R6.0	↔	R2
R6.1	↔	R3
R7	↔	R7

12.2.1 Terminology

The following terminology is used throughout this chapter.

Fault Number

The fault number is identical with the bit position in the fault map reported over the Abis interface.

Internal Fault Map Class 1A (I1A)

Faults reported in this class are faults that affect MO functionality. Faulty HW is part of the signalling MO.

Internal Fault Map Class 1B (I1B)

Faults reported in this class are faults that affect MO functionality. The origin of the fault is external to the signalling MO.

Internal Fault Map Class 2A (I2A)

Faults reported in this class are faults that do not affect MO functionality. Faulty HW is part of the signalling MO.

External Condition Map Class 1 (EC1)

Conditions reported in this class are conditions that affect MO functionality. The conditions are TG external.

External Condition Map Class 2 (EC2)

Conditions reported in this class are conditions that do not affect MO functionality. The conditions are TG external.

Replacement Unit Map (RU Map)

Units reported in this map are HW units suspected of causing the faults in the internal fault maps described above.

Logical RU

A logical RU is defined as a unit that can be referred to but is not a single physical unit. There are four different kinds of logical RUs:

1. **Buses**. These are often referred to as a single physical unit but are implemented in the backplane of the cabinet with cables. When a bus is pointed out in the RU map it should be understood that faulty HW can be any unit connected to the bus, or the bus, itself. Logical bus RUs are:
   - X bus
   - Local bus
   - Timing bus
   - CDU bus
   - Power communication loop
2. **Antennas**. (Not applicable for RBS 2301 and RBS 2302). A logical antenna means the whole signal path between the Transmitter/Receiver and the physical antenna. The Logical antenna RUs is:
   - Antenna
3. **Environment**. This RU records conditions that cannot be affected from the base station. There are two groups under this RU:
   - Power, that handles external power
   - Climate, that handles humidity and temperature

   For example, if the temperature in the cabinet is too high or the incoming AC mains power is out of range, the logical RU "Environment"is denoted as faulty.

   Logical RU is:
   - Environment
4. **RBS DB**. The RBS database is regarded as a replaceable unit despite it is not a physical unit. It comprises the data in the database only, not the medium it resides in.

Logical RUs in 1 and 2 above are pointed out when the analysis fails to give a more detailed localization of the fault. However, the ambition is still not to point out a logical RU.

12.2.2 Decoding of Fault Maps

Note: No decoding of Fault Maps is necessary from RBS 2000 release HRB 105 01/2 revision R7. The Fault Maps will be presented in plain text (Fault Type).

The following instructions can be used when a fault map sent to OMC must be translated into a decimal number. An example is when the error log has been printed.

All fault and replacement unit codes consist of a number of hexadecimal digits, in most cases twelve. These twelve digits represent a map that consists of 48 bits. Each bit represents a decimal number and can be translated into a description by using the fault code list and the replacement unit map.

Excepted from this rule are codes for external faults. These codes contain only four hexadecimal digits, which means 16 bits. The decoding principle is the same as for the twelve-digit code.

Example 1

SO CF has reported an internal class 1A fault. The fault code is "000000004100".

Table 58 Fault code “000000004100”

47-44	43-40	39-36	35-32	31-28	27-24	23-20	19-16	15-12	11-8	7-4	3-0
0	0	0	0	0	0	0	0	4	1	0	0
0000	0000	0000	0000	0000	0000	0000	0000	0100	0001	0000	0000

Bits number 8 and 14 are set to "1", which means that faults number 8 and 14 are active in the CF class 1A fault list. Translating the numbers by using the information in the fault list gives the two faults "Timing unit VCO fault" (fault number 8) and "Local bus fault" (fault number 14).

Example 2

SO TRXC has reported a replacement unit code, "000000000001".

Table 59 Fault code “000000000001”

47-44	43-40	39-36	35-32	31-28	27-24	23-20	19-16	15-12	11-8	7-4	3-0
0	0	0	0	0	0	0	0	0	0	0	1
0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0001

Bit number 0 is set to "1", which means that replacement unit 0 is suspected of being faulty. Translating this number by using the replacement unit map for SO TRXC will give us the information "Suspected replacement unit is TRU".

Unused Decoding Table

Make a copy of this table and use it as a tool when decoding fault codes and replacement unit codes.

Table 60 Unused decoding table

47-44	43-40	39-36	35-32	31-28	27-24	23-20	19-16	15-12	11-8	7-4	3-0

Hex to Bin Table

Hex	Bin	Hex	Bin
0	0000	8	1000
1	0001	9	1001
2	0010	A	1010
3	0011	B	1011
4	0100	C	1100
5	0101	D	1101
6	0110	E	1110
7	0111	F	1111

12.2.3 SO Fault Lists

Fault codes on the Abis interface are defined per MO. The SO RU map and the I1A/I2A fault maps should be read together. The SO fault map denotes which fault it is, and the RU map denotes where the fault is located.

An AO I1B fault has a corresponding SO I2A fault. So by reading the I2A fault map and the RU map for SO CF or SO TRXC, the HW that is causing the AO I1B fault can be found. This is the case when BTS internal HW affects a single AO.

The AO is not allowed to report the HW itself since this task is assigned to the HW-responsible SO. One could say that the consequence is reported by the AO I1B fault map and the cause is reported by the SO I1A/I2A fault maps and the RU map.

SO CF, internal fault map class 1A

Fault No.	Fault type	Remark
0	Reset, failed restart attempt	
1	Reset, power on	
2	Reset, switch	
3	Reset, watchdog	
4	Reset, SW fault	

Fault No.	Fault type	Remark
5	Reset, RAM fault	
6	Reset, internal function change	
7	X bus fault	
8	Timing unit VCO fault	
9	Timing bus fault	
10	Indoor temperature out of safe range	
11		
12	DC voltage out of range	
13		
14	Local bus fault	
15	RBS database corrupted	R6 and later
16	RU database corrupted	
17	HW and IDB inconsistent	
18	Internal configuration failed	
19	Indoor temperature above safe range	Micro RBS only
20	Indoor temperature below safe range	Micro RBS only
-		
-		
47		

SO CF, internal fault map class 1B

Not used.

SO CF, internal fault map class 2A

Fault No.	Fault type	Remark
0	Reset, failed restart attempt	
1	Reset, power on	
2	Reset, switch	
3	Reset, watchdog	
4	Reset, SW fault	
5	Reset, RAM fault	
6	Reset, internal function change	
7	RXDA amplifier current fault	R6 and later
8	VSWR limits exceeded	
9	Power limits exceeded	R6 and later
10	DXU optional EEPROM checksum fault	
11	ALNA fault	
12	RX maxgain/mingain violated	R6 and later
13	Timing unit VCO ageing	
14	CDU supervision/communication lost	

Fault No.	Fault type	Remark
15	VSWR/Output power supervision lost	R6 and later
16	Indoor temperature out of normal conditional range	
17	Indoor humidity	
18	DC voltage out of range	
19	Power system in stand-alone mode	
20	External power fault	
21	Internal power capacity reduced	
22	Battery backup capacity reduced	
23	Climate capacity reduced	R6 and later
24	CU HW fault	R6 and later
25	Heater capacity reduced	
25	Loadfile missing in DXU or ECU	R7
26	Climate sensor fault	
27	System voltage sensor fault	
28	A/D converter fault	
29	Varistor fault	
30	Local bus fault	
31	High-frequency software fault	
32	Non-volatile memory corrupted	
33	RX diversity lost	
34	Output voltage fault	
35	Optional synchronisation source	
36	RU database corrupted	
37	Circuit breaker tripped	
38	Default values used	
39	RX cable disconnected	
40	Reset, DXU link lost	
41	Lost communication to TRU	R6 and later
42	Lost communication to ECU	R6 and later
43	Internal configuration failed	R6 and later
44	Indoor temperature above normal conditional range	Micro RBS only
45	Indoor temperature below normal conditional range	Micro RBS only
46	DB parameter fault	R7
47	Auxiliary Equipment Fault	R7 only

SO CF, external condition map class 1

Fault No.	Fault type
0	
-	
-	
4	L/R SWI (BTS in local mode)
5	L/R TI (Local to remote while link lost)
-	
-	
15	

SO CF, external condition map class 2

Fault No.	Fault type
0	
-	
-	
-	
9	RBS door (RBS cabinet door open)
-	
-	
15	

SO CF, replacement unit map

No.	Replaceable unit	Remark
0	DXU	
1	ECU	
2	Micro RBS	
3		
4		
5	CDU	
6	BFU	
7	PSU	
8	CDU_Cos	
9	BDM	
10	ACCU	
11	Active cooler	
12	ALNA A	
13	ALNA B	
14	Battery	

No.	Replaceable unit	Remark
15	Fan	
16	Heater	
17	Heat exchanger external fan	
18	Heat exchanger internal fan	
19	Humidity sensor	
20		
21	Temperature sensor	
22	CDU HLOUT HLIN cable	
23	CDU RX in cable	
24	CU	
25	DU	
26	FU	
27	FU CU PFWD cable	
28	FU CU PREFL cable	
29	CAB HLIN cable	
30	CDU bus	
31	Environment	
32	Local bus	
33	Power communication loop	
34	RBS DB	R7
34		
35		
36	Timing bus	
37		
38		
39	X bus	
40	Antenna	
-		
-		
47		

SO TRXC, internal fault map class 1A

Fault No.	Fault type	Remark
0	Reset, failed restart attempt	
1	Reset, power on	
2	Reset, switch	
3	Reset, watchdog	
4	Reset, SW fault	
5	Reset, RAM fault	
6	Reset, internal function change	
7		

Fault No.	Fault type	Remark
8	Timing reception fault	
9	Signal processing fault	
10	Tora Dannie communication fault	
11	DSP CPU communication fault	
12	Terrestrial traffic channel fault	
13	RF loop test fault	
14	RU database corrupted	
15	X bus communication fault	
16	Initiation fault	
17	X-interface fault	
18	DSP fault	
19	Reset, DXU link lost	
20	HW and IDB inconsistent	R6 and later
21	Internal configuration failed	R6 and later
-		
-		
47		

SO TRXC, internal fault map class 1B

Fault No.	Fault type	Remark
0	CDU not usable	R6 and later
1	Indoor temperature out of safe range	
2		
3	DC voltage out of range	
4	Indoor temperature above safe range	
5	Indoor temperature below safe range	
-		
-		
47		

SO TRXC, internal fault map class 2A

Fault No.	Fault type	Remark
0	RX cable disconnected	
1	RX EEPROM checksum fault	
2	RX configuration table checksum fault	
3	RX synthesizer unlocked	
4	RX internal voltage fault	
5	Astra Dixie communication fault	

Fault No.	Fault type	Remark
6	Astra Tracy communication fault	
7	TX EEPROM checksum fault	
8	TX configuration table checksum fault	
9	TX synthesizer unlocked	
10	TX internal voltage fault	
11	TX high temperature	
12	TX output power limits exceeded	
13	TX saturation	
14	Voltage supply fault	
15	VSWR/output power supervision lost	
16	Non-volatile memory corrupted	
17	Loadfile missing in TRU	R7
18	DSP fault	
19	High-frequency software fault	
20	RX initiation fault	
21	TX initiation fault	
22	CDU bus communication fault	
23	Default values used	
24		
25	TX maximum power restricted	
26	DB Parameter Fault	R7
-		
-		
47		

SO TRXC, external condition map class 1

Fault No.	Fault type
0	
-	
-	
4	L/R SWI (TRU in local mode)
5	L/R TI (Local to remote while link lost)
-	
-	
15	

SO TRXC, external condition map class 2

Not used.

SO TRXC, replacement unit map

No.	Replaceable unit	Remark
0	TRU	
1		
2	Micro RBS	
-		
-		
10	CDU to TRU PFWD cable	
11	CDU to TRU PREFL cable	
12	CDU to TRU RXA cable	
13	CDU to TRU RXB cable	
-		
-		
47		

12.2.4 AO Fault Lists

Fault codes on the Abis interface are defined per MO. The SO RU map and the I1A/I2A fault maps should be read together. The SO fault map denotes which fault it is, and the RU map denotes where the fault is located.

An AO I1B fault has a corresponding SO I2A fault. So by reading the I2A fault map and the RU map for SO CF or SO TRXC, the HW that is causing the AO I1B fault can be found. This is the case when BTS internal HW affects a single AO.

The AO is not allowed to report the HW itself since this task is assigned to the HW-responsible SO. One could say that the consequence is reported by the AO I1B fault map and the cause is reported by the SO I1A/I2A fault maps and the RU map.

AO CON, internal fault map class 1A (R6 and later)

Not used.

AO CON, internal fault map class 1B (R6 and later)

Not used.

AO CON, internal fault map class 2A (R6 and later)

Not used.

AO CON, external condition map class 1 (R6 and later)

Fault No.	Fault type
0	
-	

Fault No.	Fault type
-	
8	LAPD Q CG (LAPD queue congestion)
-	
-	
15	

AO CON, external condition map class 2 (R6 and later)

Fault No.	Fault type
0	
-	
-	
8	LAPD Q CG (LAPD queue congestion)
-	
-	
15	

AO CON, replacement unit map (R6 and later)

Not used. *See Section SO CF, replacement unit map on page 392,* for possible HW causing the fault.

AO TS, internal fault map class 1A

Not used

AO TS, internal fault map class 1B

Not used

AO TS, internal fault map class 2A

Not used

AO TS, external condition map class 1

Fault No.	Fault type
0	
1	
2	
3	TRA (Remote transcoder communication lost)
-	

Fault No.	Fault type
-	
15	

AO TS, external condition map class 2

Not used

AO TS, replacement unit map

Not used.

AO TF, internal fault map class 1A

Not used.

AO TF, internal fault map class 1B

Fault No.	Fault type
0	Optional synchronisation source
1	DXU optional EEPROM checksum fault
-	
-	
47	

AO TF, internal fault map class 2A

Not used.

AO TF, external condition map class 1

Fault No.	Fault type
0	
1	PCM sync (no usable PCM reference)
-	
-	
15	

AO TF, external condition map class 2

Fault No.	Fault type
0	
1	PCM sync (no usable PCM reference)

Fault No.	Fault type
-	
-	
15	

AO TF, replacement unit map

Not used. *See Section SO CF, replacement unit map on page 392,* for possible HW causing the fault.

AO TX, internal fault map class 1A

Fault No.	Fault type	Remark
0	TX offending	R6 and later
-		
-		
47		

AO TX, internal fault map class 1B

Fault No.	Fault type	Remark
0	CU not usable	
1	CDU VSWR limits exceeded	
2	CDU output power limits exceeded	
3		
4	TX antenna VSWR limits exceeded	
5		
6	TX EEPROM checksum fault	
7	TX configuration table checksum fault	
8	TX synthesizer A/B unlocked	
9	TX synthesizer C unlocked	
10	Astra Tracy communication fault	
11	TX internal voltage fault	
12	TX high temperature	
13	TX output power limits exceeded	
14	TX saturation	
15	Voltage supply fault	
16	Power unit not ready	
17	TX initiation fault	
18	CU HW fault	R6 and later
19	CU SW load/start fault	R6 and later
20	CU input power fault	R6 and later

Fault No.	Fault type	Remark
21	CU park fault	R6 and later
22	VSWR/Output power supervision lost	R6 and later
23	CU reset, power on	R6 and later
24	CU reset, communication fault	R6 and later
25	CU reset, watchdog	R6 and later
26	CU fine tuning fault	R6 and later
27	TX maximum power restricted	
-		
-		
47	TX Auxiliary Equipment Fault	R7 only

AO TX, internal fault map class 2A

Fault No.	Fault type	Remark
0	TX diversity fault	
-		
-		
47		

AO TX, external condition map class 1

Not used.

AO TX, external condition map class 2

Not used.

AO TX, replacement unit map

Not used. *See Section SO CF, replacement unit map on page 392,* and *Section SO TRXC, replacement unit map on page 396,* for possible HW causing the fault.

AO RX, internal fault map class 1A

Not used.

AO RX, internal fault map class 1B

Fault No.	Fault type	Remark
0	RXDA amplifier current fault	R6 and later
1	ALNA fault	
2		
3	RX EEPROM checksum fault	

Fault No.	Fault type	Remark
4	RX configuration table checksum fault	
5	RX synthesizer A/B unlocked	
6	RX synthesizer C unlocked	
7	Astra Dixie communication fault	
8	RX internal voltage fault	
9	RX cable disconnected	
10	RX initiation fault	
11	CDU output voltage fault	
-		
-		
47	RX Auxiliary Equipment Fault	R7 only

AO RX, internal fault map class 2A

Not used.

AO RX, external condition map class 1

Not used.

AO RX, external condition map class 2

Not used.

AO RX, replacement unit map

Not used. *See Section SO CF, replacement unit map on page 392*, and *Section SO TRXC, replacement unit map on page 396*, for possible HW causing the fault.

AO IS

AO IS is not supervised.

AO DP (R6 and later)

AO DP is not supervised.

Note: The Digital Path is supervised by PCM supervision.

12.3 Trouble Report

A trouble report should be written when system components are not operating as expected or when disturbances occur repeatedly. It should not be written for occasional hardware failures. A trouble report should also be written when a fault is found in this manual.

When writing a trouble report, always include as much information as possible. Write the trouble report as soon as possible, preferably at the RBS site. The next pages contain an example of a filled-in trouble report and a blank trouble report.

The trouble report should be sent to the nearest FSC (Field Support Center) for resolution and registration in the Ericsson trouble report system MHS (Modification Handling System). The FSC should forward the trouble report via the node MHO ERA BTS.

Special Explanations

Product number	The product number can be found on the label of the unit. Example: KRC 131 47/01.
R-state	Revision state, found on the label of the unit after the product number. Example: R1A.
Site status	Can be “Installation Test” or “Operation”

Example of Filled-in Trouble Report

Trouble Report

Company: World-Wide Telecom	Date: 27 April 1995
Issued by: Jane Doe	Phone no: +01 419 555 1212
Address 501 Montgomery Avenue Mansfield, Ohio USA	Memo id: JDOE@WWT.OHIO.US Telefax no: +01 419 555 1212

Heading: TRXC (TRU) is reporting wrong fault code		
Product number or Document number: KRC 131 47/01		R-state R 1A
Site name: Hillfield, Ohio	Site id: EOA 043	Site status: Operation
Trouble symptoms: TRXC is reporting a fault code after CPU reset.		

Trouble Desciption:

After you have pressed the CPU reset the TRU starts to send fault reports constantly.
The code is:

Internal Fault Class 1A fault no. 33

This fault code cannot be found in the fault list.

Comments:

The TRU fault indicator is not lit.

03_0179A

Figure 381 Example of filled-in trouble report

Trouble Report, Blank

Trouble Report

Company:	Date:
Issued by:	Phone no:
Address	Memo id:
	Telefax no:

Heading:		
Product number or Document number:		R-state
Site name:	Site id:	Site status:
Trouble symptoms:		
Trouble Desciption:		
Comments:		

02_0179A

Figure 382   Trouble report, blank

13 Maintenance

13.1 Maintenance Process Overview

The purpose of this chapter is to give an overview of the maintenance process and to describe how to perform correct maintenance procedures.

13.1.1 How to use this chapter

Competence requirement

In order to do maintenance work according to this manual in a safe and professional way, the work shall be done by a skilled person.

The following qualifications are minimum requirements:

- Good understanding of radio and telephone engineering.
- Good understanding of engineering English.

Maintenance Process Overview

This section describes the maintenance process and how to perform correct maintenance procedures.

Maintenance General

These sections contain general information as well as necessary information on how to operate the RBS and the PBC.

Fault Localization

This section contains information on how to identify the faulty unit(s). For supplementary information see:

OMT User's Manual *LZN 302 01*

Corrective Action

These sections describe how to perform maintenance when faulty units have been found. For supplementary information the *chapter Site Installation Tests* in this *User's Guide* is required.

Preventive Maintenance

These sections contain procedures to increase the MTBF (Mean Time Between Failure).

To be able to perform maintenance, the field technician must be familiar with the product and the safety aspects that are involved.

1. Read *chapter Safety* in this *User's Guide*.
2. Read *sections Maintenance General* to become familiar with the product and how to operate it.

3. When performing maintenance at site, evaluate the fault status with help from *section Fault Localization*.

4. Use *sections Corrective Action* in accordance with the information given in *section Fault Localization* to perform the maintenance procedures required.

5. Be sure to follow the instructions given in *section Concluding Routines* to finish the maintenance procedure.

Concluding Routines

The *section Concluding Routines* provides information on the different administrative routines that must be performed before leaving the site.

13.1.2 General

Note: The described units must not be opened at site. All maintenance that can be performed at site is described in this chapter.

The RBS 2302 is administrated and controlled by the Base Station Controller (BSC). There is an interface between the BSC and the Base Transceiver Station (BTS). The BSC has an overview of the status of the radio network and its resources.

13.1.3 Fault Handling Workflow

Steps one and two are automatically performed by the Base Station System (BSS). Step three is performed at the Operation and Maintenance Center (OMC) by an operator who handles the alarms of the Radio Base Station (RBS) with support from Operation Instructions (OPI). By analyzing the fault situation, the OMC operator will be able to take appropriate action. Step four is performed at the RBS site by a field technician who will follow the instructions in this manual.

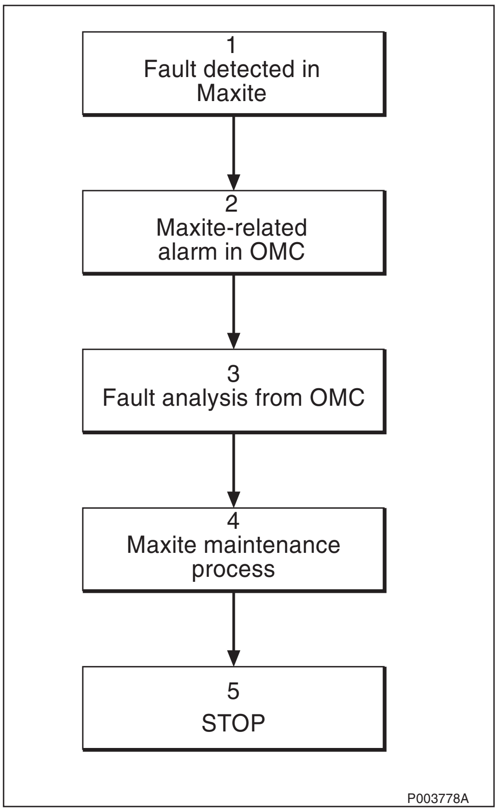


Figure 383 Fault handling workflow

13.1.4 Fault Analysis from OMC

This section describes, very briefly, a typical fault analysis process performed from an OMC. It describes procedures that must be performed before sending a field technician to the site.

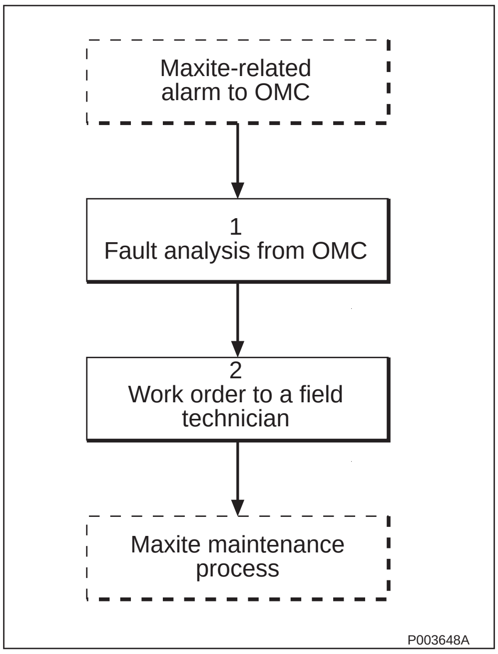


Figure 384 Fault analysis from OMC

Fault analysis from OMC (1)

The fault codes received when acting on instructions in the BSC B-Module must be translated into fault information. This is described in the *chapter Fault Handling* in this binder.

Work order to a field technician (2)

Before writing the work order, the following questions must be taken into consideration to optimize the visit at the site:

- Is preventive maintenance scheduled at this site in the near future?
- Are there any other faults that have been reported at this site that have been postponed?
- Are there any other reasons for sending a field technician to the site?

The work order must include information about the following:

- Site location.
- How to get to the site.
- Special tools or equipment needed.
- RBS identity.
- The suspected unit.
- Site history

The field technician will now take care of maintenance at the site. When the work is completed, a report will be written.

13.1.5 Maxite™ Maintenance Process

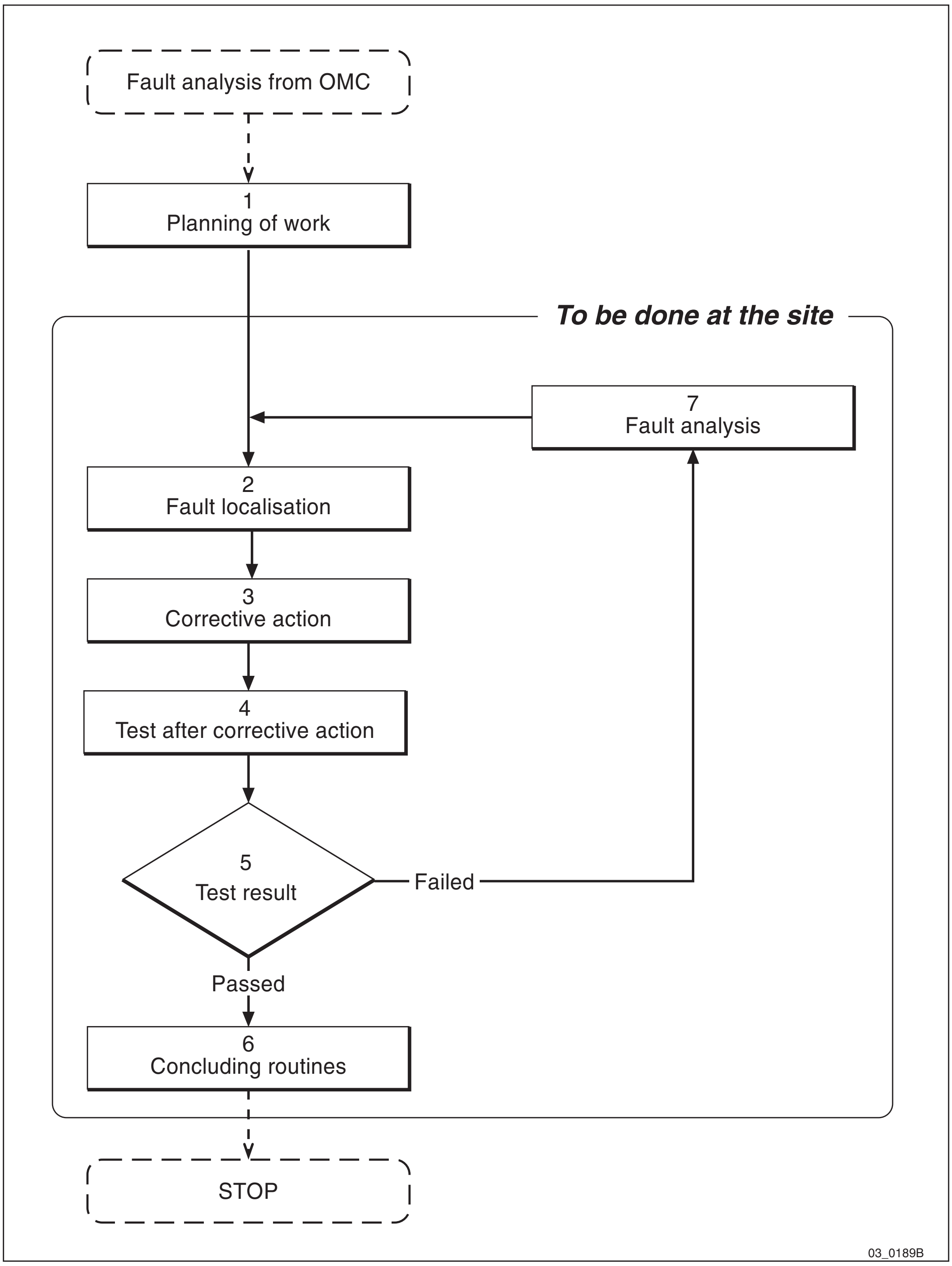


Figure 385 Maxite™ maintenance process

Planning of work (1)

As a result of the fault analysis, a work order has been written. The work order will include information about site location, how to get to the site, special tools and equipment needed, RBS identity, the suspected unit, and site history. An error log will also be included if the fault is defined as logical.

CAUTION

⚠

Read through the *chapter Safety* to ensure knowledge of potential risks prior to beginning work on the RBS equipment.

The work order should be analyzed before personnel are sent to the site. This is done in order to:

- Select the spare parts and tools required at the RBS site.
- Inform the OMC operator if the site visit will reduce RBS functionality.

Fault localization (2)

The *section Fault Localisation* provides mapping from fault information to a faulty unit.

Corrective action (3)

The *section Corrective Action* describes how to replace a faulty unit.

Test after corrective action (4)

The subsection *Test after corrective action* describes how to verify that the functionality of the radio cabinet is correct, with the help of *chapter Site Installation Tests*.

Test result (5)

If the test has failed, it will be necessary to perform a fault analysis. Otherwise, continue with *Concluding routines (6)*.

Concluding routines (6)

The *section Concluding Routines* provides information on the different administrative routines that must be performed before leaving the site.

Fault analysis (7)

Use the OMT to read fault status and translate the information received according to the Fault Code List. If the fault analysis fails to give more fault information, contact the supervisor or manager who will take further action, for example, such as contacting the FSC.

13.1.6 Fault Cases and External Alarms

Faults are indicated with LEDs, a display on the PBC and a RU map.

External Alarms

External alarms are customer defined. The alarm detector activates the alarm by an open or closed alarm sensor loop. It is possible to define and change the setup for each alarm by means of the OMT (Operations and Maintenance Terminal). The setup is stored in the IDB (Installation Data Base) in the RBS.

The yellow indicator marked “External alarm” on the Distribution Panel (DP) will light up if any external alarms are activated. When an external alarm is activated, the OMT must be used for examining the alarm status and the alarm setup.

RBS 2302 has eight (8) external alarms inputs.

RBS 2302 in Maxite™ has four (4) external alarm inputs available. One alarm input is required for the power surveillance of the PBC. Three alarm inputs are required for surveillance of the active antenna unit.

From software version BSS R7 it is possible to with the OMT define external alarms as ARAE (Antenna Related Auxiliary Equipment). This means that the fault report sent to the OMC will be able to identify the faulty unit. ARAE defined alarms are indicated with the LED “Fault” flashing when an alarm is activated.

13.2 Maintenance General

This chapter contains essential information regarding the user interface of the RBS and the PBC, changing the RBS from Remote in Local Mode, and Shut down and Start up procedures.

13.2.1 Introduction

The purpose of this chapter is to familiarize the user with the RBS. The location of the Interface is shown, and an explanation on how to read the alarms is supplied.

13.2.2 Location of the RBS User Interface

The RBS user interface, including optical indicators, power switches and control buttons, is located behind the installation box door.

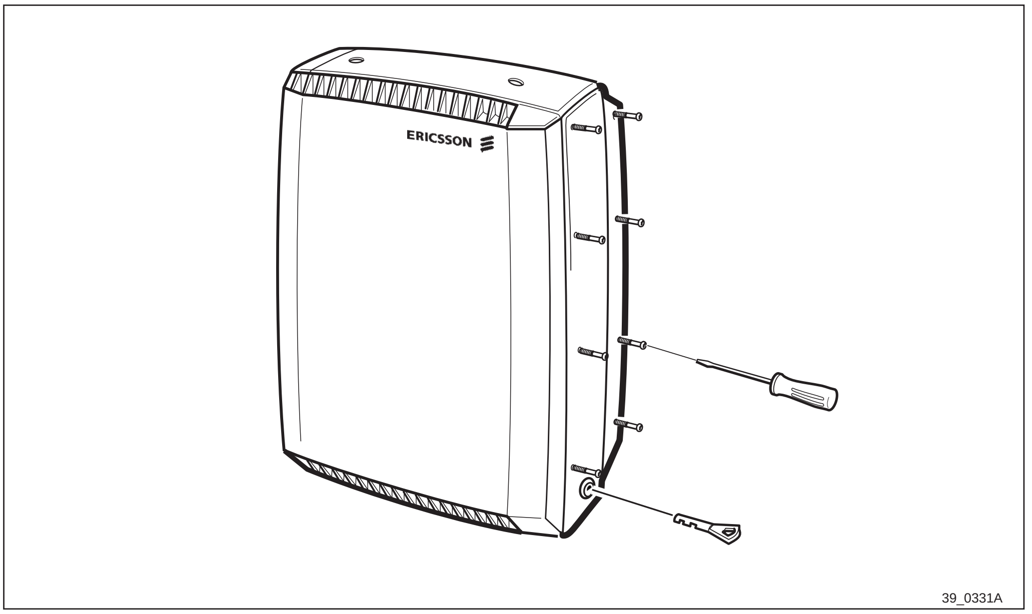


Figure 386 Sealing screws and key for the installation box door

To open the door: loosen the sealing screws and unlock with the key.

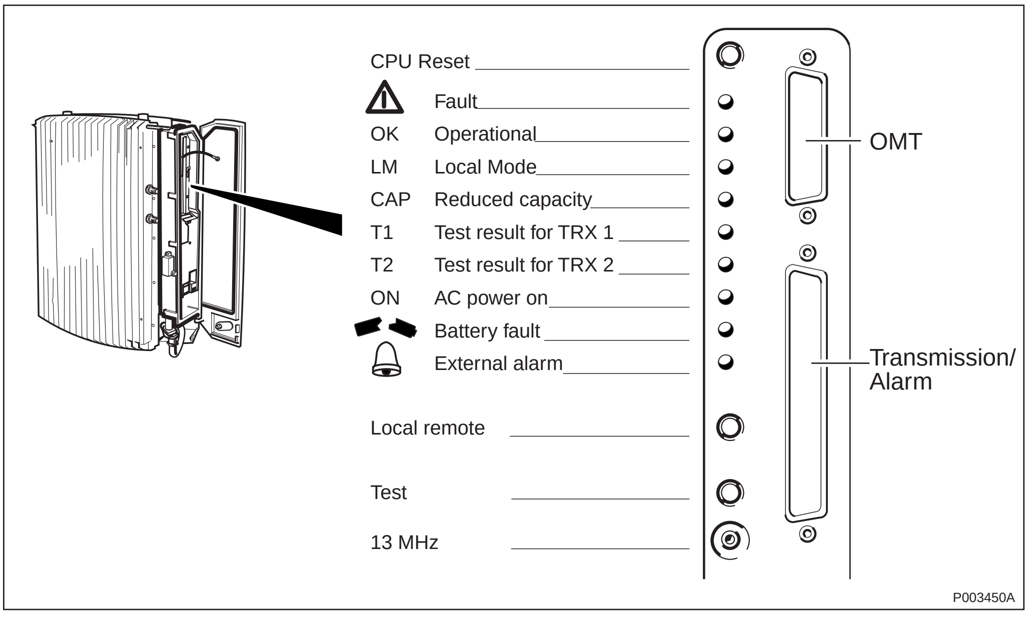


Figure 387 RBS user interface

13.2.3 Optical Indicators

The purpose of the optical indicators is to provide a fast way of indicating the operational status of the included equipment.

The general principles are:

Red:	A fault is located, check with OMT.
Yellow:	Operational (Local Mode, AC Power on).
	Faulty (Battery Fault, External Alarms, Reduced Capacity).
Green:	Operational.
Flashing indicators:	Wait, activity in progress.

The optical indicators shows that a fault/faults have been detected, and the OMT should thereafter be used for more advanced fault localization.

Explanation of the Indicators

Indicator	Mode	Description
Fault	**Generally:**	
(Red)	OFF	No fault(s) detected.
	ON	Fault(s) detected.
Fault	**2 TRX Sector Configuration:**	
(Red)	FLASHING	One of the following reasons: • IDB Database is missing, or wrongly configured. • Running on Base Application. • ARAE fault (BSS R7 or later). • Battery fault.
Fault [(1)]	**4 TRX / 6 TRX Configuration:**	
(Red)	FLASHING (Master or Extension cabinet)	One of the following reasons: • IDB Database is missing, or wrongly configured. • Fault(s) detected in Extension cabinet(s) • Running on Base Application • ARAE fault (BSS R7 or later). • Battery fault.
	ON (Extension cabinet) and FLASHING (Master cabinet)	• SW/HW fault in Extension cabinet and/or Master cabinet.

Indicator	Mode	Description
Operational[1] (Green)	OFF	Not operational, or change Local/Remote mode in progress.
	ON	When in local mode: • Operational, but not in traffic. When in remote mode: • Connected to BSC and considered operational by the BSC.
	FLASHING	One of the following reasons: • Receiving application software. Restart pending. • Configuration in progress (this may take more than 10 seconds to complete).
Local mode [1] (Yellow)	OFF	The RBS is in remote mode.
	ON	The RBS is in local mode.
	FLASHING	Change of mode in progress.
Reduced Capacity [1] (Yellow)	OFF	All TRXs are operational.
	ON	At least one TRX is not operational.
T1 Test result for TRX 1		Not used
T2 Test result for TRX 2		Not used
AC Power On[1] (Yellow)	OFF	AC power not available.
	ON	AC power available.
Battery Fault[1] (Yellow)	OFF	Battery connected.
	ON	Battery disconnected or faulty. Low battery DC voltage.
External Alarms[1] (Yellow)	OFF	No external alarm(s) active.
	ON	External alarm(s) active.
	ON (Extension cabinet) and FLASHING (Master cabinet)	External alarm on Extension cabinet(s).

[1] Indicated on all cabinets.

13.2.4 Switches and Connectors

Switches

Switch	Function
CPU reset button [1]	Reset of the RBS
Local remote button [1]	Change between Local/Remote mode
Test	Not used

[1] Configuration 4 TRX or 6 TRX: CPU reset and change of mode can be performed on both Master and Extension cabinet(s).

Connectors

Connector	Function
OMT [1]	Connector for the OMT cable
13 MHz	Connector for RF measurements and calibration

[1] Configuration 4 TRX or 6 TRX: all cabinets are controlled by the OMT connector on the Master cabinet.

13.2.5 PBC User Interface

Introduction

The purpose of this chapter is to familiarize the user with the Power and Battery Cabinet (PBC). The location of the control panel is shown, and an explanation on how to read the alarms and executed command on the PBC display is supplied.

Location of the PBC User Interface

The PBC user interface, including optical indicators, power switches and control buttons, is located behind the installation box door.

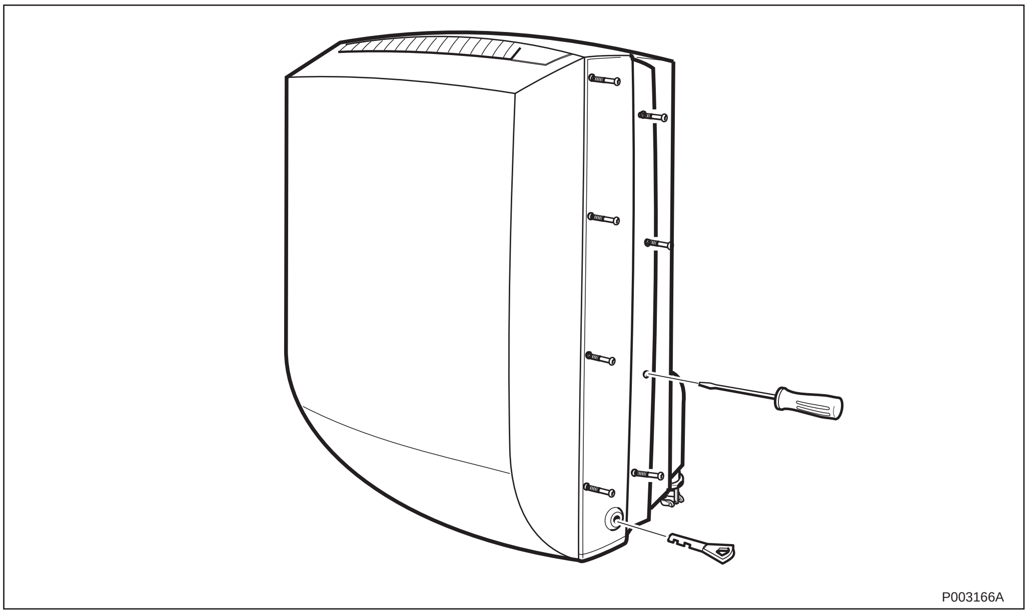


Figure 388 Sealing screws and key for the installation box door

To open the door: loosen the screws and unlock with the key.

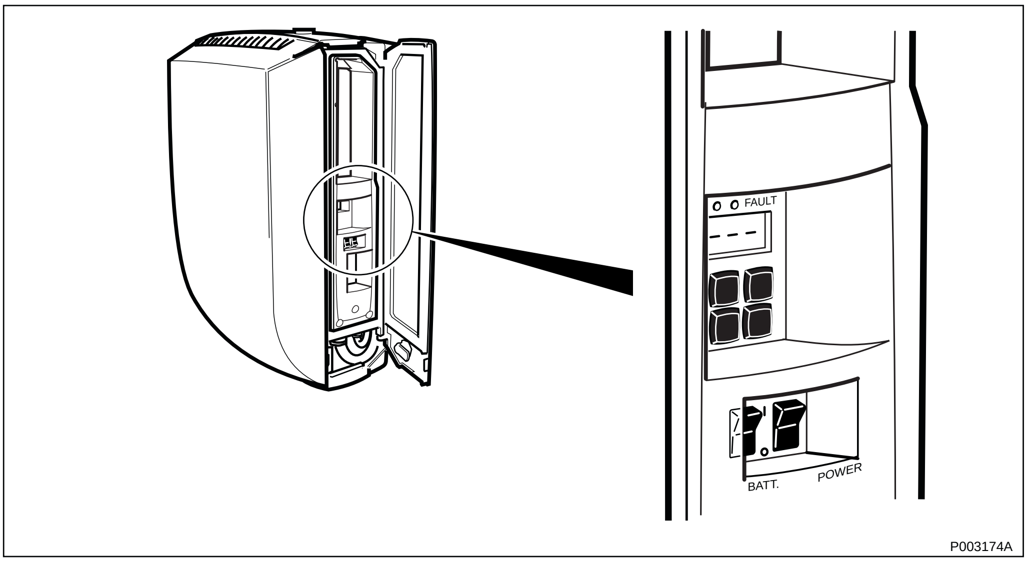


Figure 389 Location of the control panel in the PBC

Control Panel

The description of the control panel is valid irrespective of whether Coverage Extension Unit (CEU) for GSM 900 or Active Antenna Unit (AAU) for GSM 1800, GSM 1900, is used.

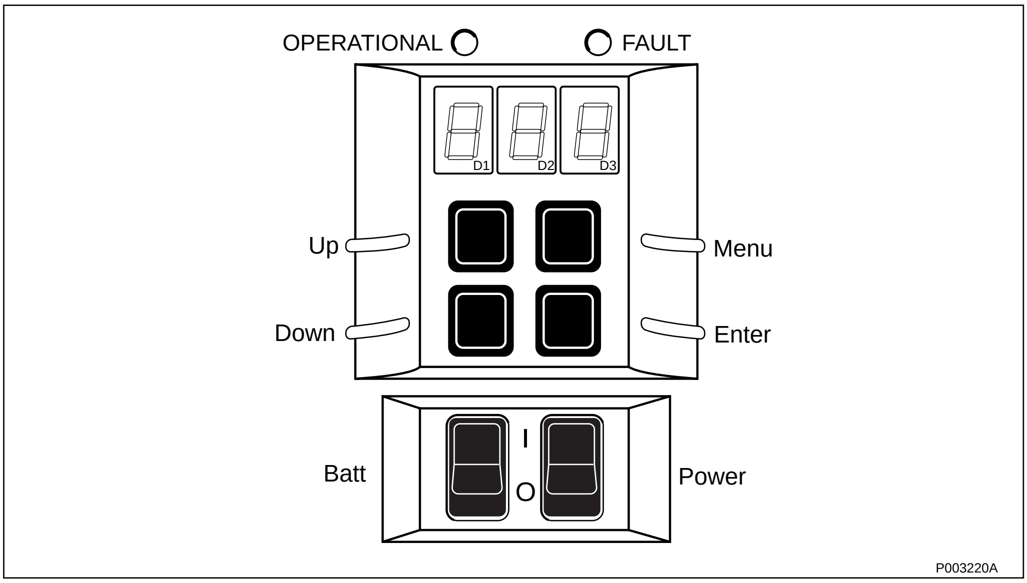


Figure 390 PBC control panel

Optical Indicators

The LED indicators give the following information on the current system status valid for CEU or AAU, and PBC alarms:

Table 61 Explanation of the LED indicators

Operational (Green)	Fault (Red)	Classification
ON	OFF	OK
OFF	ON	SEVERE
ON	ON	WARNING, POWER

Alarm Display

The alarms are shown as fault codes on the display. The display is divided into three display elements:

Element 1 (D1)	Unit number. The unit number in the alarm message, received from the AAU, CEU or PBC, is used to identify the faulty unit.
Element 2 (D2)	Alarm class. The alarm is classified according to the degree of severity. There are two Classified alarms, and one Not classified alarm: 0 = Not classified (used for historical alarms) 1 = Severe 2 = Warning
Element 3 (D3)	Fault code received from the AAU, CEU or PBC. See Table 65 on page 422. or Command that will be executed. See Table 66 on page 423.

Control Buttons

The push buttons on the display panel are used for:

– stepping through the fault codes.

– selecting commands.

Table 62 Control buttons on the display panel

Control button	Action
Up	Digit step up
Down	Digit step down
Menu	Activates command selection
Enter	Executes commands

Fault Messages

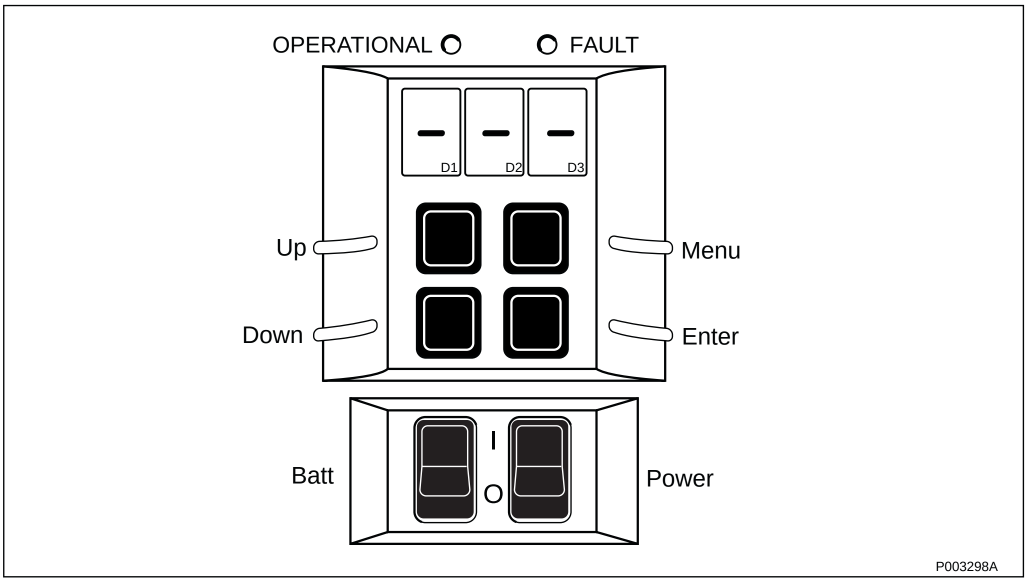


Figure 391 Display view if no faults are detected

- If there are no faults, this is indicated on the alarm display as shown in Figure 391 on page 419.
- If a fault occurs, the relevant fault code is automatically displayed, see Table 63 on page 422.
- To detect if there are several faults, step through the fault codes using the push buttons Up and Down, see Table 62 on page 418.

Except for temperature alarms, all alarm codes originate from active faults, that is, no fault history is displayed.

13.2.6 Maxite™ Alarms and Commands

The purpose of this chapter is to give an overall description of Maxite™ alarms, alarm codes, and the commands used for antenna installation.

Alarm System Overview

The Maxite alarm system provides the following functions, which are available in all Maxite configurations:

- Supervision of the antenna units alarm signals
- Communication between PBC and CEU (GSM 900), or between PBC and AAU (GSM 1800, GSM 1900).
- Supervision of the PBC alarm signals
- Signalling alarm to the RBS
- User interface for settings and alarm presentation

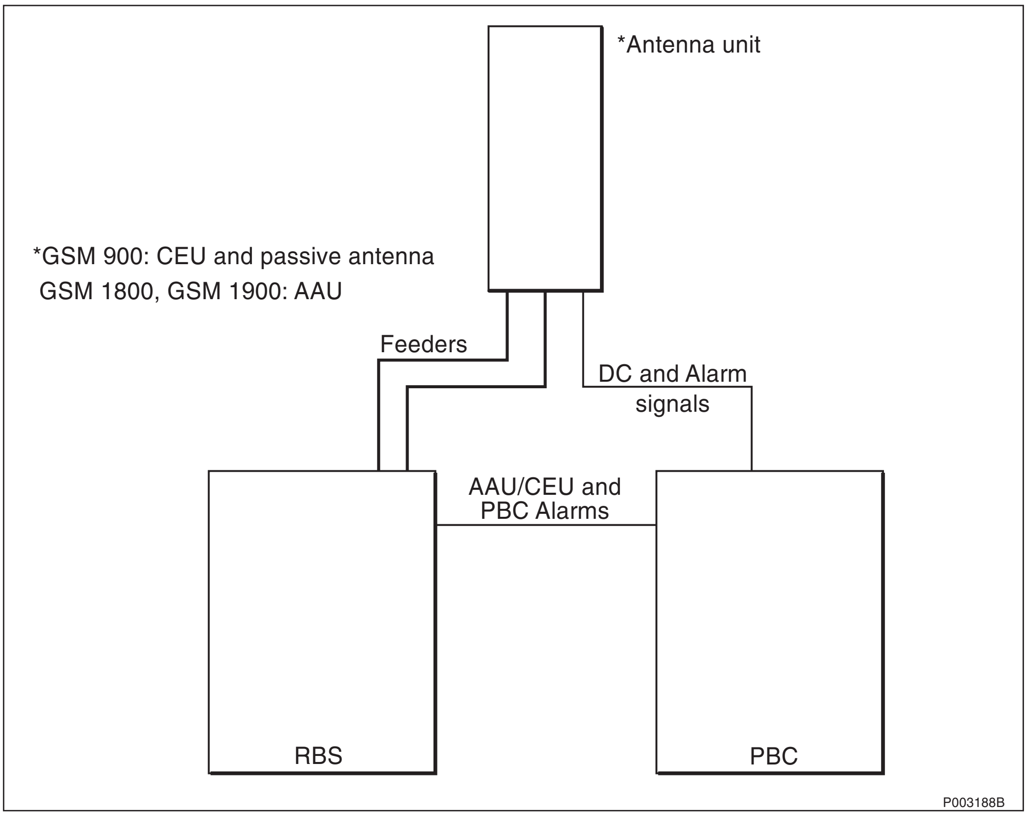


Figure 392 Overview of alarm systems function

Active Antenna Unit (AAU)

The AAU is used for GSM 1800 and GSM 1900.

The AAU supervises:

- Power Amplifier Units (TX)
- Low Noise Amplifier (RX)
- DC/DC modules (DC)
- Antenna temperature (GSM 1800 only)
- Surge suppression ALPU [(1)] (GSM 1900 only)

(1) ALPU (Antenna Lightning Protection Unit)

There is also a connection to the Feeder Duplex Unit to set the feeder attenuation value at installation. The default value for these attenuators is set to the maximum value.

Coverage Extension Unit (CEU)

The CEU, combined with a passive antenna, is used for GSM 900.

The CEU supervises:

- Power Amplifier Units (TX)
- Low Noise Amplifiers (RX)
- DC/DC modules (DC)

- Power Amplifier Temperature

There is also a connection to set the feeder attenuation value at installation. The default value for these attenuators is set to the maximum value.

Power and Battery Cabinet (PBC)

The PBC alarms supervise:

- Main input AC power
- AC/DC converter
- DC/DC converter
- Battery unit
- Data link to an antenna unit
- Cabinet temperatures

When the power is switched on, the PBC display starts flashing. The power up takes about 5 seconds, then the active system status appears on the display.

All alarms transmitted to the RBS are active alarms.

Alarms connected to the RBS

The PBC alarms are connected to the RBS external alarm inputs, and generate the following alarms:

Alarm	GSM 900	GSM 1800, GSM 1900
SEVERE-A	CEU carrier A	AAU carrier A
SEVERE-B	CEU carrier B	AAU carrier B
WARNING	CEU carrier A or B	AAU carrier A or B
POWER, WARNING	PBC	PBC

Note: The external alarm inlets on the RBS must be defined accordingly at installation. The remaining four inputs will be defined individually for each site, depending on the equipment used. See chapter *Site Installation Tests*.

Cascaded PBCs

If there is a Maxite alarm, each PBC must be checked visually at the site.

Alarm Codes

The tables below explain the codes used on the three alarm display elements.

Table 63 Unit numbers on display element D1

Code	GSM 900	GSM 1800, GSM 1900
0	PBC	PBC
1	CEU 1	Antenna 1
2(1)	(CEU 2)	(Antenna 2)
3(1)	(CEU 3)	(Antenna 3)
5	Feeder A	Feeder A
6	Feeder B	Feeder B
7	Installation fault	Installation fault

(1) For future use

Table 64 Alarm classes on display element D2

Code	Alarm class
0	Not classified
1	Severe
2	Warning

Note: Display element D2 is also used for some fault codes and messages for the feeder values.

Table 65 Fault codes on display element D3

PBC		CEU (GSM 900) AAU (GSM 1800, GSM 1900)	
Code	**Fault**	**Code**	**Fault**
0	AC fault (no mains)	0	Data link transmission fail
1	AC/DC fault	1	DC fault
2	DC/DC overload	2	TXA fault
3	DC/DC fault	3	TXB fault
4	Battery fault	4	RXA fault
5	Battery disconnected	5	RXB fault
6	Battery voltage low	6	GSM 900, GSM 1800: Overtemp active GSM 1900: ALPU active
7	Overtemp active	7	GSM 900, GSM 1800: Overtemp historical GSM 1900: ALPU historical
8	Overtemp historical	P	Output power Off
9	PBC in standalone mode, antenna detected	H	Feeder attenuators set to max

Feeder installation	
Code	**Fault**
1	Feeder A fault
2	Feeder B fault

Commands

Table 66 on page 423 lists the command codes used.

Table 66 Command codes on display element D3

Code	Command
0	Read alarms
1	Set attenuators
2	Output power Off
3	Output power On
4	Reset feeder attenuators
5	GSM 900, GSM 1800: Clear historical overtemperature
	GSM 1900: Clear ALPU alarms
6	Set PBC in stand alone mode(1)
7	Exit PBC from stand alone mode

(1) Only for RBS 2302 with PBC, but without AAU/CEU.

Transmitting a Command

To transmit a command:

1. Press Menu.
2. Select the command code (on display element D3) with the Up or Down button.
3. Press Enter. The command is executed, and the display returns to active system status.

Clear Historical Temperature Alarms

There are two kinds of temperature alarms: active and historical.

The historical temperature alarms can be displayed in two ways:

- 0 0 8, indicating PBC Alarm, Overtemperature historical.
- 1 0 7, indicating Antenna Alarm:
  - Overtemperature historical (GSM 900, GSM 1800)
  - ALPU historical (GSM 1900)

To reset the historical alarms:

1. Press Menu
2. Select code 5 with the Up or Down button.
3. Press Enter. The command is transmitted to the CEU (GSM 900), AAU (GSM 1800, GSM 1900), or PBC.

13.2.7 Changing the RBS Local/Remote Mode

The Local/Remote button can change a RBS mode in Local or remote control. The Local/Remote button is located on the Distribution Panel (DP), *see Figure 393 on page 424*. An RBS in Local Mode cannot communicate with the BSC via the PCM-line and is therefore isolated from the BSC.

The Local/Remote button is used to isolate the unit from the BSC, for example, when exchanging faulty units.

An RBS cannot be changed to Remote Mode until the database has been downloaded to the Distribution Switch Board (DXB). See:

OMT User's Manual *LZN 302 01*

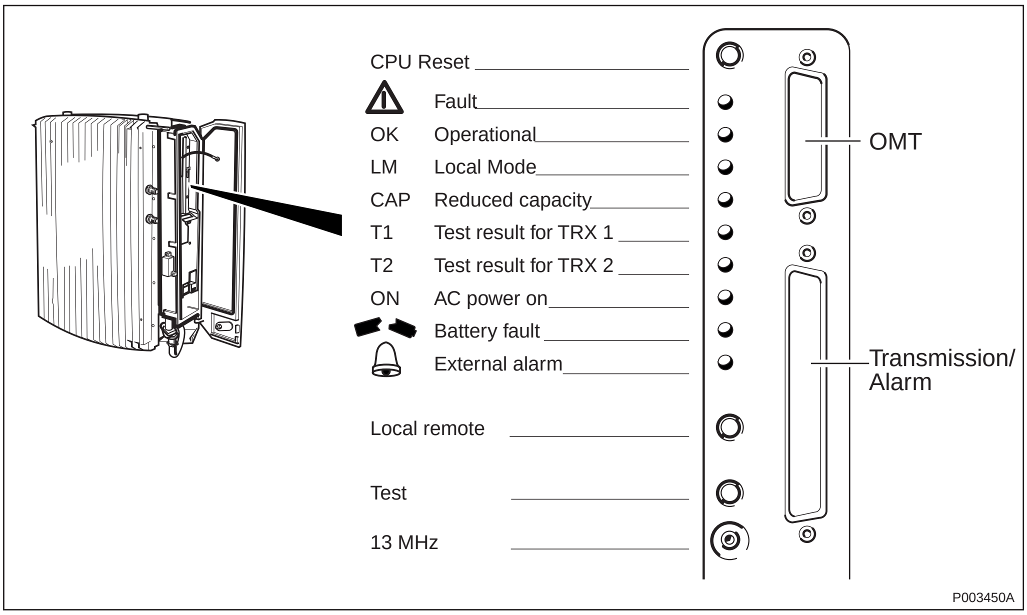


Figure 393 Distribution Panel

Changing the RBS from Remote to Local Mode

Note: The Local Mode indicator must be in mode OFF before any action is done.

1. Press the Local/Remote button.
2. The Local Mode indicator starts flashing to indicate that a change of RBS mode is in progress.

3. The Operational indicator turns off to indicate that the RBS has been taken out of operation.
4. A fault report message is sent to the BSC via the PCM-line. This means that an external condition class 1 alarm will be raised in the BSC.
5. The communication link on the PCM-line is disconnected and the RBS mode is changed in Local Mode.
6. The Local Mode indicator turns on. The Operational indicator is also turned on if the RBS is free from class 1 faults, in order to indicate that the radio cabinet is in local operation.

Changing the RBS from Local to Remote Mode

Note: The Local Mode indicator must be in mode ON before any action is done.

1. Press the Local/Remote button.
2. The Local Mode indicator starts flashing to indicate that a change of RBS mode to Remote is in progress.
3. The communication link on the PCM-line is established by an order from the BSC. The RBS is changed to Remote Mode immediately after the link towards the BSC has been established.
4. The Local Mode indicator turns off.
5. To indicate that the RBS is ready to carry traffic the Operational indicator turns on.

Note: This will only happen if the RBS is considered operational by the BSC.

Aborting changing from Local to Remote Mode for the RBS

If the Local/Remote button is pushed while the Local Mode indicator is flashing, the change of RBS mode to Remote is interrupted.

Note: This function is only valid during a change of RBS mode to Remote.

1. Press the Local/Remote button.
2. The attempt to enable a connection with the BSC will stop.
3. The RBS will then remain in Local Mode with the communication link disconnected and the Local Mode indicator on.

13.2.8 Shut down Sequence

This is the shut down sequence for Maxite.

1. Set the RBS in Local Mode.

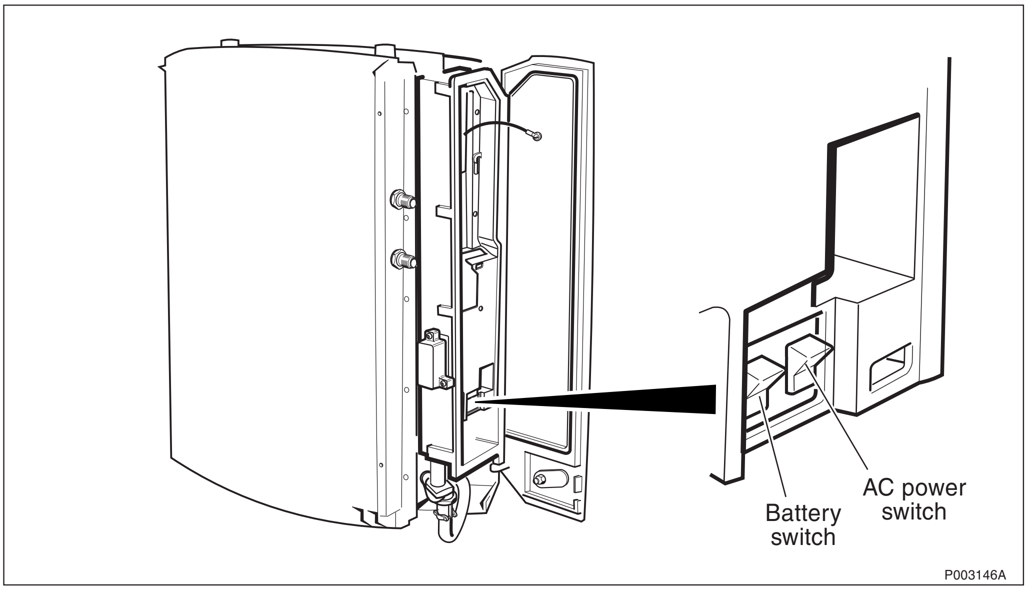


Figure 394 Battery and AC power switch in the RBS

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

Note: When the AC power supply is turned off with the AC power switch in the RBS, there is still AC voltage both on the AC board in the interface box, and on the connection board in the installation box up to the power switch.

2. Switch the RBS Battery switch to the OFF position.

3. Switch the RBS AC switch to the OFF position.

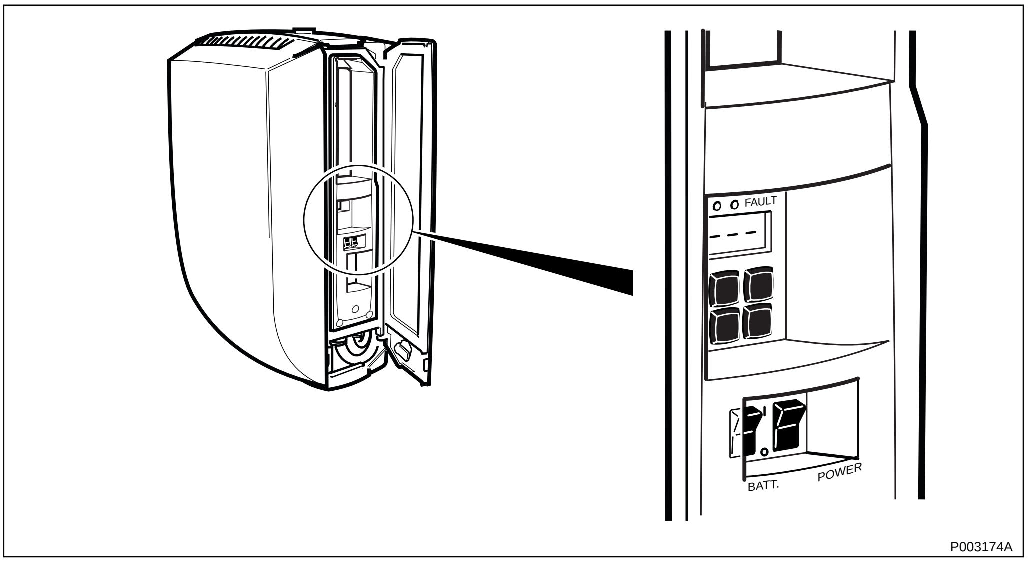


Figure 395 Battery and AC switch in the PBC

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

Note: When the AC power supply is turned off with the AC power switch in the PBC, there is still AC voltage both on the AC board in the interface box, and on the EMC board in the installation box up to the power switch.

4. Switch the PBC Battery switch to the OFF position.
5. Switch the PBC AC switch to the OFF position.

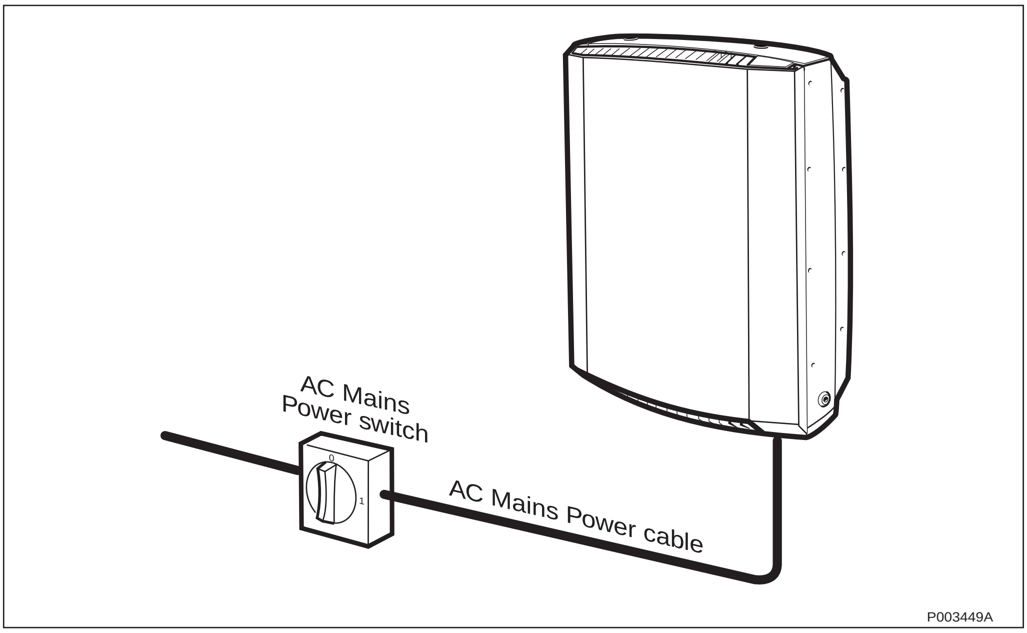


Figure 396 AC mains power switch turned off

Note: When, according to the manual, the AC Mains Power switch is to be turned off, it is very important that *all* radio cabinets and *all* battery cabinets are switched off.

6. Switch off the AC Mains Power switch.

Note: Wait at least 20 seconds before performing any work on the AC Board, so that the capacitors have sufficient time to discharge.

13.2.9 Start up Sequence

This is the start up sequence for the Maxite.

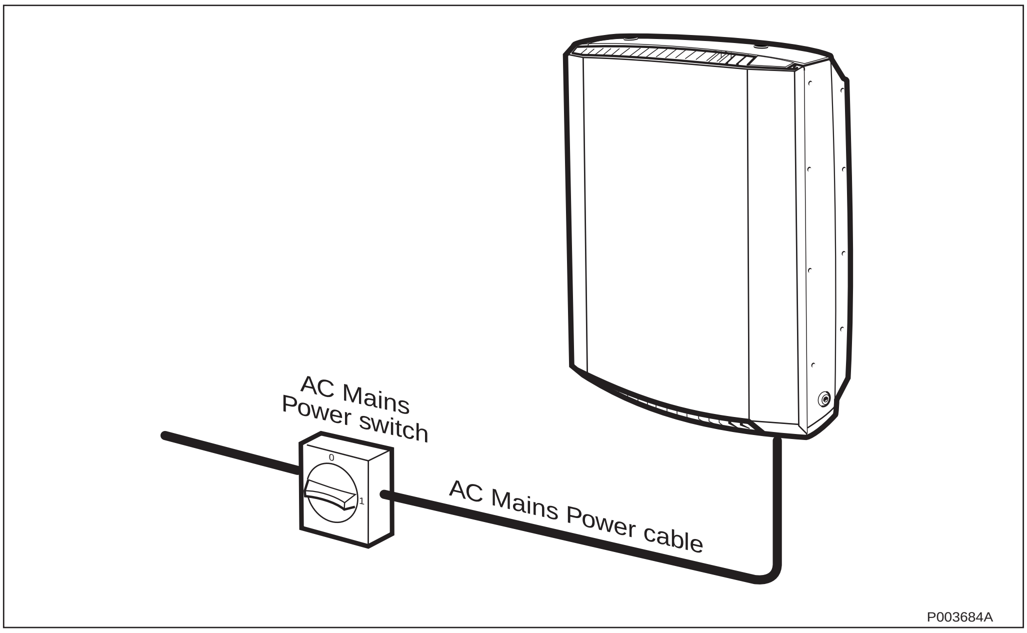


Figure 397 AC mains power switch turned on

1. Turn the AC Mains Power switch to the ON position.

Note: Switch on *all* radio cabinets and *all* battery cabinets.

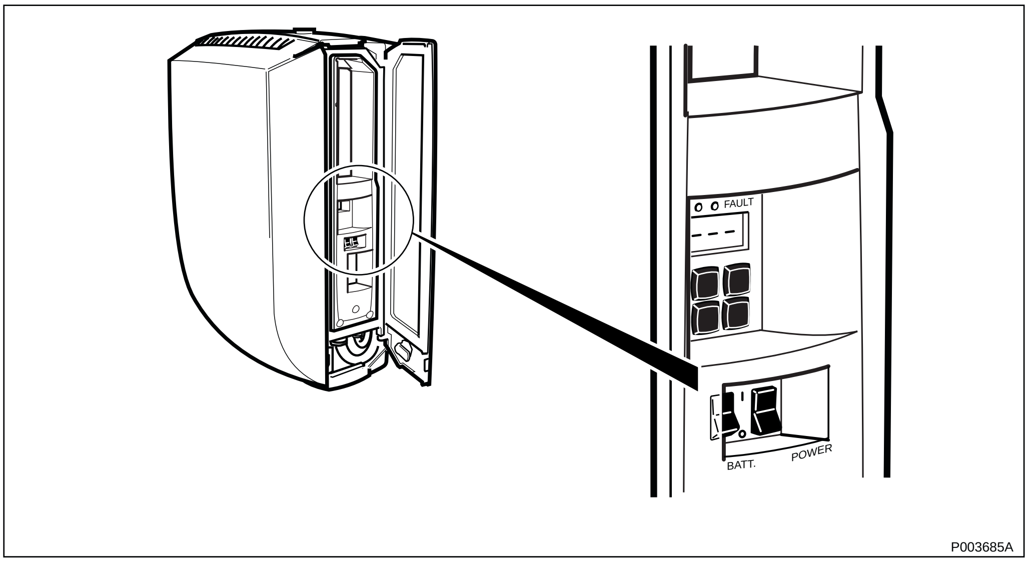


Figure 398 Battery and AC switch in the PBC

2. Switch the PBC AC switch to the ON position.
3. Switch the PBC Battery switch to the ON position.

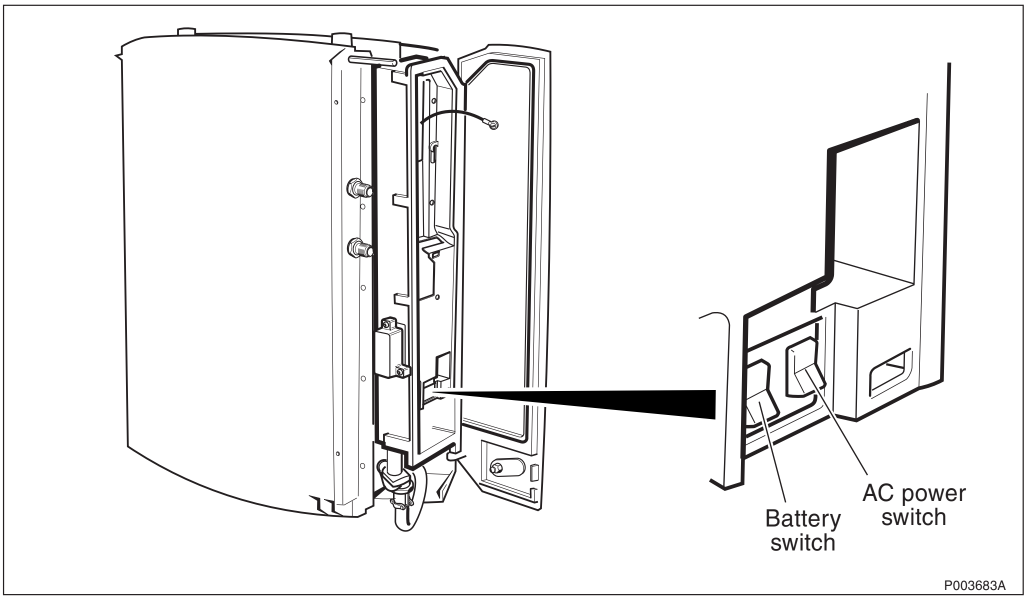


Figure 399 Battery and AC power switch

4. Switch the AC power switch on the RBS to the ON position.
5. Switch the Battery power switch on the RBS to the ON position.
6. Set the RBS in Remote Mode.

13.2.10 Tightening Torques for Maxite™

When replacing units, tighten screws/nuts according to table below. Exceptions are printed circuits boards and plastic covers inside installation boxes and interface boxes. These screws must be tightened with a reduced torque.

Table 67 Recommended Torque

Dimension	Torque				Notes
	Ncm	Nm	lbf-in	lbf-ft	
M3	110 +/- 7	-	9.7 +/- 0.6	-	
M3	80 +/- 7	-	7.1 +/- 0.6	-	Reduced for PCBs and plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	
M4	190 +/- 15	-	16.8 +/- 1.3	-	Reduced for PCBs and plastic covers
M5	540 +/- 30	-	47.8 +/- 2.6	-	Battery poles for battery cabinet
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	
M8	-	21 +/- 1.3	-	15.5 +/- 1	
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	
3/8"	-	40.7 +/- 2	-	30 +/- 1.5	GSM 1900, AAU
7/16"	-	40.7 +/- 2	-	30 +/- 1.5	GSM 1900, AAU
1/2"	-	102 +/- 5	-	75 +/- 3.8	GSM 1900, AAU

13.2.11 Cable connections overview

Note: The schematics below show all possible connections including the options, depending on the configuration at the site.

Cable connections for RBS 2302

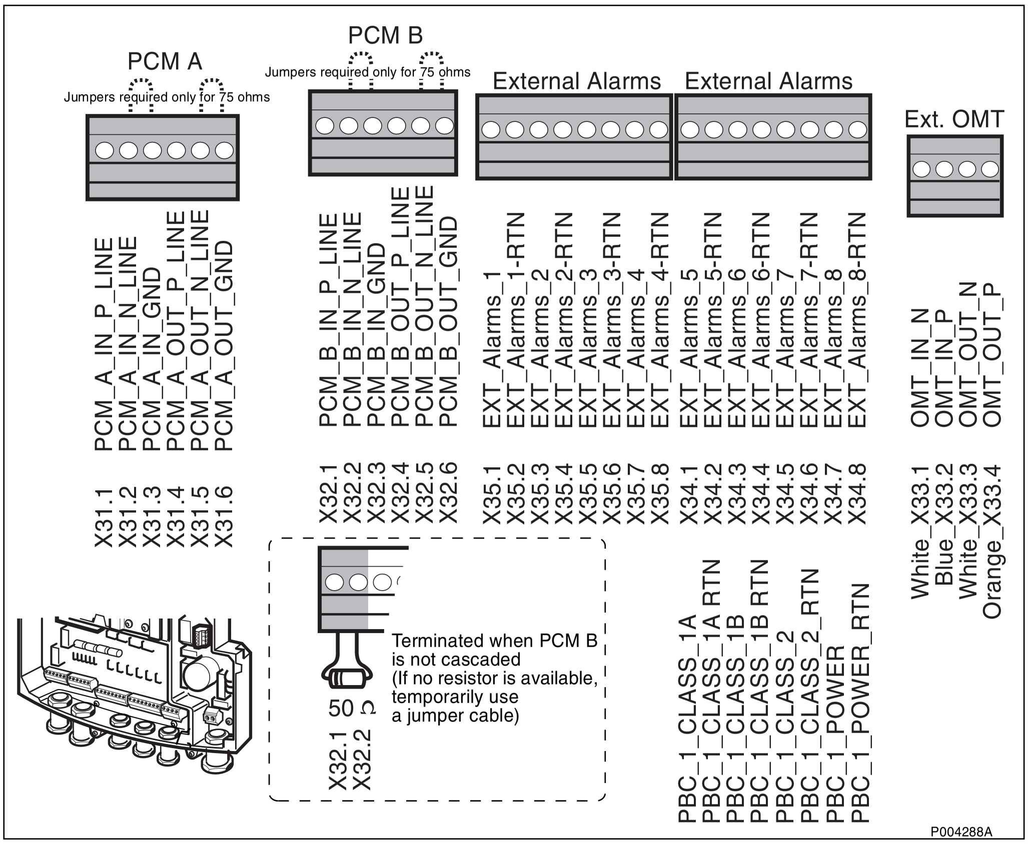


Figure 400 Cable connections for RBS 2302

Note: These schematics show all possible connections including the options, depending on the configuration at the site.

Cable connections for PBC

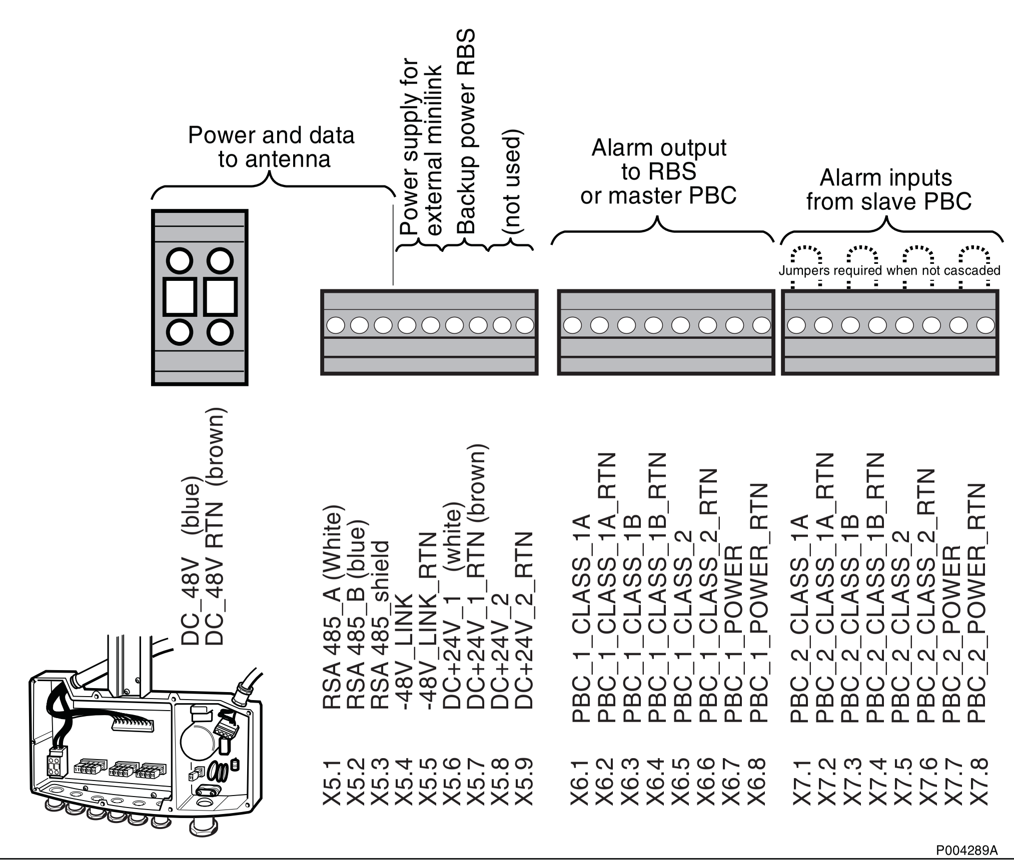


Figure 401 Cable connections for PBC

13.3 Fault Localization

This section provides information about the fault codes indicated by the units, and the procedures to find the faulty unit(s).

- Use the Optical Indicators fault code list to identify the indications on the unit(s).
- Use the fault localization procedures to trace the fault when the unit is not pinpointed.
- The 32 bit version of the OMT can be used to acquire more information, or when more than one fault is present.

13.3.1 Fault Tracing Guidelines for RBS 2302

DANGER

⚠

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

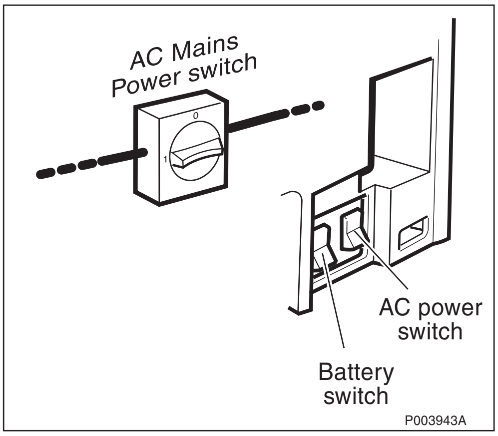
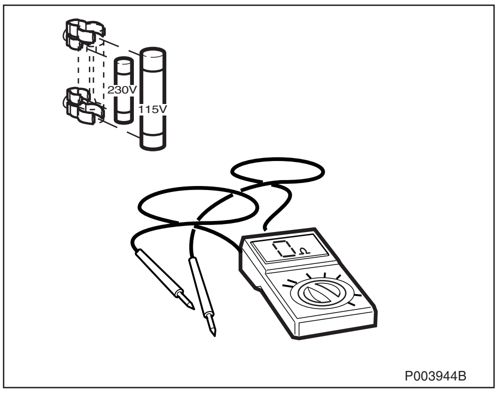
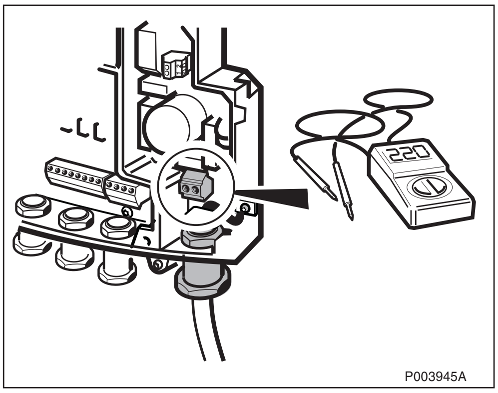
Table 68

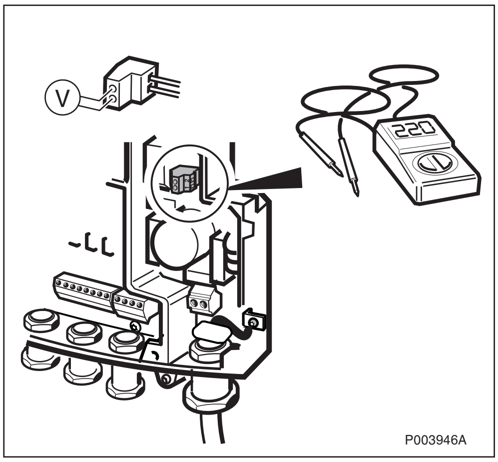
Fault (lit)	**If the red LED is lit, two causes are possible. Use OMT to display the faults.** 1/ The cabinet is faulty: Replace it. (2 TRX configuration). 2/ If the cabinet is configured as a master in a 4 or 6 TRX configuration the communication is lost to the extension cabinet(s). Check the TXL cable and the extension cabinets.
Fault (flashing)	**If the red LED is flashing, six causes are possible. Use OMT to display the faults.** 1/ The IDB is missing or corrupted: Install a new IDB according to the *OMT User's Manual*. 2/ BTS software is missing and the RBS is running on base application. The BSC is currently reloading the BTS software. 3/ Lost communication in the RBS: Replace the cabinet. (2 TRX configuration). 4/ If the cabinet is configurd as a master in a 4 or 6 TRX configuration, communication is lost to extension cabinets or faults are detected in one or both extension cabinets. Check the TXL cable and extension cabinets. 5/ An ARAE alarm is active. (Valid only from software version BSS R7 and later.) 6/ If the cabinet is configured as a master in a 4 or 6 TRX configuration an ARAE alarm is active on an extension cabinet. (Valid only from BSS R7 and later).
Reduced capacity	**If the yellow LED is lit, the radio cabinet is faulty. Replace it.**

(1) See:

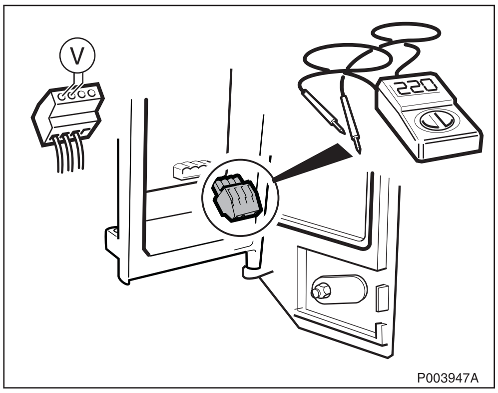
OMT User's Manual *LZN 302 01*

Table 69

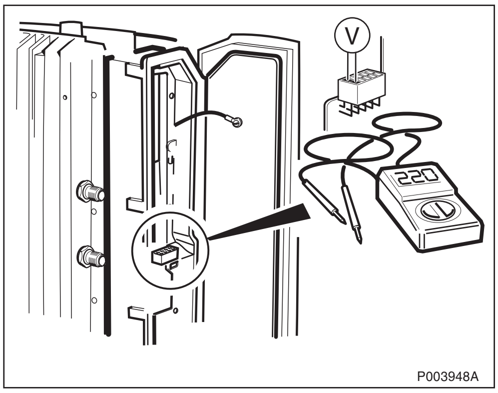
AC Power ON	If the yellow LED is *not* lit, 115/230 V is *not* present in the radio cabinet.
	 Confirm that the main switch is in the ON position and that the AC switch on the RBS is set to ON position.
	 Switch off the Mains switch and the AC switch on the RBS. Measure the resistance of the fuses with a multimeter to verify that they are undamaged. (The resistance should be 0 Ω). Then switch the power back on.
	 Measure, with a voltage meter, that 115/230 V is present at the incoming AC plinth on the AC-board in the interface box.



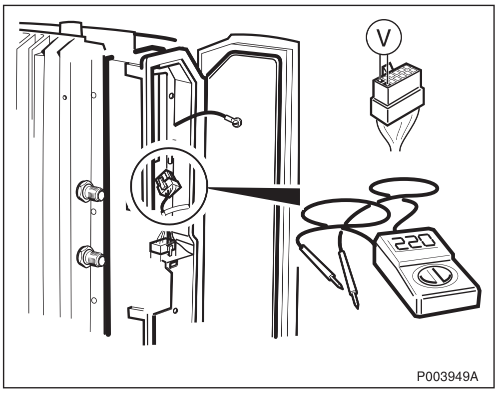
Measure that 115/230 V is present at the upper AC plinth on the AC-board, to verify that the AC-board is not faulty.



Measure that 115/230 V is present at the incoming AC plinth on the connection board, to verify that the cables are not faulty.



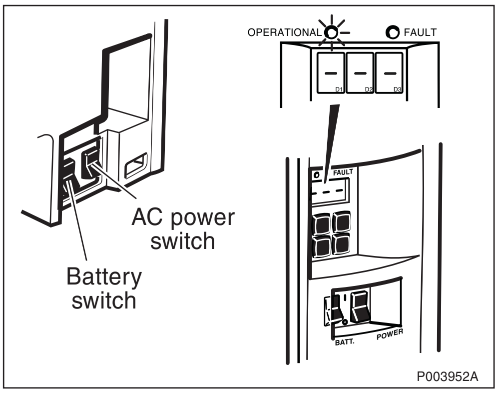
Measure that 115/230 V is present at the connector to the internal AC cable, to verify that the connection board is not defective.



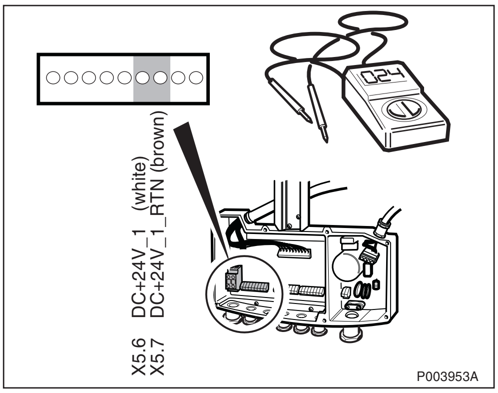
Measure that 115/230 V is present at the connector of the internal AC cable attached to the radio cabinet, to verify that the internal AC cable is undamaged. If voltage is present, replace the radio cabinet.

Table 70

Battery Fault	If the yellow LED is lit, 24 V supply is missing in the radio cabinet. Cause: the PSA is disconnected.



Confirm that the battery switches on the RBS 2302 and the PBC are in the ON position. Verify that no error codes (see Error Code PBC) are displayed on the MMI of the PBC.



Measure the voltage over plinth X5.6 and X5.7 in the interface box in the PBC, to verify that the PBC supplies 24 V.

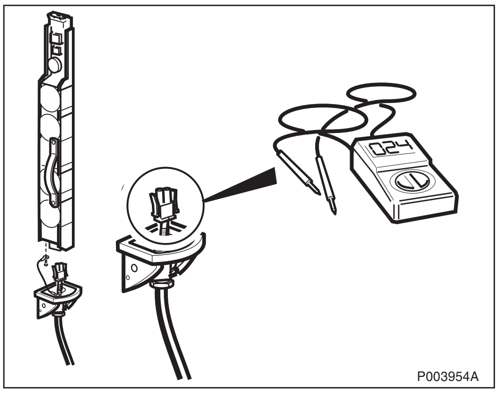
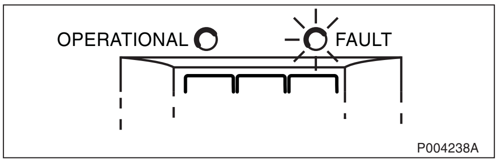
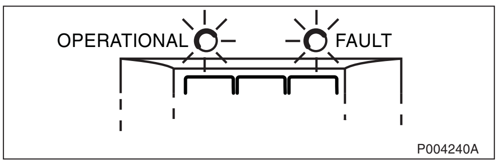
	 Examine the PSA cable by measuring that 24 V is present on the incoming connector to the PSA. If there is, replace the PSA. If not, replace the cable.

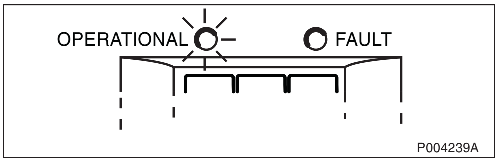
Table 71

External Alarms	
Steady light	If the yellow LED indicator is lit, this means either that auxiliary equipment is sending alarms, e.g burglar alarms or similar, or that an alarm is received from the PBC. Use the OMT to display all faults or proceed directly to the PBC. Proceed with fault tracing from the MMI of the PBC. If the external alarms LED remains lit after all faults have been cleared at the PBC, use the OMT to display remaining alarms. When software BSS R7 or later is loaded, the ARAE alarms (PBC alarms) are indicated on the LED "Fault" when active.
Flashing	If the cabinet is configured as a master in a 4 or 6 TRX configuration, one or several external alarms are present at one or both the extension cabinet(s). Use OMT to find all the active alarms.

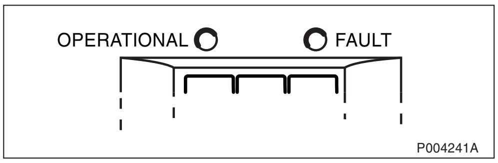
13.3.2 Fault Tracing Guidelines for the PBC and the AAU

Table 72

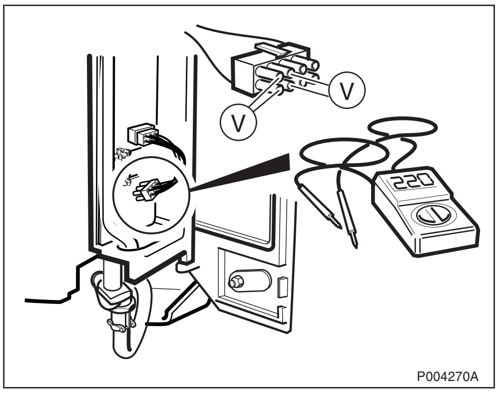
	If the red LED "Fault" is lit but not the green LED "Operational" this means severe alarm and one or more units needs replacement. Use Table 73 on page 439 to solve the problem.
	If the red LED "Fault" and the green LED "Operational" is lit this indicates Warning and one or more units needs replacement. Use Table 73 on page 439 to solve the problem.



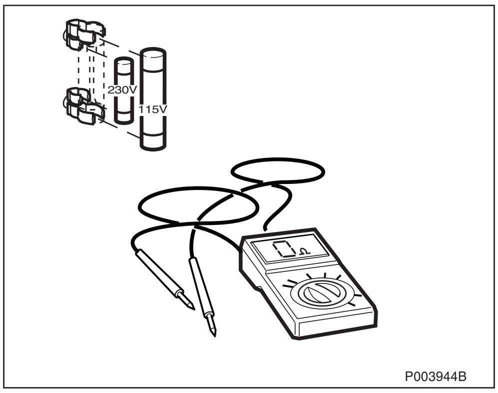
If the green LED "Operational" is lit but not the red LED "Fault" this means that the Power and Battery Cabinet and the AAU are operational and that no affecting alarms are active.



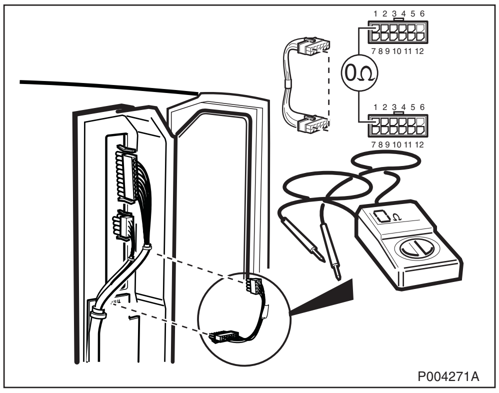
None of the two LEDs "Operational" or "Fault" are lit. Possible causes:



1/ The battery cabinet has no power and the batteries have been discharged. Check if 115/ 230 V is present to the battery cabinet by measuring on the internal AC cable.

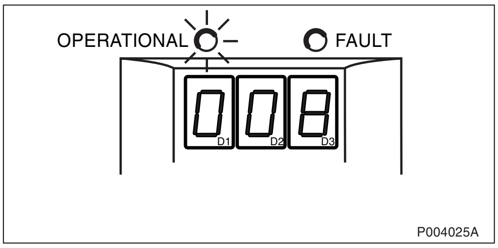
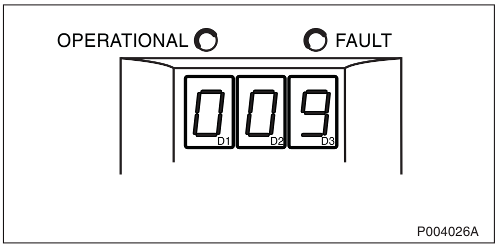
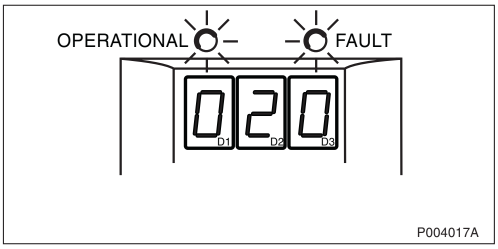


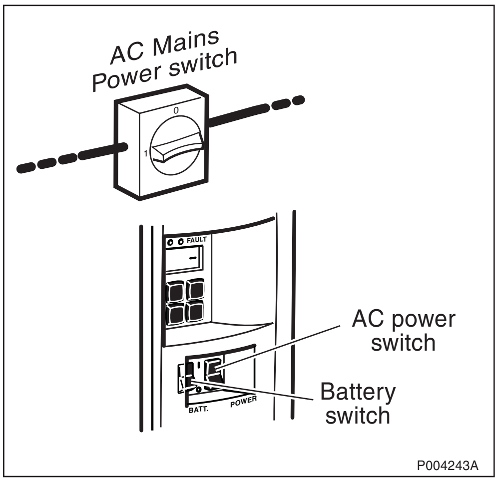
2/ The fuses are damaged and the batteries have been discharged. Turn off the Mains switch and the AC switch on the battery cabinet. Measure the resistance of the fuses with a multimeter to verify that they are undamaged (The resistance should be 0 Ω).

	 3/ The display cable is faulty. If there is 115/ 230 V present to the battery cabinet, verify that the display cable is properly connected and functional. This is done by measuring the resistance from pin to pin.

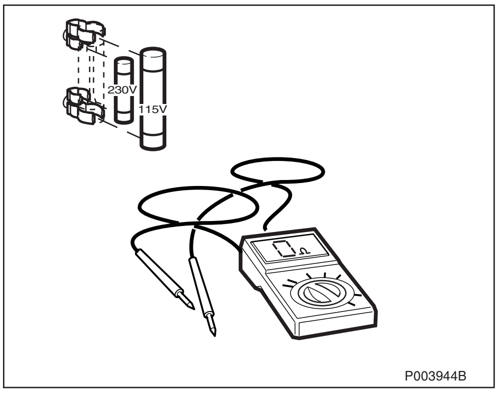
Fault Code List

Table 73

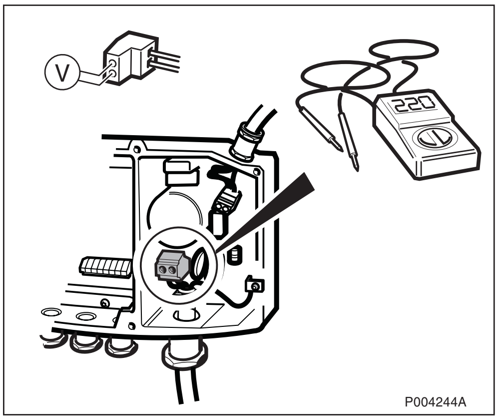
 	*Overtemp historical*. Ambient temperature might have been to high and/or circuits overloaded due to long charging of batteries.
 	*PBC in standalone mode, antenna detected*. Configure the PBC according to instructions in chapter *Site Installation Tests* (with AAU, exit Stand Alone Mode)
 	*When displayed, 115/230 V is not present in the battery cabinet*.



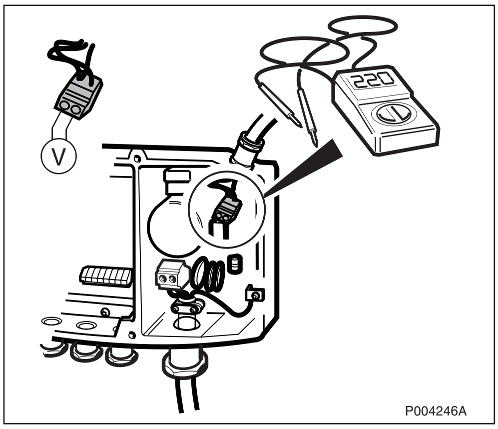
Confirm that the Mains switch is set to the ON position and that the AC switch on the PBC is set to the ON position.



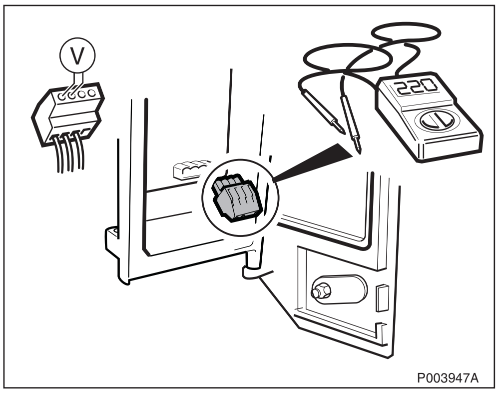
Switch off the Mains switch and the AC switch on the PBC. Measure the resistance of the fuses with a multimeter to verify that they are undamaged. (The resistance should be 0 Ω). Then turn the power back on.



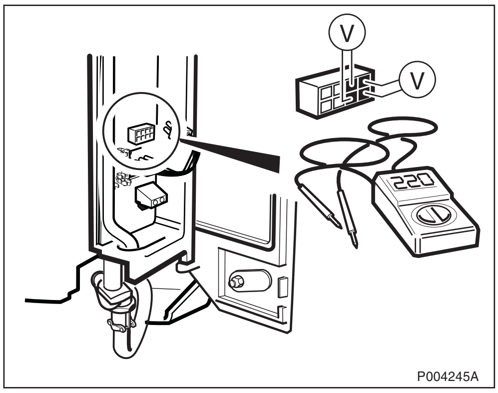
Measure with a voltage meter that 115/230 V is present at the incoming AC plinth on the AC board in the interface box.



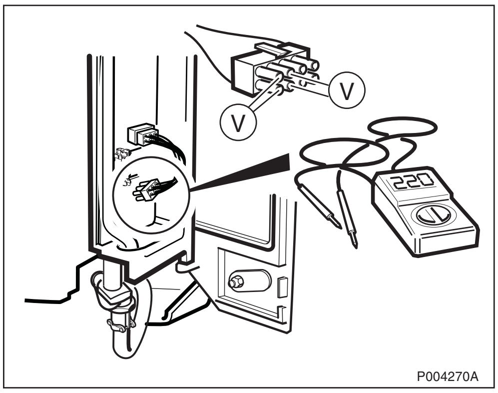
Measure that 115/230 V is present at the upper AC plinth on the AC board to verify that the AC board is not faulty.



Measure that 155/230 V is present at the incoming AC plinth on the EMC board to verify that the cables are not faulty.

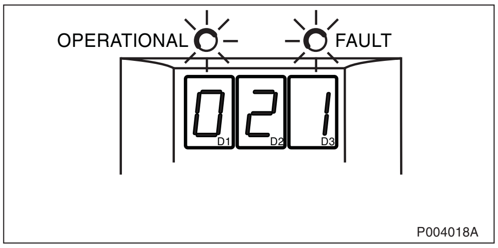


Measure that 155/230 V is present at the connector to the internal AC cable to verify that the EMC board is not faulty.



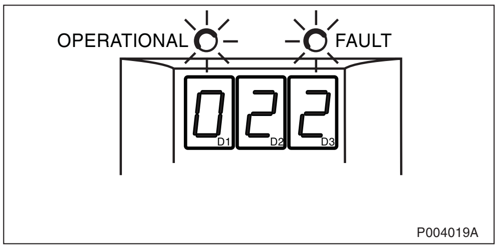
P004270A

Measure that 155/230 V is present at the connector of the internal AC cable attached to the battery cabinet to verify that the internal AC cable is not faulty. If voltage is present, replace the battery cabinet.



P004018A

AC/DC Fault. Replace the Cabinet.



P004019A

DC/DC Overload.

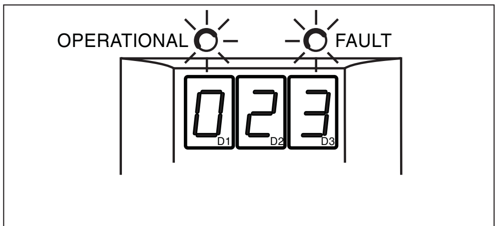
1. Take the site out of service according to *Section 13.2.8 on page 425*.

2. On the DC Surge board, check the X5 connector and the -48 V DC connector to the antenna for shortcircuits.

3. After clearing any shortcircuits, start up the PBC.

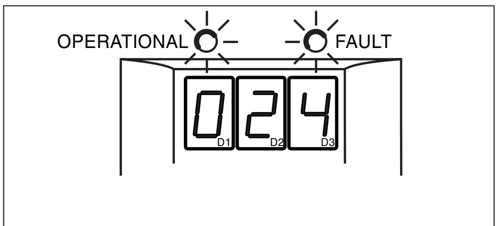
• If no alarm appears, put the site into service according to *Section 13.2.9 on page 428*.

• If alarm appears, replace the Cabinet.



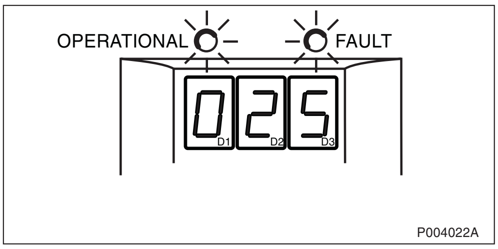
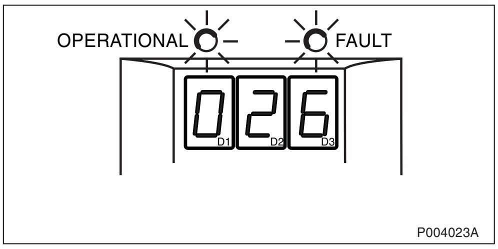
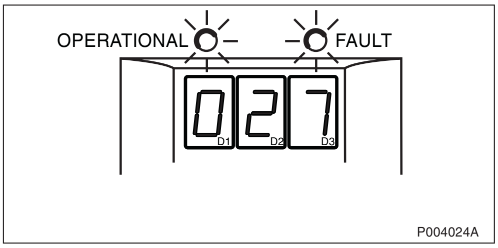
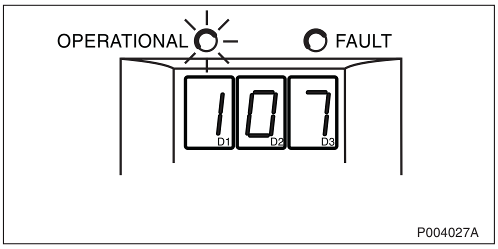
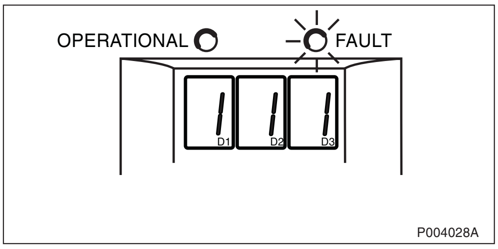
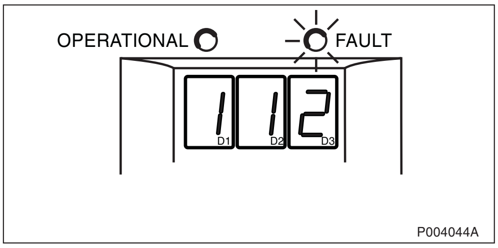
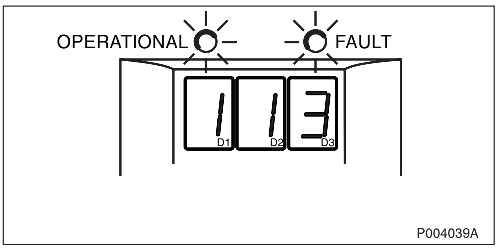
P004020A

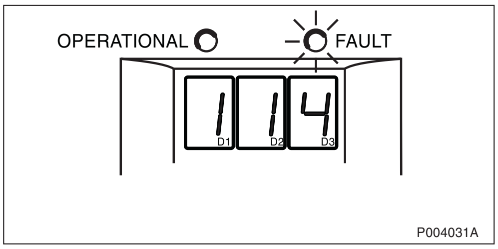
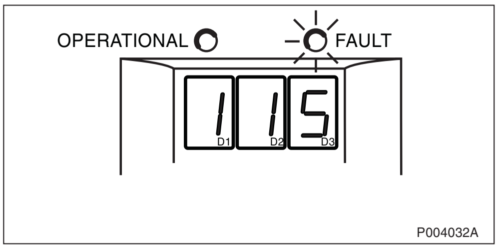
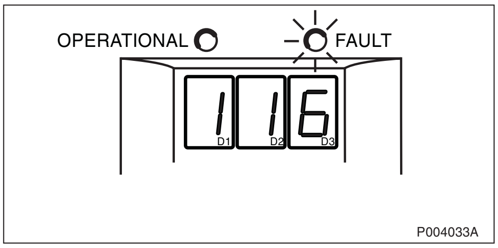
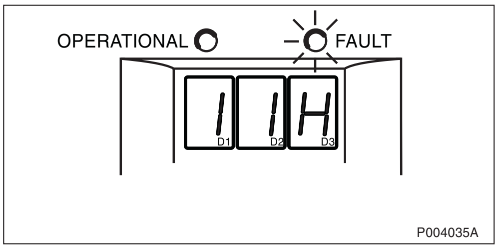
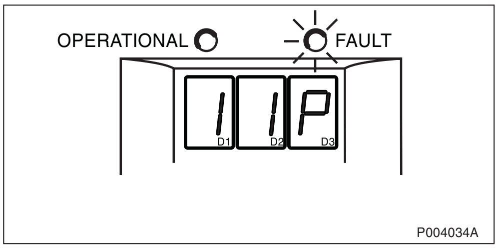
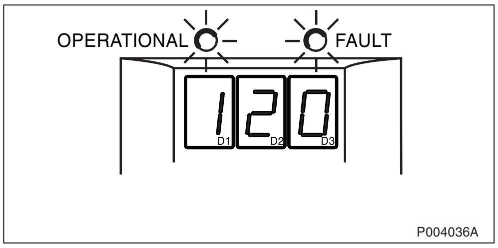
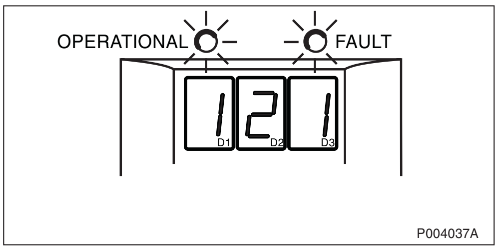
DC/DC Fault. Replace the Cabinet.

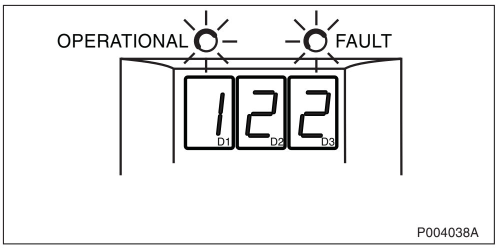
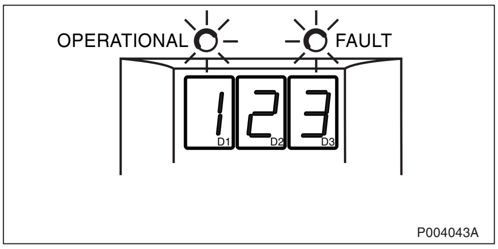
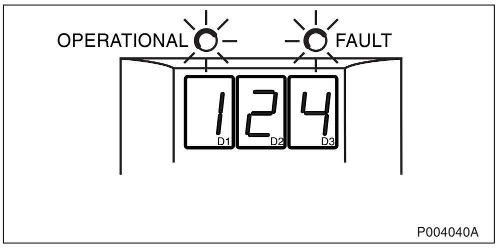
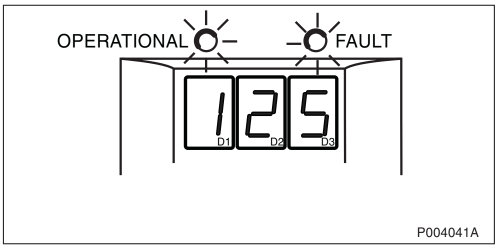
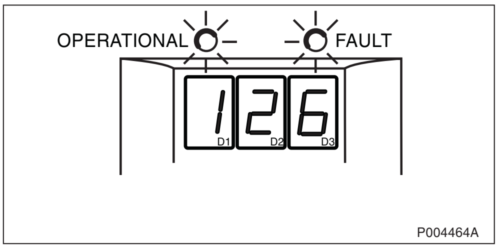
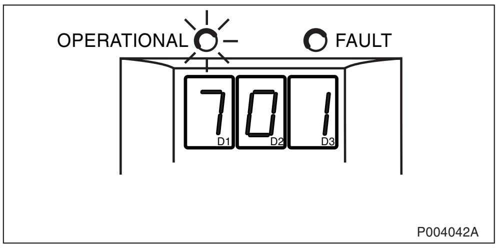


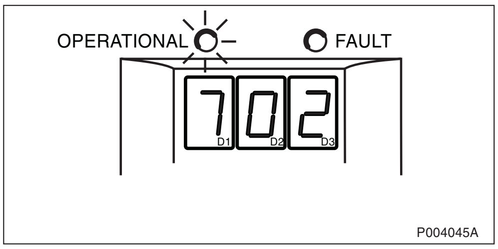
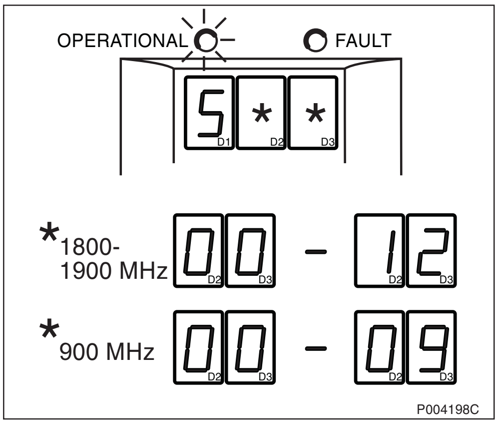
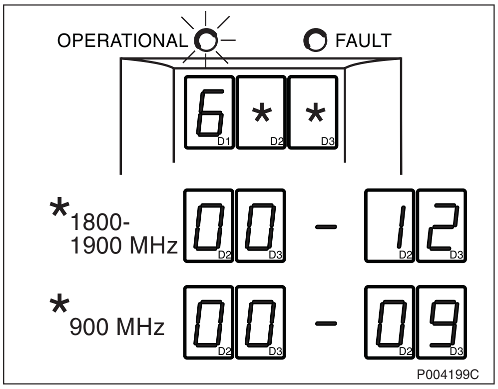
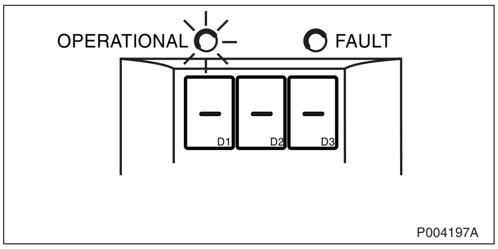
P004021A

Battery Fault. Defective batteries or charging circuits are malfunctioning. Replace the batteries/power cabinet.

	*Battery Disconnected*. Inspect and verify that all battery cables are connected and that they are intact. Check that the automatic circuit breaker is in the ON position.
	*Low Battery Voltage.* The cabinets may have been running on battery backup and are currently recharging. If the fault indication persists for more than 24 hours, replace the batteries and/or the power cabinet.
	*Overtemp active*. If the ambient temperature is normal, replace the power cabinet.
	*Historical overtemp alarm (GSM 1800).* See fault code 116. *Historical ALPU alarm (GSM 1900).* See fault code 126.
	*DC fault, EIRP loss more than 3 dB*. Replace the AAU.
	*TXA fault, EIRP loss more than 3 dB*. Replace the AAU.
	*TXB fault, EIRP loss more than 3 dB.* Replace the AAU/CEU.

	*RXA fault*. Replace the AAU/CEU.
	*RXB fault*. Replace the AAU/CEU.
	*Overtemp.* Inspect the cooling flanges. If the alarm is continuously repeated, then replace the AAU.
	*FDU attenuators set to max.*Default value from factory.
	*Output power off*. Default setting from the factory on new antennas. Can also be the result of a manual command.
	*Transmission fail*. Inspect the connecting cables (DC/data cable) to the AAU.
	*DC fault*. Replace the AAU/CEU.

	*TXA fault.* Replace the AAU/CEU.
	*TXB fault.* Replace the AAU/CEU.
	*RXA fault.* Replace the AAU/CEU.
	*RXB fault.* Replace the AAU/CEU.
	*External or Internal ALPU failure.*(Valid only for the GSM 1900 AAU.) If an external ALPU is mounted, replace the ALPU board. Otherwise the internal ALPU is damaged and an external ALPU must be mounted to regain the desired protection. Fault code 107 is shown together with 126 and is reset by the command 005 on the PBC.
	*Installation fault, feeder A*. Inspect the connectors and perform a DTF test in accordance with the *Site Installation Test* chapter.

	*Installation fault, feeder B.* Inspect the connectors and perform a DTF test in accordance with the *Site Installation Test* chapter.
	Attenuation of feeder A in steps of 1 dB. This code is displayed during setup and is not classified as a fault code.
	Attenuation of feeder B in steps of 1 dB. This code is displayed during setup and is not classified as a fault code.
	Operational. No alarms present. This code is displayed during operation and is not classified as a fault code.

13.4 Corrective Action for the RBS

13.4.1 HDSL Modem

Prior to Replacement

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.
4. Switch the RBS Battery switch to the OFF position.

5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the HDSL Modem

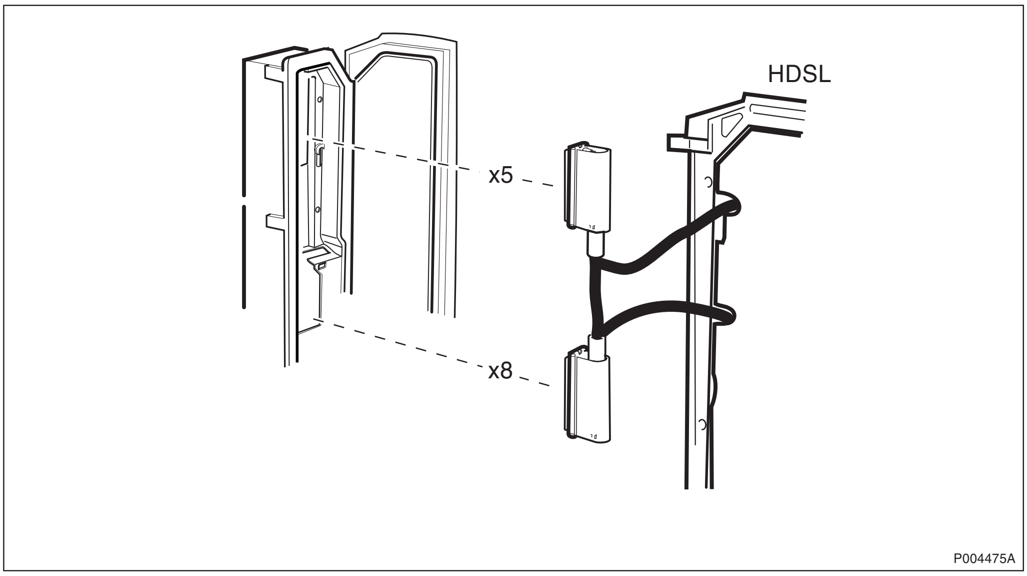


Figure 402 Disconnecting the cables

1. Disconnect the cables from the HDSL Modem.

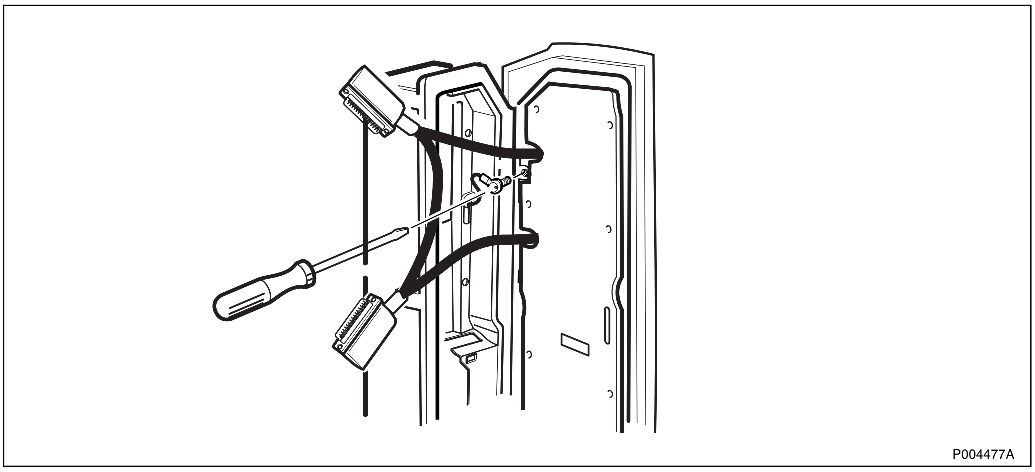


Figure 403 Disconnecting the Protective Earth

2. Disconnect the Protective Earth to the HDSL Modem.

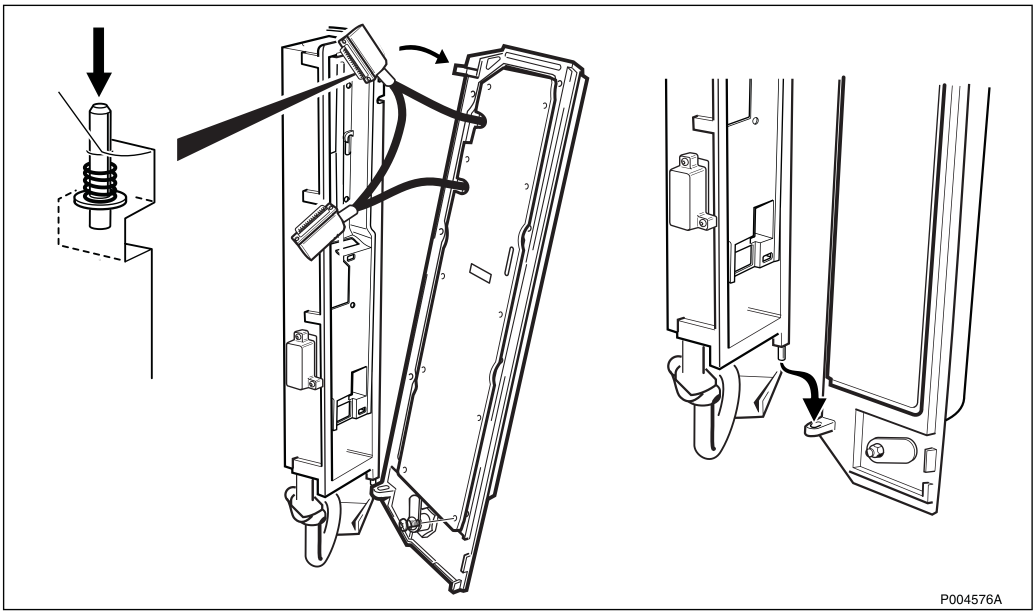


Figure 404 Dismantling the faulty HDSL Modem

3. Dismantle the faulty HDSL Modem.

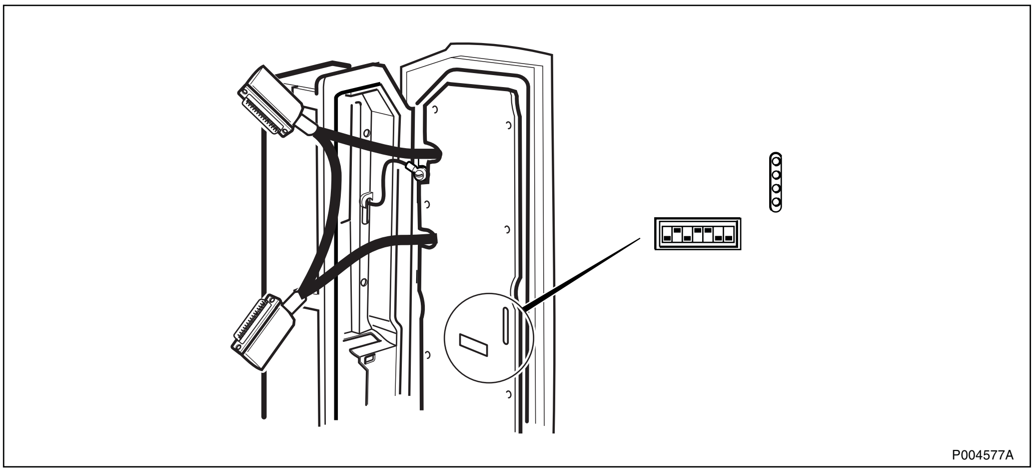


Figure 405 Position of the DIP switches

4. Choose the appropriate settings for the new Modem with the DIP switches located on the printed circuit board according to the settings of the dismantled HDSL-modem. Complete information about the settings if a reconfiguration is necessary is found in the section about the HDSL modem in the *chapter Site Installation Tests*.

5. Mount the new HDSL Modem by reversing the dismantling procedure.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.

4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.

Test after corrective action

1. Wait for the green light on the HDSL Modem.
2. Perform the checklist in *Section 13.10 on page 555*.

13.4.2 Sunshields

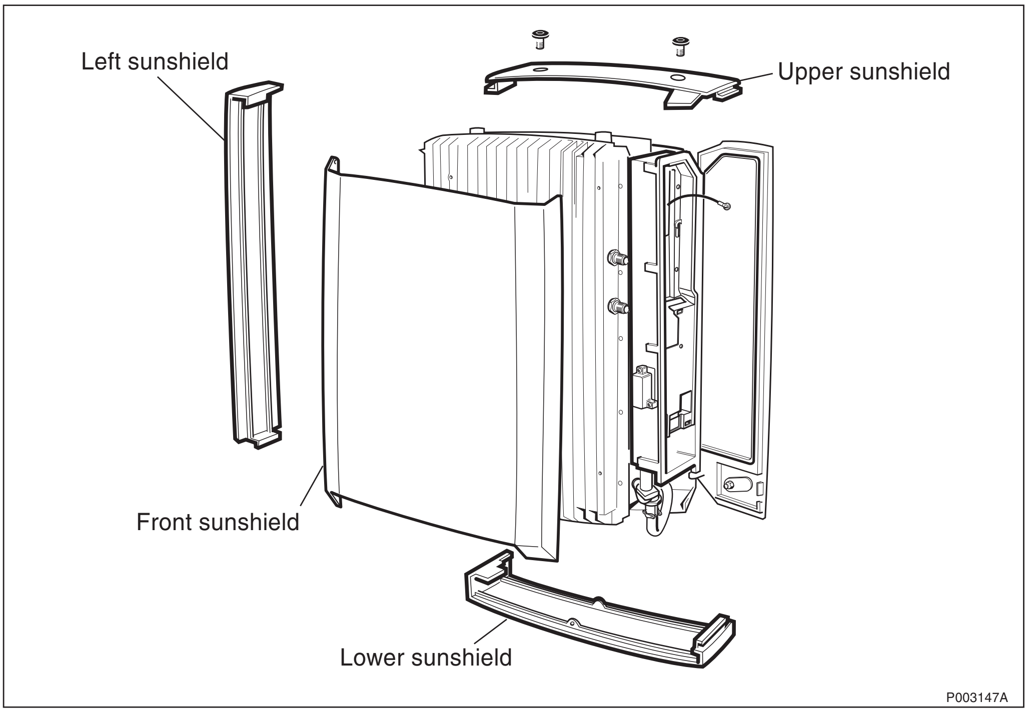


Figure 406 Sunshields overview

Replacing the front sunshield

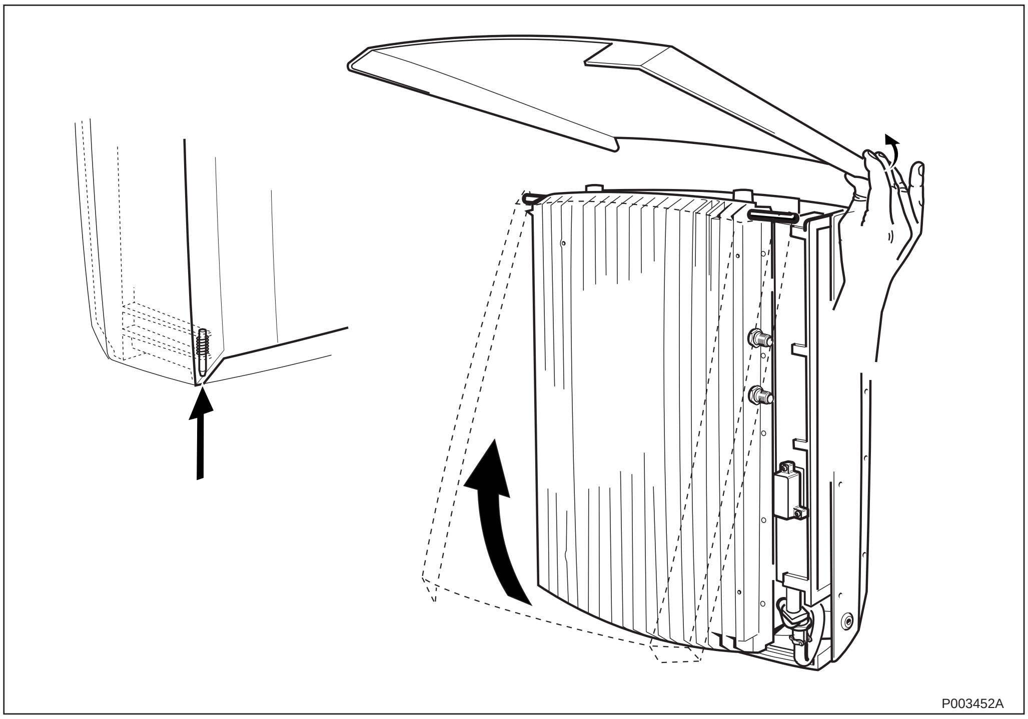


Figure 407 Replacing the front sunshield

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.
4. Push up the spring locking pin, located in the lower left hand corner.
5. Pull out the lower part of the sunshield.
6. Carefully bend out the sides at the top of the sunshield so that the sunshield snaps off.
7. Mount the new front sunshield.
8. Fold down the sunshield.

Note: Make sure that no cables are bent or squeezed.

9. Push the lower left hand corner towards the RBS, so that the spring locking pin snaps into position.
10. Set the RBS in Remote Mode.
11. Close the installation box door.

Replacing the lower sunshield

Note: If the omnidirectional antenna is used, it replaces the lower sunshield but the procedure of replacing it is the same.

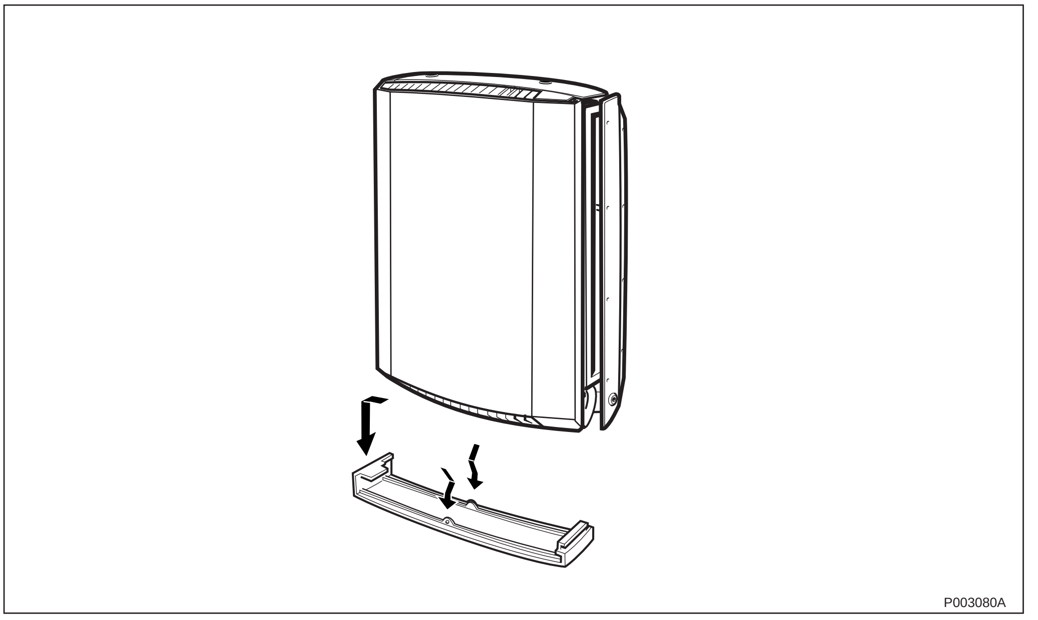


Figure 408 Replacing the lower sunshield

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.
4. Unsnap the sunshield by pressing the fasteners, located on the middle on the sunshield.
5. Pull the sunshield down and unhook it.
6. Mount the new sunshield in its cut-out in the left side of the radio cabinet.
7. Snap the sunshield into position.
8. Set the RBS in Remote Mode.
9. Close the installation box door.

Replacing the left sunshield

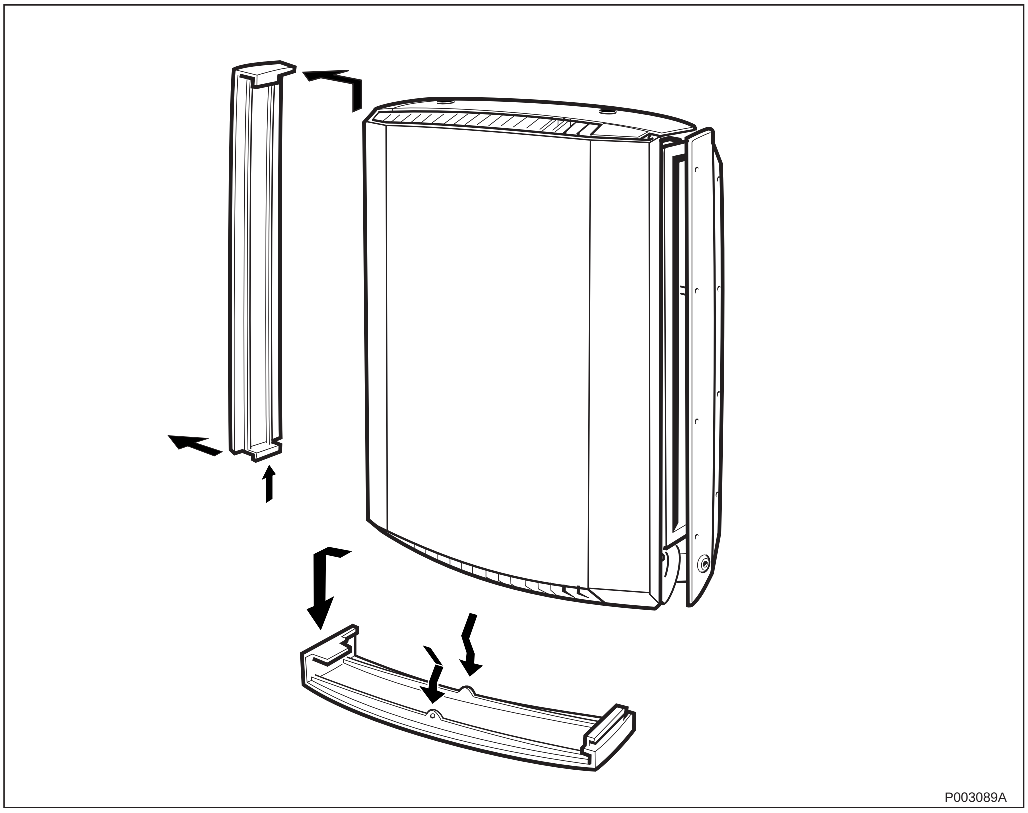


Figure 409 Replacing the left sunshield

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.
4. Remove the lower sunshield.
5. Unsnap the lower part of the left sunshield and unhook the sunshield from the RBS.
6. Mount the new left sunshield.
7. Mount the lower sunshield.
8. Set the RBS in Remote Mode.
9. Close the installation box door.

Replacing the upper sunshield

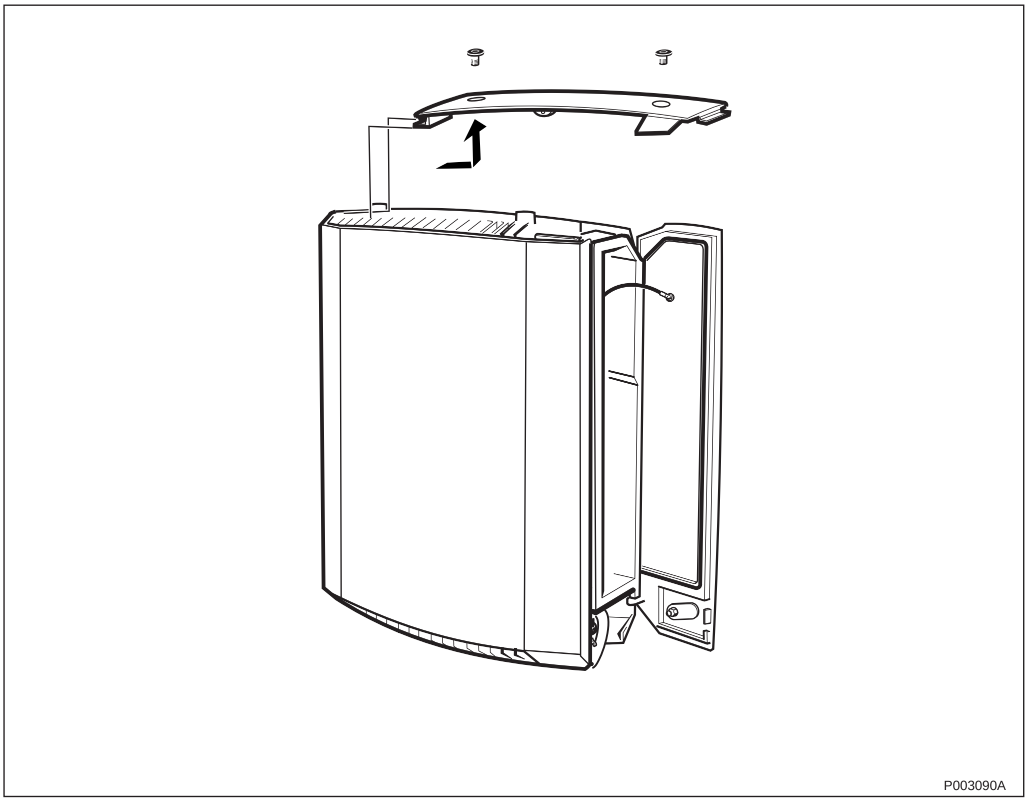


Figure 410   Replacing the upper sunshield

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.
4. Remove the screwplugs.
5. Unsnap the upper sunshield, by pressing on the middle.
6. Pull the sunshield up and to the right, and remove it.
7. Mount the new sunshield.
8. Seal the two holes with the screwplugs.
9. Set the RBS in Remote Mode.
10. Close the installation box door.

Replacing the rear sunshield

Note: To replace the rear sunshield, the cabinet must first be placed on the ground.

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.

3. Set the RBS in Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.
9. Remove the sunshields (front, lower, left and upper).
10. Remove the cabinet, *see page 462*.

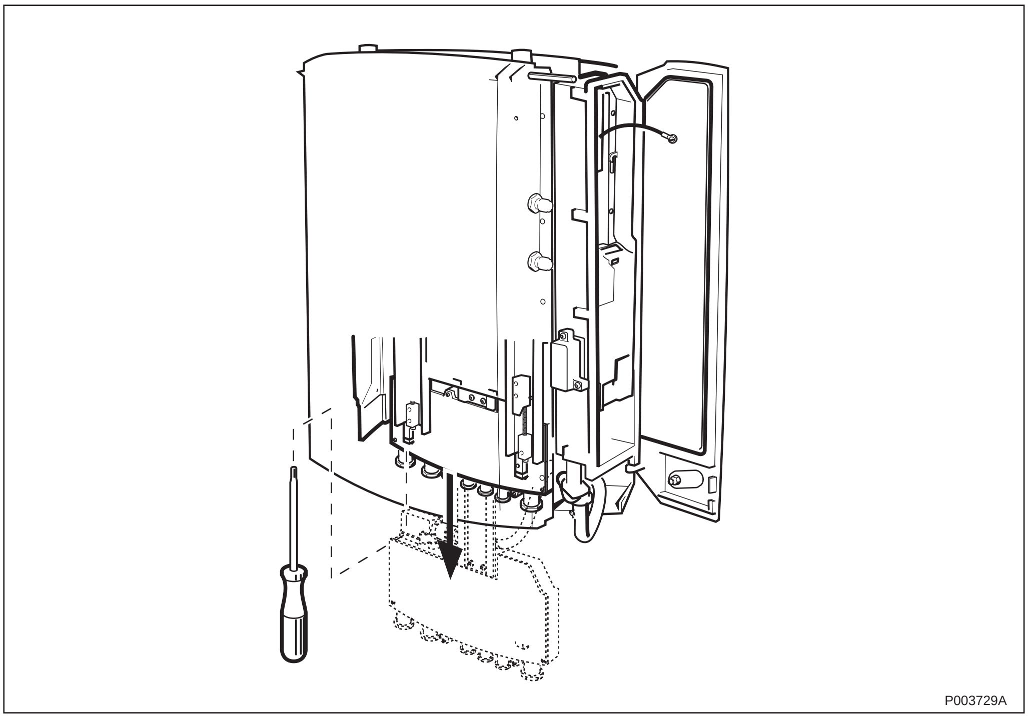


Figure 411 Releasing the interface box

11. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

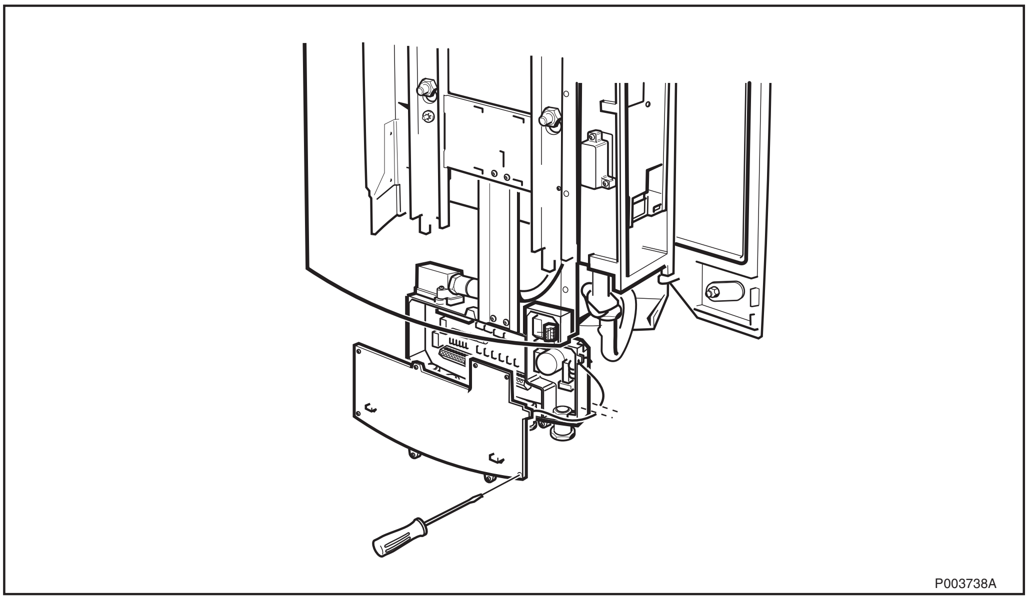


Figure 412 Loosening the interface box cover

12. Open the cover of the interface box by removing the 8 torx screws.

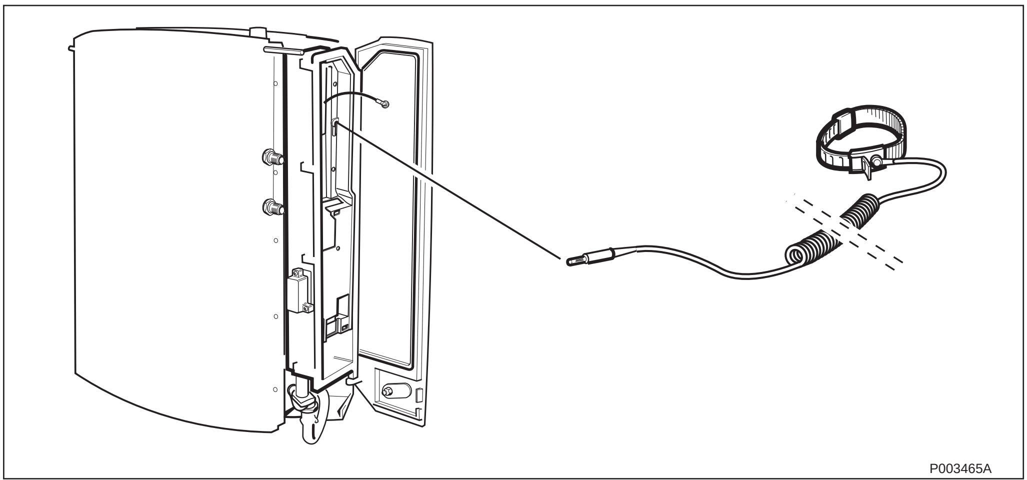


Figure 413 Connecting the ESD wrist strap

13. Connect the ESD wrist strap to the ESD connection point in the installation box.

Note: You have ten seconds to perform *step 14 on page 456*to maintain the PCM link between the BSC and the other cascade connected radio cabinets. This step is only valid when the PCM B is used in a cascade connection.

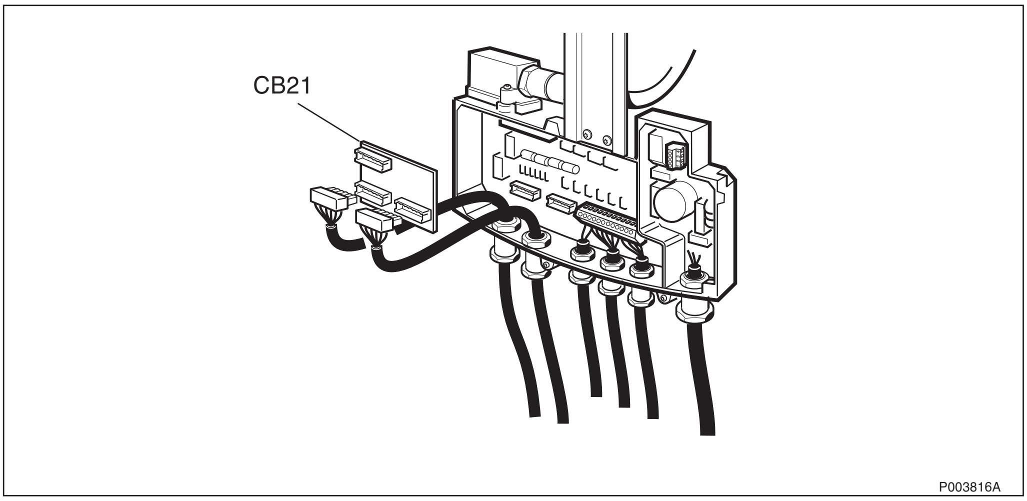


Figure 414 Mounting the CB21 connection board

14. Remove the connection terminal blocks for the PCM lines and mount the connection board CB21 on the two PCM terminal blocks.
15. Remove all remaining connection terminal blocks, including the AC terminal block.

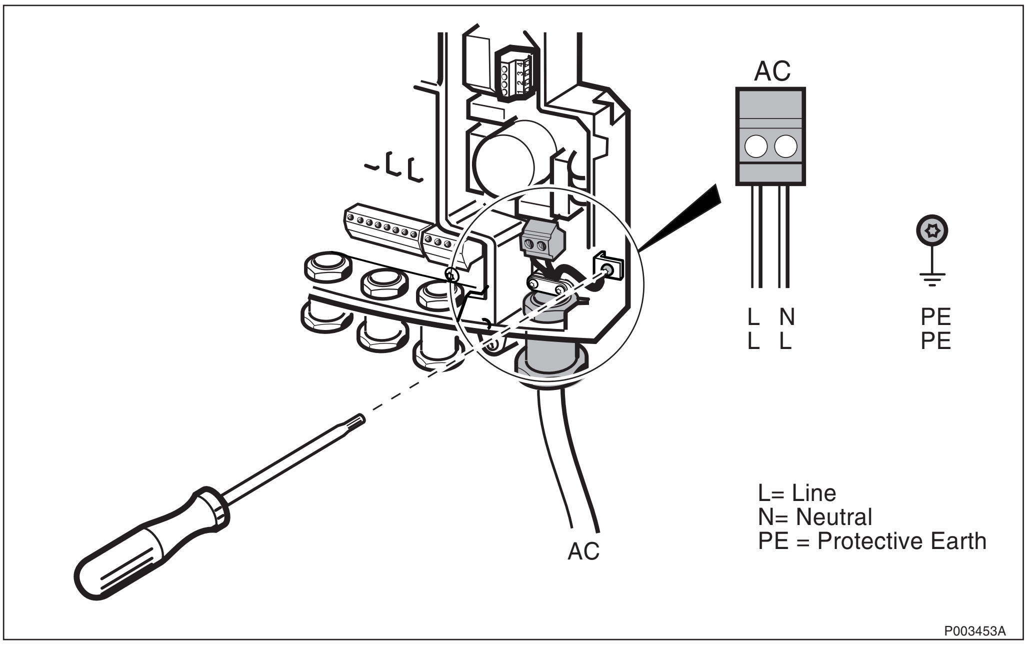


Figure 415 Loosening the Protective Earth in the AC section of the interface box

16. Loosen the Protective Earth in the AC section of the interface box.
17. Loosen the two screws on the AC pull-relief clamp.
18. Dismount the cable gland.
19. Pull out the AC cable.

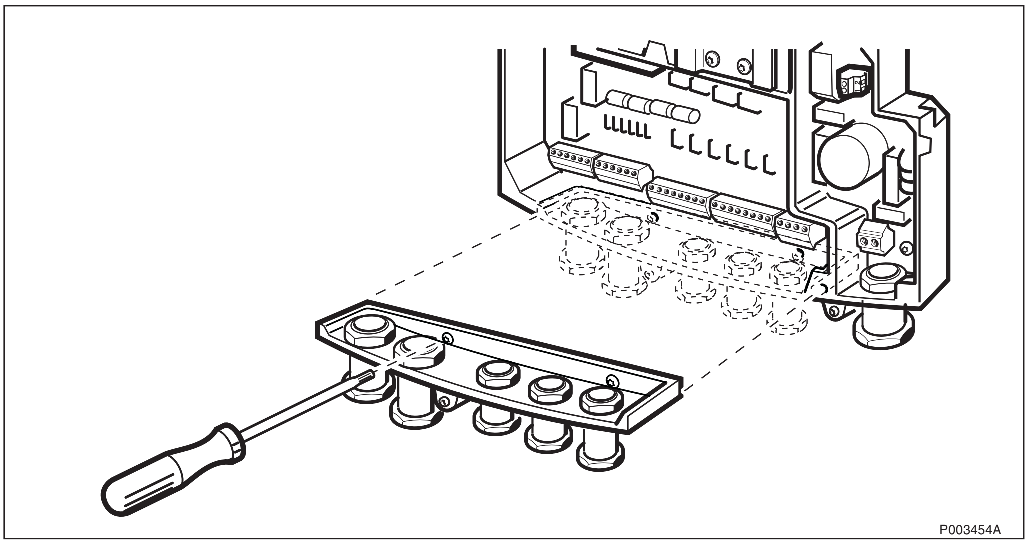


Figure 416 Loosening the gland plate

20. Remove the cable gland plate by unscrewing the two torx screws.

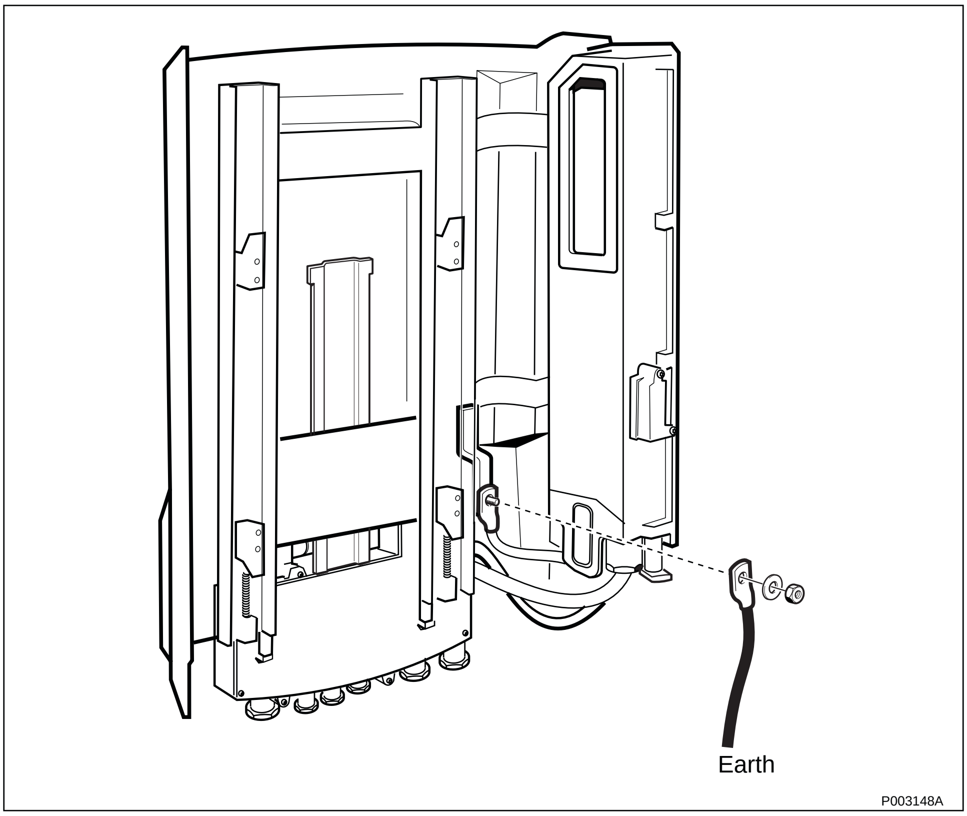


Figure 417 Removing the earth cable

21. Remove the earth cable on the mounting base.
22. Loosen the four nuts securing the mounting base.
23. Lift up the mounting base and pull it away from the wall bracket.
24. Place the mounting base on the ground.

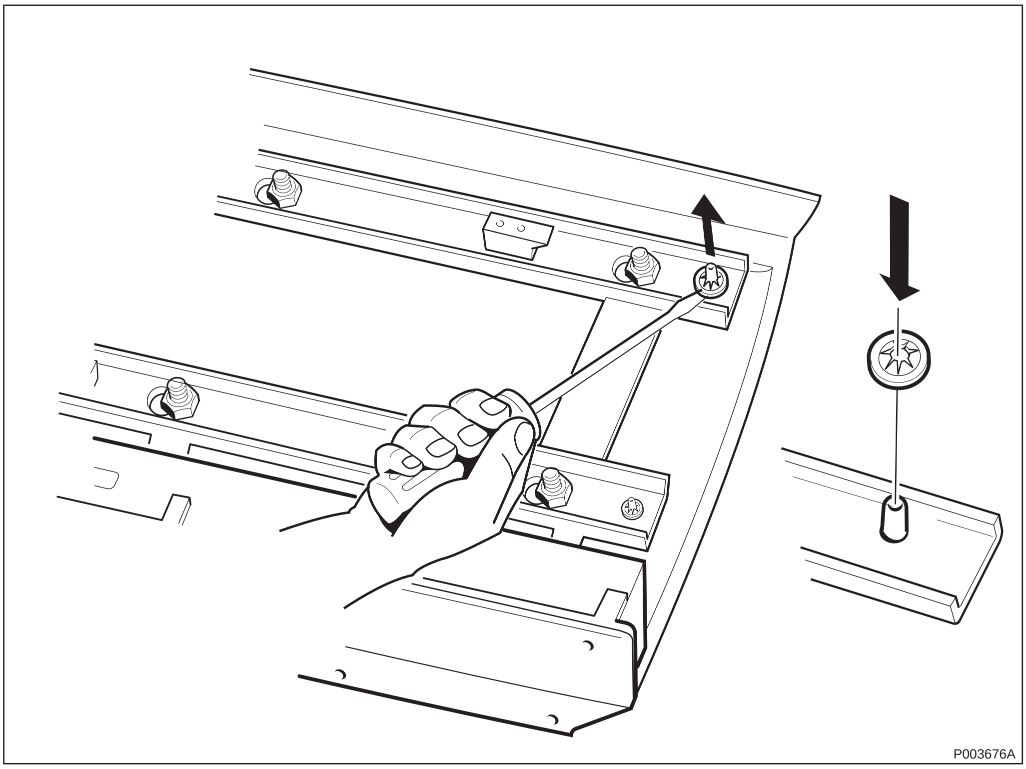


Figure 418 Removing locking washers

25. Remove the four locking washers with a screwdriver.
26. Separate the rear sunshield from the mounting base.
27. Mount the new rear sunshield and the new locking washers.
28. Remount the mounting base on the mounting plate.
29. Tighten the four nuts holding the mounting base.
30. Reconnect the earth cable to the mounting base.
31. Mount the gland plate and fasten the screws.
32. Insert the AC cable and connect the Protective Earth.

Note: You have ten seconds to reinstall the PCM terminal blocks, *see step 33 on page 458*.

33. Disconnect the connection board CB21 and remount the connection terminal block for the PCM line on the transmission board.
34. Remount the remaining connection terminal blocks.
35. Remount the cover of the interface box and tighten the screws.
36. Push up the interface box and secure it in the upper position with the two torx screws.
37. To remount the cabinet on the mounting base, *see chapter Installation of RBS 2302*.

Set to Operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC Battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the Battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.4.3 Cables

Prior to Replacement

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the cables

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

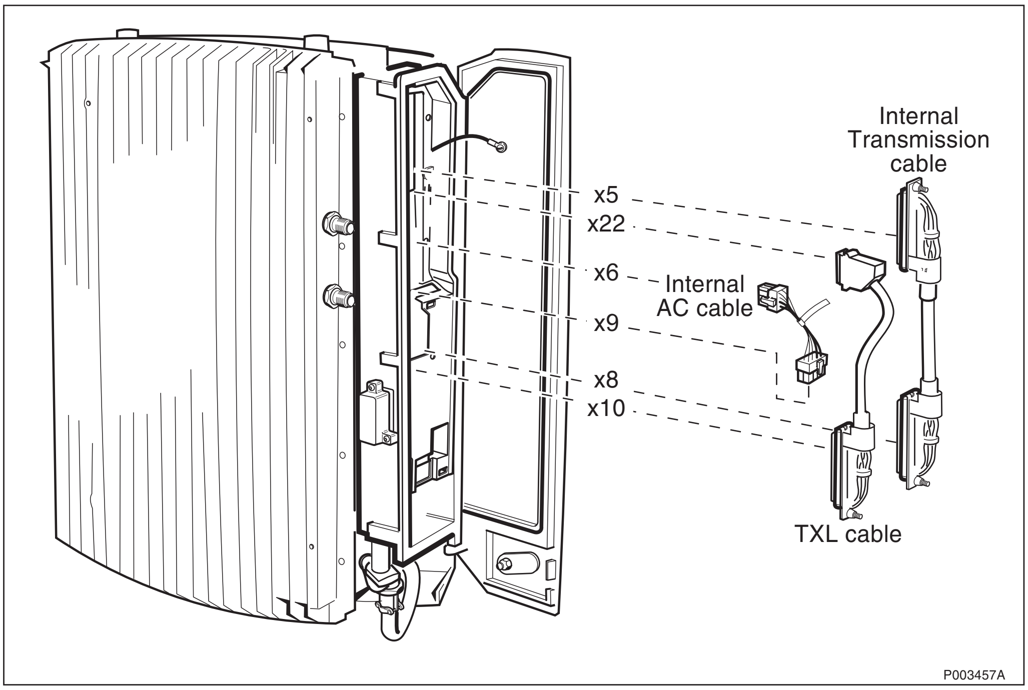


Figure 419 Overview of the cables

1. Remove the front sunshield.
2. Verify that the AC Mains power switch, located outside the cabinets, is in OFF position.

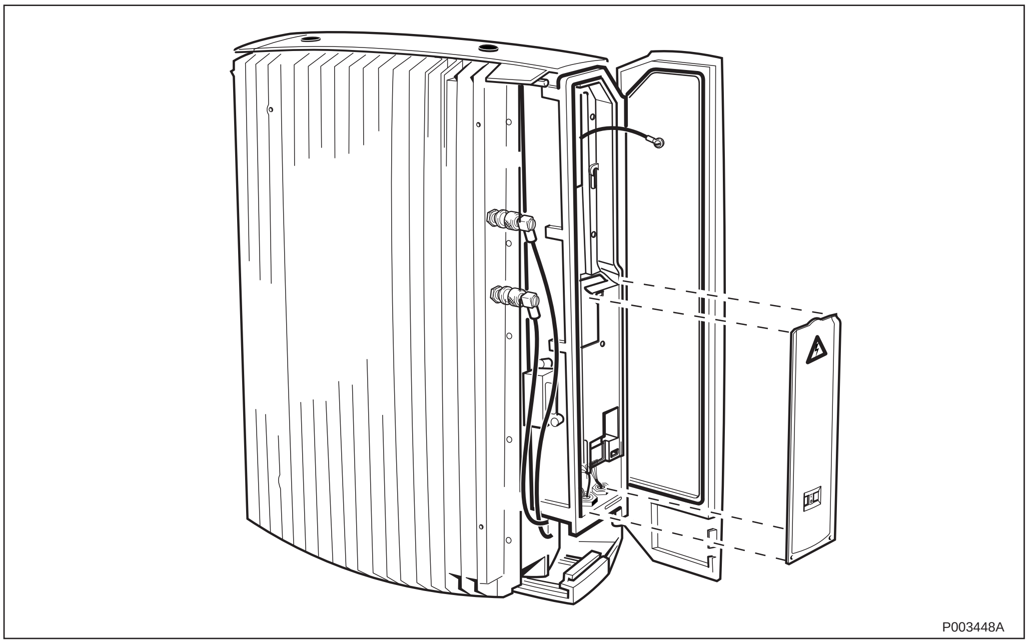


Figure 420 Removing the outer protective cover

3. Unsnap the outer protective cover and remove it.

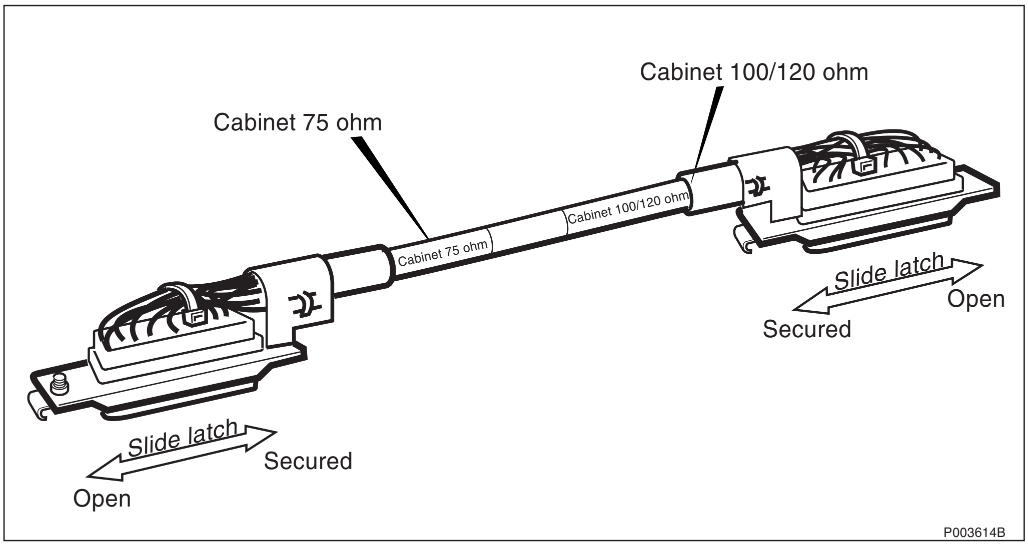


Figure 421 Internal transmission cable

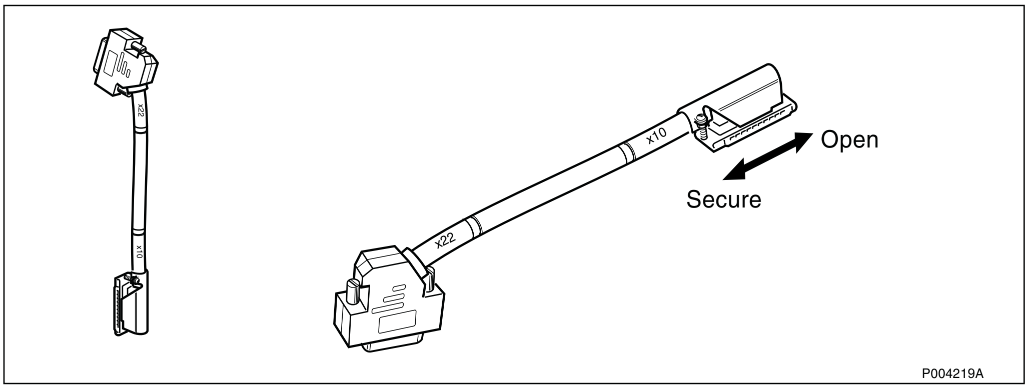


Figure 422 TXL cable

4. Disconnect and remove the internal transmission cable, the internal AC cable and the TXL cable.

Note: The internal transmission cable is secured with slide latches. The TXL cable is secured on one end with slide latches and on the other with locking screws. Open the latches and the locking screws before removing the cables.

5. Connect the new cables, *see Figure 419 on page 460*.

Note: Make sure that the correct end of the internal transmission cable is mounted to the cabinet.

6. Remount the outer protective cover.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.4.4 Radio Cabinet

Prior to Replacement

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the Radio cabinet

1. Make sure that none of the LEDs are lit inside the installation box.
2. Remove the front, lower, left and upper sunshields.

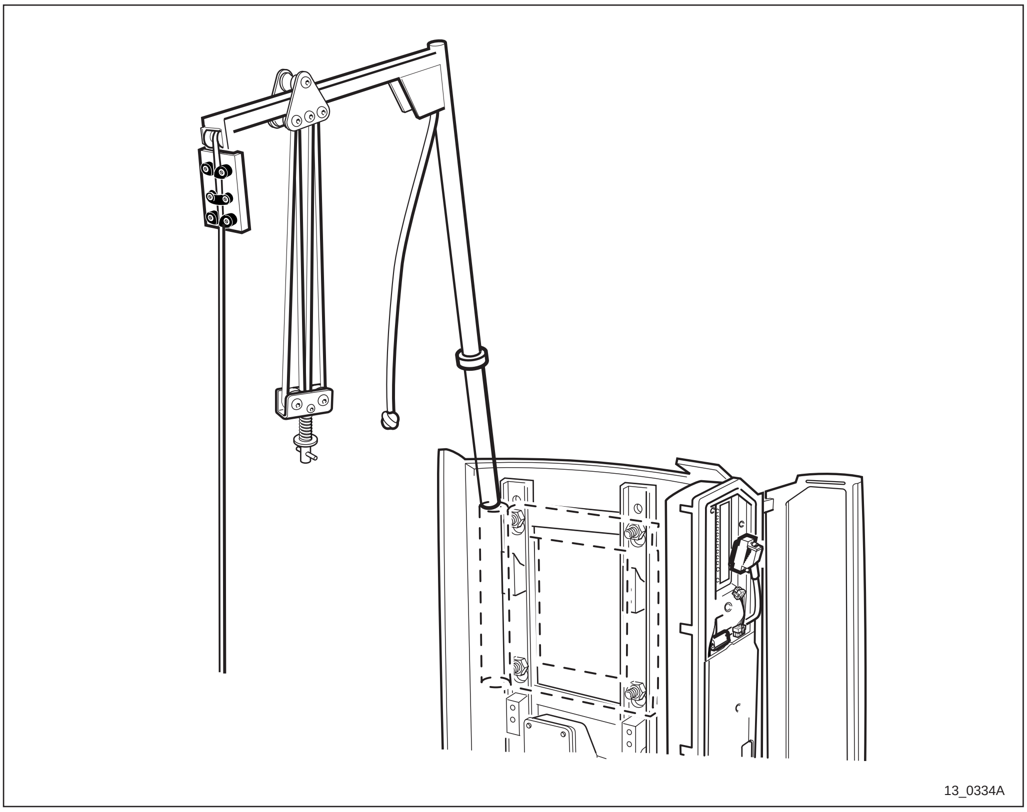


Figure 423 Lifting device

Note: The lifting device is optional.

3. Mount the lifting device (if it is to be used) on the left side of the mounting plate.

Note: For information regarding the use of the lifting device, *see chapter Installation of RBS 2302*.

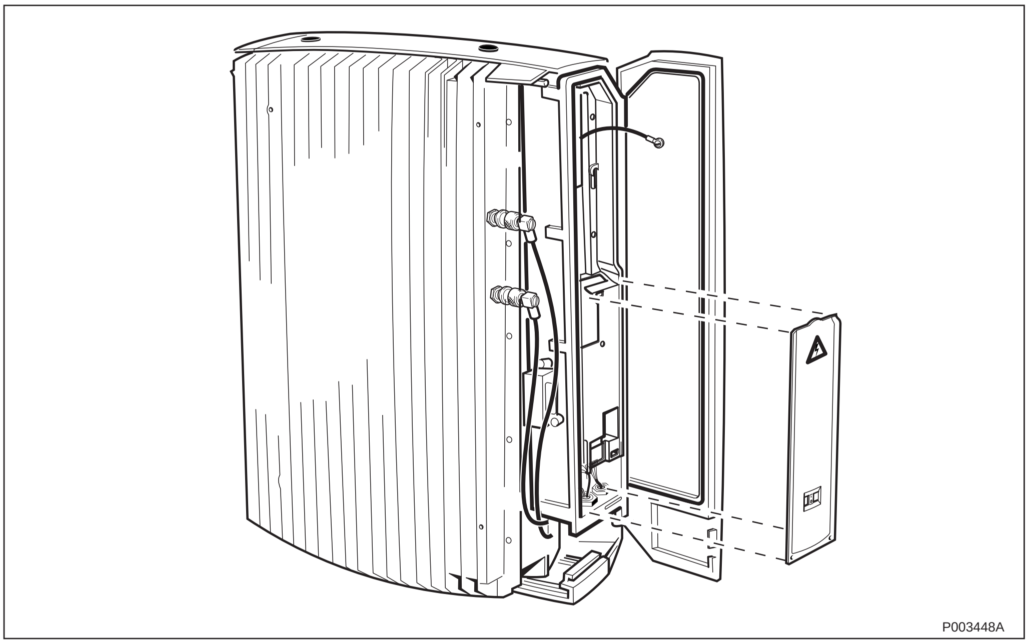


Figure 424 Outer protective cover

4. Unsnap the outer protective cover in the installation box and remove it.

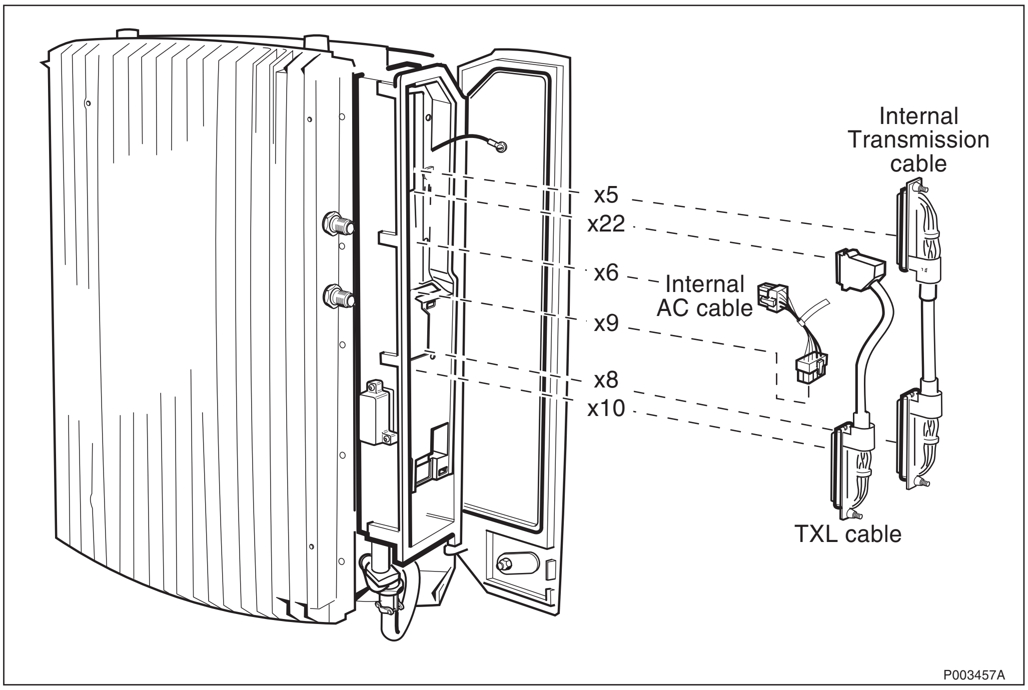


Figure 425 Internal cables

5. Disconnect the internal AC cable, the internal transmission cable and the TXL cable.

Note: The internal transmission cable is secured with slide latches. The TXL cable is secured on one end with slide latches and on the other with locking screws. Open the latches and the locking screws before removing the cables.

6. Remove the inner protective cover.

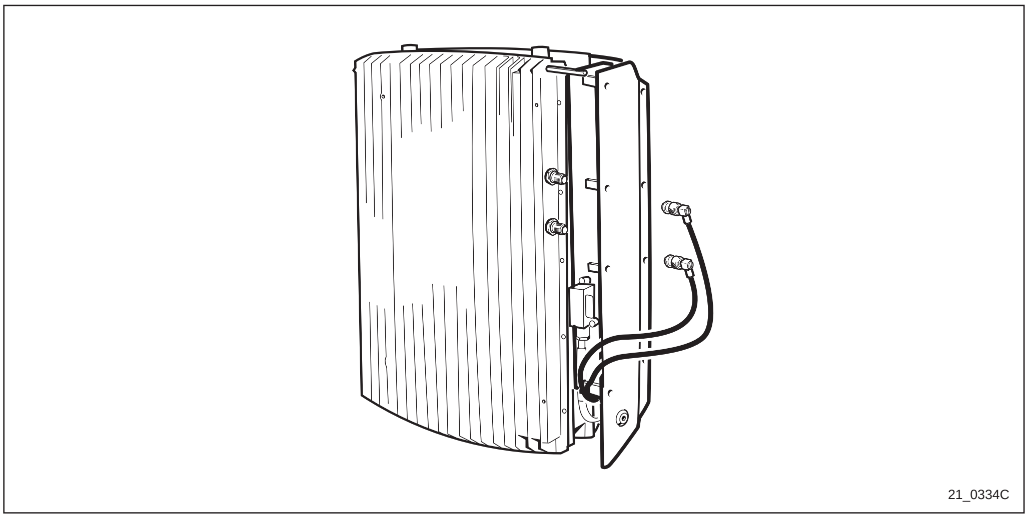


Figure 426 Disconnecting the Antenna cables

Note: Make sure that all cables are properly labelled before disconnecting them.

7. Remove the PSA according to *Section 13.4.5 on page 467*

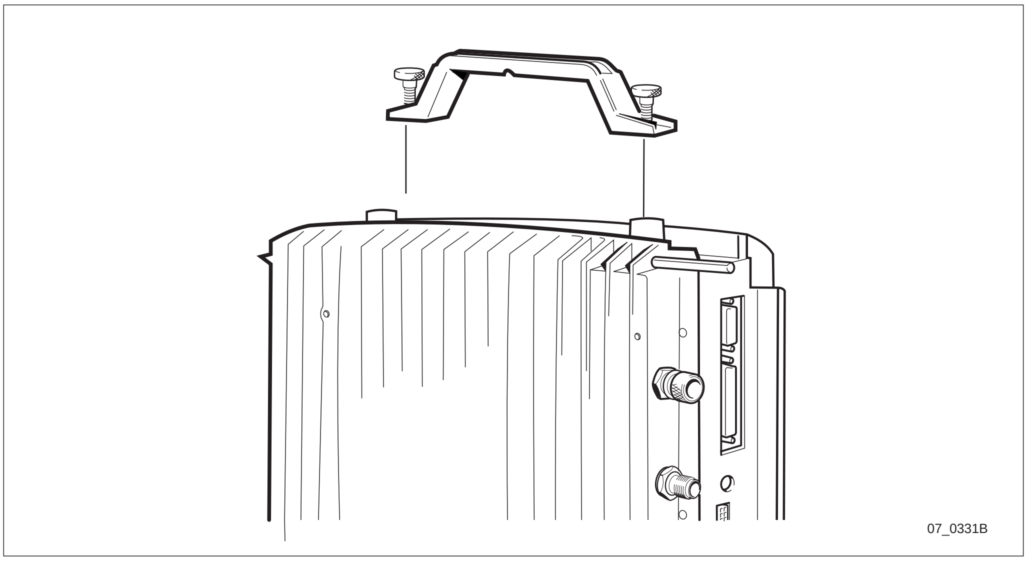


Figure 427 Mounting the handle

8. If the lifting device is used, attach the handle to the cabinet.

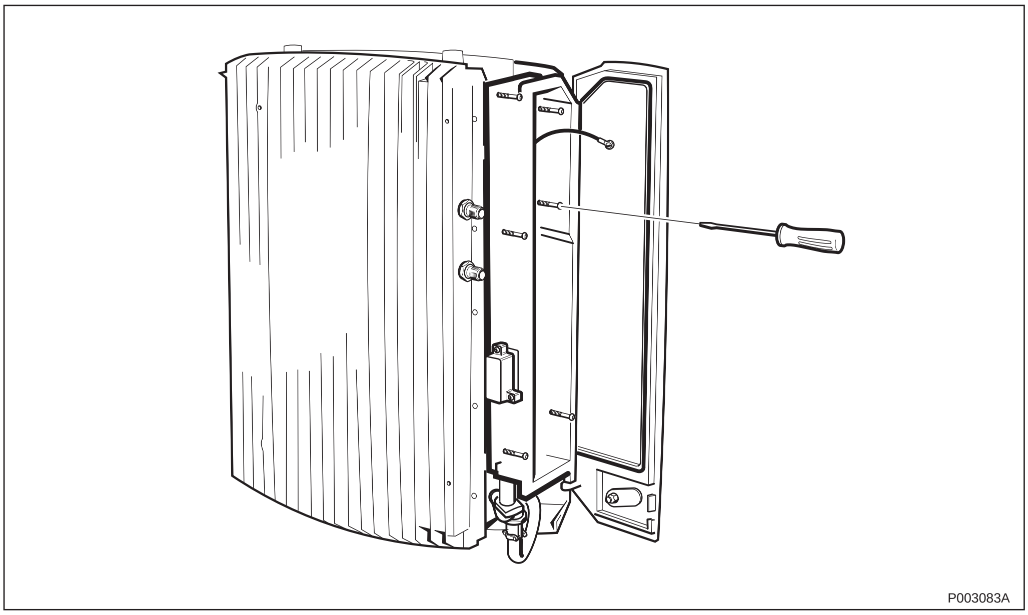


Figure 428 Loosening the installation box

9. Unscrew the six torx screws in the installation box.

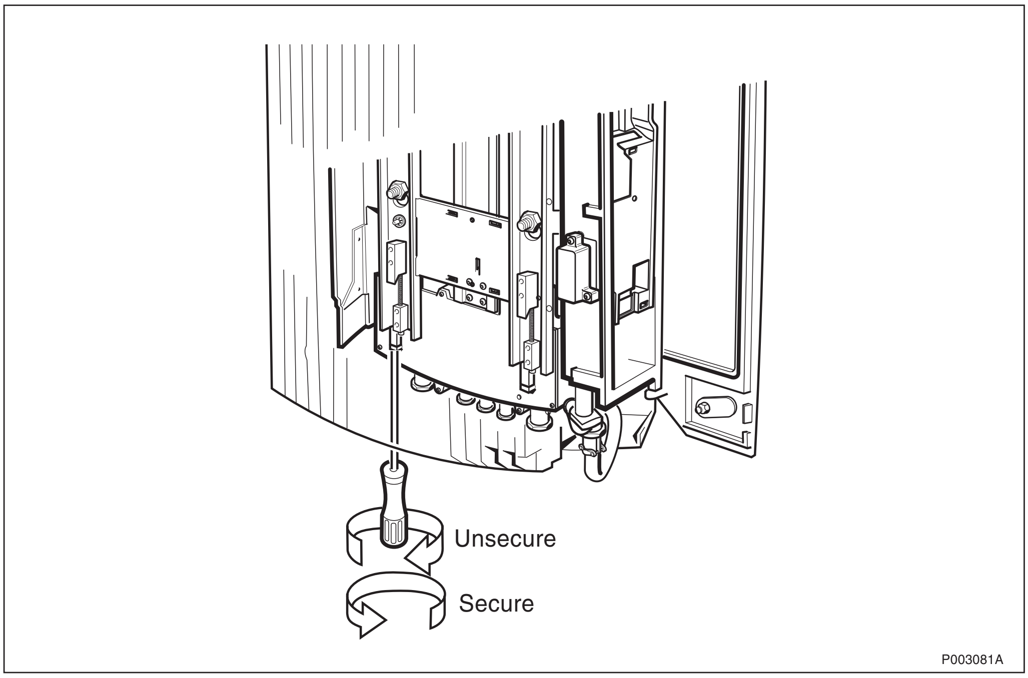


Figure 429 Unscrewing the locking device

10. Unscrew the locking device under/behind the radio cabinet by turning the 2 torx screws counterclockwise until they stop.

Note: Sometimes the two locking parts are jammed together causing the screw to move downwards instead of the wedge part moving up. This is solved simply by striking the back of the torx screwdriver with the hand, when the screw has been screwed down approximately 20 mm.

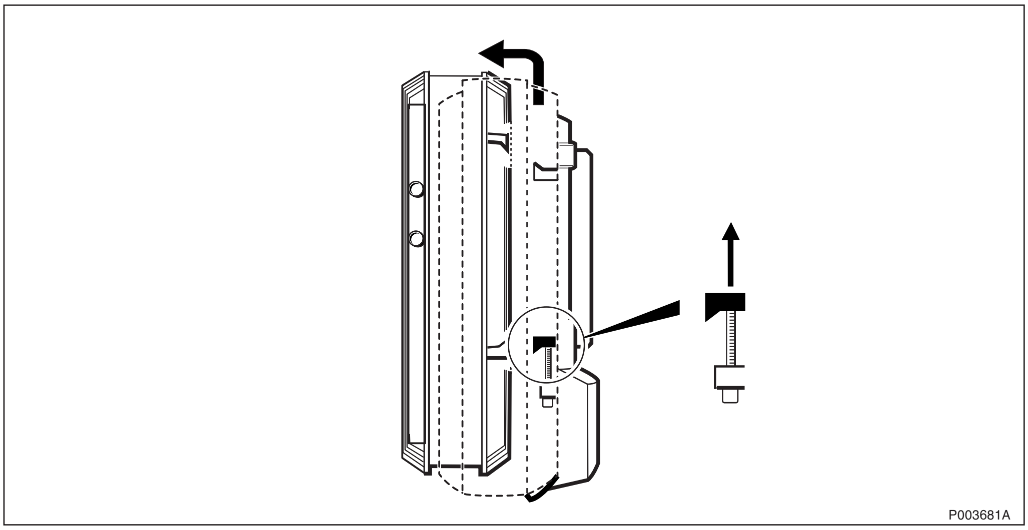


Figure 430 Unhooking the radio cabinet

11. Grip the bottom of the radio cabinet and pull it outwards.
12. Unhook the RBS by lifting the RBS upwards.
13. For information on how to mount the new radio cabinet, *see chapter Installation of RBS 2302*.

14. Remount the PSA.

Set to Operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC Battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the Battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.

Test after corrective action

1. Perform a MS test call to verify the function, *see chapter Optional Tests*.
2. Follow the instructions in *chapter RBS Site Integration, section Connecting the RBS from the BSC* and *section Test Calls on Air Interface* .
3. Perform the checklist in *Section 13.10 on page 555*.

13.4.5 PSA

Prior to Replacement

1. Open the RBS installation box door.
2. Set the RBS in Local Mode.
3. Switch the RBS Battery switch to the OFF position.
4. Switch the RBS AC switch to the OFF position.
5. Switch the PBC Battery switch to OFF position.
6. Switch the PBC AC switch to OFF position.
7. Switch off the AC Mains Power switch.

Replacing the PSA

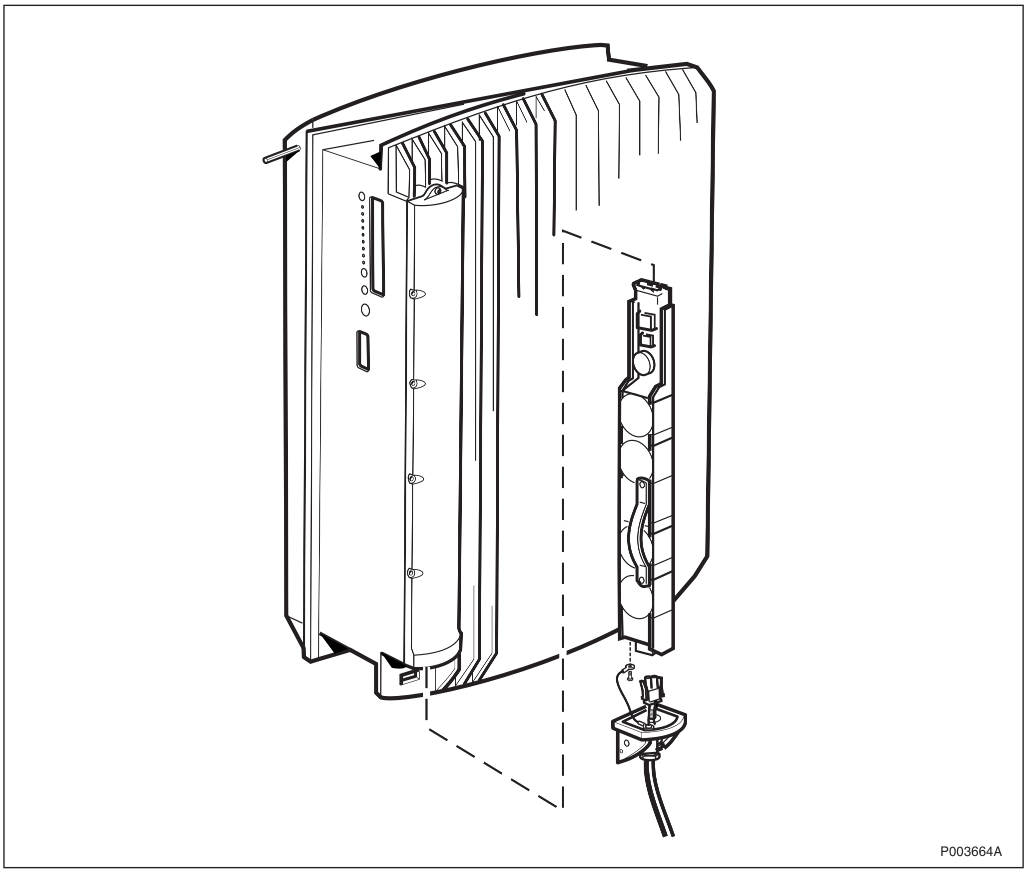


Figure 431 Replacing the PSA

1. Open the internal RBS battery compartment door by unscrewing the torx screw located on the cover.
2. Remove the faulty PSA.
3. Separate the cover from the PSA on both the faulty and new units by loosening the torx screw that hold the wire and disconnect the cables.
4. Mount the old cover on the new PSA and connect the cable.
5. Mount the wire between the cover and the new PSA with the torx screw.
6. Insert the new PSA into the battery compartment.
7. Tighten the torx screw and make sure there is no gap between the cover and the radio cabinet.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.

5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform a battery backup test, *see chapter Site Installation Tests*.
2. Perform the checklist in *Section 13.10 on page 555*.

13.4.6 Fuses

Prior to Replacement

1. Open the installation box door.
2. Switch the RBS battery switch to the OFF position.
3. Switch the RBS AC switch to the OFF position.
4. Switch the PBC battery switch to OFF position.
5. Switch the PBC AC switch to OFF position.
6. Switch off the AC Mains Power switch.

Replacing the fuses

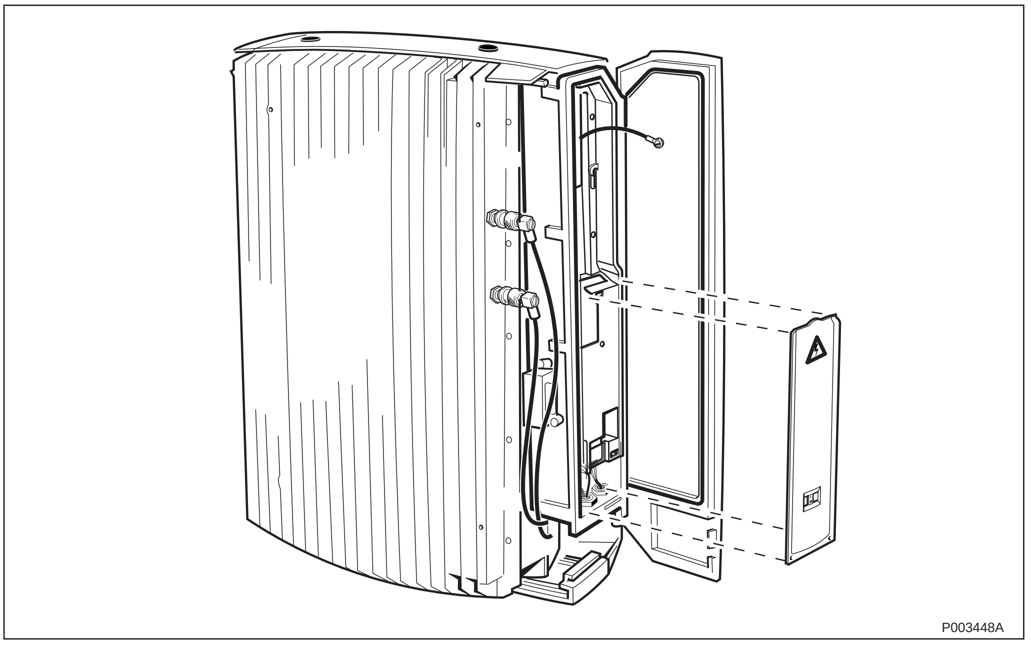


Figure 432 Removing the outer protective cover

1. Remove the outer protective cover by unsnapping it.

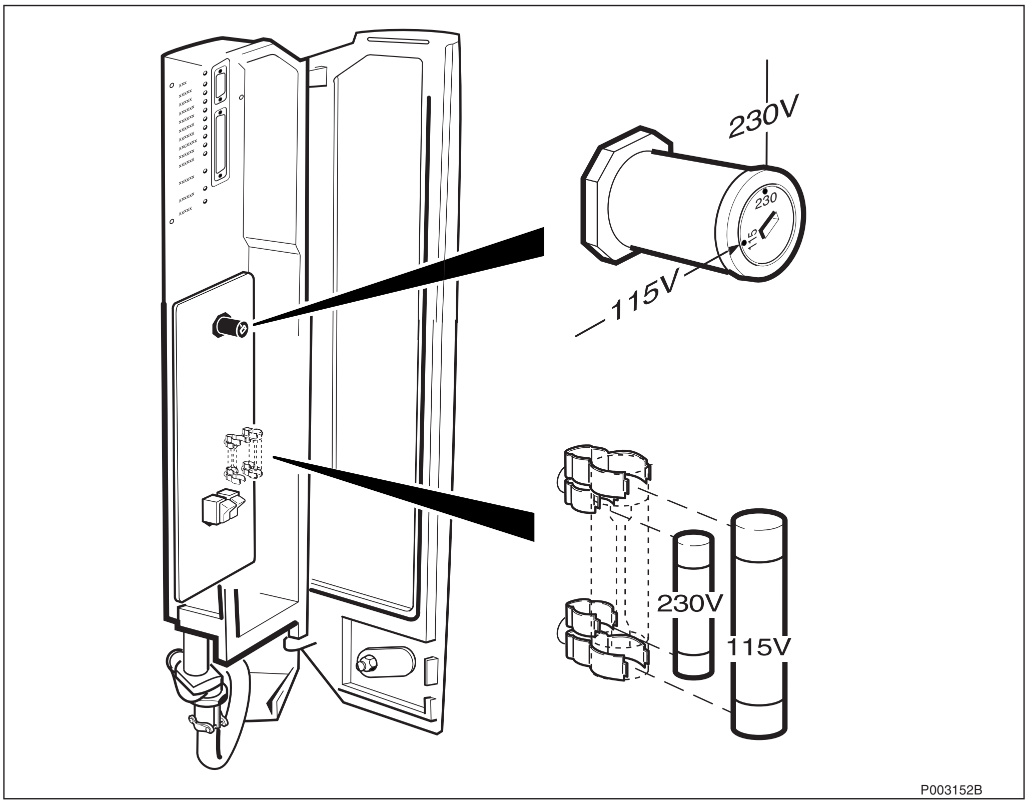


Figure 433 Replacing the fuses

2. Replace the faulty fuses with new fuses.

Table 74 Fuses

Voltage	Fuses Data	Dimension
100-127 V AC	Ceramic Slow Blow 8 A, 250 V (1)	6.3x32 mm
200-250 V AC	Ceramic Slow Blow 6.3 A, 250 V (1)	5x20 mm

(1) Fuse according to standard EN 60127.

3. Remount the outer protective cover.

Note: Make sure that the correct end of the internal transmission cable is mounted to the cabinet.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.4.7 Connection Board

Prior to Replacement

1. Open the installation box door on the radio cabinet.
2. Switch the RBS battery switch to the OFF position.
3. Switch the RBS AC switch to the OFF position.
4. Switch the PBC battery switch to OFF position.
5. Switch the PBC AC switch to OFF position.
6. Switch off the AC Mains Power switch.

Replacing the connection board

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

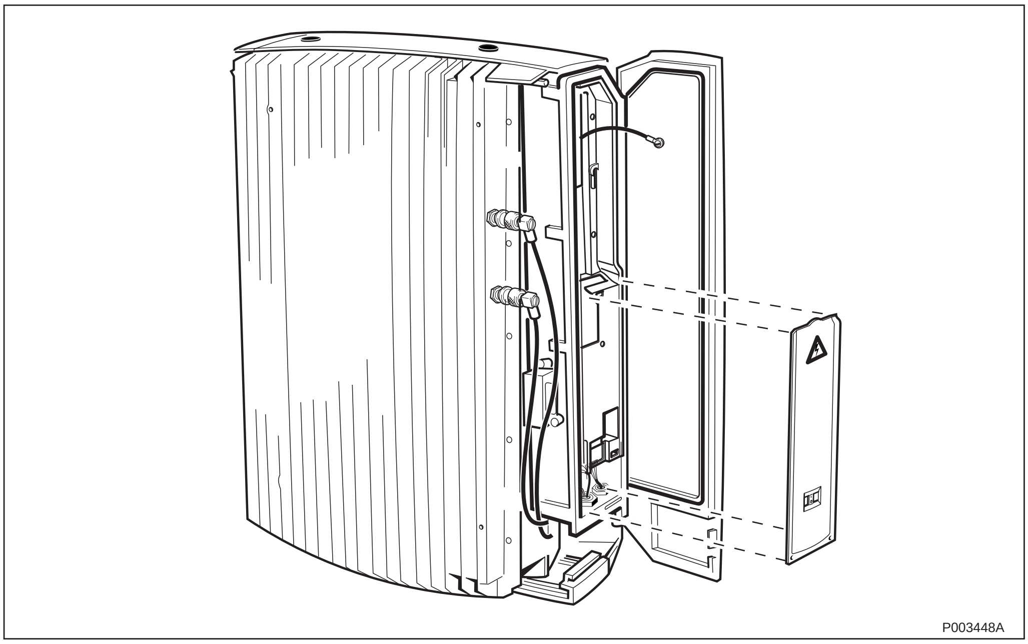


Figure 434 Removing the outer protective cover

1. Remove the outer protective cover by unsnapping it.

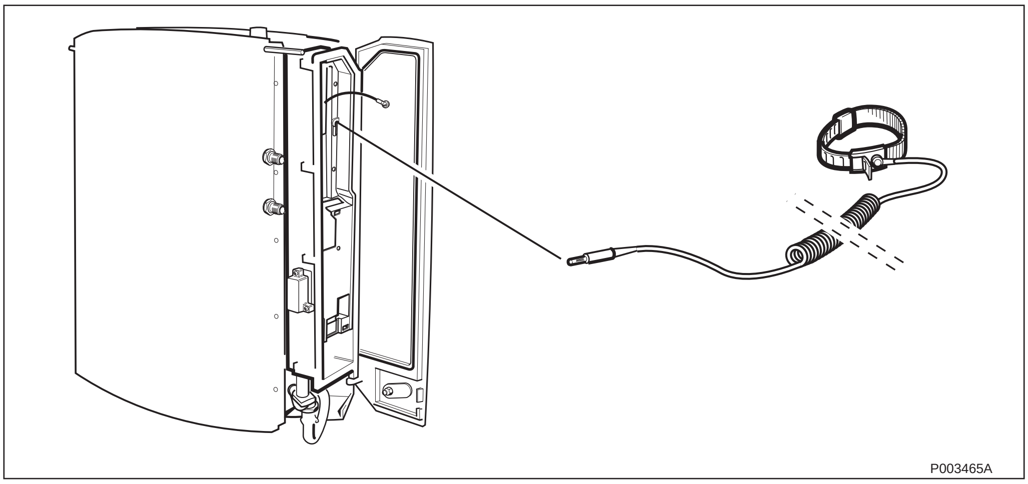


Figure 435 Connecting the ESD wrist strap

2. Connect the ESD wrist strap to the ESD connection point in the installation box.

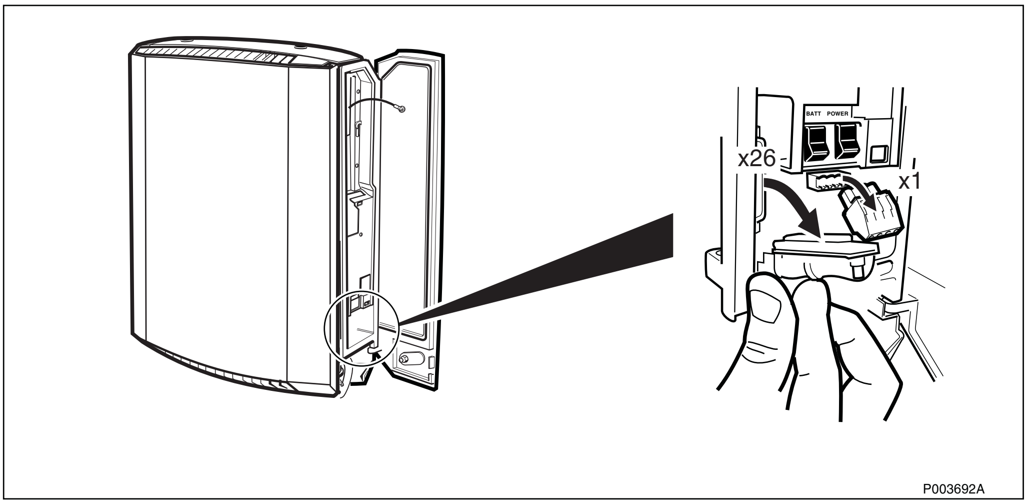


Figure 436 Disconnecting the transmission cable and AC cable

3. Disconnect the transmission cable and the AC cable from the interface box.

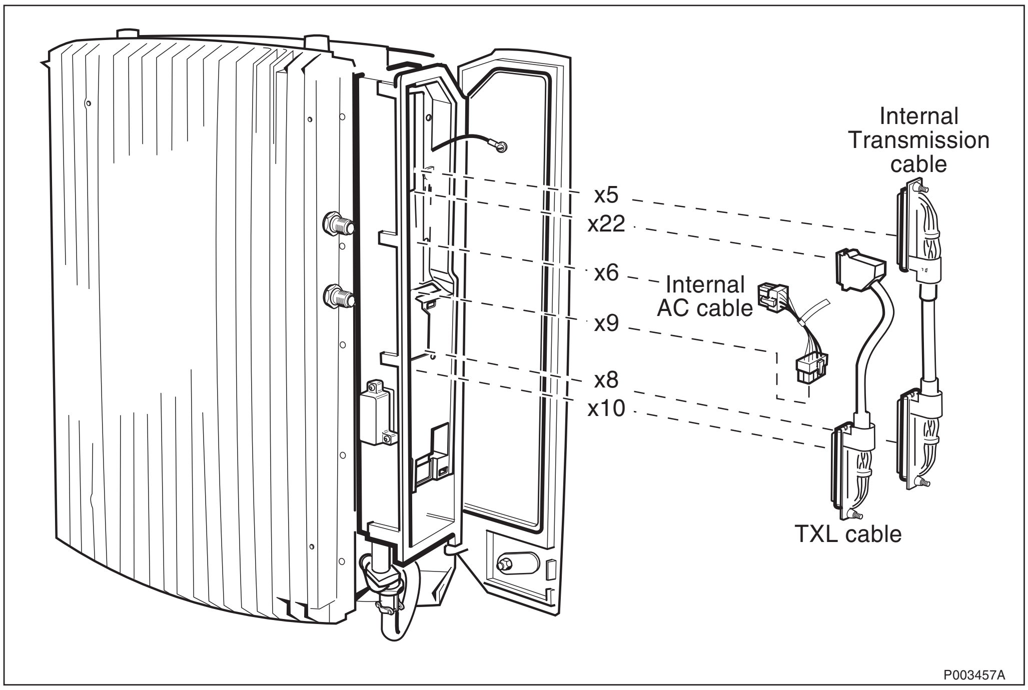


Figure 437 Disconnecting internal cables

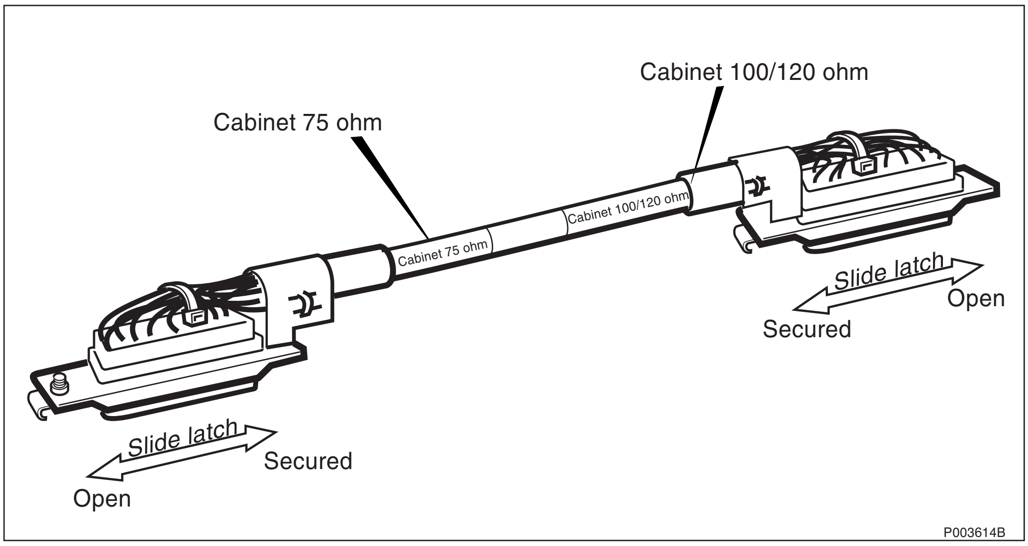


Figure 438 Internal transmission cable

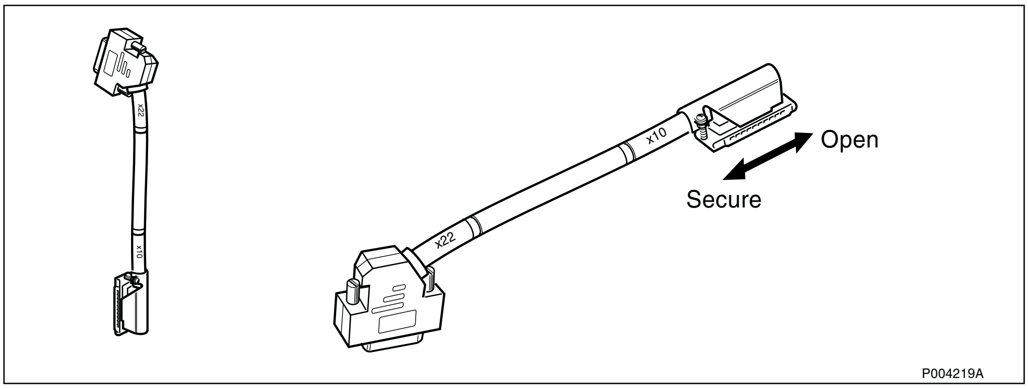


Figure 439 TXL cable

4. Disconnect the internal AC cable, the internal transmission cable and the TXL cable.

Note: The internal transmission cable is secured with slide latches. The TXL cable is secured on one end with slide latches and on the other with locking screws. Open the latches and the locking screws before removing the cables.

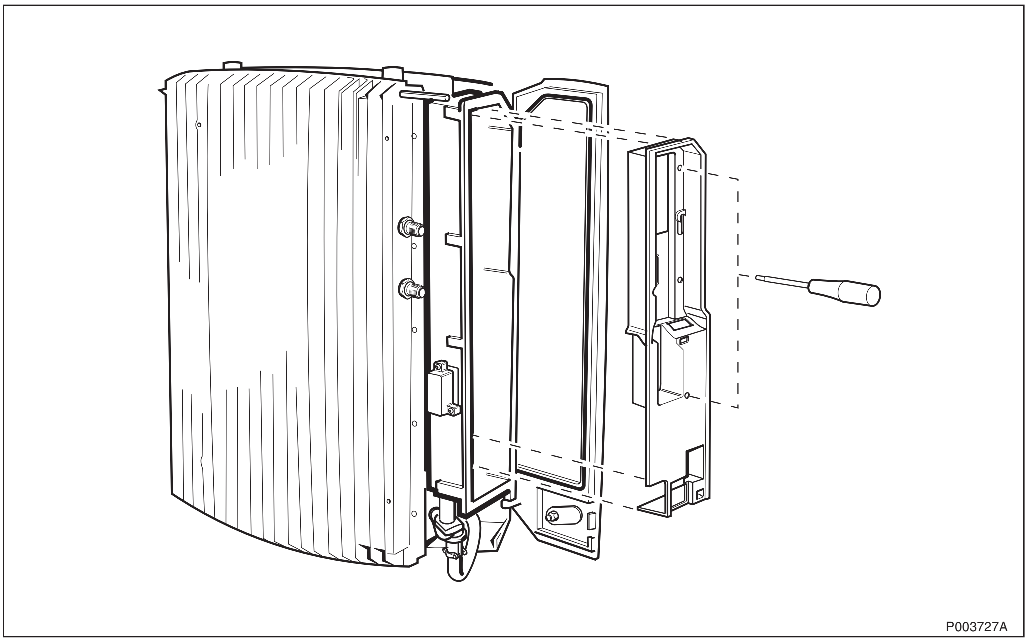


Figure 440 Removing the inner protective cover

5. Remove the inner protective cover by unscrewing the two torx screws.

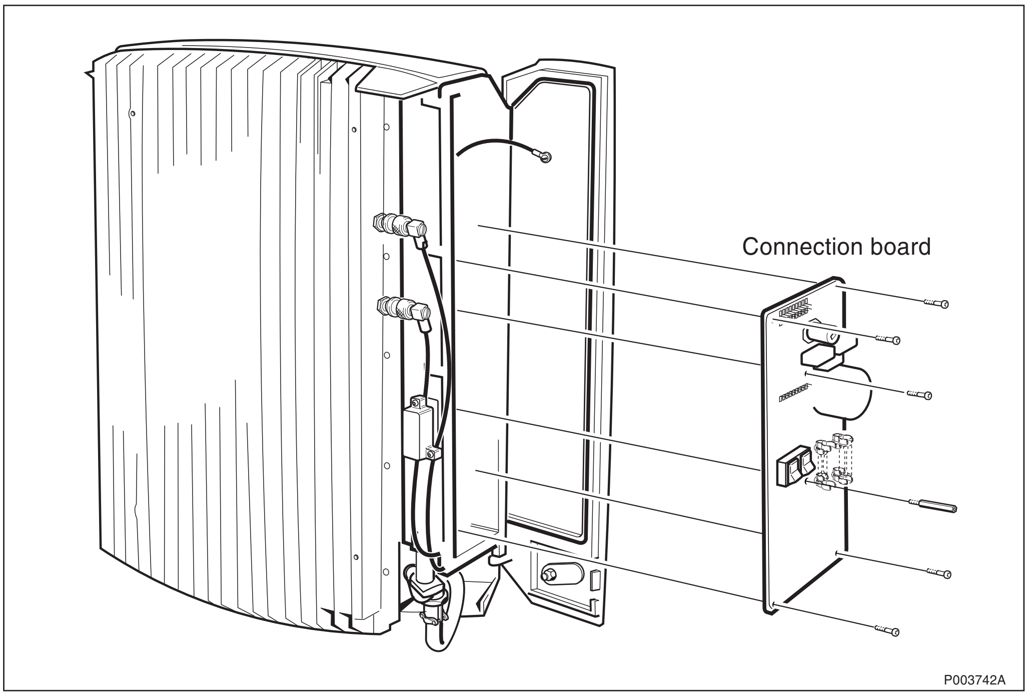


Figure 441 Removing the connection board

6. Unscrew the six screws and remove the connection board.
7. Mount the new board.
8. Make sure that the voltage selector is set for the correct voltage used at the site, and that appropriate fuses are mounted.
9. Mount the inner protective cover.
10. Reconnect the internal AC cable, the internal transmission cable and the TXL cable.

Note: Make sure that the correct end of the internal transmission cable is mounted to the cabinet.

11. Reconnect the transmission cable and the AC cable to the interface box.
12. Remount the outer protective cover.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.4.8 Transmission Board

Prior to replacement

1. Open the installation box door.
2. Set the RBS in Local Mode.
3. Switch the RBS battery switch to the OFF position.
4. Switch the RBS AC switch to the OFF position.
5. Switch the PBC battery switch to OFF position.
6. Switch the PBC AC switch to OFF position.
7. Switch off the AC Mains Power switch.

Replacing the transmission board

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

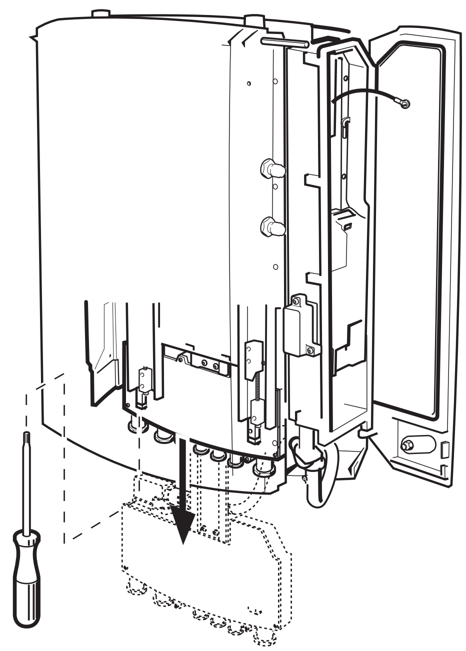


Figure 442 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

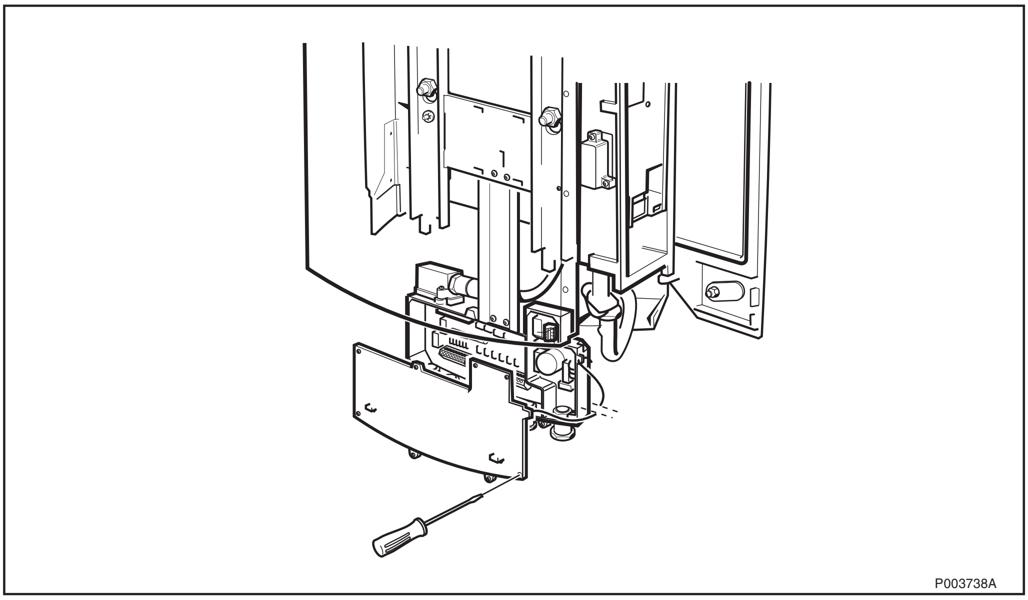


Figure 443 Loosening the interface box cover

2. Open the cover of the interface box by loosening the 8 torx screws.

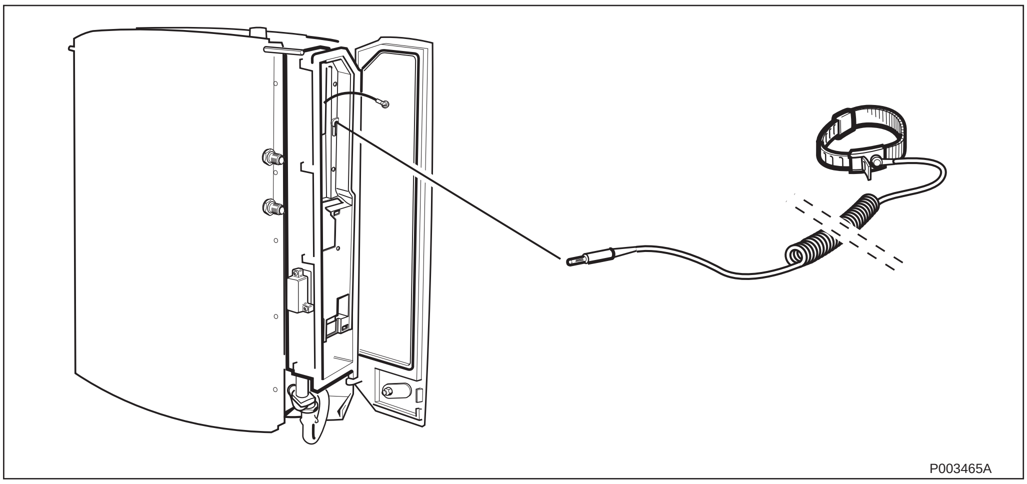


Figure 444 Connecting the ESD wrist strap

3. Connect the ESD wrist strap to the ESD connection point in the installation box.

Note: You have ten seconds to perform *step 4 on page 478*to maintain the PCM link between the BSC and the other RBS that are cascade connected. This step is only valid when the PCM B is used in a cascade connection.

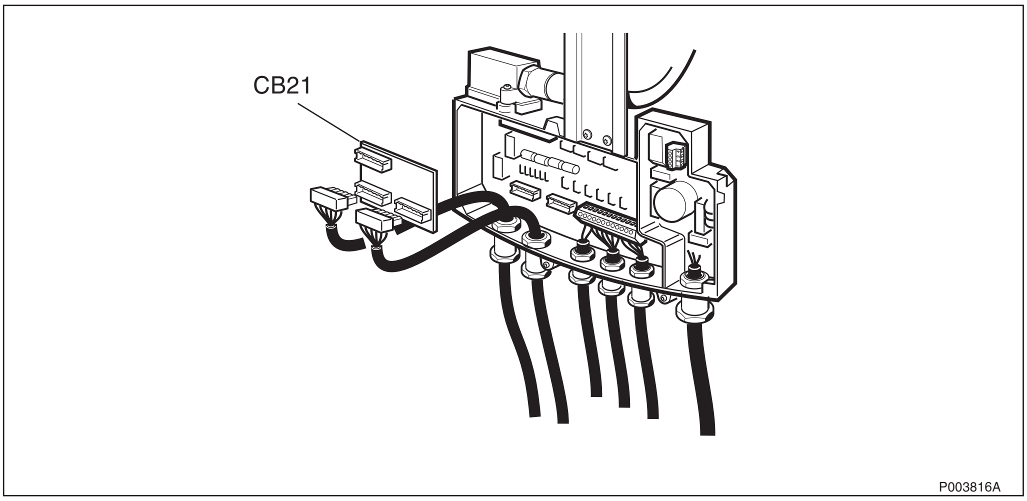


Figure 445 Mounting the CB21 connection board

4. Remove the connection terminal blocks for the PCM-lines and mount the connection board CB21 on the two PCM terminal blocks.
5. Remove all remaining connection terminal blocks connected, except for the AC terminal block.
6. Loosen the two screws holding the transmission connector located at the top left of the interface box.
7. Remove the connector.

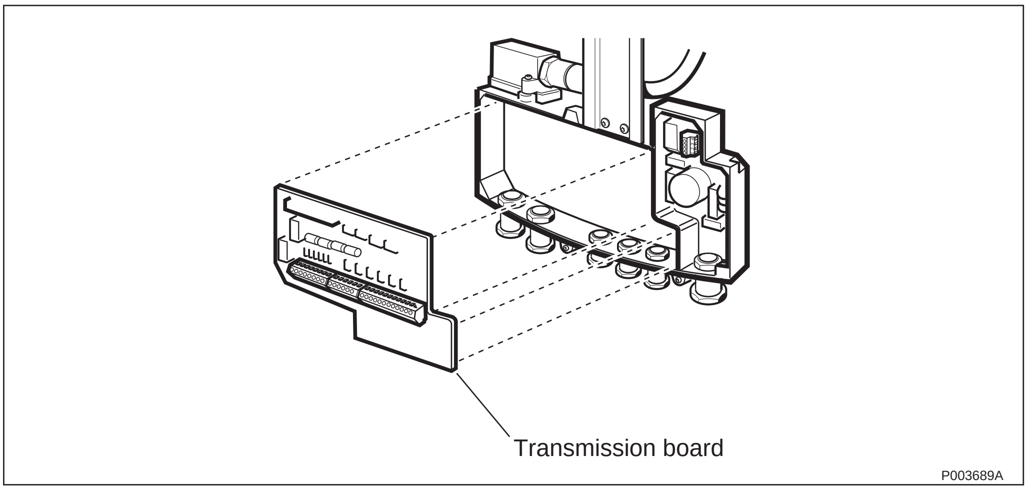


Figure 446 Loosening the transmission board

8. Unscrew all six screws holding the transmission board and remove the transmission board.
9. Mount the new transmission board and tighten the screws.
10. Connect the transmission connector located on top of the interface box, and tighten the screws.
11. Connect all the connection terminal blocks, except for the PCM lines.

Note: You have ten seconds to reinstall the PCM terminal blocks, *see step 12 on page 479*.

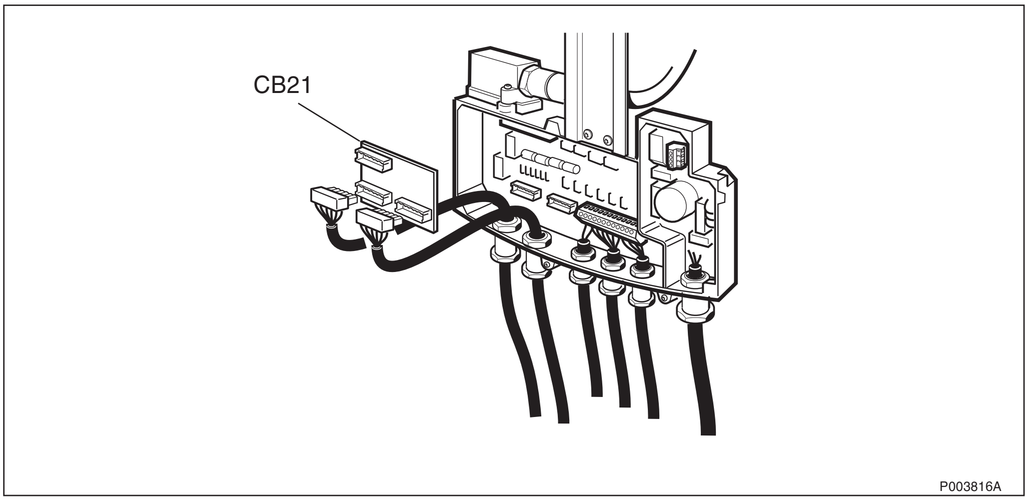


Figure 447 Dismounting the CB21 contact

12. Disconnect the connection board CB21 and remount the connection terminal block for the PCM line on the transmission board.
13. Remove the ESD wrist strap.
14. Remount the cover of the interface box and tighten the screws.
15. Push up the interface box and secure it in the upper position with the two torx screws.

Set to Operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.4.9 AC Board

Prior to Replacement

1. Open the installation box door.
2. Set the RBS in Local Mode.

3. Switch the RBS battery switch to the OFF position.
4. Switch the RBS AC switch to the OFF position.
5. Switch the PBC battery switch to OFF position.
6. Switch the PBC AC switch to OFF position.
7. Switch off the AC Mains Power switch.

Replacing the AC board

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

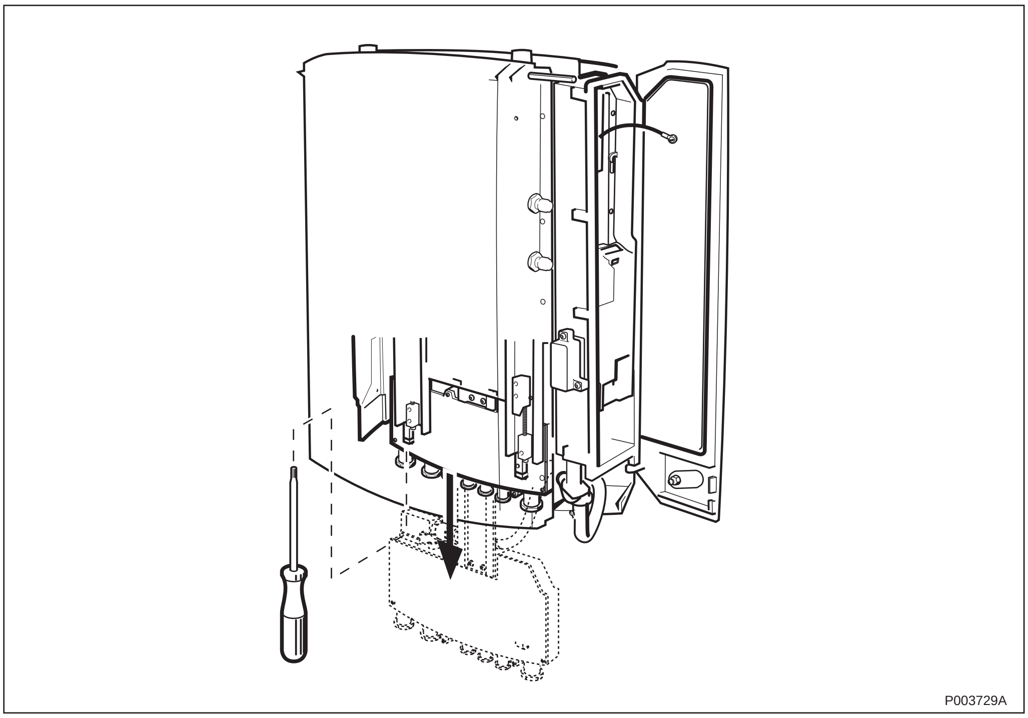


Figure 448 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

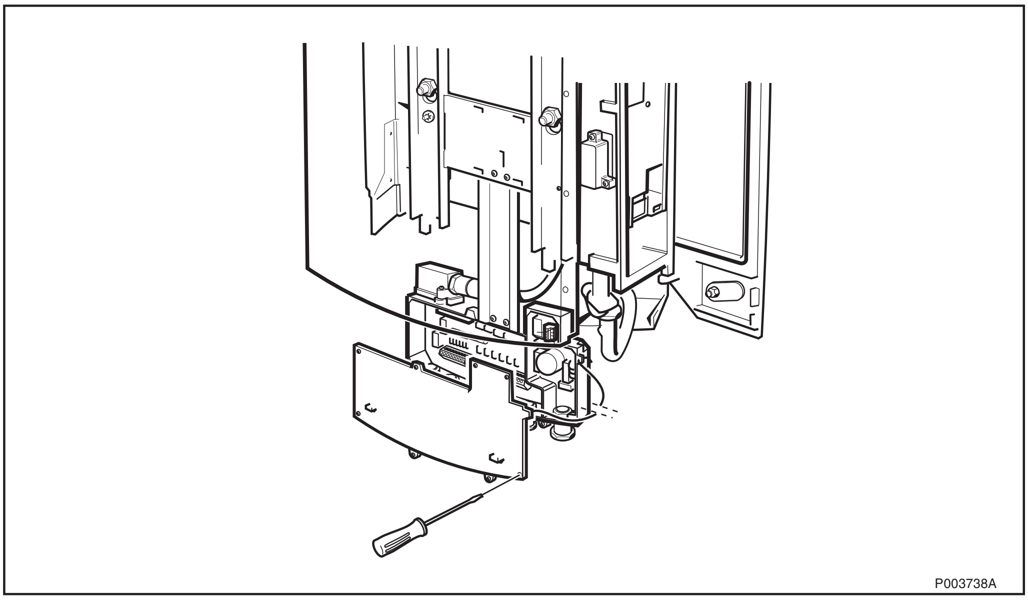


Figure 449 Loosening the interface box cover

2. Open the cover of the interface box by loosening the 8 torx screws.

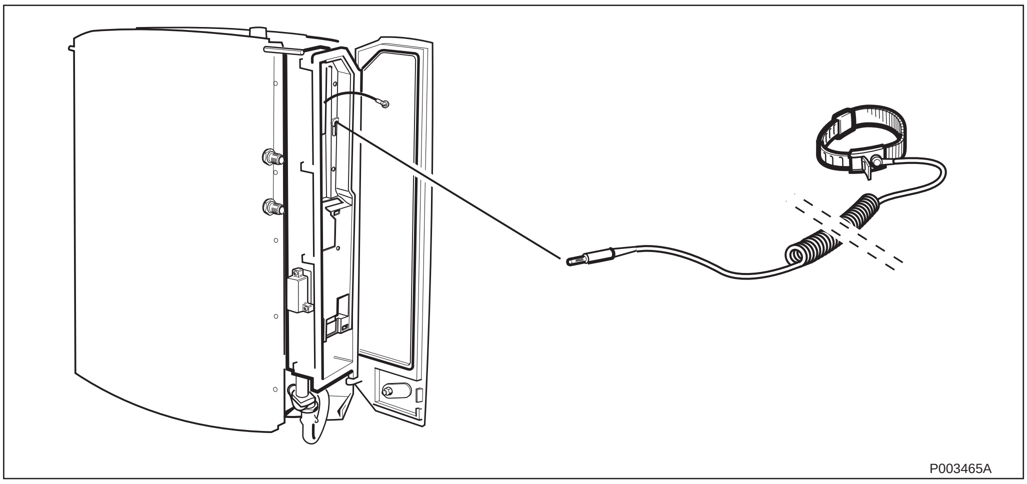


Figure 450 Connecting the ESD wrist strap

3. Connect the ESD wrist strap to the ESD connection point in the installation box.
4. Remove the pull-relief clamp of the incoming AC cable.
5. Remove the connection terminal blocks connected to the AC board.

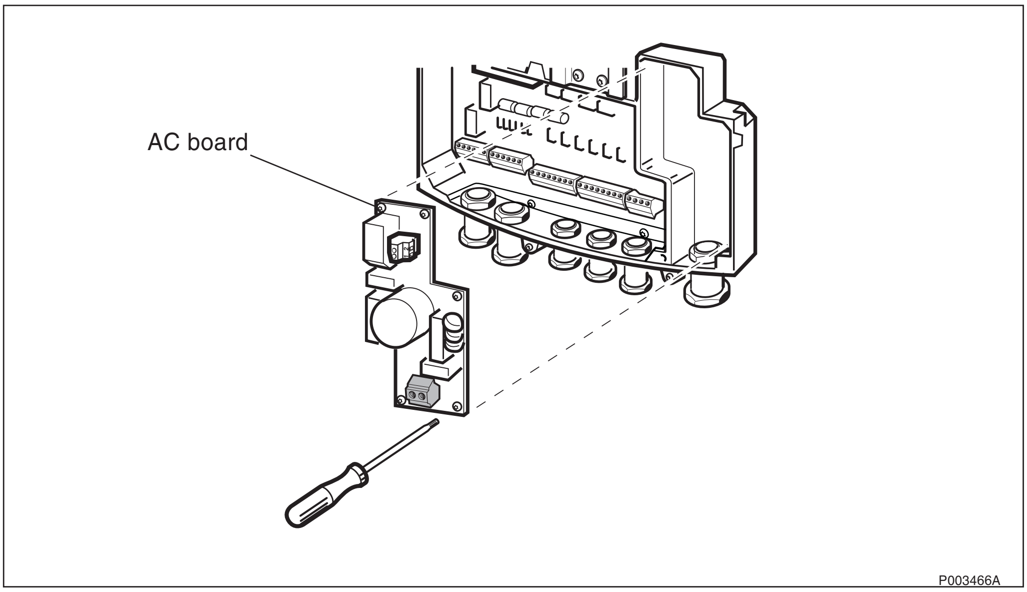


Figure 451 Removing the AC board

6. Unscrew the six torx screws holding the AC board and remove the AC board.
7. Replace the AC board and remount the six screws, including the Protective Earth. Tighten the screws.
8. Remount the two AC connection terminal blocks.
9. Remount the pull-relief clamp of the incoming AC cable.
10. Remove the ESD wrist strap.
11. Remount the cover of the interface box and tighten the screws.
12. Push up the interface box and secure it in the upper position with the two torx screws.

Set to Operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.4.10 Mounting Base

Prior to Replacement

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.
4. Switch the RBS battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the mounting base

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

1. Remove the sunshields.
2. Remove the radio cabinet, *see page 462*.

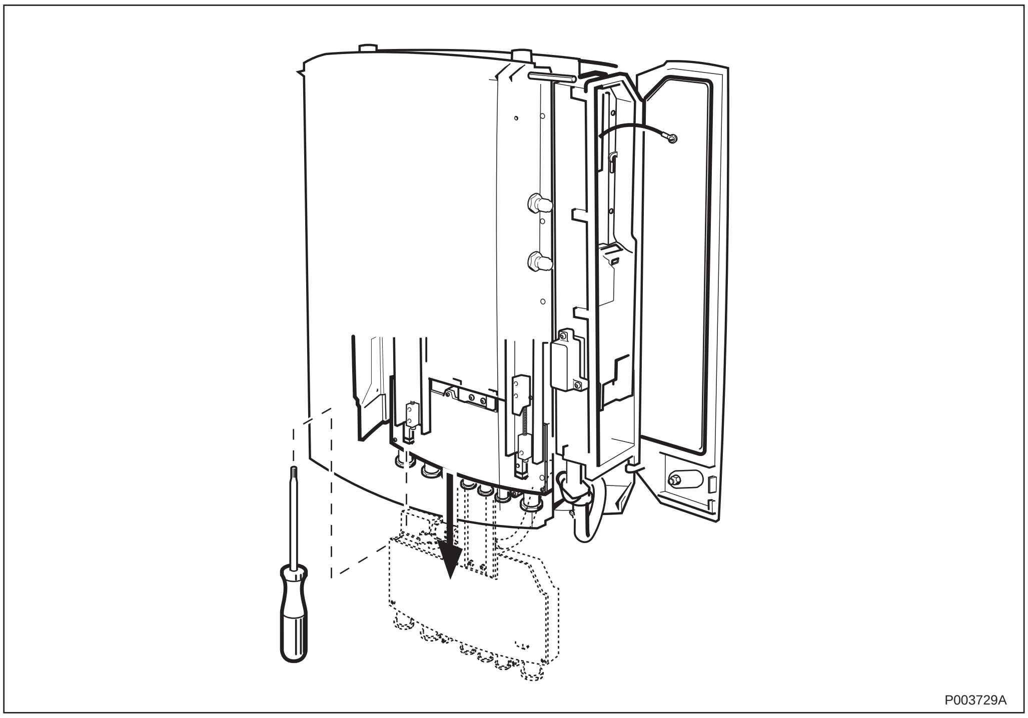


Figure 452 Loosening the interface box

3. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.
4. Open the cover of the interface box by loosening the 8 torx screws.

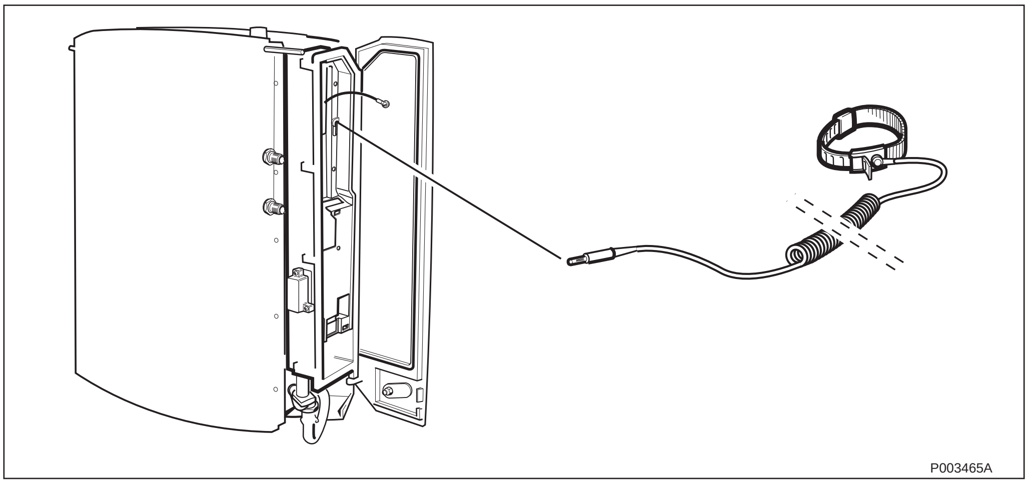


Figure 453 Connecting the ESD wrist strap

5. Connect the ESD wrist strap to the ESD connection point in the installation box.

Note: You have ten seconds to perform *step 6 on page 485*to maintain the PCM link between the BSC and the other RBS that are cascade connected. This step is only valid when the PCM B is used in a cascade connection.

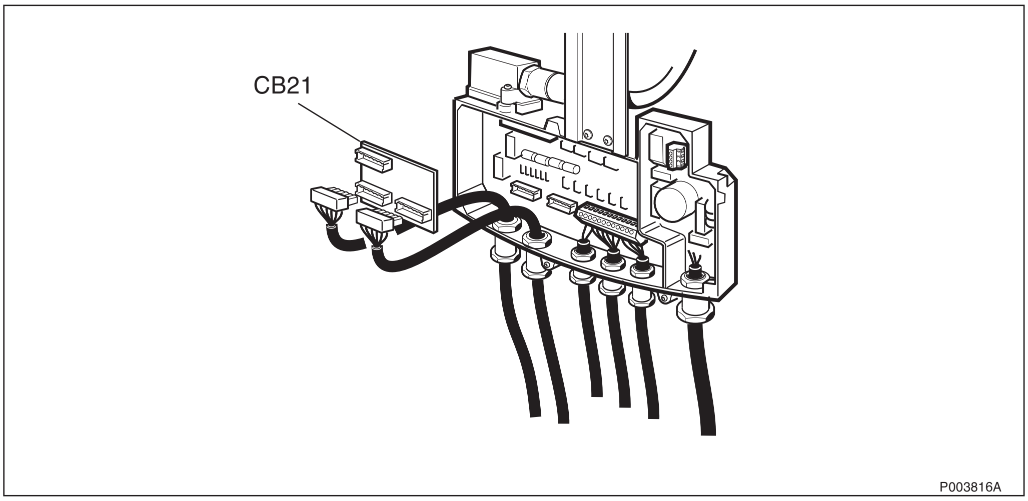


Figure 454 Mounting the CB21 connection board

6. Remove the connection terminal blocks for the PCM-lines and mount the connection board CB21 on the two PCM terminal blocks.

7. Remove all remaining terminal blocks, including the AC terminal block.

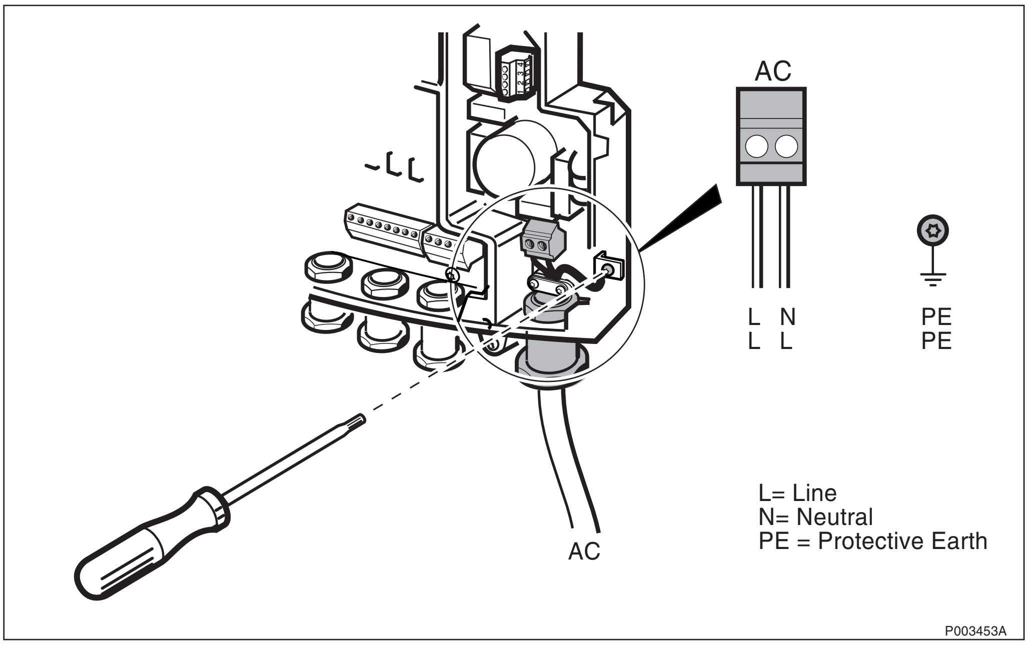


Figure 455 Loosening the Protective Earth in the AC section of the interface box

8. Loosen the Protective Earth in the AC section of the interface box.

9. Loosen the two screws on the AC pull-relief clamp.

10. Dismount the cable gland.

11. Pull out the AC cable.

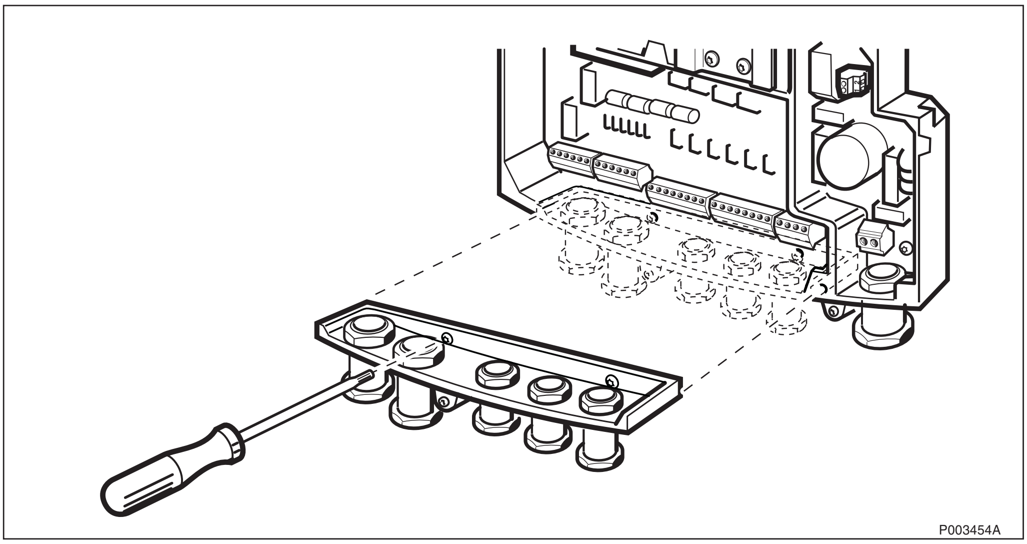


Figure 456 Loosening the gland plate

12. Remove the gland plate by loosening the two torx screws.

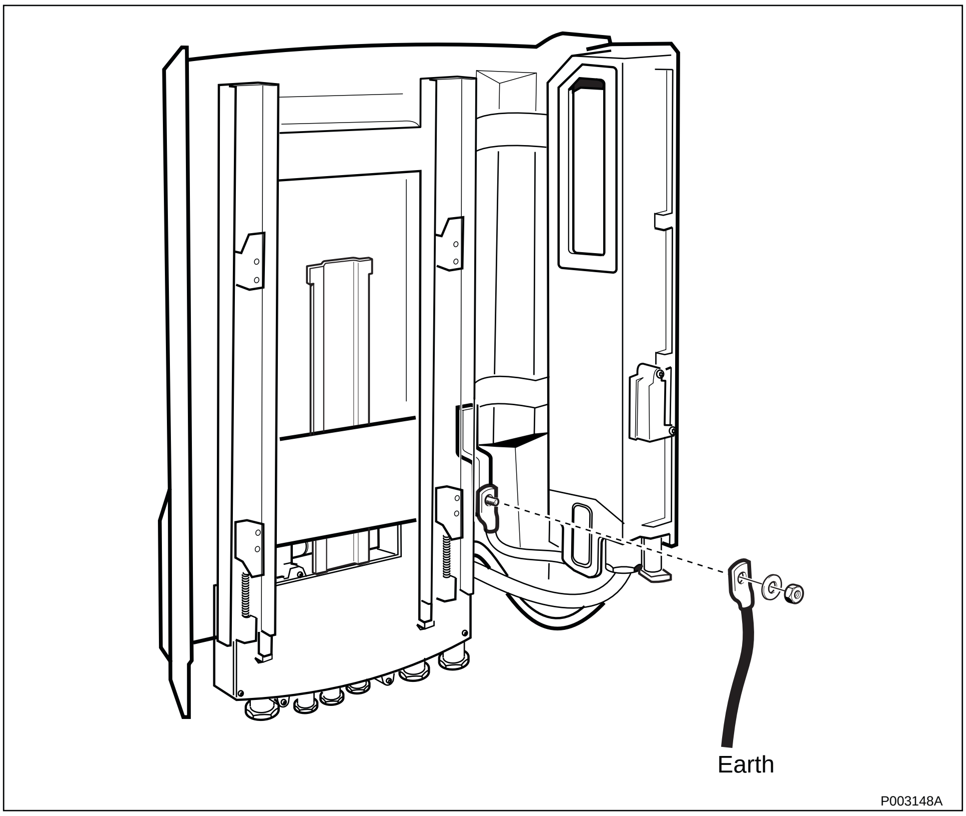


Figure 457 Remove the Earth Cable

13. Remove the earth cable on the mounting base.
14. Loosen the four nuts securing the mounting base.
15. Lift up the mounting base and pull it away from the wall bracket.
16. Place the mounting base on the ground.

17. Loosen the gland plate of the new cabinet by loosening the two torx screws.
18. Mount the new mounting base on the mounting plate.
19. Tighten the four nuts holding the mounting base.
20. Reconnect the earth cable to the mounting base.
21. Mount the old gland plate.
22. Insert the AC cable and connect the Protective Earth.

Note: You have ten seconds to reinstall the PCM terminal blocks, *see step 23 on page 487*.

23. Disconnect the connection board CB21 and remount the connection terminal blocks for the PCM line on the transmission board.
24. Remount the remaining connection terminal blocks.
25. Remount the cover of the interface box and tighten the screws.
26. Push up the interface box and secure it in the upper position with the two torx screws.
27. To remount the cabinet on the mounting base, *see chapter Installation of RBS 2302*.

Set to Operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC Battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the Battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Perform a MS test call to verify the function, *see chapter Optional Tests*.
2. Follow the instructions in *chapter RBS Site Integration, section Connecting the RBS from the BSC* and *section Test Calls on Air Interface* .
3. Perform the checklist in *Section 13.10 on page 555*.

13.4.11 Internal Synchronization (Calibrate Oscillator)

Fault Localization

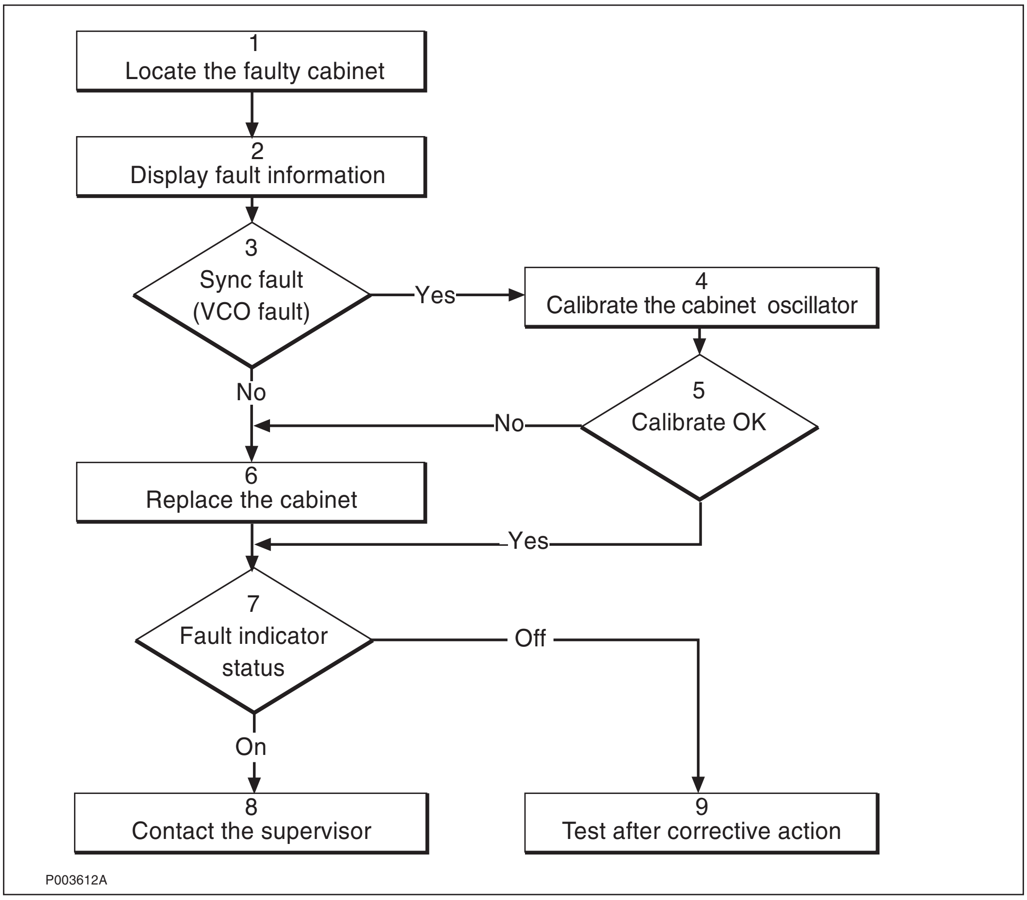


Figure 458 Internal Synchronization fault localization

1. Locate the faulty Radio cabinet

   Locate the faulty Radio cabinet according to the work order information.

2. Display fault information

   The fault status of RBS can be determined in two ways:

   •The red LED indicator labelled *Fault* on the DP, indicates that one or more faults have been detected in the radio cabinet.

   •Use OMT to display faults in the RBS. Use OMT to monitor the radio cabinet. For more information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

3. Sync Fault

   Is the alarm ”Timing Unit VCO ageing” in the internal fault map class 2A or “Timing unit VCO fault” in the internal map class 1A?

4. Calibrate the cabinet oscillator

Calibrate the optional reference oscillator according to instructions in *Section 13.7.6 on page 552*.

5. Replace the Cabinet

   Replace the radio cabinet according to instruction in *page 462*.

6. Calibration OK

   Is the calibration OK?

7. Fault indicator status

   The red LED indicator labelled *Fault* on the DP, indicates that one or more faults have been detected within the radio cabinet.

8. Contact the supervisor

   Contact the supervisor or manager who will take further action, such as consulting the FSC.

9. Test after corrective action

   Perform the recommended tests.

Replacing the cabinet

For information on how to replace the cabinet, *see page 462*.

Test after corrective action

1. If the calibration of the optional reference oscillator has been done, follow the instructions in *chapter RBS Site Integration, section Connecting the RBS from the BSC* and *section Test Calls on Air Interface*.

2. If the cabinet has been replaced, make an MS test call to verify the radio cabinet, *See chapter Optional Tests* and also follow the instructions in *chapter RBS Site Integration, section Connecting the RBS from the BSC* and *section Test Calls on Air Interface*.

3. Perform the checklist in *Section 13.10 on page 555*.

13.5 Corrective Action for the PBC

13.5.1 Sunshields

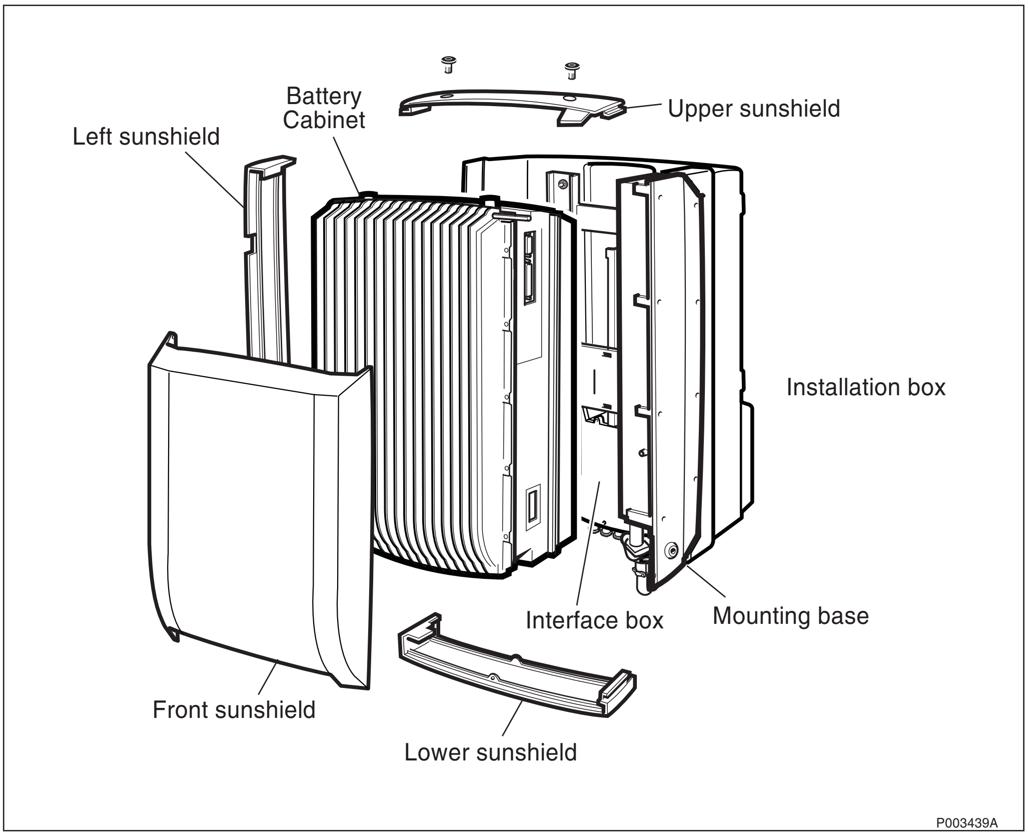


Figure 459 Sunshields overview

Replacing the front sunshield

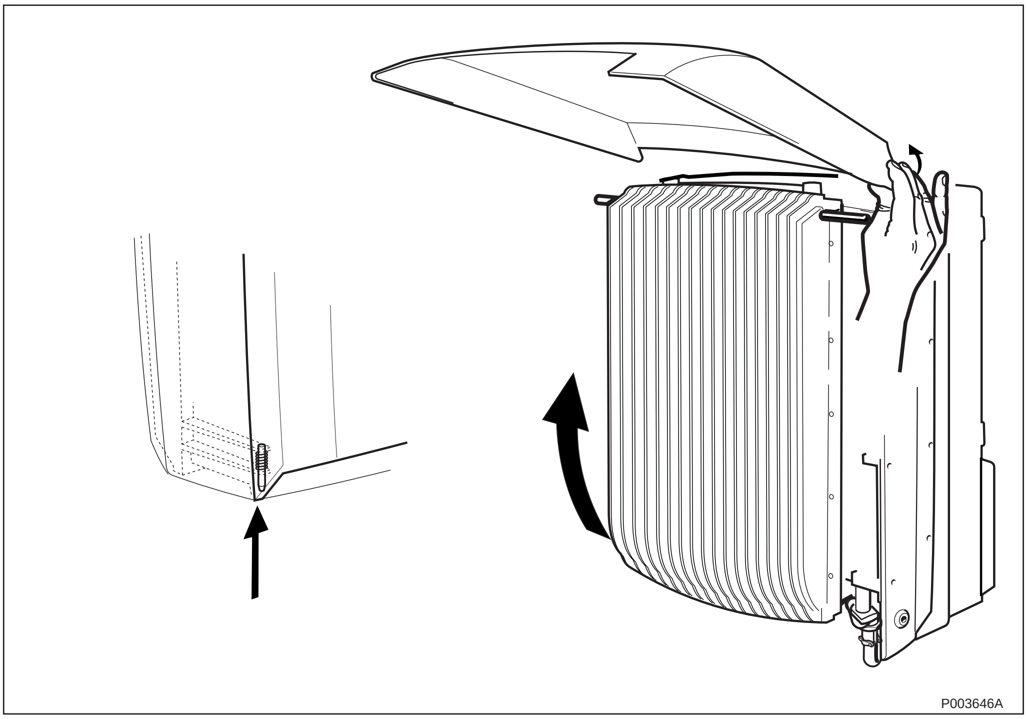


Figure 460 Replacing the front sunshield

1. Open the installation box door.
2. Push up the spring locking pin, located in the lower left hand corner.
3. Pull out the lower part of the cover.
4. Carefully bend out the sides at the top of the cover, so that the hinge snaps off and the cover can be removed.
5. Mount the new front sunshield.
6. Carefully bend out the sides on the top, so they can snap on to the hinge.
7. Fold down the cover.

Note: Make sure that no cables are bent or squeezed.

8. Press the lower left hand corner towards the battery cabinet, so that the spring locking pin snaps into position.
9. Close the installation box door.

Replacing the lower sunshield

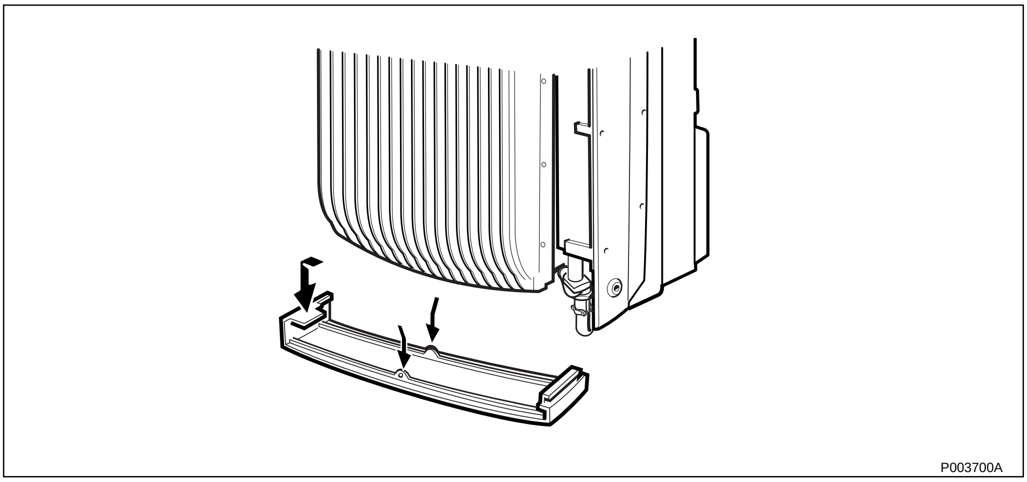


Figure 461 Replacing the lower sunshield

1. Open the installation box door.
2. Unsnap the sunshield by pressing the fasteners, located on the middle on the sunshield.
3. Pull the sunshield down and unhook it.
4. Mount the new sunshield in its cut-out in the left side of the PBC.
5. Snap the sunshield into position.
6. Close the installation box door.

Replacing the left sunshield

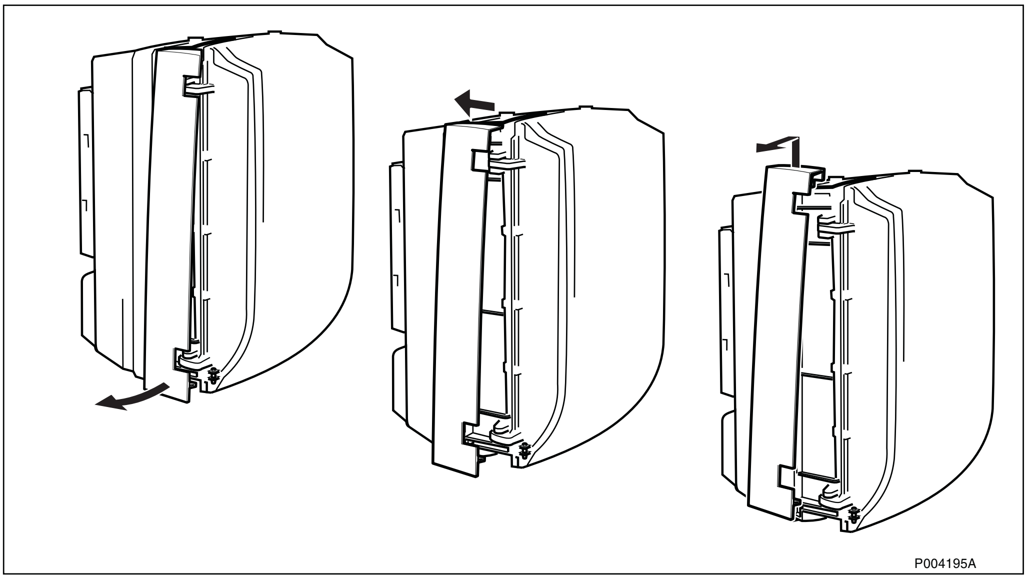


Figure 462 Replacing the left sunshield

1. Open the installation box door.
2. Remove the lower sunshield.

3. Unsnap the lower part of the left sunshield, push it back so that it clears from the hinges and unhook the sunshield from the PBC.
4. Mount the new left sunshield.
5. Mount the lower sunshield.
6. Close the installation box door.

Replacing the upper sunshield

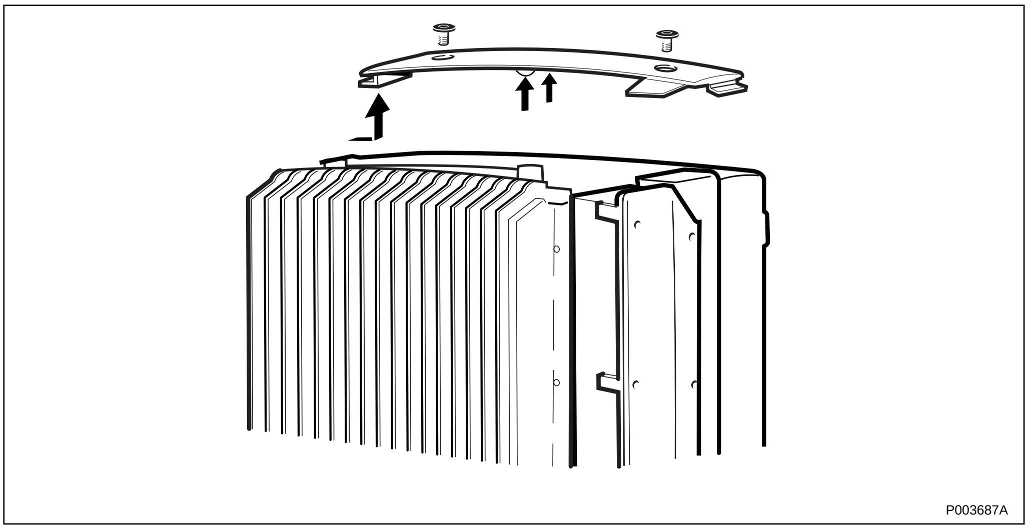


Figure 463 Replacing the upper sunshield

1. Open the installation box door.
2. Remove the screwplugs.
3. Unsnap the upper sunshield, by pressing on the middle.
4. Pull the sunshield up and to the right, and remove it.
5. Mount the new sunshield.
6. Seal the two holes with the screwplugs.
7. Close the installation box door.

Replacing the rear sunshield

Note: To replace the rear sunshield, the PBC must first be placed on the ground.

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.

7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.
9. Remove the PBC sunshields (front, lower, left and upper).
10. Remove the cabinet, *see page 508*.

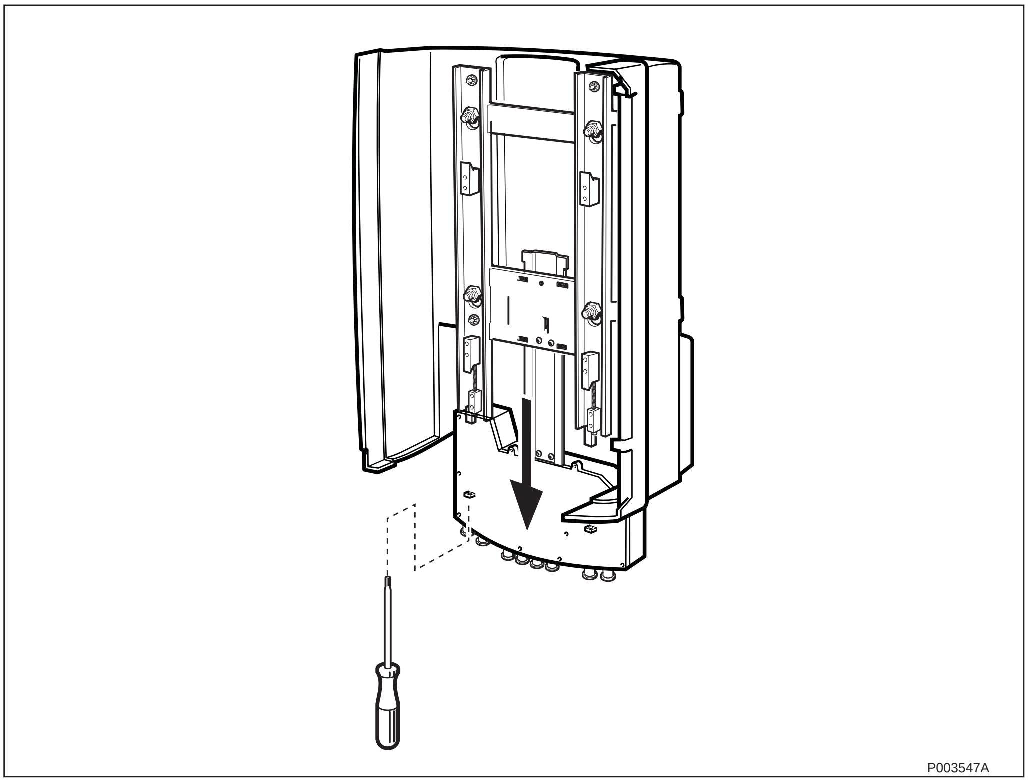


Figure 464 Releasing the interface box

11. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

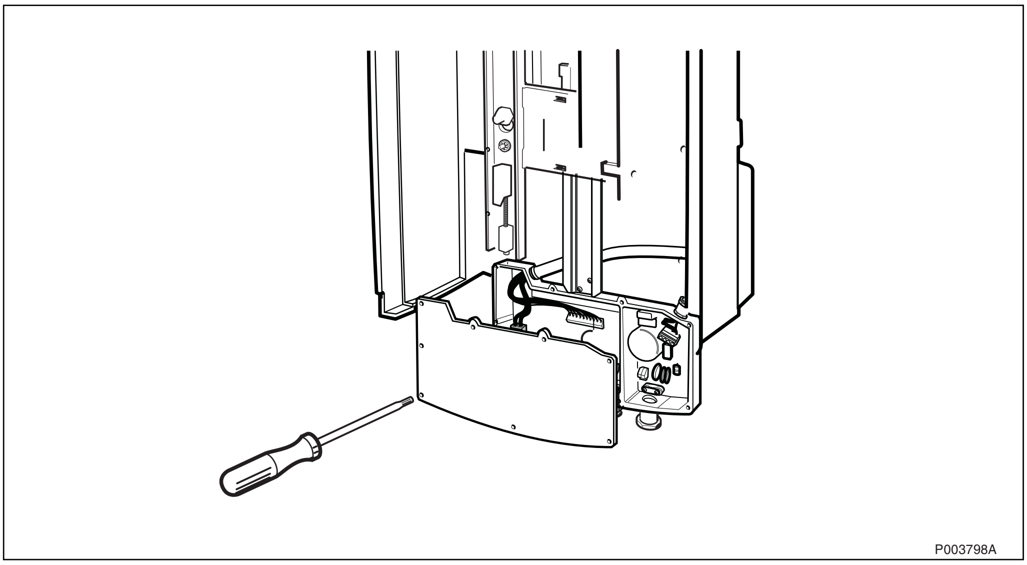


Figure 465 Loosening the interface box cover

12. Open the cover of the interface box by removing the 9 torx screws.
13. Remove all connection terminal blocks.
14. Loosen the Protective Earth in the AC section of the interface box.
15. Loosen the two screws on the AC pull-relief clamp.
16. Dismount the cable gland.
17. Pull out the AC cable.

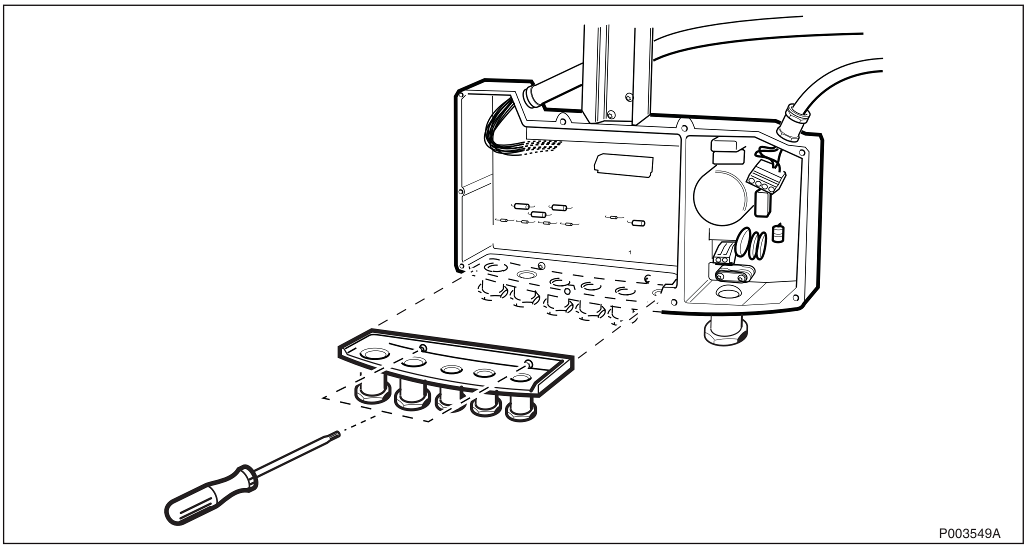


Figure 466 Loosening the gland plate

18. Loosen and remove the gland plate by unscrewing the two torx screws.

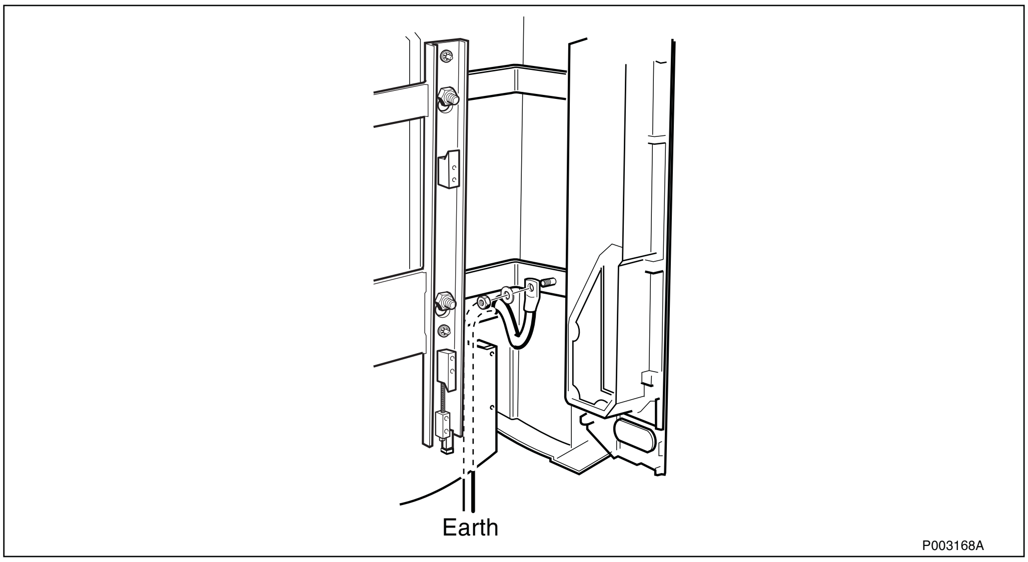


Figure 467 Removing the earth cable

19. Remove the earth cable on the mounting base.
20. Loosen the four nuts securing the mounting base.
21. Lift up the mounting base and pull it away from the wall bracket.

22. Place the mounting base on the ground.

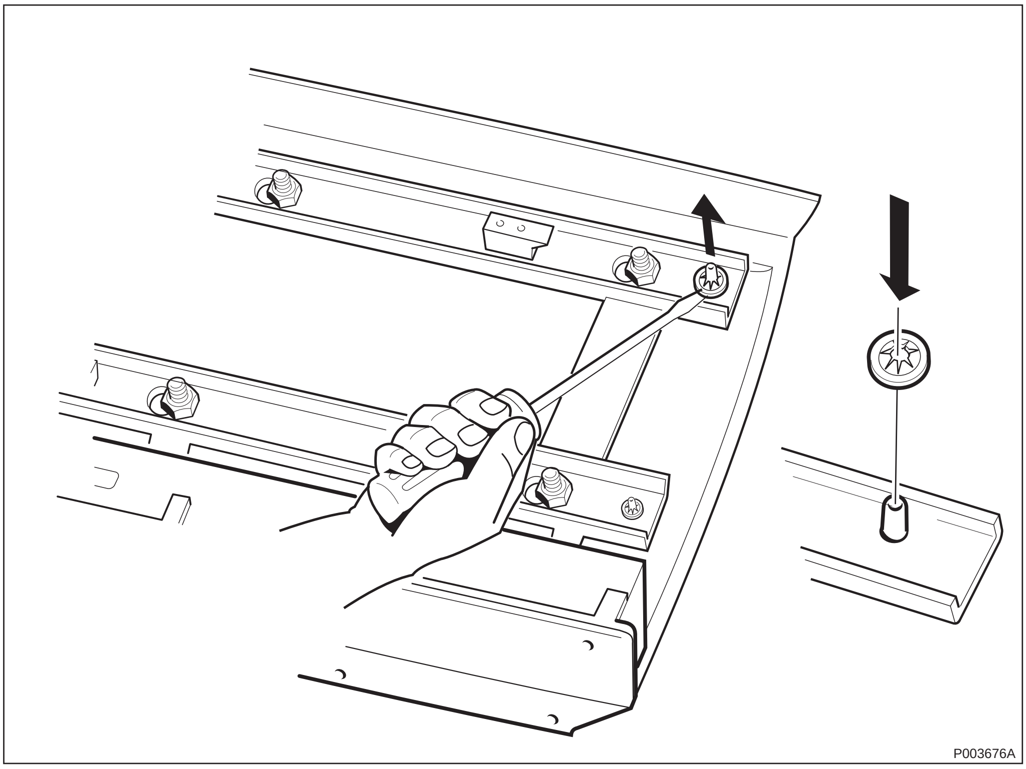


Figure 468 Removing locking washers

23. Remove the four locking washers with a screwdriver.
24. Separate the rear sunshield from the mounting base.
25. Mount the new rear sunshield and the new locking washers.
26. Remount the mounting base on the mounting plate.
27. Tighten the four nuts holding the mounting base.
28. Reconnect the earth cable to the PBC mounting base.
29. Mount the gland plate and fasten the screws.
30. Insert the AC cable and connect the Protective Earth.
31. Mount the AC cable gland.
32. Remount the remaining connection terminal blocks.
33. Remount the cover of the interface box and tighten the screws.
34. Push up the interface box and secure it in the upper position with the two torx screws.
35. To remount the cabinet on the mounting base, *see chapter Installation of Power and Battery cabinet*.
36. Remount the batteries according to *page 503*.

Set to Operation

1. Turn the AC Mains Power switch to ON position.

2. Switch the PBC AC switch to ON position.
3. Switch the PBC Battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the Battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.5.2 Batteries

Removing the batteries

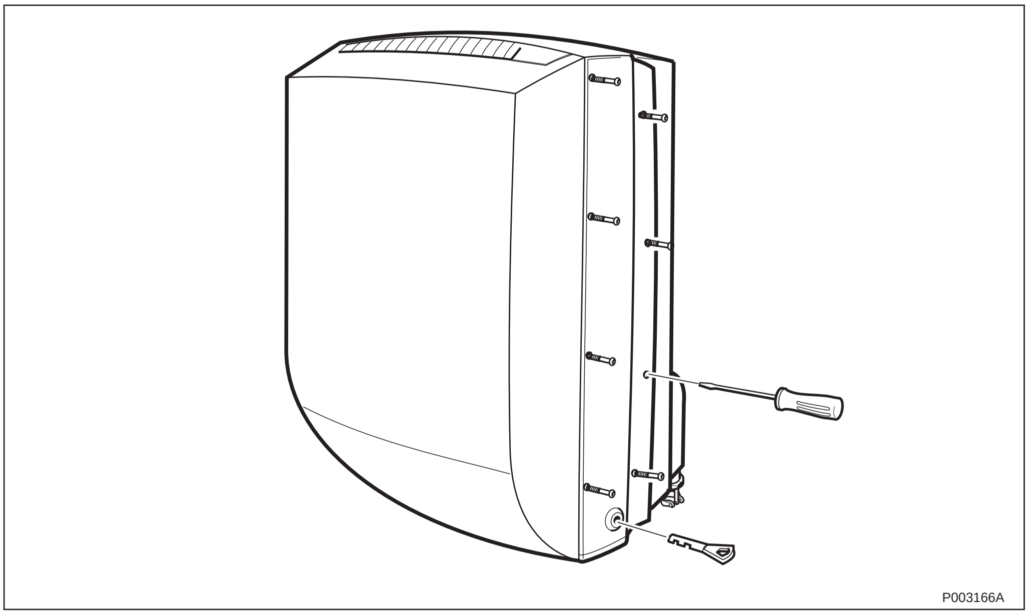


Figure 469 Opening the installation box door

1. Open the installation box door.

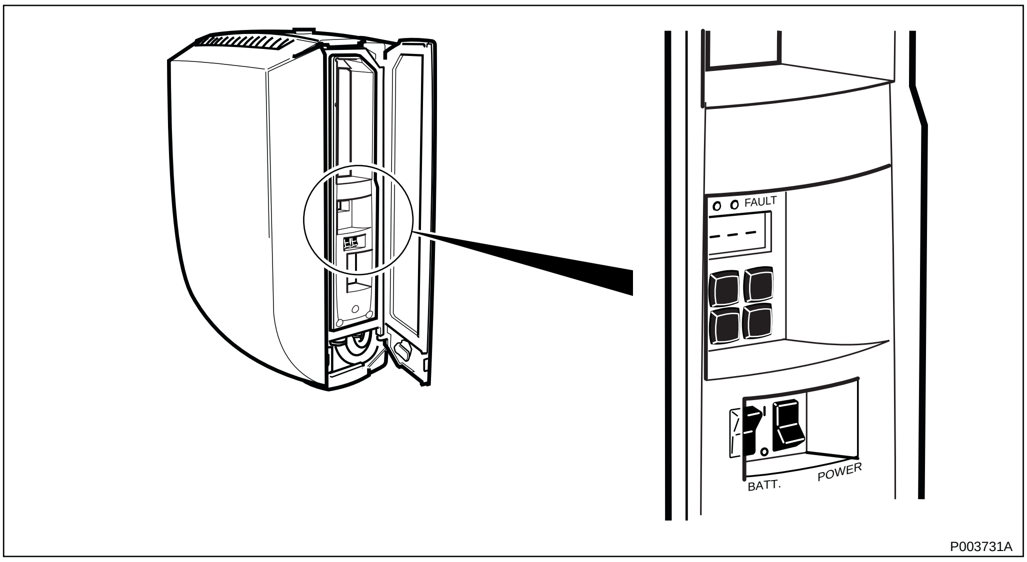


Figure 470 Battery switch

2. Switch off the battery switch.
3. Remove the front sunshield.

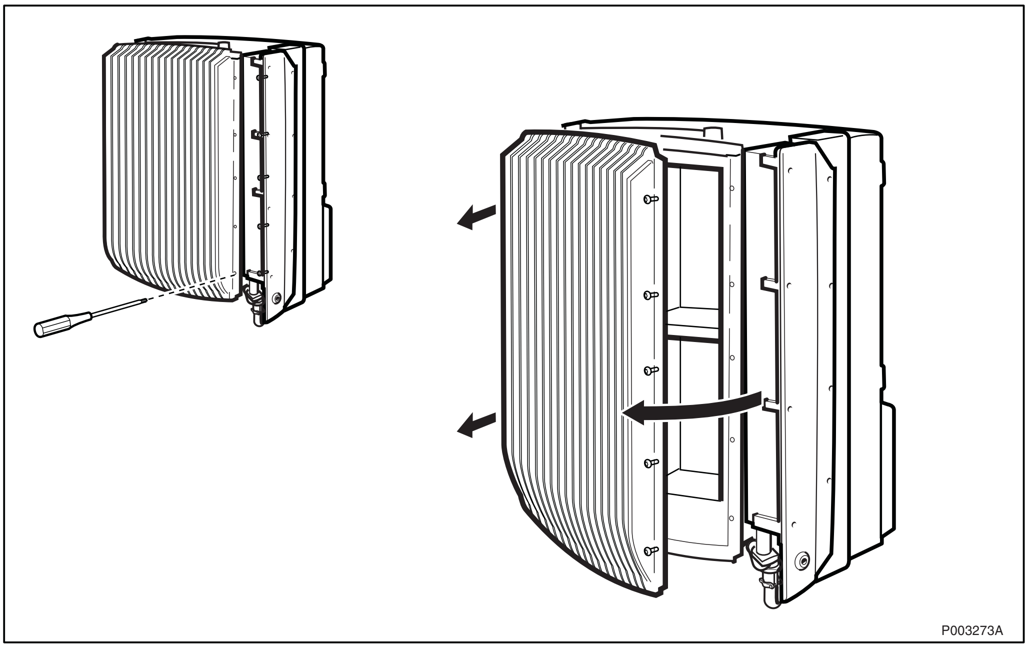


Figure 471 Opening the Battery cabinet door

4. Open the Battery cabinet door by unscrewing the 18 torx screws. Make sure that the screws are disengaged.

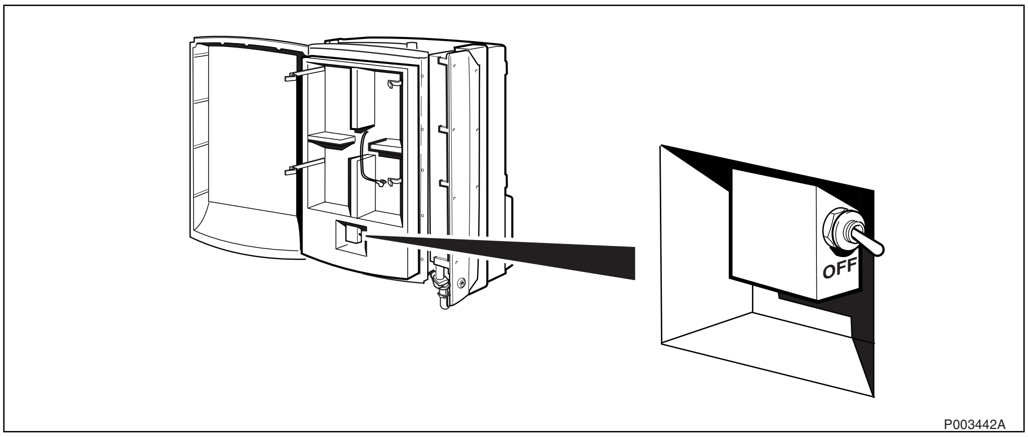


Figure 472 Automatic circuit breaker

5. Switch off the automatic circuit breaker.

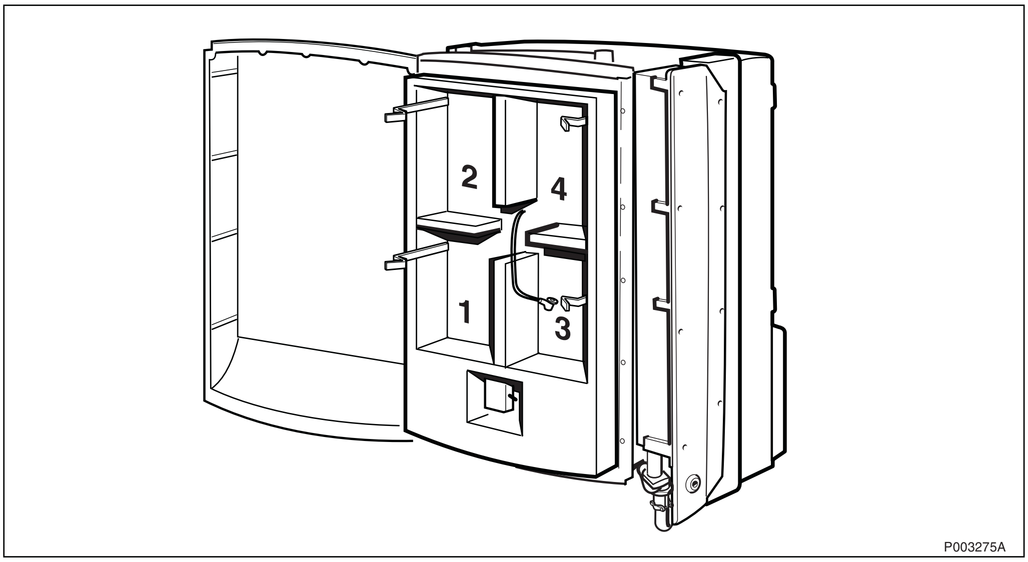


Figure 473 Battery position overview

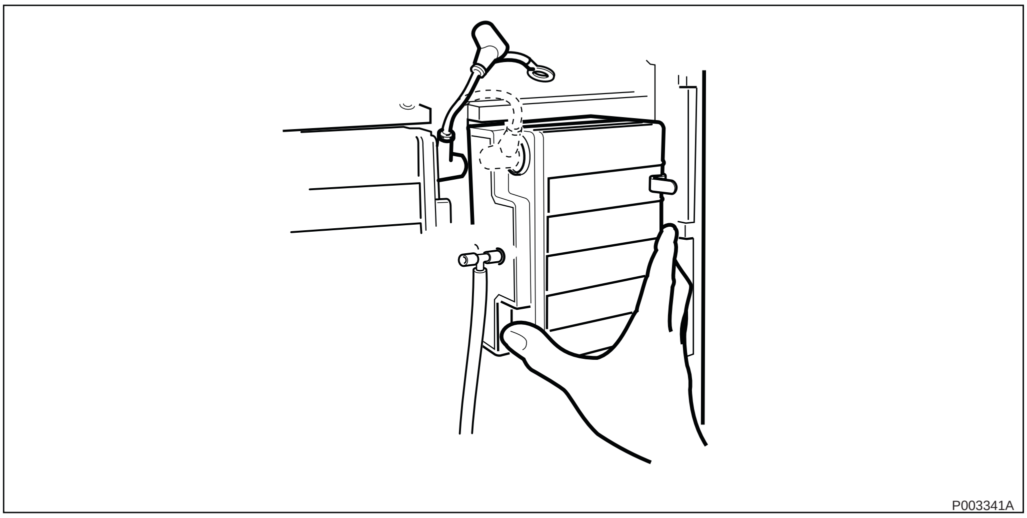


Figure 474 Disconnecting the plus-pole (+) of battery 4

6. Disconnect the battery jumper cable on the plus-pole (+) of battery 4.

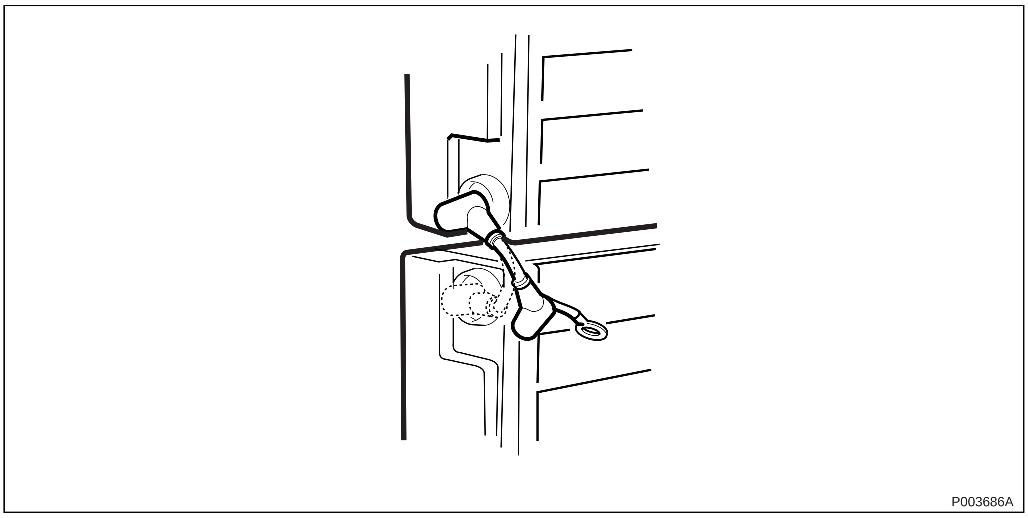


Figure 475 Disconnecting the plus-pole (+) of battery 3

7. Disconnect the battery jumper cable on the plus-pole (+) of battery 3, and remove battery 4.

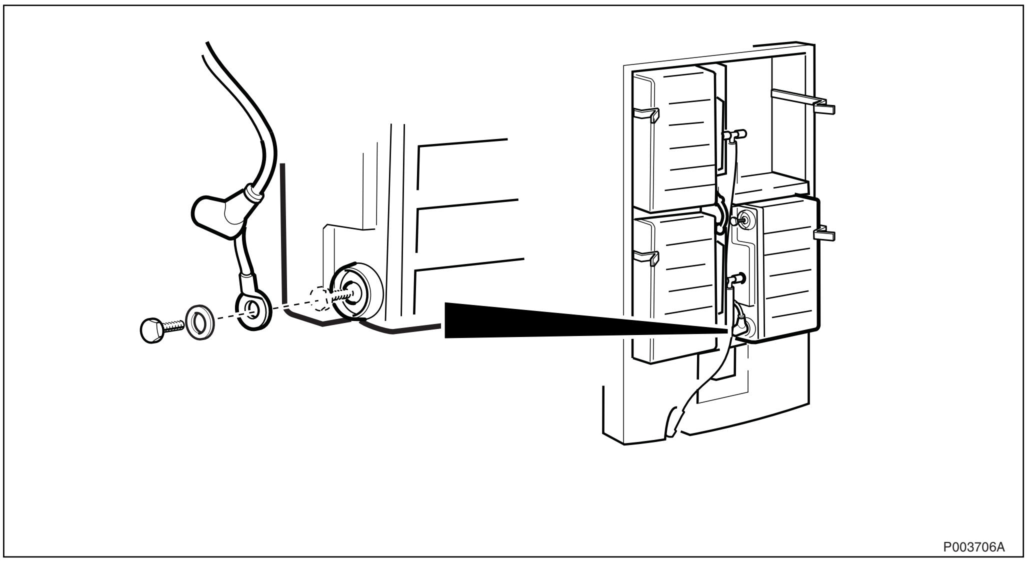


Figure 476 Disconnecting the minus-pole (-) of battery 3

8. Disconnect the minus-pole (-) of battery 3, and remove the battery.

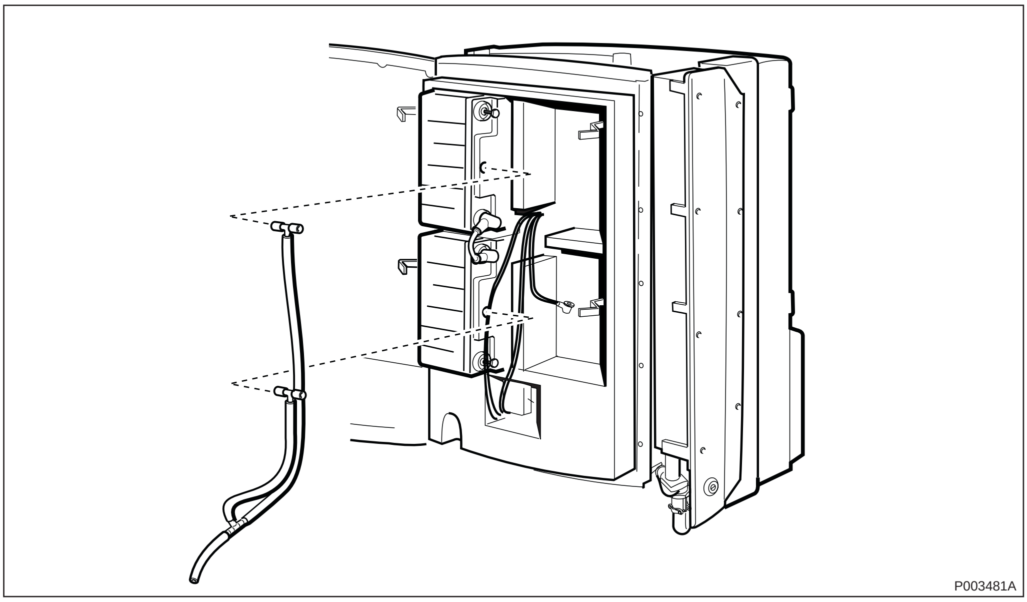


Figure 477 Removing the ventilation hoses

9. Remove the ventilation hoses from battery 1 and 2.

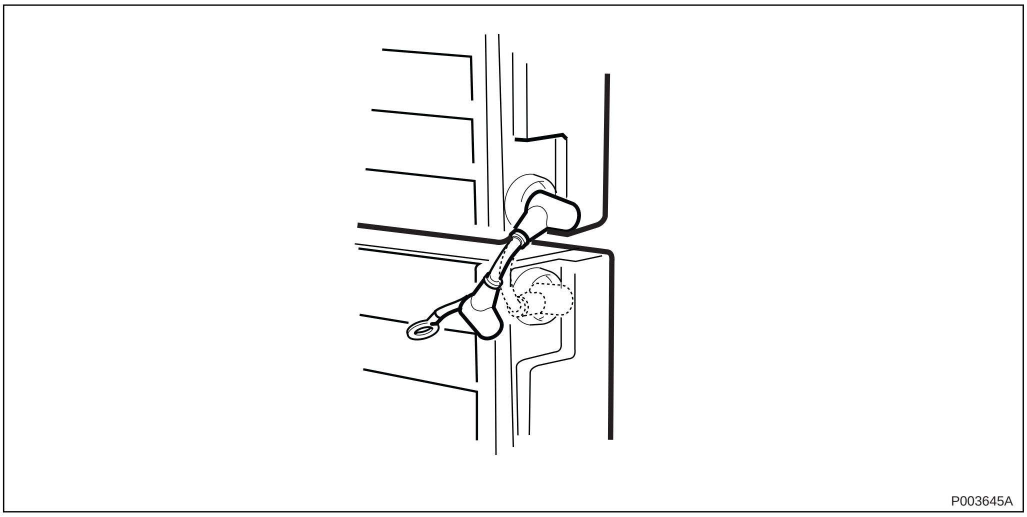


Figure 478 Disconnecting the minus-pole (-) on battery 1

10. Disconnect the battery jumper cable on the minus-pole (-) of battery 1, and remove battery 2.

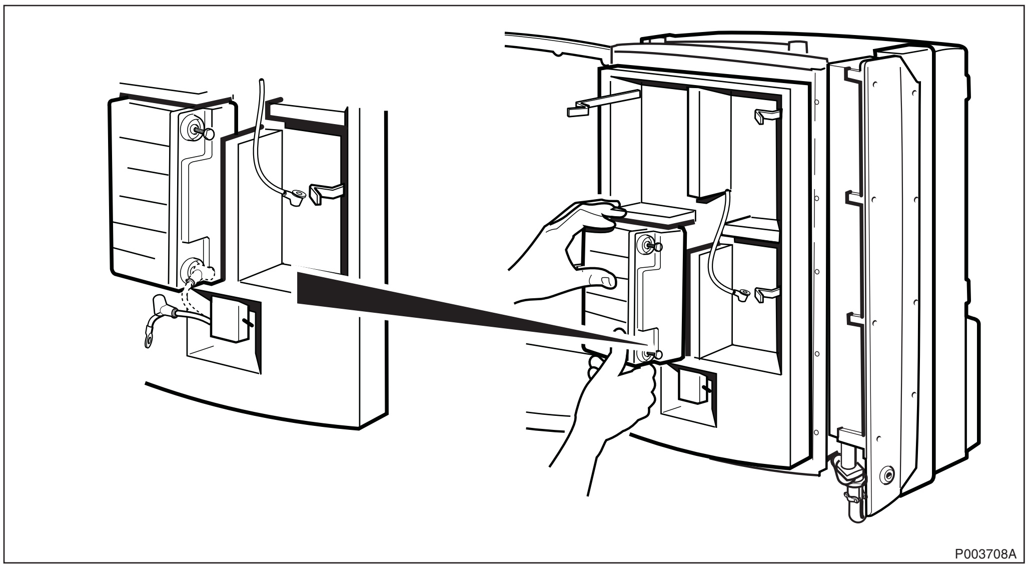


Figure 479 Disconnecting the plus-pole (+) of battery 1

11. Disconnect the plus-pole (+) of battery 1, and remove the battery.

Preparations before Installation

Note: Make sure that the cable lugs are properly mounted. If mounted incorrectly, the lugs may break.

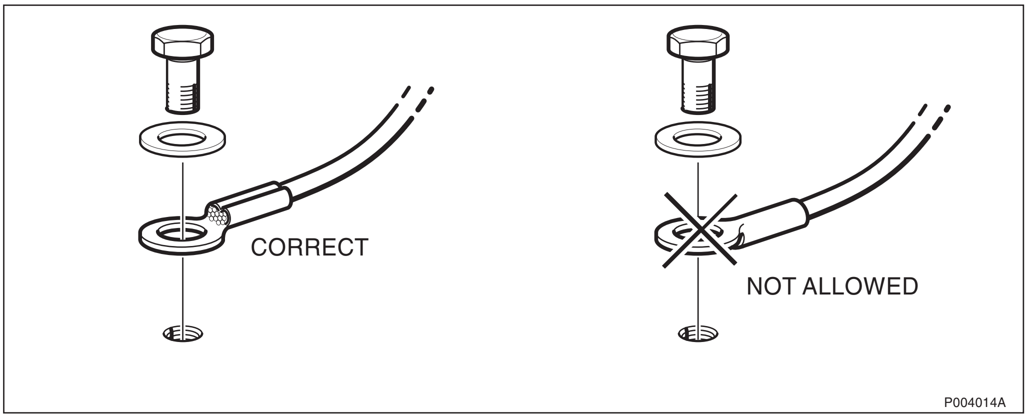


Figure 480 Connecting cable lugs to batteries

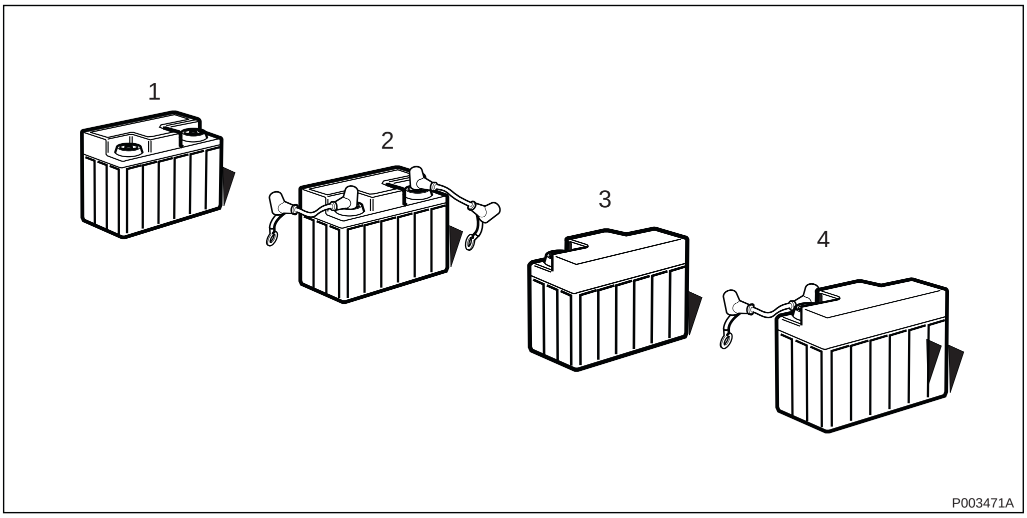


Figure 481 Battery jumper configuration

Move over all battery jumper cables from the old batteries to the new batteries, so the new set of batteries are configured in exactly the same way the old set of batteries was configured.

Note: Remove the precut tape covering the inlet to the ventilations hose on all batteries.

For safety purposes, ensure that the protective cover is put back on the battery pole after each new battery is connected.

Installing the batteries

Note: It is recommended to replace *all four* batteries with new batteries at the same occasion.

Batteries must comply with the product specification *1301–BKC 861* available from the local Ericsson company. Also ensure that the lifetime of the new battery will not expire within the chosen maintenance period.

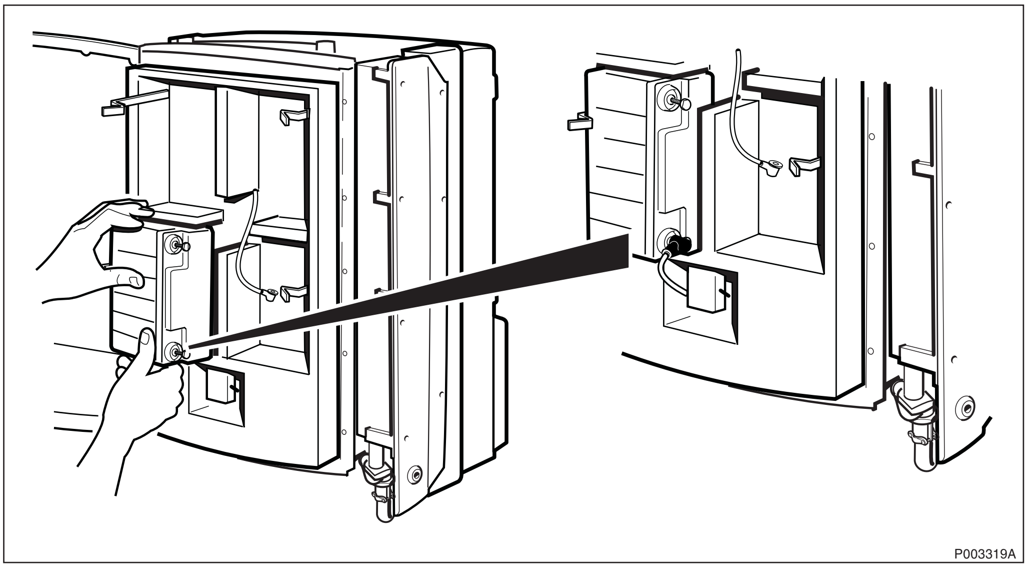


Figure 482 Installing battery 1

1. Install battery 1 and connect the plus-pole (+).

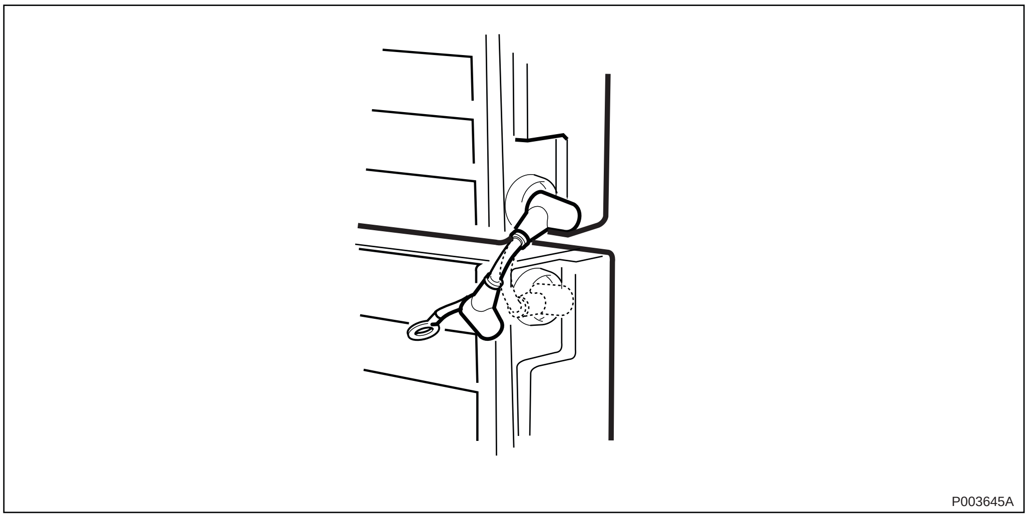


Figure 483 Installing battery 2

2. Install battery 2 with two cables preinstalled and connect the minus-pole (-) of battery 1.
3. Mount the ventilation hoses to battery 1 and 2 and guide it to the ventilation outlet down left at the bottom of the cabinet.
4. Install battery 3 and guide in the ventilation hose at the same time that the battery is tilted into position.

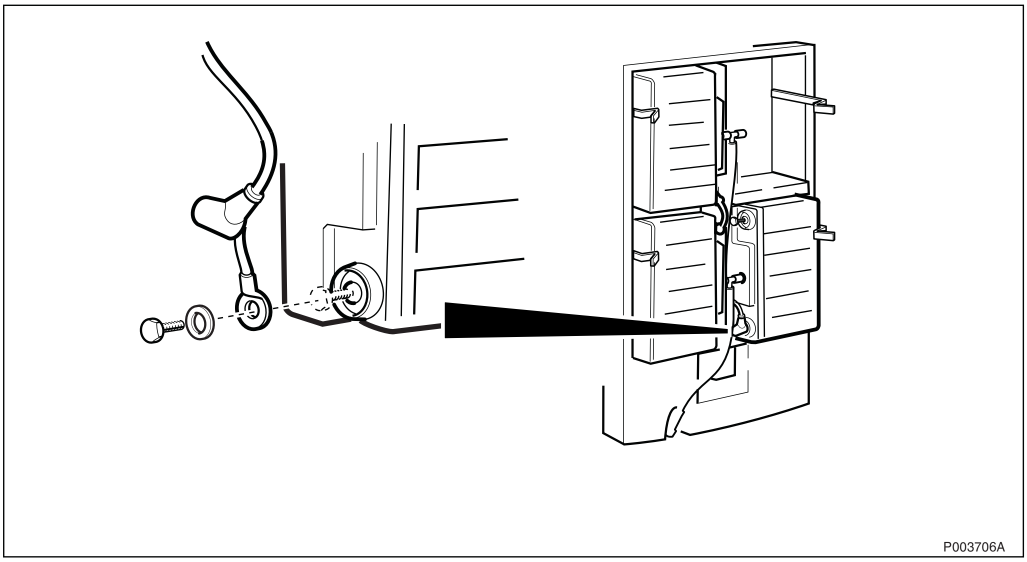


Figure 484 Connecting the minus-pole (-) of battery 3

5. Connect the minus-pole (-) of battery 3.
6. Install battery 4 and guide in the ventilation hose at the same time that the battery is tilted into position.

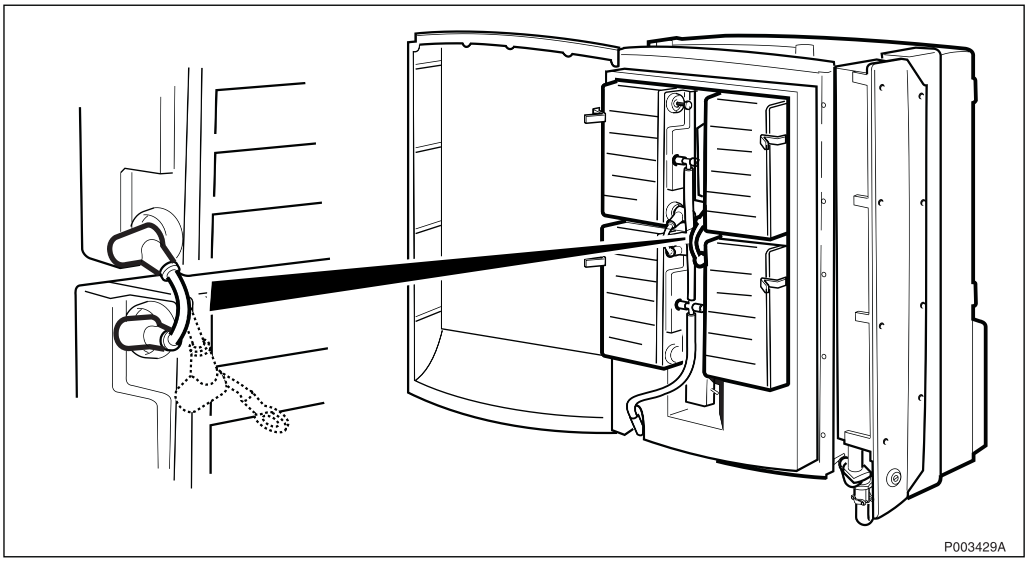


Figure 485   Connecting battery 3 and 4

7. Connect the battery jumper cable between battery 3 and 4.

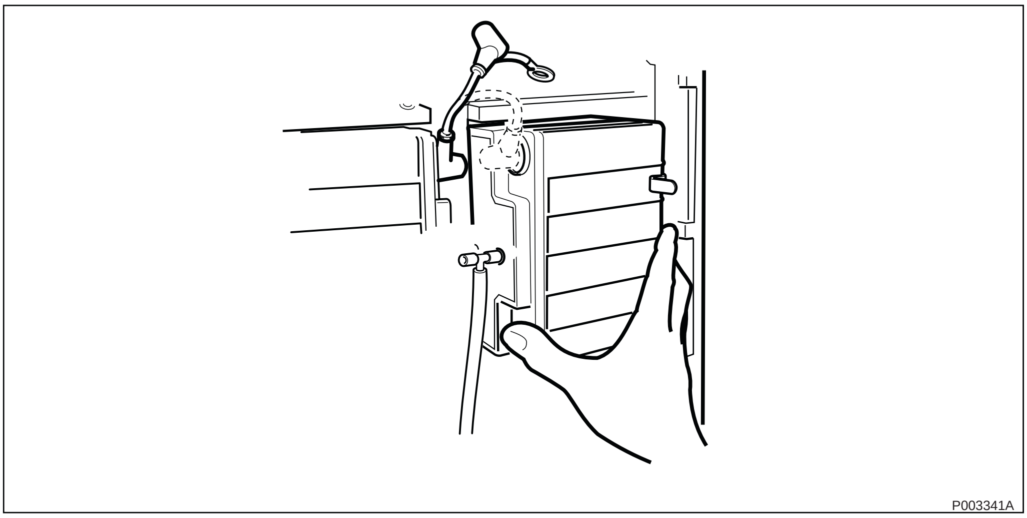


Figure 486   Connecting battery 2 and 4

8. Connect the battery jumper cable between battery 2 and 4.
9. Ensure that all cables and hoses are in the correct position so that the door can be closed.
10. Ensure that all protective covers are mounted on the battery poles.
11. Ensure that the ventilation hoses are not blocked.
12. Set the automatic circuit breaker to ON.
13. Set the battery switch to the ON position.
14. Ensure that no alarms are activated on the PBC.
15. Verify the battery installation by checking the LED *Battery Fault* on the DP on the radio cabinet.
16. Close the PBC door and screw the 18 torx screws into position.

17. Tighten the screws and mount the front sunshield.
18. Set the radio cabinet in Local Mode and update the IDB with new batteries, use the OMT to update the IDB, *see Site Installation Tests*.
19. Set the radio cabinet in Remote Mode.
20. Close and tighten the installation box doors on the RBS and the PBC.

Test after corrective action

Perform the checklist in *Section 13.10 on page 555*.

13.5.3 Cables

Prior to Replacement

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the cables

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

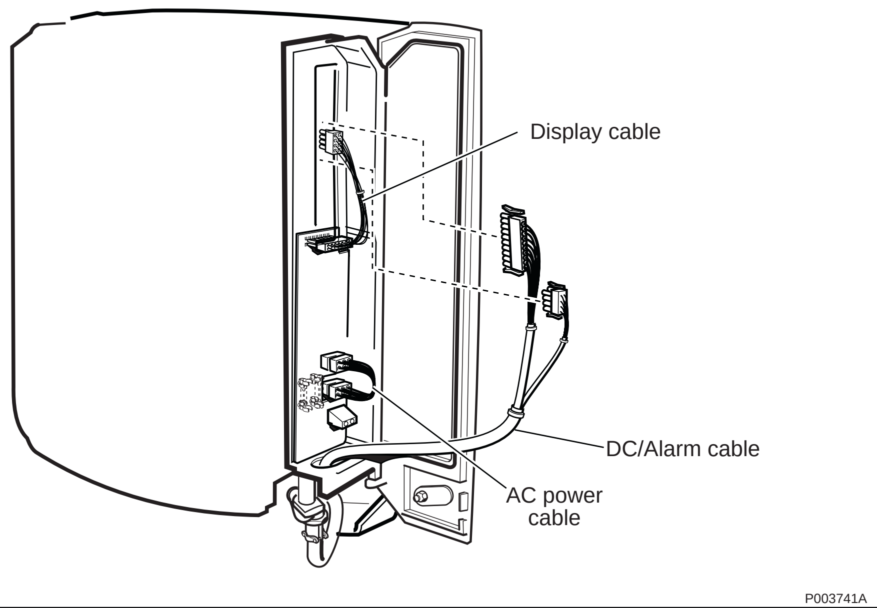


Figure 487 Overview of the cables

1. Remove the outer protective cover in the installation box by unscrewing the five torx screws.
2. Disconnect the internal AC cable, the DC/Alarm cable and the Display cable.
3. Connect the new cables.
4. Remount the protective cover.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.5.4 Battery Cabinet

Prior to Replacement

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the RBS installation box door.
3. Set the RBS in Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Open the PBC installation box door.
7. Switch the PBC Battery switch to OFF position.
8. Switch the PBC AC switch to OFF position.
9. Switch off the AC Mains Power switch.
10. Remove the sunshields (front, lower, left and upper).

Replacing the Battery cabinet

A lifting device can be used when replacing the cabinet, *see chapter Installation of RBS 2302*.

Note: The lifting device is not dimensioned for the PBC assembled with batteries.

1. Unscrew the Protective Earth from the installation box door.
2. Remove the protective cover in the PBC installation box by unscrewing the two torx screws.

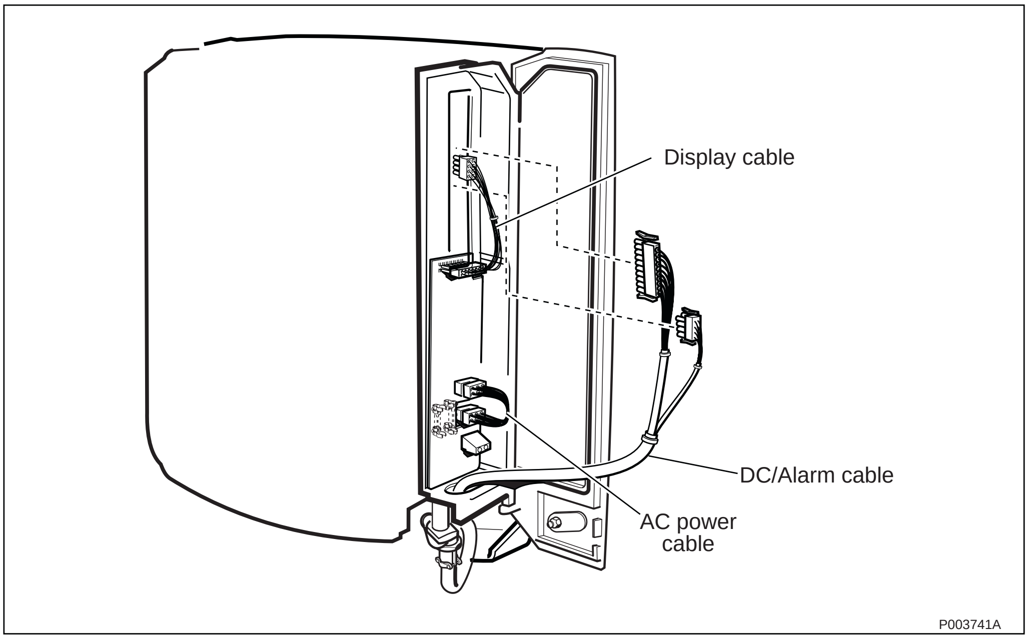


Figure 488 Overview of the cables

3. Loosen the DC/Alarm cables from the cabinet.

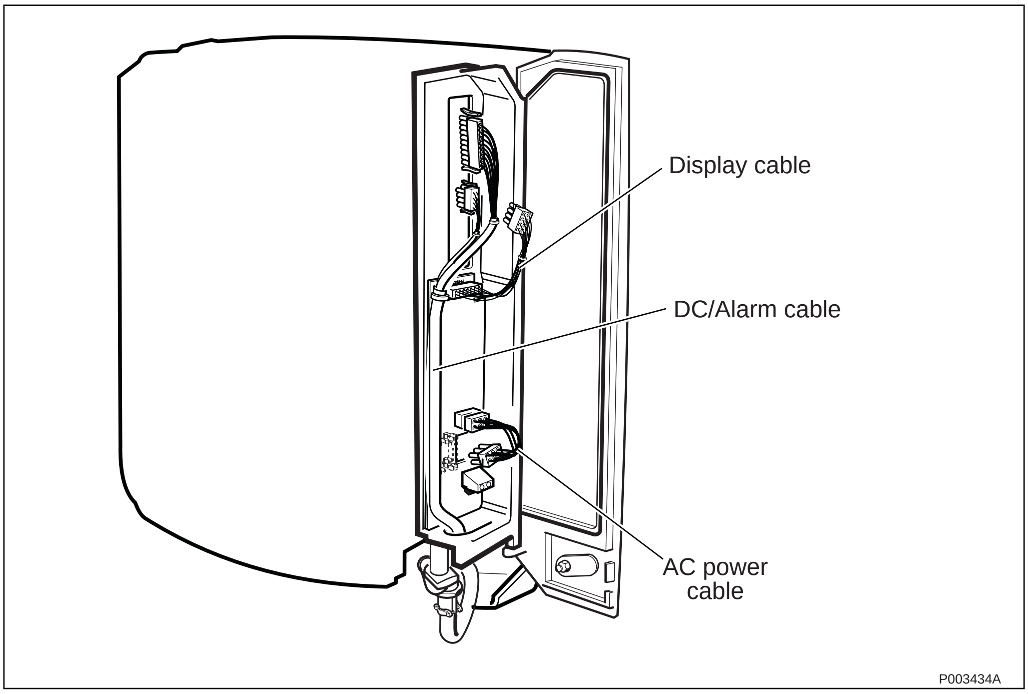


Figure 489 Loosening the AC cable and the Display cable

4. Disconnect the Display cable and the AC Power cable.

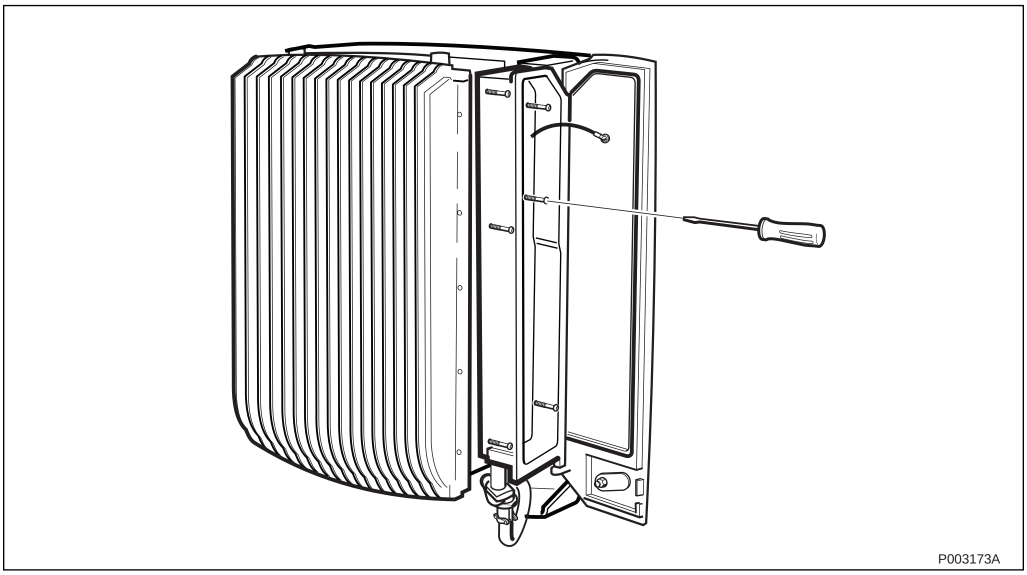


Figure 490   Loosening the installation box

5. Loosen the installation box from the cabinet by loosening the screws inside the installation box.

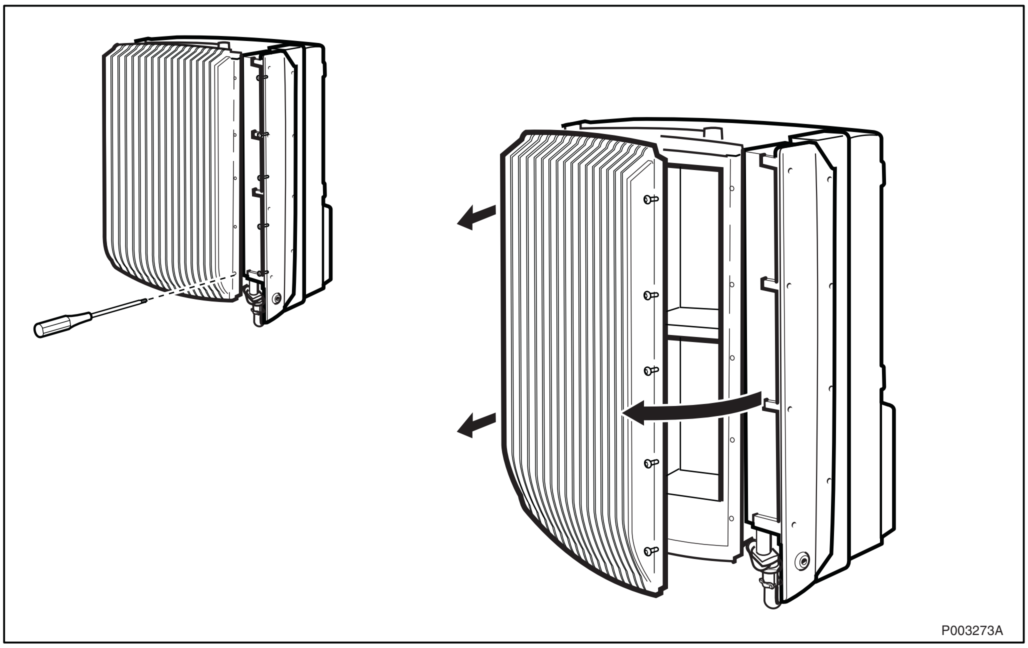


Figure 491   Opening the Battery cabinet door

6. Open the Battery cabinet door by unscrewing the 18 torx screws. Make sure that the screws are disengaged.

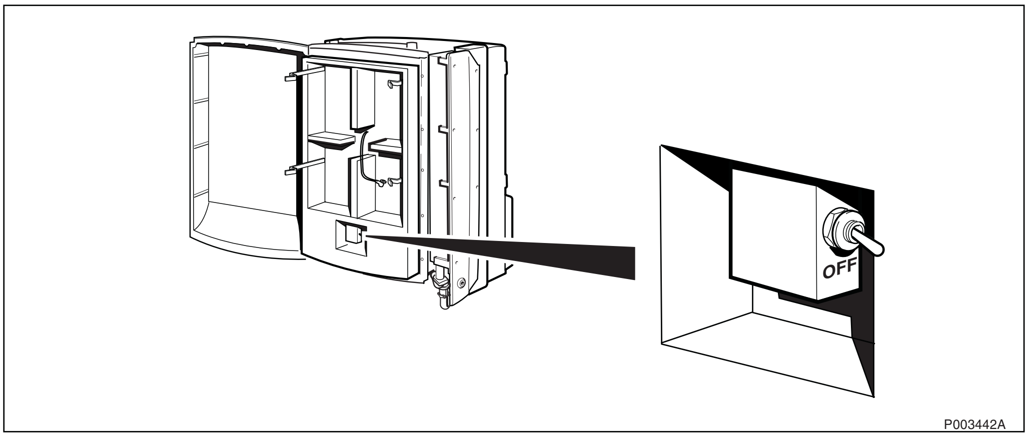


Figure 492 Automatic circuit breaker

7. Switch off the automatic circuit breaker.

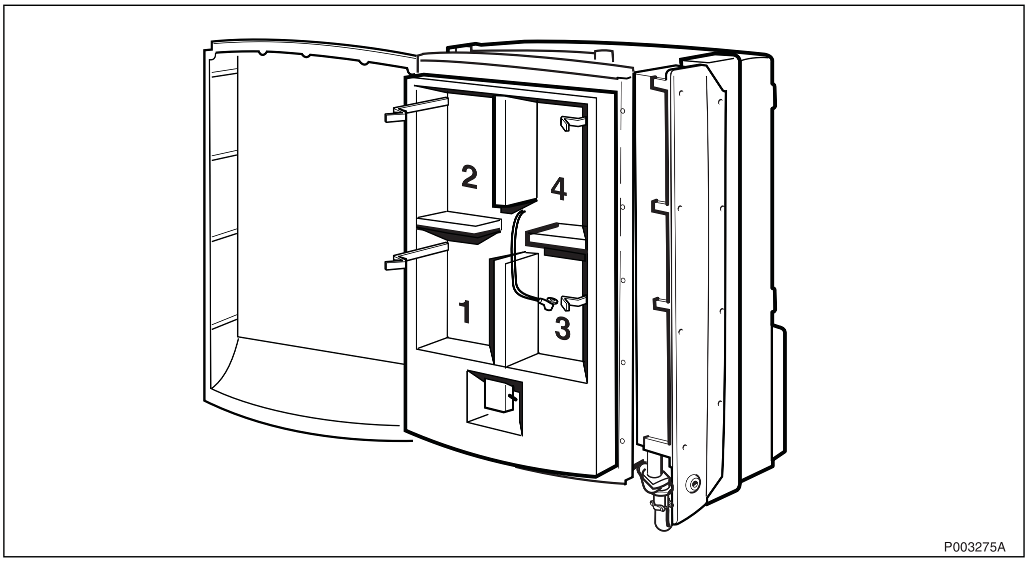


Figure 493 Battery position overview

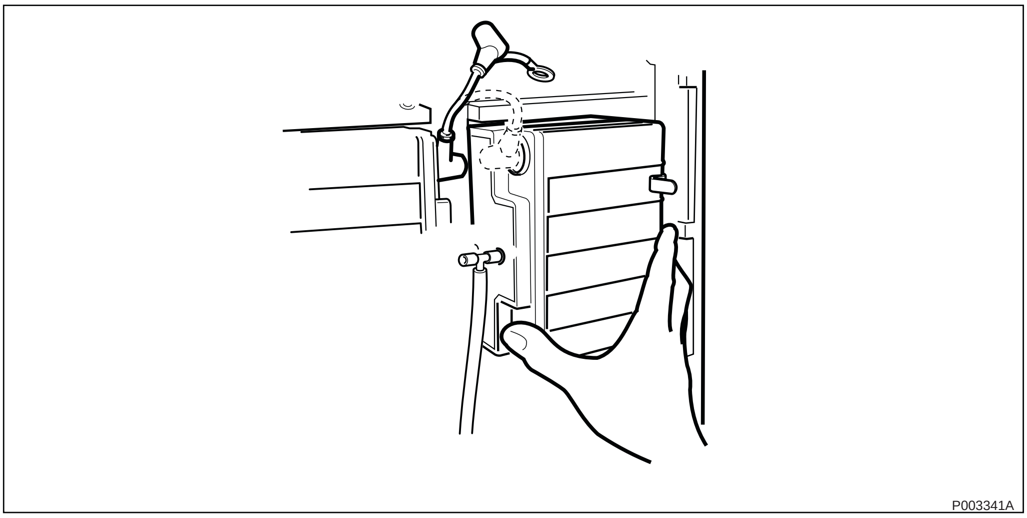


Figure 494 Disconnecting the plus-pole (+) of battery 4

8. Disconnect the battery jumper cable on the plus-pole (+) of battery 4.

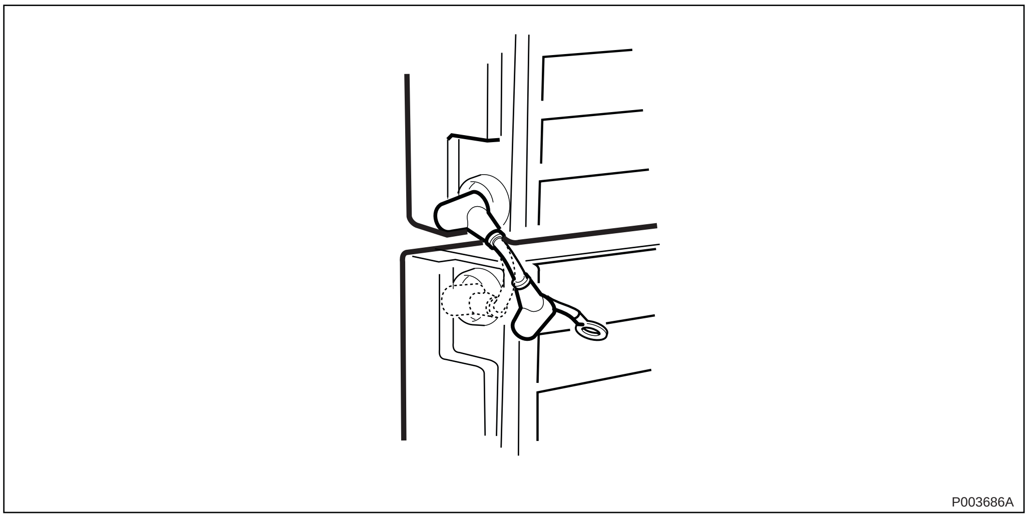


Figure 495 Disconnecting the plus-pole (+) of battery 3

9. Disconnect the battery jumper cable on the plus-pole (+) of battery 3, and remove battery 4.

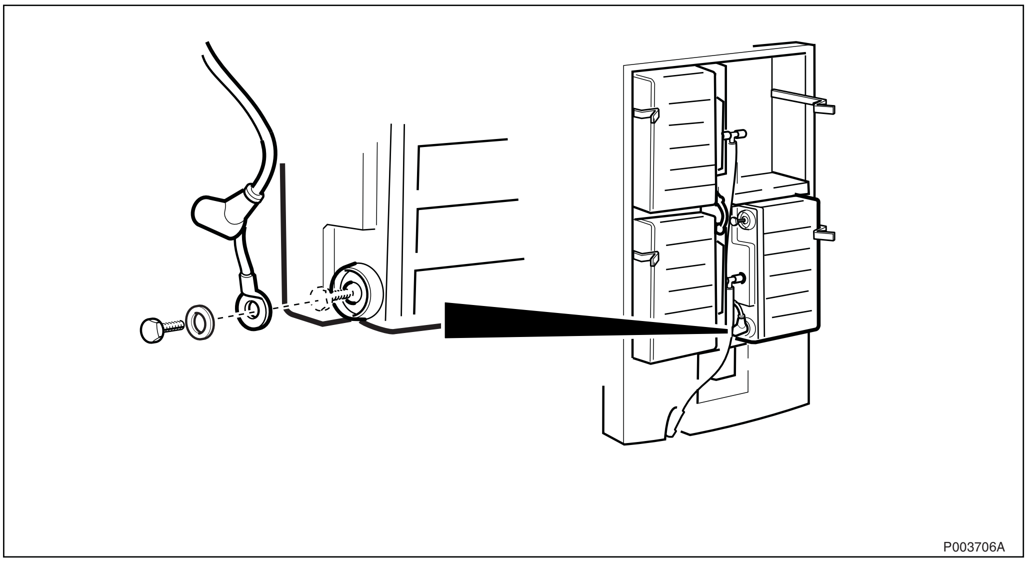


Figure 496 Disconnecting the minus-pole (-) of battery 3

10. Disconnect the minus-pole (-) of battery 3, and remove the battery.

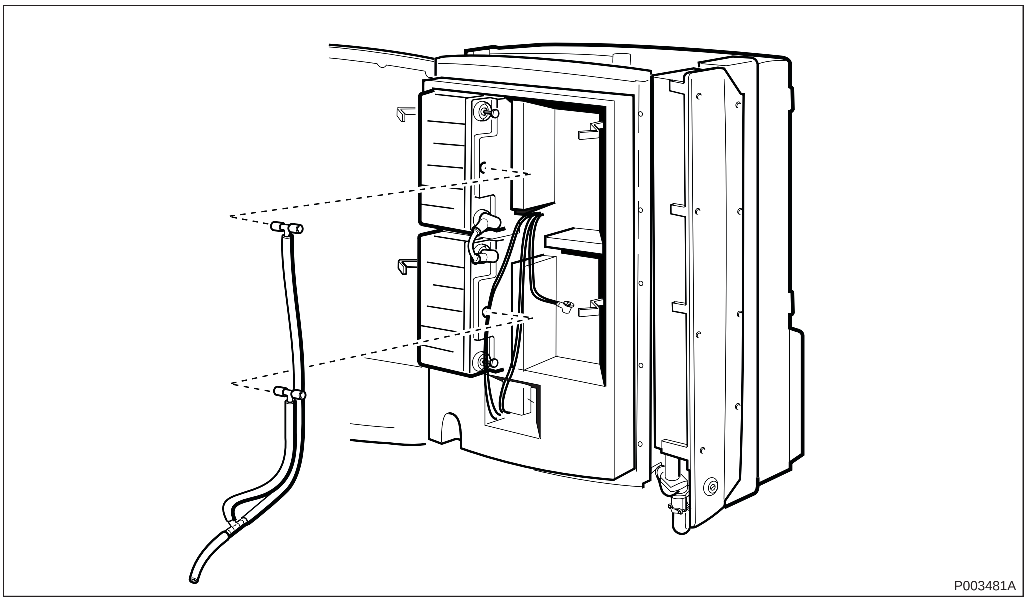


Figure 497 Removing the ventilation hoses

11. Remove the ventilation hoses from battery 1 and 2.

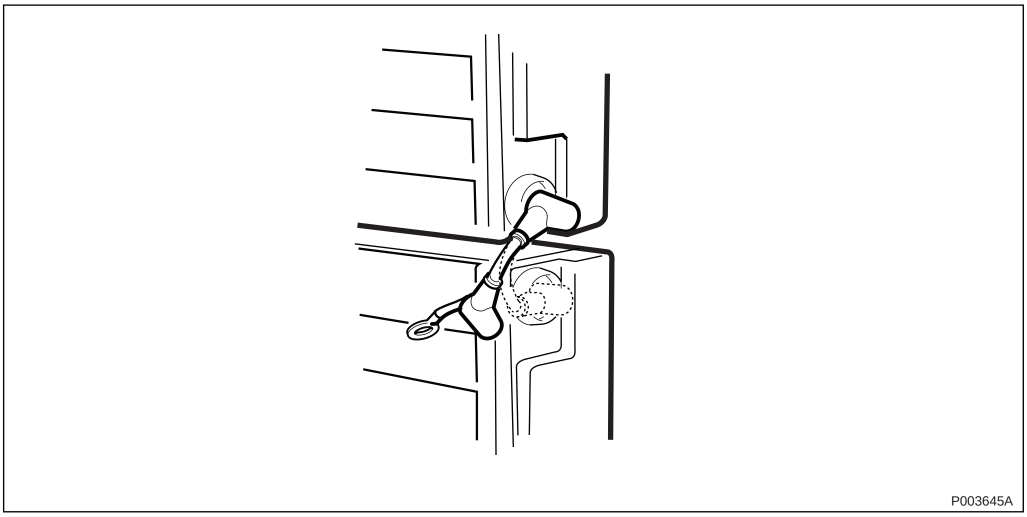


Figure 498 Disconnecting the minus-pole (-) on battery 1

12. Disconnect the battery jumper cable on the minus-pole (-) of battery 1, and remove battery 2.

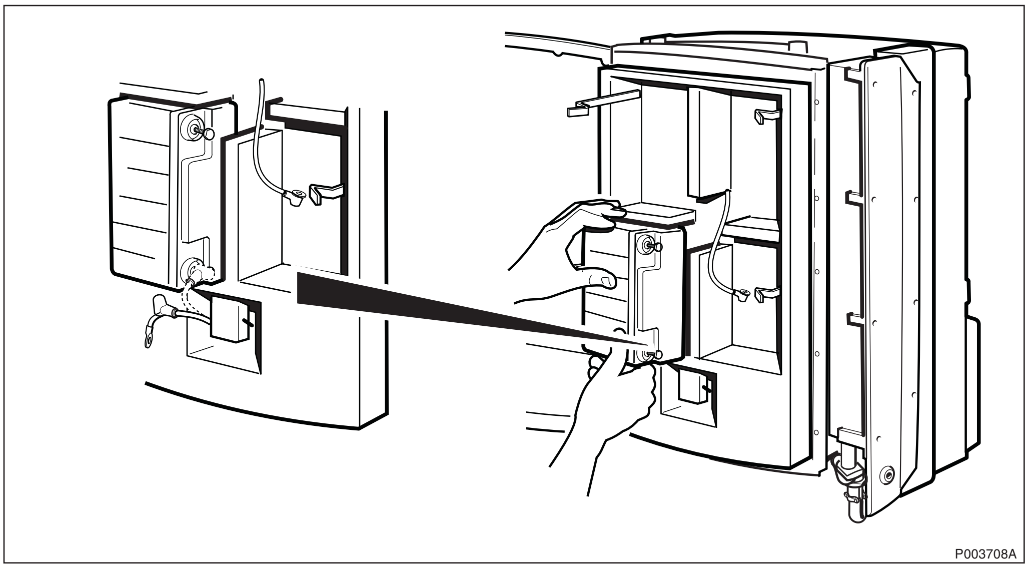


Figure 499 Disconnecting the plus-pole (+) of battery 1

13. Disconnect the plus-pole (+) of battery 1, and remove the battery.

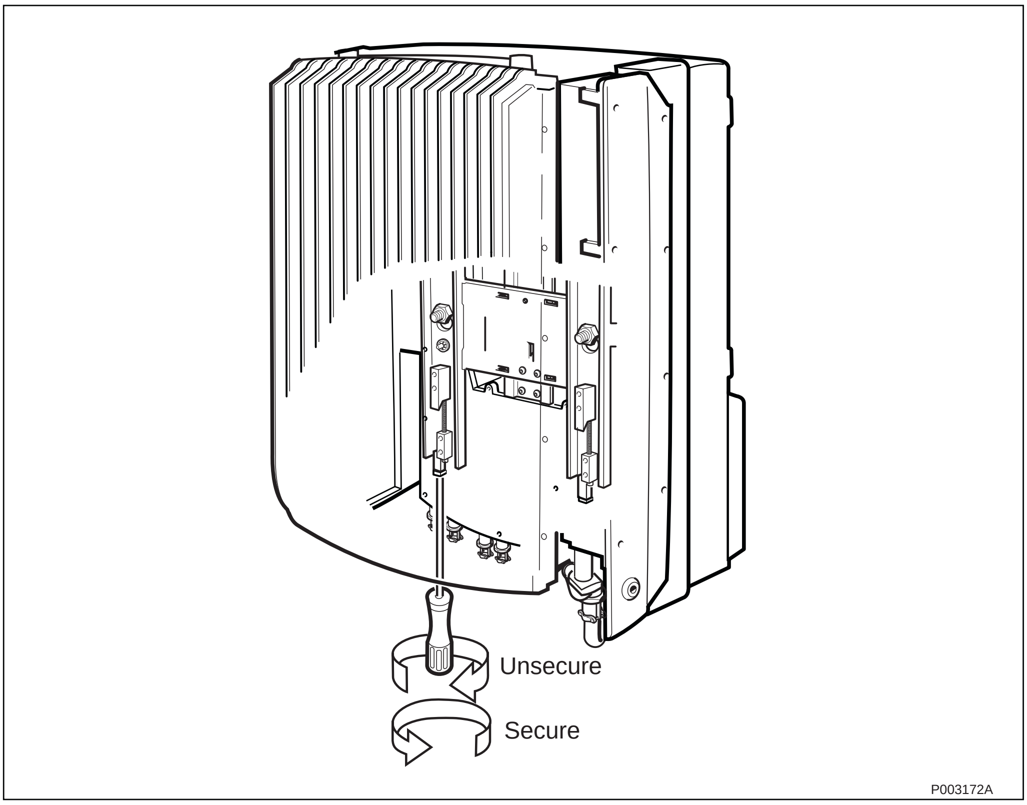


Figure 500 Loosening the cabinet

14. Close the battery cabinet door and tighten one screw in each corner.

15. Loosen the two screws holding the cabinet.

Note: Sometimes the two locking parts are jammed together causing the screw to move downwards instead of the wedge part moving up. This is solved simply by striking the back of the torx screwdriver with the hand, when the screw has been screwed down approximately 20 mm.

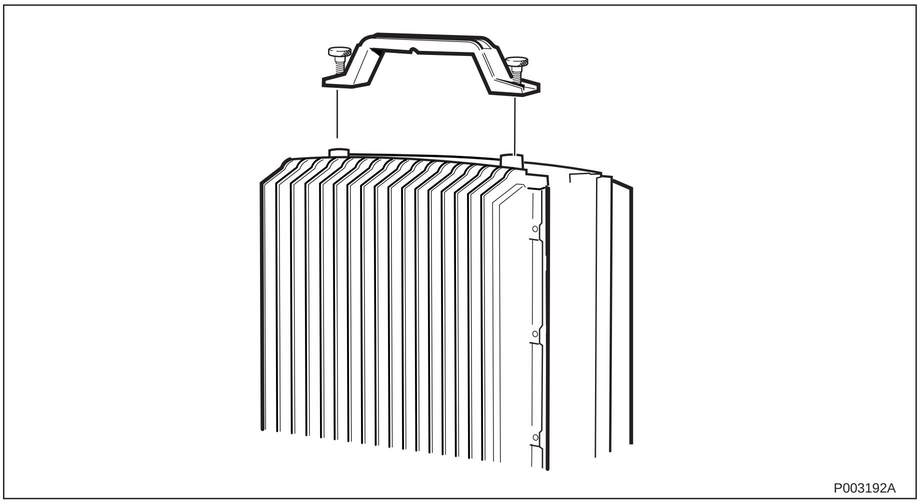


Figure 501 Mounting the optional lifting handle

16. If the lifting handle (optional) is to be used, mount it on top of the cabinet.

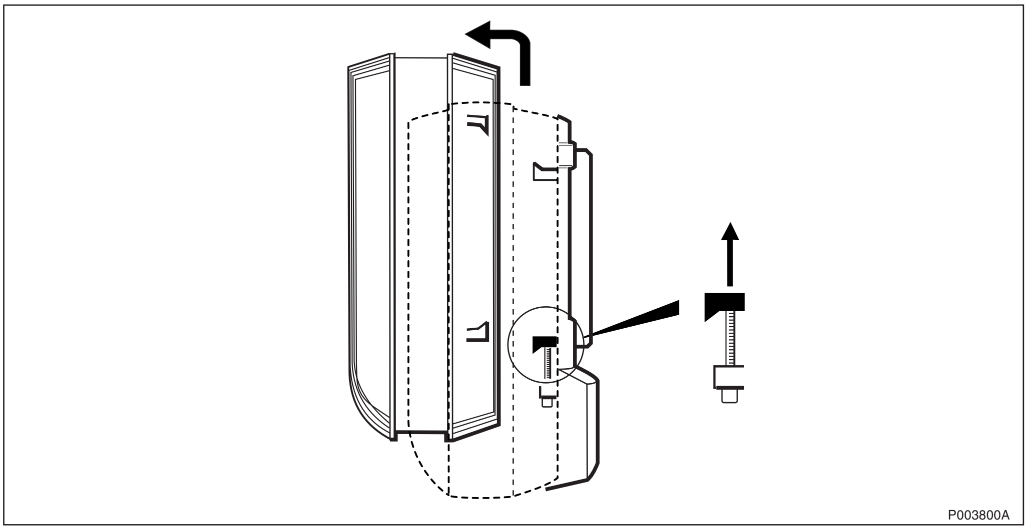


Figure 502 Unhooking the PBC

17. Remove the cabinet by lifting it up and away from the mounting base.

18. To remount the new cabinet, *see chapter Installation of Power and Battery Cabinet*.

19. Install the batteries according to *page 503*.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.

4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.

Test after corrective action

1. Perform a battery backup test, *see chapter Site Installation Tests*.
2. Perform the antenna attenuator settings to calibrate the antenna, *see chapter RBS Site Integration, section Connecting the RBS from the BSC, section Test Calls on Air Interface* and *section Network Integration Test*.
3. Perform the checklist in *Section 13.10 on page 555*.

13.5.5 Fuses

Prior to Replacement

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.
4. Switch the RBS battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the fuses

1. Open the installation box door.

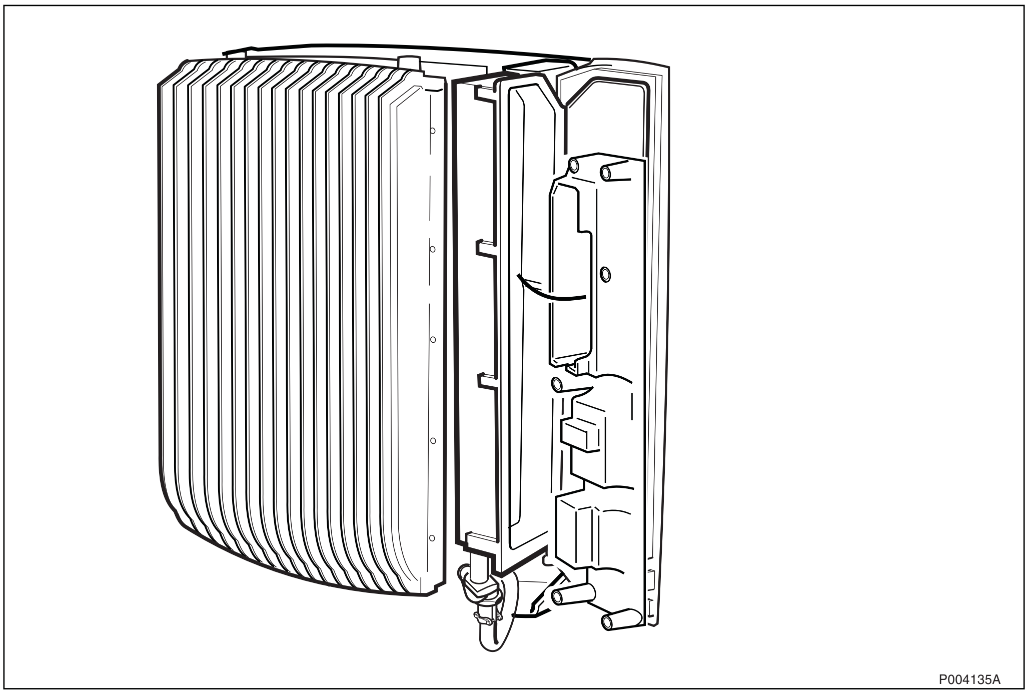


Figure 503 Removing the protective cover

2. Remove the protective cover by loosening the two torx screws.

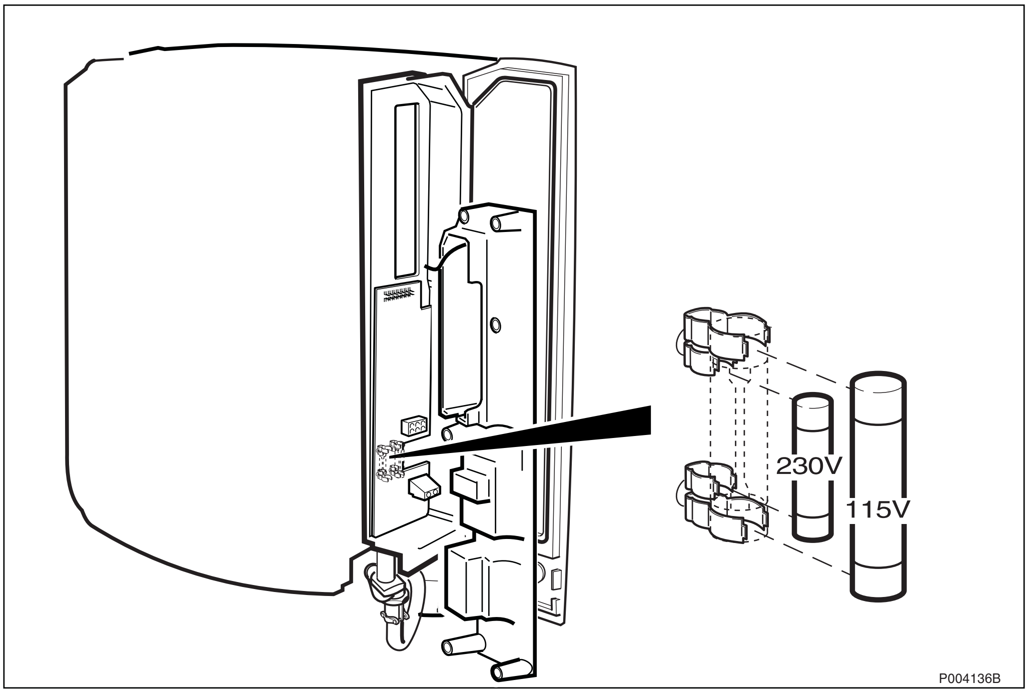


Figure 504 Replacing the fuses

3. Replace the faulty fuses with new fuses.

Table 75 Fuses

Voltage	**Fuses Data**	**Dimension**
100-127 V AC	Ceramic Slow Blow 8 A, 250 V (1)	6.3x32 mm
200-250 V AC	Ceramic Slow Blow 6.3 A, 250 V (1)	5x20 mm

(1) Fuse according to standard EN 60127.

4. Remount the protective cover by tightening the five torx screws.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.5.6 EMC Board

Prior to Replacement

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door on the radio cabinet.
3. Set the RBS in Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the EMC board

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

1. Open the installation box door on the battery cabinet.

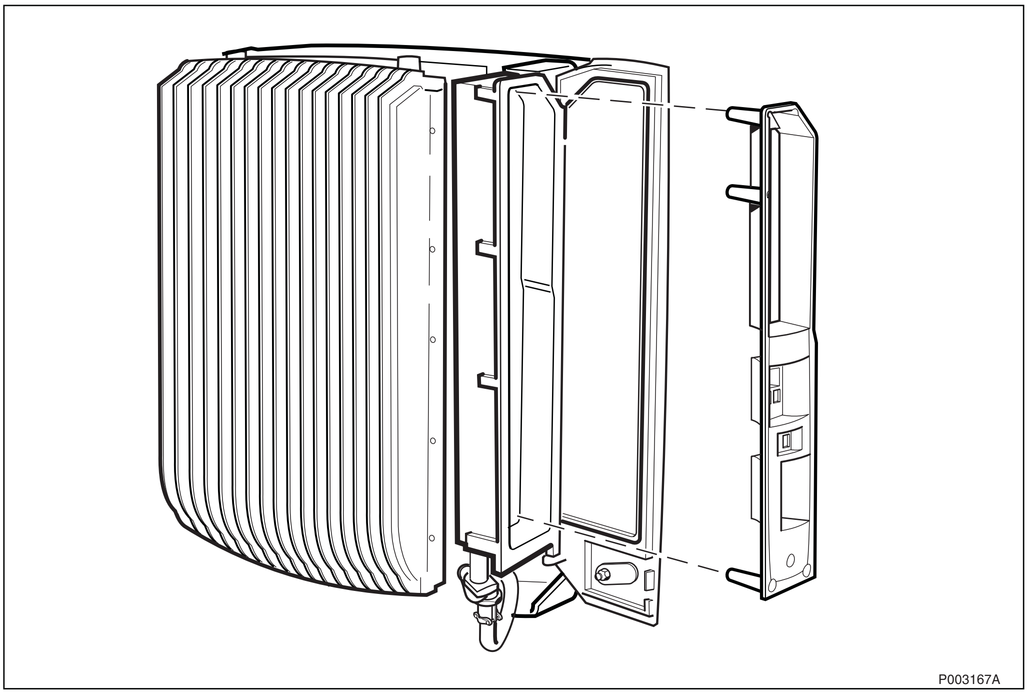


Figure 505 Removing the protective cover

2. Remove the protective cover by loosen the five torx screws.

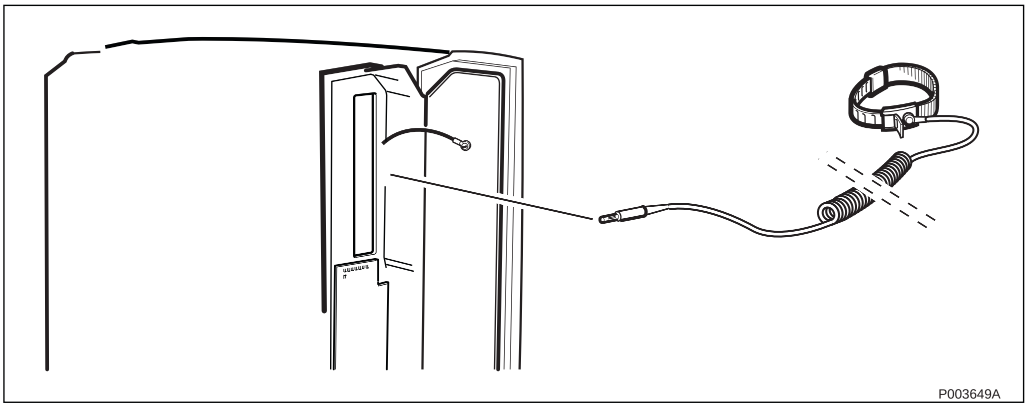


Figure 506 Connecting the ESD wrist strap

3. Connect the ESD wrist strap to the ESD connection point in the installation box.

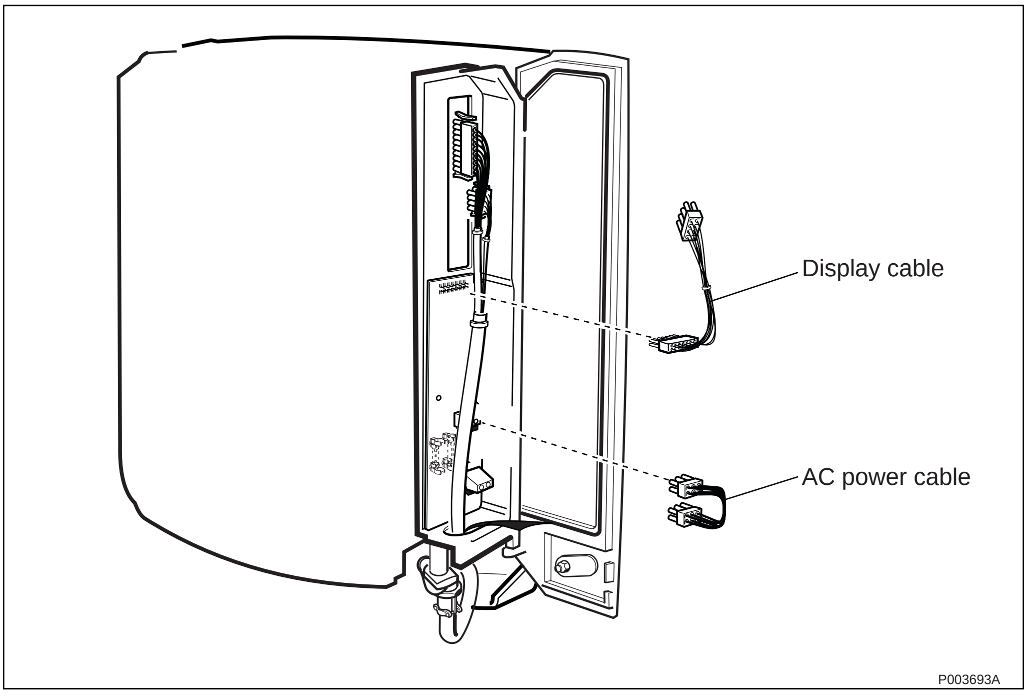


Figure 507   Overview of the cables

4. Disconnect the Display cable and AC Power cable.

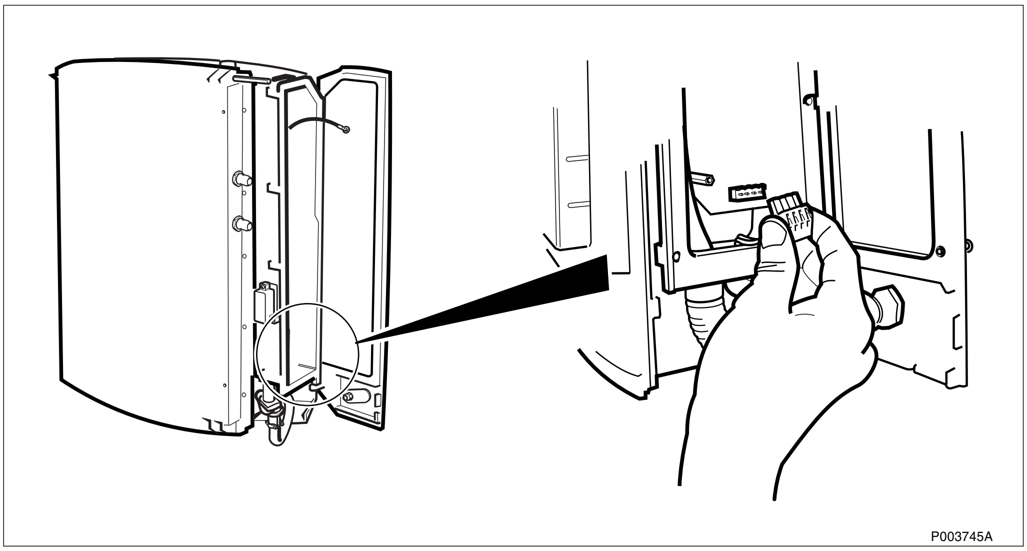


Figure 508   Disconnecting the AC cable

5. Disconnect the AC cable from the interface box on the EMC board.

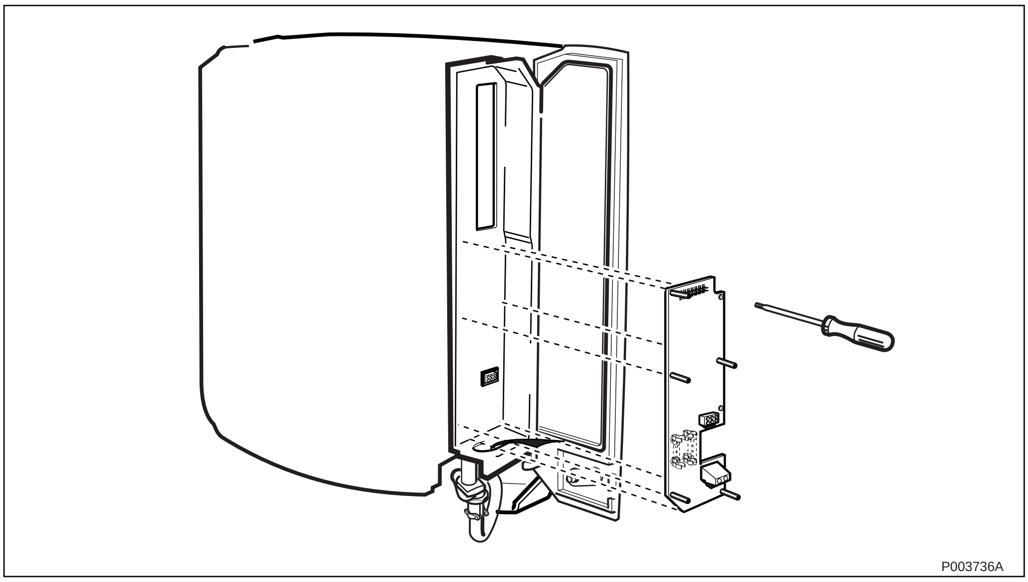


Figure 509 Removing the EMC board

6. Unscrew the 7 torx screws.
7. Mount fuses corresponding to the correct voltage on the new EMC board.
8. Mount the new EMC board.
9. Mount the 7 torx screws.
10. Connect the cables to the EMC board.
11. Remount the protective cover with the two torx screws.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.5.7 DC Surge Board

Prior to replacement

1. Inform the OMC operator that the RBS will be out of service temporarily.

2. Open the installation box door for the radio cabinet.
3. Set the RBS in Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the DC Surge Board

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

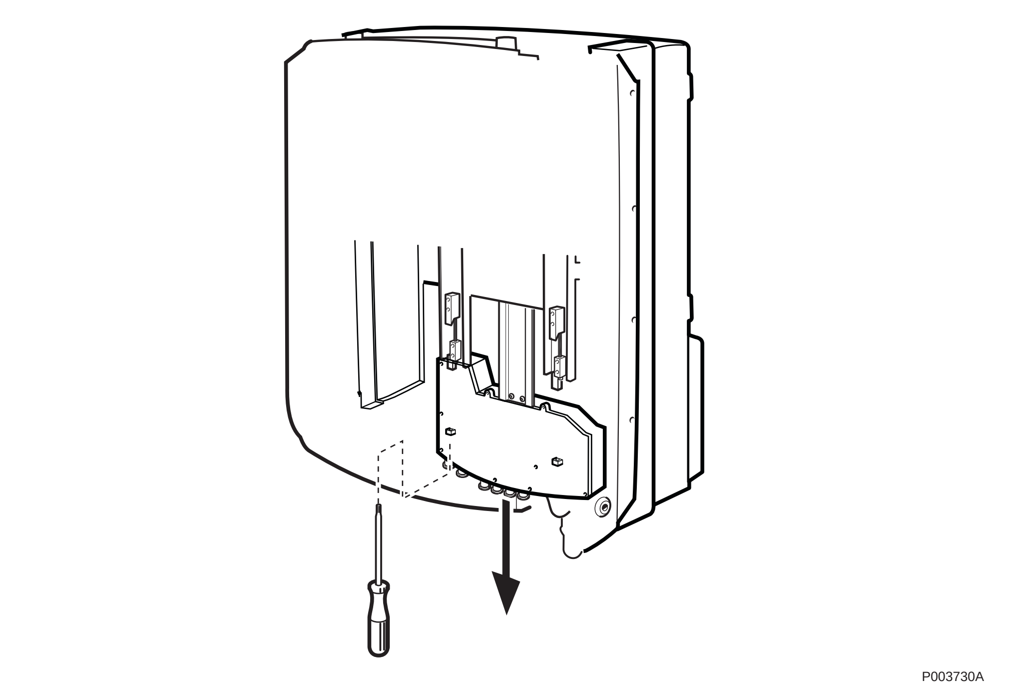


Figure 510 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

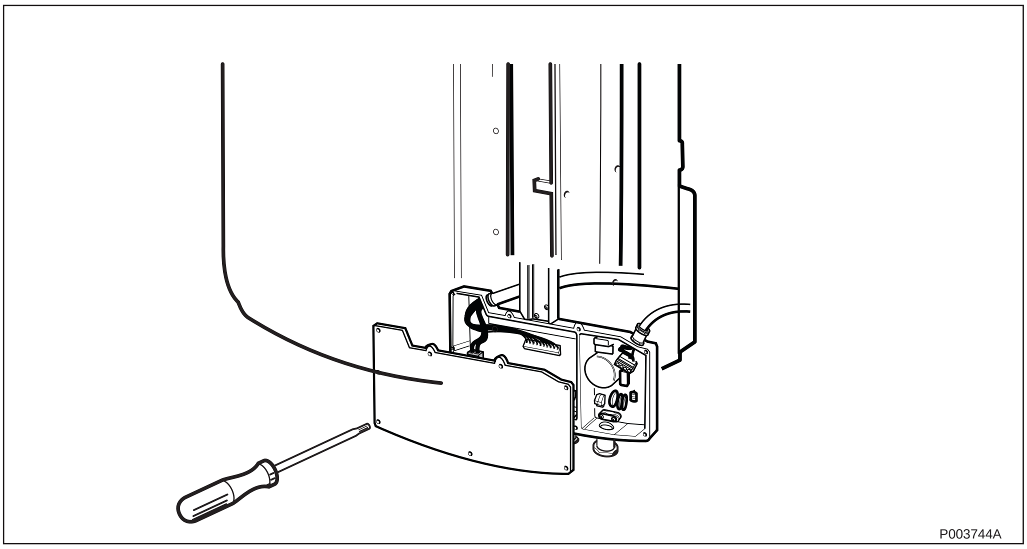


Figure 511 Loosening the interface box cover

2. Open the cover of the interface box by removing the 9 torx screws.

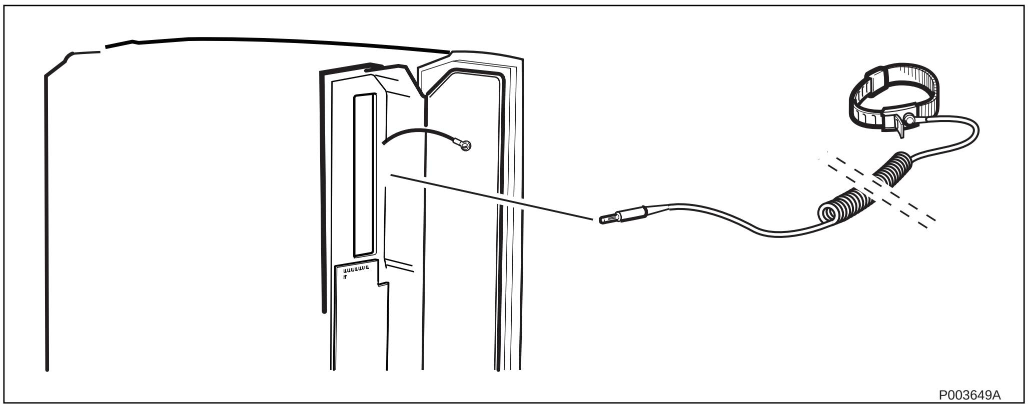


Figure 512 Connecting the ESD wrist strap

3. Connect the ESD wrist strap to the ESD connection point in the installation box.
4. Remove all connection terminal blocks.
5. Loosen the internal -48 V DC cable from the fixed terminal block. Make sure to remember the cable position or write it down.

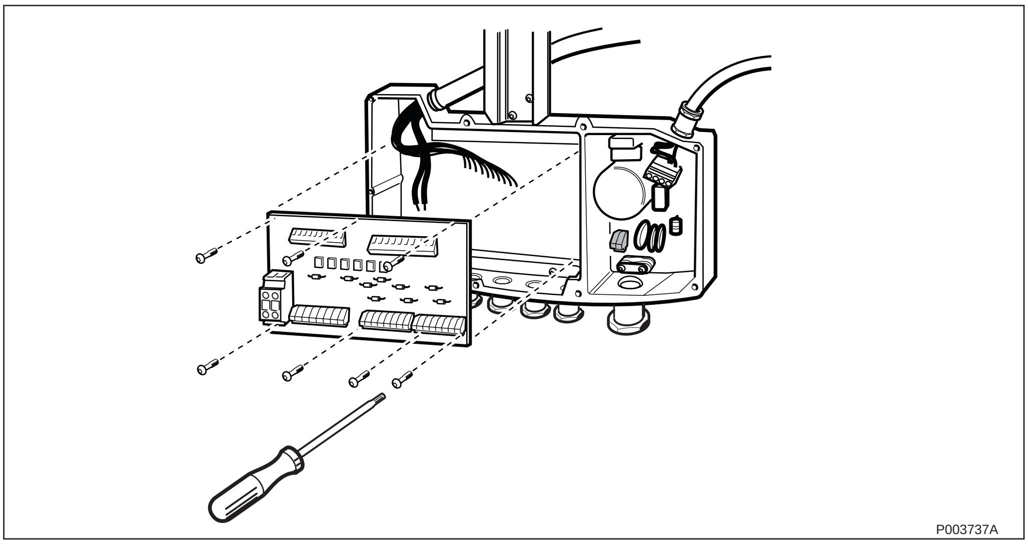


Figure 513 Removing the DC Surge board

6. Unscrew all screws holding the DC Surge board.
7. Mount the new board and tighten the screws.
8. Plug in all connection terminal blocks.
9. Install the -48V DC cable.
10. Remove the ESD wrist strap
11. Mount the cover and tighten the screws.
12. Push up the interface box and secure it in the upper position with the two torx screws.

Set to Operation

1. Switch on the AC Mains Power switch.
2. Switch on the AC and Battery switch on the battery cabinet.
3. Switch on the AC and Battery switch on the radio cabinet.
4. Set the radio cabinet in Remote Mode.
5. Close and tighten the installation box doors.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.5.8 AC Board

Prior to replacement

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door for the radio cabinet.
3. Set the RBS in Local Mode.

4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the AC board

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

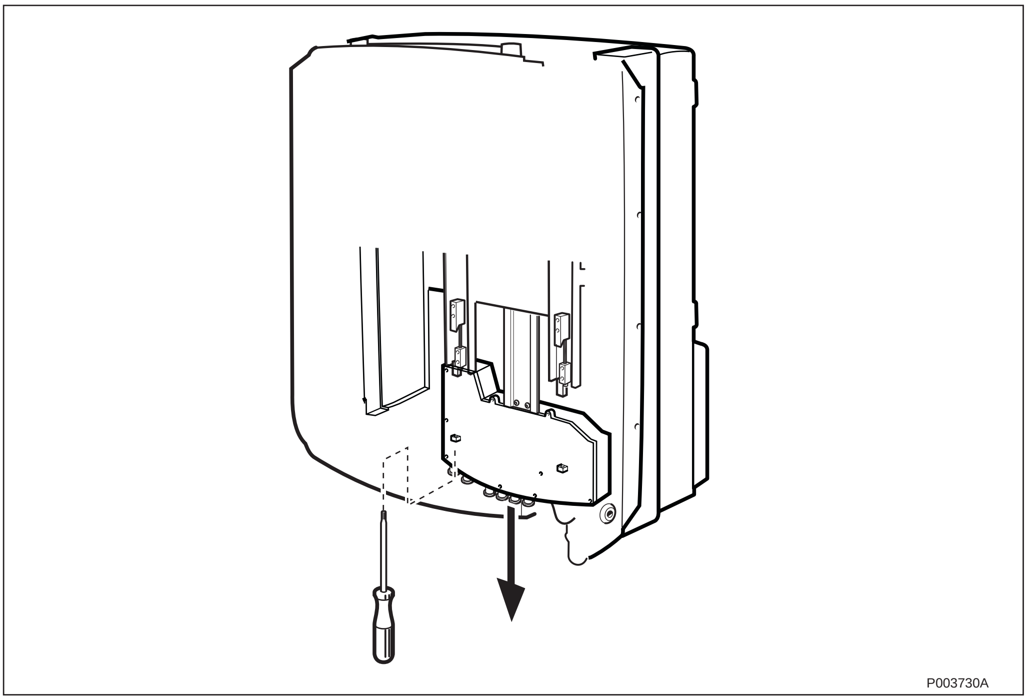


Figure 514 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

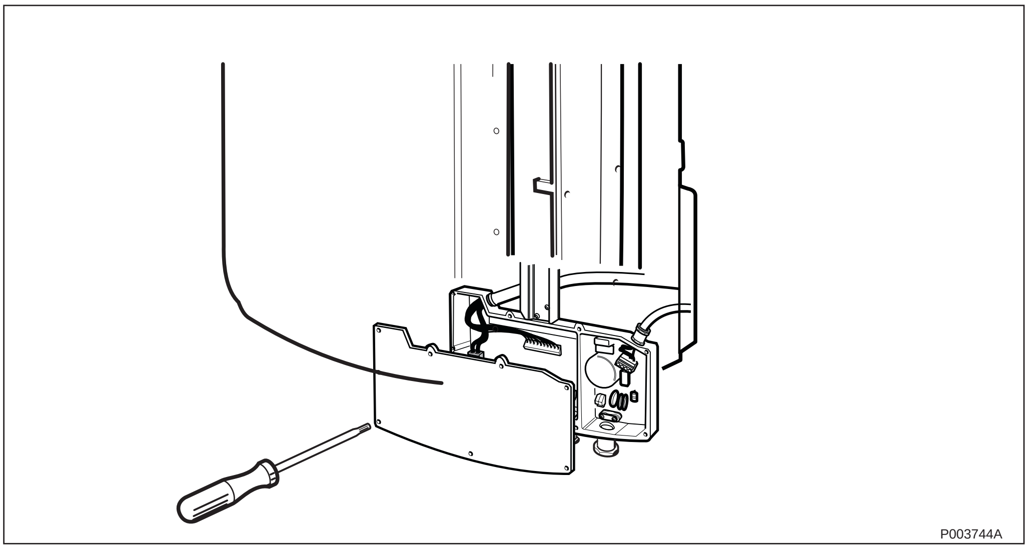


Figure 515 Loosening the interface box cover

2. Open the cover of the interface box by loosening the 9 torx screws.

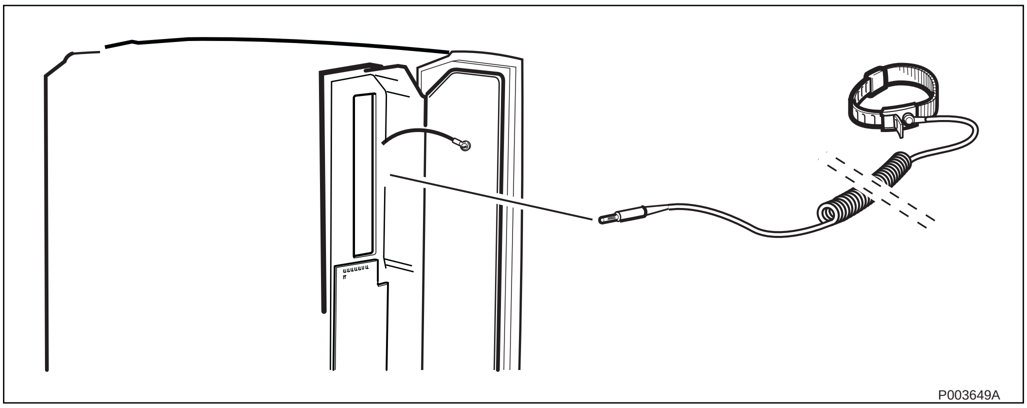


Figure 516 Connecting the ESD wrist strap

3. Connect the ESD wrist strap to the ESD connection point in the installation box.
4. Remove the connection terminal blocks connected to the AC board.

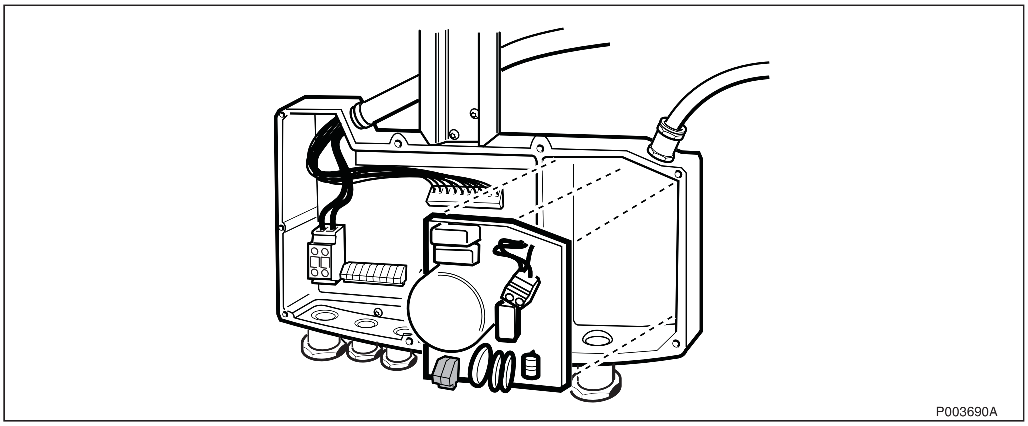


Figure 517 Removing the AC board

5. Remove the Protective Earth from the installation box.
6. Unscrew the six torx screws holding the AC board.
7. Replace the AC board and remount the six screws, including the Protective Earth.
8. Remount the two AC connection terminal blocks.
9. Remove the ESD wrist strap.
10. Remount the cover of the interface box and tighten the screws.
11. Push up the interface box and secure it in the upper position with the two torx screws.

Set to Operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS in Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Perform the checklist in *Section 13.10 on page 555*.

13.6 Maintenance Antenna Units

13.6.1 Coverage Extended Unit (CEU), 500 W EIRP GSM 900

Prior to replacement

WARNING

Radio frequency radiation. The radio frequency radiation from the antenna system might endanger your health. Switch off the transmitter when working with antennas or near them.

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the RBS installation box door.
3. Set the RBS to Local Mode.

4. Set the feeder attenuators to max on the MMI of the PBC:

    1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
    2. Select code 4 on D3 with the up/down buttons.
    3. Press Enter.
    4. Wait until the code message 11H appears on the display. This confirms that the feeder attenuators is set to maximum attenuation.

5. Turn off the battery switch on the RBS.
6. Turn off the AC switch on the RBS.
7. Turn off the battery switch on the PBC.
8. Turn off the AC switch on the PBC.

Replacing the CEU

WARNING

Read the Safety chapter regarding handling of heavy goods.

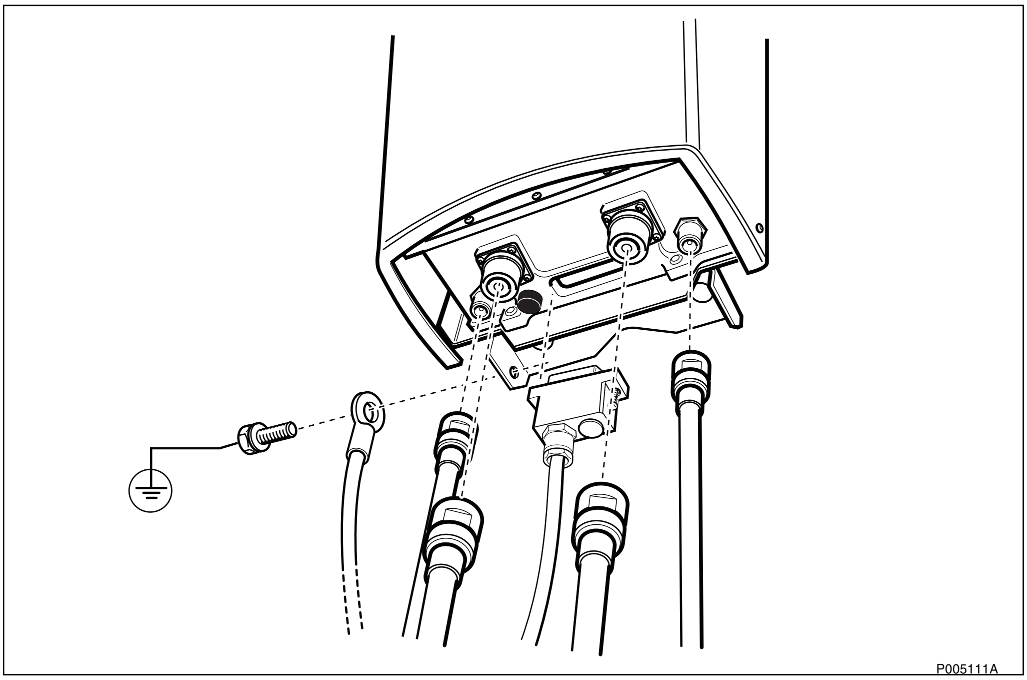


Figure 518 Loosening the cables of the CEU

1. Remove the feeder and jumper cables and the DC/Data cable.
2. Remove the earth cable.

3. Secure the CEU by attaching appropriate ropes.

Note: To hoist the CEU, the upper lifting handle and the two holes in the lower mounting fixture shall be used.

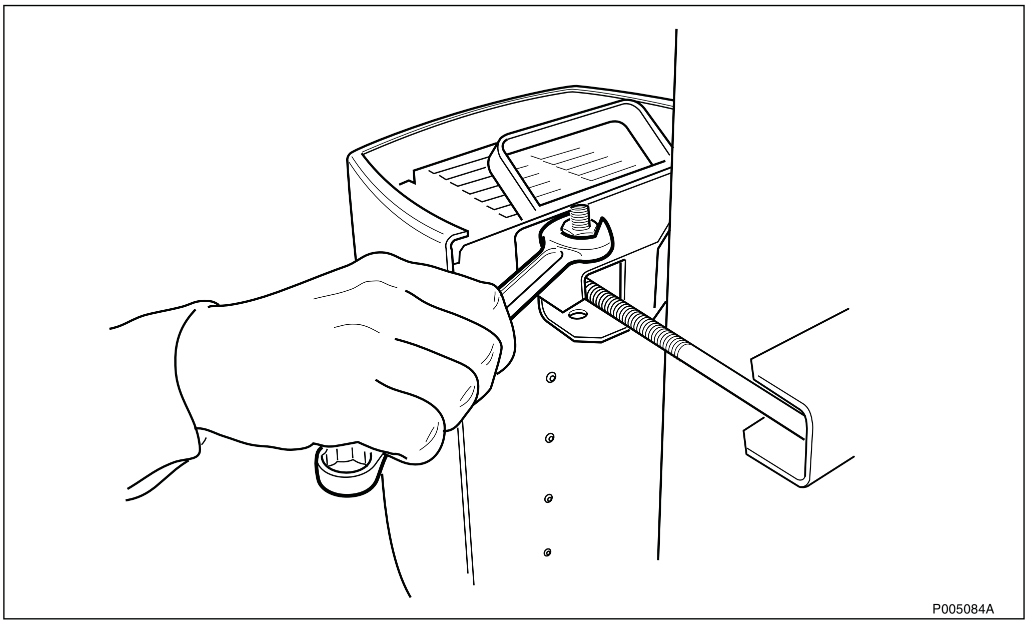


Figure 519 Loosen the locking nuts

4. Loosen the upper and lower locking nuts.

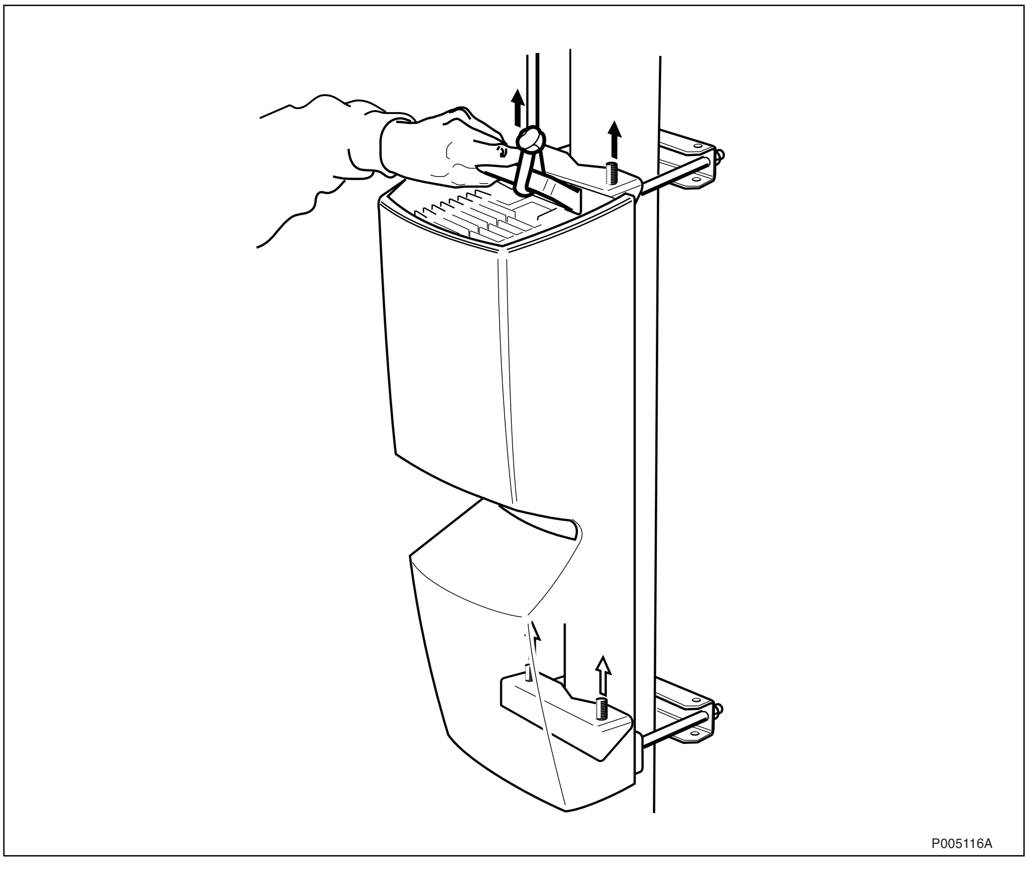


Figure 520

5. Unhook the CEU and lower it to the ground.
6. Hoist and mount the new CEU and reconnect all cables.
7. Tighten all screws according to the torques given in Section 13.2.10 on page 430.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Change the Class 1 alarms to Class 2 with the OMT. This is done to avoid severe alarms in the BSC.
2. Perform the antenna attenuator settings to calibrate the antenna, *see chapter RBS Site Integration, section Connecting the RBS from the BSC, section Test Calls on Air Interface* and *section Network Integration Test.*
3. Change the Class 2 alarms that was changed in step 1 back to Class 1 with the OMT.
4. Perform the checklist in Section 13.10 on page 555.

13.6.2 Active Antenna Unit, 500 W EIRP/GSM 1800

Prior to Replacement

WARNING

Radio frequency radiation. The radio frequency radiation from the antenna system might endanger your health. Switch off the transmitter when working with antennas or near them.

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the RBS installation box door.
3. Set the RBS to Local Mode.

4. Set the feeder attenuators to max.:

    1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
    2. Select code 4 on display element D3 with the Up or Down button.
    3. Press Enter.
    4. Wait until the code message 11H appears on the display. This confirms that the feeder attenuators are set to maximum attenuation.

5. Turn off the battery switch on the RBS.
6. Turn off the AC switch on the RBS.
7. Turn off the battery switch on the PBC.
8. Turn off the AC switch on the PBC.

Replacing the AAU

WARNING

Read the Safety chapter regarding handling of heavy goods.

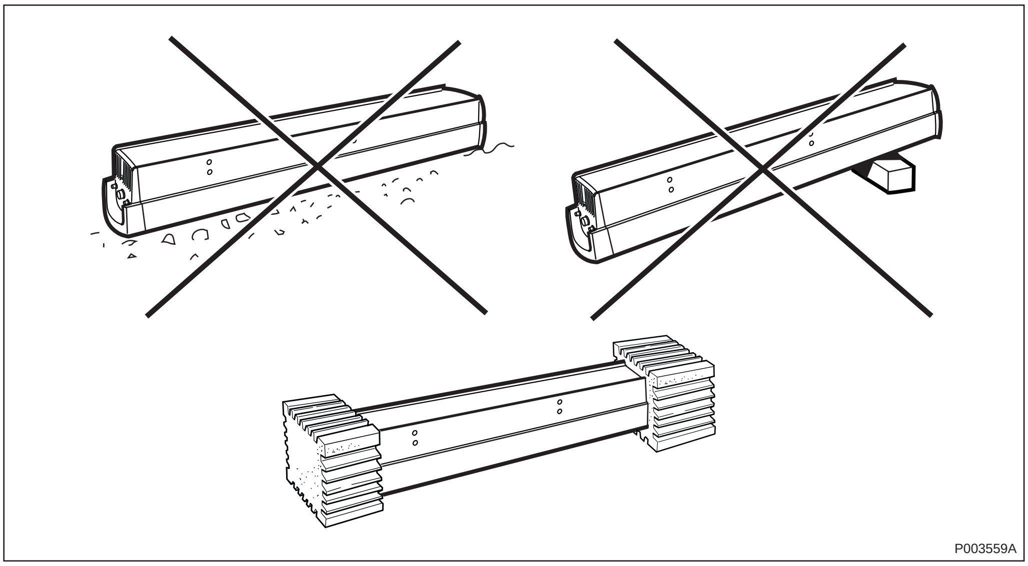


Figure 521 Handling the AAU

The construction of the bracket allows the AAU to be replaced without changing the tilt angle.

The AAU must be handled in such way that the Radom (front cover) is not exposed to pressure.

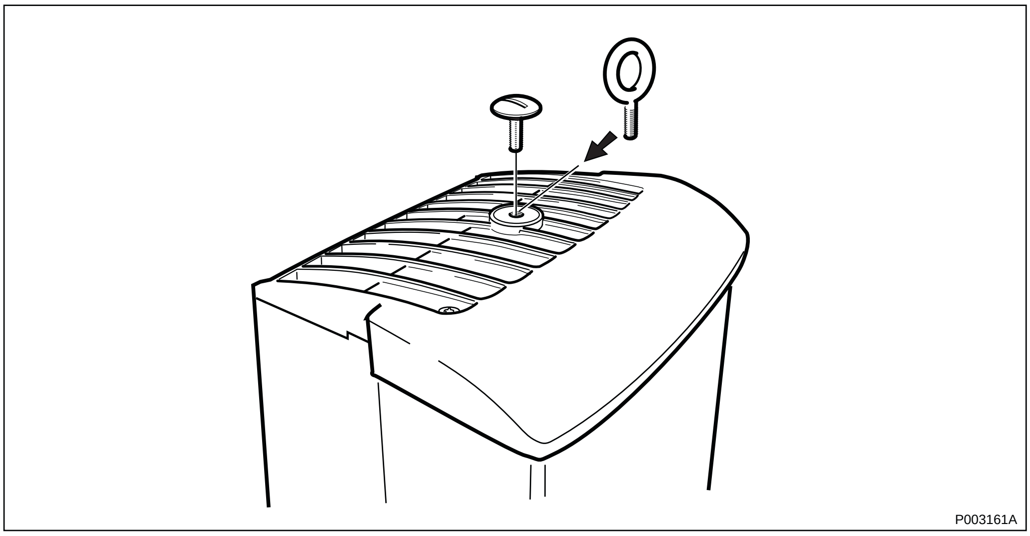


Figure 522   Mounting the lift eye on top on the AAU

1. Mount the lift eye on top of the AAU.

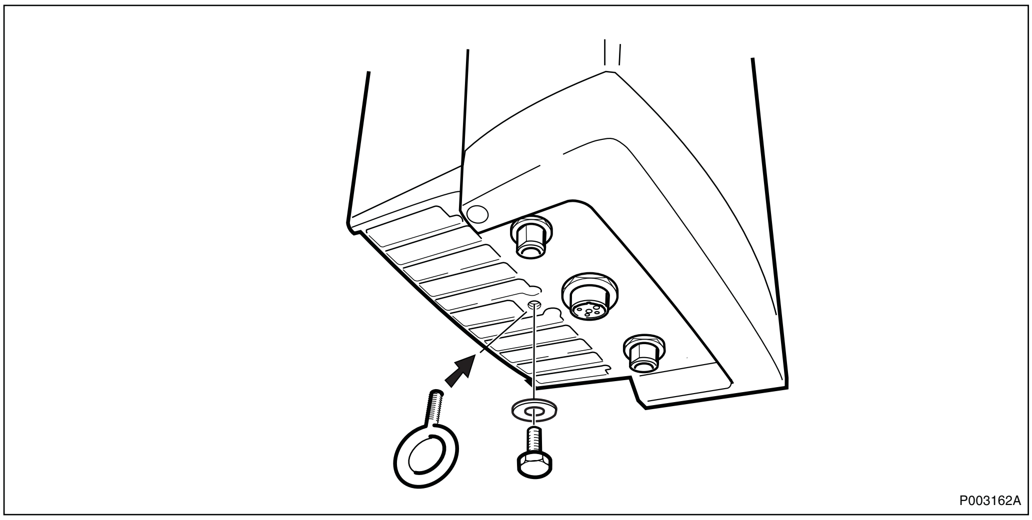


Figure 523   Replacing the earth screw with an eyebolt

2. Remove the feeder cables and the DC/Data cable.
3. Remove the earth screw at the bottom of the antenna.
4. Mount the lift eye at the bottom of the antenna using the earth screws thread.

Note: The thread for the earth screw is not constructed for lifting, but can be used for attaching an eyebolt so the AAU can be guided when hoisting it up/down.

5. Secure the antenna by attaching the rope to the upper and lower lift eye before loosening the antenna.

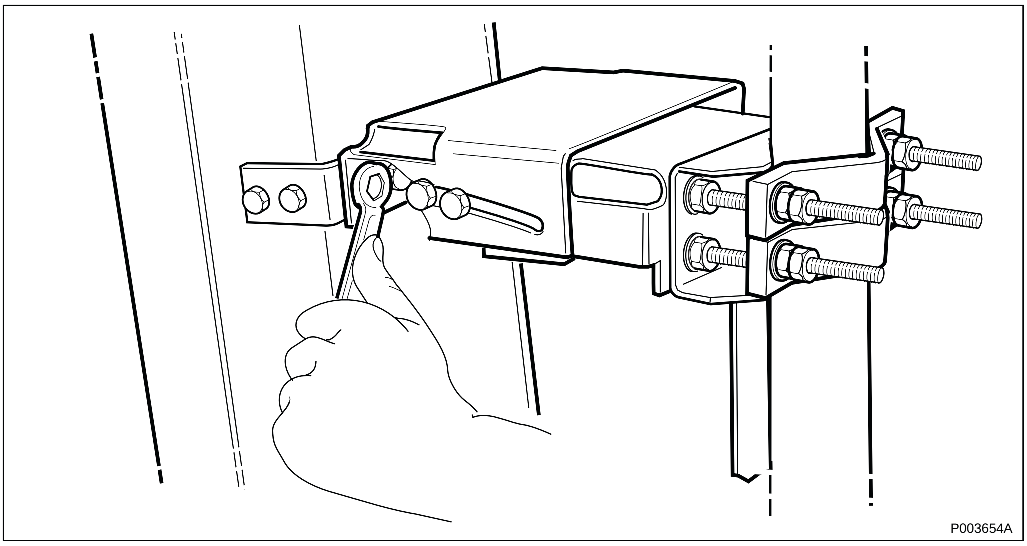


Figure 524 Loosening the four screws on the upper support

6. Loosen the four screws on the upper support.
7. Loosen the two screws on the lower part of the mounting fixture.

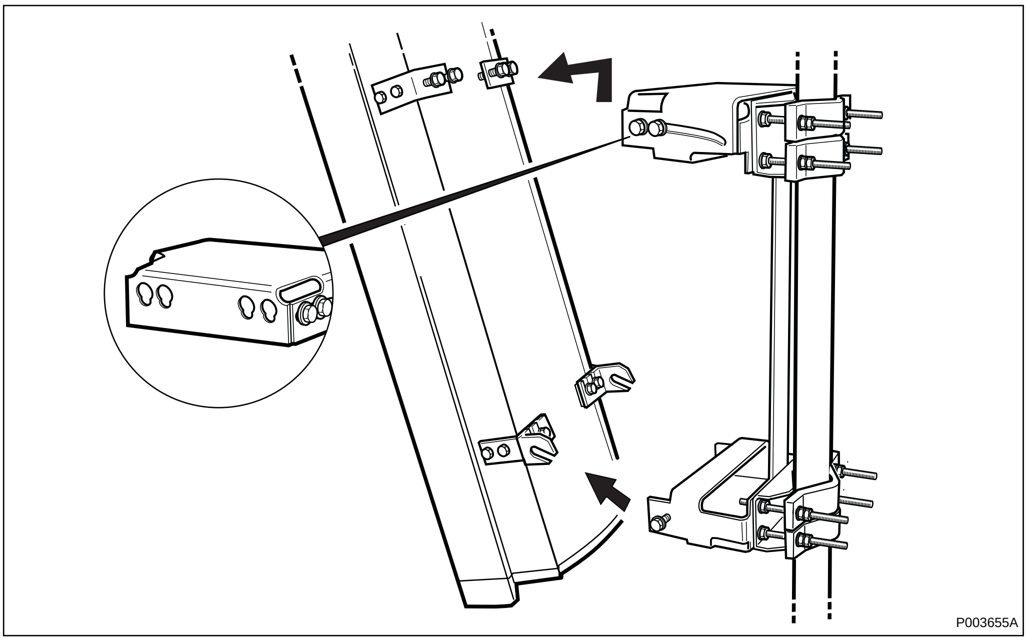


Figure 525 Unhooking the antenna

8. Lift the antenna up and out so that the four screws slide out of the keyholes.
9. Lift up the antenna from the two supporting screws.

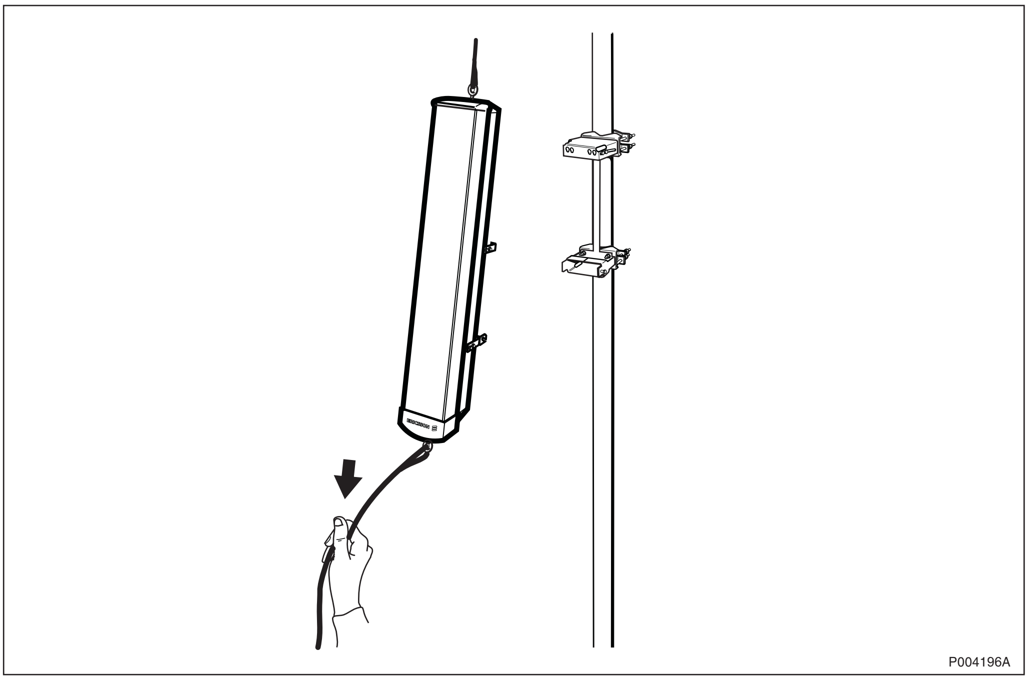


Figure 526 Guiding the AAU

10. Lower the AAU down to ground-level.
11. Dismount the upper and lower angle supports from the old AAU.
12. Dismount the upper and lower lift eye and mount them on the new antenna.

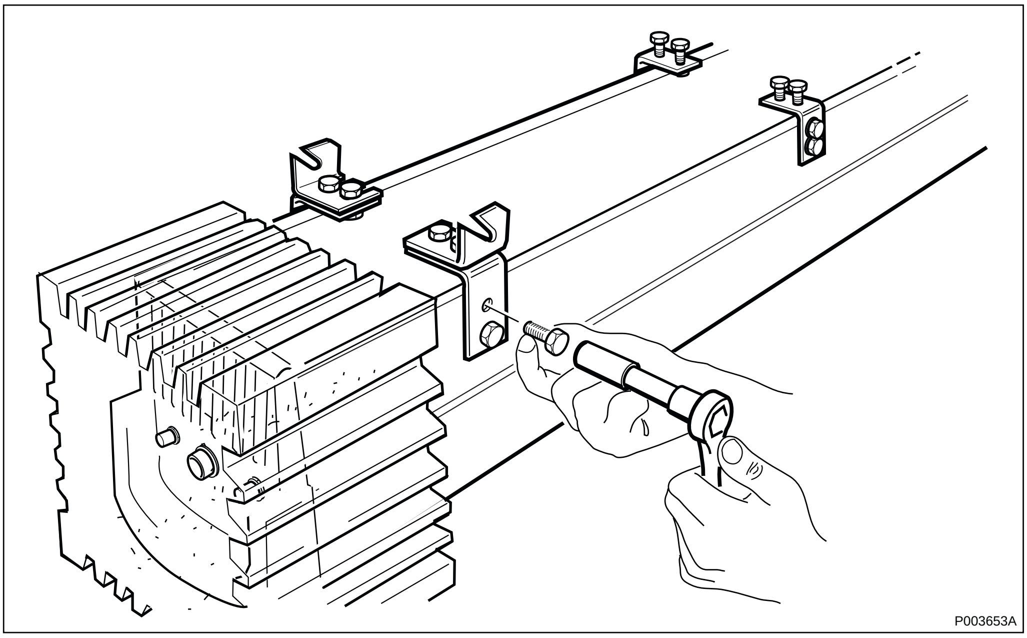


Figure 527 Mounting supports

13. Mount the upper and lower supports on the new antenna and if applicable, move the RF lightning protector from the old antenna to the new antenna.
14. Hoist the antenna up to the mounting fixture.

15. Mount the new antenna and reconnect all the cables.
16. Tighten all screws according to the torques given in Section 13.2.10 on page 430.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Change the Class 1 alarms to Class 2 with the OMT. This is done to avoid severe alarms in the BSC.
2. Perform the antenna attenuator settings to calibrate the antenna, *see chapter RBS Site Integration, section Connecting the RBS from the BSC, section Test Calls on Air Interface* and *section Network Integration Test*.
3. Change the Class 2 alarms that was changed in step 1 back to Class 1 with the OMT.
4. Perform the checklist in Section 13.10 on page 555.

13.6.3 Antenna Lightning Protection Unit (ALPU) 500 W EIRP/GSM 1800

Prior to replacement

WARNING

Radio frequency radiation. The radio frequency radiation from the antenna system might endanger your health. Switch off the transmitter when working with antennas or near them.

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the RBS installation box door.
3. Set the RBS to Local Mode.
4. Turn off the battery switch on the RBS.

5. Turn off the AC switch on the RBS.
6. Turn off the battery switch on the PBC.
7. Turn off the AC switch on the PBC.

Replacing the Lightning Protection Unit

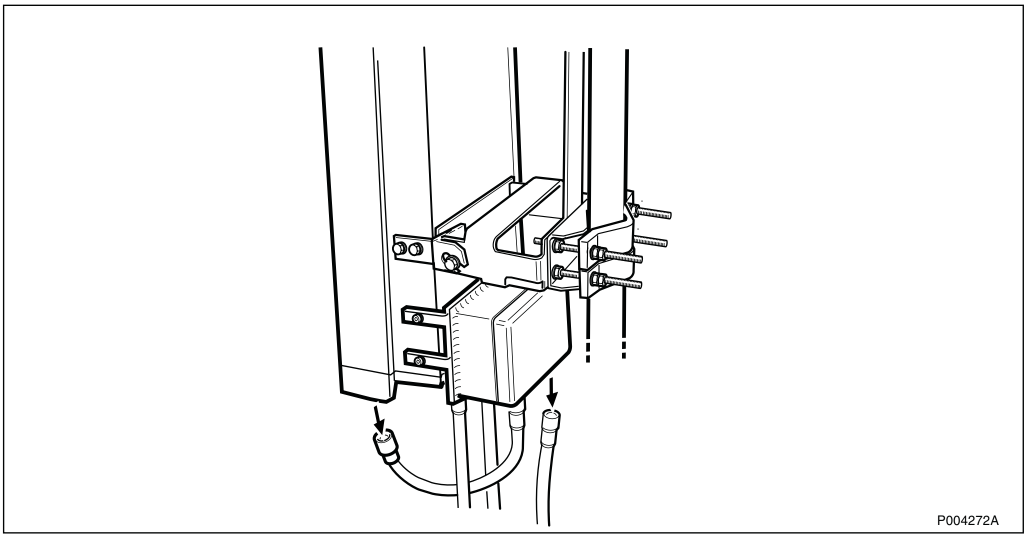


Figure 528 Disconnecting the cables

1. Disconnect the DC/Data cables to the AAU and the ALPU respectively.

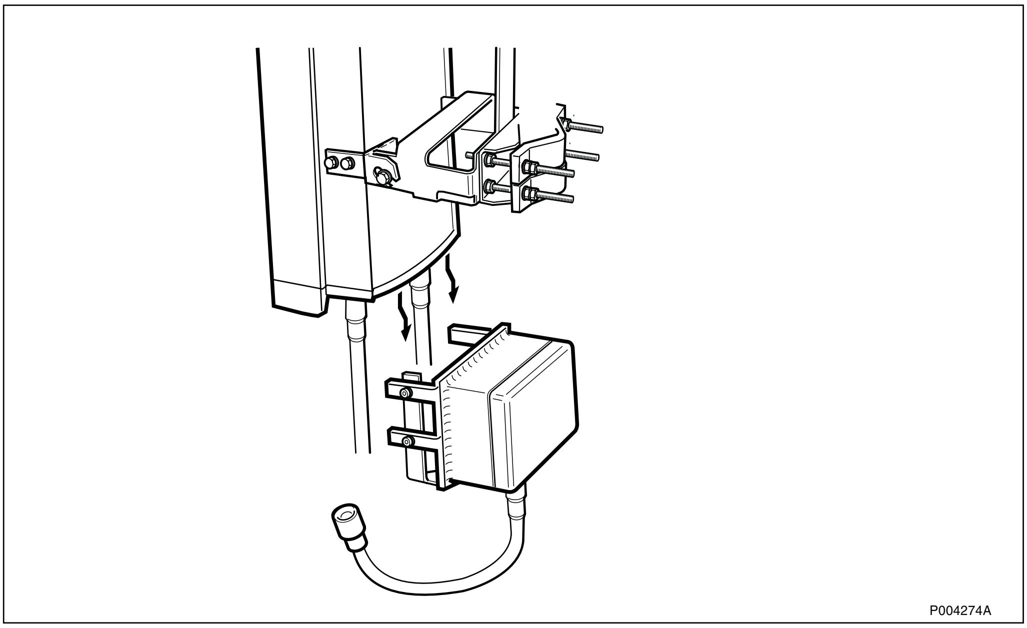


Figure 529 Loosening the ALPU from the mounting fixture

2. Loosen the ALPU from the antenna by unscrewing the 4 screws.
3. Mount the new ALPU.
4. Connect the two cables.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Verify that no active alarms are present at the MMI of the PBC.
2. Perform the antenna attenuator settings to calibrate the antenna, *see chapter RBS Site Integration, section Connecting the RBS from the BSC, section Test Calls on Air Interface* and *section Network Integration Test*.
3. Perform the checklist in Section 13.10 on page 555.

13.6.4 Active Antenna Unit, 500 W EIRP/GSM 1900

Prior to Replacement

WARNING

Radio frequency radiation. The radio frequency radiation from the antenna system might endanger your health. Switch off the transmitter when working with antennas or near them.

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the RBS installation box door.
3. Set the RBS to Local Mode.
4. Set the feeder attenuators to max.:

    1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
    2. Select code 4 on display element D3 with the Up or Down button.
    3. Press Enter.
    4. Wait until the code message 11H appears on the display. This confirms that the feeder attenuators are set to maximum attenuation.

5. Turn off the battery switch on the RBS.
6. Turn off the AC switch on the RBS.
7. Turn off the battery switch on the PBC.
8. Turn off the AC switch on the PBC.

Replacing the AAU

WARNING

⚠

Read the Safety chapter regarding handling of heavy goods.

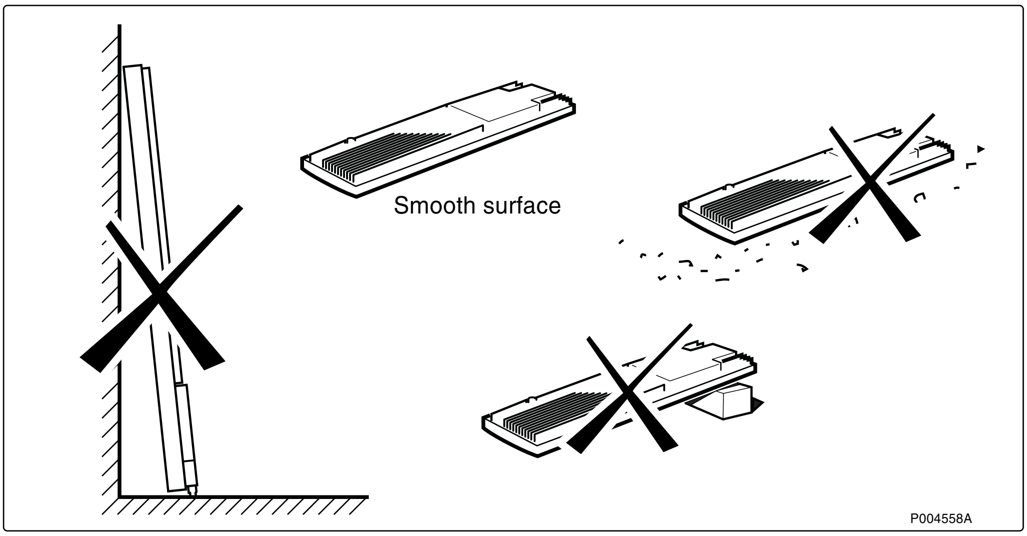


Figure 530 Handling the AAU

The construction of the bracket allows the AAU to be replaced without changing the tilt angle.

The AAU must be handled in such way that the Radom (front cover) is not exposed to pressure.

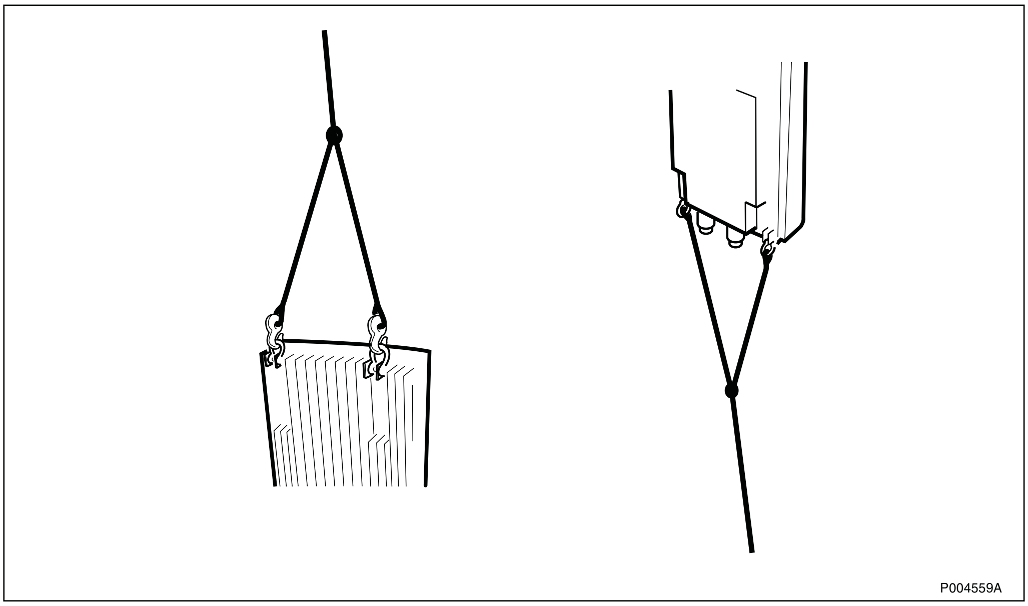


Figure 531 Securing the antenna in the lifting eyes

1. Secure the antenna by attaching a rope to the upper and lower lifting eyes before loosening the antenna.

Note: The antenna weighs about 60 kg [132 lb] when released from its mount.

2. Disconnect the cables including the earthing cable.

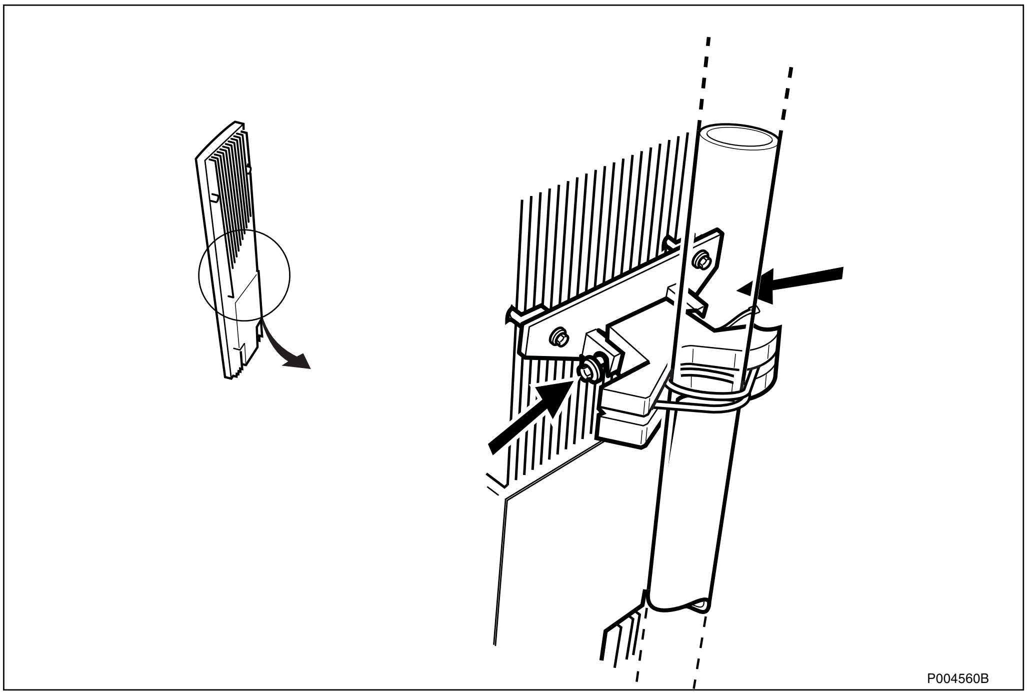


Figure 532 Releasing the two screws on the lower mount

3. Loosen the two screws on the lower mount until the antenna can be lifted out of the mount.

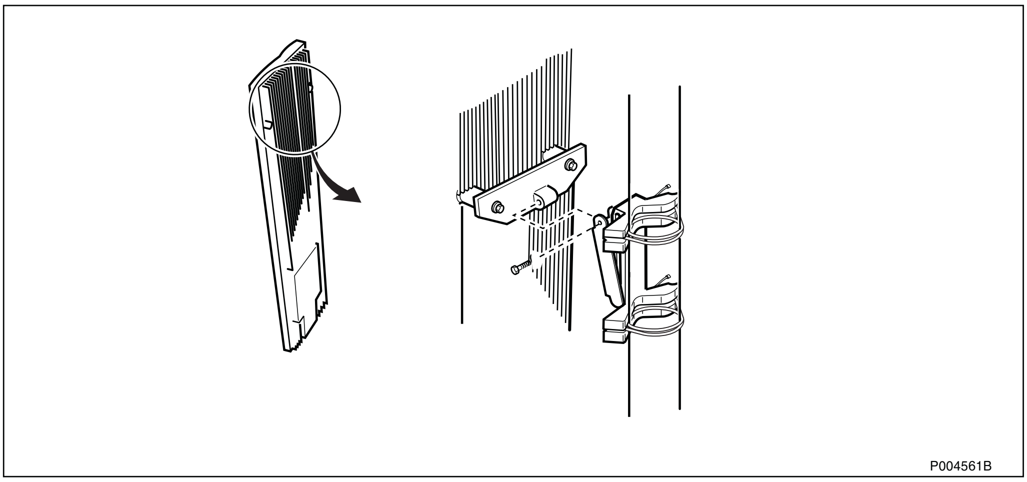


Figure 533 Unscrewing the screw on the upper mount

4. Unscrew and remove the screw on the upper mount close to the antenna to maintain the angle setting.

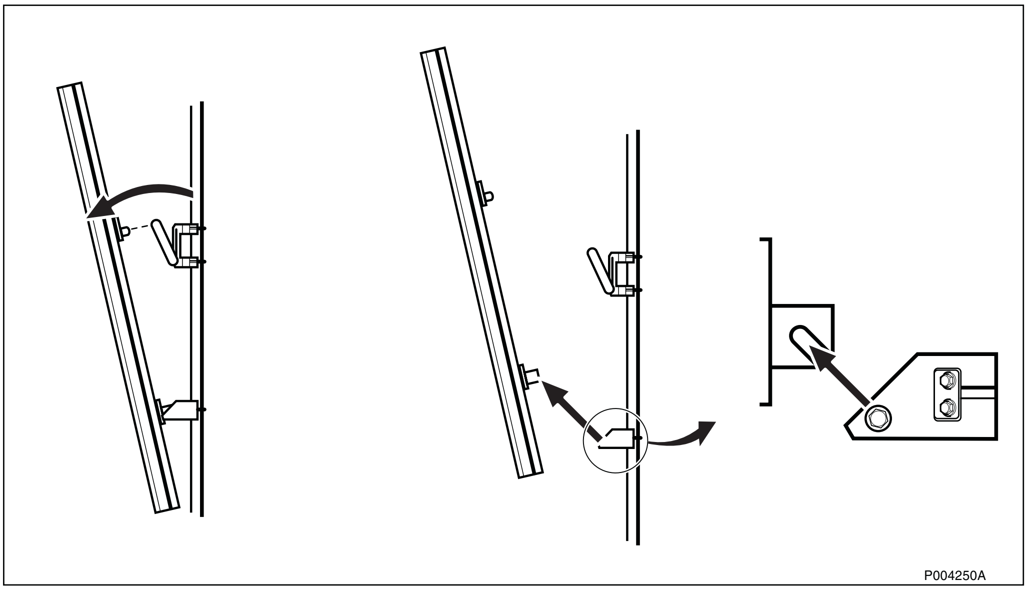


Figure 534 Lifting the antenna out of the mount while guiding it

5. Lift the antenna out of the mount while guiding it with the ropes attached to the lifting eyes to prevent the antenna from being damaged.

6. Lower the antenna down to the ground.

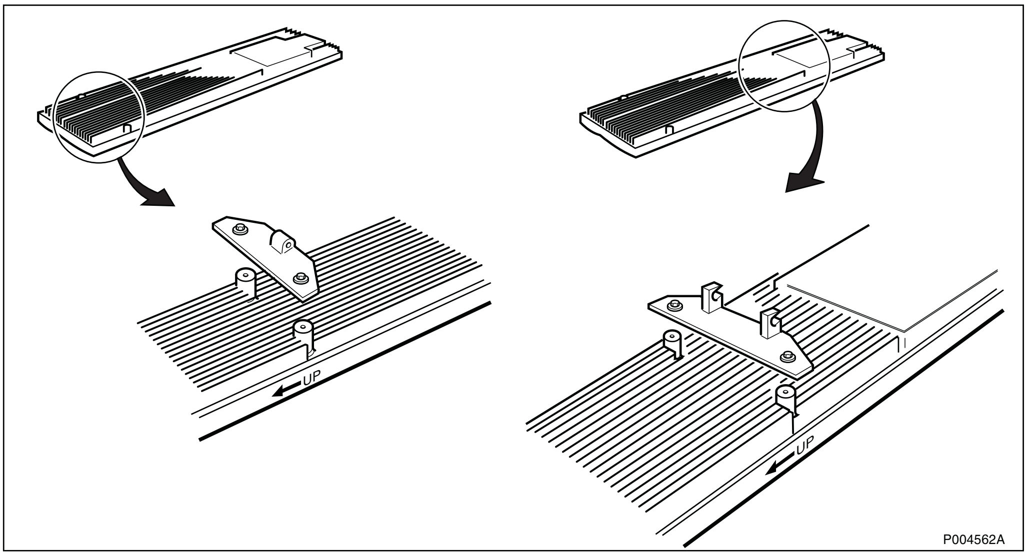


Figure 535 Remounting the brackets on the new antenna

7. Mount the brackets on the new antenna.
8. Hoist the antenna up to the mounting fixture.

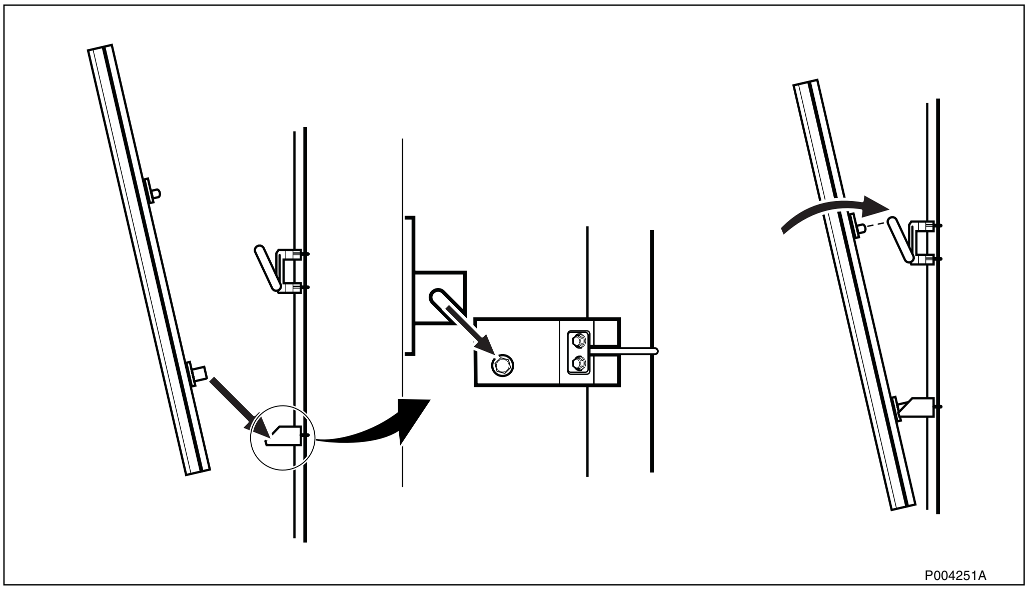


Figure 536 Sliding the antenna into the lower mount and tilt it up

9. Mount the new antenna by first sliding it into the lower mount and then securing it by tightening the upper screw.

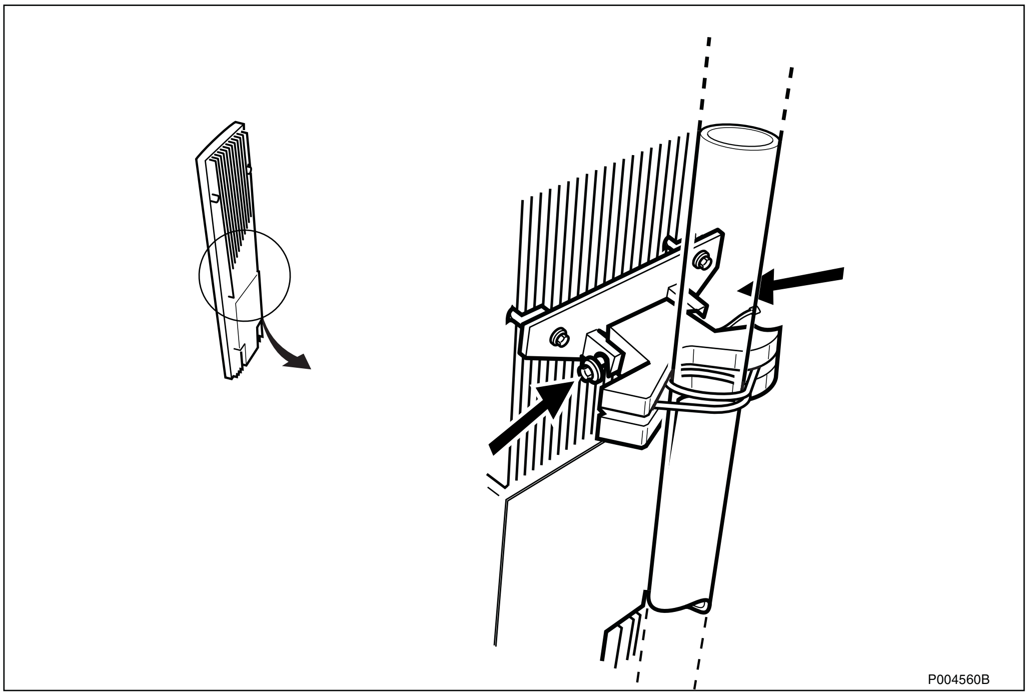


Figure 537 Tightening the two screws on the lower mount

10. Tighten the two screws on the lower mount.
11. Release the ropes from the lifting eyes.
12. Remount the cables including the earthing cable.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Change the Class 1 alarms to Class 2 with the OMT. This is done to avoid severe alarms in the BSC.
2. Perform the antenna attenuator settings to calibrate the antenna, *see chapter RBS Site Integration, section Connecting the RBS from the BSC, section Test Calls on Air Interface* and *section Network Integration Test*.
3. Change the Class 2 alarms that was changed in step 1 back to Class 1 with the OMT.
4. Perform the checklist in Section 13.10 on page 555.

13.6.5 Active Antenna Unit, 1250 W EIRP/GSM 1900

Prior to Replacement

WARNING

Radio frequency radiation. The radio frequency radiation from the antenna system might endanger your health. Switch off the transmitter when working with antennas or near them.

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the RBS installation box door.
3. Set the RBS to Local Mode.
4. Set the feeder attenuators to max.:
    1. Press Menu. Code 0 is shown on the display elements D1, D2 and D3.
    2. Select code 4 on display element D3 with the Up or Down button.
    3. Press Enter.
    4. Wait until the code message 11H appears on the display. This confirms that the feeder attenuators are set to maximum attenuation.
5. Turn off the battery switch on the RBS.
6. Turn off the AC switch on the RBS.
7. Turn off the battery switch on the PBC.
8. Turn off the AC switch on the PBC.

Replacing the AAU

WARNING

⚠

Read the Safety chapter regarding handling of heavy goods.

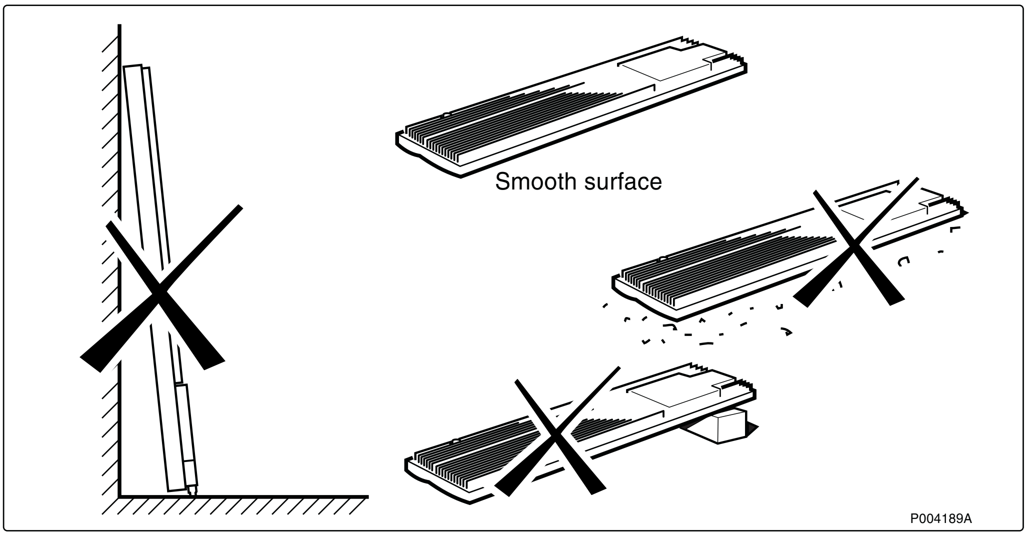


Figure 538 Handling the AAU

The construction of the bracket allows the AAU to be replaced without changing the tilt angle.

The AAU must be handled in such way that the Radom (front cover) is not exposed to pressure.

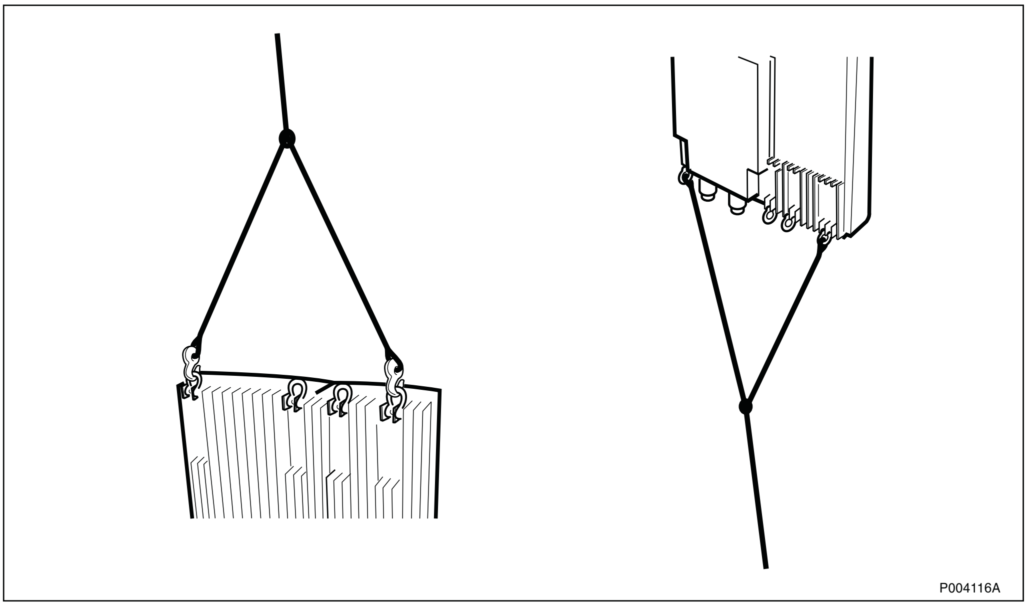


Figure 539 Securing the antenna in the lifting eyes

1. Secure the antenna by attaching a rope to the upper and lower lifting eyes before loosening the antenna.

Note: The antenna weighs about 60 kg [132 lb] when released from its mount. With Tx-module mounted the antenna weighs about 85 kg [187 lb].

2. Disconnect the cables including the earthing cable.

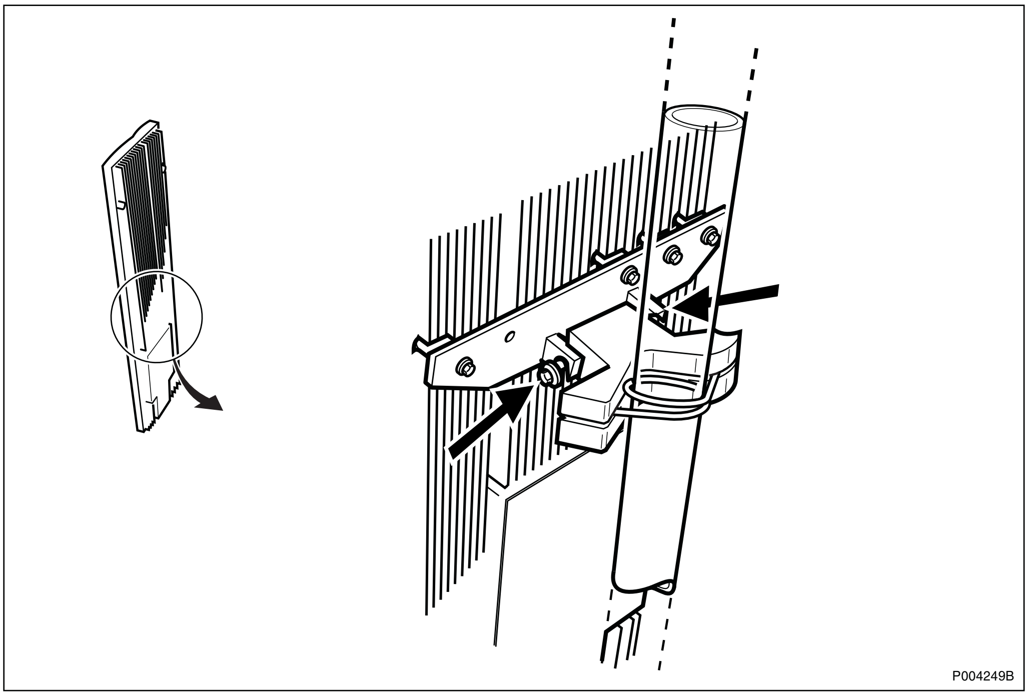


Figure 540 Releasing the two screws on the lower mount

3. Loosen the two screws on the lower mount until the antenna can be lifted out of the mount.

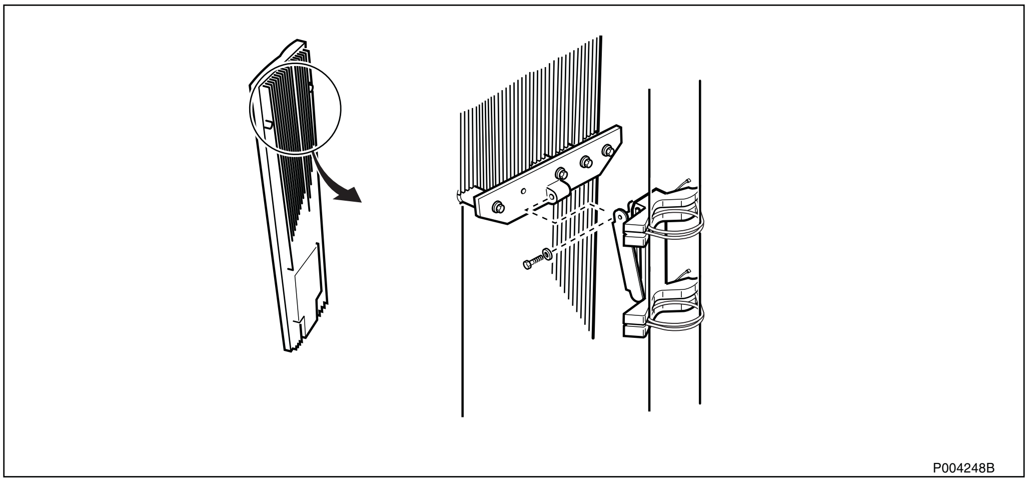


Figure 541 Unscrewing the screw on the upper mount

4. Unscrew and remove the screw on the upper mount close to the antenna to maintain the angle setting.

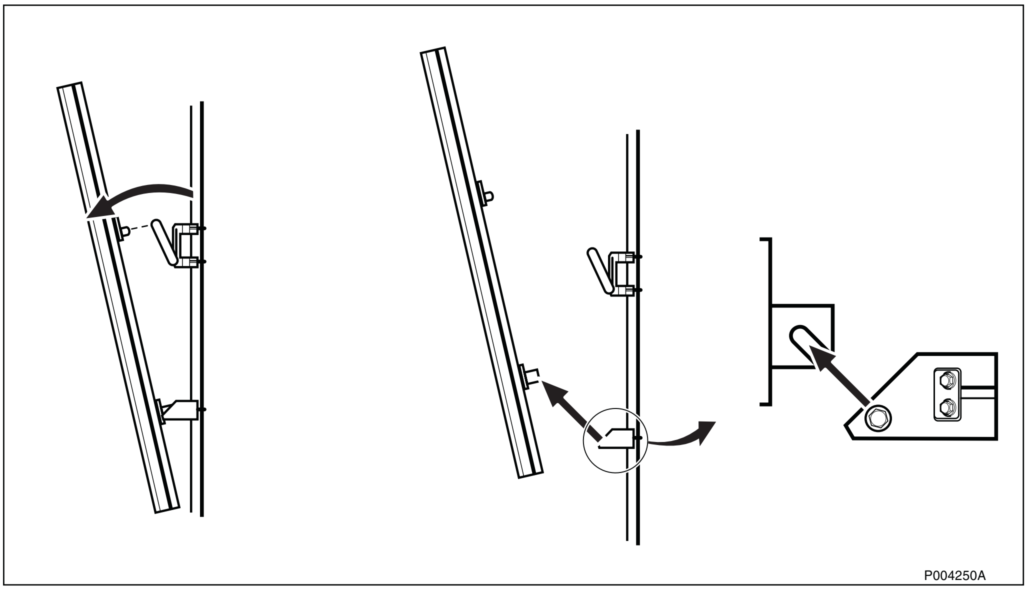


Figure 542 Lifting the antenna out of the mount while guiding it

5. Lift the antenna out of the mount while guiding it with the ropes attached to the lifting eyes to prevent the antenna from being damaged.

6. Lower the antenna down to the ground.

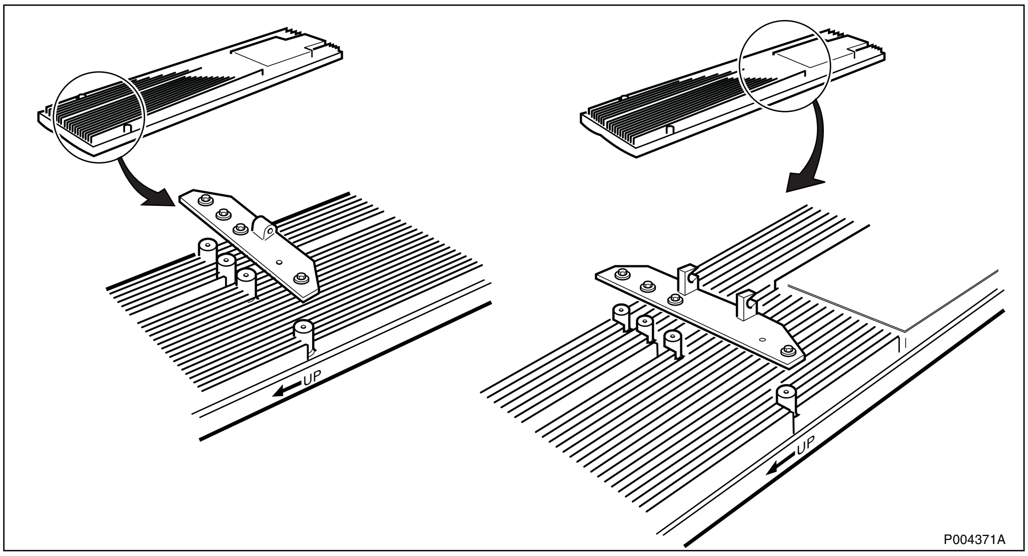


Figure 543 Remounting the brackets on the new antenna

7. Replace the faulty module and/or the cables between the modules.

8. Hoist the antenna up to the mounting fixture.

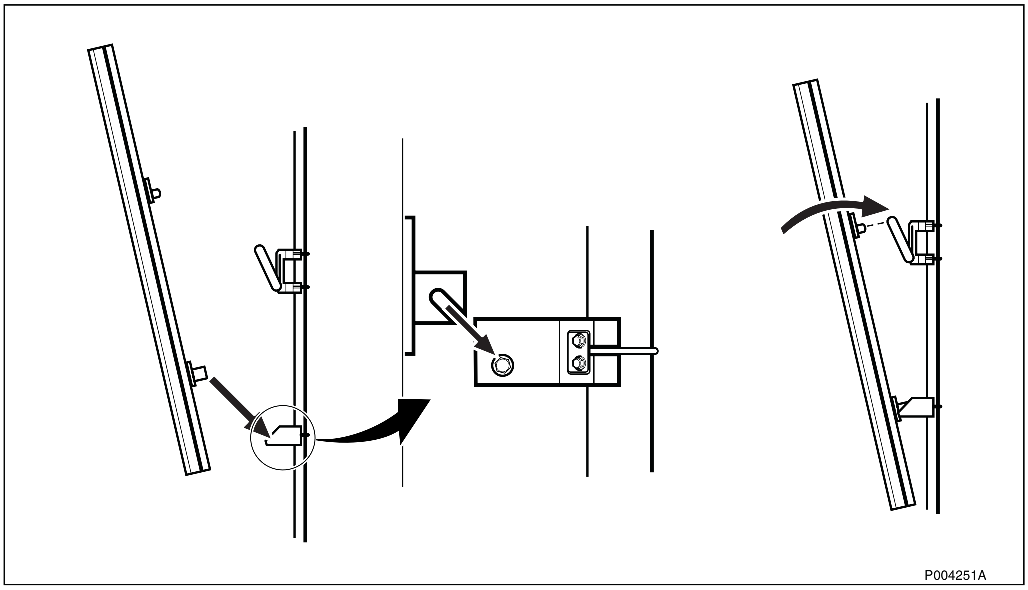


Figure 544 Sliding the antenna into the lower mount and tilt it up

9. Mount the new antenna by first sliding it into the lower mount and then securing it by tightening the upper screw.

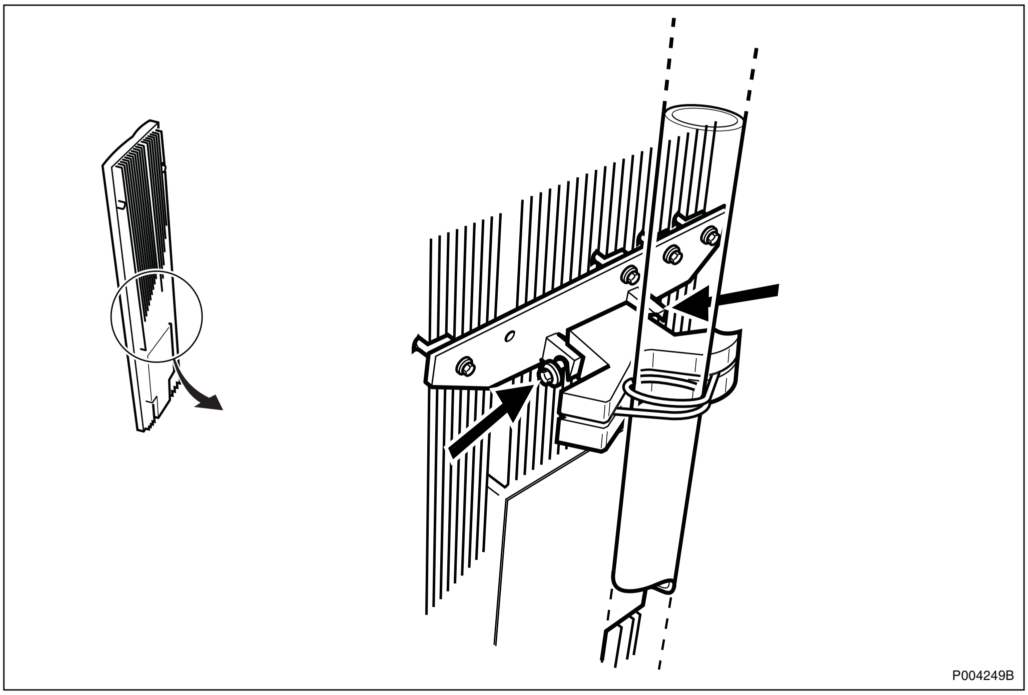


Figure 545 Tightening the two screws on the lower mount

10. Tighten the two screws on the lower mount.
11. Release the ropes from the lifting eyes.
12. Remount the cables including the earthing cable.

Set to operation

1. Turn the AC Mains Power switch to ON position.

2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Change the Class 1 alarms to Class 2 with the OMT. This is done to avoid severe alarms in the BSC.
2. Perform the antenna attenuator settings to calibrate the antenna, *see chapter RBS Site Integration, section Connecting the RBS from the BSC, section Test Calls on Air Interface* and *section Network Integration Test*.
3. Change the Class 2 alarms that was changed in step 1 back to Class 1 with the OMT.
4. Perform the checklist in Section 13.10 on page 555.

13.6.6 Antenna Lightning Protection Unit (ALPU), 500/1250 W EIRP/ GSM 1900

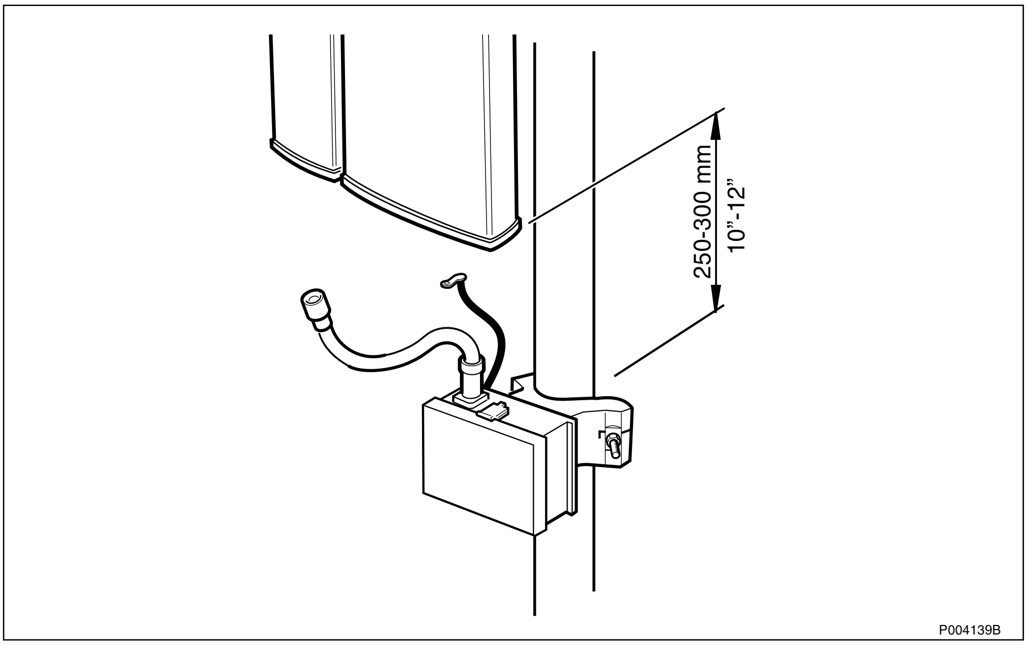


Figure 546 ALPU overview

Prior to replacement

> **WARNING**
>
> **Radio frequency radiation. The radio frequency radiation from the antenna system might endanger your health. Switch off the transmitter when working with antennas or near them.**

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the RBS installation box door.
3. Set the RBS to Local Mode.
4. Turn off the battery switch on the RBS.
5. Turn off the AC switch on the RBS.
6. Turn off the battery switch on the PBC.
7. Turn off the AC switch on the PBC.

Replacing the ALPU circuit board

1. Open the ALPU cover by unsnapping the latch.

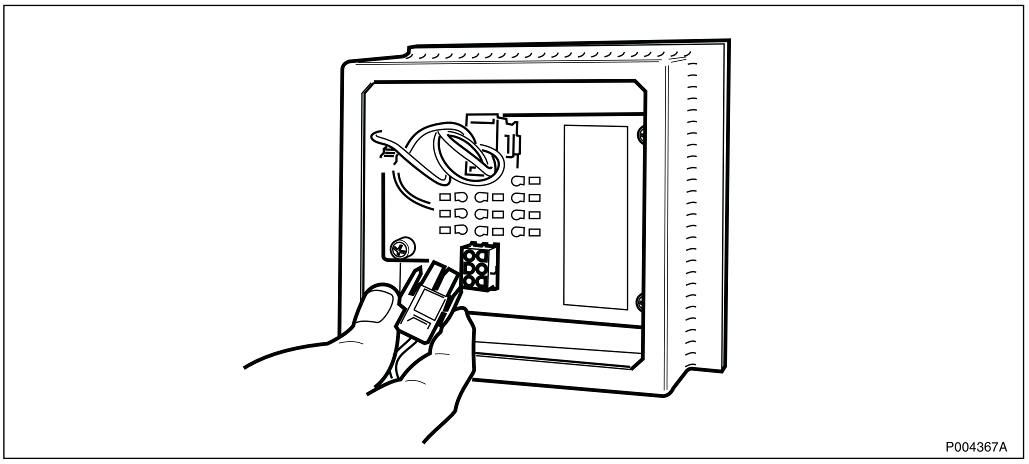


Figure 547 Unplugging the cables

2. Loosen the cables from the board by unplugging them.

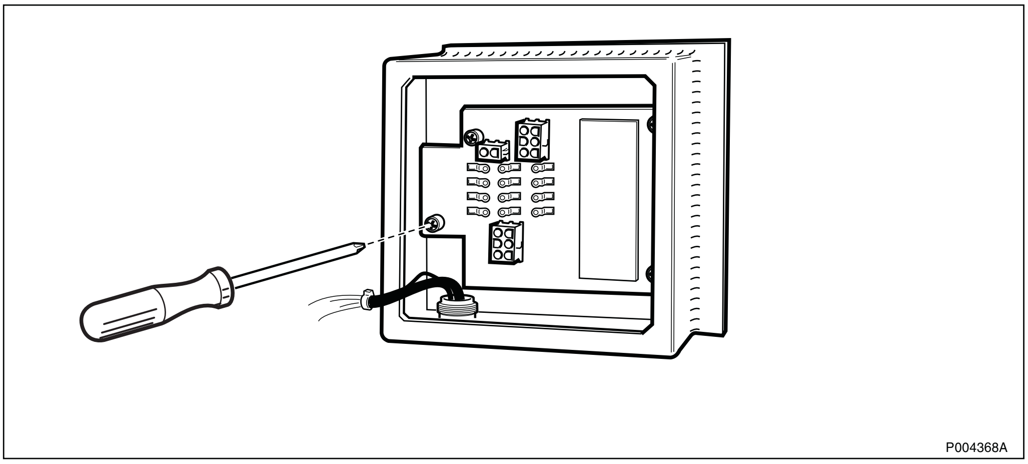


Figure 548 Removing the faulty board

3. Remove the faulty board by unscrewing the 4 screws with a Philips screwdriver.
4. Insert the new board by reversing the procedure above.
5. Plug in the cables in the new board.
6. Remount the ALPU cover by fastening the latch.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Verify that fault code 126 is not present at the MMI of the PBC.
2. Reset historical ALPU alarm (fault code 107) with command 005.
3. Perform the checklist in Section 13.10 on page 555.

13.7 Preventive Maintenance for the RBS

This chapter provides information about the units requiring regular inspection and recommended intervals. Preventive Maintenance is performed to inspect and correct faults before they cause serious damage to the equipment.

The interval between inspections at each RBS site varies depending upon the environmental conditions found there. Outdoor sites are exposed to larger amounts of contaminants and, therefore, require more maintenance than indoor sites. The RBS operator can decide to increase or decrease the recommended interval between inspections as required.

RBS Maintenance Schedule

Table 76 RBS maintenance schedule

1) Inspect the sunshields	Every time the RBS unit is controlled or repaired
2) Clean the cooling flanges	3-5 years between cleaning
3) Exchange the batteries	Exchange batteries at 5 year intervals
4) Exchange the connection board	Exchange the connection at 10 year intervals
5) Exchange the transmission board	Exchange the transmission board at 10 year intervals
6) Exchange the AC board	Exchange the AC board at 10 year intervals
7) Internal synchronisation (optional)	Calibrate at 3 year intervals

13.7.1 Sunshields

To exchange the sunshields, *see Section 13.4.2 on page 449*.

Table 77 Checklist Sunshield

Checklist	**Yes**	**No**	**Need of repair**
1) Are the sunshields dirty?			
2) Are the sunshields damaged?			
3) Are the sunshields discoloured?			
4) Are the sunshields mounted correctly?			
Signature:			
Date:			

Corrective actions

1. Clean the sunshield with a mild detergent.
2. Exchange the sunshields if they are damaged, discoloured or deformed due to high temperature.

13.7.2 Cooling flanges

1. Remove the sunshields, *see Section 13.4.2 on page 449*.
2. Clean the cooling flanges on the front with a soft brush.
3. Clean the sunshield, if necessary.
4. Clean the cooling flanges on the back of the radio cabinet.

13.7.3 Connection Board

To exchange the RBS Connection board, *see Section 13.4.7 on page 471*.

13.7.4 Transmission Board

To exchange the RBS transmission board, *see Section 13.4.8 on page 475*.

13.7.5 AC Board

To exchange the RBS AC board, *see Section 13.4.9 on page 479*.

13.7.6 Internal Synchronization (optional)

Note: It is not necessary to remove the RBS from operation in order to calibrate it.

If you need more information, *see Section 13.4.11 Internal Synchronization (Calibrate Oscillator) on page 488*.

This routine is only to be performed on a radio cabinet with an optional reference oscillator in use. Since the frequency counter is depending on environment/external conditions, it is recommended to perform the calibration indoors. For further information about external conditions, see the manual for the Frequency Counter.

Note: The limit value for a class 2 fault on the CF is 16 Hz and for a class 1 fault 40 Hz.

Connect the cable SMB-BNC between the 13 MHz-port on the Distribution Panel and the frequency counter.

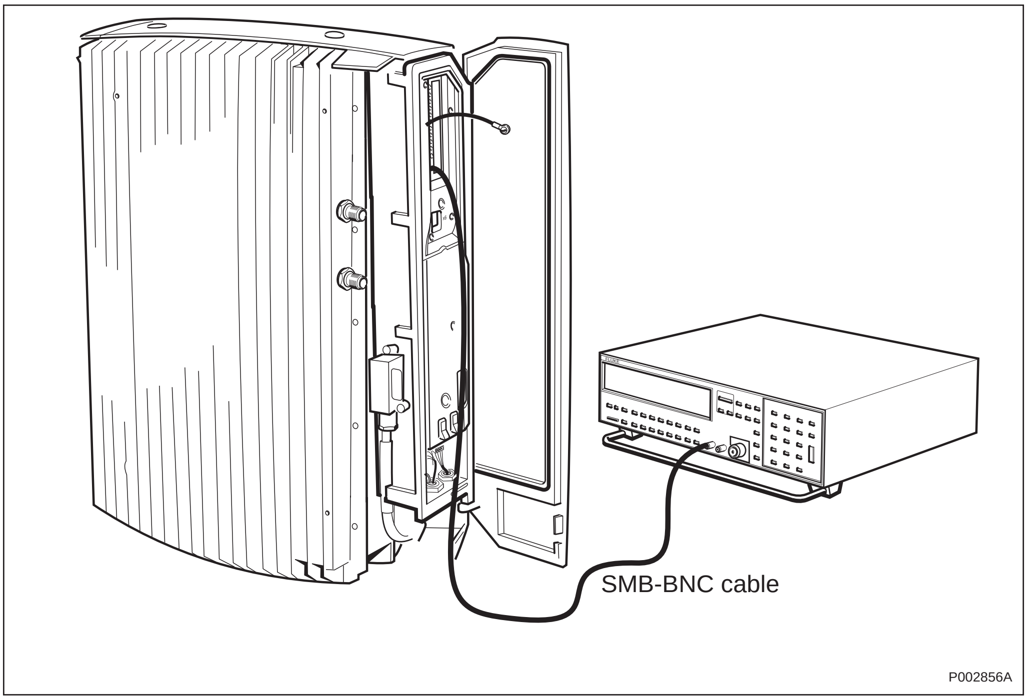


Figure 549 Calibrating the Radio cabinet

Measure with an accuracy higher than 9 digits. Use an OMT R20 (or later) to calibrate the internal oscillator if the frequency differs more than 0.65 Hz from 13 MHz. For further information on the use of the OMT, see:

OMT User's Manual *LZN 302 01*

13.8 Preventive Maintenance for the PBC

This chapter provides information about the units requiring regular inspection and recommended intervals. Preventive Maintenance is performed to inspect and correct faults before they cause serious damage to the equipment.

The interval between inspections at each RBS site varies depending upon the environmental conditions found there. Outdoor sites are exposed to larger amounts of contaminants and, therefore, require more maintenance than indoor sites. The RBS operator can decide to increase or decrease the recommended interval between inspections as required.

PBC Maintenance Schedule

Table 78 PBC maintenance schedule

1) Inspect the sunshields	Every time the PBC unit is controlled or repaired
2) Clean the cooling flanges	3-5 years between cleaning
3) Exchange the batteries	Exchange the batteries at 5 year intervals
4) Exchange the EMC board	Exchange the EMC board at 10 year intervals
5) Exchange the DC surge board	Exchange the DC surge board at 10 year intervals
6) Exchange the AC board	Exchange the AC board at 10 year intervals

13.8.1 Sunshields

For information regarding exchanging sunshields, *see Section 13.5.1 on page 490*.

Table 79 Checklist sunshield

Checklist	**Yes**	**No**	**Need of repair**
1) Are the sunshields dirty?			
2) Are the sunshields damaged?			
3) Are the sunshields discoloured?			
4) Are the sunshields mounted correctly?			
Signature:			
Date:			

Corrective actions

1. Clean the sunshield with a mild detergent.
2. Exchange the sunshields if they are damaged, discoloured or deformed due to high temperature.

13.8.2 Cooling flanges

1. Remove the sunshields, *see Section 13.5.1 on page 490*.

2. Clean the cooling flanges on the front with a soft brush.
3. Clean the sunshield, if necessary.
4. Clean the cooling flanges on the back of the battery cabinet.

13.8.3 Batteries

For information regarding exchanging the batteries, *see Section 13.5.2 on page 497*.

Table 80 Battery checklist

Checklist	**Yes**	**No**
1. Are the batteries and battery compartment free from dirt, excessive grease, oxidation and corrosion?		
2. Is the battery compartement free from discolouration and not deformed?		
3. Are the batteries still within its replacement date?		
4. Are the batteries leaking acid?		
Signature:		
Date:		

Corrective actions

1. Clean the batteries and battery box with a mild detergent and a soft brush. Remove oxidation and corrosion.
2. If the batteries are deformed or discoloured, exchange the batteries.
3. If the battery poles are damaged, exchange the batteries.
4. Exchange the batteries if the *Use before* date has passed.

13.8.4 EMC Board

To exchange the PBC EMC board, *see Section 13.5.6 on page 518*.

13.8.5 DC Surge Board

To exchange the PBC DC Surge board, *see Section 13.5.7 on page 521*.

13.8.6 AC Board

To exchange the PBC AC board, *see Section 13.5.8 on page 524*.

13.9 AAU Maintenance Schedule

Table 81 AAU maintenance schedule

1) Inspect the front cover	Every time the RBS unit is controlled or repaired
2) Clean the cooling flanges	When required depending on environmental conditions

13.9.1 Front cover

Table 82 Checklist front cover

Checklist	Yes	No	Need of repair
1) Is the front cover dirty?			
2) Is the front cover damaged?			
3) Is the front cover discoloured?			
Signature:			
Date:			

Corrective actions

1. Clean the front cover with a mild detergent.
2. Replace the antenna if the front cover is damaged or discoloured.

13.9.2 Cooling flanges

Make sure that the cooling flanges are clean, so that proper cooling is maintained.

13.10 Concluding Routines

The following checklist is not mandatory but strongly recommended. Local procedures and safety regulations must be evaluated and incorporated into this checklist.

If the answer to any of the items is NO, do not leave the site until the problem/fault has been cleared or investigated.

Table 83 Checklist

Checklist	Yes	No
1. Red fault indicator off?		
2. Operational indicator (green LED) lit?		
3. RBS in remote mode? (Yellow local mode on DP is off)		
4. Other yellow indicators OFF?		
5. External alarm OFF? (Yellow)		
6. Cabinet locked?		
7. Is the backup copy of the RBS IDB saved on a floppy disk?		
Signature:		
Date:		

13.10.1 Transport of a Faulty Unit

The faulty unit should be transported in the same packaging materials as the spare unit was delivered in.

13.10.2 Report of Finished Work

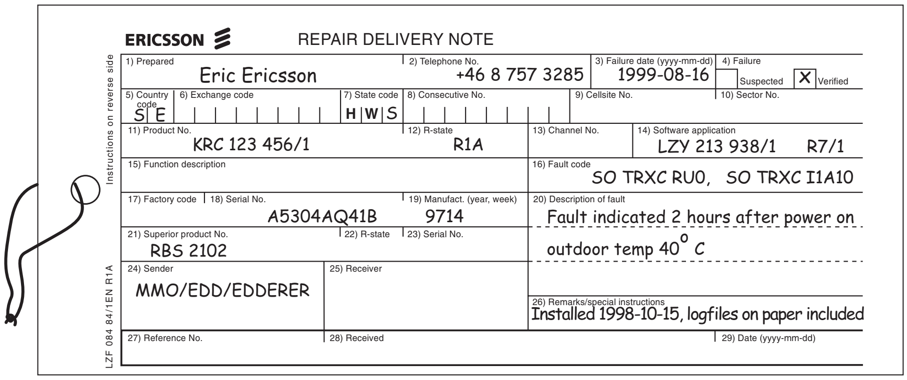
When a maintenance procedure has been completed, a report should be written including a detailed description of actions taken, all observations made in accordance with local routines for work orders, site log-book, etc.

13.10.3 Repair Delivery Note - “Blue Tag”

When a faulty unit is returned, it must always be accompanied by a repair delivery note. When the repair delivery note has been completed it must be attached to the faulty unit before sending it for repair.

The repair delivery note (LZF 084 84) can be ordered from the local FSC. A description of how to fill in a repair delivery note follows below.

Note: Add as much information as possible to Field 20 on the Repair Delivery Note to make it easier for the repair center.



ERICSSON REPAIR DELIVERY NOTE

Instructions on reverse side

1) Prepared: Eric Ericsson
2) Telephone No.: +46 8 757 3285
3) Failure date (yyyy-mm-dd): 1999-08-16
4) Failure: Suspected / X Verified
5) Country code: S E
6) Exchange code
7) State code: H W S
8) Consecutive No.
9) Cellsite No.
10) Sector No.
11) Product No.: KRC 123 456/1
12) R-state: R1A
13) Channel No.
14) Software application: LZY 213 938/1 R7/1
15) Function description
16) Fault code: SO TRXC RU0, SO TRXC I1A10
17) Factory code
18) Serial No.: A5304AQ41B
19) Manufact. (year, week): 9714
20) Description of fault: Fault indicated 2 hours after power on outdoor temp 40° C
21) Superior product No.: RBS 2102
22) R-state
23) Serial No.
24) Sender: MMO/EDD/EDDERER
25) Receiver
26) Remarks/special instructions: Installed 1998-10-15, logfiles on paper included
27) Reference No.
28) Received
29) Date (yyyy-mm-dd)

LZF 084 84/1EN R1A

The following fields are mandatory. Use block letters.

1	Prepared	Service technician´s name
2	Telephone	Service technician´s telephone number
3	Failure date	
4	Failure	Mark with an X if failure is Suspected or Verified
5	Country code	Two letter country code
7	State code	Hardware (HW) status when failure occurred: S = Unit in service when failure occurred (Repair) T = New unit failed during installation or test (Claim) R = Repaired unit failed during installation or test (Claim or Repair)
11	Product No.	Faulty unit
12	R-state	Faulty unit
14	Software application	RBS load, product number and R-state
16	Fault code	Check OMT or work order
18	Serial No.	Faulty unit
19	Manufact. (year week)	
20	Description of fault	Observations and external factors
21	Superior product No.	RBS type
24	Sender	Customer, Company, Corporate ID
26	Remarks/special instructions	Information about installation date, logfiles and modification requirements

P005537C

Figure 550 The “Blue tag”

OMT fault log — If there is a OMT fault log, it should be sent in with the “Blue Tag” on the faulty unit.

14 Product Data

This section describes the various hardware units in Maxite. It will form a basis for site requirements for Maxite. Additional information can be found in:

Reference Manual *LZN 302 77*

14.1 Radio Base Station RBS 2302

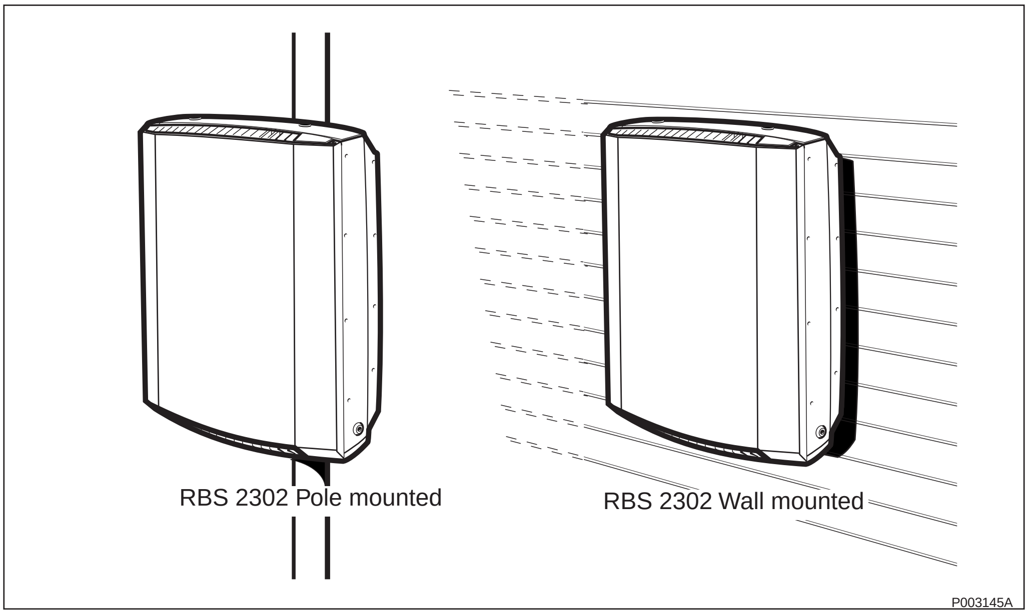


Figure 551 RBS 2302

The base station contains two low-power transceivers, and can be equipped with integrated antennas. Integrated sector or omnidirectional antennas are available for that purpose.

The RBS consists of the following main units:

- Mounting base
- Cabinet
- Sunshields

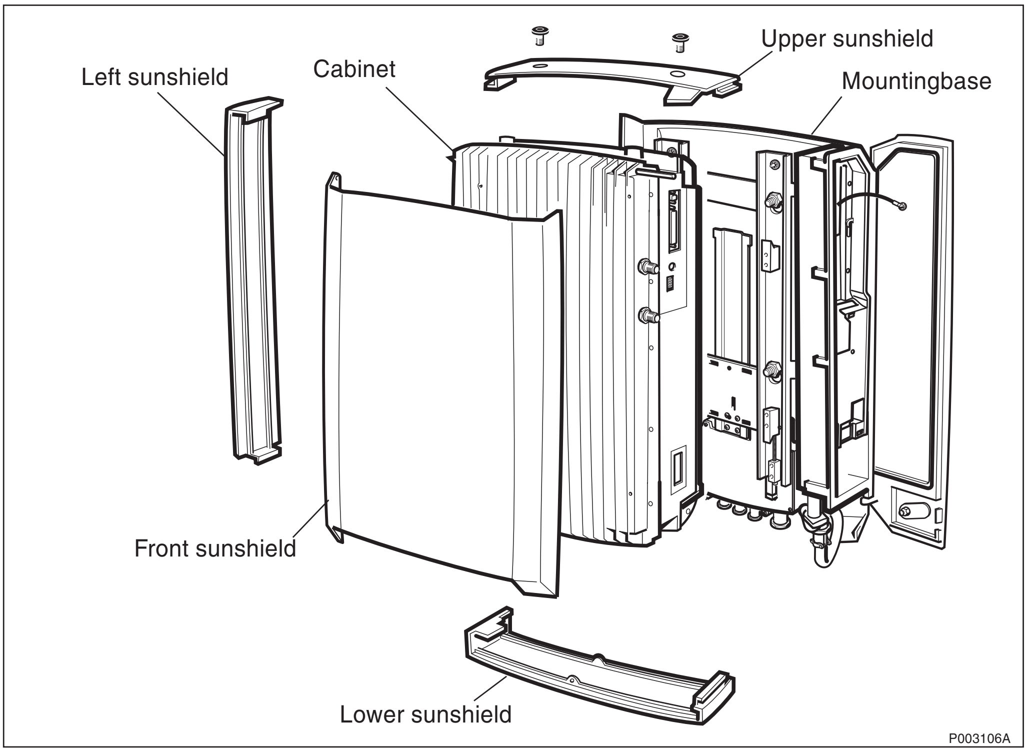


Figure 552 Main units

14.1.1 Wall Mounting

The mounting plate is used to fix the base station to a flat surface. In combination with the pole fixture it is also used to install the base station on a pole.

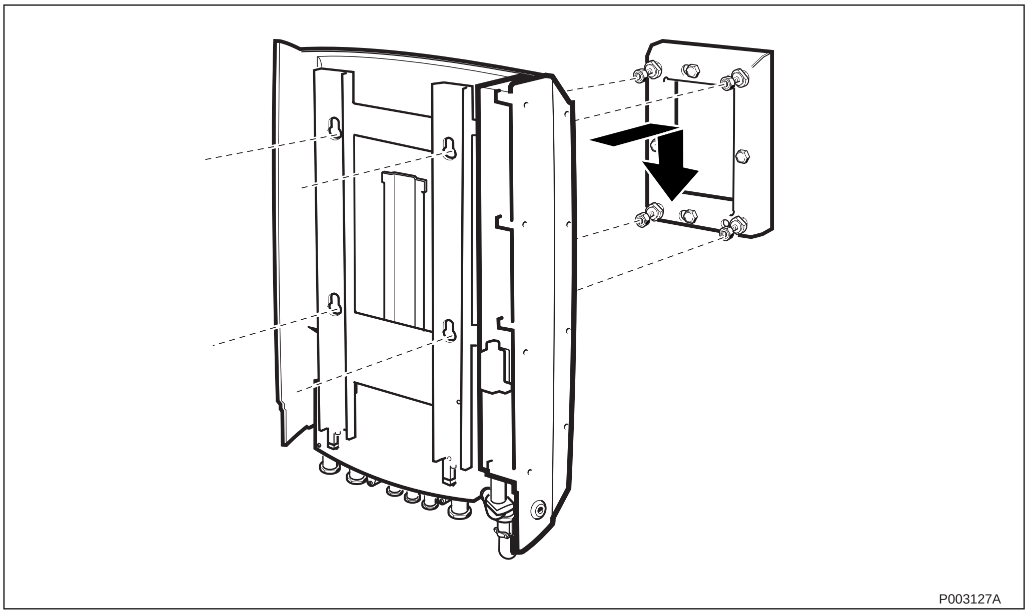


Figure 553 Mounting base and mounting plate

No separate template is required to mark out holes. The mounting plate is also used as a marking template.

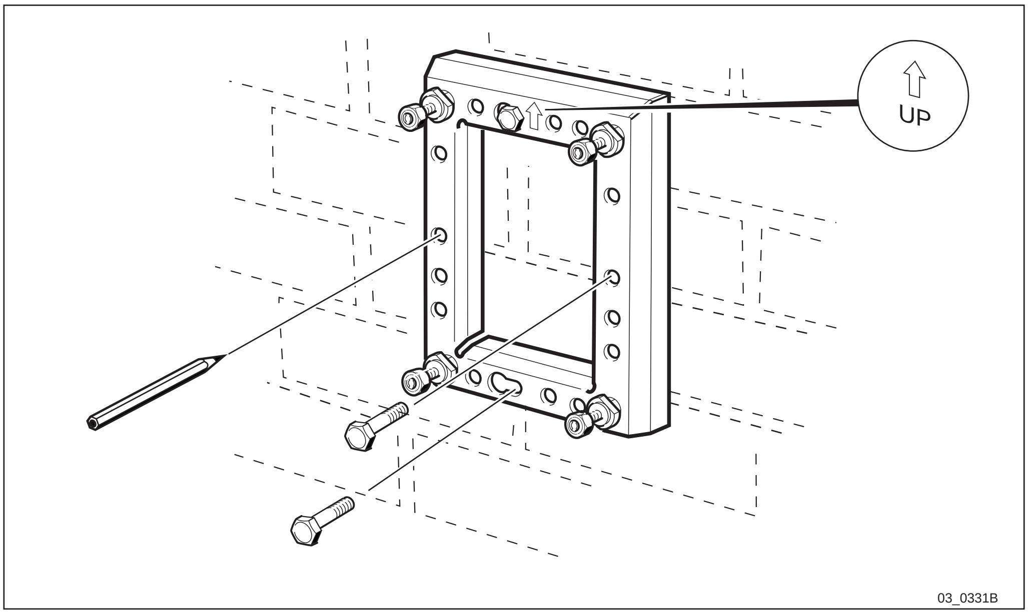


Figure 554 Mounting plate

14.1.2 Pole Mounting

The pole fixture is attached to the mounting plate if the base station is to be mounted on a tubular mast or pole. The pole fixture will attach to a round tube having a diameter of 60–114 mm.

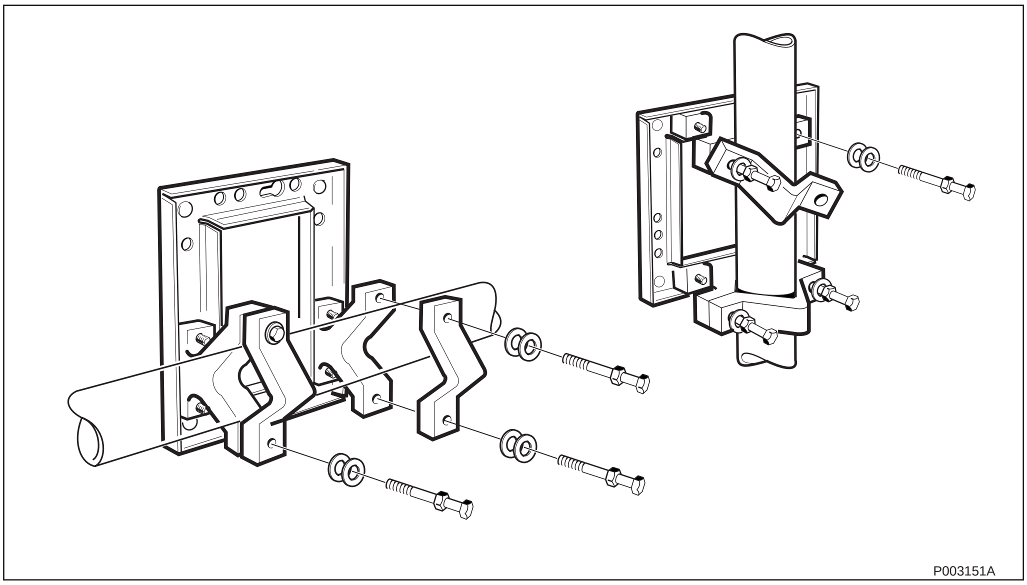


Figure 555 Pole fixture and mounting plate mounted on a tube

14.1.3 Optional HDSL transmission module

The RBS 2302 can be fitted with an optional HDSL (High-bit rate Digital Subscriber Line) modem module, fitted in a modified mounting base door. A description of the mounting of the HDSL modem is included in *chapter Installation of RBS 2302*, and the configurations are presented in *chapter Site Installation Tests*. The technical descriptions are presented in *Section 14.7 HDSL Modem on page 586*.

14.1.4 Lifting Kit (optional)

A lifting kit is available as an option.

Note: The Lifting Kit cannot be attached to the mounting fixture when it is mounted on a horizontal tube as shown to the left in *Figure 555 on page 559.* The mounting holes for the lifting kit are blocked by the pole fixture.

Note: The Lifting Kit is designed to lift maximum 25 kg (55 lbs). It is not designed to lift the PBC cabinet assembled with batteries.

For more information about using the Lifting Device *see chapter Installation of RBS 2302.*

14.1.5 Dimensions and Weight

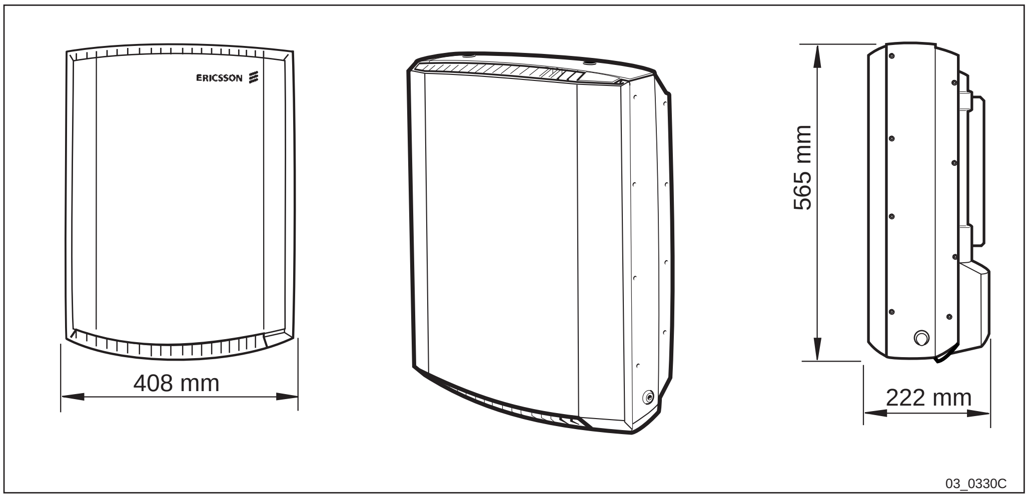


Figure 556 Dimensions

Table 84 Weights

Cabinet	18 kg	40 lb
Mounting base	8 kg	18 lb
Wall and pole mounting details	5 kg	11 lb
Total weight	31 kg	69 lb

14.1.6 Space Requirements

Free space is required around the base station for installation and maintenance. When more than one cabinet is installed at the same site, a certain distance between the cabinets is required for antenna isolation and to provide sufficient working space.

Furthermore, integrated antennas require that no large objects are situated in front of the antenna obstructing the radio beam.

The cabinet must always be installed vertically and with the cable inlets down.

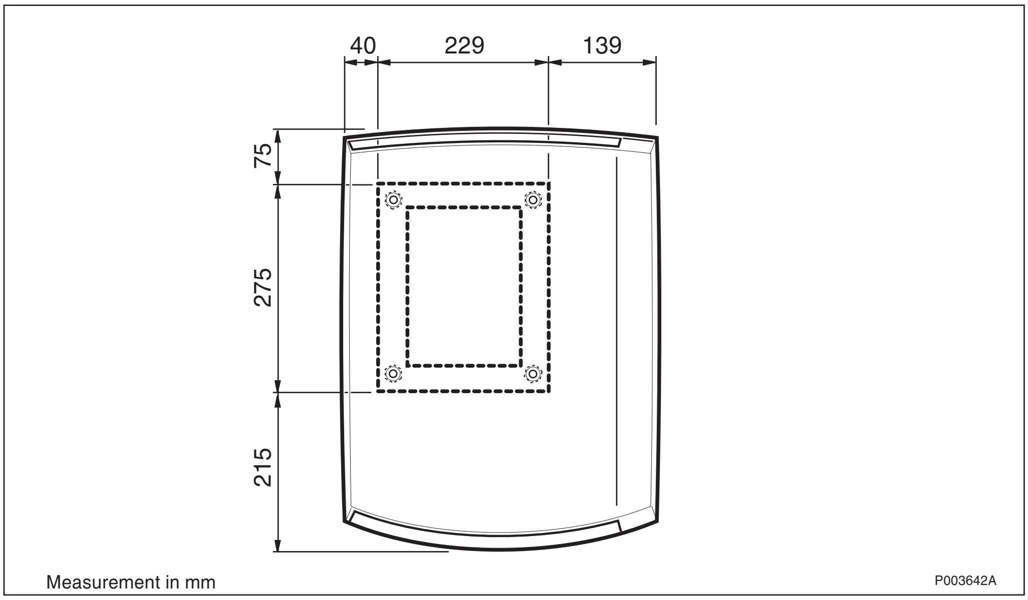


Figure 557   Mounting plate and equipment contour

Figure 557 on page 561 shows the dimensions of the equipment in relation to the mounting plate. This is to determine a suitable alignment with several units or existing equipment.

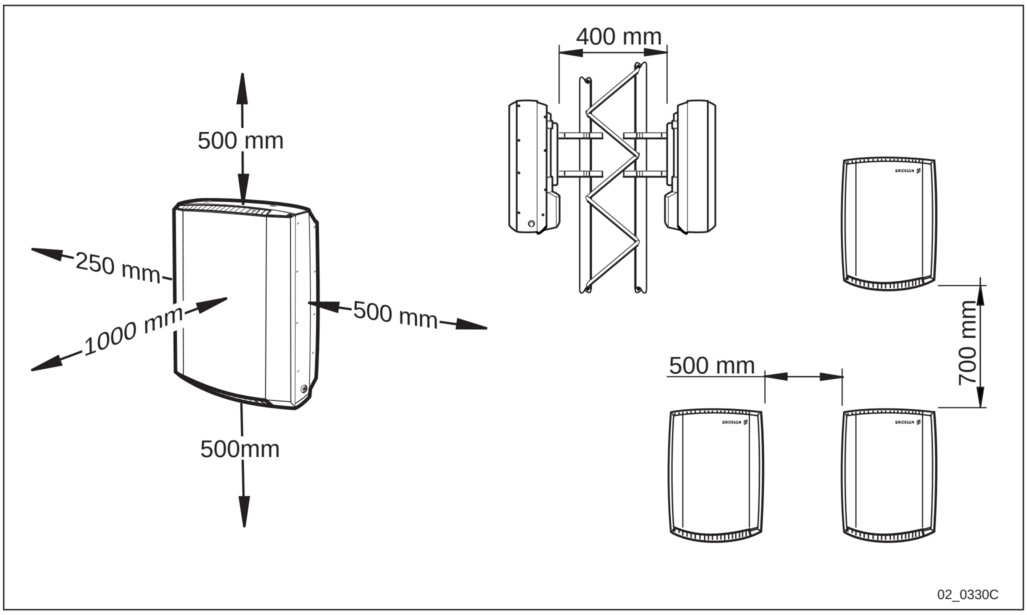


Figure 558   RBS 2302 space requirements

The maximum distance between two RBS 2302 in a 4 TRX and a 6 TRX configuration is limited by the length of the TXL-bus cable. The TXL- bus cable is 5 m long.

14.1.7 Wind load

The wind load at 50 m/s is 650 N.

14.1.8 Climatic Endurance

Table 85 Climatic endurance

Environmental parameter	Units	Normal condition	Non–destructive
Temperature	°C	-33 - +45	-40 - +70
Relative humidity	%	15 - 100	15 - 100
Solar radiation	W/m^2	1120	1120
Design wind speed	m/s	50	50

Normal condition denotes the environmental conditions where all units will function as specified.

Non-destructive range denotes environmental stress above the limits for normal operation during which no function is guaranteed and performance may degrade in an unspecified manner. When the environmental stress is over and the environment has returned to normal conditions, no manual intervention on the site is required to restore full performance of the base station.

Non-destruction refers to a period of not more than 96 consecutive hours, and a total of not more than 5.5 days in a three-year period.

14.1.9 Vibrations

The base station withstands vibrations below 1.0 G and shocks below 25 G.

14.1.10 Acoustic Noise

The base station does not emit any acoustic noise.

14.1.11 Power Supply

The base station must be connected to a dedicated circuit in the power distribution board. The circuit shall be fused with a single fuse, if the circuit is between phase and neutral and two fuses if the circuit is between two phases.

The mains voltage level is selected by a switch in the installation box. The voltage selector can be set to a nominal voltage of 115 V or 230 V.

Power consumption is listed in *chapter Site Planning and Requirements, section Power Supply*.

14.1.12 Battery Backup

The base station will survive cuts in the mains supply for at least 3 minutes. The base station will maintain full performance during the back-up time if the battery is fully charged. The battery will be recharged to at least 80% of its capacity within 15 hours.

The battery consists of two rows of nickel-cadmium cells in a sealed container. The size of the internal nickel-cadmium cells is similar to ordinary torch battery type R14 (IEC-standard) or C (ANSI-standard).

It is not possible to open the battery container.

The base station can also be powered with 24 V DC from the PBC. In this case the battery container is replaced by a battery adapter, *see Section Batteries on page 571*. However, the base station cannot be powered up with batteries (24 V DC) only.

14.1.13 Earthing

The mounting base must be earthed separately through an earthing cable. The mounting base is provided with an earthing screw (M8 thread) for this purpose.

14.1.14 Transmission

The base station can be connected to transmission interface G703, type E1 (2 Mbit/s) or T1 (1.5 Mbit/s). T1 is also called DS1.

For E1 transmission interfaces, different impedances are used by different network operators or in different applications, such as indoor or outdoor networks. The two types are unbalanced coaxial cable with 75 Ω impedances or balanced twisted pair cable with 120 Ω impedance.

For T1 transmission interfaces, balanced twisted pair cable with 100 Ω impedance is used.

In the base station there are four ports:

- PCM-A IN
- PCM-A OUT
- PCM-B IN
- PCM-B OUT

The OUT ports are transmit signals from the RBS. The IN ports are receive signals to the RBS.

The PCM-A ports must always be connected to the transmission cable towards the BSC. In cascaded configurations, the PCM-B is connected to the transmission cable going away from the BSC, that is, to the next base station.

In stand alone configuration, only the PCM-A ports are used. The PCM-B IN port has then to be terminated with a resistor between 0-150 Ω.

Type of Interfaces

- Tail cable for 75 Ω unbalanced line. Provided with TNC-female connectors. Connected to a terminal block in the interface box.
- Balanced line is connected directly to a terminal block in the interface box.

Terminators

A terminating resistor is mounted on the terminal block in the interface box. This resistor terminates the PCM-B port. The terminating resistor in the interface box is removed when the PCM-B connection is used.

Cascading

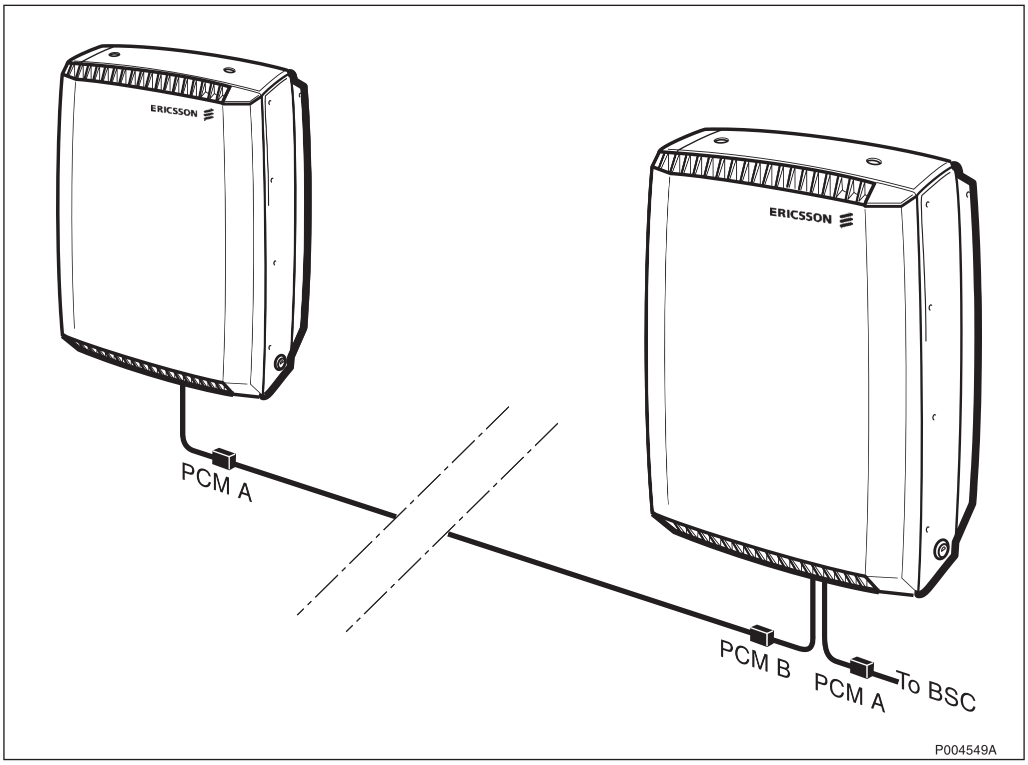


Figure 559 Cascaded cabinets

RBS 2302 can be cascaded. This means that the unused time slots from the first base station in a chain are cascaded to a second base station located at some distance from the first one.

The cable to the next base station in the chain is connected to the PCM-B ports. The terminator is not mounted in this case.

Incoming cable from the previous base station in the chain is connected to PCM-A ports. The distance between base stations depends on the type of cable or transmission media.

14.1.15 External Alarms

For supervision of external equipment, 8 external alarm circuits can be connected to a terminal block in the base station. PBC and AAU will occupy four of these alarm circuits. The optional HDSL module will occupy two of the remaining alarm circuits.

Connections are made on wire terminals that will accept wires having an area of 0.5 - 2.5 mm^2.

The cable gland has capacity for one cable with an outer sheath diameter of 5 - 9 mm.

The alarm detector connected to the screw terminals should be isolated relay contacts. A closed contact (logic zero) is required to be below 25 kΩ, and open contact (logic one) is required to be above 125 kΩ.

The current through a closed 0 ohm relay contact is between 0.05 and 0.07 mA during measurements, and less than 0.10 mA at all times.

The no load voltage between terminals is 18 to 24 V.

The external alarm inputs have overvoltage protection, which limits the voltage to 100 V relative to ground.

14.1.16 Antenna Connections

Internal and external antennas are connected to connectors behind the sunshield on the base station. The connectors are marked X2 and X3.

Table 86 Antenna connectors

Connector	Duplex 1, 2 TRX
X2	TX1/RXA
X3	TX2/RXB

The antenna connectors are of the TNC female type according to IEC 169-8.

When external antennas are used, a separate document shall be created for the site and included in the Site Installation Documentation. This document is numbered as an allocation drawing, 193 26-IPA......

The base station has no space for connection of thick antenna cables. It is recommended to use a short 6 mm diameter jumper cable to join the base station with external antenna systems. Recommended jumper length is about 1 m, longer cables will add too much attenuation, especially at 1800/1900 MHz. For a suitable jumper cable see:

Ordering Information for RBS 2000 Installation Material *131 62-HRB 105 01/MA*

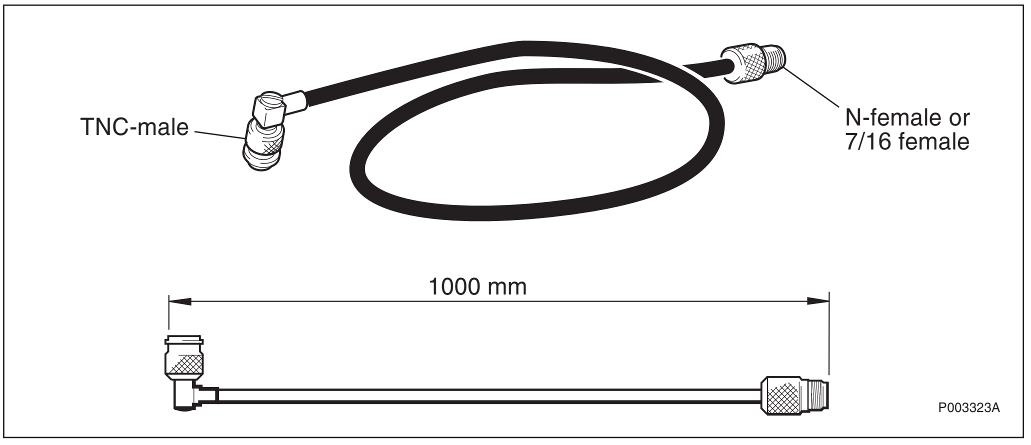


Figure 560 Jumper Cable

14.2 Power and Battery Cabinet

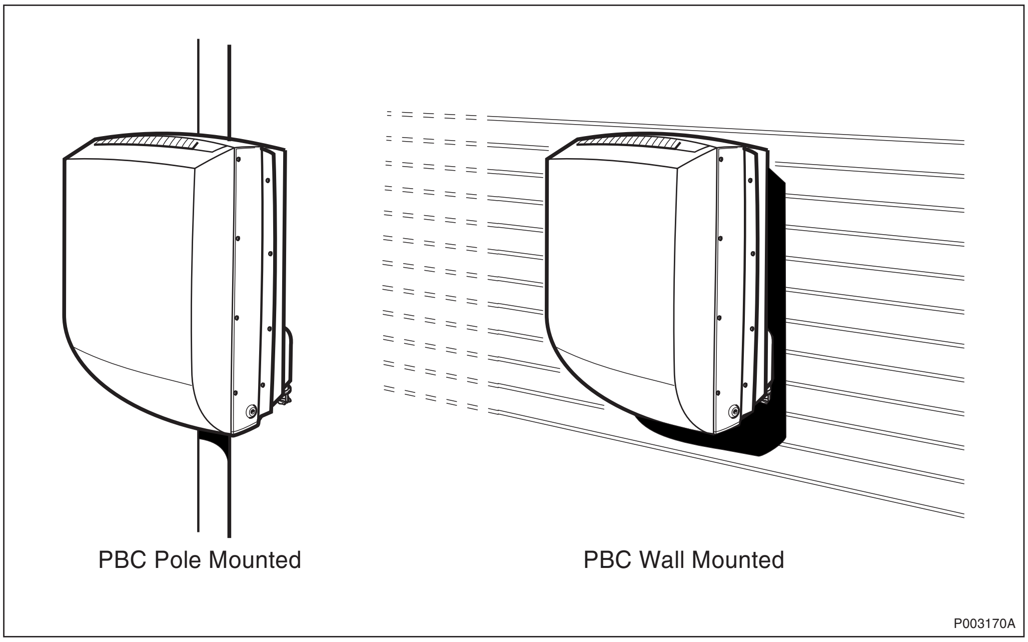


Figure 561 Power and Battery Cabinet

The PBC contains power supply for the active antenna, back-up batteries, DC/DC converter for back-up operation of RBS 2302 in case of power failure and alarm and control circuits for the active antenna.

The PBC consists of the following main units:

- Mounting base
- Cabinet
- Batteries – 4 pcs
- Sunshields

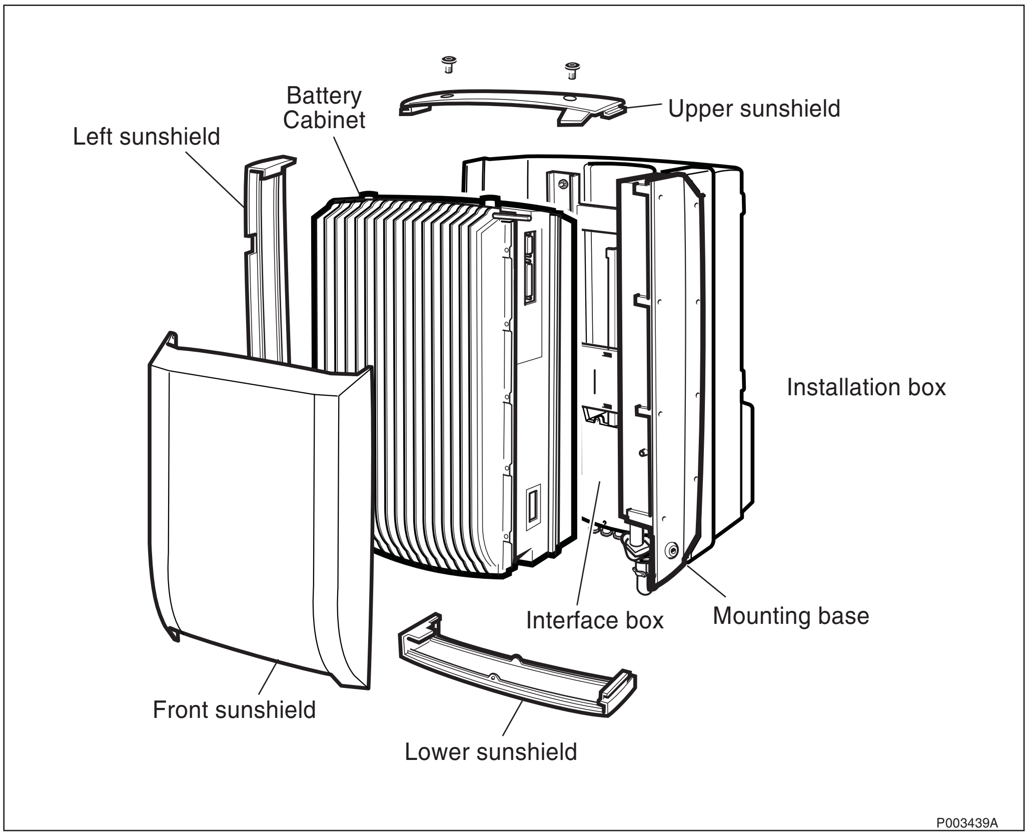


Figure 562 Main units

14.2.1 Wall Mounting

The mounting plate is used to fix the power and battery cabinet to a flat surface. In combination with the pole fixture it is also used to install the PBC on a pole.

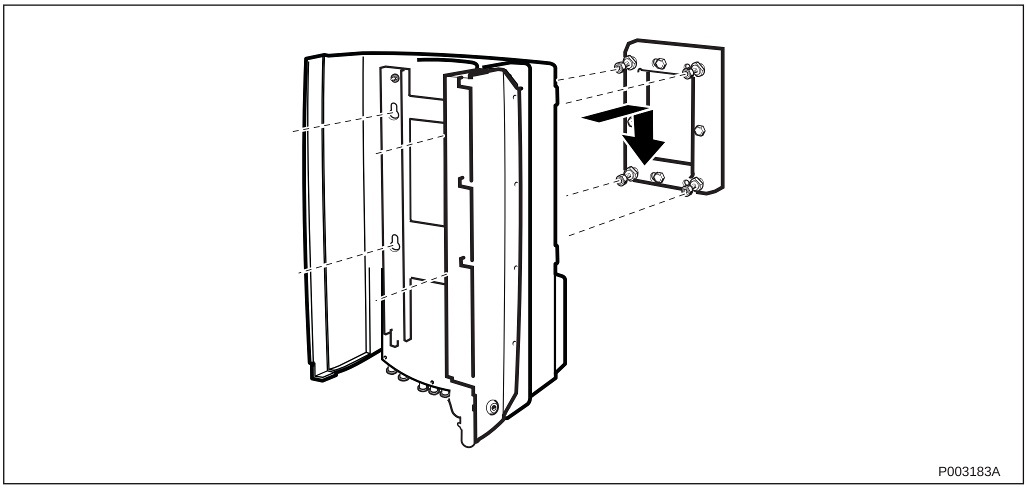


Figure 563 Mounting base and mounting plate

No separate template has to be used to mark out holes. The mounting plate is used as marking template.

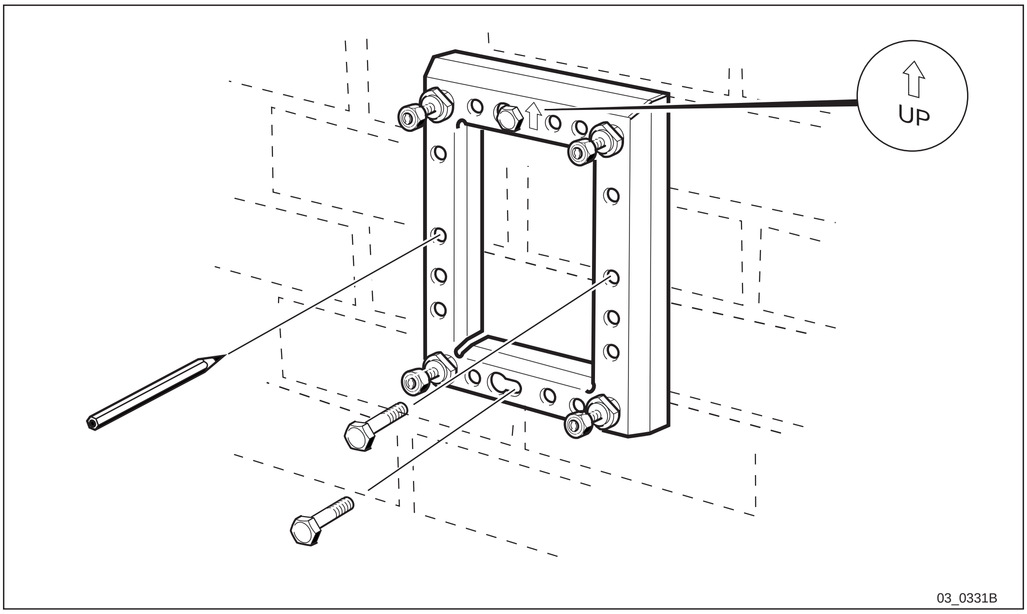


Figure 564 Mounting plate

14.2.2 Pole Mounting

The pole fixture is attached to the mounting plate if the PBC is to be mounted on a tubular mast or pole. The pole fixture will attach to a round tube having a diameter of 60–114 mm.

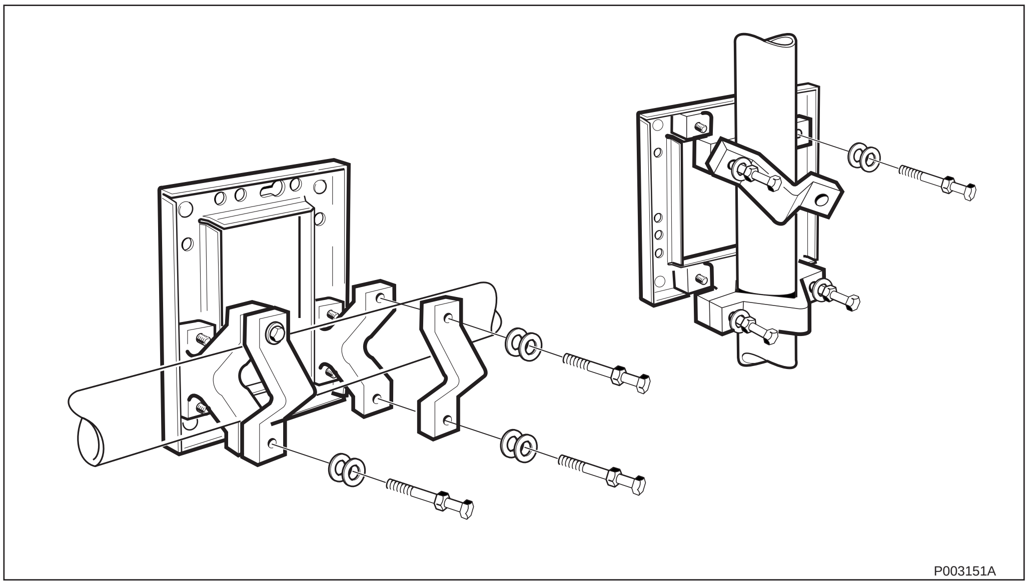


Figure 565 Pole fixture and mounting plate mounted on a tube

14.2.3 Dimensions and Weight

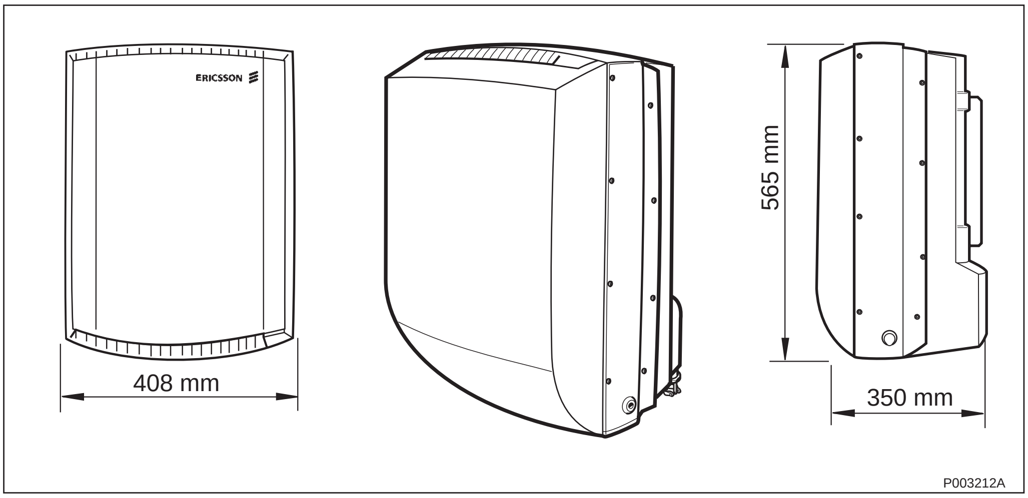


Figure 566 Dimensions

Table 87 Weights

Cabinet (no batteries)	23 kg	51 lb
Batteries	21 kg	46 lb
Mounting base	9 kg	20 lb
Wall and pole mounting details	6 kg	13 lb
Total weight	59 kg	130 lb

14.2.4 Space Requirements

Free space is required around PBC for installation and maintenance. When more than one cabinet is installed at the same site, a certain distance between the cabinets is required for air circulation and to provide sufficient working space.

The cabinet must always be installed vertically and with the cable inlets down.

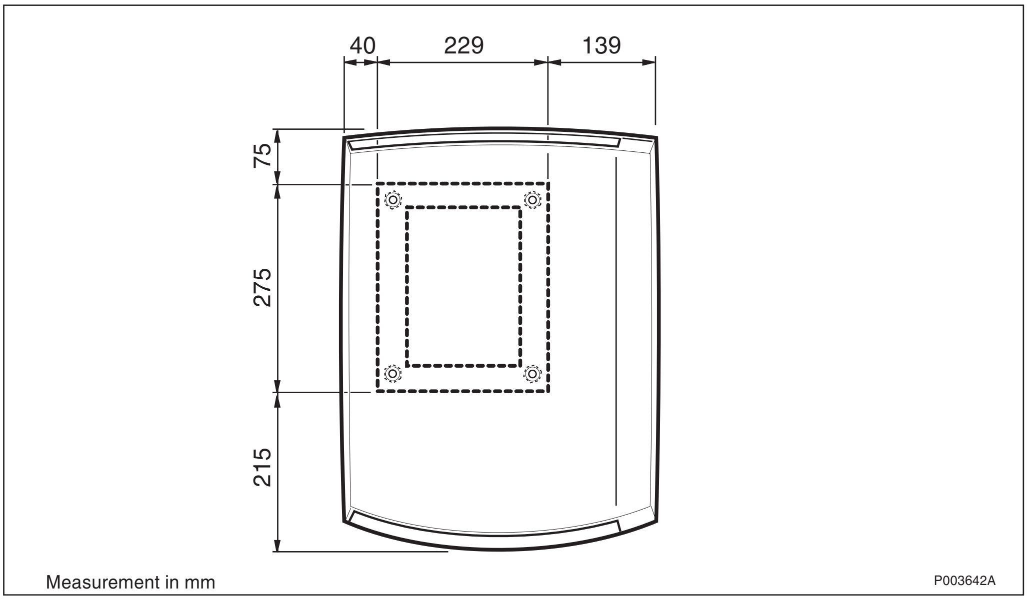


Figure 567 Mounting plate and equipment contour

Figure 567 on page 570 shows the dimensions of the equipment in relation to the mounting plate. This is to determine a suitable alignment with several units or existing equipment.

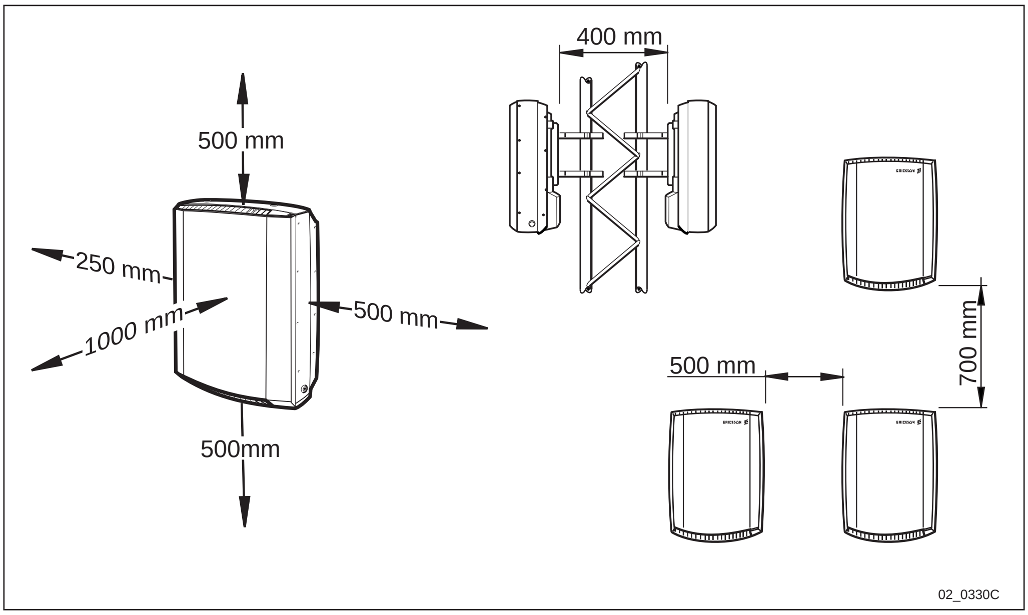


Figure 568 Space requirements for PBC

14.2.5 Wind load

The wind load at 50 m/s is 650 N.

14.2.6 Climatic Endurance

Table 88 Climatic endurance

Environmental parameter	Units	Normal condition	Non–destructive
Temperature	°C	-33 - +55	-40 - +70
Relative humidity	%	15 - 100	15 - 100
Solar radiation	W/m^2	1120	1120
Design wind speed	m/s	50	50

Normal condition denotes the environmental conditions where all units will function as specified.

Non-destructive range denotes environmental stress above the limits for normal operation during which no function is guaranteed and performance may degrade in an unspecified manner. When the environmental stress is over and the environment has returned to normal conditions, no manual intervention on the site is required to restore full performance of the base station.

Non-destruction refers to a period of not more than 96 consecutive hours, and a total of not more than 5.5 days in a three-year period.

14.2.7 Vibrations

PBC withstands vibrations below 1.0 G and shocks below 25 G.

14.2.8 Acoustical Noise

PBC does not emit any acoustical noise.

14.2.9 Power supply

PBC can be connected to the nominal mains supply voltages presented in *chapter Site Planning and Requirements, section Power Supply*.

No adjustments on the PBC are needed to adapt it to different mains voltages.

Batteries

The battery back-up consists of four 12 V modules. It is foreseen that batteries may be obtained from a local distributor to Hawker Energy. Locally supplied batteries must be of the type XT 13 from Hawker Energy, or compatible. This is a sealed lead acid battery with valve ventilators and intended for stationary use.

To enable DC power backup to RBS 2302, the PBC is supplied with a battery adapter. The battery adapter is inserted into the battery compartment in RBS 2302 and the cable to the battery adaptor is connected to the interface box in the PBC.

14.2.10 Earthing

The mounting base must be earthed separately through an earthing cable. The mounting base is provided with an earthing screw (M8 thread) for this purpose

14.3 Coverage Extension Unit for GSM 900

The Coverage Extension Unit (CEU) comprises two separate physical radio channel containing power amplifiers for the downlink and low noise amplifiers for the uplink.

The power amplifier provides the output power to the passive antenna. The gain of the amplifier is adjustable between 8.5 to 17.5 dB to compensate for feeder losses.

The low noise amplifier is adjustable between 7 and 16 dB gain to increase the receiver sensitivity and to compensate for feeder losses.

Adjustable attenuators are used to calibrate the feeder losses.

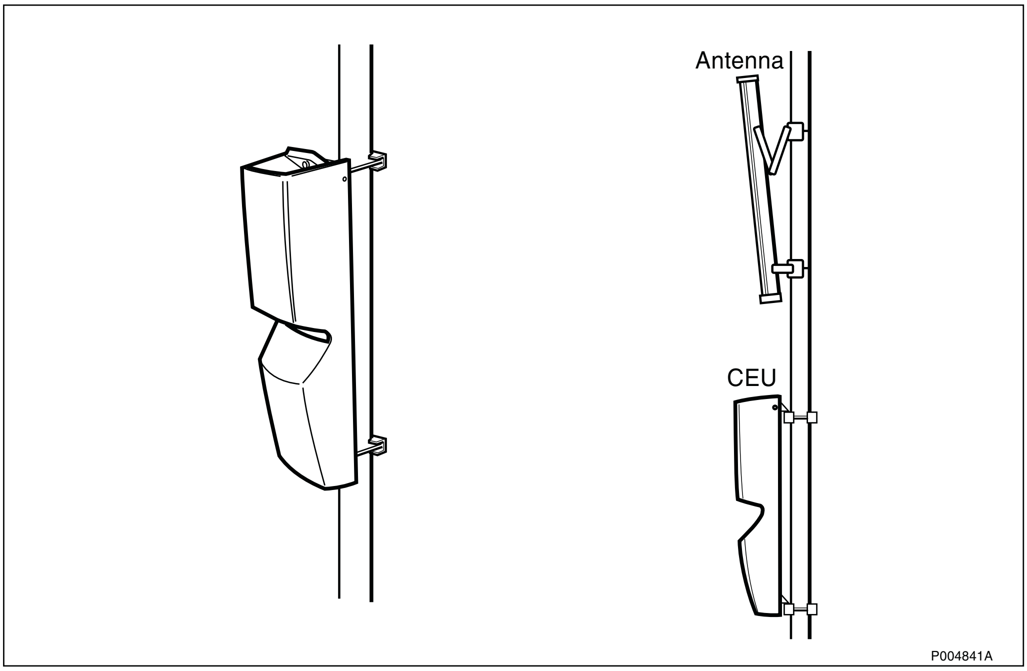


Figure 569 CEU mounted on a pole

14.3.1 Mounting Fixtures

Two options for mounting fixtures exist: a pole mounting fixture and a wall mounting fixture.

The pole mounting fixture is used to attach the CEU to a circular vertical tube with a diameter of 60 - 120 mm.

The wall mounting fixture is used to attach the CEU to a flat vertical surface.

Mounting of the passive antenna is dependent of type of antenna selected. See corresponding product data for the antenna and the manufacturer’s catalogue.

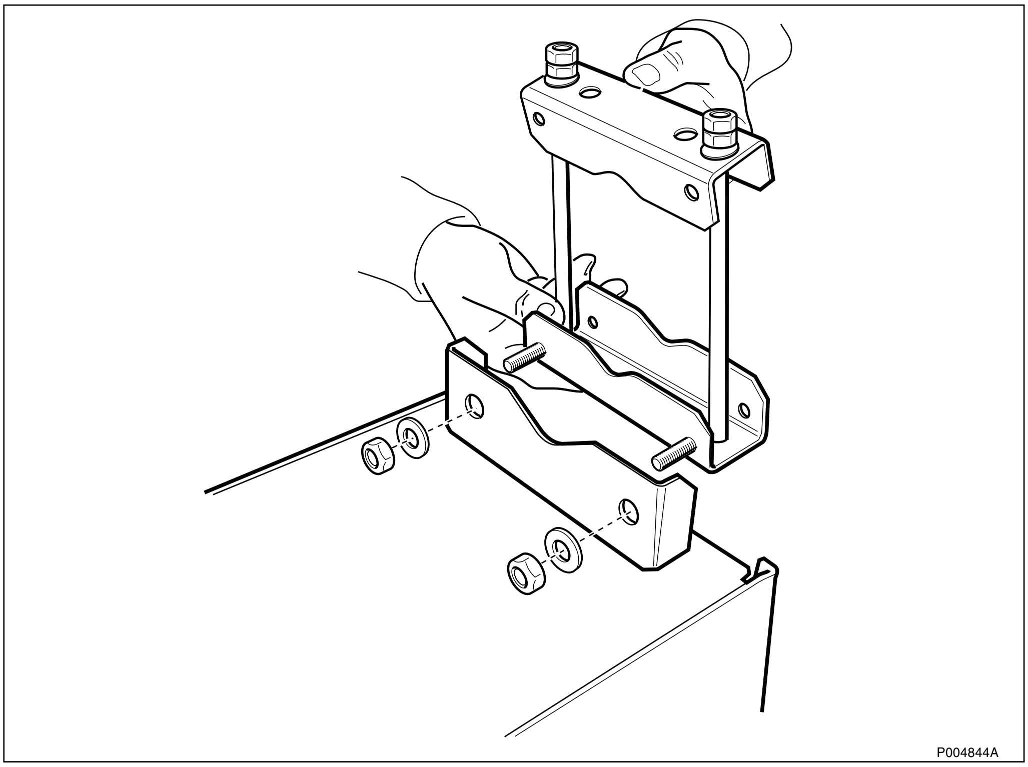


Figure 570 CEU mounting fixtures for poles

Note: It is not allowed to tilt the CEU. A CEU that is not aligned to vertical will not fulfill the high temperature limit stated in *Section 14.3.5 Climatic Endurance on page 574*.

14.3.2 Lifting Handles

The CEU is provided with two lifting handles, one at the top and one at the middle. The lifting handles can be used to carry the CEU. To hoist the CEU, the upper lifting handle and the two holes in the lower mounting fixture shall be used.

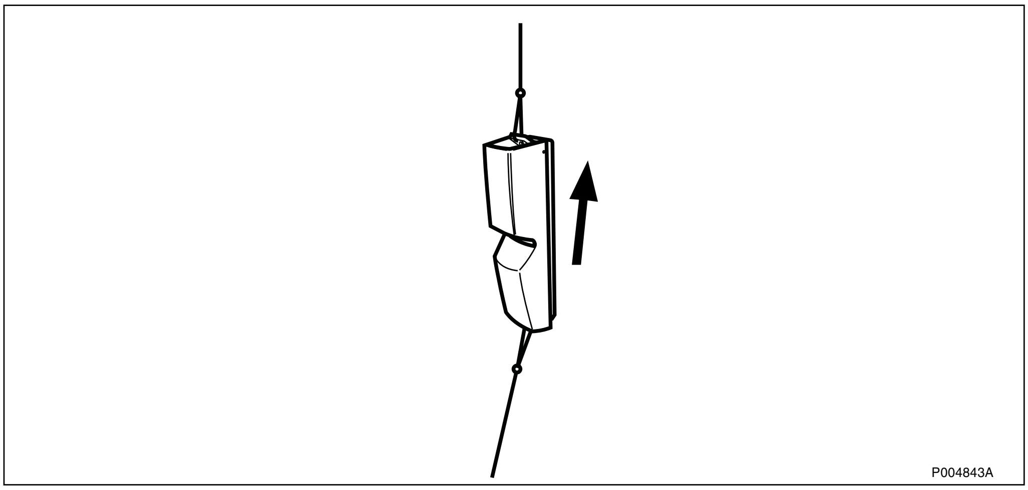


Figure 571 Hoisting CEU

14.3.3 Dimension and Weight

Table 89 Dimensions

	Height	Width	Depth
Coverage Extension Unit	905 mm	245 mm	182 mm

Table 90 Weights

Coverage Extension Unit	20.5 kg	45 lb
Option Pole Fixture	2.4 kg	5.3 lb
Option Wall Fixture	0.9 kg	2.0 lb

14.3.4 Wind Load

The wind load at 50 m/s is 280 N.

14.3.5 Climatic Endurance

Table 91 Climate Endurance

Environmental parameters	Units	Normal condition
Temperature	°C	- 33 - +45
Realtaive Humdity	%	15 - 100
Solar Radiation	W/m²	1120
Design wind speed	m/s	50

14.3.6 Vibrations

The CEU withstands vibrations below 1.0 G and shocks below 25 G.

14.3.7 Earthing

The CEU must be connected to earth. In many cases the CEU is earthed through the mounting structure. When this is not the case, a separate earthing cable must be connected to the CEU. Provision to connect an earthing cable is provided on the mounting fixture of the CEU.

14.3.8 Optional Lightning Protection

The DC/data cable is protected by built-in lightning protectors in the CEU.

To protect RF cable inputs in areas where probability of lightning strikes is very high, a lightning protector can be inserted between the cable end and the CEU-connector.

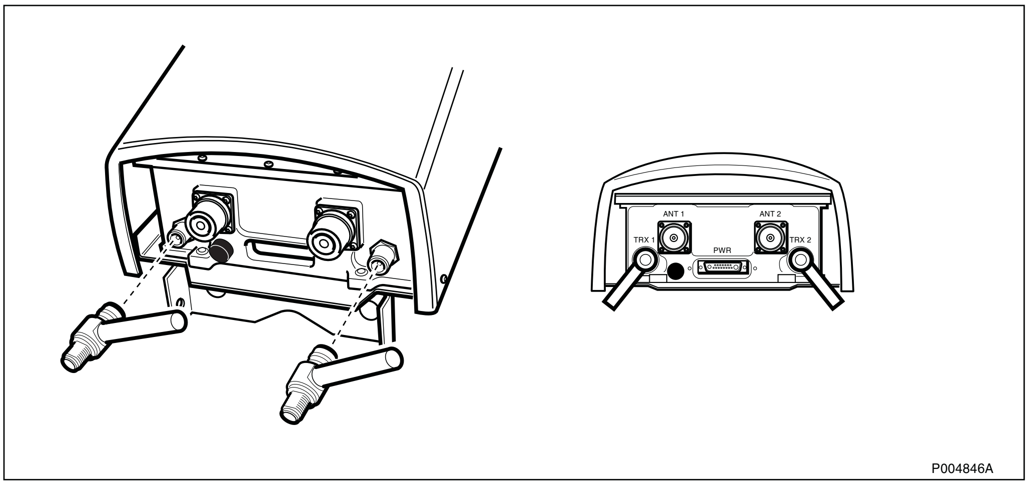


Figure 572 Connection of lightning protector

14.4 Active Antenna Unit – 500 W EIRP for GSM 1800

The Active Antenna Unit (AAU) contains power amplifiers for the downlink and LNAs for the uplink path. The amplifiers are connected to a passive antenna array. The AAU works in duplex mode. Transmit and receive signals are separated with a circulator inside the AAU.

The AAU consist of one unit and a mounting fixture.

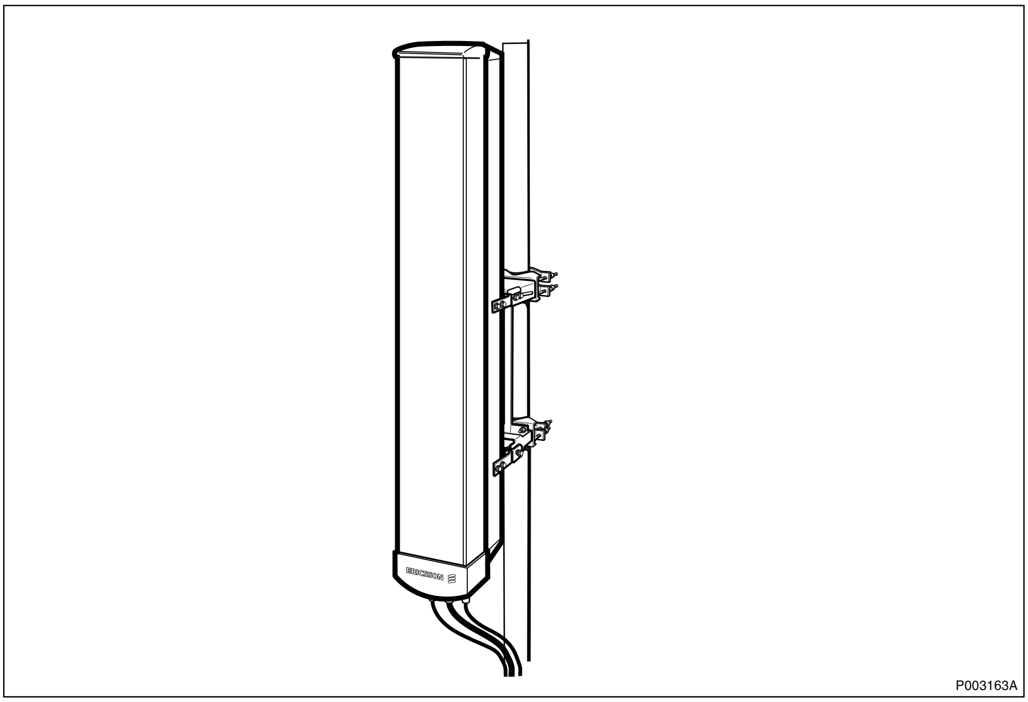


Figure 573 Active Antenna Unit, 500 W EIRP for GSM 1800

14.4.1 Mounting fixture

The mounting fixture is used to attach the antenna to a round vertical tube. The fixture will attach to a tube with 50 - 115 mm diameter.

It is also possible to mount the antenna to a flat surface. This mounting alternative will however have a very limited use, since the antenna will be perpendicular to the wall and the horizontal angle cannot be adjusted.

The mounting fixture will allow the antenna to be tilted down 0–10°.

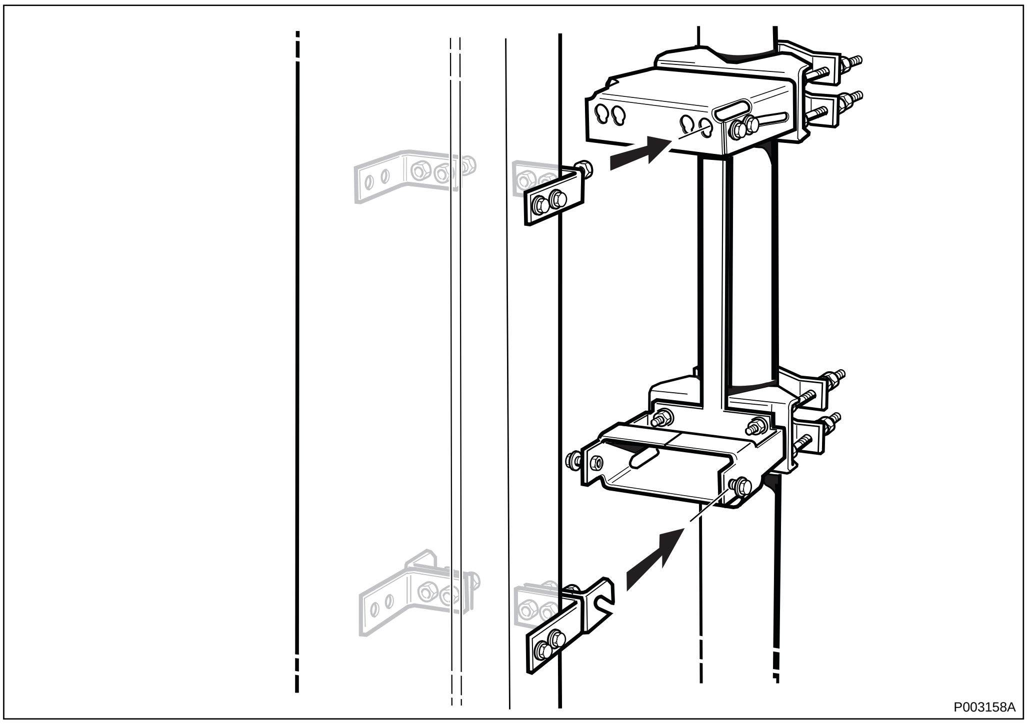


Figure 574 AAU mounting fixture

14.4.2 Lifting eye bolt

A lifting eye bolt, M8 thread, can be attached to the top and the bottom of the antenna to facilitate hoisting of the antenna. The bottom eye bolt should only be used to attach a guiding rope during hoisting.

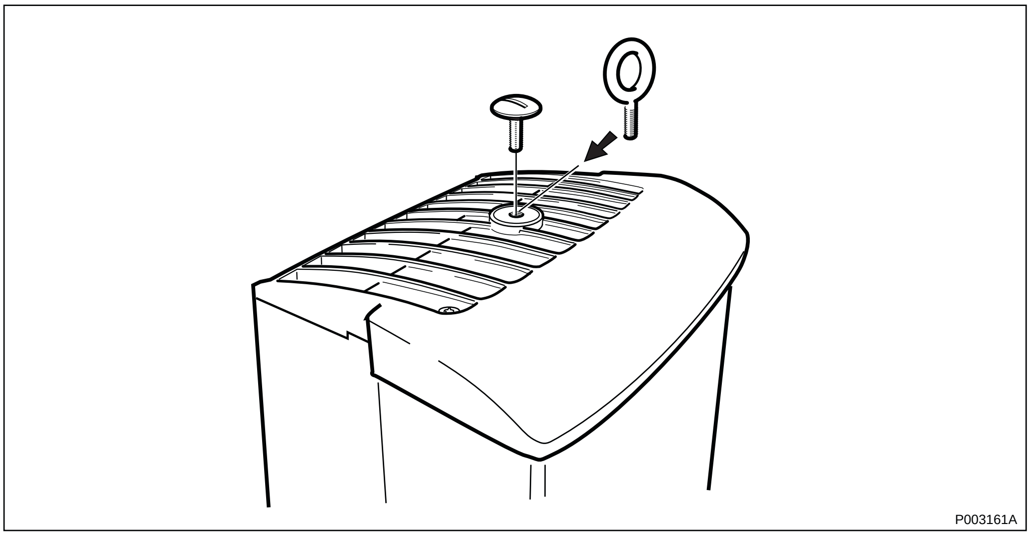


Figure 575 Lifting eye bolt (top)

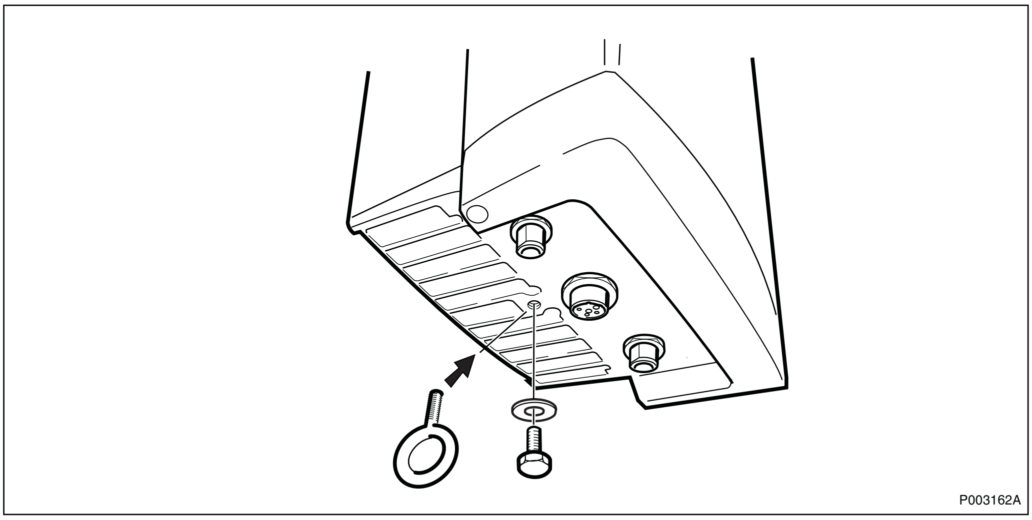


Figure 576 Lifting eye bolt (bottom)

14.4.3 Dimensions and Weight

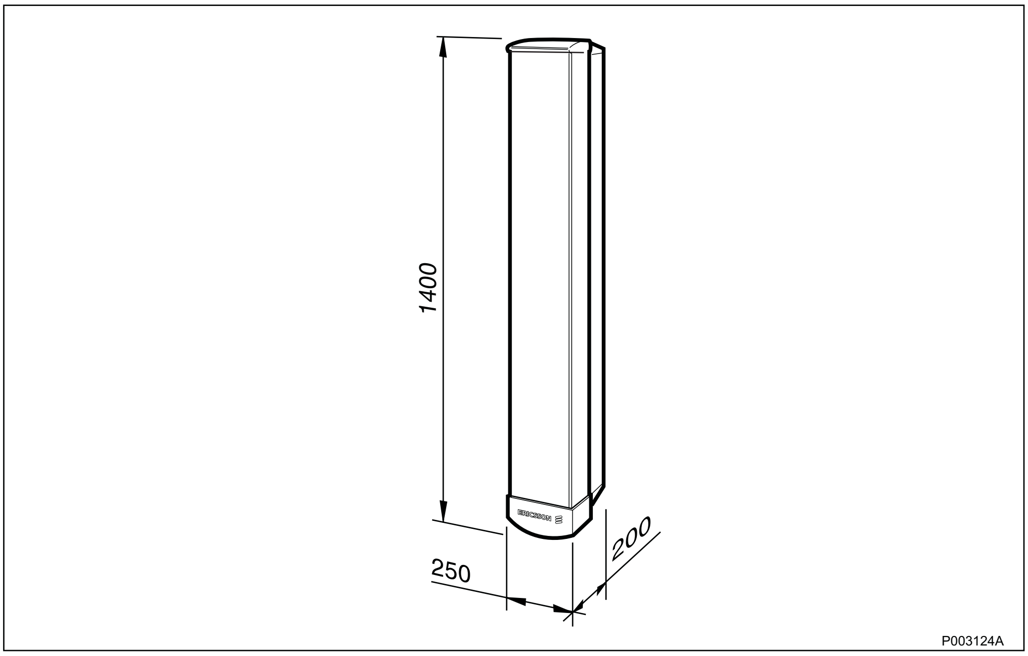


Figure 577 Active Antenna Unit dimensions

Table 92 Weights

Active Antenna Unit	30 kg	66 lb
Mounting fixture	14 kg	31 lb
Total weight	44 kg	97 lb

14.4.4 Wind load

The wind load at 50 m/s is 1250 N.

14.4.5 Climatic Endurance

Table 93 Climatic endurance

Environmental parameter	Units	Normal condition
Temperature	°C	-33 - +45
Relative humidity	%	15 - 100
Solar radiation	W/m^2	1120
Design wind speed	m/s	50

Normal condition denotes the environmental conditions where all units will function as specified.

The antenna is designed to shut off DC power supply if the above temperature ranges are exceeded.

14.4.6 Vibrations

The Active Antenna Unit withstands vibrations below 1.0 G and shocks below 25 G.

14.4.7 Earthing

The antenna must be connected to earth. In many cases the antenna is earthed through the mounting structure. When this is not the case, a separate earthing cable must be connected to the antenna. An M8 threaded hole is provided in the bottom of the antenna for this purpose. This is the same hole used to attach a lifting eye for a guide rope, as described in *Section 14.4.2 Lifting eye bolt on page 576*.

14.4.8 Optional lightning protection

To protect the DC/data cables in areas where the probability of lightning strikes is very high, an optional lightning protection box can be installed on the cable. The box is mounted on the backside of the antenna*, see Figure 578 on page 578*.

To protect RF cable inputs from lightning strikes, a lightning protector can be inserted between the cable end and the antenna connector.

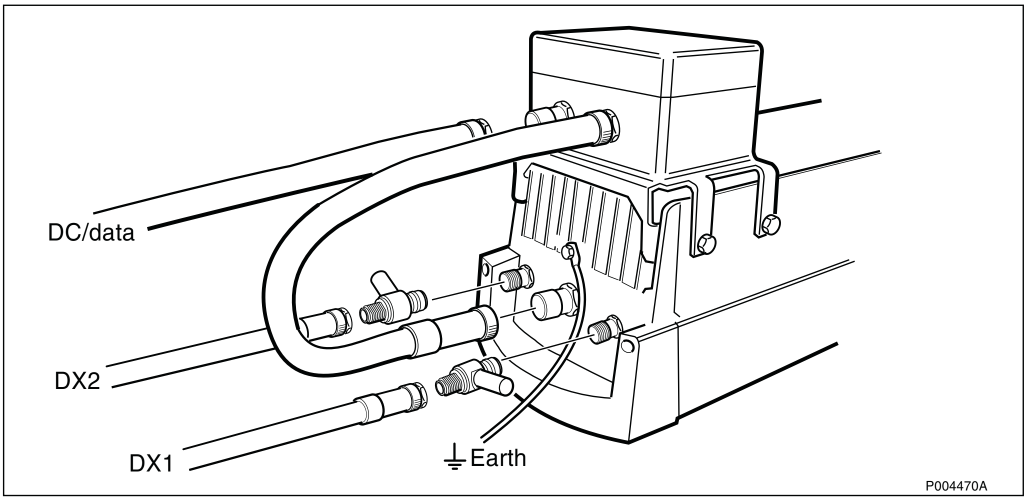


Figure 578 Lightning protection for 500 W EIRP GSM 1800 antenna

14.5 Active Antenna Unit – 500 W EIRP for GSM 1900

The Active Antenna Unit (AAU) contains power amplifiers for the downlink and LNAs for the uplink path. The amplifiers are connected to passive antenna arrays. The AAU works in duplex mode. Transmit and receive signals are separated with a circulator inside the AAU.

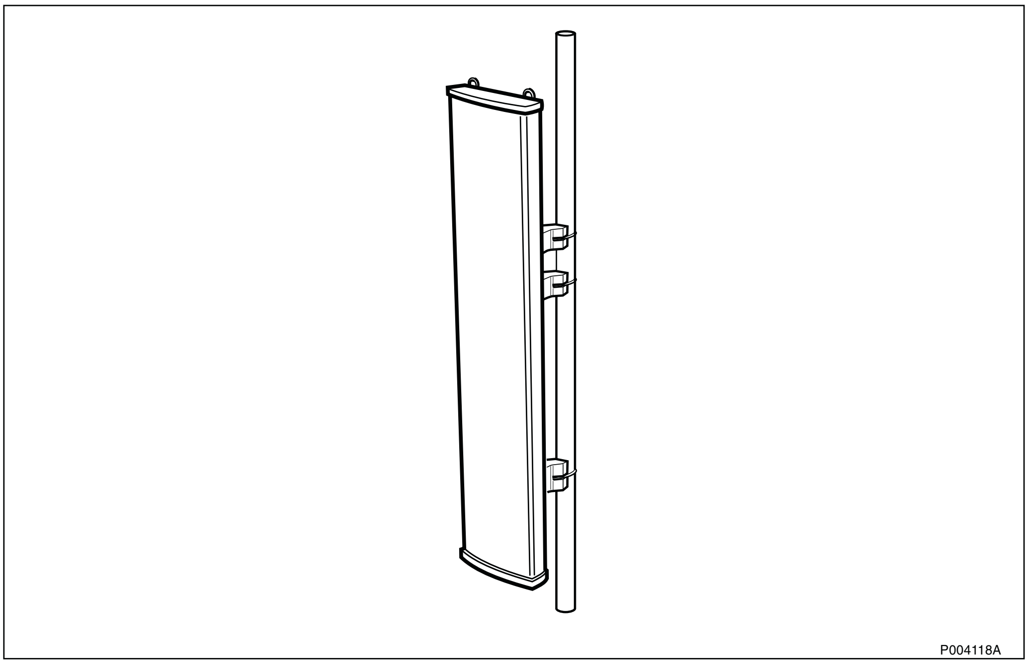


Figure 579 Active Antenna Unit 500 W EIRP for GSM 1900

14.5.1 Mounting fixture

The mounting fixture is used to attach the antenna to a round vertical tube. The fixture will attach to a tube with a diameter of 60-120 mm. The mounting fixture allows the antenna to be tilted down 0-10°.

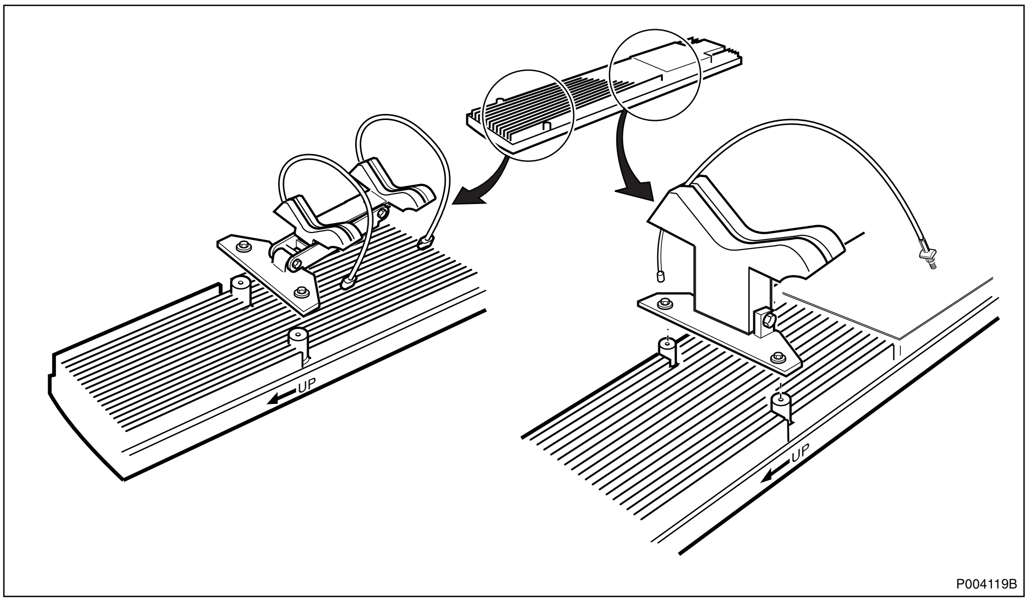


Figure 580 AAU mounting fixture

14.5.2 Lifting eyes

A lifting eye is provided in each corner of the antenna. The lifting eyes consist of shackles that can be folded back into the antenna module when not in use.

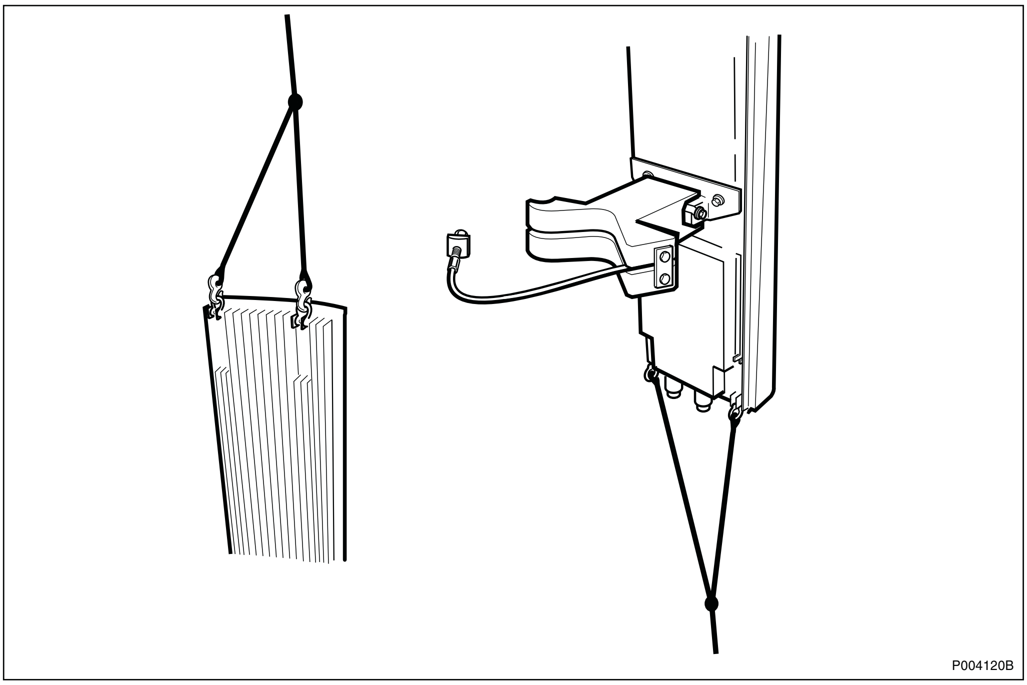


Figure 581 Lifting eyes

14.5.3 Dimensions and Weight

Table 94 Dimensions

	Height	Width	Depth
Active Antenna Unit	1700 mm(1)	350 mm	100 mm

(1) Excluding protruding connectors

Table 95 Weights

Active Antenna Unit	32 kg	70 lb
Mounting fixture	9 kg	20 kg
Total weight	41 kg	90 kg

14.5.4 Wind load

The wind load at 50 m/s is 4050 N.

14.5.5 Climatic Endurance

Table 96 Climatic endurance

Environmental parameter	Units	Normal condition
Temperature	°C	-33 - +45
Relative humidity	%	15 - 100
Solar radiation	W/m^2	1120
Design wind speed	m/s	50

Normal condition denotes the environmental conditions where all units will function as specified.

14.5.6 Vibrations

The Active Antenna Unit withstands vibrations below 1.0 G and shocks below 25 G.

14.5.7 Earthing

The antenna must be connected to earth. In many cases the antenna is earthed through the mounting structure. When this is not the case, a separate earthing cable must be connected to the antenna. An M8 stud is provided in the bottom of the antenna for this purpose.

14.5.8 Power supply

The Active Antenna Unit shall only be used with an Ericsson PBC for Maxite or a listed UL 1950 Limited Power Source.

The Active Antenna Unit shall only be used with a listed DC/Data cable, and listed RF cable that is rated VW1, and suitable for wet locations as well as UV exposure. The cable shall operate within the range of appropriate power supply for operation in the temperature range of –33°C to +45°C.

14.5.9 Optional lightning protection

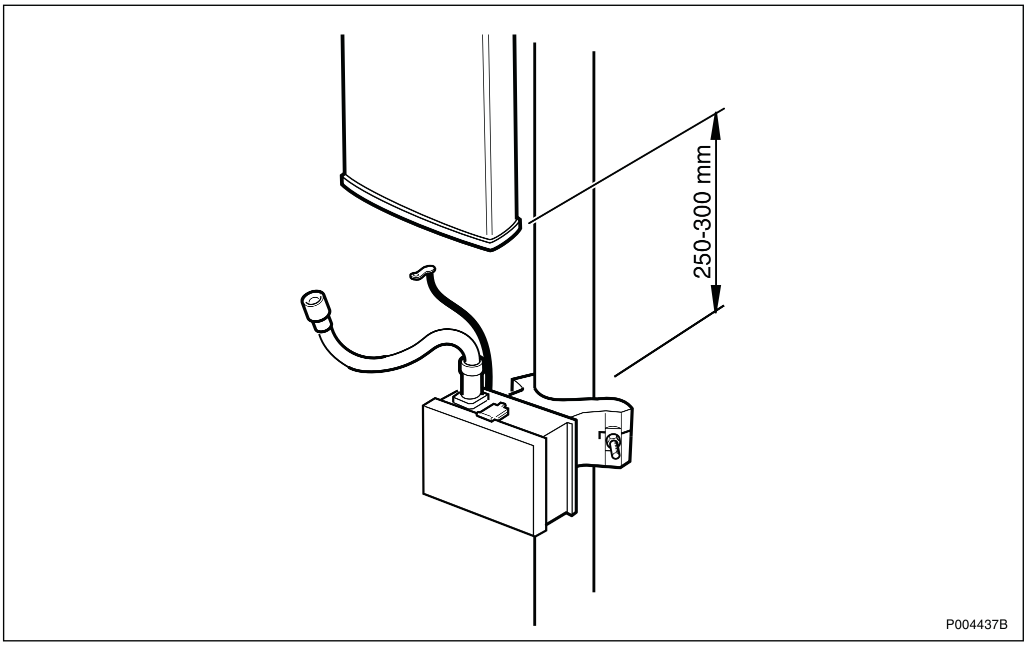


Figure 582 Lightning protection for 500 W EIRP GSM 1900 antenna

To protect the DC/data cables in areas where the probability of lightning strikes is very high, an optional lightning protection box can be installed on the cable. The box is placed near the antenna and is connected to the DC/data input via a short tail cable. To provide good ground between the antenna and the protection box, a grounding cable shall be used to connect the antenna to the lightning protection box. *See chapter Site Planning and Requirements, section Installation Material* for a suitable kit.

14.6 Active Antenna Unit – 1250 W EIRP for GSM 1900

The Active Antenna Unit (AAU) contains power amplifiers for the downlink and LNAs for the uplink path. The amplifiers are connected to passive antenna arrays. The AAU works in duplex mode. Transmit and receive signals are separated with a circulator inside the AAU.

The AAU consists of one base module and one transmit module mounted together on a common mounting fixture. The base module contains the receive function and transmit function for one GSM carrier. The transmit module contains the transmit function for a second GSM carrier.

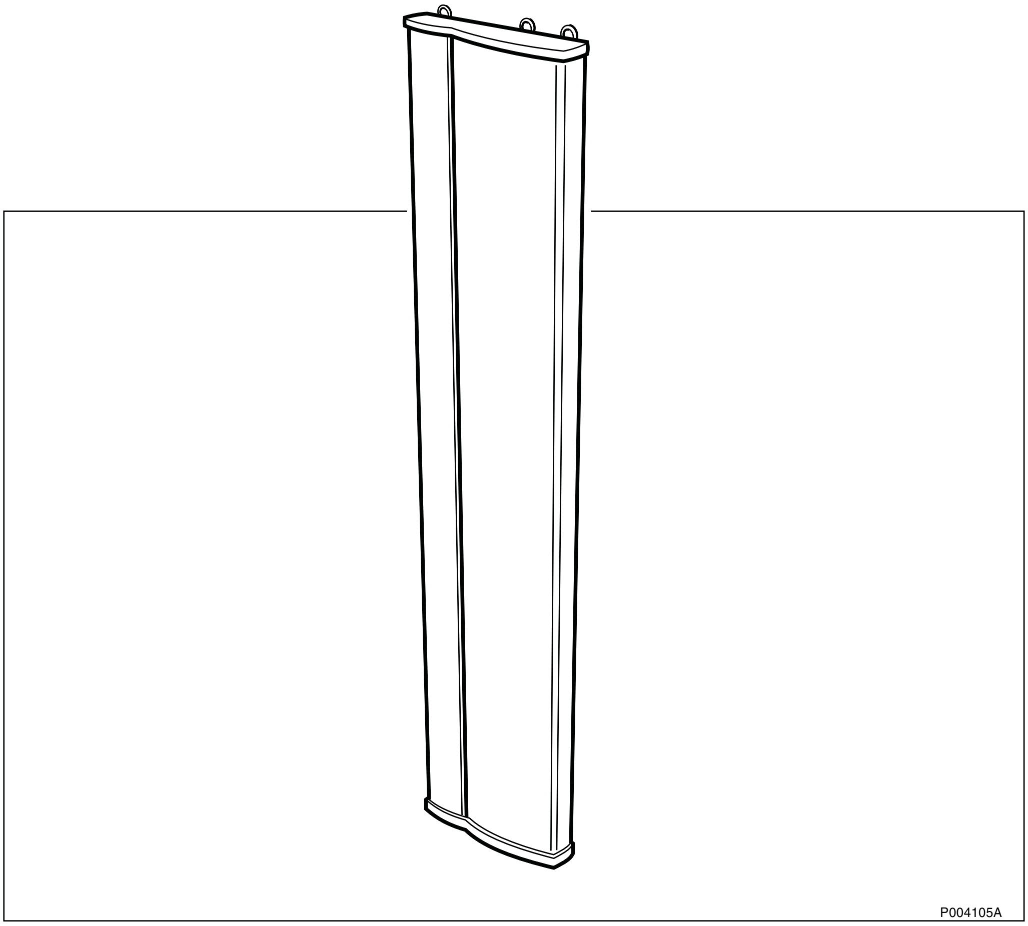


Figure 583 Active Antenna Unit 1250 W EIRP for GSM 1900

14.6.1 Mounting fixture

The mounting fixture is used to attach the antenna to a round vertical tube. The fixture will attach to a tube with a diameter of 60-120 mm. The mounting fixture allows the antenna to be tilted down 0-10°.

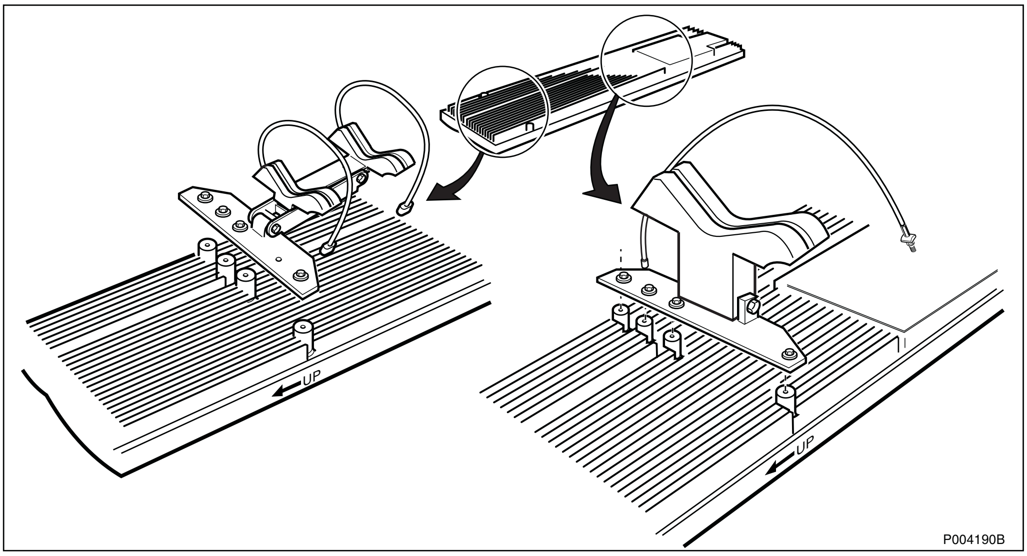


Figure 584 AAU mounting fixture

14.6.2 Lifting eyes

A lifting eye is provided in each corner of each module. The lifting eyes consist of shackles that can be folded back into the antenna module when not in use.

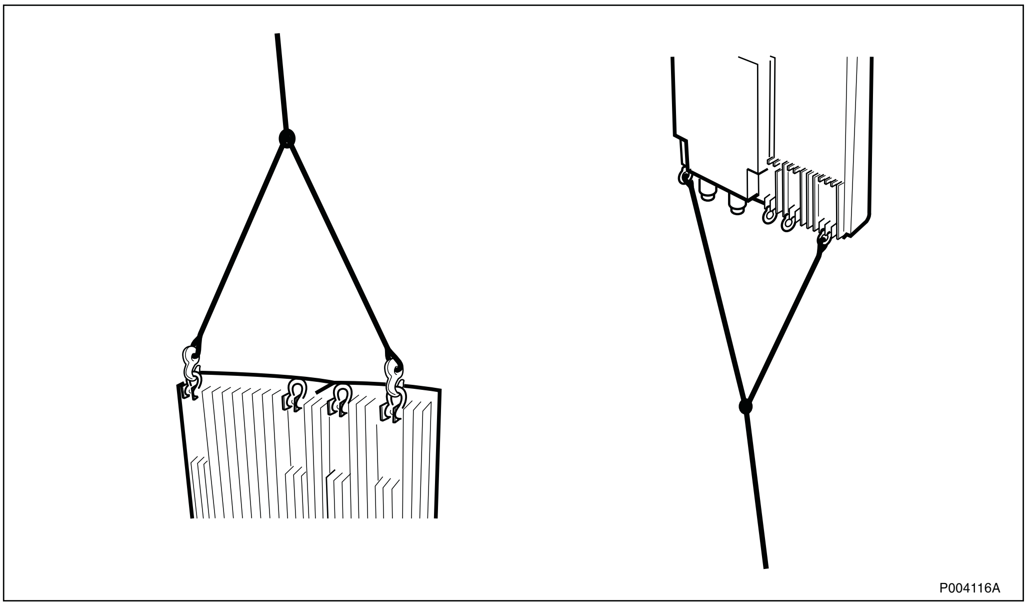


Figure 585 Lifting eyes

14.6.3 Dimensions and Weight

Table 97 Dimensions

	Height	Width	Depth
Base module	2600 mm(1)	350 mm	100 mm
Trasmit module	2600 mm	175 mm	100 mm

(1) Excluding protruding connectors

Table 98 Weights

Base module	50 kg	110 lb
Transmit module	25 kg	55 lb
Mounting fixture	10 kg	22 lb
Total weight	85 kg	187 lb

14.6.4 Wind load

The wind load at 50 m/s is 6230 N.

14.6.5 Climatic Endurance

Table 99 Climatic endurance

Environmental parameter	Units	Normal condition
Temperature	°C	-33 - +45
Relative humidity	%	15 - 100
Solar radiation	W/m^2	1120
Design wind speed	m/s	50

Normal condition denotes the environmental conditions where all units will function as specified.

14.6.6 Vibrations

The Active Antenna Unit withstands vibrations below 1.0 G and shocks below 25 G.

14.6.7 Earthing

The antenna must be connected to earth. In many cases the antenna is earthed through the mounting structure. When this is not the case, a separate earthing cable must be connected to the antenna. An M8 stud is provided in the bottom of the antenna for this purpose.

14.6.8 Power supply

The Active Antenna Unit shall only be used with an Ericsson PBC for Maxite or a listed UL 1950 Limited Power Source.

The Active Antenna Unit shall only be used with a listed DC/Data cable, and listed RF cable that is rated VW1, and suitable for wet locations as well as UV exposure. The cable shall operate within the range of appropriate power supply for operation in the temperature range of –33°C to +45°C.

14.6.9 Optional lightning protection

To protect the DC/data cable in areas where the probability of lightning strikes is very high, an optional lightning protection box can be installed on the cable. The box is placed near the antenna and is connected to the DC/data input via a short tail cable. To provide good ground between the antenna and the protection box, a grounding cable shall be used to connect the antenna to the lightning protection box. *See chapter Site Planning and Requirements, section Installation Material* for a suitable kit.

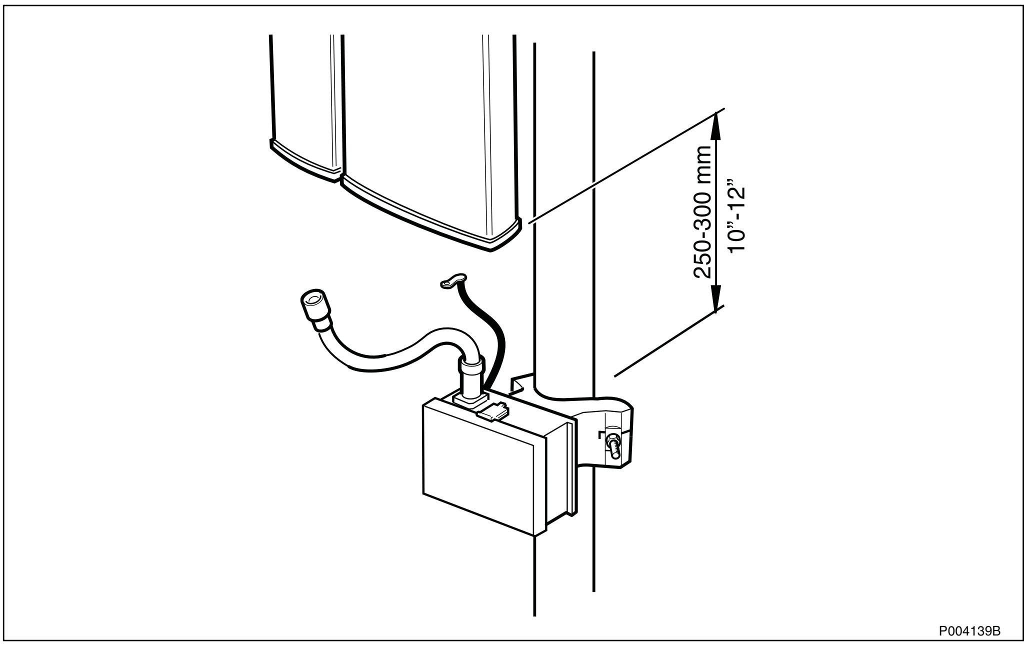


Figure 586 Lightning protection for 1250 W EIRP GSM 1900 antenna

14.7 HDSL Modem

14.7.1 General

The HDSL (High-bit rate Digital Subscriber Line) is an optional transmission module, mounted in an extended installation box door. By using the integrated HDSL transmission it is possible to connect the RBS 2302 to physical twisted copper pairs from a BSC (Base Station Controller) with HDSL equipment at BSC site and/or to another RBS 2302 with HDSL. The distance can be longer than with traditional line terminals. The usage of repeaters will then be reduced, which means lower transmission costs. This makes the installation easier and the sites will be more landlord friendly due to integrated solution.

Note: HDSL technology uses duplex communication on each pair.

The wires in a pair are polarity independent. When a two pair HDSL interface is used, the two pairs can be connected arbitrarily.

14.7.2 HDSL Technical Specification

Device name:	NTU-E–2P
DTE bit rate:	2048 kbit/s
DTE interface type:	G.703, 120Ω balanced, G.704 frame structure
DTE signal coding:	HDB3
DTE timing:	Co-directional

Line rates:	2320 kbit/s, 1168 kbit/s or 592 kbit/s, automatic rate detection at slave modems
Line code:	2B1Q
Impedance:	135Ω
Transmit level:	+13.5 dBm (at 135Ω resistive load)
Max. cable length	*See Table 100 on page 587*and *Table 101 on page 587*
Input voltage:	+7 V DC (supply from the radio cabinet)
Power consumption:	max 3.5 W at NTU-E-2P

Table 100 Maximum cable attenuation and length with 0.4 mm 37 nF/km cable. The cable attenuation is 9.1 dB/km at 150 kHz.

	0.4 mm 37nF/km 9.1 dB/km					
	no noise		**5µV/√(Hz) ie. -6 dB**		**10 µV/√(Hz) ie. -0 dB**	
line rate (kbit/s)	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**
2320	4.0	36	3.0	27	2.4	22
1168	5.2	47	4.2	38	3.6	33
592	5.4	49	4.8	43	4.2	38

Table 101 Maximum cable attenuation and length with 0.5 mm 40 nF/km cable. The cable attenuation is 6.6 dB/km at 150 kHz.

	0.5 mm 40 nF/km 6.6 dB/km					
	no noise		**5µV/√(Hz) ie. -6 dB**		**10 µV/√(Hz) ie. -0 dB**	
line rate (kbit/s)	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**
2320	5.0	33	3.9	26	3.4	23
1168	7.0	46	5.7	38	5.0	33
592	7.5	50	6.9	46	6.0	40

Note: 10µV/√(Hz) is the noise level according to the ETSI Technical Specifications TS 101 135. 5µV/√(Hz) is a 6 dB lower noise level.

For planning the HDSL transmission network following should be considered:

By using the attenuation values in the 10µV/√(Hz) noise level column, an undisturbed and reliable operation can be obtained on most connections. The attenuation values in the “no noise” column shall be considered as theoretical values.

Dimension and Weight

The size of the door including HDSL modem:

(H x W x D): 488 x 112 x 44 mm

The total weight of the door including HDSL modem is 1.7 kg.

14.7.3 Material

The HDSL Modem Module consists of one kit, product number ZAT 759 19/101.

15 Glossary

This glossary lists abbreviations and acronyms used in texts dealing with RBS 2301 and 2302. Some basic terms and acronyms needed for cross-references are included in the list.

In the RBS manuals, terminology defined by GSM is used together with terms related to Ericsson and the CME 20 and CMS 40 projects.

Terms and Abbreviations

An arrow -> is used to indicate a reference to another entry in this list.

AAU	Active Antenna Unit
Abis	GSM interface standard defining attributes of the communication between BSC and BTS.
AC	Alternating Current
A/D converter	Analog to Digital converter
AGW	Abis Gateway
AIS	Alarm Indication Signal
ALBO	Automatic Line Build Out
ALPU	Antenna Lightning Protection Unit
AO	Application Object
ARAE	Antenna Related Auxiliary Equipment
ARFCN	Absolute Radio Frequency Channel Number
ARP	Antenna Reference Point
ASIC	Application Specific Integrated Circuit
Astra	ASIC in the TRU
AU	Antenna Unit GSM 900 = CEU + Passive Antenna GSM 1800/1900 = AAU
BCCH	Broadcast Control CHannel Downlink only broadcast channel for broadcast of general information at a base station, on a base station basis.
BER	Bit Error Rate
BSC	Base Station Controller

	GSM network node for control of one or more BTSs.
BSCSim	Base Station Controller Simulator
BSS	Base Station System GSM network logical unit comprising one BSC and one or more BTSs.
BTS	Base Transceiver Station GSM network unit operating on a set of radio frequency channels in one cell.
Burst	A portion of digital information, the physical content, that is transferred within the time interval of one time slot.
CAN	Canada
Cabinet	The physical housing of a base station.
Cascade connections	Connection of several cabinets by the PCM cable. Similar to serial connection. -> Cascading
Cascading	Connection of several cabinets by the PCM cable. Similar to serial connection. -> Cascade connections
CCCH	Common Control CHannel Channel combining the following common control channels: PCH Paging CHannel RACH Random Access CHannel AGCH Access Grant CHannel
CDU	Combining and Distribution Unit
Cell	An area of radio coverage identified by the GSM network by means of the cell identity.
CEU	Coverage Extension Unit
CF	Central Functions
Channel	The common term channel denotes the virtual connection, consisting of physical and logical channels between BSS and MS, during a call in progress. -> Logical Channel -> Physical Channel

Channel Combination	A physical channel on an air interface carries a defined set of logical channels.
Channel group	A channel group is a group of dedicated logical channels to a specific MS.
CM	Common Mode
CME 20	Cellular Mobile Europe - CME 20 Ericsson digital land mobile telecommunication system based on the GSM standards. - CME 201 Ericsson GSM system comprising Ericsson equipment only.
CMRU	Central Main Replaceable Unit. Main RU. The RBS is physically connected to the Base Station Controller (BSC) via the CMRU. There is only one CMRU in each RBS.
CMS 40	Cellular Mobile System Ericsson digital land mobile telecommunication system based on the Joint Technical Committee (JTC) specification for PCS 1900.
CPI	Communication and Power Interface
CPU	Central Processing Unit
CS	Coding Scheme
CSA	Canadian Standards Association
CSES	Consecutive Severely Errored Second
CSU	Customer Service Unit
Dannie	ASIC in the TRU
dB	decibel
DB	DataBase
DC	Direct Current
DCC	Digital Cross Connector
DCS	Digital Communication System International standard for 1800 MHz based on the GSM standard.
DIP	DIgital Path

	The name of the function used for supervision of the connected PCM lines.
Dixie	ASIC in the TRU
DM	Degraded Minute
DM	Differential Mode
DMRU	Distributed Main Replaceable Unit If a Main RU is subordinated to the CMRU, it is said to be distributed.
Downlink	Signalling direction, from the system to the MS
DP	Distribution Panel
DPX	Duplexer
DS1	Digital Signal Level 1 (1544 kbit/s)
DSP	Digital Signal Processor
DTF	Distance To Fault
DUT	Device Under Test
DXB	Distribution Switch Board
DXX	Ericsson Cellular Transmission System including NMS
E1	Short for G.703 2048 kbit/s PCM link
EEPROM	Electrically Erasable Programmable Read-Only Memory
EIRP	Effective Isotropic Radiated Power
EMC	Electro Magnetic Compatibility
ES	Errored Second
ESD	ElectroStatic Discharge
ETS	European Telecommunication Standard
EXT	External
FCC	Federal Communications Commission
FDL	Facility Data Link
FDU	Feeder Duplexer Unit
FS	Function Specification

FSC	Field Support Centre
FU	Filtering Unit
GPRS	Global Package Rating System
GS	General Specification
GSM	Global System for Mobile communications International standard for a TDMA digital mobile communication system. Originally, GSM was an abbreviation for Groupe Special Mobile, which is a European mobile telecommunication interest group, established in 1982.
GSM 900	GSM system 900 MHz (generic)
GSM 1800	(GSM-based) Digital Communication System 1800 MHz (generic)
GSM 1900	(GSM-based) Digital Communication System 1900 MHz (generic)
HDLC	High level Data Link Control
HDSL	High bit rate Digital Subscriber Line
HISC	HIghway Splitter Combiner
HLIN	High Level IN
HLOUT	High Level OUT
HW	HardWare
HWU	HardWare Unit An HWU consists of one or more SEs. An HWU is a functional unit within the RBS. The HWU is either active (equipped with a processor) or passive (without processor).
ID	IDentification
IDB	Installation Data Base
IEC	International Electric Commission
IF box	Inter Face Box
INT	Internal
IS	Interface Switch
I1A	Internal Fault Map Class 1A
I1B	Internal Fault Map Class 1B

I2A	Internal Fault Map Class 2A
JTC	Joint Technical Committee
LAN	Local Area Network
LAPD	Link Access Procedures on D-channel LAPD is the data link layer (layer 2) protocol used for communication between the BSC and the BTS on the Abis interface. Abis layer 2 is sometimes used synonymously with LAPD.
LBO	Line Build Out
LED	Light Emitting Diode
LLB	Line Loop Back
LNA	Low Noise Amplifier
Local bus	The local bus offers communication between a central main RU (DXU) and distributed main RUs (TRU and ECU).
Local mode	When the RU is in RU mode Local it is not prepared for BSC communication.
Local/Remote switch	Using the Local/Remote switch, an operator orders the RU to enter Local or Remote mode.
LOF	Loss Of Frame
Logical Channel	A logical channel represents a specified portion of the informationcarrying capacity of a physical channel. GSM defines two major categories of logical channels: TCHs Traffic CHannels, for speech or user data CCHs Control CHannels, for control signalling. -> Physical Channel -> Channel Combination
Logical RU	A unit which can be referred to, but is not a single physical unit. There are three different kinds of logical RUs: 1. Buses 2. Antennas

	3. Environment
LOS	Loss Of Signal
LVD	Low Voltage Directive
LVF	Low Voltage Filter
MADT	Mean Accumulated DownTime
Main RU	A main replaceable unit is a replaceable unit that contains one or more processors, to which software can be downloaded from the BSC.
MCB	MultiCasting Box
MHS	Modification Handling System Ericsson trouble report database
MMI	Man-Machine Interface
MO	Managed Object
MRT	Mean Repair Time
MS	Mobile Station
MTBF	Mean Time Between Failure
MTBCF	Mean Time Between Catastrophe Failure
NCS	National Colour System
NMS	Ericsson Network Management System in DXX
Nominal Power	The nominal power is the power level defined when configuring the transceiver.
O&M	Operation and Maintenance General term for activities such as configuration, utilization of channels (frequency bands), cell planning, system supervision, hardware and software maintenance, subscriber administration, etc.
OMC	Operation and Maintenance Centre
OMT	Operation and Maintenance Terminal The OMT is a terminal that supports functions for handling the RBS on site. The terminal can be a portable PC.

Operation	Operation is the normal, everyday running of the RBS with full functionality.
OPI	OPerational Instructions
PA	Power Amplifier
PAM	Power Amplifier Module
PBA	Printed Board Assembly
PBC	Power and Battery Cabinet
PC	Personal Computer
PCB	Printed Circuit Board
PCH	Paging CHannel Downlink only subchannel of CCCH for system paging of MSs. -> CCCH
PCM	Pulse Coded Modulations (used as a name for the G.703 transmission interface)
PCS	Personal Communication Services
PFWD	Power Forward
Physical Channel	An air interface physical channel carries one or more logical channels. A physical channel uses a combination of frequency and time division multiplexing and is defined as a sequence of radio frequency channels and time slots. -> TDMA frame -> Logical channel
PIN	Personal Identification Number
PLB	Payload Loop Back
PREFL	Power Reflected
PSA	Power Supply Adapter
PSU	Power Supply Unit
RACH	Random Access CHannel Uplink only subchannel of CCCH for MS request for allocation of a dedicated channel. -> CCCH
RAI	Remote Alarm Indication

RAM	Random Access Memory
RBS	Radio Base Station All equipment forming one or more Ericsson base stations. ->BTS
RBS 2000	New RBS generation
Remote mode	When the RU is in RU mode Remote, a link is established between the BCS and the central main RU.
RF	Radio Frequency
RLC	Repair Logistic Centre
R-state	Release state
RTN	Return
RU	Replaceable Unit An RU consists of one or more HWUs. An RU may be replaced by another RU of the same type. The RU is the smallest unit that can be handled on site.
RX	Receiver
RXA	Receiver antenna branch A
RXB	Receiver antenna branch B
RXDA	Receiver Divider Amplifier
RXDP	Receiver Distribution Plane
RXQUAL	Measure of signal quality as defined in GSM 05.08:8.2.4
SES	Severely Errored Second
SIR	Small Indoor RBS
SO	Service Object
Sub RU	A sub-replaceable unit is always connected to a superior Main RU. This connection is used for example for retrieval of the RU identity. A sub-RU normally does not have a processor. Note that an RU with a processor that is not loadable is classified as a sub-RU.
SW	SoftWare

SWR	Standing Wave Ratio
SYNC	Synchronous
T1	Transmission facility for DS1 (1544 kbit/s).
TCB	Tranceiver Control Board
TCH	Traffic CHannel The traffic channels carry either encoded speech or user data.
TDMA	Time Division Multiple Access Multiplexing of several channels in a common frequency band. Each channel is assigned a certain time division, a time slot.
TDMA frame	GSM air interface time frame comprising eight time slots.
TEI	Terminal Endpoint Identifier TEI is an identification code carried by a LAPD frame as a terminal connection endpoint within a Service Access Point (SAP).
TEMS	TEst Mobile Station
TF	Timing Function
TG	Transceiver Group
Timing bus	The timing bus carries air timing information from the timing unit in the DXU to the TRUs.
TM	Transport Module
TMA	Tower Mounted Amplifier
TN O&M	Transport Network Operation and Maintenance (in general).
Tora	ASIC in the TRU
TRA	Transcoder Rate Adapter The TRA Unit in BSC performs transcoding of speech information and rate adaption of data information.
Tracy	ASIC in the TRU

TRX	Transceiver (combined transmitter and receiver)
TS	Time Slot A 0.577 ms period (TDMA frame subunit) corresponding to 156.25 raw bits of information. The eight time slots of each TDMA frame are numbered 0...7. -> Burst
TT	Total Time
TX	Transmitter
TXA	Transmitter antenna branch A
TXB	Transmitter antenna branch B
TXU	Radio Transmitter Unit
UAS	Unavailable Seconds
UL	Underwriters Laboratories Inc.
Uplink	Signalling direction, from the MS to the system.
UPS	Uninterrupted Power Supply
VCO	Voltage Controlled Oscillator
VSWR	Voltage Standing Wave Ratio RF signal measure. The quotient between transmitted and reflected power.
X bus	The X bus carries transmit air data frames between trancievers. This is used for baseband frequency hopping.

Maxite™ Spare Parts Catalogue

Due to continued progress in methodology, design and manufacturing, the contents of this document are subject to revision without notice.

Contents

1 Preface for the Spare Parts Catalogue

Target Groups:

1. Field Technichians.
2. Technical Administrators

The Catalogue is a complement to the Maintenance Manual and provides relevant information necessary to order replaceable parts. This information is useful for the general planning of a maintenance organisation and in building up a spare parts stock.

The Spare Parts Catalogue with Product No: LZN 302 98, (previous EN/LZT 123 2775) can be ordered separately, but is also included in the User’s Guide with Product No: LZN 302 75, (prevoius EN/ LZB 119 3477)

Maxite™ is a micro base station with active antenna

Note: "Maxite is a trademark owned by Telefonaktiebolaget L M Ericsson, Sweden"

1.1 Release History

In addition to editorial changes, such as corrections of spelling, grammar and layout, the following changes have been made for each release.

Only the three latest revisions are listed below.

1.1.1 R1A to R2A

- GSM 1900 Radio Unit variants.
- Active antennas for GSM 1900, 1250 W model.
- Optional cables for 4 and 6 TRX.

1.1.2 R2A to R3A

- Active antennas for GSM 1900, 500 W model.
- Lightning protection for Active antennas.
- Optional external Fan Unit for RBS 2302.
- .

1.1.3 R3A to R4A

- Coverage Extension Unit, CEU for GSM 900. Booster to be used for passive antennas.
- Sun shield cover, Mast fixture, Pole fixture, cables and details for CEU.
- Optional Fan Unit for RBS 2302 is removed from this Catalogue. Not applicable for Maxite.
- The Catalogue has changed product number. EN/LZT 123 2775 is replaced by LZN 302 98.

2 Spare Parts Philosophy for Maxite™

The specifying and classifying of spare parts is done during the service preparation process which is a part of the industrialization process. The result is a spare part list containing three classes of spare parts:

1. Recommended for customer stock. Intended to be replaced on site and intended to be repaired at Ericsson Repair Center (former code = U).
2. Recommended for customer stock. Intended to be replaced on site or at local shop and intended to be disposed after consumption (former code = R).
3. Not recommended for customer stock. The parts are available when needed (former code = A).

The spare parts catalogue is adapted to this structure.

The dimensioning and recommendation of spare parts will not follow the principle one-of-each-board-in-use unless the customer expressly so insists.

The dimensioning and recommendation of spare part stocks is and will be done with a computer-based calculation model for BTS equipment.

The tool is working with the parameters:

- Product reliability (MTBF)
- Spare part delivery lead time or repair turn around time.
- Chosen service level, that is, Spare Part Management.
- The spare part structure.
- Quantity of each unit in operation to be supported by the specific stock.
- The probability of shortage.

2.1 General Information

The catalogue is divided into separate chapters, depending on recommendations (classifications).

Position numbers put in brackets ( ) are associated parts, not necessary shown in illustrations. Position numbers with letters, like 3A, 3B are alternative products.

Parts without Product number may be shown on illustrations, but are not recommended for customer stock, or may be included in a Spare Parts Set (and not separate orderable). If a reference to another chapter is given, more information will be found there.

Spare Parts Ordering Address:

Please use the Regional Ericsson Company, else:

Ericsson Radio Systems AB

Att: Hardware Services

Customer Services (BMOG)

S-164 80 Stockholm

Repair Delivery Address:

Please use the Regional Logistics Center specified in the System Services Contract with the local Ericsson Radio Systems Company.

Catalogue Ordering:

Use the product no ...... seen at the bottom of this page.

External users can order Spare Parts Catalogues (or other manuals according to the Library Overview), from the same address as for Spare Parts, above.

Internal users (within the Ericsson Company) can always find the latest version of the Catalogue on the Intranet address:

http://gsmrbs.ericsson.se/rbsinstructions/

Remarks

External user's comments or questions regarding information in this catalogue should be addressed to :

Spare Parts Documentation Telefax: **+46 8 757 1388**or as e-mail to **HWS.Support@era.ericsson.se**

Internal Ericsson users can e-mail as above or make a MHS Trouble Report on the catalogue's Product No and R-state seen at the bottom of this page.

3 Recommended Spare Parts for Customer Stock (Repairable)

About this Chapter

All spare parts in this chapter have the internal code = U.

These parts are recommended for Customer stock. Intended to be replaced on site and intended to be repaired at Ericsson Repair Centre.

It is only possible to order new repairable parts as long as serial production continous. When production ceases these parts can only be sent for repair.

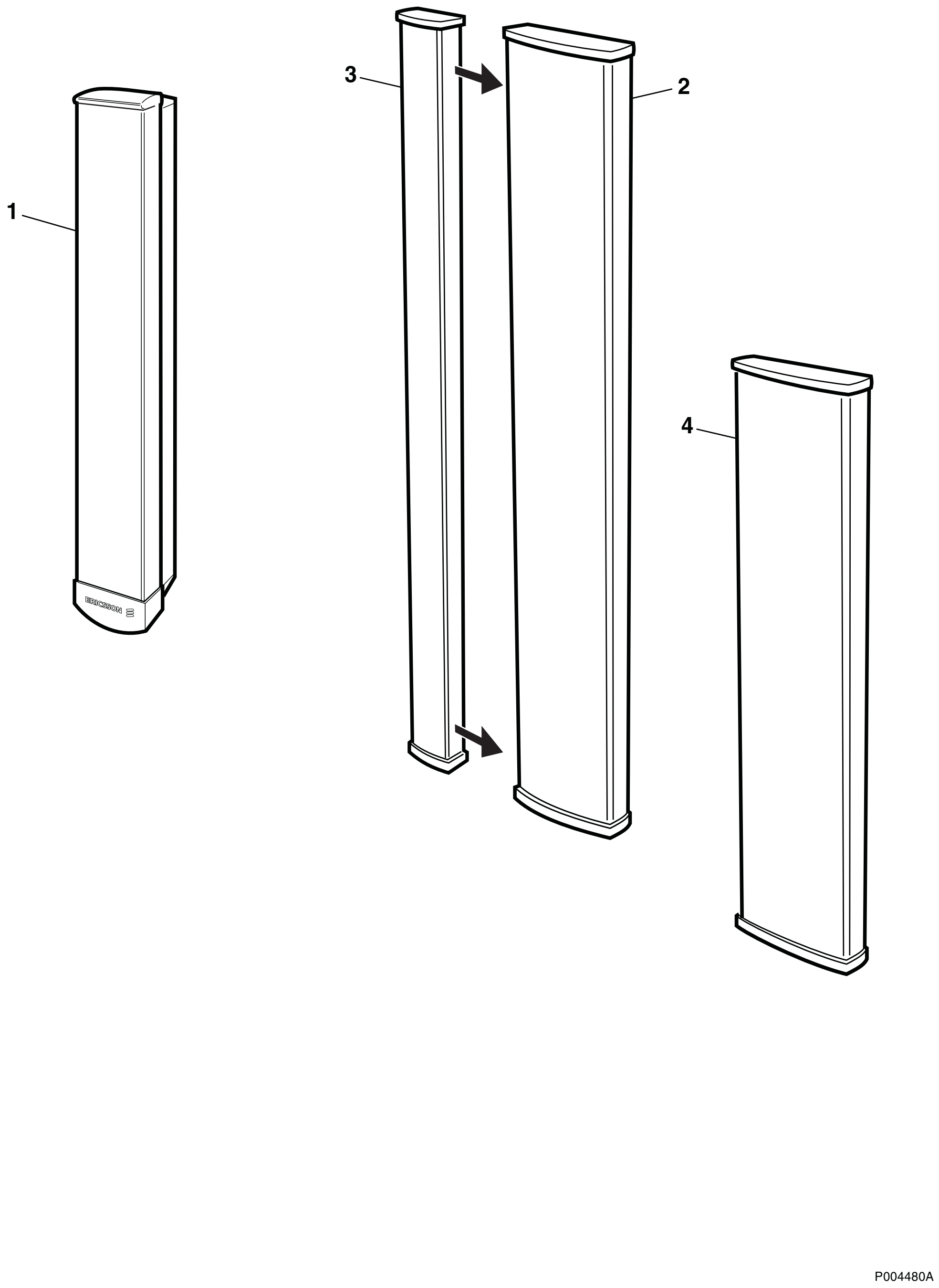


Figure 1

3.1 Active Antenna Unit, AAU

3.1.1 Antenna GSM 1800

Pos	Product No	Product name	Description
1	KRE 101 1580/1	Antenna unit	500W/GSM 1800 Active Antenna Unit, AAU

3.1.2 Antennas GSM 1900

2	KRE 101 1769/1	Antenna unit	Base Module 1250W/GSM 1900 - Band A. Active Antenna Unit, AAU
	KRE 101 1769/2	Antenna unit	Base Module 1250W/GSM 1900 - Band B. Active Antenna Unit, AAU
	KRE 101 1769/3	Antenna unit	Base Module 1250W/GSM 1900 - Band C. Active Antenna Unit, AAU
3	KRE 101 1769/11	Antenna unit	TX Module 1250W/GSM 1900 - Band A. Active Antenna Unit, AAU
	KRE 101 1769/12	Antenna unit	TX Module 1250W/GSM 1900 - Band B. Active Antenna Unit, AAU
	KRE 101 1769/13	Antenna unit	TX Module 1250W/GSM 1900 - Band C. Active Antenna Unit, AAU
4	KRE 101 1823/1	Antenna unit	500W/GSM 1900- Band A. Active Antenna Unit, AAU
	KRE 101 1823/2	Antenna unit	500W/GSM 1900 - Band B. Active Antenna Unit, AAU
	KRE 101 1823/3	Antenna unit	500W/GSM 1900- Band C. Active Antenna Unit, AAU

Note: The Active Antenna Unit does not include Mounting fixture. See Chapter "Other Available Parts"

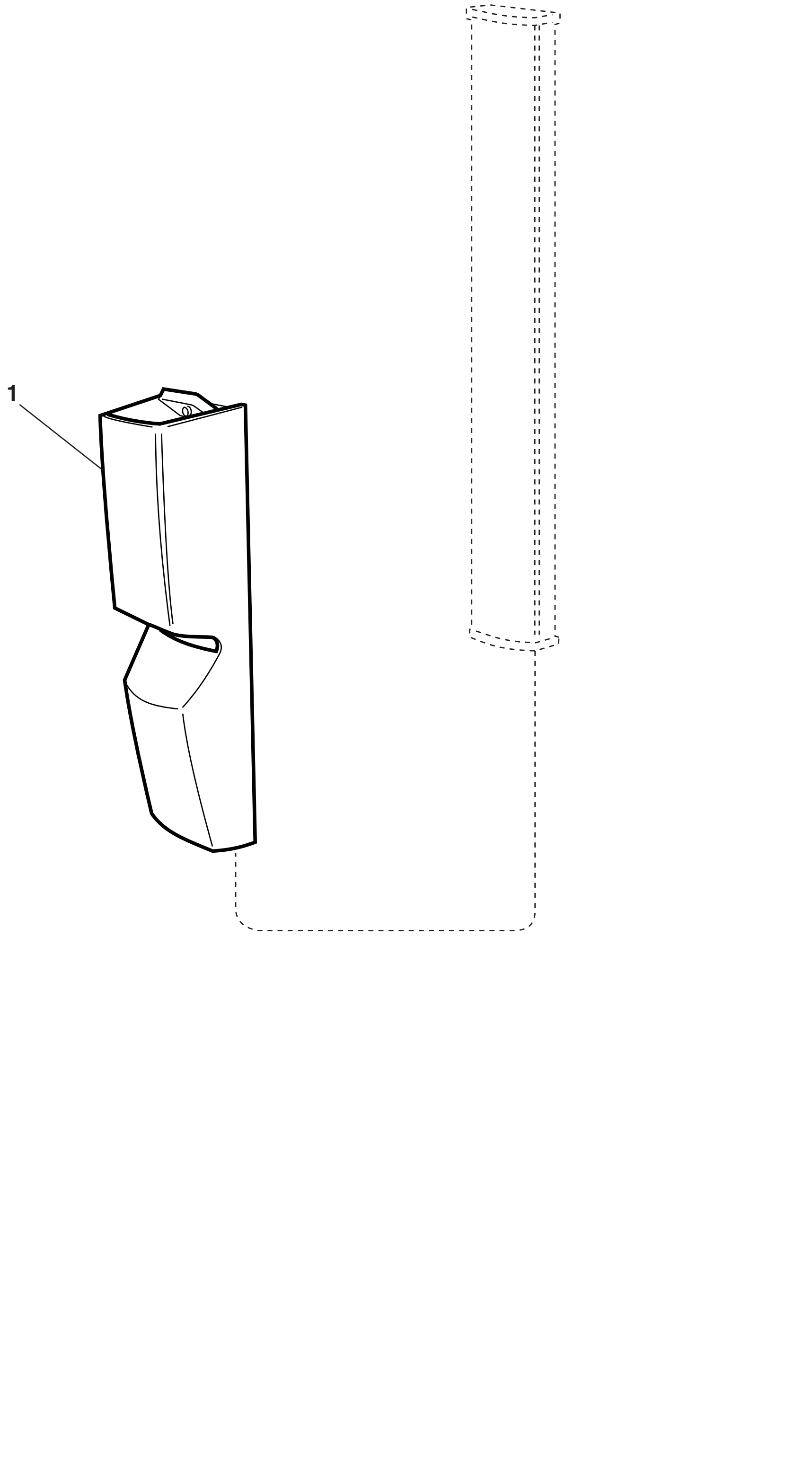


Figure 2

3.2 Coverage Extension Unit, CEU

3.2.1 Booster for Passive Antennas GSM 900

1	KRY 112 29/2	Amplifier	For GSM 900 Antennas

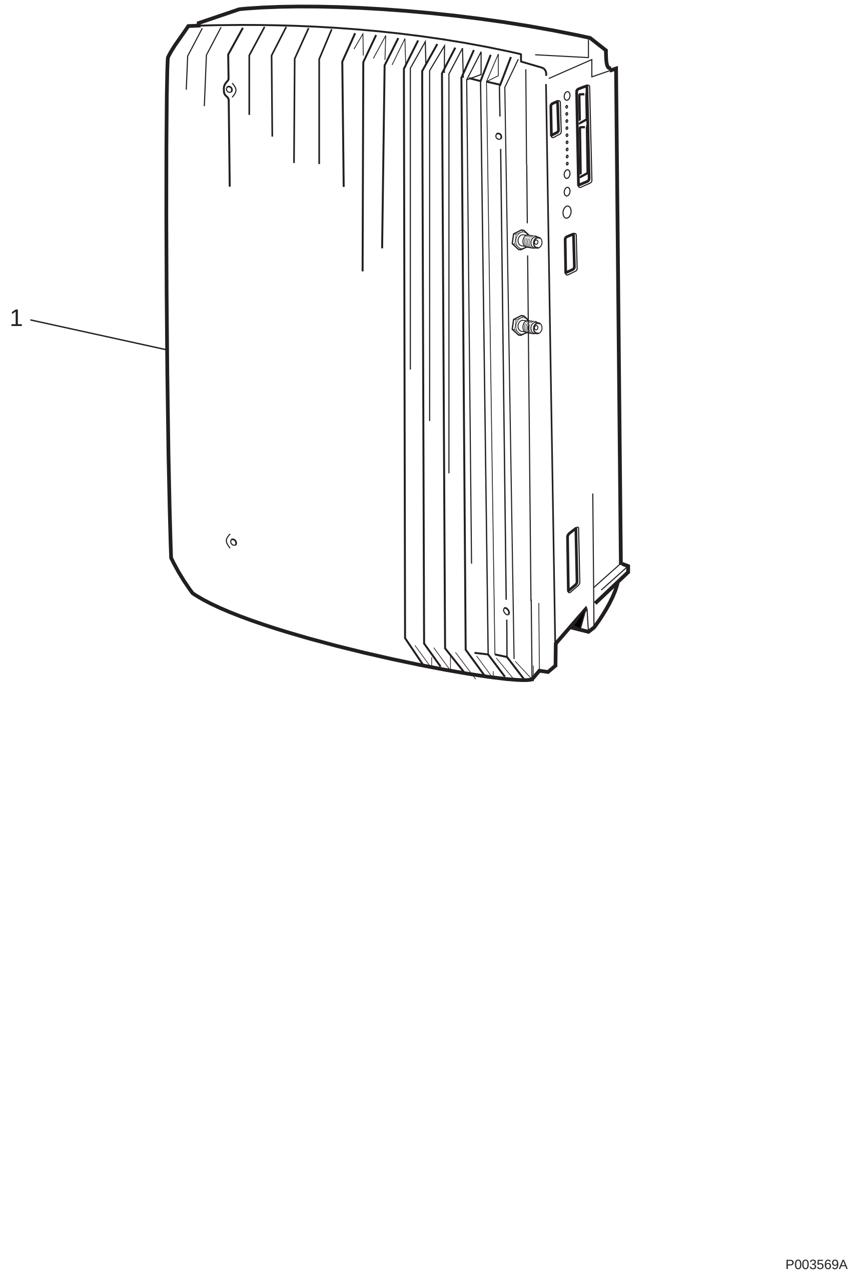


Figure 3

3.3 Radio Cabinet RBS 2302

3.3.1 GSM 900

Pos	Product No	Denom.	System standard	Number of TRX	Transm. Interface	Intern. Synch	Encr	Filter Type
1	KRC 161 31/022	Radio unit	GSM 900	2	E1	N	A5/1	DPX
	KRC 161 31/024	Radio unit	GSM 900	2	E1	N	A5/2	DPX
	KRC 161 31/032	Radio unit	GSM 900	2	T1	N	A5/2	DPX

3.3.2 GSM 1800

	KRC 161 31/054	Radio unit	GSM 1800	2	E1	N	A5/1	DPX
	KRC 161 31/056	Radio unit	GSM 1800	2	E1	N	A5/2	DPX
	KRC 161 31/064	Radio unit	GSM 1800	2	T1	N	A5/2	DPX

3.3.3 GSM 1900

	KRC 161 31/088	Radio unit	GSM 1900	2	E1	N	A5/2	DPX
	KRC 161 31/090	Radio unit	GSM 1900	2	T1	Y	A5/1	DPX
	KRC 161 31/094	Radio unit	GSM 1900	2	T1	N	A5/1	DPX

Note: The Radio unit does not include Mounting Base and Battery.

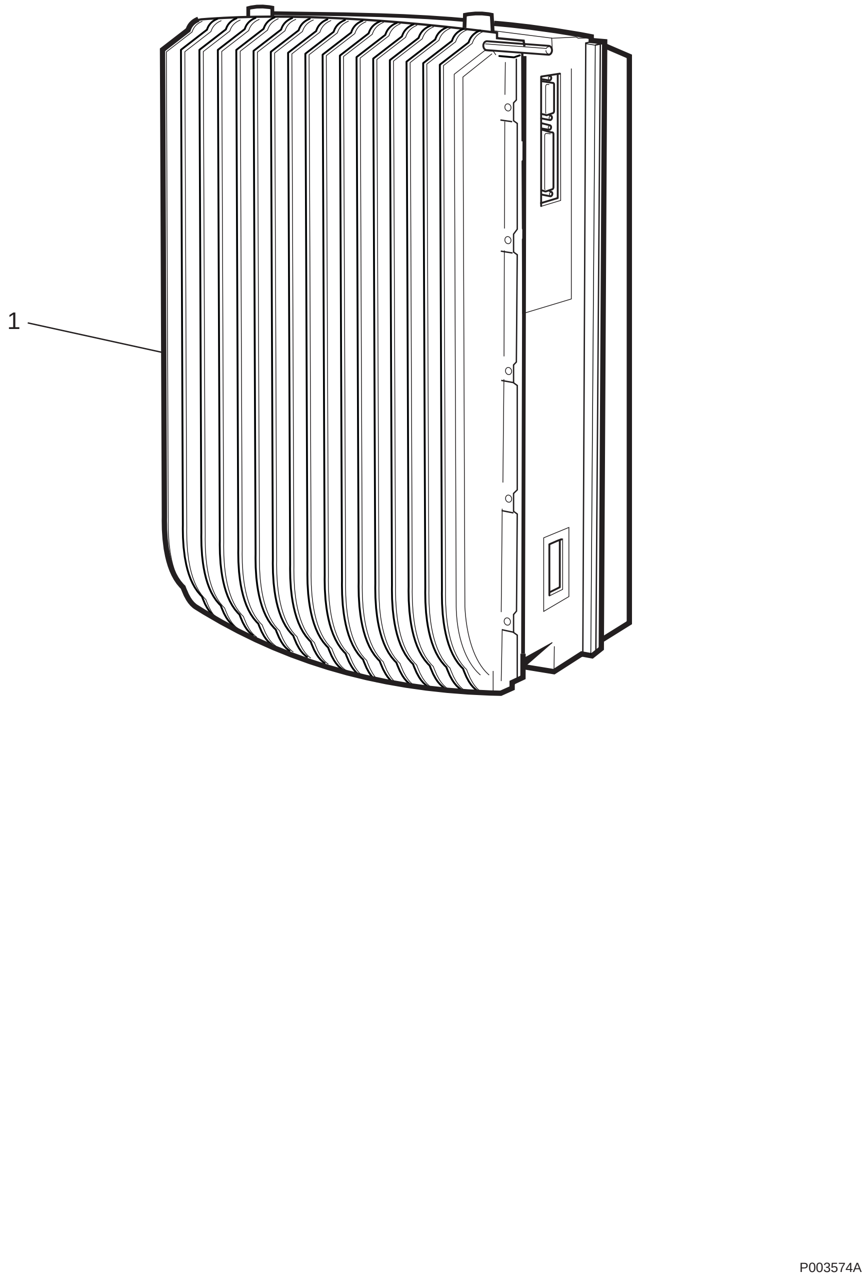


Figure 4

3.4 Power and Battery Cabinet, PBC

Pos	Product No	Product name	Description
1	BMK 905 01/1	Battery Cabinet	/*Not including Mounting Base and Battery*

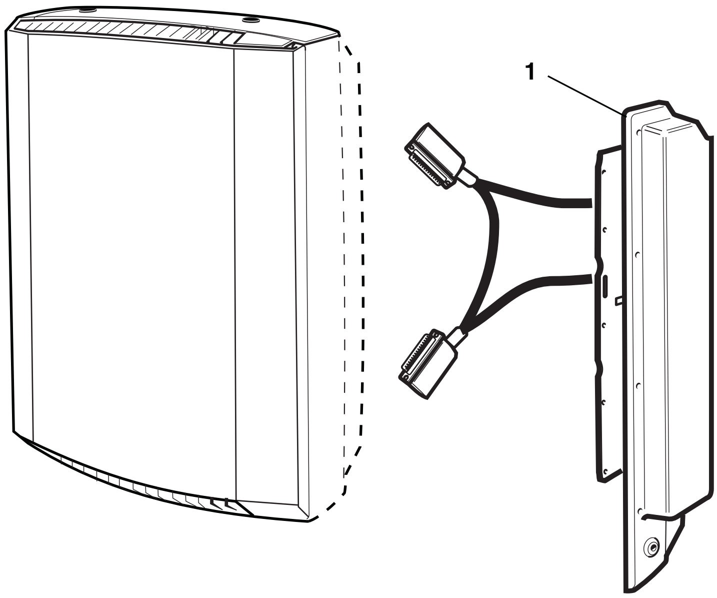


Figure 5

3.5 Optional HDSL Unit for RBS 2302

3.5.1 HDSL Unit

Pos	Product No	Denomination	Description
1	ZAT 759 19/101	Modem	Complete side door for RBS 2302. Including HDSL modem and internal cables.

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4 Recommended Spare Parts for Customer Stock (Not Repairable45)

About this Chapter

All spare parts in this chapter have the internal code = R.

These parts are recommended for Customer stock. Intended to be replaced on site and intended to be disposed after consumption.

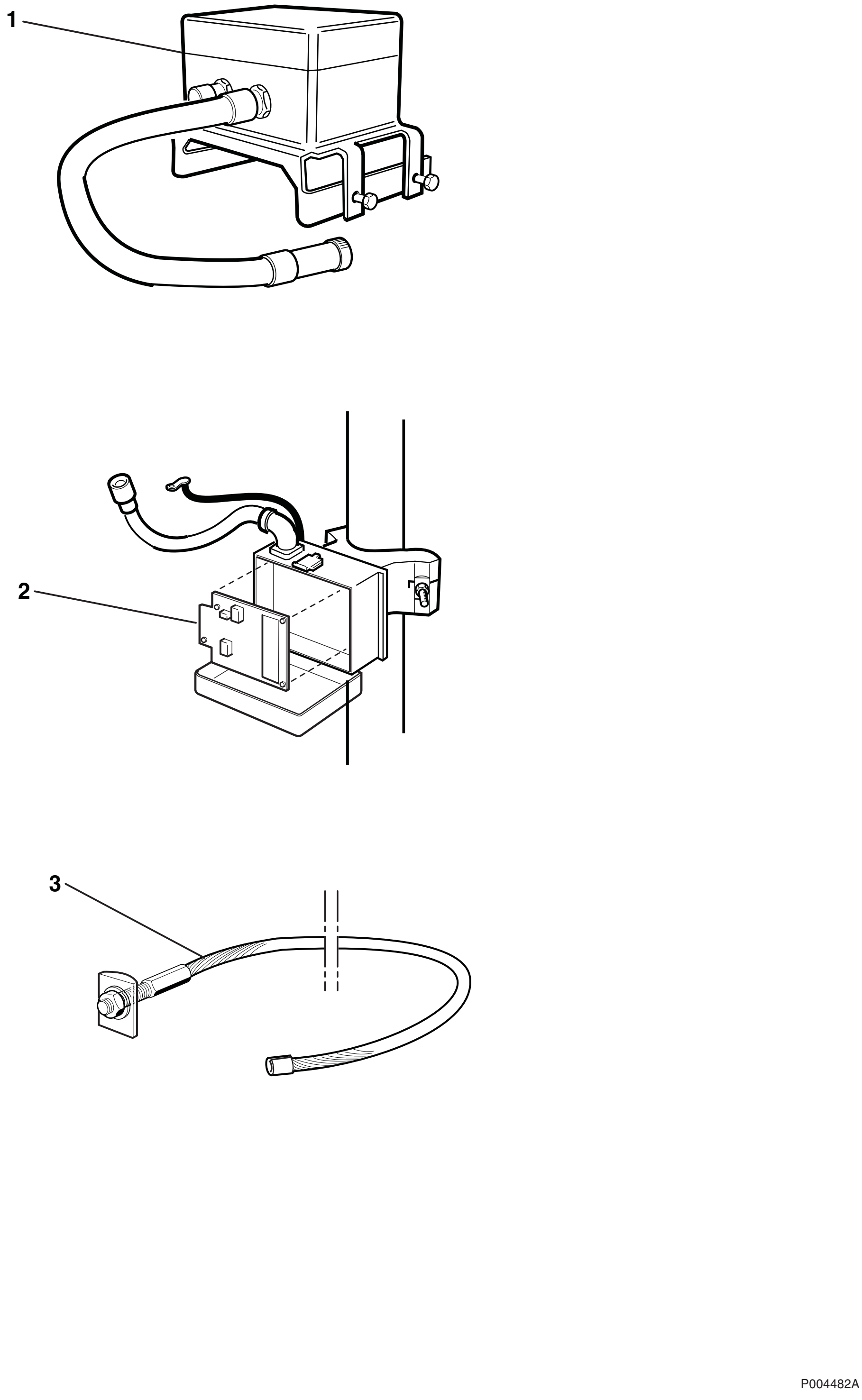

Figure 6

4.1 Parts for Active Antenna Unit, AAU

4.1.1 Unit for Lightning Protection GSM 1800

Pos	Product No	Denomination	Description
1	NGC 901 09/1	Lightning Protector	Lightning protector for DC/Data cable in GSM 1800 Active Antenna Unit. **(Available from September 1999.)**

Note 1 Lightning protection for RF-cables in GSM 1800 see Chapter "Other Available Parts"

4.1.2 Board for Lightning Protection Unit GSM 1900

2	ROA 117 9373/1	Printed Assembly Board	Lightning protector board for DC/Data cable in GSM 1900 Active Antenna Unit.

Note 2 For Complete Lightning Protection Unit for GSM 1900 see Chapter "Other Available Parts"

4.1.3 Mounting wire for GSM 1900

3	SXA 104 7804/1	Accessories	Mounting wire with details for GSM 1900 Antennas and for GSM 1900 Lightning Protector.

Note 3 For Complete Mounting Fixture see Chapter "Other Available Parts"

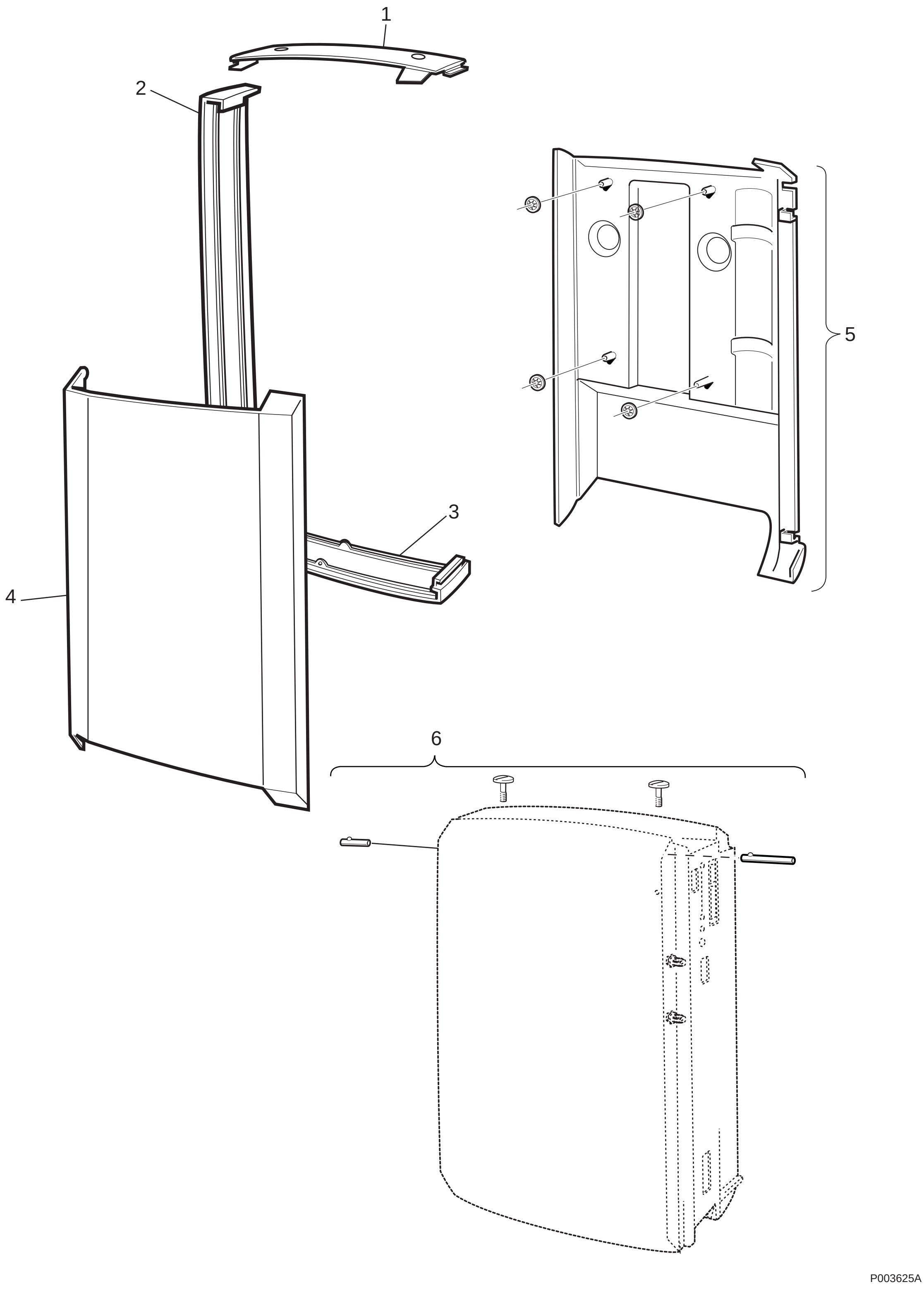

Figure 7

4.2 Sunshields for RBS 2302

Pos	Product No	Product name	Description
1	SDF 105 11/1	Sun Shield	Upper /*Grey*
2	SDF 105 12/1	Sun Shield	Left /*Grey*
3	SDF 105 13/1	Sun Shield	Lower /*Grey*
4	SDF 105 09/1	Sun Shield	Front /*Grey*
	SDF 105 09/2	Sun Shield	Front /*Green*
	SDF 105 09/3	Sun Shield	Front /*Blue*
	SDF 105 09/4	Sun Shield	Front /*Red*
	SDF 105 09/5	Sun Shield	Front /*Ochre*
	SDF 105 09/6	Sun Shield	Front /*Yellow*
5	NTZ 111 44/01	Spare Parts Set	Rear Sunshield, /*Grey. Includes Locking Washers. (Also included in a Mounting Base)*
6	NTZ 112 86/SH03	Spare Parts Set	Sun Shield Accessories /*Includes front right and left shaft (hinge pin) and upper end plugs.*

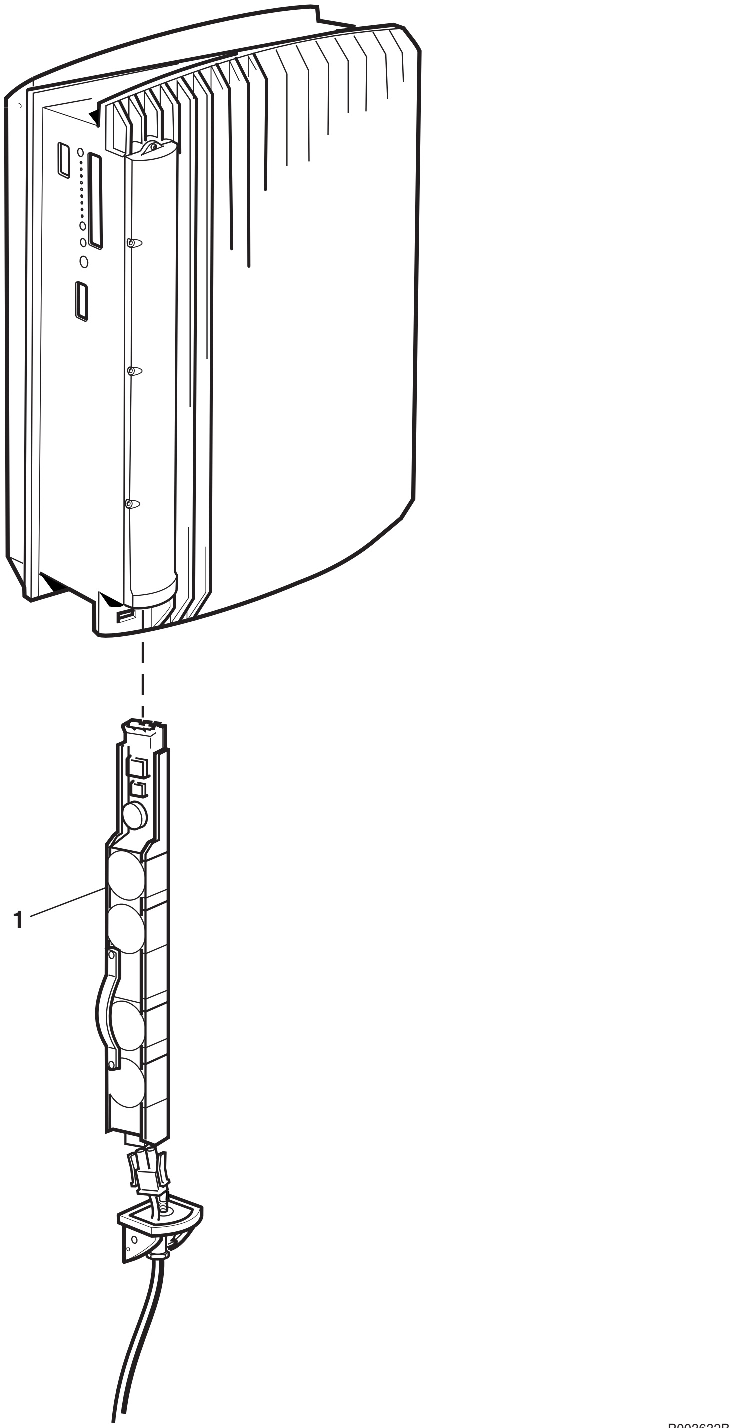

Figure 8

4.3 Power Supply Adapter for RBS 2302

Pos	Product No	Denomination	Description
1	BMY 908 04/1	Adapter	PSA, power supply adapter kit /*Includes cover lid, cable 5.0 m and other details.*

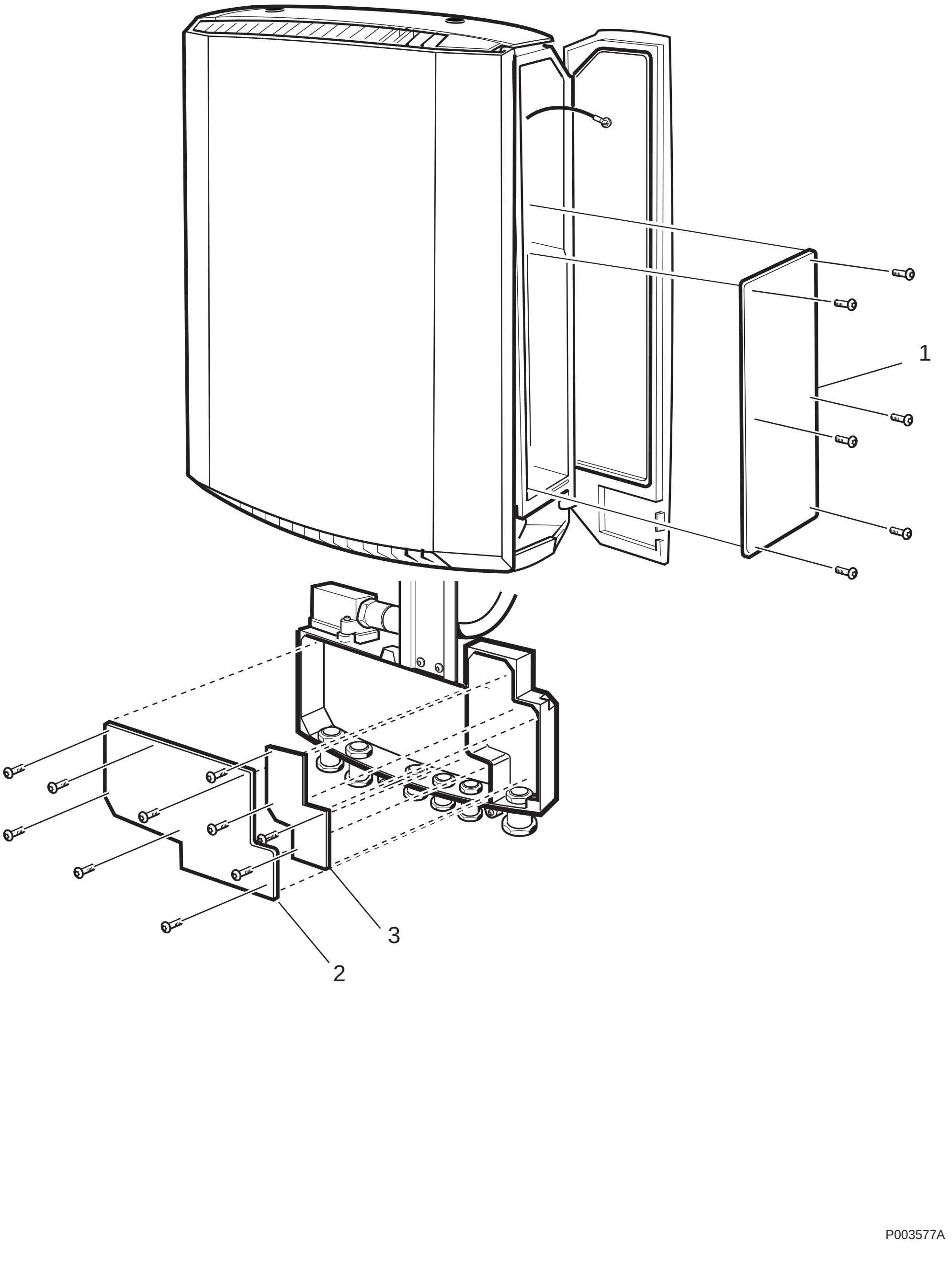

Figure 9

4.4 Replaceable Boards for RBS 2302

Pos	Product No	Denomination	Description
1	NTZ 111 44/02	Spare Parts Set	Connection board /*Incl screws.*
2	NTZ 111 44/03	Spare Parts Set	Transmission board /*Incl screws.*
3	NTZ 111 44/04	Spare Parts Set	AC board /*Incl screws.*

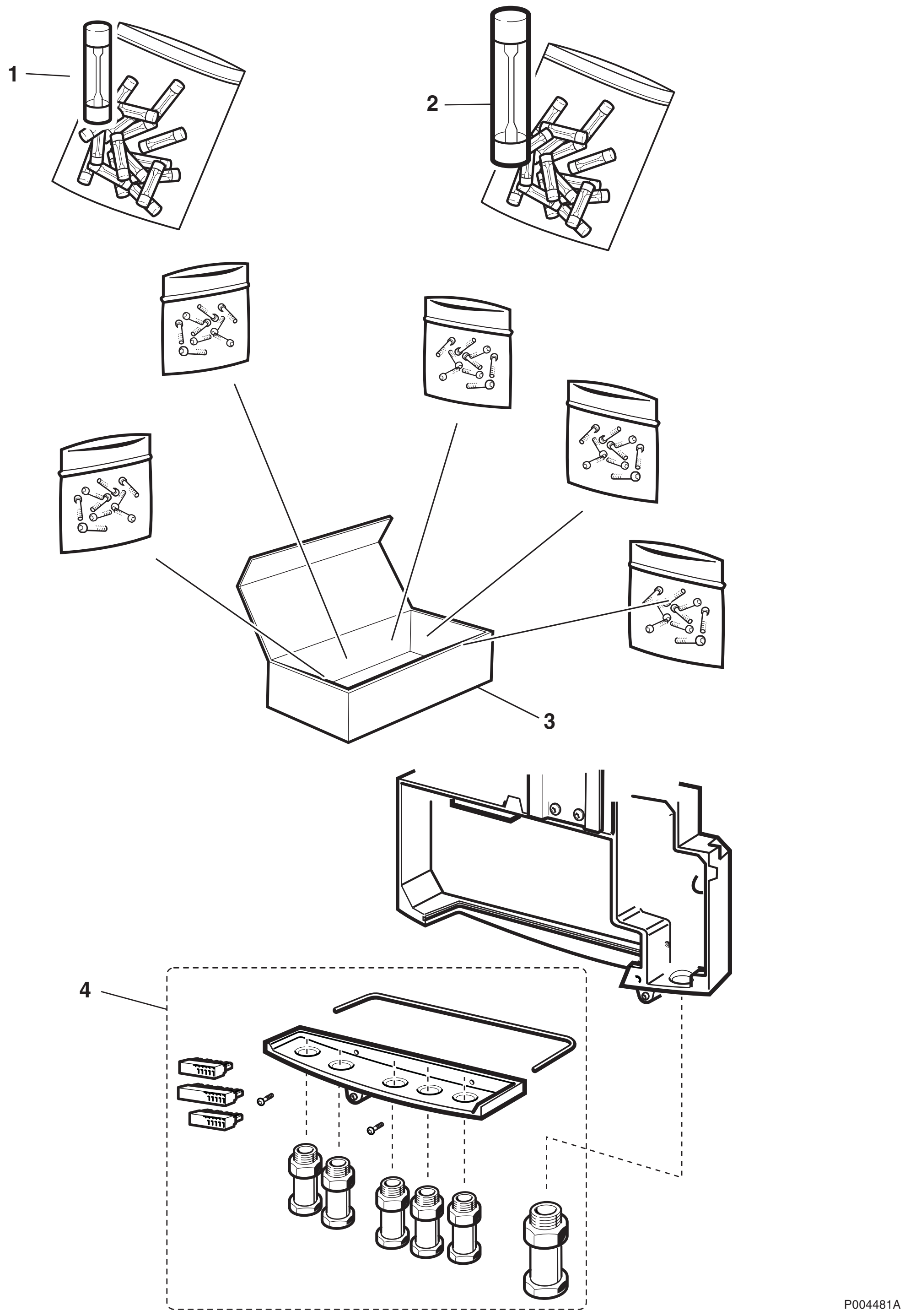

Figure 10

4.5 Fuses, Screws and Installation Details for RBS 2302

Pos	Product No	Denomination	Description
1	NTZ 111 44/08	Spare Parts Set	Fuses for 230 V /*6.3A size 5x20 mm, slow blow, 20 pcs.*
2	NTZ 112 86/FU02	Spare Parts Set	Fuses for 115 V /*8A size 6.3 x32 mm, slow blow, 20 pcs*
3	NTZ 111 44/05	Spare Parts Set	Set of screws for RBS 2302 /*Includes some of the most common screws, washers and fixing details.*
4	NTZ 111 44/06	Spare Parts Set	Set for RBS 2302 Interface box /*Includes terminal blocks, cable glands, gland plate with screws and shielding gasket.*

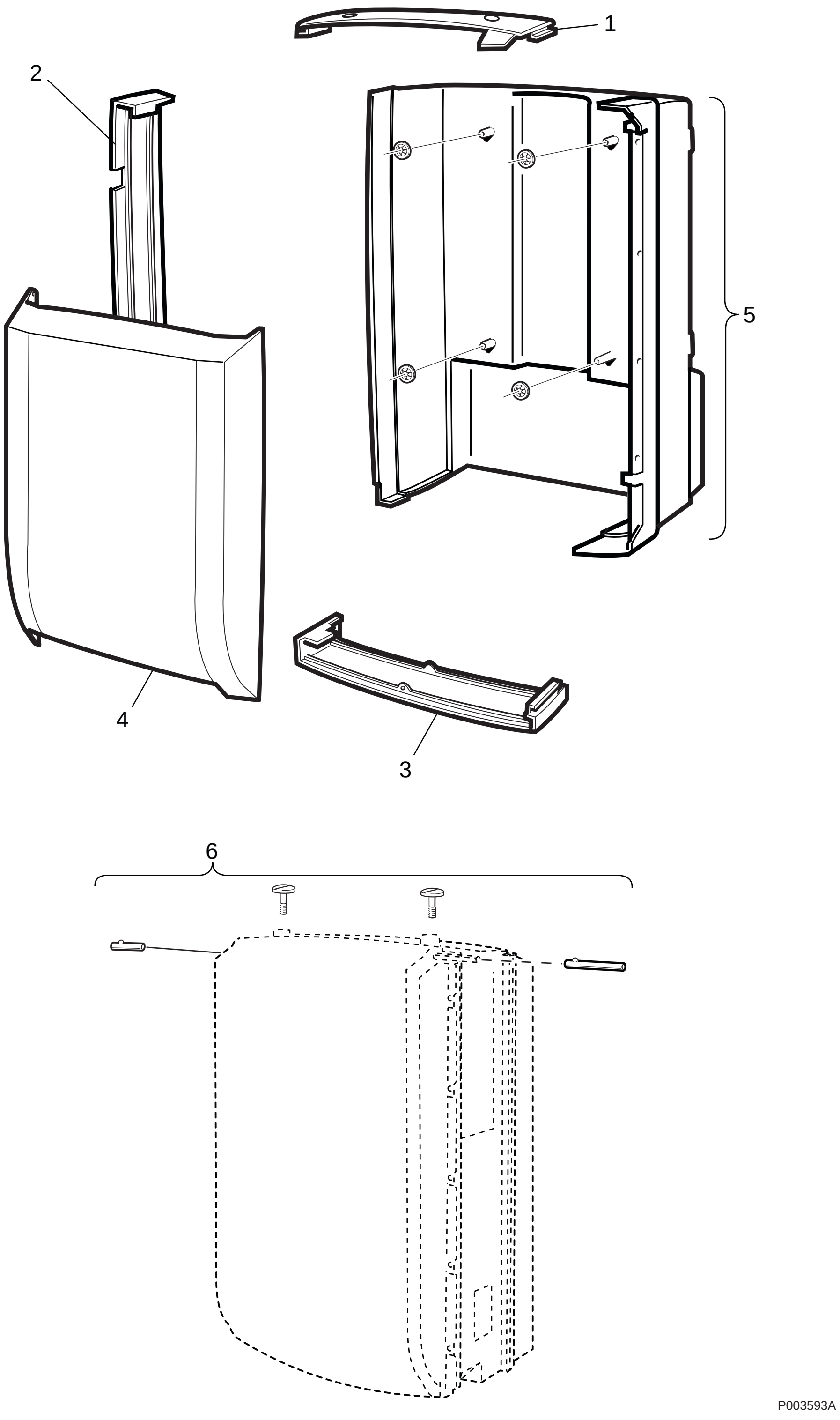

Figure 11

4.6 Sunshields for PBC

Pos	Product No	Product name	Description
1	SDF 105 11/1	Sun Shield	Upper /*Grey*
2	SDF 105 12/2	Sun Shield	Left /*Grey*
3	SDF 105 13/1	Sun Shield	Lower /*Grey*
4	SDF 105 10/21	Sun Shield	Front /*Grey*
	SDF 105 10/22	Sun Shield	Front /*Green*
	SDF 105 10/23	Sun Shield	Front /*Blue*
	SDF 105 10/24	Sun Shield	Front /*Red*
	SDF 105 10/25	Sun Shield	Front /*Ochre*
	SDF 105 10/26	Sun Shield	Front /*Yellow*
5	NTZ 111 45/02	Spare Parts Set	Rear Sunshield /*Grey. Includes Locking Washers. (Also included in a complete Mounting Base)*
6	NTZ 112 86/SH03	Spare Parts Set	Sun Shield Accessories /*Includes front right and left shaft (hinge pin) and upper end plugs.*

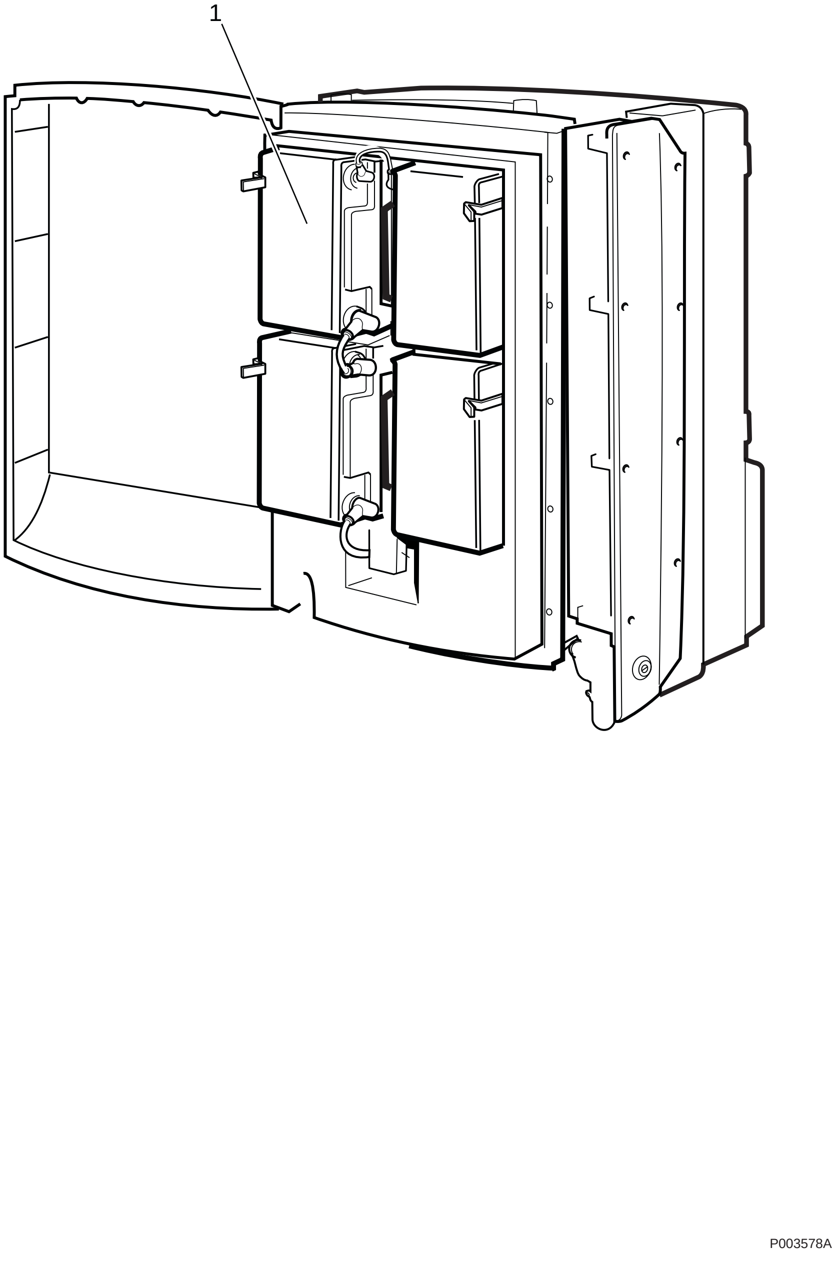

Figure 12

4.7 Batteries for PBC

Pos	Product No	Denomination	Description
1		Batteries	See **Note**

Note : Local purchase recommended. Batteries must comply with the specification document 1301-BKC 861 available from the local Ericsson Company.

(If local purchase not possible use Product No: 24/BKC 861 0013/004 . Includes 4 batteries)

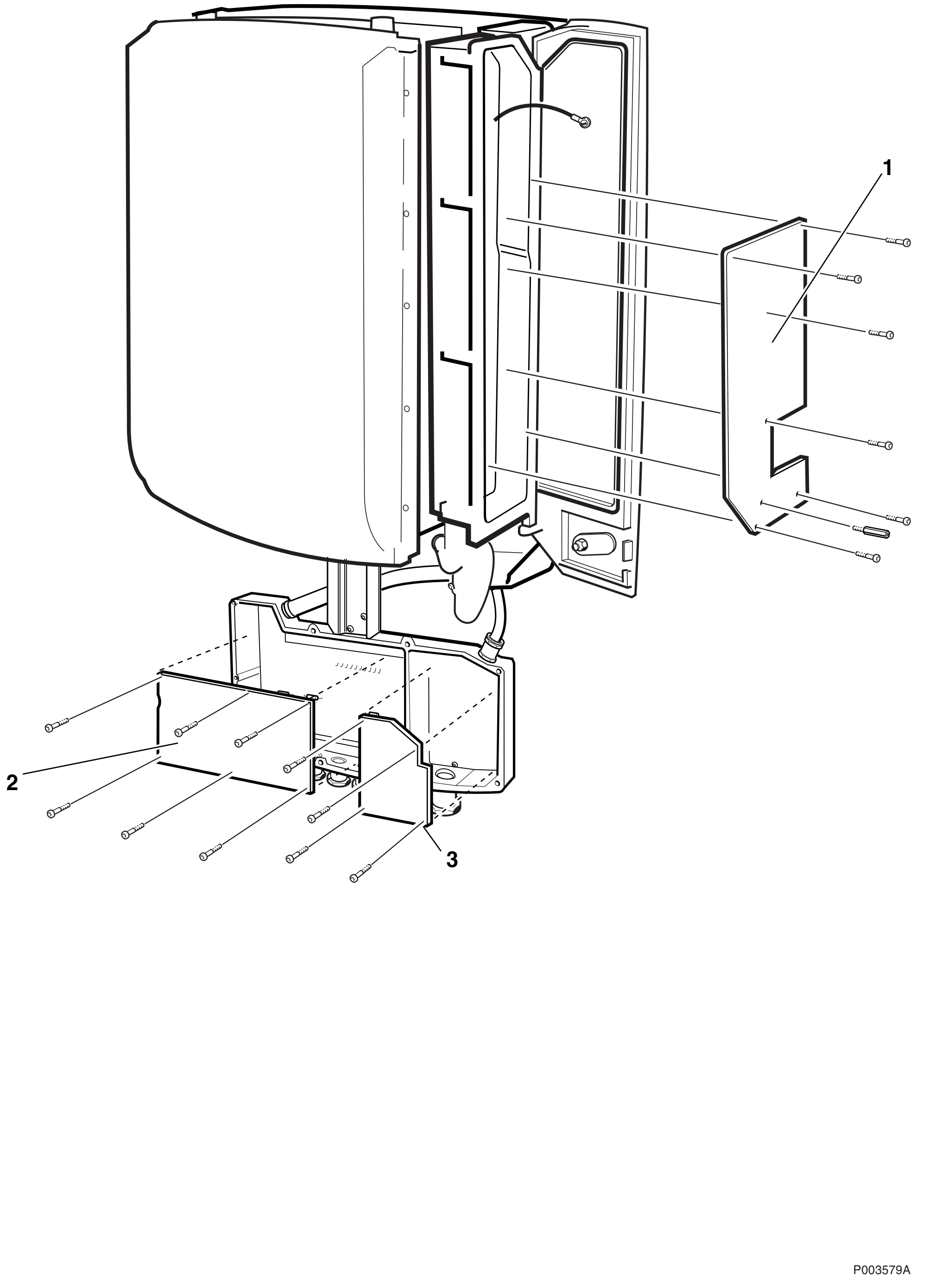

Figure 13

4.8 Replaceable Boards for PBC

Pos	Product No	Denomination	Description
1	NTZ 111 45/03	Spare Parts Set	EMC board /*Incl screws and spacer.*
2	NTZ 111 45/04	Spare Parts Set	DC alarm board /*Incl screws.*
3	NTZ 111 45/05	Spare Parts Set	AC board /*Incl screws.*

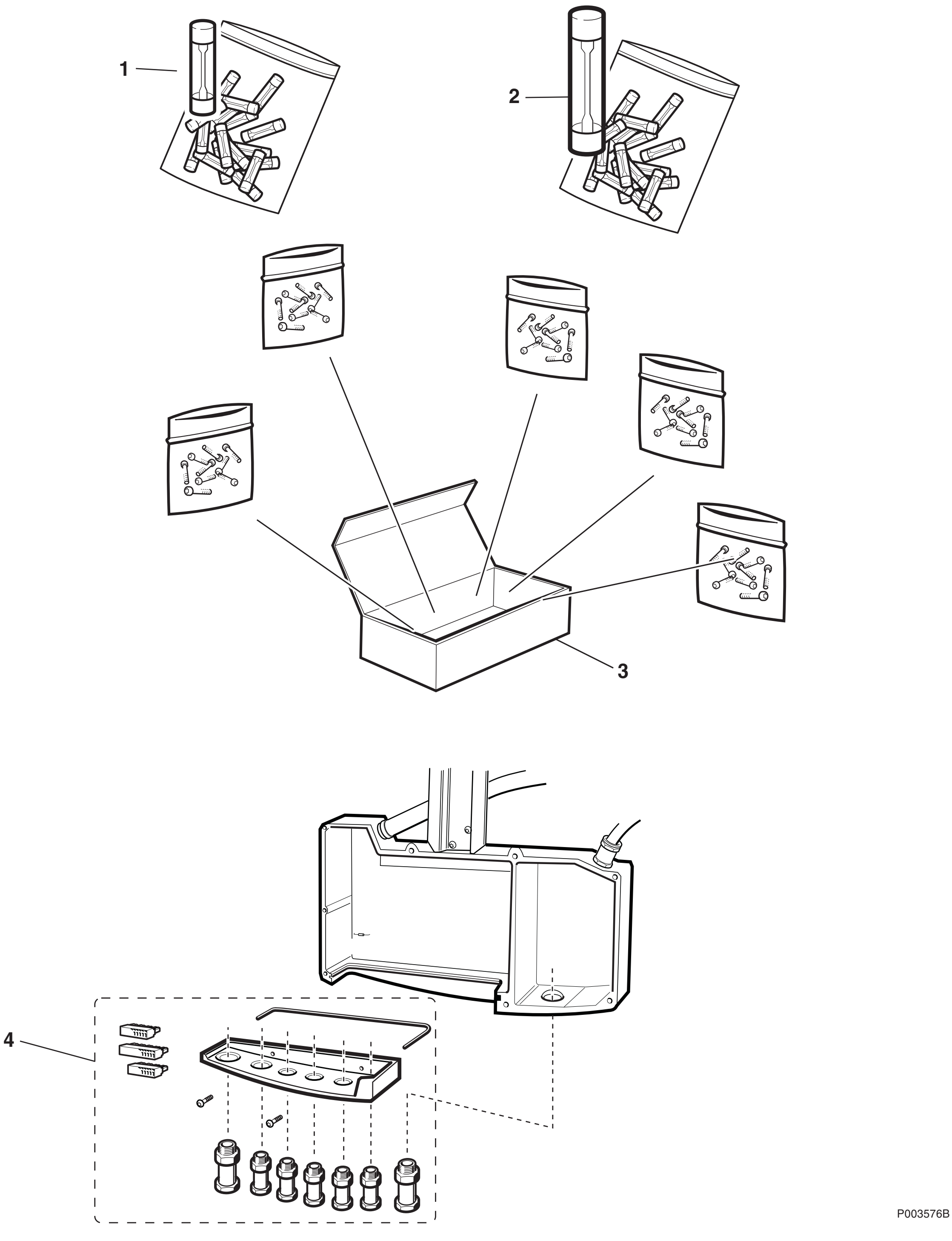

Figure 14

4.9 Fuses, Screws and Installation Details for PBC

Pos	Product No	Denomination	Description
1	NTZ 112 86/FU01	Spare Parts Set	Fuses for 230 V /*4A size 5x20 mm, slow blow, 20 pcs*
2	NTZ 112 86/FU02	Spare Parts Set	Fuses for 115 V /*8A size 6.3x32 mm, slow blow, 20 pcs*
3	NTZ 111 45/06	Spare Parts Set	Set of screws for PBC/*Includes some of the most common screws, washers and fixing details.*
4	NTZ 111 45/01	Spare Parts Set	Set for PBC Interface box /*Includes terminal blocks, cable glands, gland plate with screws and shielding gasket.*

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5 Other Available Parts

About this Chapter

All spare parts in this chapter have the internal code = A.

These parts are not recommended for Customer stock. The parts are available when needed.

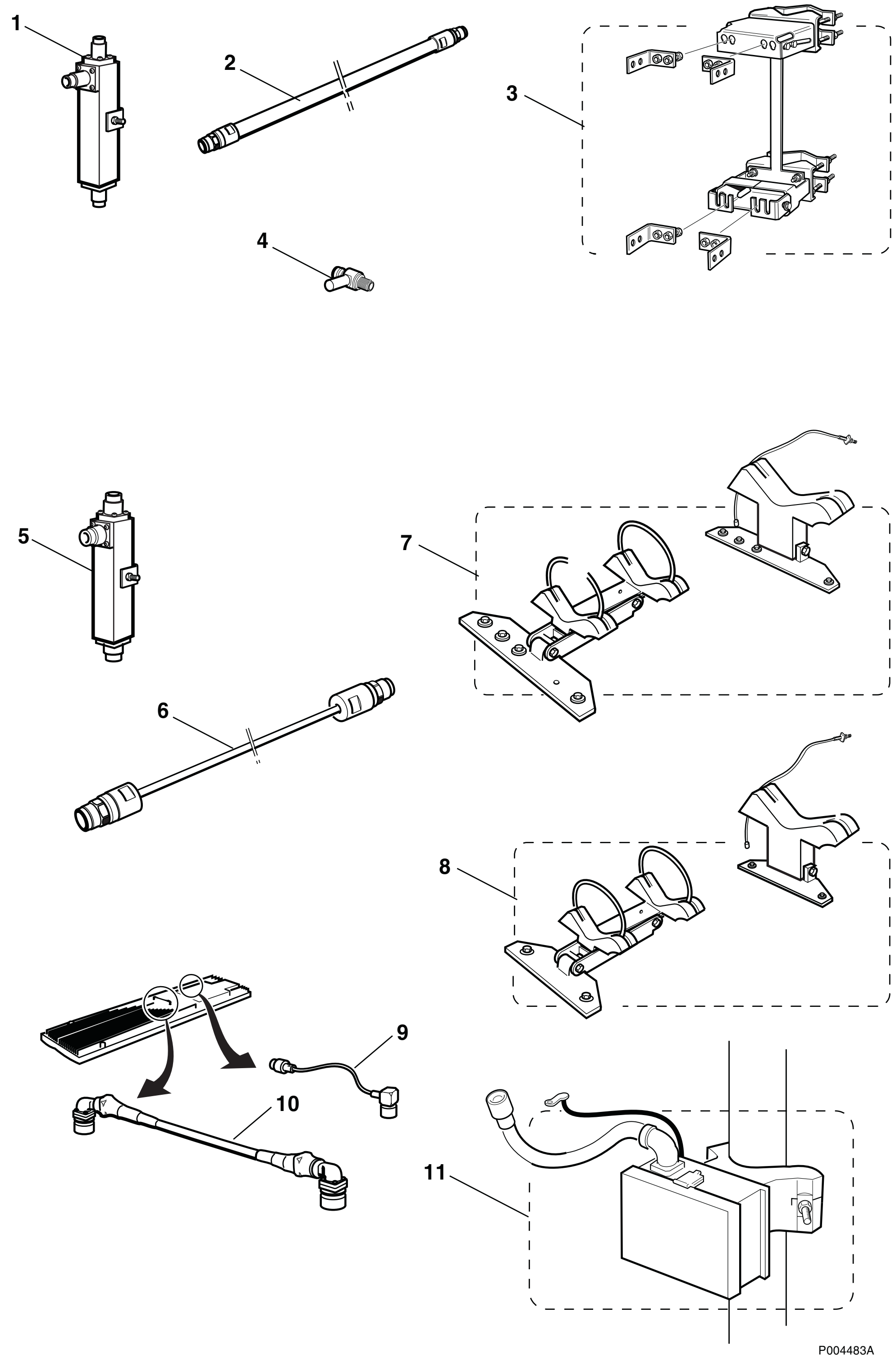

Figure 15

5.1 Other Available Parts for Active Antenna Unit, AAU

5.1.1 GSM 1800

Pos	Product No	Product name	Description
1	UPA 101 019/1	Power divider	Highway Splitter Combiner, HISC
2	RPM 518 985/1	Cable with connector	For HISC 2.0 m
3	SXK 111 4166/1	Mounting Fixture	Pole /Mast Fixture set for Active Antenna, GSM 1800/ 500W */Complete*
4	NGC 901 07/1	Lightning Protector	For RF

5.1.2 GSM 1900

Pos	Product No	Product name	Description
5	UPA 101 019/2	Power divider	Highway Splitter Combiner, HISC
6	RPM 518 985/2	Cable with connector	For HISC 2.0 m
7	SXA 105 9117/1	Mounting Bracket	Pole /Mast Fixture set for Active Antenna GSM 1900/ 1250W Base Module + TX Module */Complete*
8	SXA 105 9167/1	Mounting Bracket	Pole /Mast Fixture set for Active Antenna GSM 1900/ 1250W Base Module only */Complete*
9	RPM 113 4123/1	Cable	RF-cable, Base module - TX module
10	RPM 113 4124/1	Cable	DC/Data cable , Base module - TX module
11	SXA 105 9118/1	Protection	Complete Lightning Protection Unit . Including Lightning Protection Board and Wire.

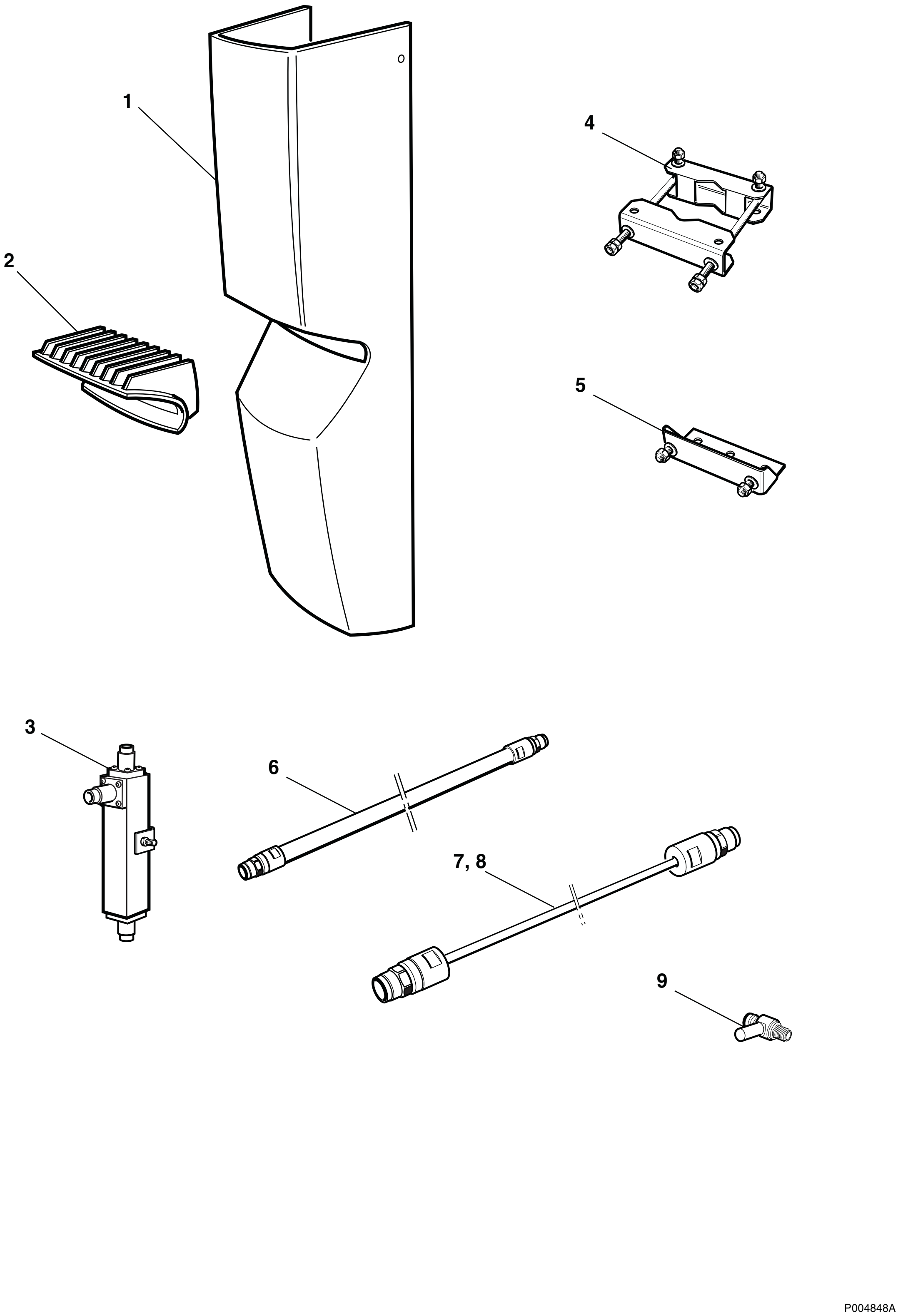

Figure 16

5.2 Other Available Parts for Coverage Extension Unit, CEU

5.2.1 GSM 900

Pos	Product No	Product name	Description
1	SDF 107 167/2	Cover	Grey
2	SXA 105 9036/1	Mechanical Component	Grating
3	UPA 101 019/1	Power Divider	Highway Splitter Combiner, HISC
4	NTM 202 20/1	Mounting Set	Mast fixture for CEU
5	NTM 202 21/1	Mounting Set	Wall fixture for CEU
6	RPM 518 985/1	Cable with connector	For HISC, Jumper N-Connectors, 2.0 m,
7	RPM 518 985/2	Cable with connector	For CEU, Jumper 7/16 Connectors , 2.0 m
8	RPM 518 985/3	Cable with connector	For CEU, Omni Cable, 4.0m
9	NGC 601 16/01	Lightning Protector	For RF

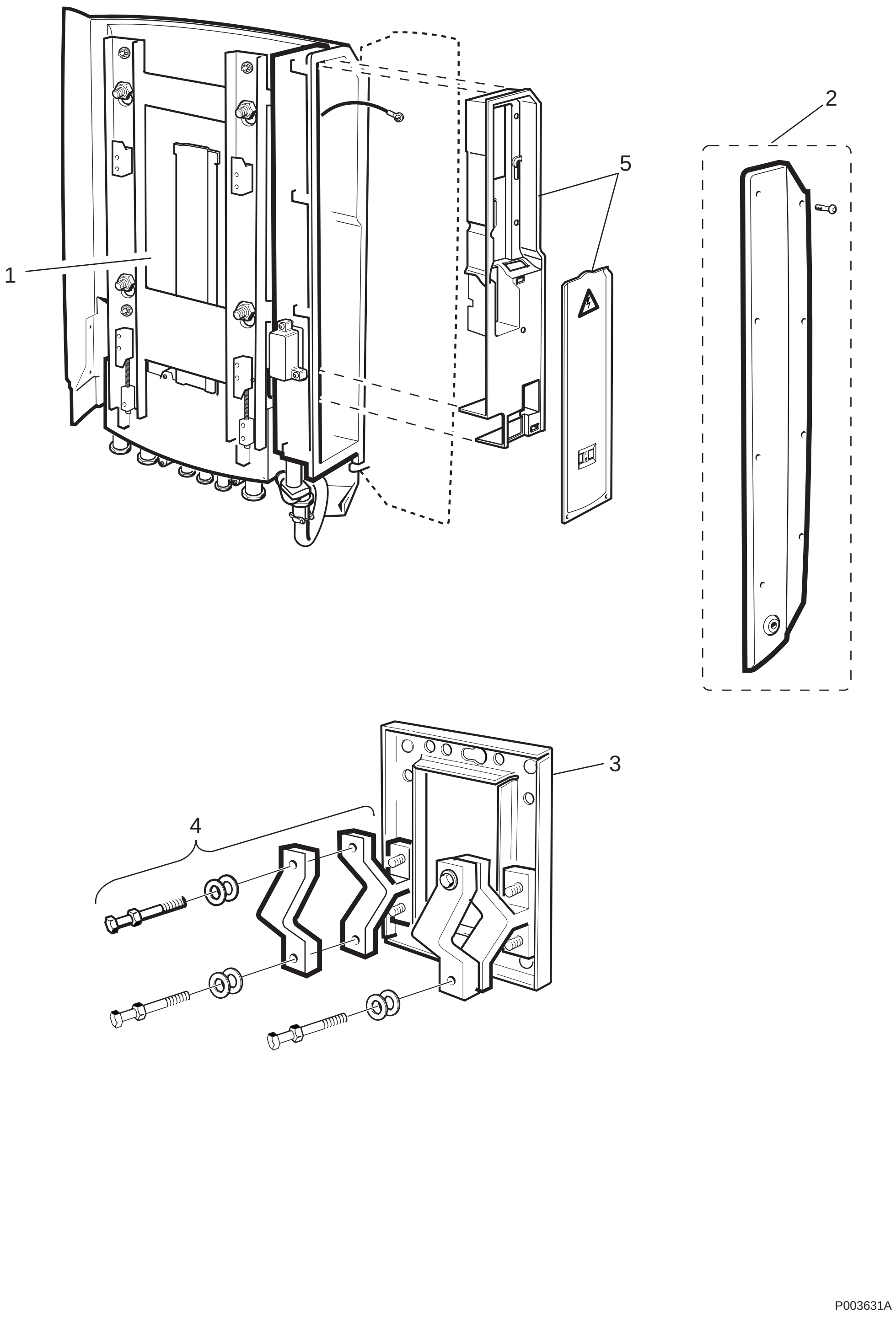

Figure 17

5.3 Other Available Parts for RBS 2302, Mechanics

Pos	Product No	Denomination	Description
1	SEB 112 1017/2	Mounting Base	/*Excluding Side-door for installation box*
2	SDD 513 0100/1	Cover-lid	Side-door for installation box, complete
3	SEB 114 100/2	Mounting Plate	Wall Bracket
4	NTM 192 08/2	Set of materials	Pole / Mast Fixture set
5	NTZ 111 44/07	Spare Parts Set	Set for Installation Box /*Incl Protective covers and screws.*

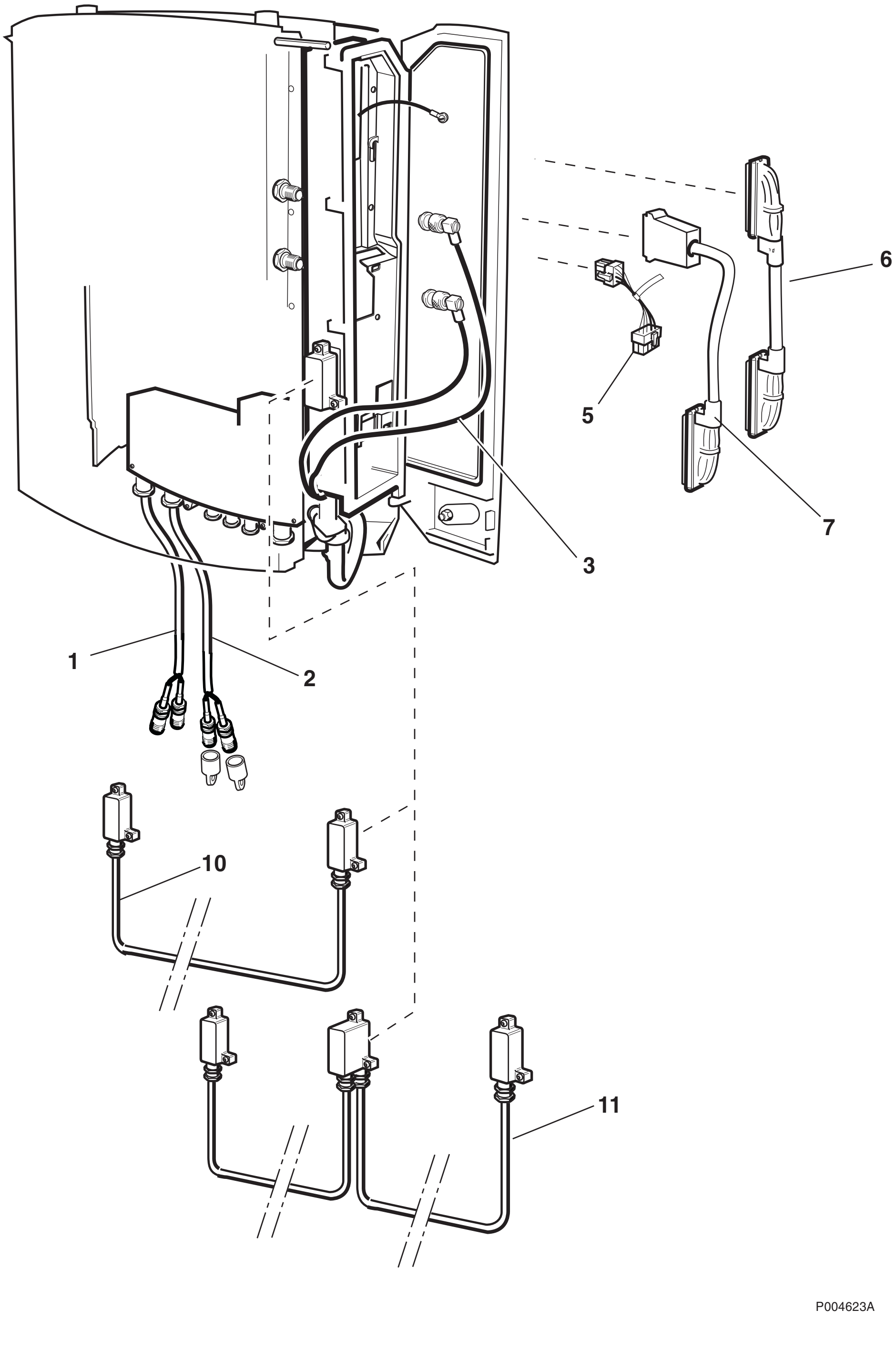

Figure 18

5.4 Other Available Parts for RBS 2302, Cables

Pos	Product No	Denomination	Description
1	RPM 518 974/1	Cable with connector	Coaxial 75 ohm TNC/F. PCM-A
2	RPM 518 974/2	Cable with connector	Coaxial 75 ohm TNC/F. PCM-B
3A	RPM 119 87/1	Cable with connector	Jumper N-type Female /*Used in Cabinet*
3B	RPM 119 87/2	Cable with connector	Jumper 7/16-type Female /*Used in Cabinet*
5	RPM 518 903/00130	Cable with connector	Internal AC cable /*For installation box*
6	RPM 518 959/1	Cable with connector	Internal transmission cable 75 alt 100/120 ohm / *Reversable cable, for installation box*
7	RPM 518 958/1	Cable with connector	TXL-cable /*For installation box*
10	RPM 518 962/1	Cable with connector	4 TRX external cable /*(Optional)*
11	RPM 518 962/3	Cable with connector	6 TRX external cable /*(Optional)*

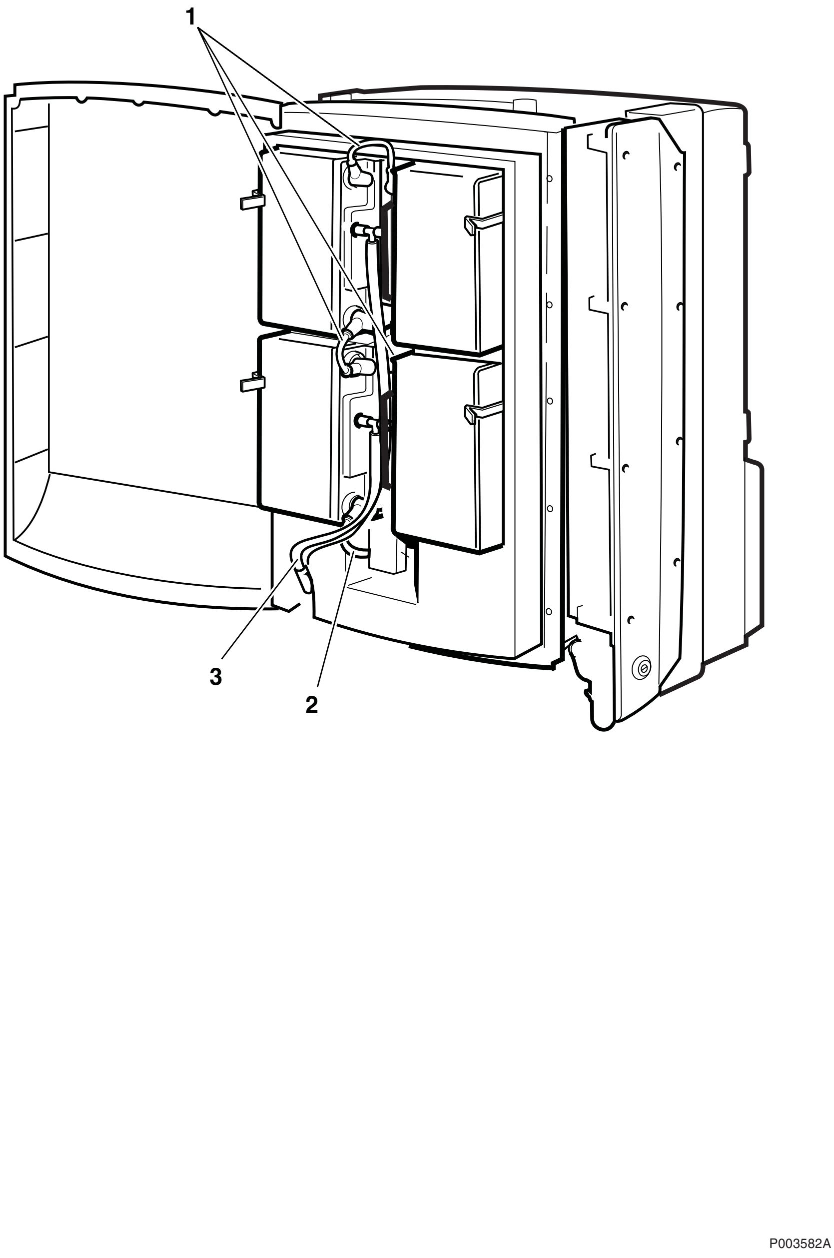

Figure 19

5.5 Battery Accessories for PBC

Pos	Product No	Denomination	Description
1	RPM 518 966/1	Cable with connector	For battery 0.06m
2	RPM 518 966/2	Cable with connector	For battery 0.11m
3	SEA 910 06/1	Hose	Ventilation set for PBC batteries

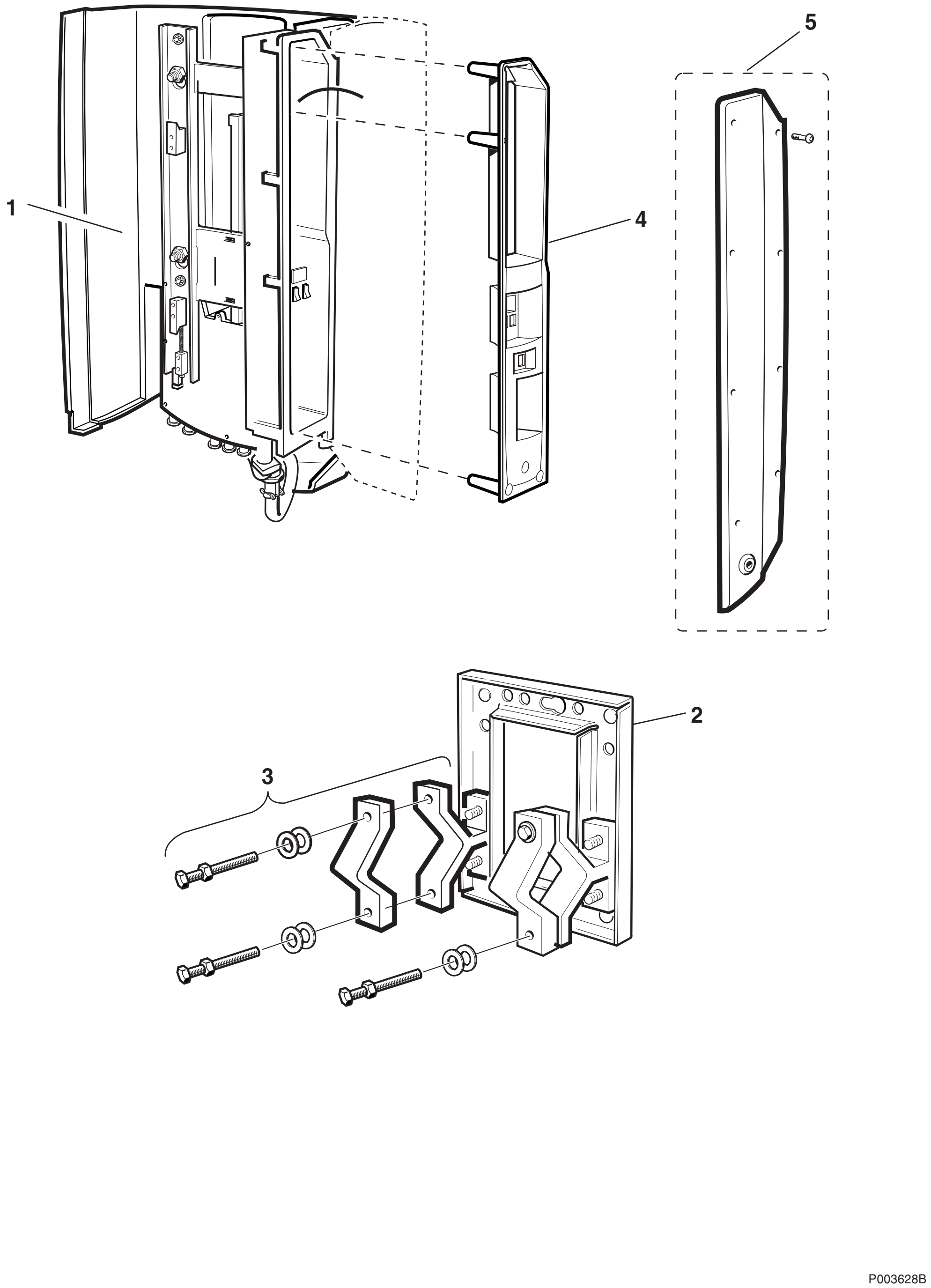

Figure 20

5.6 Other Available Parts for PBC, Mechanics

Pos	Product No	Product name	Description
1	SEB 104 19/1	Mounting Base	Complete Mounting Base for PBC
2	SEB 114 100/2	Mounting Plate	Wall Bracket
3	NTM 192 08/2	Set of materials	Pole / Mast Fixture set
4	SDF 105 21/2	Protective cover	*/Incl screws*
5	NTZ 111 45/07	Spare Parts set	Side-door for installation box.

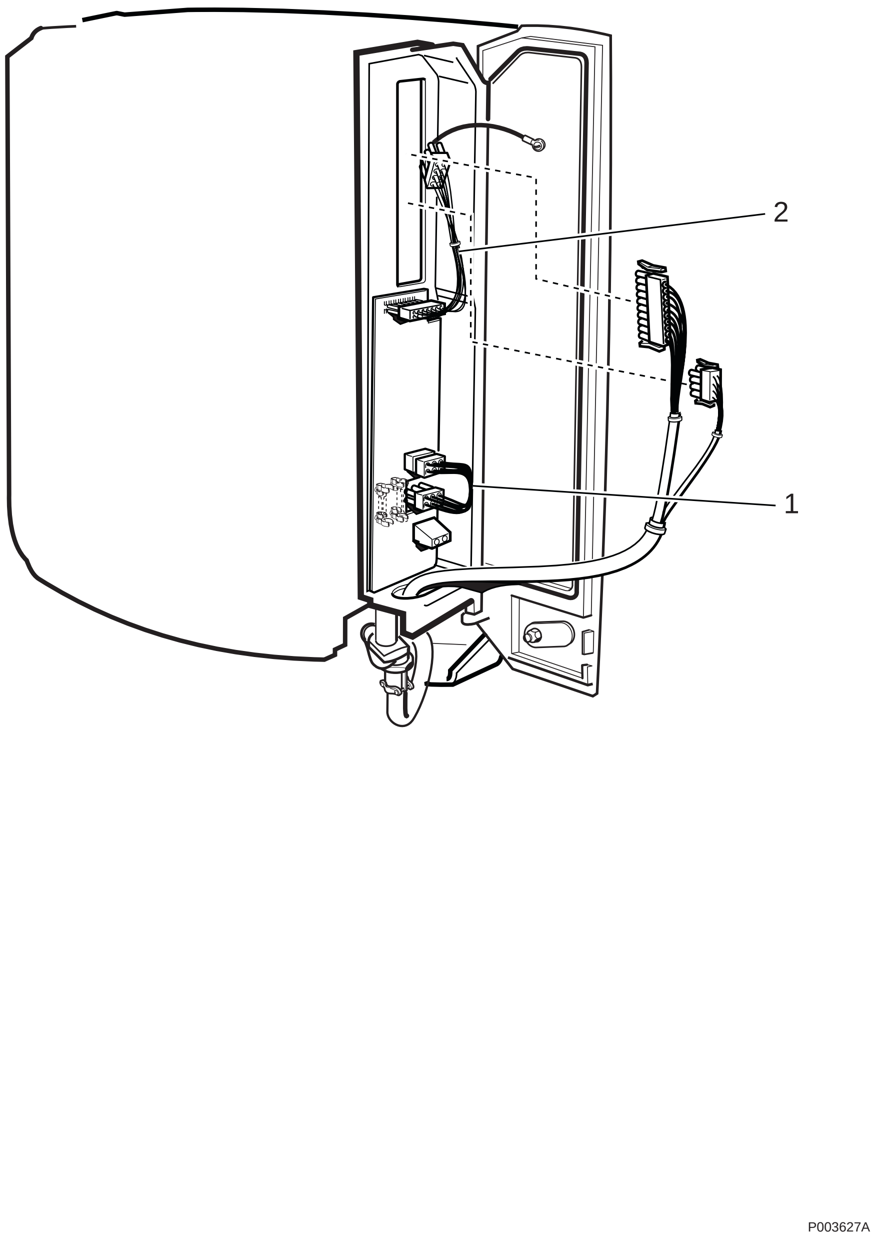

Figure 21

5.7 Other Available Parts for PBC, Internal Cables

Pos	Product No	Product name	Description
1	RPM 518 952/1	Cable with connector	Internal AC cable / *For installation box*
2	RPM 518 956/1	Cable with connector	Display cable / *For installation box*

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5.8 Packages for Repairable Products

Pos	Product No	Product name	Description
(1)	RTK 994 04/1	Packing Set	For RBS
(2)	RTK 994 04/7	Packing Set	For PBC
(3)	RTK 994 282	Package	For Antenna GSM 1800
(4)	RTK 993 4591/1	Packing Set	For CEU
(5)	RTK 993 4147/44	Box	For HDSL

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6 Maxite™ Product Revision Information

This Chapter shows replaced or withdrawn Products

6.1 Replaced or Withdrawn Products

Old Product	Revision Information	New Product
6/BKC 861 0013/004	Replaced	24/BKC 861 0013/004
BKV 301 321/1	Not Applicable in Maxite	(Only used in RBS 2302 sites)
BMY 980 04/1	Incorrect number	BMY 908 04/1
RPM 513 760/1	Withdrawn	-
RPM 518 954/1	Withdrawn	-
RPM 518 972/1	Replaced	RPM 518 985/1

7 Numerical Index for Maxite™