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User´s Guide

RBS 2302

User’s Guide RBS 2302

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

Contents

1 Introduction

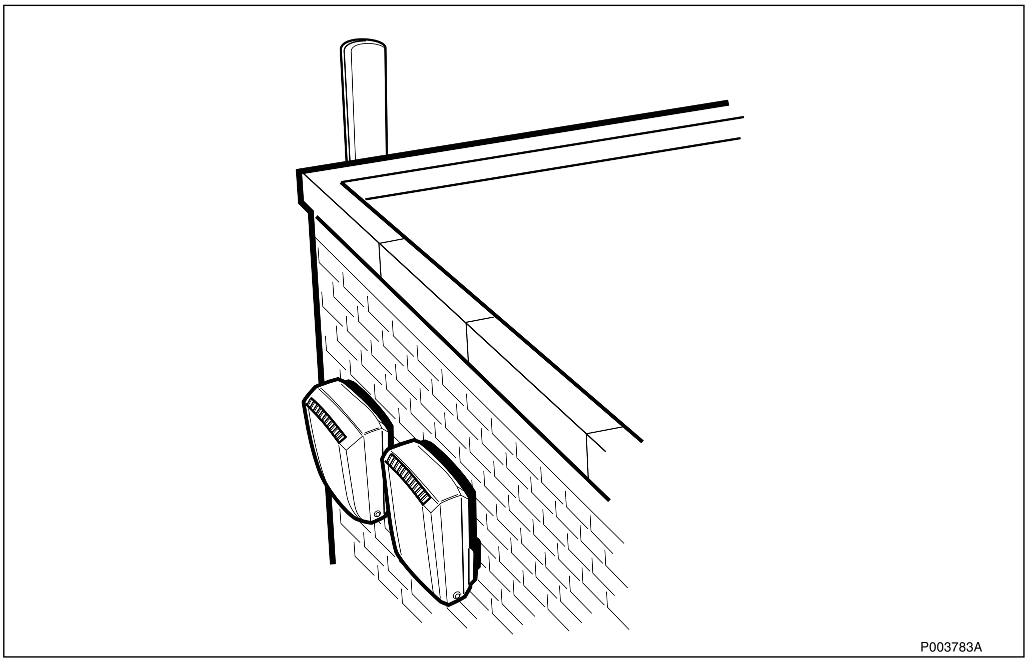

Figure 1 RBS 2302 and PBC, wallmounted

- The RBS 2302 is a high quality micro base station which enables a simpler site search process, whilst at the same time, allowing for cost-efficient implementations of high capacity radio networks. This makes the RBS 2302 very landlord friendly and easy to place wherever you need it.
- The RBS 2302 can be mounted on a pole, like a lamp post or in an antenna tower, or directly on the wall. In itself, the RBS 2302 is a complete BTS site, including transmission, integrated power supply, optionally integrated antennas and a optional battery-backed power supply.

The RBS 2302 User's Guide consists of the chapters listed below. A brief summary of the chapters is presented.

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 installation engineering process for the RBS 2302.

Installation of RBS 2302

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

Installation of Power and Battery Cabinet

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

Antenna System Tests

Describes the site specific tests for antennas that should be performed at site.

Site Installation Tests

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

Optional Tests

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

RBS Site Integration

Describes how to integrate a RBS site into a network.

Fault Handling

Contains helpful information when an error on site has occured, 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 all parts that can be located on site.

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 RBS 2302 activities.

The aim of the RBS 2302 User's Guide is to present the information in a userfriendly way.

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

Help Desk

E-mail address to Product Line Maintenance Base Transceiver Stations helpdesk (for Ericsson internal use only):

plmbts@era.ericsson.se

See also *http://gsmrbs.ericsson.se/plmbts/* for more information.

1.2 Radio Site Implementation Process

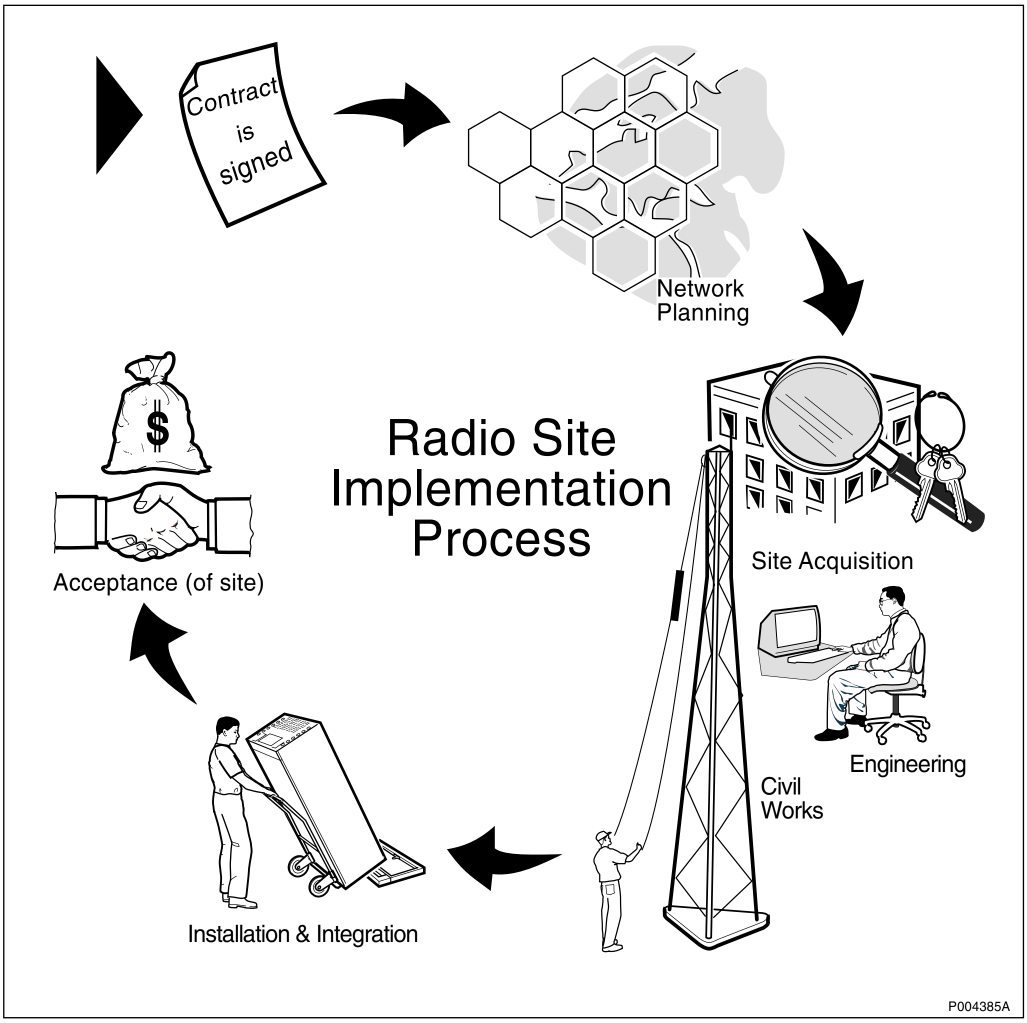

Figure 2 The Radio Site Implementation Process

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 teh 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.
- 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

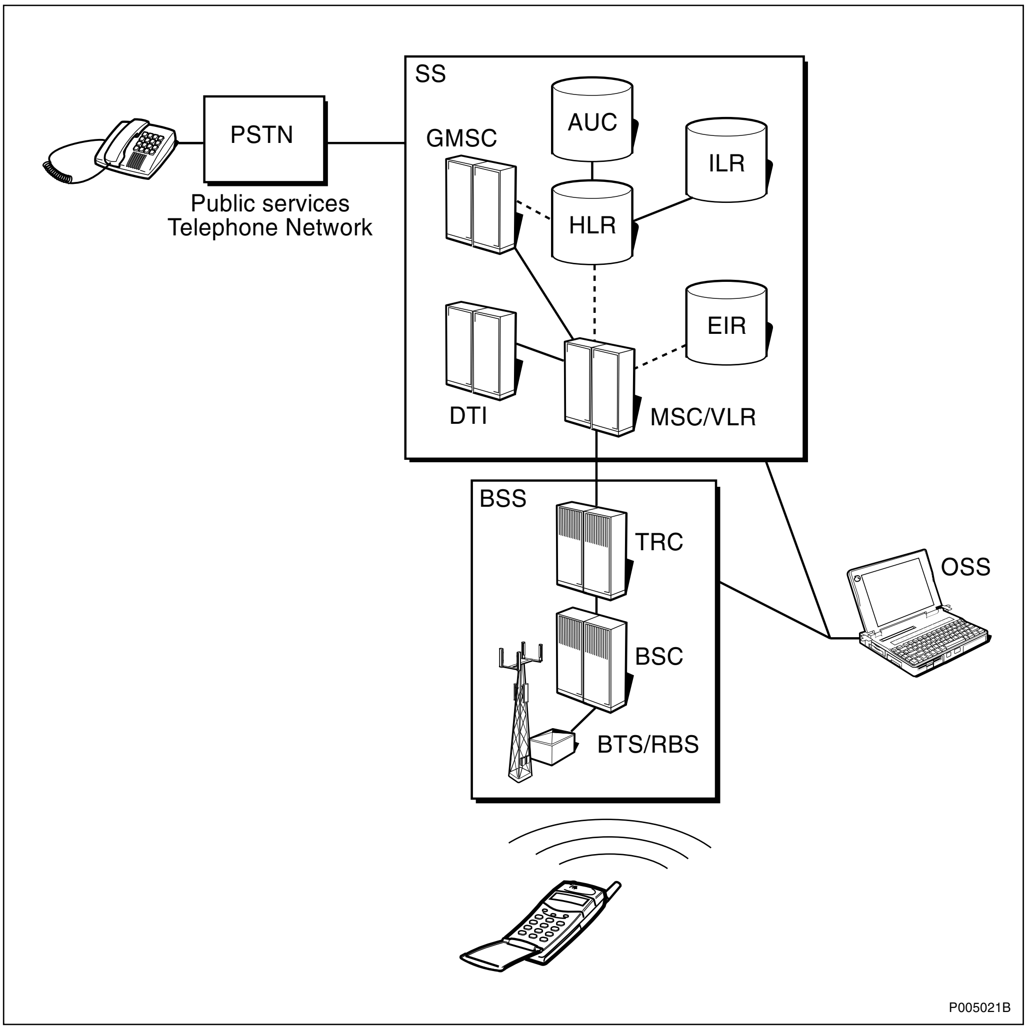

Figure 3 GSM System Overview

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 consisit of an AMPS HLR and partsof 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 teh 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 monitos 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 R2A to R3A

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

Site Planning and Product Data

- Block Diagram of PBC updated.
- *Chapter Transmission* updated.

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.

Site Installation Tests

- New *chapter Handover Test*.
- 4 TRX and 6 TRX configurations.
- Optional HDSL modem.

Maintenance Manual

- New *chapter HDSL Modem*.
- New *chapter Fan Unit*.

General Information

- *Fault Code List* updated.

Spare Parts Catalogue

- Optional Fan Unit.
- Optional HDSL modem.

1.4.2 R3A to R4A

In this release of RBS 2302 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 *chapter Site Planning and Product Data* (new name for this chapter in R4A, see below).
- *Section Radio Site Implementation Process* has been added.

Tools and Instruments

The *chapter Tools and Instruments* has been updated.

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*.

- *Site Planning and Requirements* now only contains information about site specific requirements.

Installation of RBS 2302

- Parts of the *subsection HDSL Transmission Module Installation* have been moved here from the chapter formerly called *General Information*.

Antenna System Tests

This chapter has been extracted from *chapter Site Installation Tests*.

- *Subsection Anritsu SiteMaster* has been updated.

Site Installation Tests

- In *section RBS 2302* the *subsections Optical Indicators* and *Switches and Connectors* have been updated. Also the *subsection Power Switches in the RBS* has been moved here from *section Test Sequence*.
- In *section Power and Battery Cabinet* the *subsection Power Switches in the PBC* has been moved here from *section Test Sequence*.
- *Section Antenna Installation Tests* has been moved to a separate chapter; *Antenna System Tests*.
- In *section Test Sequence* there have been structural changes.
- In *section Test Sequence* the *subsection Flowchart* has been updated.
- In *section Test Sequence* two new subsections have been included; *AC Mains Power Test* and *Fan Unit Test*.
- In *section Test Sequence* the *subsection MS Test Call Using BSC Simulator* has been moved to the new *chapter Optional Tests*.
- The *section Fault Tracing Hints* has been moved to the new *chapter Fault Handling*.

Optional Tests

This chapter has been added in R4A.

- The *subsection MS Test Call Using BSC Simulator*has been moved here from *chapter Site Installation Tests*.

Fault Handling

This chapter has been added in R4A.

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

Maintenance

This chapter has been structurally redesigned.

Previous *section Maintenace General* has been divided into two separate sections; *Maintenace General for RBS 2302* and *Maintenace General for PBC*.

- In *section Maintenace General for RBS 2302*the *subsections Optical Indicators* and *Switches and Connectors* have 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 the different units that can be mounted on site.

- *Section Lifting Device* and parts of *section HDSL Modem* have been moved here from the chapter formerly called *General Information*.

General information

This chapter no longer exists. The information in this chapter has been placed according to the description above.

1.4.3 R4A to R5A

Introduction

- Information about the new *chapter RBS Site Integration* added.
- Address to helpdesk updated.
- Release History updated.

Safety

The *chapter Safety* has been updated.

Tools and Instruments

The *chapter Tools and Instruments* has been updated.

Site Planning and Requirements

- The *section RBS 2302 Overview* has been moved here from *chapter Product Data*.

Installation of RBS 2302

- Information regarding the use of ESD wrist strap added.
- Instructions on how to use the drilling template added.
- Instructions on how to mount the HDSL door added. Also the information on how to connect the HDSL modem to the PCM connectors has been moved here from *chapter Product Data*.
- Instructions on how to install the fuses with the fuseholder added.
- Instructions on how to mount the Power Supply Adapter (PSA) added.
- Information on how to connect cabinets when cascade connection is used added.
- *Section Mounting the Multicasting Box (optional)*has been clarified.
- *Section Connecting the External Antenna Jumpers (optional)* has been updated.

- *Section Mounting the Sunshields, subsection Upper Sunshield* has been given new information.
- *Section 4 and 6 TRX Configuration (optional)* has been updated.
- New information on how to route the alarm cable in *section Mounting the Fan Unit* added.
- *Section Lifting Device* has been moved here, and placed as an appendix, from *chapter Product Data*.

Installation of Power and Battery Cabinet

- Information regarding the use of ESD wrist strap added.
- Instructions on how to use the drilling template added.
- Structural changes in section *Connecting External Cables*.

Antenna System Tests

- *Subsection Anritsu Site Master* has been updated (minor changes).

Site Installation Tests

- Information regarding the use of ESD wrist strap added.
- In *section Test Sequence* there have been structural changes.
- In *section Test Sequence* the *subsection Flowchart* has been updated.
- In *section Test Sequence* the subsection formerly called *Multidrop* has changed name to *Network Configuration*. Also the information has been updated.
- In *section Test Sequence* the subsection formerly called *LBO Parameter Settings (T1)* has been divided into to subsections: *Define PCM Parameters (E1 120 Ω)* and *Define PCM Parameters (T1 100 Ω)*. Also the information has been updated.
- In *section Test Sequence* the *subsection Network Integration Test* has been updated and moved to the new *chapter RBS Site Integration*.
- In *section Test Sequence* the *subsection Handover Test* has been updated and moved to the new *chapter RBS Site Integration*.
- In *section Test Sequence* the *subsection HDSL Configuration* has been updated and moved here from *chapter Installation of RBS 2302*.

Optional Tests

- Information regarding the use of ESD wrist strap added.
- The *subsection Test through HDSL using the MS and BSC Simulator* has been added.

RBS Site Integration

This chapter has been added in R5A.

Fault Handling

No changes.

Maintenance

- In *section Fault Localization*, information added to the subsections *Fault tracing Guidelines for RBS 2302*and *Fault tracing Guidelines for the PBC*.
- Information about the fuses for the Fan Unit added to *section Corrective Action for the RBS, subsection Fan Unit (optional)*.
- Information that the RBS do not have to be removed from service when changing the front, lower, left or upper sunshield added to *section Corrective Action for the RBS, subsection Sunshields*.
- Instructions on how to install the fuses with the fuseholder added to *section Corrective Action for the RBS, subsection Fuses*.
- New instructions regarding the fuseholder added to *section Corrective Action for the RBS, subsection Connection Board*.
- The Blue Tag, including the instructions, has been updated *in section Concluding Routines*.

Product Data

- The *section RBS 2302 Overview* has been moved to *chapter Site Planning and Requirements*.
- In *section Radio Base Station RBS 2302, subsection Power Supply* the values for Heat Generation have been changed.
- In *section Power and Battery Cabinet (optional), subsection Climatic Endurance* the temperature range for Normal Condition has been changed.
- *Section Lifting Device* has been moved to *chapter Installation of RBS 2302*.

1.4.4 R5A to R6A

Introduction

Release History updated.

Tools and Instruments

The *chapter Tools and Instruments* has been updated.

Installation of RBS 2302

- Information added that it may be necessary to protect the cabinet during installation due to bad weather conditions.

- New section added, *Assembling and earthing of a twisted pair cable*.
- New section added, *Connecting the PCM cable*. This section contains new information how to connect the PCM cable with DC isolation.
- The product number for the 75 Ω coaxial cable with DC isolation has been changed to RPM 518 974/2.
- Information regarding the hysteresis of the temperature sensors for the fans added.

Installation of Power and Battery Cabinet

Information added that it may be necessary to protect the cabinet during installation due to bad weather conditions.

Site Installation Tests

- Information regarding SW requirements added in section *Preface*.
- The test section now contains only the tests. General information necessary to perform the tests has been moved to earlier sections. Example of this are sections *Start-up and Shut-down* and *Connecting the OMT*.
- Other minor structural changes have also been made.
- The flowchart in section *Test Sequence* has been updated.
- Information regarding the hysteresis of the temperature sensors for the fans added in section *Fan Unit Test*.
- In section *HDSL Configuration* the function of the leds has been updated.
- In section *Test Record* the test record for Stand Alone Tests has been updated.

Maintenance

In section *Preventive Maintenance for the RBS* the subsection *Internal Synchronization* has been updated.

1.4.5 R6A to R6B

General

Cable gland capacity has been changed throughout the document from 8–19 mm to 7–15 mm.

Product number of wrist strap has been removed throughout the manual.

“DC/Alarm” cable has been replaced by “DC/Data cable” throughout the manual.

Introduction

Release History updated.

Tools and Instruments

The chapter *Tools and Instruments* has been updated.

Antenna System Tests

The entire chapter *Antenna System Tests* has been updated due to new version of Site Master.

Site Installation Tests

- New order for test sequence.
- New instruction for installation of IDB.

RBS Site Integration

In section *Helpful Hints*, a section added containing an example of exchange data for 6 TRX.

Product Data

- In section *Radio Base Station RBS 2302*, subsection *Power Supply*, the information regarding the power supply and heat generation has been updated.
- In section *Power and Battery Cabinet*, subsection *Power Supply*, the information regarding the power supply and heat generation has been updated.
- In section *Radio Base Station RBS 2302*, subsection *Vibrations*, information regarding base station vibration withstanding has been changed.

1.4.6 R6B to R7A

General

- Reference to *General Installation Instructions LZN 302 49* is changed to *Standard Site Material Installation Instructions EN/ LZT 720 0014*.
- Quick Guides are added.

Introduction

- Release History updated.

Tools and Instruments

- License for OMT added in table, Test Equipment for Site Installation Tests, section 3.2.1
- Version LPP 106 35/10 of BMCSim II removed.
- R6 SW, OMT Kit removed.
- Kit Specification for TEMS (1900) added.

- 3.1.1 Hearing Protector in first description list moved to table. Second description list: Torque wrench 1.7Nm for TNC connectors LTT 601 93.
- Site Master Kit updated.

Site Planning and Requirements

- Information regarding Site Investigation has been added.
- Information regarding Site Requirements has been added.
- Information regarding power supply requirements for Canada and the USA has been added.
- Information regarding Installation Material has been added.

Installation of RBS 2302

- Changed values in torque table in section *Tools and Instruments*.
- Picture for Unpacking the RBS is changed.
- *Overview* renamed to *Work Process for RBS Cabinet Installation* and contains a flowdiagram.
- *Installation Box* renamed to *Installing the Fuses and Setting the Voltage*.
- Instruction 6 in *Mounting the Cabinet* is reconstructed.
- Some instructions in *Mounting the Sunshields* is reconstructed.
- Note in *Connecting AC* about Neutral and Line.
- Changed pictures for *Loosening the Termination Block.*
- Section *Connecting the HDSL Module (Optional)* in section *Connecting External Cables* is reconstructed.

Installation of Power and Battery Cabinet

- Changed values in torque table in section *Tools and Instruments*.
- Picture for Unpacking the PBC is changed.
- Changed pictures for *Loosening the Termination Block*.
- Some instructions in *Mounting the Sunshields* is reconstructed.

Antenna System Tests

- Modified chapter structure
- New order for test sequence
- Picture updated
- Examples updated

Site Installation Tests

- Modified chapter structure
- New test sequence
- New description of Configuring IDB generally
- New description of Configuring HDSL
- New description of Defining Short and Long Haul Parameters

Optional Tests

- Note added regarding BSCSim II not supporting CRC-4.
- Test Record Updated.

RBS Site Integration

- BSC transmission tests moved to precondition.
- BSC commands removed.
- Removed Test of External Alarm.
- Test Calls using TEMS method updated.
- Test Record Updated.

Fault Handling

- The information on how to decode Fault Maps has been removed since the faults are displayed in plain text and not in hexadecimal digits.
- All Fault Code Lists have been removed of the same reason.

Maintenance

- Redused torque for captive screws for RBS 2302 and PBC changed.
- From release R3A and on of the PBC it is no voltage present on terminal X5.8 and X5.9.
- The CB21 Board has changed name to Loop forward/backward board.
- Time between replacements for the Internal Battery has been changed from six to five years.
- In chapter “Preventive maintenance for the RBS” it is changed that the fan unit should be inspected everytime the RBS is controlled or repaired instead of with 3 years intervals.
- Section Internal Synchronization (If applicable) is modified.

Product Data

- Values for wind load have been added.

- Two jumper cables have been added.
- Power consumption graph has been added.
- Acoustic noise level has been added for the Fan Unit.

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:

Figure 5 Radio frequency radiation

Figure 6 Electrical hazard

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.

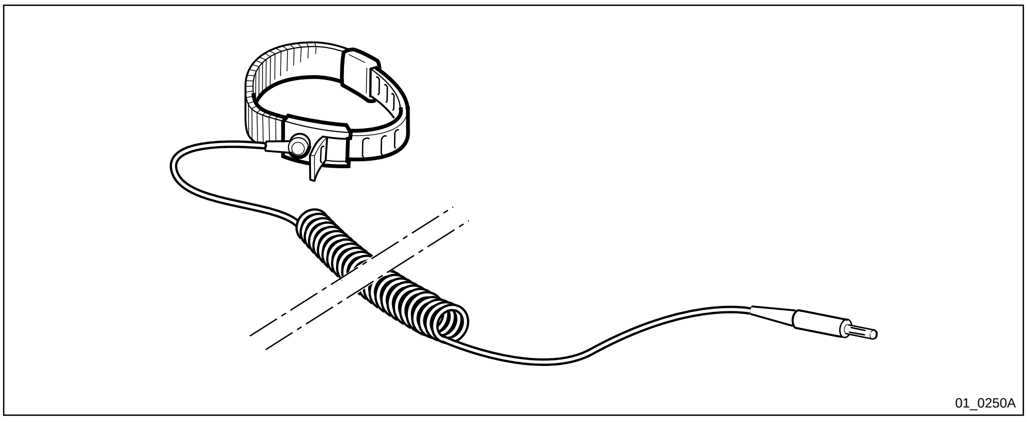

Figure 8 ESD wrist strap LYB 250 01/14

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

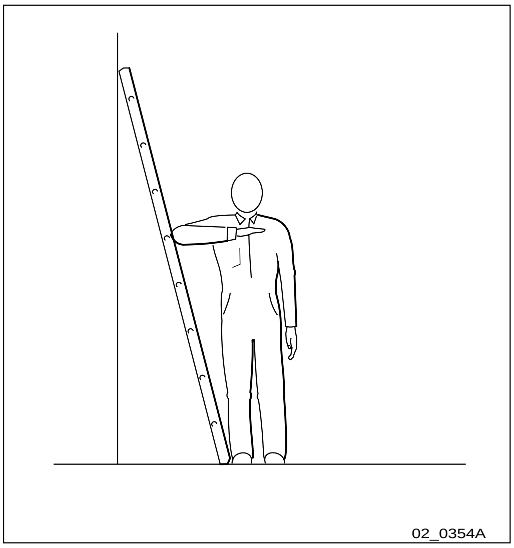

Figure 9 Checking the angle

- 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

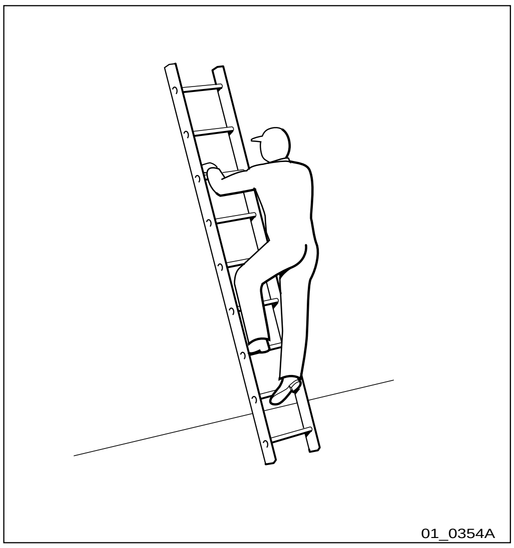

Figure 10 Climbing the ladder

- 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 and the Power and Battery Cabinet (PBC).

3.1 Tools for Installation of RBS 2302, Antenna and PBC

For more information regarding tools, *see*

Standard Site Material Installation Instructions	*LZT 720 0014*

3.1.1 Installation Tools

Table 1 Installation Tools

Description	Product No.
Personal Installation Tool Set(1)	LTT 601 96/1
Cordless hammer drill machine tool set 230V	LTT 601 12/2
Cordless hammer drill machine tool set 110V	LTT 601 12/1
Torque wrench 1.7Nm for TNC connectors	LTT 601 9
Crimping Tool Set for earthing	LTT 601 86
U-ring wrench, 15 mm	-
U-ring wrench, 18 mm	-
U-ring wrench, 22 mm	-
Eye protector	-
Hearing protector	-

(1) The following tools are required from the Personal Installation Tool Set, LTT 602 96/1.

- Side cutting pliers
- Snip nose pliers
- Wire stripper 0,2–6 mm_2
- Screwdriver TORX, T10, T20, T30
- Screwdriver, wide 3 mm, 5.5 mm
- Adjustable spanner 10”
- Knife
- Measuring tape, 5 m
- Voltage Tester
- U-ring wrench, 10 mm, 17 mm, 19 mm, 20 mm, 24 mm
- Torque wrench, 4–20 Nm, 10–55 Nm
- Spirit level

- Socket set 3/8”
- ESD wrist strap

For safety equipment, *see chapter Safety Instructions*.

3.1.2 Installation Material

Table 2 Installation Material

Description	Product No.
Sealing kit	5/NMT 201 230/3
Earthing Kit	5/NTM 201 201
Cable 4 x wire to RS 422, 50 M Extended OMT (if applicable)	RPM 518 976

3.1.3 Accessories

Table 3 Accessories

Description	Product No.
Assortment Set	NTM 201 1491/1
Lifting Device Kit	SXK 107 5723/1
Lifting handle(1)	SXK 107 5775/1
Lifting-eye bolts	SAR 201 080/03

(1) Included in Lifting Device Kit, SXK 107 5723/1

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. The lifting-eye bolts is used for lifting the Active Antenna Unit.

3.2 Equipment for Antenna System Tests

This section contains lists of equipment and manuals needed to perform the following tests, *according to chapter Antenna System Tests*.

- DTF Test
- SWR Test

3.2.1 Test Equipment for Antenna System Tests

Table 4 Test Equipment for Antenna System Tests

Description	Specification	Product No.
Antenna Tester Set	Site Master S331B	LPK 102 101/7

3.2.2 Manuals for Antenna System Tests

Table 5 Manuals for Antenna System Tests

Product Name	Product No.
Radio Site Installation Documentation	Site specific
Standard Site Material Installation Instruction	EN/LZT 720 0014
Anritsu Site Master User's guide(1)	-

(1) Included in Antenna Tester Set, *see Section 3.7.1 Antenna Tester Set, LPK 102 101/7 (GSM 900/1800/1900) on page 40*.

3.3 Equipment for Site Installation Tests

This section contains lists of equipment and manuals needed to perform the following tests, *according to chapter Site Installation Tests*.

- Testing AC Mains Power
- Testing Fan Unit
- Configuring IDB
- Reading Fault Status
- Testing External Alarms
- Testing Battery Backup

3.3.1 Test Equipment for Site Installation Tests

Table 6 Test Equipment for Site Installation Tests

Description	Specification	Product No.
OMT Kit		NTM 201 2289/1
Licence for OMT		FAJ 112 02/1
Cable, RS 422 connector to RS 232 connector, 2 m	Converter, only used when extended OMT is used on site.	RPM 518 964/1
Fluke 79 III	Multimeter	LPK 102 024/2

3.3.2 Manuals for Site Installation Tests

Table 7 Manuals for Site Installation Tests

Product Name	Product No.
OMT User's Manual(1)	LZN 302 01

(1) Included in OMT Kit, *see Section 3.7.2 OMT Kit, NTM 201 2289/1 on page 41*.

3.4 Equipment for Optional Tests

This section contains lists of equipment and manuals needed to perform the following tests, *according to chapter Optional Tests*.

- TEMS Test Call using BSCSim II

3.4.1 Test Equipment for Optional Tests

Table 8 Test equipment for Optional Tests

Description	Specification	Product No.
BSC Simulator	BSCSim II Kit(1)	LPP 106 35/11
PC Laptop	with Win 95, NT 4.0 or later	-
Filter Unit (Multi casting box)	2 units are required for 4TRX, and 3 units are required for 6TRX configuration.	KRF 201 439/1
Test Accessories	2 units are required for 4TRX, and 3 units are required for 6TRX configuration.	NTM 201 2216/3
Martis DXX HTU-2M	HDSL modem	ZAT 759 20/101
Cable Kit	for HDSL modem	KDY 196 48/1
TEMS	TEMS for GSM 900/1800	LPB 123 013/2
TEMS	TEMS for GSM 1900	LPB 123 014/2
MS Cable(2)	for TEMS	NTZ 112 294/5

(1) For description, *see Section 3.7.3 BSCSim II Kit, LPP 106 35/11 on page 42*.
(2) Included in Test Accessories, *see Section 3.7.4 Test Accessories, NTM 201 2216/3 on page 42*.

3.4.2 Manuals for Optional Tests

Table 9 Manuals for Optional Tests

Product Name	Product No.
BSCSim II User’s Guide(1)	EN/LZT 123 2771/1
TEMS User’s Manual(2)	LZT 108 2684

(1) Included in BSCSim II, *see Section 3.7.3 BSCSim II Kit, LPP 106 35/11 on page 42*.
(2) Included in TEMS Kit, *see Section 3.7.6 TEMS Kit (GSM 900/1800), LPB 123 013/2 on page 44 and Section 3.7.6 TEMS Kit (GSM 900/1800), LPB 123 013/2 on page 44*.

3.5 Equipment for RBS Site Integration

This section contains lists of equipment and manuals needed to perform the following tests, *according to chapter RBS Site Integration*.

- Testing Transmission
- Making Test Calls on Air Interface

3.5.1 Test Equipment for RBS Site Integration

Table 10 Test equipment for RBS Site Integration

Description	Specification	Product No.
Loop forward/ backward board	For transmission test.	LPY 107 757/1
PC Laptop	With Win 95, NT 4.0 or later.	-
TEMS Kit	TEMS for GSM 900/1800	LPB 123 013/2
TEMS Kit	TEMS for GSM 1900	LPB 123 014/2

3.5.2 Manuals for RBS Site Integration

Table 11 Manuals for RBS Site Integration

Product Name	Product No.
TEMS User's Manual(1)	LZT 108 2684

(1) Included in TEMS Kit, *see Section 3.7.6 TEMS Kit (GSM 900/1800), LPB 123 013/2 on page 44 and Section 3.7.7 TEMS Kit (GSM 1900), LPB 123 014/2 on page 45*.

3.6 Equipment for Maintenance

This section contains lists of equipment needed to perform maintenance, *according to chapter Maintenance*. Depending on the maintenance that is to be performed, use the appropriate equipment. *See table below*.

3.6.1 Special Tools for Maintenance

Table 12 Special tools for Maintenance

Description	Comment	Product No.
Loop forward/ backward board	Used while changing RBS 2302, mounting base or transmission board.	LPY 107 757/ 1
Cover plate	For sealing the RBS mounting base installation box, if a change of RBS cabinets takes time.	SXA 117 1926/1
Frequency Counter Set(1)	For calibrating the internal oscillator.	LPK 102 102/1

(1) For description, *see Section 3.7.5 Frequency Counter Set, LPK 102 102/ 1 on page 43*.

3.7 Kit specifications

This section contains descriptions of the different kits presented in this chapter.

3.7.1 Antenna Tester Set, LPK 102 101/7 (GSM 900/1800/1900)

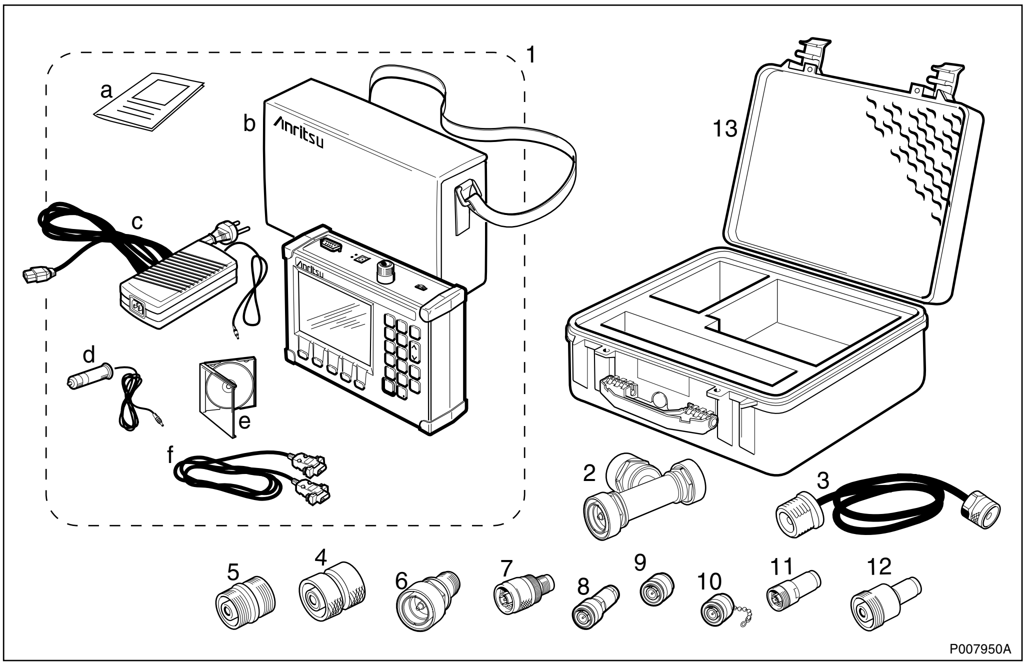

Figure 11 Antenna Tester Set, LPK 102 101/7 (GSM 900/1800/1900)

Table 13 Antenna Tester Set specification

Item	Description	Qty	Product No.
1	Site Master, Anritsu S331B	1	-
a	• Operating Manual	1	-
b	• Soft Carrying Case	1	-
c	• AC-DC Adapter	1	-
d	• Cigarette Lighter/12 V DC Adapter	1	-
e	• Site Master SW for PC	1	-
f	• Serial Interface Cable	1	-
2	Precision 7/16 Type Open/Short/ Load	1	-
3	Test Port Extension Cable, N plug to 7/16 jack, 1.5 m	1	-
4	Adapter 7/16 plug to 7/16 plug	1	-
5	Adapter 7/16 jack to 7/16 jack	1	-
6	Adapter 7/16 plug to N jack	1	-
7	Adapter N plug to TNC jack	1	-
8	TNC Load plug	1	-
9	TNC Short plug	1	-
10	TNC Open plug	1	-
11	Standard N Type Load jack	1	-
12	Standard 7/16 Type Load jack	1	-
13	Transit Case for Site Master	1	-

3.7.2 OMT Kit, NTM 201 2289/1

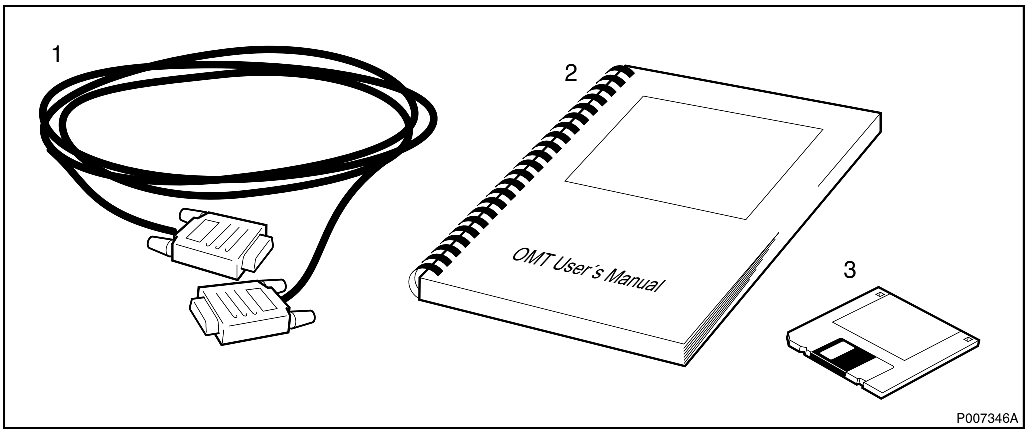

Figure 12 OMT Kit, NTM 201 22889/1

Table 14 OMT Kit specification

Item	Description	Qty	Product No.
1	C1, 9 pin D-sub connector male to female	1	RPM 113 463
2	OMT User's Manual	1	LZN 302 01
3	OMT SW	1	LZY 213 1034/1

3.7.3 BSCSim II Kit, LPP 106 35/11

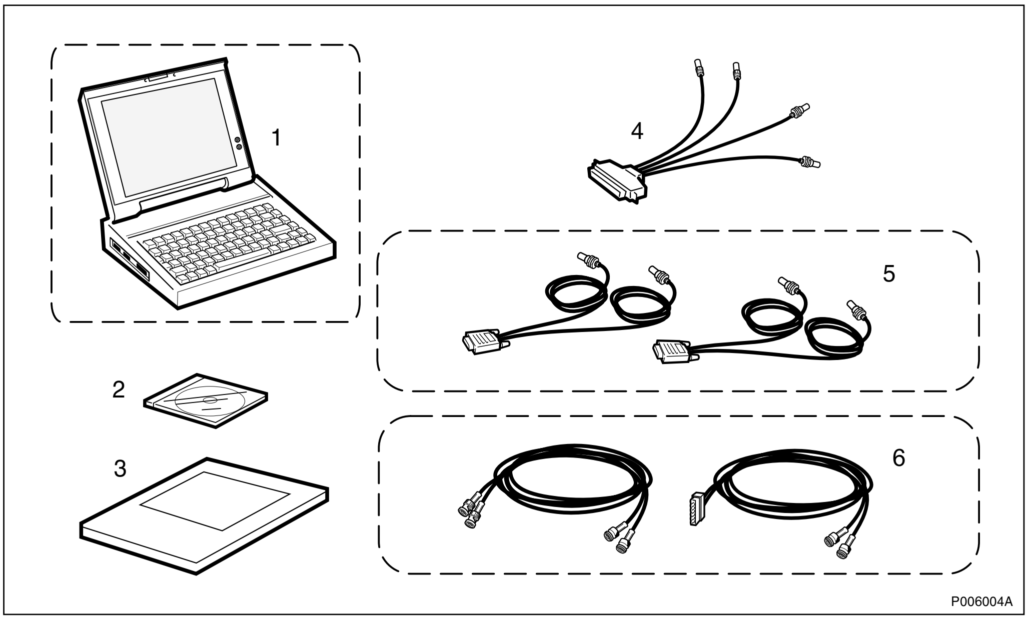

Figure 13 BSCSim II Kit, LPP 106 35/11

Table 15 BSCSim II Kit specification

Item	Description	Qty	Product No.
1	PC Platform Dolch (1)	1	KDV 120 1080/1
2	RBS Test Tools Software	1	LZY 213 1123/1
3	BSCSim II User's Guide	1	EN/LZT 123 2771/1
4	PCM Communication Kit	1	KDV 120 1048
5	Cable Kit RBS 2000	1	KDY 196 82/1
6	Cable Kit RBS 2302/2401	1	KDY 196 85/1

(1)Item not included in figure.

3.7.4 Test Accessories, NTM 201 2216/3

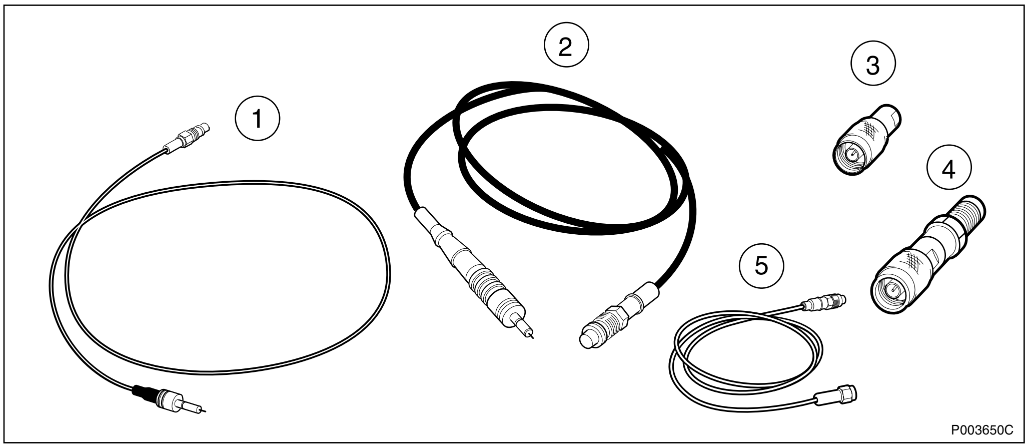

Figure 14 Test Accessories, NTM 201 2216/3

Table 16 Test Accessories specification

Item	Description	Qty	Product No.
1	MS Cable	1	NTZ 112 291/2
2	MS Cable	1	NTZ 112 294/5
3	Adapter	1	LPY 107 1001/1
4	Attenuator 30 dB, 2W	3	LPY 107 1002/1
5	MS Cable	1	NTZ 112 294

3.7.5 Frequency Counter Set, LPK 102 102/1

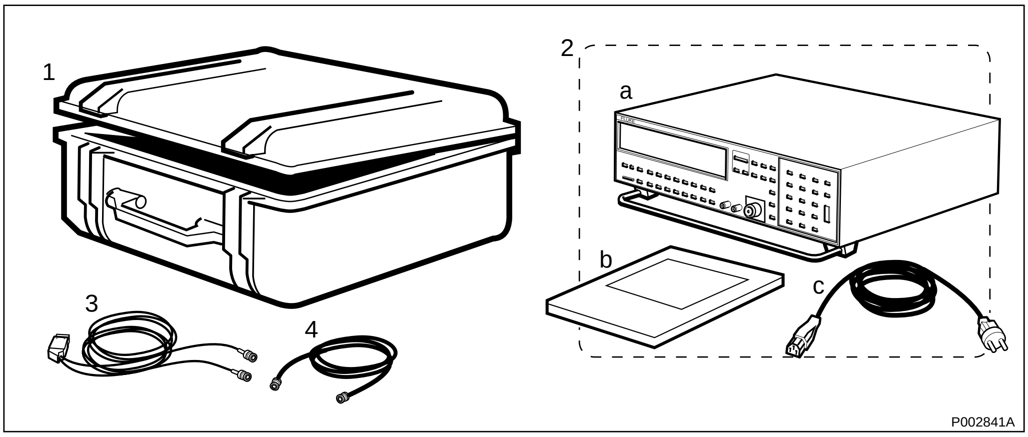

Figure 15 Frequency Counter Set, LPK 102 102/1

Table 17 Frequency Counter Set specification

Item	Description	Qty	Product No.
1	Transport case	1	
2	Instrument set	1	-
a	• Instrument	1	
b	• Operators Manual	1	
c	• Power cord	1	
3	Cable, 1/4 Euro connector jack to 2x BNC plug	1	RPM 113 768/01
4	Cable, BNC plug SMB jack	1	RPM 113 772

3.7.6 TEMS Kit (GSM 900/1800), LPB 123 013/2

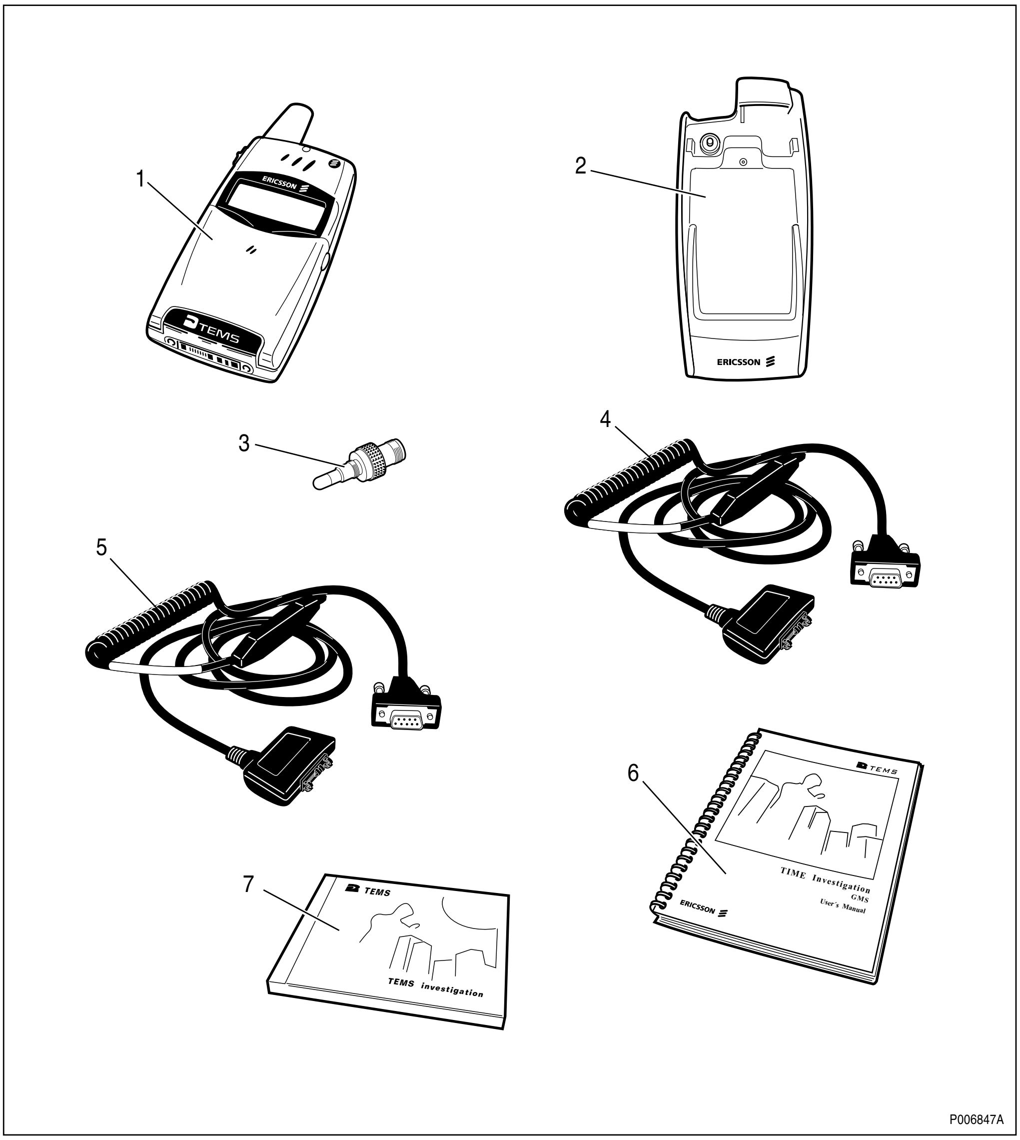

Figure 16 TEMS Kit (GSM 900/1800), LPB 123 013/2

Table 18 TEMS Kit (GSM 900/1800) specification

Item	Description	Qty	Product No.
1	TEMS T28s, Dual Band GSM 900/1800	1	KRC 161 55/1
2	Click-in-holder, Car Kit	1	DPY 901 60
3	Antenna adapter	1	RNT 799 05
4	TEMS cable MS-PC	1	KRY 901 41
5	TEMS cable Car Kit-PC	1	KRY 901 42
6	TEMS User's Manual	1	LZT 108 2684
7	TEMS Investigation GSM, PC SW, CD	1	LZY 214 0573/2

3.7.7 TEMS Kit (GSM 1900), LPB 123 014/2

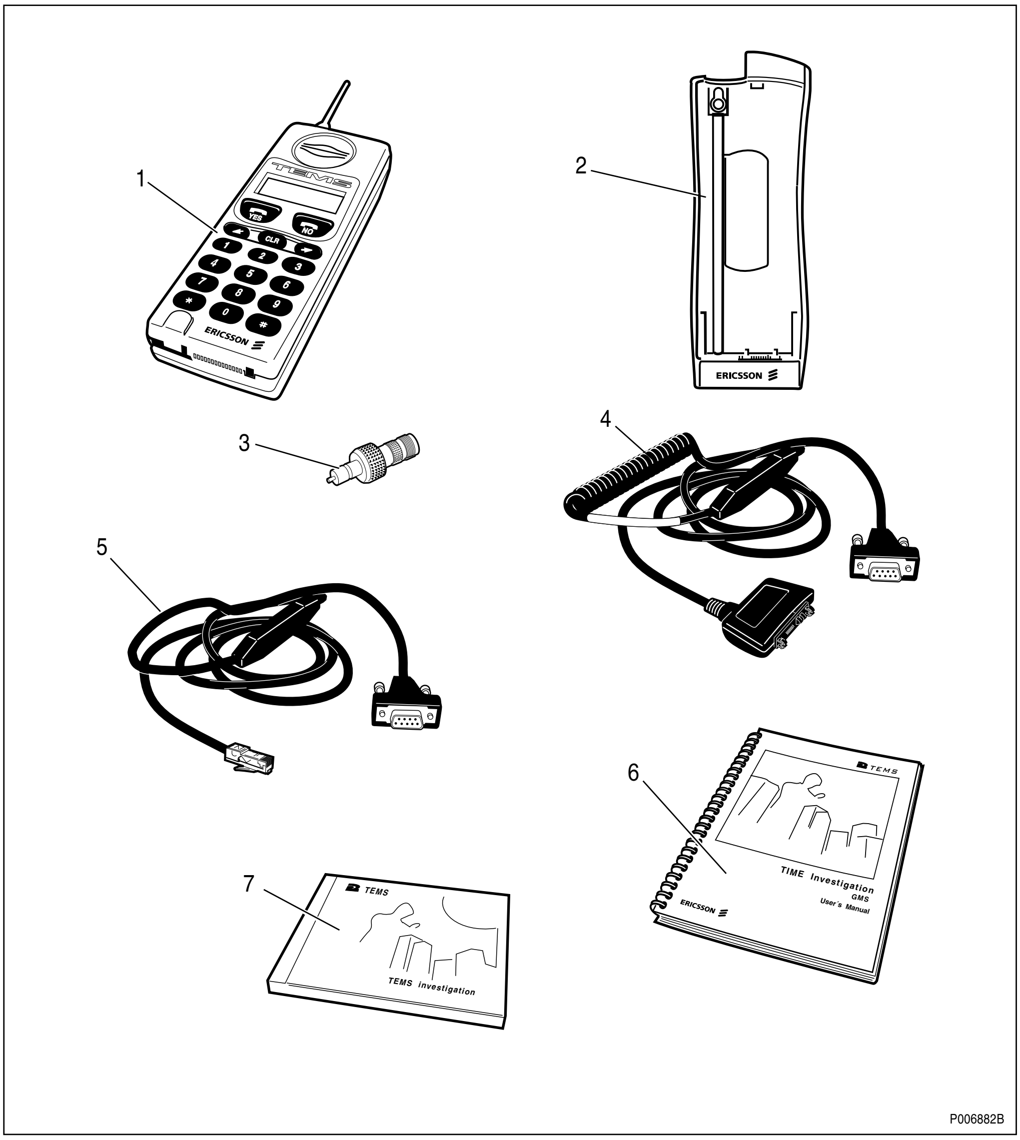

Figure 17 TEMS Kit (GSM 1900), LPB 123 014/2

Table 19 TEMS Kit (GSM 1900) specification

Item	Description	Qty	Product No.
1	TEMS CF 688, GSM 1900	1	KRC 101 1330/1
2	Click-in-holder, Car Kit	1	DPY 901 49
3	Antenna adapter	1	RNT 799 06
4	TEMS cable MS-PC	1	KRY 901 16
5	TEMS cable Car Kit-PC	1	KRY 901 17
6	TEMS User's Manual	1	LZT 108 2684
7	TEMS Investigation GSM, PC SW, CD	1	LZY 214 0573/2

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.

4.1 Competence Requirements

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 2302 and Maxite	*131 62-HRB 105 112/06*
Standard Site Material Catalogue	*LZN 302 39*

Also see

Radio Site Installation Engineering Manual	*LZN 302 069*

for helpful information regarding the installation engineering. It covers today only Macro products and not Micro products, but still gives some general information on matters to consider when designing a site.

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).

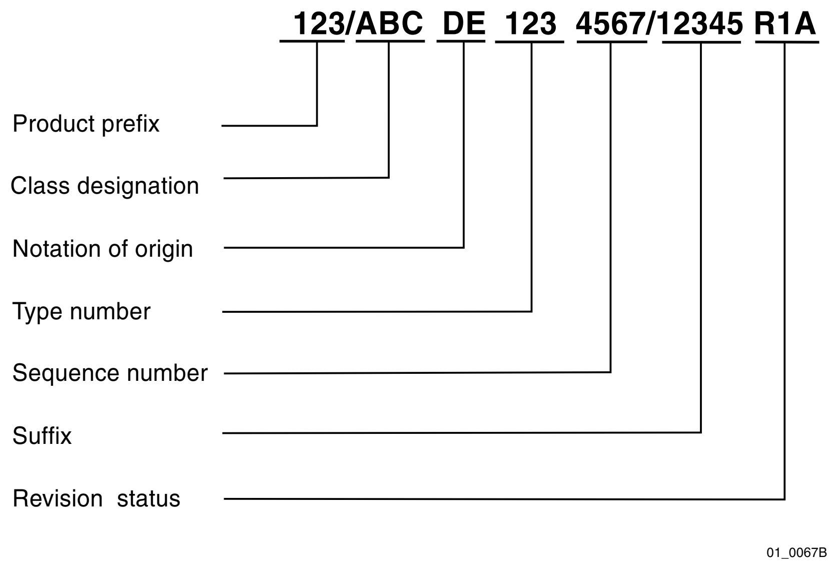

Figure 18 The complete product identity

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.

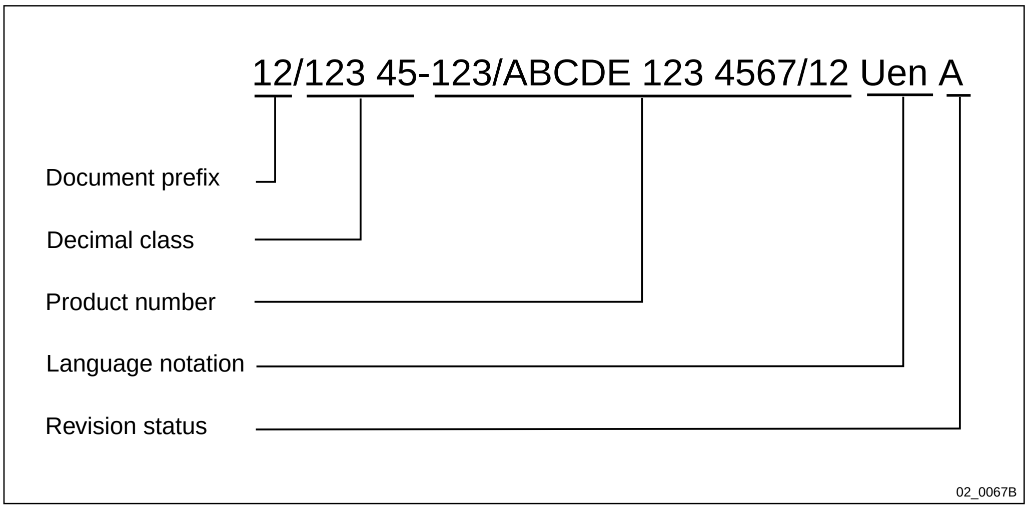

Figure 19 The complete document identity

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-	Configuration 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.

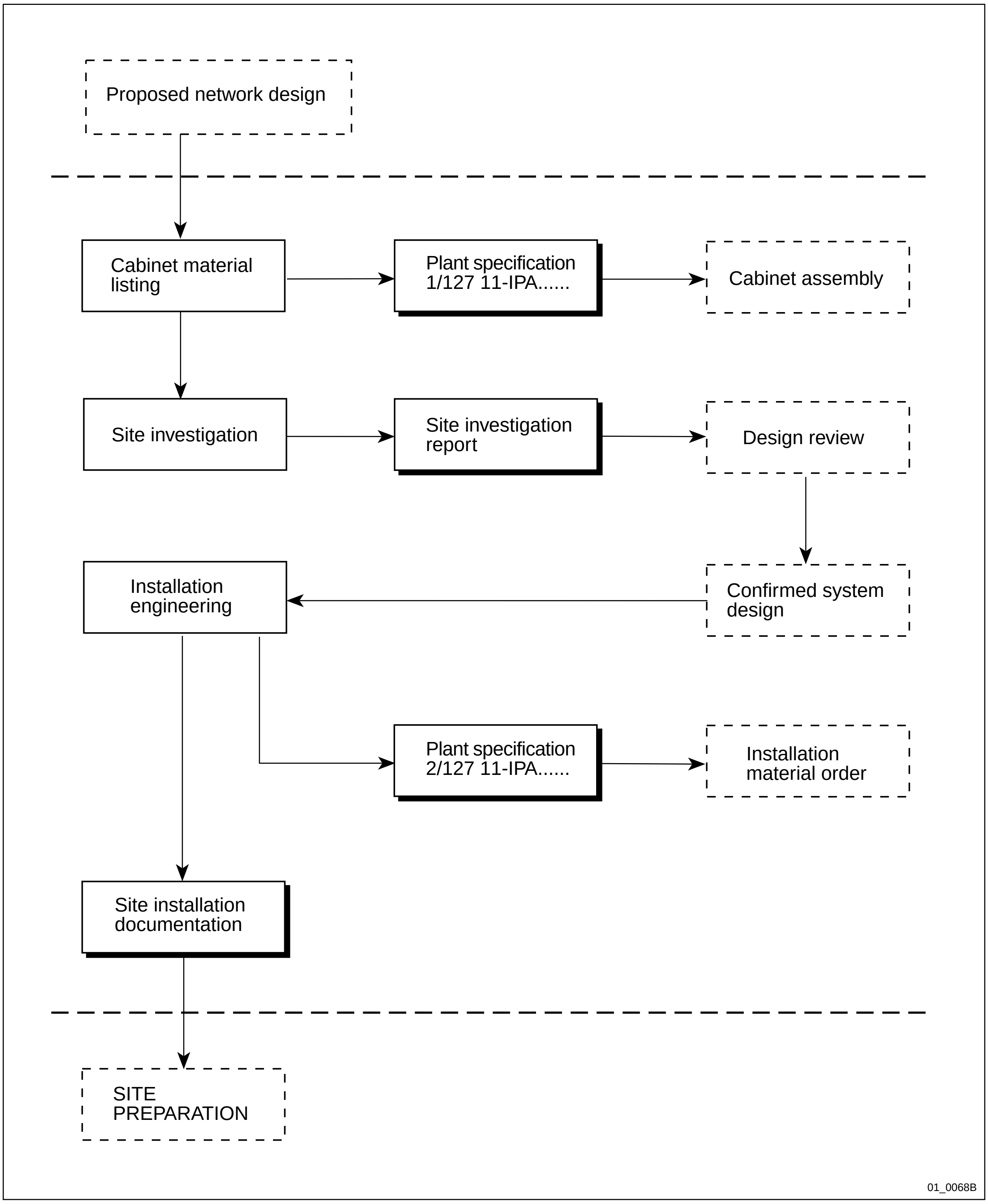

Figure 20 Planning overview

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 20 on page 50*, 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 *Chapter Tools and Instruments*.
- 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.

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

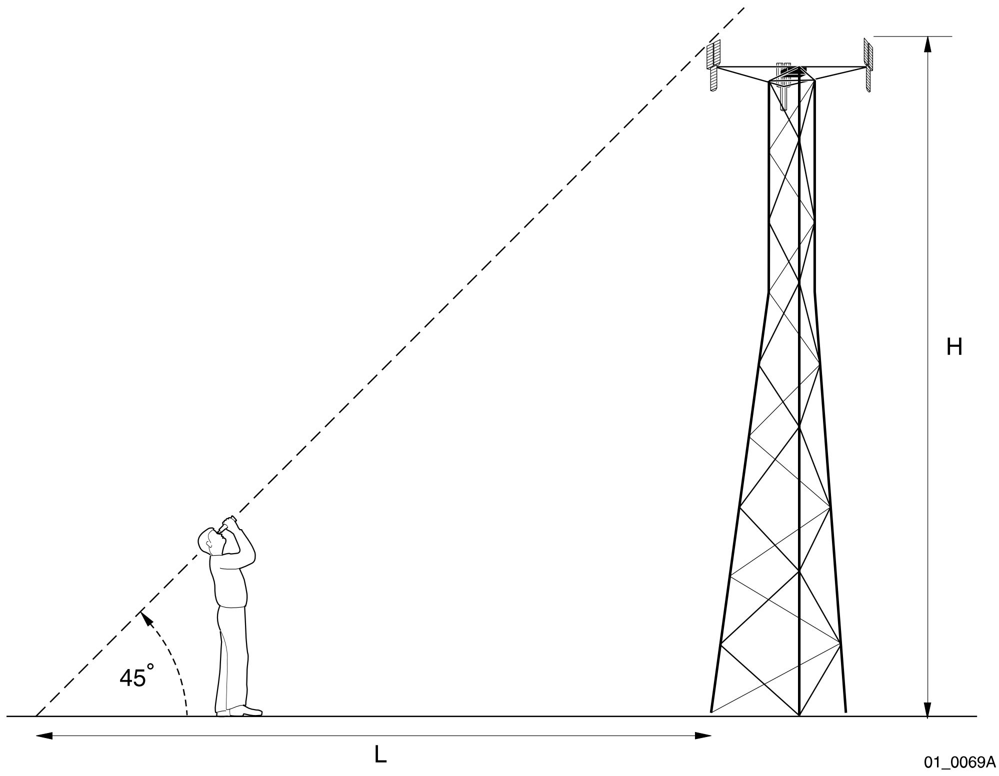

Figure 21 The 45° method of measuring a tower

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 are included in:

📖	*Ordering Information for RBS 2302 and Maxite*	*131 62-HRB 105 112/06*

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*	*LZN 302 39*

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.

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.

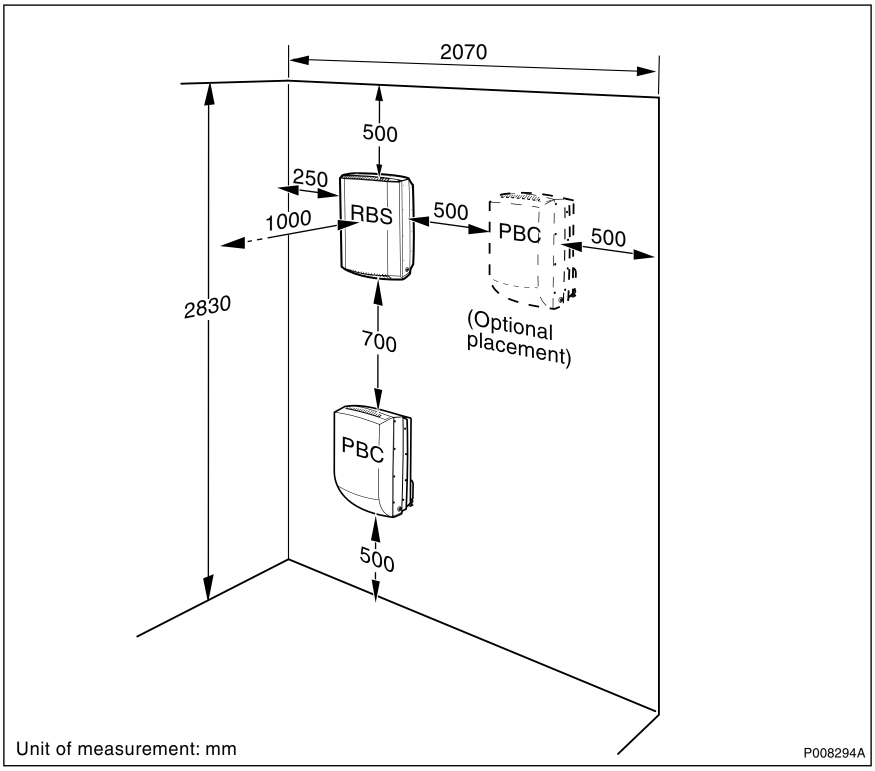

Figure 22 Minimum space requirements

This figure above 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 ± 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 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.

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 Power Supply

The base station must be connected to the nominal mains supply voltages presented in *chapter Product Data*.

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.

4.8.1 Requirements for USA and Canada installations

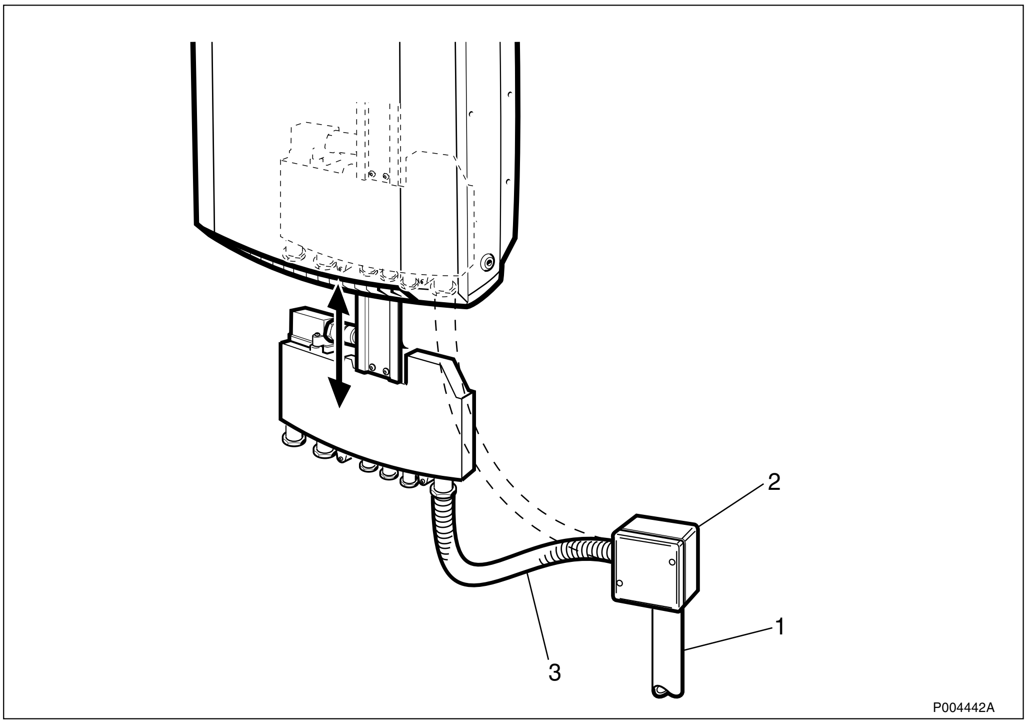

Figure 23 Connection in accordance with NEC and CEC

Connection shall be made in accordance with NEC and CEC.

In *Figure 23 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.

4.9 Earthing and Lightning Protection

RBS 2302 must be connected to separate site earth. This may consist of an existing lightning protection or an earth electrode. The design of earth electrodes can be found in:

Radio Site Installation Engineering Manual	*LZN 302 069*

The requirement is also valid for indoor installations and the aim is to ensure the proper function of the overvoltage protectors.

4.10 Installation Material

Details about the material for installation can be found in:

Standard Site Material Installation Instructions	*EN/LZT 720 0014*

4.11 RBS 2302 Configuration Overview

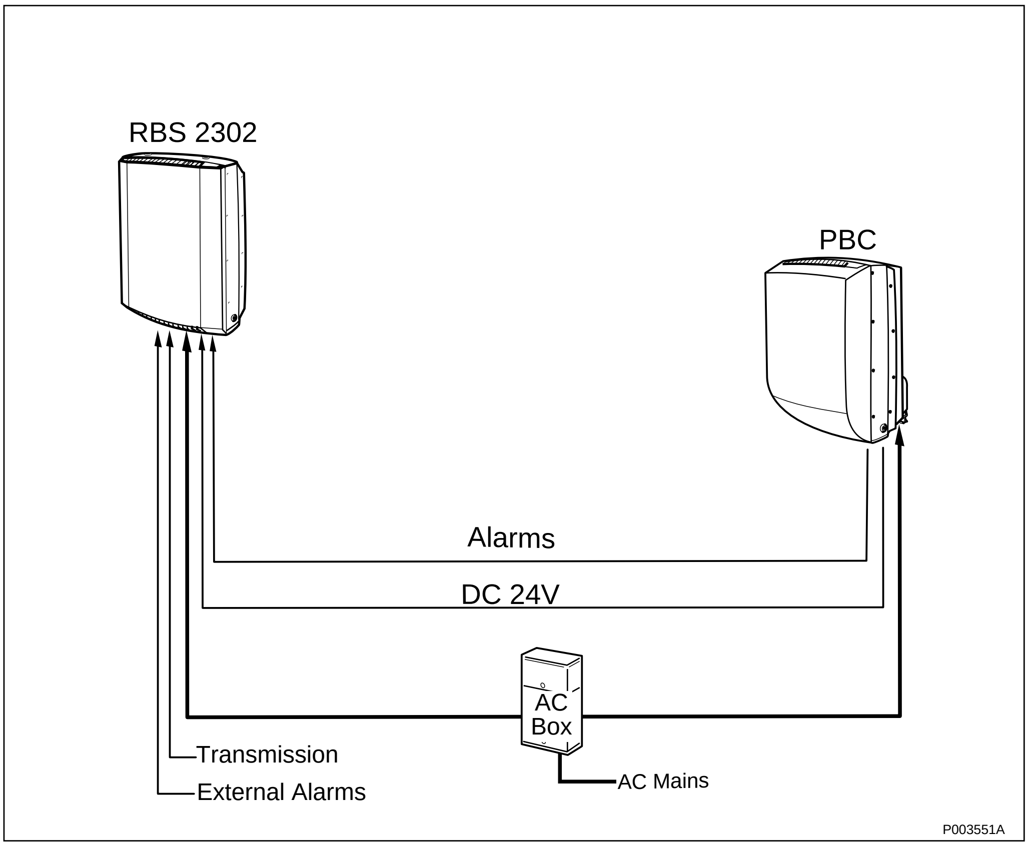

Figure 24 Configuration with 2 TRX

The basic Micro RBS configuration is a two TRX configuration and can be optionally supplied with a PBC.

- one PBC
- one RBS 2302

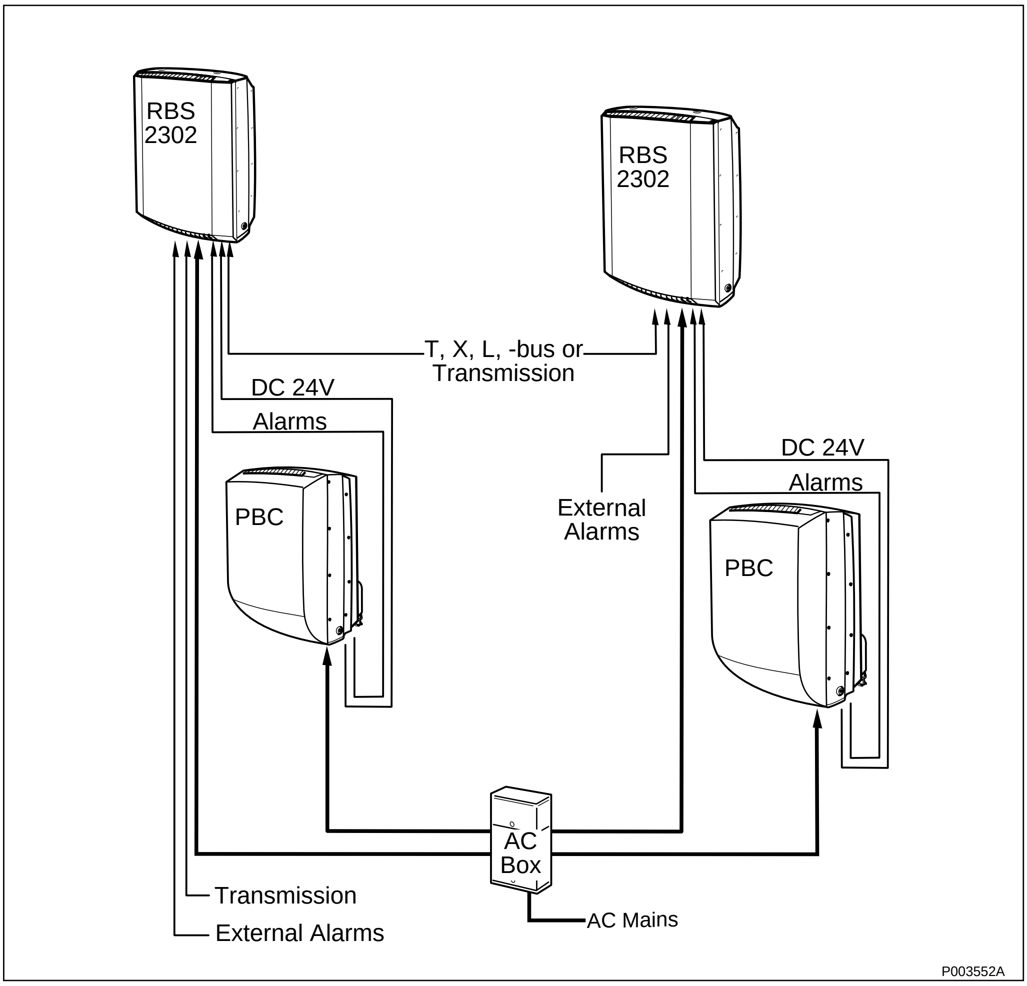

Figure 25 Configuration with 4 TRX

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

- two PBC
- two RBS 2302

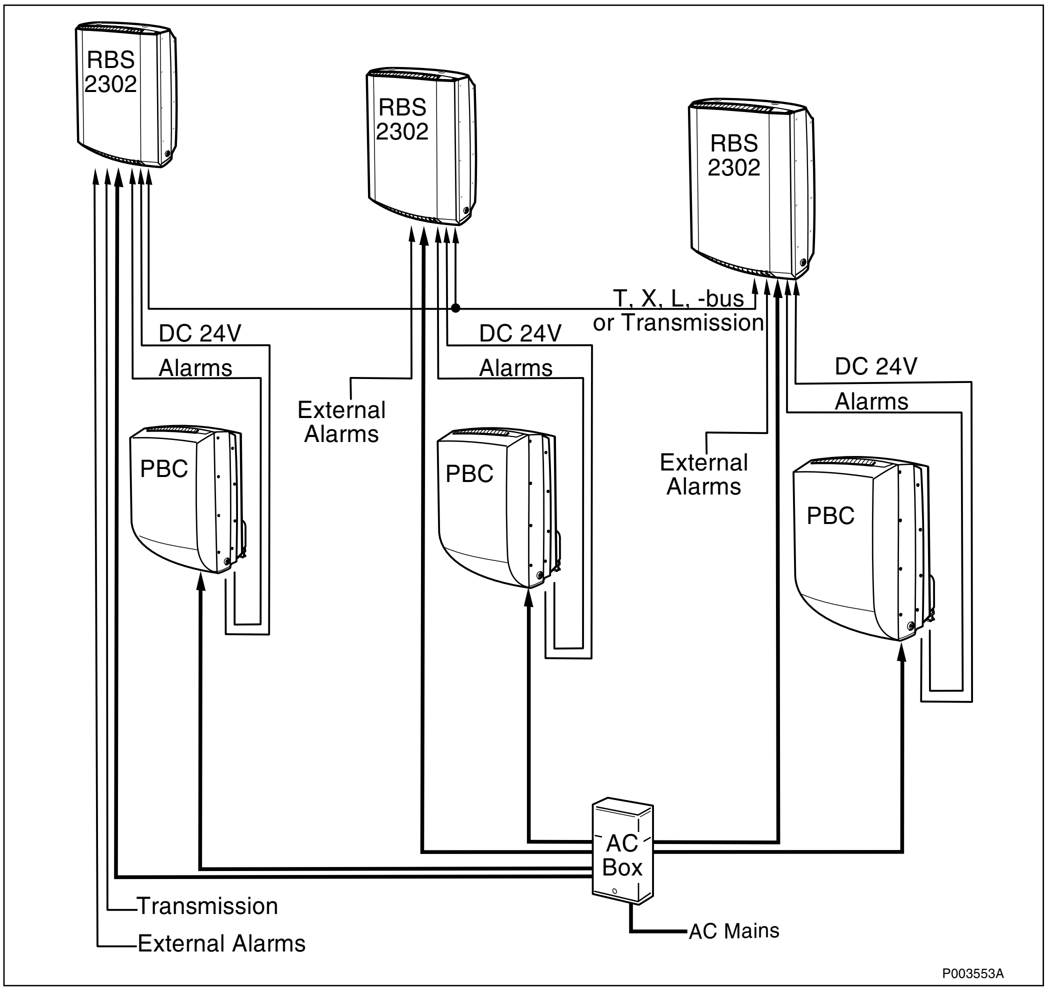

Figure 26 Configuration with 6 TRX

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

- three PBC
- three RBS 2302

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5 Installation of RBS 2302

5.1 Preface

This section describes how to install the radio base station on a pole or on a wall. It also describes how to install antennas.

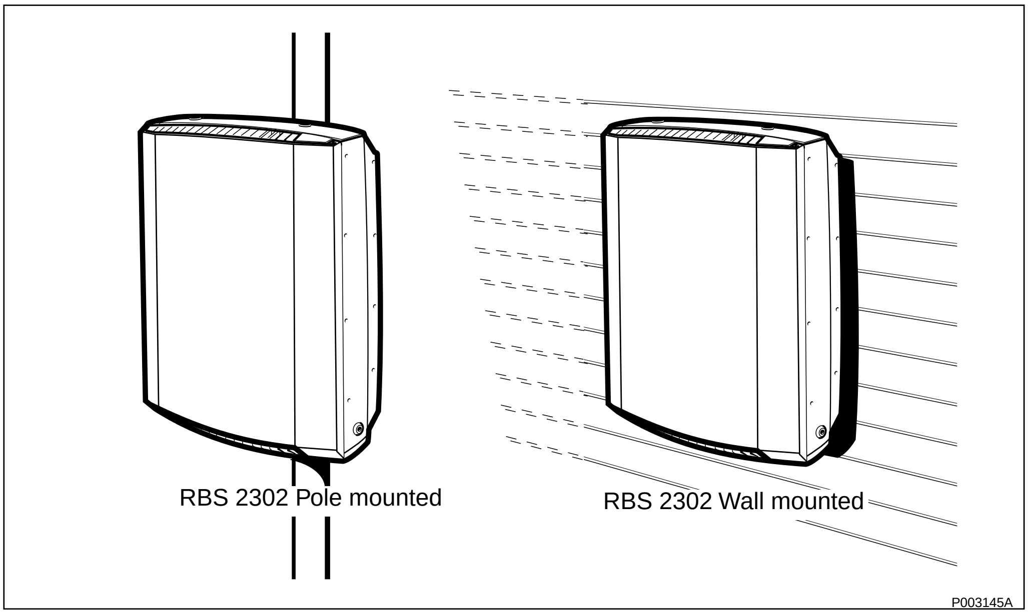


Figure 27 Installation alternatives

5.1.1 Preconditions

Ensure that the following conditions are met:

- ☐ Site access permission received.
- ☐ Ordered RBS 2302, equipment, specified tools and other necessary facilities have been delivered.
- ☐ Electrical ducting is ready and AC mains power is available.
- ☐ Earth Point is available.
- ☐ Transmission line to BSC is available.
- ☐ During bad weather conditions it may be necessary to protect the cabinet during installation.
- ☐ When the cabinet is mounted outdoors or if the ambivient temperature changes between hot and cold, it must not be left without power for more than 48 hours. This requirement is caused by the risk of humidity damages.
- ☐ Always use an approved antistatic bracelet to avoid damage to components mounted on printed board assemblies.

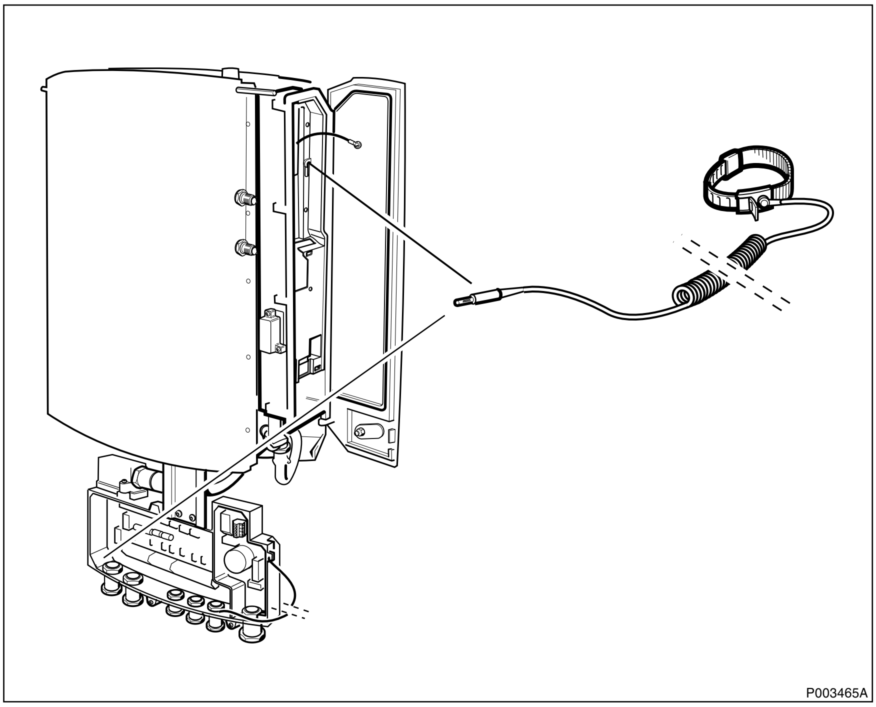


Figure 28 Connecting the ESD wrist strap

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.

Preconditions for pole-mounted RBS 2302

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

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.

📖	*Standard Site Material Installation Instructions*	*EN/LZT 720 0014*

Competence Requirements

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

The following qualifications are minimum requirements:

☐ Good understanding of radio and telephone engineering.

☐ Good understanding of engineering English.

5.1.2 Tightening Torque

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

Table 20 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 torque for plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	
M4	170 +/- 15	-	15.1 +/- 1.3	-	Reduced torque for captive screws
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	
M8	-	21 +/- 1.3	-	15.5 +/- 1	
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	

5.1.3 Work Process for RBS Cabinet and Antenna Installation

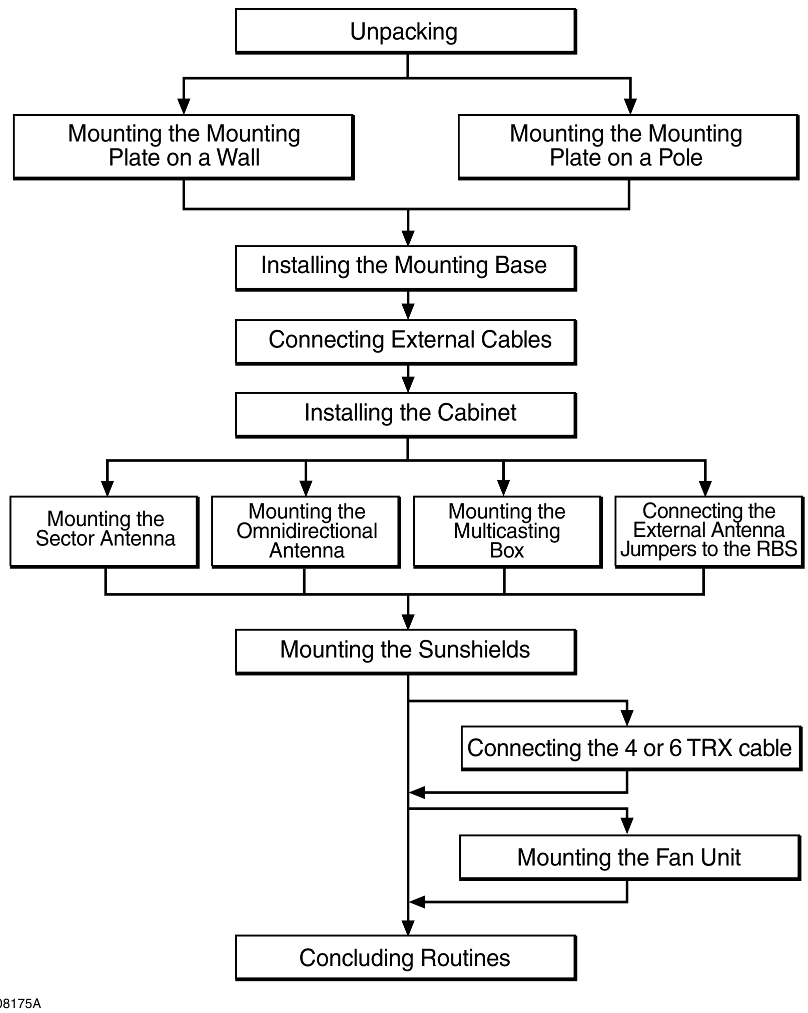


Figure 29 Working Process for Cabinet and Antenna Installation

5.2 Unpacking the RBS 2302

CAUTION

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

In order to avoid damages to components due to electrostatic discharges during unpacking, make sure not to come in contact with the connectors on the cabinet

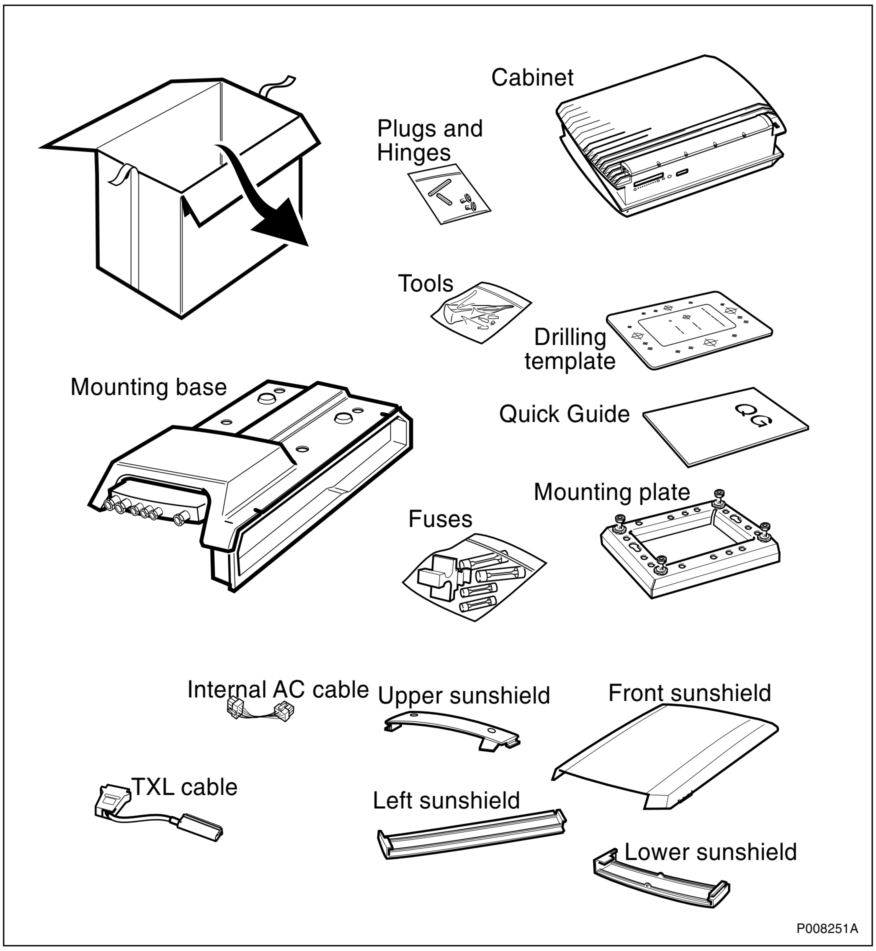


Figure 30 Unpacking the cabinet, sunshields and cables, and the mounting base

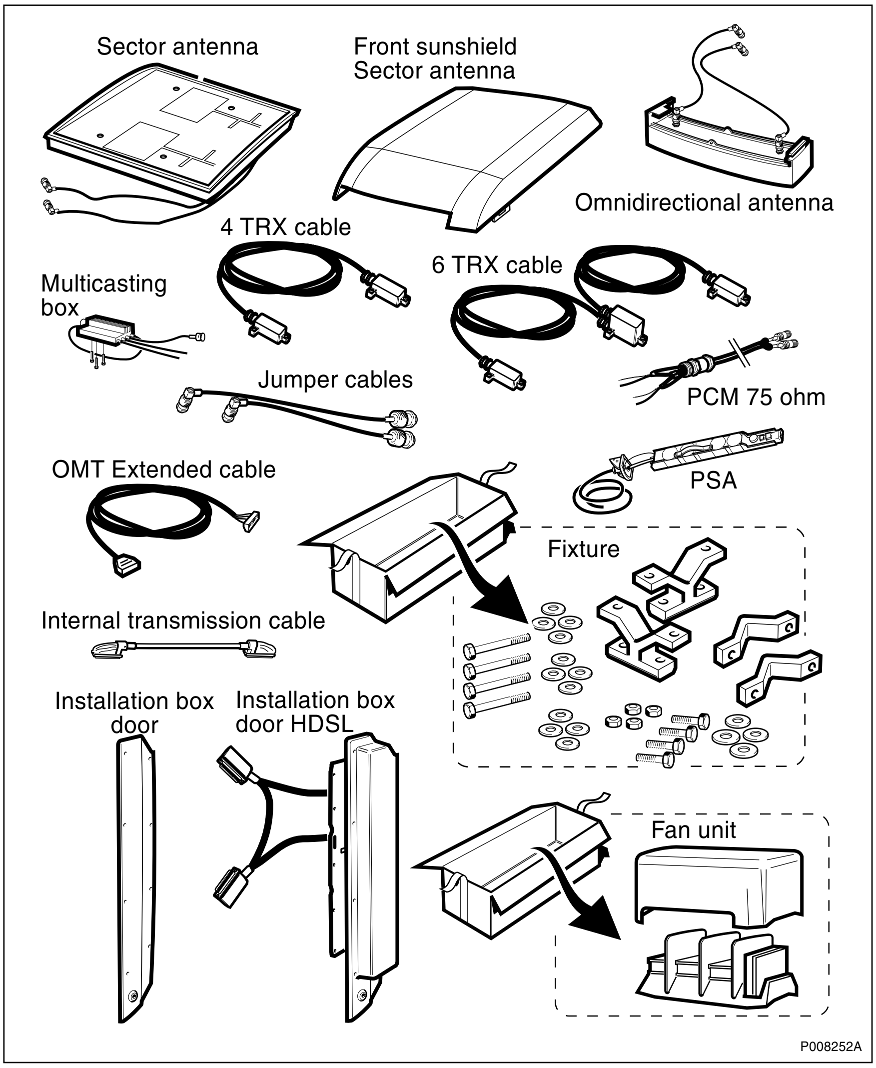


Figure 31 Unpacking the optionals

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

5.3 Mounting the Mounting Plate

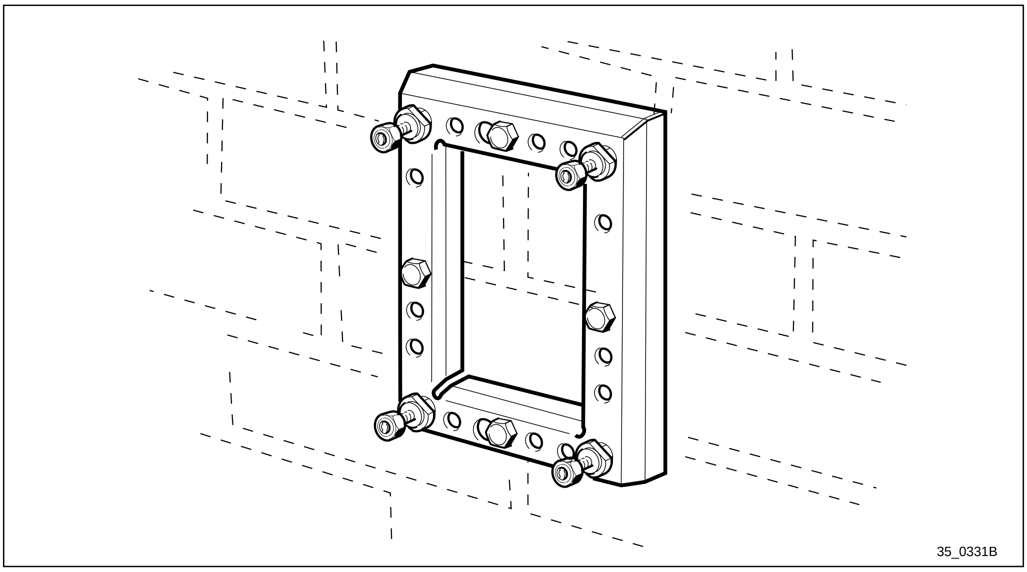


Figure 32 Mounting the mounting plate

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.

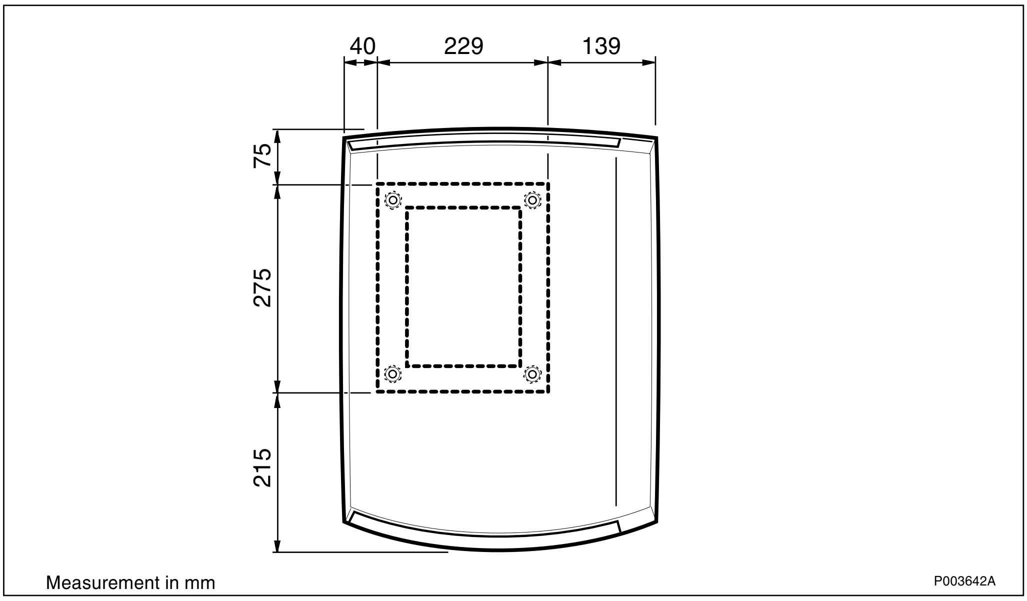


Figure 33 Mounting plate and equipment contour, front view

Figure above 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 Product Data* and *chapter Site Planning and Requirements*.

5.3.1 Mounting the Mounting Plate on a Wall

1. Place the mounting plate drilling template in the position where the RBS 2302 is to be situated.

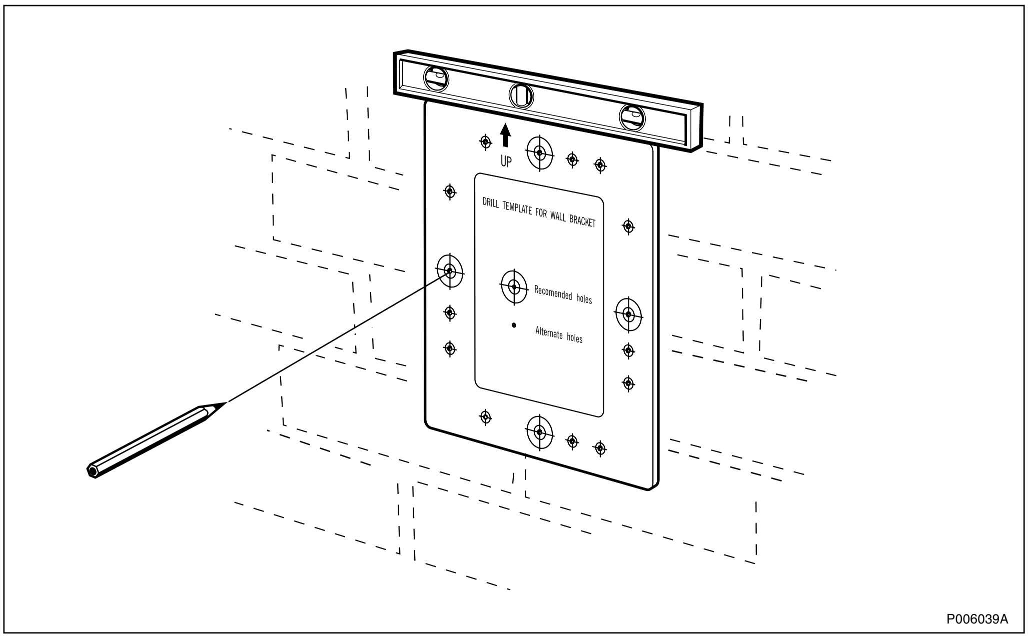


Figure 34 Marking the holes

2. Check with a spiritlevel that the drilling template is placed in a horizontal position.
3. Use a pen to mark the position of the holes that are to be drilled.
4. Remove the template and drill the holes for the 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.

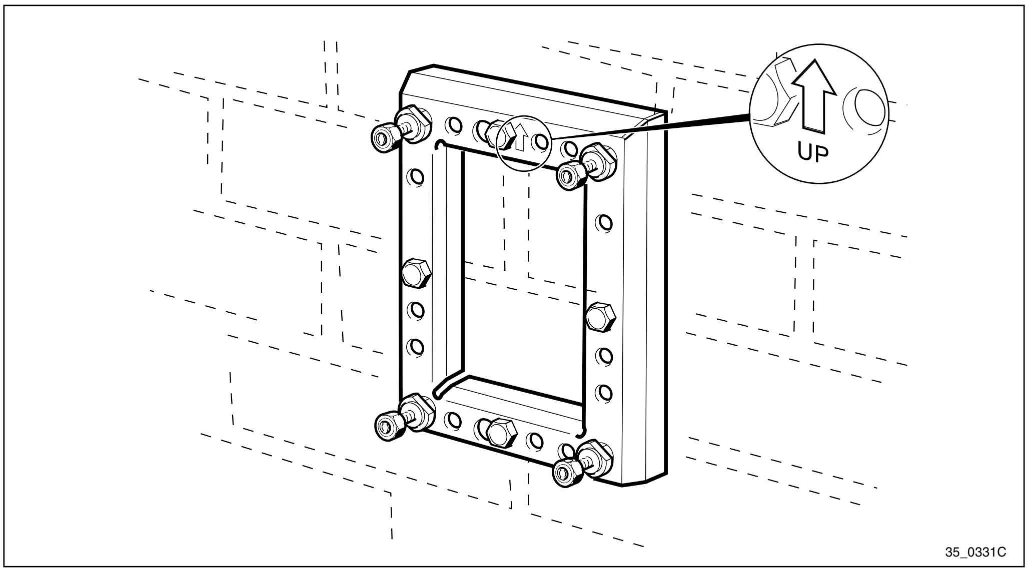


Figure 35 Mounting plate

5. Mount 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.

5.3.2 Mounting the Mounting Plate on a Pole

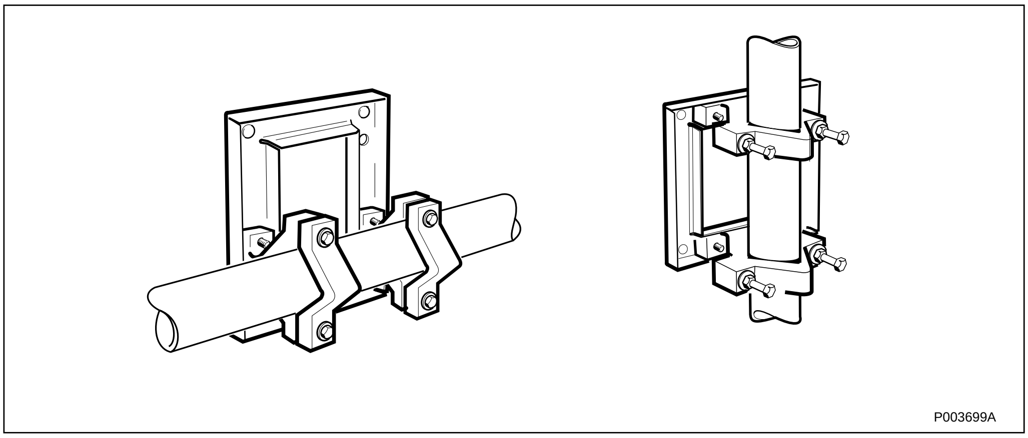


Figure 36 Mounting alternatives

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

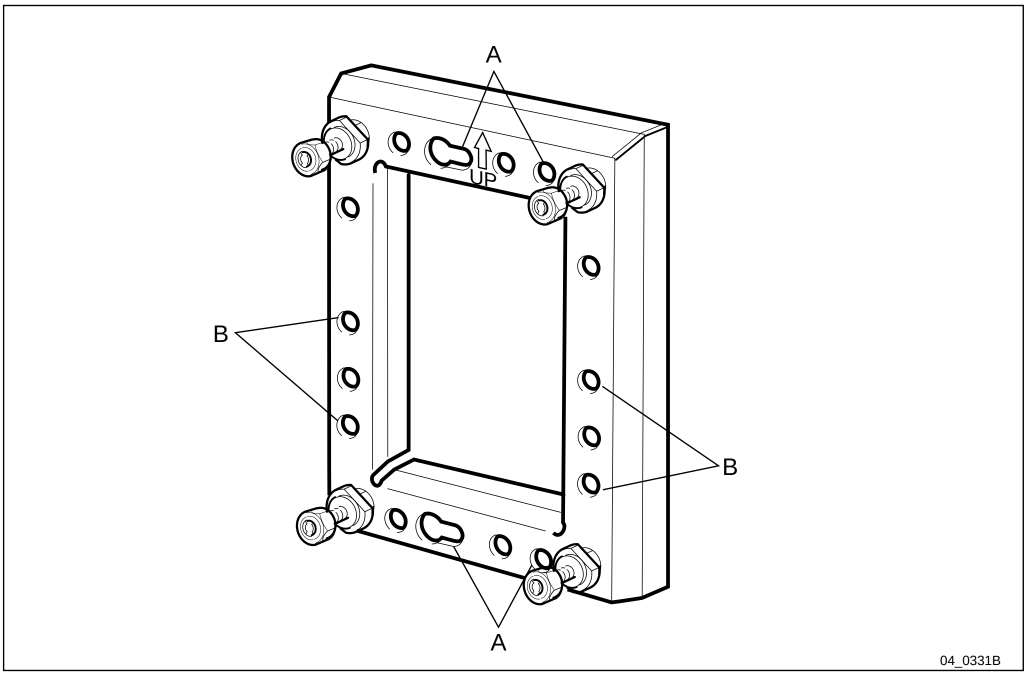


Figure 37 Choosing the appropriate holes

A Holes to be used for vertical pole

B Holes to be used for horizontal pole

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

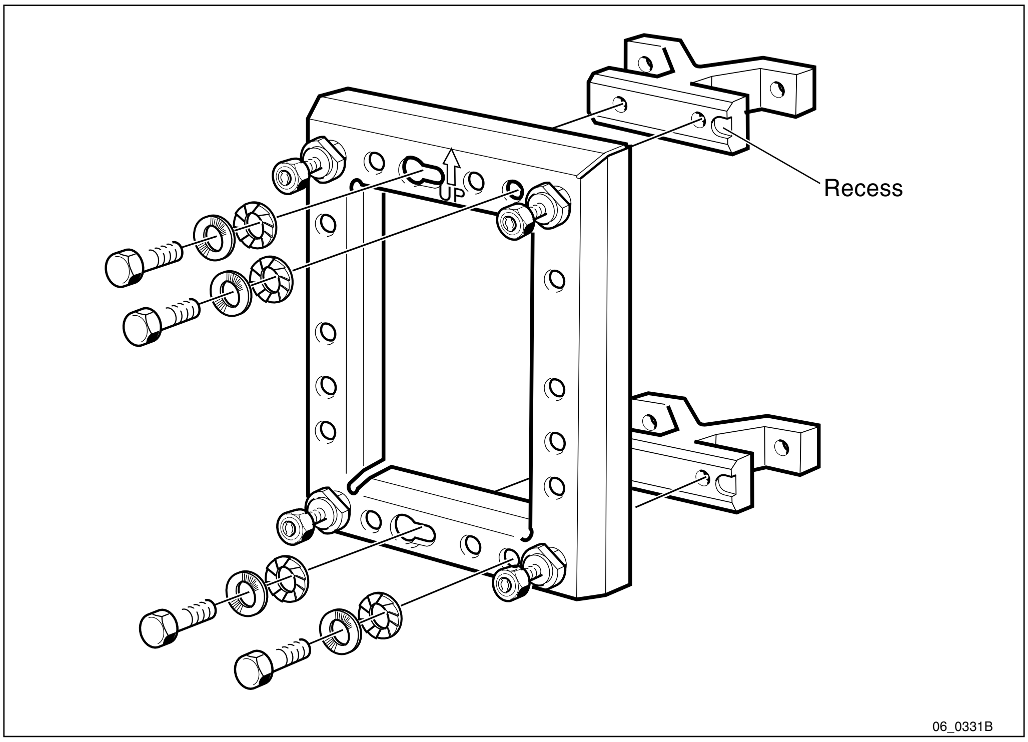


Figure 38 Fastening the clamps and mounting the washers

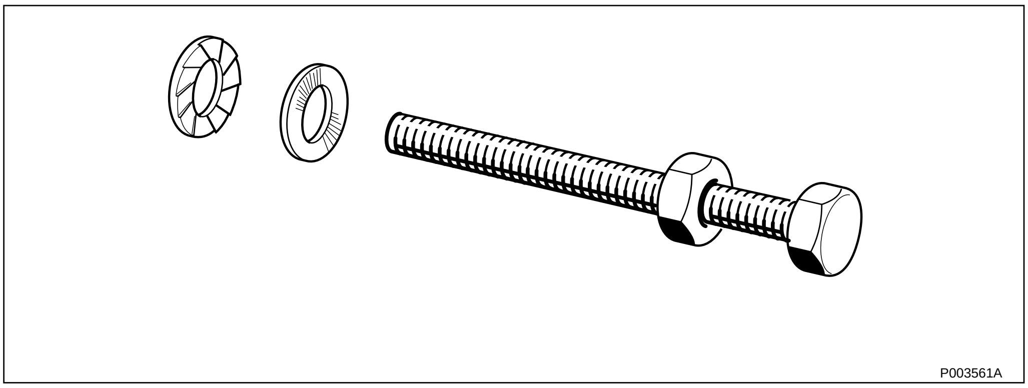


Figure 39 Mounting the washers

2. Make sure that the washers are mounted correctly, *see figure above*.
3. Fasten the two clamps with the screws and washers, for torque *see Table 20 on page 67*. Ensure that the recess is attached at the correct place.

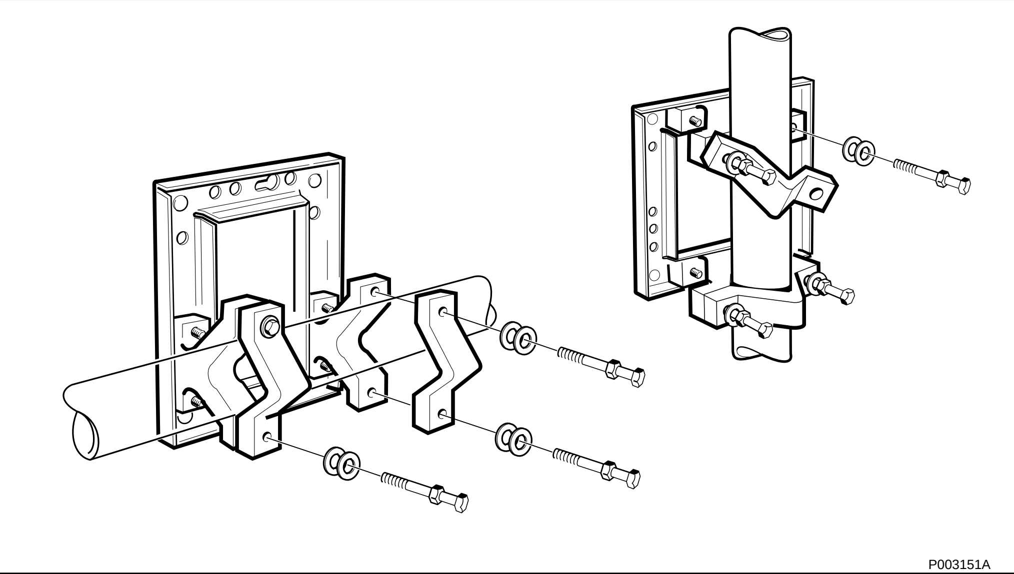


Figure 40 Placing the mounting plate correctly

4. Place the mounting plate at the correct height on the pole and mount the clamps.
5. Make sure that the washers are mounted correctly *see Figure 39 on page 73*.
6. Mount the screws and tighten them alternately (right and left side) in order to avoid bending the screws, *see Table 20 on page 67*.

5.4 Installing the Mounting Base

5.4.1 Mounting the Mounting Base

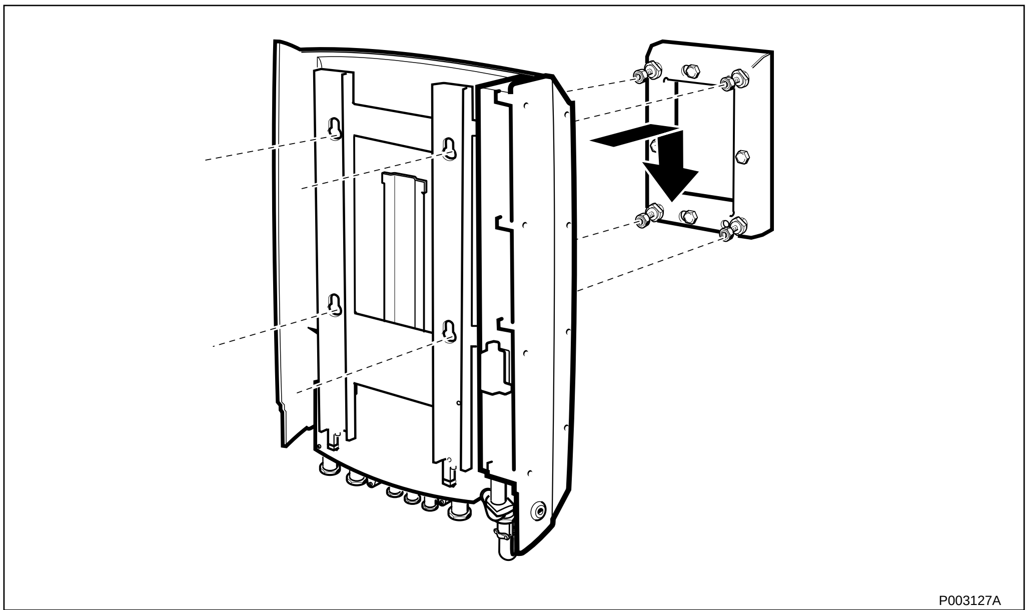


Figure 41 Mounting the mounting base on the mounting plate

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.
2. Check with a spiritlevel if the mounting base is placed in a vertical position.

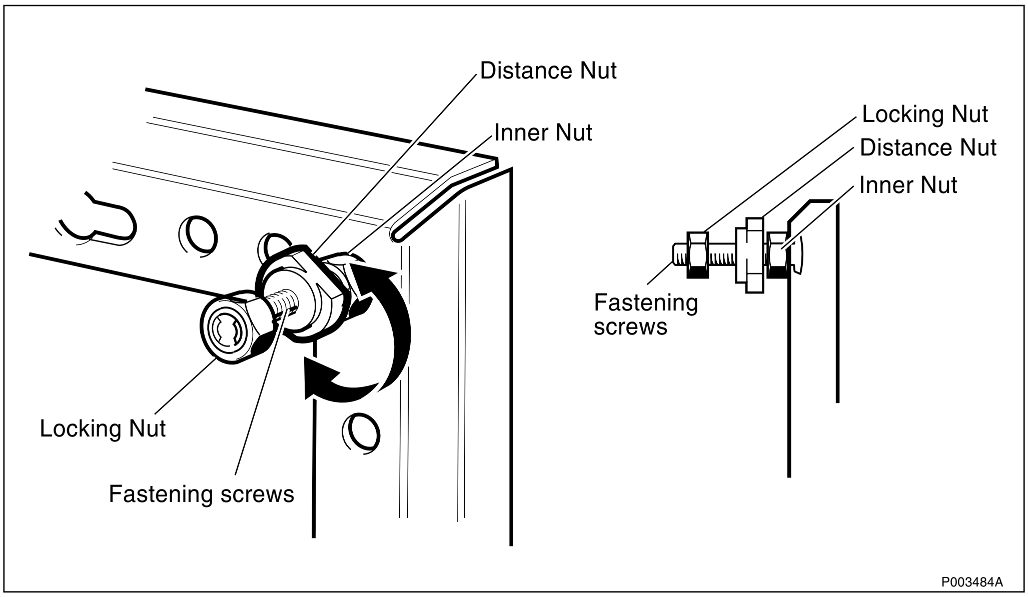


Figure 42 Adjusting the distance nuts

3. If the mounting base is not in a vertical position the inclination can be corrected 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.

4. When the mounting base is correctly adjusted, tighten the four locking nuts, *see Table 20 on page 67*.

5.4.2 Mounting the Installation Box Door

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

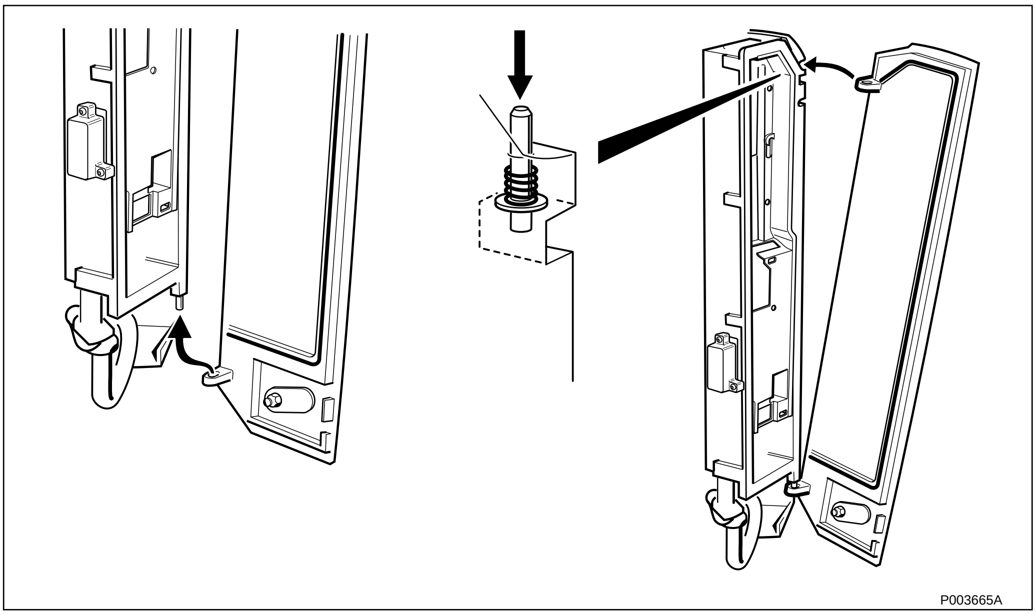


Figure 43 Mounting the installation box door

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.

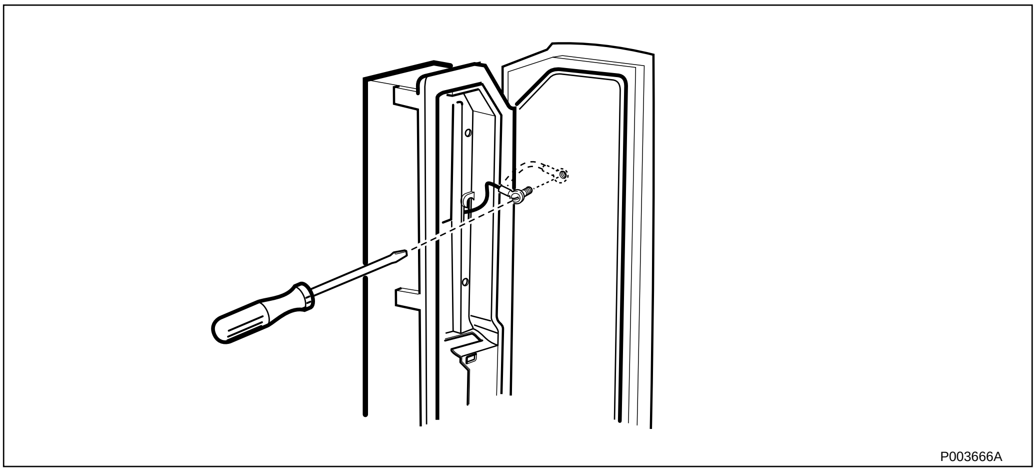


Figure 44 Mounting the earth cable, Installation Box Door without HDSL

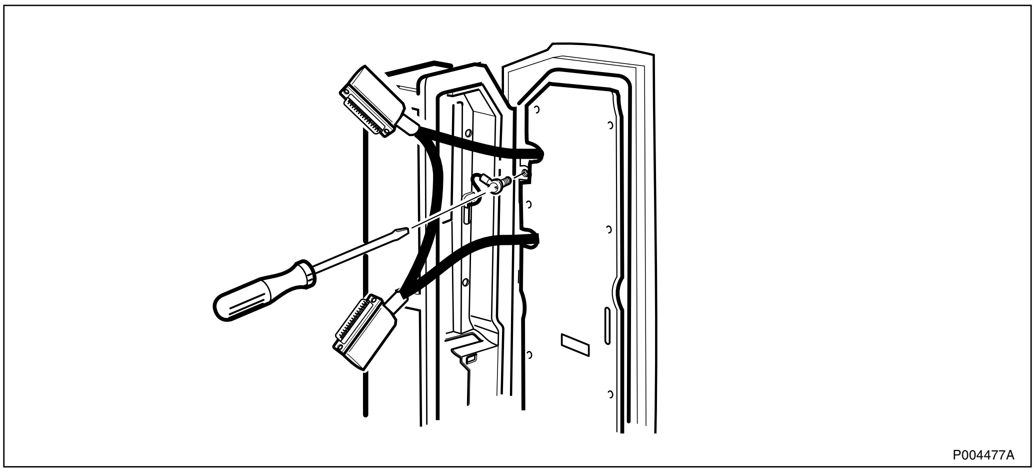


Figure 45 Mounting the earth cable, Installation Box Door with HDSL

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

5.4.3 Installing the Fuses and Setting the Voltage

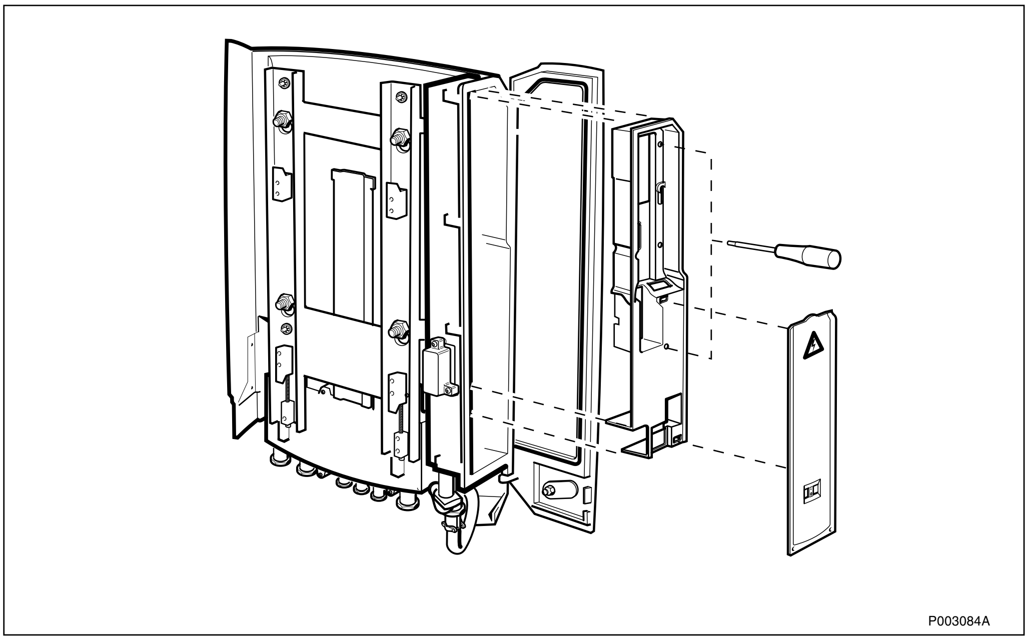


Figure 46 Removing the protection covers

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 voltage selector is now accessible.

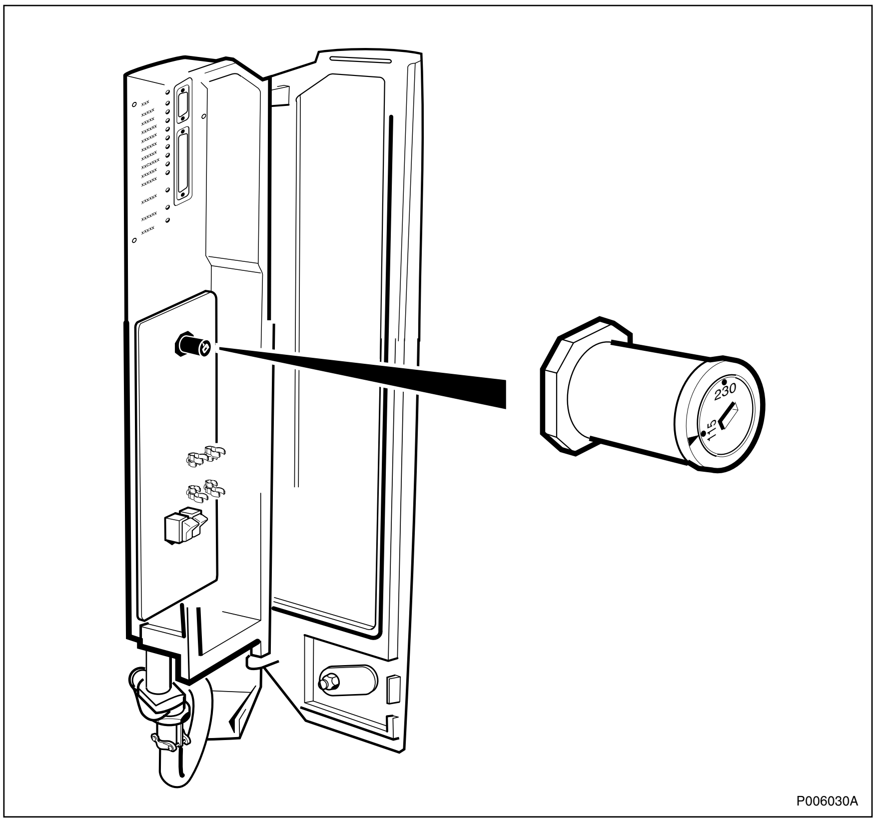


Figure 47 Checking the voltage selector

3. Set the voltage selector to the correct value, 115 V or 230 V. Compare with the Site Documentation to verify the voltage.

4. Remount the inner protection cover.

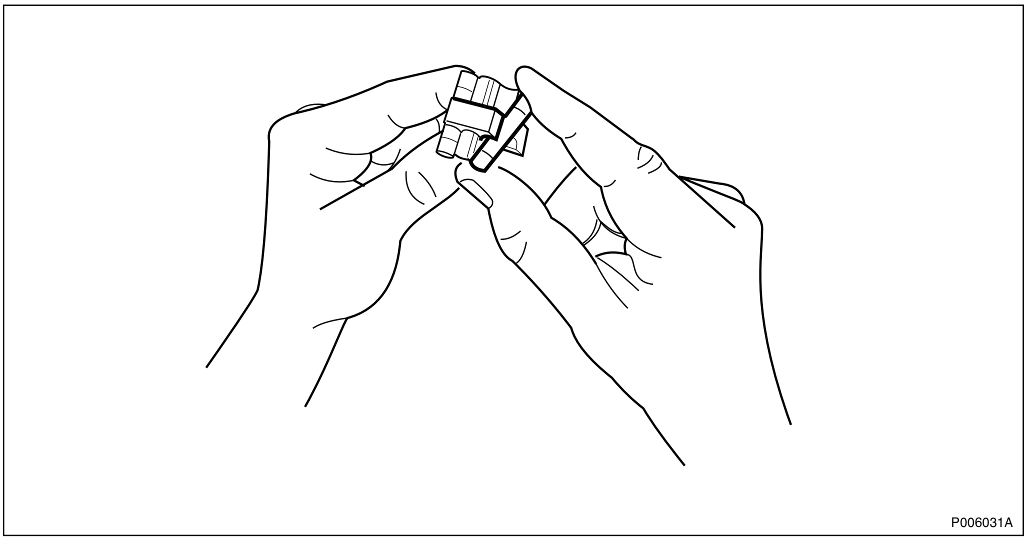


Figure 48 Snapping the fuses into position

5. Snap the 2 fuses onto the fuseholder. Make sure that the correct fuses are used, *see table below*.

Table 21

Voltage	Fuses Data	Dimension
100-127 V AC	Ceramic Slow Blow 8 AT 250 V[(1)]	6.3x32 mm
200-250 V AC	Ceramic Slow Blow 6.3 AT 250 V[(1)]	5x20 mm

(1) Fuse according to standard EN 60127.

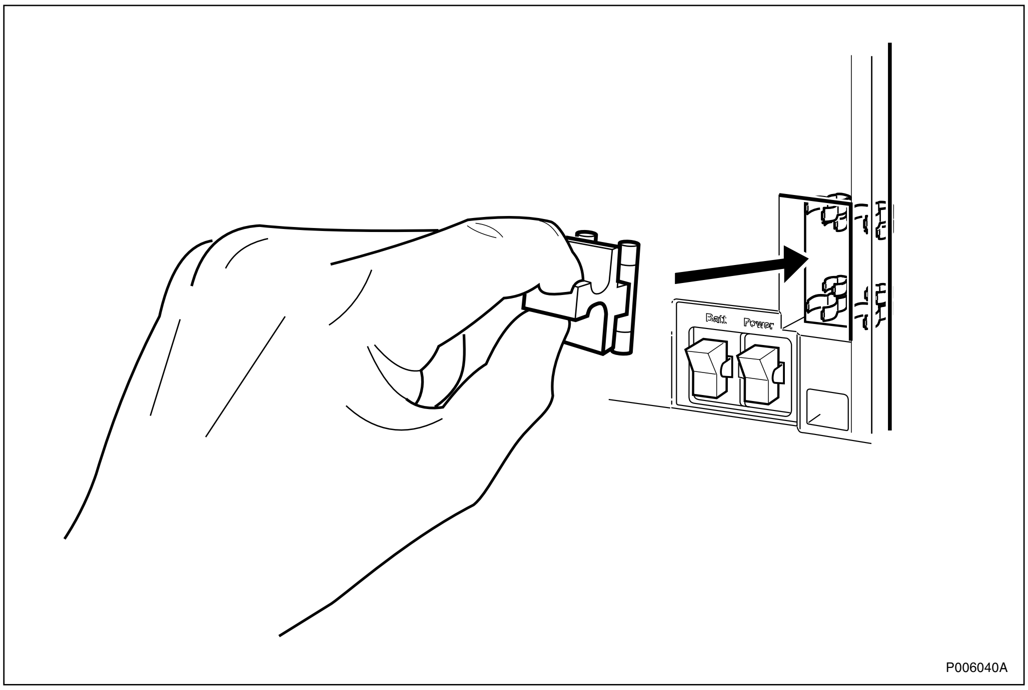


Figure 49 Snapping the fuseholder into postion

6. Snap the fuseholder into position.

5.4.4 Connecting Earth and Lightning Protection

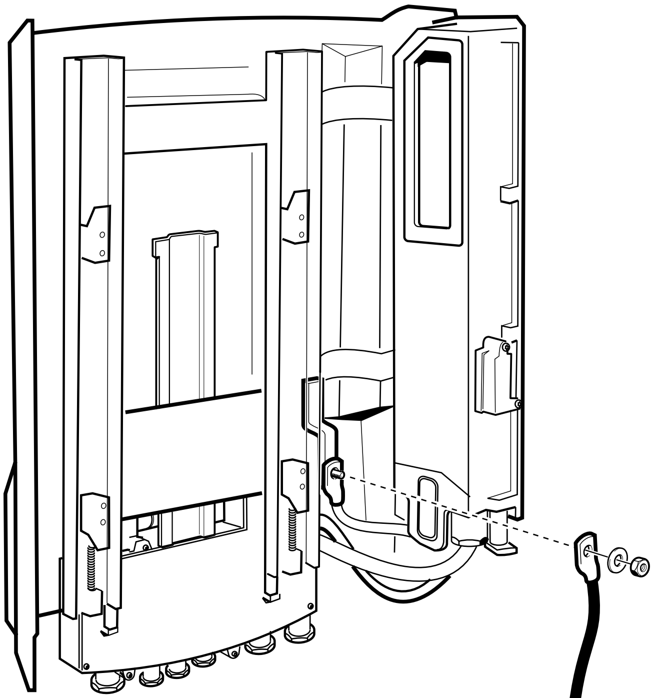


Figure 50 Connecting earth and lightning protection

If the site is located outdoors and is not protected from lightning, protect the system as follows:

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

📖	*Standard Site Material Installation Instructions*	*EN/LZT 720 0014*

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:

📖	*Standard Site Material Installation Instructions*	*EN/LZT 720 0014*

5.5 Connecting External Cables

This section describes the connections of AC mains, PCM (Network) and the external alarm cable.

5.5.1 Opening the Interface Box

Before the connection procedure can begin the interface box has to be opened.

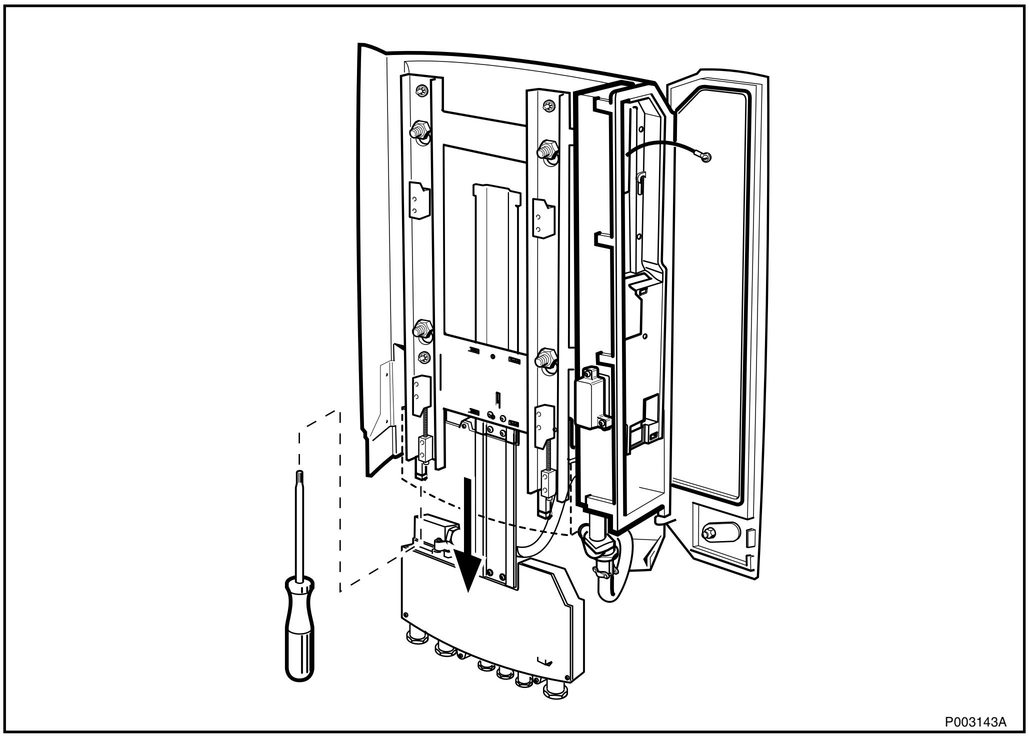


Figure 51 Pulling down the interface box

1. Loosen the screws securing the interface box placed underneath the RBS and pull down the interface box.

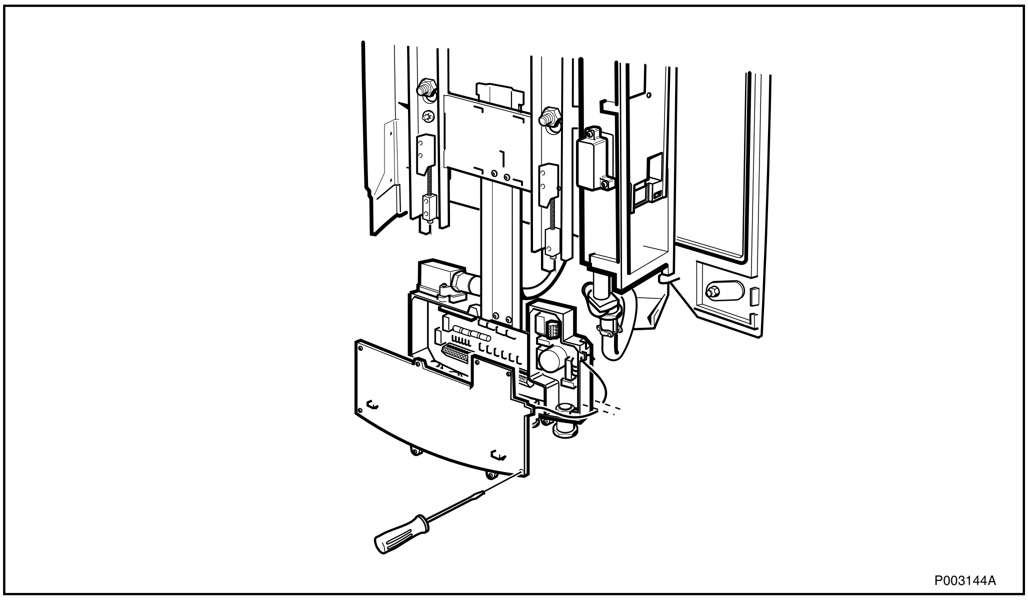


Figure 52 Opening the interface box cover

2. Unscrew the 8 torx screws on the interface box cover. Let the cover hang in the strap.

5.5.2 Connecting the AC Mains

DANGER

High voltage is used in the operation of this equippment. 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 electrical 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 and modify the electrical installation.

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, indicated by PE and the earth symbol.

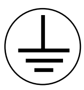


Figure 53 Protective Earth

The Protective Earth connection is essential.

Connecting AC

It is not possible to loosen the gland plate for the AC cable from the interface box.

Follow the procedure below to connect the AC mains power cable.

Note: Make sure the AC Mains is switched off before beginning the AC installation procedure.

1. Route the AC mains cable so the interface box can be pushed up into the cabinet.

If a flexible conduit is to be used, replace the AC mains cable inlet (feed throught) with the flexible conduit and its fastening device, *see Figure 56 on page 84*.

2. Cut the cable to the appropriate length.

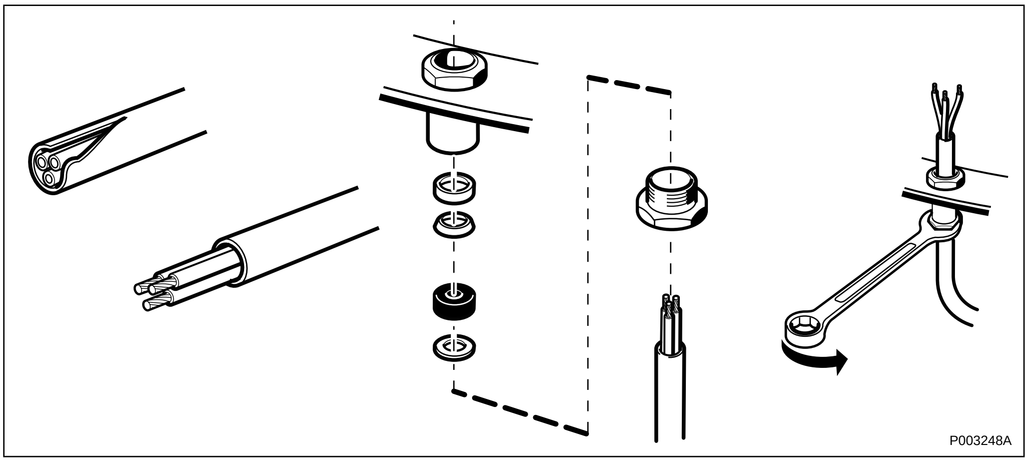


Figure 54 Dismantling and mounting the cable inlet

3. Cut the cable isolation.
4. Adjust the sealing grommet to the cable diameter.
5. Mount all cable inlet details, *see Figure 54 on page 83*.
6. Route the cable into the inlet and tighten the cable gland.

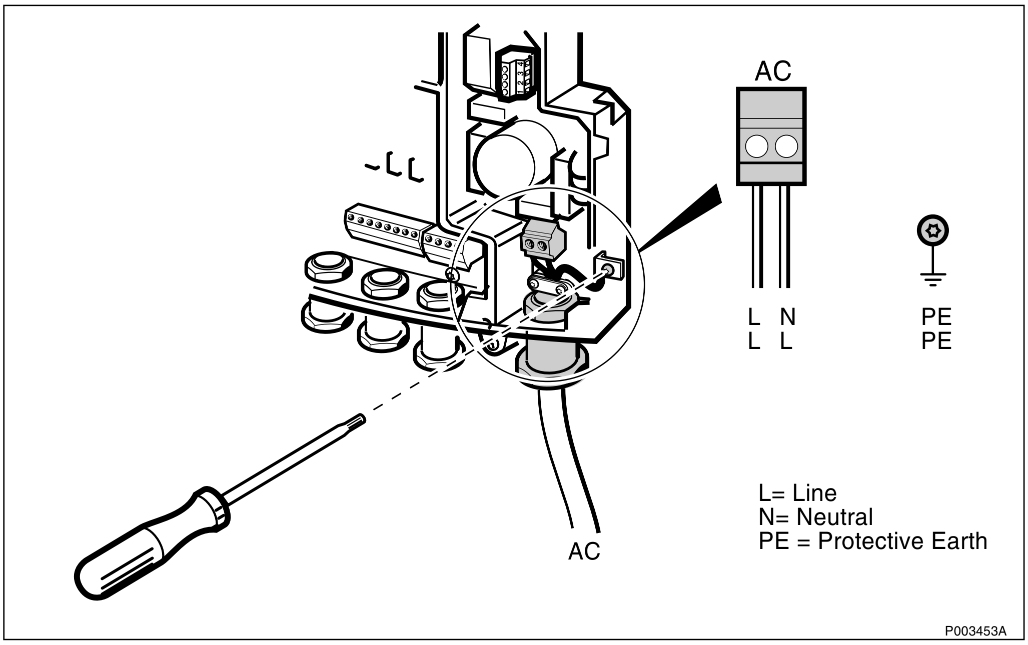


Figure 55 Connecting AC mains and protective earth

7. Connect the AC mains cable.
8. Ensure that the protective earth (PE) is properly connected.

Note: Line and neutral shall be connected according to figure above. It is required to have one common neutral (N) within the complete intallation. It is recommended to supply the site from one phase only.

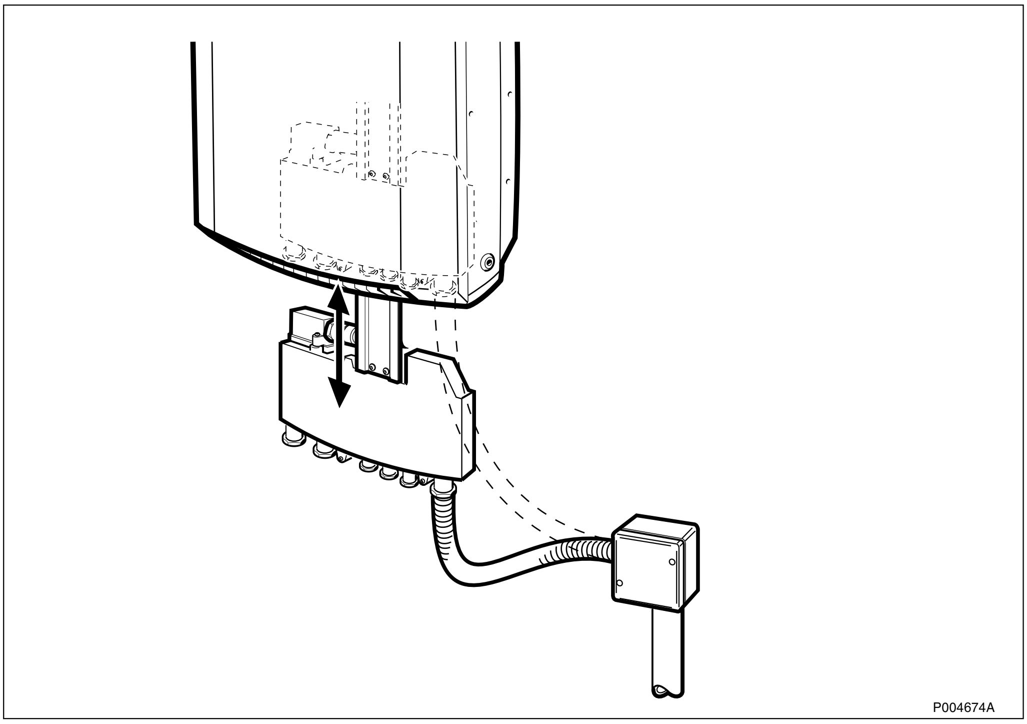


Figure 56 Example of use of flexible conduit

5.5.3 Loosening the Interface Box Gland Plate

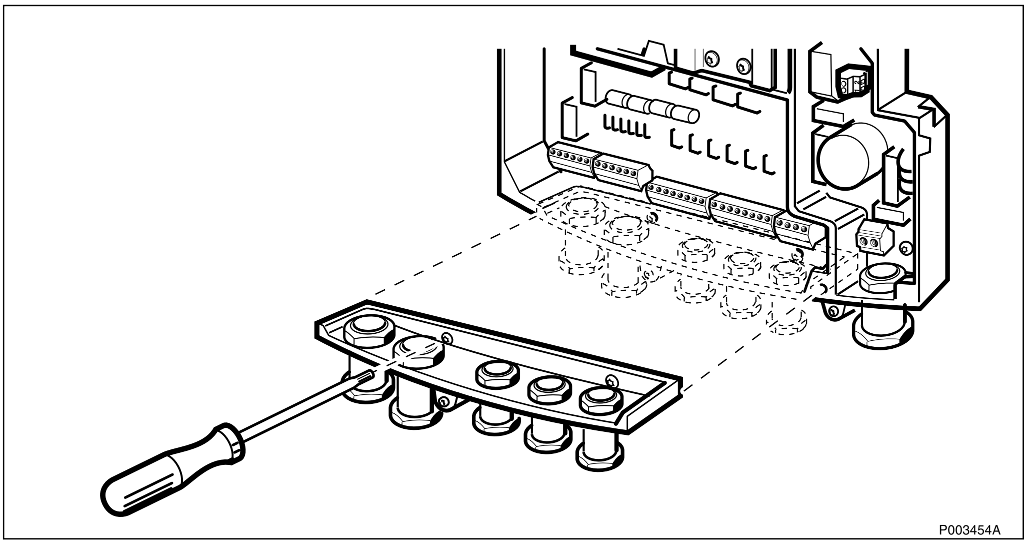


Figure 57 Loosening the gland plate

To simplify the mounting of the cables to the interface box the gland plate may be loosened. This is done by unscrewing the 2 torx screws.

For example is it easier to mount the cable inlet and the cable termination block at ground level instead of at a height, for example on a ladder.

Loosening the Termination Block

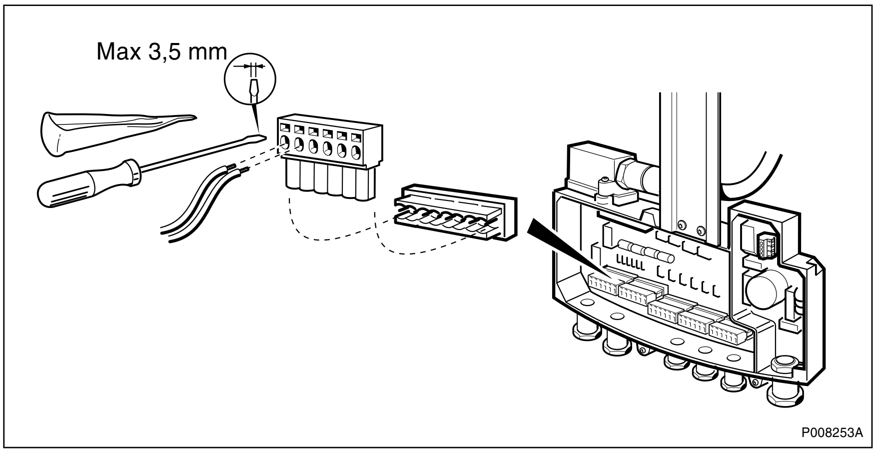


Figure 58 Loosening the termination block

The termination blocks may be loosened to simplify the mounting of the cables.

5.5.4 Assembling and Earthing of a PCM Twisted Pair Cable

This section describes the assembling and mounting of a twisted pair cable that is to be connected to the interface box. Also different ways to earth the cable is presented.

Assembling the Cable Gland

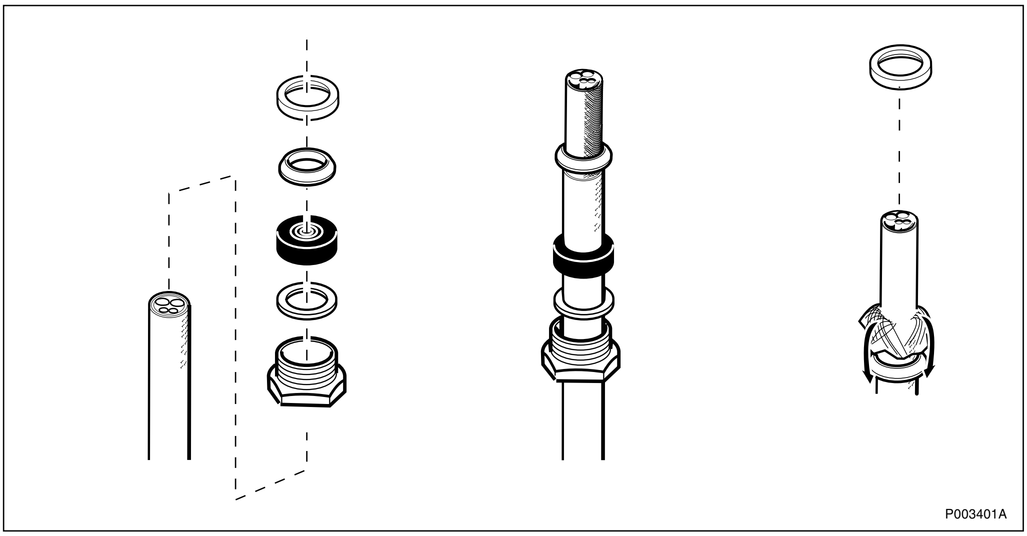


Figure 59 Assembling the cable gland

1. Cut the cable to appropriate length.

Note: Remember to take into account that extra cable length is required so that the interface box can be mounted back into position in the mounting base.

2. Route the cable so the interface box can be pushed up.

3. Adjust the sealing grommet to the cable diameter.
4. Mount all cable gland details, except for the last clamping cone.
5. Remove the insulation.

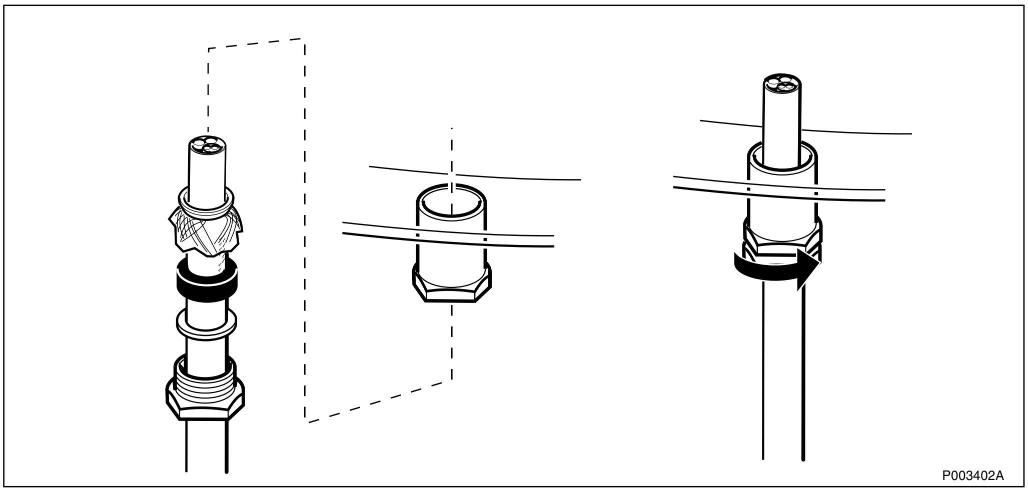


Figure 60 Mounting the cable gland

6. Fold the outer braid.
7. To earth the cable, fit the clamping cone over the cable so that the outer cable braid is squeezed between clamping ring and clamping cone.
8. Route the cable into the inlet and tighten the cable gland.

Earthing the Twisted Pair Cable

Depending on the cable, there are several ways to earth a twisted pair cable. The principle is that it is most satisfying to make the earth connection as near as possible to the cable gland. The *table below* shows how to earth the cable in different cases.

Table 22 Earthing options for twisted pair cable

Type of cable	**Earthing point**
Inner and outer shield.	Inner shield to the pull relief clamp and the outer shield to the cable gland, see *Figure 61 on page 87*. alternative Inner shield to the termination block and the outer shield to the cable gland, see *Figure 62 on page 87*.
Inner shield only.	Shield to the pull relief clamp, see *Figure 63 on page 88*.
Outer shield only.	Shield to the cable gland, see *Figure 64 on page 88*.

The figures below show the corresponding connections.

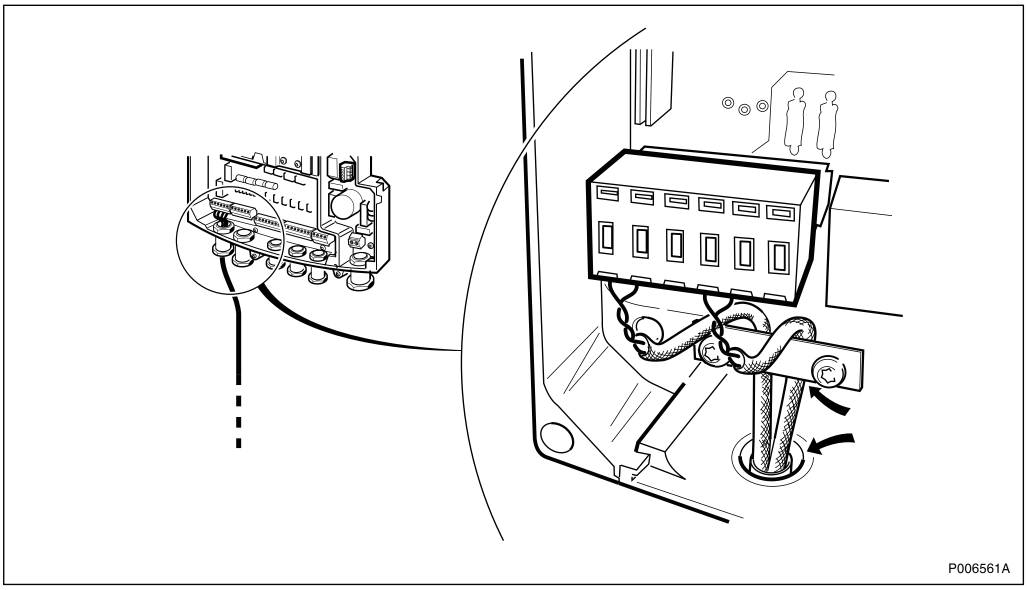


Figure 61 Inner and outer shield, earthing via the pull relief clamp and the cable gland

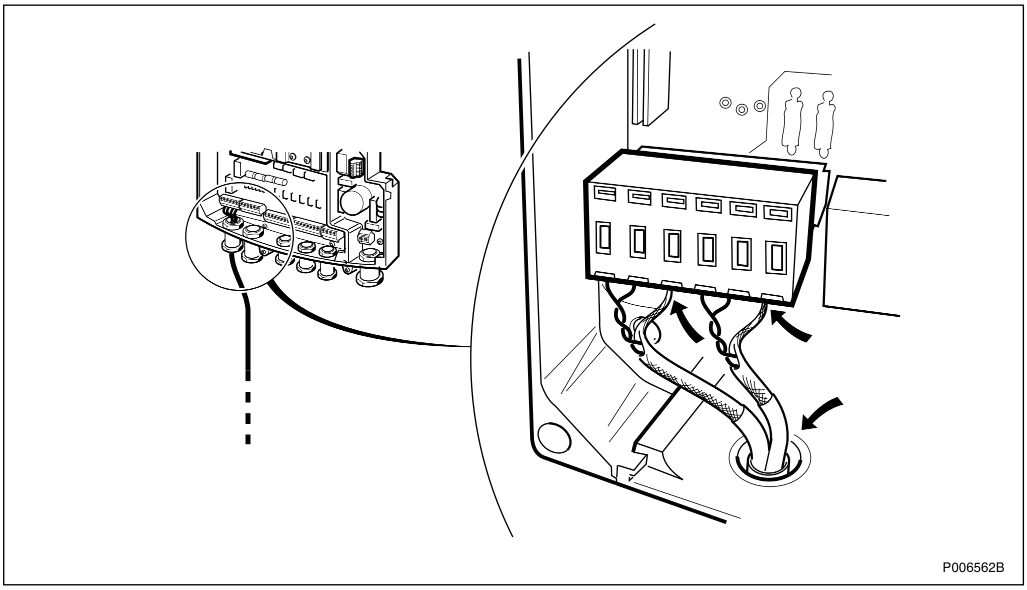


Figure 62 Inner and outer shield, alternative, earthing via the termination block and the cable gland

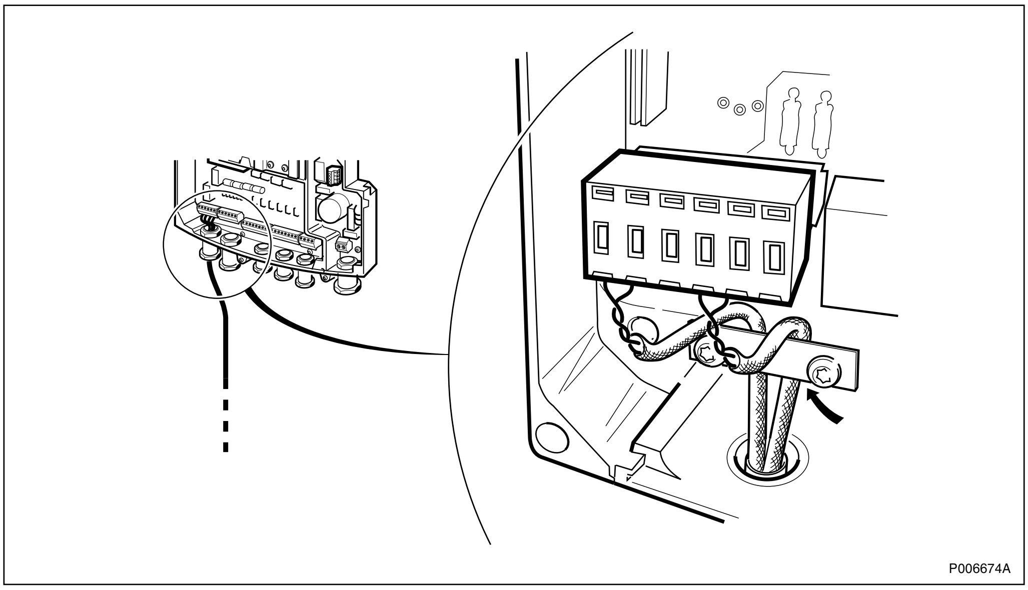


Figure 63 Inner shield only, earthing via the pull relief clamp

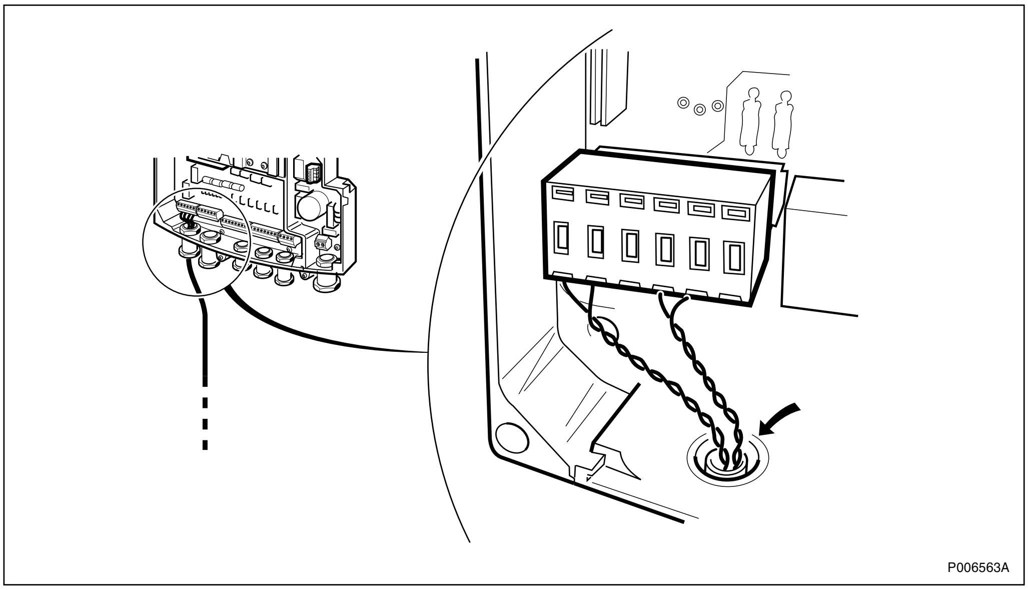


Figure 64 Outer shield only, earthing via the cable gland

5.5.5 Connecting the PCM Cable

Different types of cables can be used for the PCM transmission, depending on the transmission to the RBS. These cables are presented below.

- The pre–assembled 75 Ω coaxial cable with DC isolation that can be ordered as an option for 75 Ω transmission as shown in Figure 67 on page 90
- It is possible to use an ordinary 75 Ω coaxial cable to assemble a cable with the same function as the pre-assembled. It is also possible to assemble a cable without the DC isolation function, but otherwise with the same function as the pre-assembled. How to assemble these cables is described in *Section Assembling the PCM coaxial 75 Ω cable on page 89.*

- The twisted pair cable used for 100/120 Ω transmission. *See Section 5.5.4 on page 85* for assembling and earthing the twisted pair cable.

Assembling the PCM coaxial 75 Ω cable

The connection cable for 75 Ω coaxial cable (RPM 518 974/2) with DC isolation can be ordered as an option. The cable inlet is premounted so the only installation is to connect the termination block.

But it is possible to assemble a cable with the same characteristics as the premounted. If the DC isolation is not required it is also possible to assemble a cable without this feature.

How to assemble these cable are presented below.

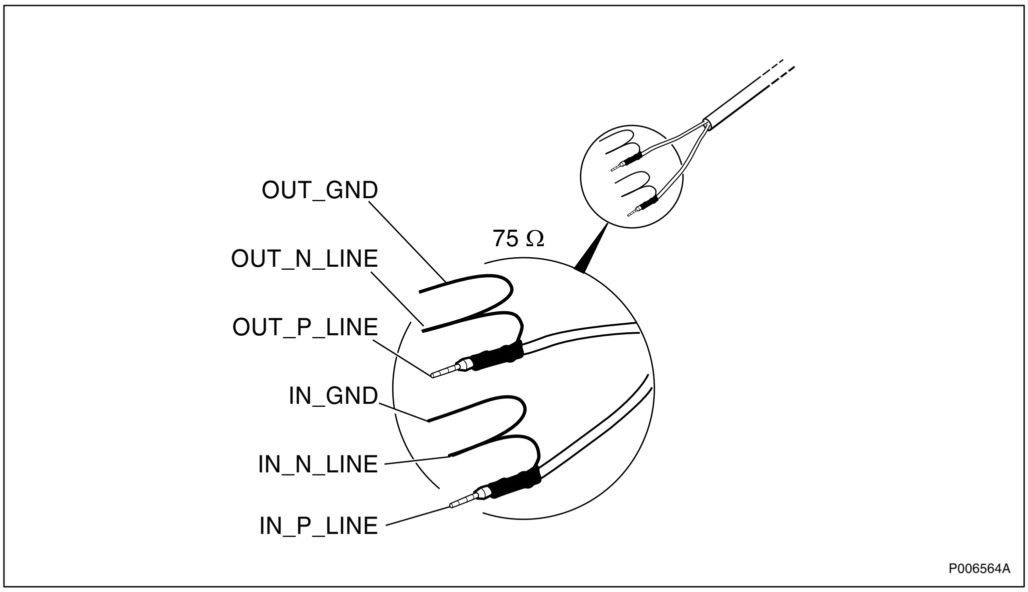


Figure 65 Alternative 75 Ω PCM cable if DC isolation is not required

If the DC isolation is not required a 75 Ω cable can be assembled by using an ordinary coaxial cable, *see figure above*.

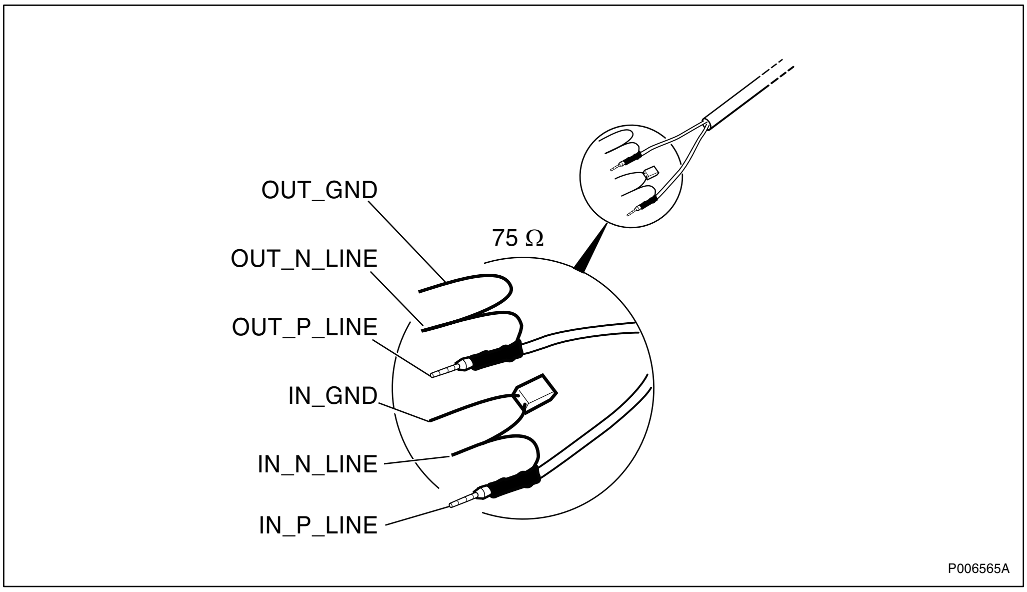


Figure 66 Alternative 75 Ω PCM cable if DC isolation is required

If the DC isolation is required a 75 Ω cable can be assembled by using an ordinary coaxial cable with a 33 nF (voltage tolerance: 400 V) capacitor mounted between IN_N_LINE and IN_GND, *see figure above*.

Connecting the PCM A coaxial 75 Ω cable

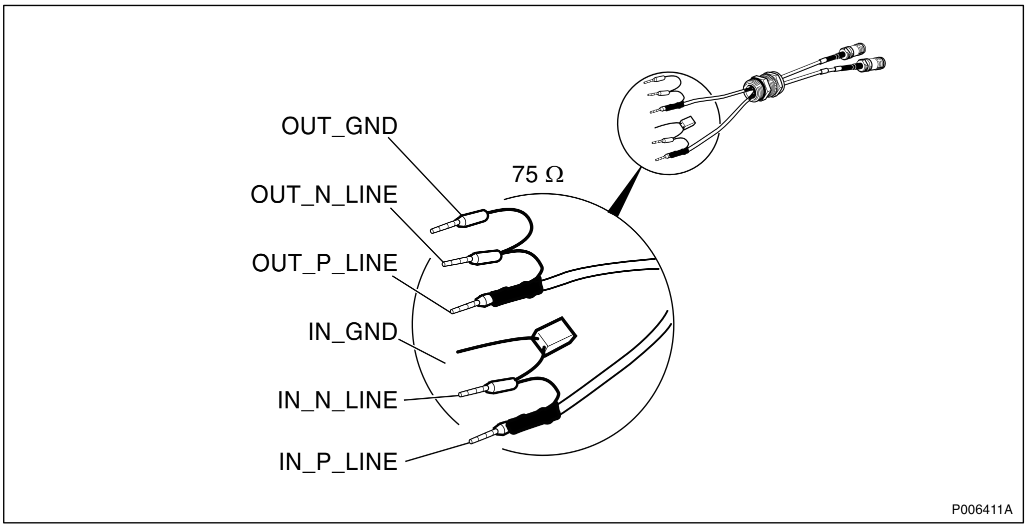


Figure 67 The 75 Ω PCM cable with DC isolation of IN wire, and coaxial TNC connectors

1. Remove the existing cable gland from the gland plate.

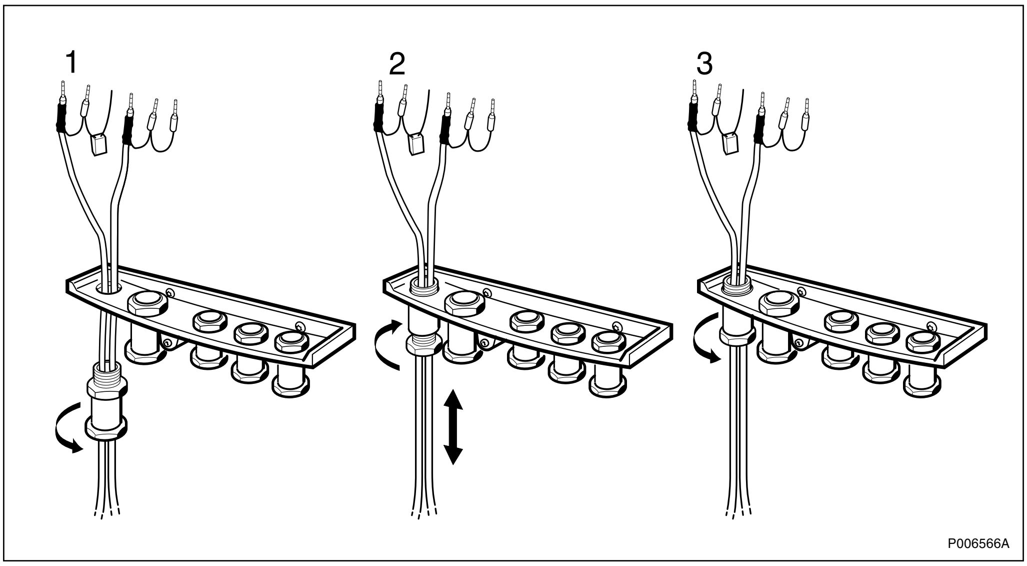


Figure 68   Mounting the cable gland with the optional 75 Ω PCM cable in the gland plate

2. Run the cable through the inlet on the cable gland plate.
3. Mount the cable gland on the gland plate and tighten the upper nut.
4. Loosen the lower cable gland sealing nut a few turns so it is possible to adjust the cable length.

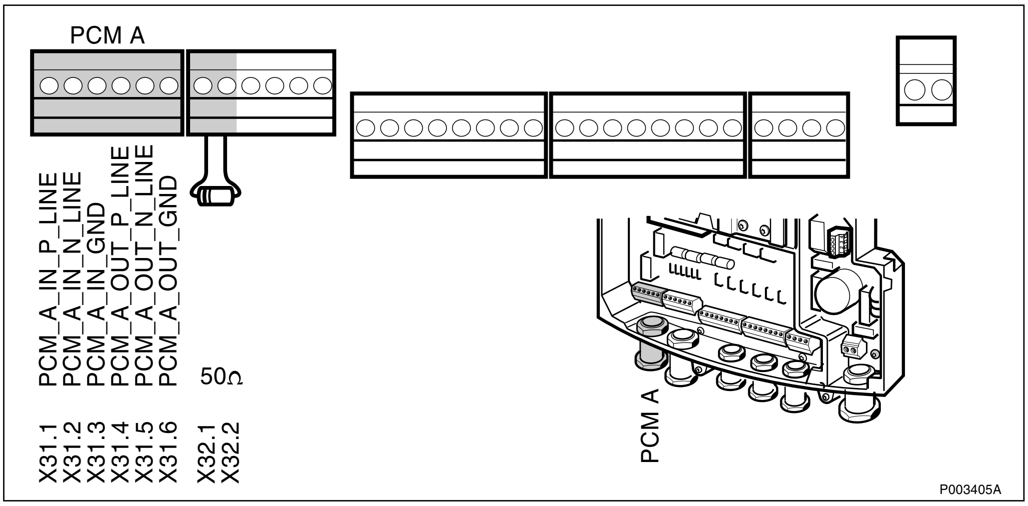


Figure 69   Connecting the 75 Ω PCM cable to the termination block

5. Connect the cables to the termination block according to the figure above.

Note: If not using a cascade connection, the premounted 50 Ω resistance between X32.1 and X32.2 on the PCM-B termination block should not be removed.

6. Remount the cable gland plate and tighten the 2 torx screws.
7. Adjust the cable to the appropiate length.

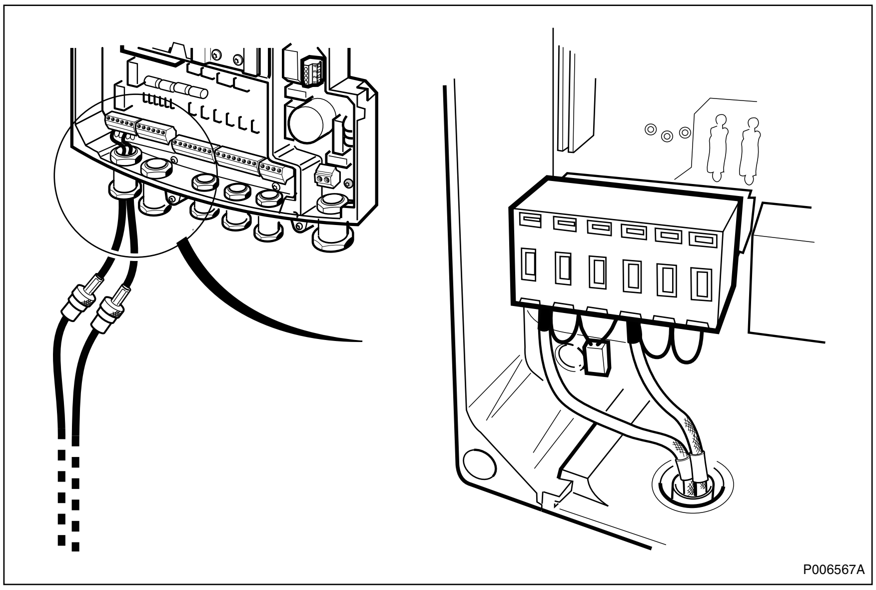


Figure 70 Principle of connecting coaxial PCM cable

8. Connect the termination block to the plinth.
9. Tighten the lower cable gland sealing nut.

Connecting the PCM A 100/120 Ω cable

The following section describes the procedure for connecting the PCM A twisted pair cable.

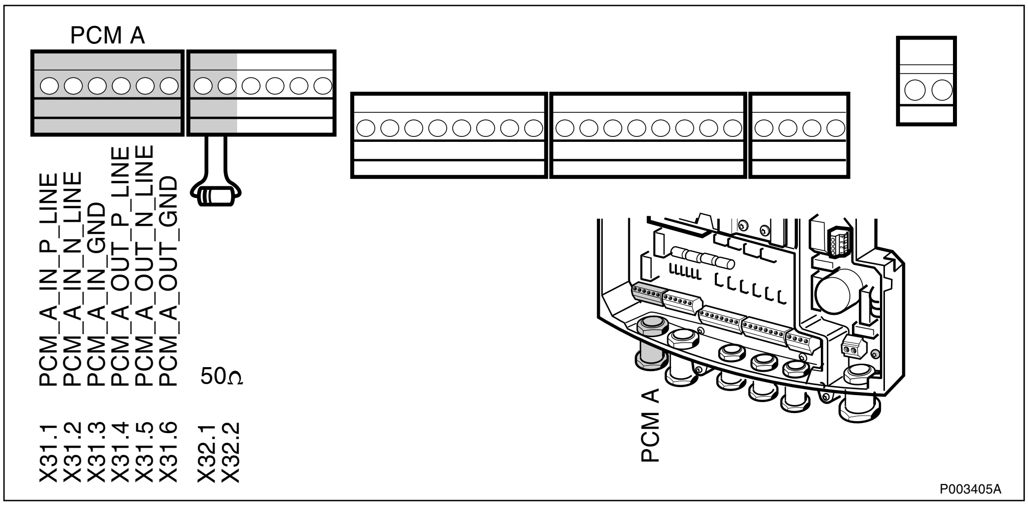


Figure 71 Connecting PCM- A cable 100/120 Ω

Note: If not using a cascade connection, the premounted 50 Ω resistance between X32.1 and X32.2 on the PCM-B termination block should not be removed.

1. If jumper wires are preinstalled between X31.2 and X31.3 **and** X31.5 and X31.6 respectively, remove them.
2. Connect the PCM-A 100/120 Ω cable, (twisted pair).
3. Earth the cable in one of the ways that are described in *page 86*.

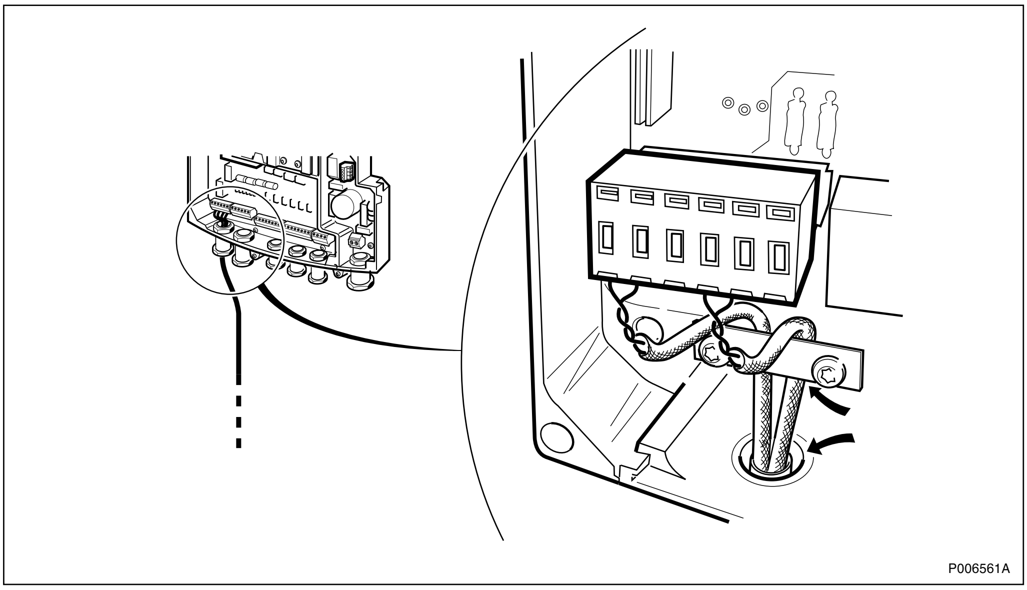


Figure 72 The cable connected to the termination block. Earthing via the cable gland and the pull relief clamp.

Connecting the PCM B coaxial 75 Ω cable (Cascade Connection)

The connection cable for 75 Ω coaxial cable (RPM 518 974/2) can be ordered as an option. The cable inlet is premounted so the only installation is to connect the termination block.

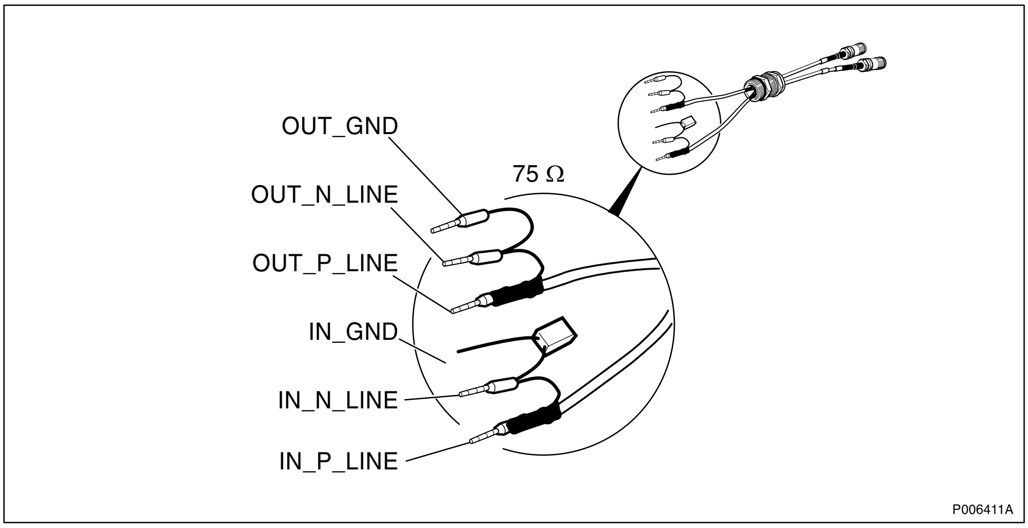


Figure 73 The 75 Ω PCM cable with DC isolation of IN wire, and coaxial TNC connectors

1. Remove the 50 Ω termination resistor from the PCM B temination block.

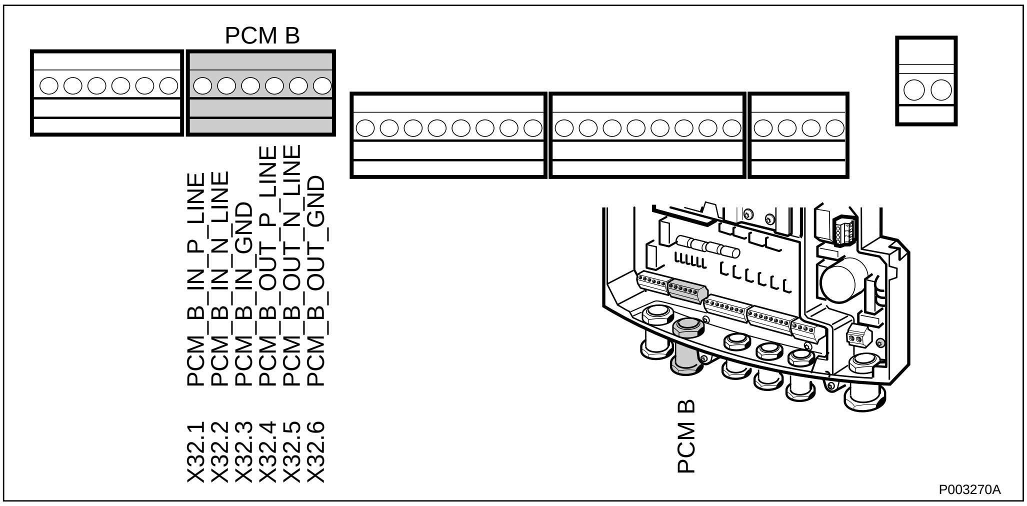


Figure 74   Connecting the 75 Ω PCM cable to the termination block (Cascade connection)

2. Follow the procedure for the PCM A cable in *Section Connecting the PCM A coaxial 75 Ω cable on page 90*to connect the PCM B cable. When connecting the cables to the PCM B termination block, refer to the figure above.

Connecting the PCM B 100/120 Ω cable (Cascade Connection)

The following section describes the procedure for connecting the PCM B twisted pair cable, used for cascade connection of up to five RBSs.

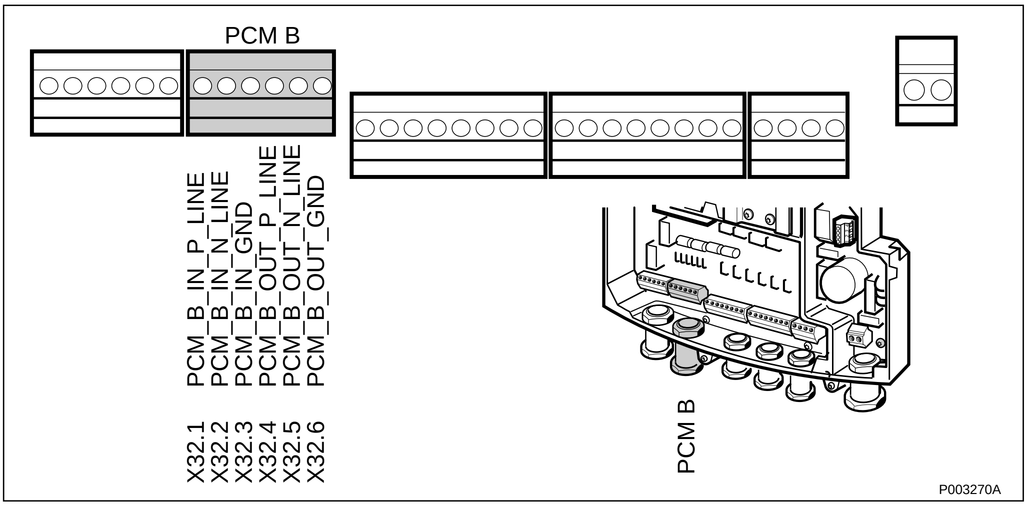


Figure 75   Connecting the PCM-B cable 100/120 Ω

1. Remove the premounted 50 Ω resistance between X32.1 and X32.2 on the PCM-B termination block.
2. If jumper wires are preinstalled beteween X32.2 and X32.3 **and** X32.5 and X32.6 respectively, remove them.
3. Connect the PCM-B 100/120 Ω cable, (twisted pair).
4. Earth the cable in one of the ways that are described on *page 86*.

Compare with *Figure 72 on page 93* which show the corresponding connections for the PCM-A termination block.

5. Connect the PCM-B cable to the next cabinet. Connections according to *Section Cascade Connection, Connection between the Cabinets on page 95*.

Cascade Connection, Connection between the Cabinets

This section deals with the connection between the cabinets when cascade connection is used.

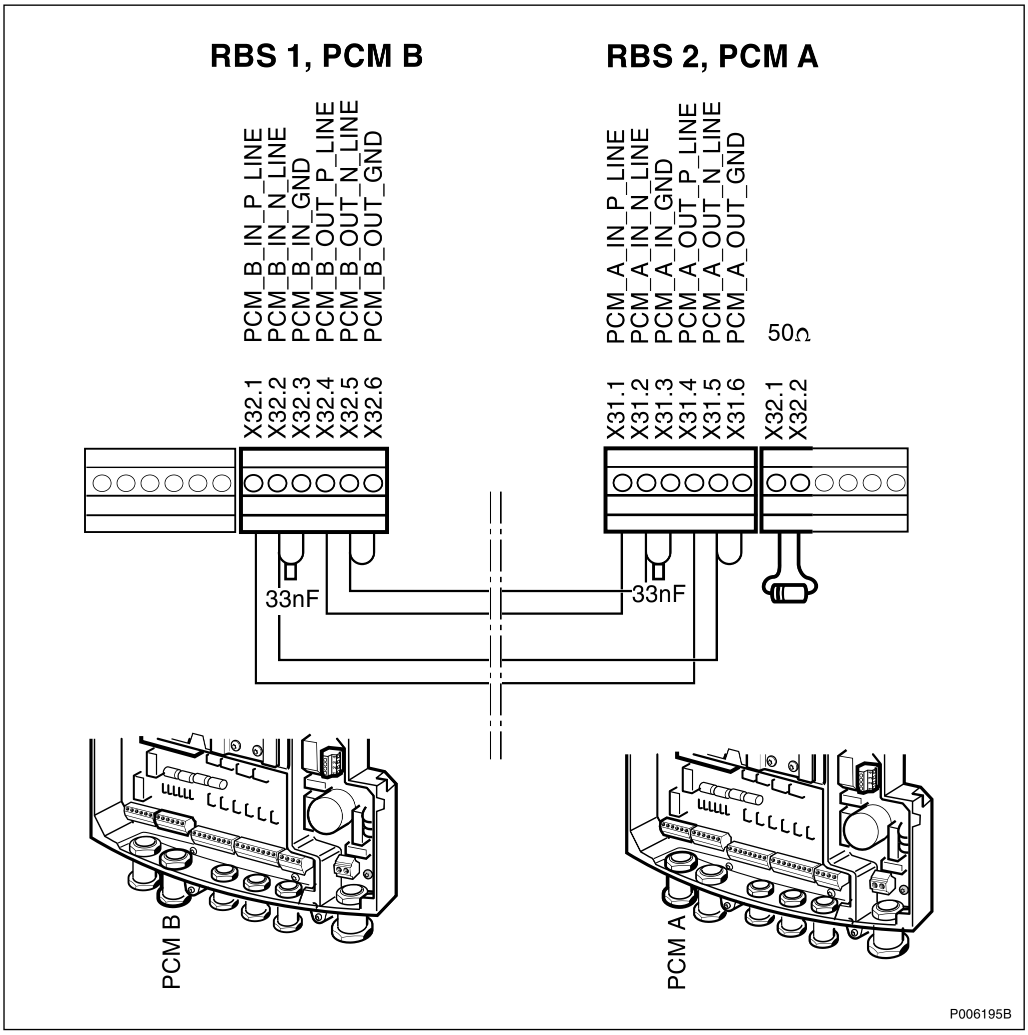


Figure 76   Connection between RBS 1 and RBS 2, cascade connection, 75 Ω coaxial cable

The figure above shows the connection for the transmission between RBS 1 and RBS 2 (cascade connection) for 75 Ω coaxial cable.

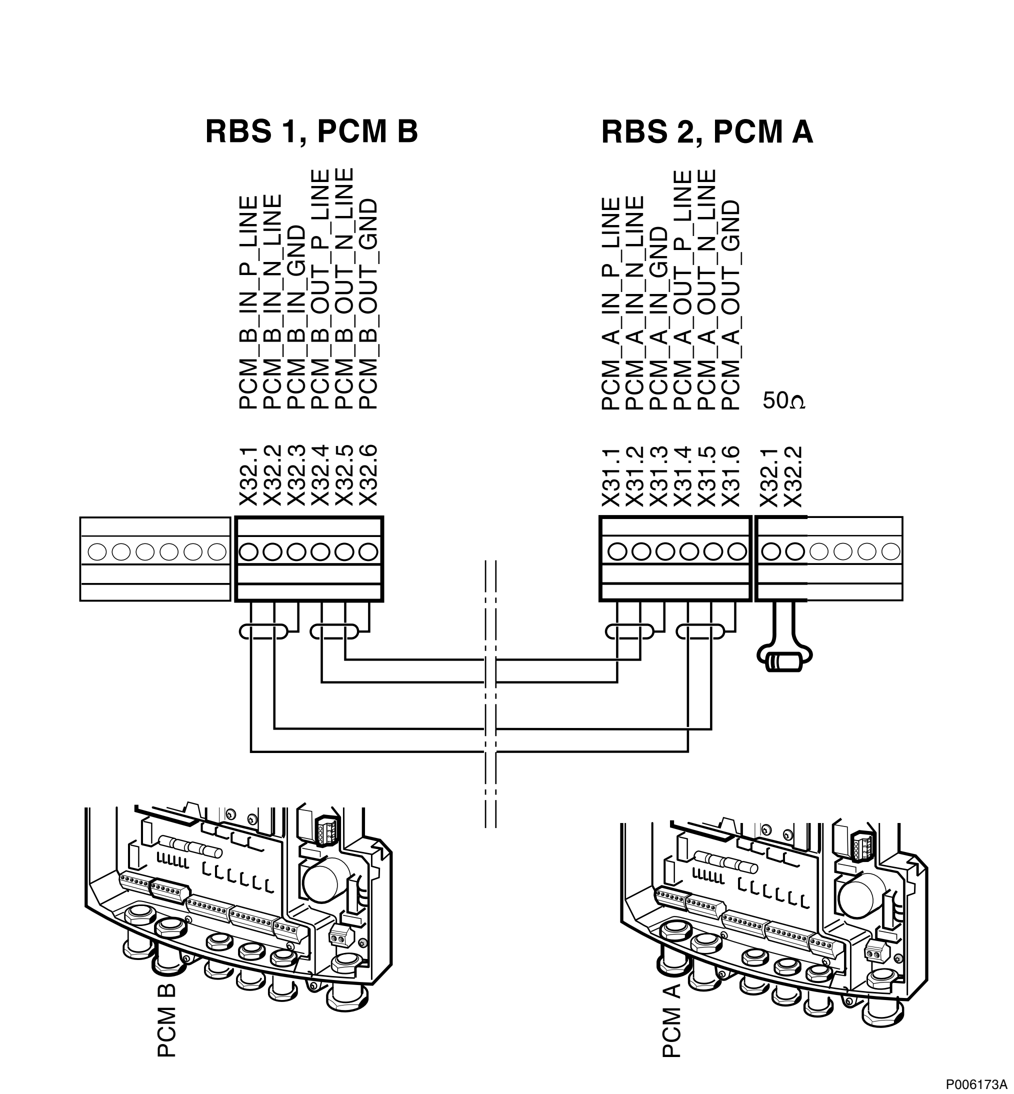


Figure 77 Connection between RBS 1 and RBS 2, cascade connection, 100/120 Ω twisted pair cable

The figure above shows the connection for the transmission between RBS 1 and RBS 2 (cascade connection) for 100/120 Ω twisted pair cable. See *page 86* for earthing options.

Connecting the PCM cable (coaxial) to the incoming PCM line

1. Connect the PCM cable connector, type TNC, to the incoming PCM line.

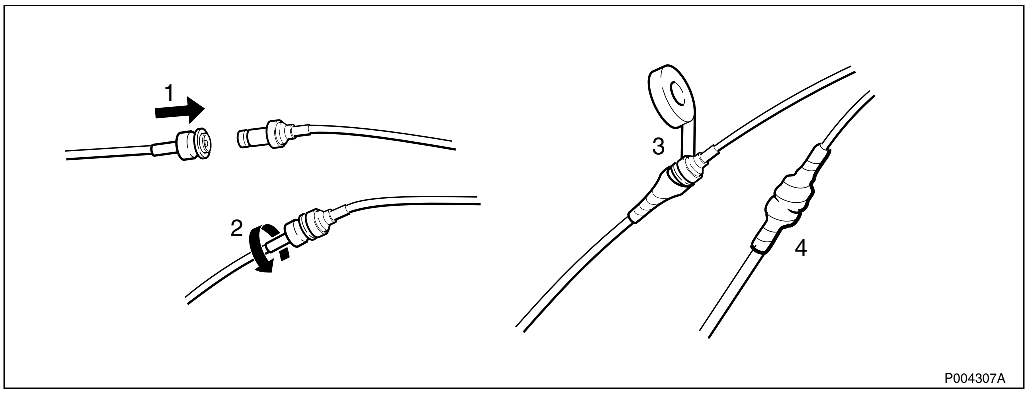
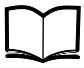


Figure 78 Connecting and sealing the TNC connector for the PCM 75 Ω cable

2. Seal the connector.

Information about the sealing procedure can be found in:



Standard Site Material Installation Instructions	*EN/LZT 720 0014*

5.5.6 Connecting the HDSL Modem (optional)

For more information regarding the mounting of the HDSL modem *see chapter Installation of RBS 2302*.

Definitions

Upstream	Connection from BSC or previous 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.

The details about the physical installation and the grounding procedure for the cables are described in *Section 5.5.4 on page 85*.

Configure transmission according to Figure 79 on page 98:

Configuration mode	Stand alone point to point				Cascade		
Transmission to BSC	HDSL, 2 Pair	HDSL, 1 Pair	HDSL, 1 Pair	HDSL, 2 Pair	HDSL, 1 Pair	PCM	PCM
Transmission to cascaded RBS	n.a	n.a	PCM	PCM	HDSL, 1 Pair	HDSL, 2 Pairs	HDSL, 1 Pair
A x31.1 x31.2 x31.3 x31.4 x31.5 x31.6	Pair 2, US Pair 2, US GND Pair 1, US Pair 1, US GND	US US GND - - -	US US GND - - -	Pair 2, US Pair 2, US GND Pair 1, US Pair 1, US GND	US US GND - - -	PCM_A_IN_P_LINE PCM_A_IN_N_LINE PCM_A_IN_GND PCM_A_OUT_P_LINE PCM_A_OUT_N_LINE PCM_A_OUT_GND	PCM_A_IN_P_LINE PCM_A_IN_N_LINE PCM_A_IN_GND PCM_A_OUT_P_LINE PCM_A_OUT_N_LINE PCM_A_OUT_GND
B x32.1 x32.2 x32.3 x32.4 x32.5 x32.6	- - - - - - 50 Ω	- - - - - - 50 Ω	PCM_B_IN_P_LINE PCM_B_IN_N_LINE PCM_B_IN_GND PCM_B_OUT_P_LINE PCM_B_OUT_N_LINE PCM_B_OUT_GND	PCM_B_IN_P_LINE PCM_B_IN_N_LINE PCM_B_IN_GND PCM_B_OUT_P_LINE PCM_B_OUT_N_LINE PCM_B_OUT_GND	- - - DS DS GND	Pair 2, DS Pair 2, DS GND Pair 1, DS Pair 1,DS GND	- - - DS DS GND

P008321A

Figure 79 Transmission configuration

Example 1

Configuration mode: -
Transmission to BSC: HDSL, 2 Pair
Transmission to cascaded RBS: PCM

Result:
A
x31.1 Pair 2, US
x31.2 Pair 2, US
x31.3 GND
x31.4 Pair 1, US
x31.5 Pair 1, US
x31.6 GND

B
x32.1 PCM_B_IN_P_LINE
x32.2 PCM_B_IN_N_LINE
x32.3 PCM_B_IN_GND
x32.4 PCM_B_OUT_P_LINE
x32.5 PCM_B_OUT_N_LINE
x32.6 PCM_B_OUT_GND

See figure below

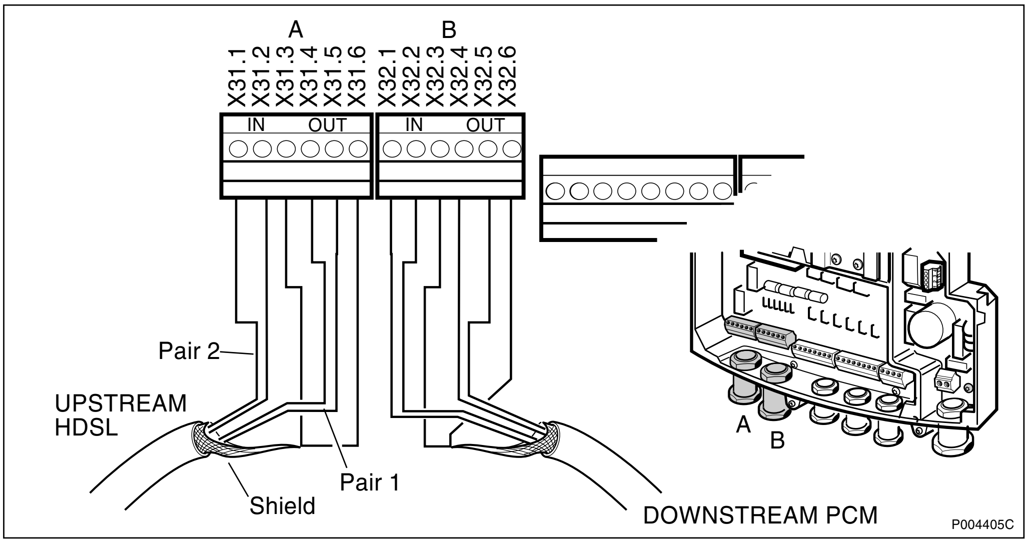


Figure 80 Result of example 1

Shield, if available, is connected to the pull relief clamp or to X31.3 and X31.6 (ground connections). See *page 86*for earthing options.

External Alarms of the RBS 2302 used by the HDSL Modem Modul

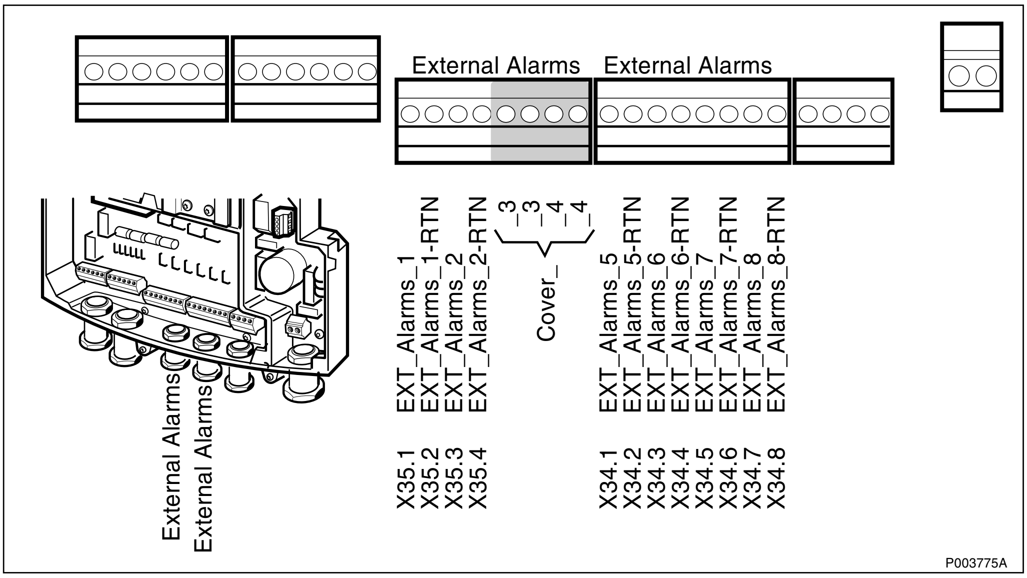


Figure 81 Covering of External Alarms

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.

5.5.7 Connecting the External– and PBC Alarm Cables

The RBS 2302 has eight external alarm inputs. Four of the eight alarm inputs are reserved for the optional 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.

1. Dismantle the Alarm cable and mount the cable inlet, *see Section 5.5.4 on page 85*.

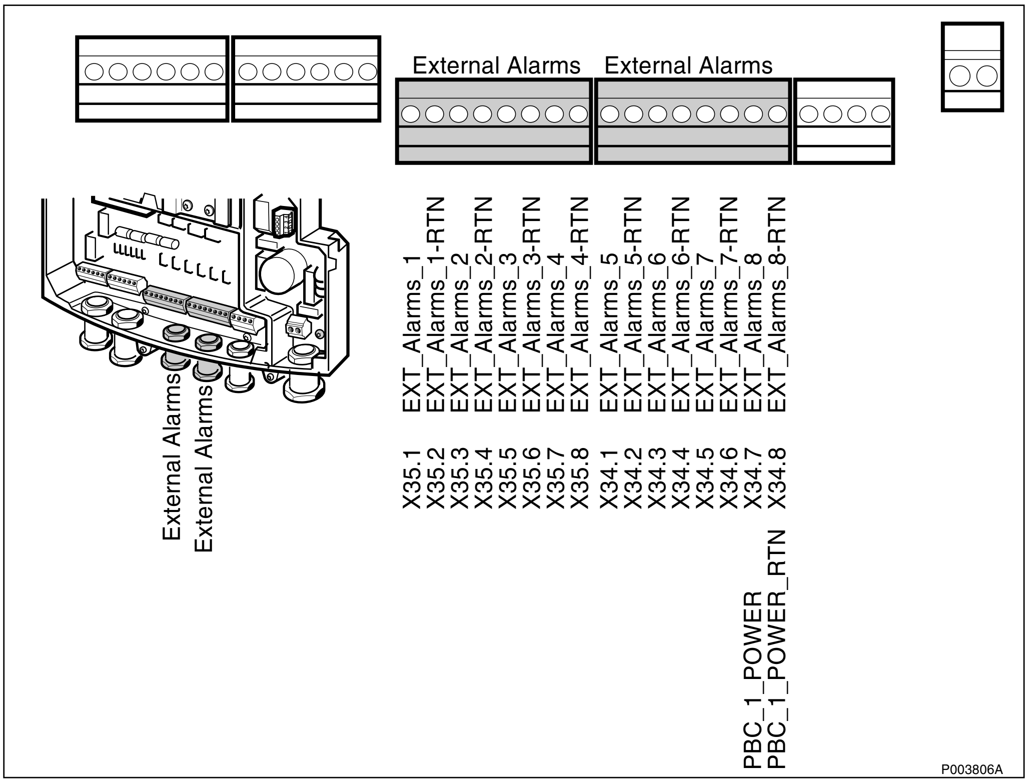


Figure 82 Connecting external– and PBC alarm cables

2. Connect the external alarm cable to the termination block.

5.5.8 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. Dismantle the extended OMT cable and mount the cable inlet, *see Section 5.5.4 on page 85*.

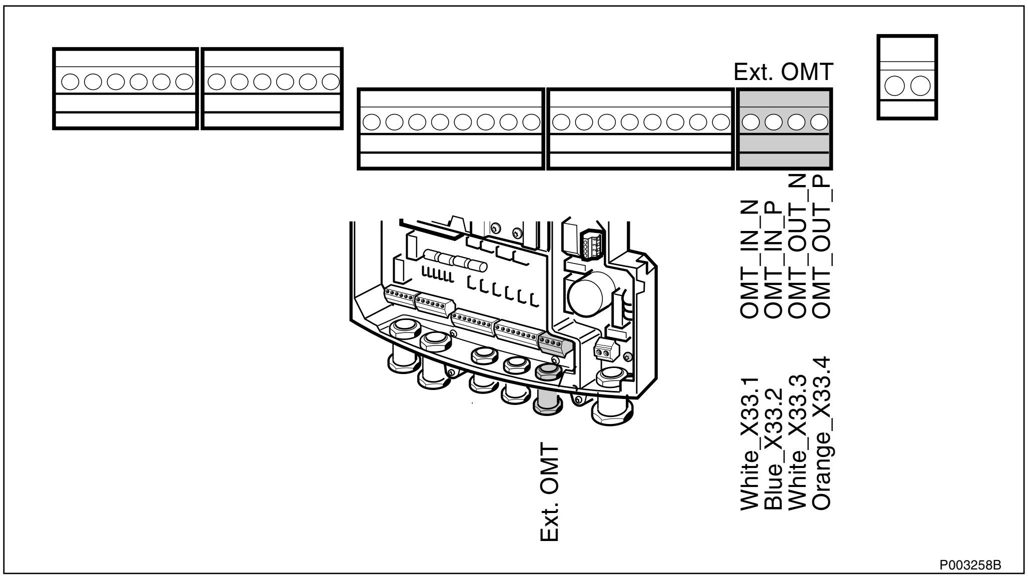


Figure 83 Connecting the extended OMT cable

2. Mount the wires to the termination block.

Note: The two white wires are from two different twin pairs and should not be mixed.

5.5.9 Closing the Interface Box

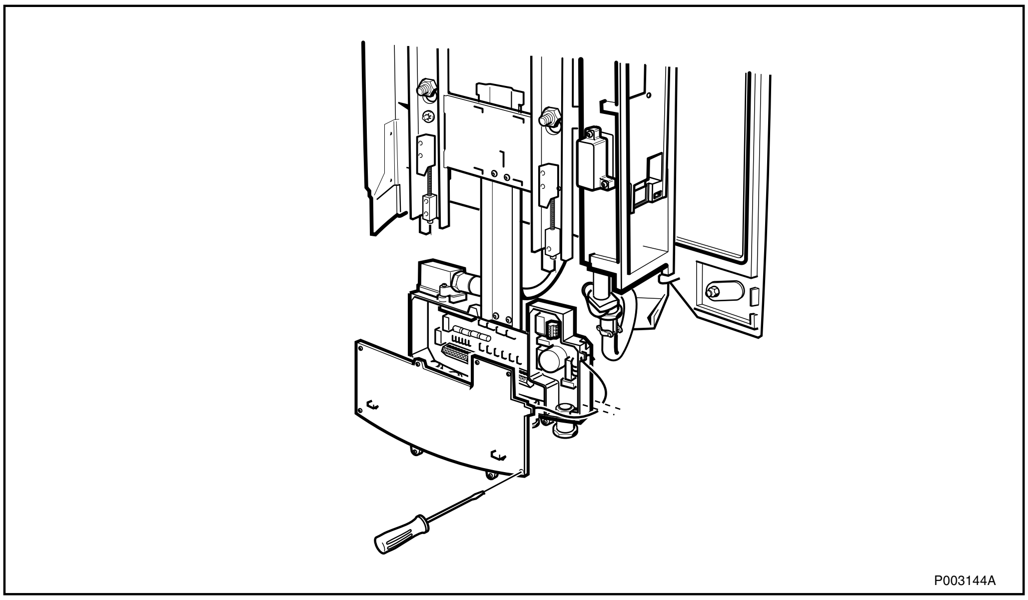


Figure 84 Closing the interface box

1. Remount the interface box cover by screwing the 8 torx screws back into position.
2. Push the interface box upwards and screw the two torx screws situated on the mounting base back into position.

5.6 Installing the Cabinet

5.6.1 Mounting the PSA(optional)

The RBS 2302 cabinet is delivered with a premounted internal battery. In order to use a Power and Battery Cabinet together with the RBS the internal battery must be replaced by a Power Supply Adapter (PSA).

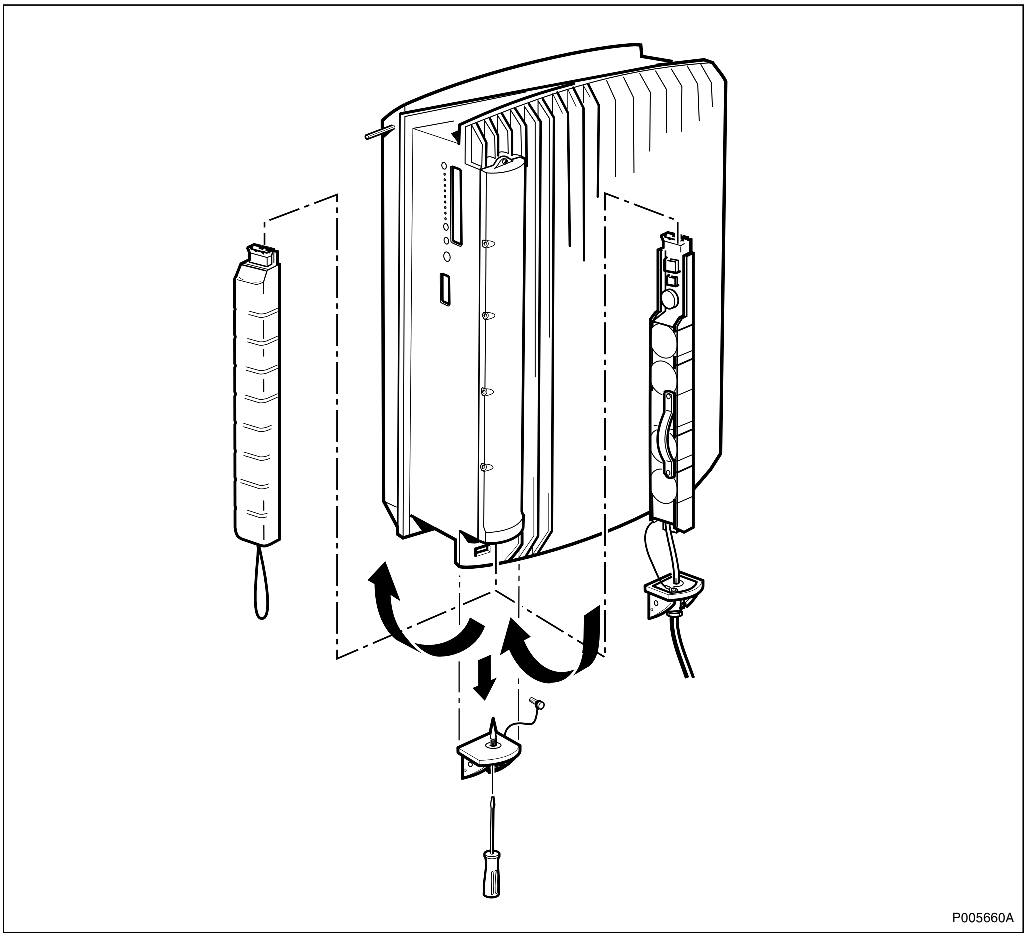


Figure 85 Switching the internal battery to the PSA

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 that there is no gap between the cover and cabinet.

5.6.2 Mounting the Cabinet

To facilitate the mounting a lifting device may be used *see Section 5.12 Appendix, Lifting Device on page 128.*

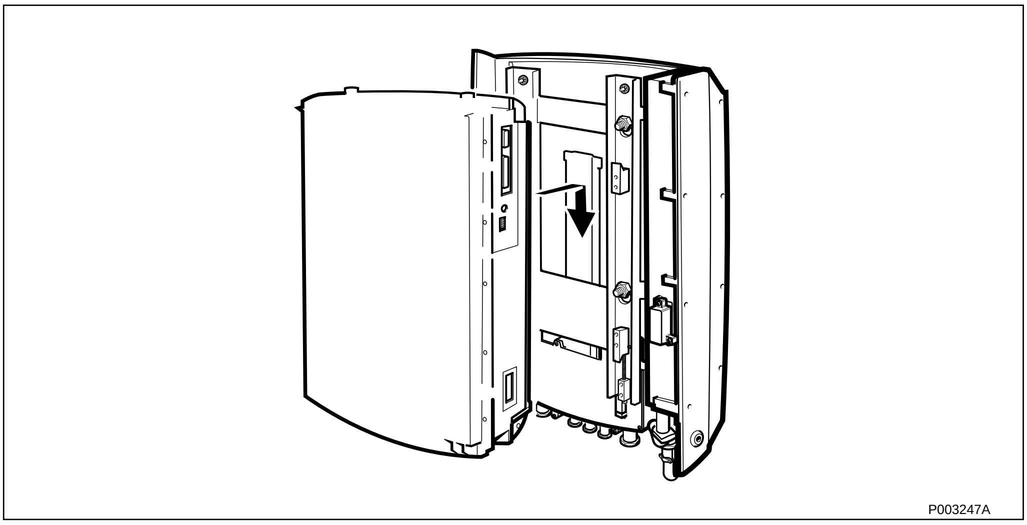


Figure 86 Mounting the cabinet

1. Make sure that the hooks are in there outmost positions. See *Figure 88 on page 105*.
2. Mount the lifting handle (optional) on the cabinet and lift it on to the mounting base. *See figure below*.

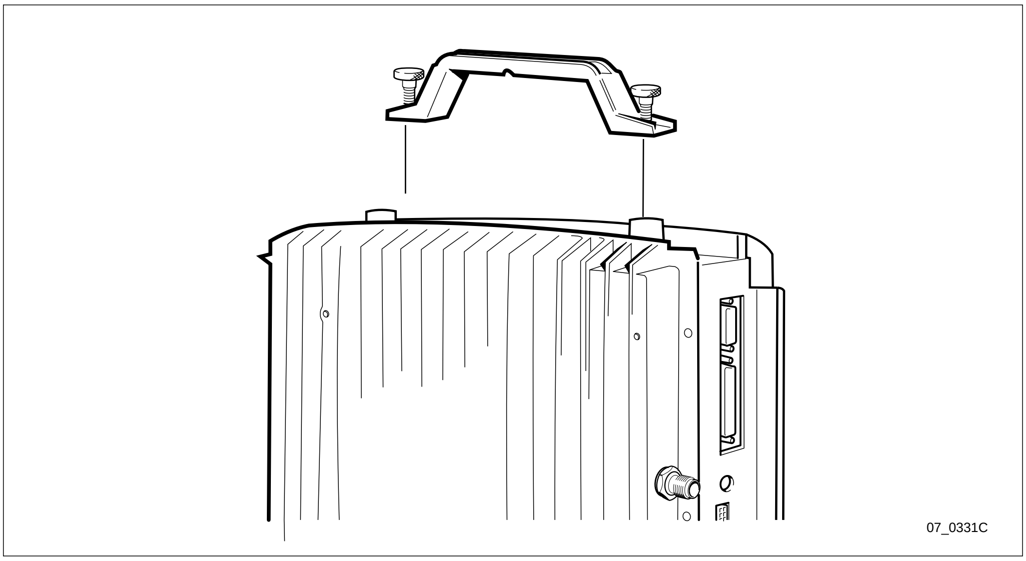


Figure 87 Mounting the lifting handle

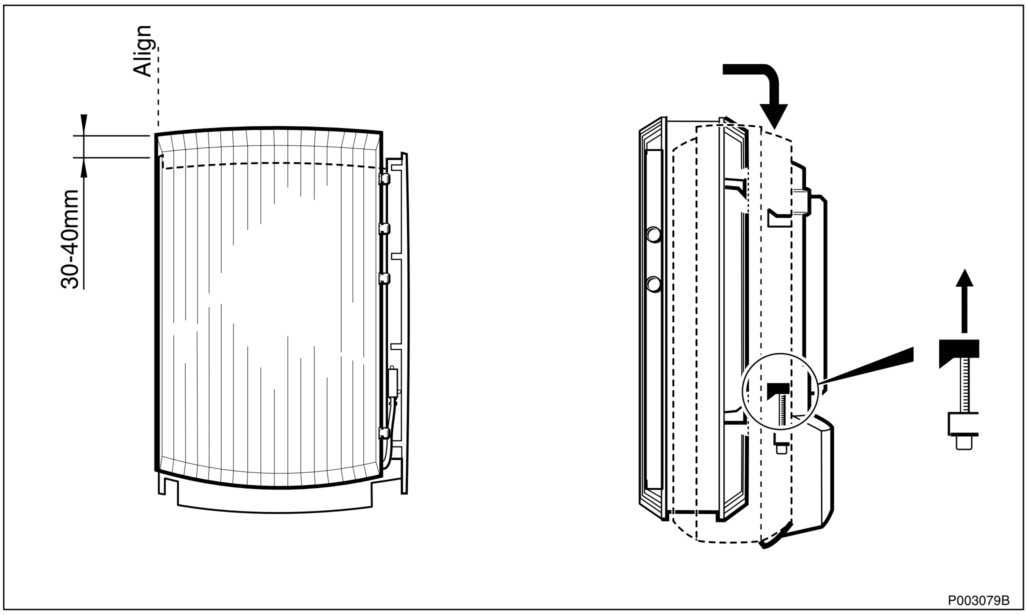


Figure 88 Facilitating mounting the cabinet on the mounting base

3. 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. *See figure above.*

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

5. 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.

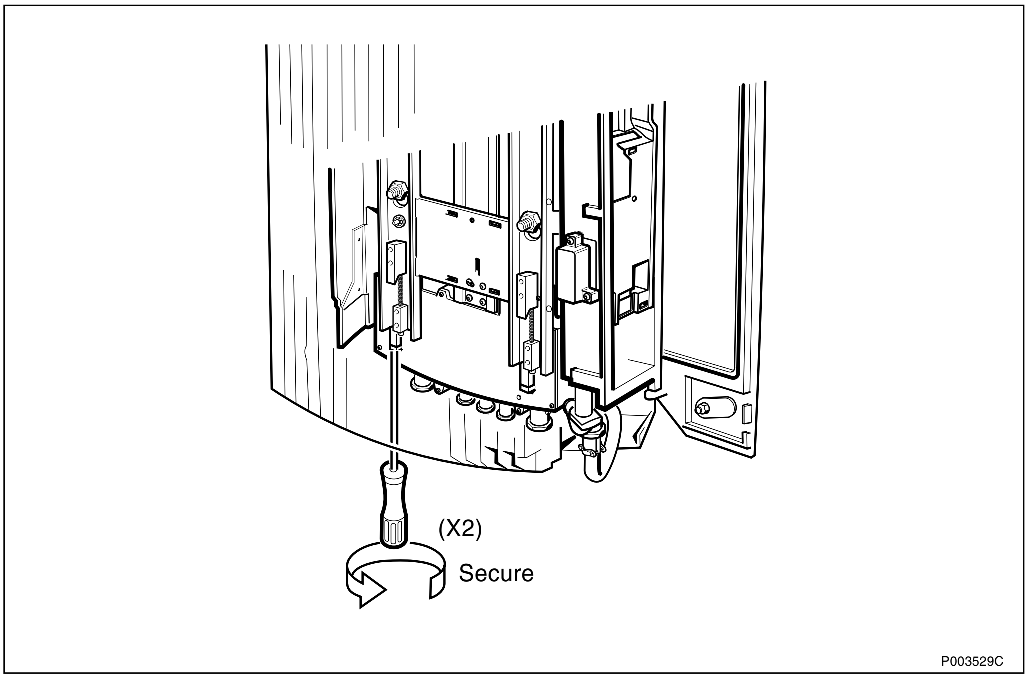


Figure 89 Securing the cabinet

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

7. Remove lifting device and the lifting handle if it has been used.

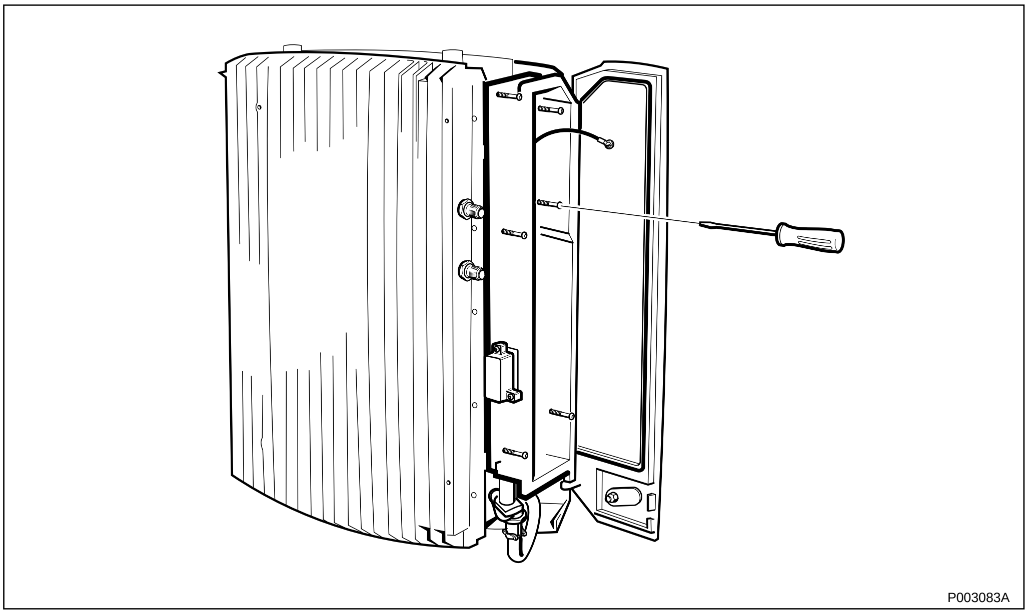


Figure 90 Fastening the installation box

8. In the installation box, turn each of the 6 torx screws until they engage the threads. When all have engaged their threads, tighten them.

5.6.3 Connecting Internal Cables

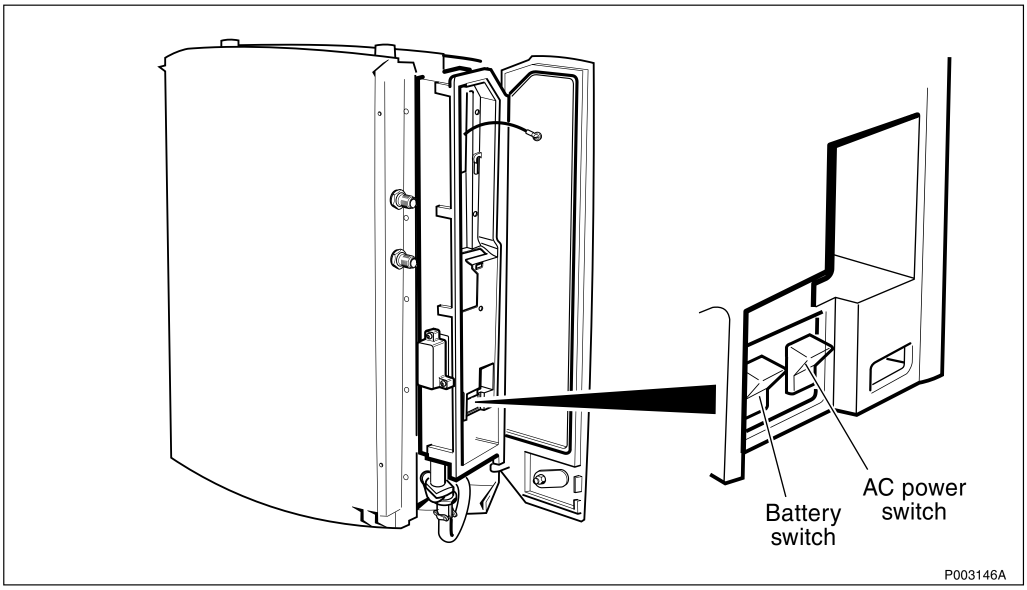


Figure 91 AC power and battery switches

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

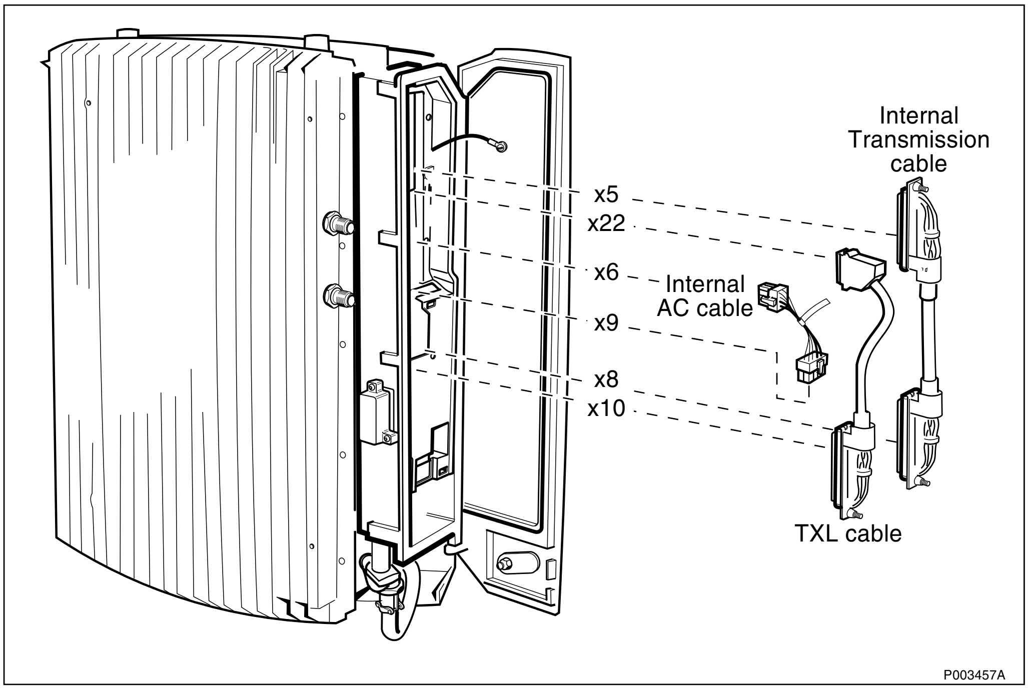


Figure 92 Connecting cables between cabinet and mounting base

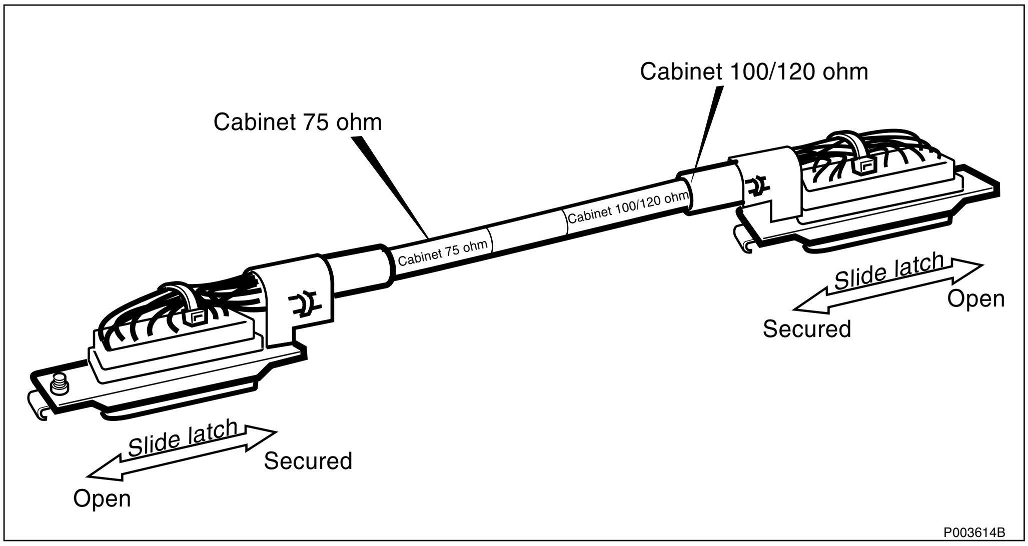


Figure 93 Transmission cable

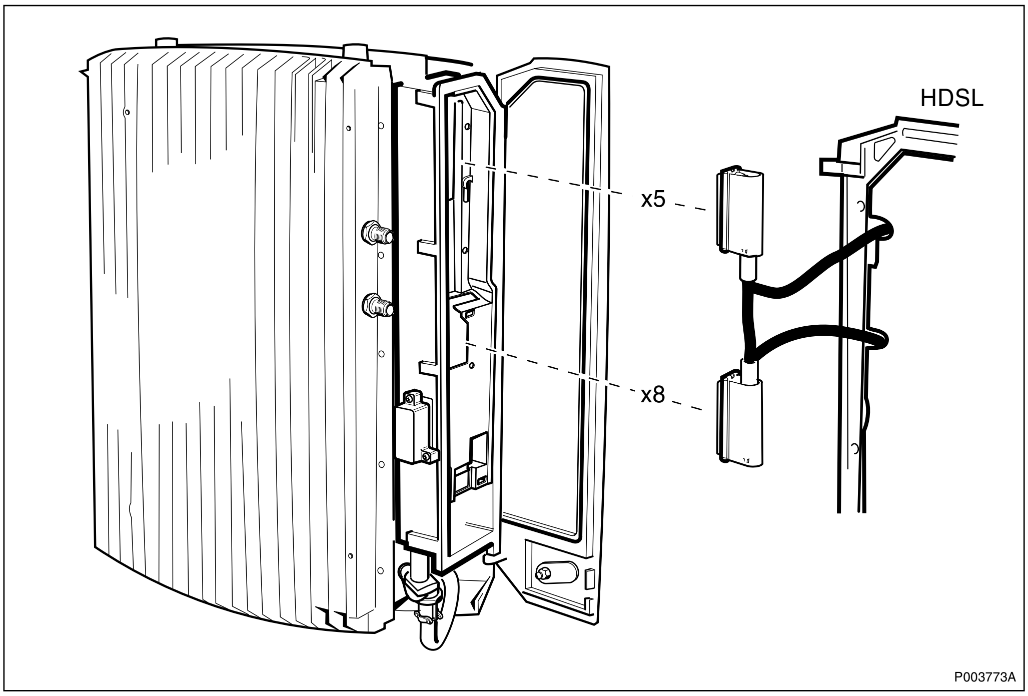


Figure 94 Connecting the HDSL modem cables

2. Connect the transmission cable:

Without HDSL

- Connect the transmission cable between the connection board and the 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 92 on page 107* and *Figure 93 on page 107*.

With HDSL

- Connect the cables from the HDSL door to the respective connector, X5 and X8. *See Figure 94 on page 108*.

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

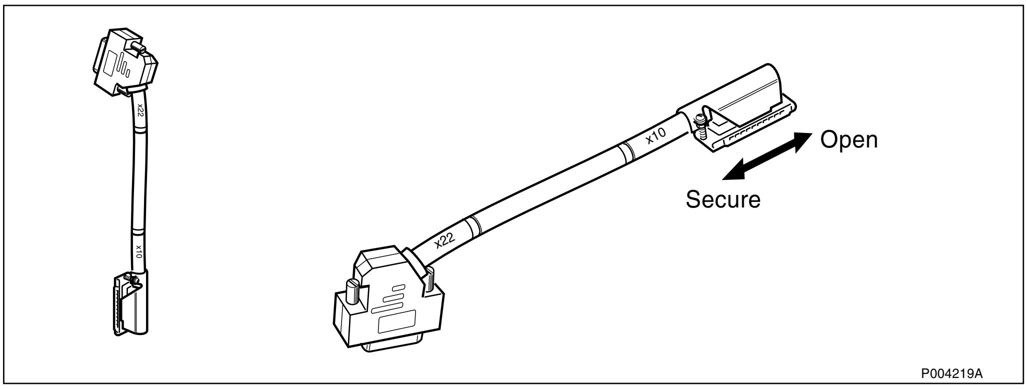


Figure 95 TXL cable

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.

5.7 Mounting the Antenna

5.7.1 Mounting the Sector Antenna (alternative)

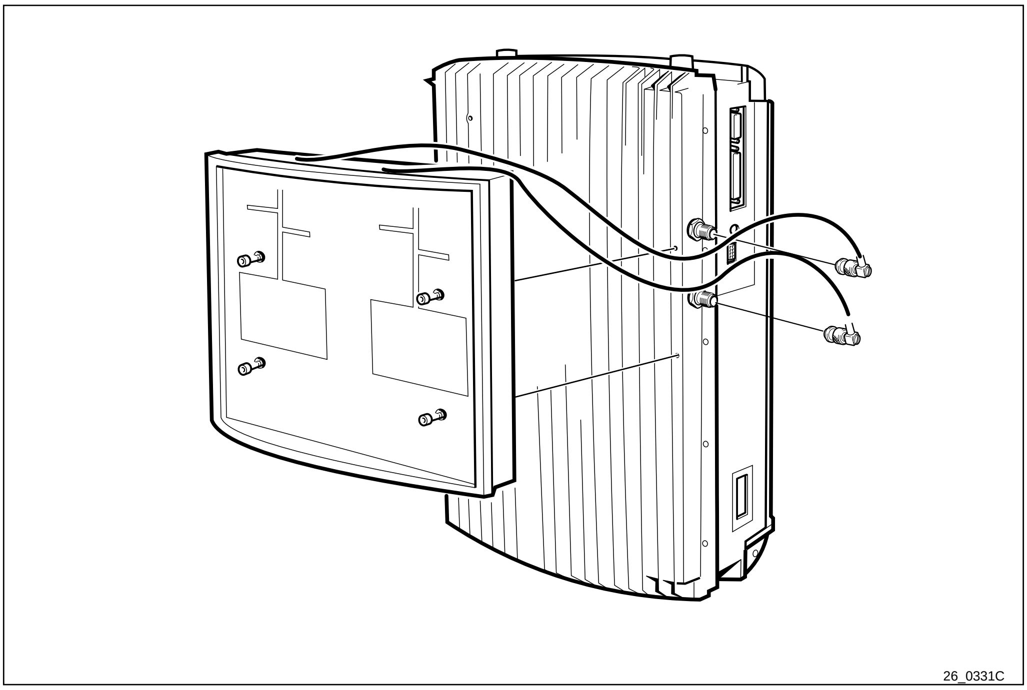


Figure 96 Mounting the sector antenna

1. Mount the antenna and fasten the four screws, *see Table 20 on page 67*.

Note: Make sure that no cables are bent or squeezed.

2. Connect the antenna cables.

5.7.2 Mounting the Omnidirectional Antenna (alternative)

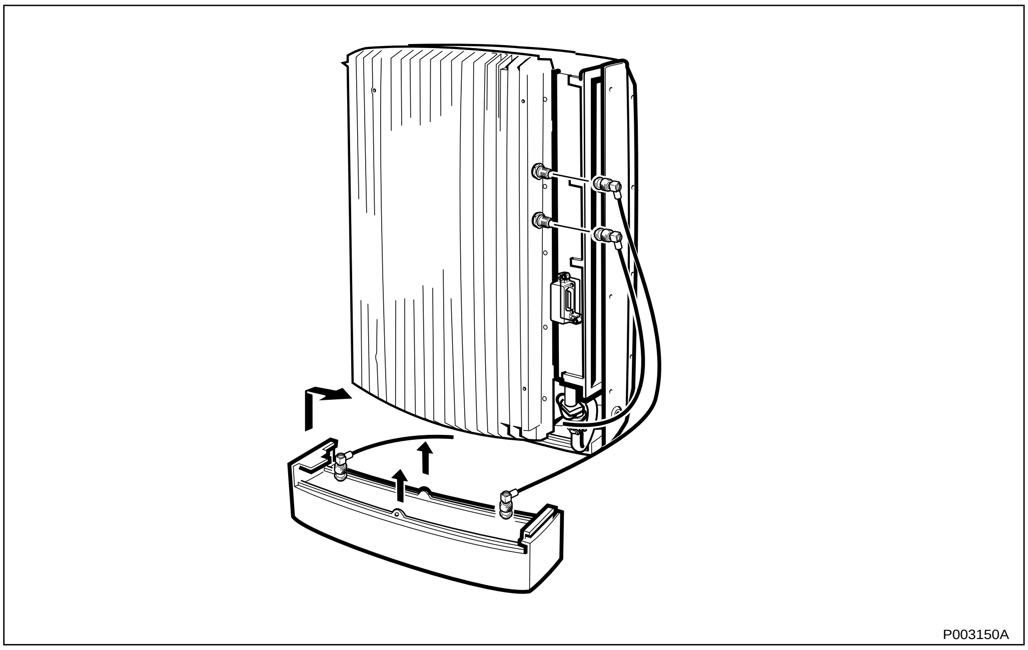


Figure 97 Mounting the omnidirectional antenna

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

1. Hook on the omnidirectional antenna, on the left side of the cabinet.

Note: Make sure that no cables are bent or squeezed.

2. Push it up until it snaps in place. The fasteners are situated in the middle.

3. Connect the antenna cables.

5.7.3 Mounting the Multicasting Box (alternative)

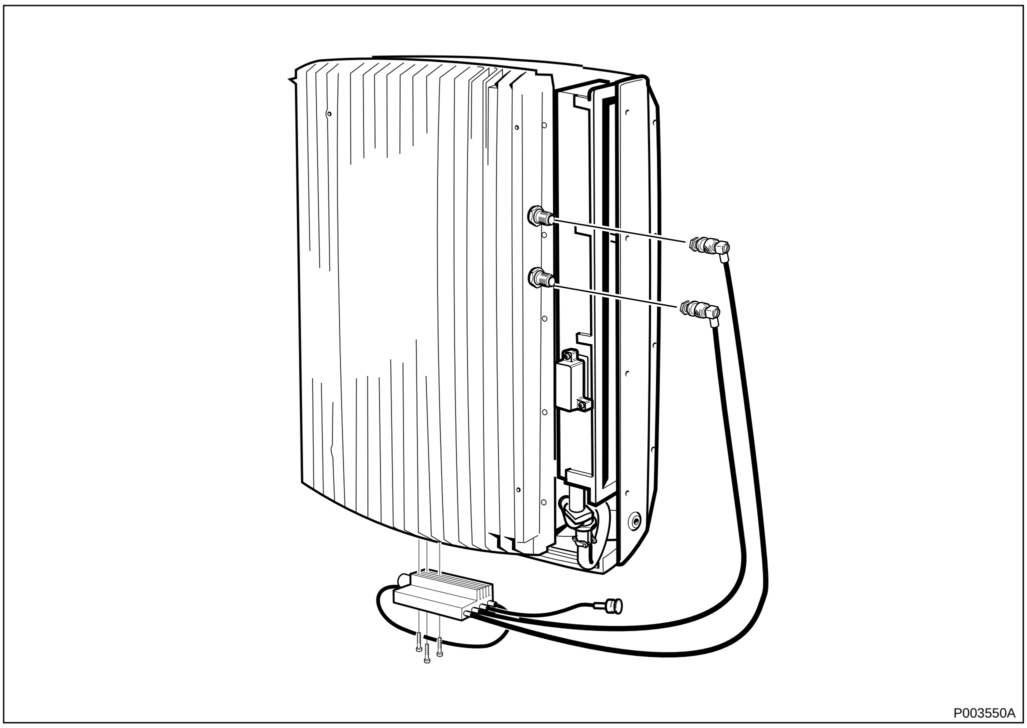


Figure 98 Mounting the multicasting box

Note: The multicasting box must be mounted before the sunshields.

For information regarding antenna configuration see allocation drawing 193 26–IPA xxxx in the Site Installation Documentation.

1. Mount the multicasting box with three torx screws on the bottom of the cabinet.
2. Connect the antenna jumper cables to the TNC connectors on the cabinet: TX/RX A output to connector X2, and TX/RX B output to connector X3.

The following jumpers are available:

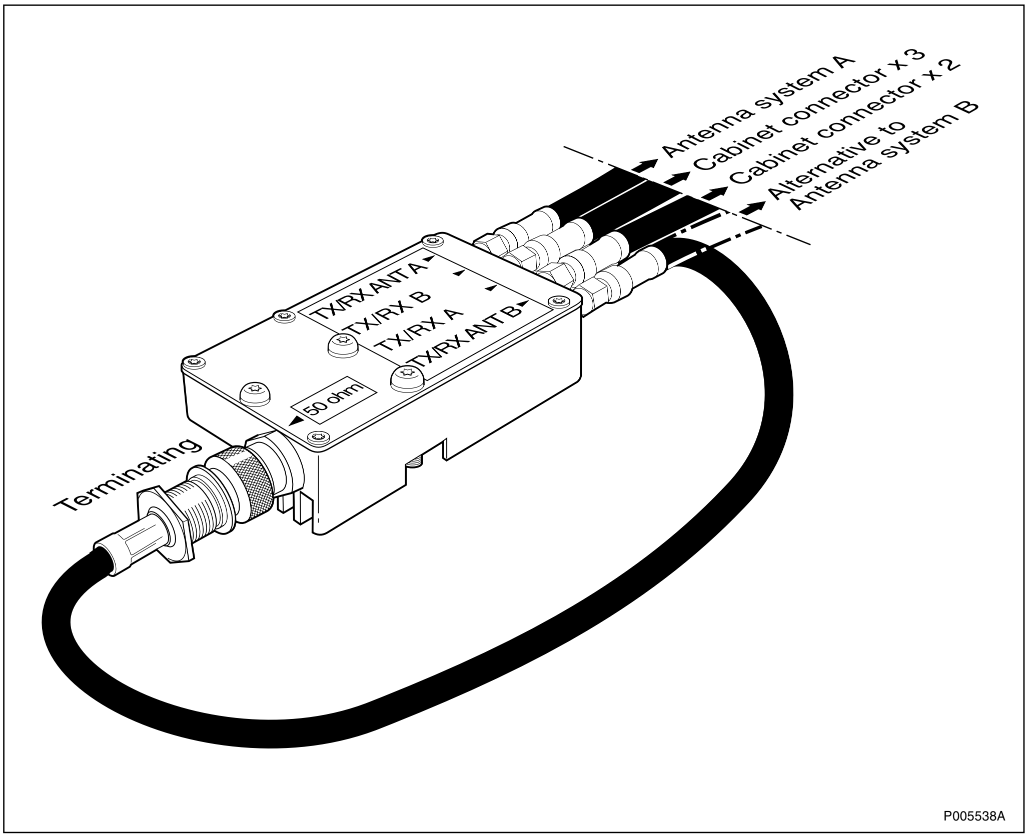


Figure 99 Connecting antenna cables to the multicasting box

3. Connect the antenna cable(s) to the antenna system(s).

   If only one antenna system (A) is used the second antenna system (B) output must be terminated by the built-in 50 Ω load, according to the figure above.

   If a second distributed antenna system (B) is used, connect it to the TX/RX ANT B antenna output.

5.7.4 Connecting the External Antenna Jumpers to the RBS (if applicable)

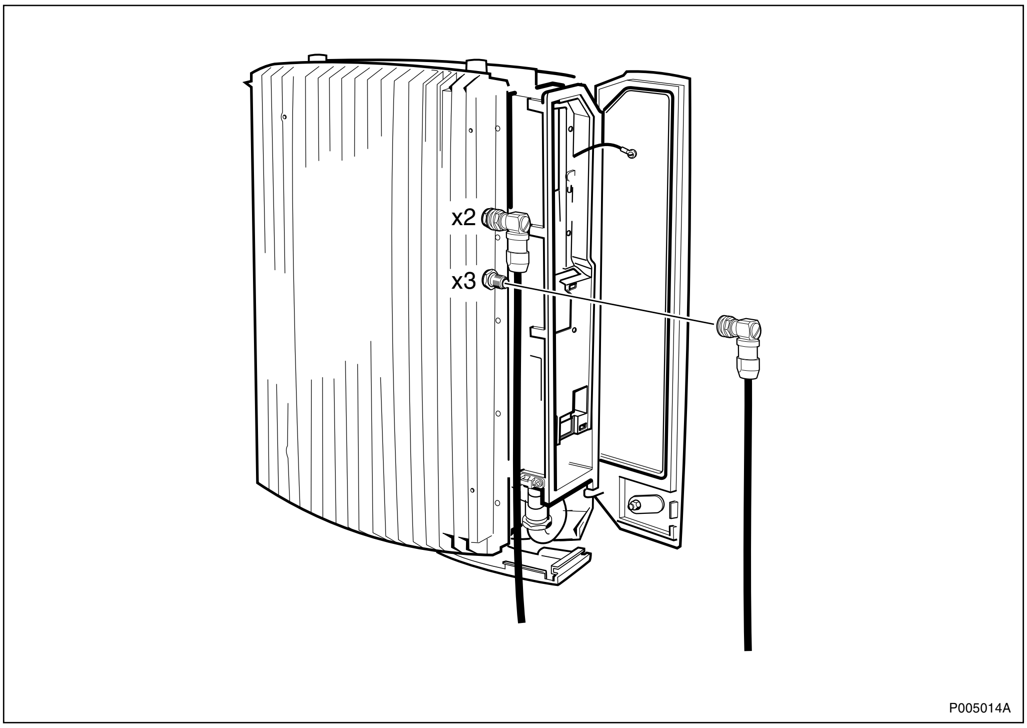


Figure 100 Connecting the antenna jumper cable to the RBS

For the sake of clarity the cabinet is shown without the sunshields.

1. Connect the antenna jumper cable to the connector labled X2 on the RBS. The tightening of the nut will be done later.

2. Connect the antenna jumper cable to the connector labled X3 on the RBS. The tightening of the nut will be done later.

The following jumper cables are available:

Table 23

Product number	Length (m)	Connector
RPM 119 87/1	1	TNC-male and N-female
RPM 119 87/2	1	TNC-male and 7/16”-female
RPM 513 760/1	1	TNC-male and N-male

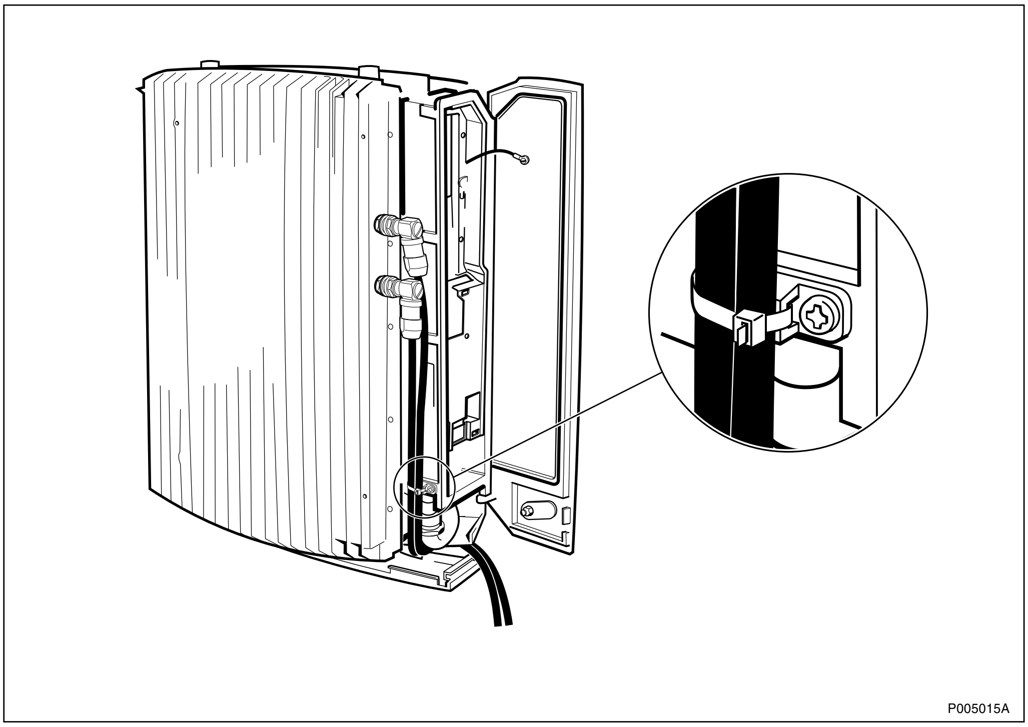


Figure 101 Installation of jumper cable

3. Route the antenna jumper cable between the lower sunshield and the mounting base, and strap the cable according to the figure above.

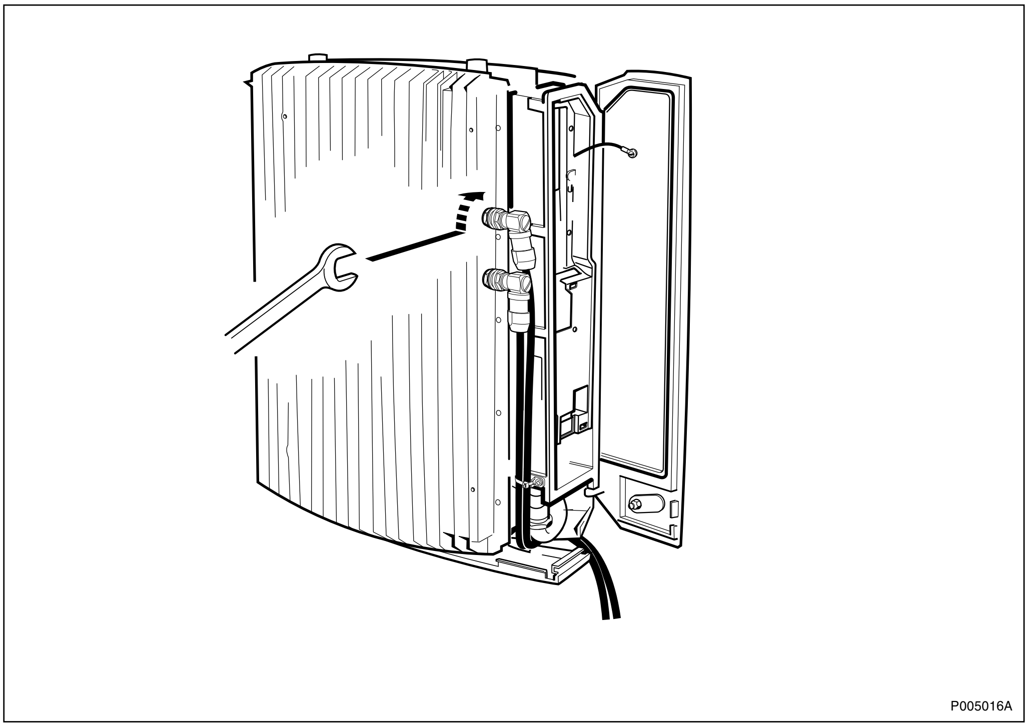


Figure 102 Tightening of the nuts for the jumper cable

4. Tighten the nuts for the conectors X2 and X3 on the RBS, according to the figure above, *see Table 20 on page 67*.

For installation of the External Antenna see:

Standard Site Material Installation Instructions *EN/LZT 720 0014*

For information regarding antenna configuration, see allocation drawing 193 26–IPA xxxx in the Site Installation Documentation.

5.8 Mounting the Sunshields

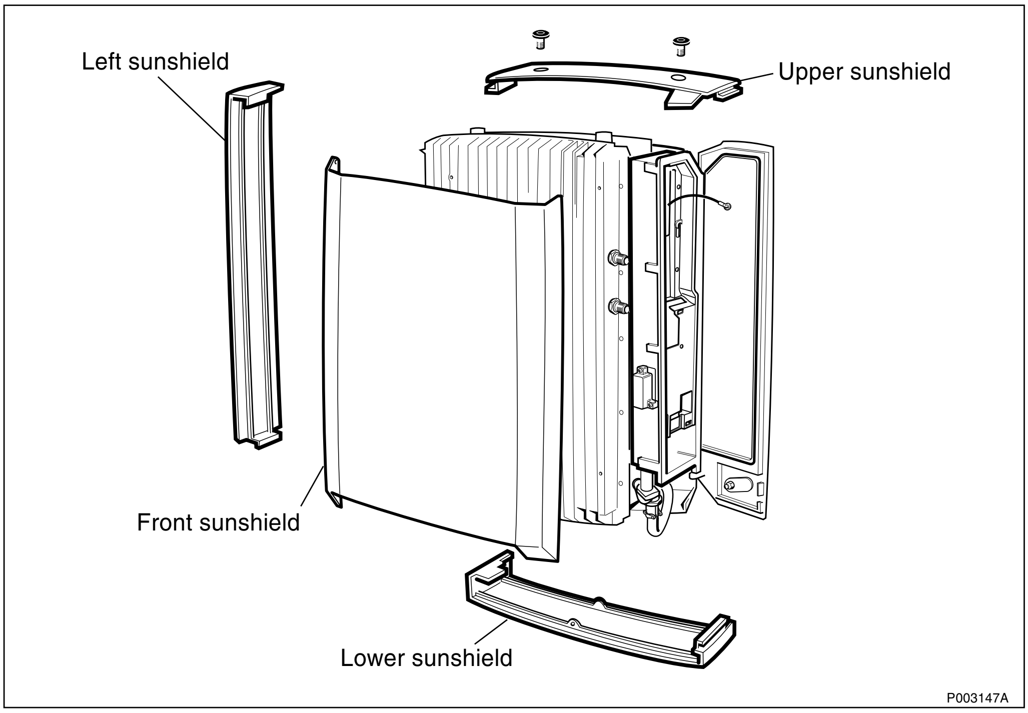


Figure 103 Main units

5.8.1 Mounting the Upper Sunshield

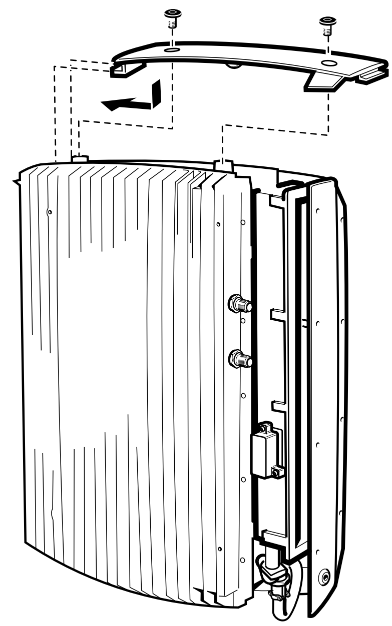


Figure 104 Mounting the upper sunshield

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

Note: The plugs are to be screwed, *not* pressed.

5.8.2 Mounting the Left Sunshield

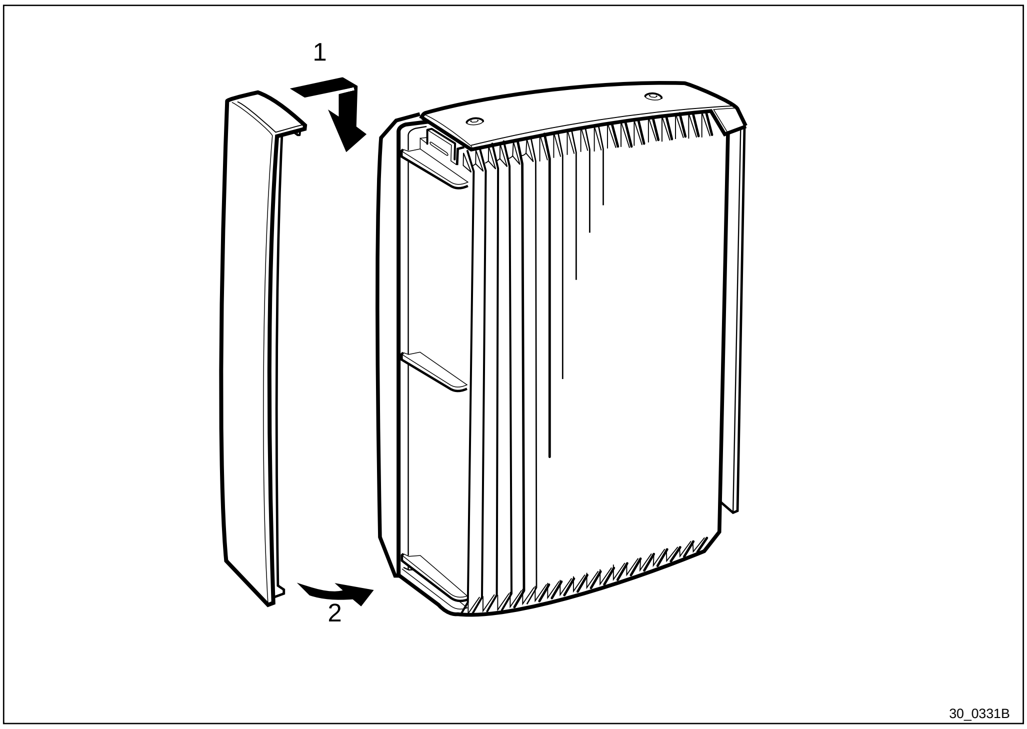


Figure 105 Mounting the left sunshield

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.

5.8.3 Mounting the Lower Sunshield

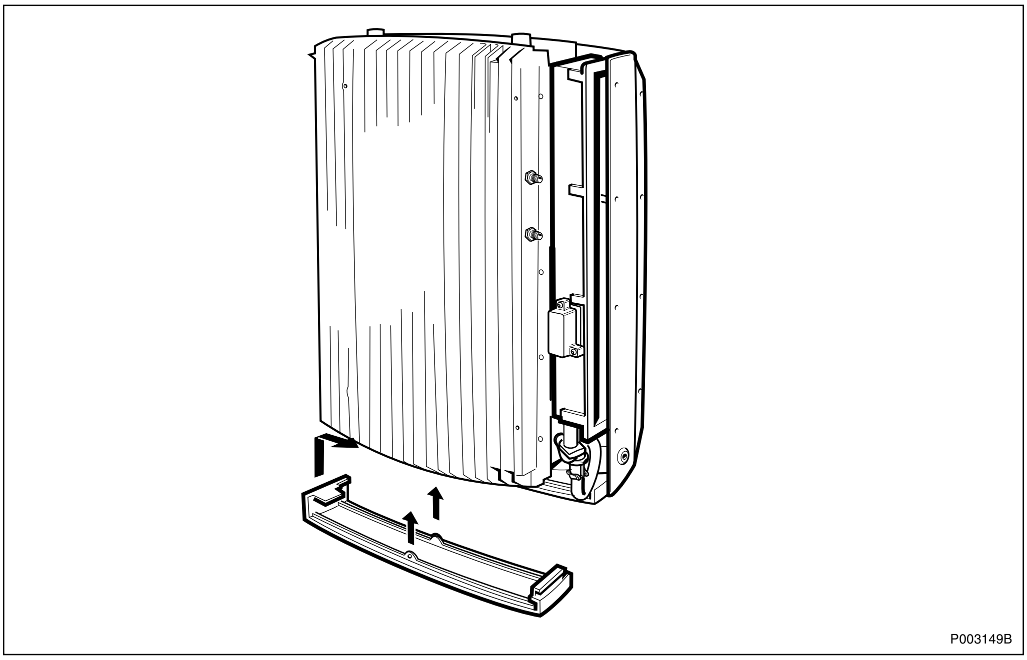


Figure 106 Mounting the lower sunshield

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.

5.8.4 Mounting the Front Sunshield

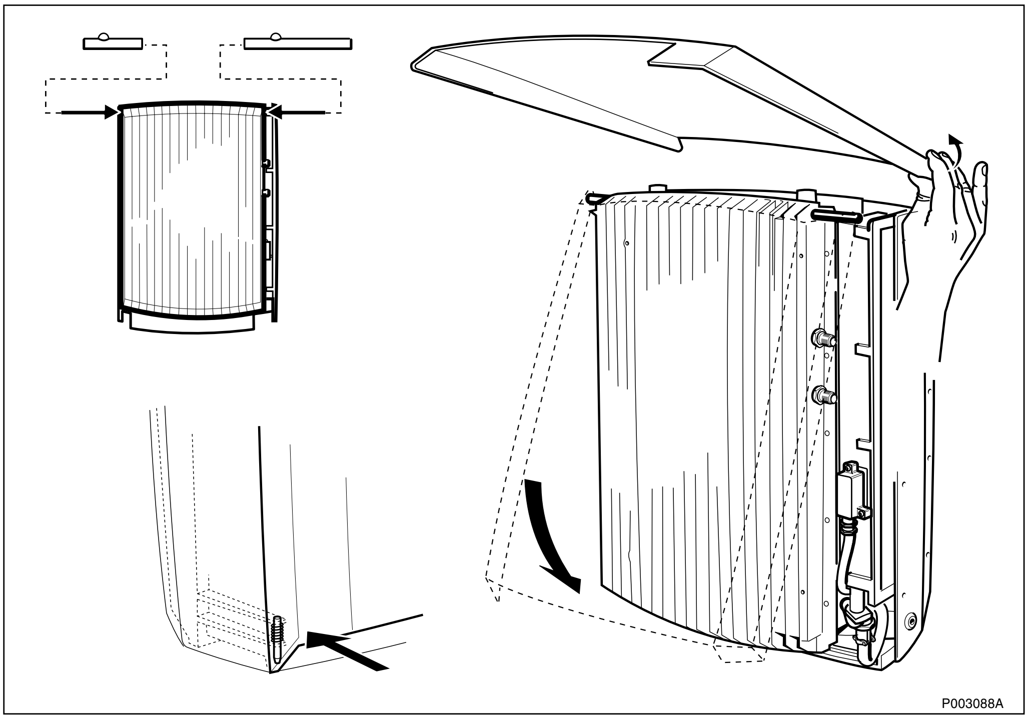


Figure 107 Mounting the front sunshield

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.

5.9 Connecting the 4– or 6 TRX Cable (optional)

The RBS configuration can supply a 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 cabling for extension cabinet 1 and cabinet 2 is the same as for the basic RBS cabling configuration. Four external alarms can be connected for each extension radio cabinet.

Follow this procedure to connect the TXL-bus cable.

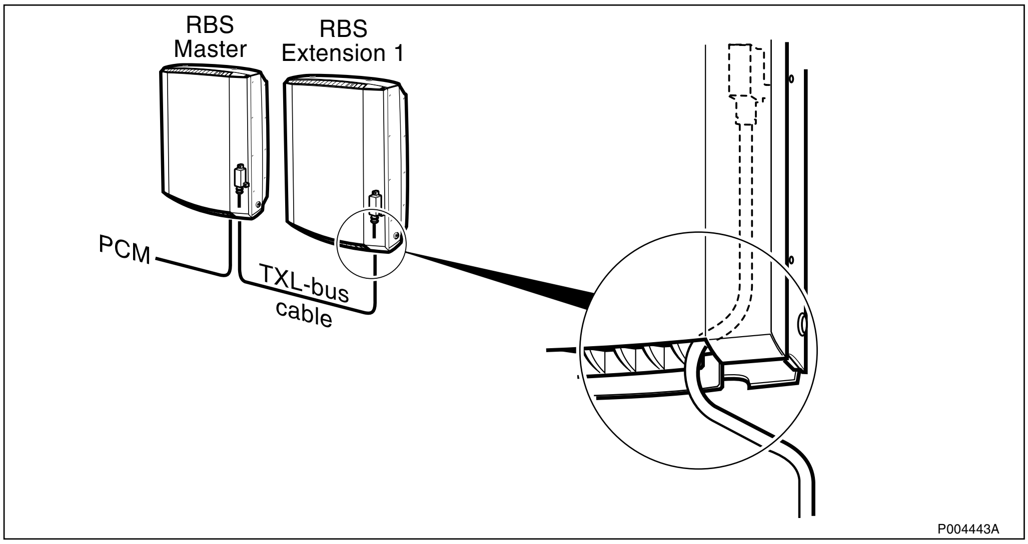


Figure 108 TXL-bus connection for 4 TRX configuration

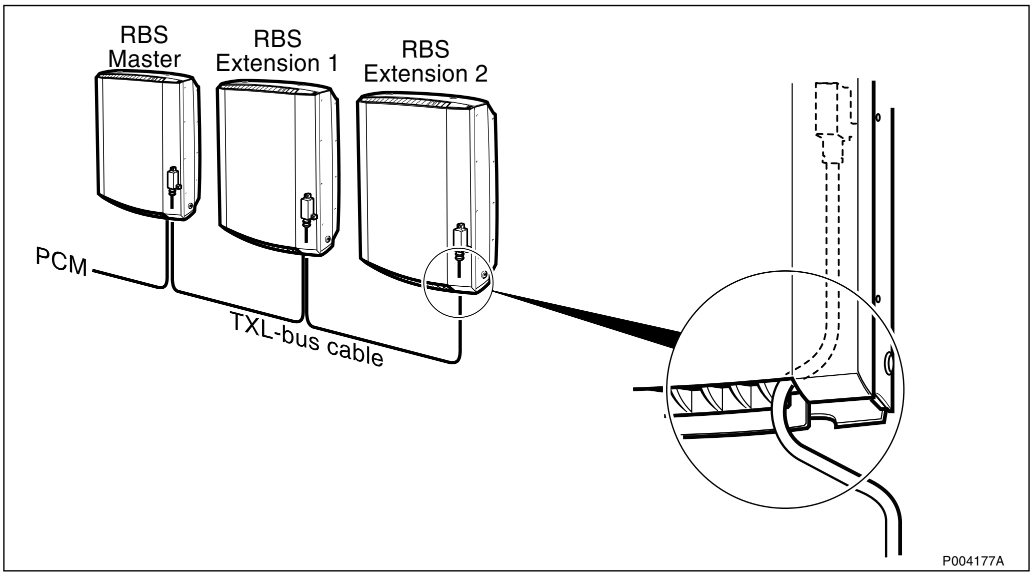


Figure 109 TXL-bus connection for 6 TRX configuration

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. 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 a 4 TRX configuration is used, continue to step 8.

   If a 6 TRX configuration is used, do step 5–7 to connect the Extension cabinet 2. The 6 TRX cable have two cables attached to the D-sub connector marked RBS EXT 1.

8. Fasten all front sunshields and close all installation box doors.

5.10 Mounting the Fan Unit (optional)

DANGER

Improper electrical installation may cause fire or electrical 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 and modify the electrical installation.

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 connection box, indicated by PE and the earth symbol.

Figure 110 Protective Earth

The Protective Earth connection is essential.

Note: Make sure the AC Mains is switched off before beginning the AC installation procedure.

Note: The Fan Unit can only be mounted after the sunshields have been mounted.

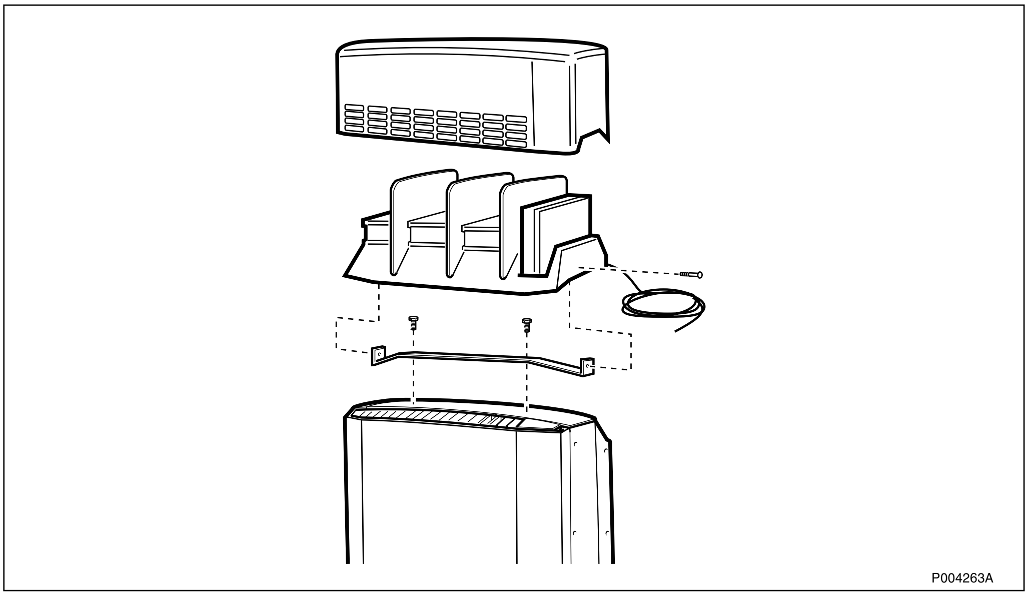


Figure 111 Fan Unit overview

1. Remove the two screw plugs on top of the radio cabinet.

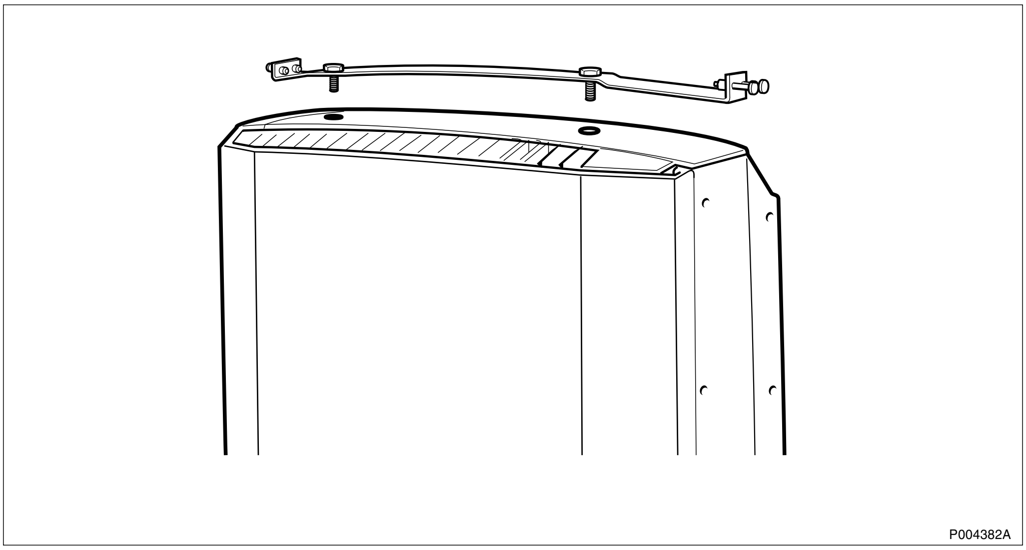


Figure 112 Mounting the relay bar

2. Mount the relay bar and fasten it with the 2 screws.

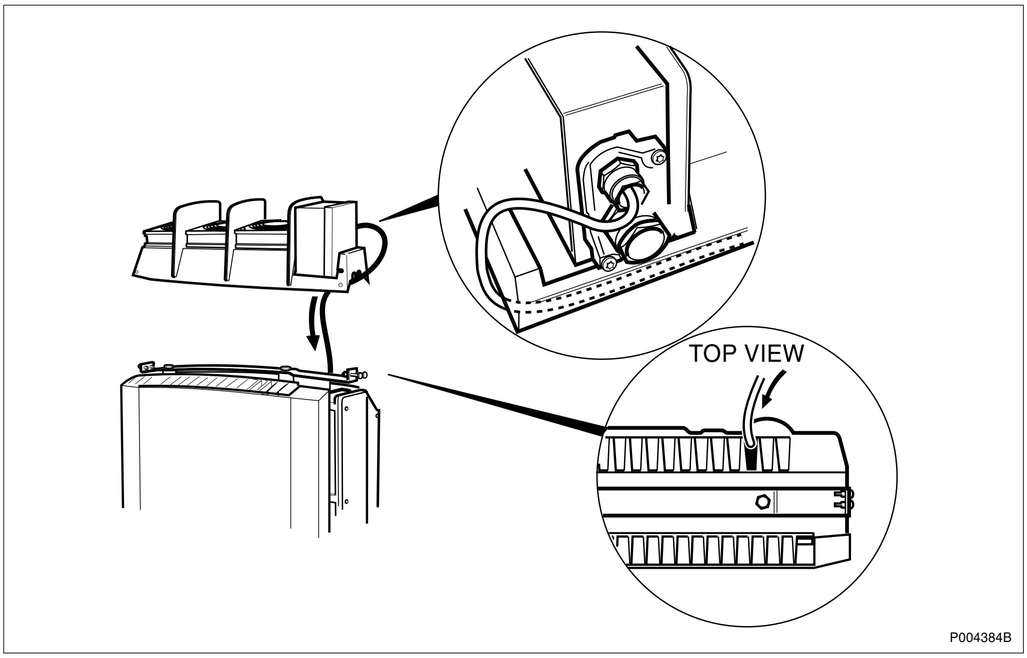


Figure 113 Routing the alarm cable through the cooling flanges

3. Route the alarm cable according to the figure above, down to the interface box through cooling flange number three, counting from the right.

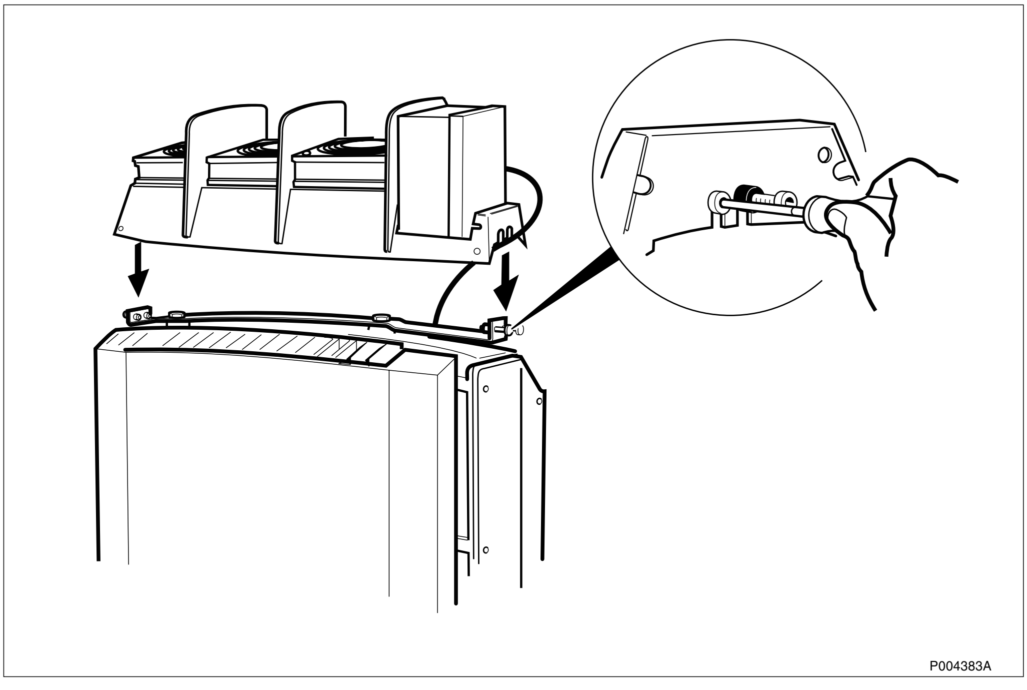


Figure 114 Mounting the Fan Unit

4. Mount the Fan Unit on the relay bar and fasten it on each side with the screws.

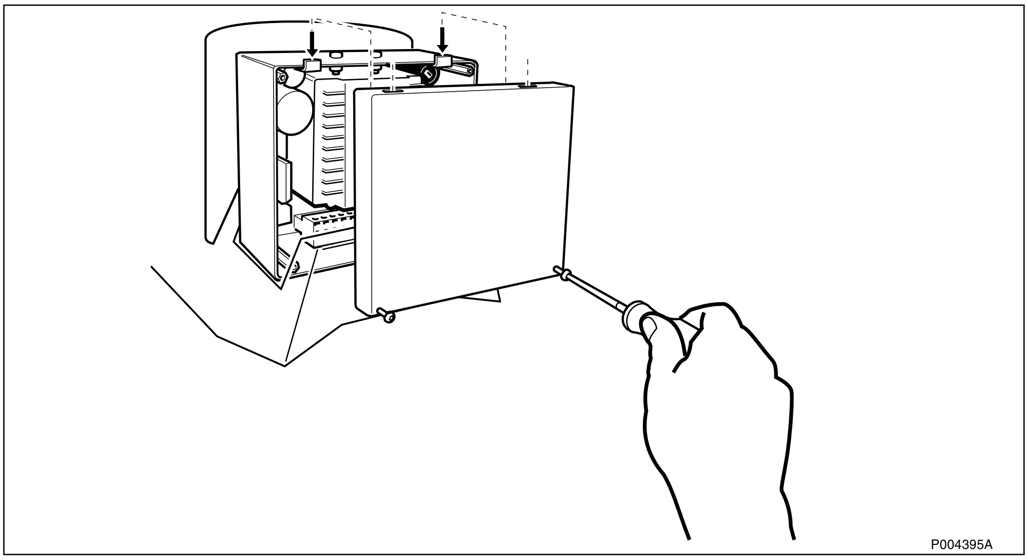


Figure 115 Opening the control box cover

5. Open the control box cover.

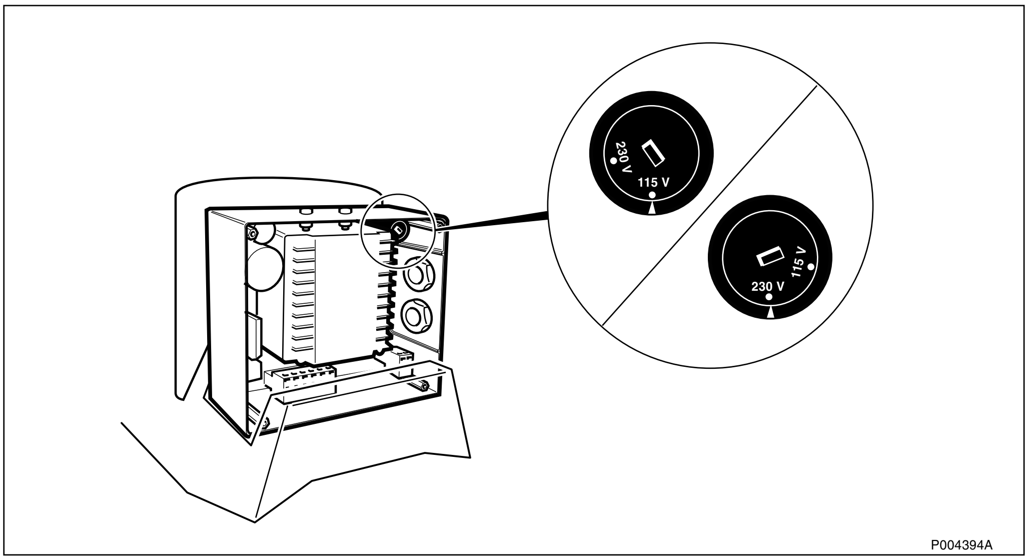


Figure 116 Adjusting the AC selector switch

6. Adjust the AC selector switch to the correct voltage present.

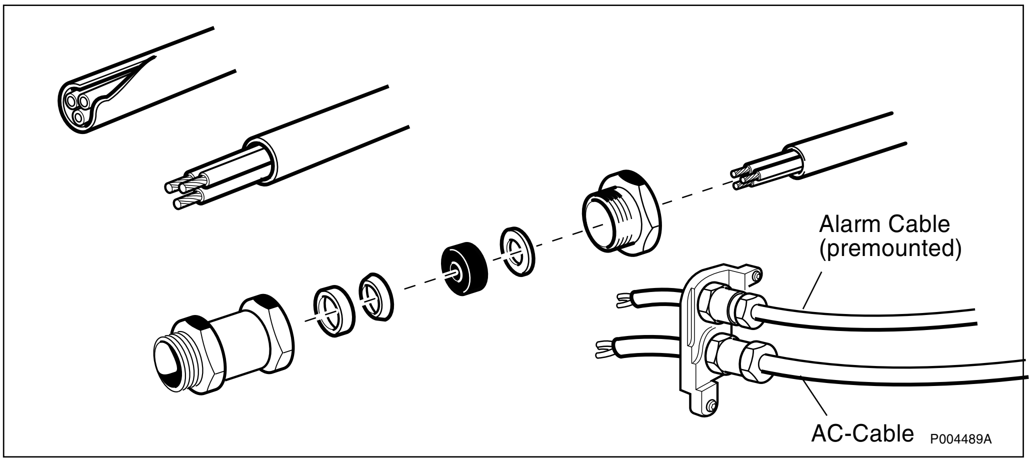


Figure 117 Cable inlets

7. Adjust the sealing grommet to the AC cable diameter and assemble the inlet details.
8. Insert the AC cable through the inlet.

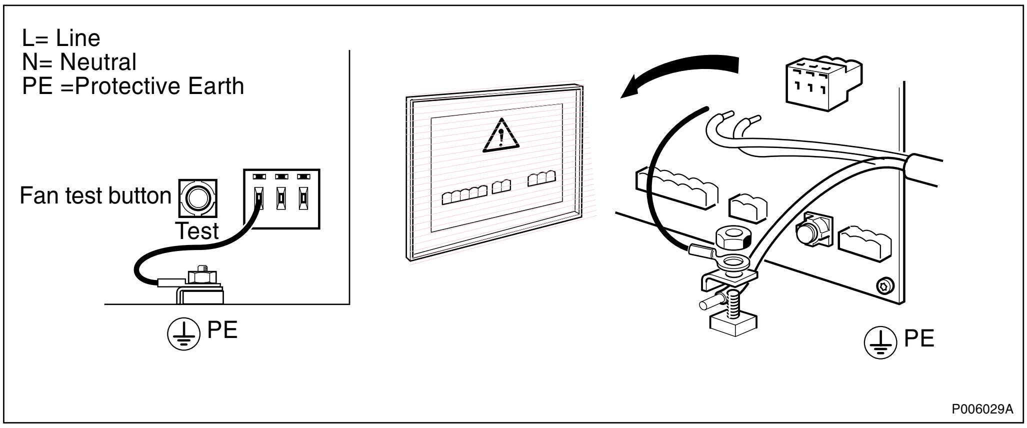


Figure 118 Connecting the AC cable and the protective earth (PE)

Note: When connecting the AC cable and the protective earth (PE), follow the instructions on the control box cover.

9. Remove the AC plinth and connect the cables to the plinth.
10. Connect the protective earth (PE).

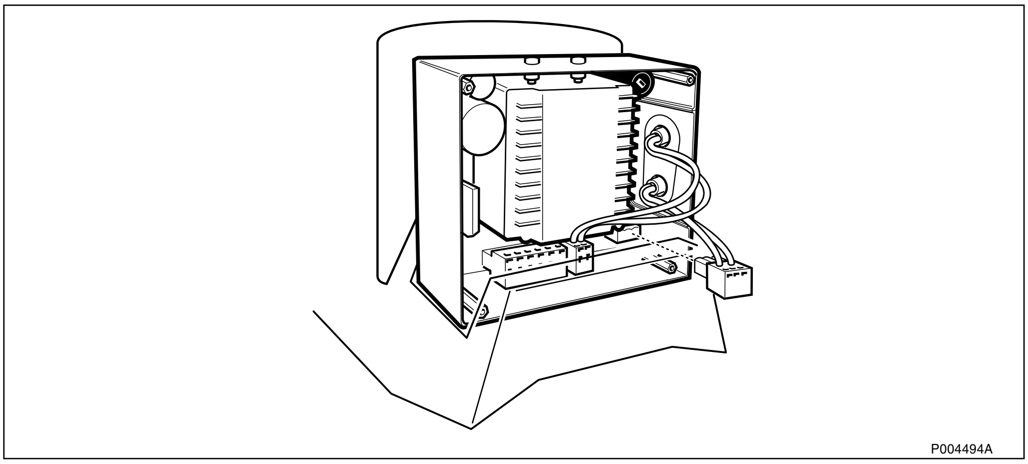


Figure 119 Remounting the AC plinth

11. Remount the AC plinth.
12. Remount the control box cover.

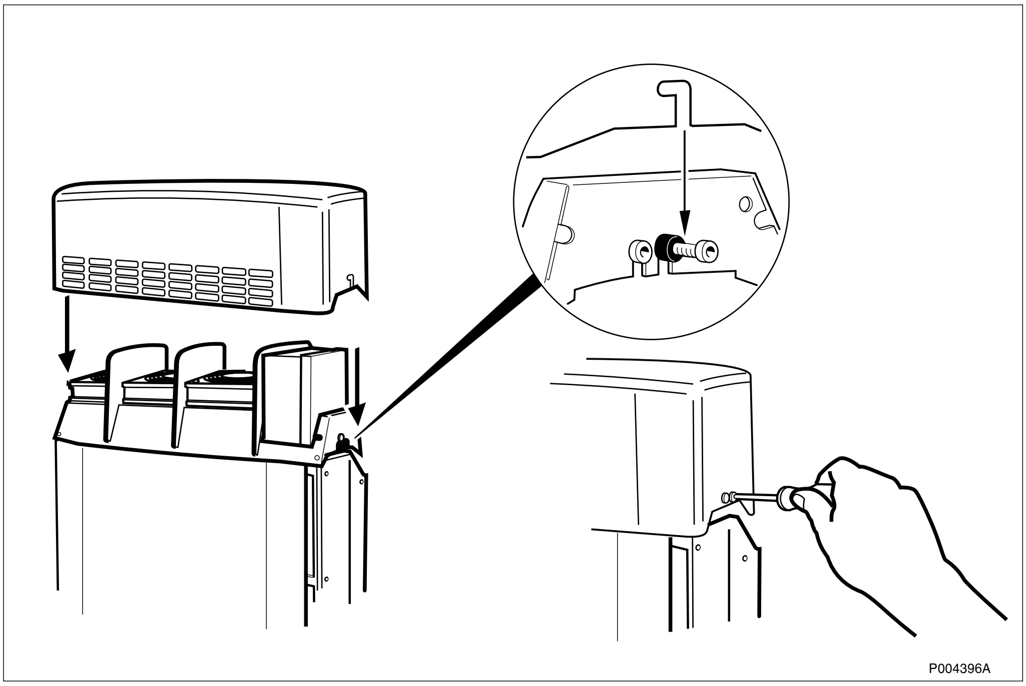


Figure 120 Mounting the Fan Unit cover

13. Mount the Fan Unit cover and fasten it with the screws on each side.

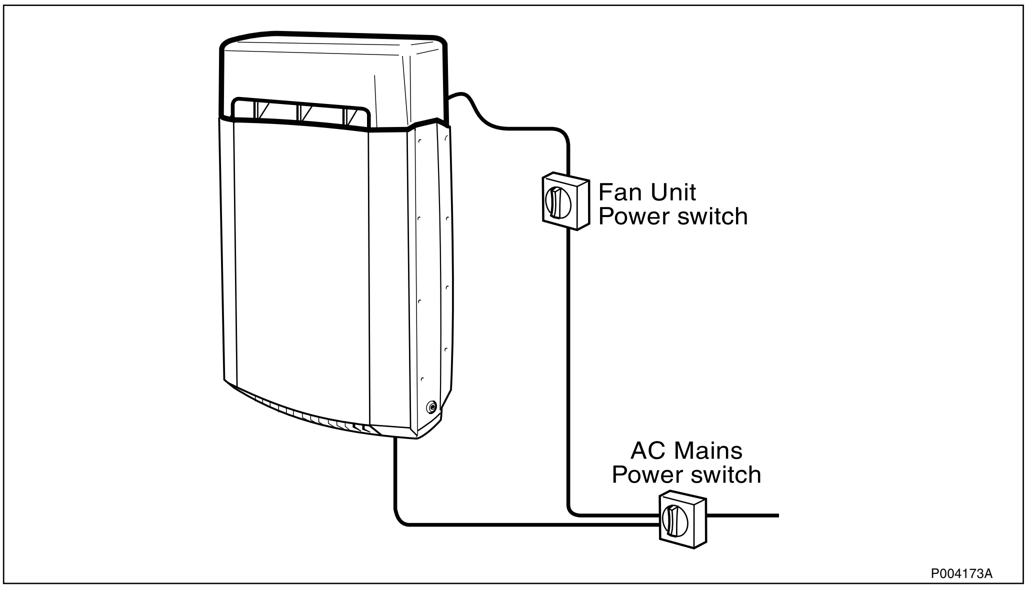


Figure 121 Connecting the AC cable

14. Route the AC cable to the current outlet.
15. Connect the cable to the outlet.

Note: The fans will automatically start when the ambient temperature is too high.

Note: The test button for the fans is located in the control box, *see Figure 118 on page 124.* To verify that all fans are working press the test button. When releasing the test button the fans will turn off. If the temperature is above 30 °C the fans will still be running due to the hysteresis of the temperature sensor.

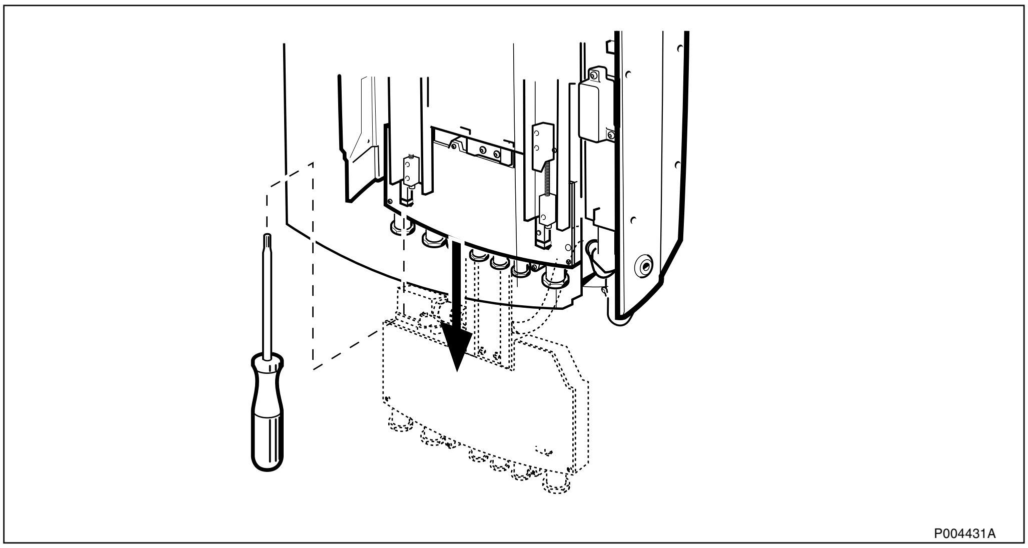


Figure 122 Pulling down the interface box

16. Loosen the screws securing the interface box placed underneath the RBS and pull down the interface box.

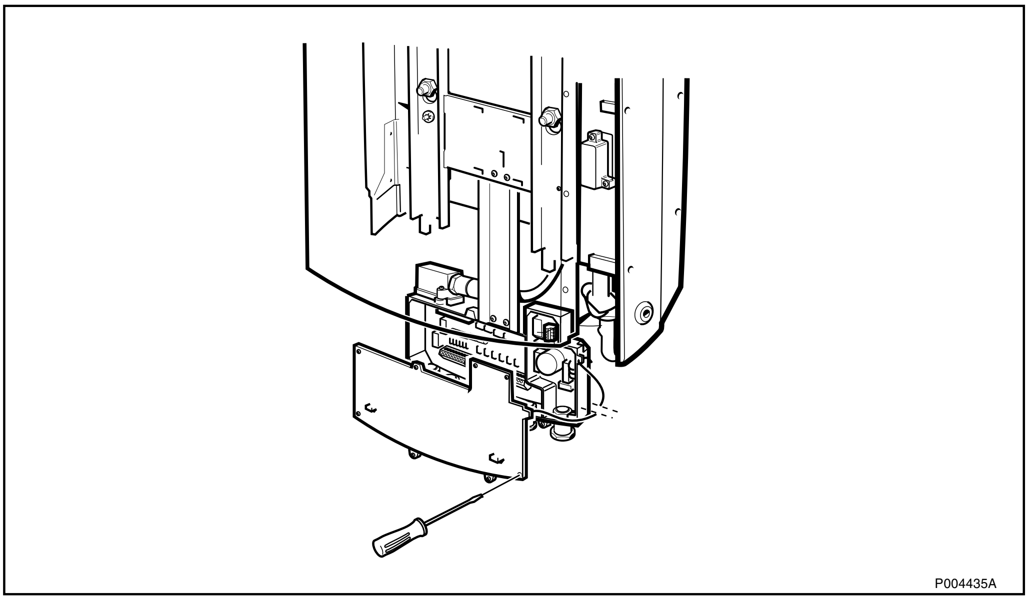


Figure 123 Opening the installation box cover

17. Unscrew the 8 torx screws on the interface box cover. Let the cover hang in the strap.

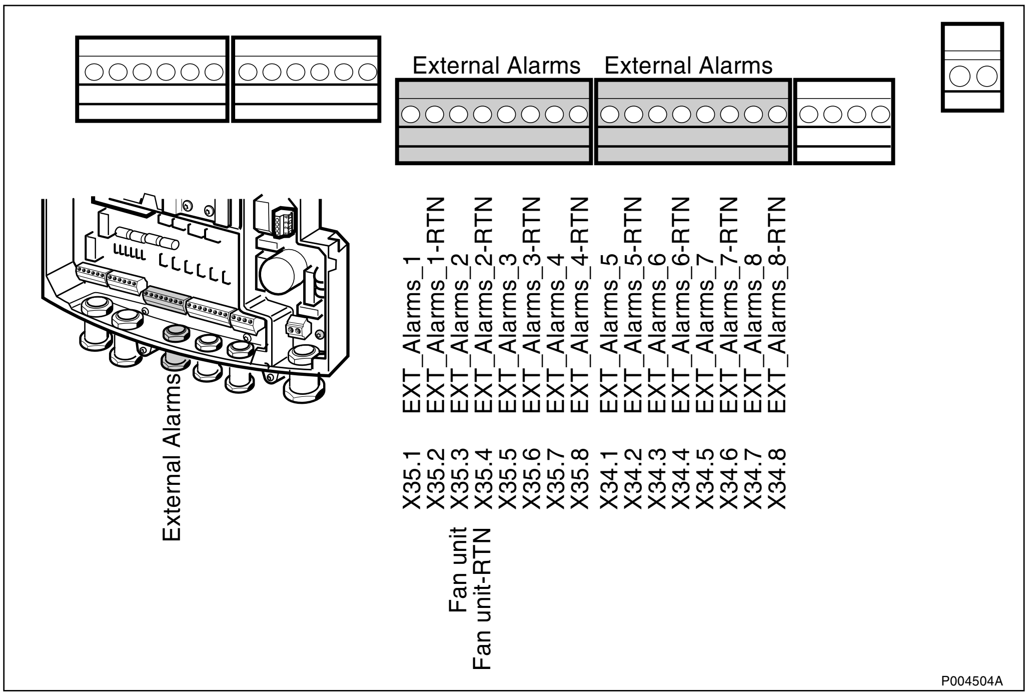


Figure 124 Connecting the alarm cable to the Interface box

18. Connect the alarm cable to the interface box.

19. Remount the installation box cover by screwing the 8 torx screws back into position.

20. Push up the interface box and secure it to the mounting base with the 2 torx screws.

5.11 Concluding Routines

Checklist

The following checklist is not mandatory but strongly recommended. Local procedures and safety regulations must be evaluated and included in this checklist.

Table 24 Checklist

Check that:		OK
1	all cables are strapped and run in a proper way.	
2	the interface box is pushed up and the screws are tighten.	
3	all sunshields are in the position for being locked by the installation box door.	
4	the installation box door is closed, all screws are tighten and the door is locked..	
5	the site is tidy and clean from waste.	

Note: The Site Installation Test should follow within 48 hours after the installation, because if the cabinet is left without power there is a risk of humidity damages to the components in the cabinet if ambivient temperature changes between hot and cold.

5.12 Appendix, Lifting Device

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.

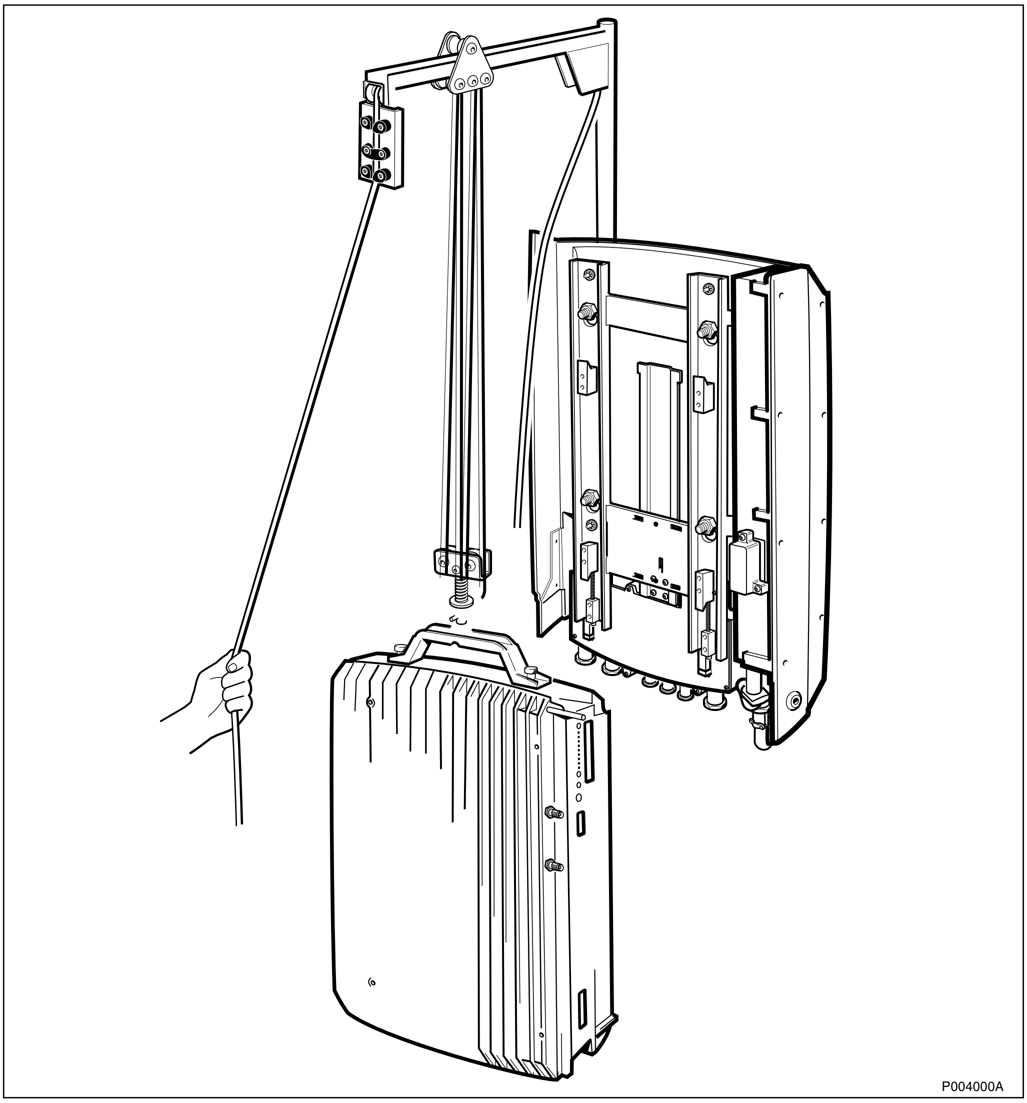


Figure 125 Lifting Device Overview

5.12.1 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.

Free space above the cabinet must be at least 800 mm, to allow the lifting device to be installed and removed from the mounting plate.

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.

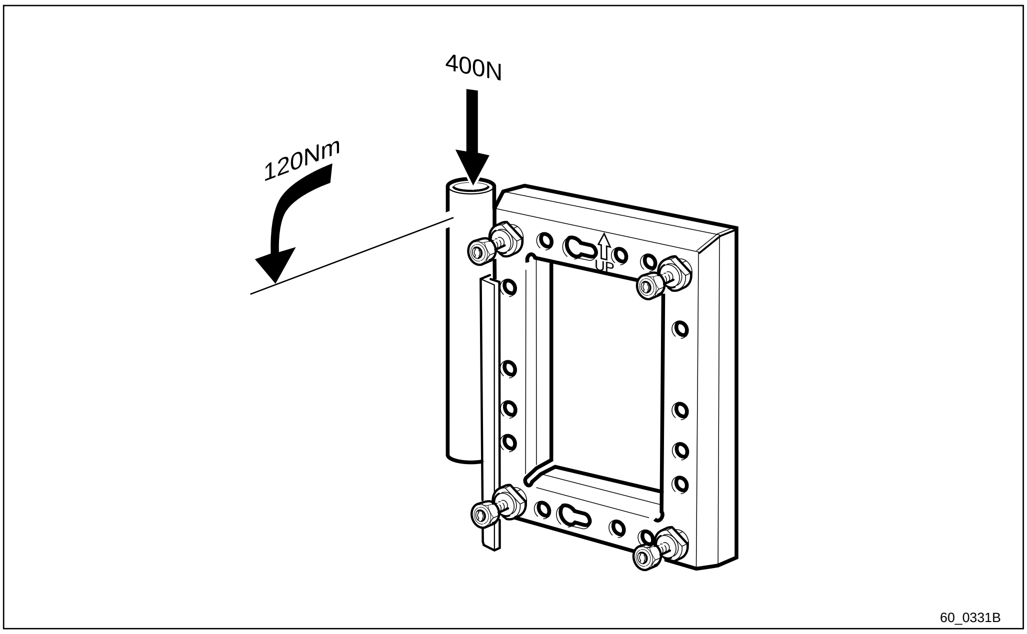


Figure 126 Maximum wall loading values

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.**

5.12.2 Handling the Lifting Device

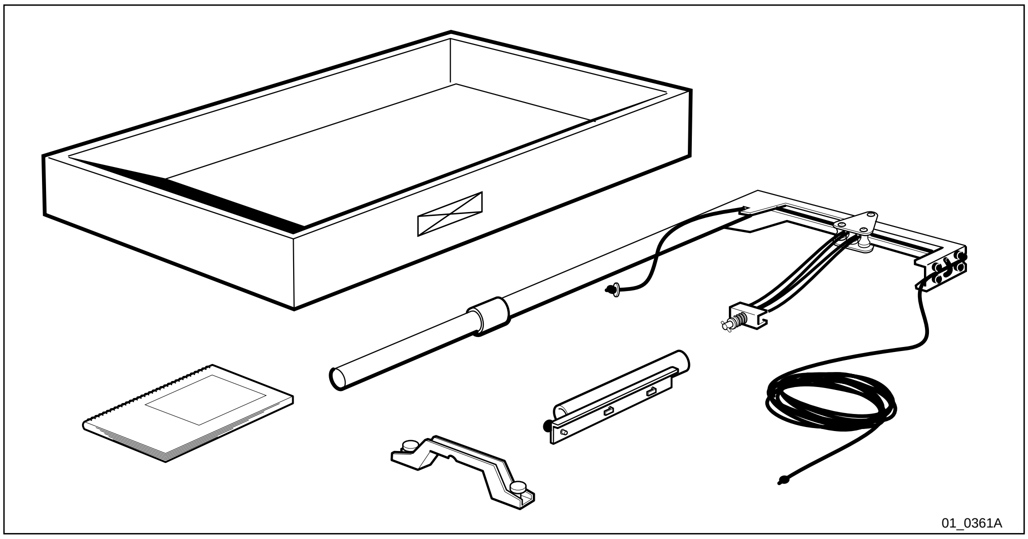


Figure 127 Equipment Overview

1. Check the delivered equipment against the packing list.

Figure 128 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.

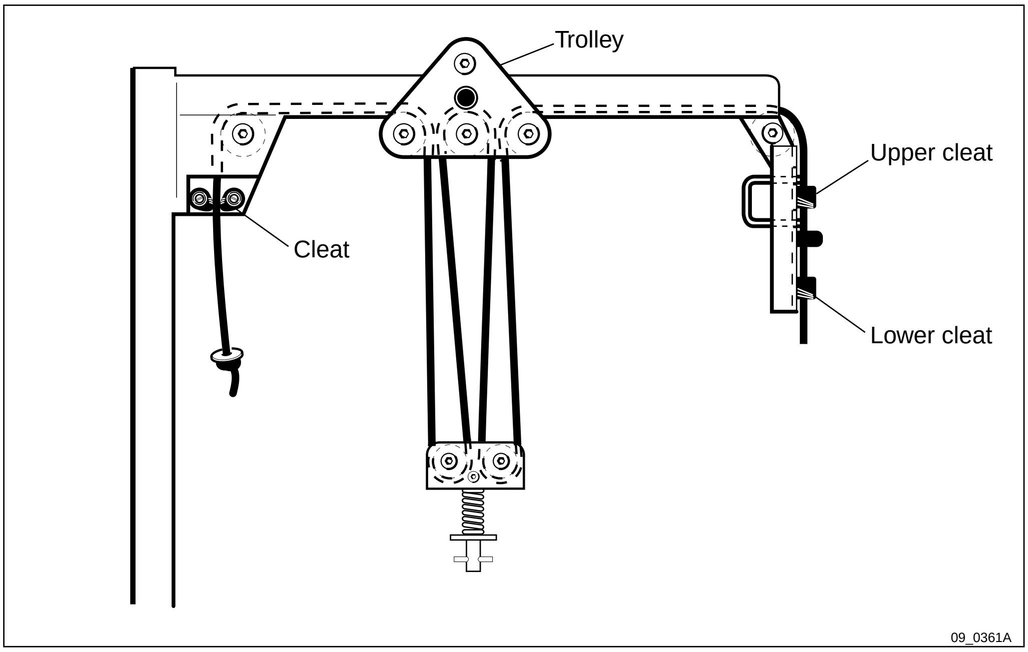


Figure 129 Rope wiring

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

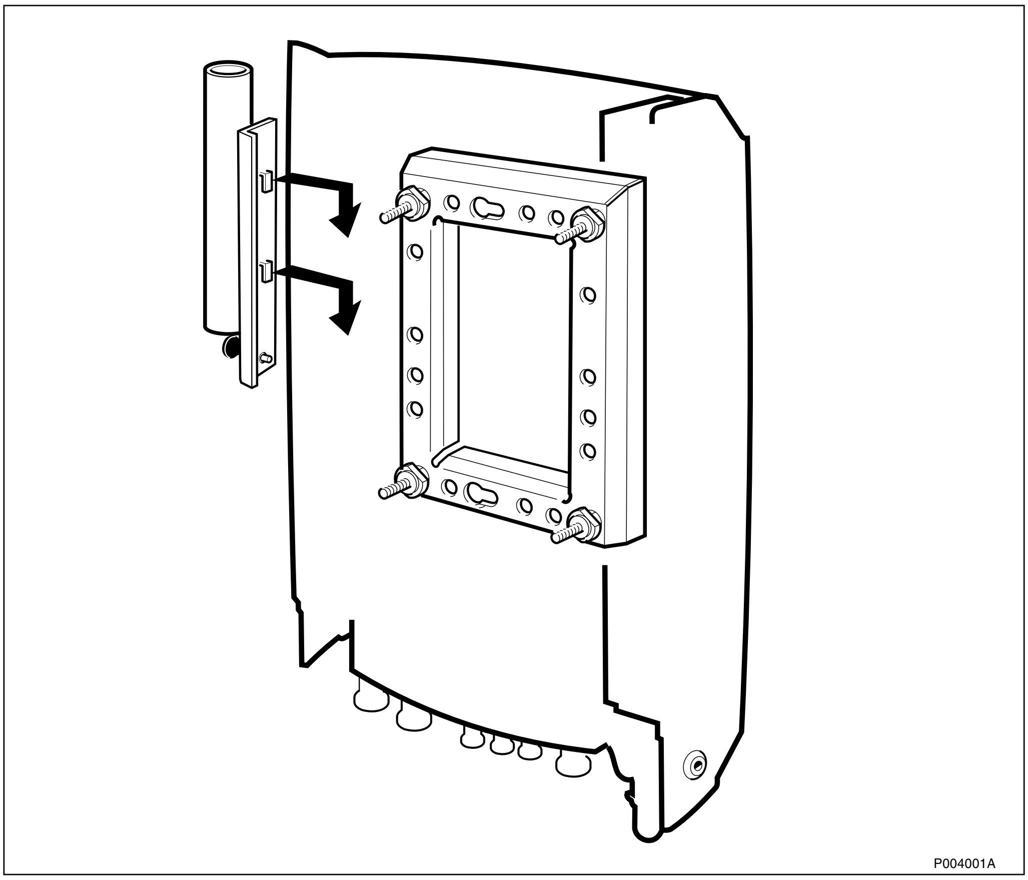


Figure 130 Mounting the lifting device

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

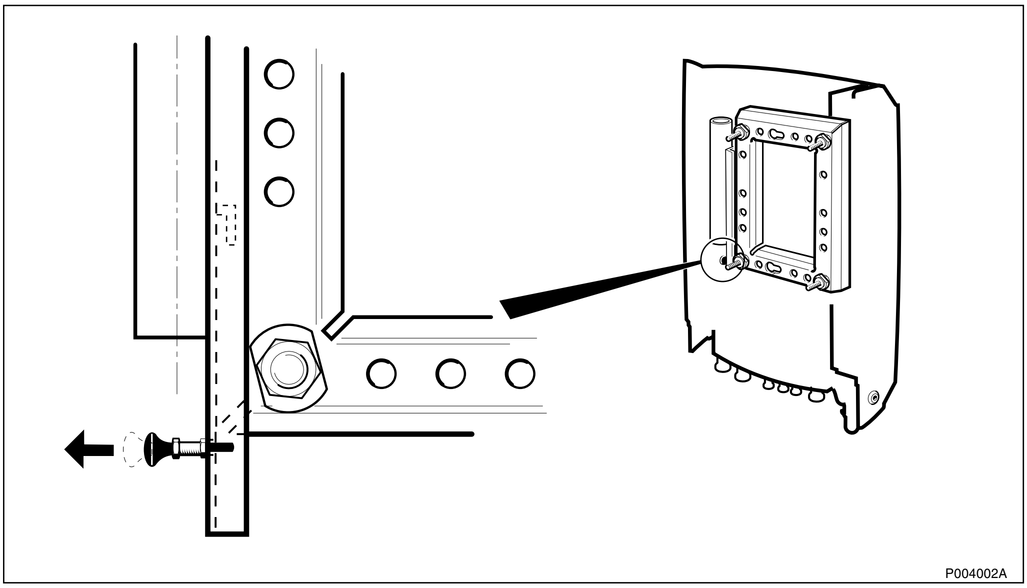


Figure 131 Locking pin position

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

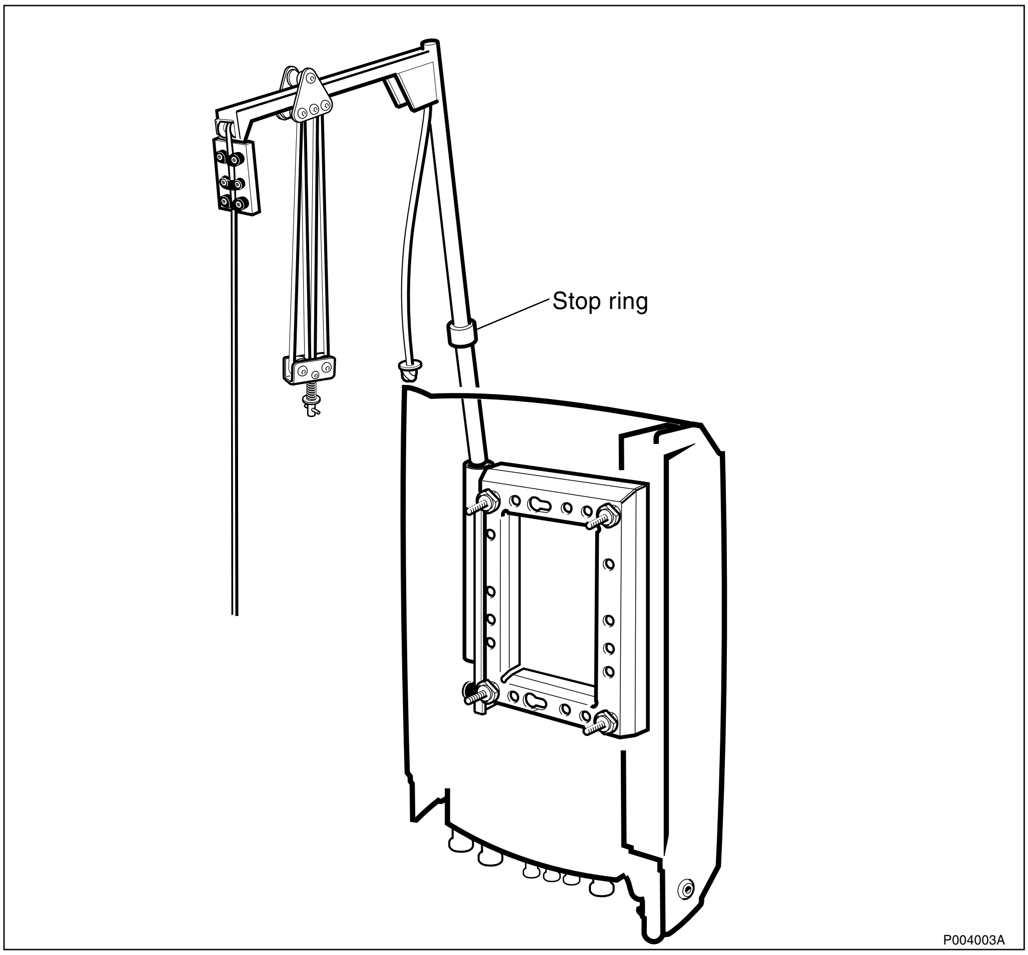


Figure 132 Inserting the lifting device in the tube-bracket

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

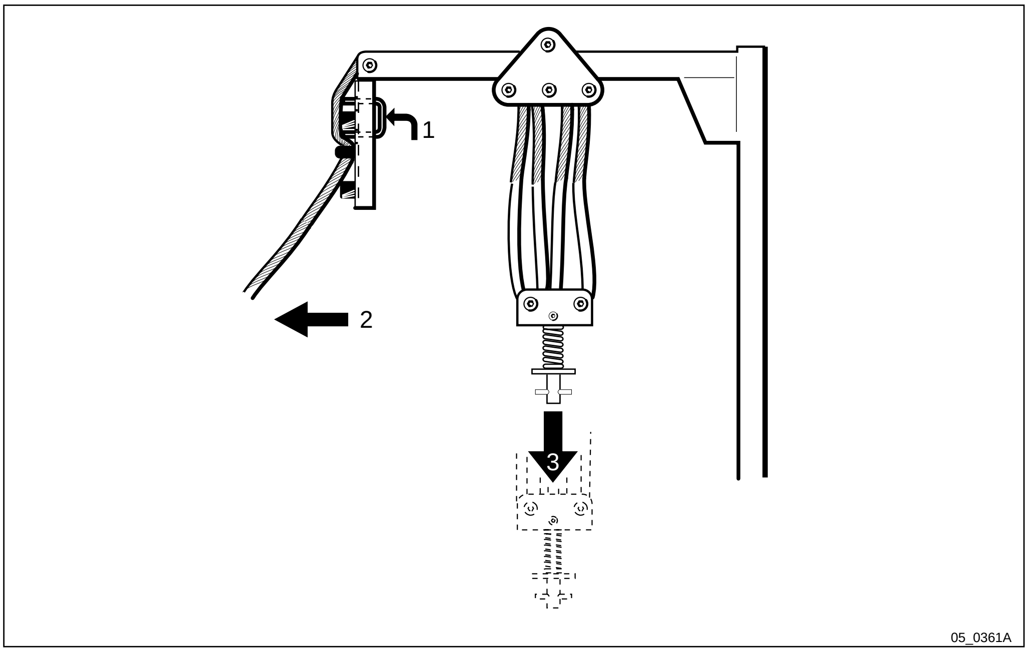


Figure 133 Loosening the rope

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.

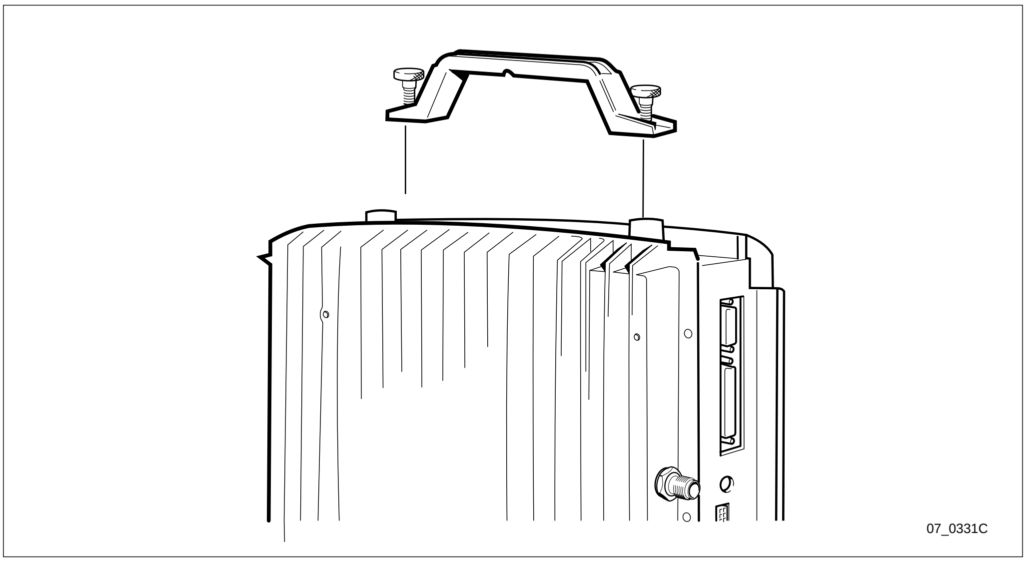


Figure 134 Mounting the handle

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.

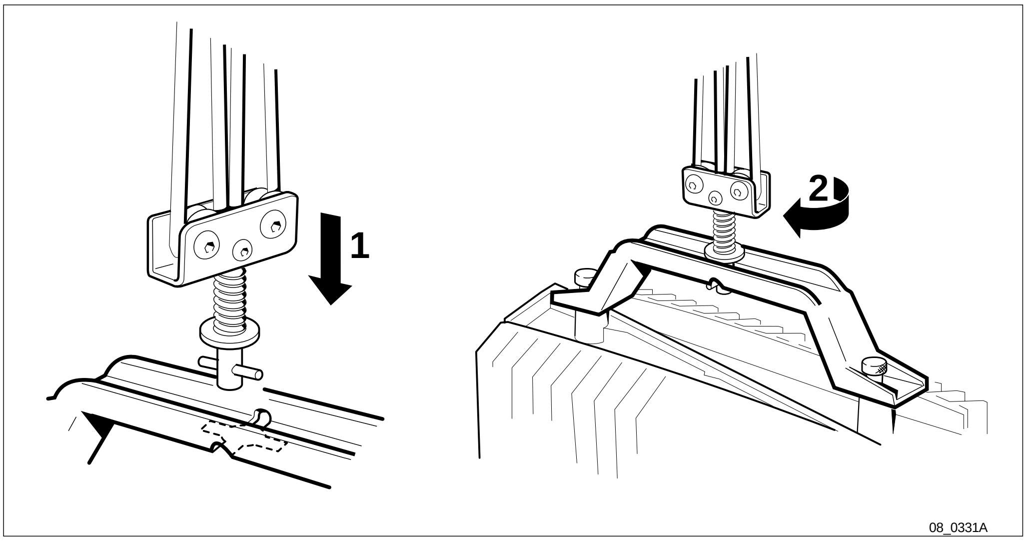


Figure 135 Securing the hook

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 sun-shield.

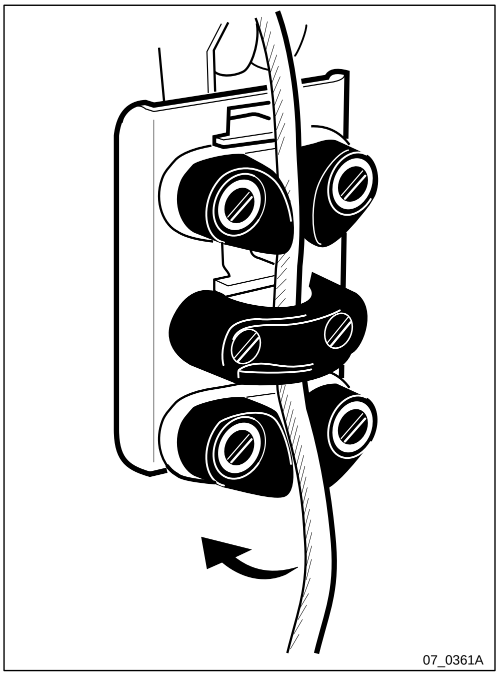


Figure 136 Fastening the rope

13. Fasten the rope in the lower cleat.

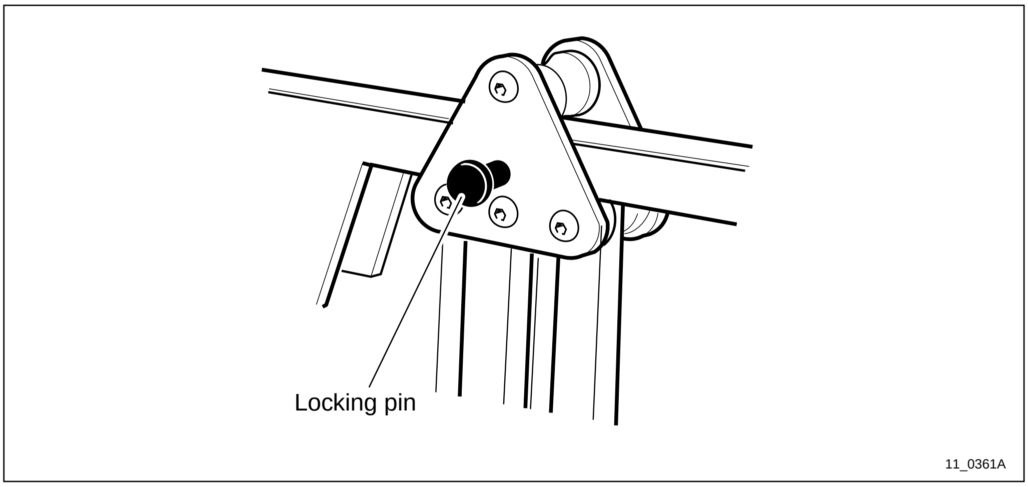


Figure 137 Releasing the trolley

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

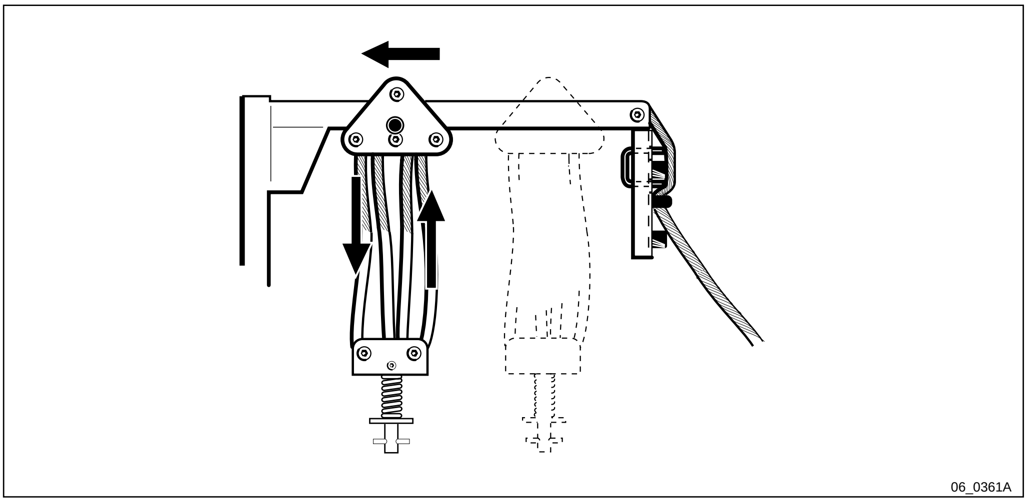


Figure 138 Moving the trolley

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

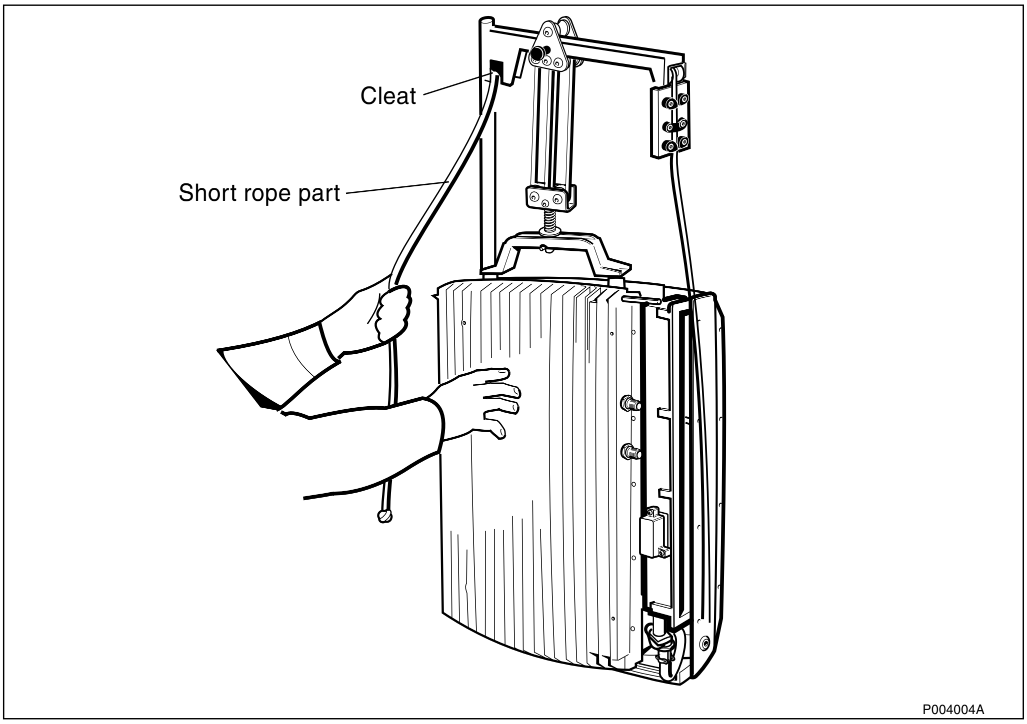


Figure 139 Adjusting the height

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

17. Continue with the instructions from *step 3 on page 105*and on, in *Section 5.6.2 on page 103*.

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6 Installation of Power and Battery Cabinet

6.1 Preface

This section describes how to mount and install the Power and Battery Cabinet. It also includes the connections of external cables to the PBC.

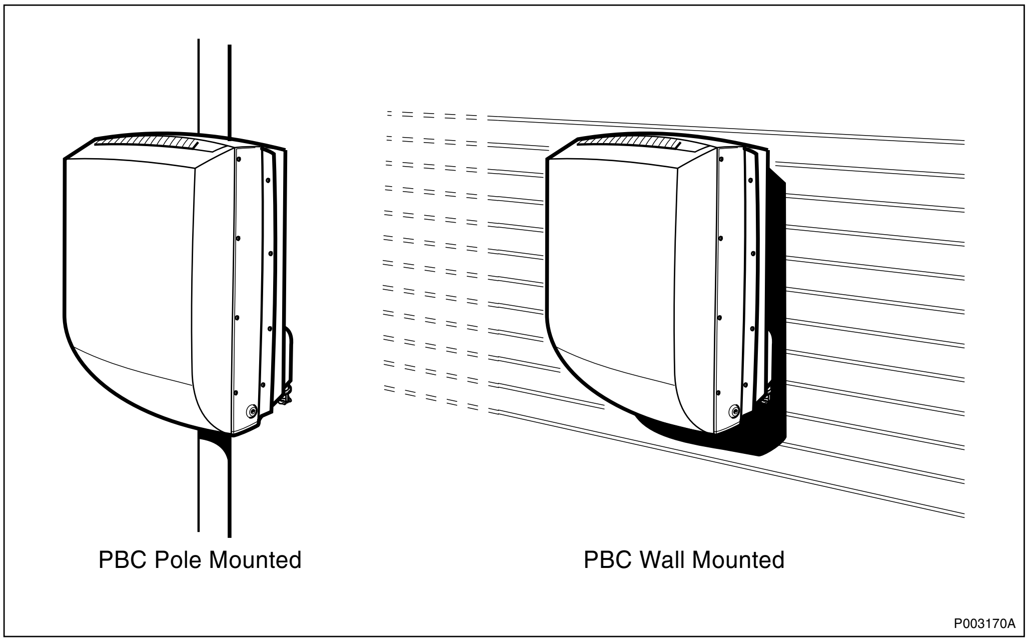


Figure 140 Installation alternatives

6.1.1 Preconditions

Ensure that the following conditions are met:

- ☐ Site access permission received.
- ☐ Ordered PBC, equipment, specified tools and other necessary facilities have been delivered.
- ☐ Electrical ducting is ready and AC mains power is available.
- ☐ When the cabinet is mounted outdoors or if the ambivient temperature changes between hot and cold, it must not be left without power for more than 48 hours. This requirement is caused by the risk of humidity damages.
- ☐ Earth Point is available.
- ☐ During bad weather conditions it may be necessary to protect the cabinet during installation.
- ☐ Always use an approved antistatic bracelet to avoid damage to components mounted on printed board assemblies.

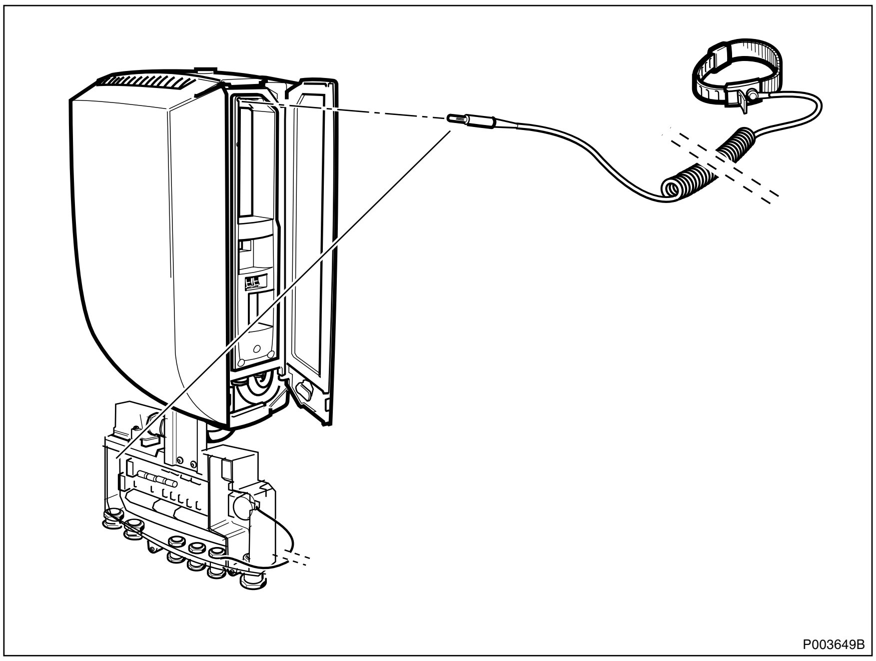


Figure 141 Connecting the ESD wrist strap

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.

Preconditions for pole-mounted PBC

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

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.

📖	*Standard Site Material Installation Instructions*	*EN/LZT 720 0014*

Competence Requirements

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

The following qualifications are minimum requirements:

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

6.1.2 Tightening Torque

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

Table 25 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 torque for plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	
M4	170 +/- 15	-	15.1 +/- 1.3	-	Reduced torque for captive screws
M5	540 +/- 30	-	47.8 +/- 2.6	-	Torque for battery poles
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	
M8	-	21 +/- 1.3	-	15.5 +/- 1	
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	

6.1.3 Work Process for Power and Battery Cabinet Installation

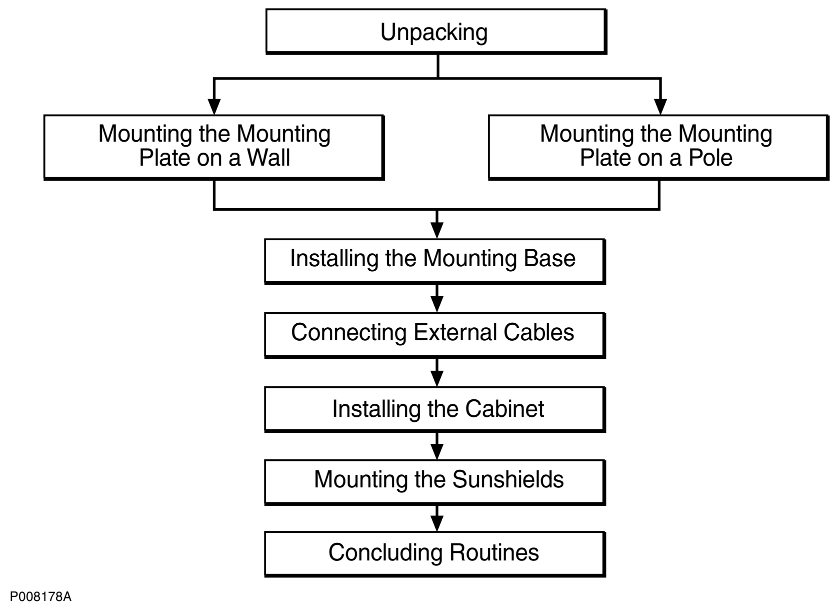


Figure 142 Working process for installing the PBC

6.2 Unpacking the Power and Battery Cabinet

CAUTION

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

In order to avoid damage to components due to electrostatic discharge during unpacking, make sure not to come in contact with the connectors on the cabinet.

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

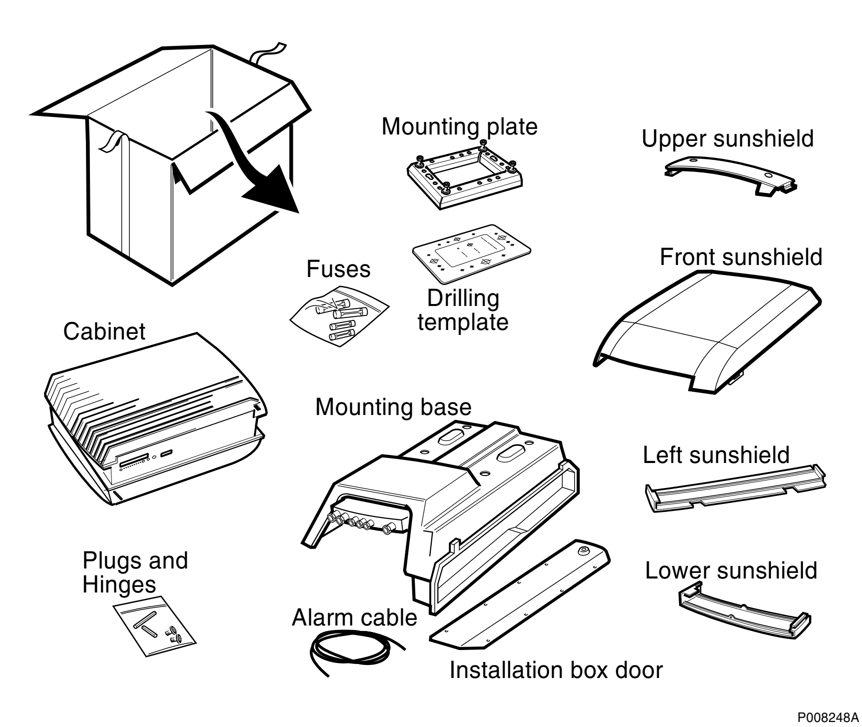


Figure 143 Unpacking the cabinet, mounting base and sunshields

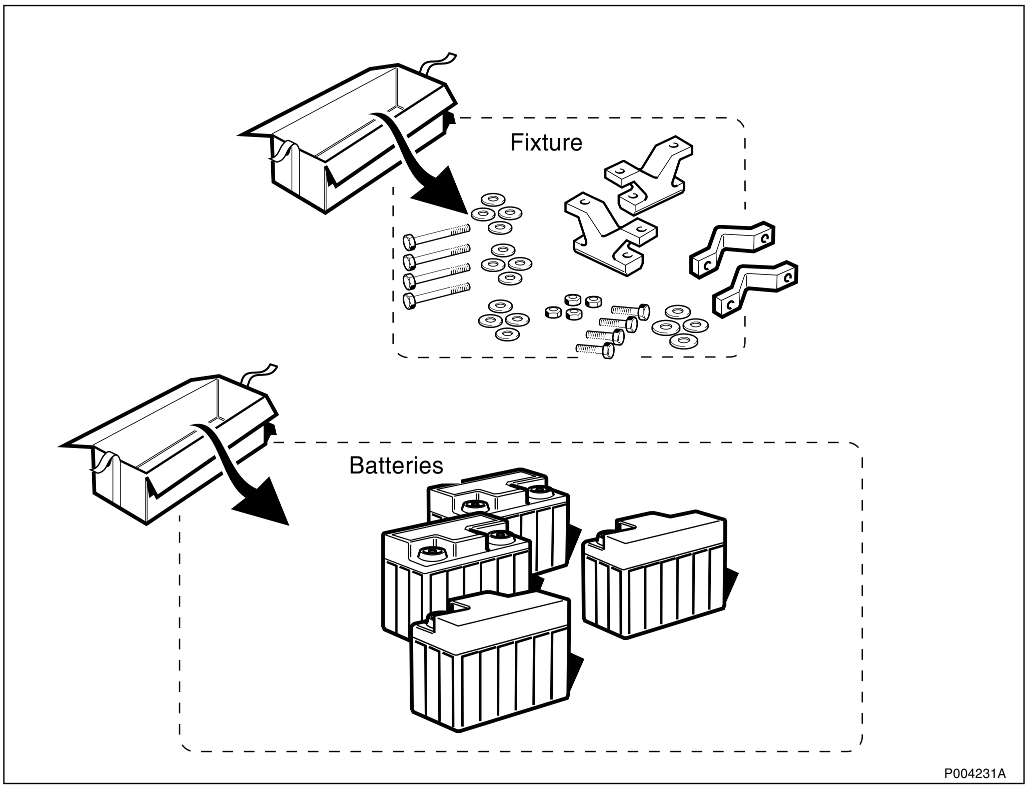


Figure 144 Unpacking the optionals

6.3 Mounting the Mounting Plate

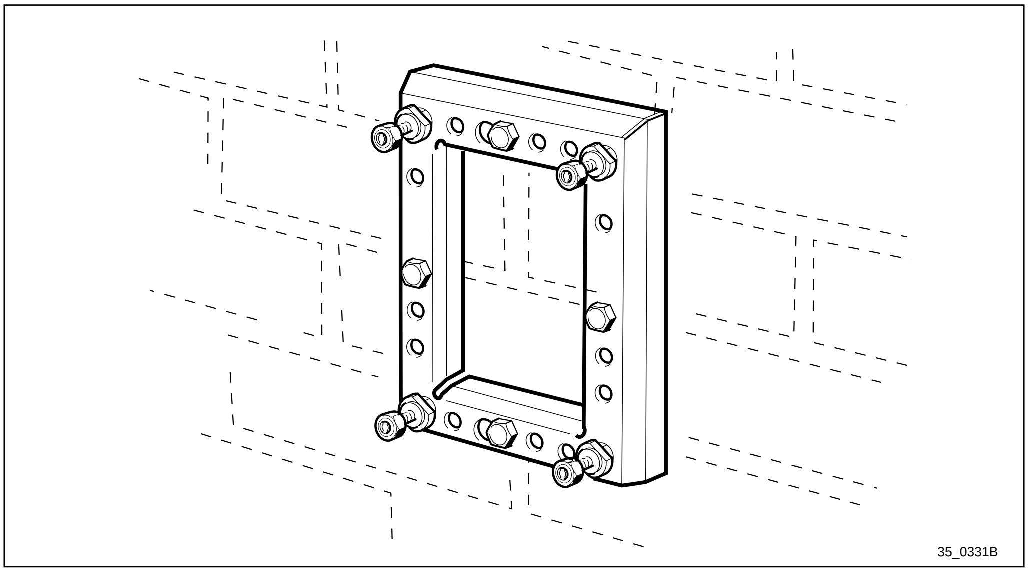


Figure 145 Mounting the mounting plate

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.

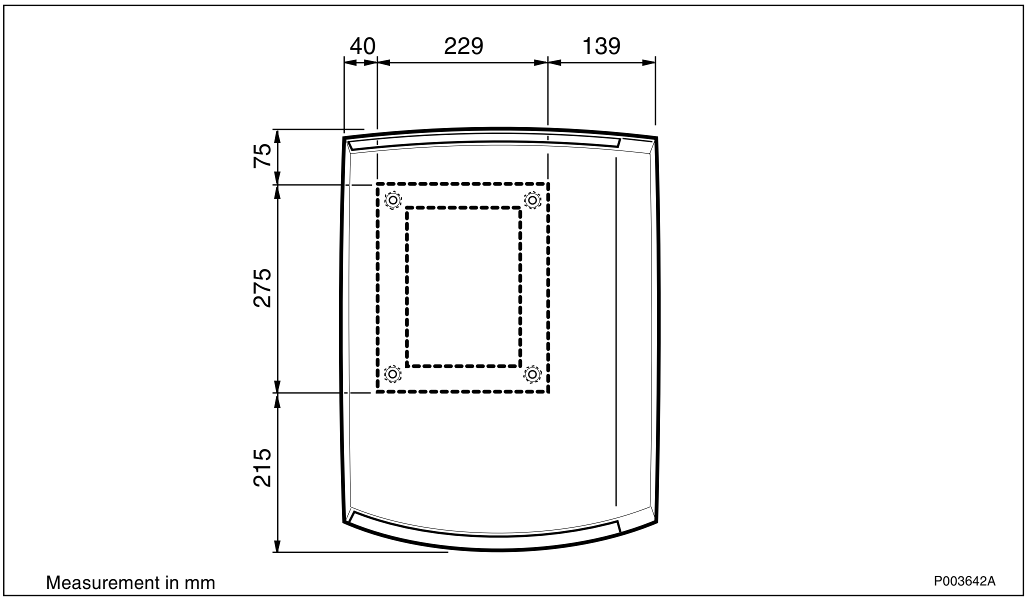


Figure 146 Mounting plate and equipment contour, front view

The *figure above* 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 Product Data* and *chapter Site Planning and Requirements*.

6.3.1 Mounting the Mounting Plate on a Wall

1. Place the mounting plate drilling template in the position where the PBC is to be situated.

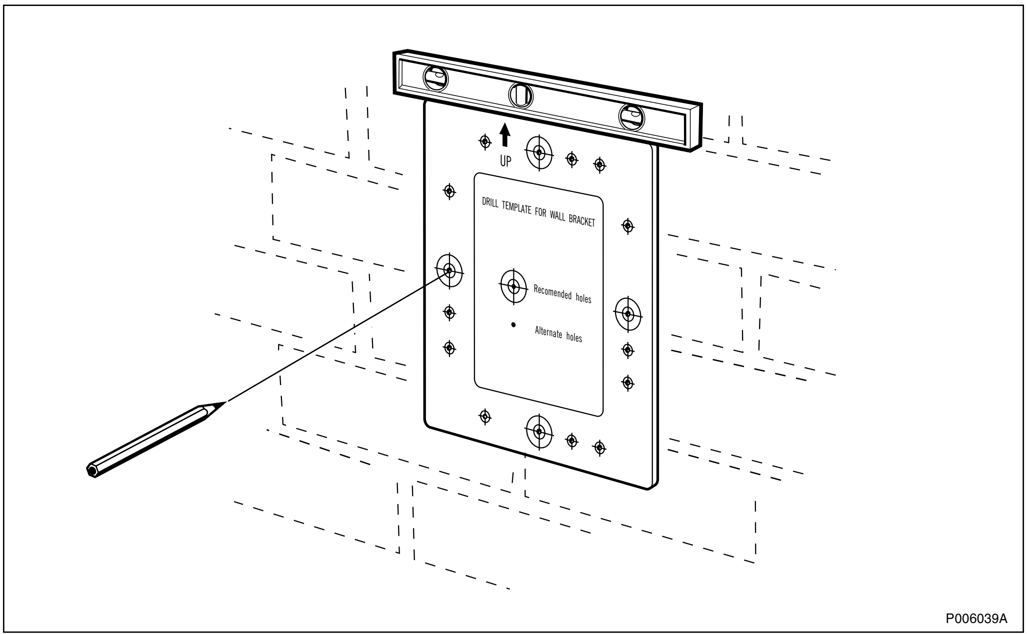


Figure 147 Marking the holes

2. Check with a spiritlevel that the drilling template is placed in a horizontal position.

3. Use a pen to mark the position of the holes that are to be drilled.

4. Remove the template and drill the holes for the 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.

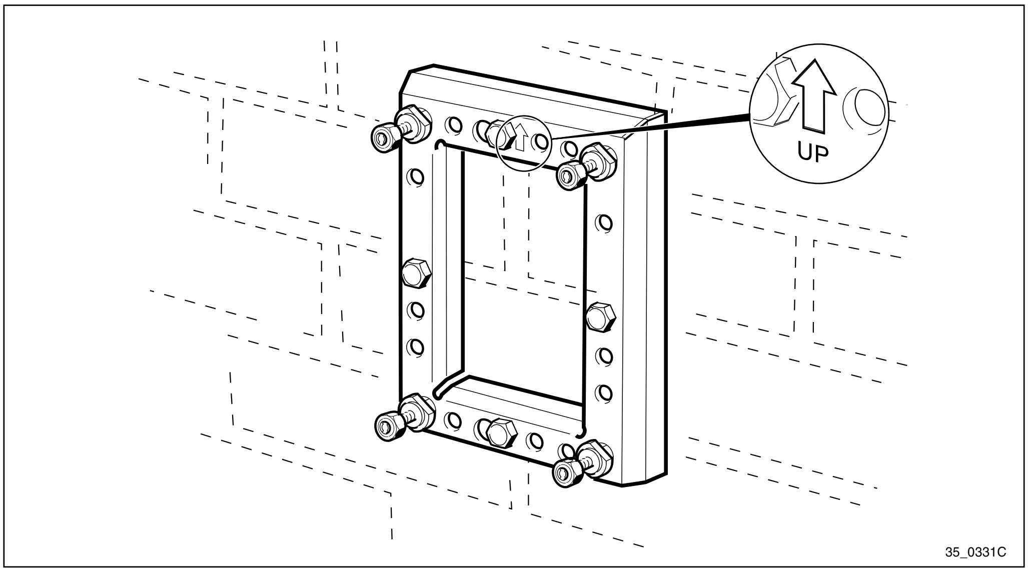


Figure 148 Mounting plate

5. Mount 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.

6.3.2 Mounting the Mounting Plate on a Pole

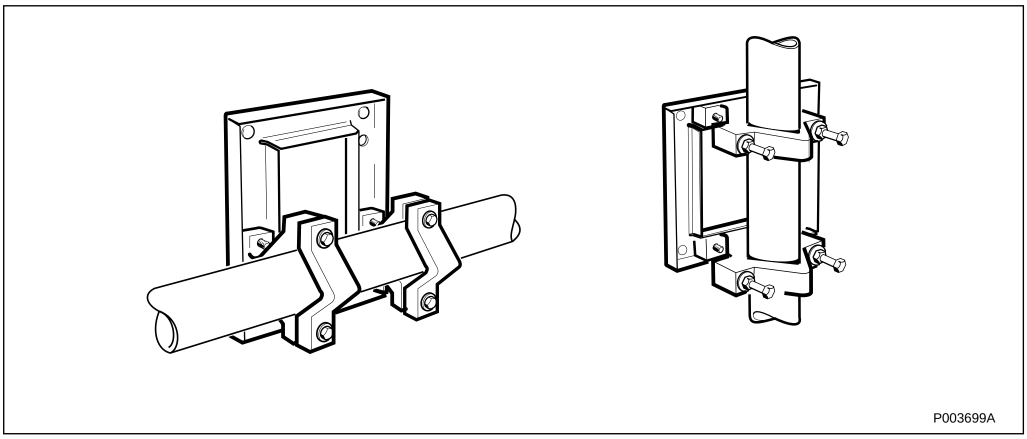


Figure 149 Mounting alternatives

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

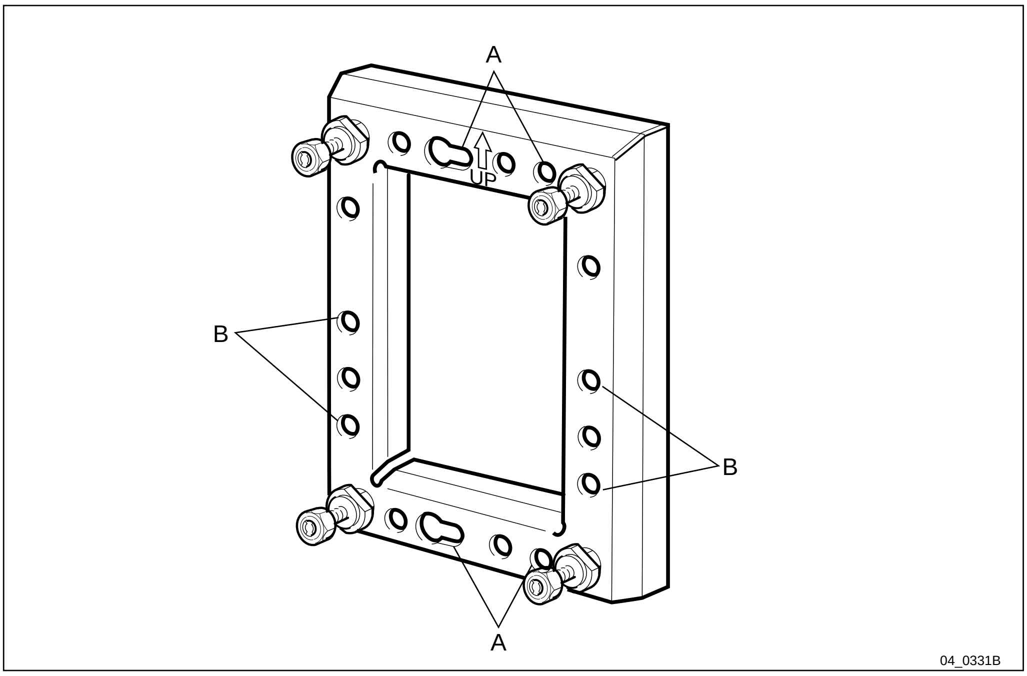


Figure 150 Choosing the appropriate holes

A Holes to be used for vertical pole

B Holes to be used for horizontal pole

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

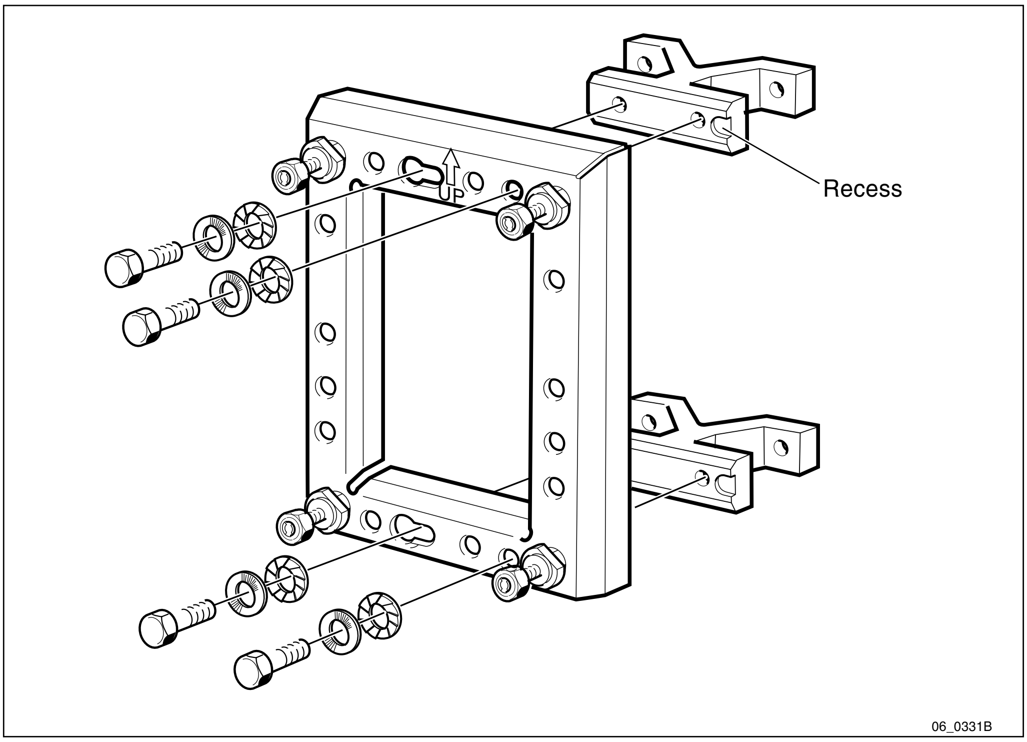
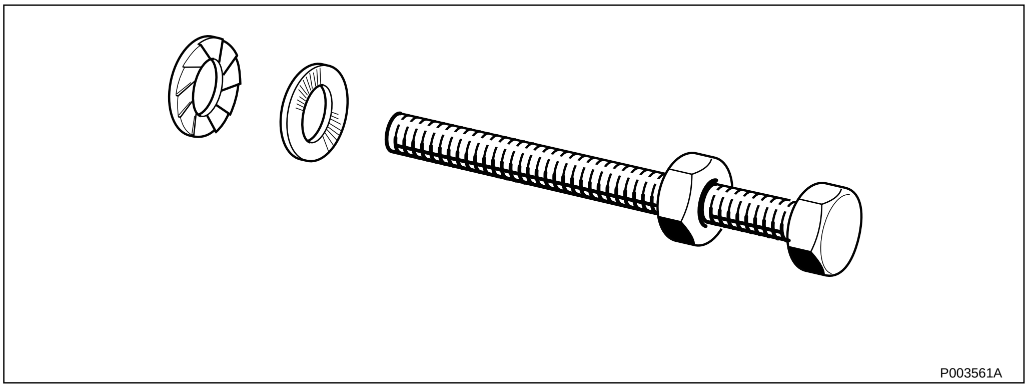


Figure 151 Fastening the clamps and mounting the washers

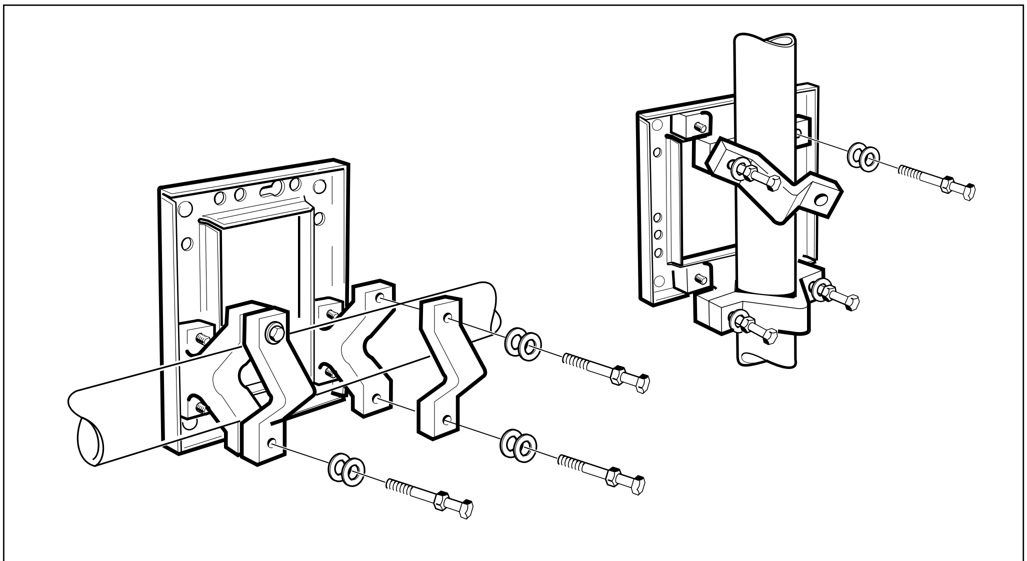


P003561A

Figure 152 Mounting the washers

2. Make sure that the washers are mounted correctly, *see figure above*.

3. Fasten the two clamps with the screws and washers, for torque *see Table 25 on page 141*. Ensure that the recess is attached at the correct place.



P003151A

Figure 153 Placing the mounting plate correctly

4. Place the mounting base at the correct height on the pole and mount the clamps.

5. Make sure that the washers are mounted correctly, *see figure above*.

6. Mount the screws and tighten them alternately (right and left side) in order to avoid bending the screws, for torque *see Table 25 on page 141*.

6.4 Installing the Mounting Base

6.4.1 Mounting the Mounting Base

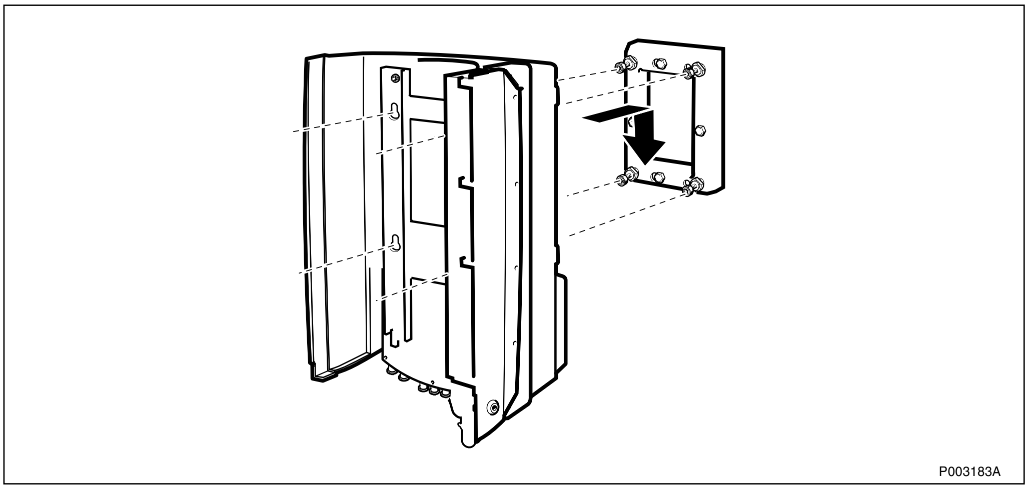


Figure 154 Mounting the mounting base on the mounting plate

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.
2. Check with a spiritlevel if the mounting base is placed in a vertical position.

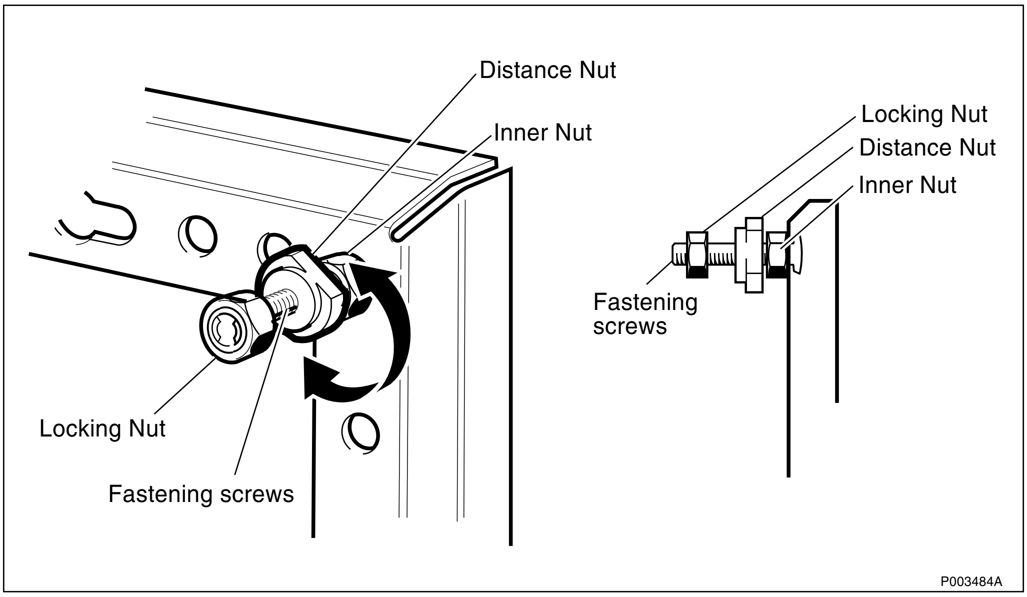


Figure 155 Adjusting the distance nuts

3. If the mounting base is not in a vertical position the inclination can be corrected 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 locking nuts secure the bolts in the mounting plate.

4. When the mounting base is correctly adjusted, tighten the four locking nuts, for torque *see Table 25 on page 141*.

6.4.2 Mounting the Installation Box Door

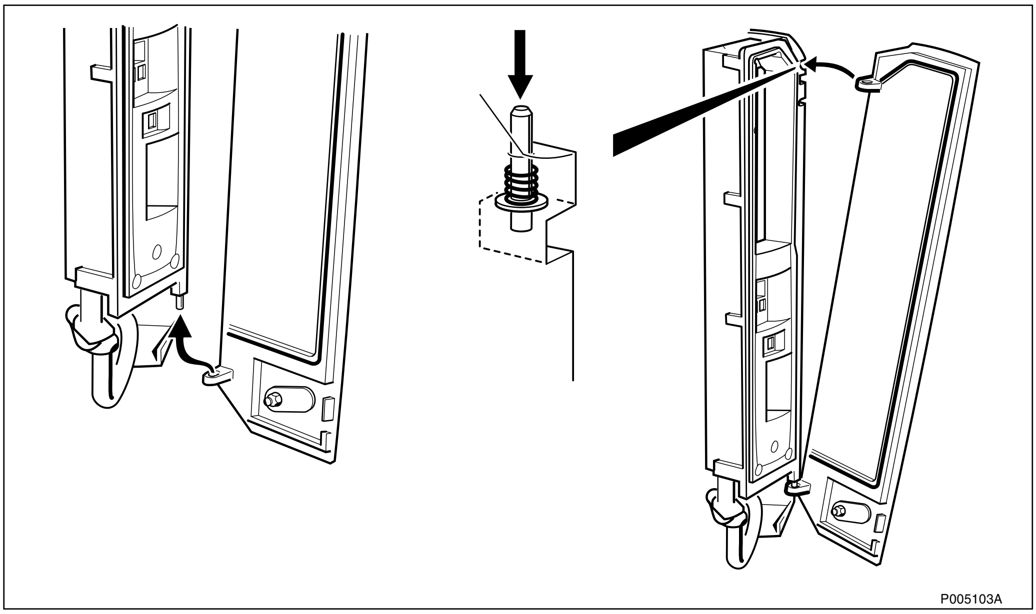


Figure 156 Mounting the installation box door

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.

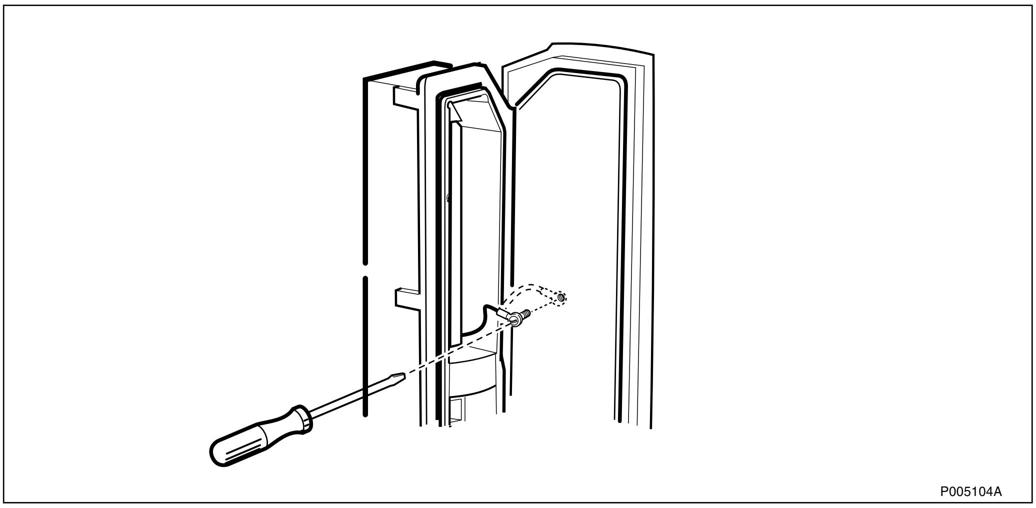


Figure 157 Mounting the earth cable

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

6.4.3 Installing the Fuses

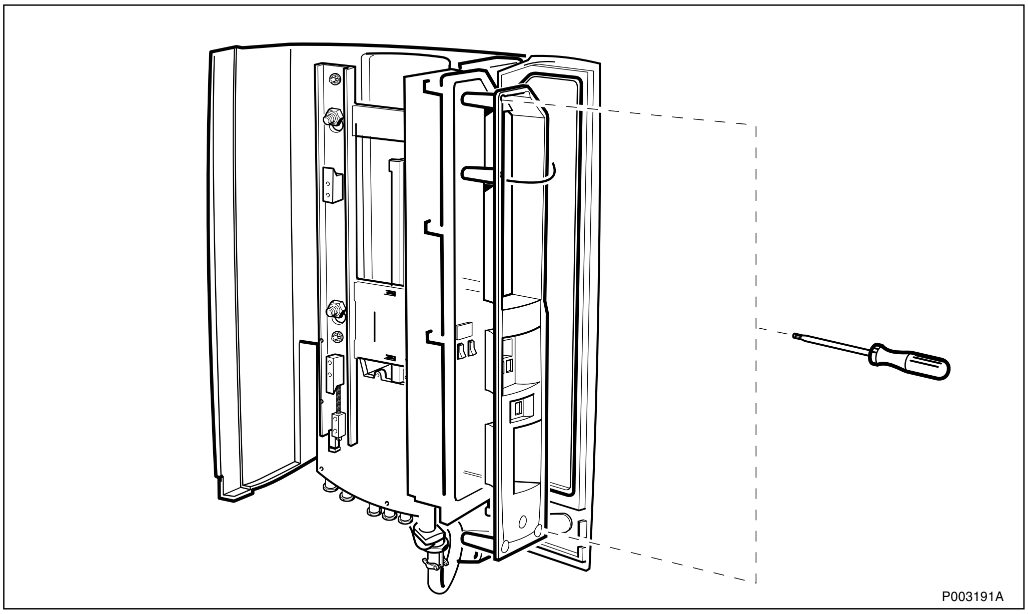


Figure 158 Removing the protection cover

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

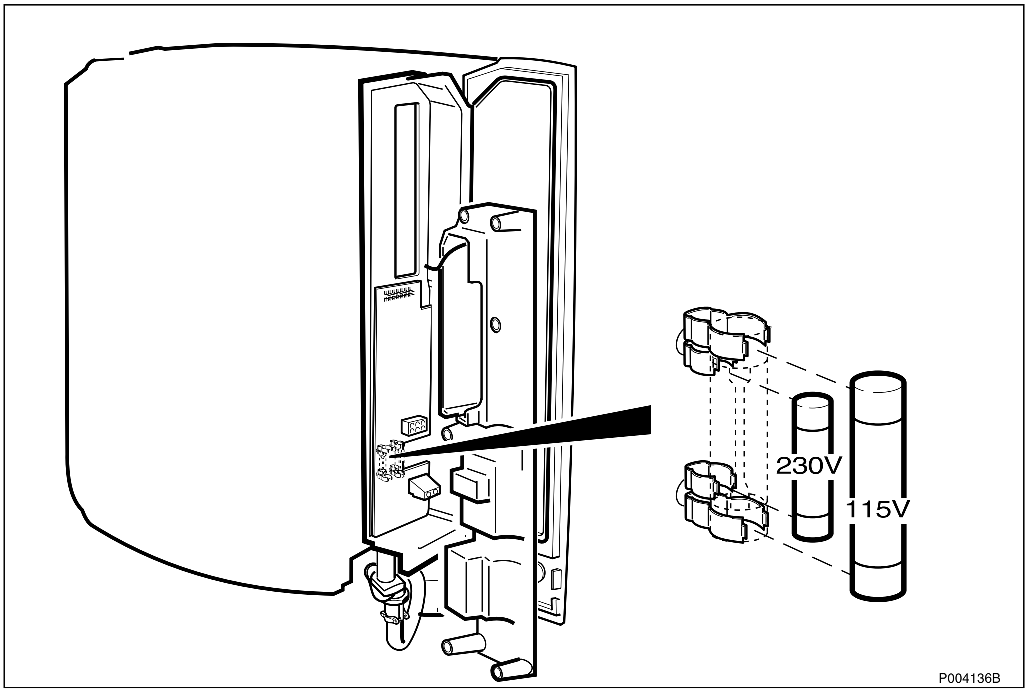


Figure 159 Installing the fuses

2. Install the recommended fuses.

Table 26

Voltage	Fuses Data	Dimension
100-127 V AC	Ceramic Slow Blow 8 AT, 250 V(1)	6.3x32 mm
200-250 V AC	Ceramic Slow Blow 4 AT, 250 V(1)	5x20 mm

(1) Fuse according to standard EN 60127

6.4.4 Connecting Earth and Lightning Protection

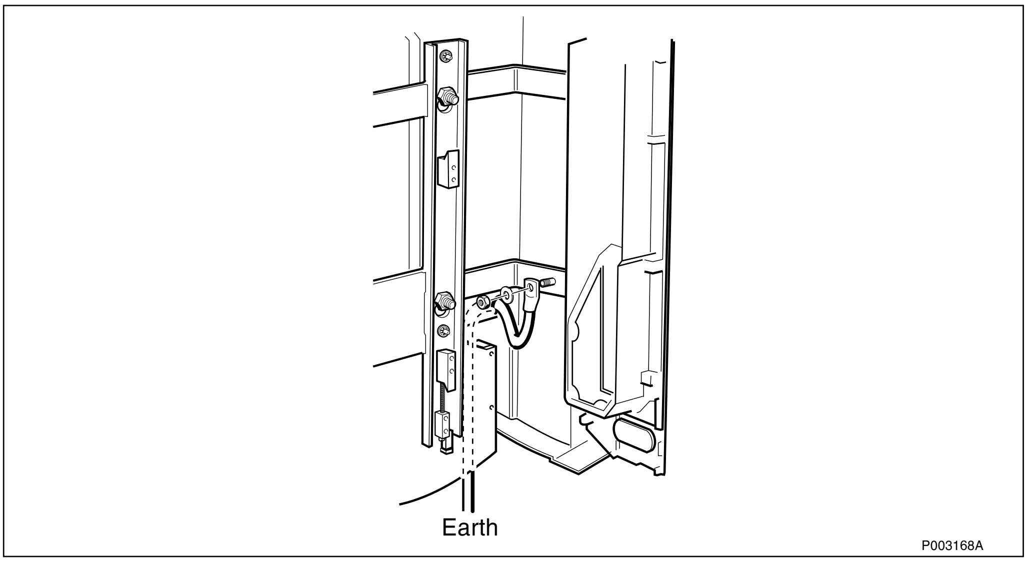


Figure 160 Connecting earth and lightning protection

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:

Standard Site Material Installation Instructions	*EN/LZT 720 0014*

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:

Standard Site Material Installation Instructions	*EN/LZT 720 0014*

6.5 Installation of External Cables

This section describes the connections to the PBC.

6.5.1 Opening the Interface Box

Before the connection procedure can begin the interface box has to be opened.

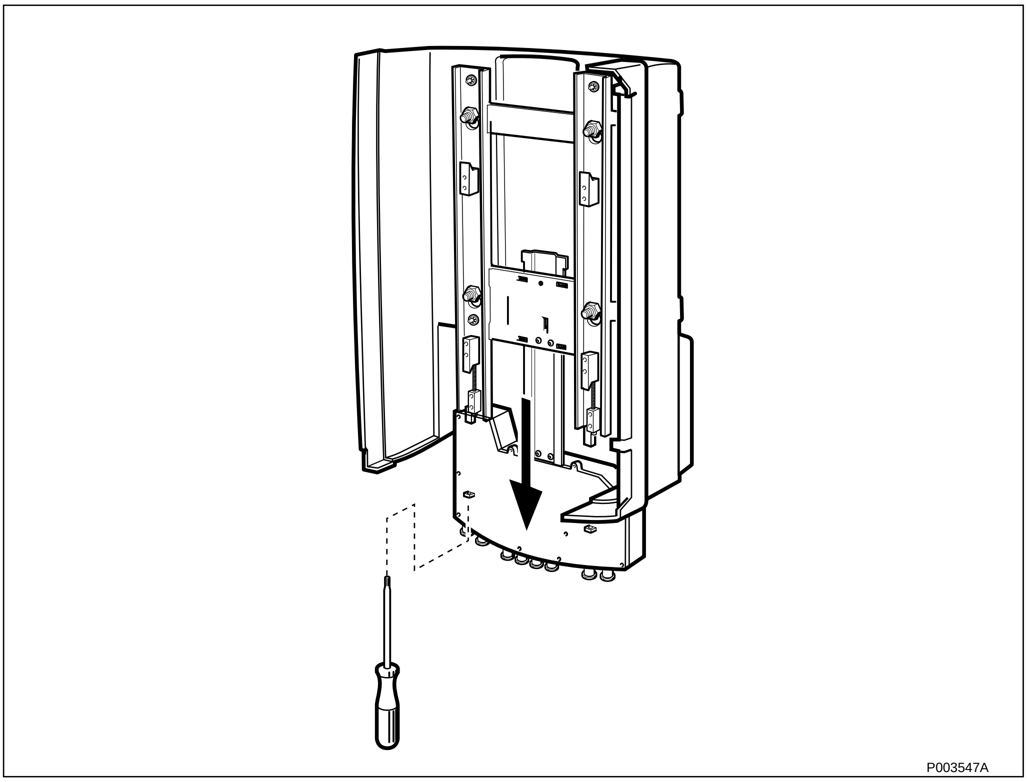


Figure 161 Pulling down the interface box

1. Loosen the screws securing the interface box on the mounting base and pull down the interface box.

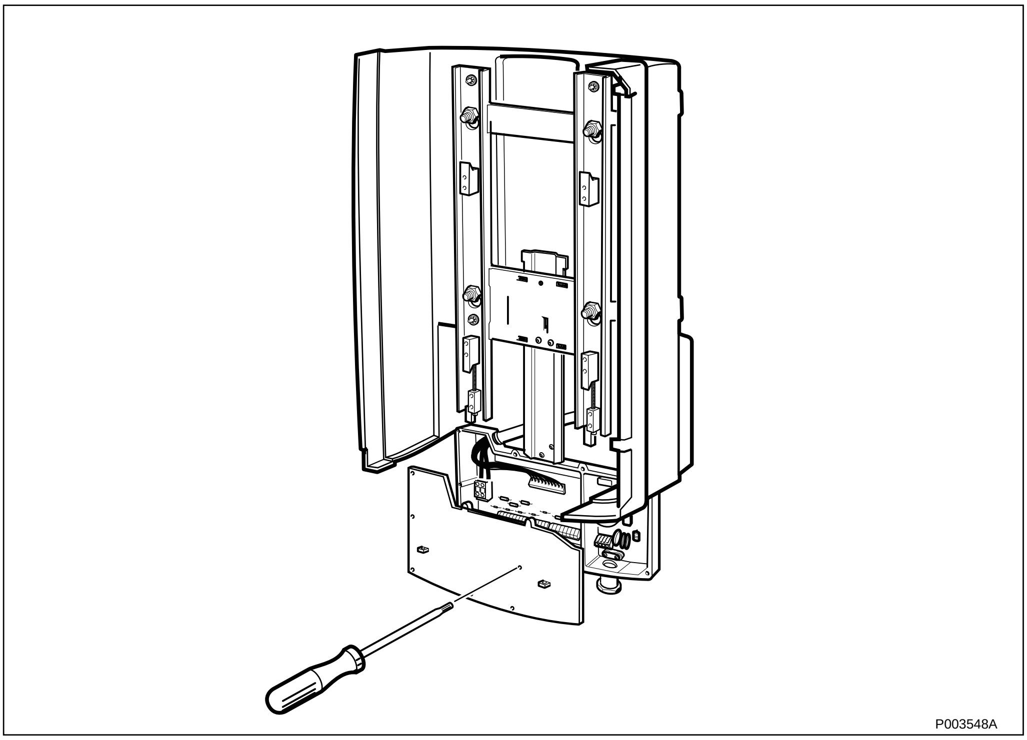


Figure 162 Opening the interface box

2. Unscrew the 9 torx screws on the interface box cover. Let the cover hang in the strap.

6.5.2 Connecting the AC Mains

DANGER

High voltage is used in the operation of this equippment. 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 electrical 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 and modify the electrical installation.

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, indicated by PE and the earth symbol.

Figure 163 Protective Earth

The Protective Earth connection is essential.

Connecting AC

It is not possible to loosen the gland plate for the AC cable from the interface box. Thus the AC cable can not be mounted at ground level.

Follow the procedure below to connect the AC mains power cable.

Note: Make sure the AC Mains is switched off before beginning the AC installation procedure.

1. Route the AC mains cable so the interface box can be pushed up into the cabinet.

If a flexible conduit is to be used, replace the AC mains cable inlet (feed throught) with the flexible conduit and its fastening device, *see Figure 166 on page 156*.

2. Cut the cable to the appropriate length.

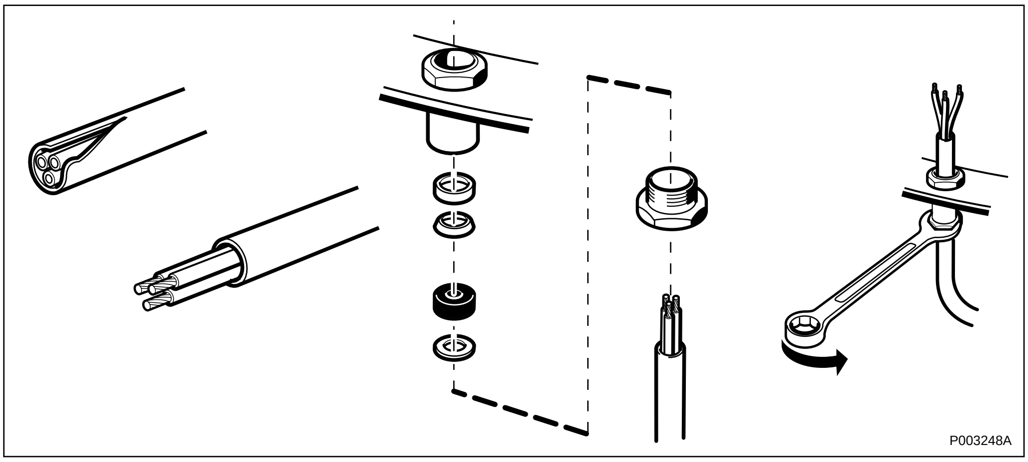


Figure 164 Dismantling and mounting the cable inlet

3. Cut the cable isolation.
4. Adjust the sealing grommet to the cable diameter.
5. Mount all cable inlet details, *see figure above*.
6. Route the cable into the inlet and tighten the cable gland.

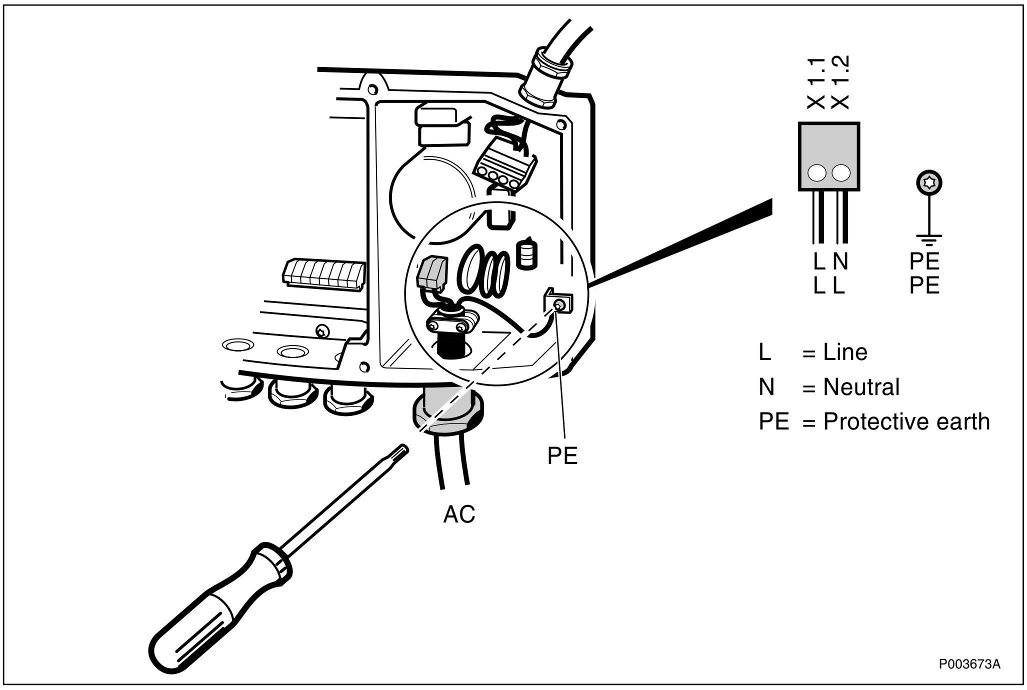


Figure 165 Connecting the AC mains and Protective Earth

7. Connect the AC mains cable.
8. Ensure that the protective earth (PE) is properly connected.

Note: Line and neutral shall be connected according to *figure above*. It is required to have one common neutral (N) within the complete intallation. It is recommended to supply the site from same phase only.

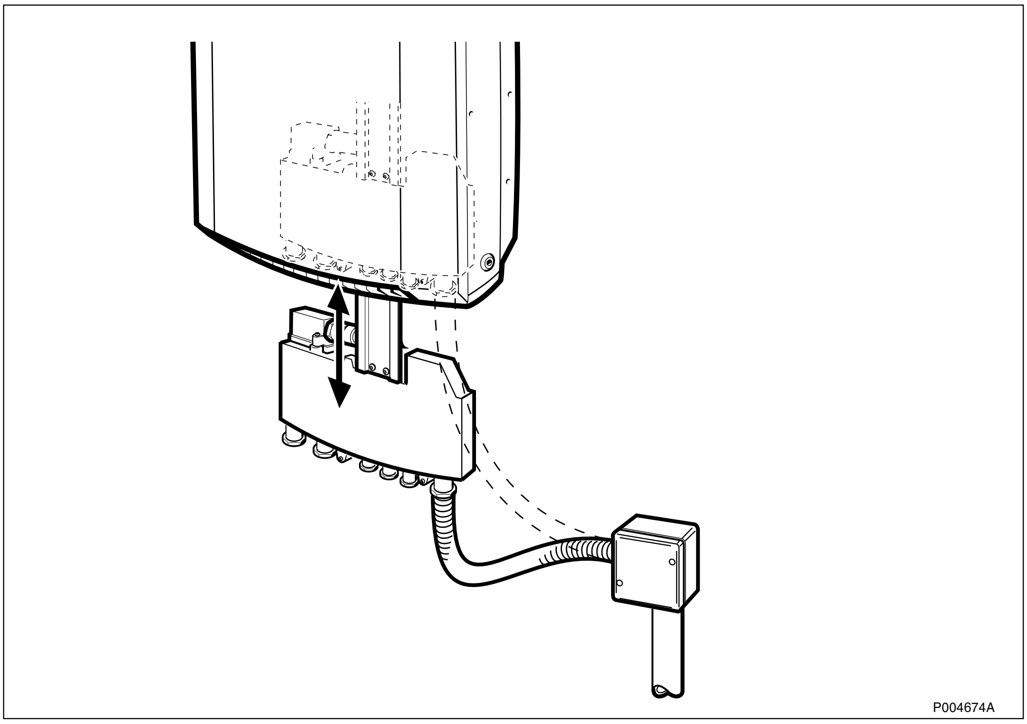


Figure 166 Example of use of flexible conduit

6.5.3 Loosening the Interface Box Gland Plate

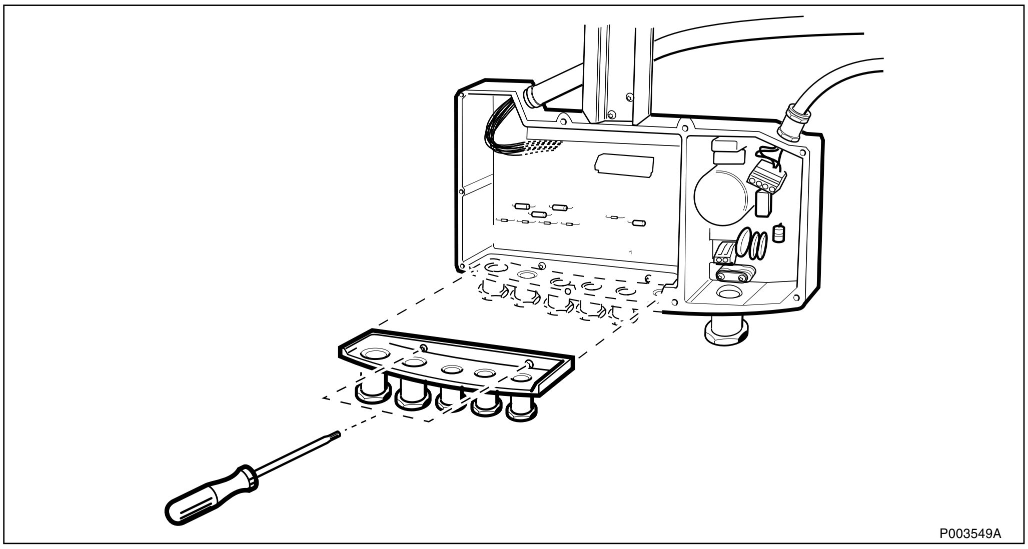


Figure 167 Loosening the gland plate

To simplify the mounting of the cables to the interface box the gland plate may be loosened. This is done by unscrewing the 2 torx screws.

For example is it easier to mount the cable inlet and the cable termination block at ground level instead of at a height, for example on a ladder.

Loosening the Termination Block

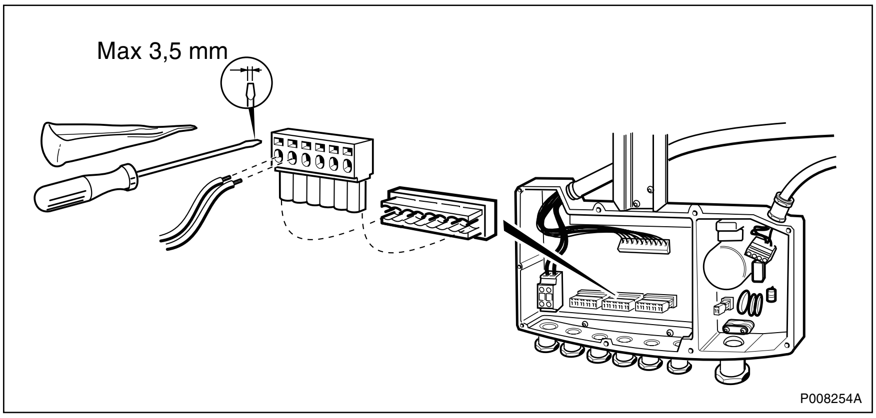


Figure 168 Loosening the termination block

The termination blocks may be loosened to simplify the mounting of the cables.

6.5.4 Assembling the Cable Gland

This section describes the assembling and mounting of the cables that are to be connected to the interface box.

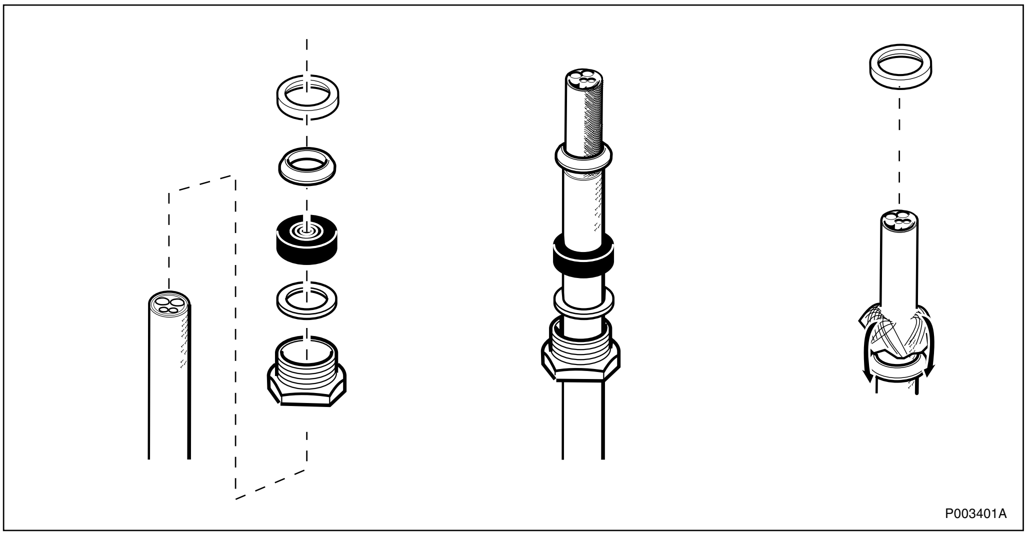


Figure 169 Assembling the cable gland

1. Cut the cables to appropriate length .

Note: Remember to take into account that extra cable length is required so that the interface box can be mounted back into the mounting base.

2. Route the cables so the interface box can be pushed up.
3. Adjust the sealing grommet to the cable diameter.
4. Mount all cable gland details, except for the last clamping cone.
5. Remove the insulation.

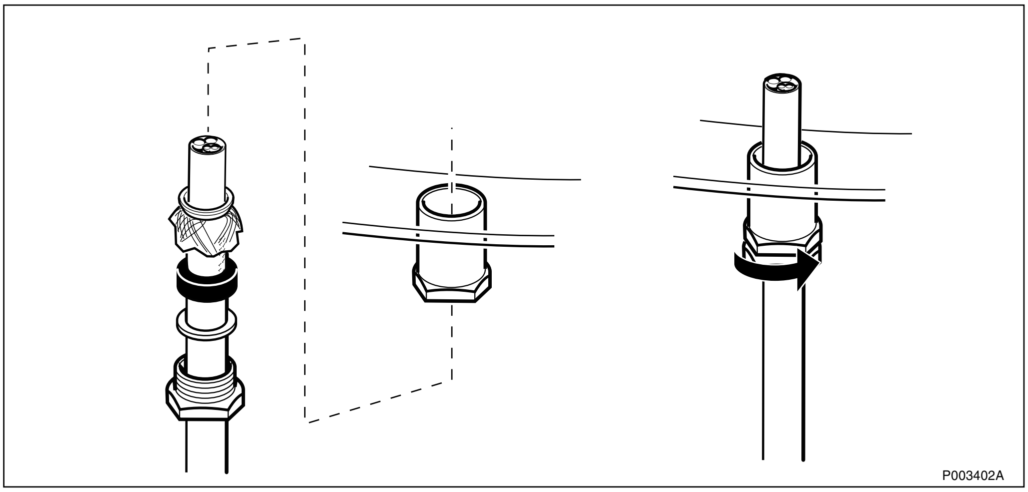


Figure 170 Mounting the cable gland

6. Fold the outer braid.
7. To earth the cable, fit the clamping cone over the cable so that the outer cable braid is squeezed between clamping ring and clamping cone.
8. Route the cable into the inlet and tighten the cable gland.

6.5.5 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 premounted.

1. Dismantle the cable and mount the cable inlet, *see Section 6.5.4 Assembling the Cable Gland on page 157*.

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.

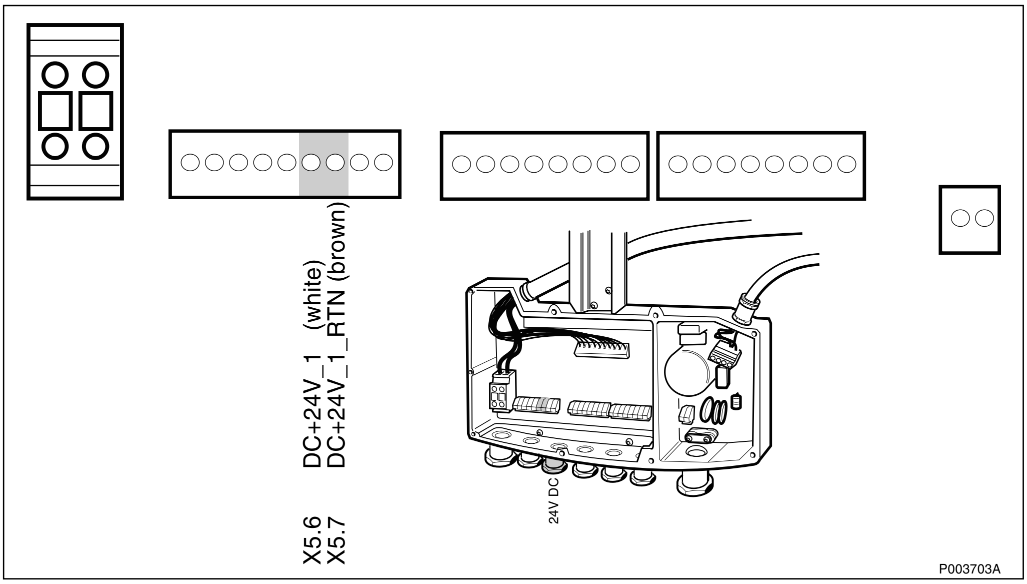


Figure 171 Connecting the 24 V DC Power Supply Adapter

2. Insert the cable wires in to the termination block.

6.5.6 Connecting the Alarm cable

1. Dismantle the cable and mount the cable inlet, *see Section 6.5.4 Assembling the Cable Gland on page 157*.

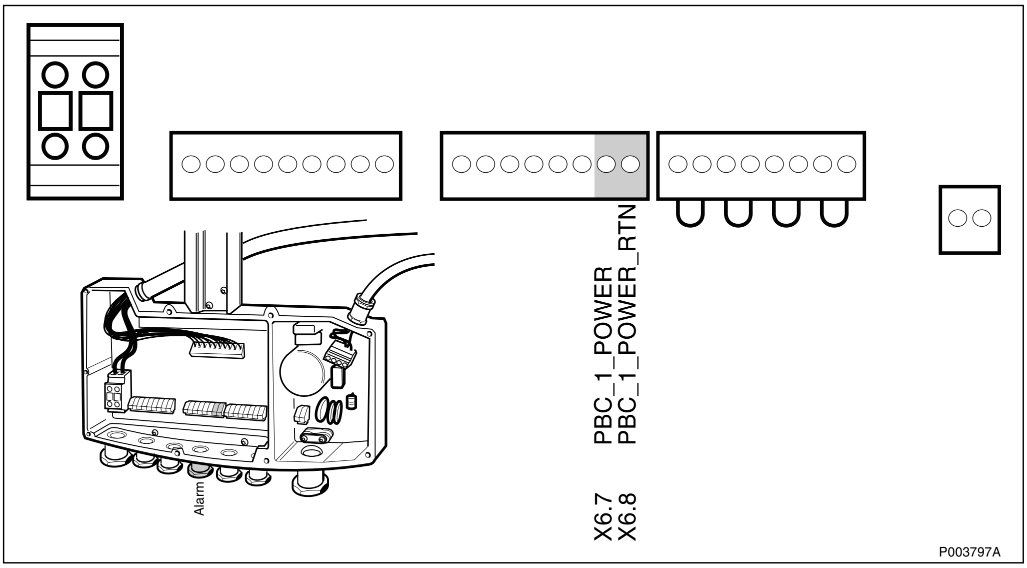


Figure 172 Connecting the alarm cable

2. Insert the cable wires in to the termination block.

6.5.7 Closing the Interface Box

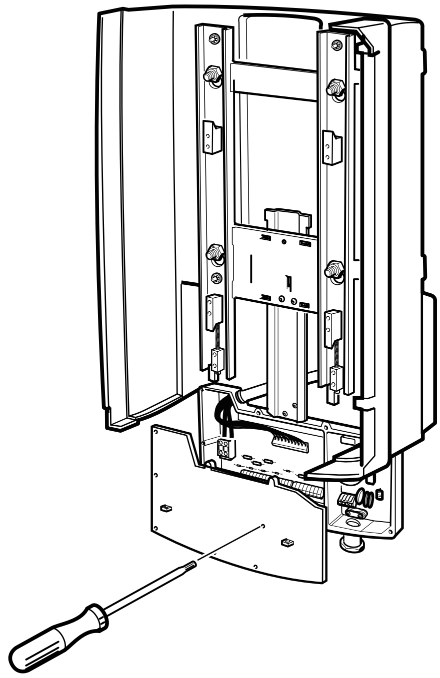


Figure 173 Closing the interface box

1. Remount the interface box cover by screwing the 9 torx screws back into position.
2. Push the interface box upwards and screw the two torx screws situated on the mounting base back into position.

6.6 Installing the Cabinet

6.6.1 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 lifting the PBC assembled with batteries.

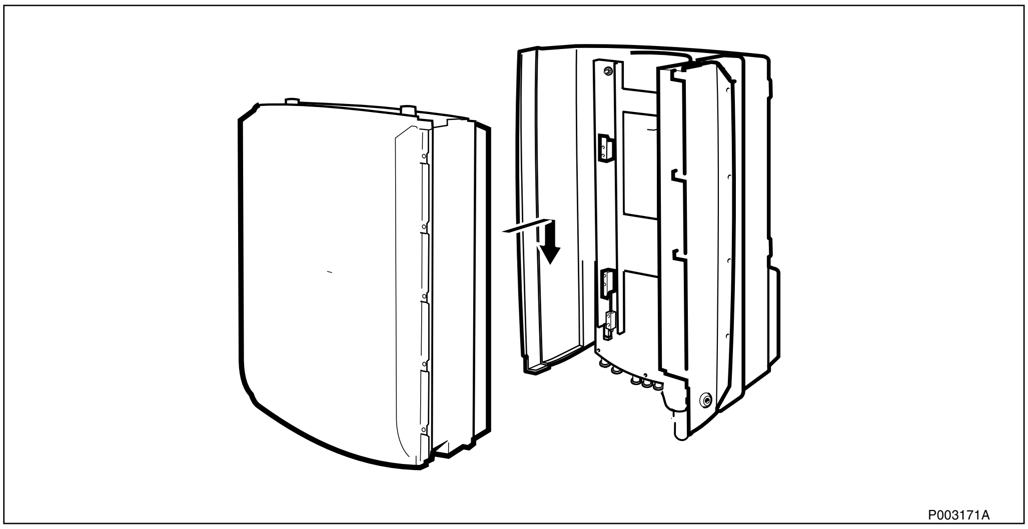


Figure 174   Mounting the cabinet

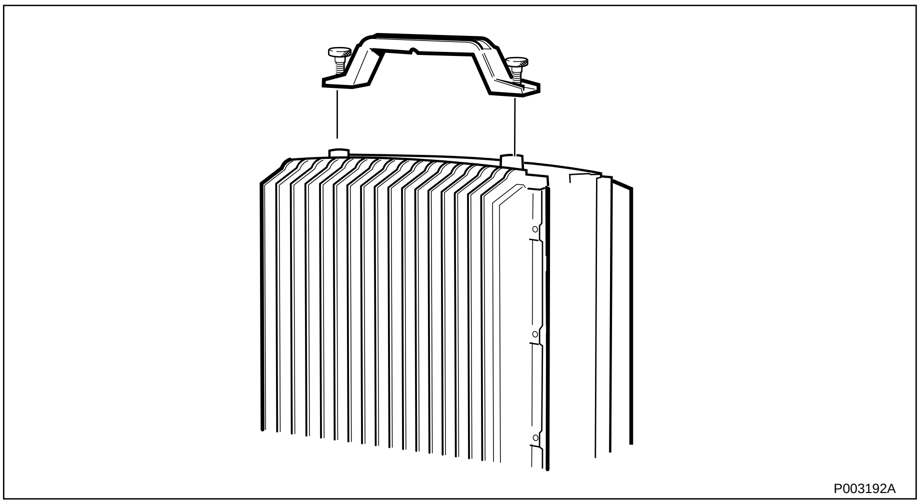


Figure 175   Mounting the lifting handle

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

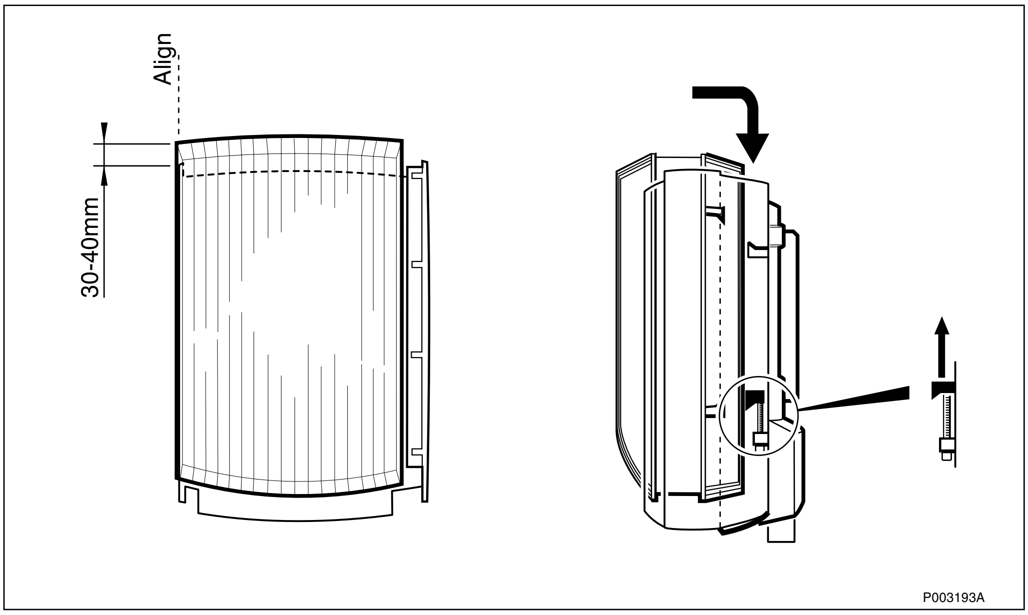


Figure 176 Facilitating mounting the cabinet on the mounting base

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 above*.

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.

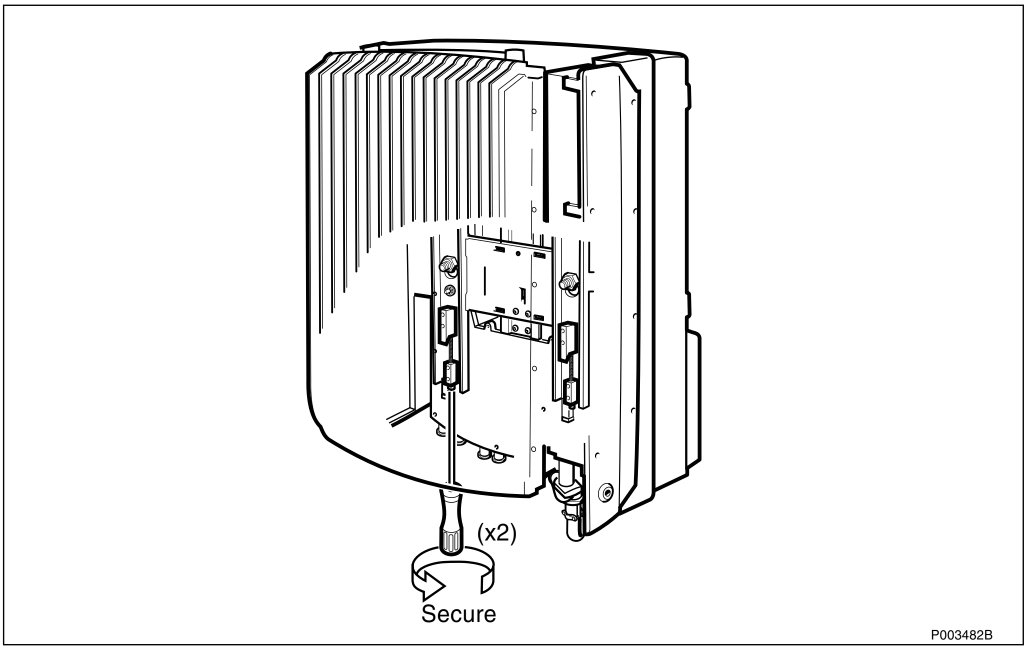


Figure 177 Securing the cabinet

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

6. Remove the lifting handle if it has been used.

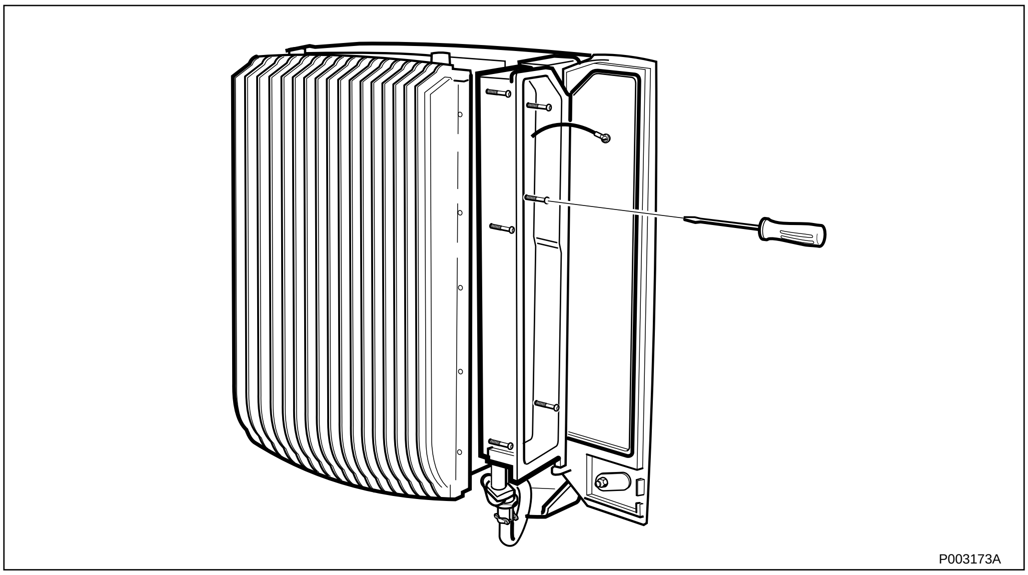


Figure 178 Fastening the installation box

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

6.6.2 Connecting Internal Cables

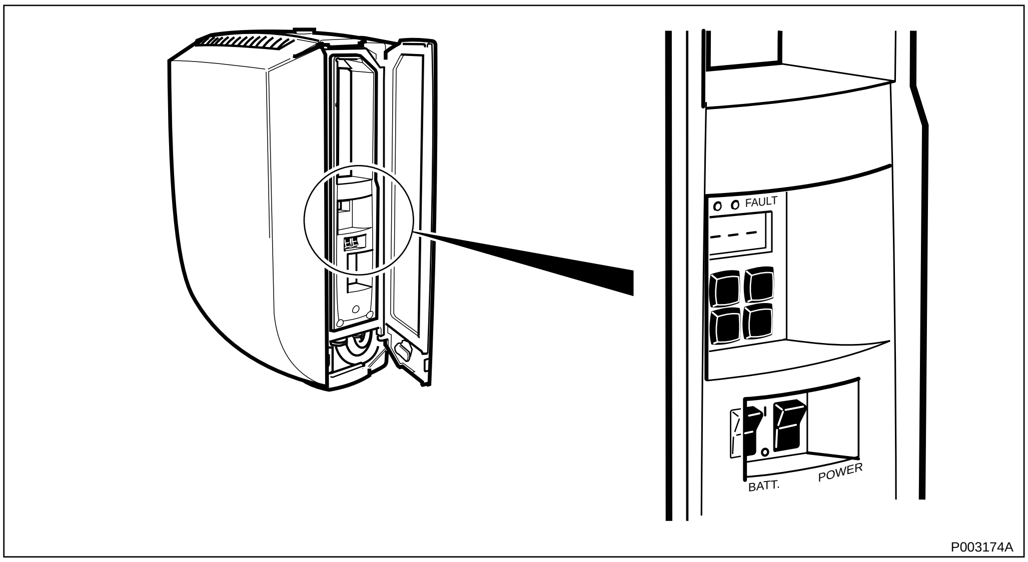


Figure 179 Position of the AC power and battery switches

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

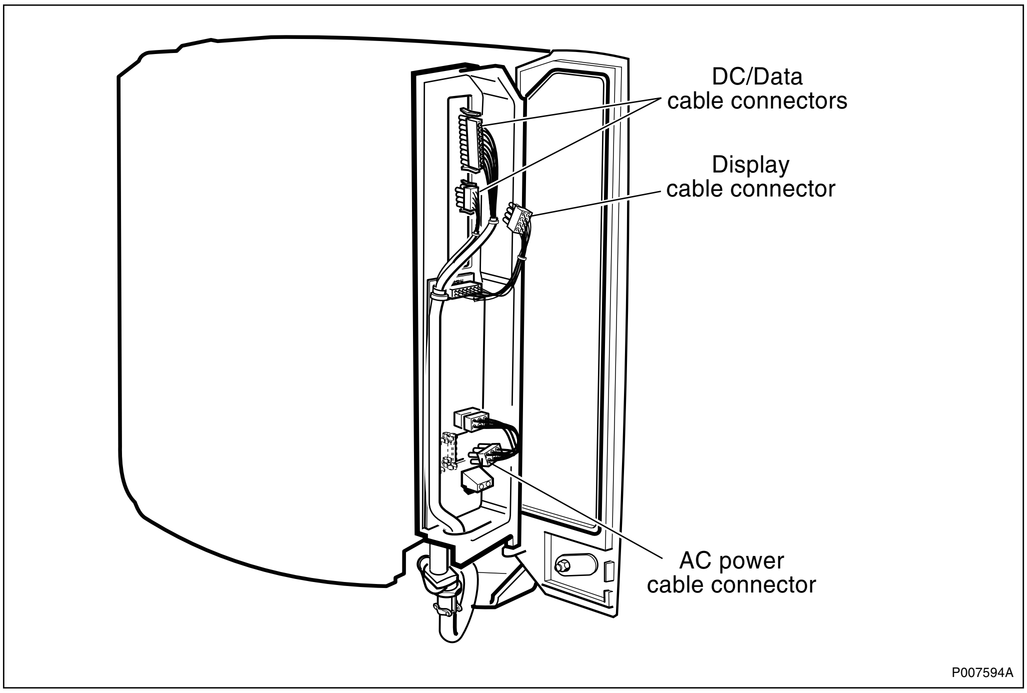


Figure 180 Connecting internal cables

2. Plug the four connectors for the AC power cable, display cable and DC/Data cable in to the cabinet.
3. Remount the protection cover.

6.6.3 Installing the Batteries

Note: The batteries must be installed to have the full function of the PBC.

DANGER

⚠

Read Safety instructions regarding handling and connecting batteries.

CAUTION

⚠

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

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

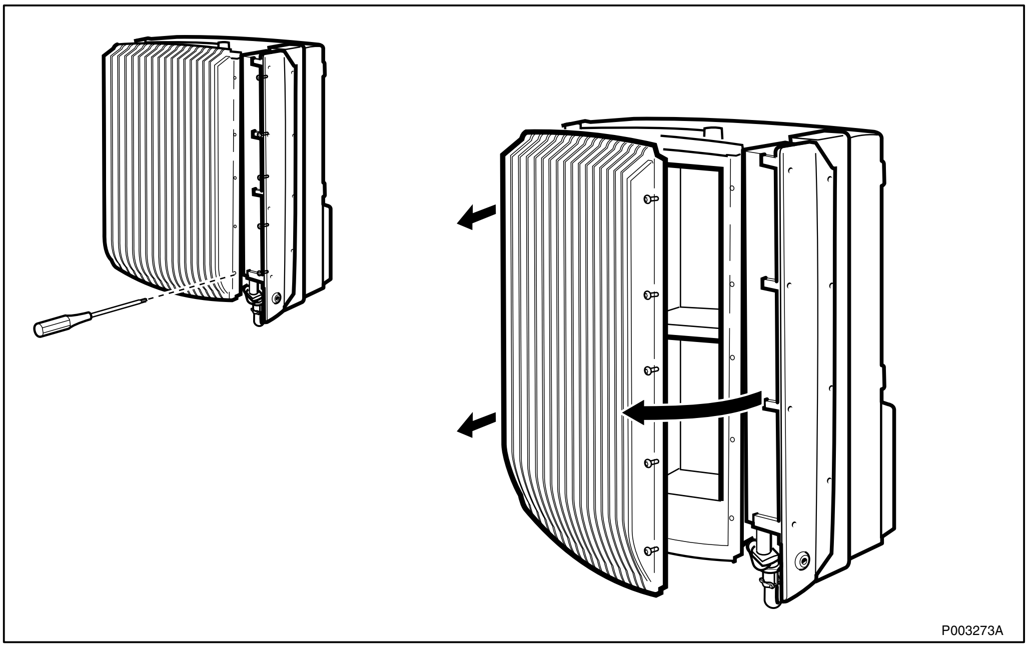


Figure 181 Opening the battery compartment

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

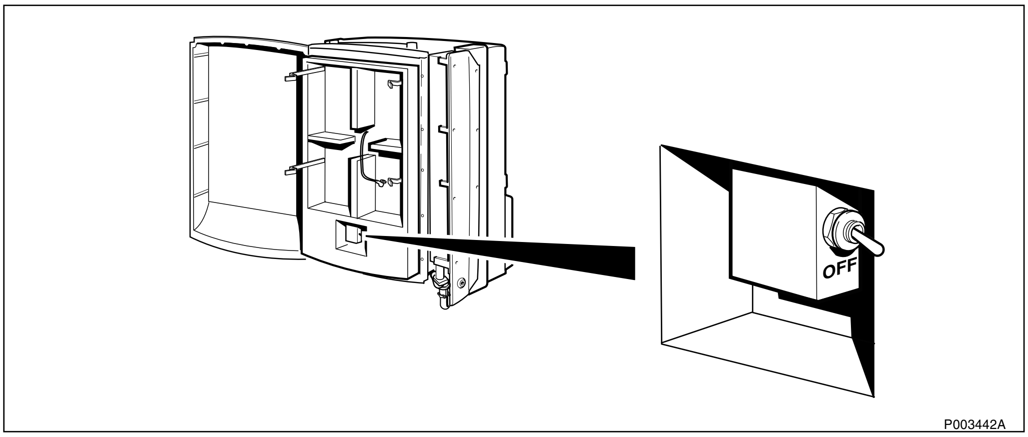


Figure 182 Battery switch position

Note: Ensure that the automatic circuit breaker is in the OFF position.

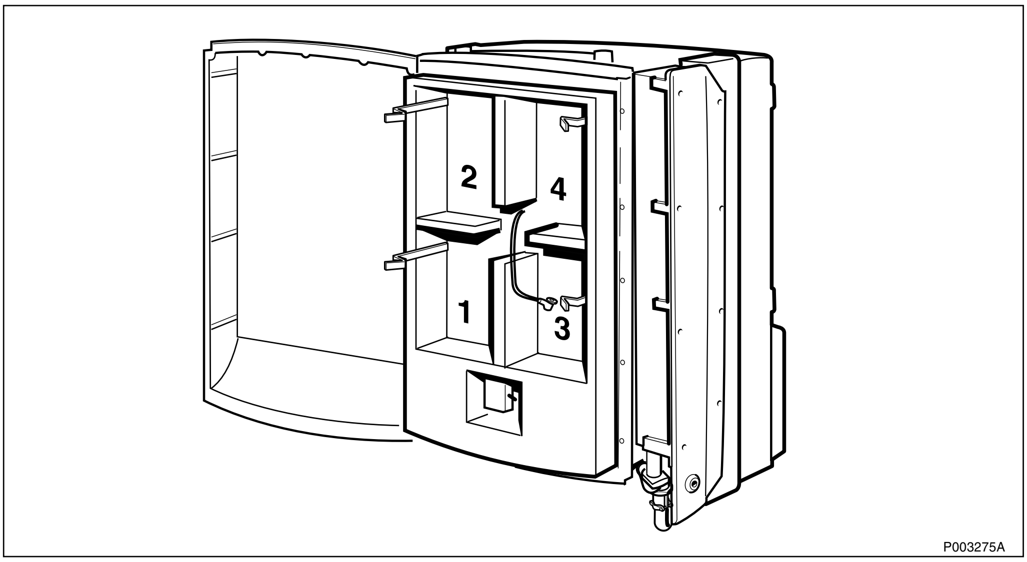


Figure 183 Battery numbering

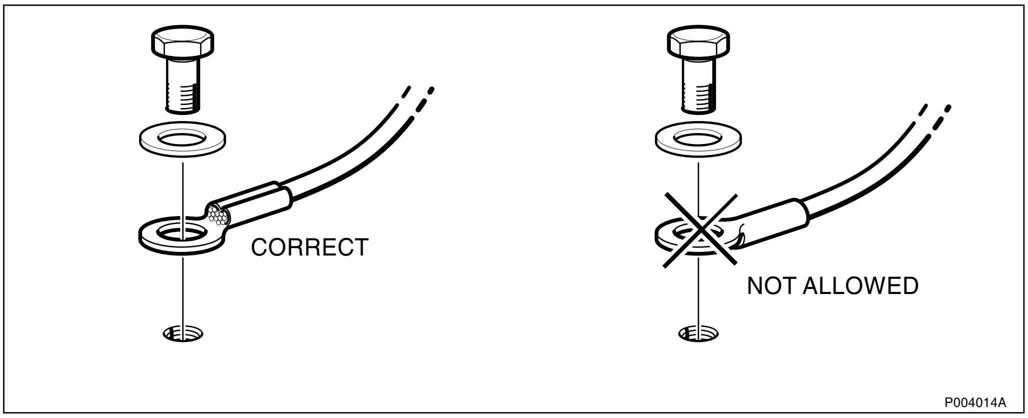


Figure 184 Connecting cable lugs to batteries

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

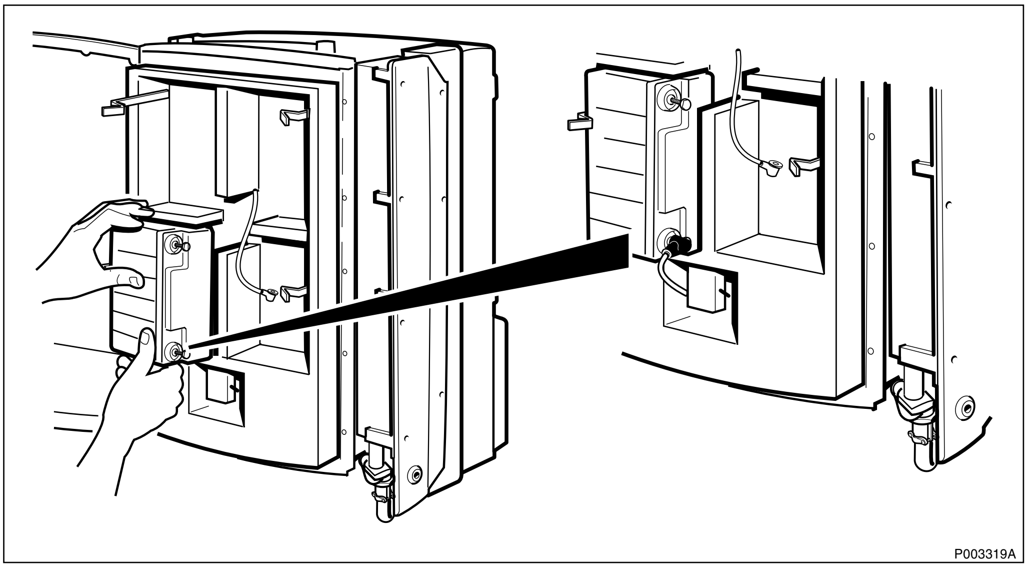


Figure 185 Installing battery 1

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. Install battery 1 and connect the cable coming from the battery switch panel to the plus-pole (+).

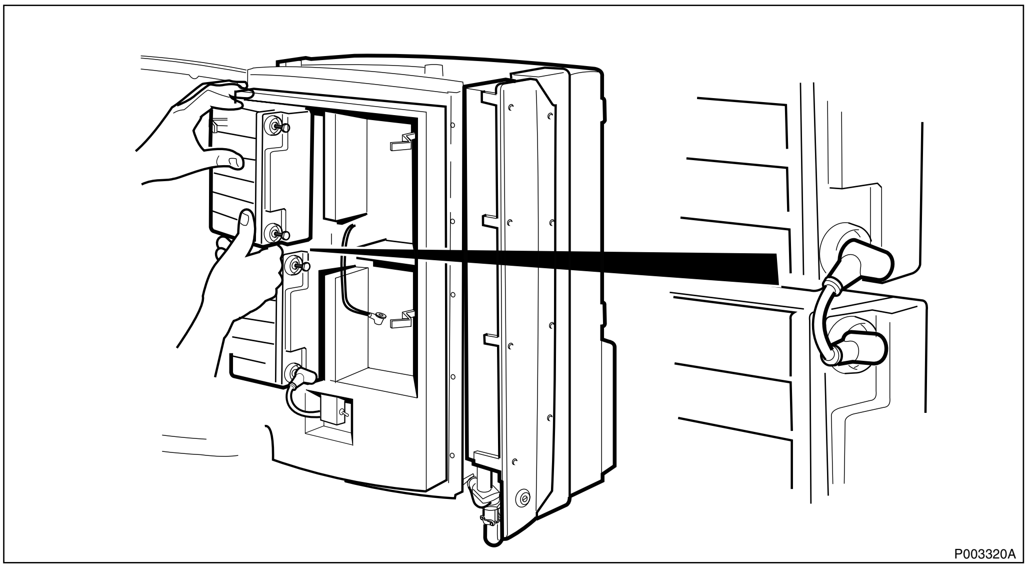


Figure 186 Connecting the first and second battery

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

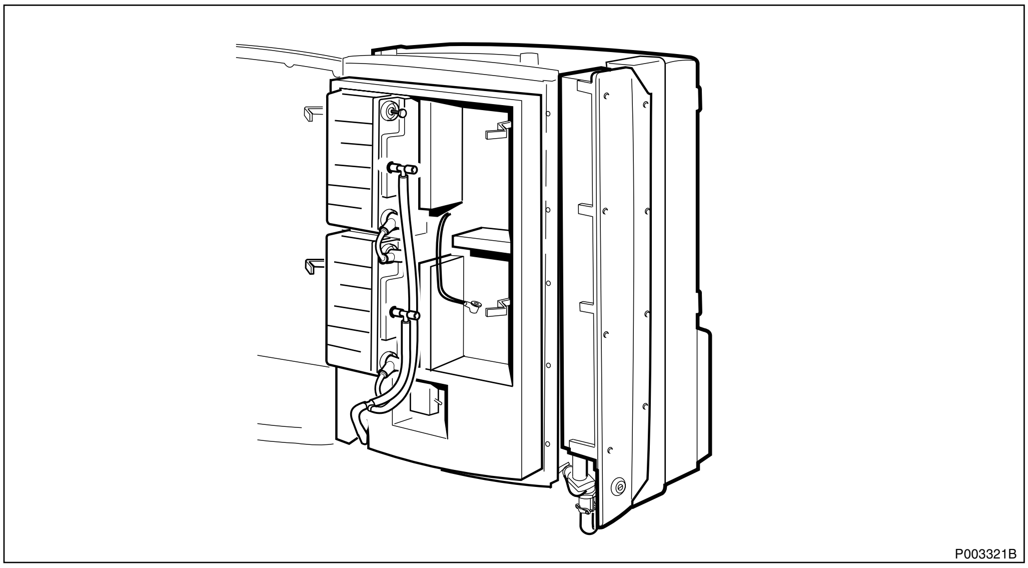


Figure 187 Connecting the ventilation hose

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.

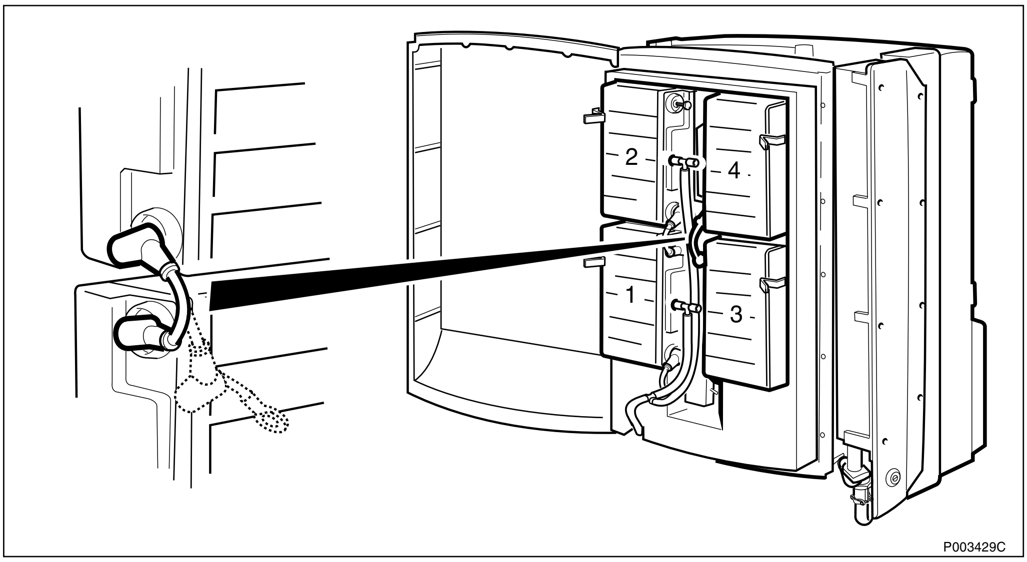


Figure 188 Connecting battery 3 and 4

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

Note: To prevent short circuit, do not connect battery jumper cable between battery 2 and 4 until step 10 is done.

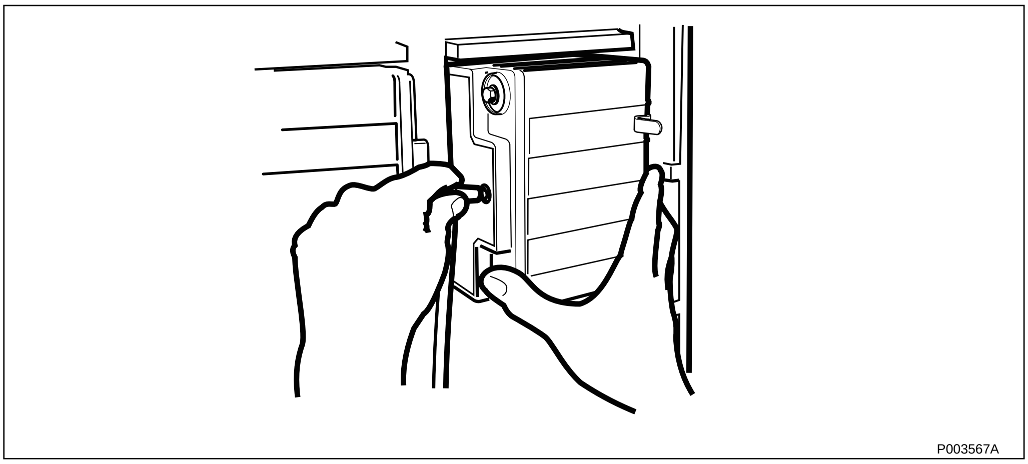


Figure 189 Connecting the ventilation hose

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

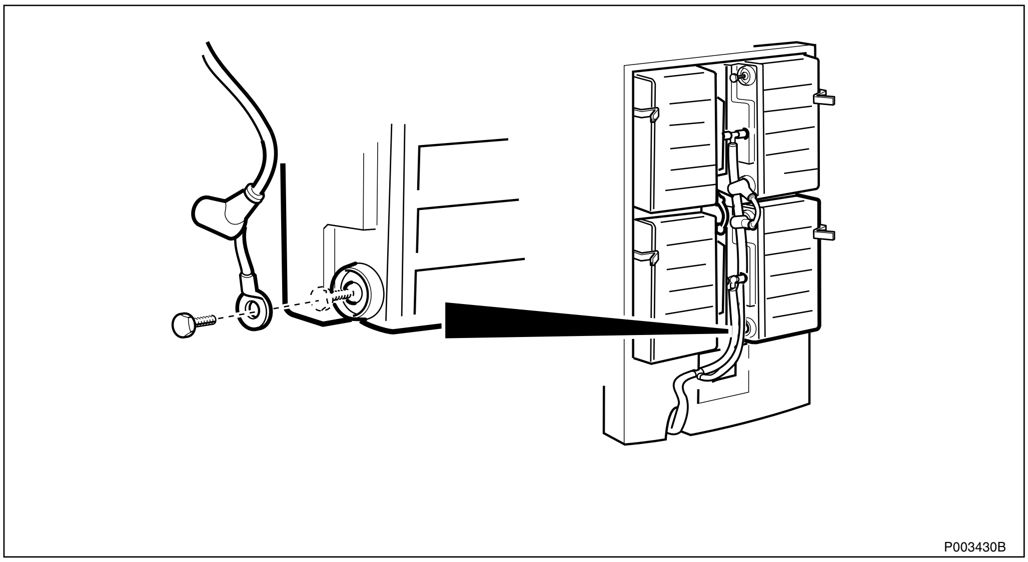


Figure 190 Connecting the minus-pole of battery 3

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

Note: Ensure that the automatic circuit breaker is in the OFF position.

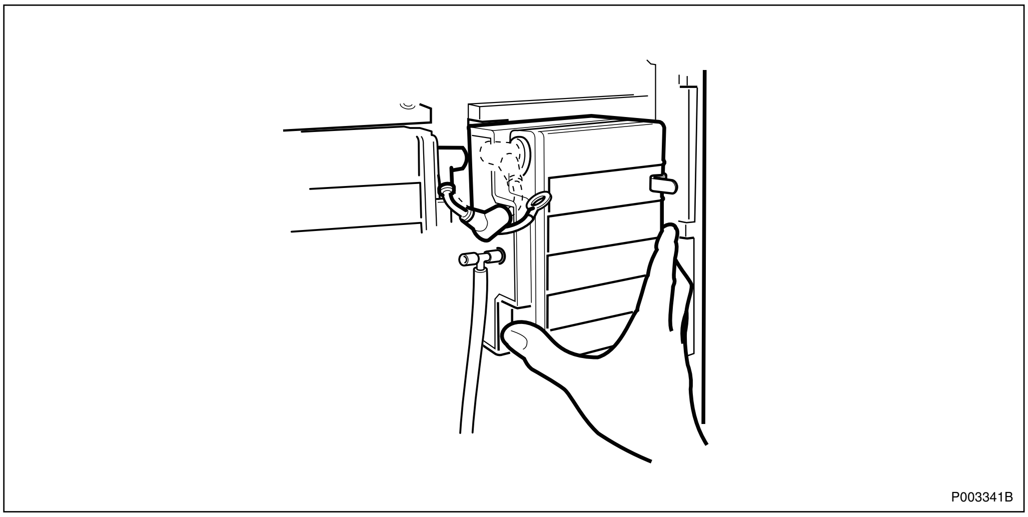


Figure 191 Connecting battery 2 and 4

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

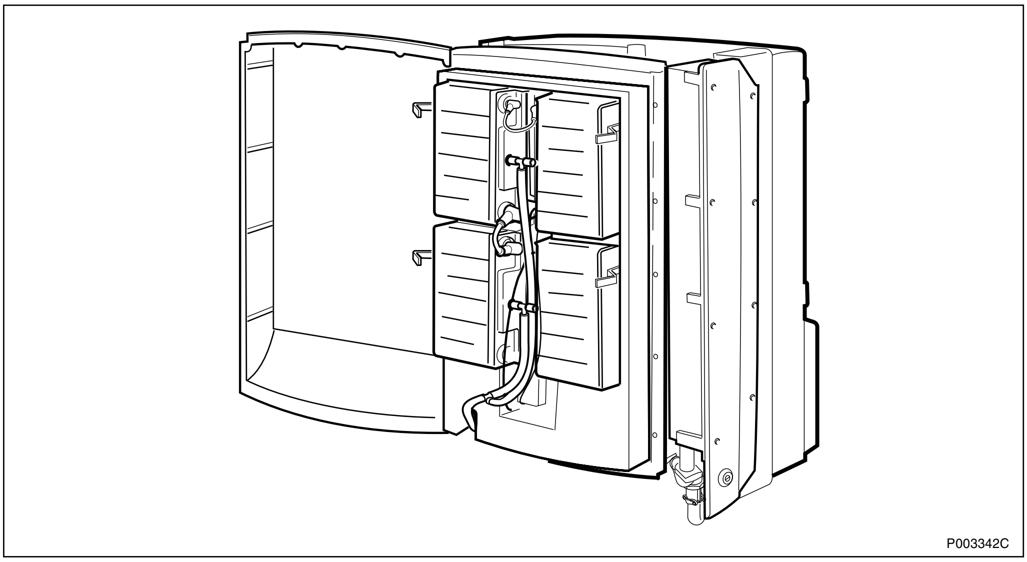


Figure 192 Power and Battery Cabinet

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. Set the automatic circuit breaker in the ON position.
17. Close the PBC door and screw the 18 torx screws back into position.

6.7 Mounting the Sunshields

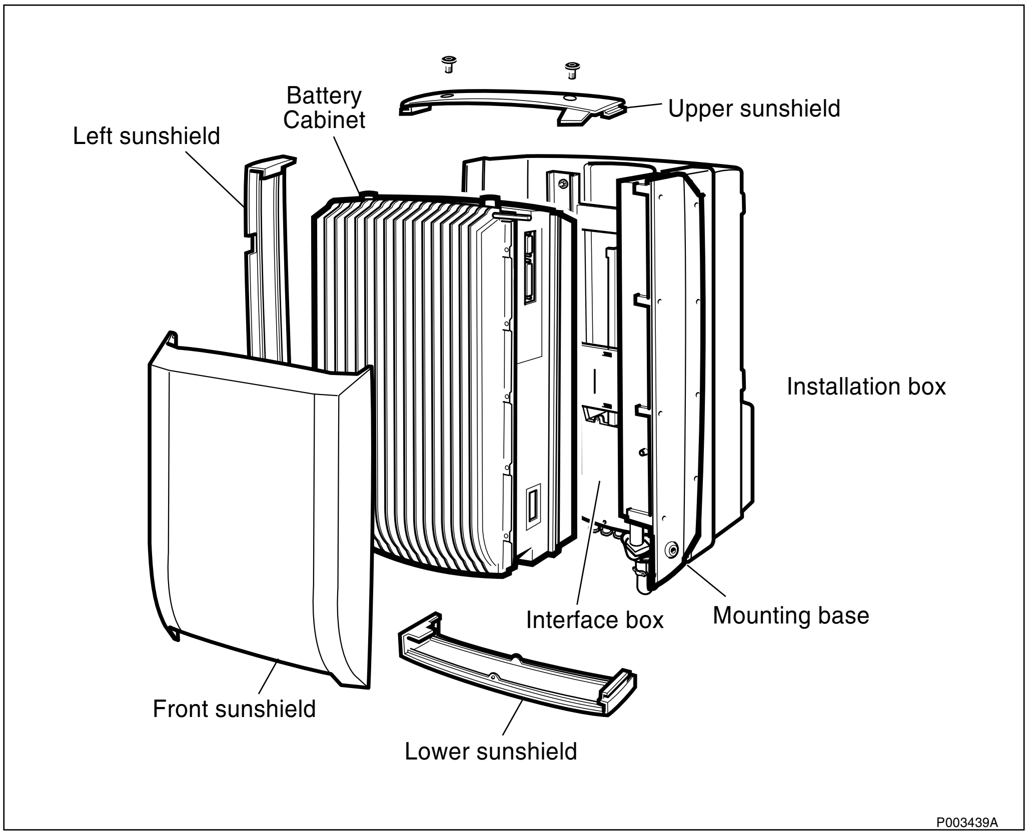


Figure 193 Main units

6.7.1 Mounting the Upper Sunshield

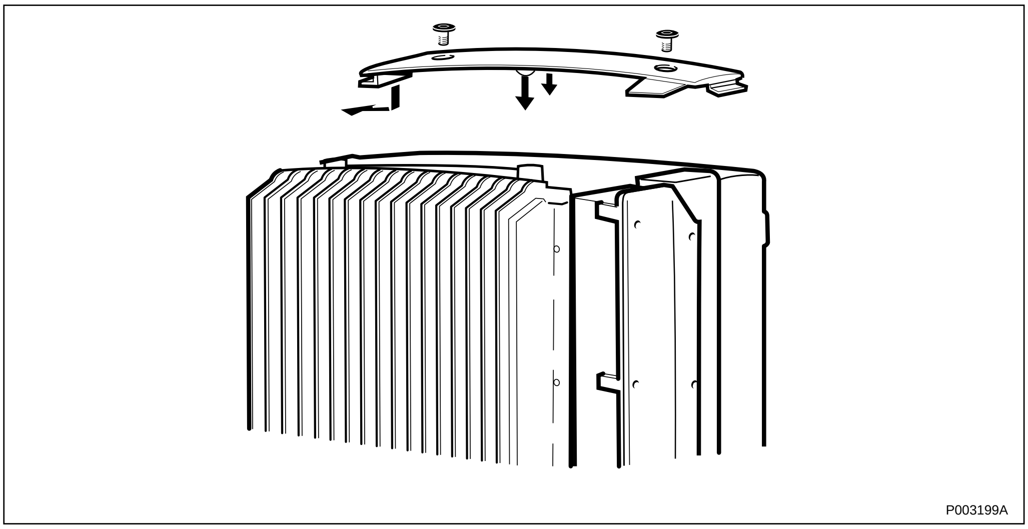


Figure 194 Mounting the upper sunshield

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

Note: The plugs are to be screwed, *not* pressed.

6.7.2 Mounting the Left Sunshield

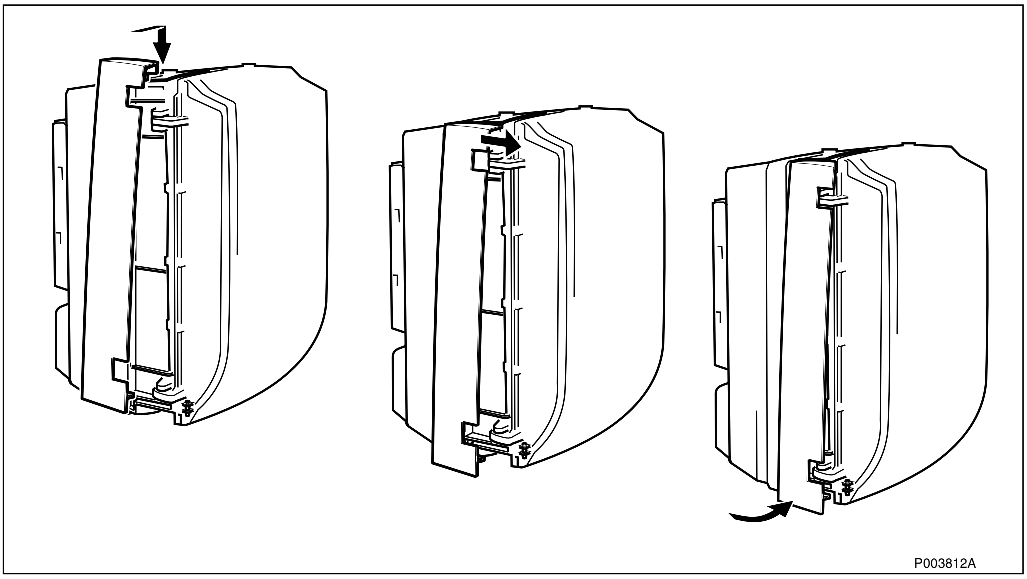


Figure 195 Mounting the left sunshield

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.

6.7.3 Mounting the Lower Sunshield

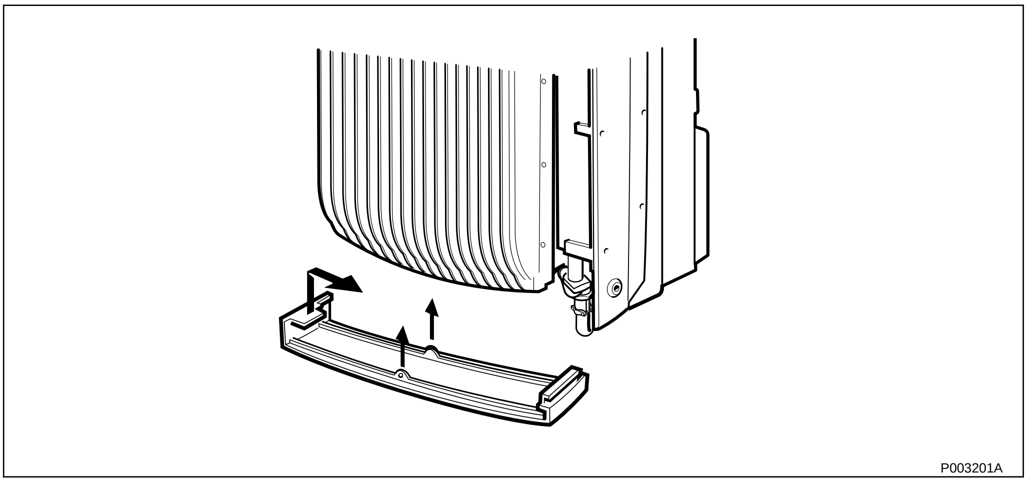


Figure 196 Mounting the lower sunshield

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 and push it up until it snaps into position. The fasteners are situated on the middle of the cabinet.

6.7.4 Mounting the Front Sunshield

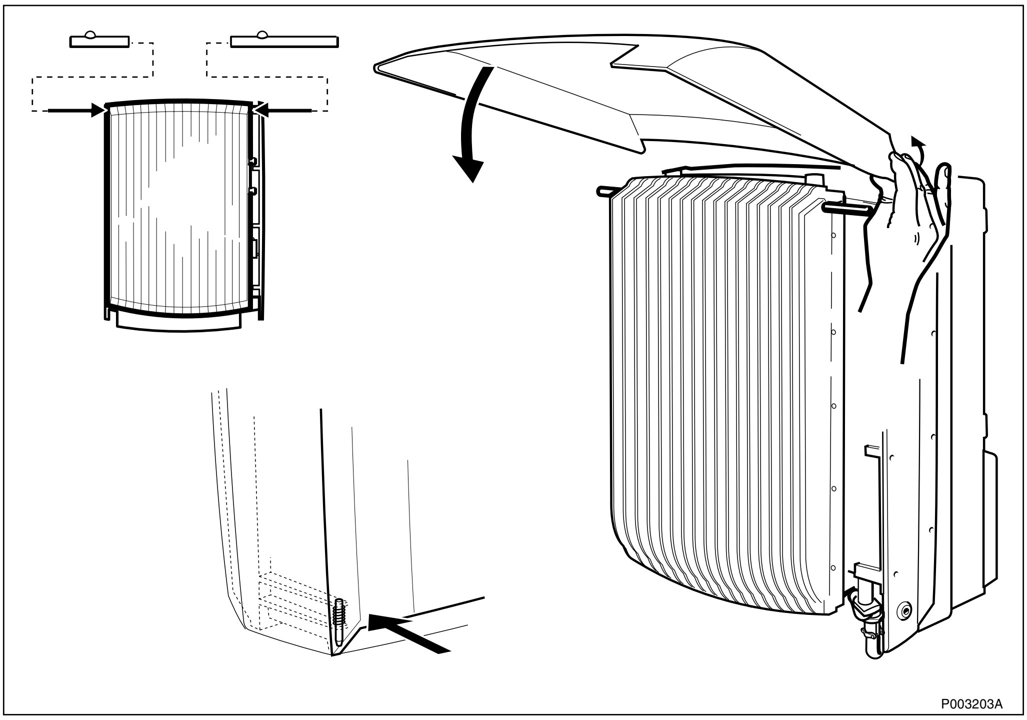


Figure 197 Mounting the front sunshield

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.

6.8 Concluding Routines

Checklist

The following checklist is not mandatory but strongly recommended. Local procedures and safety regulations must be evaluated and included in this checklist.

Table 27 Checklist

Check that:		OK
1	all cables are strapped and run in a proper way.	
2	the interface box is pushed up and the screws tightened.	
3	all sunshields are in the position for being locked by the installation box door.	
4	the installation box door is closed and all screws are tighten and the door is locked.	
5	the site is tidy and clean from waste.	

Note: The Site Installation Test should follow within 48 hours after the installation, because if the cabinet is left without power there is a risk of humidity damages to the components in the cabinet if ambivient temperature changes between hot and cold.

7 Antenna System Tests

7.1 Preface

This chapter describes how to verify that the antenna system is properly installed. The tests also include measuring the feeder length for feeder system loss calculations.

The instructions in this chapter describe how to make Distance To Fault (DTF) and Standing Wave Ratio (SWR) measurements on GSM 900/1800/1900 antenna systems, using the Anritsu Site Master S331B. *See figure below*.

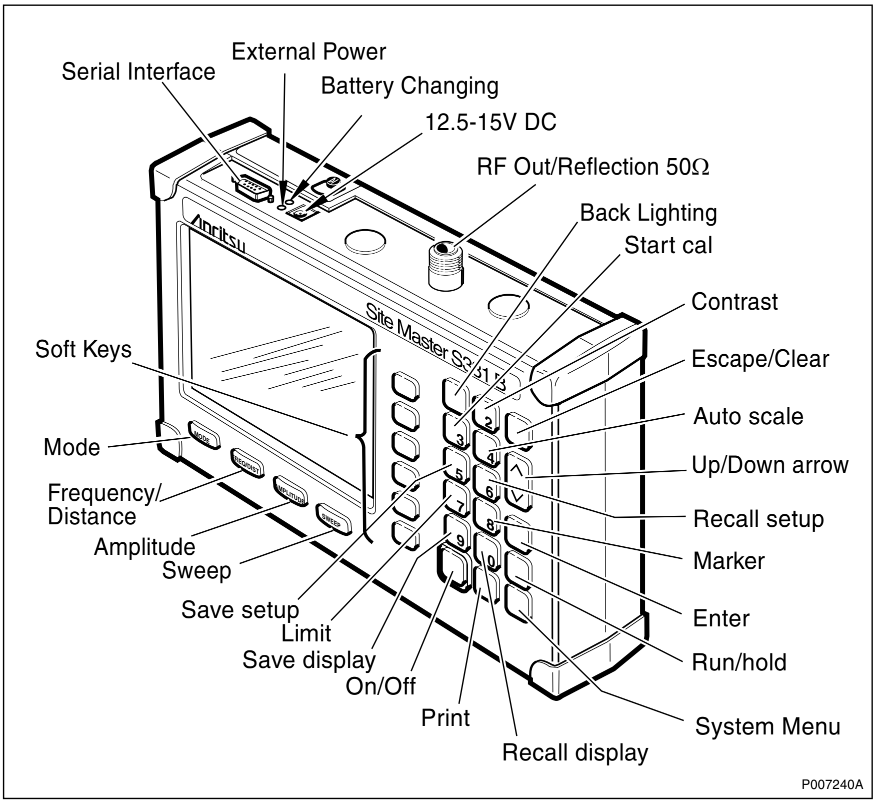


Figure 198 Antritsu Site Master

The following Site Master models can still be used if already purchased: S120A for GSM 900, S235A for GSM 1800/1900, S251A/B for GSM 900/1800/1900 and S331A for GSM 900/1800/1900 antenna systems. The instructions for these older instruments are not included in this manual.

Note: If older equipment is used, make sure that all accessories necessary are included. *See Chapter Tools and Instruments.*

It is recommended to perform the DTF tests during the installation phase, before the antennas are connected.

After the results have been saved in the Site Master, the tester can obtain hard copies by importing the waveforms to a PC. The necessary software and serial cable are enclosed with the Site Master.

For more detailed information, *see*:

Anritsu Site Master User's Guide

7.1.1 Preconditions

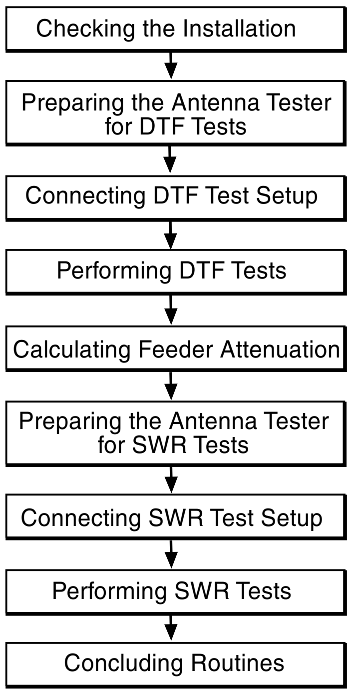
Ensure that:

- ☐ for the DTF tests, the installation of feeder cables with jumpers is complete.
- ☐ for the SWR tests, the connection of antennas and feeder cables with jumpers is complete.

Note: Do not cover the connectors with sealing tape until all testing is completed.

7.1.2 Work Process for Antenna System Tests

This section describes the work process for Antenna System Tests.



P008334B

Figure 199 Work Process for Antenna System Tests

Note: If no external antennas are used, the DTF tests shall not be done.

7.2 Checking the Installation

This section describes how to check that the antenna installation is correct, so that the antenna system can be tested.

Before starting the tests, ensure that:

- ☐ the installation is in accordance with the *Radio Site Installation Documentation*.
- ☐ no cables or connectors are damaged and that all cables (feeders and jumpers) are properly marked.
- ☐ all connectors are properly connected and tightened.
- ☐ the antenna directions are according to the *Radio Site Installation Documentation*. Consider magnetic influences from nearby metallic objects and deviation from magnetic north when using the compass.
- ☐ the correct cable is connected to the correct antenna.
- ☐ remarks, if any, are recorded in the test record, *see Figure 209 on page 191*, and forwarded to the person responsible for the site installation.

7.3 Preparing the Antenna Tester for DTF Tests

Note: If only internal antennas are used, the DTF tests are not done.

To achieve accurate DTF test results and to compensate for test port extension cables, the Site Master must be calibrated.

Before calibrating the Site Master, the frequency range has to be set.

Note: The Site Master must be calibrated each time the frequency range is changed.

The Site Master also has to be calibrated if one of the following symbols is shown on the display: "CAL OFF" or "↑°C".

7.3.1 Setting Frequency Range

These instructions describe how to set the frequency range for the DTF tests.

1. Press the **MODE** key and select **FREQ-SWR** by using the **Up/Down**arrow key. Press **ENTER**.
2. Press the **FREQ/DIST** key.
3. Find the "Start frequency" in MHz in *the table below*.
4. Press the **F1** soft key and enter the "Start frequency" in MHz. Press **ENTER**.
5. Find the "Stop frequency" in MHz *in the table below*.
6. Press the **F2** soft key and enter the "Stop frequency" in MHz. Press **ENTER**.
7. Check that the FREQ (MHz) scale in the display area indicates the correct frequency start and stop values.

Table 28 Start and stop frequencies

System	Start frequency (MHz)	Stop frequency (MHz)
GSM 900	800	1000
GSM 1800	1700	1900
GSM 1900	1800	2000

7.3.2 Calibrating the Antenna Tester for DTF Tests

These instructions describe how to calibrate the antenna tester for the DTF tests.

The calibration components needed are precision Open, Short and Load. *See figure below.*

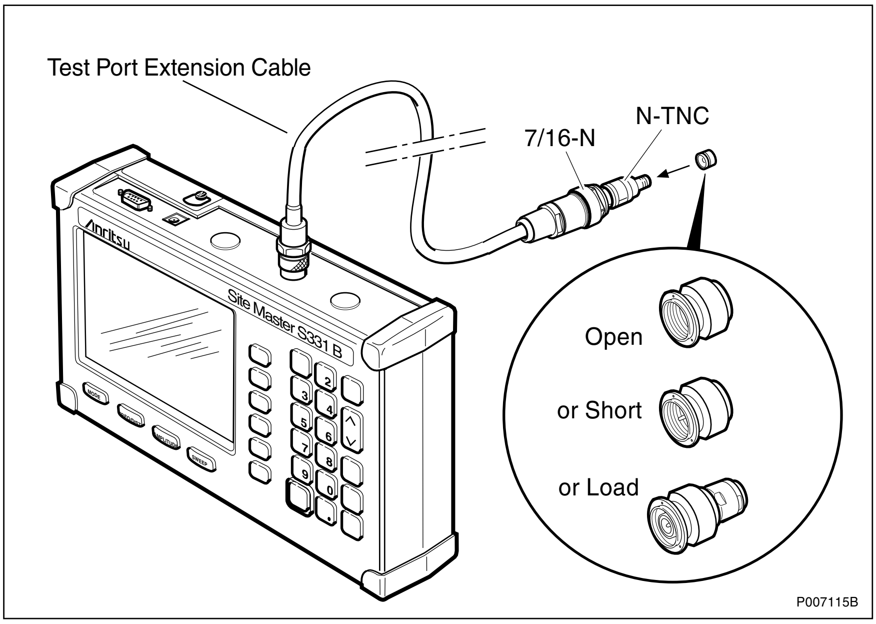


Figure 200 Connecting the calibration components

1. Connect the test port extension cable to the Anritsu Site Master. *See figure above.*
2. Connect the 7/16-N adapter to the test port extension cable and the 7/16-N to the N-TNC adapter. *See figure above.*
3. Press the **START CAL** key.
4. Connect the Open and press **ENTER**. *See figure above.* Wait for the measurement to complete.

Note: For correct calibration results, ensure that the Open, Short or Load is connected at the same point where the test object will be connected.

5. Repeat step 4 for the Short and the Load according to the step-by-step instructions on the Site Master screen.
6. When the calibration is complete, disconnect the calibration equipment from the test port extension cable.

After the calibration, the display will show "CAL ON" as long as the calibration is valid.

7.3.3 Entering Cable Parameters

These instructions describe how to enter the correct cable parameters, attenuation (CABLE LOSS) and propagation velocity factor (PROP VEL) needed to achieve accurate DTF test results.

1. Press the **MODE** key and select **DTF-SWR** by using the **Up/Down**arrow key. Press **ENTER**.
2. Press the **DTF AID** soft key.
3. Use the **Up/Down** arrow key to select **CABLE LOSS**. Press **ENTER**.
4. Find the cable loss in dB/m in *the table below* for the type of feeder being tested.
5. Enter the value and press **ENTER**.
6. Use the **Up/Down** arrow key to select **PROP VEL**. Press **ENTER**.
7. Find the propagation velocity factor in *the table below* for the type of feeder being tested.
8. Enter the value obtained from the table and press **ENTER**.

Table 29 Propagation velocity factor and attenuation for different cables

Supplier Code	Product No.	Propaga-tion Velocity Factor (PROP VEL)	Attenuation, dB/m (CABLE LOSS)		
			900 MHz	1800 MHz	1900 MHz
Andrew 3/8", LDF2RN	TZC 500 82	0.88	0.110	0.159	0.166
Andrew 1/2", LDF4RN	TZC 500 80	0.88	0.069	0.100	0.104
Andrew 1/2". LDF4	TZC 501 26	0.88	0.069	0.100	0.104
Andrew 7/8", LDF5	TZC 501 22	0.89	0.039	0.057	0.060
Andrew 7/8", LDF5RN	TZC 501 47	0.89	0.039	0.057	0.059
Andrew 1 5/8", LDF7	TZC 501 28	0.88	0.023	0.034	0.036

Note: If the cable type cannot be found in the table above, the values must be taken from the manufacturer’s specifications.

7.4 Connecting DTF Test Setup

This section contains test setups and information about how to connect the test equipment for the DTF tests.

1. Connect the 50 Ω standard load to the feeder. *See the figure below*.
2. Connect the test equipment to the RBS jumper. *See the figure below*.

3. Check that all connections are properly connected and tightened.

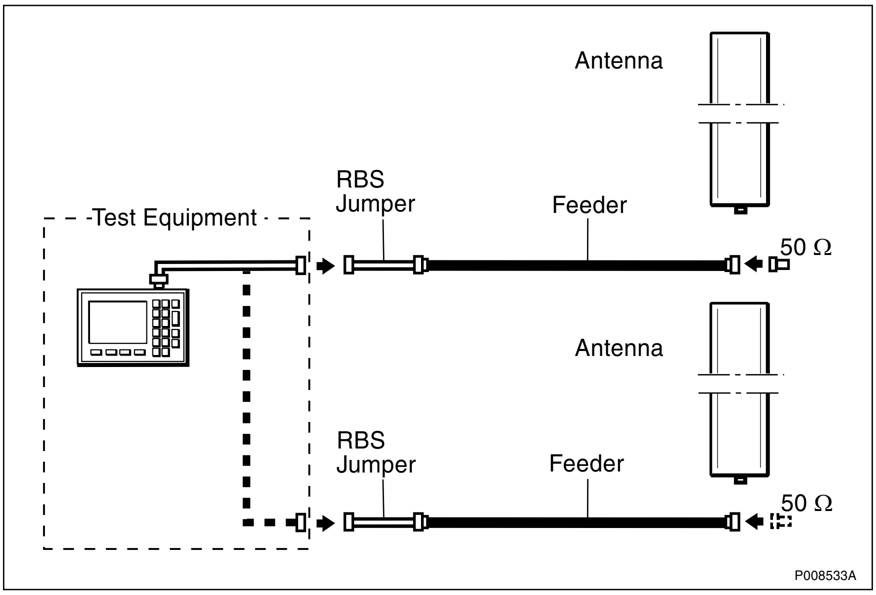


Figure 201 DTF test setup

7.5 Performing DTF Tests

This section describes how to test DTF. The purpose of the DTF tests is to verify that there are no bad connections or other faults (for example sharp bends) in the feeder system. It also measures the length of the feeder system to be used in the feeder attenuation calculation.

It is recommended to do the DTF tests during the installation phase, before the antennas are connected.

Before starting the test, ensure that:

☐ the Site Masters display shows "CAL ON", indicating that the Site Master is calibrated. If the display shows "CAL OFF", calibrate the Site Master according to *Section 7.3 on page 177*.

☐ the test equipment is connected according to *Section 7.4 on page 179*.

7.5.1 Verifying the Feeder Installation

These instructions describe how to verify the feeder installation.

1. Press the **FREQ/DIST** key to set the frequency.
2. Press the **D1** soft key, enter the desired start value (usually 0.0 m), and press **ENTER**.
3. Press the **D2** soft key, enter the desired stop value (usually the total length of the feeder system), and press **ENTER**.
4. Press the **AMPLITUDE** key to set the scale.
5. Press the **TOP** soft key, enter 1.2, and press **ENTER**.
6. Press the **LIMIT EDIT** soft key, enter 1.05, and press **ENTER**.

Note: Ensure that Limit is not in OFF-mode by pressing the **LIMIT ON/OFF** soft key.

7. Wait while the Site Master is calculating (6 to 22 seconds depending on selected display resolution).

8. Observe the waveform and check that no reflections are above 1.05 SWR (31.5 dB Return Loss). *See figures below.*

Example of an Approved DTF Measurement

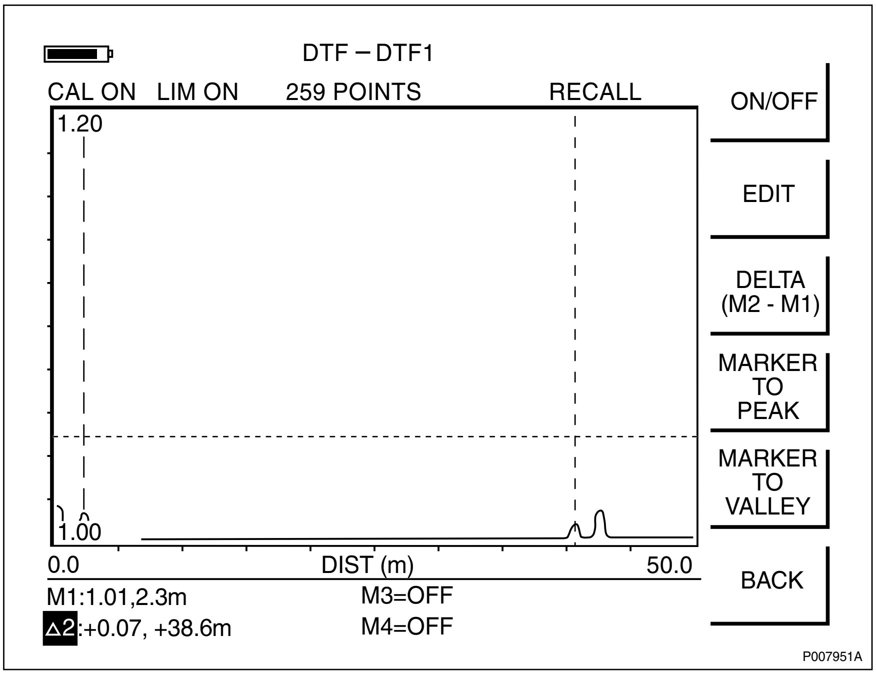


Figure 202 Example of an approved DTF measurement

Example of an Unapproved DTF Measurement

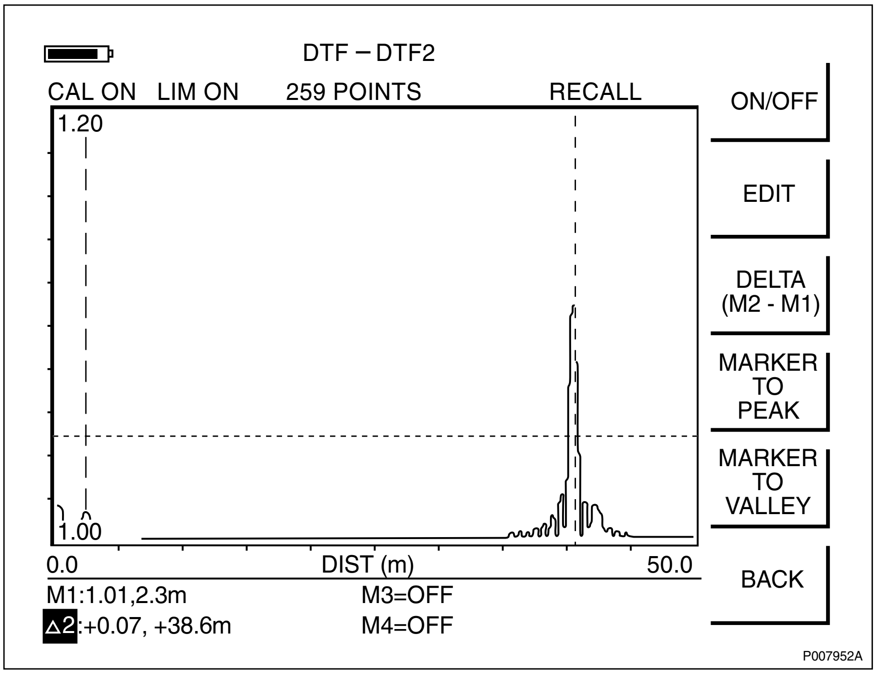


Figure 203 Example of an unapproved DTF measurement

7.5.2 Measuring Feeder Length

These instructions describe how to measure feeder length.

1. Press the **MARKER** key.
2. Press the **M1** soft key.
3. Press the **EDIT** soft key and place the **M1** marker at the near end of the feeder using the **Up/Down** arrow key. *See Figure 202 on page 181*.
4. Press the **BACK** soft key and then the **M2** soft key.
5. Press the **EDIT** soft key and place the M2 marker at the far end of the feeder using the **Up/Down** arrow key. *See Figure 202 on page 181*.
6. Press the **DELTA** (M2–M1) soft key. Enter the Δ2 value as the feeder length in the test record.
7. Create a unique trace name according to *Section 7.5.3 on page 182*.
8. Save the measurement by pressing the **SAVE DISPLAY** key. Type in the trace name using the alpha-numeric soft keys. Press **ENTER**.

7.5.3 Naming a DTF Measurement

These instructions describe how to give the measurement a unique name traceable to the correct antenna system on the correct site.

1. Find the Site Code in the *Radio Site Installation Documentation*.

2. Read the label on the actual jumper.
3. Add "type of measurement", "Site Code"and "label text" (maximum 16 characters). *See example below*.

Example 2 Naming a DTF measurement

1. The Site Code found in *Radio Site Installation Documentation* is “SOF007_A”
2. The label on the jumper says “Cell A: DX1”
3. The type of measurement is DTF, so the name of the DTF measurement is DTF + the Site Code + the label text = “DTFSOF007ADX1”.

7.6 Calculating the Feeder Attenuation

These instructions describe how to calculate the attenuation of the feeder system.

1. Find the feeder length measured in *Section 7.5.2 on page 182*.
2. Find the attenuation value (dB/m) for the actual cable type in *Table 30 on page 183*.
3. Calculate the attenuation by multiplying the actual length in metres by the attenuation per metre.
4. Add the attenuations for the feeder and the jumpers. *See Example 3 on page 184.*
5. Enter the result of the calculation in the test record.
6. Repeat *Section 7.5 on page 180* to *Section 7.6 on page 183*for all antenna feeders on the site.

Table 30 Attenuation (dB/m) for different cables

Supplier Code	**Product No.**	**Attenuation, dB/m (CABLE LOSS)**		
		900 MHz	**1800 MHz**	**1900 MHz**
Andrew 3/8", LDF2RN	TZC 500 82	0.110	0.159	0.166
Andrew 1/2", LDF4RN	TZC 500 80	0.069	0.100	0.104
Andrew 1/2". LDF4	TZC 501 26	0.069	0.100	0.104
Andrew 7/8", LDF5	TZC 501 22	0.039	0.057	0.060
Andrew 7/8", LDF5RN	TZC 501 47	0.039	0.057	0.059
Andrew 1 5/8", LDF7	TZC 501 28	0.023	0.034	0.036

Note: If the cable type is not found in the table above, the values must be taken from the manufacturer’s specifications.

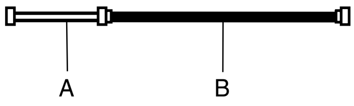


Figure 204 Figure to example of calculating the total feeder attenuation (GSM 900)

Example 3 Calculating the total feeder attenuation (GSM 900)

1. The length of the RBS jumper (A) is 2 m.
   Feeder (B) length has been measured to 40 m.
2. The cables used are:

   RBS jumper (A): *See figure above.*
   Andrew LDF 3/8”
   The attenuation is 0.110 dB/m. *See the table above.*

   Feeder (B): *See figure above.*
   Andrew LDF 1/2”
   The attenuation is 0.069 dB/m. *See the table above.*

3. Calculate the actual jumper (A) attenuation:
   2 x 0.110 = 0.22 dB

   Calculate the actual feeder (B) attenuation:
   40 x 0.069 = 2.76 dB

4. Add the calculated attenuations to obtain the total attenuation :
   A + B = 0.22 + 2.76 = 2.98 dB

7.7 Preparing the Antenna Tester for SWR Tests

To achieve accurate SWR test results and to compensate for Test Port Extension Cables, the Site Master must be calibrated. Since the frequency range is different from the one set in the DTF test, the Site Master must be calibrated again.

The frequency range has to be set before the calibration.

Note: The Site Master must be calibrated each time the frequency range is changed.

7.7.1 Setting Frequency Range

These instructions describe how to set the frequency range for the SWR tests.

1. Press the **MODE** key and select **FREQ-SWR**.
2. Press the **FREQ/DIST** key.

3. Find the "Start frequency" in MHz in *the table below*.
4. Press the **F1** soft key and enter the "Start frequency" in MHz. Press **ENTER**.
5. Find the "Stop frequency" in MHz in *the table below*.
6. Press the **F2** soft key and enter the "Stop frequency" in MHz. Press **ENTER**.
7. Check that the FREQ (MHz) scale in the display area indicates the correct frequency start and stop values.

Table 31 Start and stop frequencies

System	Start frequency (MHz)	Stop frequency (MHz)
GSM 900	890	960
GSM 1800	1710	1880
GSM 1900	1850	1990

7.7.2 Calibrating the Antenna Tester for SWR Tests

These instructions describe how to calibrate the antenna tester for SWR tests.

The calibration components needed are precision Open, Short and Load. *See figure below.*

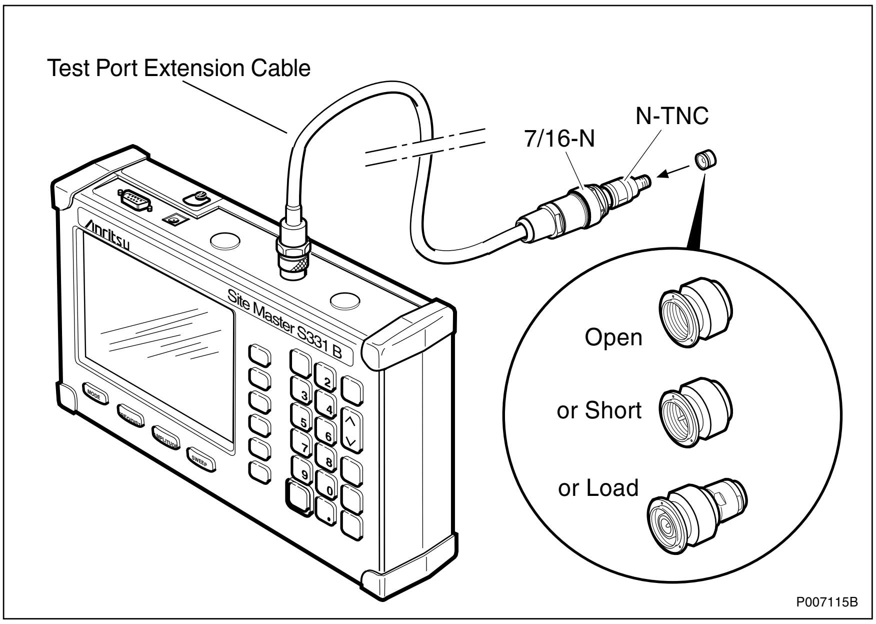


Figure 205 Connecting the calibration components

1. Connect the test port extension cable to the Anritsu Site Master. *See figure above.*
2. Connect the 7/16-N adapter to the test port extension cable and the 7/16-N to the N-TNC adapter. *See figure above.*
3. Press the **START CAL** key.

4. Connect the Open and press **ENTER**. *See figure above.* Wait for the measurement to complete.

Note: For correct calibration results, ensure that the Open, Short or Load is connected at the end of the test port extension cable, at the same point where the test object will be connected.

5. Repeat step 4 for the Short and the Load according to the step-by-step instructions on the Site Master screen.

6. When the calibration is complete, disconnect the calibration equipment from the test port extension cable.

After the calibration, the display will show "CAL ON" as long as the calibration is valid.

7.8 Connecting SWR Test Setup

This section how to connect the test equipment for the SWR test.

Before connecting the SWR test setup, ensure that:

☐ all the antenna system components are properly connected and tightened.

1. Connect the test equipment to the RBS jumper. *See figure below*.

2. Check that all connections are properly connected and tightened.

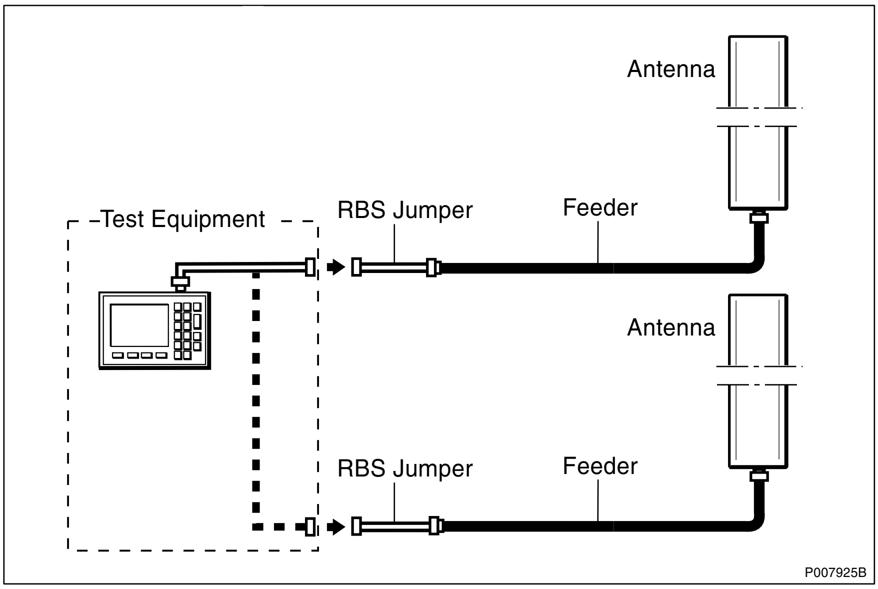


Figure 206 SWR test setup

7.9 Performing SWR Tests

This section describes how to test SWR. The purpose of the SWR tests is to verify the antenna system all the way up to the antenna when it is completely installed. The test verifies that the SWR is not too high and that the signal is not reflected back into the RBS.

Before starting the test, ensure that:

☐ the Site Master's display shows "CAL ON", indicating that the Site Master is calibrated. If the display shows "CAL OFF", calibrate the Site Master according to *Section 7.7 on page 184*.

☐ the test equipment is connected according to *Section 7.8 on page 186*.

7.9.1 Verifying the Antenna System Installation

These instructions describe how to verify the antenna system installation.

1. Press the **AMPLITUDE** key to set the scale.
2. Press the **TOP** soft key, enter 1.5, and press **ENTER**.
3. Press **LIMIT EDIT** soft key, enter 1.4, and press **ENTER**.

Note: Ensure that Limit is not in OFF-mode by pressing the **LIMIT ON/OFF** soft key.

4. Observe the waveform. For examples of approved and unapproved SWR measurements, *see figures below*.
5. Check that no SWR levels are above 1.4 (= 15.6 dB RL). *See Table 32 on page 189*. Enter the test results in the test record.
6. Create a unique trace name according to *Section 7.9.2 on page 189*. Save the measurement by pressing the **SAVE DISPLAY**key. Type in the trace name using the alpha-numeric soft keys, and press **ENTER**.
7. Repeat steps 1 to 6 for each feeder on the site.

Example of an Approved SWR Measurement

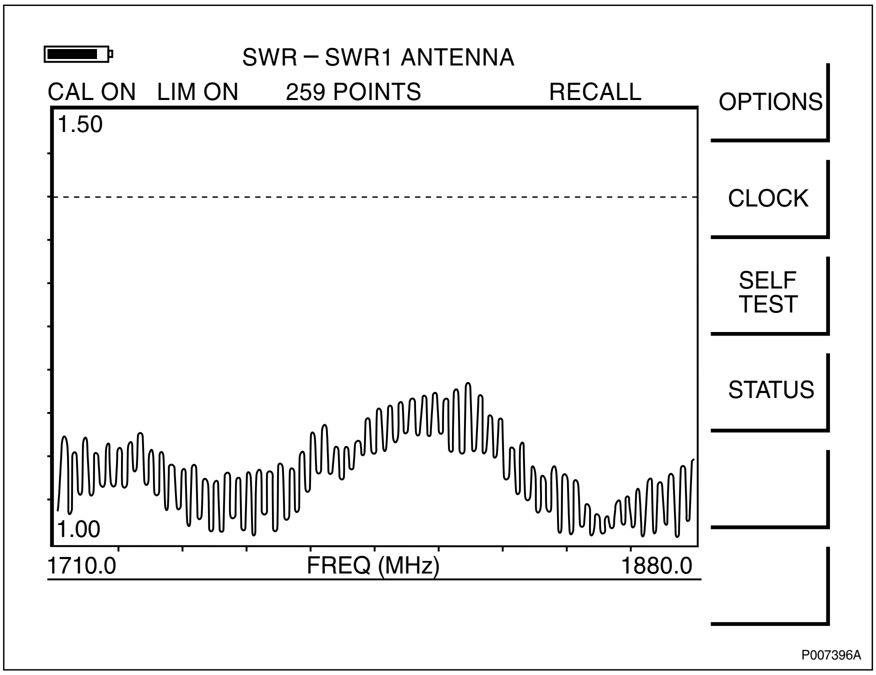


Figure 207 Example of an approved SWR measurement

Example of an Unapproved SWR Measurement

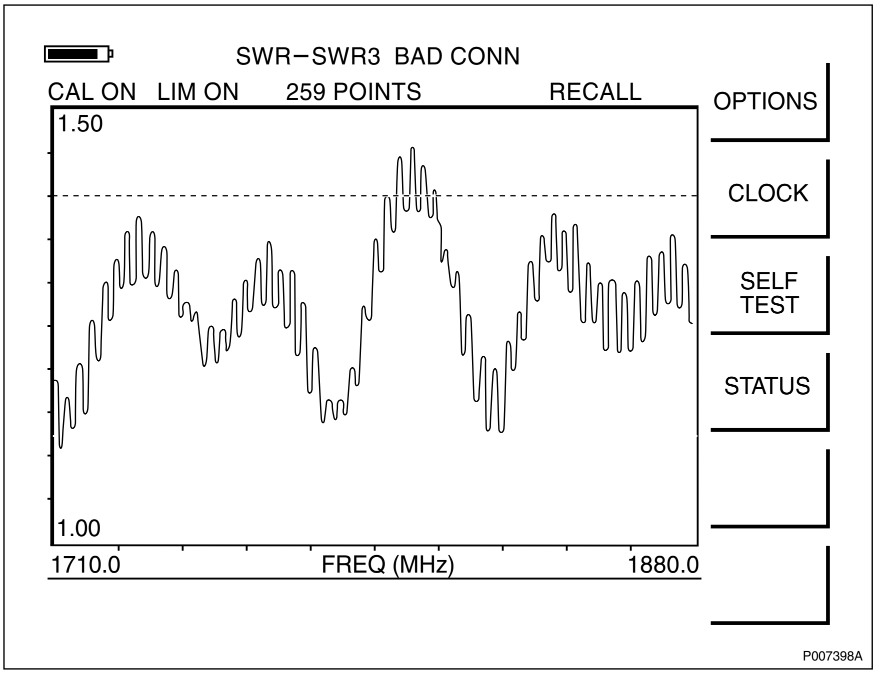


Figure 208 Example of an unapproved SWR measurement

Conversion Table

Table 32 Conversion table

Return Loss (dB)	SWR	Return Loss (dB)	SWR	Return Loss (dB)	SWR	Return Loss (dB)	SWR
4.0	4.42	14.6	1.46	21.0	1.20	32.0	1.05
6.0	3.01	14.8	1.44	21.5	1.18	32.5	1.04
8.0	2.32	15.0	1.43	22.0	1.17	33.0	1.04
10.0	1.92	15.2	1.42	22.5	1.16	33.5	1.04
10.5	1.85	15.4	1.41	23.0	1.15	34.0	1.04
11.0	1.79	15.6	1.40	23.5	1.14	34.5	1.03
11.2	1.76	15.8	1.39	24.0	1.13	35.0	1.03
11.4	1.74	16.0	1.38	24.5	1.12	35.5	1.03
11.6	1.71	16.2	1.37	25.0	1.12	36.0	1.03
11.8	1.69	16.4	1.36	25.5	1.11	36.5	1.03
12.0	1.67	16.6	1.35	26.0	1.10	37.0	1.02
12.2	1.65	16.8	1.34	26.5	1.10	37.5	1.02
12.4	1.63	17.0	1.33	27.0	1.09	38.0	1.02
12.6	1.61	17.2	1.32	27.5	1.08	38.5	1.02
12.8	1.59	17.4	1.31	28.0	1.08	39.0	1.02
13.0	1.58	17.6	1.30	28.5	1.07	39.5	1.02
13.2	1.56	17.8	1.29	29.0	1.07	40.0	1.02
13.4	1.54	18.0	1.29	29.5	1.07	40.5	1.01
13.6	1.53	18.5	1.27	30.0	1.06	41.0	1.01
13.8	1.51	19.0	1.25	30.5	1.06	41.5	1.01
14.0	1.50	19.5	1.23	31.0	1.05	42.0	1.01
14.2	1.48	20.0	1.22	31.5	1.05	42.5	1.01
14.4	1.47	20.5	1.21				

7.9.2 Naming an SWR Measurement

To give the measurement a unique name traceable to the correct antenna system on the correct site, the following method is recommended.

1. Find the Site Code in the *Radio Site Installation Documentation*.
2. Read the label on the actual jumper.
3. Add "type of measurement", "Site Code"and "label text" (maximum 16 characters). *See example below*.

Example 4 Naming an SWR Measurement

1. The Site Code found in *Radio Site Installation Documentation* is “SOF007_A”
2. The label on the jumper says “Cell A: DX1”
3. The type of measurement is SWR, so the name of the SWR

measurement is SWR + the Site Code + the label text = “SWRSOF007ADX1.

7.10 Concluding Routines

This section describes the actions to be taken before leaving the site.

The following checklist is not mandatory, but strongly recommended. Local procedures and safety regulations must be evaluated and included in the list.

Table 33 Checklist

Check that:	**OK**
all test results have been saved and entered in the Test Record.	
the *Radio Site Installation Documentation* is completed with the Test Record and the test printouts.	
all outdoor antenna system connectors are covered with sealing tape.	
that all test equipment has been accounted for and removed from the site.	

7.10.1 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. 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 Field Support Centre (FSC) for resolution and registration in the Ericsson trouble report system Modification Handling System (MHS).

7.10.2 Repair Delivery Note ‘‘Blue Tag’’

When a faulty unit is returned, it must always be accompanied with 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 can also be found in *Chapter Maintenance*.

7.10.3 Test Record

Test Record for Antenna System Tests

Date:	Site Name:
Site No:	Cell Configuration:
Cell Identity:	
Tester's Name:	
Test Instrument: Anritsu Site Master S_______	Serial Number:

Installation Check

Visual Check: Pass/Fail

DTF Test

	RBS 1		RBS 2		RBS 3	
DTF Test	X 2	X 3	X 2	X 3	X 2	X 3
(< 1.05 SWR): Pass/Fail						
Feeder Length						
Total Feeder Attenuation						

SWR Test

	RBS 1		RBS 2		RBS 3	
<1.4 SWR or>15.6 dB RL	X 2	X 3	X 2	X 3	X 2	X 3
SWR						
Return Loss (dB)						

X2 equals the path from the X2 connector on the RBS to the antenna, including jumper and feeder.

X3 equals the path from the X3 connector on the RBS to the antenna, including jumper and feeder.

Cable Marking: ______________________

____

____

Signatures

Responsible for the Record Date: ________ Name: ______________

Customer Acceptance Date: ________ Name: ______________

Remarks ______________________

____

P006028D

Figure 209 Test Record for Antenna System Tests

7.10.4 Test Record Supplement

The following illustration shows an example of a printout from the Site Master Software Tools. This shall be added as a supplement to the test protocol and be included in the *Radio Site Installation Documentation*.

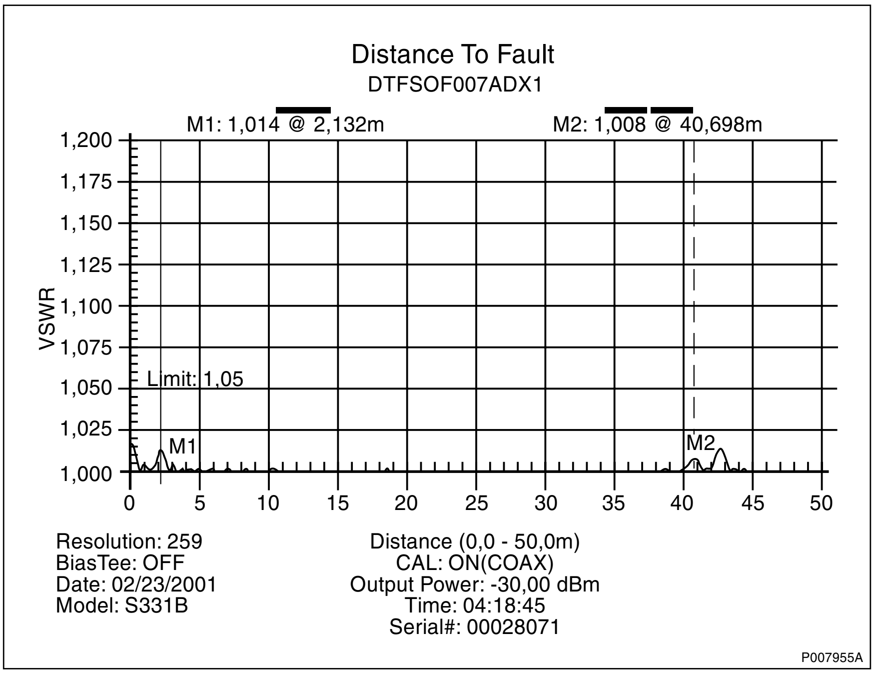


Figure 210 An example DTF measurement plot

After saving all test results in the Site Master, the test results must be transferred to a PC using the serial cable and the Site Master Software Tools. *See the instructions below*. For further instructions, *see*:

Anritsu Site Master User's Guide

1. Connect the Site Master to the PC's serial port using the serial cable.
2. Start **Site Master Software Tools** on the PC.
3. In the Site Master Software Tools, press the **Start Plot Capture** button.
4. Select the desired plots from the **Plots Download** dialogue box and click **OK**.
5. Save the plots to the PC.
6. Print the plots from the Site Master Software Tools and insert these in the *Radio Site Installation Documentation*.

8 Site Installation Tests

8.1 Preface

This chapter describes the tests that must be performed to verify the installation of the radio cabinet. The radio cabinet itself has already been tested in the factory.

For information about required test equipment, tools and manuals, *see Chapter Tools and Instruments*.

8.1.1 Preconditions

Ensure that:

☐ the RF Test Record (from the factory) is found in *Radio Site Installation Documentation*.

☐ the safety instructions are read and understood. *See Chapter Safety Instructions*.

☐ Test Records to be filled in are brought to site. *See Figure 240 on page 232* and *Figure 241 on page 233*.

☐ the software in the BSC and the RBS complies with the minimum requirements. *See table below*. This is necessary so that certain configurations can be used.

Table 34 Software minimum requirements for different configurations

Configuration	BSC SW Version	RBS SW version (name displayed in the OMT)
RBS 2302, 2 TRX	BSS R6	LZY 213 431/1 R12 (R012J)
RBS 2302, 4 TRX or 6 TRX	BSS R7	LZY 213 938/1 R8 (R008P)

☐ all personal rings, wrist-watches and other metallic objects are removed before working with the power system.

☐ an approved ESD wrist strap is used, to avoid damage to components mounted on circuits. *See figure below*.

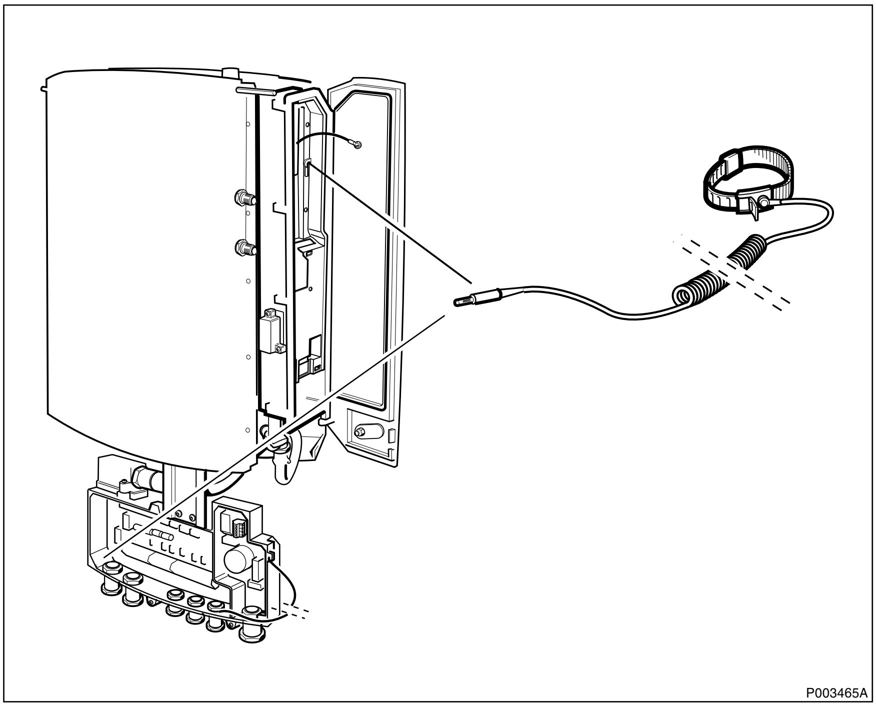


Figure 211 Connecting the ESD wrist strap to the RBS

8.1.2 Work Process for Site Installation Tests

This section describes in which order to perform the tests. When the exit criteria are fulfilled, the tester should enter the results in the test record. *See Figure 240 on page 232* and *Figure 241 on page 233*and return to the flow diagram for the next step in the process. *See figure below*.

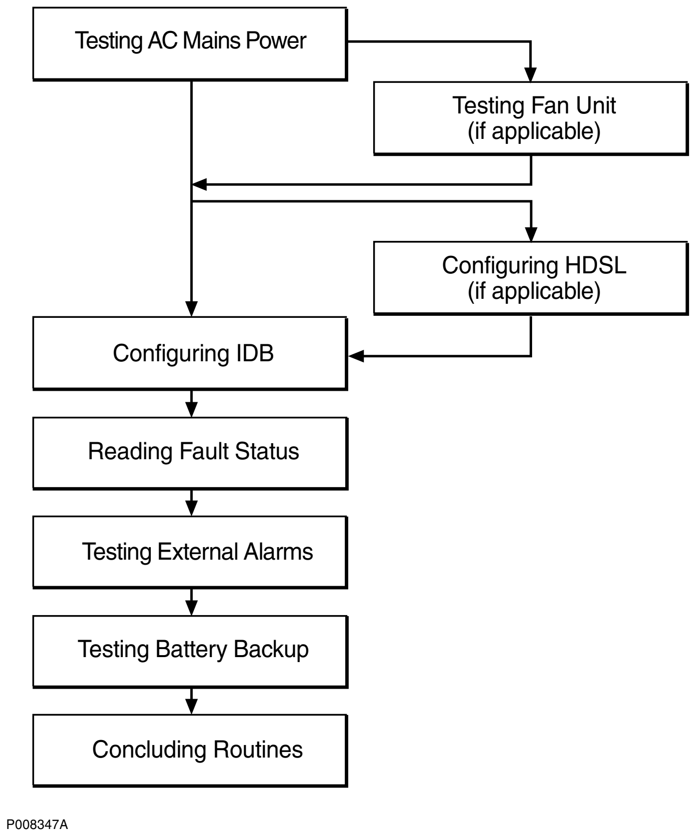


Figure 212 Work process for Site Installation Tests

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 the processes in this manual must be notified and agree to the changes, or the responsibility is automatically transferred to the person making the changes.

8.1.3 Switching off the RBS and the PBC

Below is a description of how to switch off the RBS and the PBC, should this for some reason become necessary during the work process.

To locate the AC and DC power switches, *see Figure 217 on page 199*and *Figure 220 on page 201*.

Note: The RBS must be shut down before the PBC.

To switch off the RBS:

1. Switch off the DC battery power.
2. Switch off the AC mains power.

To switch off the PBC:

1. Switch off the DC battery power.
2. Switch off the AC mains power.

8.2 Testing AC Mains Power

This section describes how to verify that the RBS and the PBC have correct incoming AC mains power and how to switch on the PBC and the RBS.

8.2.1 Preconditions

Before starting the test, ensure that:

☐ the RBS is switched off.

☐ the PBC is switched off.

8.2.2 Testing AC Mains Power on RBS and PBC

This section describes how to verify that the RBS and the PBC have the correct voltage on the AC terminal in the interface box.

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.

1. Check that the nominal AC mains voltage selector on the RBS mounting base is in the correct position (115 or 230 V). *See figure below*. For information about what voltage to set, *see Radio Site Installation Documentation*.

   No adjustments on the PBC are needed for adaptation to different mains voltages.

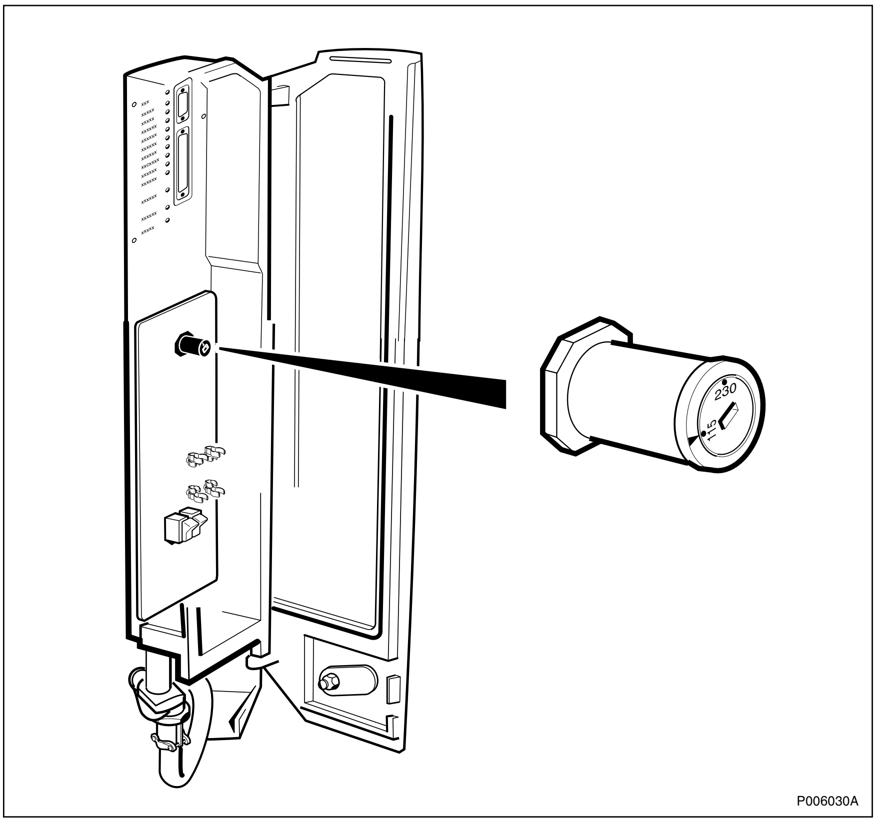


Figure 213 Location of AC mains voltage selector on the RBS mounting base

2. Switch on the incoming AC mains power.
3. Verify that the RBS has correct voltage on the AC terminal in the interface box, using a multimeter.

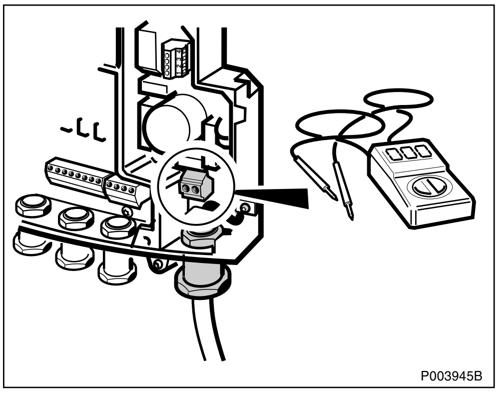


Figure 214 Verifying correct voltage on AC terminal on RBS

4. If a PBC is used, verify with a multimeter that the PBC has correct voltage on the AC terminal in the interface box.

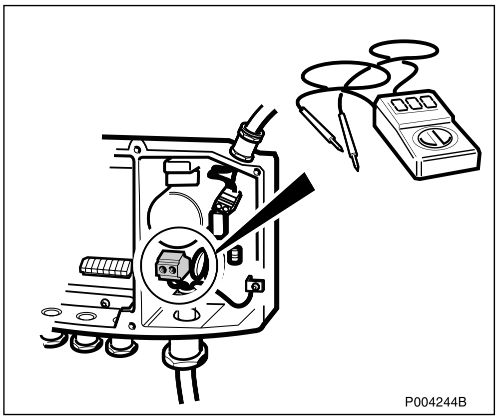


Figure 215 Verifying correct voltage on AC terminal on PBC

8.2.3 Switching on the PBC and RBS

This section describes how to switch on the PBC and the RBS. If a PBC is not used, continue with *Section Switching on the RBS on page 200.*

Note: The PBC must be switched on before the RBS.

Switching on the PBC

Before switching on the PBC, check that all cables are correctly connected. *See Chapter Installation of Power and Battery Cabinet.*

1. Open the PBC installation box door by loosening the screws and unlock with the key. *See figure below.*

   The PBC control panel, including optical indicators, power switches and control buttons, is located behind the installation box door.

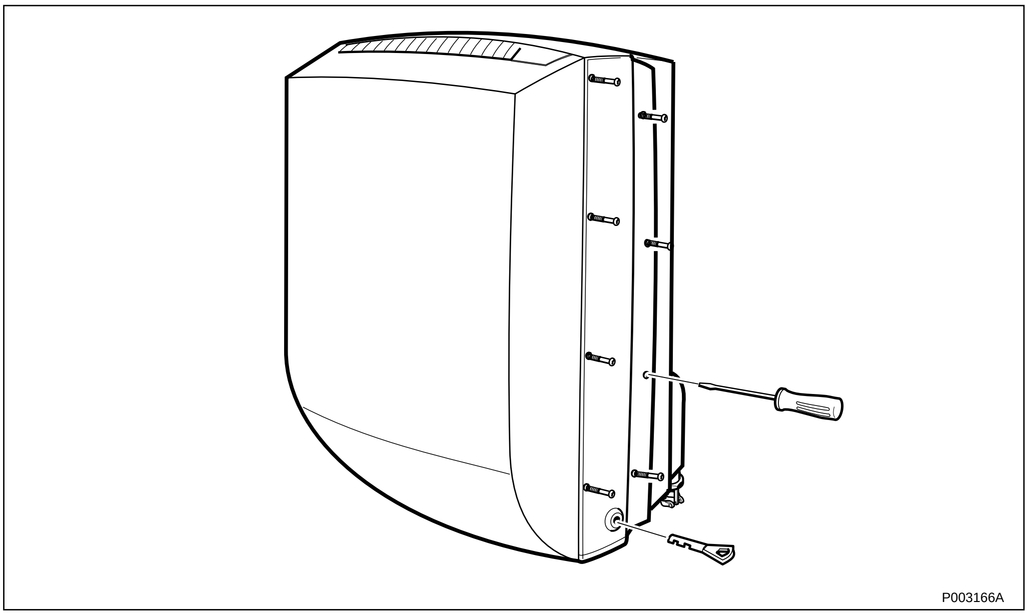


Figure 216 Opening the PBC installation box door

2. Switch on the AC mains power.

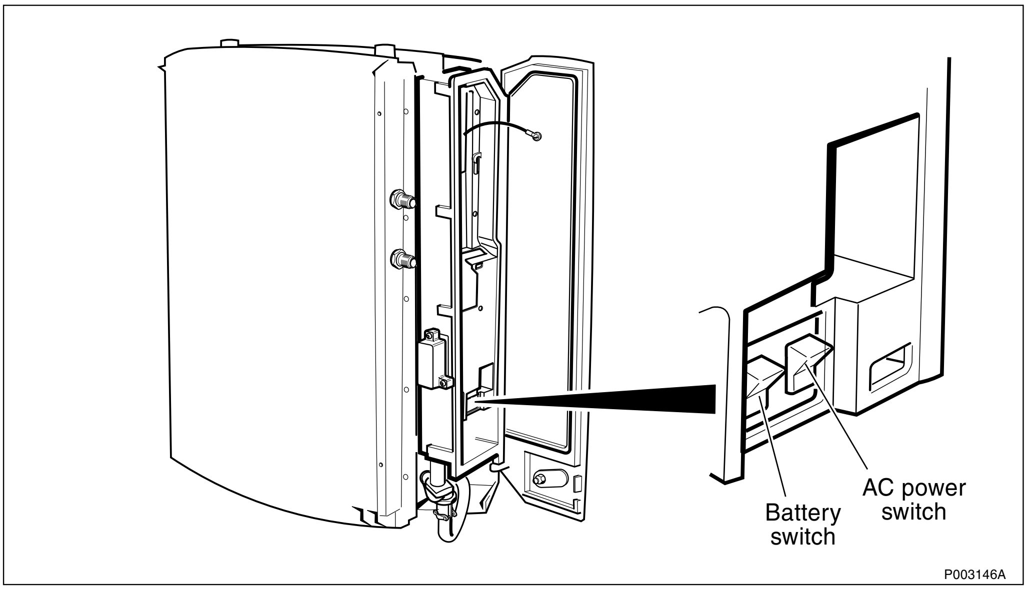


Figure 217 PBC power switches on the control panel

3. Switch on the DC battery power.
4. Check the PBC LEDs for alarms. *See table below.*

Table 35 PBC LEDs

Operational (green)	**Fault (red)**	**Classification**
ON	OFF	OK
OFF	ON	SEVERE
ON	ON	WARNING, POWER

5. Check the display on the PBC control panel for alarms. If there are no alarms present, the display will look as shown in *the figure below*.

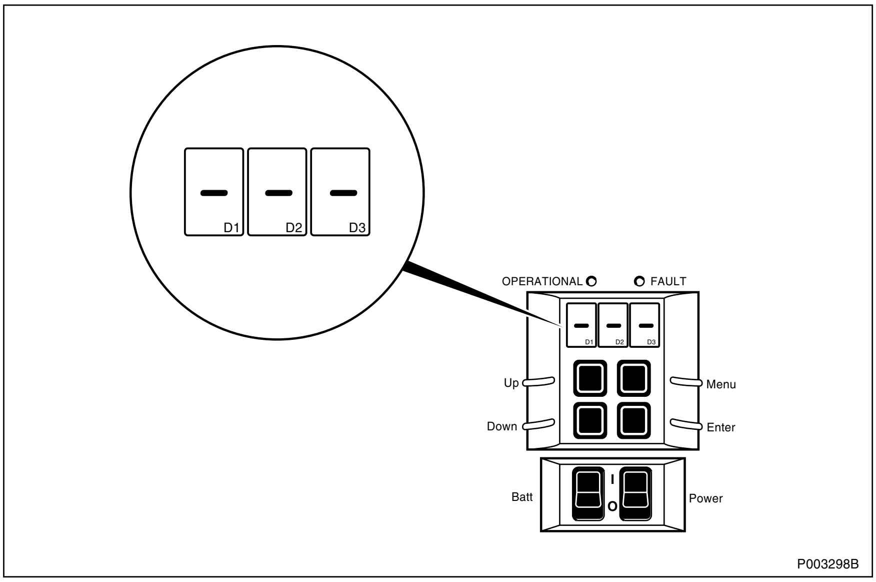


Figure 218 View of display on PBC control panel if no alarms are present

6. If alarms are shown on the three display elements, *see Chapter Maintenance* for information about the alarms and how to correct the faults.

Note: If code **110** shows, set the PBC in Stand Alone Mode with command code **006**.

Switching on the RBS

Before switching on the RBS, check that all cables are correctly connected. *See Chapter Installation of RBS 2302*.

1. Open the RBS installation box door by loosening the screws and unlock with the key. *See figure below*.

   The RBS control panel, including optical indicators, power switches and control buttons, is located behind the installation box door.

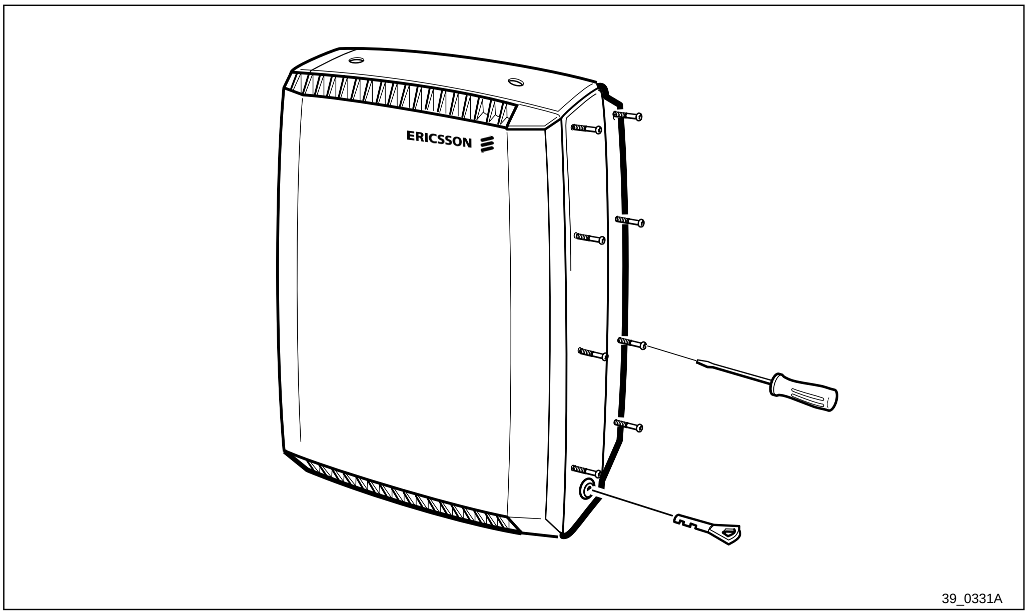


Figure 219 Opening the RBS installation box door

2. Switch on the AC mains power.

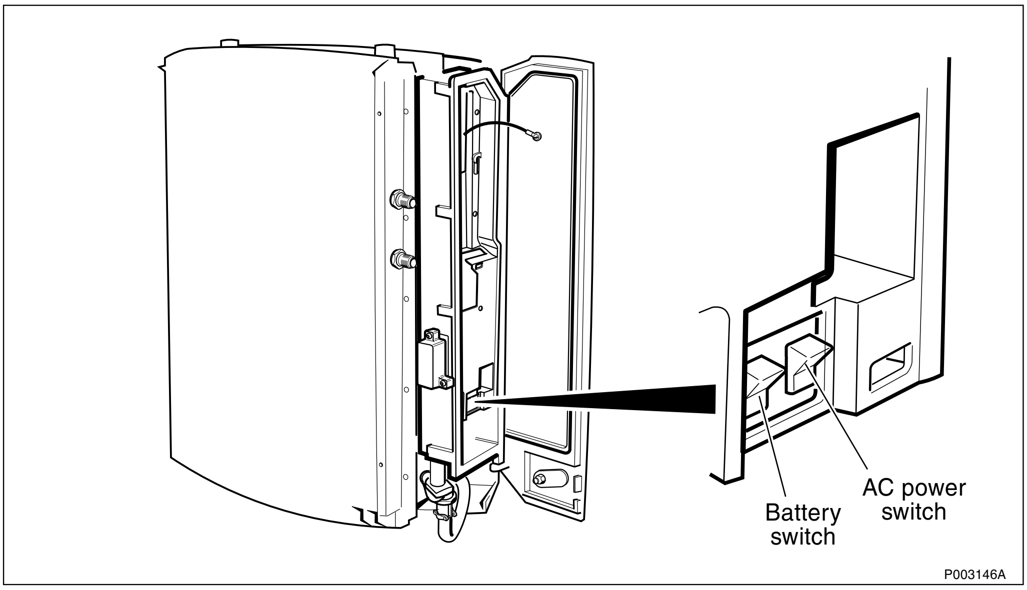


Figure 220 RBS power switches

3. Switch on the battery power. *See figure above.*

   The RBS will automatically run a self-test.

4. If the RBS is not in Local mode, as soon as the self-test is finished, set the RBS in Local mode with the Local remote button. *See figure below.*

   When the RBS is in Local mode, the Local remote indicator has a fixed light.

   If the RBS is in Remote mode and the SW versions of the RBS and the BSC differ, the BSC will copy its SW version to the RBS without warning.

Note: Do not set the RBS in Local mode while downloading SW.

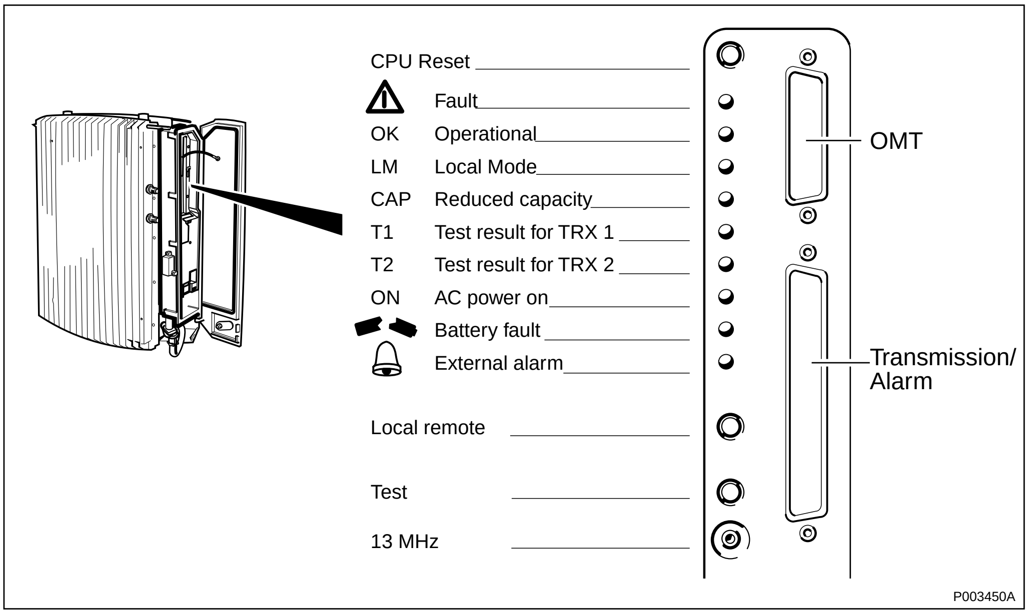


Figure 221 RBS user interface

5. Check the RBS for alarms.

   For explanation of indicators, fault localisation and correction of faults, *see Chapter Maintenance*.

Note: At temperatures below freezing, warming up the RBS may take about half an hour, during which time the LEDs in the interface box will remain turned off.

8.3 Testing Fan Unit (if applicable)

This section describes how to test the fan unit.

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.**

1. Remove the control box cover on the fan unit by loosening the two screws.

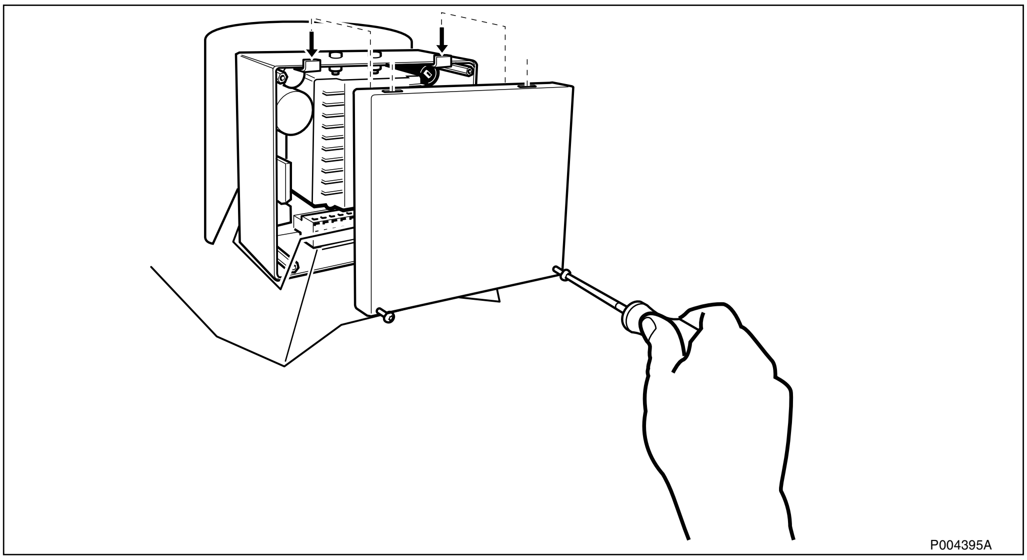


Figure 222 Removing the fan unit control box cover

2. Turn on the power to the fan unit.

3. Press the fan test button with an insulated screwdriver. *See figure below*.

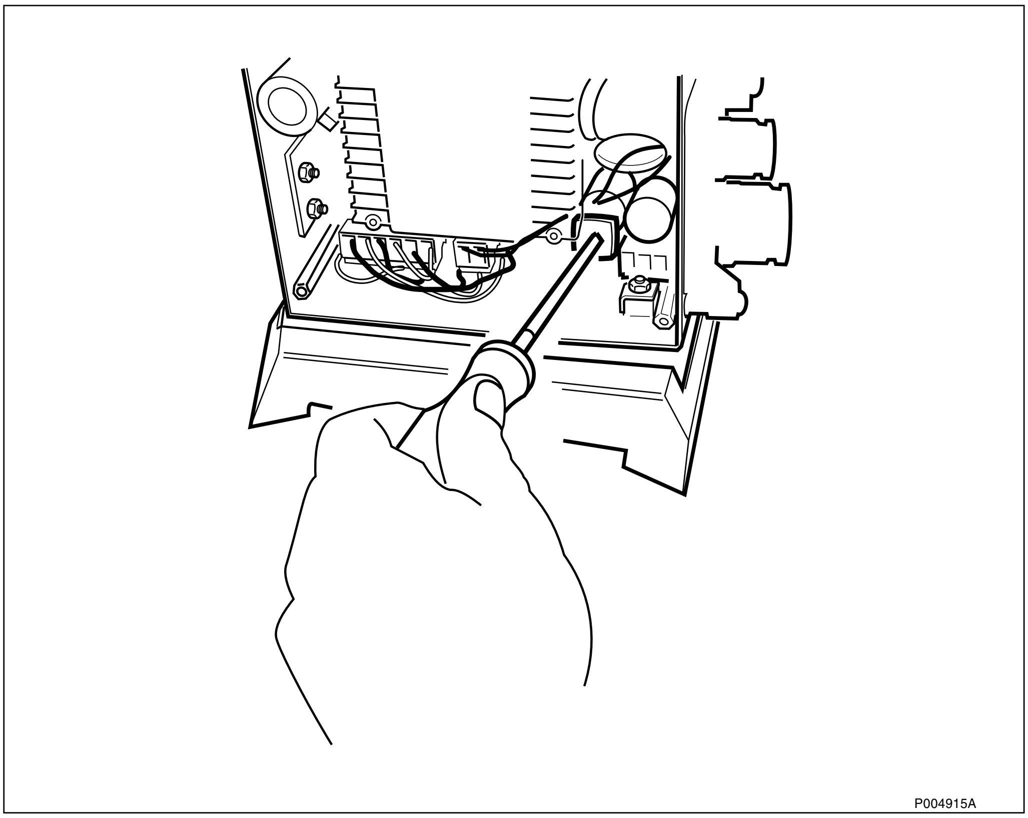


Figure 223 Activating the fan test button in the control box

4. Check that all three fans are running.

   If the temperature is above 30 °C, the fans will still be running after releasing the test button due to the hysteresis of the temperature sensor.

5. Remount the fan unit control box cover and tighten the two screws.

8.4 Configuring HDSL (if applicable)

This section describes how to configure the HDSL modem. If several RBSs with HDSL modems are used, each HDSL modem has to be configured separately according to the transmission used for that RBS.

CAUTION

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

8.4.1 Removing the HDSL Modem

These instructions describe how to remove the HDSL modem.

1. Disconnect the transmission cables from the RBS and the earth cable from the HDSL door.

2. Remove the door by pressing down the spring locking pin on the upper right hand corner of the door and lift the door off.

3. Remove the HDSL modem module from the door by removing the screws and lift it out so that the printed board is accessible. *See figure below*.

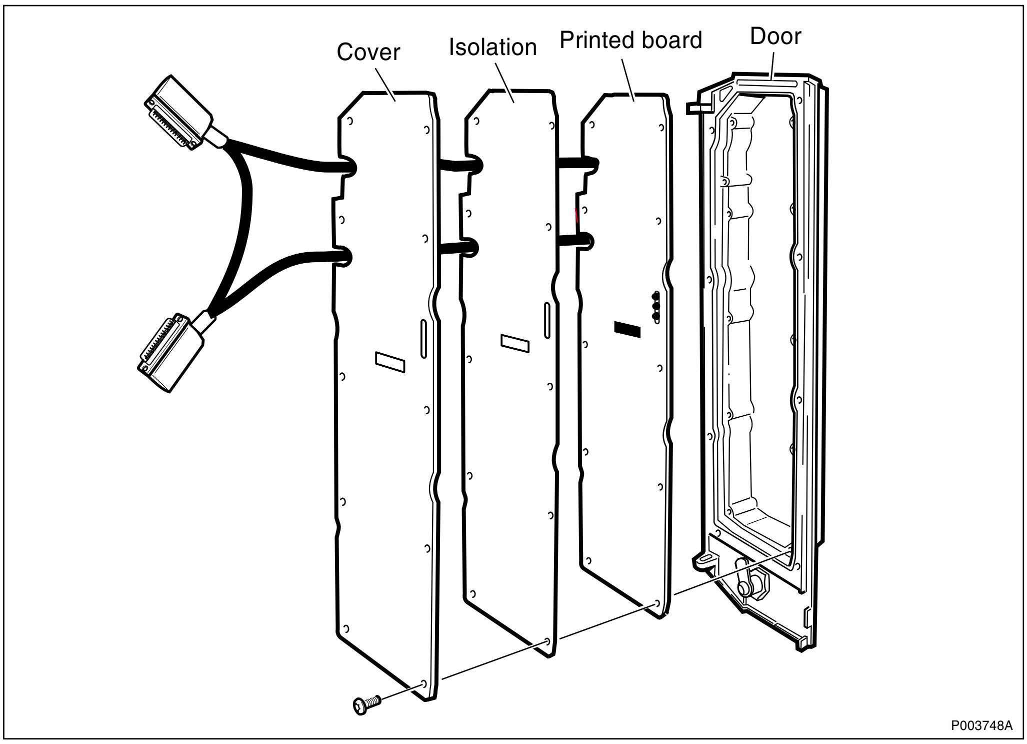


Figure 224 Removing the HDSL modem module from the HDSL door

8.4.2 Connecting the Connectors on the HDSL Modem Module

These instructions describe how to connect the connectors to the line interface on the HDSL modem module.

1. *See the Radio Site Installation Documentation* to find out which configuration is to be used.

2. *See the table below* to find out which connector to use for the line interface (J2, J4 or J6) and for the G.703 interface (J1, J3 and J5) of the HDSL module.

Table 36 Connector selections for the different link choices

Configurations			
Upstream	**Downstream**	**Line Interface**	**G.703 Interface**
HDSL, one pair		J2	J1
HDSL, two pairs		J2	J1
HDSL, one pair	PCM	J2	J1
HDSL, two pairs	PCM	J2	J1
HDSL (cascade)	HDSL (cascade)	J4	J3
PCM	HDSL, one pair	J6	J5
PCM	HDSL, two pairs	J6	J5

Note: Default settings are J3 and J4. If the configuration is changed, the marking of the cover must be updated.

3. Connect the line and G.703 cables to the selected connectors.

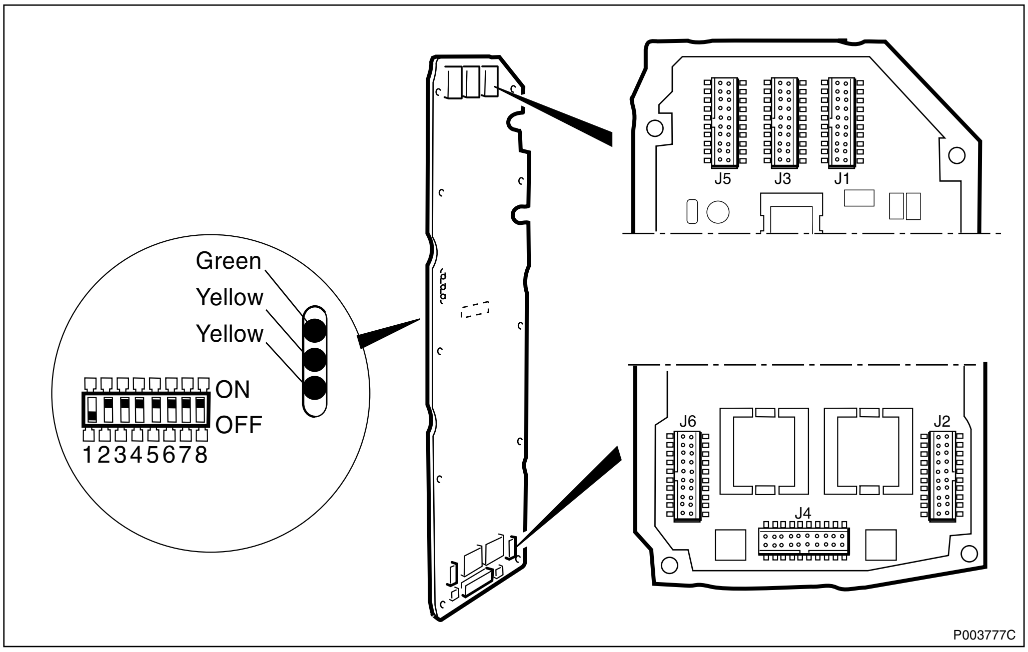


Figure 225 Location of connectors and DIP switches

8.4.3 Setting the DIP Switches

These instructions describe how to set the DIP switches.

1. *See figure above* to locate the DIP switches.
2. To obtain information for the DIP switch settings for the configuration required, find the configuration in *the table below* and proceed to the table referred to under "DIP Switches".
3. Set the DIP switches.
4. Remount the HDSL modem module onto the HDSL door.

Table 37 DIP switch tables for the different configurations

Configurations	DIP Switches
HDSL upstream, one pair	*Table 39 on page 207*
HDSL upstream, two pairs	*Table 39 on page 207*
HDSL upstream, one pair-PCM downstream	*Table 39 on page 207*
HDSL upstream, two pairs-PCM downstream	*Table 39 on page 207*
HDSL upstream-HDSL downstream (cascade)	*Table 38 on page 206*
PCM upstream-HDSL downstream, one pair	*Table 39 on page 207*
PCM upstream-HDSL downstream, two pairs	*Table 39 on page 207*
ETSI	*Table 40 on page 207*

The table below shows the chain (cascading) mode strappings of DIP switches.

Table 38 The chain (cascading) mode strappings of DIP switches

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 not used

The table below shows point-to-point DXX proprietary mode strappings of DIP switches.

Table 39 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 not used

Note: The HDSL 1+1 protection mode selection (SW 6) is independent from the link type selection and is only available in 2 pair mode.

The table below shows point-to-point ETSI compliant mode strappings of the DIP switches.

Table 40 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 compliant 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

Function	Switch position	Parameter value
	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 not used

8.4.4 Remounting the HDSL Door on the RBS

These instructions describe how to remount the HDSL door on the RBS.

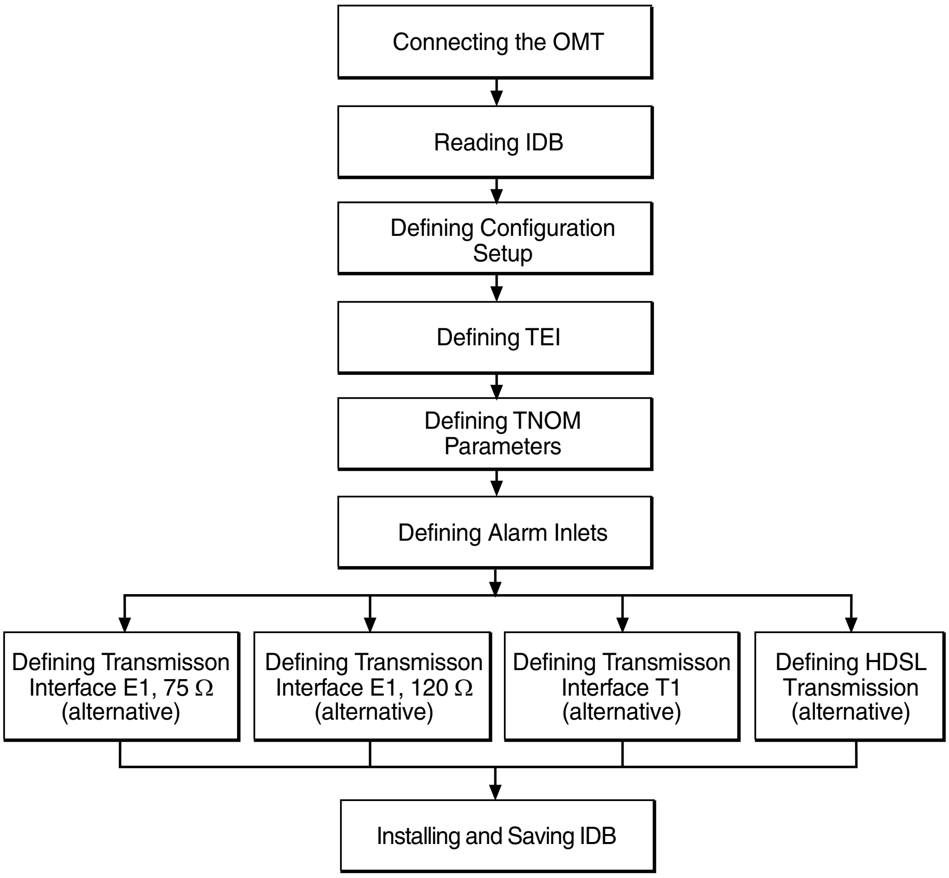
1. Remount the HDSL door onto the RBS.
2. Re-connect the transmission and earth cables. *See Chapter Installation of RBS 2302*
3. Check that the green LED (DC power on) is on.

Note: How to test the HDSL modem is described in *Chapter Optional Tests*, where explanations of the different LEDs can also be found.

8.5 Configuring IDB

This section describes how to configure the Installation Database (IDB). The IDB contains information about the equipment and the configuration of the cabinet.

The *figure below* shows the work process for configuring the IDB.



P008346A

Figure 226 Work process for IDB configuration

Note: If the configuration consists of more than 2 TRXs, the IDB should only be installed in the master RBS. The extension RBS(s) must be switched off until the IDB has been installed in the master RBS.

8.5.1 Connecting the OMT

This section describes how to connect the Operation and Maintenance Terminal (OMT) to the (master) RBS.

The OMT is used for configuration and fault status reading.

1. Connect the OMT cable (C1) from a PC COM port 1 to the input inside the RBS's installation box marked X10. *See figure below*.

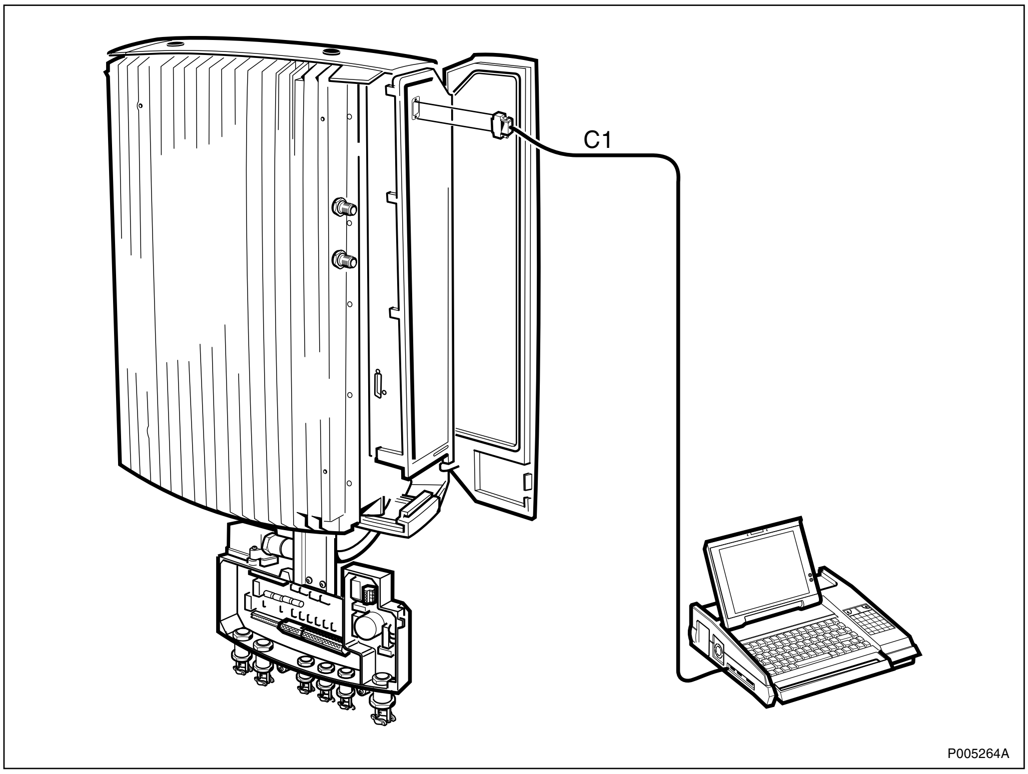


Figure 227 Connecting the OMT

Connecting the Extended OMT Cable (if applicable)

These instructions describe how to connect the extended OMT cable.

1. Connect the OMT converter between the extended OMT cable and a PC. *See figure below*.

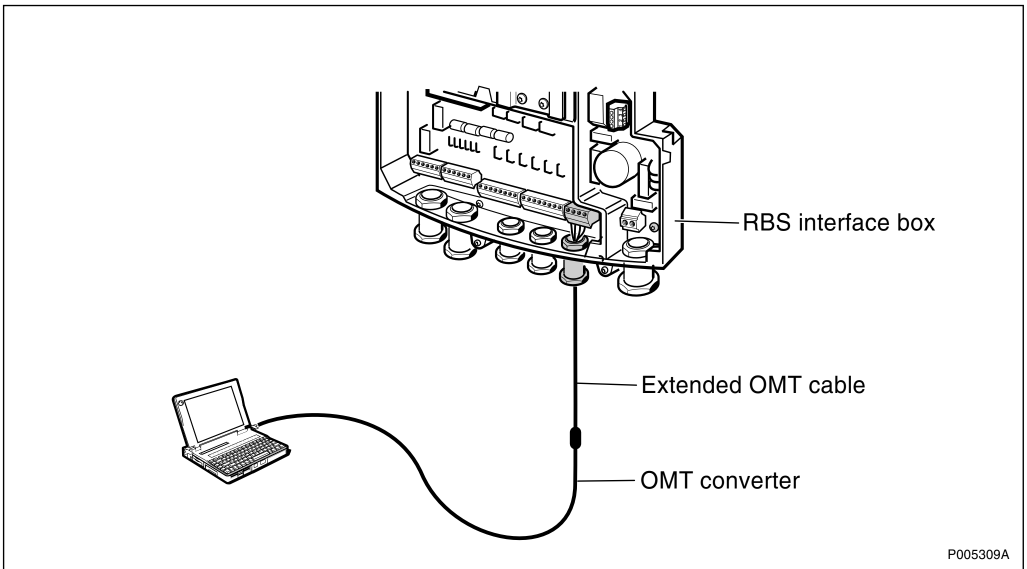


Figure 228 Connecting the extended OMT cable

Note: For further information about the extended OMT cable, *see Chapter Tools and Instruments* and *Chapter Installation of RBS 2302*.

8.5.2 Reading IDB

This section describes how to check if the correct IDB is installed in the RBS by checking that the values of the parameters in the OMT correspond with the values given in the *Radio Site Installation Documentation*.

Note: When changing from regular RBS 2302 configuration to Maxite configuration or vice versa, do not re-use the old radio parameters in the OMT-window Re-use Site Specific Data.

1. Start the OMT.
2. In the **Connection** menu, select **Connect**.
3. In the **File** menu, select **Read IDB**.
4. In the System view, select and click with the right mouse button on the **RBS 2000** icon and select **Display Information**, **Display TEI** and **Display TNOM** to find the values of the parameters in the OMT.
5. Select and click with the right mouse button on the **PCM** icon and select **Display Information**to find the values of the parameters.
6. Select and click with the right mouse button on the **Alarm Inlets** icon and select **Display Information** to find the values of the parameters.
7. Check that the values in the OMT correspond with those given in the *Radio Site Installation Documentation*. Also *see the table below*.

Table 41 Reading and checking IDB

Check that the parameters for the following are correct:	OK
Transmission Interface	
Cabinet configuration(s)	
Antenna Sector Configuration(s)	
Antenna Type(s)	
TEI value for cabinet 0	
TNOM Parameters	
PCM Parameters	
Alarm Inlets	

8. If the IDB is correct, continue with *Section 8.6 on page 226*.
9. If the IDB is not correct, a new IDB must be created. *See Section Creating IDB below*.
10. In the System view, press **Connection**and **Disconnect** to logically disconnect the OMT from the RBS.

Note: When using the SW Power Boost (TX-diversity) the OMT will show two TRXs, even though the RBS is to be considered as having only one TRX.

8.5.3 Defining Configuration Setup

This section describes how to define the configuration setup in the OMT.

Note: Before starting creating IDB, ensure that the OMT has been logically disconnected from the RBS.

Defining Transmission Interface

1. In the **File** menu, select **Create IDB**, to open the Create IDB window.
2. Select transmission interface. *See Radio Site Installation Documentation*.

Defining Cabinet Setup

3. To add cabinets to the **Cabinet Setup**box, press **New** to open the Define Setup For Cabinet window.
4. In the **Cabinet Type** box, select "2302". In the **Power System** box, select power system according to the *Radio Site Installation Documentation*. Press **OK**.
5. If a 4-TRX or 6-TRX configuration is used, repeat steps 3 to 4 for the remaining RBS(s).

Defining Antenna Sector Setup

6. To add antenna sectors to the **Antenna Sector Setup** box, press **New** to open the Define Setup For Antenna Sector window.
7. In the **Frequency** box, select frequency. *See Radio Site Installation Documentation*. Press **OK**.
8. Define the remaining antenna sectors the same way as described above. Press **OK** in the Create IDB window.

Selecting Antenna Type (if applicable)

9. In box **Select Antenna type for each Sector**, select antenna type. *See Radio Site Installation Documentation.* Press **OK**.

Selecting the Final Configuration

10. In the Final Configuration Selection window, select the site cell configuration (SCC). *See Radio Site Installation Documentation*.
11. Verify that the correct parameters have been entered. Press **OK**.

8.5.4 Defining TEI

These instructions describe how to define TEI.

1. Select the Cabinet 0 view.
2. Click on the **Micro Cabinet** icon, select **Operation** and **Define TEI**.

3. Enter the correct TEI value. *See Radio Site Installation Documentation*. Press **OK**.

4. Return to the System view.

8.5.5 Defining TNOM Parameters (if applicable)

These instructions describe how to define the TNOM parameters if supported by the network. *See Radio Site Installation Documentation*.

1. In the System view, select the **RBS 2000**icon.

2. In the **Operation** menu, select **Define TNOM**.

3. Set **TNOM Use** “On”.

4. In boxes **TNOM Timeslot** and **TNOM Node ID**, insert the values that can be found in the *Radio Site Installation Documentation*. Press **OK**.

8.5.6 Defining Alarm Inlets

These instructions describe how to define the alarm inlets.

1. In the System view, select the **Alarm Inlets** icon.

2. In the **Operation** menu, select **Define Alarm Inlets**.

3. Define the alarms according to the instructions below.

4. Press **OK** when all alarms are defined.

Defining PBC Alarms (if applicable)

If a PBC is used, define PBC alarms according to the instructions below.

1. In the Define Alarm Inlets window, define the PBC alarms according to *the table below*. Press **Apply** after each alarm defined.

2. If there are more PBCs, define the PBC alarms for the remaining PBC(s) as described above.

Table 42 PBC alarm parameters

Alarm Inlet Information	0/8	1/8	2/8
Inlet Usage	External alarm	External alarm	External alarm
Type	Breaking	Breaking	Breaking
ID (1)			
Severity	Level 2	Level 2	Level 2
Comment	PBC POWER, WARNING	PBC POWER, WARNING	PBC POWER, WARNING

(1) Preferably ID should be set to the same number as the corresponding alarm inlet.

Defining Fan Alarms (if applicable)

These instructions describe how to define the fan alarms.

1. Define the fan alarms as external alarms according to the *table below*. Press **Apply** after each alarm defined.

Table 43 Fan alarm parameters

	RBS 1	RBS 2	RBS 3
Alarm Inlet Information	0/2	1/2	2/2
Inlet Usage	External alarm	External alarm	External alarm
Type	Breaking	Breaking	Breaking
ID (1)			
Severity	Level 2	Level 2	Level 2
Comment	FAN UNIT	FAN UNIT	FAN UNIT

(1) Preferably ID should be set to the same number as the corresponding alarm inlet.

Defining HDSL Alarms (if applicable)

These instructions describe how to define the HDSL alarms.

1. Define HDSL modem alarms according to the *table below*. Press **Apply** after each alarm defined.

Table 44 HDSL alarm parameters

Alarm Inlet Information	0/3	0/4
Inlet Usage	External alarm	External alarm
Type	Closing	Closing
ID (1)		
Severity	Level 2	Level 2
Comment	HDSL DEGRADATION DOWNSTREAM OR PAIR 1	HDSL DEGRADATION UPSTREAM OR PAIR 2

(1) Preferably ID should be set to the same number as the corresponding alarm inlet.

Defining Customer Specific Alarms (if applicable)

These instructions describe how to define customer specific alarms.

1. Define customer specific alarms on the remaining unused alarm inlets. *See Radio Site Installation Documentation*. Press **Apply** after each alarm defined.

8.5.7 Defining Transmission Interface E1, 75 Ω (alternative)

This section describes how to define the parameters for transmission interface E1, 75 Ω.

1. In the System view, click on the **PCM**icon.
2. In the **Operation** menu, select **Define PCM**.

3. Set the parameters. *See the table below*for parameters.
4. Press **OK** when all parameters are set.

Table 45 PCM parameters settings for transmission interface E1, 75 Ω

PCM Parameter		Settings
Transmission Interface		E1
Network Topology		*See Radio Site Installation Documentation.*
Sync Source		*See Radio Site Installation Documentation.*
CRC-4		*See Radio Site Installation Documentation.*
Spare bits		*See Radio Site Installation Documentation.*
Receiver Sensitivity	A	Short haul
	B	Short haul

8.5.8 Defining Transmission Interface E1, 120 Ω (alternative)

This section describes how to define the parameters for transmission interface E1, 120 Ω.

1. In the System view, click on the **PCM**icon.
2. In the **Operation** menu, select **Define PCM**.
3. Set the parameters. *See the table below*for parameters.
4. Press **OK** when all parameters are set.

Table 46 PCM parameters settings for transmission interface E1, 120 Ω

PCM Parameter		Settings
Transmission Interface		E1
Network Topology		*See Radio Site Installation Documentation.*
Sync Source		*See Radio Site Installation Documentation.*
CRC-4		*See Radio Site Installation Documentation.*
Spare bits		*See Radio Site Installation Documentation.*
Receiver Sensitivity	A	*See instructions below the table.*
	B	*See instructions below the table.*

Calculating the Cable Attenuation

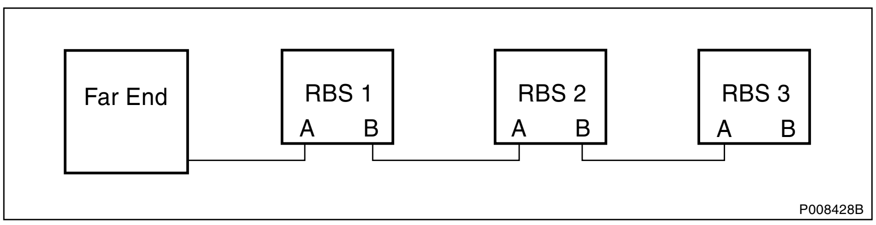


Figure 229 System view for transmission interface E1, 120 Ω

1. Calculate the cable attenuation between the far end and the RBS according to the following formula:

Cable attenuation = cable length x cable attenuation per metre (or foot). *See Radio Site Installation Documentation*.

If multidrop is used, calculate the attenuation of the entire RBS chain, since Receiver Sensitivity A is determined by the total attenuation of the chain. *See example below.*

2. If the cable attenuation between the far end and the RBS is less than 6 dB, set the receiver sensitivity to short haul.

   If the cable attenuation is more than 6 dB, set the receiver sensitivity to long haul.

Example of an LBO Parameters Calculation for Transmission Interface E1

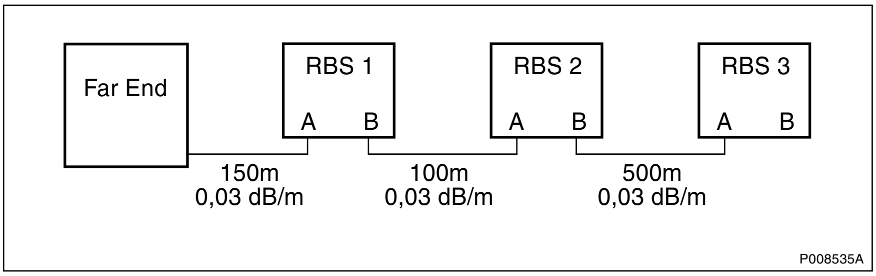


Figure 230 Example of calculating the LBO parameters for transmission interface E1

Example 5 Calculating the LBO parameters for transmission interface E1

In this example, far end, RBS 1, RBS 2 and RBS 3 refer to *the figure above.*
RBS 1:
The cable length between RBS 1 and the far end is 150 metres.
The cable attenuation for the cable between RBS 1 and the far end is 0.03 dB/m.

1 Calculate the cable attenuation between the far end and RBS 1:
150 m x 0.03 dB/m = 4.5 dB

2 Set Receiver Sensitivity A for RBS 1 to “Short haul”.

The cable length between RBS 1 and RBS 2 is 100 metres.
The cable attenuation for the cable between RBS 1 and RBS 2 is 0.03 dB/m.

3 Calculate the cable attenuation between RBS 1 and RBS 2:
100 m x 0.03 dB/m = 3 dB

4 Set Receiver Sensitivity B for RBS 1 to “Short haul”.

RBS 2:
1 Add the two calculated cable attenuations:
4.5 + 3 = 7.5 dB

2 Set Receiver Sensitivity A for RBS 2 to “Long haul”.

The cable length between RBS 2 and RBS 3 is 500 metres.
The cable attenuation for the cable between RBS 2 and RBS 3 is 0.03 dB/m.

3 Calculate the cable attenuation between RBS 2 and RBS 3:
500 m x 0.03 dB/m = 15 dB

4 Set Receiver Sensitivity B for RBS 2 to “Long haul”.

RBS 3:

1 Add the three calculated cable attenuations:
4.5 + 3 + 15 = 22.5 dB

2 Set Receiver Sensitivity A for RBS 3 to “Long haul”.

3 Set Receiver Sensitivity B for RBS 3 to “Short haul” (not connected).

8.5.9 Defining Transmission Interface T1 (alternative)

This section describes how to define parameters for transmission interface T1 when using the reference cable (multipair 22 AWG office cable) or similar.

For information about what LBO parameters to set, *see Radio Site Installation Documentation* and go to the correct section below.

If no information is given in *Radio Site Installation Documentation*, *see the table below*.

Table 47 Selecting the correct section for defining transmission interface T1

<table>
<tr><th colspan="2">If...</th><th>then...</th></tr>
<tr><td colspan="2">the cable length is less than 655 feet</td><td>go to Section Defining LBO Parameters to Short Haul.</td></tr>
<tr><td rowspan="3">the cable length is more than 655 feet and...</td><td>the signal level at the customer interface and the cable attenuation is known</td><td>go to Section Defining LBO Parameters to Long Haul Manually.</td></tr>
<tr><td>only the maximum input signal level at the far end is known</td><td>go to Section Defining LBO Parameters to Long Haul Automatically.</td></tr>
<tr><td>neither the signal level at the customer interface nor the cable attenuation are known</td><td>go to Section Defining LBO Parameters to "Long h., 0 dB".</td></tr>
<tr><td colspan="2">there is no information about the cable length</td><td>go to Section Defining LBO Parameters to "Long h., 0 dB".</td></tr>
</table>

Defining LBO Parameters to Short Haul

This section describes how to define LBO parameters to short haul.

1. In the System view, click on the **PCM**icon.
2. In the **Operation** menu, select **Define PCM**.
3. Set the parameters. *See the table below*for parameters.
4. Press **OK** when all parameters are set.

Table 48 PCM parameters settings for transmission interface T1, short haul

PCM Parameter	Setting
Transmission Interface	DS1(T1)
Network Topology	*See Radio Site Installation Documentation*.
Sync Source	*See Radio Site Installation Documentation*
LBO A	*See instructions below the table.*
LBO B	*See instructions below the table.*
FDL Use	*See Radio Site Installation Documentation.*

Calculating LBO Parameters for Short Haul

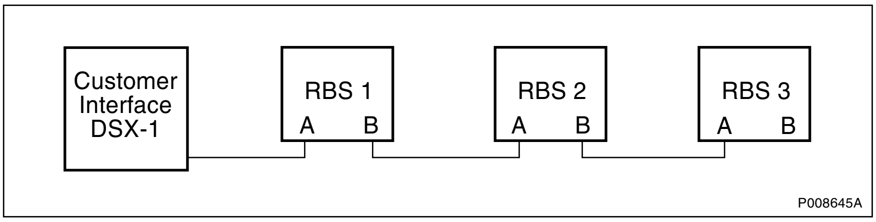


Figure 231 System view for transmission interface T1, short haul

1. Find out the length of the cable between the RBS and the customer interface (the cross-connection point DSX-1). *See figure above.*

   If the cable length is not known, set the LBO parameters to "Short h., 0–133 feet".

2. Use the cable length and *the table below* to set the correct LBO parameters in the OMT.

Table 49 Setting LBO parameters to short haul in the OMT

Cable Length		LBO Setting
Feet	**Metres**	**(in the OMT)**
0 - 133	0 - 40	Short h., 0 - 133 feet
133 - 266	40 - 81	Short h., 133 - 266 feet
266 - 399	81 - 122	Short h., 266 - 399 feet
399 - 533	122 - 162	Short h., 399 - 533 feet
533 - 655	162 - 200	Short h., 533 - 655 feet

Example of an LBO Parameters Calculation for Short Haul

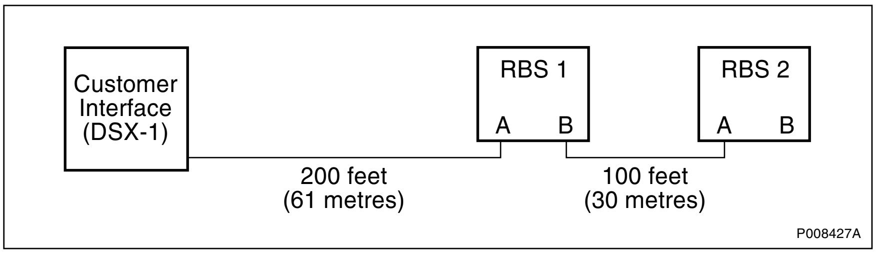


Figure 232 Example of calculating LBO parameters for short haul

Example 6 Calculating LBO parameters for short haul

In this example, customer interface (DSX-1), RBS 1 and RBS 2 refer to *the figure above.*
RBS 1:
The cable length between RBS 1 and the customer interface (DSX-1) is 200 feet (61 metres).

1 Set LBO A for RBS 1 to “Short h., 133 – 266 feet”.
See table above

2 Set LBO B for RBS 1 to “Short h., 0 – 133 feet”.

RBS 2:
The cable length between RBS 2 and the customer interface (DSX-1) is 300 feet (200 + 100 feet) (91 metres).

1 Set LBO A for RBS 2 to “Short h., 266 – 399 feet”.
See table above.

2 Set LBO B (not connected) for RBS 2 to “Short h., 0 – 133 feet”.

Defining LBO Parameters to Long Haul Manually

This section describes how to define LBO to long haul when the signal level at the customer interface and the cable attenuation is known.

Signal level at the customer interface means either the maximum input signal level at the far end or the carrier advised code at the network interface. *See figure below.*

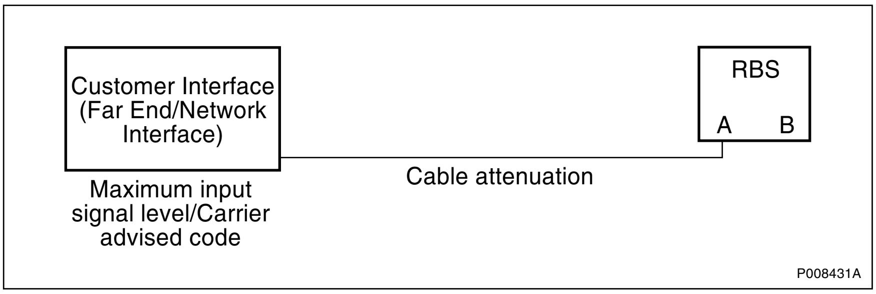


Figure 233 System parameters for defining LBO parameters to long haul

1. In the System view, click on the **PCM**icon.
2. In the **Operation** menu, select **Define PCM**.
3. Set the parameters. *See the table below*for parameters.
4. Press **OK** when all parameters are set.

Table 50 Manual PCM parameters settings for transmission interface T1, long haul

PCM Parameter	Settings
Transmission Interface	DS1(T1)
Network Topology	*See Radio Site Installation Documentation.*
Sync Source	*See Radio Site Installation Documentation.*
LBO A	*See instructions below table.*
LBO B	*See instructions below table.*
FDL Use	*See Radio Site Installation Documentation.*

Calculating the LBO Parameters to Long Haul Manually

1. If multidrop, the total cable length to the RBS in question is to be used. Also *see example below.*
2. Set the LBO parameters to long haul in the OMT in box **DS1 (T1) LBO A**.

If the carrier advised code is the signal level given in *Radio Site Installation Documentation*, *see the table below* for the correct LBO parameters.

Table 51 Long haul parameters for different carrier advised codes at the network interface

Cable Attenuation (dB)	Long Haul Parameters for different Carrier Advised Codes at the Network Interface			
	A (0 dB)	B (-7.5 dB)	C (-15 dB)	D (-22.5 dB)
0 - 7.5	0	-7.5	-15	-22.5
7.5 - 15	NA	0	-7.5	-15
15 - 22.5	NA	NA	0	-7.5
22.5 -	NA	NA	NA	0

If maximum input signal level is the signal level given in *Radio Site Installation Documentation*, *see the table below* for the correct LBO parameters.

Table 52 Long haul parameters for different maximum input signal levels

Cable Attenuation (dB)	Long Haul Parameters for Different Maximum Input Signal Levels at the Far End			
	0 dB	**-7.5 dB**	**-15 dB**	**-22.5 dB**
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

3. LBO B is always set to “Long h., 0 dB”.

Example of a Manual LBO Parameters Calculation for Long Haul

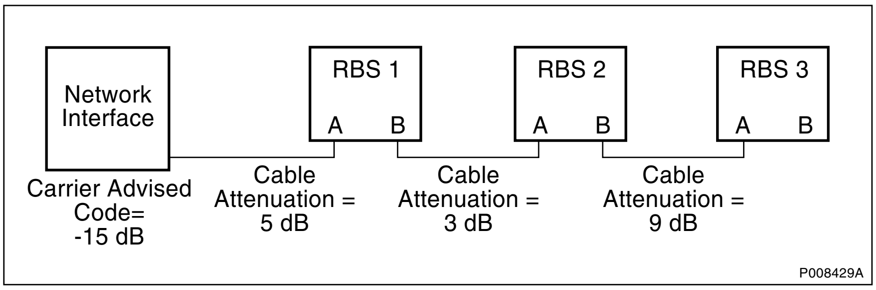


Figure 234 Example of calculating LBO parameters manually for long haul

Example 7 Calculating LBO parameters manually for long haul

In this example, network interface, RBS 1, RBS 2 and RBS 3 refer to *the figure above.*
RBS 1:
Carrier advised code at the network interface is “B” (–15 dB) and the cable attenuation is 5 dB.

1 *See the table Long haul parameters for different carrier advised codes at the network interface* to find the correct LBO parameter for LBO A.

2 Set LBO A to “Long h., -15 dB”.

3 Set LBO B to “Long h., 0 dB”.

RBS 2:
The cable attenuation between RBS 1 and RBS 2 is 3 dB.

1 Calculate the total cable attenuation between RBS 2 and the network interface: 5 + 3 = 8 dB

2 *See the table Long haul parameters for different carrier advised codes at the network interface* to find the correct LBO parameter for LBO A.

3 Set LBO A to “Long h., -7.5 dB”.

4 Set LBO B to “Long h., 0 dB”.

RBS 3:
The cable attenuation between RBS 2 and RBS 3 is 9 dB.

1 Calculate the total cable attenuation for RBS 3 and the network interface: 5 + 3 + 9 = 17 dB

2 *See the table Long haul parameters for different carrier advised codes at the network interface* to find the correct LBO parameter for LBO A.

3 Set LBO A to “Long h., 0 dB”.

4 Set LBO B to “Long h., 0 dB”.

Defining LBO Parameters to Long Haul Automatically

This section describes how to define LBO to long haul when the maximum input signal level at the far end is known, but not the cable attenuation. The cable attenuation can be measured by the RBS according to the instructions below. Also *see figure below*.

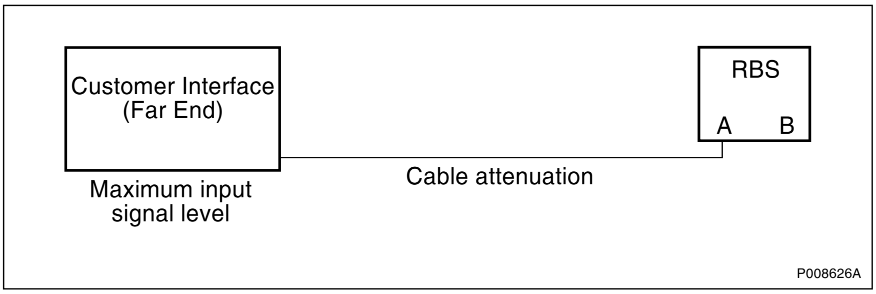


Figure 235 System parameters for defining LBO parameters automatically to long haul

1. In the System view, click on the **PCM**icon.
2. In the **Operation** menu, select **Define PCM**.
3. Set the parameters. *See the table below*for parameters.
4. Press **OK** when all parameters are set.

Table 53 PCM parameters settings for transmission interface T1, long haul

PCM Parameter	**Setting**
Transmission Interface	DS1(T1)
Network Topology	*See Radio Site Installation Documentation*.
Sync Source	*See Radio Site Installation Documentation*
LBO A	*See instructions below table.*
LBO B	*See instructions below table.*
FDL Use	*See Radio Site Installation Documentation.*

Calculating the LBO Parameters to Long Haul Automatically

1. Set LBO A to "Long h. ALBO, *value of the maximum input signal level* dB". *See Radio Site Installation Documentation.* Press **OK**.
2. Set LBO B to “Long h., 0 dB”.

3. In the **Connection** menu, press **Connect**.
4. In the **File** menu, select **Install IDB**.

   The RBS shall remain in Local mode after the IDB has been installed.
5. In the System view, click on the **PCM**icon.
6. In the **Operation** menu, select **Monitor...** and **Lin Att PCM A**.
7. Press **Start Monitor** and read the value of the cable attenuation. The displayed value is given in deci dB (10 deci dB = 1 dB).

   The RBS will automatically set the correct value in the IDB.
8. If multidrop, set LBO A on the second (third) RBS to “Long h. ALBO, 0 dB” and measure the cable attenuation as described above. The value measured is the cable attenuation to the previous RBS in the chain, so the measured cable attenuation values have to be added in order to obtain the total cable attenuation for the RBS in question.
9. To set the correct LBO parameters to long haul in the OMT in box DS1 (T1) LBO A, *see the table below*.

   LBO B is always set to “Long h., 0 dB”.

Table 54 Long haul parameters for different maximum input signal levels

Cable Attenuation (dB)	**Long Haul Parameters for Different Maximum Input Signal Levels at the Far End**			
	0 dB	**-7.5 dB**	**-15 dB**	**-22.5 dB**
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 of an Automatic LBO Parameters Calculation for Long Haul

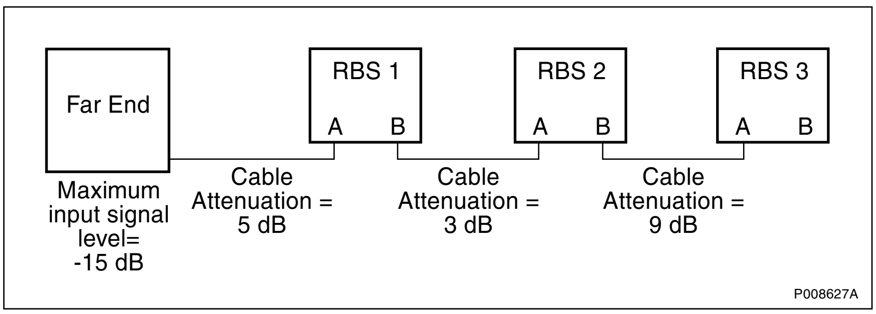


Figure 236 Example of calculating LBO parameters automatically for long haul

Example 8 Calculating LBO parameters automatically for long haul

In this example, far end, RBS 1, RBS 2 and RBS 3 refer to *the figure above.*
Maximum input signal level at the far end is -15 dB.

The cable attenuation is not known.

RBS 1:
1 Set LBO A to “Long h. ALBO, -15 dB”.

The cable attenuation is measured by the RBS to 5 dB.

2 The value of LBO A is set automatically by the RBS.

3 Set LBO B to “Long h., 0 dB”.

RBS 2:
1 Set LBO A to “Long h. ALBO, 0 dB”.

The cable attenuation between RBS 1 and RBS 2 is measured to 3 dB by RBS 2.

2 Add the two measurements to obtain the total cable attenuation for RBS 2:
5 + 3 dB = 8 dB

3 *See the table above* to find the correct LBO parameter for LBO A.

4 Set LBO A to “Long h., -7.5 dB”.

5 Set LBO B to “Long h. 0 dB”.

RBS 3:
1 Set LBO A to “Long h. ALBO, 0 dB”.

The cable attenuation between RBS 2 and RBS 3 is measured to 9 dB by RBS 3.

2 Add the three measurements to obtain the total cable attenuation for RBS 3:
5 + 3 + 9 dB = 17 dB

3 *See the table above* to find the correct LBO parameter for LBO A.

4 Set LBO A to “Long h., 0 dB”.

5 Set LBO B to “Long h. 0 dB”.

Defining LBO Parameters to “Long h., 0 dB”

This section describes how to define the LBO parameters if none of the parameters carrier advised code, maximum input signal at the customer interface, cable attenuation or cable length are known.

1. In the System view, click on the **PCM**icon.
2. In the **Operation** menu, select **Define PCM**.
3. Set the parameters. *See the table below*for parameters.
4. Press **OK** when all parameters are set.

Table 55 Manual PCM parameters settings for transmission interface T1, long haul

PCM Parameter	Settings
Transmission Interface	DS1(T1)
Network Topology	*See Radio Site Installation Documentation.*
Sync Source	*See Radio Site Installation Documentation.*
LBO A	*Long h., 0 dB*
LBO B	*Long h., 0 dB*
FDL Use	*See Radio Site Installation Documentation.*

8.5.10 Defining HDSL Transmission (alternative)

This section describes how to define parameters for HDSL transmission.

Note: HDSL can be combined with PCM transmission. The HDSL port shall be configured as described below and the PCM port as in *Section 8.5.8 on page 215*.

1. In the System view, click on the **PCM**icon.
2. In the **Operation** menu, select **Define PCM**.
3. Set the parameters. *See the table below*for parameters.
4. Press **OK** when all parameters are set.

Table 56 PCM parameters settings for HDSL transmission

PCM Parameter		Setting
Transmission Interface		E1
Network Topology		*See Radio Site Installation Documentation.*
Sync Source		*See Radio Site Installation Documentation.*
CRC-4		*See Radio Site Installation Documentation.*
Spare bits		*See Radio Site Installation Documentation.*
Receiver Sensitivity	A	Short haul
	B	Short haul

8.5.11 Installing and Saving IDB

This section describes how to install and save the IDB.

Note: The RBS must be in Local Mode to accept a new or modified IDB.

1. Connect the OMT to the RBS if not already connected. *See Section 8.5.1 on page 209.*
2. If there are extension RBSs, ensure that these are switched off.
3. In the **Connection** menu, select **Connect** to connect the OMT to the RBS.
4. In the **File** menu, select **Install IDB**.

The RBS shall remain in Local mode after the IDB has been installed.

5. If there are extension RBSs, switch these on. They will now enter Local mode.
6. Wait a few minutes before setting the extension RBS(s) in Remote mode.
7. Check in the OMT that the master RBS has established contact with the extension RBS(s) by viewing SW-revisions for all RBSs.
8. In the System view, click on the **PCM**icon. In the **Operation** menu, select **Display Information** to check that the correct PCM parameters have been defined.
9. In the System view, click on the **Alarm Inlets** icon. In the **Operation** menu, select **Display Information** to check that the defined alarms have been properly installed.
10. Save the IDB on a disk. The name of the IDB file must be site specific. Label the disk according to *the table below*.

Table 57 IDB disk 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)

8.6 Reading Fault Status

This section describes how to read fault status. If any fault LED on the RBS is on, including the external alarms LED, fault status must be read. Make sure the OMT has been started and the IDB read. *See Section 8.5.2 on page 211*.

1. Under System View, select icon **RBS 2000**.
2. Under **Operation**, select **Monitor...** and **Fault Status** to read the fault status log.
3. If the fault status log shows alarms, *see Chapter Maintenance*. Take corrective actions if necessary before continuing.
4. Select box **Alarm Inlets** and **Monitor...** and check if there are any faults regarding alarm inlets. Keep the window open for the next test.

8.7 Testing External Alarms

This section describes how to, with the OMT, test that all external alarms are recognized and handled correctly. The test is passed when all defined alarms are recognized.

Note: The RBS must be in Local mode before testing external alarms. If the RBS remains in Remote mode all alarms activated during the test will be reported to the BSC, which might take corrective action.

To activate a closing alarm, short-circuit two alarm ports with a loop. *See figure below.*

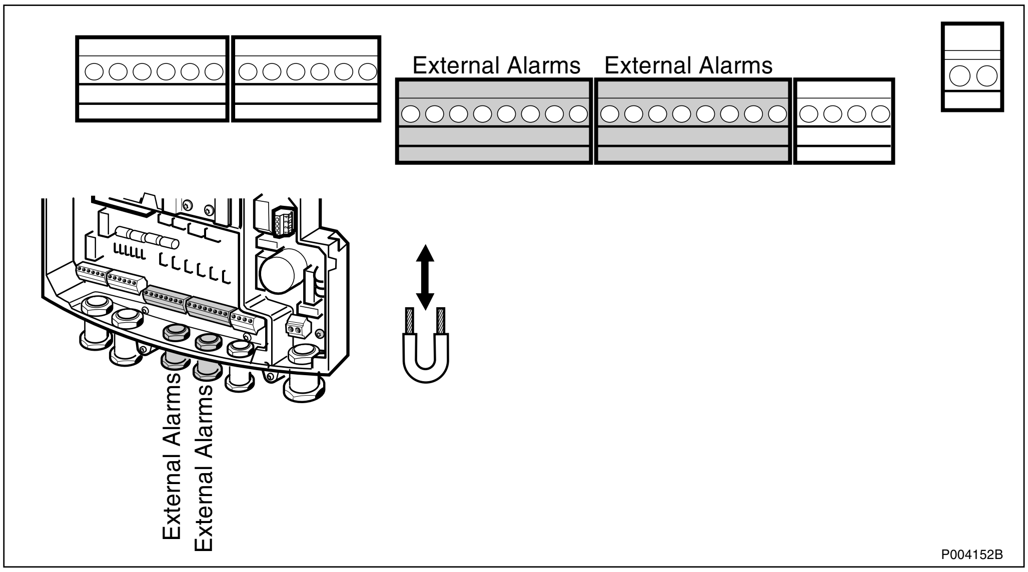


Figure 237 Test of closing alarm

To activate a breaking alarm, disconnect either the X35 or X34 connector, depending on alarm to be tested. *See figure below.*

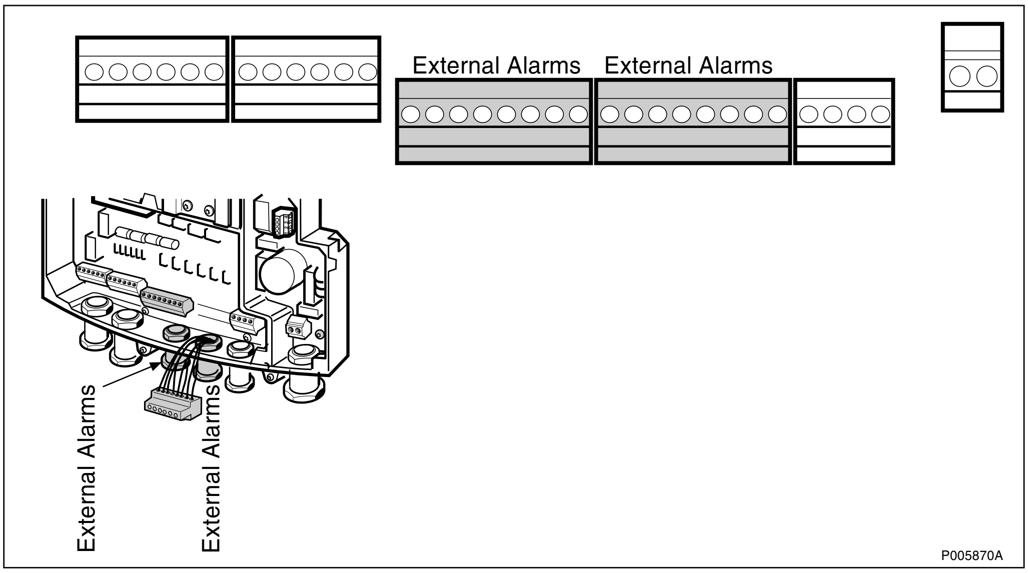


Figure 238 Test of breaking alarm

Testing External Alarms for 2-, 4- and 6-TRX Configurations

These instructions describe how to test external alarms.

1. Set the RBS in Local mode if it is in Remote mode.

2. Activate the selected alarm on the (master) RBS by applying appropriate closing or breaking. *See figures above.*

   The alarm connectors are located in the interface box.

Table 58 Activated external alarm on the master RBS

Check that:	**OK**
the external alarm indicator on the (master) RBS is lit or flashing.	
the appropriate alarm appears when monitoring alarms in the OMT.	

3. Deactivate the alarm activated in step 2.

Table 59 Deactivated external alarm on the (master) RBS

Check that:	**OK**
no faults are indicated on the (master) RBS.	
no faults are indicated when monitoring alarms in the OMT.	

4. Repeat step 2 to 3 for all defined alarms including the extension cabinets.

Note: The external alarms for all RBSs are read on the master RBS.

8.8 Testing Battery Backup

This section describes how to verify that the battery is able to supply DC power when the AC mains power is off.

8.8.1 Preconditions

Before starting the tests, ensure that:

- ☐ the PBC (if used) has been powered up for at least 15 minutes.
- ☐ the AC and battery power for the PBC (if used) are switched on.
- ☐ no faults are displayed on the PBC (if used).
- ☐ the AC and battery power for the RBS are switched on.
- ☐ the RBS has been powered up for at least five minutes.
- ☐ the Battery Fault Indicator is off – if the indicator light is yellow, the battery has to be recharged.

8.8.2 Testing Battery Backup of Internal Battery

This section describes how to test that the internal battery is able to supply DC when the AC mains power is off.

Note: Make sure that the Battery Fault indicator is off before testing the battery.

The test shall be performed for each RBS. The test is passed if the RBS is still running when the incoming AC mains power for the RBS has been switched off.

1. Switch off the incoming AC mains power for the RBS.

Table 60 AC mains power off

Check that:	**OK**
the indicator AC Power On is off.	
the RBS is still running.	

2. Switch on the incoming AC mains power for the RBS.

Table 61 AC mains power on

Check that:	**OK**
the indicator AC Power On on the RBS is lit (yellow).	

8.8.3 Testing PBC Battery Backup (if applicable)

This section describes test procedures for 2-, 4- and 6-TRX configurations.

Note: Make sure that the Battery Fault indicator is off before testing the battery. For identification of alarms and correction of faults, *see Chapter Maintenance.*

The test must be performed for each set of RBS and PBC included in the configuration used. The test has been passed if the RBS is still running when the incoming AC for the RBS and the PBC has been switched off. This is indicated by the Local mode indicator being on or flashing.

1. Switch off the incoming AC mains power for the tested RBS and PBC.

Table 62 AC mains power off

Check that:	**OK**
the indicator AC Power On on the RBS is off.	
the RBS is still running.	
alarm code 020 is displayed on the PBC .	

2. Switch on the incoming AC mains power on the PBC and RBS.

Table 63 AC mains power on

Check that:	**OK**
the AC Power On indicator on the RBS is lit (yellow).	
alarm code 020 on the PBC ceases.	

3. If a 4- or 6-TRX configuration is used, repeat steps 1 to 2 for remaining pair(s) of RBS(s) and PBC(s).

8.9 Concluding Routines

This section describes the actions to be taken before leaving the site.

The following checklist is not mandatory, but strongly recommended. Local procedures and safety regulations must be evaluated and included in the list.

Table 64 Checklist

Check that:		**OK**
1	a back-up copy of the IDB has been saved on a disk.	
2	the LED status of the RBS is according to *the figure below*.	
3	the test equipment has been disconnected from the RBS.	
4	all cables are connected and undamaged.	
5	the RBS(s) is/are in Remote mode.	
6	the PBC(s) is/are operational (optional).	
7	the cabinet(s) is/are locked	
8	the radio sub-cabinet and mounting base are free from foreign objects.	
9	all tools have been accounted for and removed from the site	
10	defective part(s) has/have been packed for shipment (including Repair Delivery Note).	
11	the necessary Test Records have been completed. *See Figure 240 on page 232* and *Figure 241 on page 233.*	
12	all other necessary paper-work has been completed	

Accepted LED status when finished with Site Installation Tests are shown in *the figure below*.

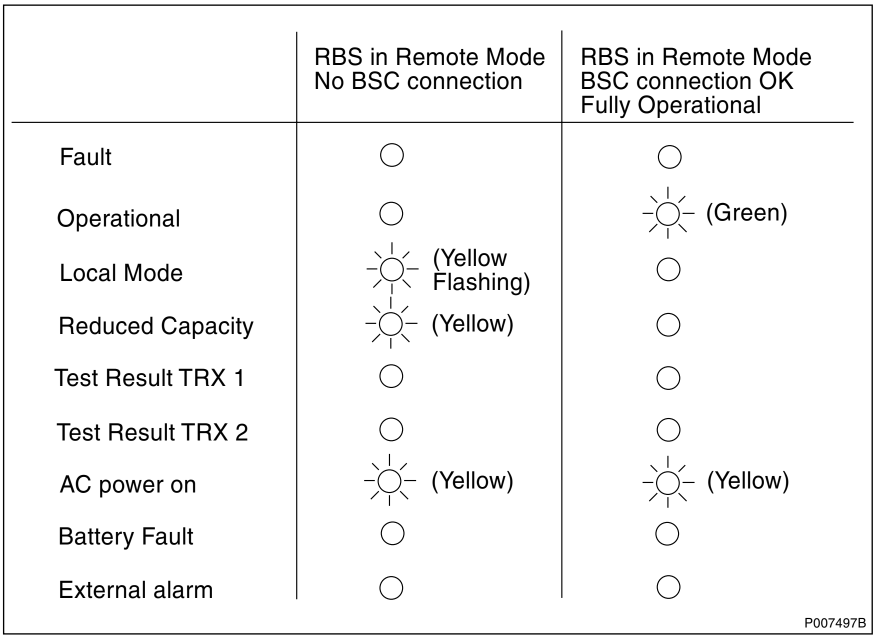


Figure 239 Accepted LED status

8.9.1 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 Field Support Centre (FSC) for resolution and registration in the Ericsson trouble report system Modification Handling System (MHS).

8.9.2 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 can also be found in *Chapter Maintenance*.

8.9.3 Test Records

Date:	Site Name:
Site No:	Cell Configuration:
RBS Type:	Tester's Name:

Site Hardware Status

Unit	Product No.	Serial No.	Rev.	Manufacture Date
RBS 1:				
-Radio Cabinet				
-Mounting Base				
-PSA				
-Fan Unit				
-HDSL				
RBS 2:				
-Radio Cabinet				
-Mounting Base				
-PSA				
-Fan Unit				
-HDSL				
RBS 3:				
-Radio Cabinet				
-Mounting Base				
-PSA				
-Fan Unit				
-HDSL				
PBC 1:				
-Battery Cabinet				
-Mounting Base				
PBC 2:				
-Battery Cabinet				
-Mounting Base				
PBC 3:				
-Battery Cabinet				
-Mounting Base				

P005582B

Figure 240 Test Record for Site Hardware Status

Site Installation Tests GSM -

Date:	Site Name:
Site No:	Cell Configuration:
RBS Type: 2302	Tester's Name:

AC Mains Power Test:

Pass/Fail	

Fan Unit Test (if Applicable):

Pass/Fail	

HDSL Configuration (if Applicable):

	Connector Settings
Line Interface	
G.703 Interface	

	1	2	3	4	5	6	7	8
On								
Off								

IDB Configuration:

Multidrop/Stand Alone	
RBS Sequence No	

TEI Value	

TNOM (On/Off)	Timeslot	Node ID

Alarm No	X/1	X/2	X/3	X/4	X/5	X/6	X/7	X/8
RBS 1								
RBS 2								
RBS 3								

PCM Parameter	Settings	
Transmission Interface		
Network Topology		
Sync Source		
CRC-4		
Spare Bits		
Receiver Sensitivity A/LBO A		Line Att:
Receiver Sensitivity B/LBO B		Line Att:
FDL Use (only for DS1 (T1))		

Fault Status Read:

Pass/Fail	

External Alarms Test:

Pass/Fail	

Battery Backup Test:

Pass/Fail	

Remarks: ______________________________

____

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Figure 241 Test Record for Site Installation Tests

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9 Optional Tests

9.1 Preface

These tests are performed in the integration, *see chapter RBS Site Integration*, and are therefore optional. These tests may be performed if there is no connection with the BSC yet.

All results shall, during the tests, be documented in the Test Record, *see Section 9.3.2 Completing the Test Record for Optional tests on page 247*.

9.1.1 Preconditions

Before starting the tests ensure that:

- ☐ the test record for Site Installation tests is completed.
- ☐ the test record for Antenna System Tests is completed.

9.1.2 Electrostatic Discharge

Always use an approved antistatic bracelet to avoid damage to components mounted on printed board assemblies.

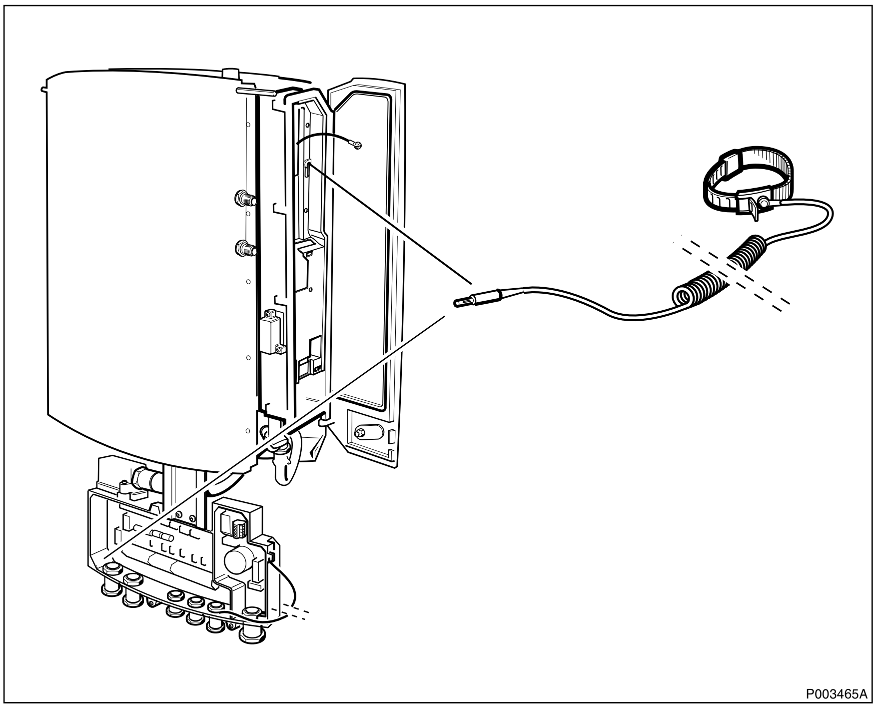

Figure 242 Connecting the ESD wrist strap to the RBS

9.2 TEMS Call Test using BSCSim II

This test may be performed when there is no connection with the BSC yet.

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 through the base station. The test is passed when a call has been made on all TRXs.

The equipment used is BSCSim II, a mobile station (TEMS) and a Multicasting Box (MCB).

For more information regarding the BSCSim II, see:

BSCSim II User's Guide *EN/LZT 123 2771/1*

For tests involving the HDSL modem, the Martis DXX HTU-2M (product number ZAT 759 20/101) is also needed. The HTU is used as a converter between the PCM signal and the HDSL signal. This instrument will throughout the instructions be referred to as HTU.

Note: The HTU is not needed for tests on PCM upstream–HDSL downstream configuration.

9.2.1 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

Note: The BSCSim II does not support CRC-4. If the RBS is configured with CRC-4, it needs to be disabled in the RBS IDB during tests using OMT, *see chapter Site installation Tests*.

9.2.2 Cables

Throughout the test the cables will be referred to as follows:

C1	OMT cable
C2	MS cable
C3	Transmission cable, E1 75 Ω
C4	Transmission cable, T1 100 Ω, E1 120 Ω
C5	Transmission cable, HDSL
C6	Cable between BSCSim II and HTU
A1	Attenuator, 30 dB, 2 W
Ad1	Adapter

For more information regarding the cables, *see chapter Tools and Instruments*.

9.2.3 Making Test Calls using TEMS and BSCSim II

This section describes how to make a test call using TEMS and BSCSim II.

Note: If HDSL modem is used perform the setup and the test call according to *Section 9.2.4 Making a Test Call through HDSL using the TEMS and BSCSim II on page 240*.

Test Setup Procedure: 2 TRX Configuration

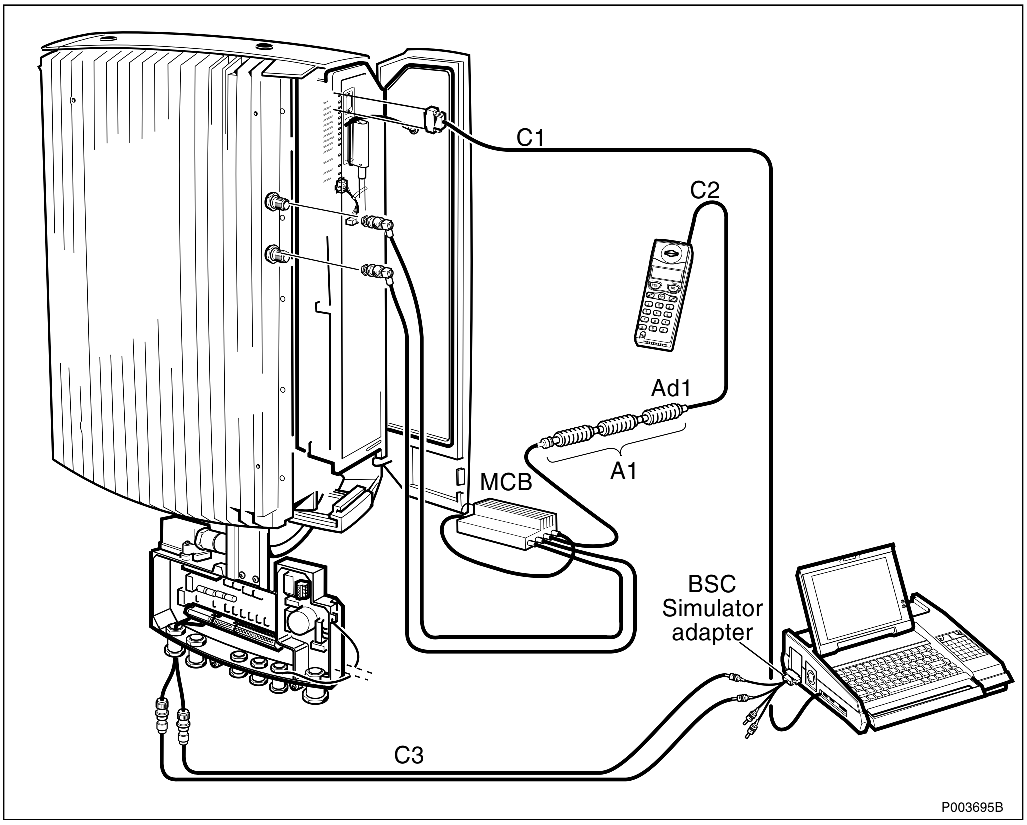

Figure 243 Setup using BSCSim II, E1 75 Ω (2.0 Mbit/s)

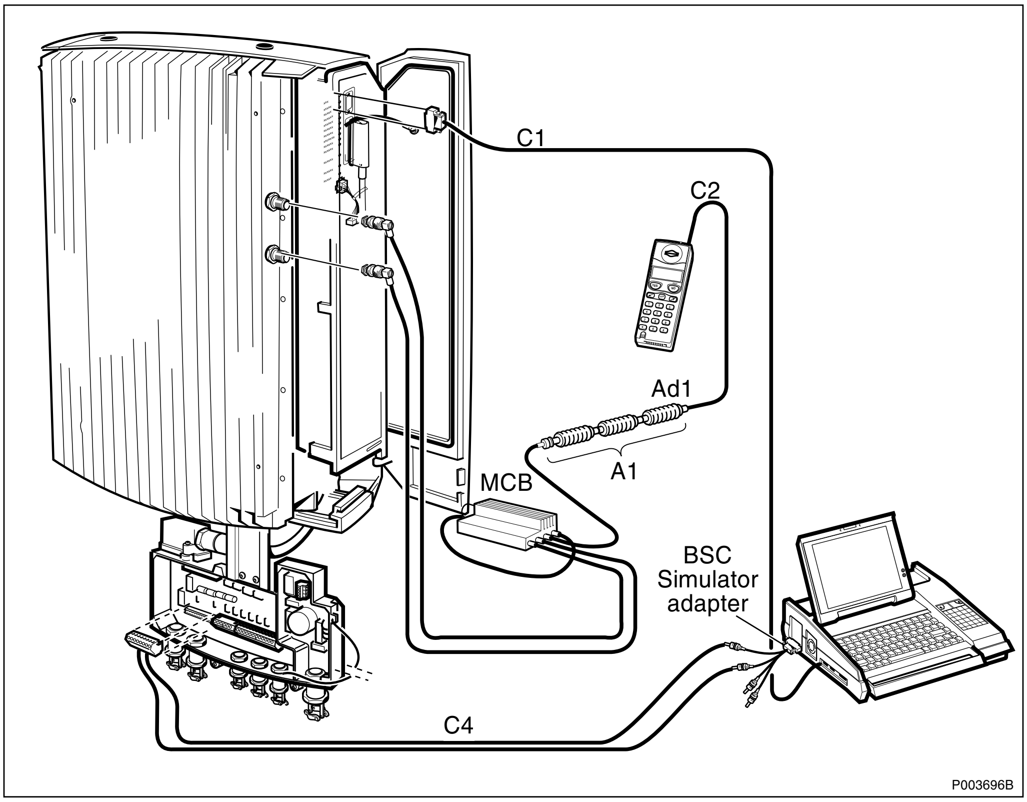

Figure 244 Setup using BSCSim II, T1 100 Ω (1.5 Mbit/s) and E1 120 Ω (2.0 Mbit/s)

1. Ensure that the RBS is in Remote mode. If not, change to Remote mode by pressing the Local remote button on the RBS.
2. Connect C1 to the COM1 port on the BSCSim II, and to the input inside the installation box marked OMT.

Note: Always connect the BSCSim II to the Master RBS (BSCSim II, R2A or later, is required).

3. Connect the BSCSim II adapter to the input on the BSCSim II.
4. Connect the cables between the BSCSim II and the interface box:

   For E1 75 Ω:

   1. Disconnect the existing cables from the PCM A cables that are connected to the interface box.
   2. Connect C3 to the BNC connector on the BSCSim II adapter.
   3. Connect C3 to the PCM A cables that are connected to the interface box, *see Figure 243 on page 238*.

   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 C4 to the BNO connector on the BSCSim II adapter.
   3. Connect the C4 plug to the PCM A socket in the interface box, *see Figure 244 on page 238*.

5. Connect C2 to the antenna inlet on the mobile, and to the Ad1.
6. Connect the adapter Ad1 to the first attenuator A1.
7. Connect the three attenuators A1.
8. Connect the third attenuator A1 to the Multicasting Box (MCB).
9. Make sure that the RBS are switched off or is not transmitting. Disconnect the antenna jumper cables from the antenna outputs X2 and X3 on the RBS.
10. Connect the cables from the MCB to the antenna outputs on the RBS:

    TX/RX Ant A to X2

    TX/RX Ant B to X3
11. Switch on the PBC (if used), RBS and the BSCSim II

Test Setup Procedure: 4 TRX and 6 TRX Configurations

When this test setup is used, one cell per RBS must be defined.

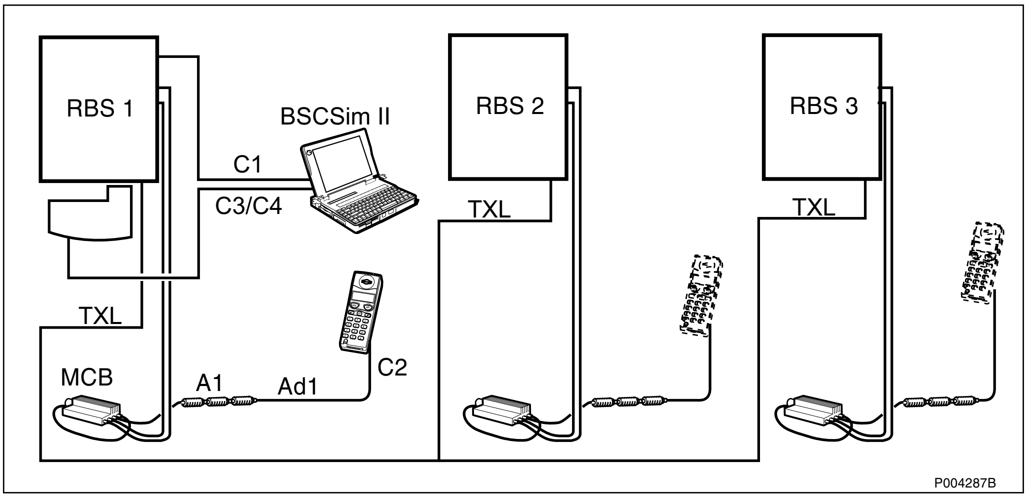

Figure 245 Test setup for 4 TRX and 6 TRX configurations

1. Master RBS: Follow the instructions in *Section Test Setup Procedure: 2 TRX Configuration on page 238*.
2. Extension RBSs: Assemble cable C2, adapter Ad1, attenuator A1 and MCB, and connect the assembly to each Extension RBS.
3. When making a test call, connect the mobile station to the RBS that is to be tested.

Test Sequence

Note: The time from start until the RBS is operational varies depending on the 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 respectively (provided that the test setup is the same).

When the test is completed, disconnect the test equipment and reconnect the cables to the PCM A socket in the interface box.

9.2.4 Making a Test Call through HDSL using the TEMS and BSCSim II

This section describes how to make a test call through the HDSL using TEMS and BSCSim II. This test should only be made if a HDSL modem is used.

Note: If a HDSL modem is not used perform the setup and the test call according to *Section 9.2.3 Making Test Calls using TEMS and BSCSim II on page 237*.

Test Setup Procedure

The following figures show examples of different test setups.

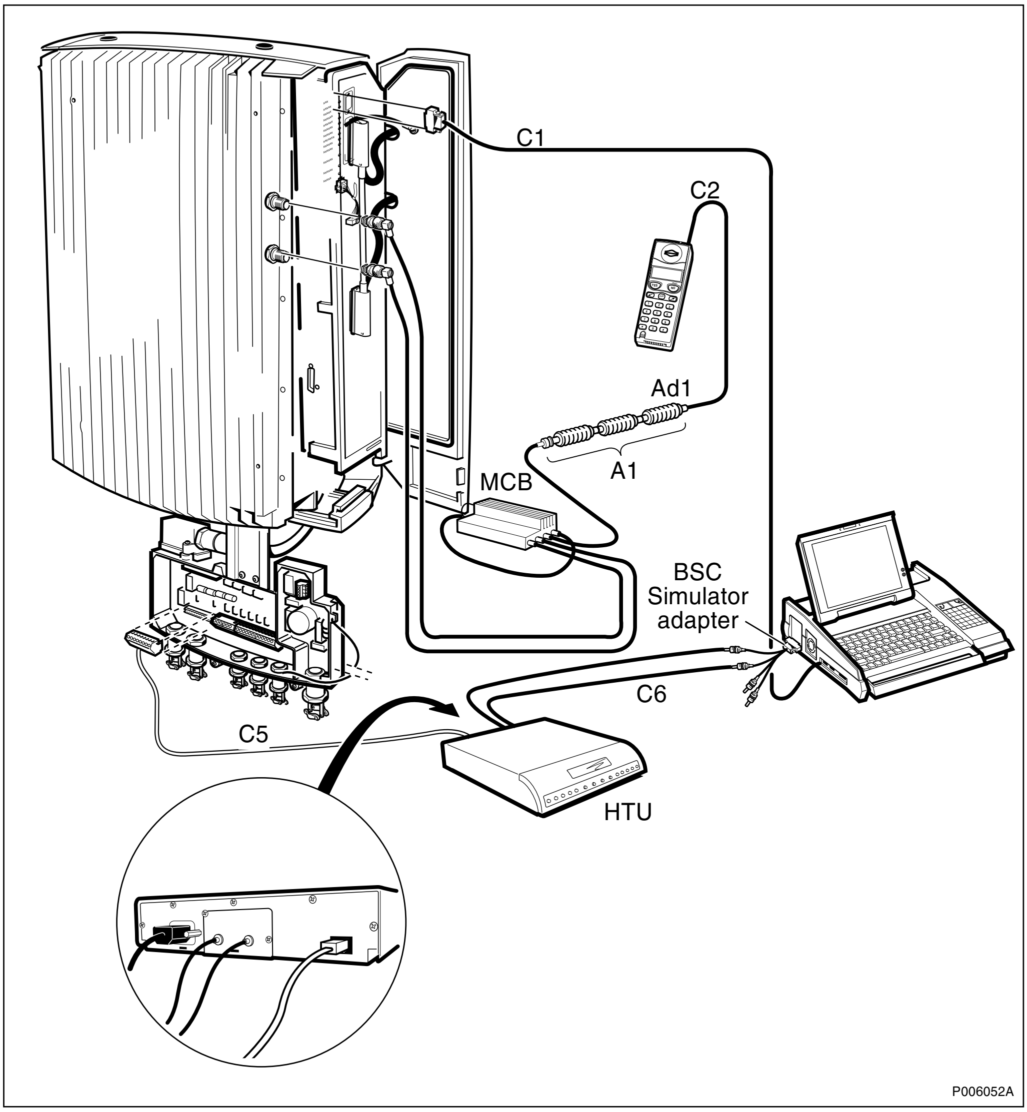

Figure 246 Example of test setup, HDSL upstream, one or two pairs

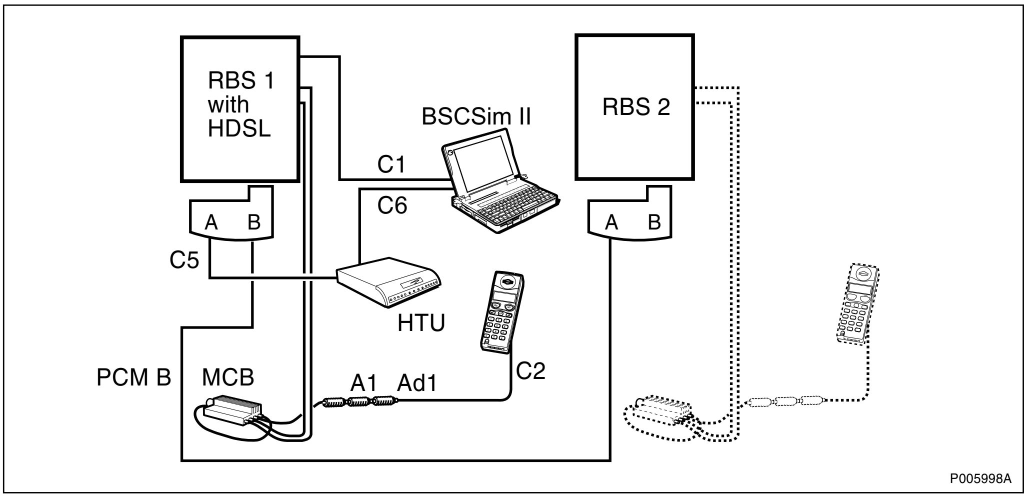

Figure 247 *Example of test setup, HDSL upstream, one or two pairs–PCM downstream*

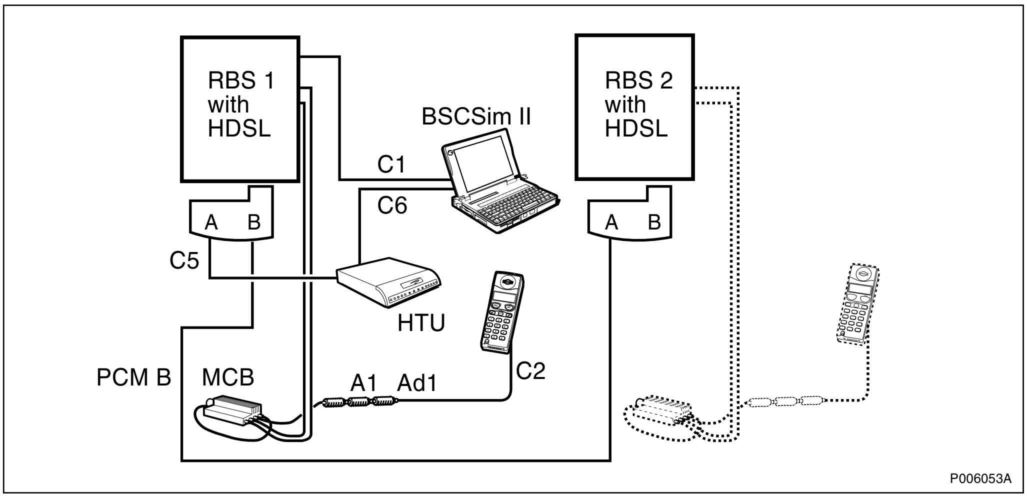

Figure 248 *Example of test setup, HDSL upstream–HDSL downstream (cascade)*

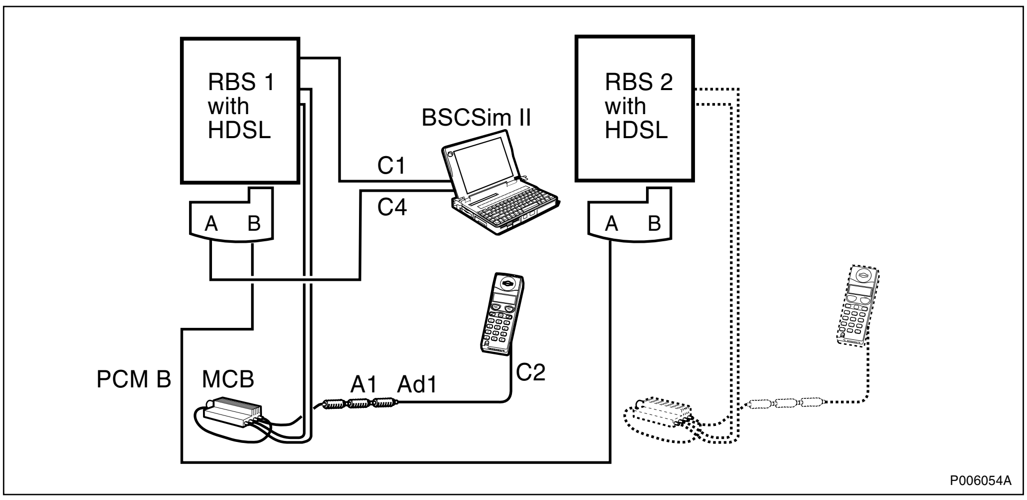

Figure 249 *Example of test setup, PCM upstream–HDSL downstream, one or two pairs*

For detailed information on how to connect the cables for the different configurations, *see chapter Installation of RBS 2302*

Follow the procedure below to set up the test equipment.

Note: The HTU is not needed for tests on PCM upstream–HDSL downstream configuration.

If the HTU is not used, perform the setup and the test according to *Section Test Setup Procedure: 2 TRX Configuration on page 238*.

1. Ensure that the RBS is in Remote mode. If not, change to Remote mode by pressing the Local remote button on the RBS.
2. Connect C1 to the COM1 port on the BSCSim II, and to the input inside the installation box marked OMT.

Note: Always connect the BSCSim II to the Master RBS (BSCSim II, R2A or later, is required).

3. Connect the BSCSim II adapter to the input on the BSCSim II.
4. Connect the cables between the BSCSim II via the HTU to the interface box (E1 120 Ω):

    1. Remove the existing PCM A cables plug from the interface box.
    2. Connect C6 to the BNC connectors on the BSC simulator adapter.
    3. Connect C6 from the BSCSim II to the SMB connectors on the HTU.
    4. Connect C5 to the RJ45 socket on the HTU and connect the cables plug to the PCM A socket in the interface box.

5. Connect C2 to the antenna inlet on the mobile, and to the adapter Ad1.
6. Connect the adapter Ad1 to the first attenuator A1.
7. Connect the three attenuators A1.
8. Connect the third attenuator A1 to the Multicasting Box (MCB).
9. Make sure that the RBSs are switched off or is not transmitting. Disconnect the antenna jumper cables from the antenna outputs X2 and X3 on the RBS.
10. Connect the cables from the MCB to the antenna outputs on the RBS:

    TX/RX Ant A to X2

    TX/RX Ant B to X3

11. Switch on the PBC (if used), RBS, HTU (if used) and the BSCSim II

Test Sequence

1. Make sure that the connectors and the DIP switches are set correctly, according to *chapter Site Installation Tests*.

2. Set HTU parameters:

   To confirm a selection, press Enter on the HTU.

   1. Select HTU-2M.
   2. Select Params.
   3. Select HDSLine.
   4. Select HDSLTyp and OTU.
   5. Select LineMod and choose 1×2M (one pair) or 2×1M (two pairs), depending on the configuration *see Table 65 on page 244*.
   6. Select Role and choose Master (when using the HTU, the HTU is always defined as Master and the HDSL modem as Slave).
   7. Select NWTopol and choose P_to_P or Chain depending on the configuration *see Table 65 on page 244*.
   8. Select Update and choose Update. The display shows "UPDATING".
   9. Go back to the main menu by pressing Exit three times.

3. Check on the HDSL modem that the LEDs are indicating the correct configuration, *see Section HDSL Modem LEDs on page 245*.
4. Check on the HTU that LineCnd on the display shows “OK” (for one pair) or “OK/OK” (for two pairs). If not, check the connections and make sure that the correct configuration is used.
5. Make call tests (diversity A and B) using the BSC simulator.

   The test is passed when calls have been made on all TRXs. At least one timeslot must be tested in each TRX.
6. When the test is completed, disconnect the test equipment and reconnect the cables to the PCM A socket in the interface box.

Table 65 Parameter settings in the HTU

	Parameters in HTU			
Configurations	**HDSLTyp**(1)	**LineMod**	**Role**	**NWTopol**
HDSL upstream, one pair	OTU	1×2	Master	P_to_P
HDSL upstream, two pairs	OTU	2×1	Master	P_to_P
HDSL upstream, one pair-PCM downstream	OTU	1×2	Master	P_to_P
HDSL upstream, two pairs-PCM downstream	OTU	2×1	Master	P_to_P
HDSL upstream-HDSL downstream (cascade)	OTU	1×2	Master	Chain

(1) ETSI when used.

HDSL Modem LEDs

Table 66 HDSL modem LEDs indicating the current configuration

Configuration	HDSL modem LEDs
HDSL upstream, one pair	On, On, Off
HDSL upstream, two pairs	On, On, On
HDSL upstream, one pair-PCM downstream	On, On, Off
HDSL upstream, two pairs-PCM downstream	On, On, On
HDSL upstream-HDSL downstream (cascade)	On, On, On

Table 67 HDSL modem LEDs status

LED	LED On		LED Off
	Steady Light	Flashing Light	
Green	Power On	Faulty Configuration(1)	Power Off
Upper yellow, upstream/pair 2	Link operational	Filter tuning in progress	Link break/not in use
Lower yellow, downstream/pair 1	Link operational	Filter tuning in progress	Link break/not in use

(1) A faulty configuration (inconsistent settings of the DIP switches) is indicated by all three LEDs flashing simultaneously.

9.3 Concluding Routines

This section describes action to be taken before leaving the site and the test records to be completed during the tests.

9.3.1 Checklist

The following checklist is not mandatory but strongly recommended. Local procedures and safety regulations must be evaluated and included in this checklist.

Table 68 Checklist

Check that:		**OK**
1	the LED status of the RBS is according to table below.	
2	the test equipment has been disconnected from the RBS.	
3	the Radio sub-cabinet and mountingbase are free from foreign objects.	
4	all cables are undamaged.	
5	a backup copy of the RBS IDB has been saved on a disk, if it has been altered.	
9	all tools have been accounted for.	
10	the cabinet has been locked and the screws have been tightened.	
11	all other necessary paper work has been completed.	

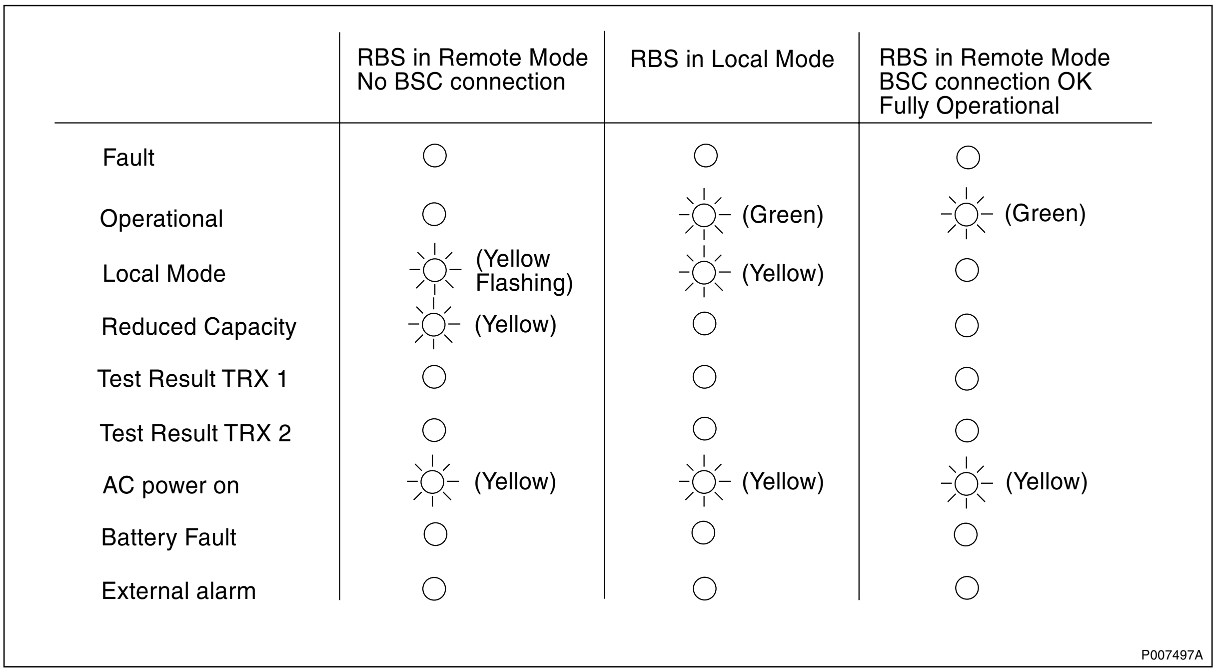

Figure 250 Different accepted LED statuses

9.3.2 Completing the Test Record for Optional tests

Optional Tests GSM -

Date:	Site Name:
Site No:	Cell Configuration:
RBS Type:	Tester's 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
0										
1										
2										
3										
4										
5										

HDSL Test (If Applicable):

Pass/Fail	

Remarks:

P008355B

Figure 251 test Record for optional Tests

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10 RBS Site Integration

10.1 Preface

This chapter describes how to integrate the RBS with the BSC into the GSM network and the tests to verify the integration. The integration is made with the RBS connected to a PCM link and in close collaboration with a BSC operator.

All results shall be documented in the Test Record, *see Section 10.5.2 Completing the RBS Site Integration Test Record on page 257*.

10.1.1 Preconditions RBS

Before starting ensure that:

- ☐ the Test Record for Site Installation Tests is completed.
- ☐ the Test Record for Antenna System Tests is completed.
- ☐ the RBS commissioning is in contact with the BSC operator.
- ☐ The RBS commissioning and the BSC operator have agreed upon BCCHNO parameters.
- ☐ The RBS commissioning and the BSC operator have agreed upon DCHNO parameters.
- ☐ The RBS commissioning and the BSC operator have agreed upon BSIC parameters.
- ☐ The RBS commissioning and the BSC operator have agreed upon timeslots used for SDCCH.
- ☐ The RBS commissioning and the BSC operator have agreed upon defined SW version for the RBS.

10.1.2 Preconditions BSC

Before starting ensure that:

- ☐ the Test record for Network Element is completed.
- ☐ the Test Record for Integration of MSC/VLR is completed.
- ☐ the RBS commissioning is in contact with the BSC operator.
- ☐ The RBS commissioning and the BSC operator have agreed upon BCCHNO parameters.
- ☐ The RBS commissioning and the BSC operator have agreed upon DCHNO parameters.
- ☐ The RBS commissioning and the BSC operator have agreed upon BSIC parameters.
- ☐ The RBS commissioning and the BSC operator have agreed upon timeslots used for SDCCH.
- ☐ The RBS commissioning and the BSC operator have agreed upon defined SW version for the RBS.

10.1.3 Work Process for RBS Site Integration

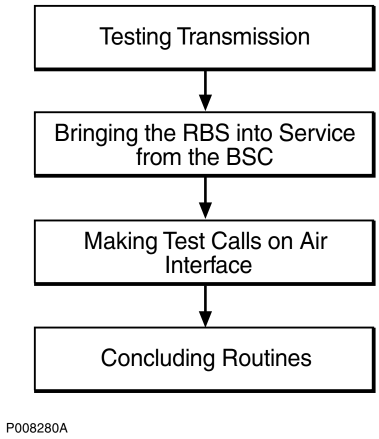


Figure 252 Work Process for RBS Site Integration

10.2 Testing Transmission

This section describes how to test the transmission. The purpose of this test is to ensure that the connection between the BSC and the RBS is working correctly. If multidrop/cascading is used, only the last RBS in the chain needs to be tested.

10.2.1 Testing Transmission on E1

This section describes how to test transmission if transmission interface E1 is used.

Note: This test does not include transmission test through the Mounting Base.

Note: The test is only performed if the RBS is directly connected to the BSC and not via a network.

1. Remove the PCM A cable plug in the transmission interface box on the RBS and connect it to the Loop Back socket on the Loop forward/backward board, *see figure below*.

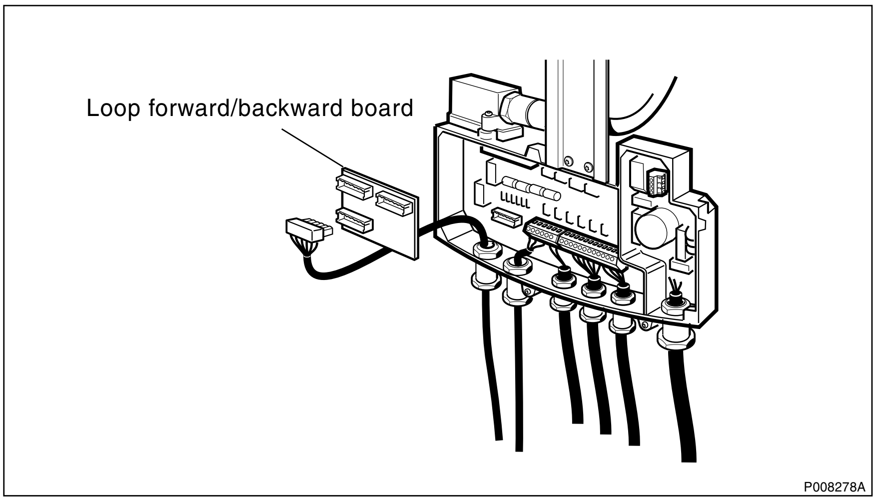


Figure 253 Loop forward/backward board

2. Request the BSC operator to check the digital path on the active RBLT.

3. Remove the PCM A cable plug from the Loop forward/backward board and reconnect it to PCM A socket in the interface box on the RBS.

4. Wait for the BSC operator to check that the Abis Paths are correctly defined and that the Digital Path between the BSC and the RBS works properly.

5. Enter Pass/Fail in the Test Record, *see Section 10.5.2 Completing the RBS Site Integration Test Record on page 257*

10.2.2 Testing Transmission on T1

This section describes how to test transmission if transmission interface T1 is used.

Note: Transmission test on T1 can also be performed the same way as E1 according to *Section 10.2.1 Testing Transmission on E1 on page 250*.

1. Request the BSC operator to use CSU functionality.

2. Configure the RBS for CSU, using OMT and restart the RBS.

For more information regarding CSU, see:

Reference Manual	*EN/LZT 720 0002*

3. Wait for the BSC to check the digital path on the active RBLT.

4. Deactivate CSU functionality in the RBS, using OMT and restart the RBS.

5. Wait for the BSC operator to check that the Abis Paths are correctly defined and that the Digital Path between the BSC and the RBS works properly.

6. Enter Pass/Fail in the Test Record, *see Section 10.5.2 Completing the RBS Site Integration Test Record on page 257*

10.2.3 Testing Transmission on E1 with HDSL

This section describes how to test the transmission if transmission interface E1 with HDSL is used.

1. Check that the green LED indicator on the HDSL lights with a fixed light.
2. Check that the yellow LED indicator(s) on the HDSL lights with a fixed light. The LED is flashing when the HDSL filter is tuning.

The number of LED indicators in use is depending on the HDSL configuration. For further information regarding HDSL configuration, *see chapter Site installation Tests*.

3. Wait for the BSC operator to check that the Abis Paths are correctly defined and that the Digital Path between the BSC and the RBS is working properly.
4. Enter Pass/Fail in the Test Record, *see Section 10.5.2 Completing the RBS Site Integration Test Record on page 257*

10.3 Bringing the RBS into Service from the BSC

This section describes how to bring the RBS into service from the BSC.

Note: The BSC operator can bring MOs into service and deblock them even though the RBS is in Remote mode. The RBS will then response directly to the BSC operator.

1. Set the RBS in Local mode, using the Local/Remote button located in the user interface of the RBS.
2. Wait for the BSC operator to logically bring into service and deblock the MOs on each TRX.
3. Set the RBS in Remote mode, using the Local/Remote button located in the user interface of the RBS.

   The RBS will now download and execute the commands previously prepared by the BSC operator.
4. If BTS PCM Supervision is used, wait for the BSC operator to activate it and check that MO DP state is operational.
5. Wait for the BSC operator to activate and check the cell.

10.4 Making Test Calls on Air Interface

This section describes how to make Test Calls on Air Interface. The tests are performed from the BTS site to verify that all timeslots on all TRXs work properly.

Note: It is important that all TCH-TS are tested to ensure full capacity.

All the Test Calls should be made from a distance of at least 50 m from the antenna system, *see figure below*.

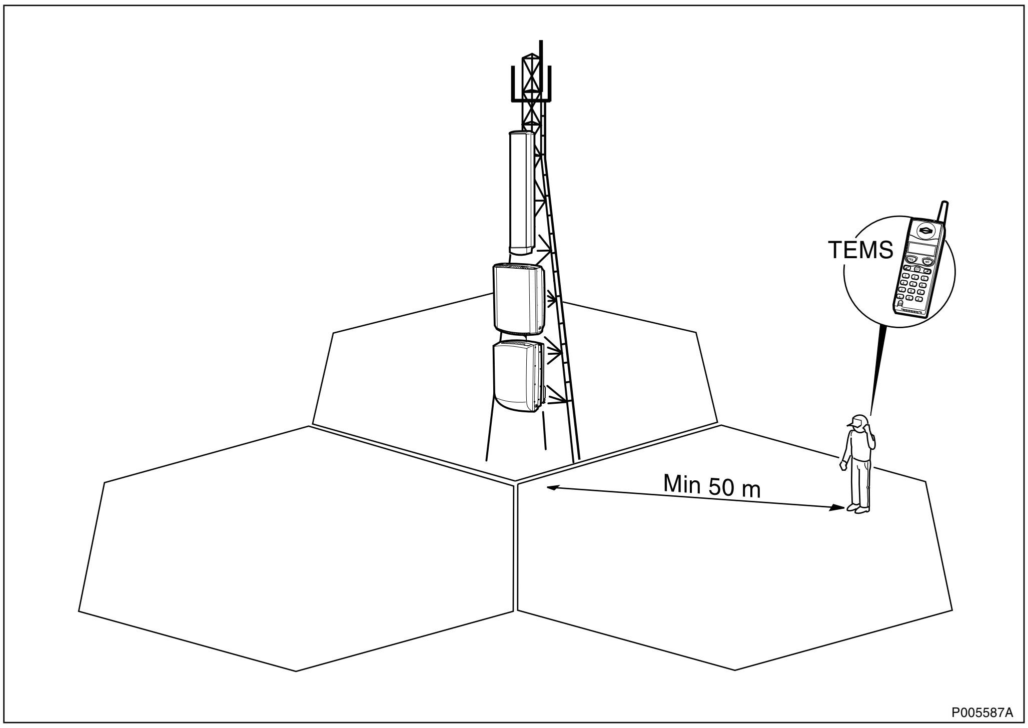


Figure 254 A Test Call using TEMS

10.4.1 Making Test Call using TEMS

This section describes how to make a Test Call using a TEMS and a PC with TEMS SW. The purpose of this test is to ensure that all Timeslots on all TRXs work properly. The Test Record should be completed during the test, *see Section 10.5.2 Completing the RBS Site Integration Test Record on page 257*.

1. Connect the TEMS with a TEMS cable to the COM1 port on a PC containing TEMS SW, *see figure below*.

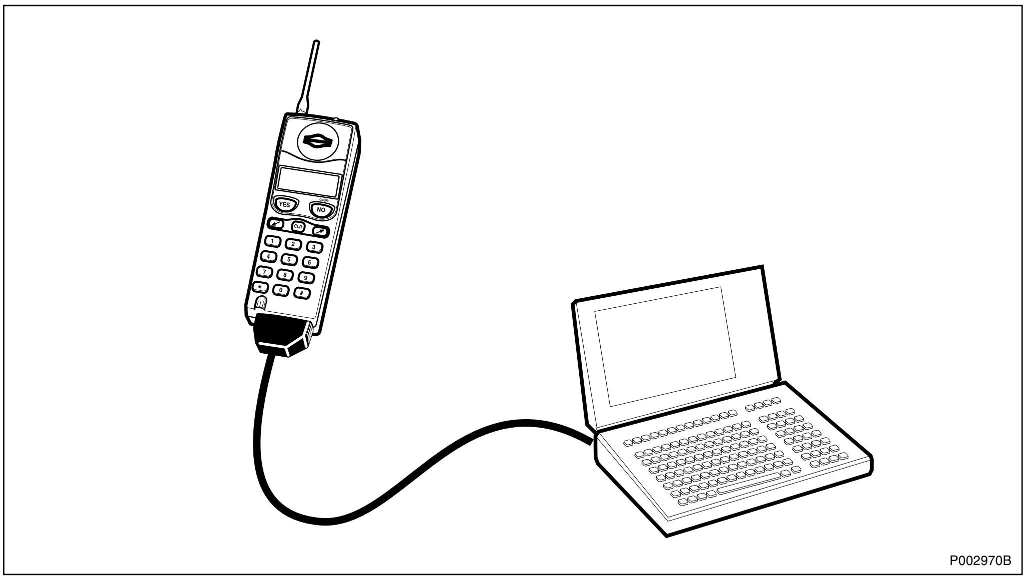


Figure 255 Connecting the TEMS to a PC

2. Start the TEMS and the TEMS SW.

For more information regarding TEMS and TEMS SW, see:

TEMS Manual

3. Press the **Externals** menu tab and select **Enable Connections**. In **External Connection**, define COM1 as MS1 Port for MS1. The MS2 Port and Position Port should be defined as Not used.
4. Open the **Test of TCH** in the **Control** menu tab. Enter the telephone number, Frequency (ARCFN), Broadcast Channel (BCCH) and the Frequency for the Traffic Channel (TCH).
5. Select the Timeslots used for traffic and press **Add**. The BCCH and SDCCH channels are used for signalling and do not carry traffic. Do not make Test Calls on these TS.

   Repeat this procedure for each TRX.
6. Press the **Start** button. The TEMS will now make a Test Call on all selected Timeslots. For each Timeslot, let the RBS commissioning staff verify the Speech Quality and enter Pass/Fail in the Test Record, *see Section 10.5.2 Completing the RBS Site Integration Test Record on page 257*.

10.4.2 Making Diversity Test Call (if Applicable)

This section describes how to make a Diversity Test Call. The purpose of this test is to ensure that both RXD A and B works properly.

Note: If Antenna Diversity is not supported, do not make Diversity Test Call.

1. Wait for the BSC operator to Configure RXD=A.
2. Request the BSC operator to block all TRXs except for the one being tested and check that it is configured with BCCH and SDCCH.
3. Make a call from the TEMS.
4. Request the BSC operator to check that one TCH is busy. Verify the speech quality and enter Pass/Fail in the Test Record, *see Section 10.5.2 Completing the RBS Site Integration Test Record on page 257*.
5. Terminate the call.
6. Request the BSC to check that the tested TCH is released.
7. Repeat step 2 to step 6 until all TRXs in the cell have been tested.
8. Wait for the BSC operator to configure RXD=B.
9. Request the BSC operator to block all TRXs except for the one being tested and check that it is configured with BCCH and SDCCH.
10. Make a call from the TEMS.

11. Request the BSC operator to check that one TCH is busy. Verify the speech quality and enter Pass/Fail in the Test Record, *see Section 10.5.2 Completing the RBS Site Integration Test Record on page 257*.
12. Terminate the call.
13. Request the BSC to check that the tested TCH is released.
14. Repeat step 9 to step 13 until all TRXs in the cell have been tested.
15. Wait for the BSC operator to restore the cell.

10.4.3 Making Test Call from Fixed Network

This section describes how to make a Test Call from the fixed network. The purpose of this test is to confirm that the cell is available from the Fixed Network.

1. Request the BSC operator to configure a TRX with BCCH and SDCCH.
2. Request the BSC commissioning staff to make a call from a fixed network phone to the TEMS.
3. Request the BSC operator to check that TCH is busy and verify the ARFCN and the TS displayed in the TEMS. Verify the speech quality and enter Pass/Fail in the Test Record, *see Section 10.5.2 Completing the RBS Site Integration Test Record on page 257*.
4. Terminate the call.

10.4.4 Making Handover Test Call

This section describes how to make a Handover Test Call. The purpose of this test is to verify that handovers between cells work properly and that the coverage of the cell is according to the cell planning. If no handover takes place at cell borders according to cell planning the BSC personal must be contacted.

Note: The Handover Test Call must be made at least 50 meters from the Antenna System

1. Make a Test Call using TEMS and a PC containing TEMS SW.
2. Move from one cell to another and verify that the call is not disconnected.
3. Select **Start Logging** in the **Log** menu tab on the PC. Give the log a unique name and select a destination for the log to be saved.
4. Select the **Monitor** menu tab, go to the **Status information** sub menu and select **Serving + neighbouring cell**.
5. Monitor the signal strength (RxLev) and move through the cells to verify that handover takes place between cells at the cell borders, *see figure below*.

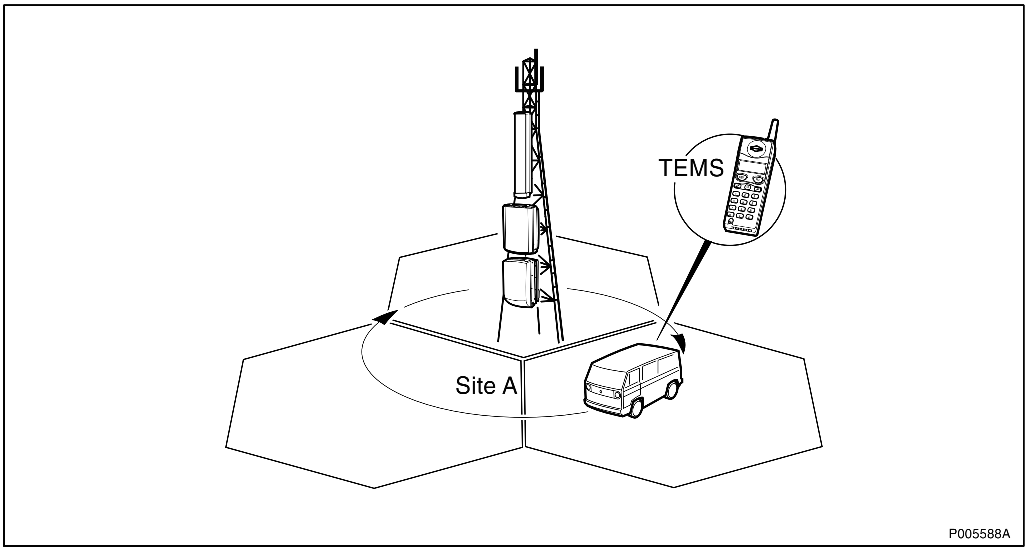


Figure 256 Verify that handover takes place at the cell borders

6. Enter the test results in the Test Record, *see Section 10.5.2 Completing the RBS Site Integration Test Record on page 257*.

7. Terminate the call and stop the log.

10.5 Concluding Routines

This section describes action to be taken before leaving the site and the test records to be completed during the tests.

10.5.1 Checklist

The following checklist is not mandatory but strongly recommended. Local procedures and safety regulations must be evaluated and included in this checklist.

Table 69 Checklist

Check that:		OK
1	the red fault indicators are off.	
2	all operational green LEDs are lit.	
3	the RBS is in remote mode (the yellow Local mode indicator is off).	
4	all yellow indicators are off, except the AC Power On indicator.	
5	test equipment has been disconnected from the RBS.	
6	RBS and the PBC cabinets and mounting base are free from foreign objects.	
7	all cables are undamaged.	
8	a backup copy of the RBS IDB has been saved on a disk, if it has been altered.	
9	all tools have been accounted for.	
10	the cabinet has been locked and the screws have been tightened.	
11	all other necessary paper work has been completed.	

10.5.2 Completing the RBS Site Integration Test Record

RBS Site Integration GSM -

Date:	Site Name:
Site No:	Cell Configuration:
RBS Type:	Tester’s Name:

Transmission Test

Pass/Fail	

Test Call Using TEMS

TRX	Cell ID	ARFCN	BSIC	TS0	TS1	TS2	TS3	TS4	TS5	TS6	TS7
0											
1											
2											
3											
4											
5											

Diversity Test Call (if Applicable)

RXD	TRX0	TRX1	TRX2	TRX3	TRX4	TRX5
A						
B						

Test Call from Fixed Network

Pass/Fail	

Handover Test Call

A to B	A to C	B to A	B to C	C to A	C to B

Remarks: ______________________________

____

____

____

____

P008283B

Figure 257 The RBS Site Integration Test Record

10.5.3 Completing the NE 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 the 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 Ericsson´s responsibilities, that have been made on this site:..............

Date:..........................

The Buyer	The Contractor
Company Name:	Company Name: Ericsson Radio Systems AB
Person Responsible:	Person Responsible:

P004631B

Figure 258 Example of a Network Element Acceptance Certificate

11 Fault Handling

11.1 Fault Code List

This section gives a description of how faults reported to the BSC and displayed in the OMT's Fault Monitor should be interpreted.

11.1.1 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

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.

11.1.2 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.

11.2 Fault Tracing Hints

Table 70 Fault tracing hints

Fault	Action
Fault LED is flashing.	• Check battery function • Reset the RBS by pressing the 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.	• Press the local/remote button until the RBS is in local mode. • Reset the RBS by pressing the CPU Reset button and try to install the IDB again.
The OMT will not read IDB.	• Check that the cable is correctly connected. • Reset the RBS by pressing the CPU Reset button.
The RBS will not take CF into service (when using a BSCSim II to make a test call).	• Check that the cables are correctly connected. • Make sure that the RBS is in remote mode. • Reset the RBS by pressing the CPU Reset button.
The OMT will not define alarm inlets.	• Disconnect the OMT.
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.

Fault	Action
PCM fails when installing BTS SW with BSCSim II.	• 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.

11.3 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).

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 259 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 260 Trouble report, blank

12 Maintenance

12.1 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.

12.1.1 How to Use this Chapter

Competence Requirements

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

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.

General RBS 2302/PBC Information

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 General RBS 2302/PBC Information* 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.

12.1.2 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.

12.1.3 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.

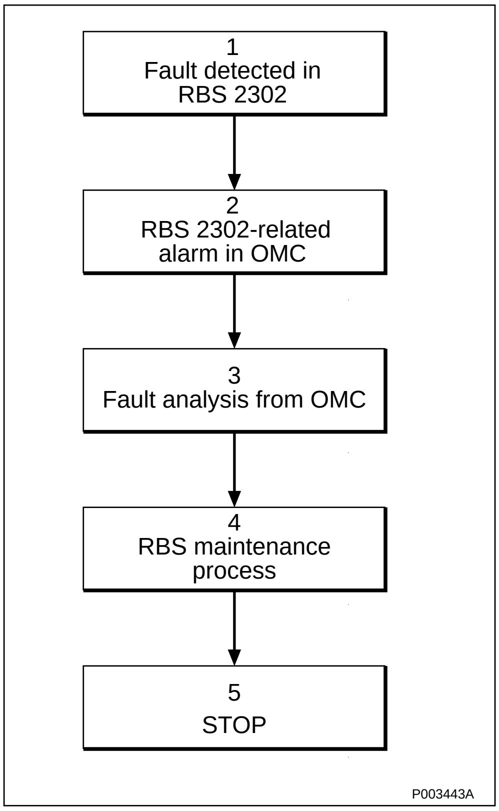


Figure 261 Fault handling workflow

12.1.4 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.

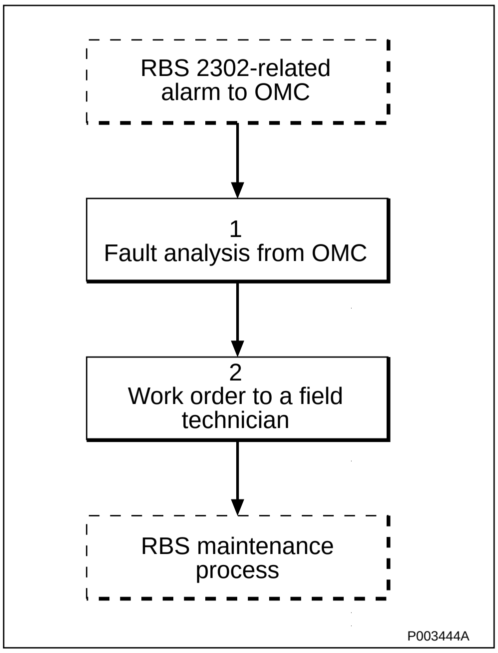


Figure 262 Fault analysis from OMC

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.

12.1.5 Maintenance Process

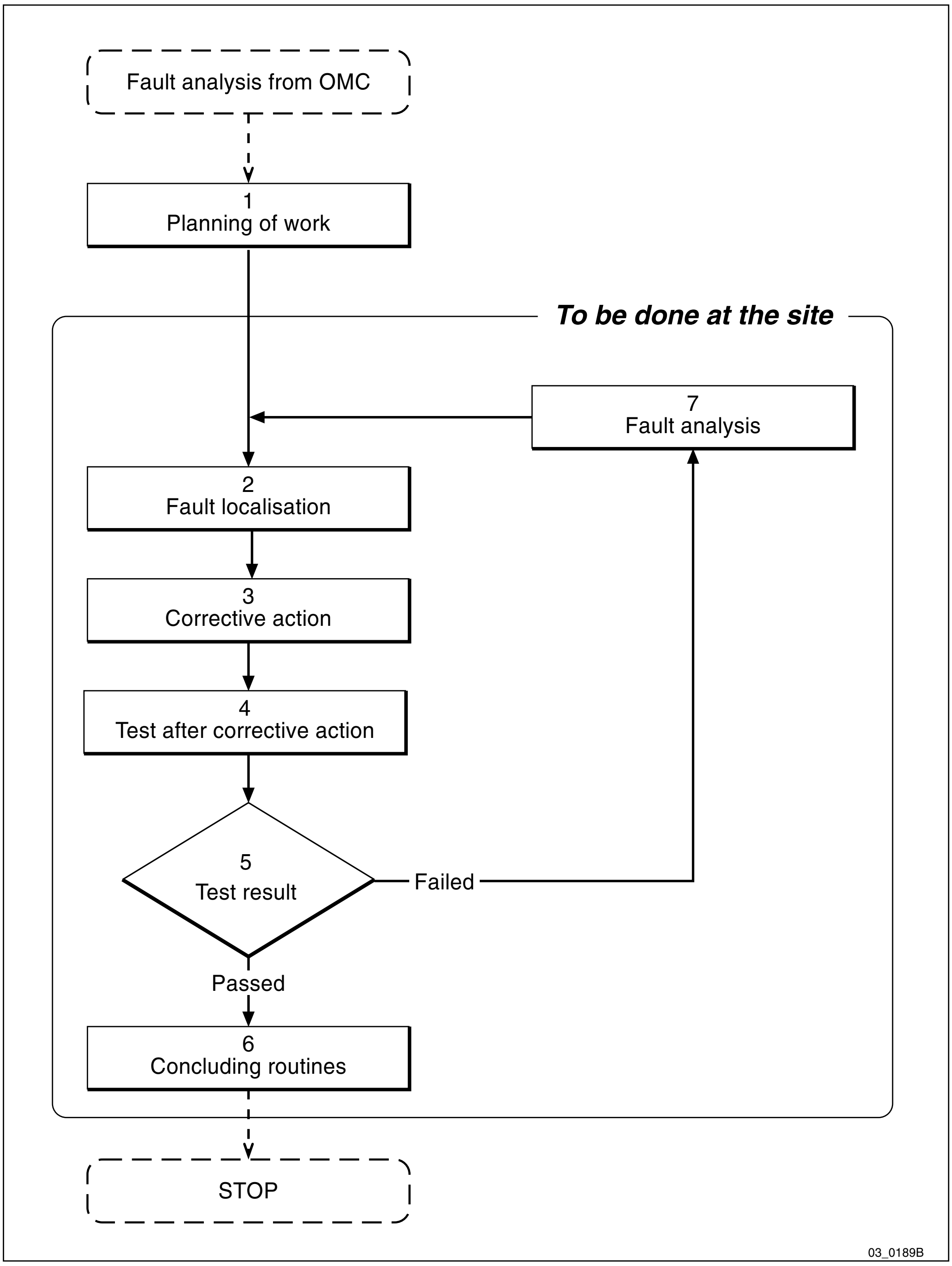


Figure 263 Maxite™ maintenance process

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.

12.1.6 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 with optional PBC has seven (7) external alarm inputs available. One alarm input is required for the power surveillance of the PBC.

12.2 General RBS 2302 Information

This chapter contains essential information regarding the user interface of the RBS, changing the RBS from Remote to Local Mode, Shut down and Start up procedures.

The purpose of this chapter is to familiarize the user with the RBS.

12.2.1 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.

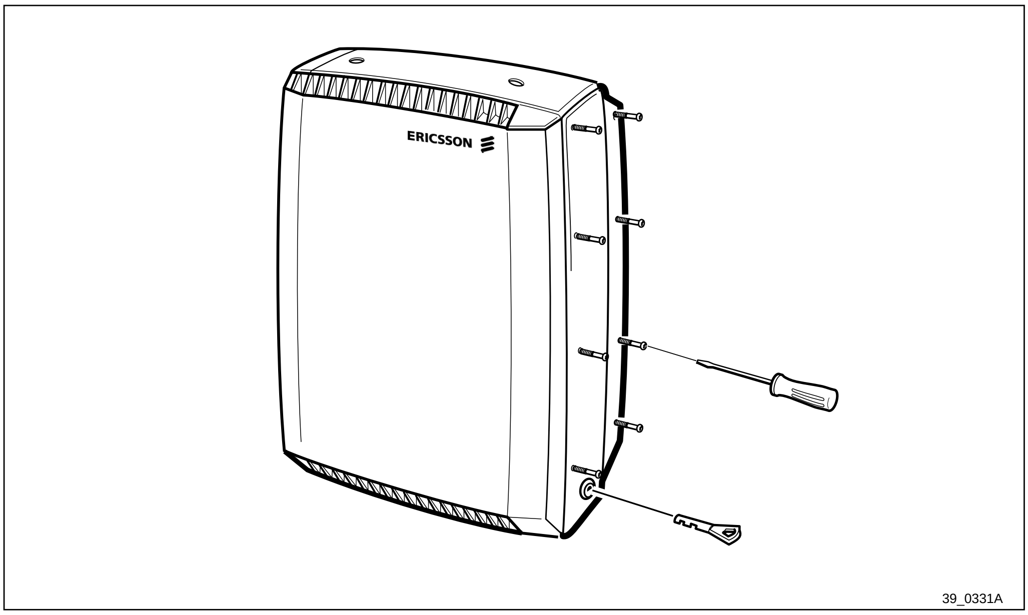


Figure 264 Sealing screws and key for the installation box door

To open the door: loosen the sealing screws and unlock with the key.

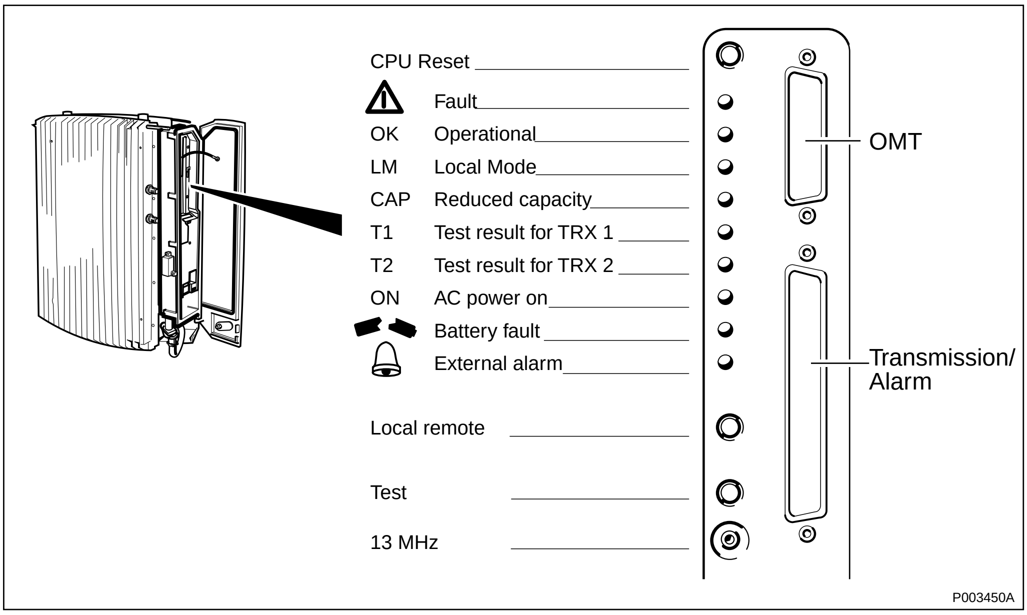


Figure 265 RBS user interface

12.2.2 Electrostatical Discharge

To avoid damage to components mounted on printed board assemblies, always use an approved antistatic wrist strap.

There are two ESD connection points on the RBS 2302. One is situated in the interface box and the other in the installation box as shown in the figure below.

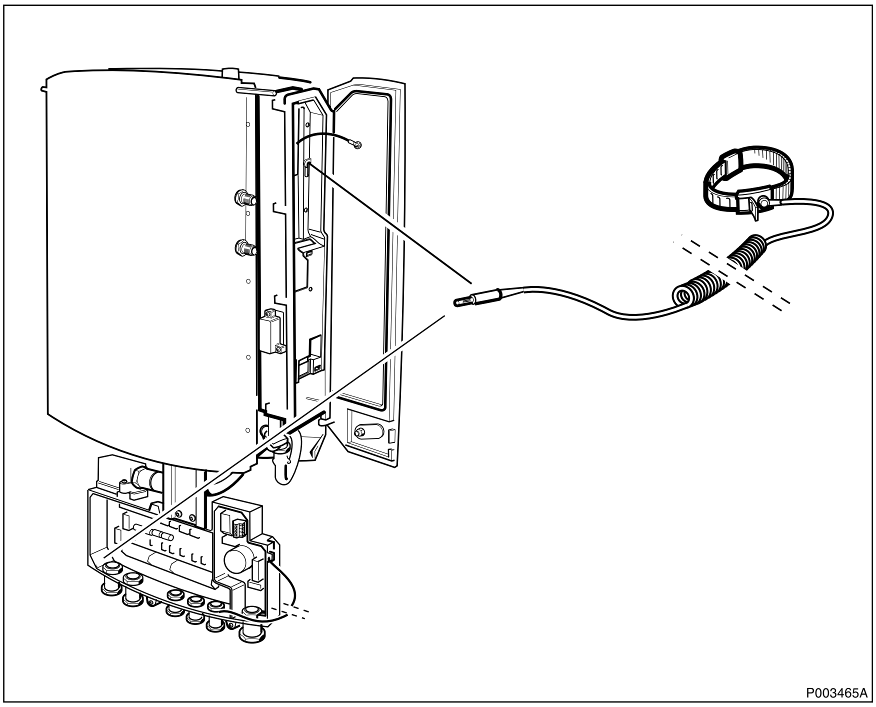


Figure 266 Connection points for the ESD wrist strap

12.2.3 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 (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. • 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. • Battery fault.
	ON (Extension cabinet) and FLASHING (Master cabinet)	• SW/HW fault in Extension cabinet and/or Master cabinet.
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).

Indicator	Mode	Description
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.

12.2.4 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.

12.2.5 Changing the RBS Local/Remote Mode

The Local/Remote button can change a RBS mode to local or remote control. The Local/Remote button is located on the Distribution Panel (DP), *see Figure 267 on page 276.* 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 replacing faulty units.

An RBS must not 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*

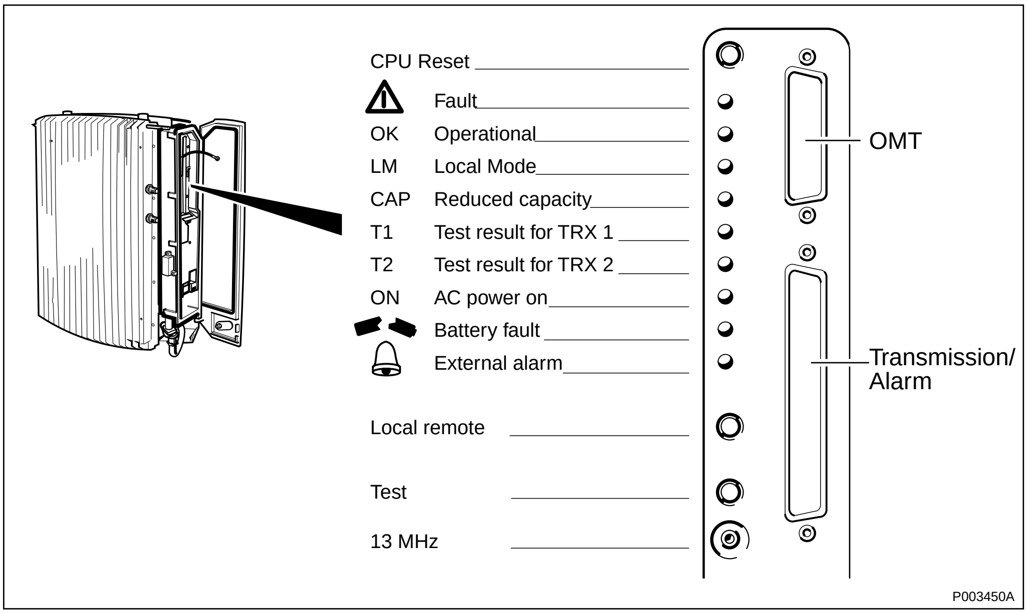


Figure 267 Distribution Panel

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 to 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.

12.2.6 Shut Down Sequence

This is the shut down sequence for RBS 2302.

1. Set the RBS in Local Mode.

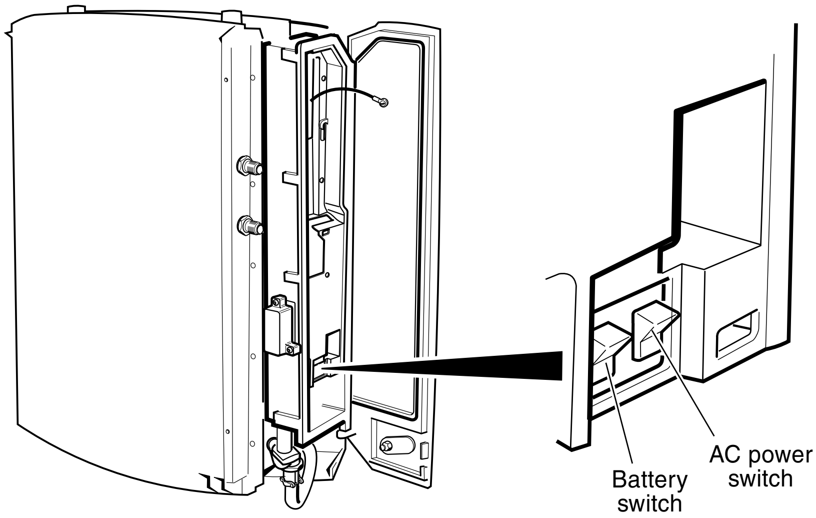


Figure 268 Battery and AC power switch in the RBS

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.

If the PBC is not used, proceed to *step 6 on page 280*.

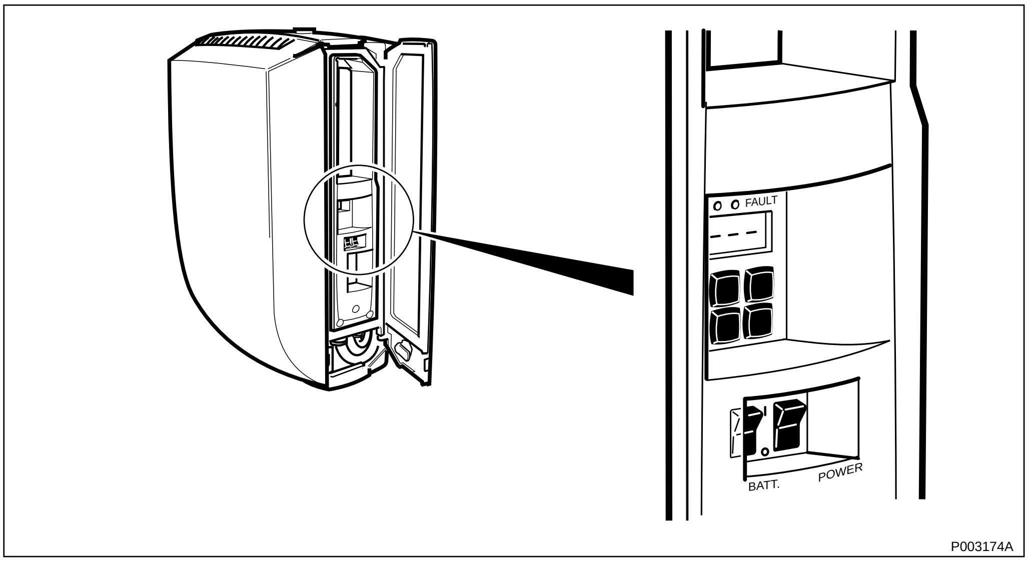


Figure 269 Battery and AC switch in the PBC

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.

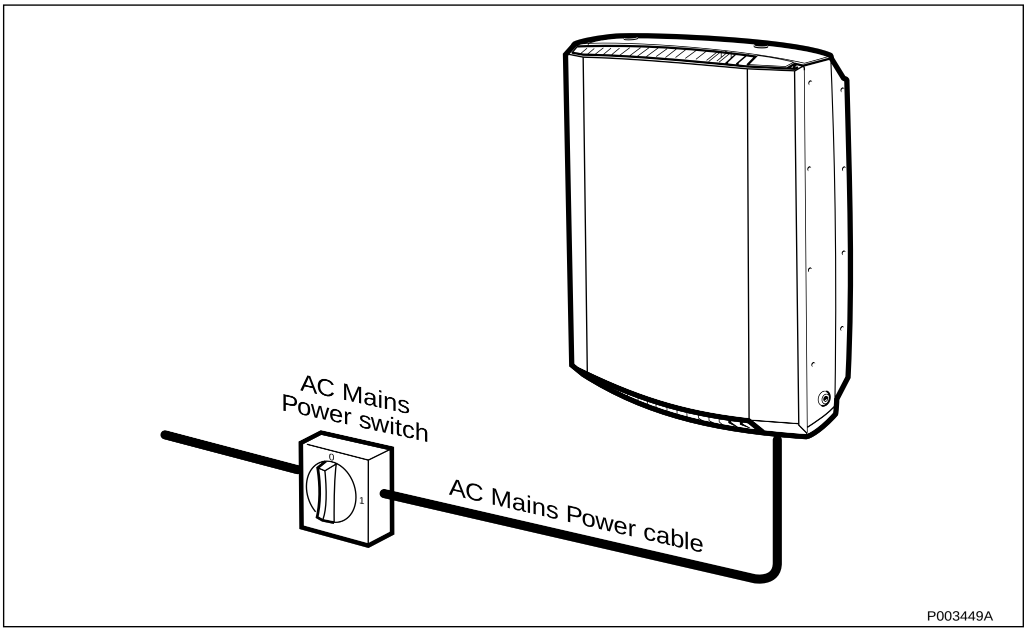


Figure 270 AC mains power switch turned off

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.

12.2.7 Start Up Sequence

This is the start up sequence for the RBS 2302.

1. Turn the AC Mains Power switch to the ON position.

Note: Switch on *all* radio cabinets and *all* battery cabinets.

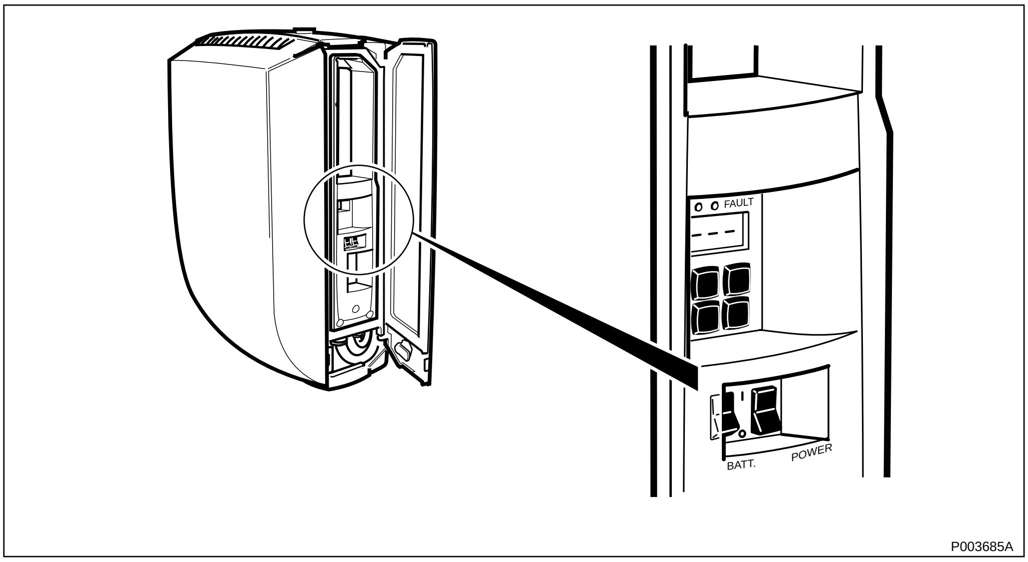


Figure 271 Battery and AC switch in the PBC

If the PBC is not used, proceed to *step 4 on page 281*.

2. Switch the PBC AC switch to the ON position.
3. Switch the PBC Battery switch to the ON position.

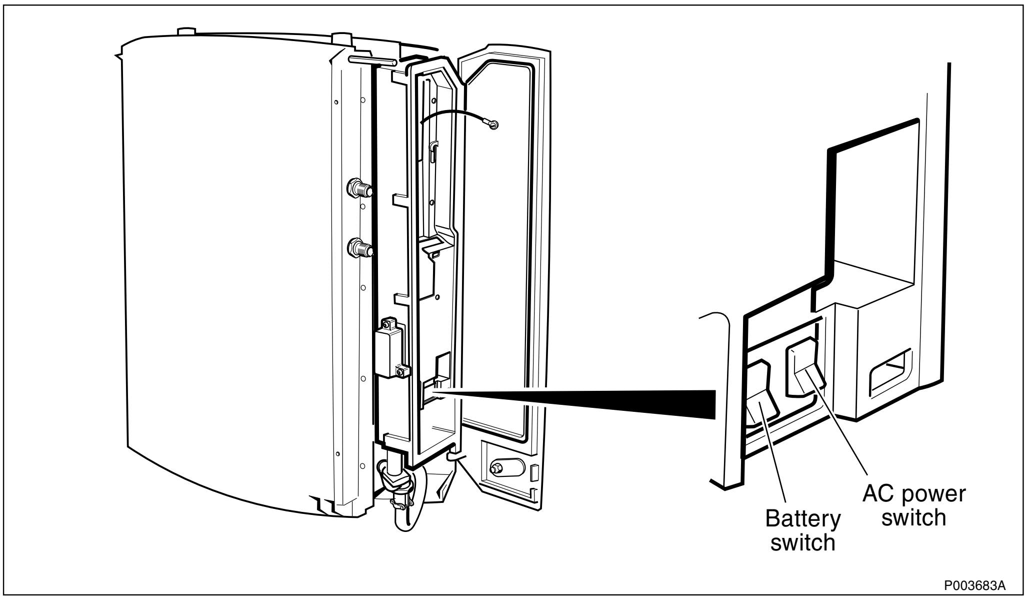


Figure 272 Battery and AC power switch

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.

12.2.8 Tightening Torques for RBS 2302

When replacing units, tighten screws/nuts according to table below. Exceptions are captive screws and plastic covers inside installation boxes and interface boxes. These screws must be tightened with a reduced torque.

Table 71 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 torque for plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	
M4	170 +/- 15	-	15.1 +/- 1.3	-	Reduced torque for captive screws
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	
M8	-	21 +/- 1.3	-	15.5 +/- 1	
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	

12.2.9 Cable Connections Overview for RBS 2302

This schematic shows all possible connections including the options, depending on the configuration at the site.

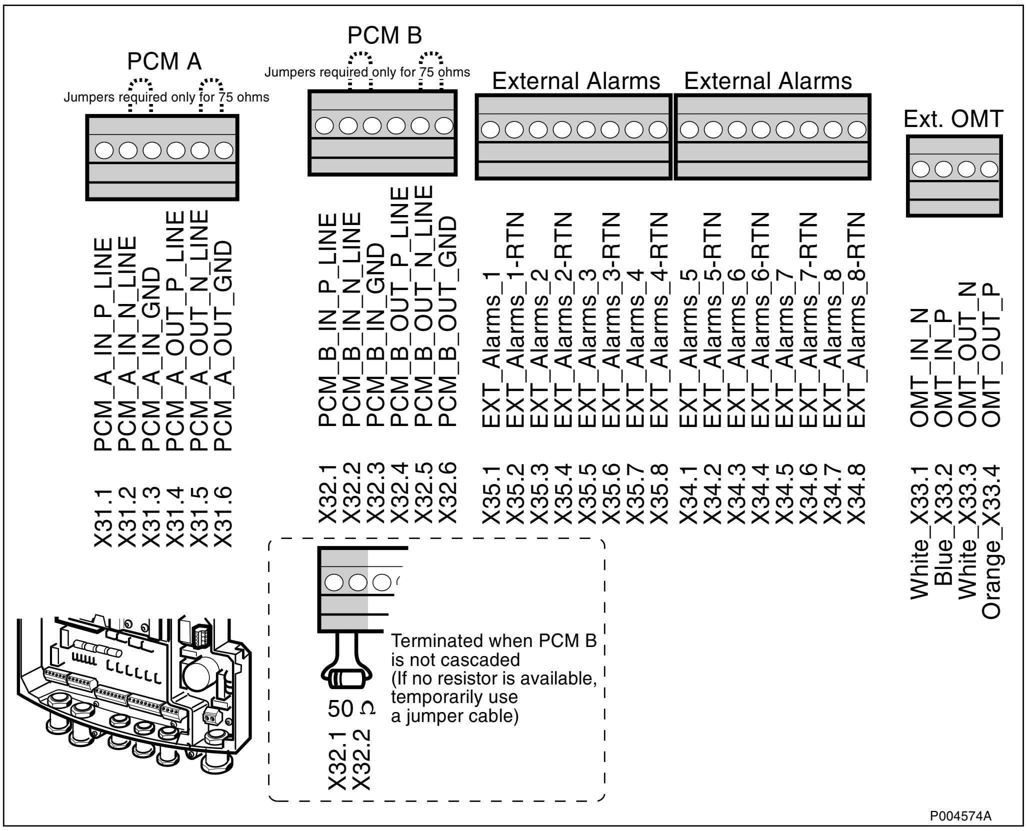


Figure 273 Cable connections for RBS 2302

12.3 General PBC Information

This chapter contains essential information regarding the user interface of the PBC, and explanations are given on how to read the alarms and execute command via the PBC.

The purpose of this chapter is to familiarize the user with the Power and Battery Cabinet (PBC).

Note: The PBC must be in Stand Alone mode, as no active antenna is used. To set the PBC in Stand Alone mode, *see Section Commands on page 288*.

12.3.1 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.

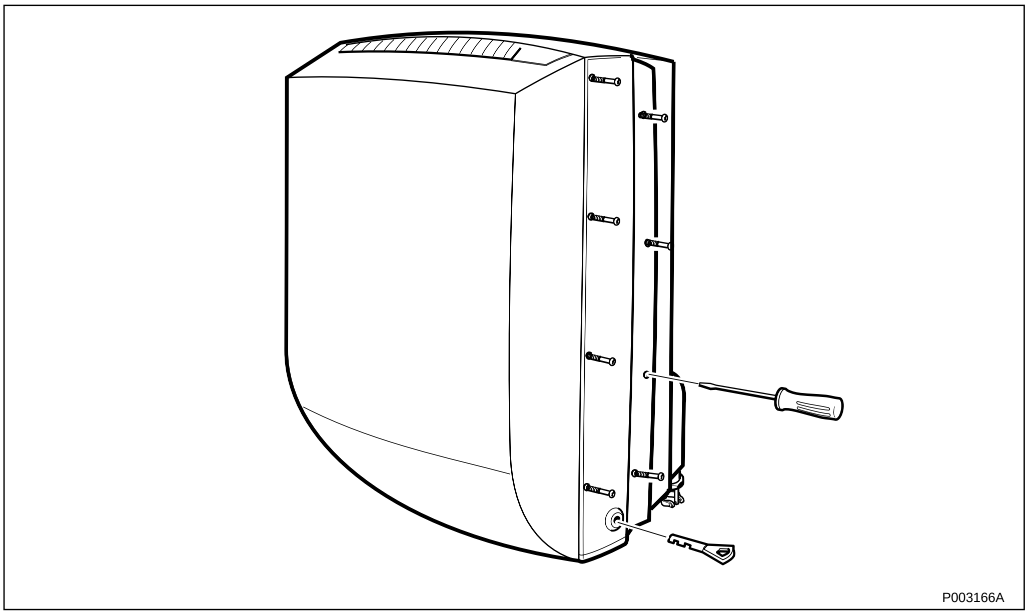


Figure 274 Sealing screws and key for the installation box door

To open the door: loosen the screws and unlock with the key.

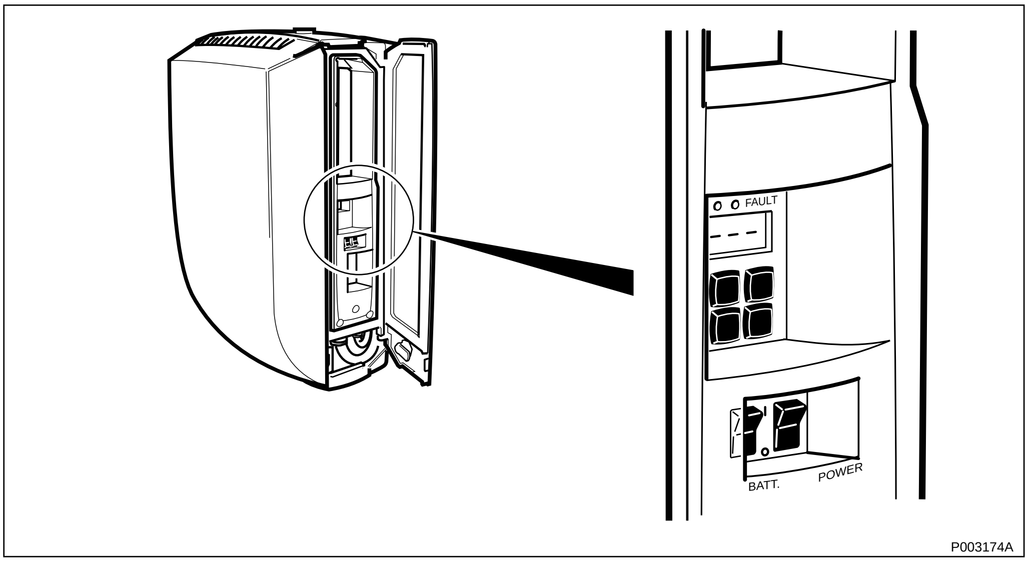


Figure 275 Location of the control panel in the PBC

12.3.2 Electrostatical Discharge

To avoid damage to components mounted on printed board assemblies, always use an approved antistatic wrist strap.

There are two ESD connection points on the PBC. One is situated in the interface box and the other in the installation box as shown in the figure below.

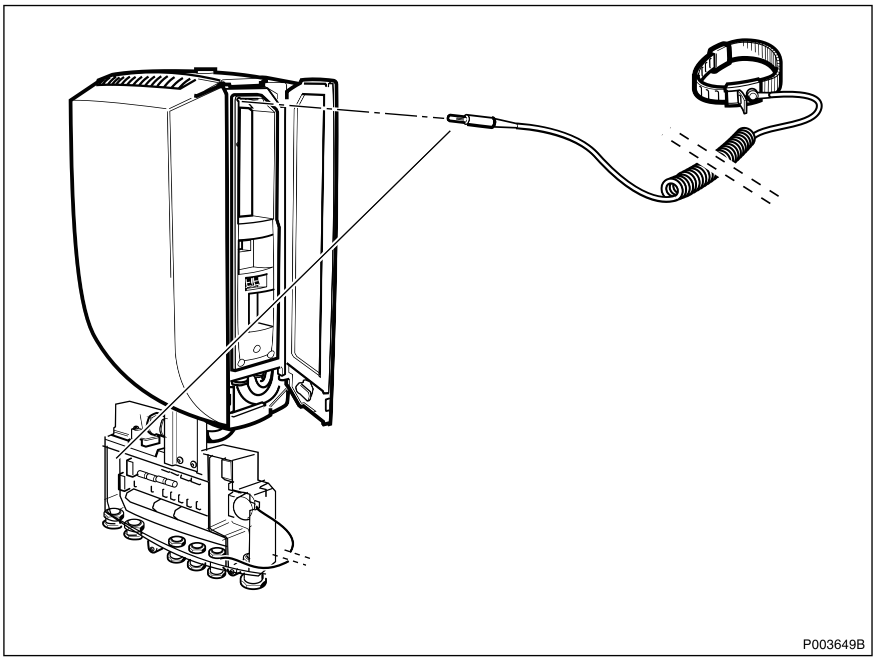


Figure 276 Connection points for the ESD wrist strap

12.3.3 Control Panel

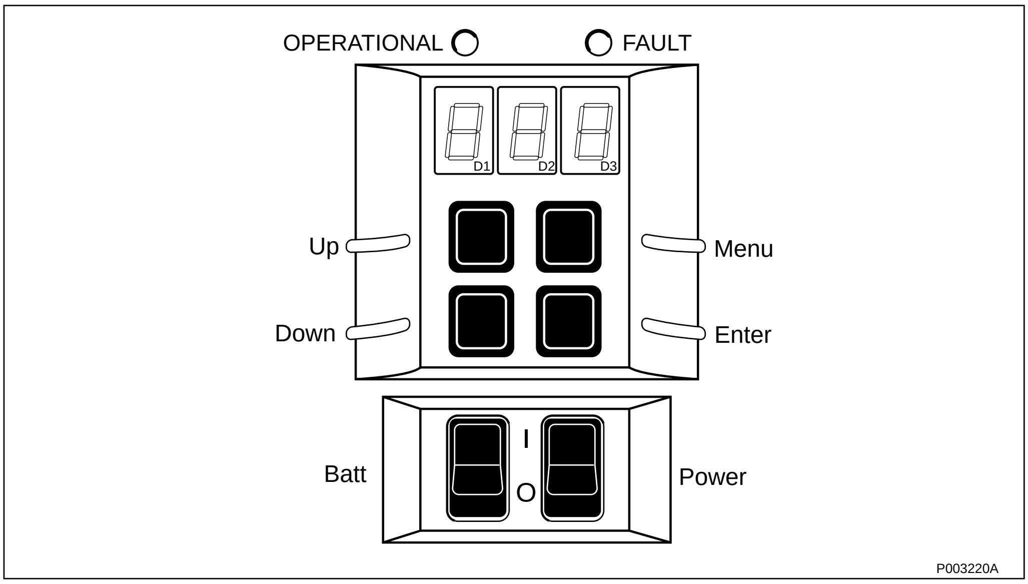


Figure 277 PBC control panel

Optical Indicators

The LED indicators give the following information on the current system status, valid for the PBC alarms:

Table 72 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 is used to identify the faulty unit. 0 = PBC (Unit numbers 1 - 9 are not used for RBS 2302)
Element 2 (D2)	Alarm class.
	The alarm is classified according to the degree of severity. There are two Classified alarms, and one Not classified: 0 = Not classified (used for historical alarms) 1 = Severe 2 = Warning
Element 3 (D3)	Fault code from the PBC. *See Table 75 on page 287* or Command that will be executed. *See Table 76 on page 288*.

Control Buttons

The push buttons on the display panel are used for:

– stepping through the fault codes.

– selecting commands.

Table 73 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

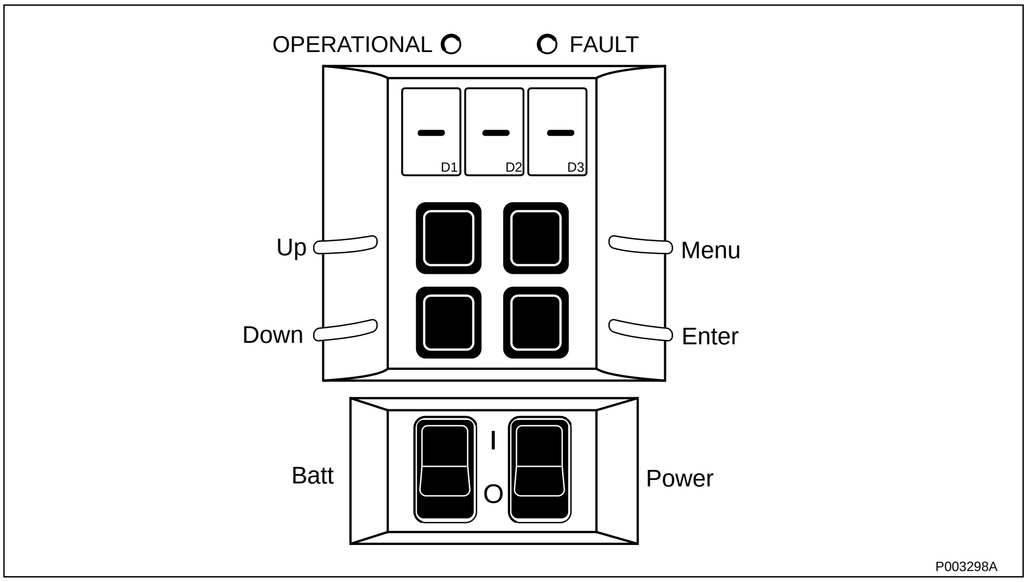


Figure 278 Display view if no faults are detected

- If there are no faults, this is indicated on the alarm display as shown in the *figure above*.
- If a fault occurs, the relevant fault code is automatically displayed, *see page 287*.
- To detect if there are several faults, step through the fault codes using the push buttons Up and Down, *see Table 73 on page 286*.

Except for temperature alarms, all alarm codes originate from present faults, that is, no fault history is displayed.

12.3.4 Supervision of the PBC

The PBC alarms supervise:

- Main input AC power
- AC/DC converter
- DC/DC converter
- Battery unit
- Cabinet temperatures

The PBC has eight alarm 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.

All alarms transmitted to the RBS are active alarms.

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.

Alarm Connected to the RBS

The PBC alarm is connected to an RBS external alarm input, and generates the following alarm:

Alarm	Unit
POWER, WARNING	PBC

Note: The external alarm inputs on the RBS must be defined accordingly at installation, *see chapter Site Installation Tests*.

Fault Codes

Table 74 Alarm classes on display element D2

Code	Alarm class
0	Not classified
1	Severe
2	Warning

Table 75 Fault codes on display element D3

Code	Fault
0	AC fault (no mains)
1	AC/DC fault
2	DC/DC overload
3	DC/DC fault
4	Battery fault
5	Battery disconnected
6	Battery voltage low
7	Overtemp active
8	Overtemp historical
9	PBC in stand alone mode, antenna detected

Commands

Table 76 on page 288 lists the command codes used for RBS 2302. Other codes are used for Maxite.

Table 76 Command codes on display element D3

Code	Command
5	Clear historical temperature alarms
6	Set PBC in stand alone mode
7	Exit PBC from stand alone mode

Clear Historical Temperature Alarms

There are two kinds of temperature alarms: active and historical.

Alarm code 0 0 8 on the display indicates "PBC Alarm, Overtemperature historical".

To reset the historical alarm:

1. Press Menu.
2. Select code 5 on display element D3 with the Up or Down button.
3. Press Enter. The command is executed.

Setting the PBC in Stand Alone Mode

Note: Always set the PBC in Stand Alone mode when active antenna is not used.

1. Press Menu.
2. Select code 6 on display element D3 with the Up or Down button.
3. Press Enter. The command is executed.

12.3.5 Tightening Torques for the PBC

When replacing units, tighten screws/nuts according to table below. Note that for captive screws, battery poles and plastic covers inside installation boxes and interface boxes, the screws must be tightened with a reduced torque.

Table 77 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 torque for plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	
M4	170 +/- 15	-	15.1 +/- 1.3	-	Reduced torque for captive screws
M5	540 +/- 30	-	47.8 +/- 2.6	-	Torque for battery poles
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	
M8	-	21 +/- 1.3	-	15.5 +/- 1	
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	

12.3.6 Cable Connections Overview for the PBC

This schematic shows all possible connections including the options, depending on the configuration at the site.

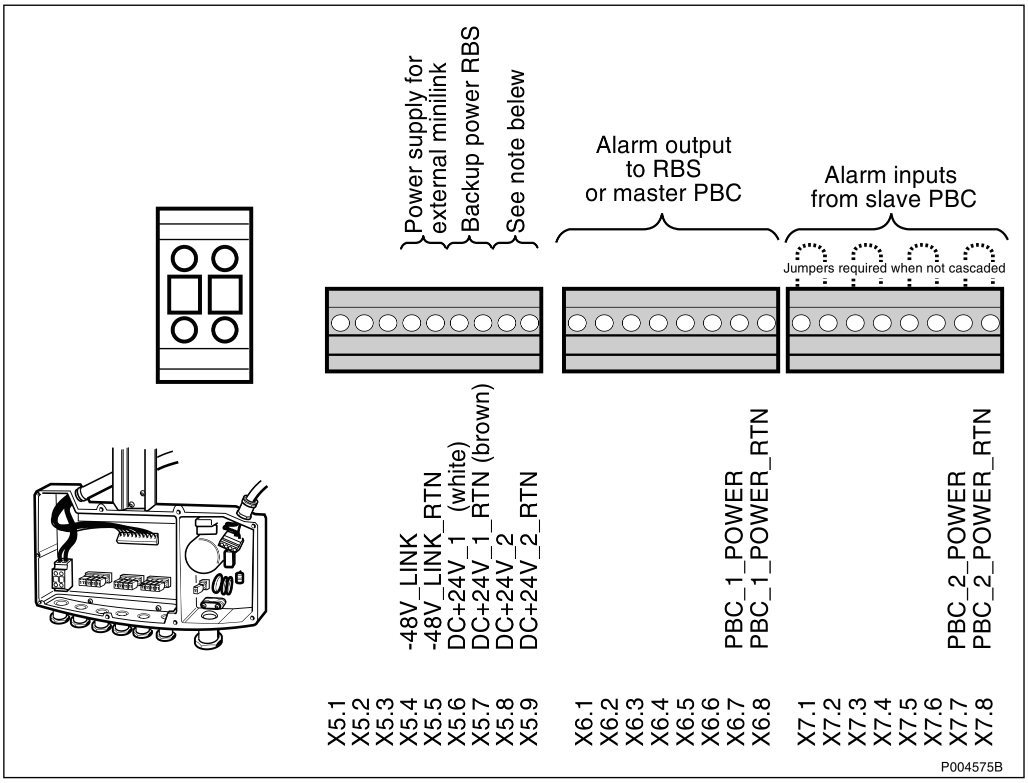


Figure 279 Cable connections for PBC

Note: From release R3A and on, no voltage is present on terminal X5.8 and X5.9.

12.4 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.

12.4.1 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.

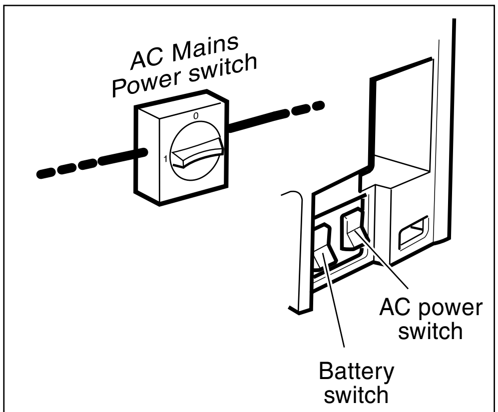
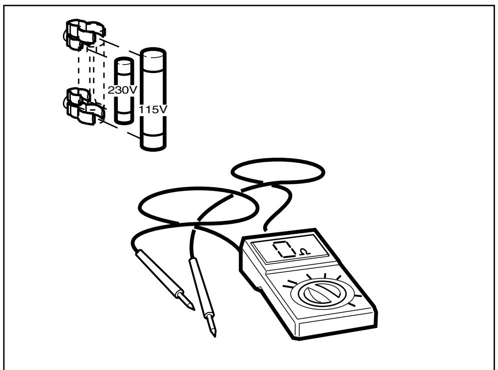
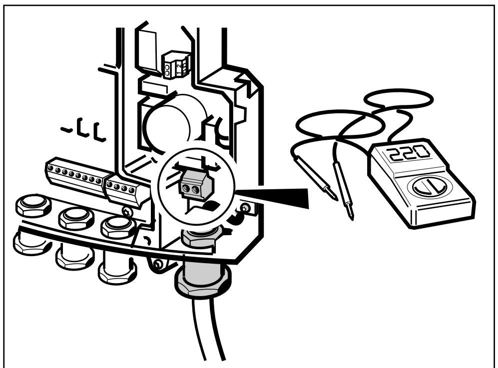
Table 78

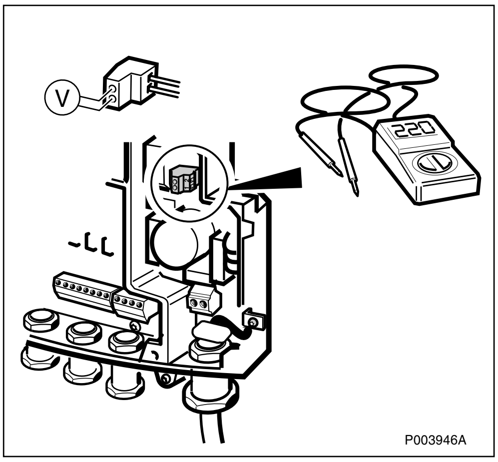
Fault (lit)	**If the red LED is lit, two causes are possible. Use OMT to display the faults.** 1/ The cabinet is faulty: Replace it. (2 TRX configuration). 2/ If the cabinet is configured as a master in a 4 or 6 TRX configuration the communication is lost to the extension cabinet(s). Check the TXL cable and the extension cabinets.
Fault (flashing)	**If the red LED is flashing, four 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* [1]. 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 configured 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.
Reduced capacity	**If the yellow LED is lit, the radio cabinet is faulty. Replace it.**

[1] See:

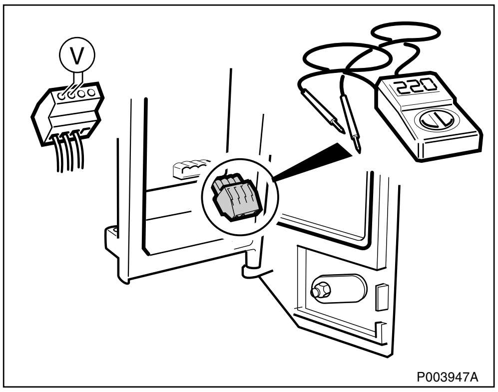
OMT User's Manual *LZN 302 01*

Table 79

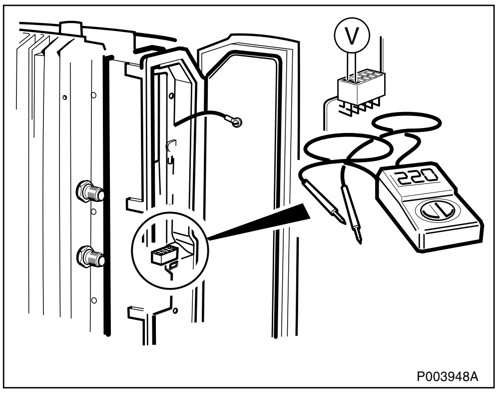
AC Power ON	If the yellow LED is *not* lit, 115/230 V is *not* present in the radio cabinet.
	 P003943A Confirm that the main switch is in the ON position and that the AC switch on the RBS is set to ON position.
	 P003944B Switch off the Mains switch and the AC switch on the RBS. Measure the resistance of the fuses with a multimeter to verify that they are undamaged. (The resistance should be 0 Ω). Then switch the power back on.
	 P003945A 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.

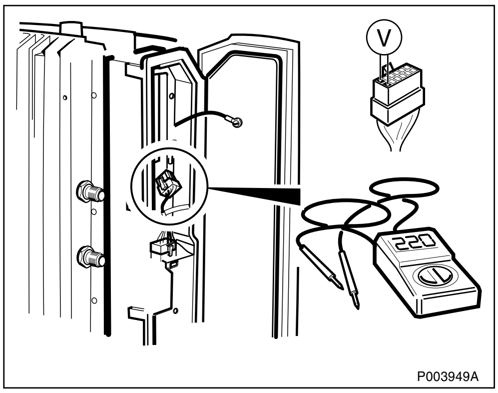
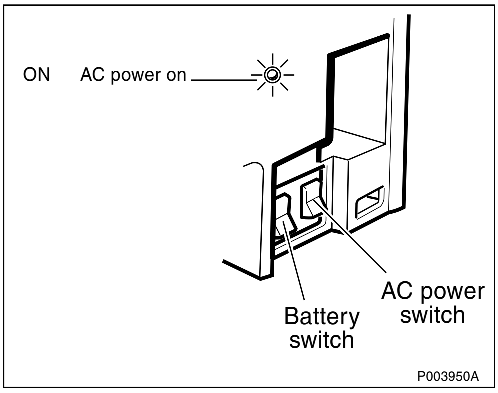
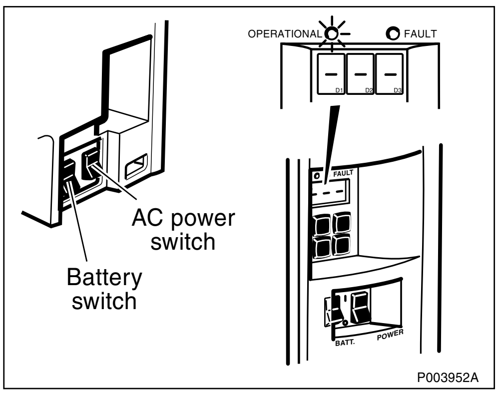
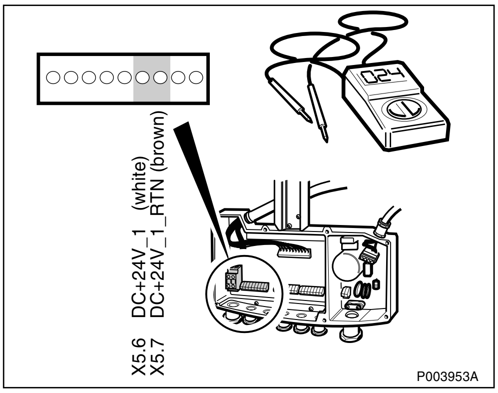
	 Measure that 115/230 V is present at the connector of the internal AC cable attached to the radio cabinet, to verify that the internal AC cable is undamaged. If voltage is present, replace the radio cabinet.

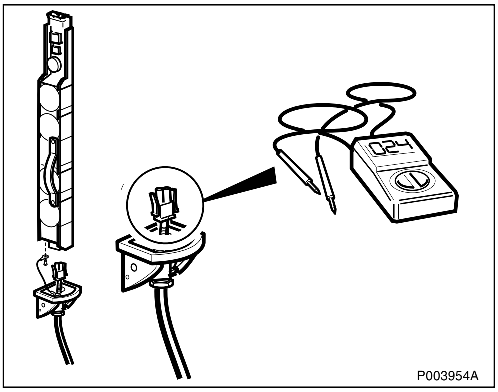
Table 80

Battery Fault	If the yellow LED is lit, 24 V supply is missing in the radio cabinet. Cause: the PSA or the battery is disconnected or low battery voltage in the internal battery. If the cabinet has been powered with backup battery it might take up to 24 hours until the battery is fully charged and the LED will turn off.
Case 1: Internal Backup Battery	 Confirm that the battery switch is in the ON position and that AC voltage is present, so that the backup battery has not run for so long that it is empty. If the battery is faulty, it must be replaced.
Case 2: External Power and Battery Cabinet with PSA and AC switch PBC.	

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.



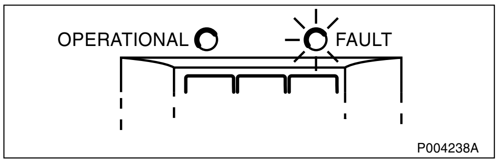
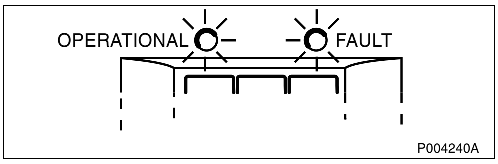
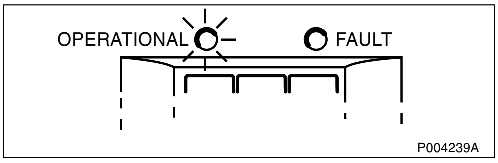
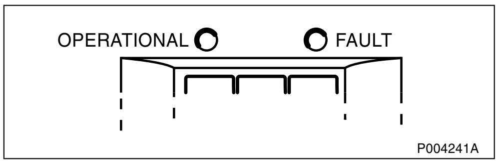
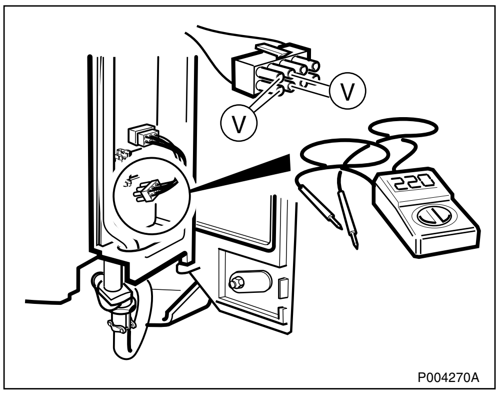
Examine the PSA cable by measuring that 24 V is present on the incoming connector to the PSA. If there is, replace the PSA. If not, replace the cable.

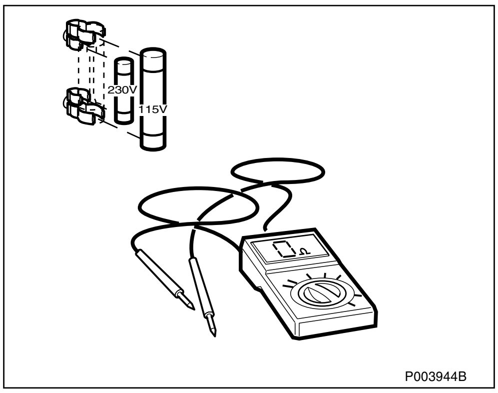
Table 81

External Alarms	If the yellow LED indicator is lit, this means either that auxiliary equipment is sending alarms, e.g. burglar alarms, alarms or similar, or that an alarm is received from the PBC. Use the OMT to locate the active alarm(s). When software BSS R7 or later is loaded, the ARAE alarms (PBC alarms) are indicated on the LED "Fault" when active, if the optional PBC is used.

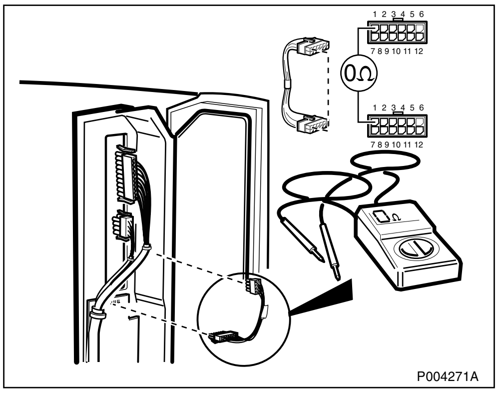
12.4.2 Fault Tracing Guidelines for the PBC

Table 82 Fault tracing guidelines for the PBC

	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 83 on page 297*, *Fault code list* 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 service or replacement. Use *Table 83 on page 297*, *Fault code list* 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 is 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.



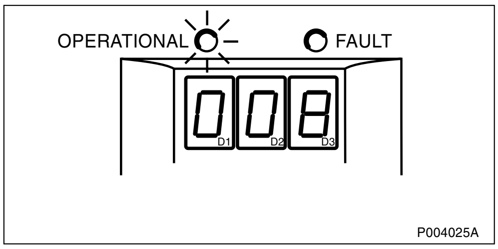
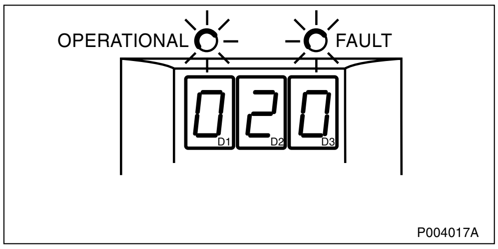
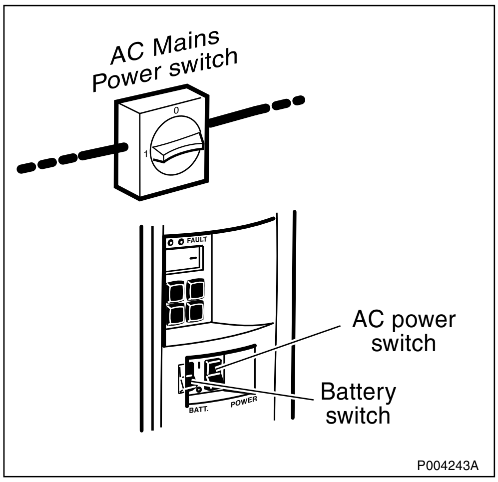
2/ The fuses are damaged and the batteries have been discharged. Turn off the Mains switch and the AC switch on the battery cabinet. Measure the resistance of the fuses with a multimeter to verify that they are undamaged. (The resistance should be 0 Ω).

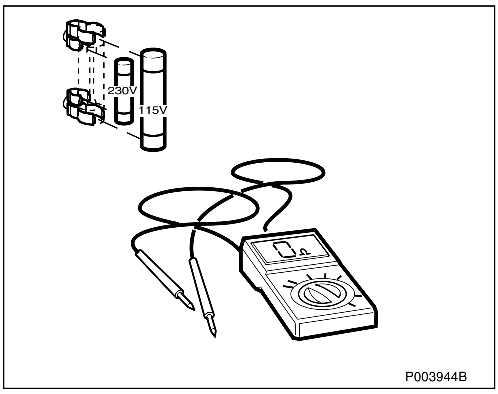


3/ The display cable is faulty. If there is 115/230 V present to the battery cabinet, verify that the display cable is properly connected and functional. This is done by measuring the resistance from pin to pin.

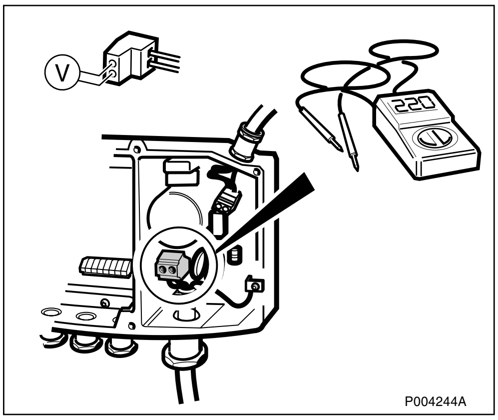
Fault Code List

Table 83 Fault code list

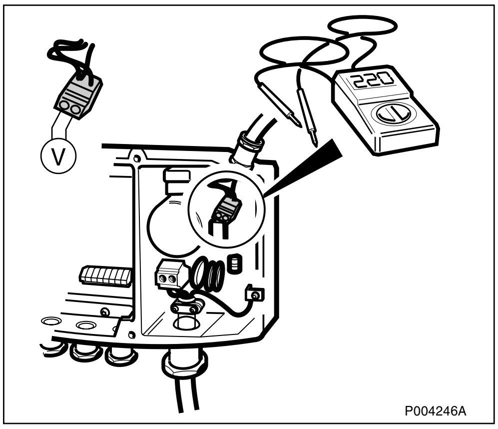
<table>
<tr><td>
</td><td>Overtemp historical. Ambient temperature might have been to high and/or circuits overloaded due to long charging of batteries.</td></tr>
<tr><td>
</td><td>When displayed, 115/230 V is not present in the battery cabinet.</td></tr>
<tr><td></td><td>

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.</td></tr>
<tr><td></td><td>

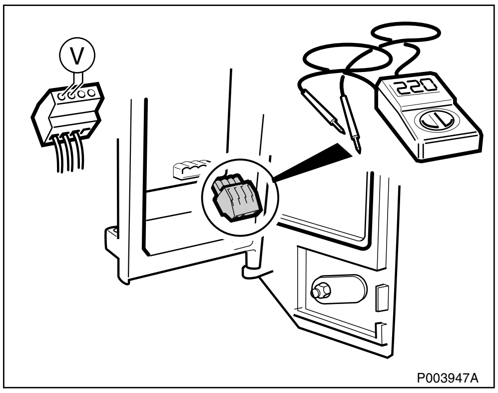
Switch off the Mains switch and the AC switch on the PBC. Measure the resistance of the fuses with a multimeter to verify that they are undamaged. (The resistance should be 0 Ω). Then switch the power back on.</td></tr>
</table>



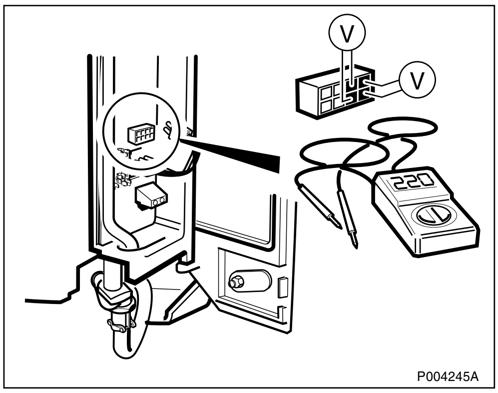
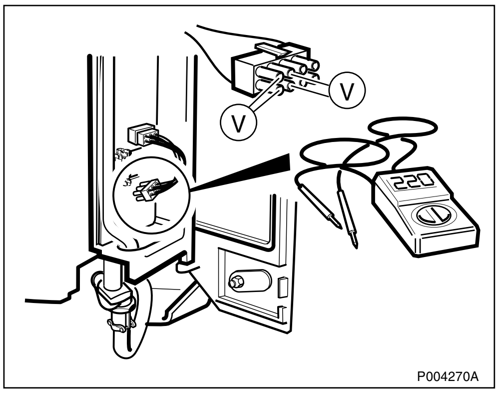
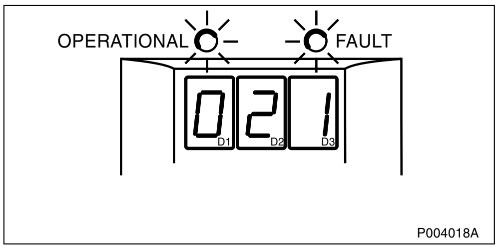
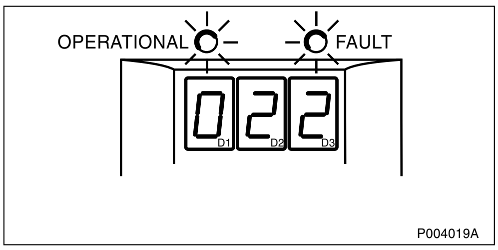
Measure with a voltage meter that 115/230 V is present at the incoming AC plinth on the AC board in the interface box.

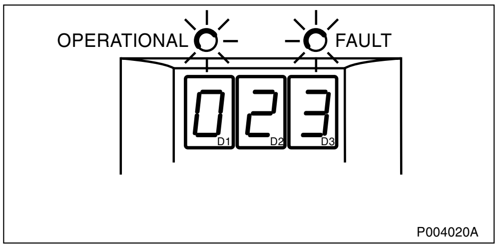
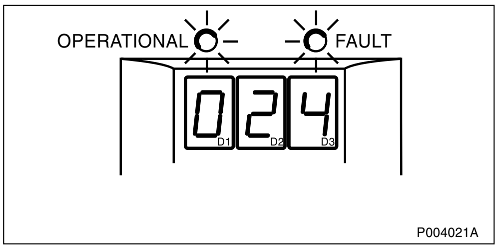
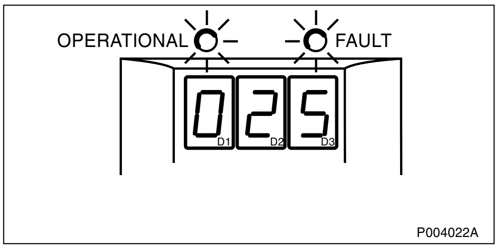
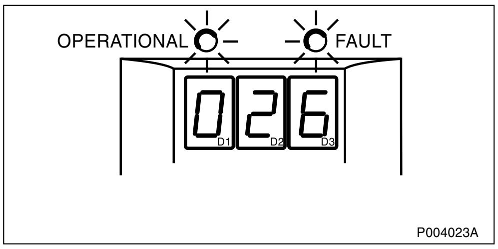
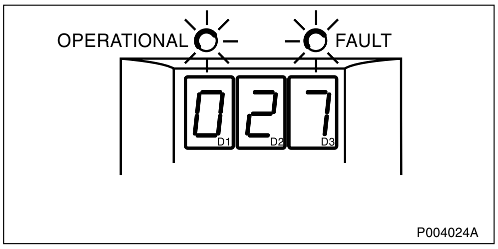
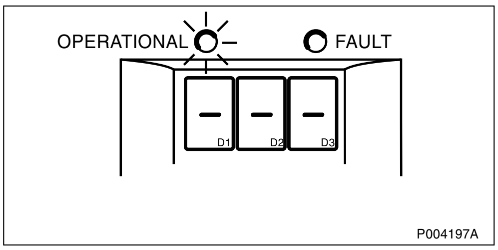


Measure that 115/230 V is present at the upper AC plinth on the AC board to verify that the AC board is not faulty.



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.
	 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.
	*AC/DC Fault*. Replace the Cabinet.
	*DC/DC Overload*. 1. Take the site out of service according to *Section 12.2.6 on page 277*. 2. On the DC Surge board, check the X5 connector and the -48 V DC connector to the antenna for shortcircuits. After clearing any shortcircuits, start up the PBC. • If no alarm appears, put the site into service according to *Section 12.2.7 on page 280*. • If alarm appears, replace the Cabinet.

	*DC/DC Fault*. Replace the Cabinet.
	*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.* This alarm might be active if the ambient temperature is above 40 °C. If the ambient temperature is normal, replace the power cabinet.
	*Operational*. No alarms present.

12.5 Corrective Action for the RBS

12.5.1 General Information Regarding Replacement

During maintenance the RBS and the PBC often have to be taken out of service. The procedures prior to replacement and setting to operation are the same in these cases and are presented below.

For more information regarding the start up and shut down sequence *see Section 12.2.7 on page 280* and *Section 12.2.6 on page 277*.

Prior to Replacement (Shut Down Sequence)

1. Inform the OMC operator that the RBS will be out of service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Switch the RBS battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.

If the PBC is not used, proceed to *step 8 on page 301*.

6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch the AC Mains Power switch to OFF position.

Set to Operation (Start Up Sequence)

1. Switch the AC Mains Power switch to ON position.

If the PBC is not used, proceed to *step 4 on page 301*.

2. Switch the PBC AC switch to ON position.
3. Switch the PBC Battery switch to ON position.
4. Switch the RBS AC switch to ON position.
5. Switch the RBS Battery switch to ON position.
6. Set the RBS to Remote Mode.
7. Inform the OMC operator that the site is taken into service.

12.5.2 HDSL Modem

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

Replacing the HDSL Modem

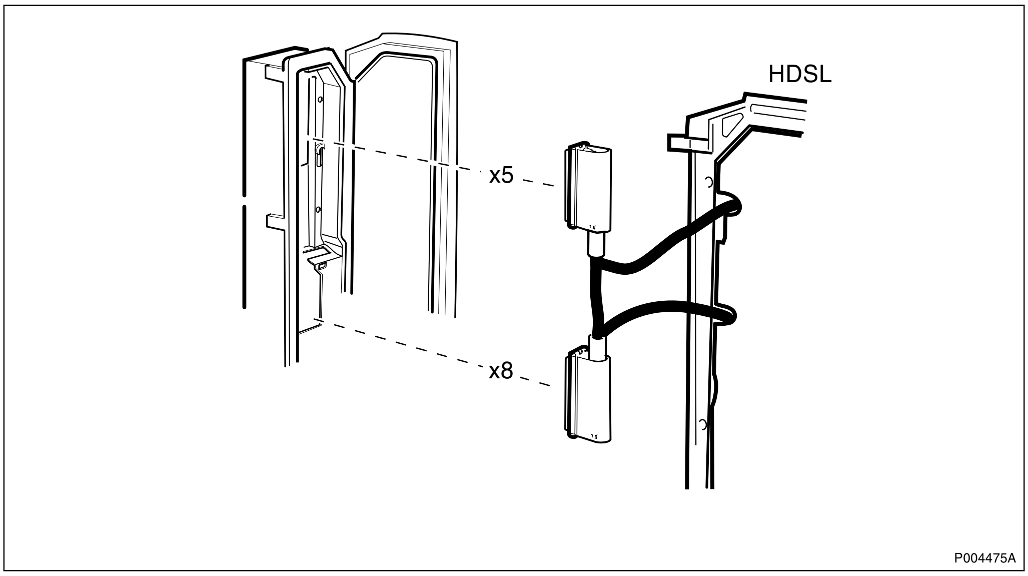


Figure 280 Disconnecting the cables

1. Disconnect the cables from the HDSL Modem.

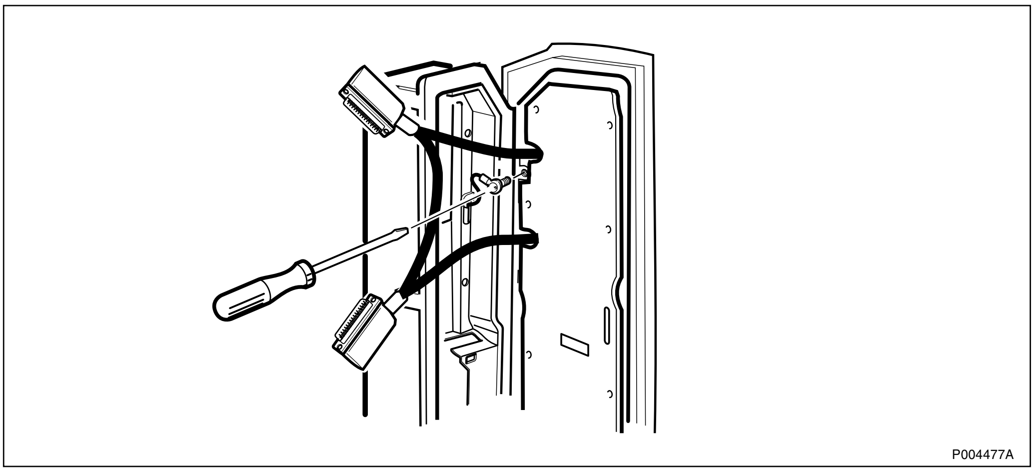


Figure 281 Disconnecting the Protective Earth

2. Disconnect the Protective Earth to the HDSL Modem.

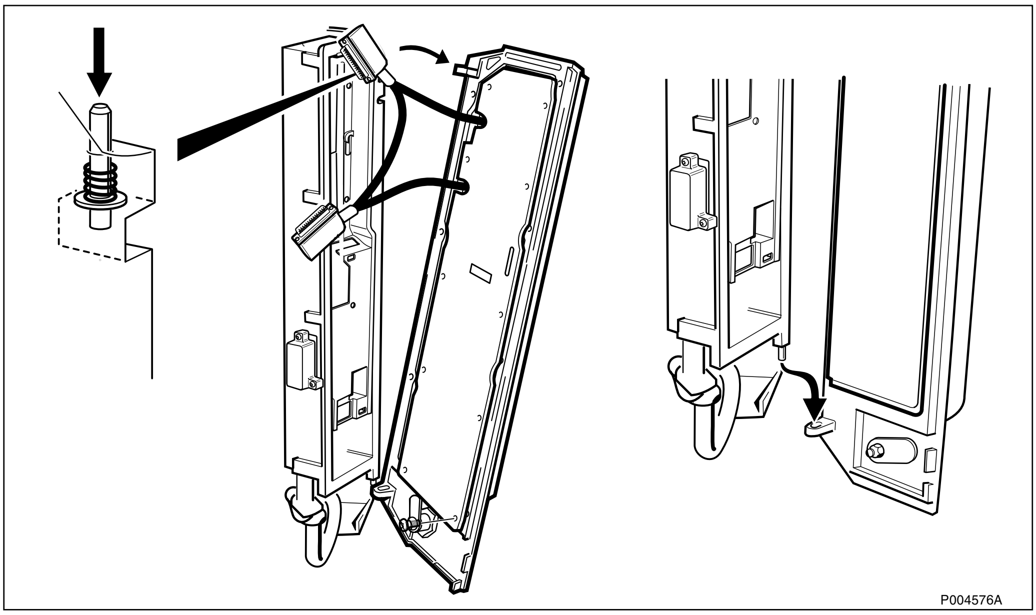


Figure 282 Dismantling the faulty HDSL Modem

3. Dismantle the faulty HDSL Modem.

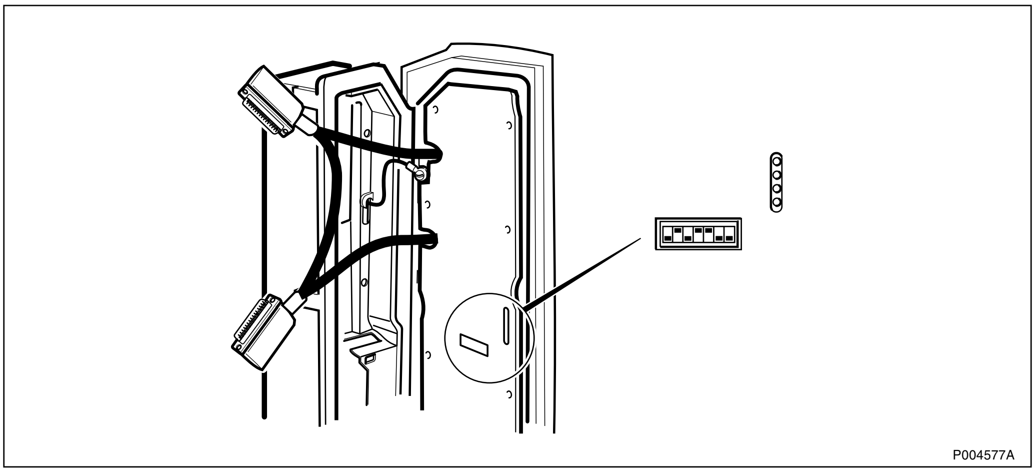


Figure 283 Position of the DIP switches

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

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

1. Wait for the green light on the HDSL Modem.
2. Perform the checklist in *Section 12.9 on page 391*.

12.5.3 Fan Unit

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.

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. Set the AC switch for the Fan Unit in OFF position.

   If there is no separate AC switch for the Fan Unit, perform the shut down sequence as described on *page 301*.

Replacing the Fan Unit

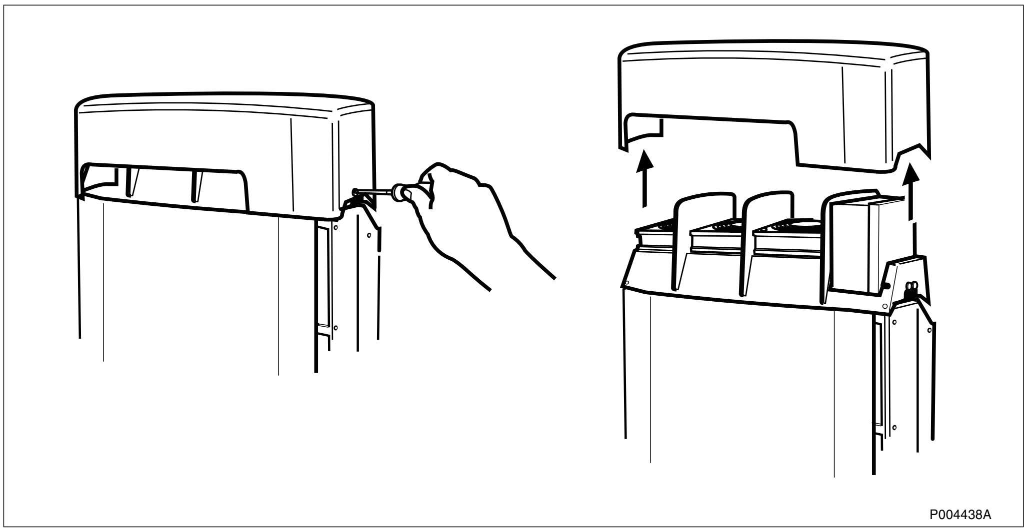


Figure 284 Removing the cover

1. Remove the Fan Unit cover by unscrewing the screws on each side.

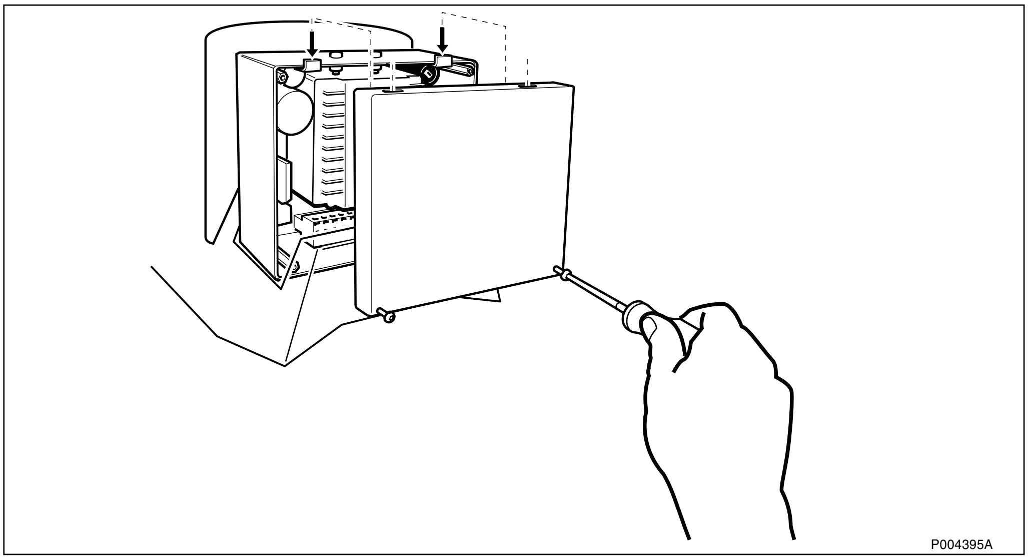


Figure 285 Opening the control box

2. Open the Fan Unit control box by unscrewing the two screws.

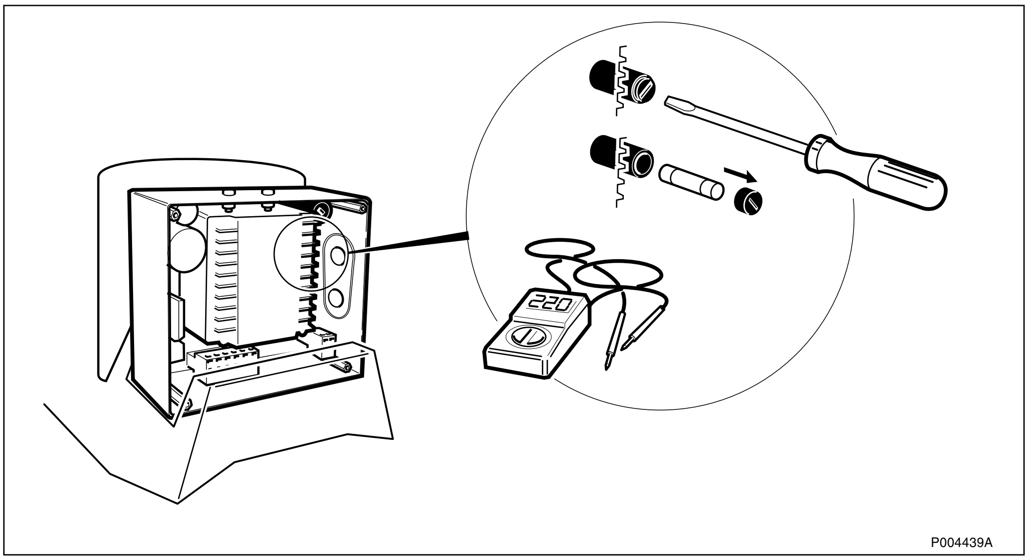


Figure 286 Inspecting the fuses

3. Inspect the fuses to see if they are damaged, and replace them if necessary.

Table 84 Fuses

Voltage	Fuses Data	Dimension
100-127 V AC	Ceramic Slow Blow 6.3 AT, 250 V (1)	5x20 mm
200-250 V AC	Ceramic Slow Blow 6.3 AT, 250 V (1)	5x20 mm

(1) Fuse according to standard EN 60127.

4. If the fuses were damaged, proceed to *Section Test after Corrective Action on page 308*.

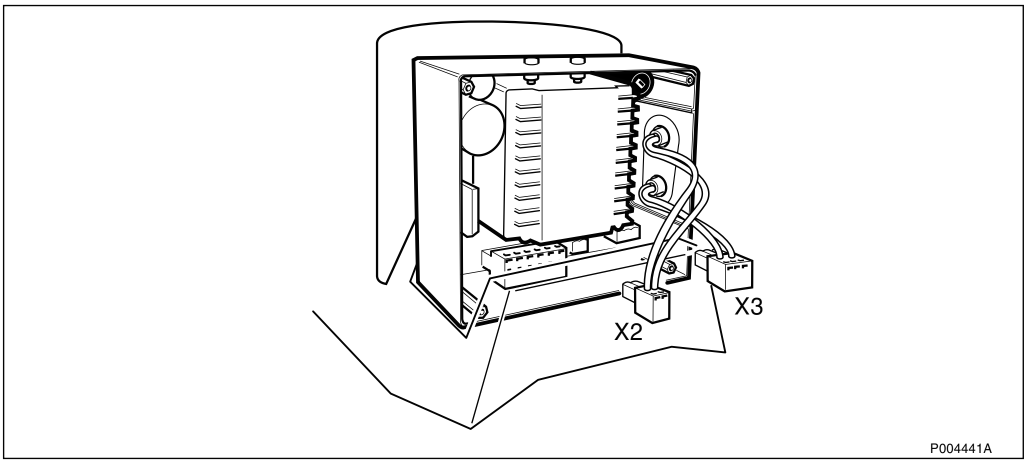


Figure 287 Unplugging the fast connection plinths

5. Unplug the fast connection plinths for the alarm cable (x2) and the AC cable (x3), and disconnect the protective earth cable.

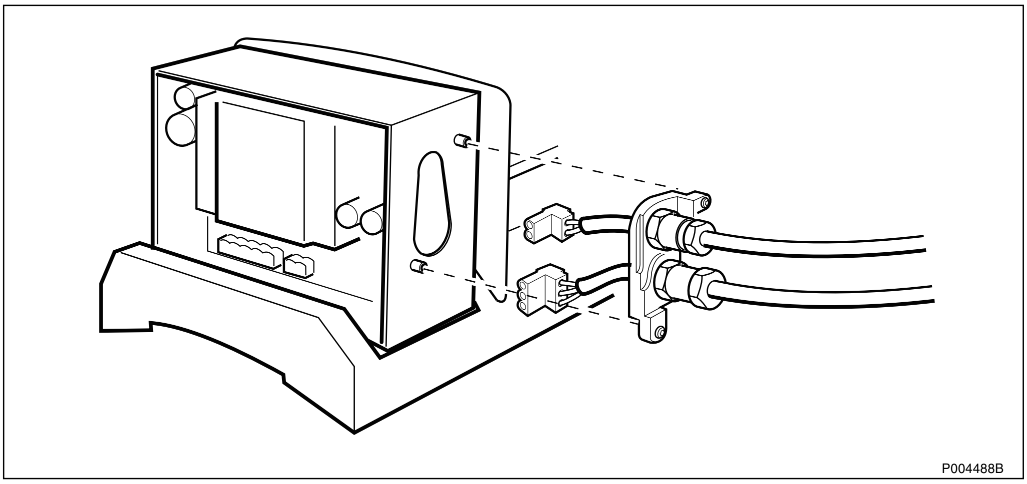


Figure 288 Loosening the cable feed through plate

6. Loosen the cable feed through plate by unscrewing the two screws.
7. Pull out the alarm cable and the AC cable.

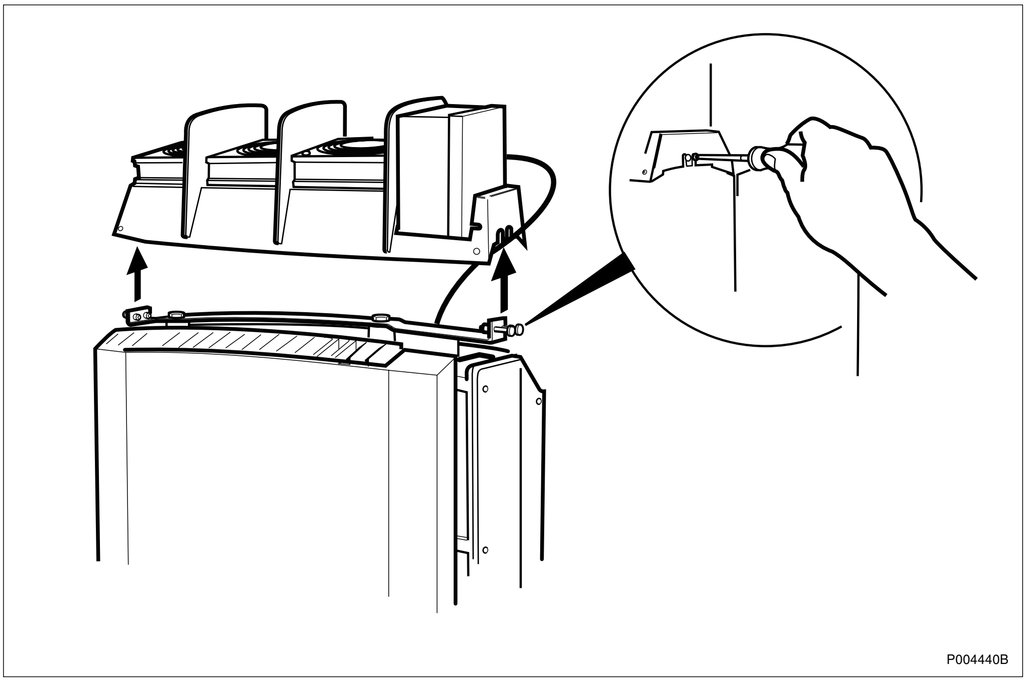


Figure 289 Loosening the Fan Unit

8. Loosen the Fan Unit from the bracket by unscrewing the screws on the short sides.

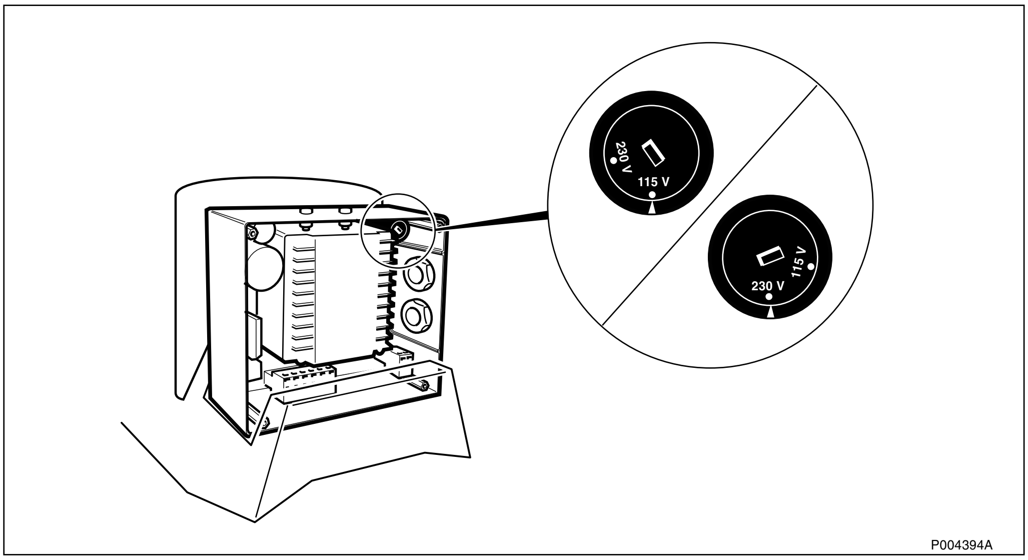


Figure 290 AC selector

9. Verify that the voltage selector on the new Fan Unit is set to the right voltage and that the fuses are mounted.

10. Mount the new Fan Unit and tighten the two screws.

11. Insert the cables through the control box according to the *Figure 288 on page 306* and tighten the two screws.

12. Plug in the fast connection plinths for the alarm cable (x2) and the AC cable (x3), and reconnect the protective earth cable.

Set to Operation

Set the AC switch for the Fan Unit in ON position.

If there is no separate AC switch for the Fan Unit, perform the start up sequence as described on *page 301*.

Test after Corrective Action

1. Press the test button located to the left part of the AC plinth in the control box and make sure that all three fans are running.
2. Mount the cover on the Fan Unit control box and tighten the two screws.
3. Mount the cover on the Fan Unit and tighten it with the one screw on each side.

12.5.4 Sunshields

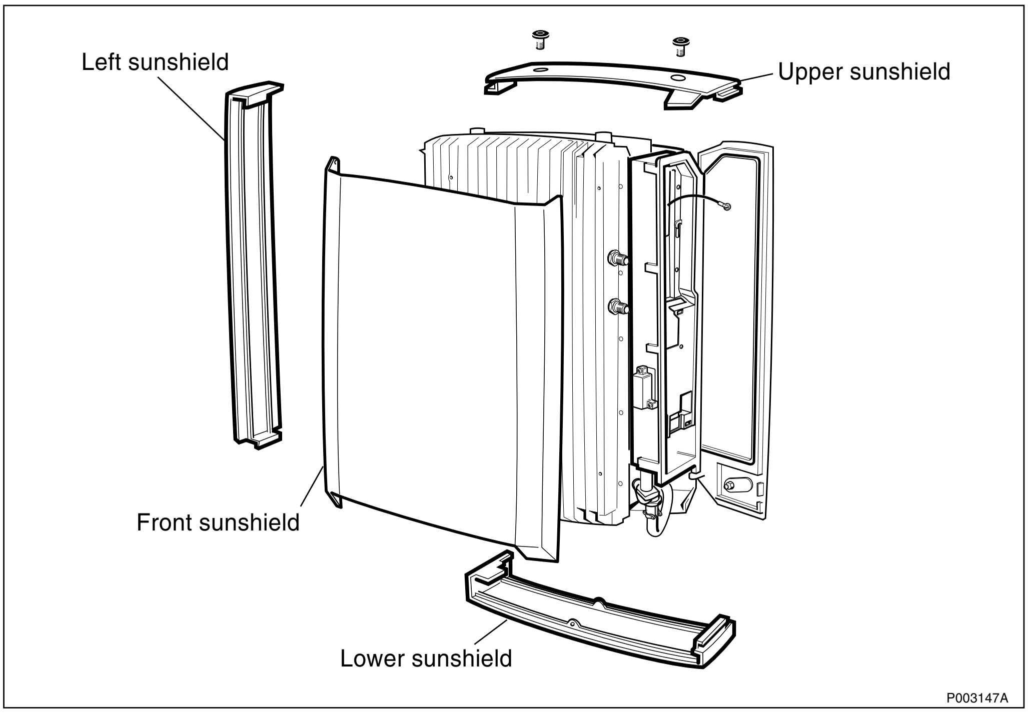


Figure 291 Sunshields overview

Replacing the Front Sunshield

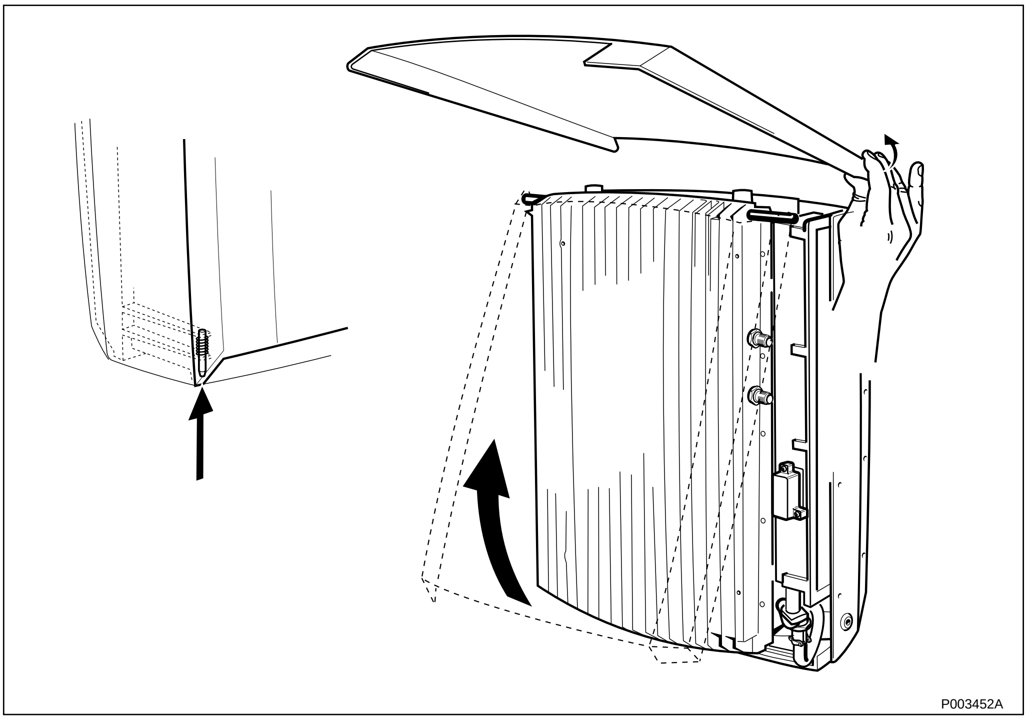


Figure 292 Replacing the front sunshield

If only external antennas are used, ignore steps 1, 3 and 10.

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.

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.

If only external antennas are used, ignore steps 1, 3 and 8.

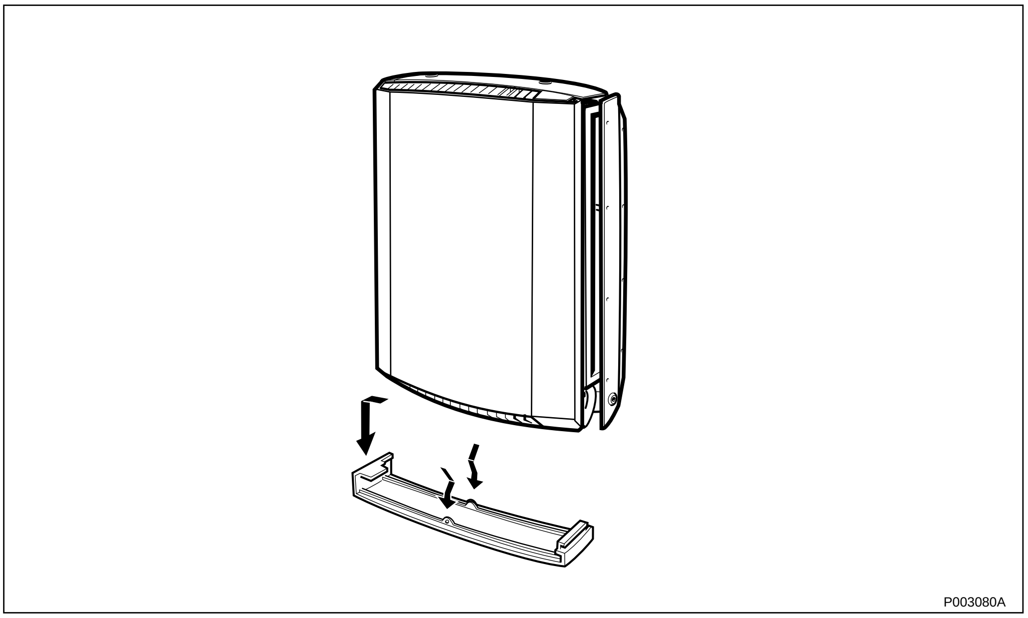


Figure 293 Replacing the lower sunshield

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.

Replacing the Left Sunshield

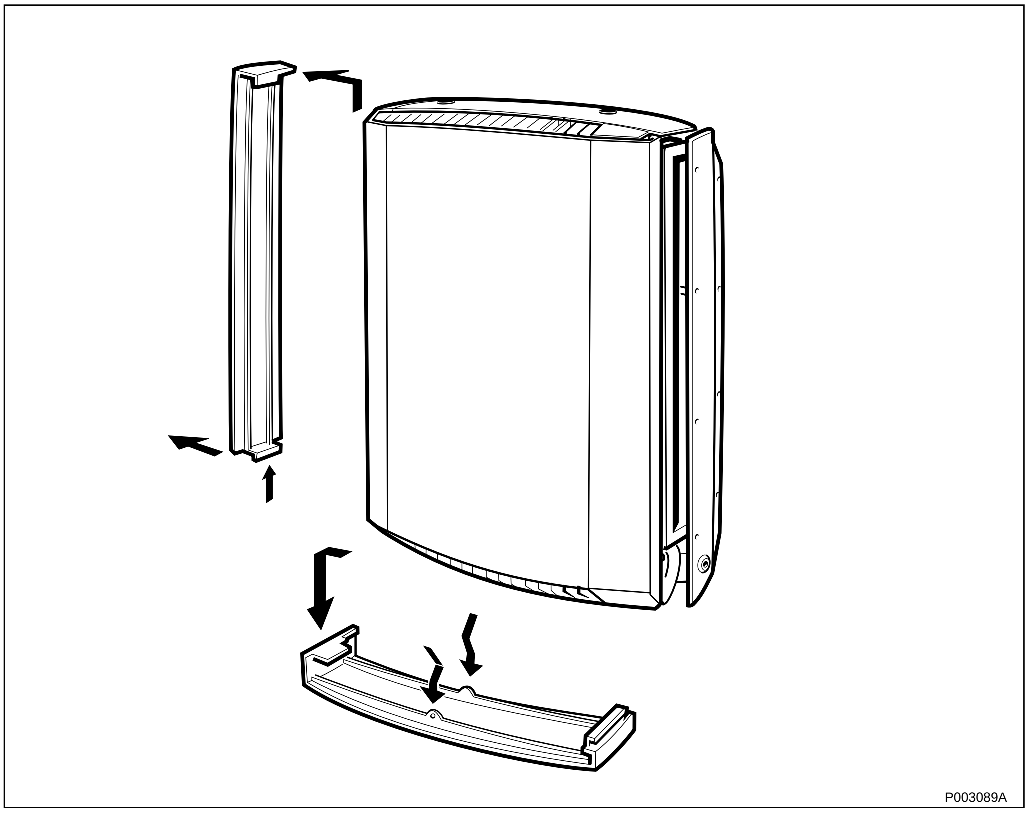


Figure 294 Replacing the left sunshield

If only external antennas are used, ignore steps 1, 3 and 8.

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.

Replacing the Upper Sunshield

If only external antennas are used, ignore steps 1, 3 and 9.

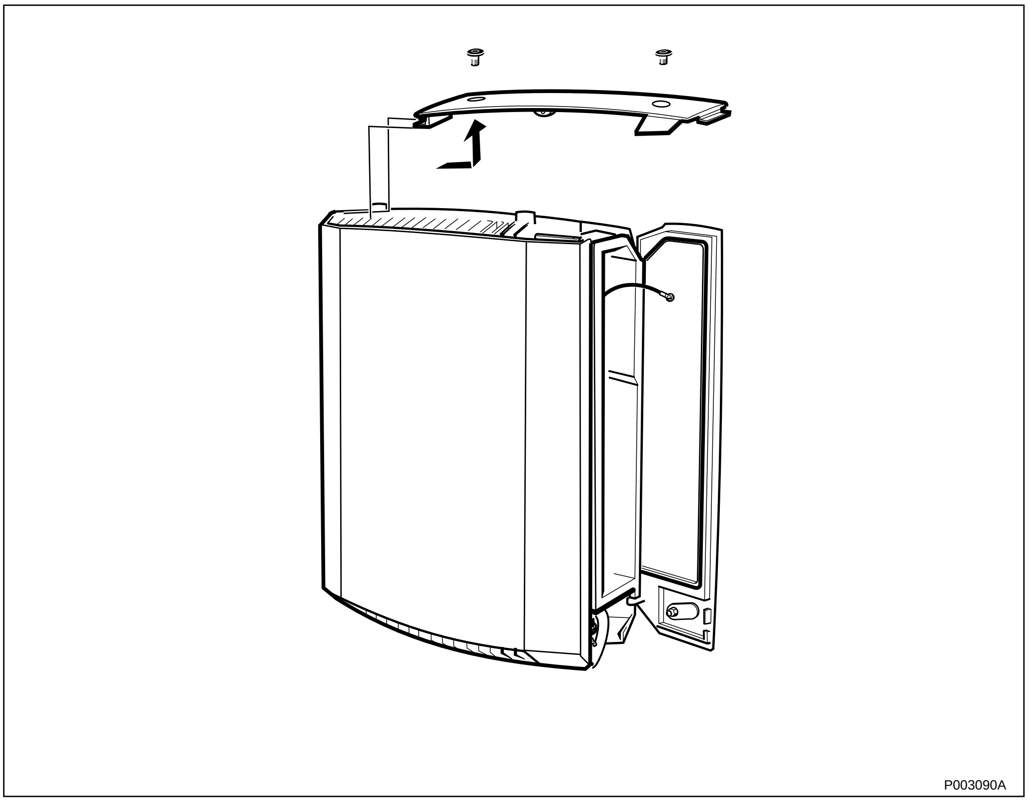


Figure 295 Replacing the upper sunshield

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.

Replacing the Rear Sunshield

In order to keep the transmission to BSC the Loop forward/backward board is needed during the replacement of the rear Sunshield, *see chapter Tools and Instruments*.

To replace the rear sunshield, the cabinet must first be placed on the ground.

1. Perform the shut down sequence as described on *page 301*.
2. Remove the sunshields (front, lower, left and upper).
3. Remove the cabinet, *see page 326*.

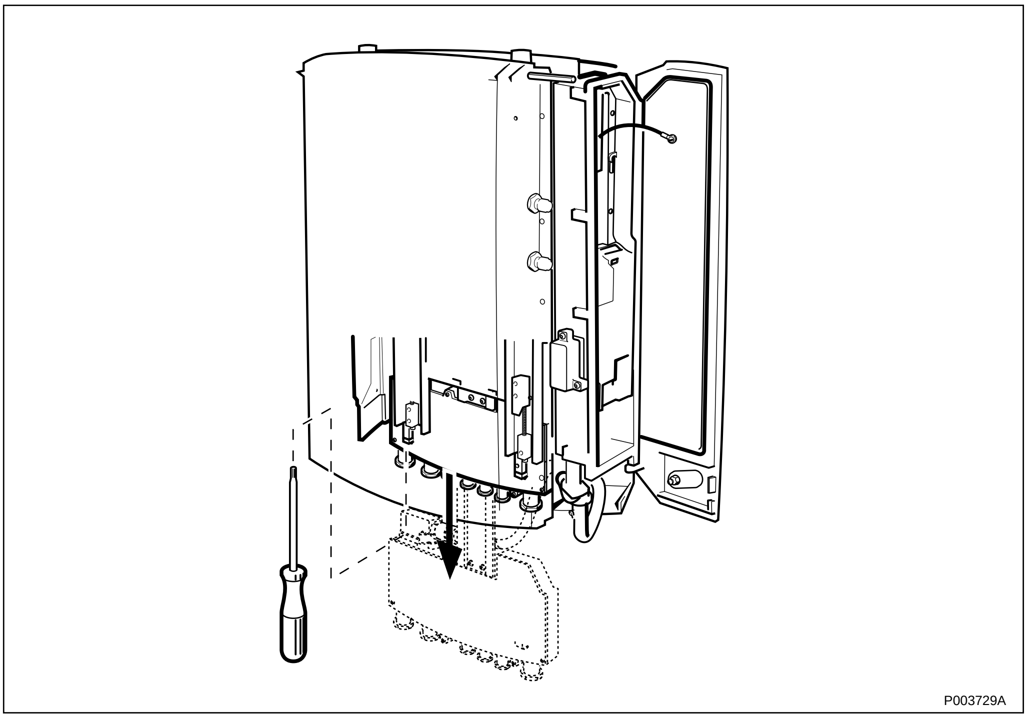


Figure 296 Releasing the interface box

4. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

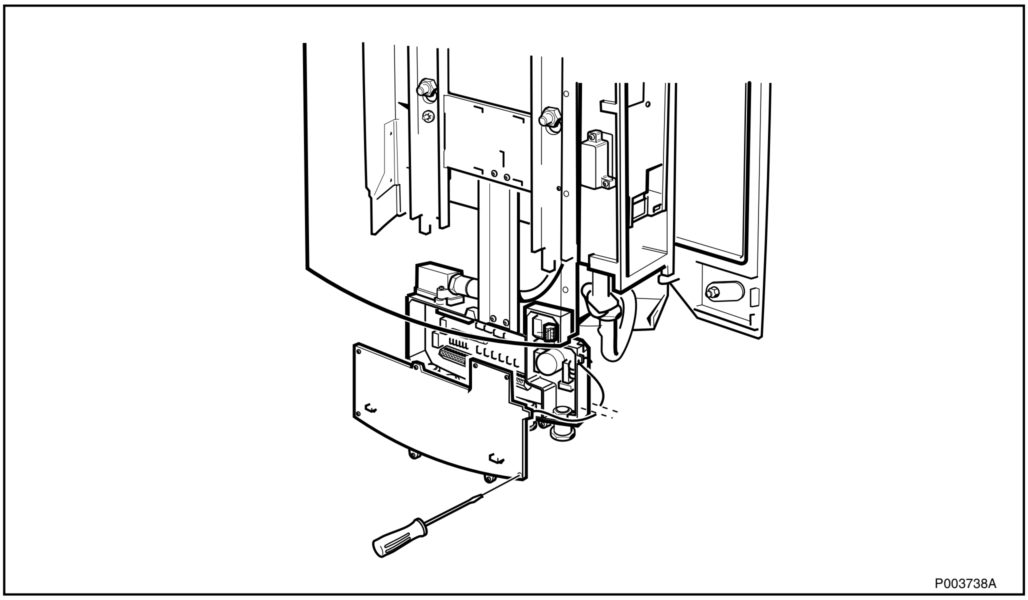


Figure 297 Loosening the interface box cover

5. Open the cover of the interface box by removing the 8 torx screws.

6. Connect the ESD wrist strap to the ESD connection point in the interface box.

Note: You have ten seconds to perform *step 7 on page 314* 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.

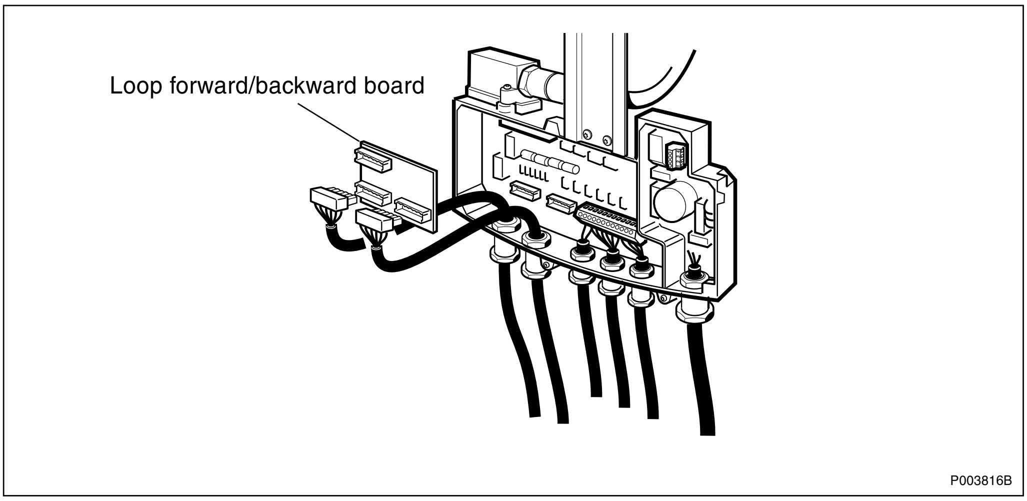


Figure 298 Mounting the Loop forward/backward board

7. Remove the connection terminal blocks for the PCM lines and mount the Loop forward/backward board on the two PCM terminal blocks.
8. Remove all remaining connection terminal blocks, including the AC terminal block.

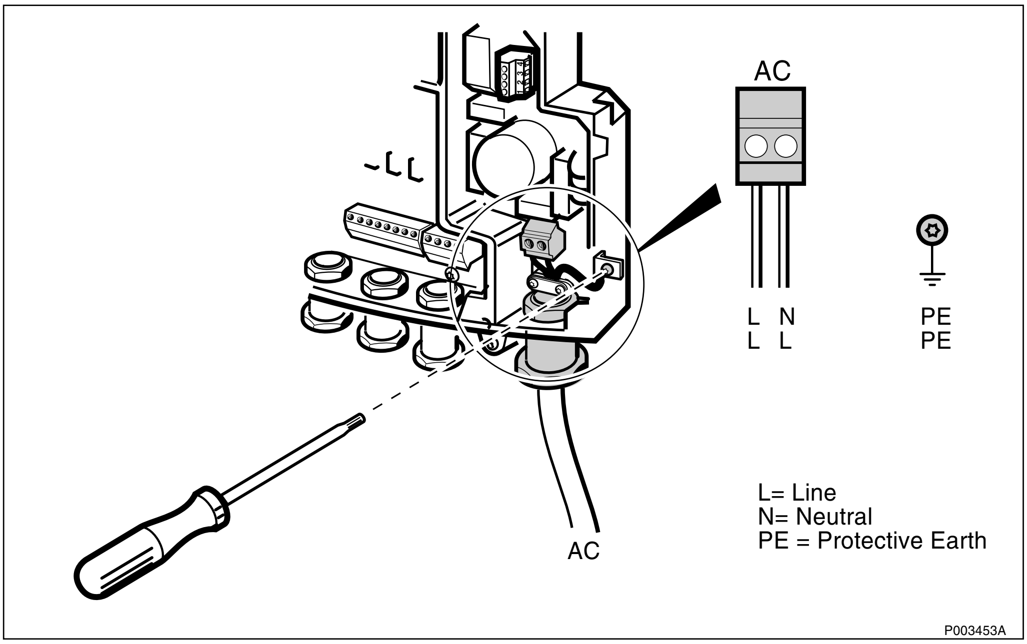


Figure 299 Loosening the Protective Earth in the AC section of the interface box

9. Loosen the Protective Earth in the AC section of the interface box.
10. Loosen the two screws on the AC pull-relief clamp.
11. Dismount the cable gland.
12. Pull out the AC cable.

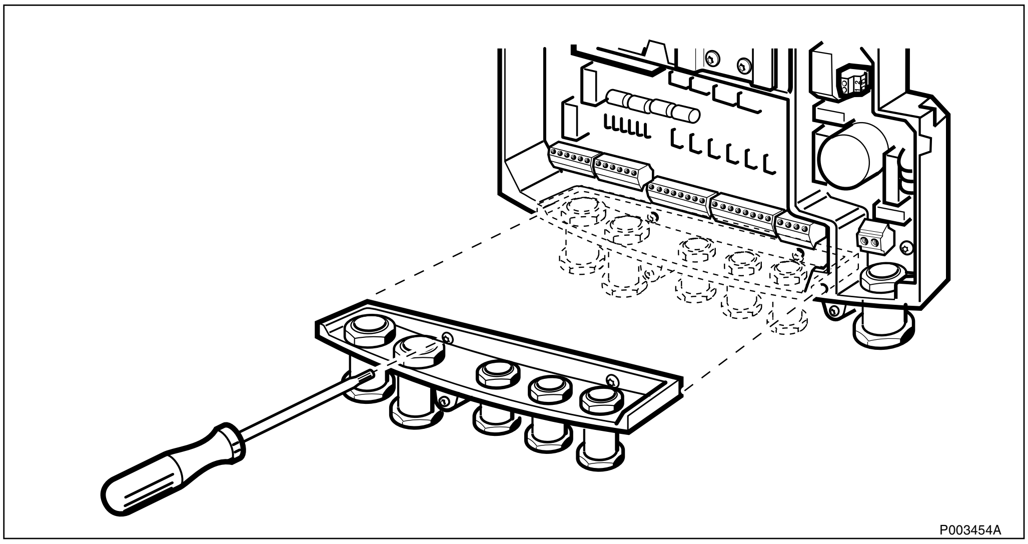


Figure 300 Loosening the gland plate

13. Remove the cable gland plate by unscrewing the two torx screws.

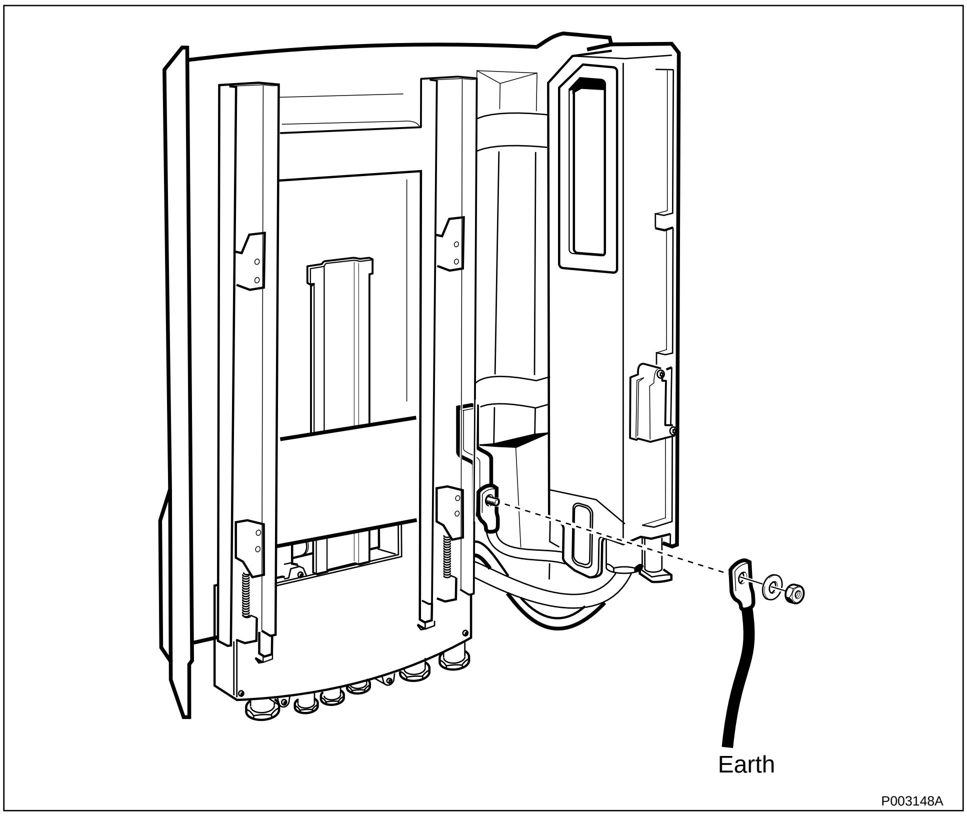


Figure 301 Removing the earth cable

14. Remove the earth cable on the mounting base.
15. Loosen the four nuts securing the mounting base.
16. Lift up the mounting base and pull it away from the wall bracket.
17. Place the mounting base on the ground.

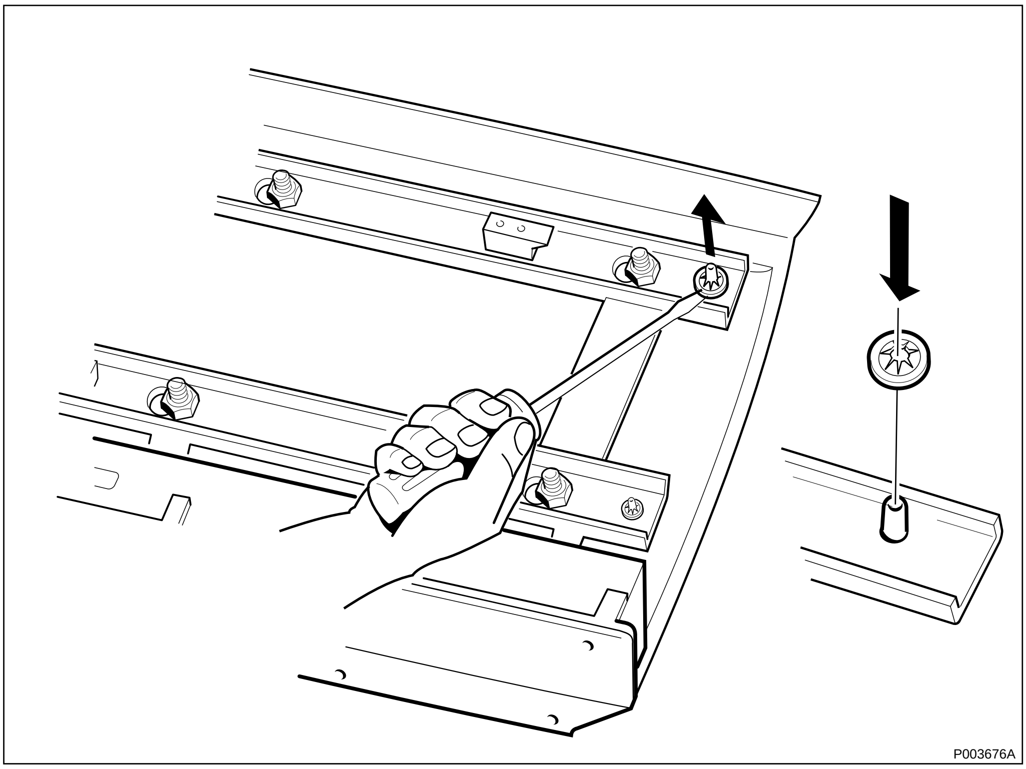


Figure 302 Removing locking washers

18. Remove the four locking washers with a screwdriver.
19. Separate the rear sunshield from the mounting base.
20. Mount the new rear sunshield and the new locking washers.
21. Remount the mounting base on the mounting plate.
22. Tighten the four nuts holding the mounting base.
23. Reconnect the earth cable to the mounting base.
24. Mount the gland plate and fasten the screws.
25. Insert the AC cable and connect the Protective Earth.

Note: You have ten seconds to reinstall the PCM terminal blocks, *see step 26 on page 316*.

26. Disconnect the Loop forward/backward board and remount the connection terminal block for the PCM line on the transmission board.
27. Remount the remaining connection terminal blocks.
28. Remount the cover of the interface box and tighten the screws.
29. Push up the interface box and secure it in the upper position with the two torx screws.
30. Remount the cabinet on the mounting base, *see chapter Installation of RBS 2302*.

Set to Operation

If the RBS have been shut down, perform the start up sequence in *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.5.5 Sector Antenna

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.

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.

Replacing the Sector Antenna

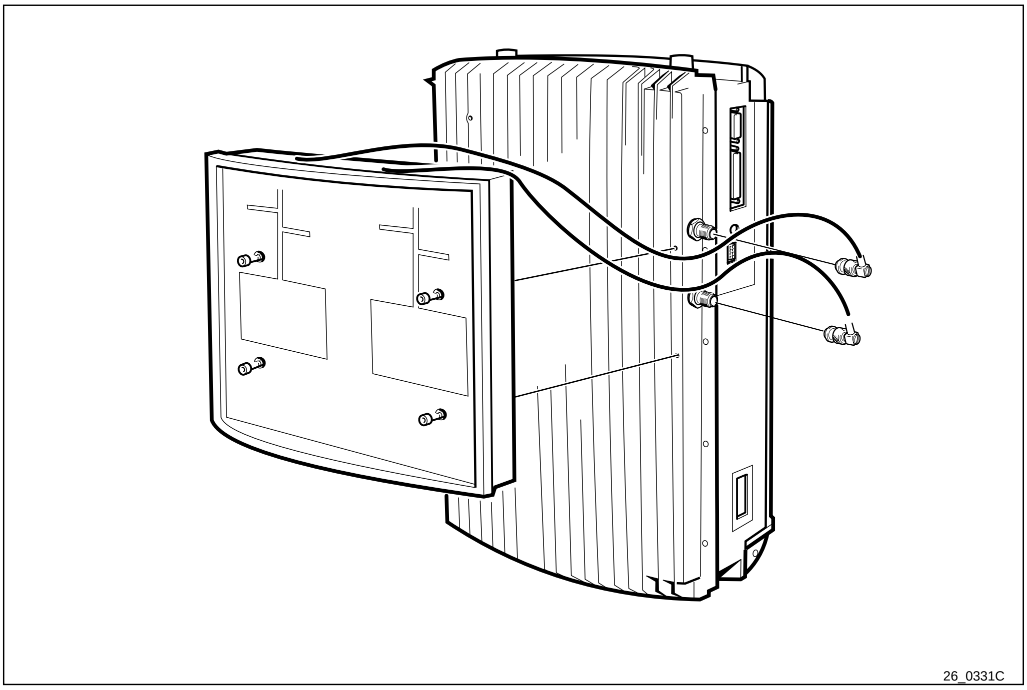


Figure 303 Sector antenna

1. Remove the front sunshield.

Note: Make sure that all cables are properly labelled before disconnecting them.

2. Disconnect the antenna cables.
3. Remove the antenna by loosening the four torx screws holding it in place.
4. Mount the new antenna.

Note: Make sure that no cables are bent or squeezed.

5. Fasten the four torx screws.
6. Reconnect the antenna cables.
7. Mount the front sunshield, *see chapter Installation of RBS 2302*.

Set to Operation

1. Set the RBS in Remote Mode.
2. Inform the OMC operator that the site is taken into service.

Test after Corrective Action

1. Perform the checklist in *Section 12.9 on page 391*.

12.5.6 Omnidirectional Antenna

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.

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.

Replacing the Omnidirectional Antenna

The Omnidirectional antenna is placed underneath the radio cabinet.

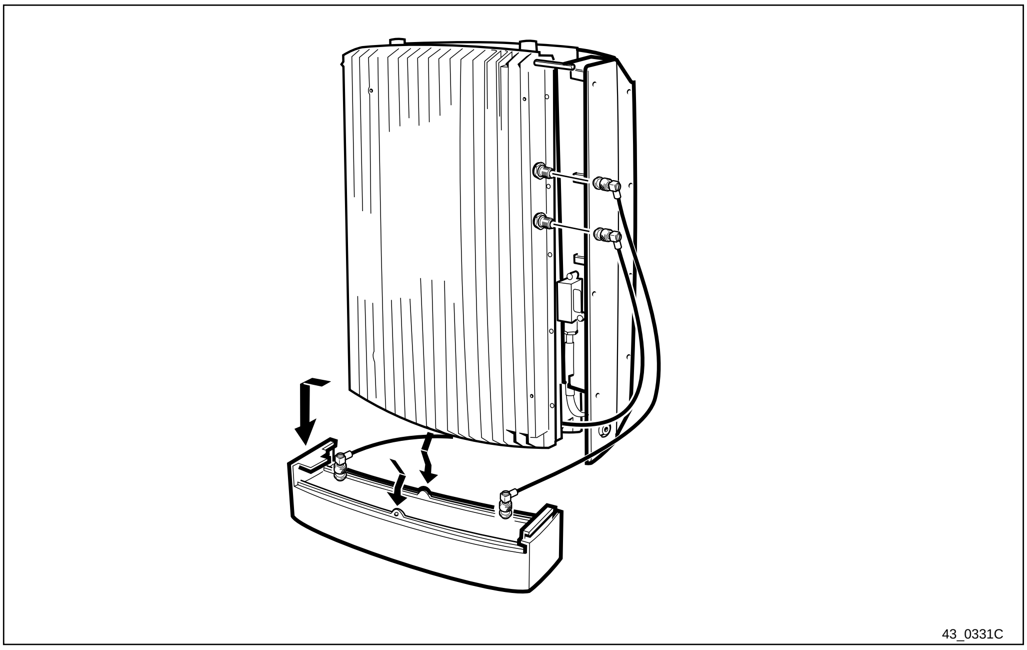


Figure 304 Omnidirectional antenna

Note: Make sure that all cables are properly labelled before disconnecting them.

1. Disconnect the antenna cables.
2. Remove the front sun shield.
3. Unsnap the antenna by pressing the fasteners, located in the middle on the antenna.
4. Pull the antenna down and unhook it.
5. Replace the old antenna with the new.
6. Reconnect the antenna cables.

Set to Operation

1. Set the RBS in Remote Mode.
2. Inform the OMC operator that the site is taken into service.

Test after Corrective Action

1. Perform the checklist in *Section 12.9 on page 391*.

12.5.7 External Antenna

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.

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.

Replacing the External Antenna

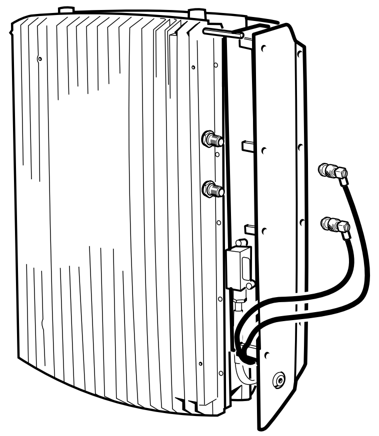


Figure 305 External Antenna jumpers

1. Remove the front sunshield and the lower sunshield.

Note: Make sure that all cables are properly labelled before disconnecting them.

2. Disconnect the antenna cables.
3. Remove the antenna.
4. Mount the new antenna.
5. Reconnect the antenna cables.
6. Remount the lower sunshield and the front sunshield.

Set to Operation

1. Set the RBS in Remote Mode.
2. Inform the OMC operator that the site is taken into service.

Test after Corrective Action

1. Perform Antenna Installation Tests, *see chapter Antenna System Tests*.
2. Perform the checklist in *Section 12.9 on page 391*.

12.5.8 Multicasting Box

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.

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS in Local Mode.

Replacing the Multicasting Box

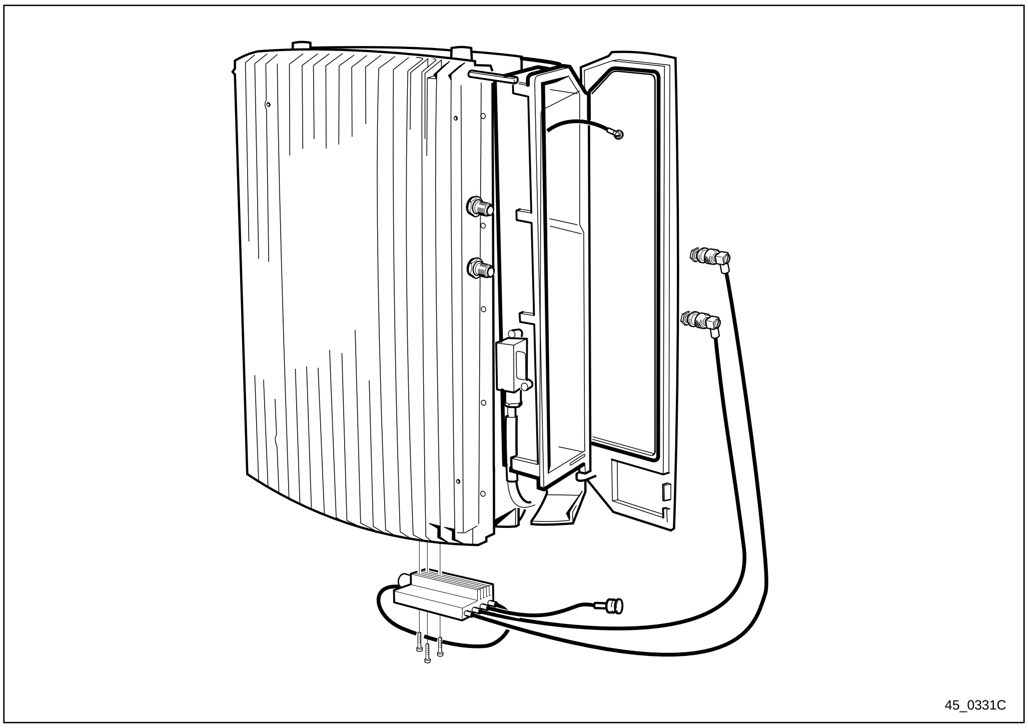


Figure 306 Multicasting Box

1. Remove the lower sunshield by pressing the fasteners, located on the middle on the sunshield.

Note: Make sure that all cables are properly labelled before disconnecting them.

2. Disconnect the antenna cables connected to the radio cabinet.
3. Disconnect the external antenna cable connected to the multicasting box.
4. Remove the multicasting box by loosening the three torx screws.
5. Mount the new multicasting box.
6. Reconnect the external antenna cable.
7. Reconnect the antenna cables to the cabinet.
8. Mount the lower sunshield.

Set to Operation

1. Set the RBS in Remote Mode.
2. Inform the OMC operator that the site is taken into service.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.5.9 Battery

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

Replacing the Battery

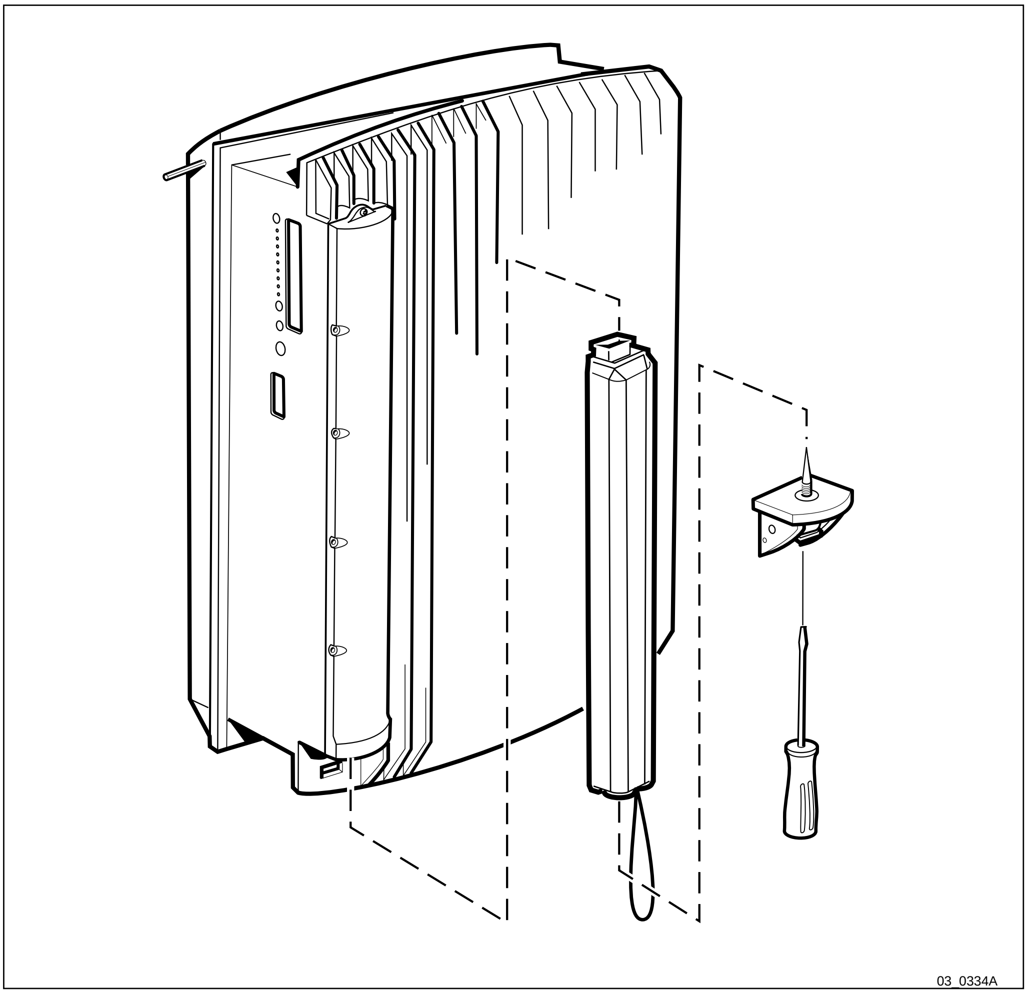


Figure 307 Replacing the battery

1. Unscrew the battery cover.
2. Replace the faulty battery with the new battery.
3. Remount the battery cover.
4. Switch on the AC switch and the battery switch.
5. Verify the new battery by switching the AC switch to OFF and inspect the battery fault indicator.
6. If the fault LED is OFF, set the AC switch to on.

Test after Corrective Action

Note: The new battery might be discharged. It will then take up to 25 hours until full performance is achieved.

1. Perform the start up sequence as described on *page 301*.
2. Perform the checklist in *Section 12.9 on page 391*.

12.5.10 Cables

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

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.

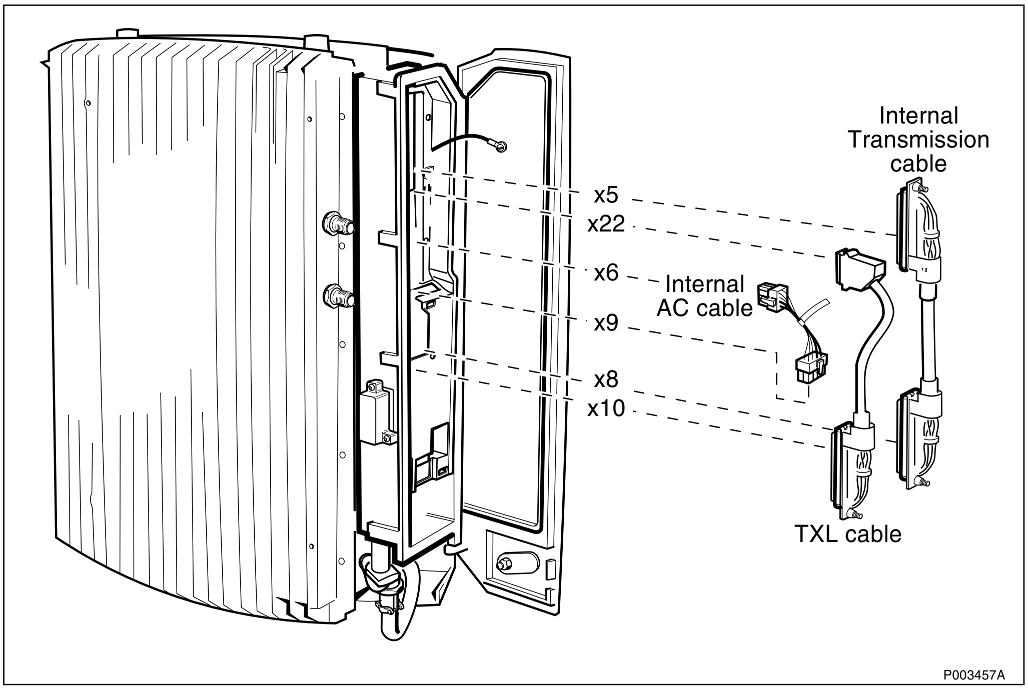


Figure 308 Overview of the cables

1. Remove the front sunshield.
2. Verify that the AC Mains power switch, located outside the cabinets, is in OFF position.

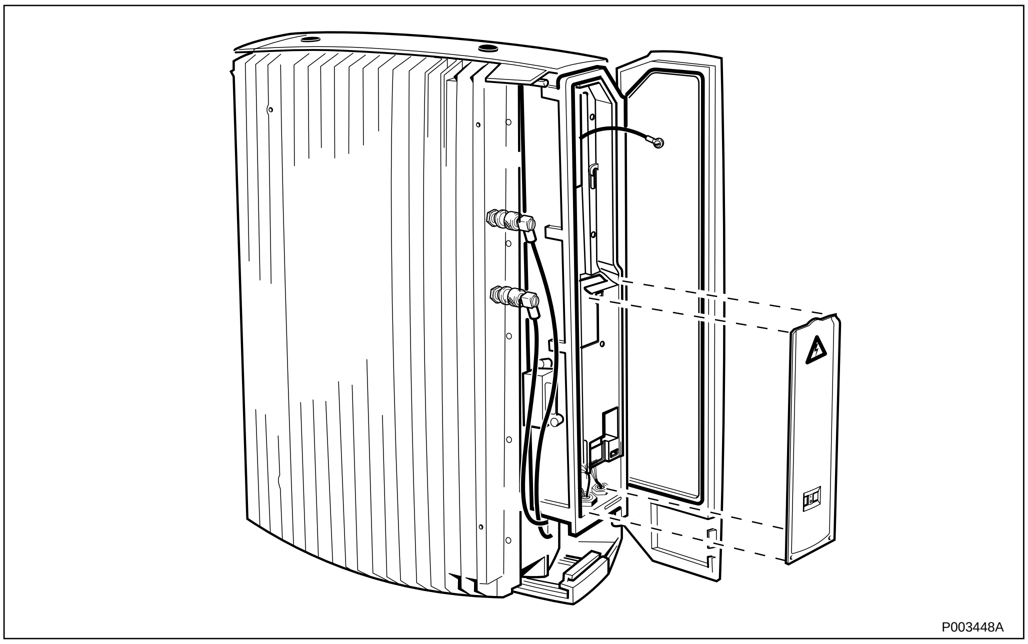


Figure 309 Removing the outer protective cover

3. Unsnap the outer protective cover and remove it.

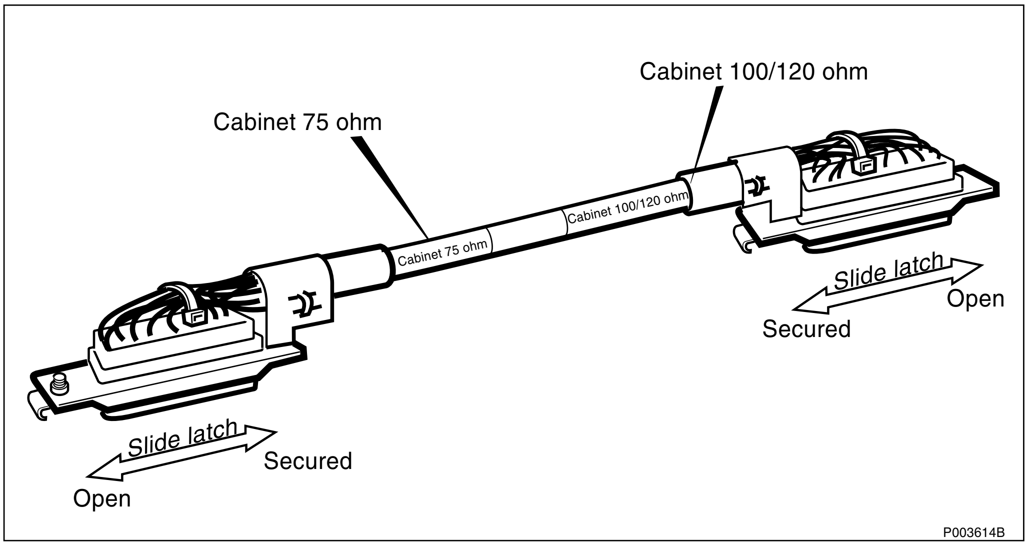


Figure 310 Internal transmission cable

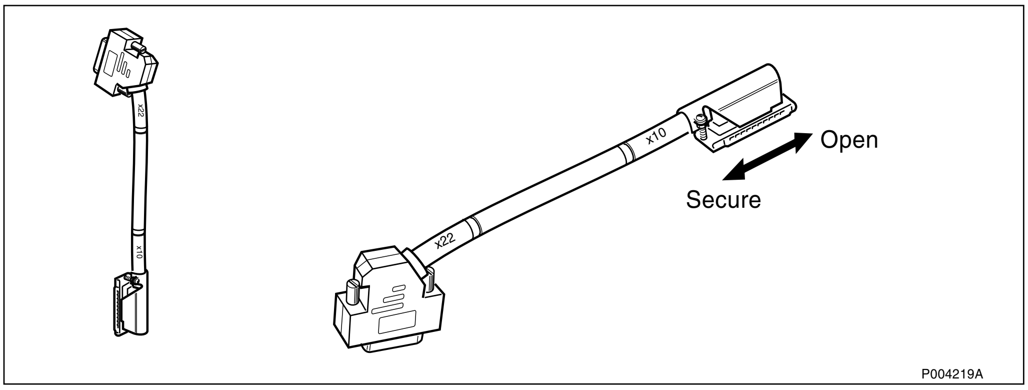


Figure 311 TXL cable

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 308 on page 324*.

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

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.5.11 Radio Cabinet

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

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.
3. Mount the optional lifting device (if it is to be used) on the left side of the mounting plate.

   For information regarding the use of the lifting device, *see chapter Installation of RBS 2302*.

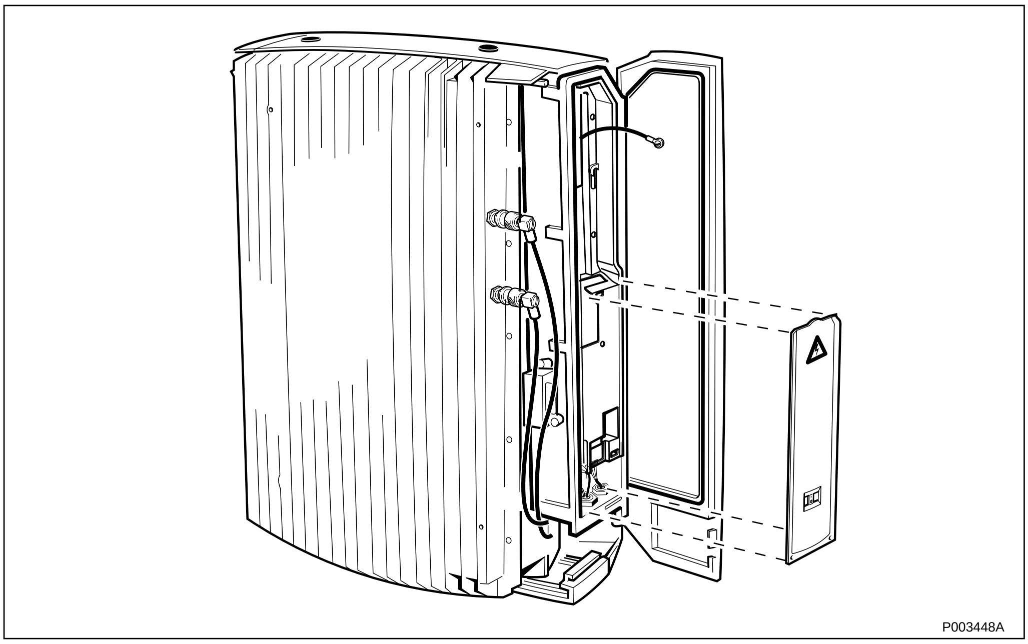


Figure 312 Outer protective cover

4. Unsnap the outer protective cover in the installation box and remove it.

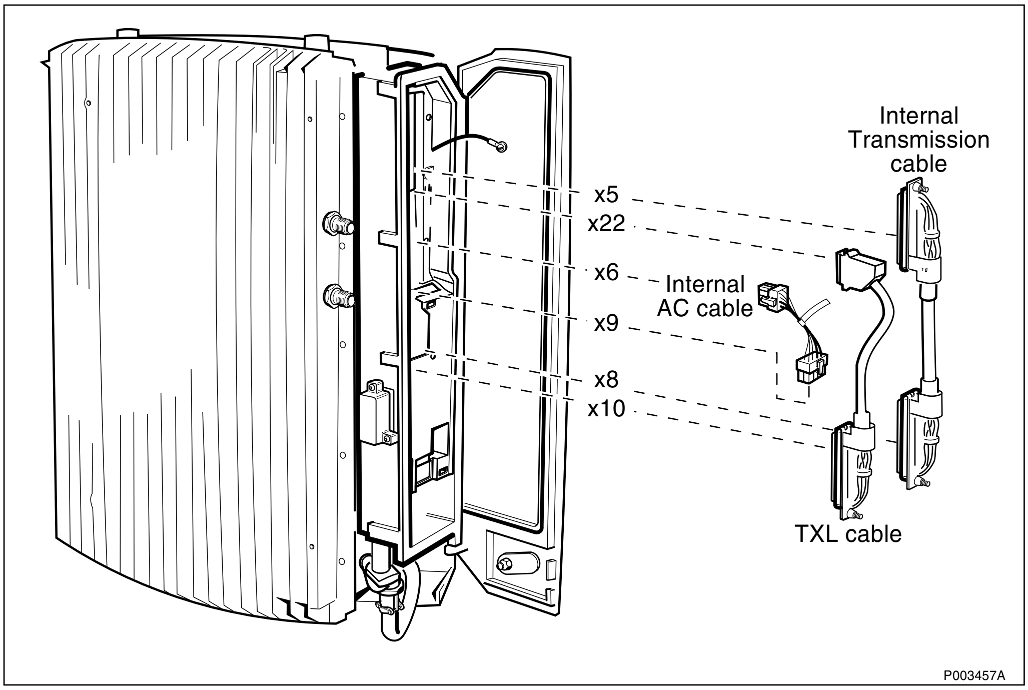


Figure 313 Internal cables

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.

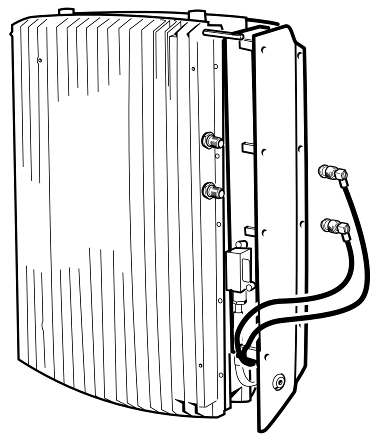


Figure 314 Disconnecting the antenna cables

Note: Make sure that all cables are properly labelled before disconnecting them.

7. If an external antenna is used, disconnect the antenna cables from the radio cabinet.

   If a multicasting box is mounted under the radio cabinet, remove the box from the radio cabinet according to *Section 12.5.8 on page 321*.

   If an omnidirectional antenna is mounted under the radio cabinet, remove the antenna according to *Section Replacing the Omnidirectional Antenna on page 318*.

   If a sector antenna is mounted on the radio cabinet, remove it according to *Section Replacing the Sector Antenna on page 317*.

8. Remove the battery, *see page 323*or if the optional PBC is used, remove the PSA according to *Section 12.5.12 on page 331*.

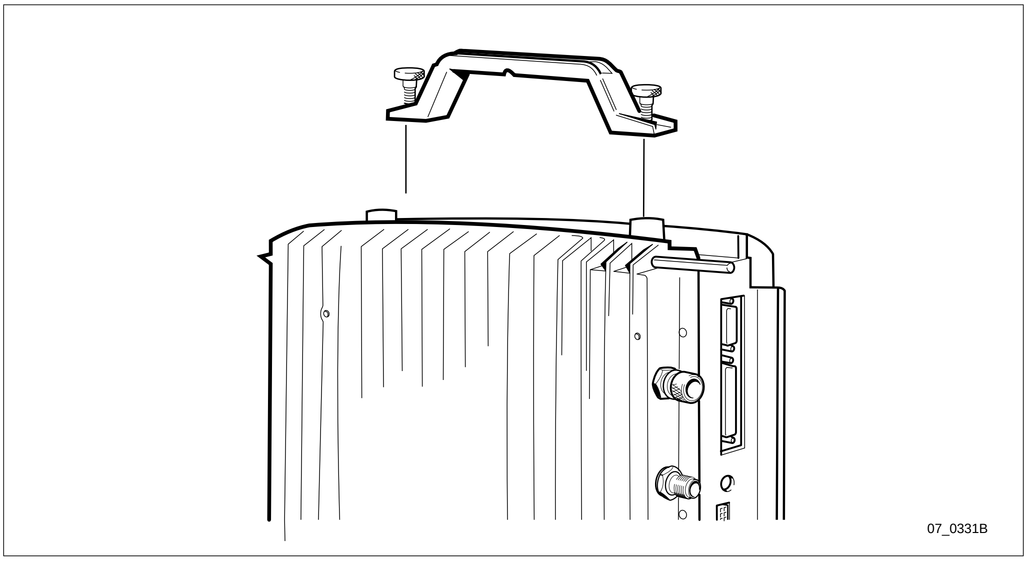


Figure 315 Mounting the handle

9. If the lifting device is used, attach the handle to the cabinet.

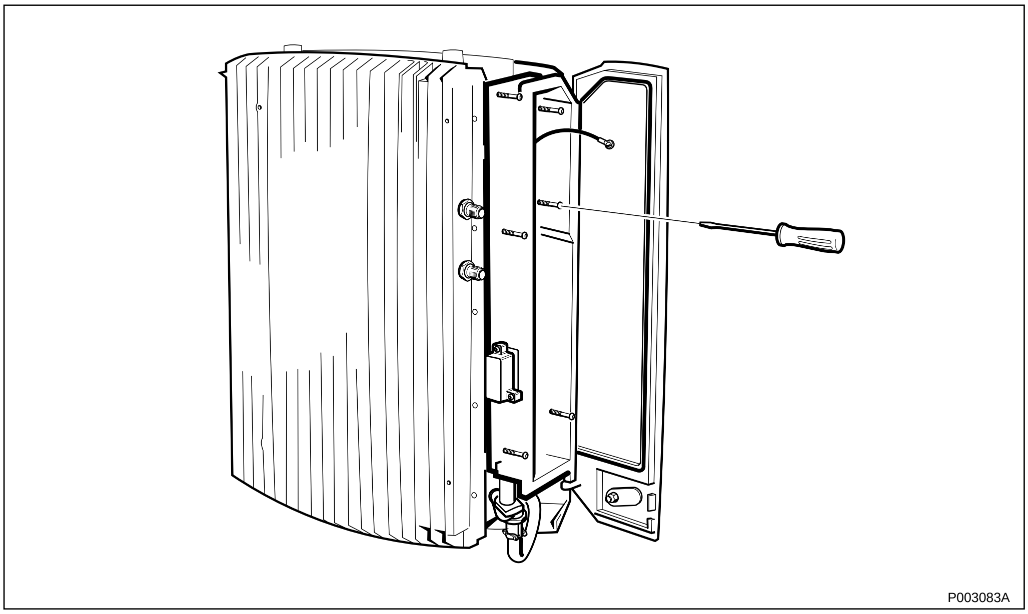


Figure 316 Loosening the installation box

10. Unscrew the six torx screws in the installation box.

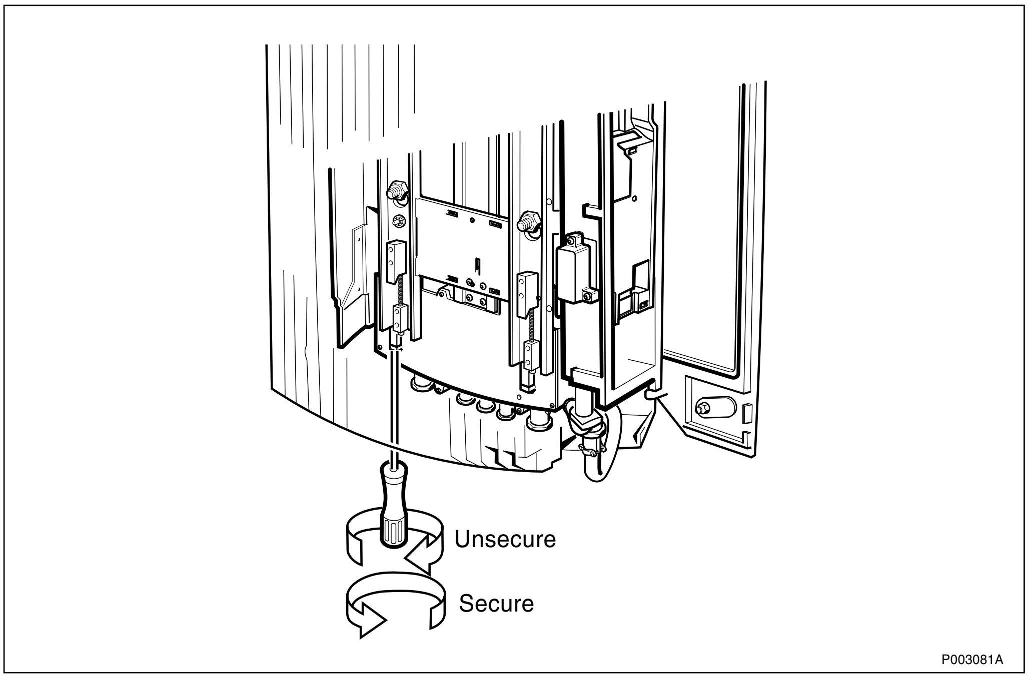


Figure 317 Unscrewing the locking device

11. 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.

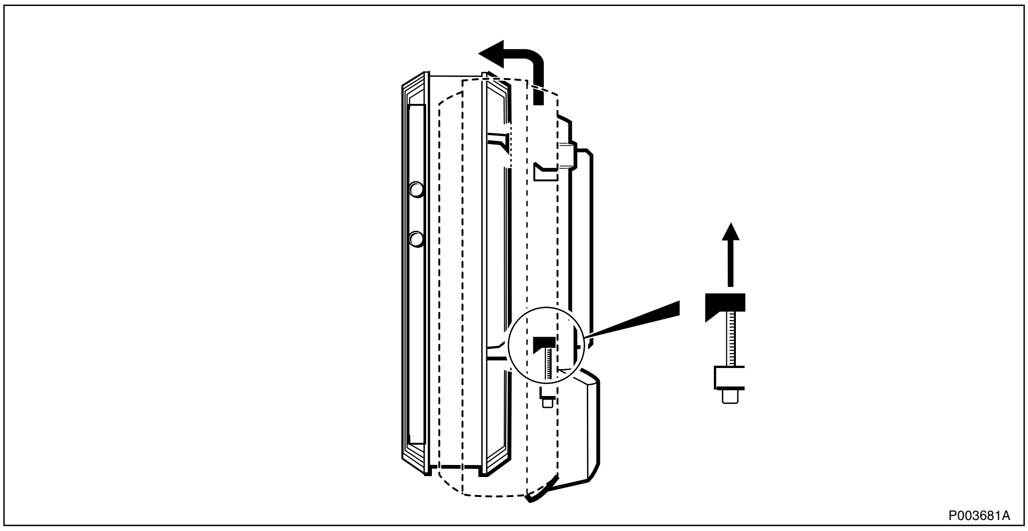


Figure 318 Unhooking the radio cabinet

12. Grip the bottom of the radio cabinet and pull it outwards.
13. Unhook the RBS by lifting the RBS upwards.
14. Mount the new radio cabinet, *see chapter Installation of RBS 2302*.
15. Remount the battery or PSA.

Set to Operation

Perform the start up sequence as described on *page 301*.

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 12.9 on page 391*.

12.5.12 PSA (if Applicable)

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

Replacing the PSA

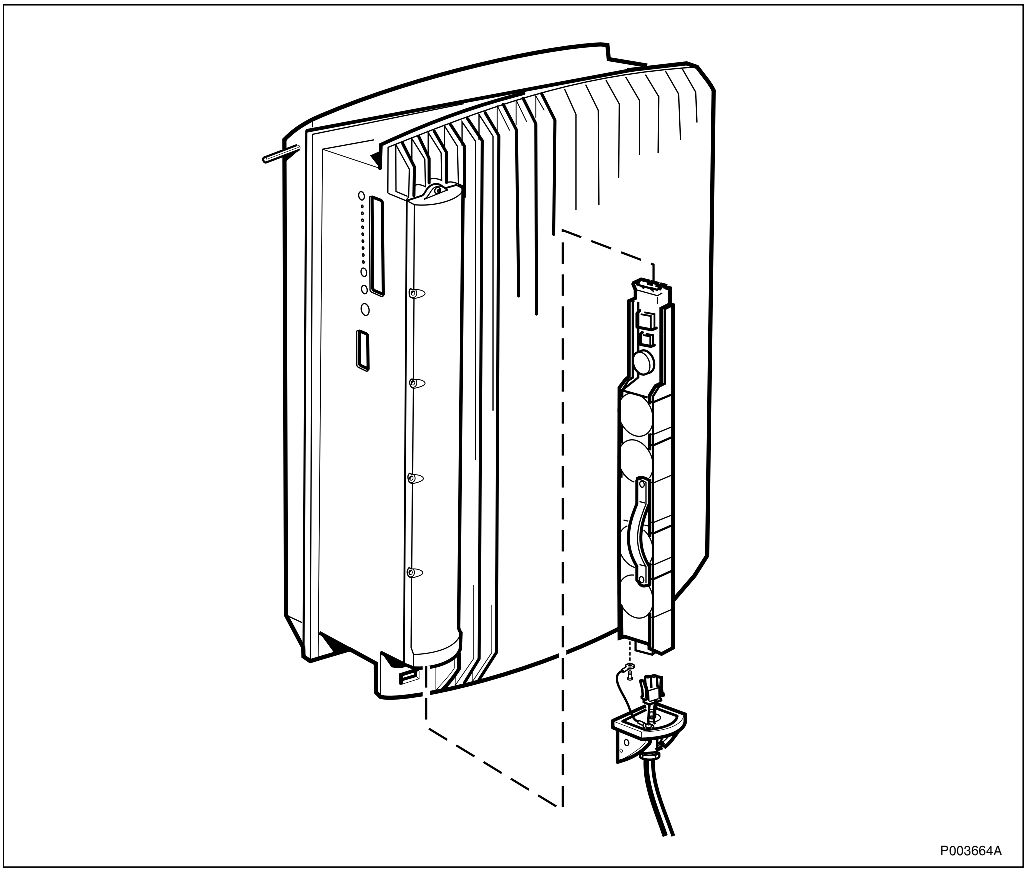


Figure 319 Replacing the PSA

1. Open the internal RBS battery compartment cover 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

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

1. Perform a battery backup test, *see chapter Site Installation Tests*.
2. Perform the checklist in *Section 12.9 on page 391*.

12.5.13 Fuses

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

Replacing the Fuses

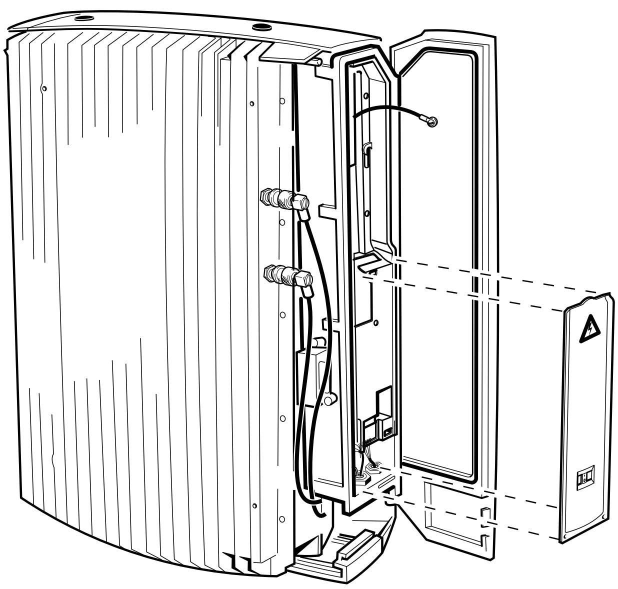


Figure 320 Removing the outer protective cover

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

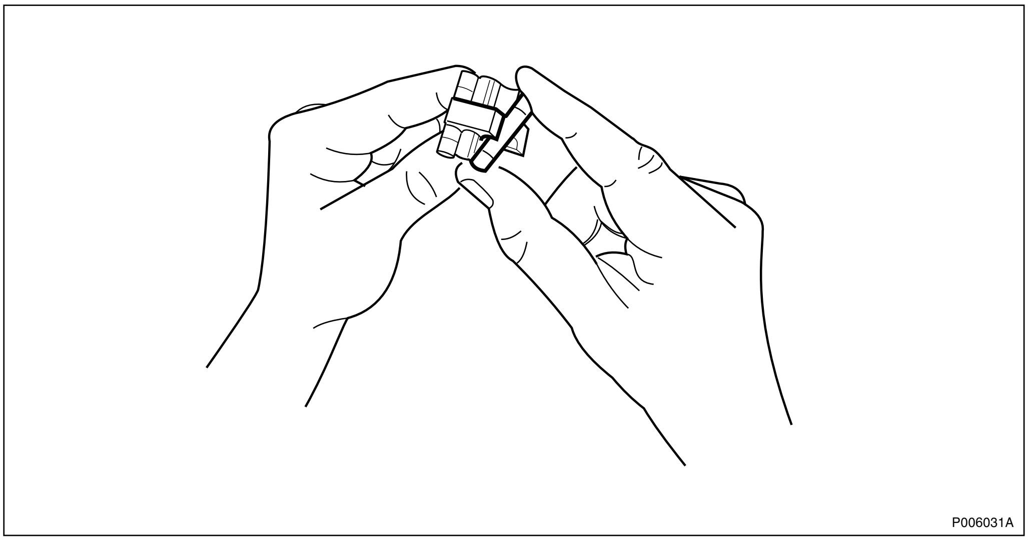


Figure 321 Snapping the fuses into position

2. Remove the fuseholder and replace the faulty fuses with new fuses. Make sure that the correct fuses are used, *see table below*.

Table 85 Fuses

Voltage	Fuses Data	Dimension
100-127 V AC	Ceramic Slow Blow 8 AT, 250 V (1)	6.3x32 mm
200-250 V AC	Ceramic Slow Blow 6.3 AT, 250 V (1)	5x20 mm

(1) Fuse according to standard EN 60127.

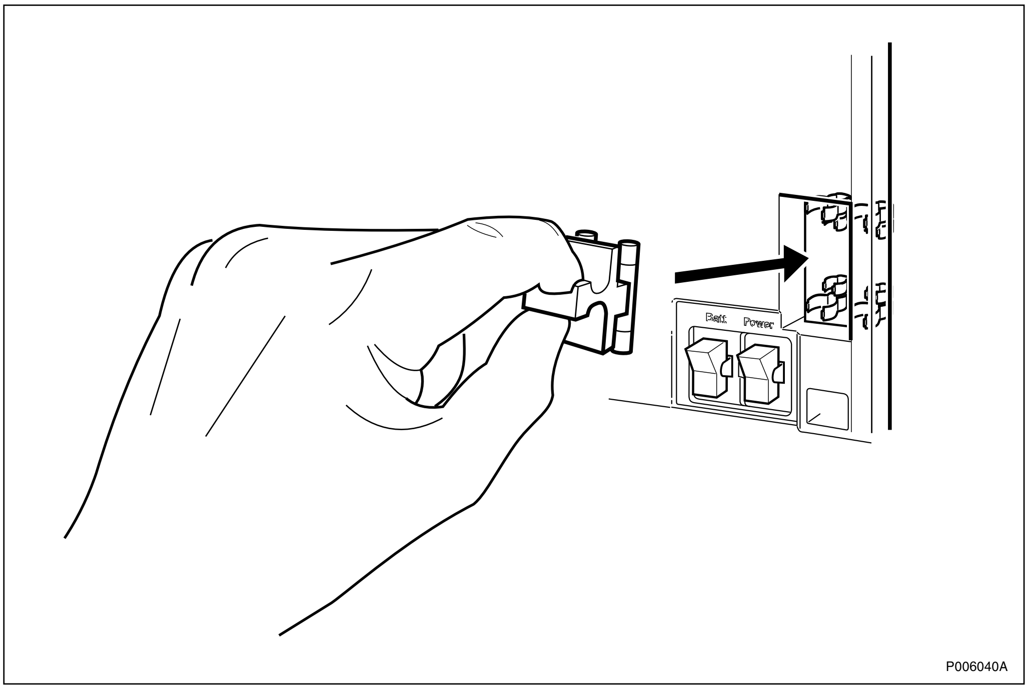


Figure 322 Snapping the fuseholder into position

3. Snap the fuseholder back into position.

4. Remount the outer protection cover.

Set to Operation

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.5.14 Connection Board

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

Replacing the Connection Board

CAUTION

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

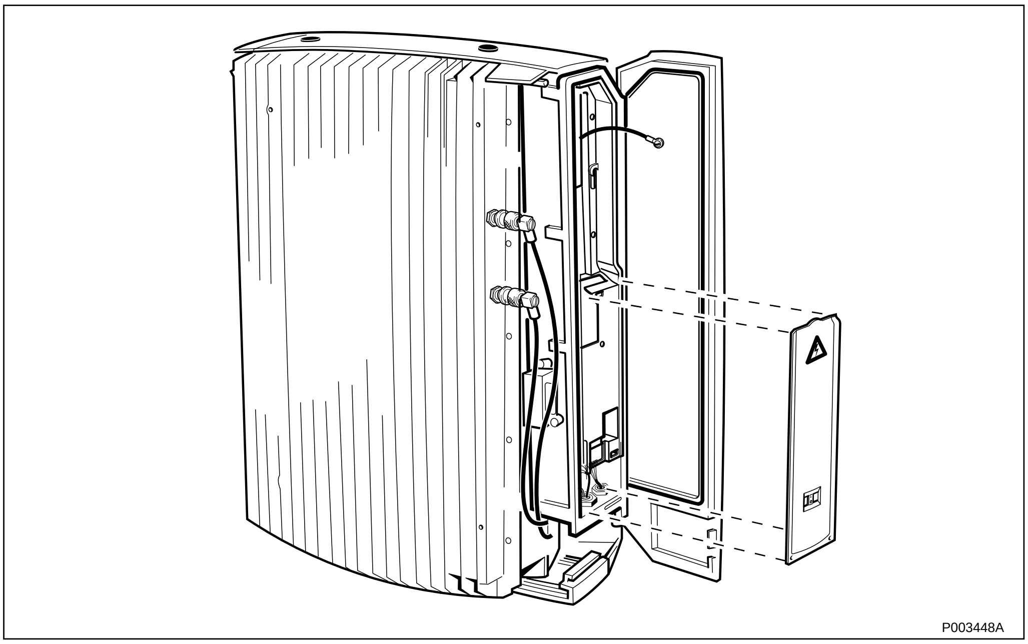


Figure 323 Removing the outer protective cover

1. Remove the outer protective cover by unsnapping it.

2. Connect the ESD wrist strap to the ESD connection point in the installation box.

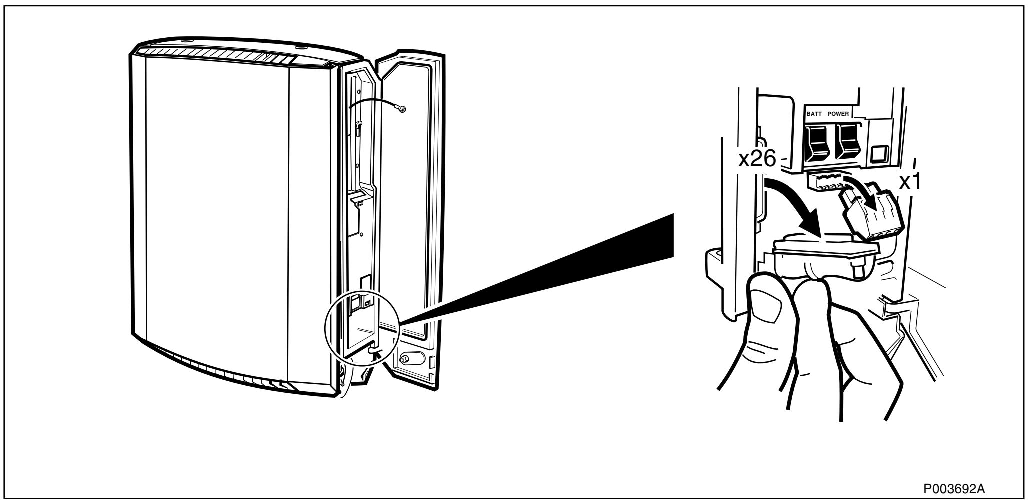


Figure 324 Disconnecting the transmission cable and AC cable

3. Disconnect the transmission cable and the AC cable from the interface box.

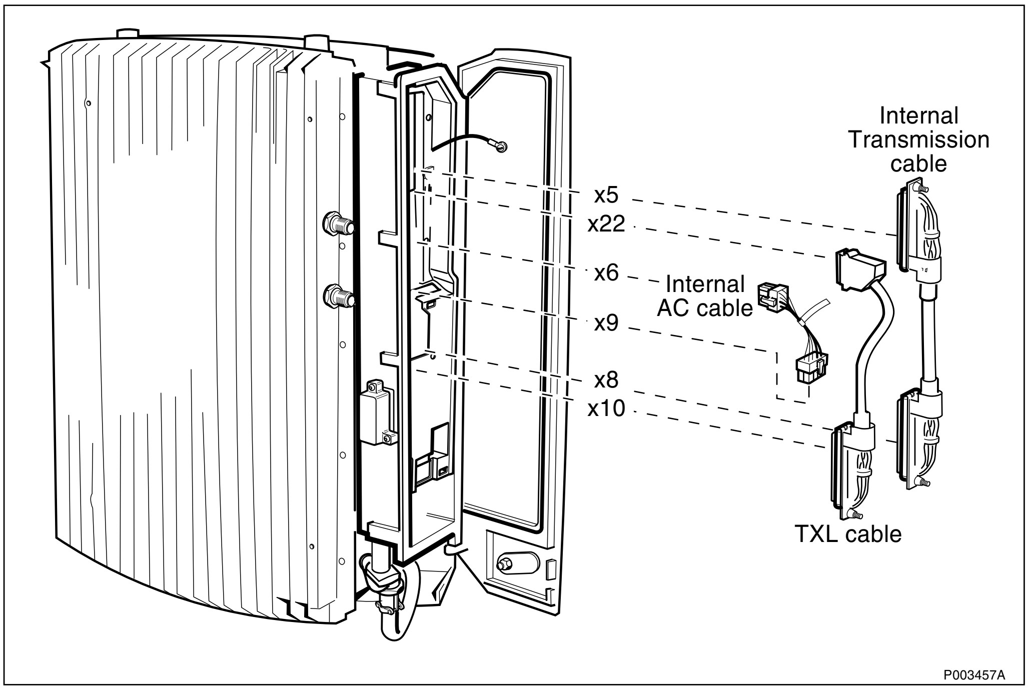


Figure 325 Disconnecting internal cables

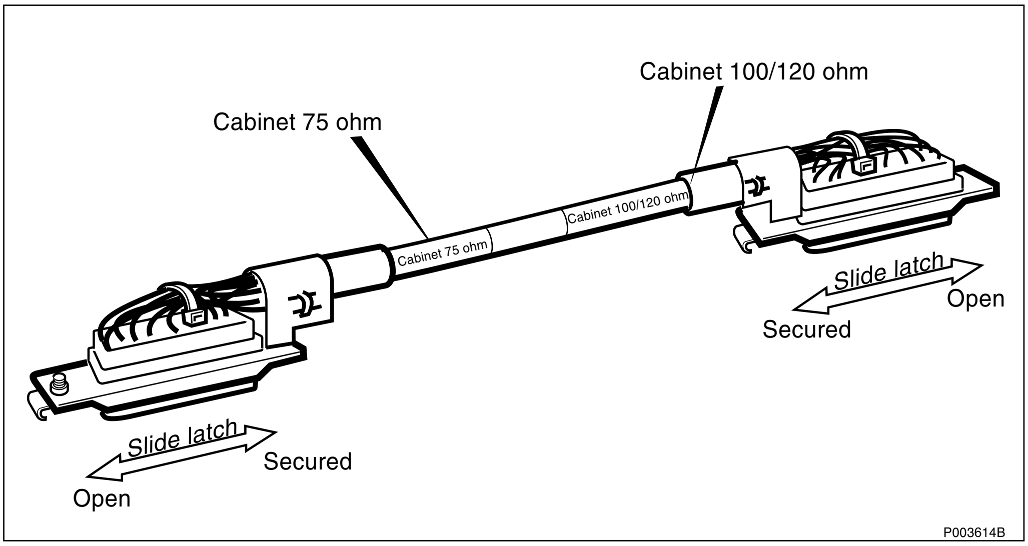


Figure 326 Internal transmission cable

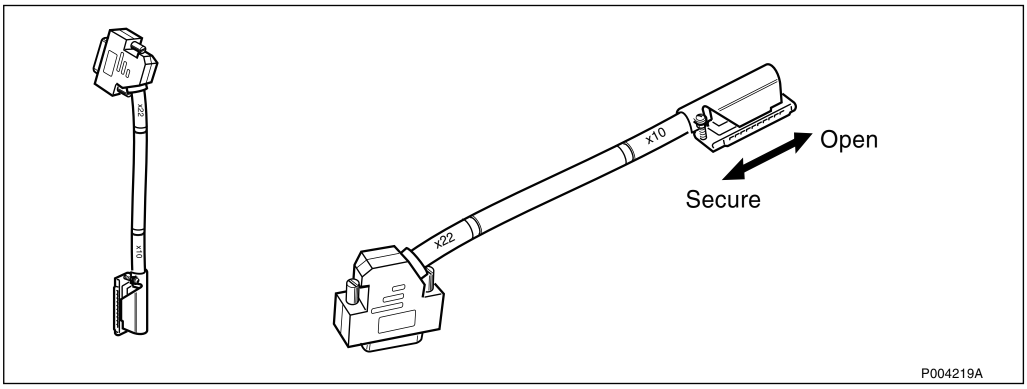


Figure 327 TXL cable

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.

5. Remove the fuseholder including the fuses.

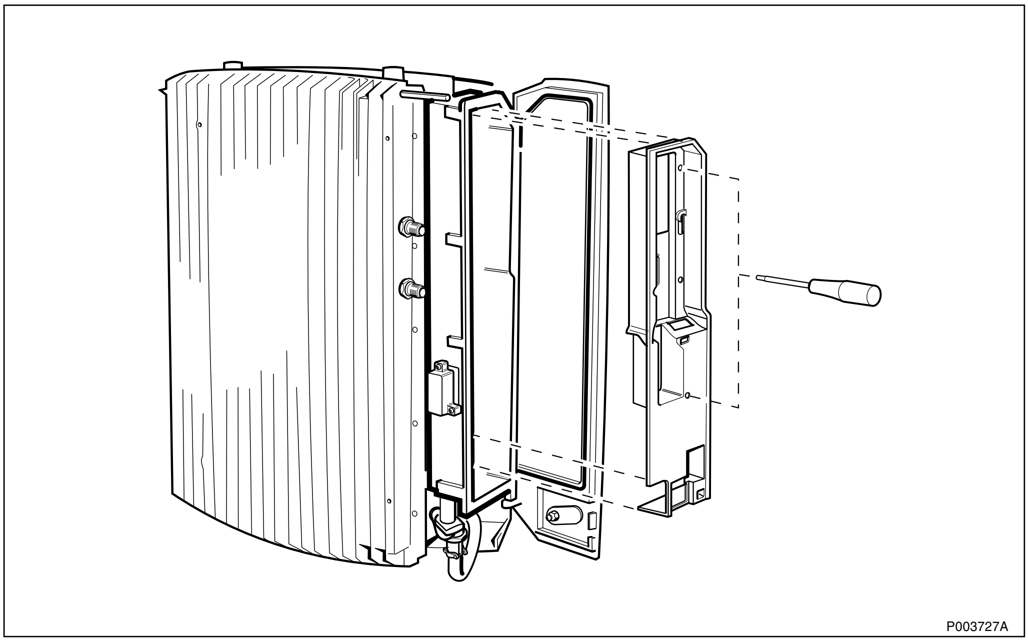


Figure 328 Removing the inner protective cover

6. Remove the inner protective cover by unscrewing the two torx screws.

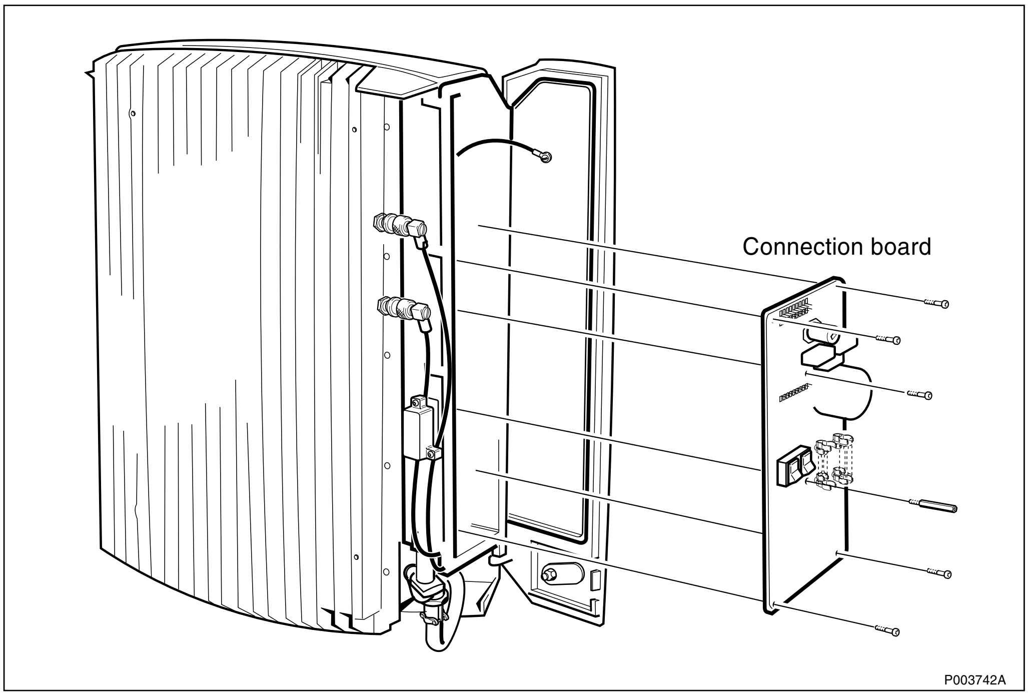


Figure 329 Removing the connection board

7. Unscrew the six screws and remove the connection board.

8. Mount the new board.

9. Make sure that the voltage selector is set for the correct voltage used at the site.

10. Mount the inner protective cover.

11. Remount the fuseholder including the fuses.
12. 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.

13. Reconnect the transmission cable and the AC cable to the interface box.
14. Remove the ESD wrist strap.
15. Remount the outer protective cover.

Set to Operation

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.5.15 Transmission Board

In order to maintain the transmission to BSC the Loop forward/backward board is needed during the replacement of the Transmission Board, *see chapter Tools and Instruments*.

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

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.

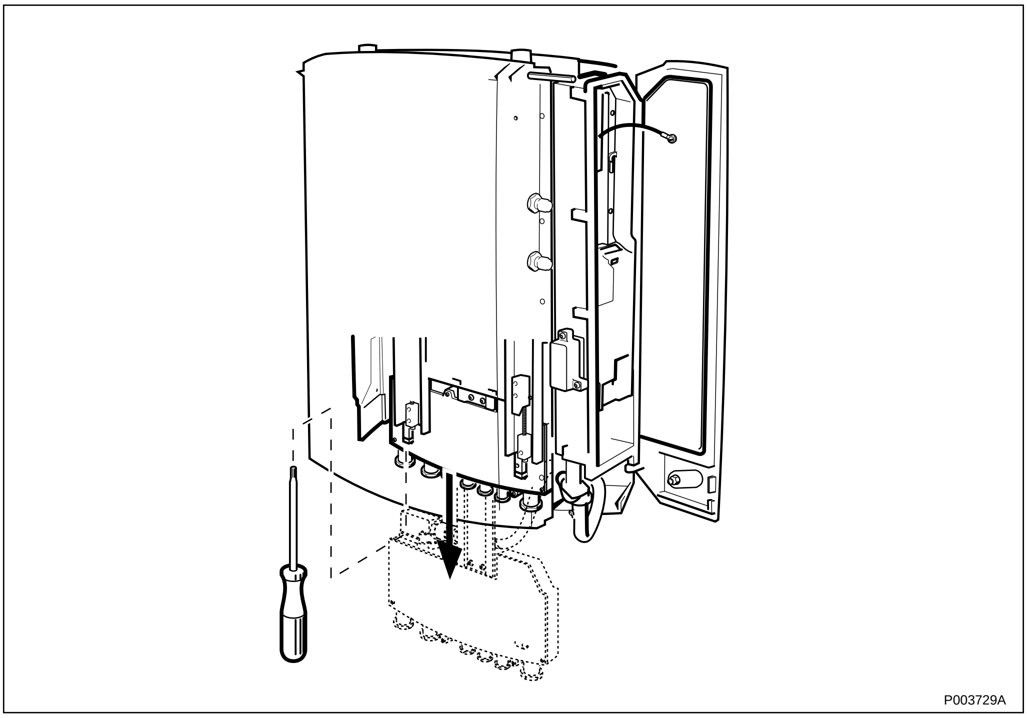


Figure 330 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

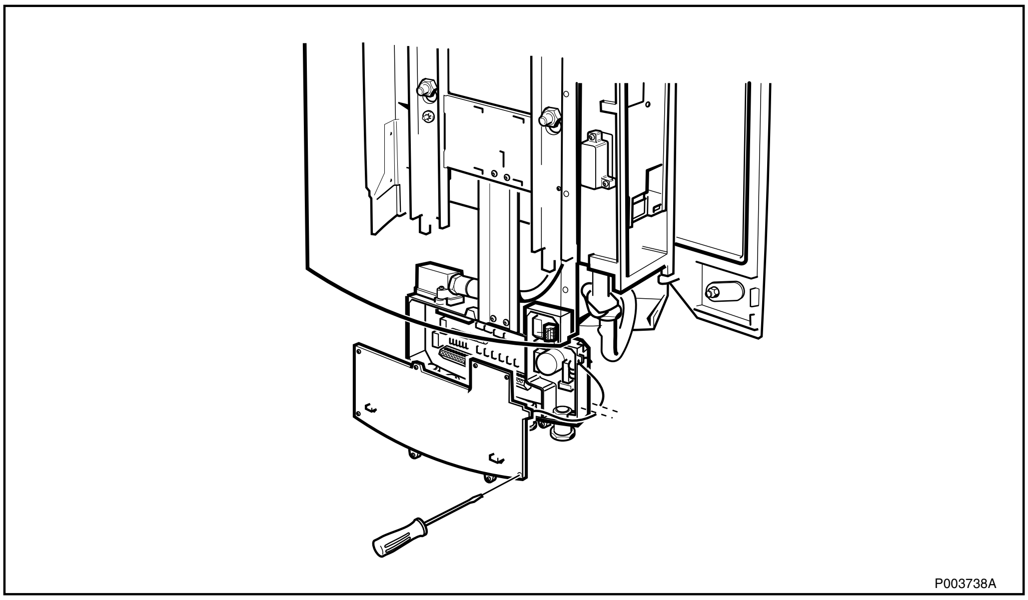


Figure 331 Loosening the interface box cover

2. Open the cover of the interface box by loosening the 8 torx screws.

3. Connect the ESD wrist strap to the ESD connection point in the interface box.

Note: You have ten seconds to perform *step 4 on page 340* 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.

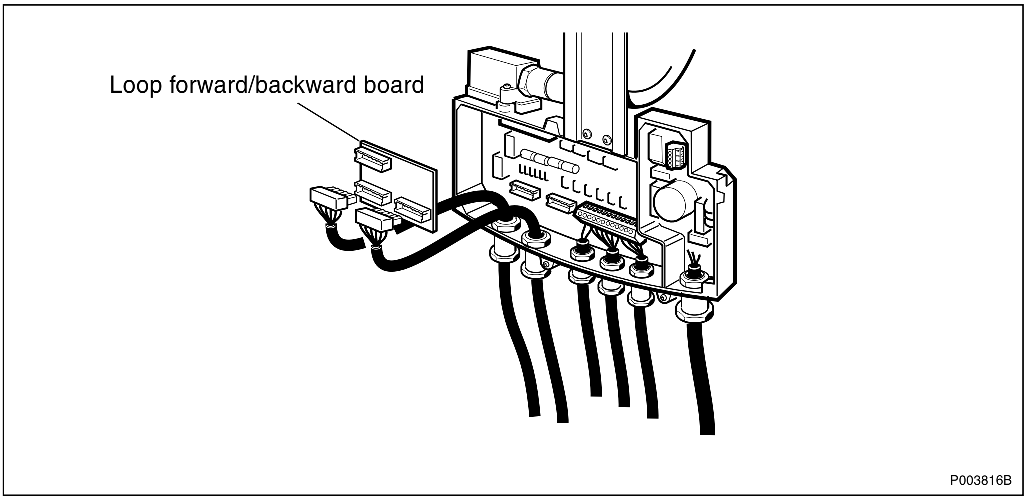


Figure 332 Mounting the Loop forward/backward board

4. Remove the connection terminal blocks for the PCM-lines and mount the Loop forward/backward board 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.

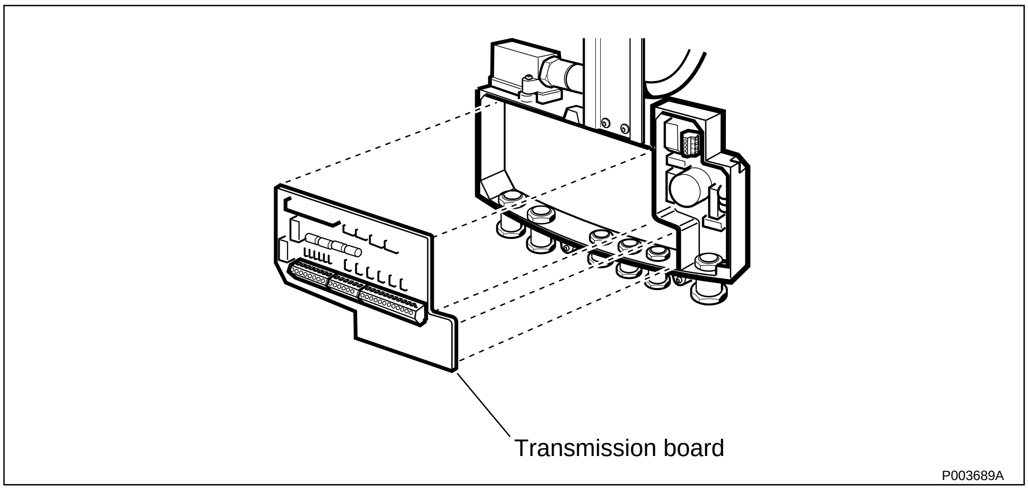


Figure 333 Loosening the transmission board

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 341*.

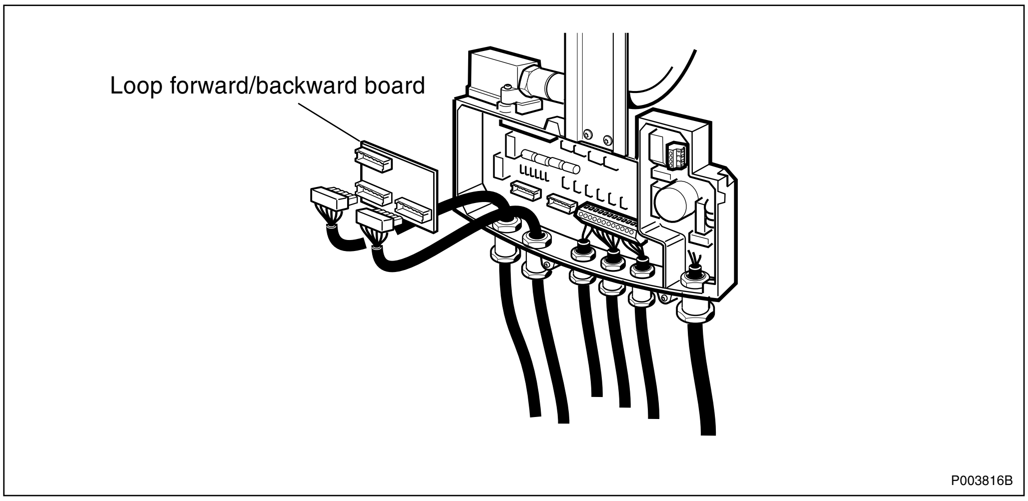


Figure 334 Disconnecting the Loop forward/backward board

12. Disconnect the Loop forward/backward board 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

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.5.16 AC Board

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

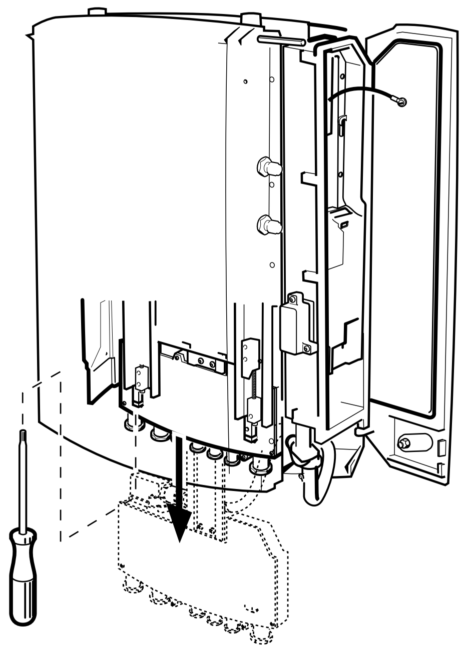
Replacing the AC Board

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.



P003729A

Figure 335 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

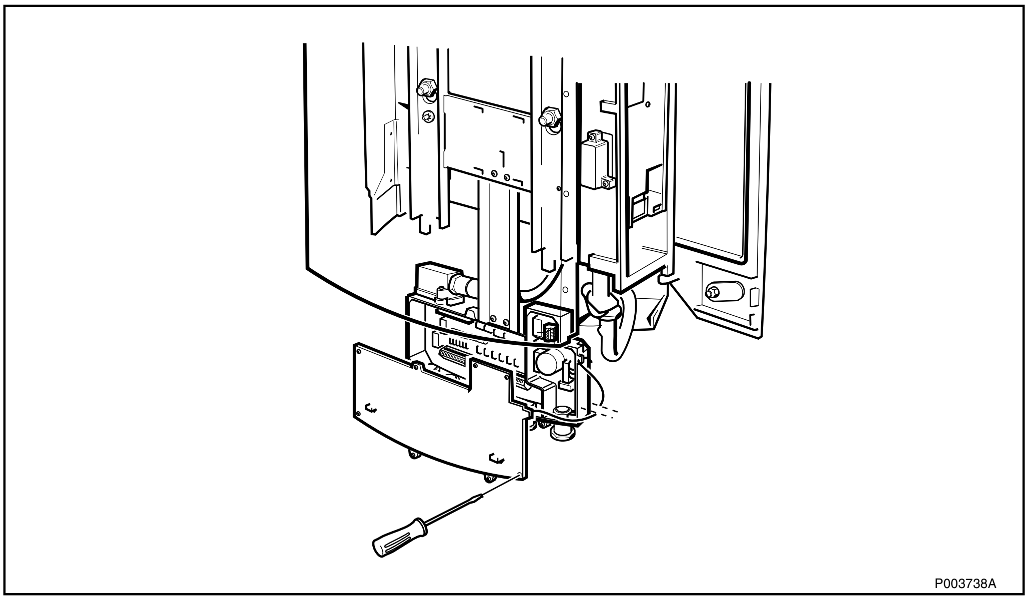


Figure 336 Loosening the interface box cover

2. Open the cover of the interface box by loosening the 8 torx screws.

3. Connect the ESD wrist strap to the ESD connection point in the interface box.

4. Remove the pull-relief clamp of the incoming AC cable.

5. Remove the connection terminal blocks connected to the AC board.

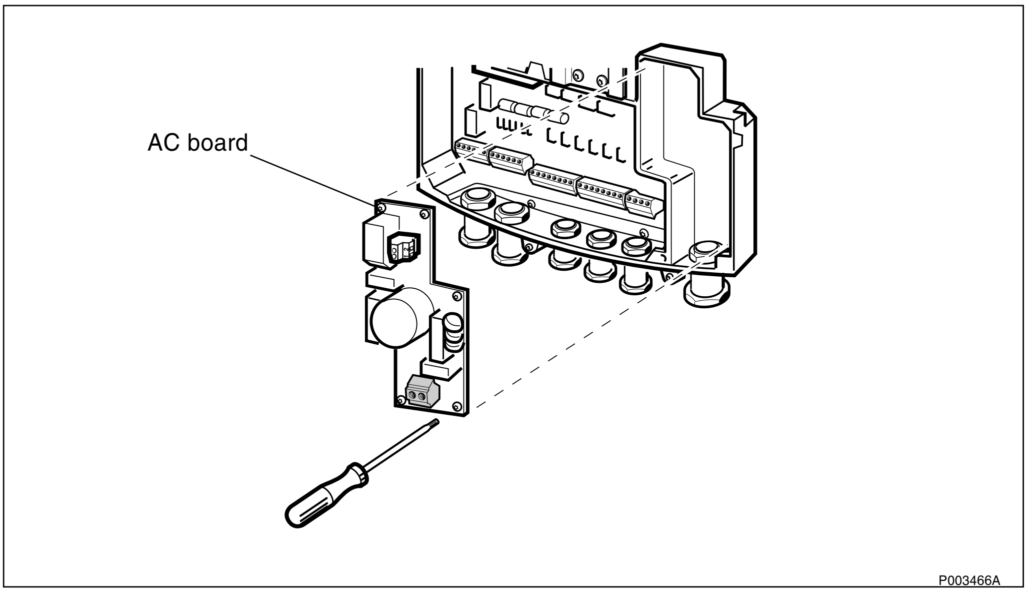


Figure 337 Removing the AC board

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

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.5.17 Mounting Base

In order to keep the transmission to BSC the Loop forward/backward board is needed during the replacement of the Mounting Base, *see chapter Tools and Instruments*.

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

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 326*.

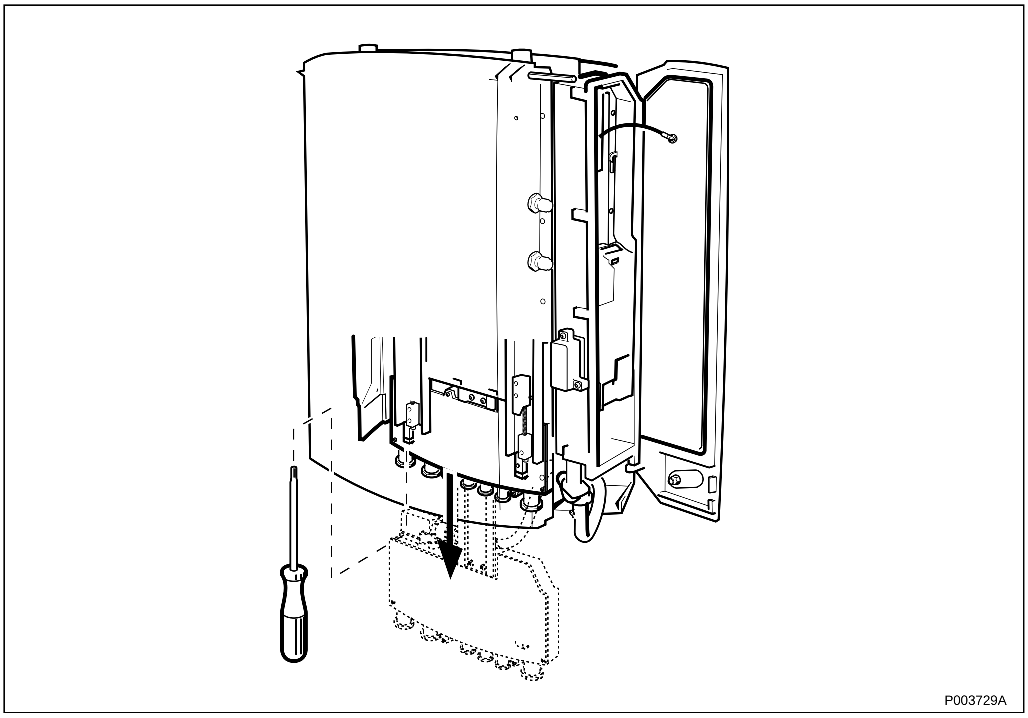


Figure 338 Loosening the interface box

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.
5. Connect the ESD wrist strap to the ESD connection point in the interface box.

Note: You have ten seconds to perform *step 6 on page 347*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.

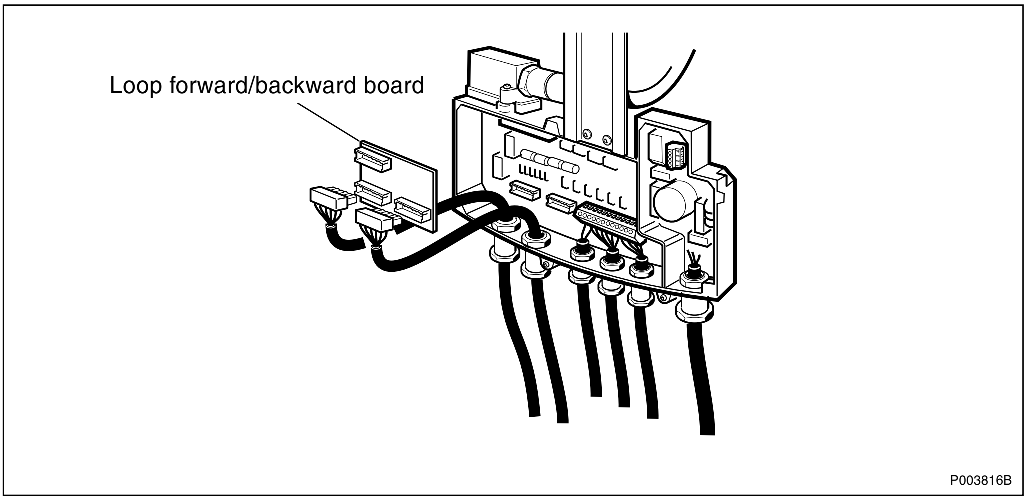


Figure 339 Connecting the Loop forward/backward board

6. Remove the connection terminal blocks for the PCM-lines and mount the Loop forward/backward board on the two PCM terminal blocks.
7. Remove all remaining terminal blocks, including the AC terminal block.

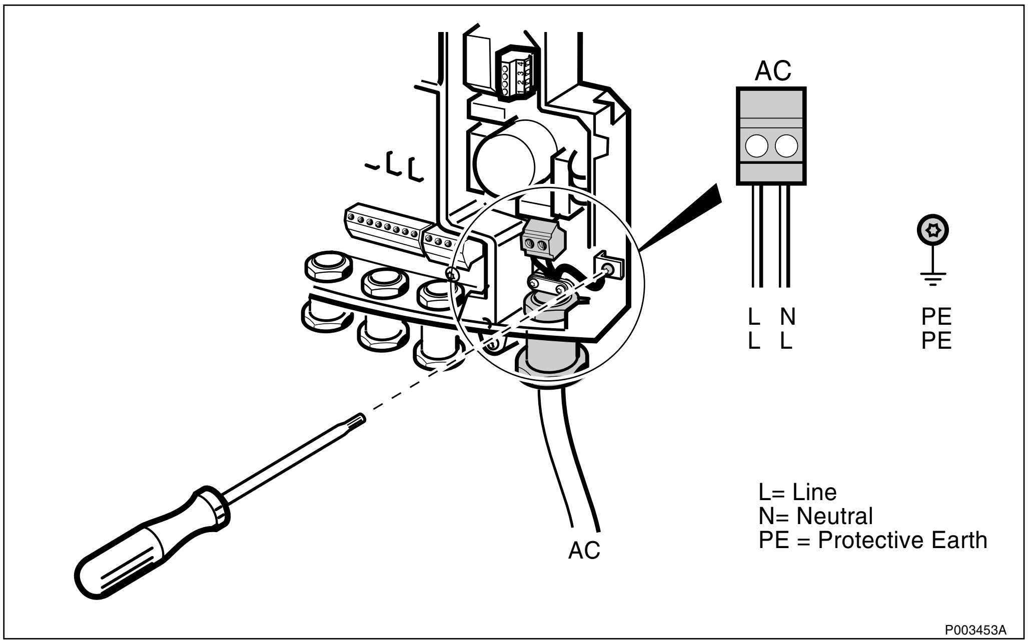


Figure 340   Loosening the Protective Earth in the AC section of the interface box

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.

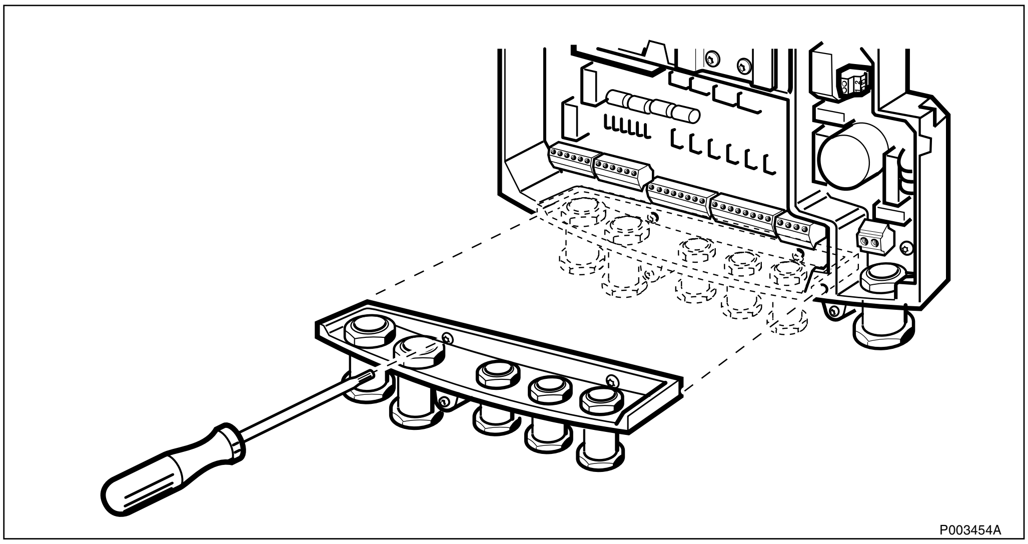


Figure 341   Loosening the gland plate

12. Remove the gland plate by loosening the two torx screws.

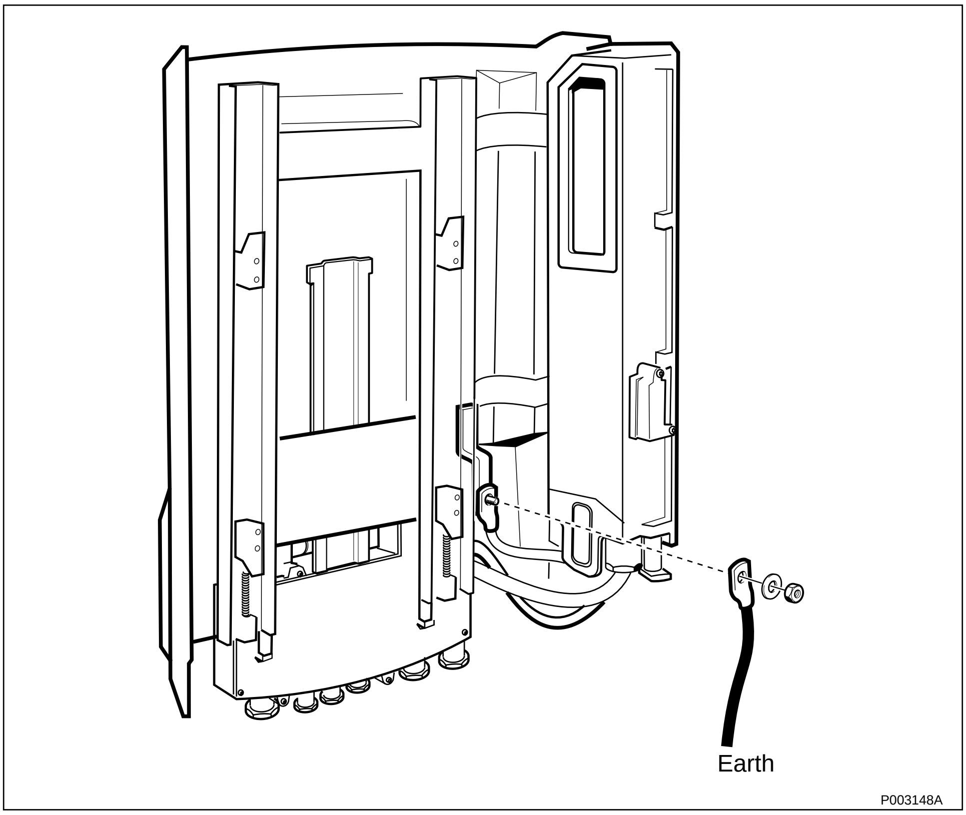


Figure 342 Remove the earth cable

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. Remove the ESD wrist strap.
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. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.
22. Open the cover of the interface box by loosening the 8 torx screws.
23. Loosen the gland plate of the new mounting base by loosening the two torx screws.
24. Connect the ESD wrist strap to the ESD connection point in the interface box.
25. Mount the old gland plate.
26. Insert the AC cable and connect the Protective Earth.

Note: You have ten seconds to reinstall the PCM terminal blocks, *see step 27 on page 349*.

27. Disconnect the Loop forward/backward board and remount the connection terminal blocks for the PCM line on the transmission board.
28. Remount the remaining connection terminal blocks.
29. Remount the cover of the interface box and tighten the screws.
30. Push up the interface box and secure it in the upper position with the two torx screws.
31. Remount the cabinet on the mounting base, *see chapter Installation of RBS 2302*.

Set to Operation

Perform the start up sequence as described on *page 301*.

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 12.9 on page 391*.

12.5.18 Internal Synchronization (if Applicable)

This calibration is only applicable on RBS 2302 with product no. KRC 161 31/90.

Note: It is not necessary to take the RBS out of service in order to perform the calibration.

Fault Localization

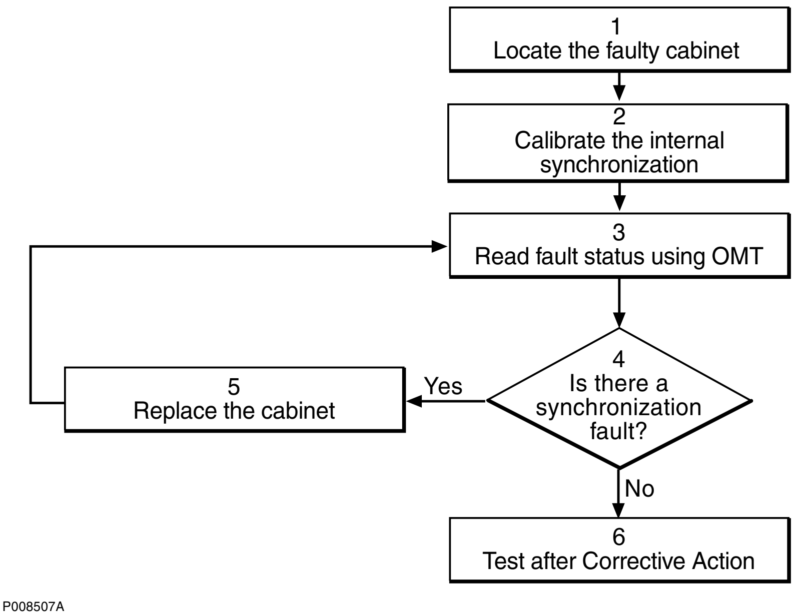


Figure 343 Internal Synchronization fault localization

1. Locate the faulty Radio cabinet, *according to the work order information.*
2. Calibrate the internal synchronization, according to instructions in *Section 12.7.7 on page 387*.
3. Read fault status using OMT.

   The red LED indicator labelled **Fault** on the distribution panel, indicates that one or more faults have been detected within the cabinet.

   Use OMT to display faults in the RBS and to monitor the cabinet. For more information on the use of OMT, *see:*

OMT User's Manual *LZN 302 01*

4. 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:

Table 86

If...	**then...**
alarm “Timing Unit VCO ageing” in the internal fault map class 2A or “Timing unit VCO fault” in the internal map class 1A is displayed in the OMT	1. Replace the cabinet according to instruction in *page 326*. 2. Repeat step 3.
no sync fault is found	1. Perform the recommended tests in tests in *Test after Corrective Action*.
other alarms are displayed in the OMT	1. Contact the supervisor or manager who will take further action, such as consulting the FSC.

Replacing the Cabinet

For information on how to replace the cabinet, *see page 326*.

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 12.9 on page 391*.

12.6 Corrective Action for the PBC

12.6.1 Sunshields

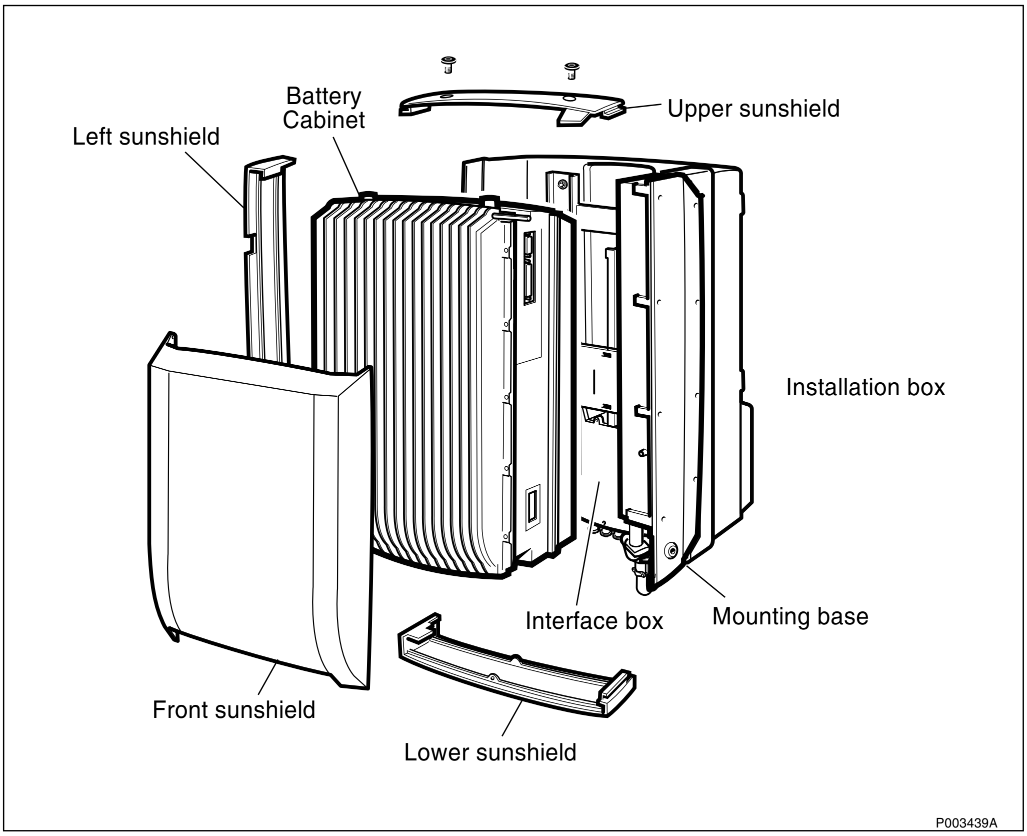


Figure 344 Sunshields overview

Replacing the Front Sunshield

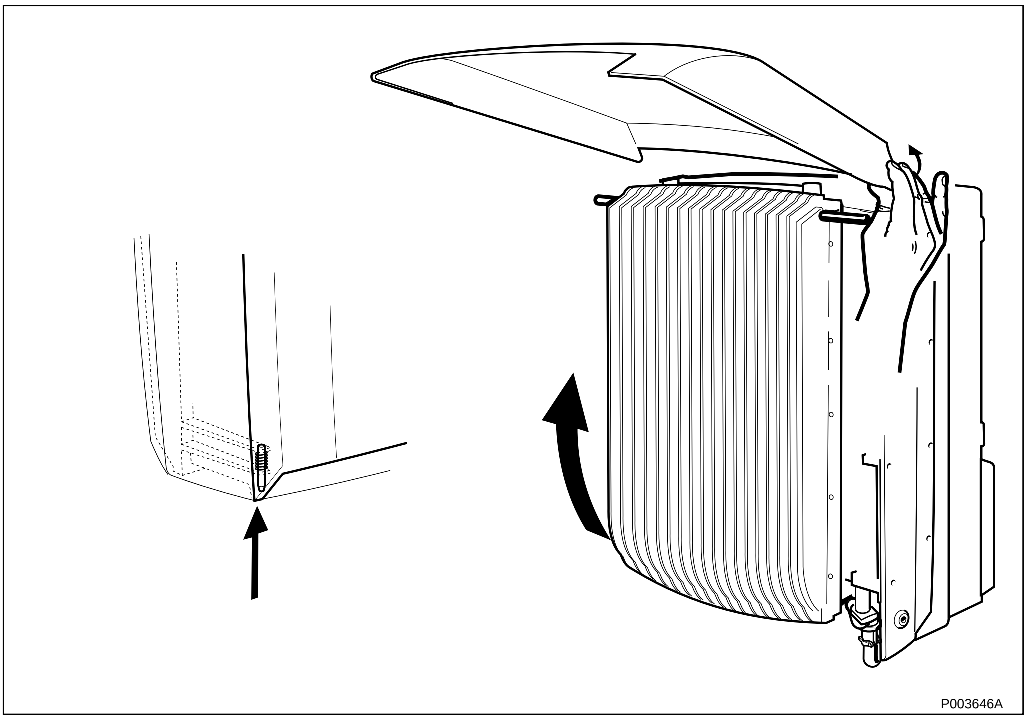


Figure 345 Replacing the front sunshield

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

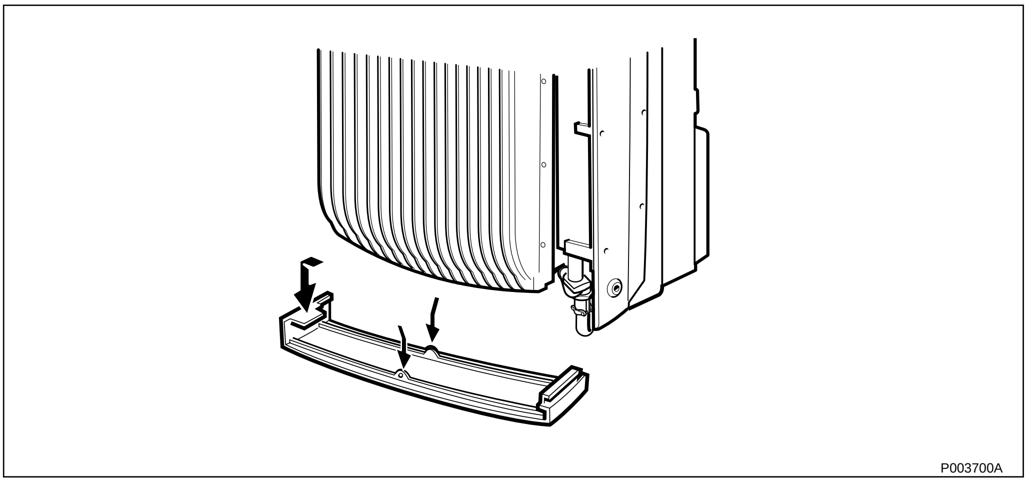


Figure 346 Replacing the lower sunshield

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

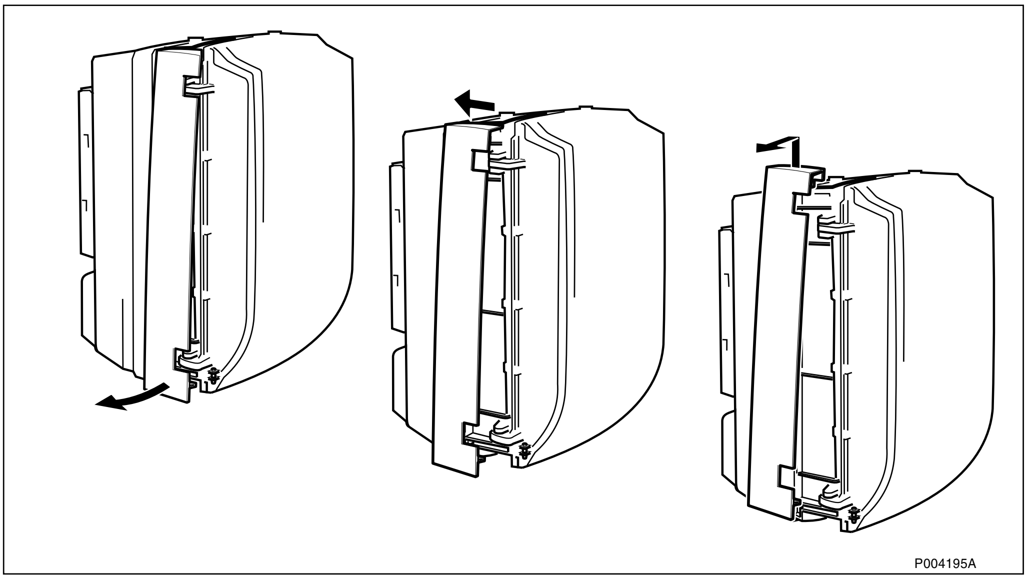


Figure 347 Replacing the left sunshield

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

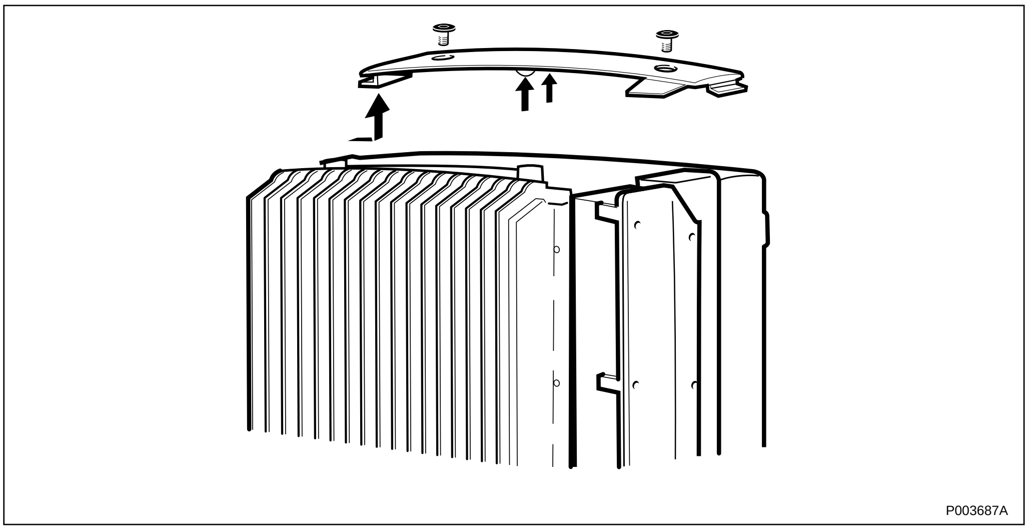


Figure 348 Replacing the upper sunshield

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

To replace the rear sunshield, the PBC must first be placed on the ground.

1. Perform the shut down sequence as described on *page 301*.
2. Remove the PBC sunshields (front, lower, left and upper).
3. Remove the cabinet, *see page 369*.

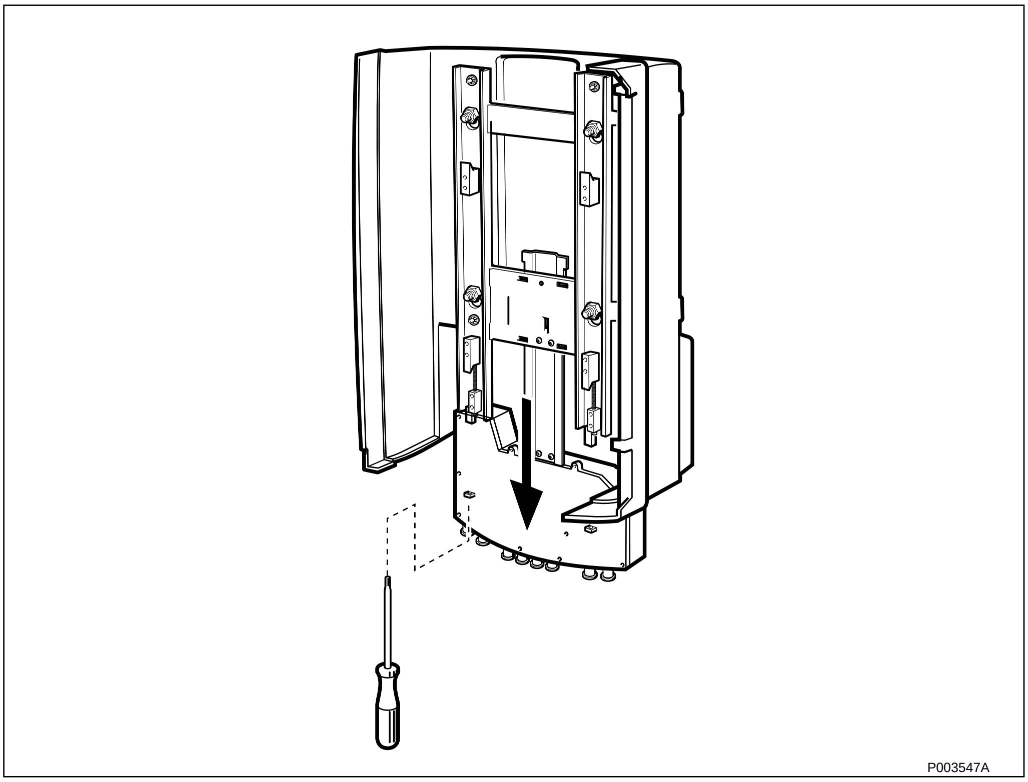


Figure 349 Releasing the interface box

4. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

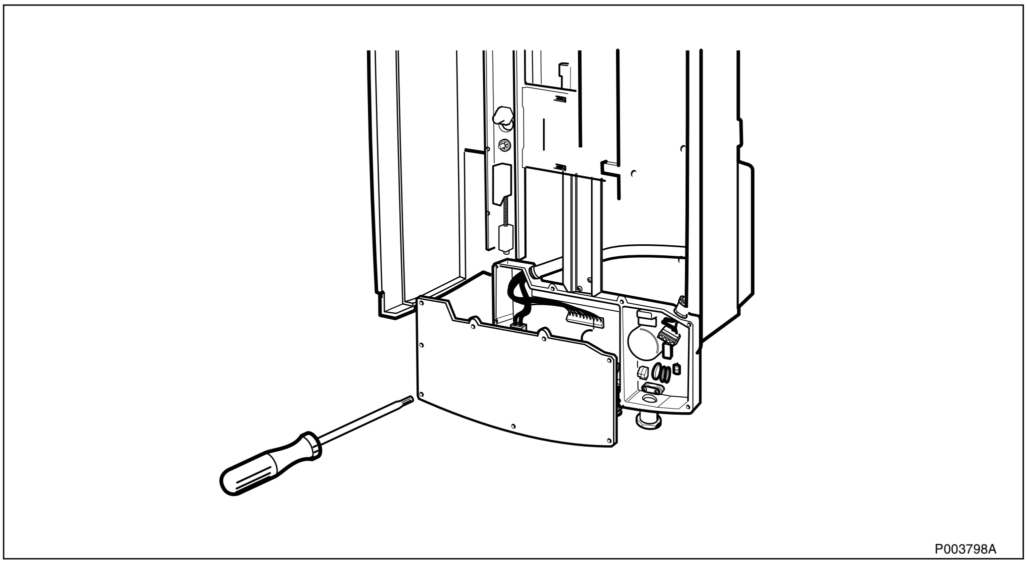


Figure 350 Loosening the interface box cover

5. Open the cover of the interface box by removing the 9 torx screws.
6. Connect the ESD wrist strap to the ESD connection point in the interface box.
7. Remove all connection terminal blocks.
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.

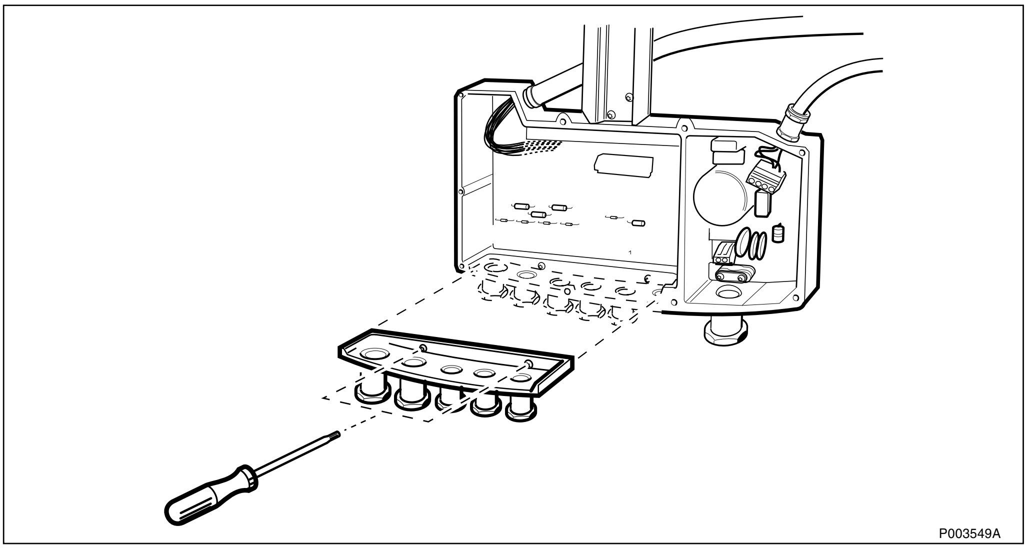


Figure 351 Loosening the gland plate

12. Loosen and remove the gland plate by unscrewing the two torx screws.

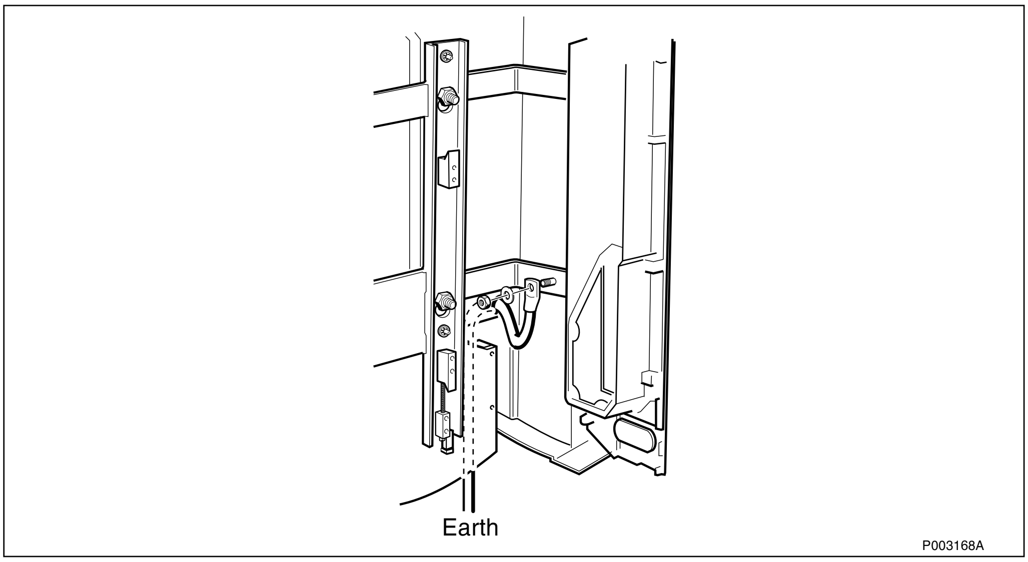


Figure 352 Removing the earth cable

13. Remove the earth cable on the mounting base.
14. Remove the ESD wrist strap.
15. Loosen the four nuts securing the mounting base.
16. Lift up the mounting base and pull it away from the wall bracket.
17. Place the mounting base on the ground.

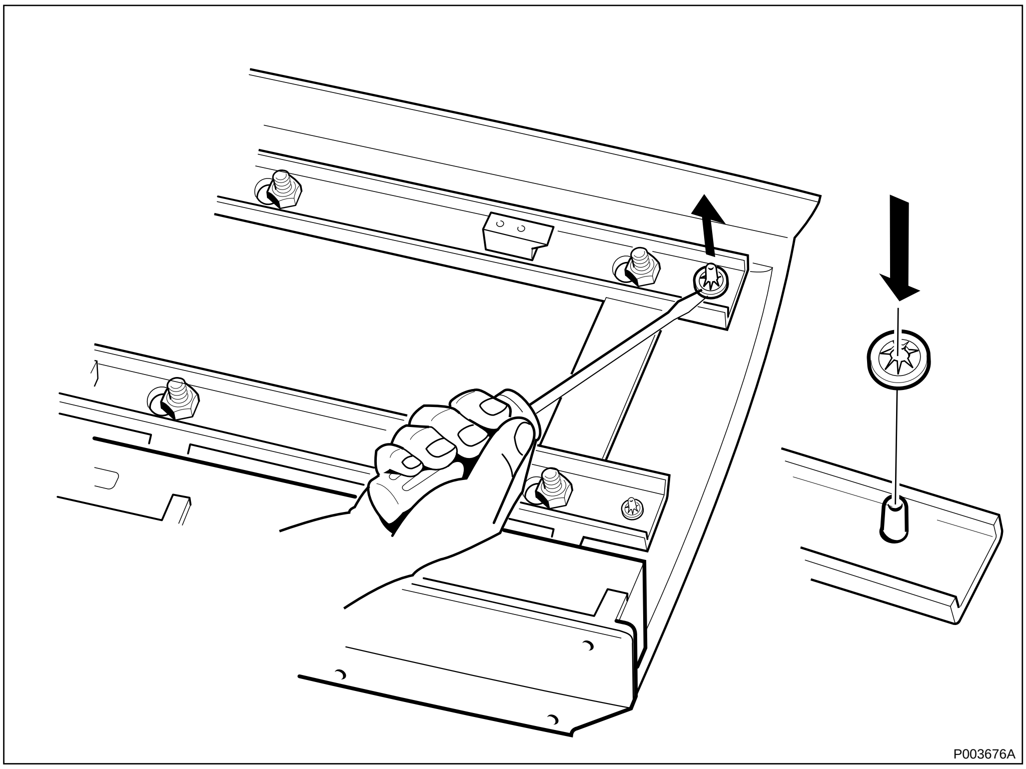


Figure 353 Removing locking washers

18. Remove the four locking washers with a screwdriver.
19. Separate the rear sunshield from the mounting base.
20. Mount the new rear sunshield and the new locking washers.
21. Remount the mounting base on the mounting plate.
22. Tighten the four nuts holding the mounting base.
23. Reconnect the earth cable to the PBC mounting base.
24. Connect the ESD wrist strap to the ESD connection point in the interface box.
25. Mount the gland plate and fasten the screws.
26. Insert the AC cable and connect the Protective Earth.
27. Mount the AC cable gland.
28. Remount the remaining connection terminal blocks.
29. Remove the ESD wrist strap.
30. Remount the cover of the interface box and tighten the screws.
31. Push up the interface box and secure it in the upper position with the two torx screws.
32. Remount the cabinet on the mounting base, *see chapter Installation of Power and Battery cabinet*.
33. Remount the batteries according to *page 365*.

Set to Operation

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.6.2 Batteries

Removing the Batteries

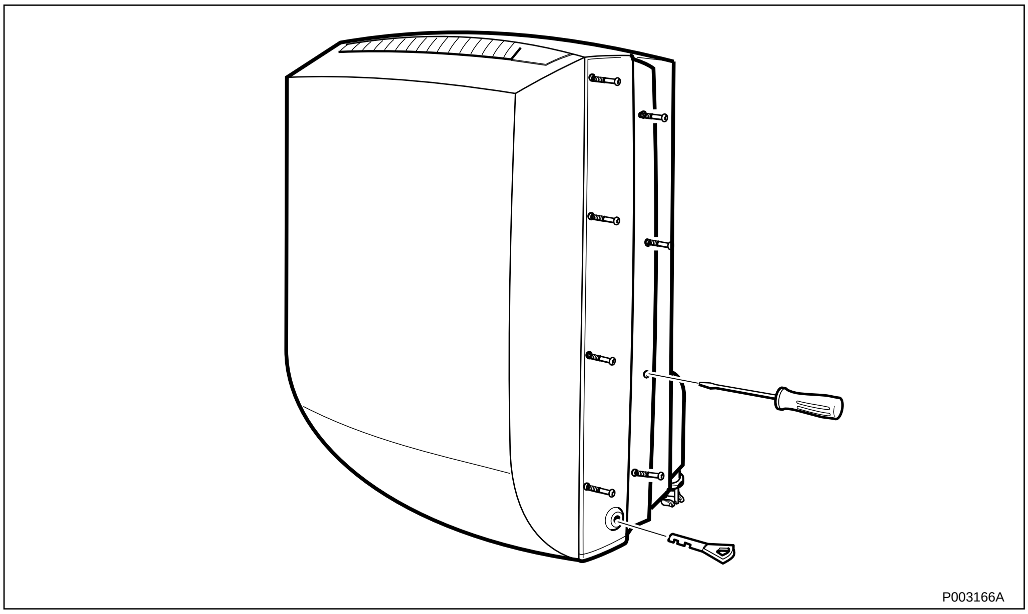


Figure 354 Opening the installation box door

1. Open the installation box door.

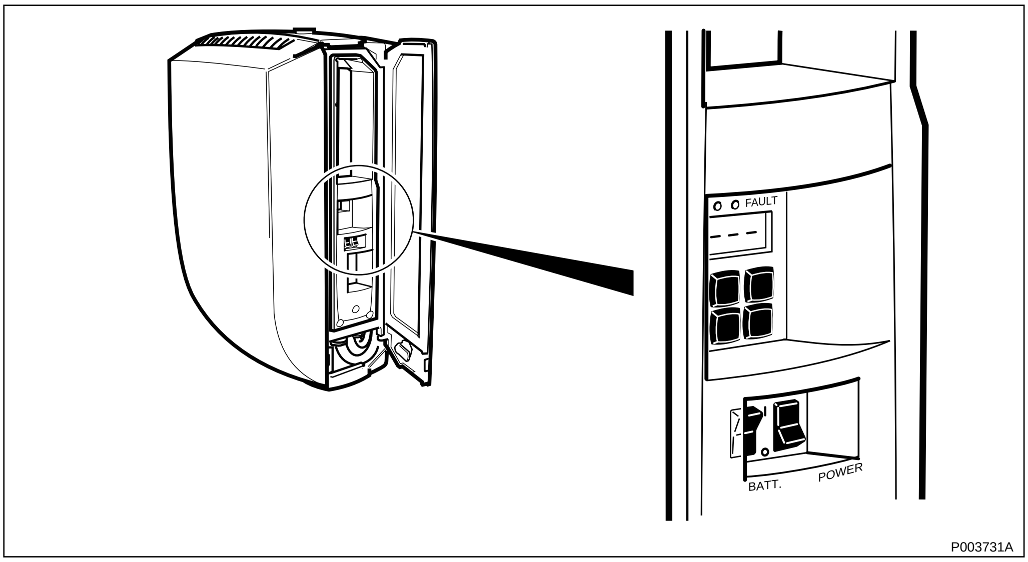


Figure 355 Battery switch

2. Switch off the battery switch.

3. Remove the front sunshield.

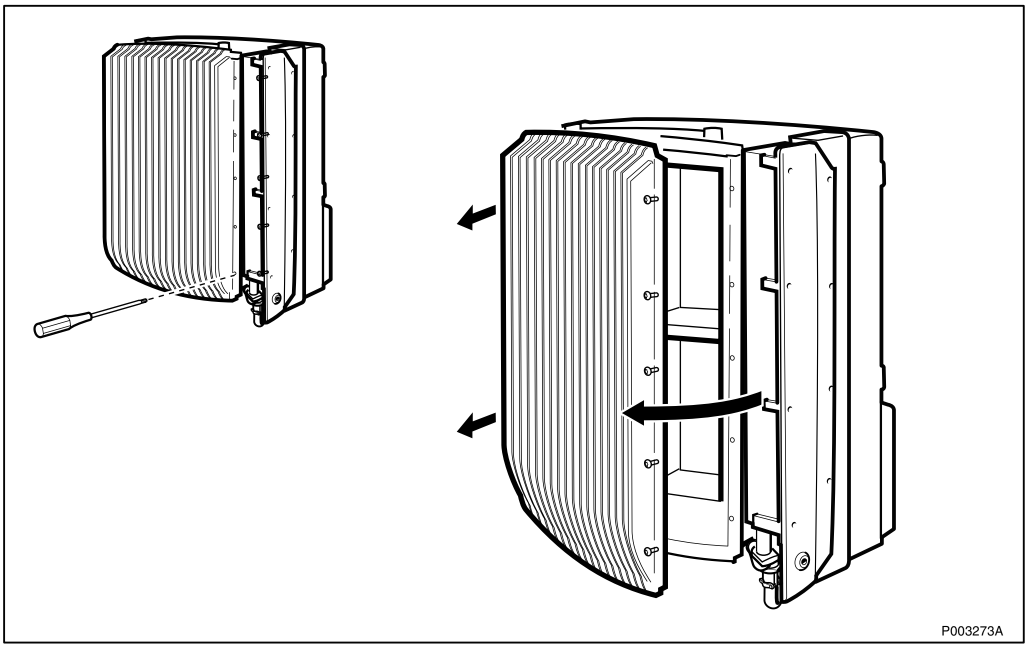


Figure 356 Opening the battery cabinet door

4. Open the Battery cabinet door by unscrewing the 18 torx screws. Make sure that the screws are disengaged.

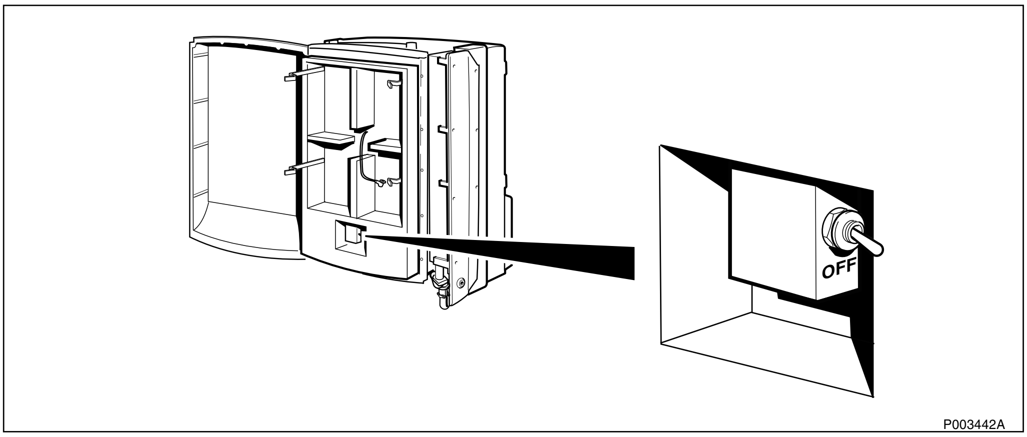


Figure 357 Automatic circuit breaker

5. Switch off the automatic circuit breaker.

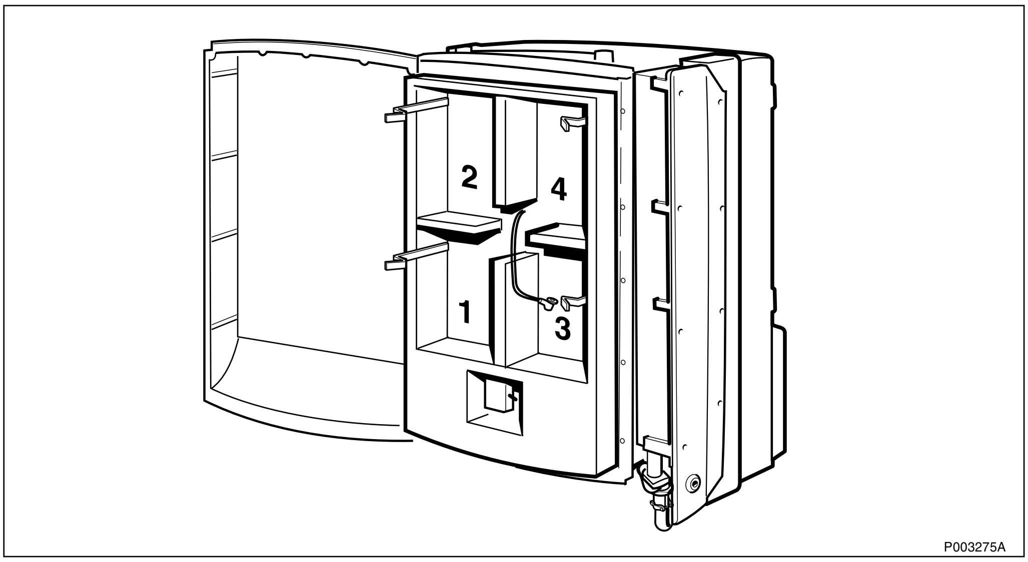


Figure 358   Battery position overview

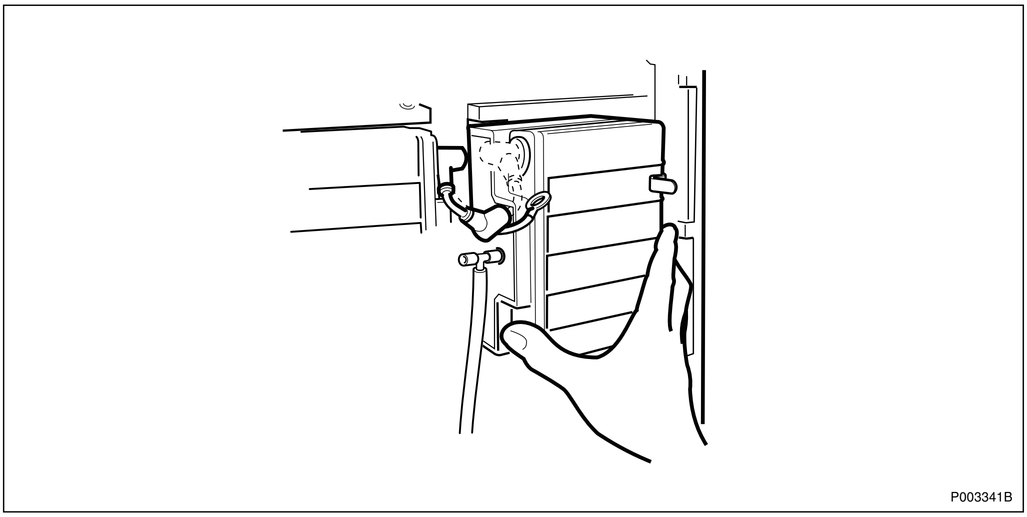


Figure 359   Disconnecting the plus-pole (+) of battery 4

6. Disconnect the battery jumper cable on the plus-pole (+) of battery 4.

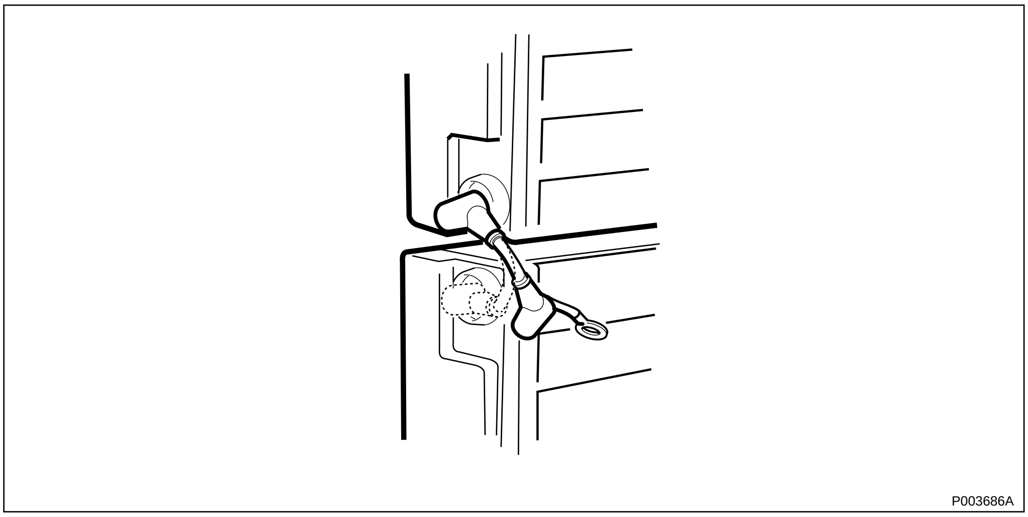


Figure 360 Disconnecting the plus-pole (+) of battery 3

7. Disconnect the battery jumper cable on the plus-pole (+) of battery 3, and remove battery 4.

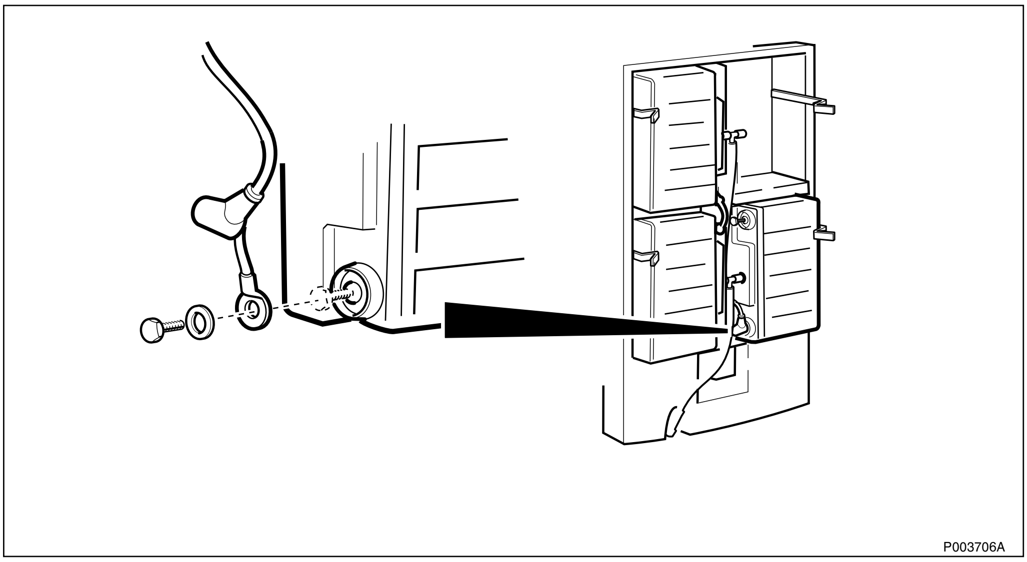


Figure 361 Disconnecting the minus-pole (-) of battery 3

8. Disconnect the minus-pole (-) of battery 3, and remove the battery.

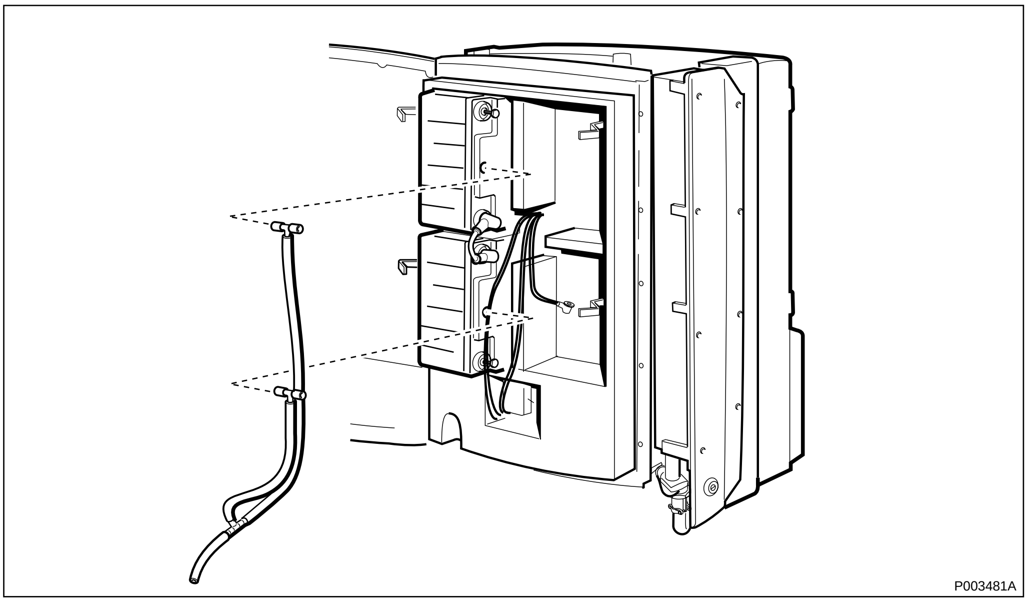


Figure 362 Removing the ventilation hoses

9. Remove the ventilation hoses from battery 1 and 2.

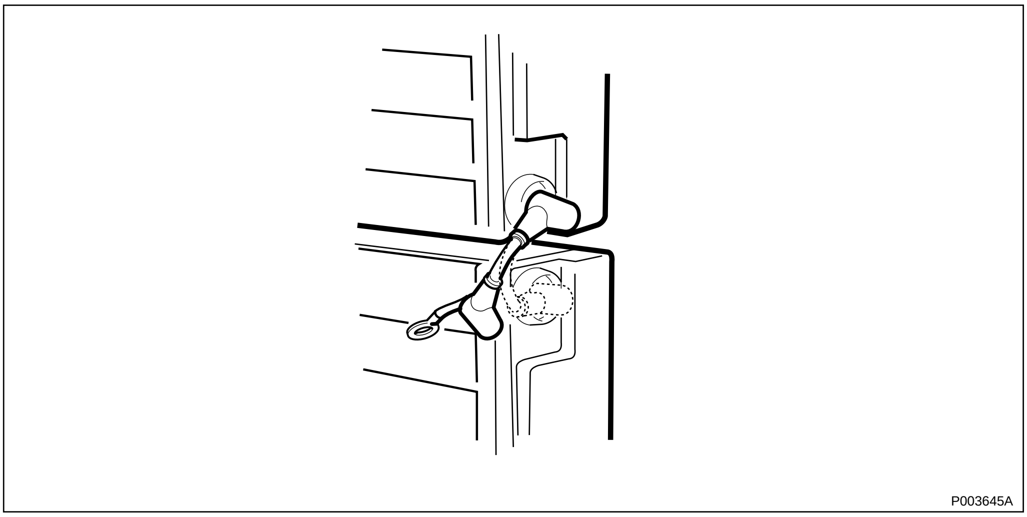


Figure 363 Disconnecting the minus-pole (-) on battery 1

10. Disconnect the battery jumper cable on the minus-pole (-) of battery 1, and remove battery 2.

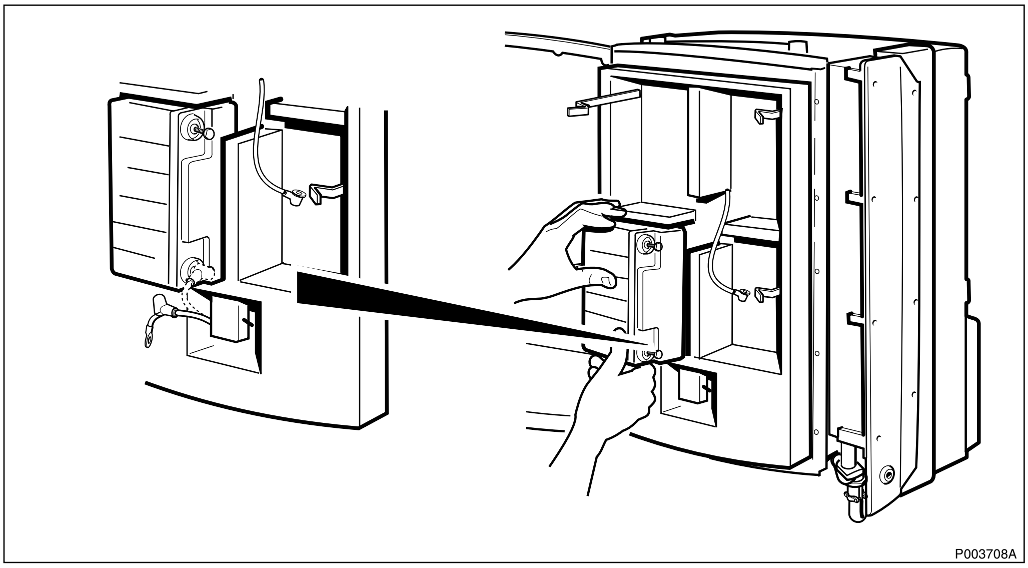


Figure 364 Disconnecting the plus-pole (+) of battery 1

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.

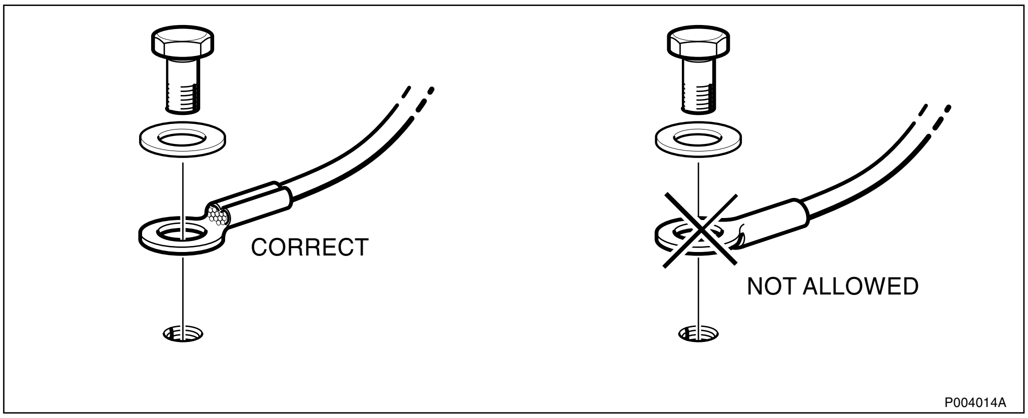


Figure 365 Connecting cable lugs to batteries

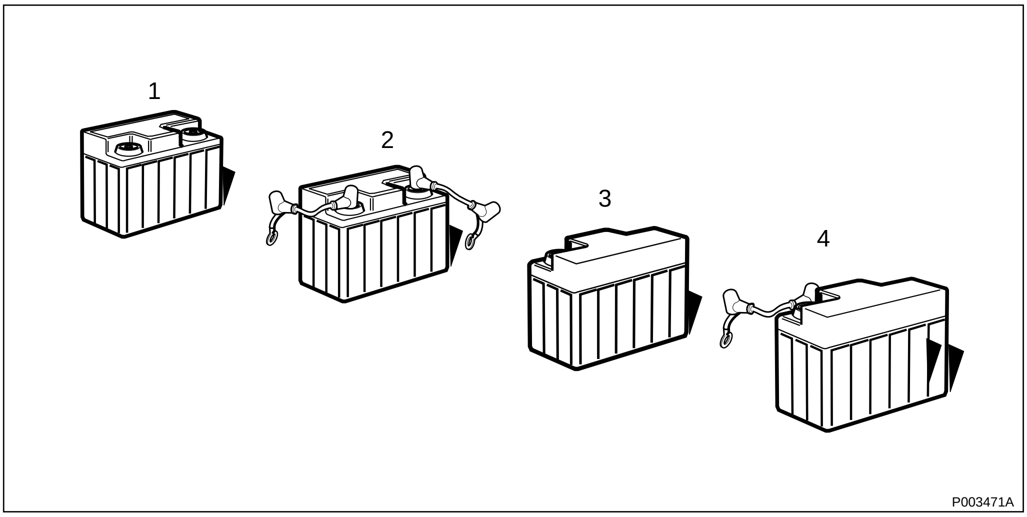


Figure 366 Battery jumper configuration

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.

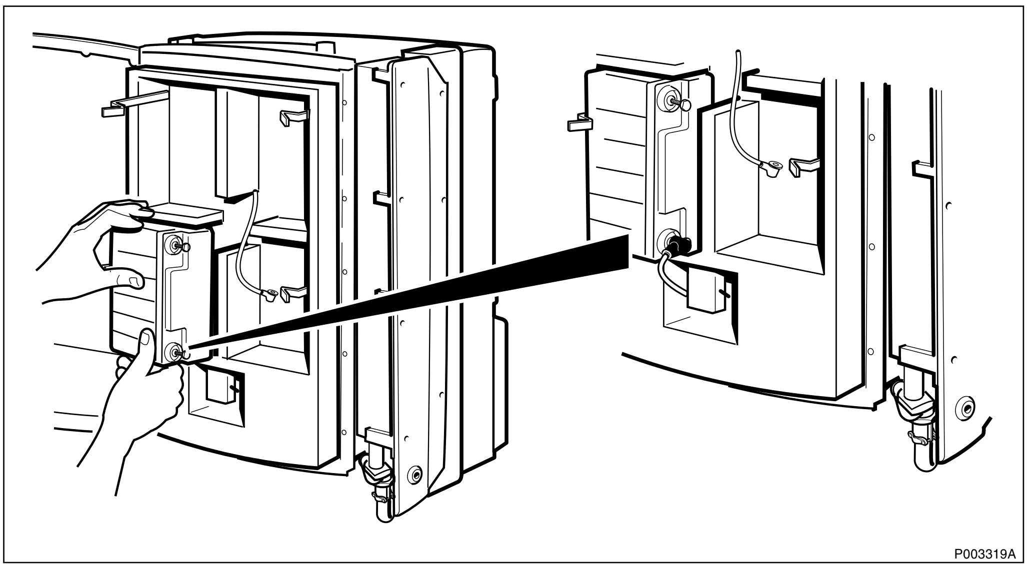


Figure 367 Installing battery 1

1. Install battery 1 and connect the plus-pole (+).

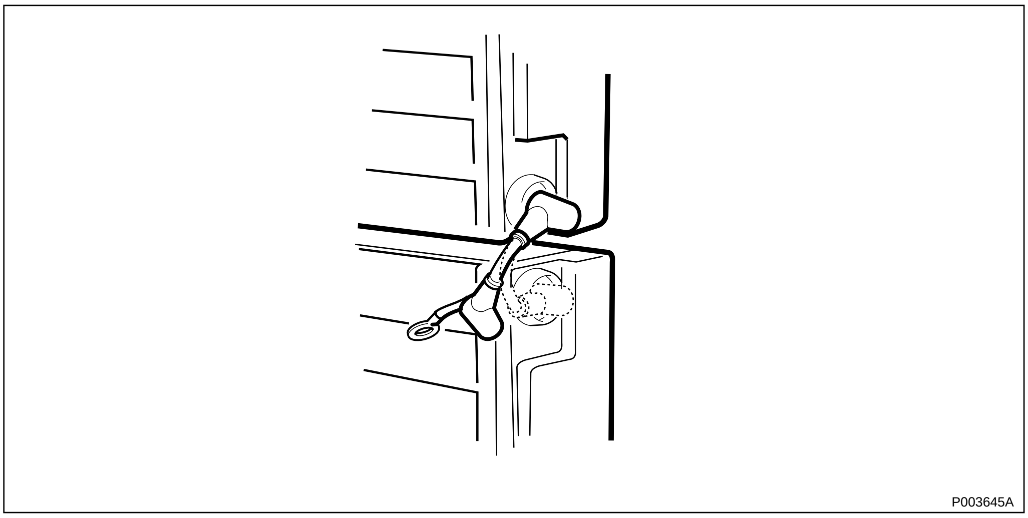


Figure 368 Installing battery 2

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.

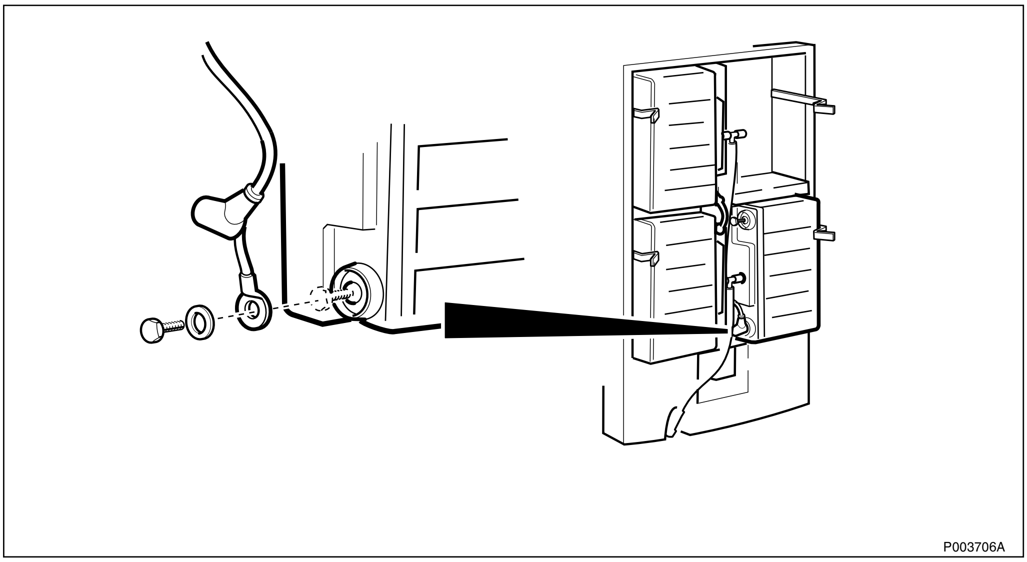


Figure 369 Connecting the minus-pole (-) of battery 3

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.

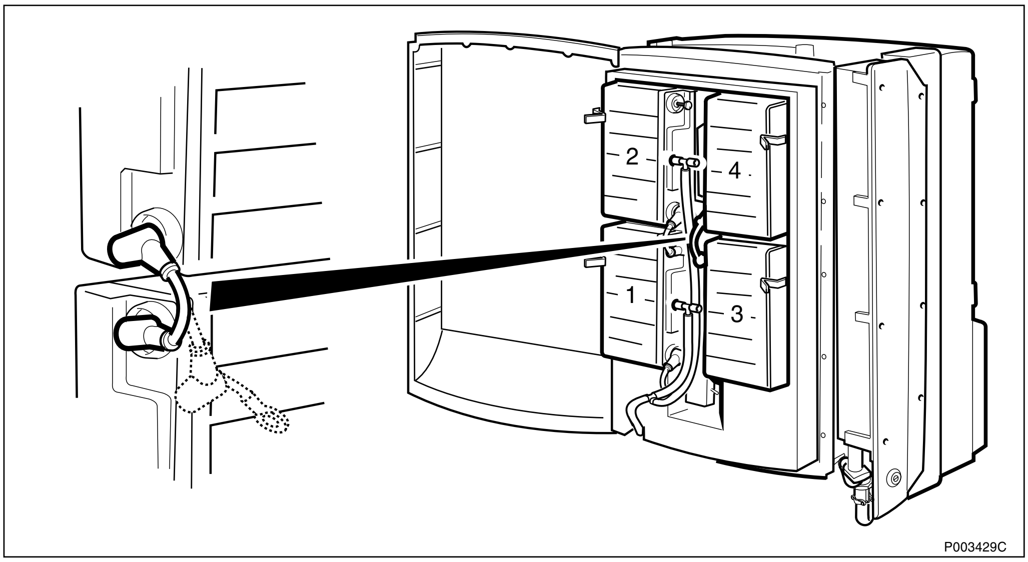


Figure 370 Connecting battery 3 and 4

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

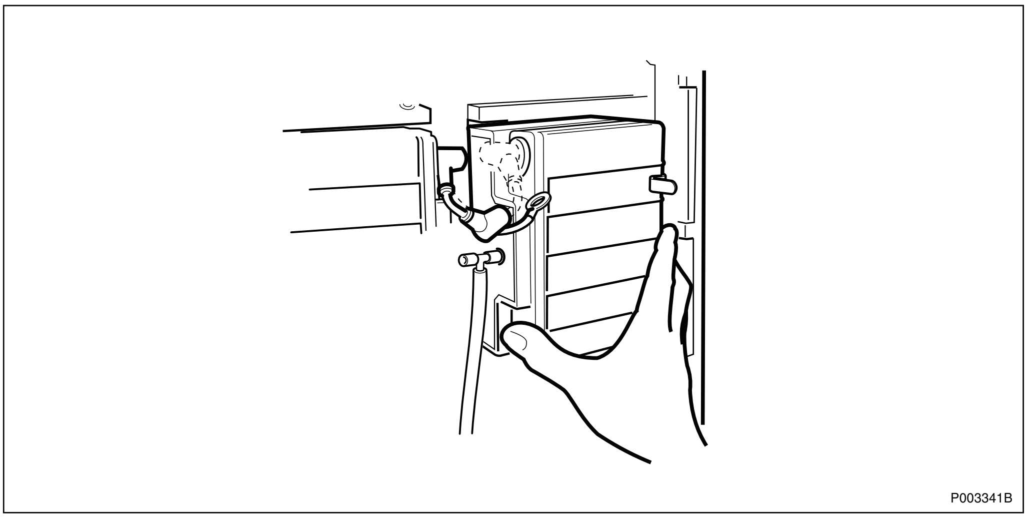


Figure 371 Connecting battery 2 and 4

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*.

Set to Operation

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.6.3 Cables

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

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.

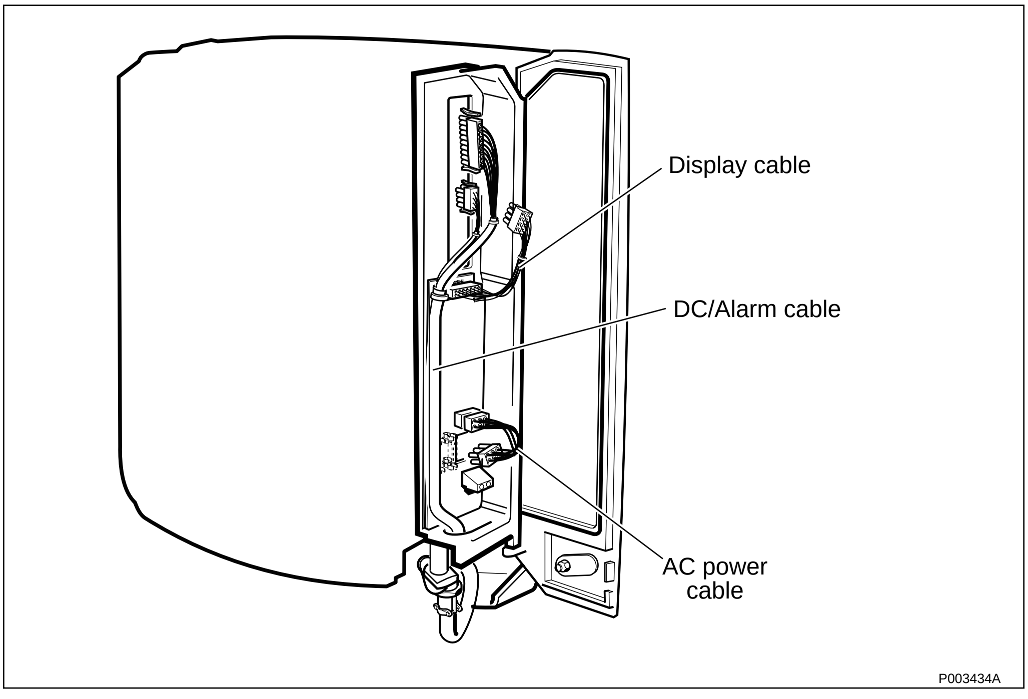


Figure 372 Overview of the cables

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

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.6.4 Battery Cabinet

Prior to Replacement

1. Perform the shut down sequence as described on *page 301*.
2. 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.

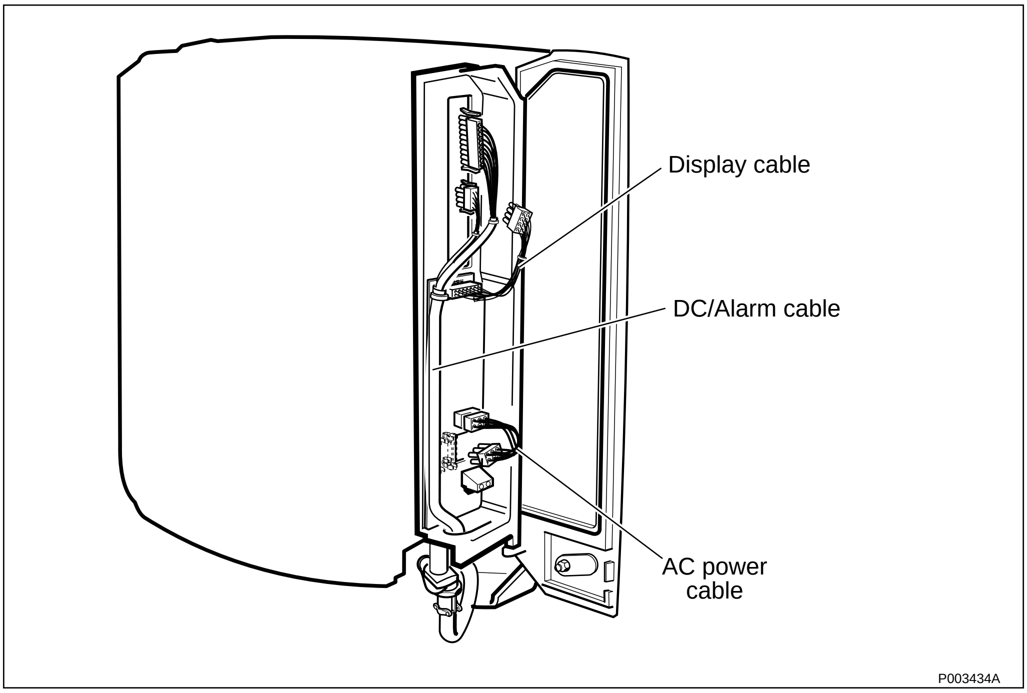


Figure 373 Loosening the AC cable and the Display cable

3. Disconnect the DC/Alarm cables, Display cable and the AC Power cable.

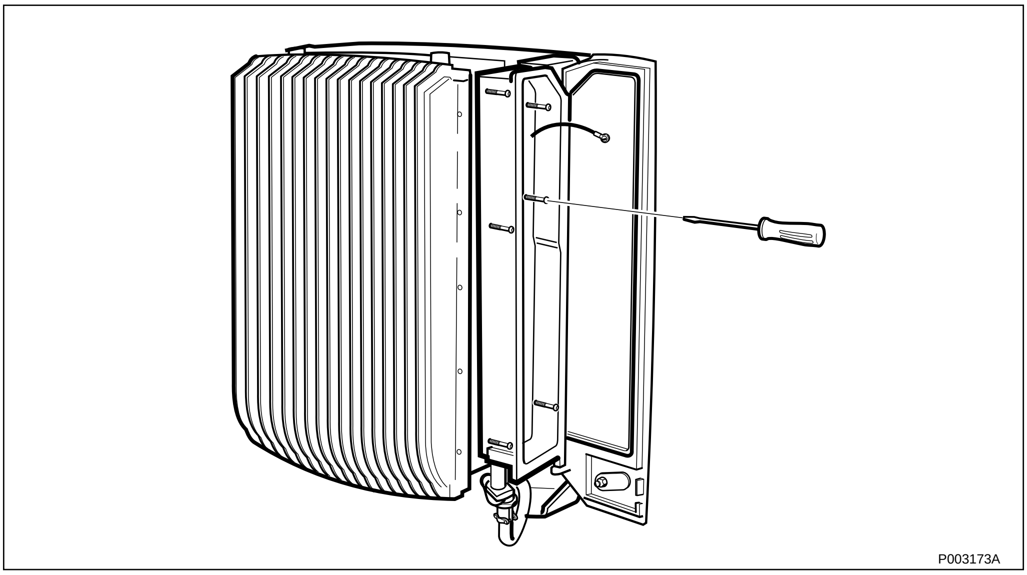


Figure 374 Loosening the installation box

4. Loosen the installation box from the cabinet by loosening the screws inside the installation box.

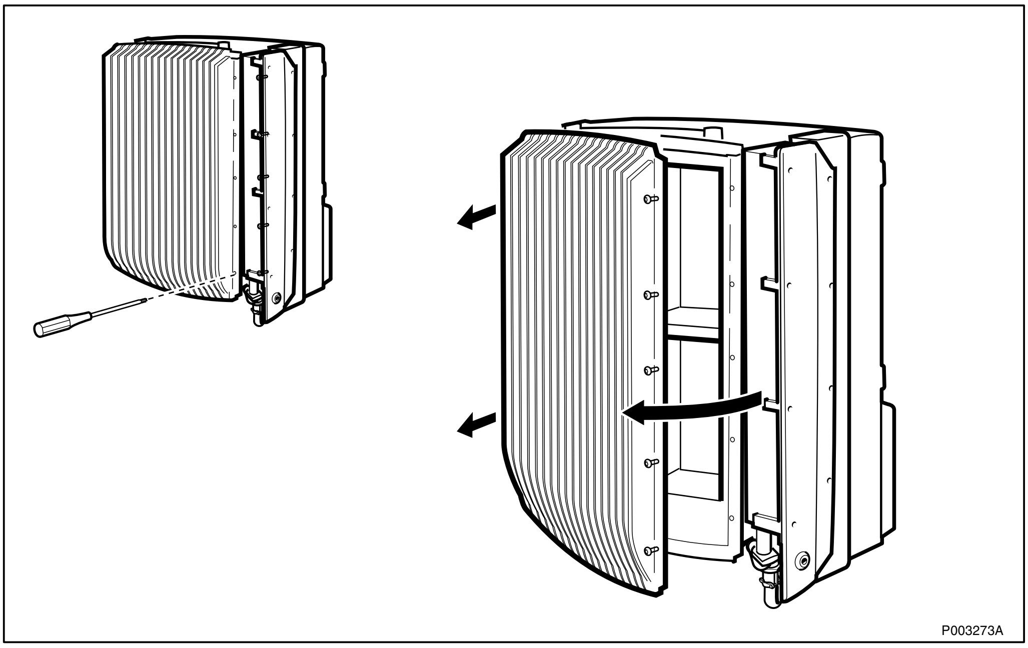


Figure 375 Opening the battery cabinet door

5. Open the Battery cabinet door by unscrewing the 18 torx screws. Make sure that the screws are disengaged.

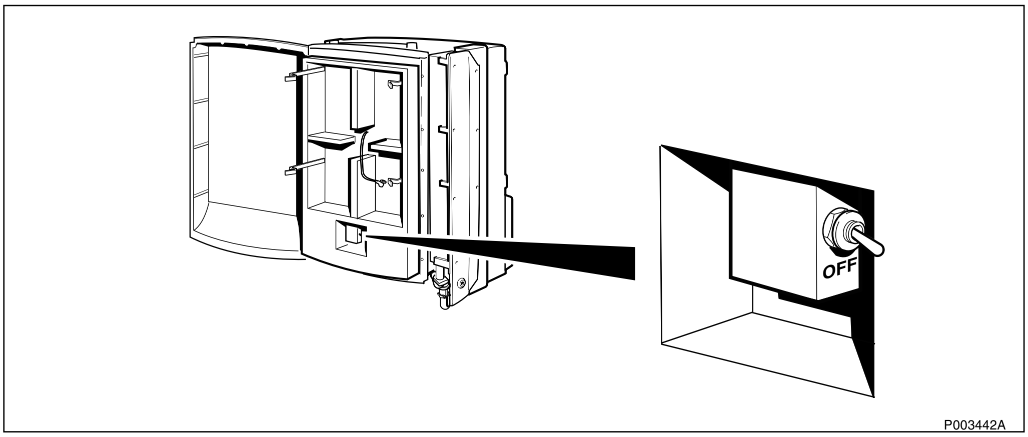


Figure 376 Automatic circuit breaker

6. Switch off the automatic circuit breaker.

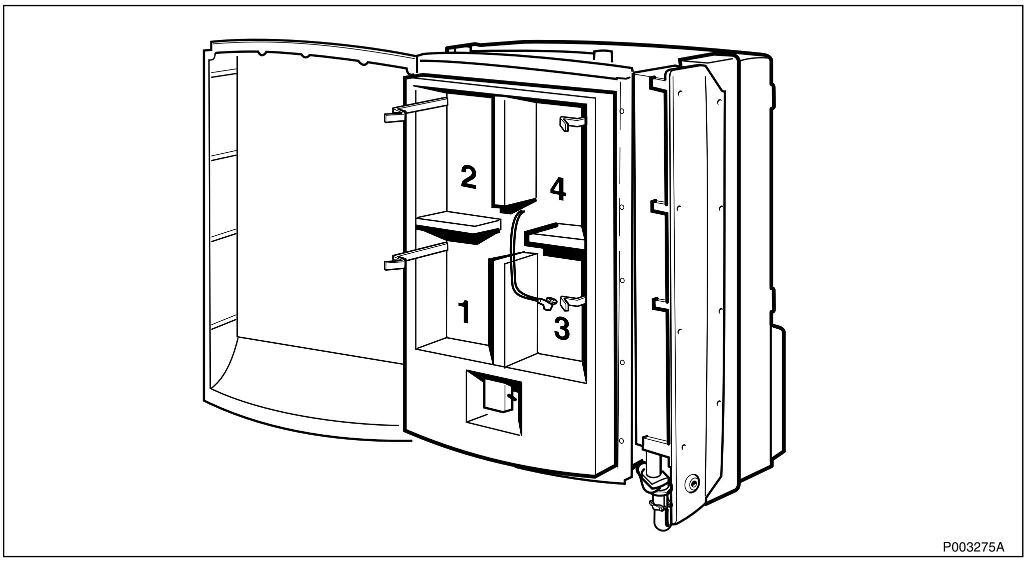


Figure 377 Battery position overview

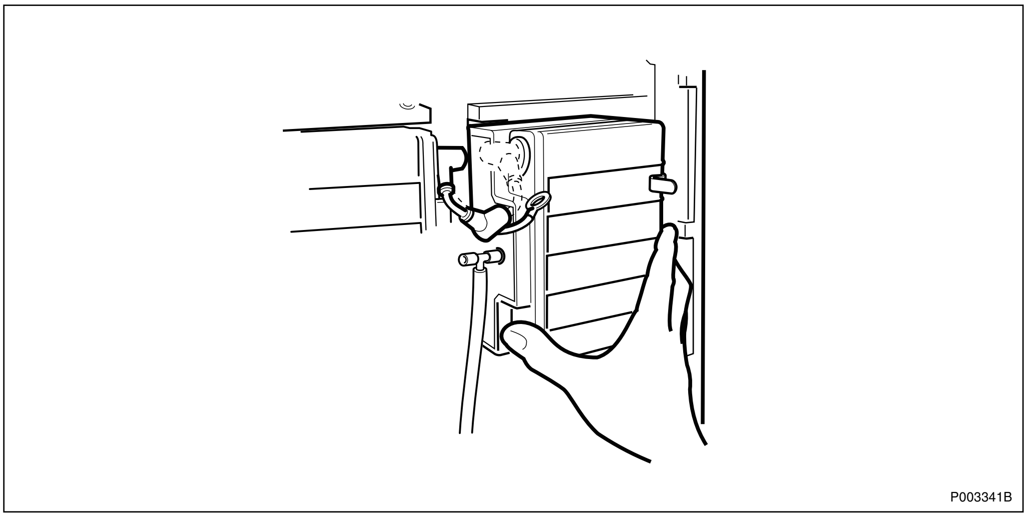


Figure 378 Disconnecting the plus-pole (+) of battery 4

7. Disconnect the battery jumper cable on the plus-pole (+) of battery 4.

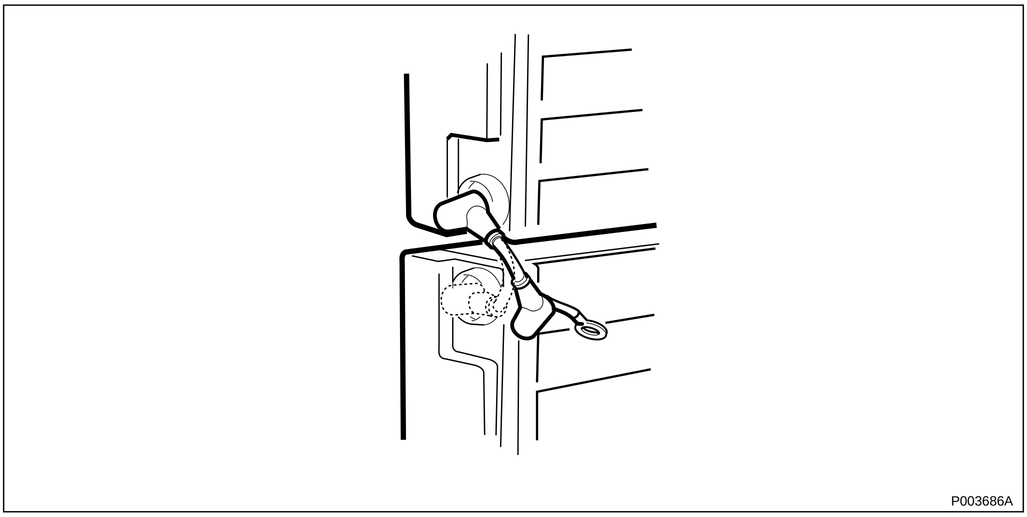


Figure 379 Disconnecting the plus-pole (+) of battery 3

8. Disconnect the battery jumper cable on the plus-pole (+) of battery 3, and remove battery 4.

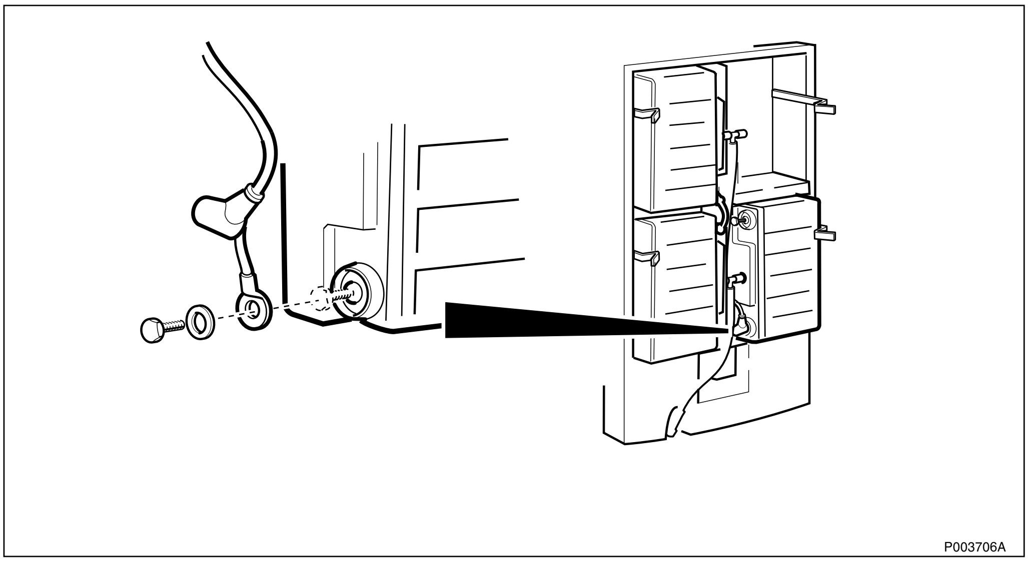


Figure 380 Disconnecting the minus-pole (-) of battery 3

9. Disconnect the minus-pole (-) of battery 3, and remove the battery.

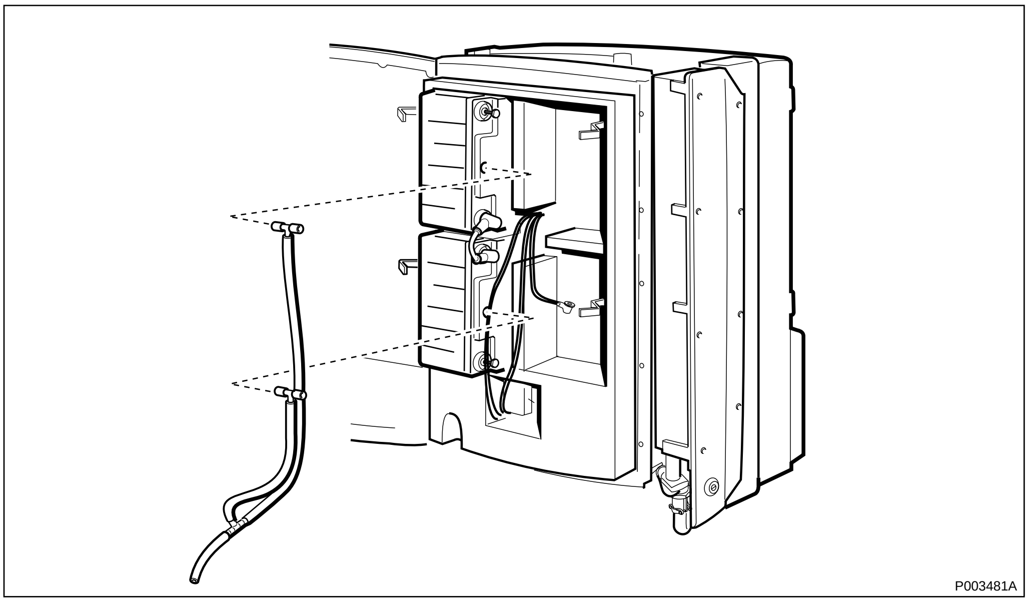


Figure 381 Removing the ventilation hoses

10. Remove the ventilation hoses from battery 1 and 2.

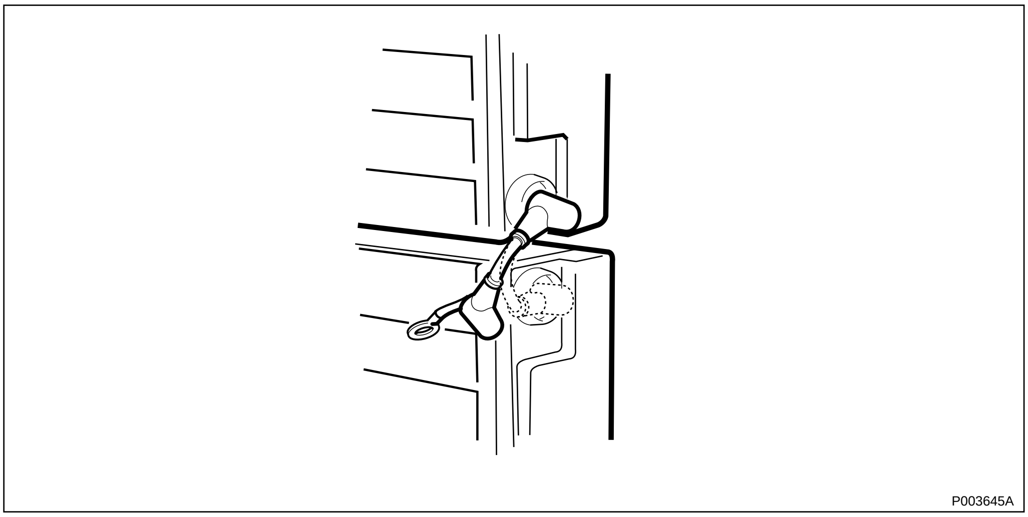


Figure 382 Disconnecting the minus-pole (-) on battery 1

11. Disconnect the battery jumper cable on the minus-pole (-) of battery 1, and remove battery 2.

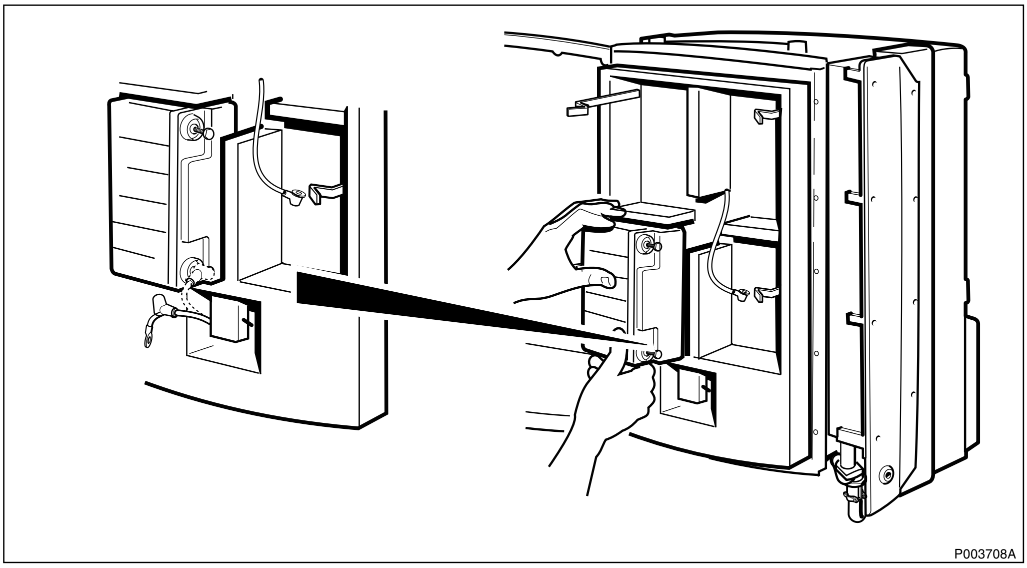


Figure 383 Disconnecting the plus-pole (+) of battery 1

12. Disconnect the plus-pole (+) of battery 1, and remove the battery.

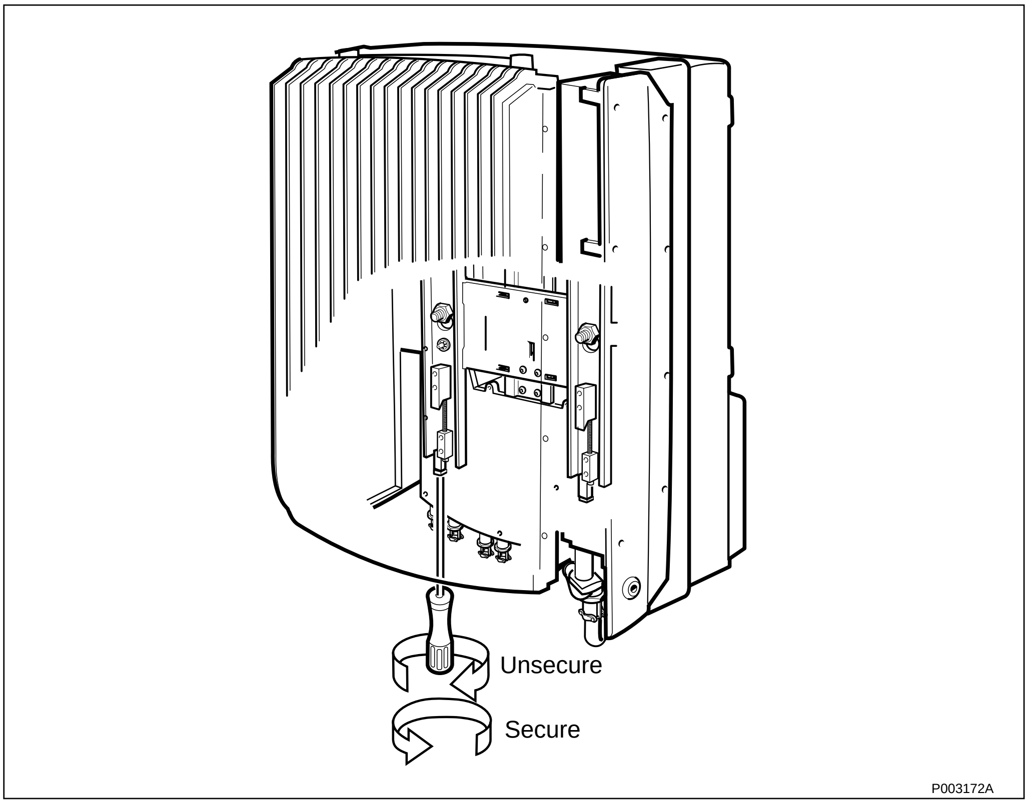


Figure 384 Loosening the cabinet

13. Close the battery cabinet door and tighten one screw in each corner.

14. 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.

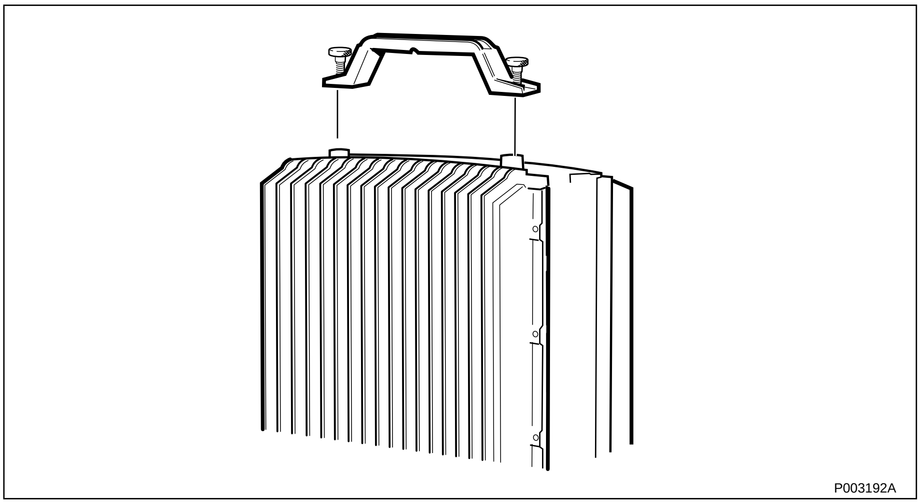


Figure 385 Mounting the optional lifting handle

15. If the lifting handle (optional) is to be used, mount it on top of the cabinet.

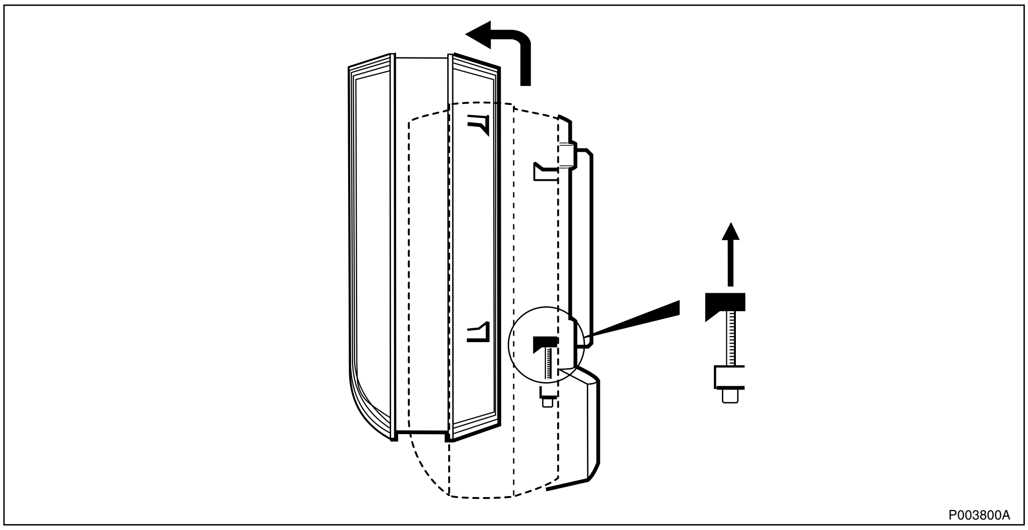


Figure 386 Unhooking the PBC

16. Remove the cabinet by lifting it up and away from the mounting base.
17. Remount the new cabinet, *see chapter Installation of Power and Battery Cabinet*.
18. Install the batteries according to *page 365*.

Set to Operation

Perform the start up sequence as described on *page 301*.

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 12.9 on page 391*.

12.6.5 Fuses

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

Replacing the Fuses

1. Open the installation box door.

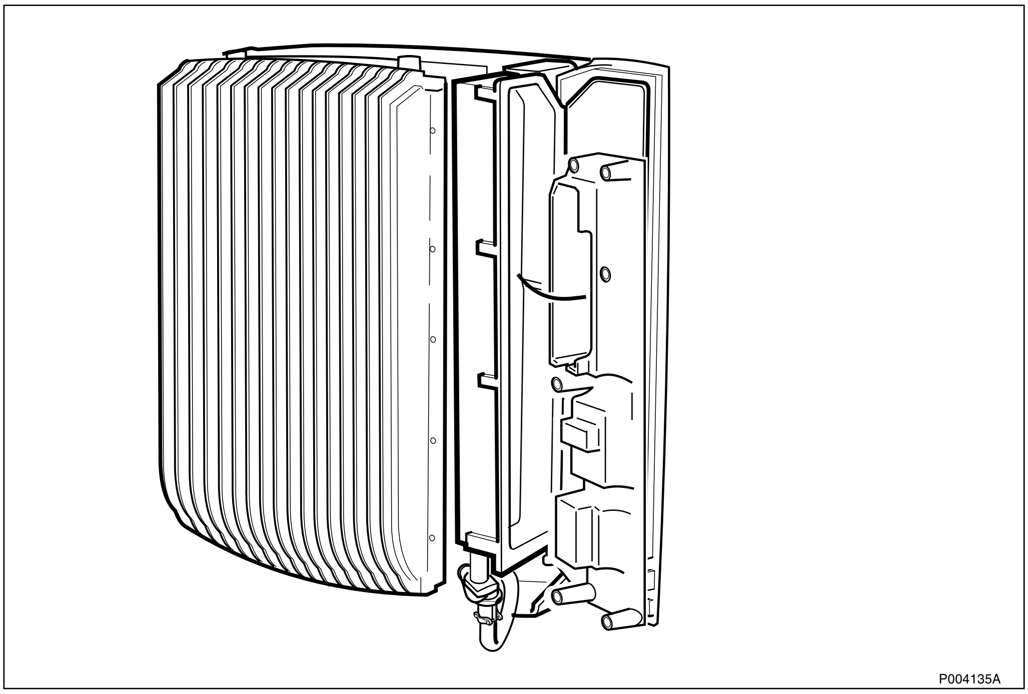


Figure 387 Removing the protective cover

2. Remove the protective cover by loosening the two torx screws.

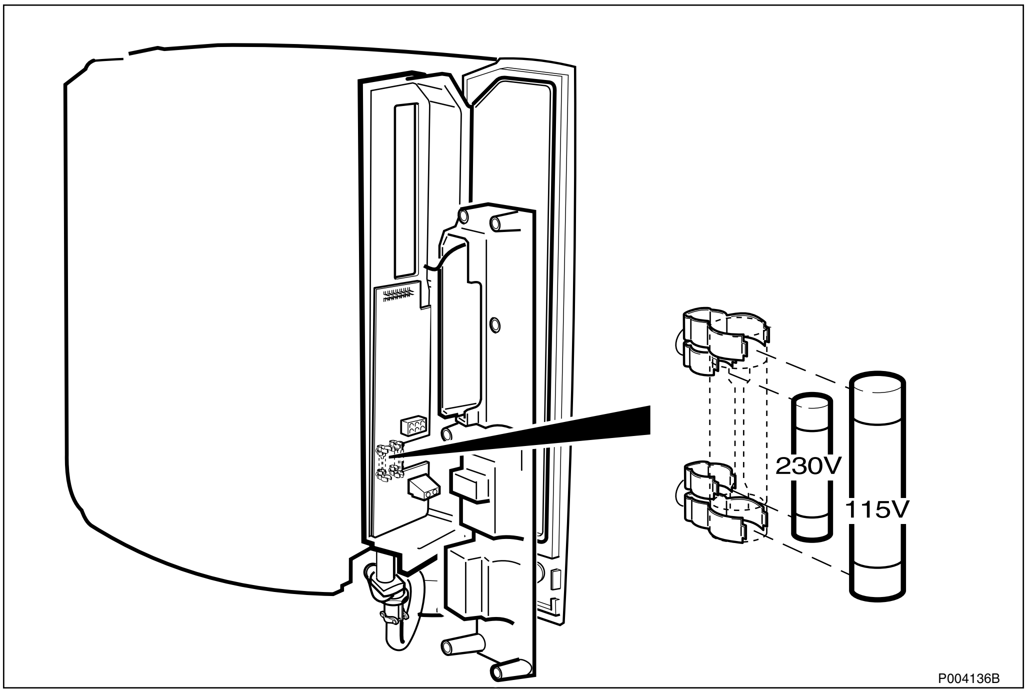


Figure 388 Replacing the fuses

3. Replace the faulty fuses with new fuses.

Table 87 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

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.6.6 EMC Board

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

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.

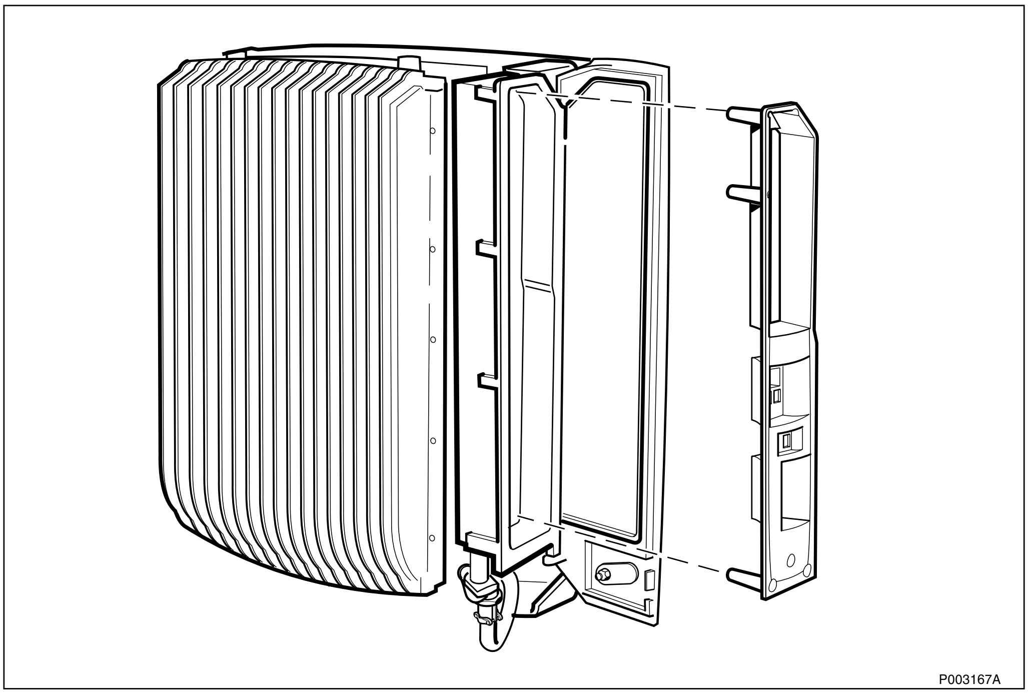


Figure 389 Removing the protective cover

2. Remove the protective cover by loosen the five torx screws.

3. Connect the ESD wrist strap to the ESD connection point in the installation box.

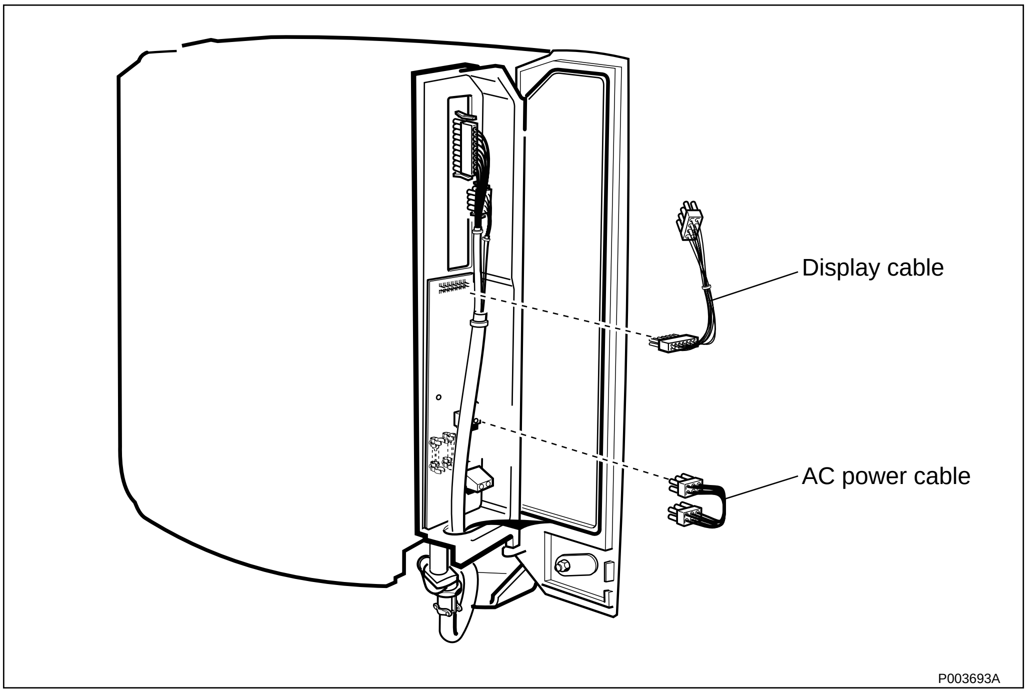


Figure 390 Overview of the cables

4. Disconnect the Display cable and AC Power cable.

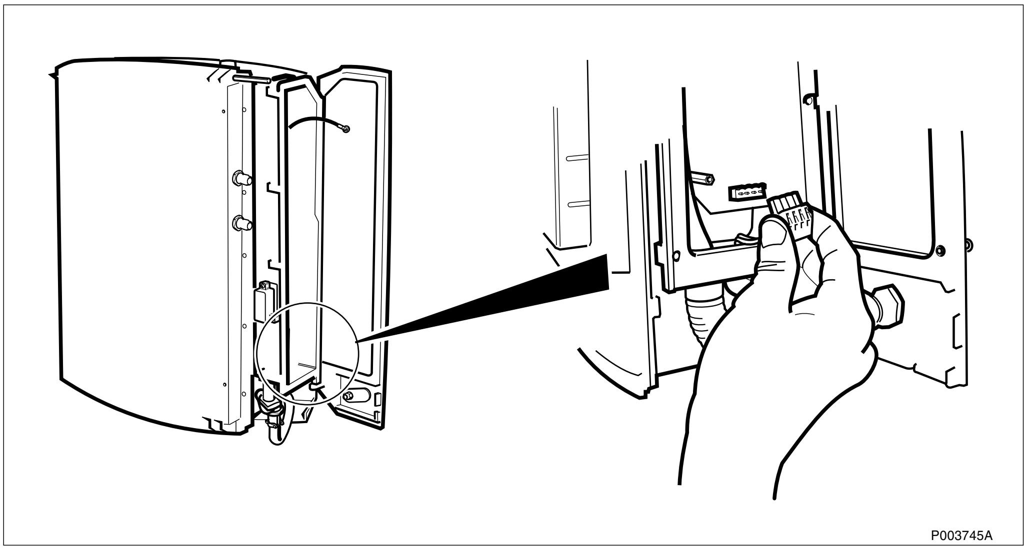


Figure 391 Disconnecting the AC cable

5. Disconnect the AC cable from the interface box on the EMC board.

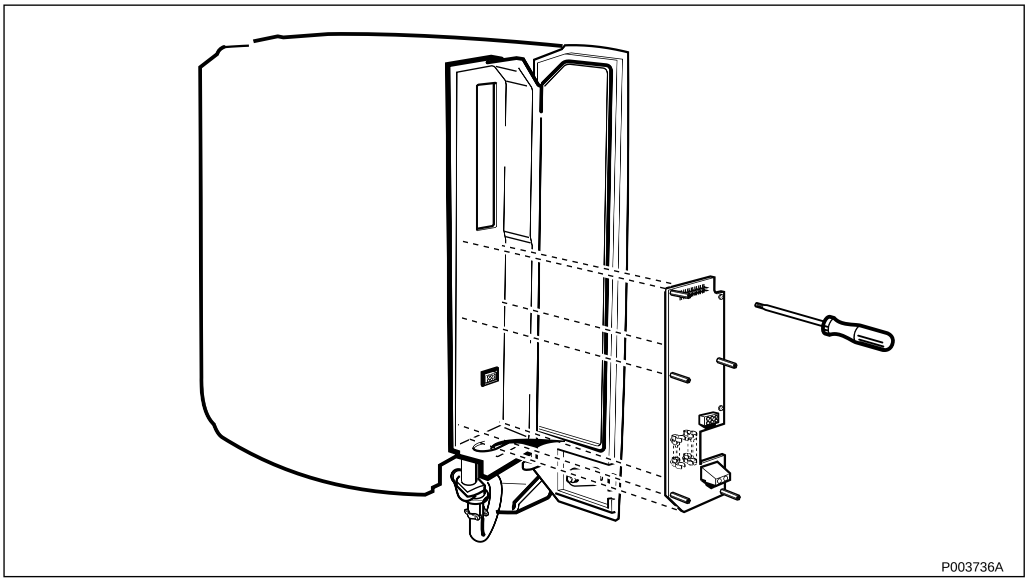


Figure 392 Removing the EMC board

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. Remove the ESD wrist strap.
12. Remount the protective cover with the two torx screws.

Set to Operation

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.6.7 DC Surge Board

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

Replacing the DC Surge Board

CAUTION

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

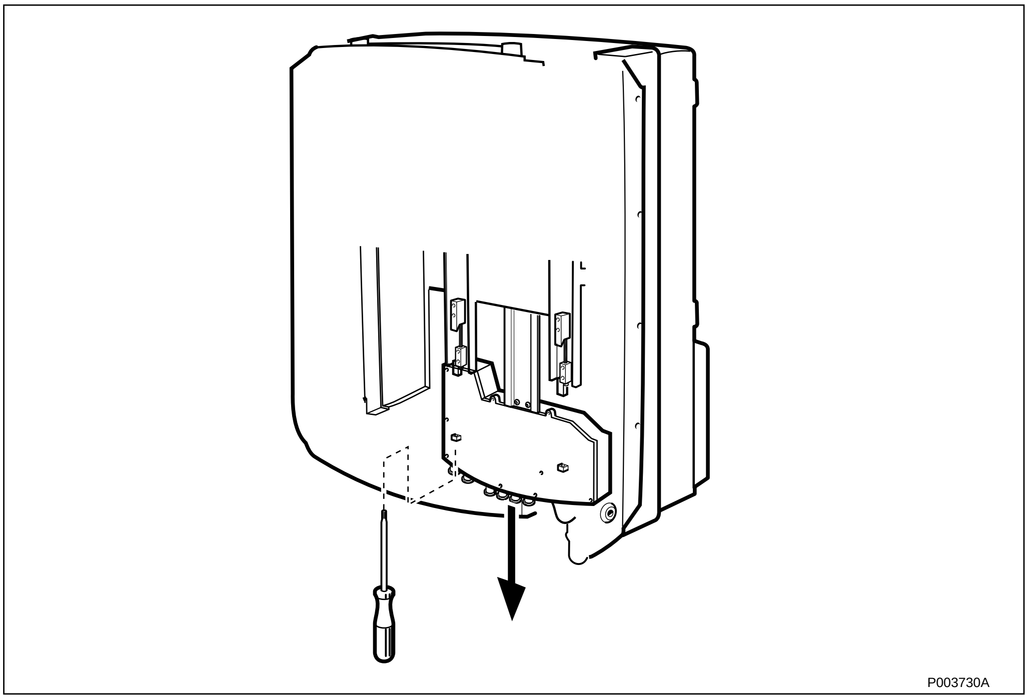


Figure 393 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

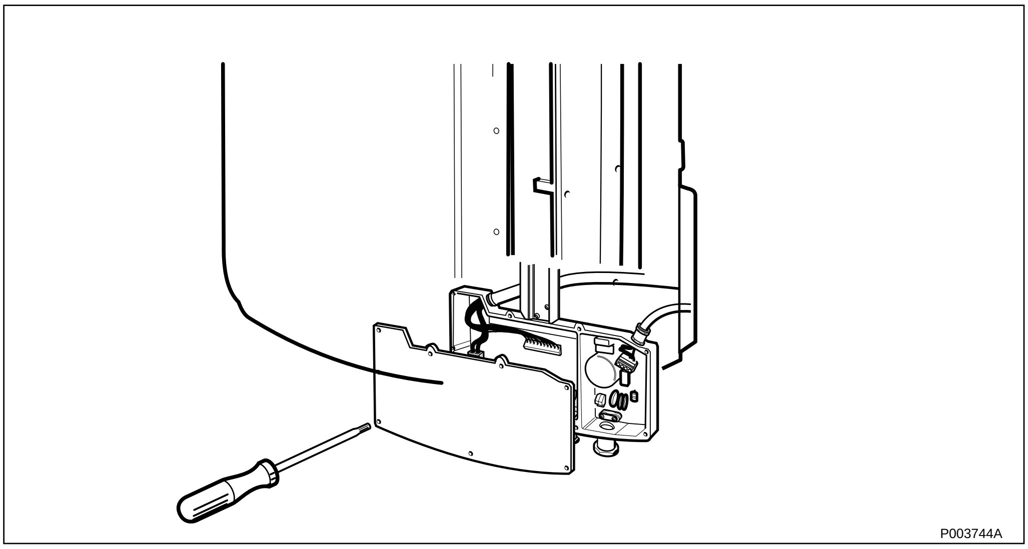


Figure 394 Loosening the interface box cover

2. Open the cover of the interface box by removing the 9 torx screws.
3. Connect the ESD wrist strap to the ESD connection point in the interface 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.

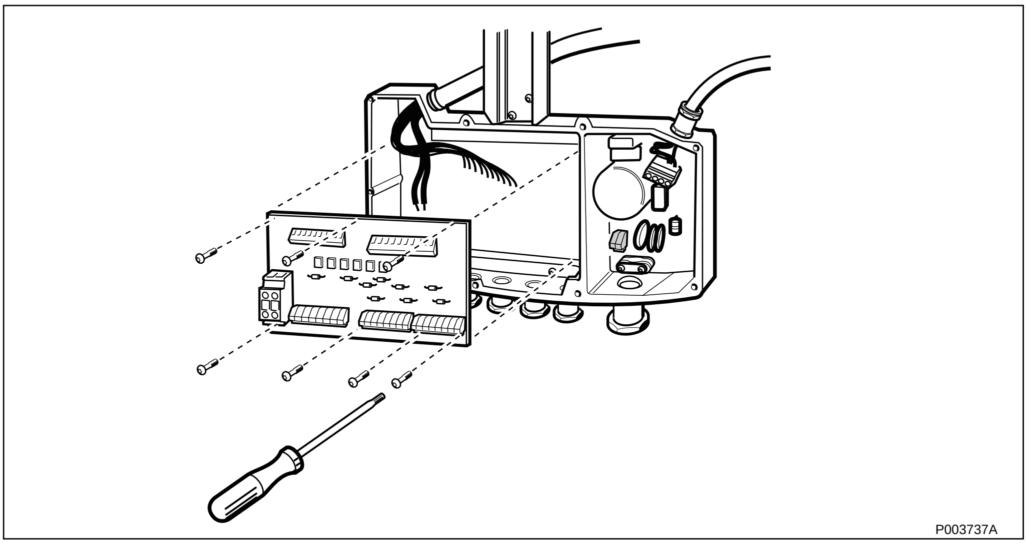


Figure 395 Removing the DC Surge board

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

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.6.8 AC Board

Prior to Replacement

Perform the shut down sequence as described on *page 301*.

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.

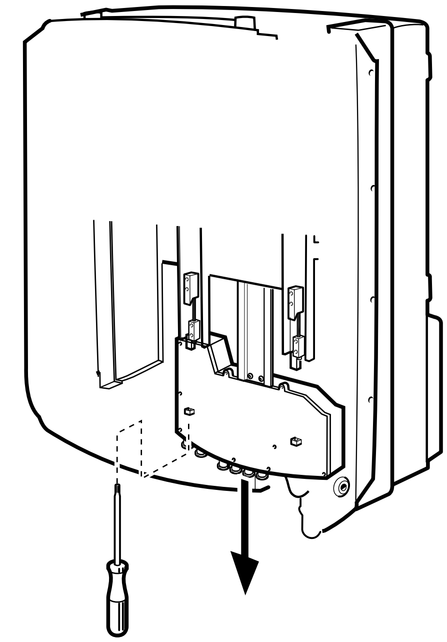


Figure 396 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

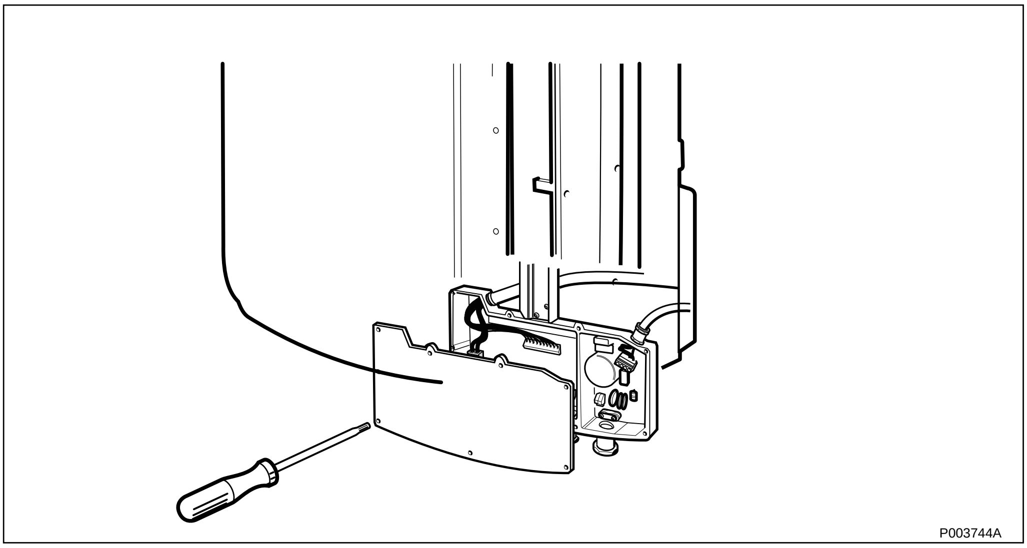


Figure 397 Loosening the interface box cover

2. Open the cover of the interface box by loosening the 9 torx screws.
3. Connect the ESD wrist strap to the ESD connection point in the interface box.
4. Remove the connection terminal blocks connected to the AC board.

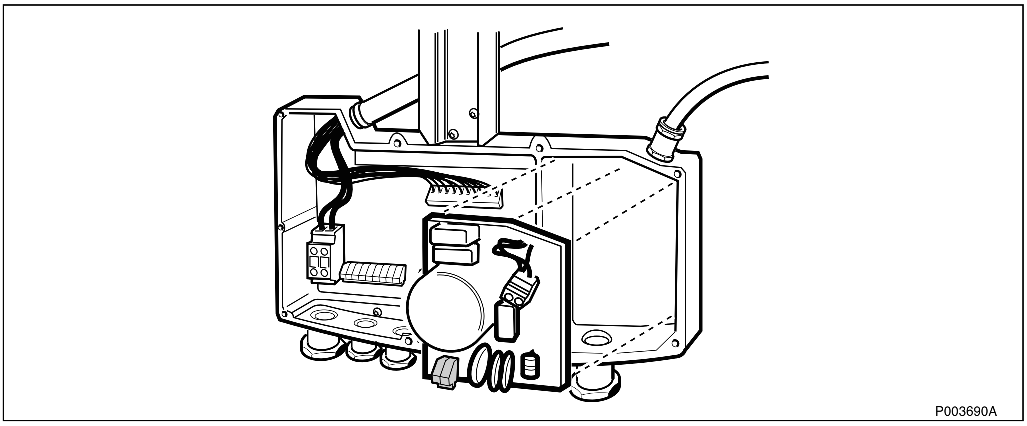


Figure 398 Removing the AC board

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

Perform the start up sequence as described on *page 301*.

Test after Corrective Action

Perform the checklist in *Section 12.9 on page 391*.

12.7 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 88 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) Replace the battery	Replace battery at 5 year intervals
4) Replace the connection board	Replace the connection board at 10 year intervals
5) Replace the transmission board	Replace the transmission board at 10 year intervals
6) Replace the AC board	Replace the AC board at 10 year intervals
7) Internal synchronisation (if applicable)	Calibrate at 3 year intervals
8) Inspect the Fan Unit (if applicable)	Every time the RBS is controlled or repaired

12.7.1 Sunshields

Replace the sunshields if they are damaged, discoloured or deformed.

To replace the sunshields, *see Section 12.5.4 on page 308*.

12.7.2 Cooling Flanges

1. Remove the sunshields, *see Section 12.5.4 on page 308*.
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.

12.7.3 Internal Battery

The internal battery is guaranteed to last five years from the manufacturing date (year-week) on the battery label. Replace the battery before the date expires (manufacturing date + five years). Depending on the circumstantial facts (like temperature, frequent power failures etc.) at the site, the maintenance period may need to be shortened. *See Section 12.5.9 on page 323*

12.7.4 Connection Board

To replace the RBS Connection board, *see Section 12.5.14 on page 334*.

12.7.5 Transmission Board

To replace the RBS transmission board, *see Section 12.5.15 on page 338*.

12.7.6 AC Board

To replace the RBS AC board, *see Section 12.5.16 on page 342*.

12.7.7 Internal Synchronization (if Applicable)

Note: This calibration is only applicable on RBS 2302 with product no. KRC 161 31/90.

The purpose of calibrating the 13 MHz oscillator is to avoid the high risk of traffic disturbances. This has to be done every third year.

It is not necessary to take the RBS out of service in order to perform the calibration.

Tools and Instruments

For information about required test equipment and tools *see chapter Tools and Instruments.*

Calibration Preparations

1. Make sure that the RBS is loaded with BSS R7 SW or higher and is Operational.
2. Make sure that the cell have been in active state for at least one hour. The RBS contains an ovenoscillator that has to be warmed up to become stabile.

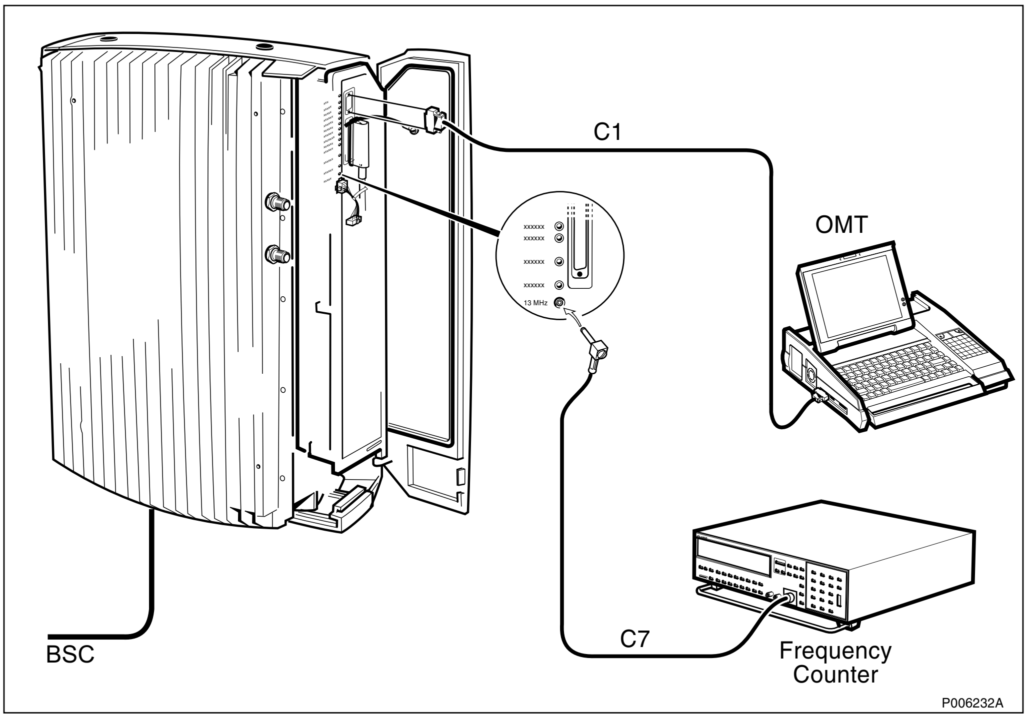


Figure 399 Testbed configuration

3. Connect the OMT cable (C1) from a PC COM-port to the RBS according to the figure above.

4. Connect the cable (RPM 113 772) from port A on the frequency counter to the 13 MHz port in the User Interface according to the figure above.

The MO TF (RBS) must be synchronised to the optional reference oscillator. This is done by preforming step 3-6.

5. Enter the command RXMOP:MO=RXOTF-x;

6. Read the value (INTI, INTE, PCM or DEFAULT) of parameter SYNCSRC an write it down.

If the value is INTE, proceed with *Section Calibration of the 13 MHz Oscillator on page 388*, else proceed with step 5-6.

7. If the value is not INTE enter:

   RXMSC:MO=RXOTF-x, TFMODE=SA, SYNCSRC=INTE;

8. Enter the command RXMOP:MO=RXOTF-x; again and make sure that the value of the parameter SYNCSRC is INTE.

Calibration of the 13 MHz Oscillator

Before starting the calibration the IDB must be checked and read with OMT.

Perform the calibration, for further information see:

OMT User's Manual *LZN 302 01*

Wait until the locked LED on the frequency counter (FC) is lit. It takes about 15 minutes before the FC is ready for operation. Do not start to measure the frequency before the warm-up period is ended.

1. Set level trig in mode auto.
2. Set sample size to 10 seconds and in mode mean.
3. Measure the frequency during 5 minutes.
4. Enter the mean frequency (with an accuracy of 1/1000 Hz) into the OMT.
5. Wait 10 minutes and measure the frequency again during 5 minutes. If the frequency deviate more than 208 mHz (16 ppB) from 13 MHz repeat step 4.

The calibration is finished.

Restore the BSC

If the parameter SYNCSRC value was not INTE, *see step 6 on page 388*, enter:

RXMSC:MO=RXOTF-x, TFMODE=SA, SYNCSRC=[original value].

12.7.8 Fan Unit (if Applicable)

Note: *See Section 12.5.3 Fan Unit on page 304* for taking the RBS and Fan Unit out of service.

Table 89 Fan Unit maintenance schedule

1) Inspect the Fan Unit cover to see that it is not damaged or dirty	Every time the RBS is controlled or repaired
2) Inspect the fans to see that they are clean and that no obstacles are blocking the airflow	Every time the RBS is controlled or repaired

Corrective Actions

1. Replace the cover if it is damaged.
2. Clean the cover with a mild detergent.
3. Clean the fans with a mild detergent.
4. Remove any obstacles blocking the air flows.

Test after Corrective Actions

Run all the three fans to see that they operative. If not replace the Fan Unit according to *Section 12.5.3 Fan Unit on page 304*.

12.8 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 90 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) Replace the batteries	Replace the batteries at 5 year intervals
4) Replace the EMC board	Replace the EMC board at 10 year intervals
5) Replace the DC surge board	Replace the DC surge board at 10 year intervals
6) Replace the AC board	Replace the AC board at 10 year intervals

12.8.1 Sunshields

Replace the sunshields if they are damaged, discoloured or deformed.

For information regarding replacement of the sunshields, *see Section 12.6.1 on page 352*.

12.8.2 Cooling Flanges

1. Remove the sunshields, *see Section 12.6.1 on page 352*.
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.

12.8.3 Batteries

For information regarding replacement of the batteries, *see Section 12.6.2 on page 359*.

Table 91 Battery checklist

Check that:		OK
1	the batteries and battery compartment are free from dirt, excessive grease, oxidation and corrosion.	
2	the battery compartment is free from discolouration and is not deformed.	
3	the batteries are still within their replacement date.	
4	the batteries not are leaking acid.	

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, replace the batteries.
3. If the battery poles are damaged, replace the batteries.
4. Replace the batteries if the lifetime of the batteries will expire before the next scheduled maintenance.

   The batteries are guaranteed to last five years from the manufacturing date (year-week) on the battery label. Replace the battery before the date expires (manufacturing date + five years).

12.8.4 EMC Board

To replace the PBC EMC board, *see Section 12.6.6 on page 378*.

12.8.5 DC Surge Board

To replace the PBC DC Surge board, *see Section 12.6.7 on page 381*.

12.8.6 AC Board

To replace the PBC AC board, *see Section 12.6.8 on page 383*.

12.9 Concluding Routines

The following checklist is not mandatory but strongly recommended. Local procedures and safety regulations must be evaluated and incorporated into this checklist.

Table 92 Checklist

Check that:		OK
1	the red Fault indicator is off.	
2	the Operational indicator (green LED) is lit.	
3	the RBS is in remote mode. (Yellow local mode on DP is off.)	
4	other yellow indicators are off.	
5	the External alarm indicator is off. (Yellow indicator.)	
6	the backup copy of the RBS IDB is saved on a floppy disk.	
7	the OMC operator is informed that the site is taken into service.	
8	all the cabinets are closed and locked.	

12.9.1 Transport of a Faulty Unit

The faulty unit should be transported in the same packaging materials as the spare unit was delivered in.

12.9.2 Report of Finished Work

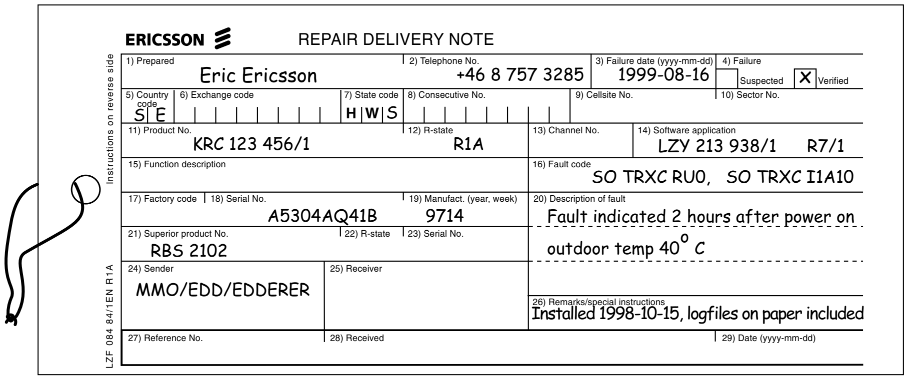
When a maintenance procedure has been completed, a report should be written including a detailed description of actions taken, all observations made in accordance with local routines for work orders, site log-book, etc.

12.9.3 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.



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 400 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.

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13 Product Data

This chapter describes the hardware units for a RBS 2302 site. It will form a basis for the site requirements. Additional information can be found in:

Reference Manual *EN/LZT 720 0002*

13.1 Radio Base Station RBS 2302

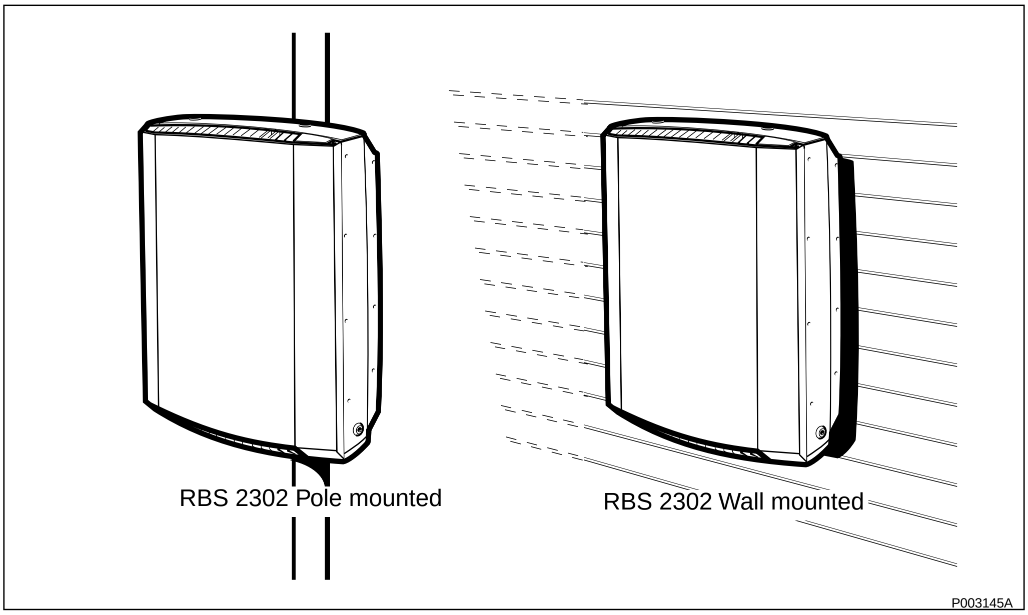

Figure 401 RBS 2302

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.

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 purpose of the RBS as a stand alone product is to supply "hot spot" capacity in small areas.

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

The RBS consists of the following main units:

- Mounting base
- Cabinet
- Antenna options:
  - integrated omnidirectional antenna unit
  - integrated sector antenna unit
  - multicasting box

- Sunshields

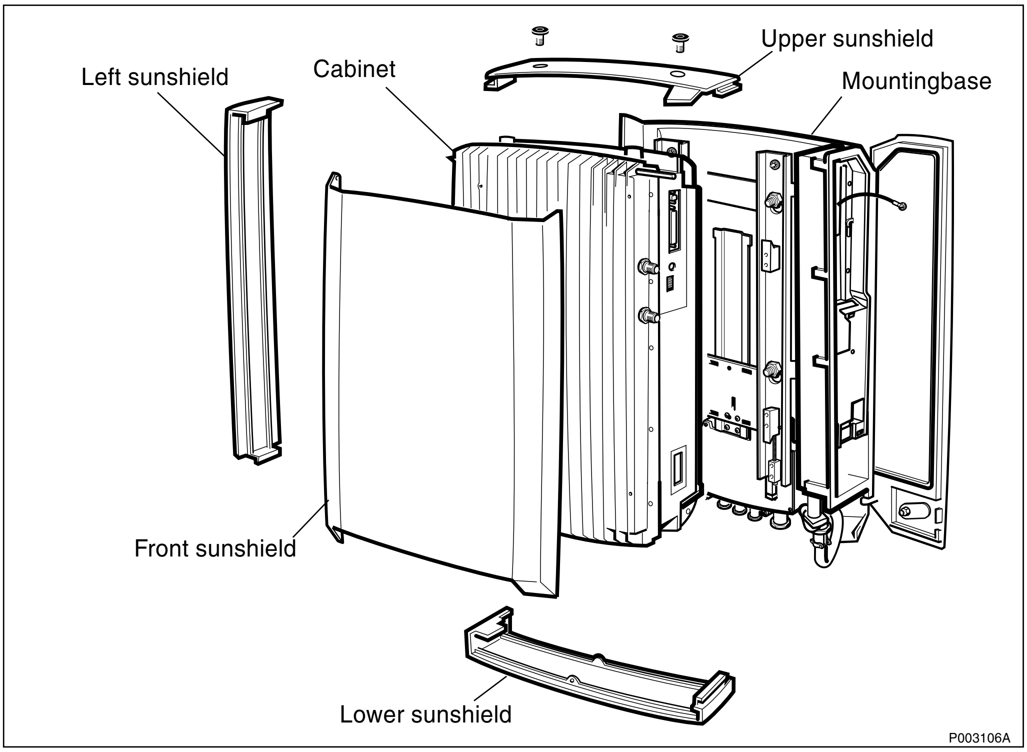

Figure 402 Main units

13.1.1 Mounting

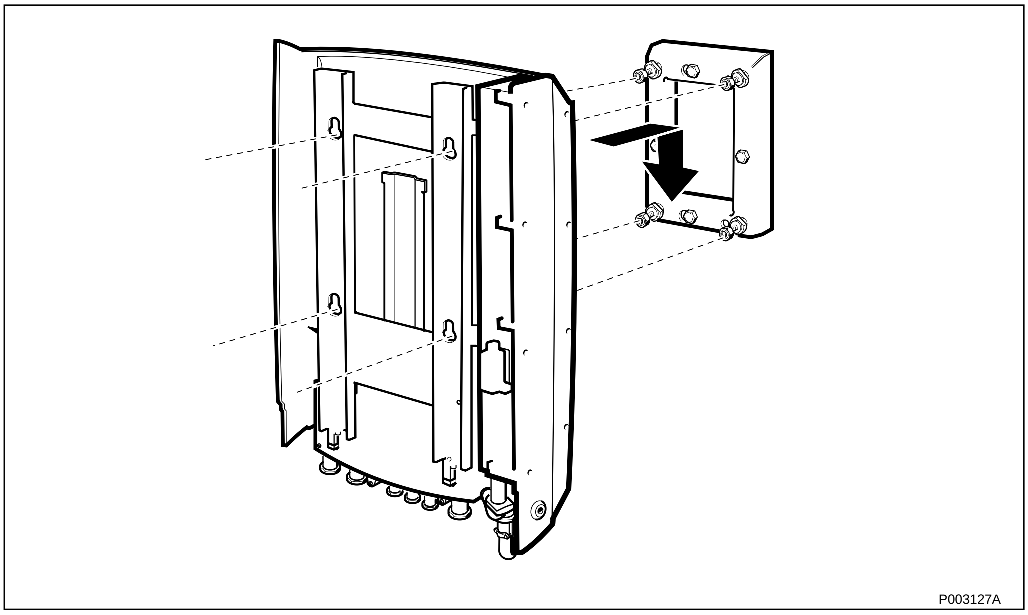

Figure 403 Mounting base and mounting plate

A 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.

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.

The cabinet must always be installed vertically and with the cable inlets down.

13.1.2 Dimensions and Weight

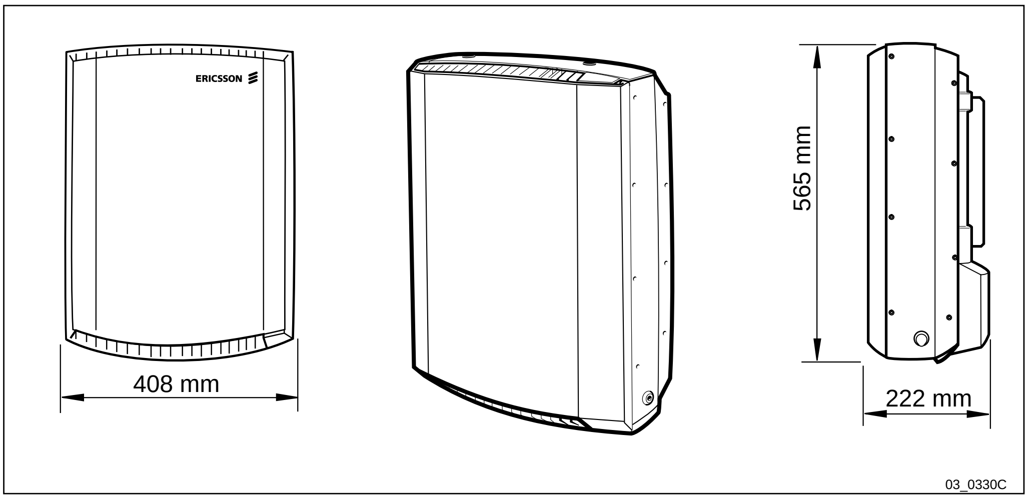

Figure 404 Dimensions

Table 93 Dimensions

	Height	**Width**	**Depth**
RBS 2302	565 mm	408 mm	222 mm

The optional Fan Unit will increase the height of the RBS 2302 with 115 mm.

Table 94 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

13.1.3 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 air circulation 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.

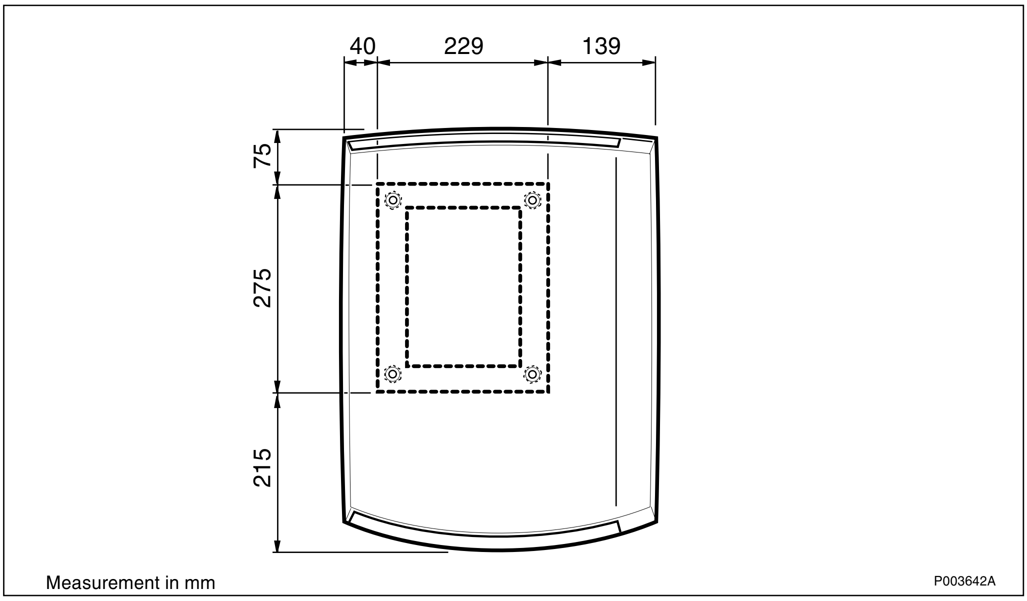

Figure 405   Mounting plate and equipment contour

The *figure above* 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.

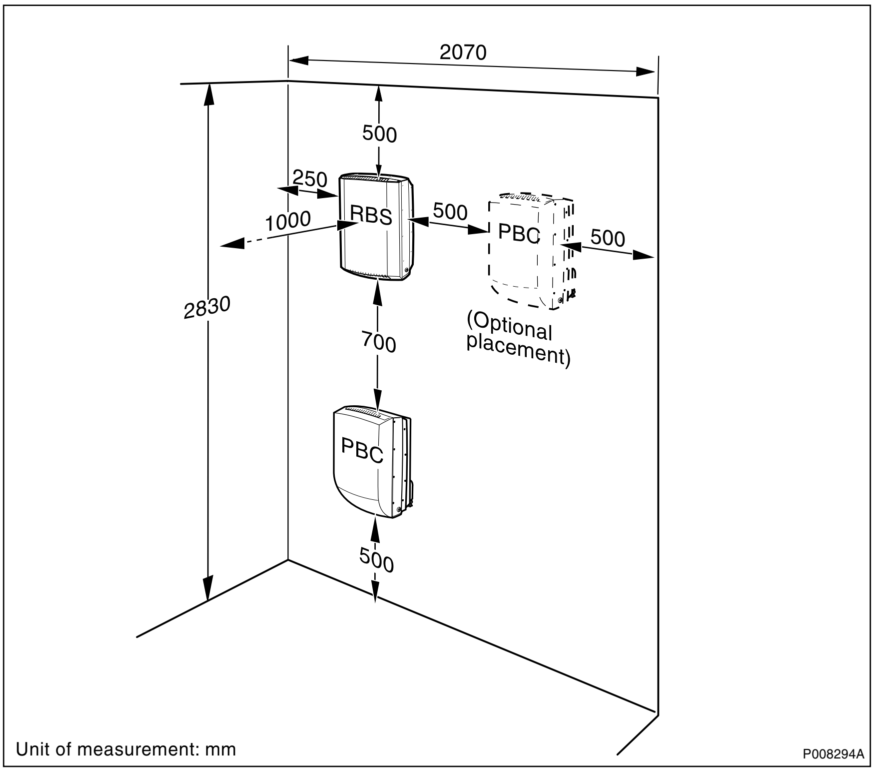

Figure 406   Space requirements

The maximum distance between two RBS 2302 in a 4 TRX or a 6 TRX configuration is limited by the length of the TXL-bus cable. The maximum length of the TXL–bus cable is 5 m, but since the cable is routed under the sunshield the efficient distance is about one meter shorter, that is about 4 m.

The maximum distance between the RBS 2302 and the PBC is 5 m, limited by the length of the PSA-cable.

13.1.4 Wind Load

The wind load at 50 m/s is 650 N.

13.1.5 Climatic Endurance

Table 95 Climatic endurance

Environmental parameter	Units	Normal condition	Non–destructive
Temperature	°C	-33 to +45	-40 to +70
Temperature (RBS equipped with Fan Unit)	°C	-33 to +55	-40 to +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.

13.1.6 Vibrations

The base station withstands vibrations below 0.5 G and shocks below 25 G.

13.1.7 Acoustic Noise

The base station does not emit any acoustic noise.

13.1.8 AC Mains Power Supply

The RBS 2302 can be connected to the nominal mains supply voltages presented in *Table 96 on page 400*.

The base station shall 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. It is recommended to supply the site from one phase only.

Note: Fuse value must not exceed 10 A.

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

Connections are made on terminals in the interface box on the mounting base. The terminal will accept wires having a maximum area of 2.5 mm^2.

The mains voltage is connected between two of the terminals. The third terminal is a screw terminal on the body, used for protective earth.

The cable gland has capacity for one power cable with an outer sheath diameter of 7 – 15 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.

Supply Voltage

Table 96 Supply voltages

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

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.

Limiting Values for AC Mains Supply

Table 97 Limiting values

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

Power Consumption and Heat Generation

Table 98 Power consumption and heat generation

Operation	Power consumption		Heat generation	
	230 V	115 V	230 V	115 V
Normal operation(1)	140 VA	190 VA	90 W	90 W
Maximum(2)	500 VA	500 VA	350 W	350 W

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

13.1.9 Internal Battery Backup

The RBS 2302 will survive cuts in the mains supply for at least 3 minutes and maintains full performance during this 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 base station cannot be powered up with the internal battery only.

The RBS 2302 can also be backed-up by a PBC. In this case the internal battery is replaced by a Power Supply Adapter (PSA), *see Section 13.2.9 Batteries on page 409.*

13.1.10 Earthing

The mounting base must be earthed separately and is provided with an M8 earthing bolt for this purpose. A suitable earthing kit must be used to connect the bolt with the lightning protection system of the site.

13.1.11 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

- Unbalanced line, connected via a 75 Ω tail cable with TNC-female connectors to a terminal block in the interface box.

  The cable is possible to order separately.

- Balanced line, 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

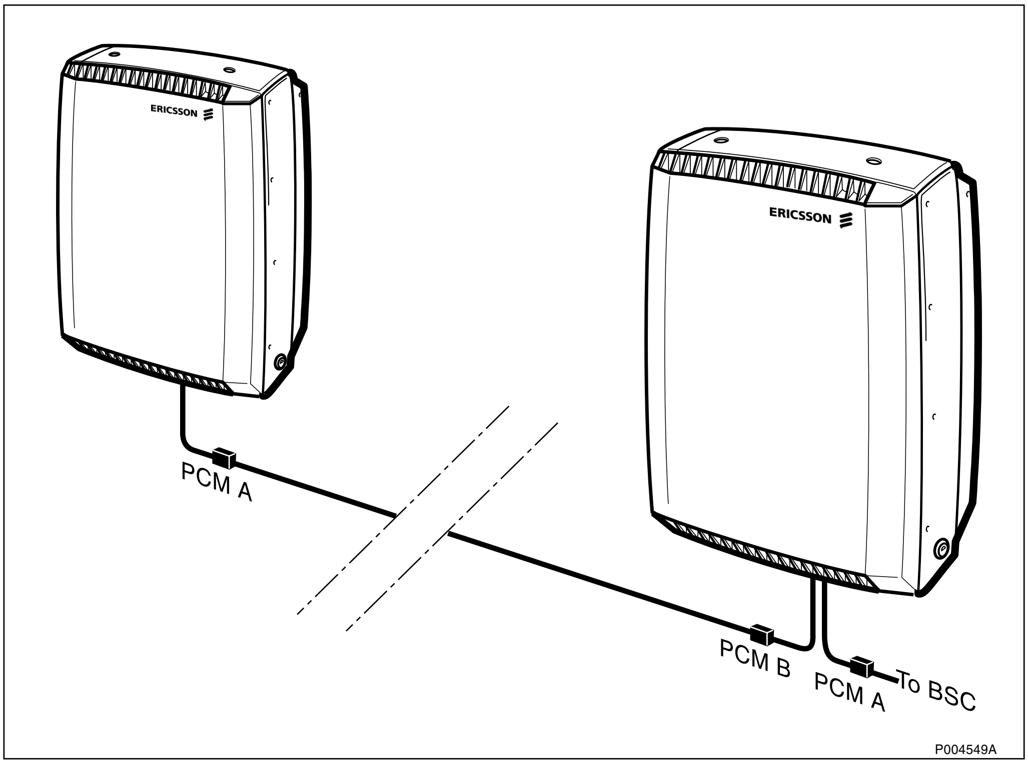

Figure 407 Cascaded cabinets

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.

13.1.12 HDSL Modem (Optional)

The HDSL modem 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.

The HDSL modem uses two of the external alarms.

A description of installation of the HDSL modem is included in *chapter Installation of RBS 2302* and the technical description is presented in *Section 13.3 HDSL Modem (Optional) on page 412*.

13.1.13 External Alarms

For supervision of external equipment, 8 external alarm circuits can be connected to a terminal block in the base station. Optional equipment will occupy the following alarm inlets:

- Fan Unit: Alarm inlet 2
- HDSL modem: Alarm inlet 3 and 4
- PBC: Alarm inlet 8

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.

13.1.14 Antenna Connections

Antenna jumpers are connected behind the sunshield on the base station. The connectors are marked X2 and X3.

Table 99 Antenna connectors

Connector	TX/RX diversity
X2	TX0/RXA
X3	TX1/RXB

The antenna connectors are of the TNC-female type according to IEC 169-8.

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 MHz. The table below lists the suitable jumper cables.

Table 100 Jumper cables

Cable	Length	Connector
RPM 119 87/1	1 m.	TNC-male and N-female
RPM 119 87/2	1 m.	TNC-male and 7/16-female
RPM 513 760/1	1 m.	TNC-male and N-male

13.2 Power and Battery Cabinet

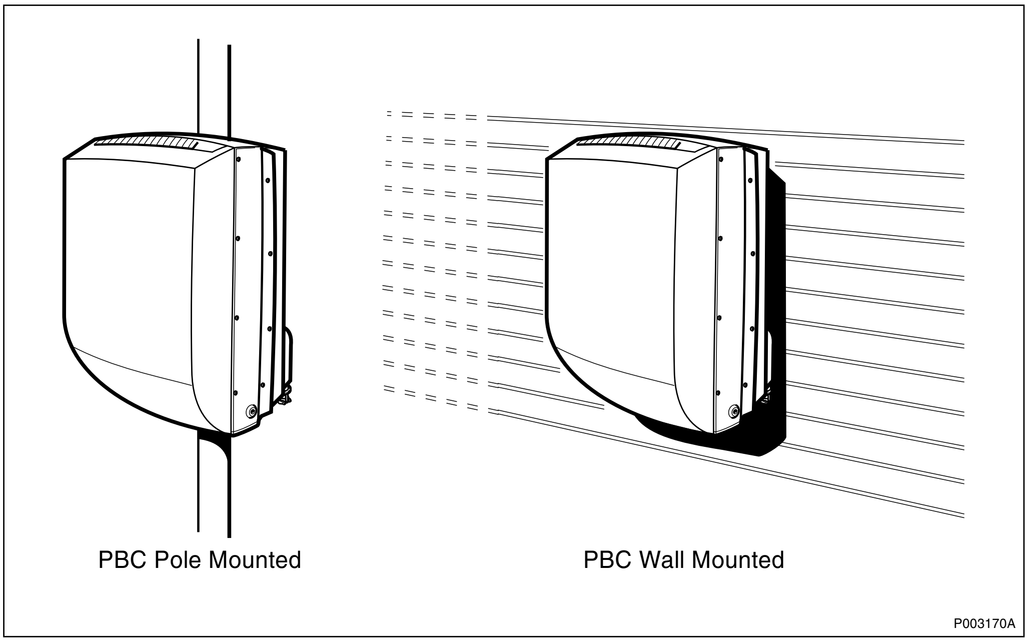

Figure 408 Power and Battery Cabinet

The PBC powers the optional radio link equipment (-48 V) during normal operation, and provides battery back-up for RBS 2302 and the radio link equipment in case of power failure.

Note: The batteries must be installed in the PBC to make Maxite function correctly.

Up to two MINI-LINK C or three MINI-LINK E can be supplied.

The PBC consists of the following main units:

- Mounting base
- Cabinet
- Batteries – 4 pcs
- Sunshields

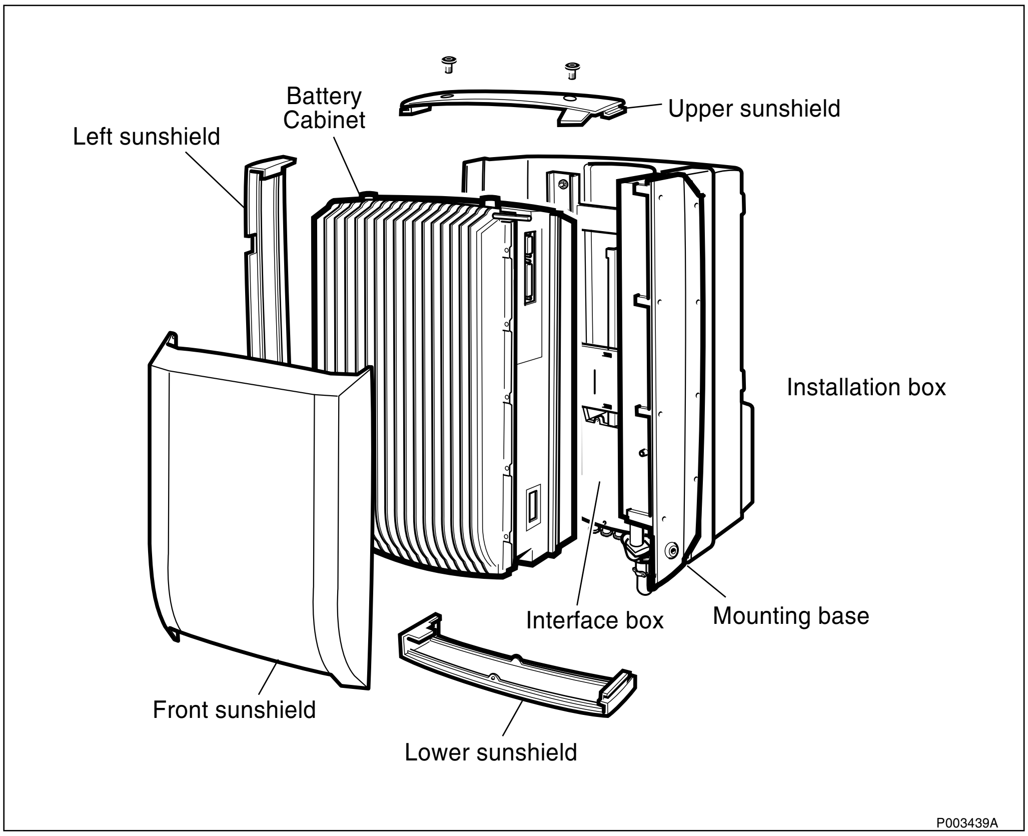

Figure 409 Main units

13.2.1 Mounting

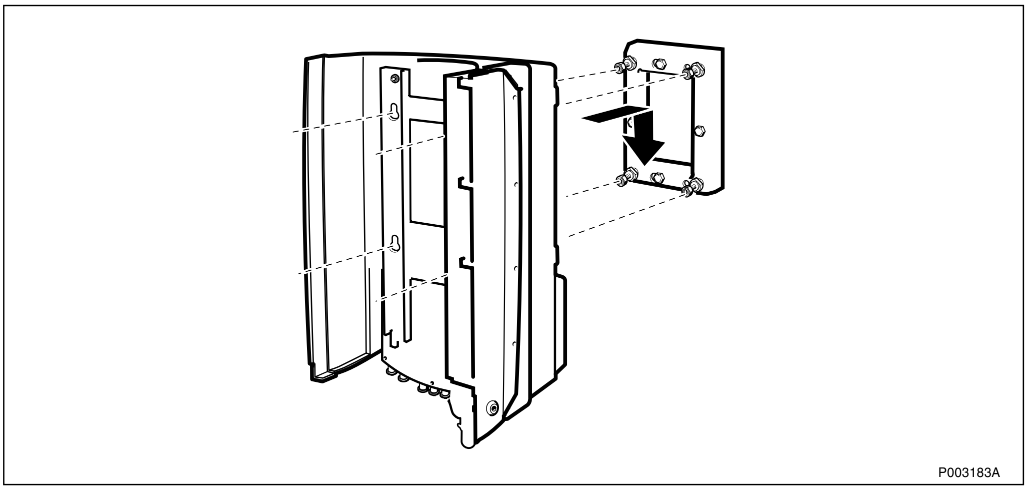

Figure 410 Mounting base and mounting plate

A mounting plate is used to fix the PBC to a flat surface.

In combination with the pole fixture it is also used to install the PBC on a pole.

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.

The cabinet must always be installed vertically and with the cable inlets down.

13.2.2 Dimensions and Weight

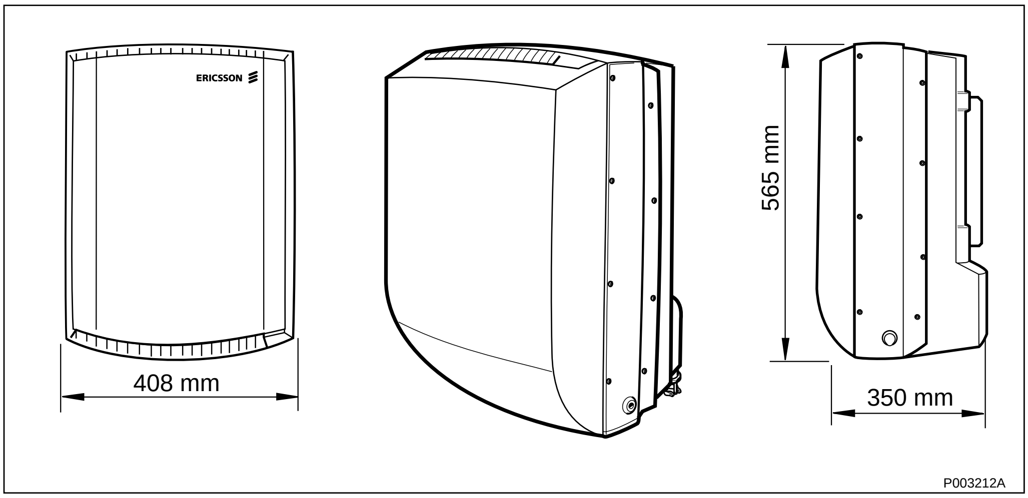

Figure 411 Dimensions

Table 101 Dimensions

	Height	**Width**	**Depth**
PBC	565 mm	408 mm	350 mm

Table 102 Weights

Cabinet (without 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

13.2.3 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.

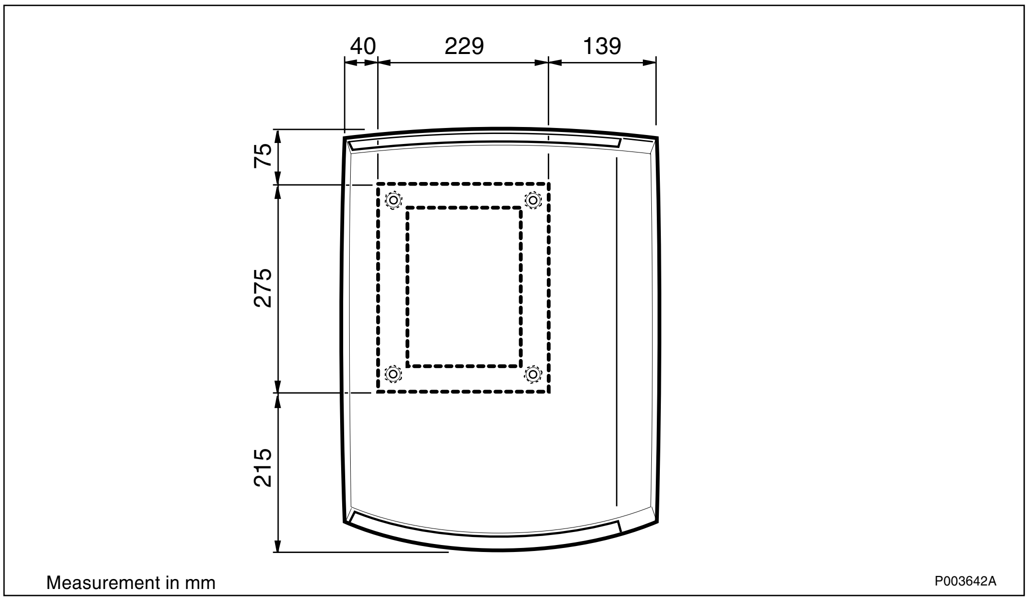

Figure 412 Mounting plate and equipment contour

The *figure above* 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.

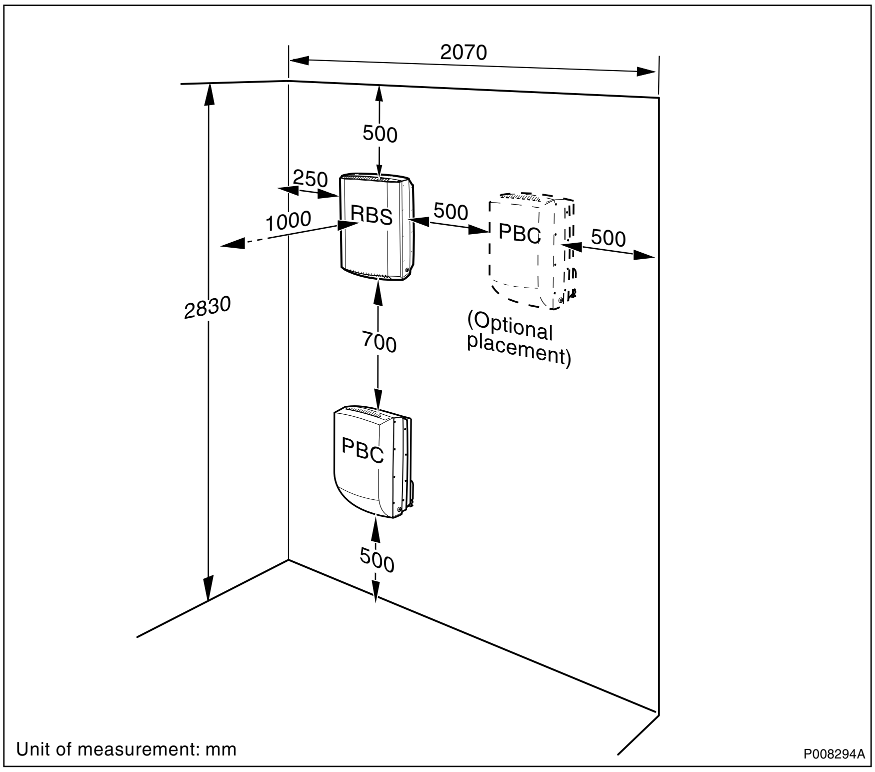

Figure 413 Minimum space requirements

The maximum distance between the PBC and the RBS 2302 is 5 m, limited by the length of the PSA-cable.

13.2.4 Wind Load

The wind load at 50 m/s is 650 N.

13.2.5 Climatic Endurance

Table 103 Climatic endurance

Environmental parameter	Units	Normal condition	Non–destructive
Temperature	°C	-33 to +45	-40 to +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.

13.2.6 Vibrations

PBC withstands vibrations below 1.0 G and shocks below 25 G.

13.2.7 Acoustical Noise

PBC does not emit any acoustical noise.

13.2.8 AC Mains Power Supply

The PBC can be connected to the same nominal mains supply voltages as RBS 2302, as presented in *Table 104 on page 409*.

The PBC shall be connected to a dedicated circuit in the power distribution board. The circuit must be connected to the same phase as the RBS 2302. 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. It is recommended to supply the site from one phase only.

Note: Fuse value must not exceed 10 A.

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 terminals in the interface box on the mounting base. The terminals will accept wires having a maximum area of 2.5 mm^2.

The mains voltage is connected between two of the terminals. The third terminal is a screw terminal on the body, used for protective earth.

The cable gland has capacity for one power cable with an outer sheath diameter of 7– 15 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.

Supply Voltage

Table 104 Supply voltages

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

No adjustments on the PBC are needed to adapt it to the different mains voltages.

Limiting Values for AC Mains Supply

Table 105 Limiting values

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

Power Consumption and Heat Generation

Table 106 Power consumption and heat generation

Operation	Power consumption	Heat generation
Normal operation(1)	150 VA	60 W
Maximum(2)	200 VA	75 W

(1) PBC with fully loaded batteries in configuration with one RBS 2302 and three MINI-LINK E Micro.
(2) With activated heater

13.2.9 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 Power Supply Adapter (PSA). The battery adapter is inserted into the battery compartment in RBS 2302 and the cable to the battery adapter is connected to the interface box in the PBC.

13.2.10 PBC Backup Capacity

The table below states the power consumption of the different parts of the site and how much battery power the equipment requires from the PBC when site is in back-up mode.

The table is divided into:

- Typical values — values measured by Ericsson in laboratory on a limited number of units.
- Guaranteed values — values guaranteed by the design.

In order to find out the:

- typical back-up time, add the values in the column “Battery Power Consumption Typical” and check the corresponding value in *Figure 414 on page 412*.
- guaranteed back-up time, add the values in the column “Battery Power Consumption Guaranteed” and check the corresponding value in *Figure 414 on page 412*.

All values in the table is when full traffic on all TRXs.

Table 107 Power consumption

Item	Voltage	Power Consumption Typical	Power Consumption Guaranteed	Battery Power Consumption Typical	Battery Power Consumption Guaranteed
RBS	+24 V	70 W	150 W	86 W	185 W
PSA cable loss(1)	+24 V	5 W	10 W	6 W	12 W
Link equipment(2)	-48 V	22 W	25 W	20.5 W	25 W
Link cable loss	-48 V	0.028 W/m	0.028 W/m	0.026 W/m	0.026 W/m

(1) For PSA Cable of 5 m.
(2) One terminal MINI-LINK E Micro (up to three can be supplied).

The *figure below* is used for normal temperature (approximately 25 degrees) and for cold environments (approximately 33 degrees below zero).

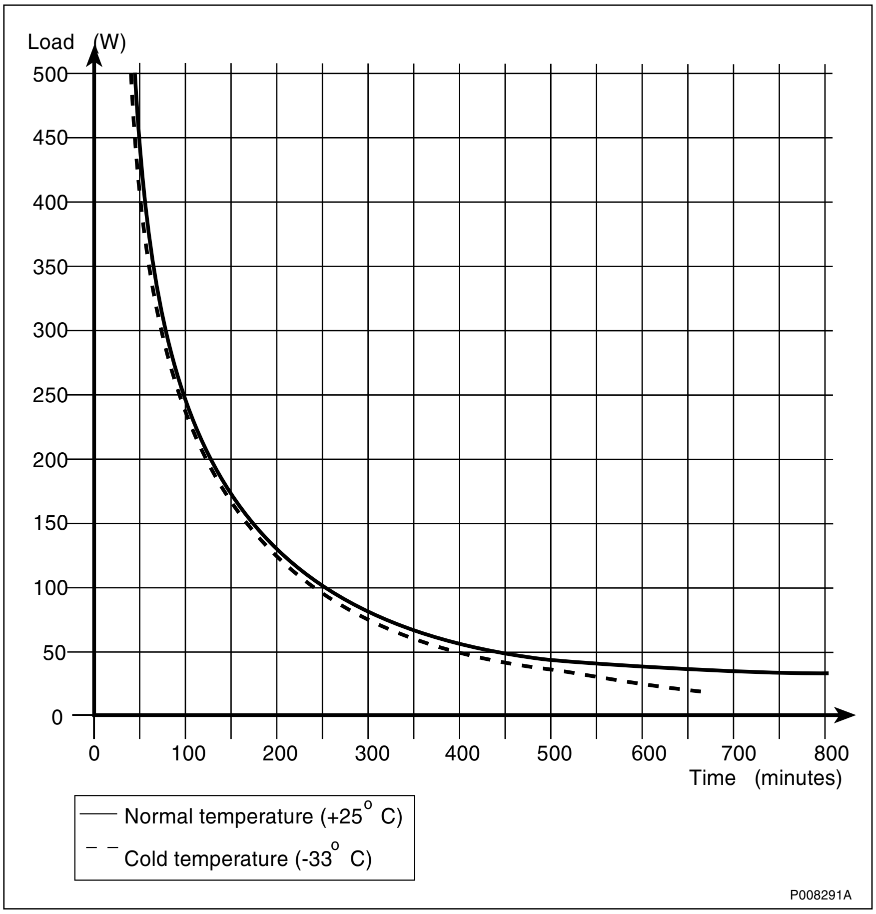

Figure 414 Power consumption graph

13.2.11 Earthing

The mounting base must be earthed separately and is provided with an M8 earthing bolt for this purpose. A suitable earthing kit must be used to connect the bolt with the lightning protection system of the site.

13.3 HDSL Modem (Optional)

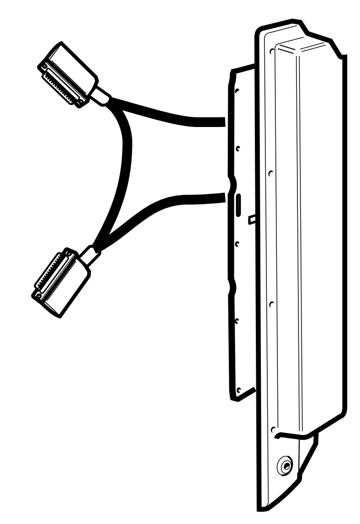

Figure 415 Optional HDSL modem

The HDSL modem is an optional transmission module, mounted in an extended installation box door. By using the integrated HDSL modem 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.

The HDSL modem uses two of the external alarms. These alarms is defined by setting of a switch on the HDSL modem.

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.

13.3.1 Dimension and Weight

Table 108 Dimensions and weight

	Height	Width	Depth	Weight
HDSL modem	488 mm	112 mm	44 mm	1.7 kg

13.3.2 Power

Table 109 Dimensions and weight

Input voltage	+7 V DC (supply from the radio cabinet)
Power consumption	max 3.5 W at NTU-E-2P

13.3.3 HDSL Modem Interfaces

Data Terminal Equipment Interface (to BTS)

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 Interface (HDSL)

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 110 on page 413*and *Table 111 on page 414*

Table 110 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 111 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

10 μV/√(Hz) is the noise level according to the ETSI Technical Specifications TS 101 135. 5 μV/√(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 10 μV/√(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.

13.4 Fan Unit (Optional)

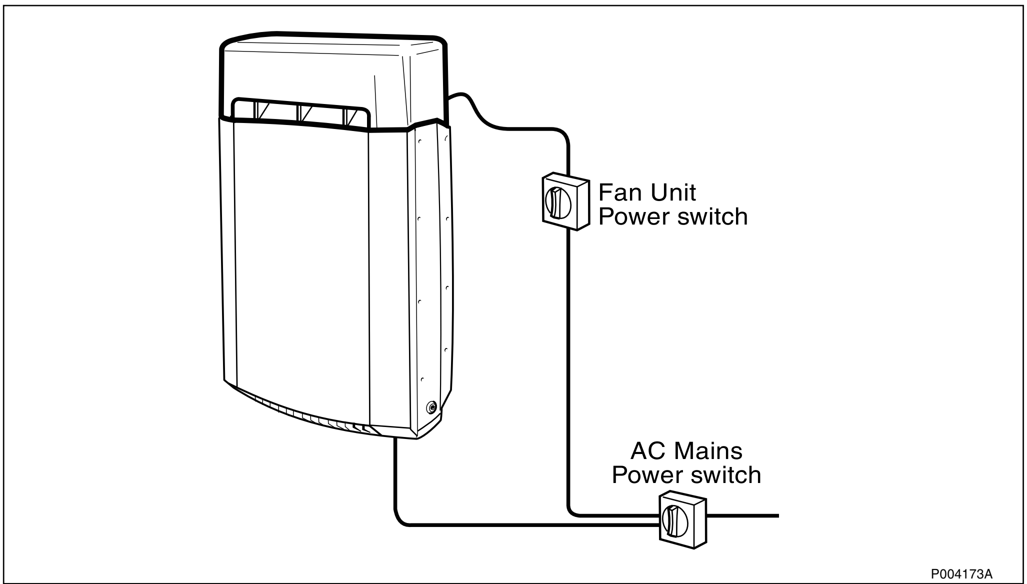

Figure 416 Fan Unit

A fan unit is available as an option. This unit will increase the high temperature endurance for the base station to +55 °C.

The Fan Unit will switch on if the ambient temperature is above approximately +35 °C. It will switch off again at approximately +30 °C.

13.4.1 Dimensions and Weight

Table 112 Dimensions

	Height	**Width**	**Depth**
Fan Unit	193 mm	405 mm	193 mm

13.4.2 Space Requirements

The fan unit is installed on top of the RBS cabinet and will increase the height of the RBS 2302 with 115 mm.

13.4.3 Acoustic Noise

The Fan Unit contributes with less than 5.5 Bel at temperatures below +30 °C and less than 6.5 Bel at other temperatures.

13.4.4 AC Mains Power Supply

The Fan Unit should be provided with its own mains switch. Otherwise it will be necessary to switch off the supply to the entire base station when the Fan Unit is replaced.

The Fan Unit can be connected to the same supply voltages as the RBS 2302. A switch is provided to set the supply voltage range to 230 V or 115 V.

The power consumption is less than 15 VA at nominal mains supply of 230 V.

13.4.5 Alarms

The Fan Unit has one alarm connection, which will occupy one of the external alarm connections.

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14 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.

1–P	One Pair connection with echo cancellation (= 2 wires)
2–P	Two Pair connection with echo cancellation (= 4 wires)
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.
BCS	Block Check Sequence
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.
Cabinet	The physical housing of a base station
CAN	Canada
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
CRC	Cyclic Redundancy Check
CS	Coding Scheme
CSA	Canadian Standards Association
CSES	Consecutive Severely Errored Second
CSU	Customer Service Unit
Dannie	ASIC in the TRU
dB	decibel

dBm	Decibel per 1 milliwatt
DB	DataBase
DC	Direct Current
DCC	Digital Cross Connector
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
DTE	Data Terminal Equipment
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
EOC	Embedded Operations Channel
ES	Errored Second

ESB	External Synchronization Bus
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	Filter Unit
GPRS	General Packet Radio Services
GS	General Specification
GSL	GPRS Signalling Link
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)
HCE	HDSL Central Equipment
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).
IA	Immediate Assignment
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
MAC	Medium Access Controller
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.
NTU	Network Terminating Unit
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, and so forth
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)
PCU	Packet Control Unit
PDCH	Packet Data Channel
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	Radio Link Control
RLC	Repair Logistic Centre
RSL	Radio Signalling Link
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).
TC	Transaction Capabilities
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.
TLS	Terrestrial Link Supervision
TM	Transport Module
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
TRS	Transceiver System
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

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.

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CAPTION LIST

Document No.	
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Date	Rev
01-10-11	A

User´s Guide

RBS 2302

Quick Guides

EN/LZT 720 0209 R1A

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EN/LZT 720 0162 R1B

EN/LZT 720 0190 R1B

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Antenna System
RBS 2302

QUICK GUIDE
Test

EN/LZT 720 0209 R1A

Condensed Information for experienced users based on CPI product LZN 302 21, 22, 20, 74, 75

Checking the Installation
↓
Preparing the Antenna Tester for DTF Tests
↓
Connecting DTF Test Setup
↓
Performing DTF Tests
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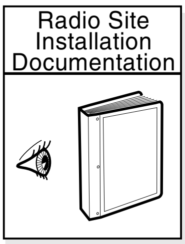
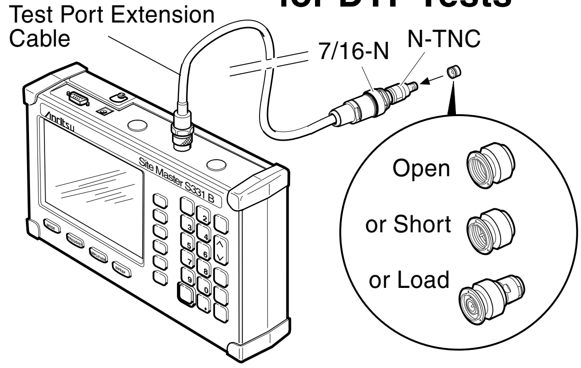
Calculating Feeder Attenuation
↓
Preparing the Antenna Tester for SWR Tests
↓
Connecting SWR Test Setup
↓
Performing SWR Tests
↓
Concluding Routines

Checking the Installation



Preparing the Antenna Tester for DTF Tests



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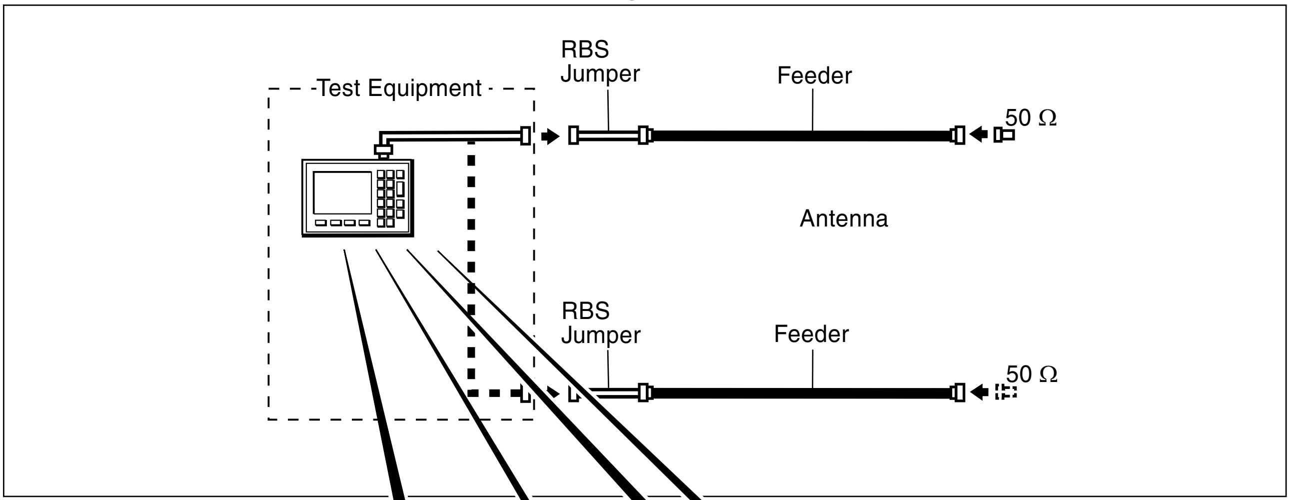
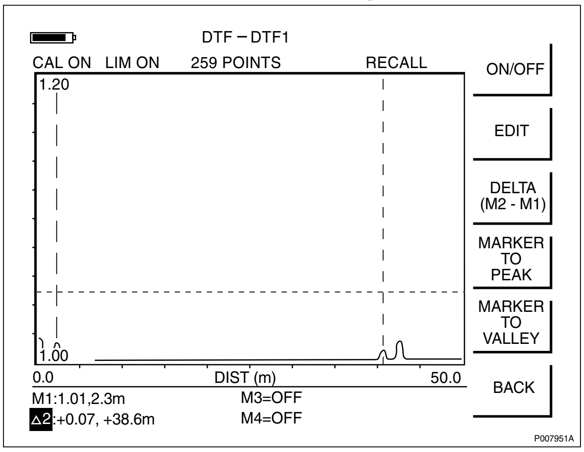
Connecting DTF Test Setup



System	Start freq. MHz	Stop freq. MHz
GSM 900	800	1000
GSM 1800	1700	1900
GSM 1900	1800	2000

Supplier Code	Product No.	Propagation Velocity Factor (PROP VEL)	Attenuation, dB/m (CABLE LOSS)		
			900 MHz	1800 MHz	1900 MHz
Andrew 3/8", LDF2RN	TZC 500 82	0.88	0.110	0.159	0.166
Andrew 1/2", LDF4RN	TZC 500 80	0.88	0.069	0.100	0.104
Andrew 1/2", LDF4	TZC 500 26	0.88	0.069	0.100	0.104
Andrew 7/8", LDF5	TZC 500 22	0.89	0.039	0.057	0.060
Andrew 7/8", LDF5RN	TZC 500 47	0.89	0.039	0.057	0.059
Andrew 1 5/8", LDF7	TZC 500 28	0.88	0.023	0.034	0.036

Performing DTF Tests - Measurement examples



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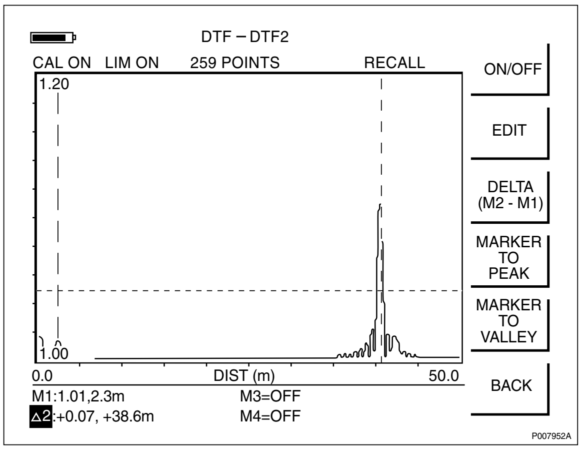

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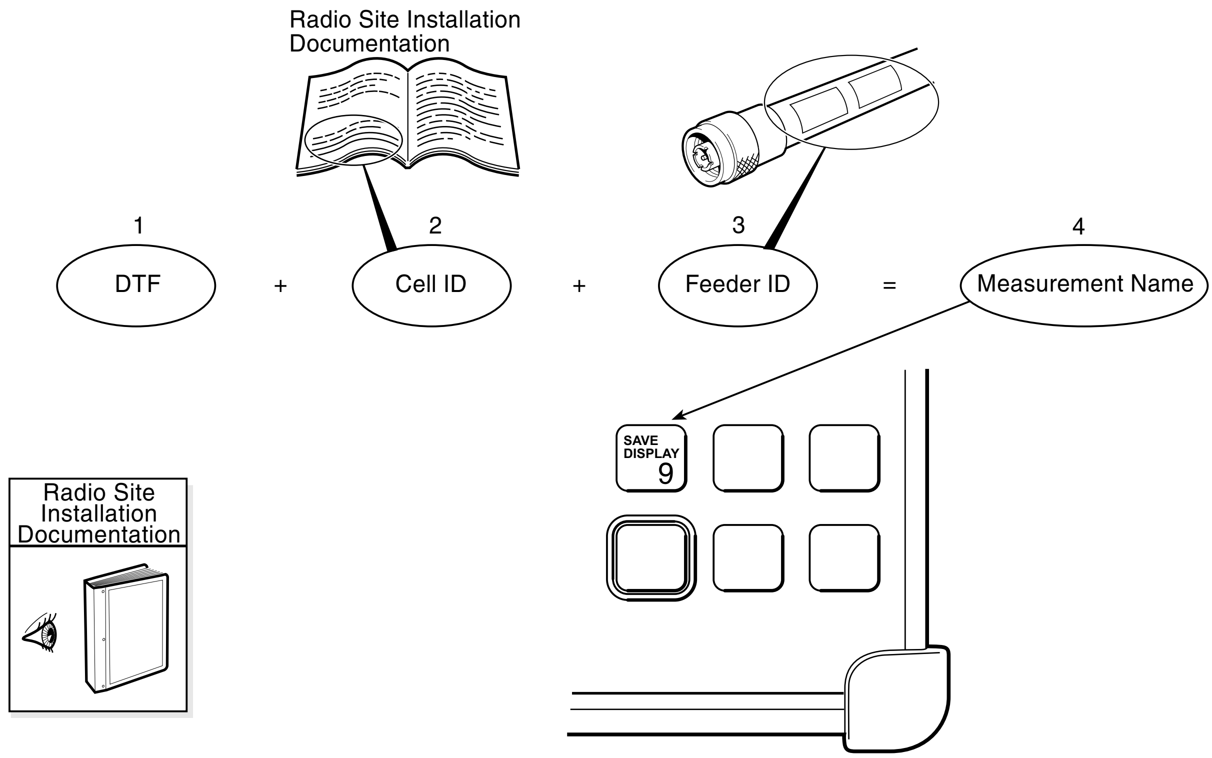
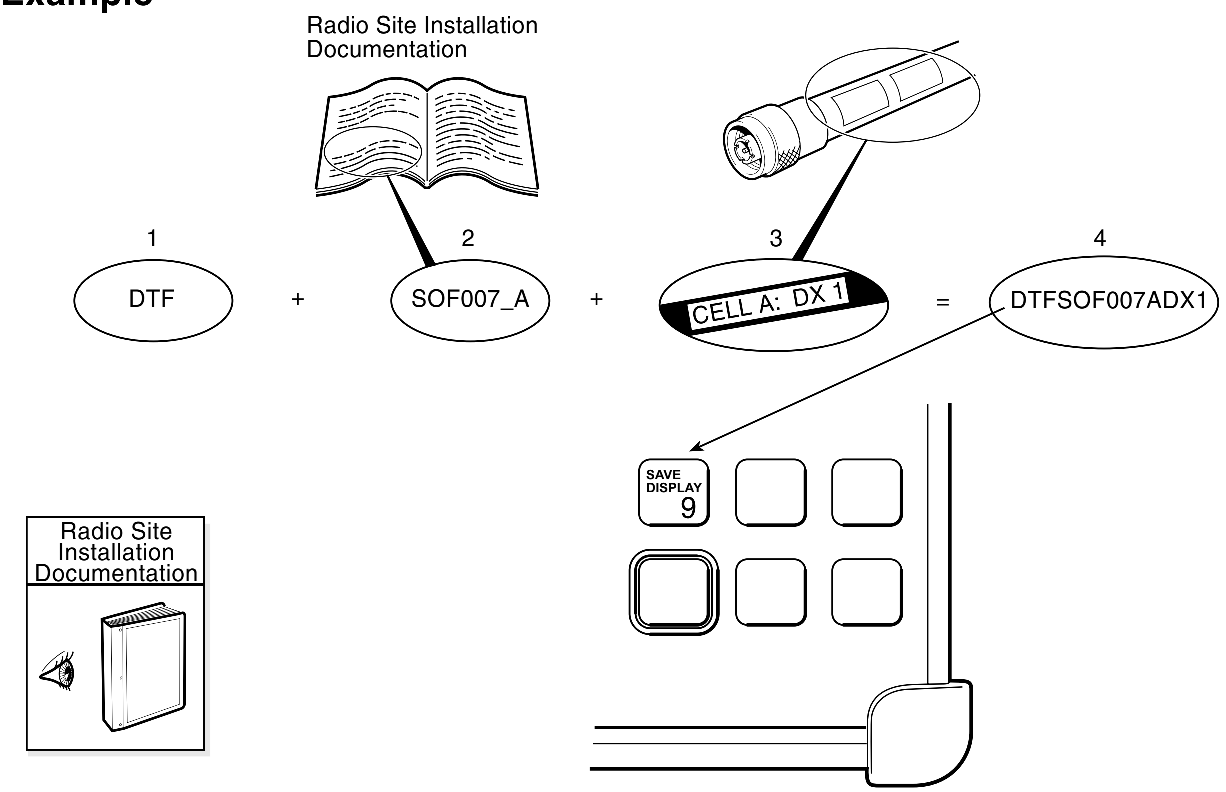
Saving DTF Measurement

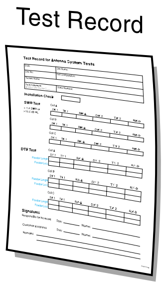


Example



Calculating Feeder Attenuation

A + B = Total feeder attenuation



Supplier Code	Product No.	Attenuation, dB/m (CABLE LOSS)		
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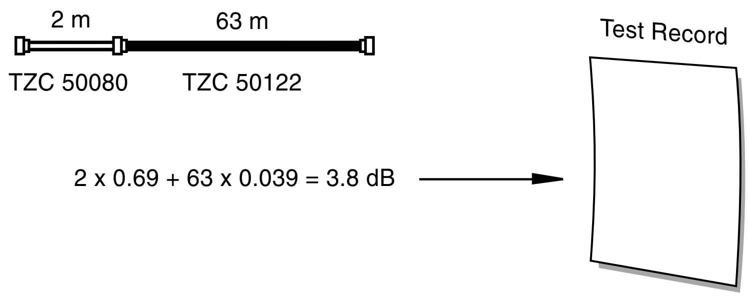
Andrew 7/8", LDF5RN	TZC 500 47	0.039	0.057	0.059
Andrew 1 5/8", LDF7	TZC 500 28	0.023	0.034	0.036

Example



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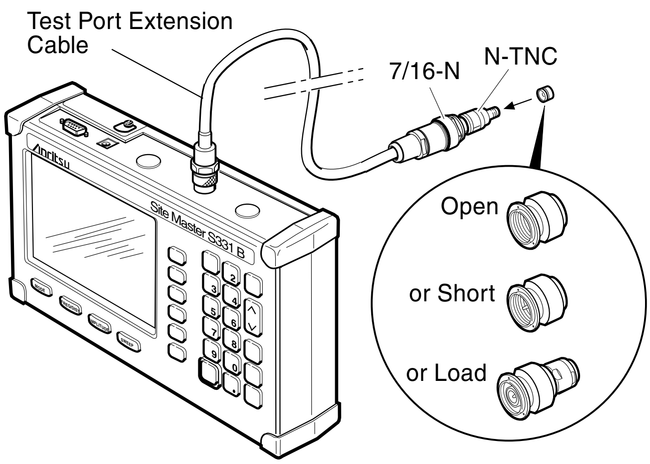
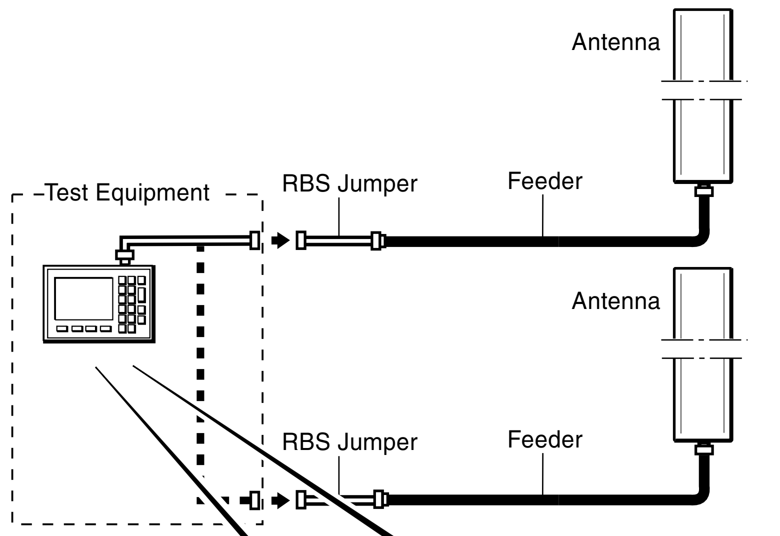
Andrew 1 5/8", LDF7	TZC 500 28	0.023	0.034	0.036

Perparing the Antenna Tester for SWR Test

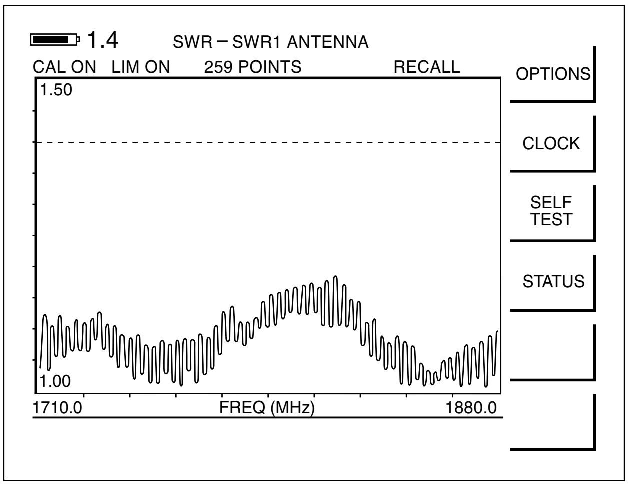


Connecting SWR Test Setup



System	Start freq. MHz	Stop freq MHz.
GSM 900	890	960
E-GSM 900	880	960
GSM 1800	1710	1880
GSM 1900	1850	1990

Preforming SWR Tests - Measurement examples



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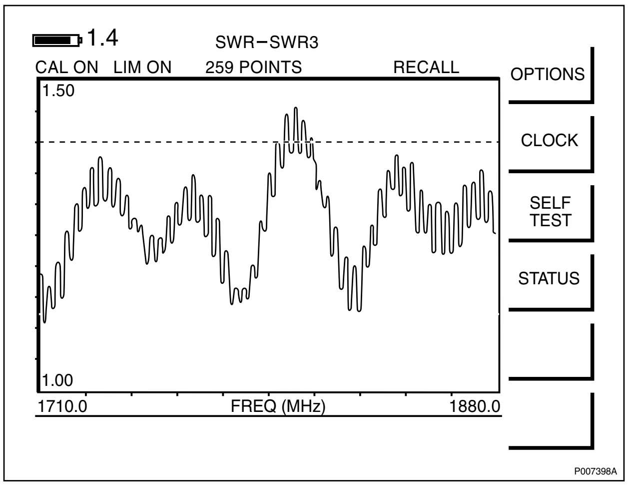

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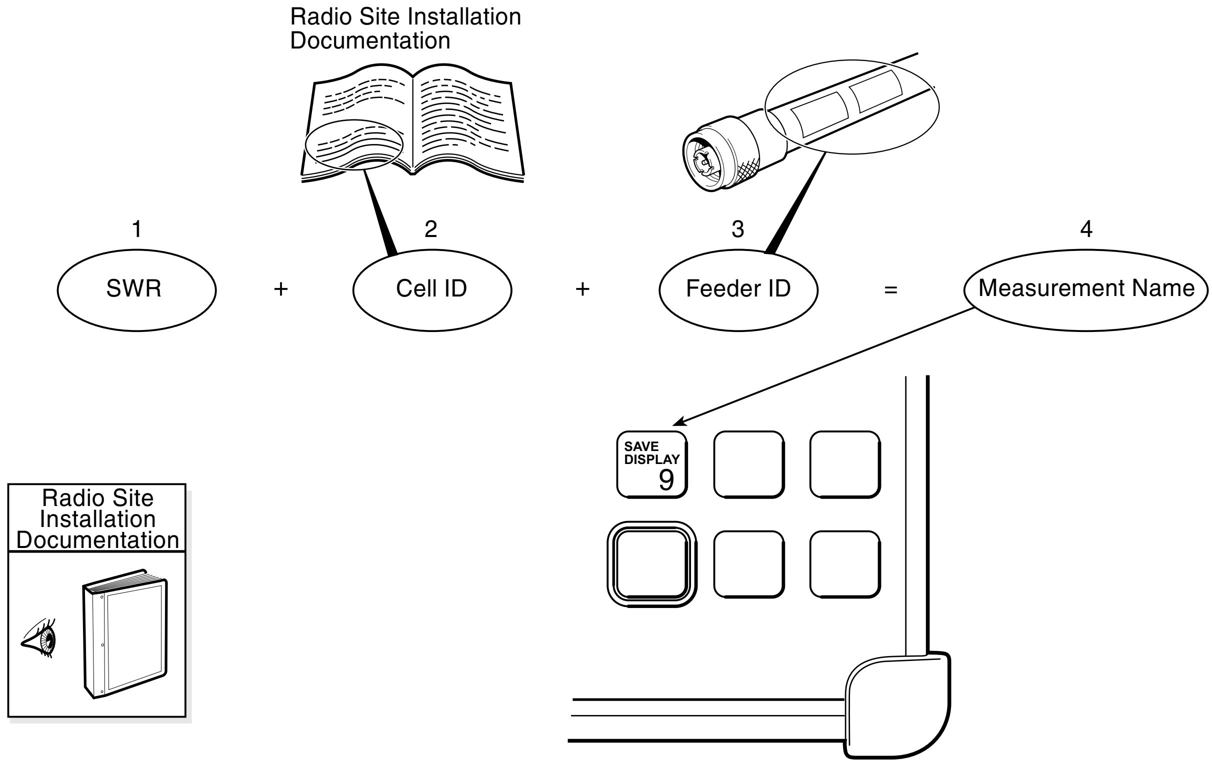
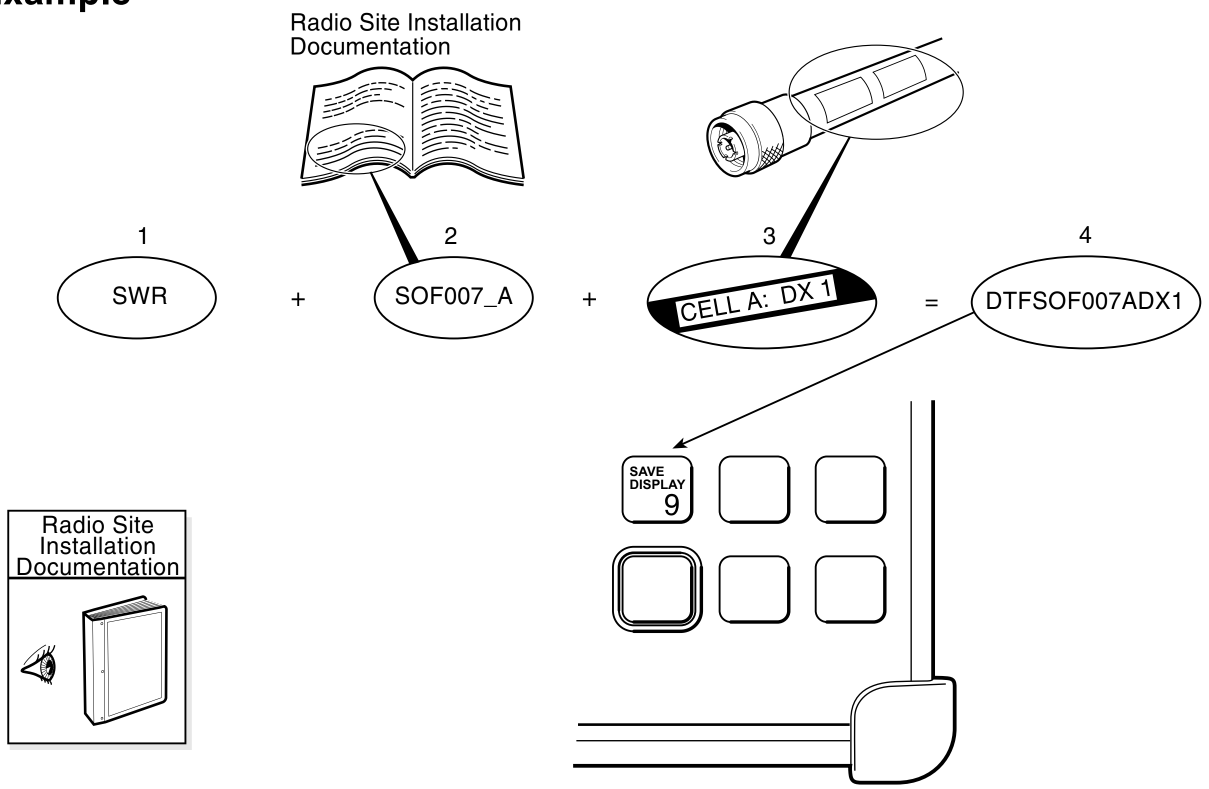
Saving SWR Measurement



Example

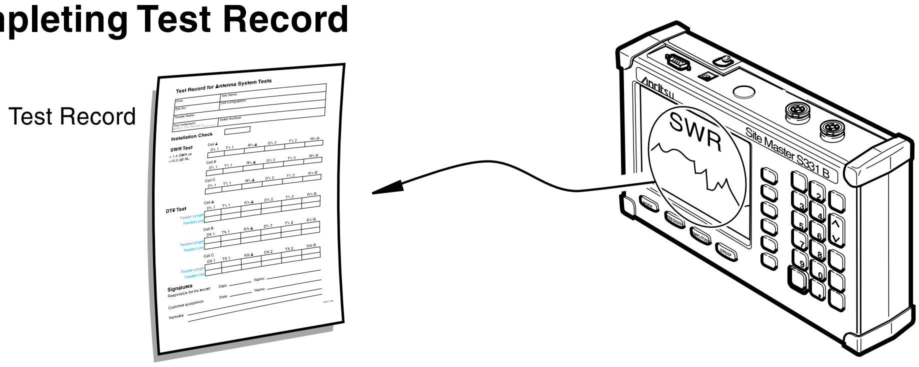


Conversion Table Return Loss ←→ SWR

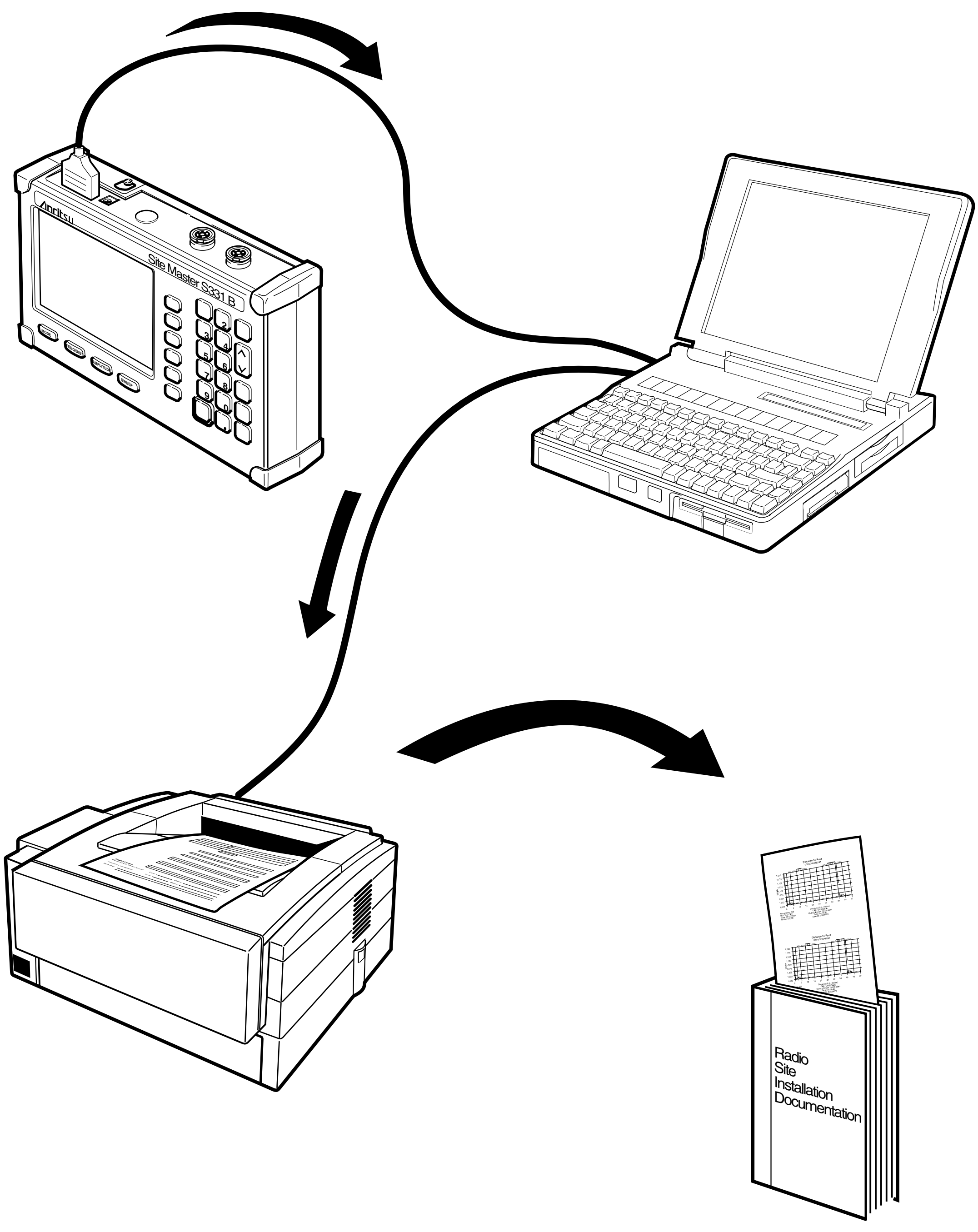
Return Loss (dB)	SWR	Return Loss (dB	SWR	Return Loss (dB)	SWR
4.0	4.42	16.0	1.38	28.0	1.08
6.0	3.01	16.2	1.37	28.5	1.07
8.0	2.32	16.4	1.36	29.0	1.07
10.0	1.92	16.6	1.35	29.5	1.07
10.5	1.85	16.8	1.34	30.0	1.06
11.0	1.79	17.0	1.33	30.5	1.06
11.2	1.76	17.2	1.32	31.0	1.05
11.4	1.74	17.4	1.31	31.5	1.05
11.6	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

Concluding Routines

Completing Test Record



Completing Radio Site Installation Documentation



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Division Mobile Systems
Allén 5, Sundbyberg
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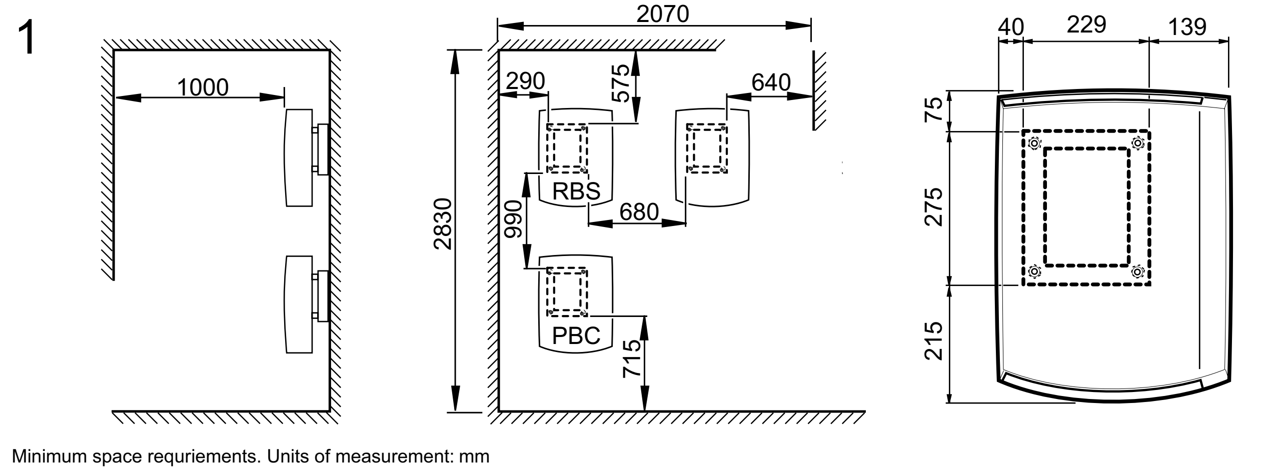
EN/LZT 720 0209 R1A

RBS 2302

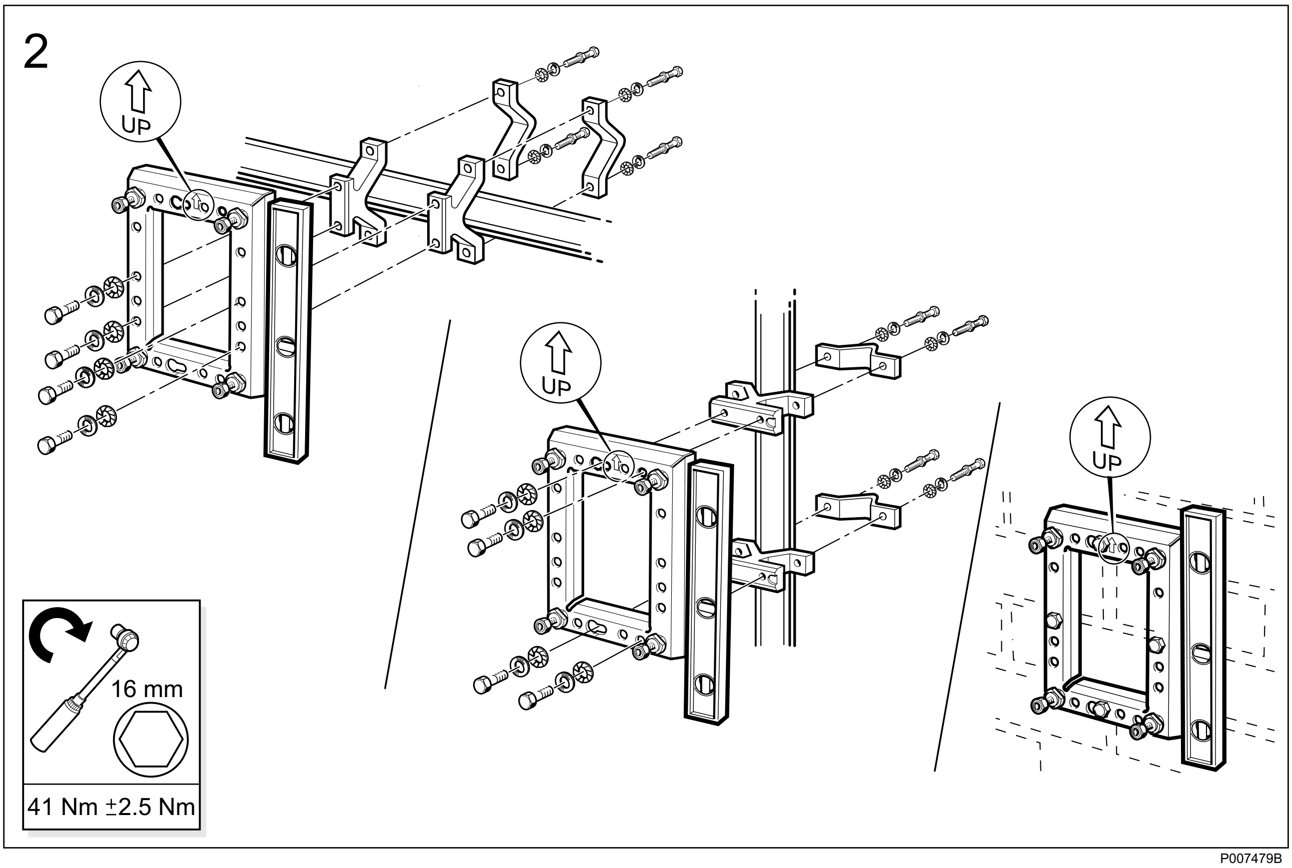
QUICK GUIDE
Installation

EN/LZT 720 0110 R1B

Condensed Information for experienced users based on CPI product LZN 302 74



Minimum space requriements. Units of measurement: mm



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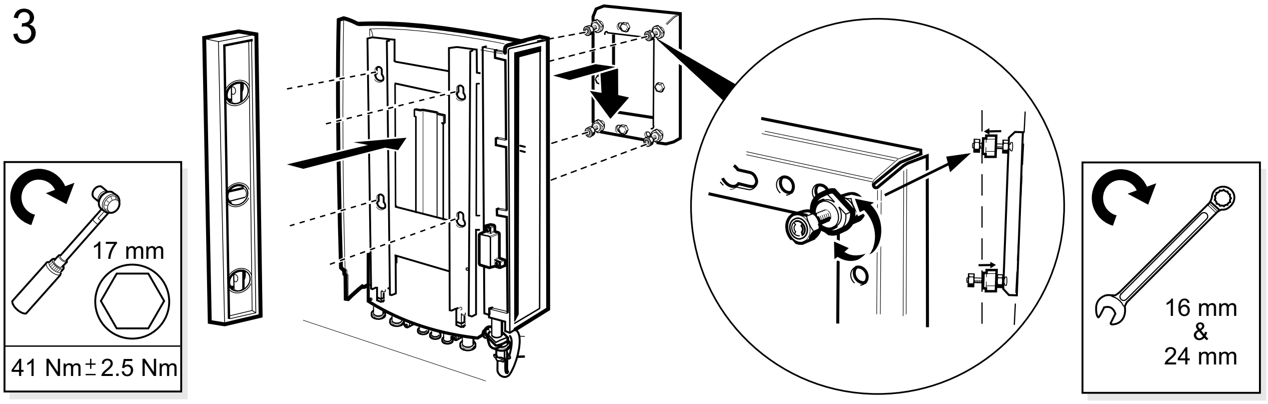
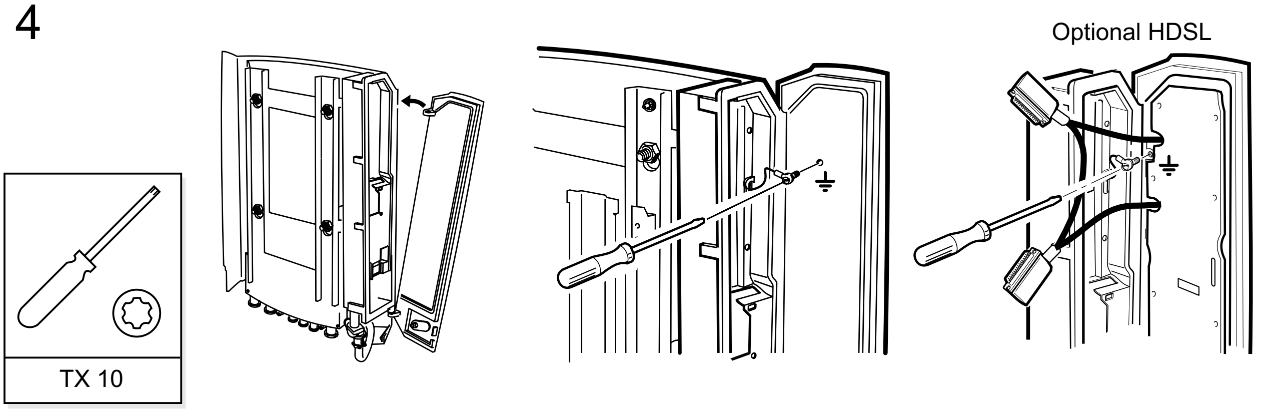
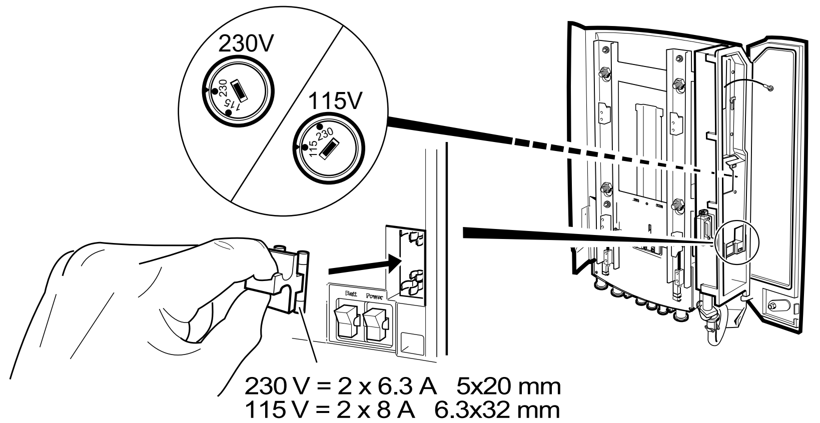

17 mm
41 Nm ± 2.5 Nm
16 mm
&
24 mm

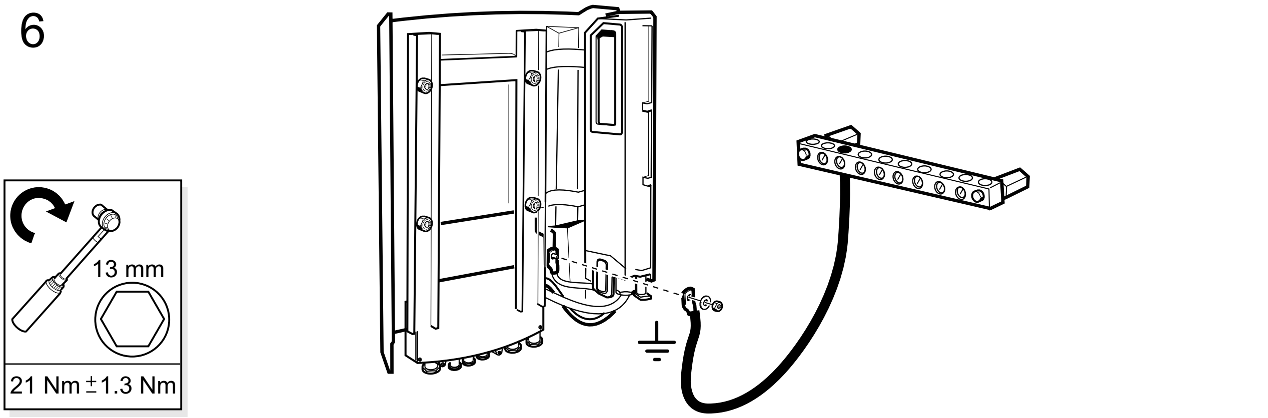
4


TX 10
Optional HDSL

5

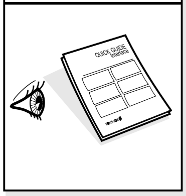

230V
230
115
115V
115
230
Batt.
Power
230 V = 2 x 6.3 A 5x20 mm
115 V = 2 x 8 A 6.3x32 mm

6

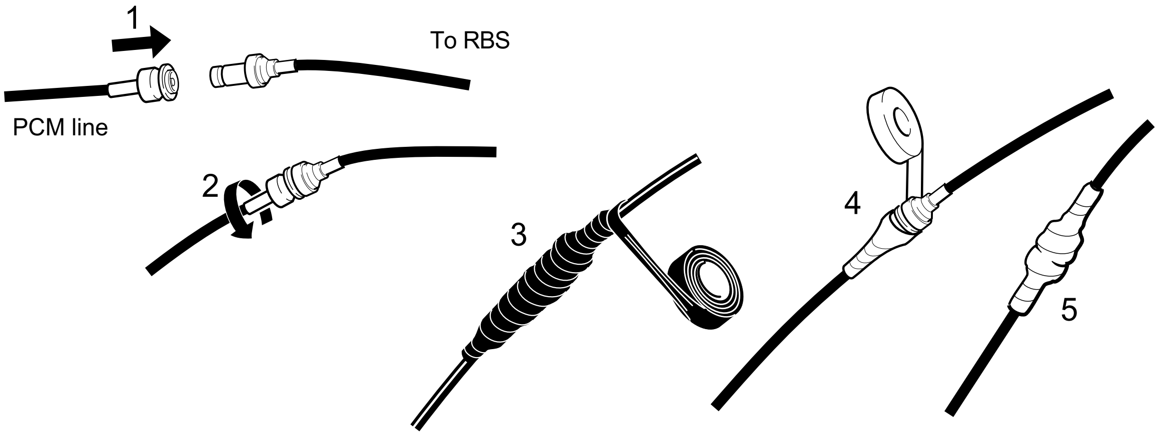

13 mm
21 Nm ± 1.3 Nm

7 External Cables

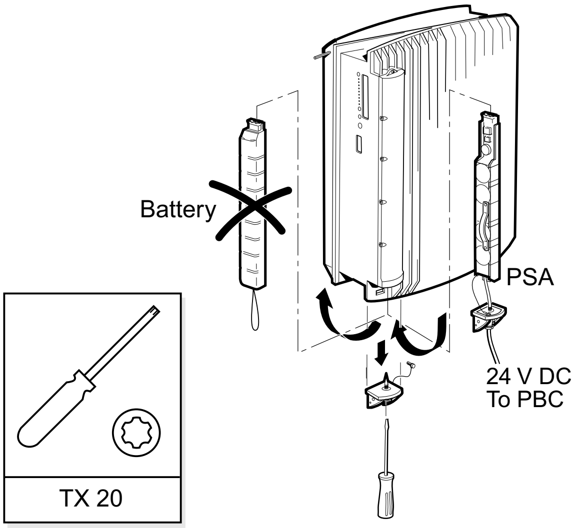
Interface QG



8 PCM line

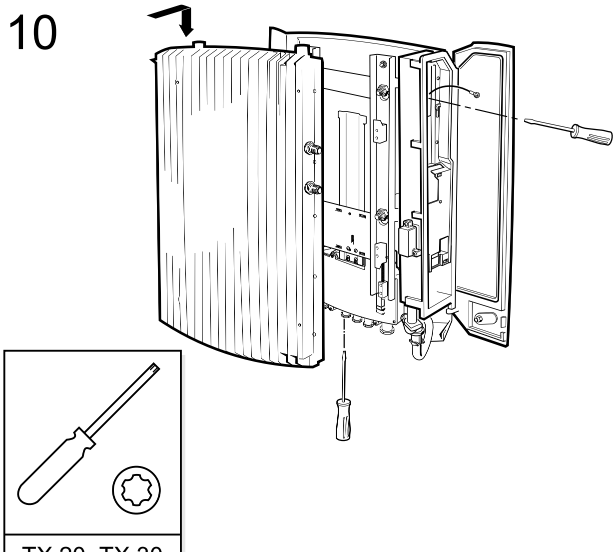


9 Optional PSA

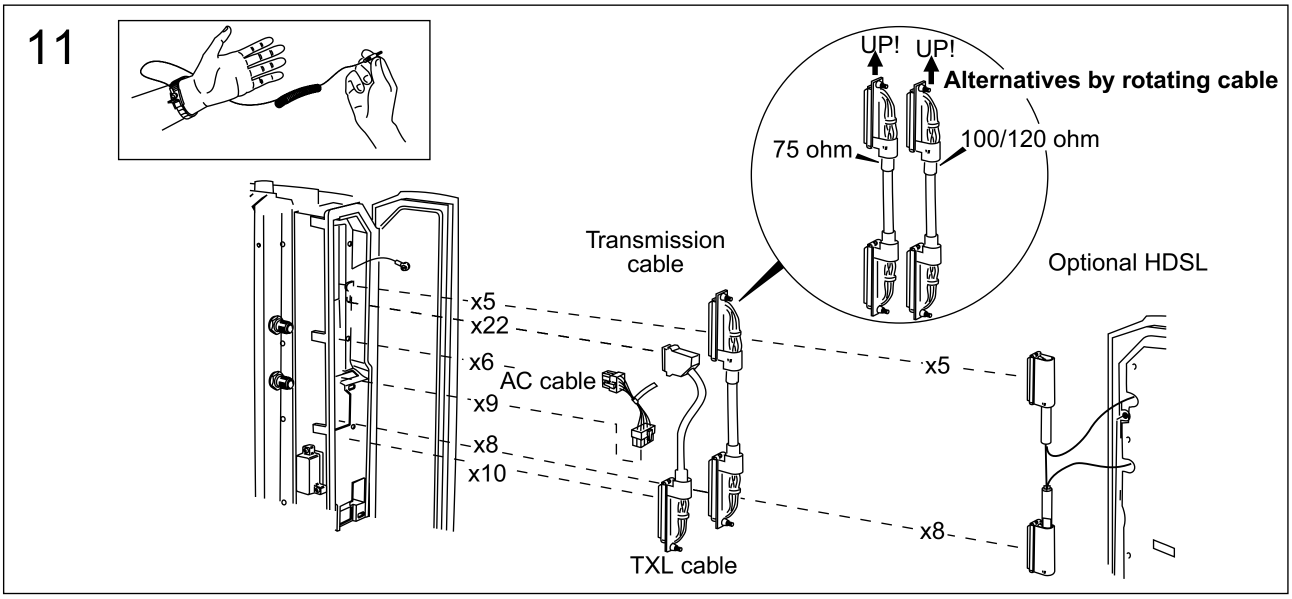


TX 20

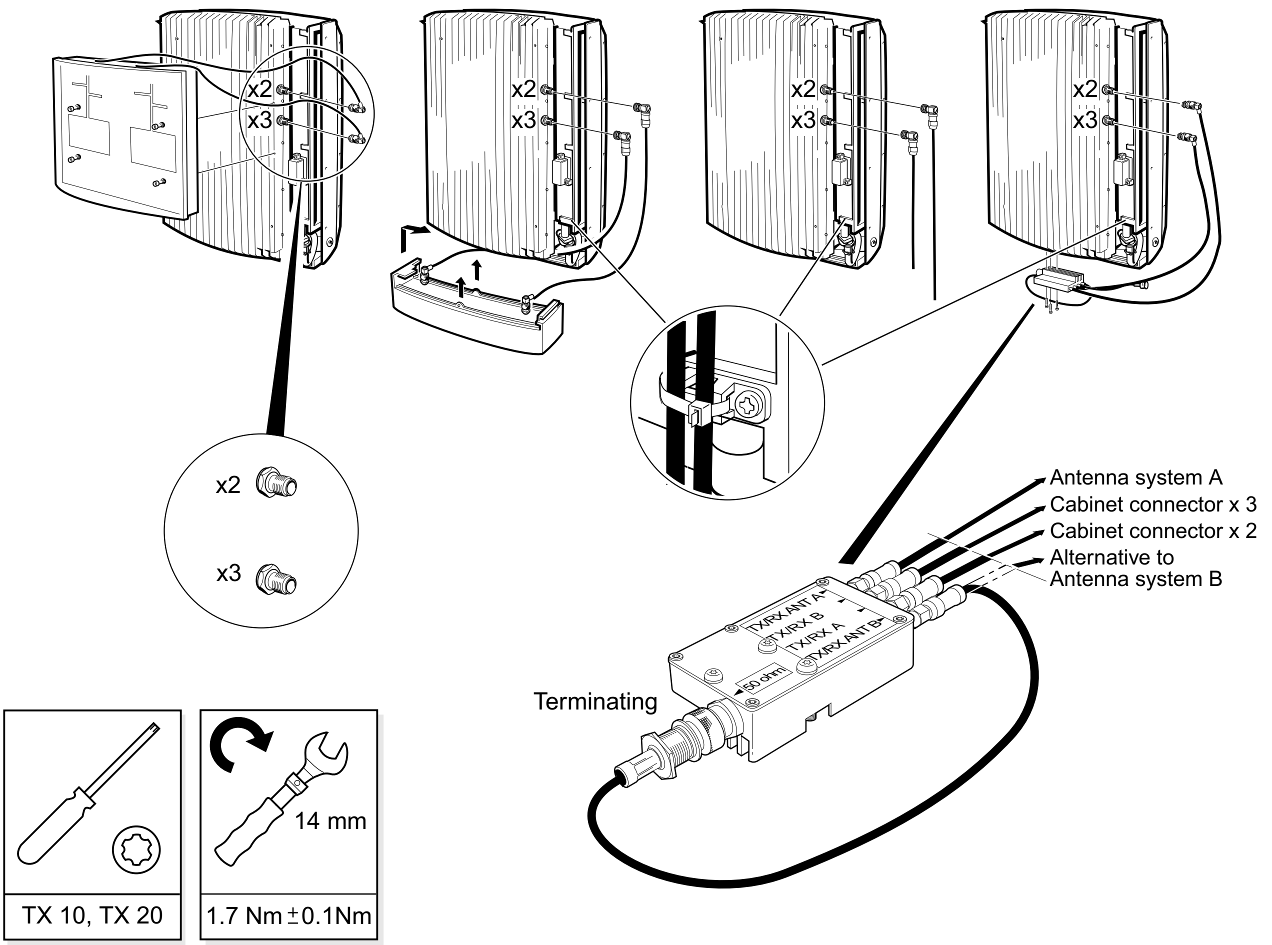
10

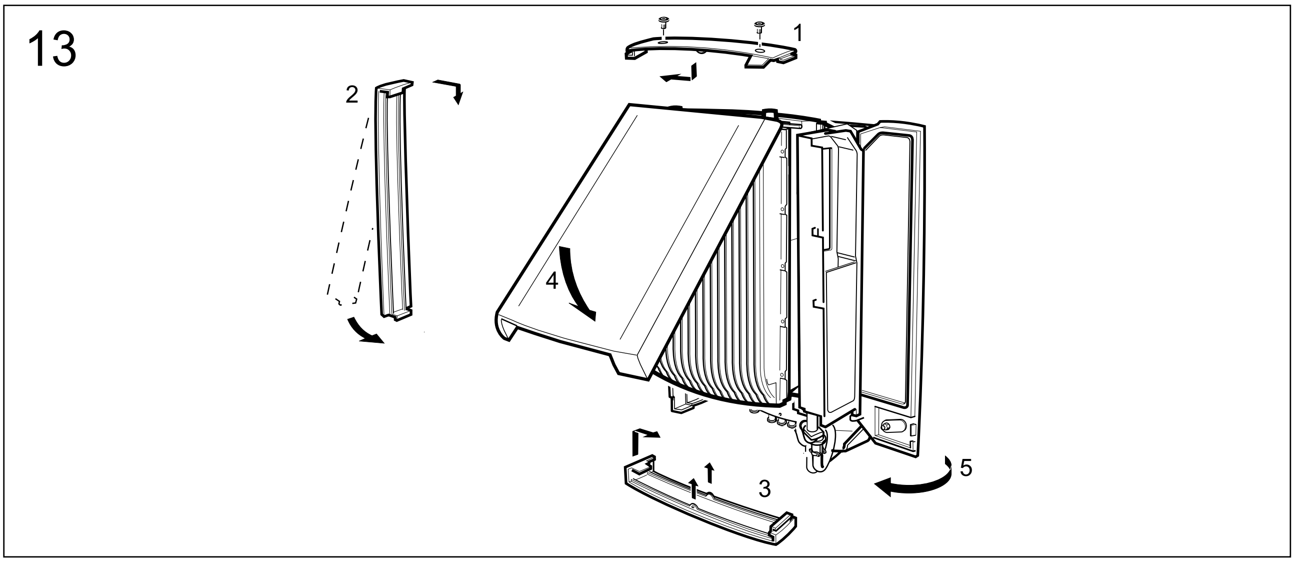


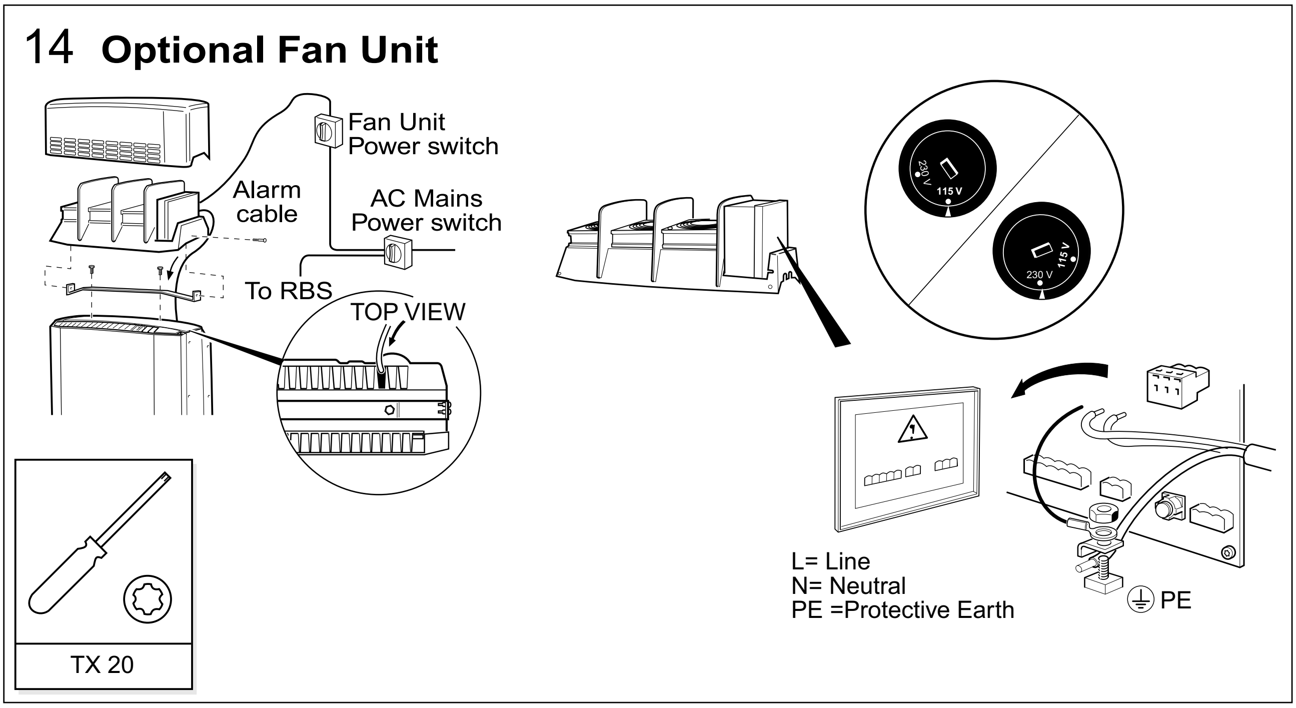
TX 20, TX 30



12 Antenna alternatives




13
1
2
3
4
5


14 Optional Fan Unit
Fan Unit
Power switch
Alarm
cable
AC Mains
Power switch
To RBS
TOP VIEW
230 V
115 V
TX 20
L= Line
N= Neutral
PE =Protective Earth
PE

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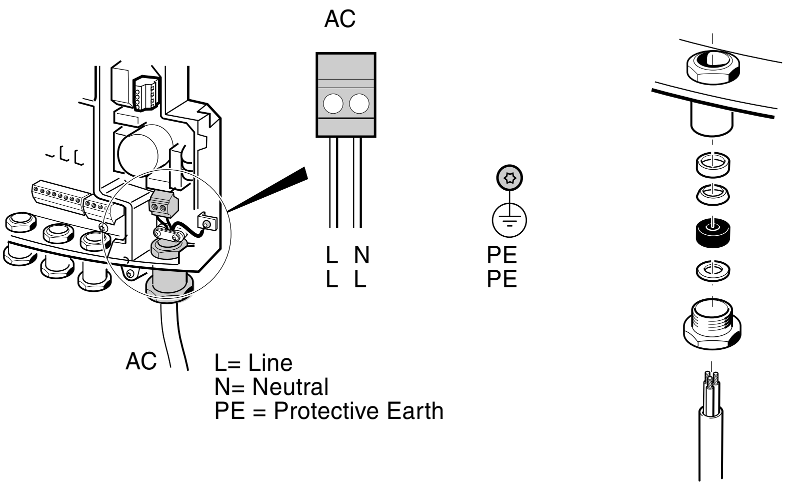
RBS 2302

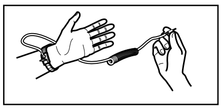
QUICK GUIDE
Interface

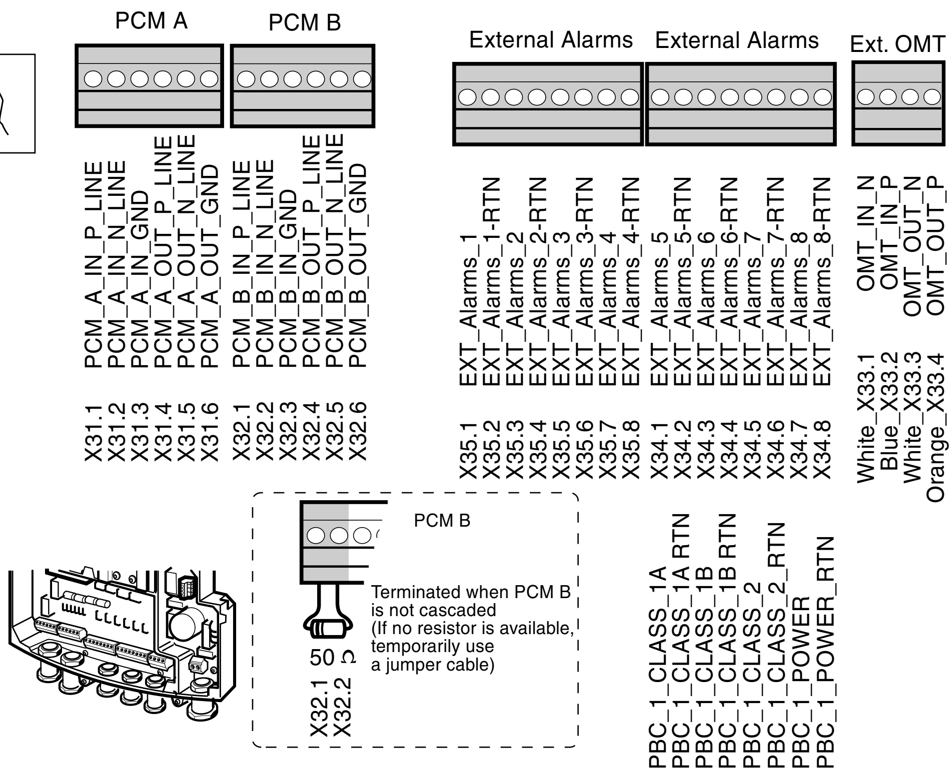
EN/LZT 720 0160 R1B

Condensed Information for experienced users based on CPI product LZN 30274

AC







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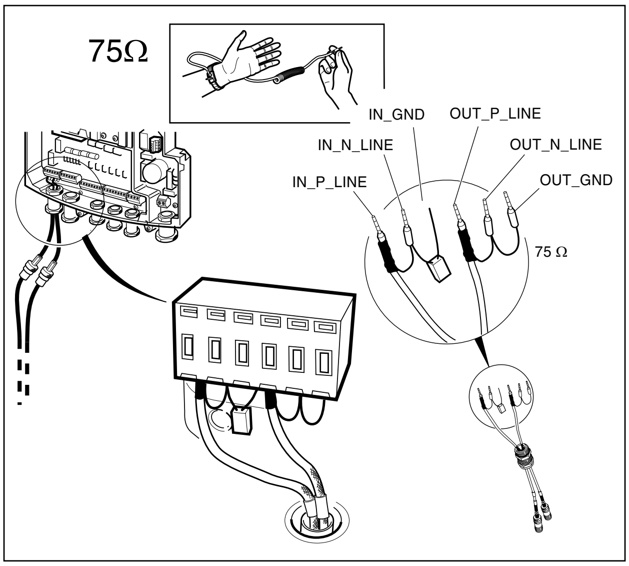
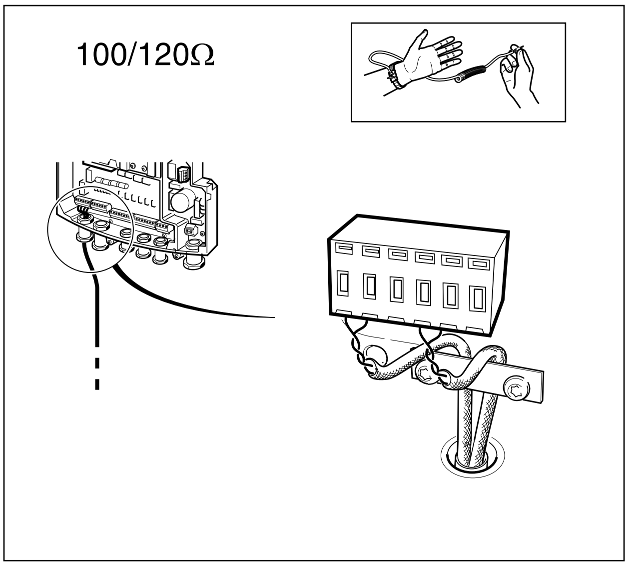
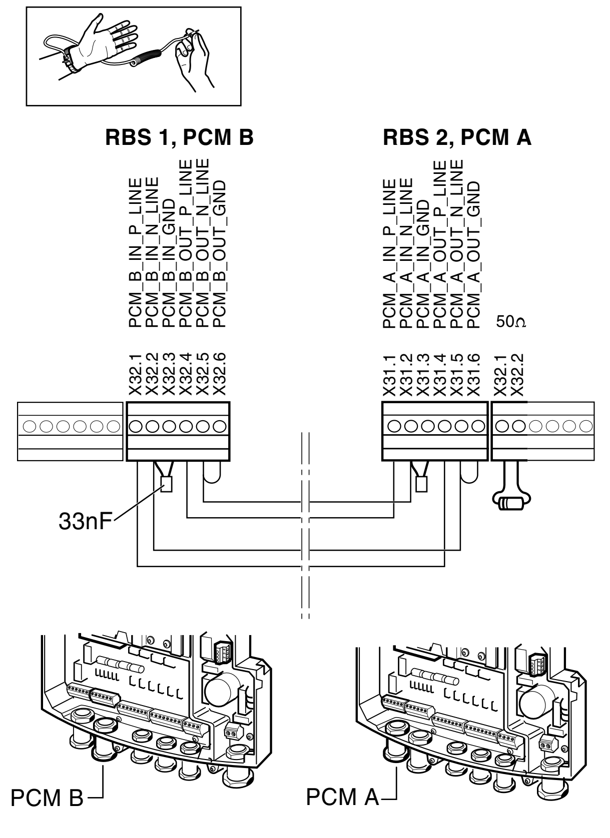
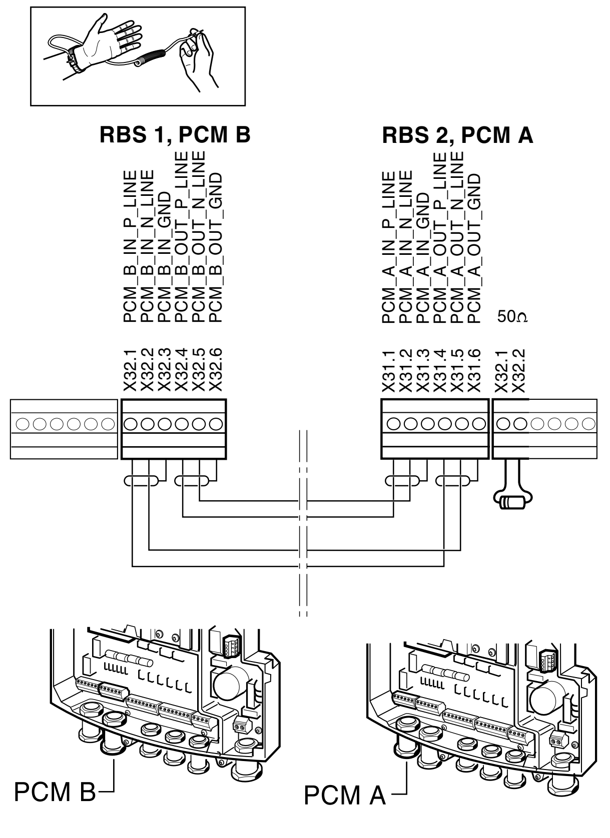




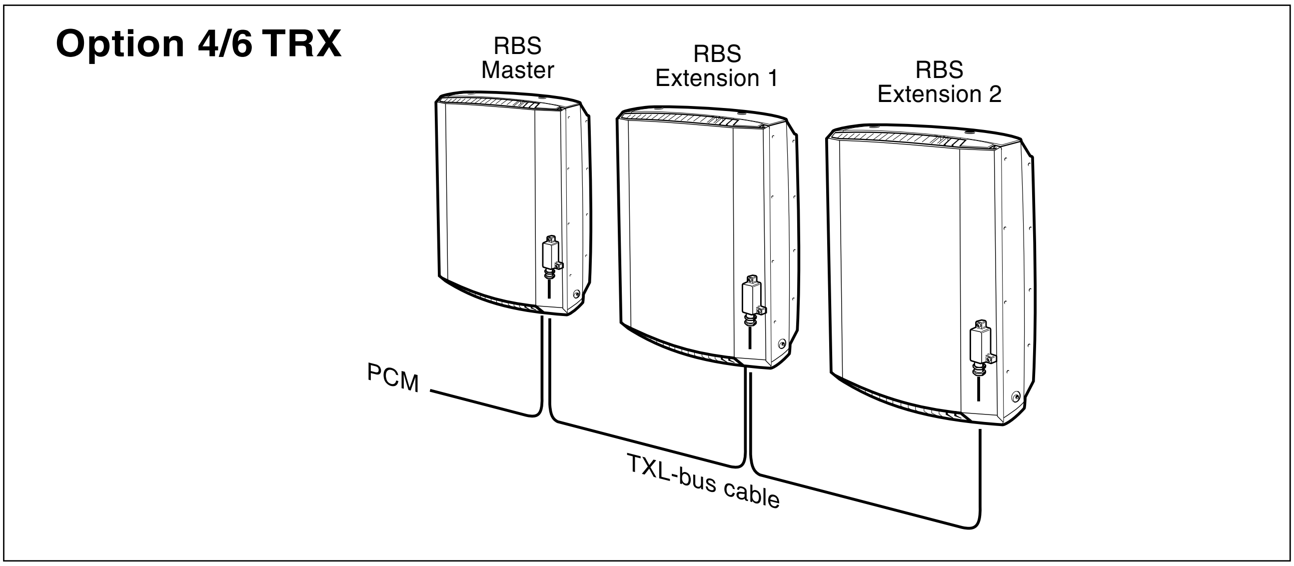
Option, cascade connection 75 Ω



Option, cascade connection 100/120 Ω



Configuration mode	Stand alone point to point				Cascade		
Connectors on HDSL Modem	J1 and J2				J3 and J4	J5 and J6	
Transmission to BSC	HDSL, 2 Pair	HDSL, 1 Pair	HDSL, 1 Pair	HDSL, 2 Pair	HDSL, 1 Pair	PCM	PCM
Transmission to cascaded RBS	n.a	n.a	PCM	PCM	HDSL, 1 Pair	HDSL, 2 Pairs	HDSL, 1 Pair
A							
x31.1	Pair 2, US	US	US	Pair 2, US	US	PCM_A_IN_P_LINE	PCM_A_IN_P_LINE
x31.2	Pair 2, US	US	US	Pair 2, US	US	PCM_A_IN_N_LINE	PCM_A_IN_N_LINE
x31.3	GND	GND	GND	GND	GND	PCM_A_IN_GND	PCM_A_IN_GND
x31.4	Pair 1, US	-	-	Pair 1, US	-	PCM_A_OUT_P_LINE	PCM_A_OUT_P_LINE
x31.5	Pair 1, US	-	-	Pair 1, US	-	PCM_A_OUT_N_LINE	PCM_A_OUT_N_LINE
x31.6	GND	-	-	GND	-	PCM_A_OUT_GND	PCM_A_OUT_GND
B							
x32.1	-	-	PCM_B_IN_P_LINE	PCM_B_IN_P_LINE	-	Pair 2, DS	-
x32.2	-	-	PCM_B_IN_N_LINE	PCM_B_IN_N_LINE	-	Pair 2, DS	-
x32.3	- 50 Ω	- 50 Ω	PCM_B_IN_GND	PCM_B_IN_GND	-	GND	-
x32.4	-	-	PCM_B_OUT_P_LINE	PCM_B_OUT_P_LINE	DS	Pair 1, DS	DS
x32.5	-	-	PCM_B_OUT_N_LINE	PCM_B_OUT_N_LINE	DS	Pair 1,DS	DS
x32.6	-	-	PCM_B_OUT_GND	PCM_B_OUT_GND	GND	GND	GND



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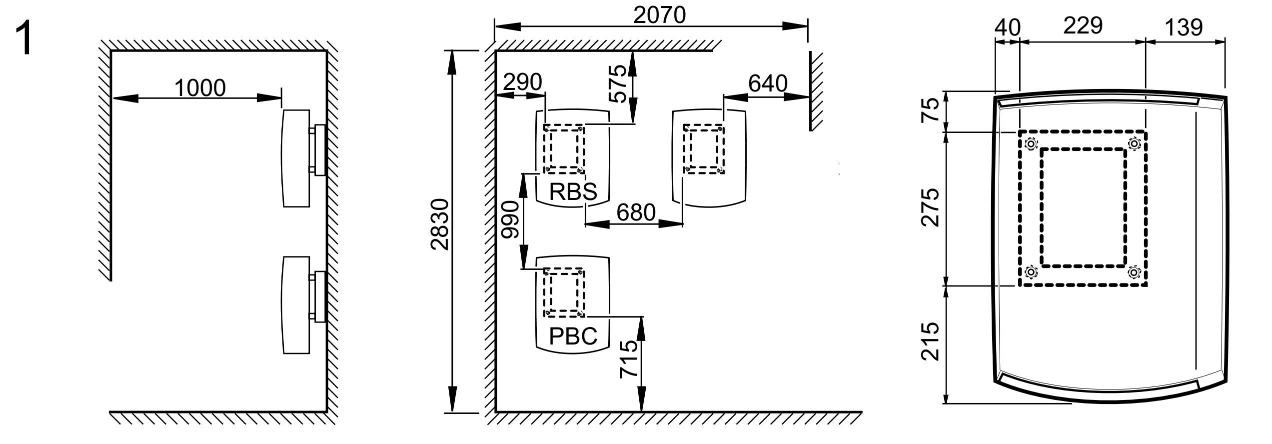
EN/LZT 720 0160 R1B

Power and Battery Cabinet

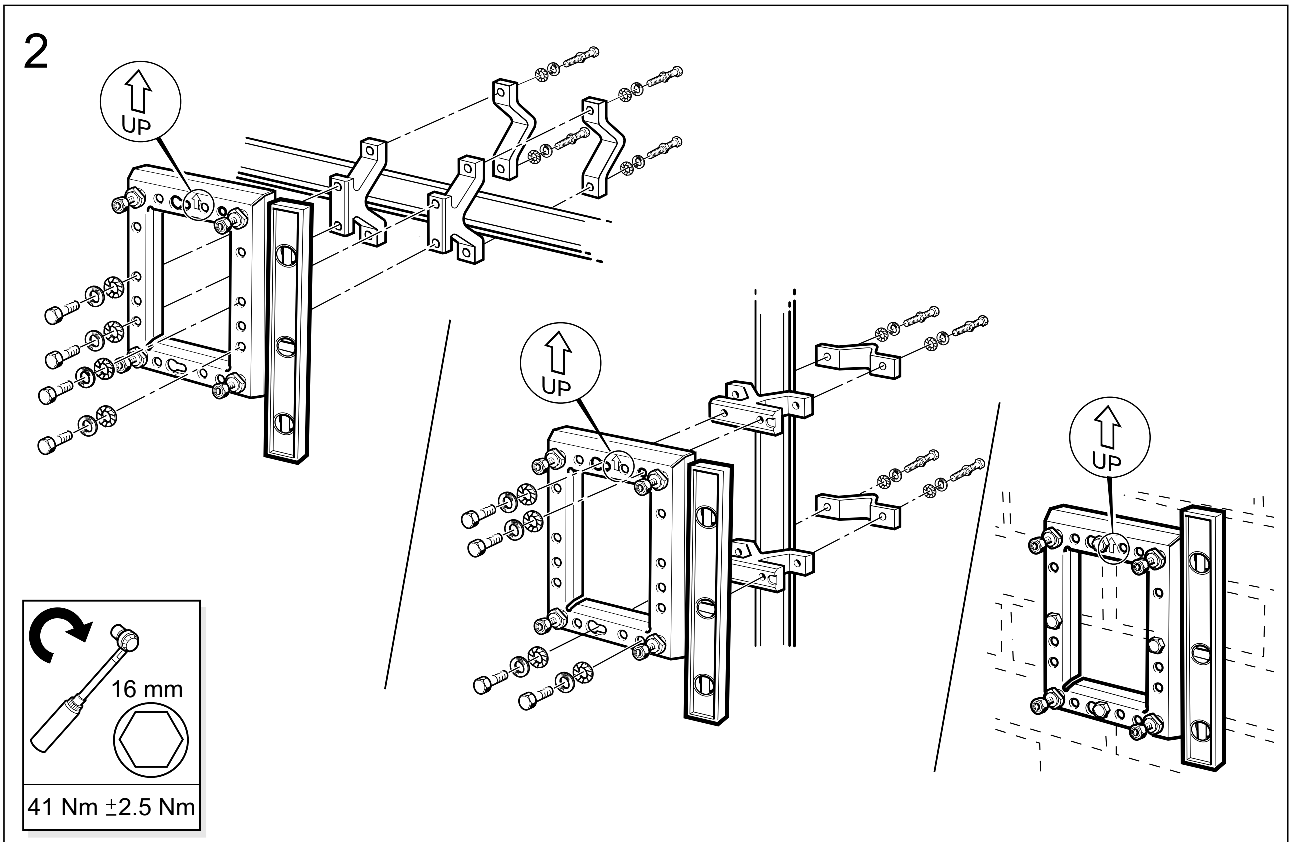
QUICK GUIDE
Installation

EN/LZT 720 0121 R1B

Condensed Information for experienced users based on CPI product LZN 302 74

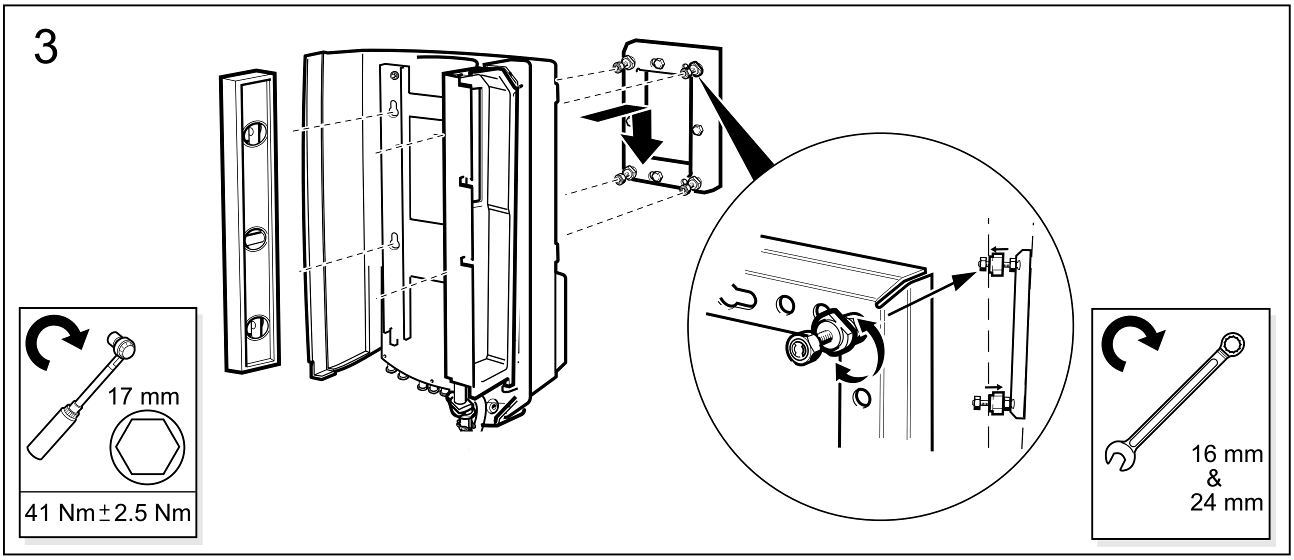


Minimum space requriements. Units of measurement: mm

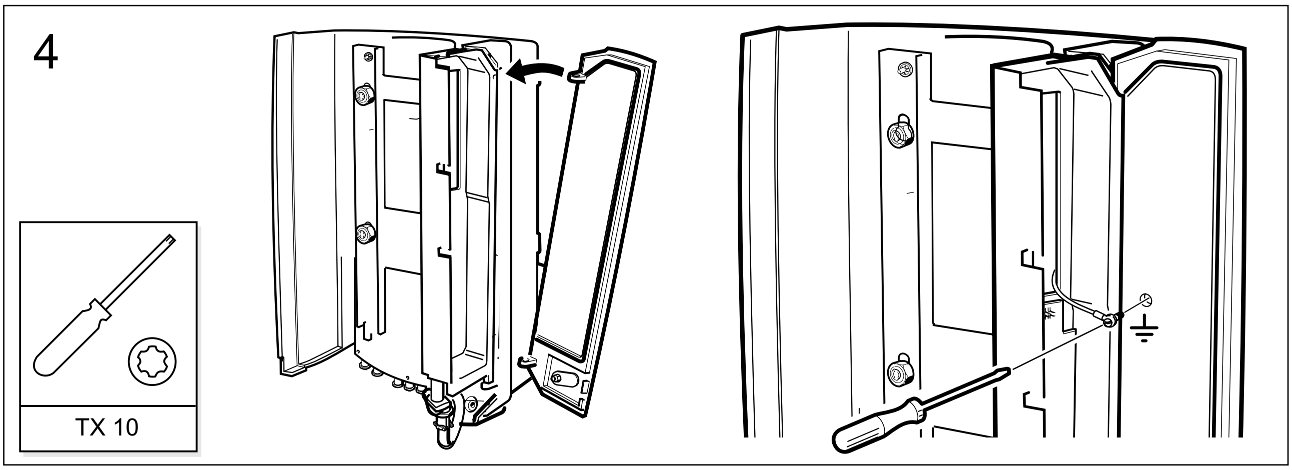


P007556B

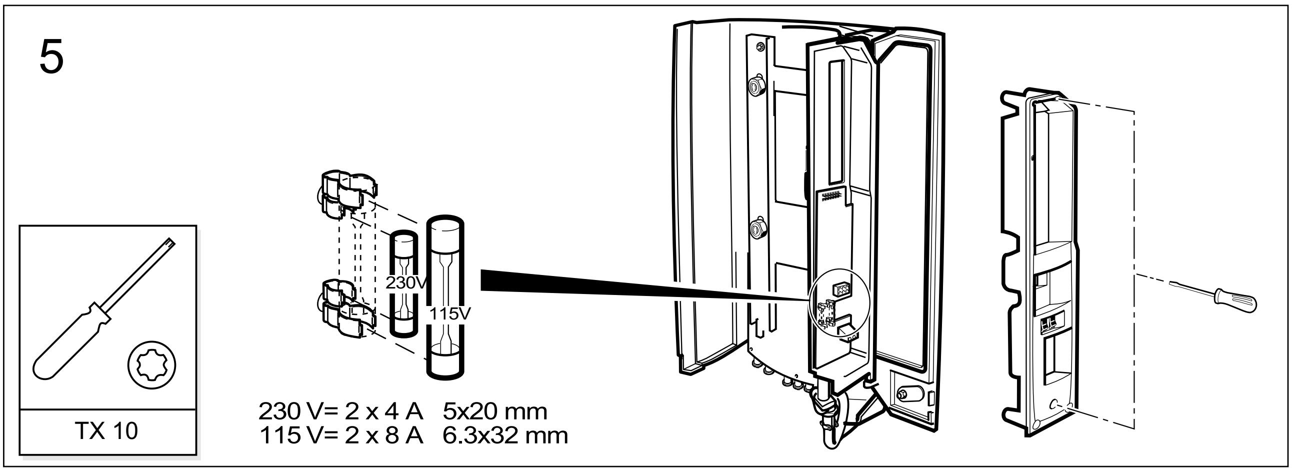
3


17 mm
41 Nm ± 2.5 Nm
16 mm
&
24 mm

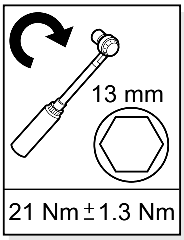
4

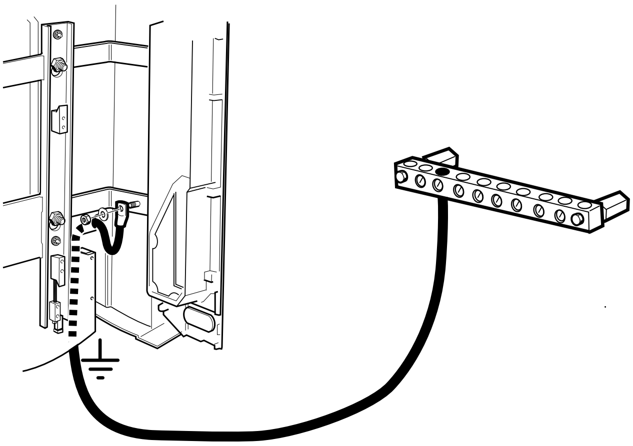

TX 10

5

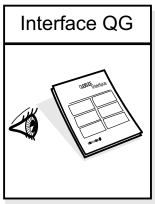

230V
115V
230 V= 2 x 4 A 5x20 mm
115 V= 2 x 8 A 6.3x32 mm
TX 10

8





9 External cables



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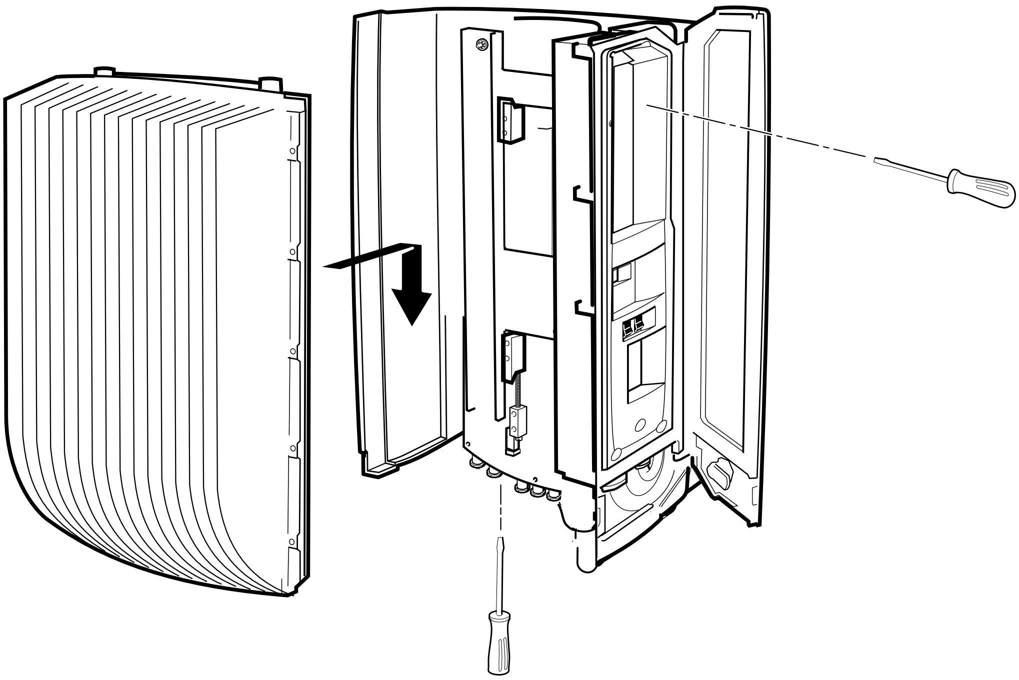
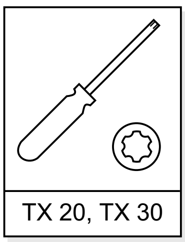
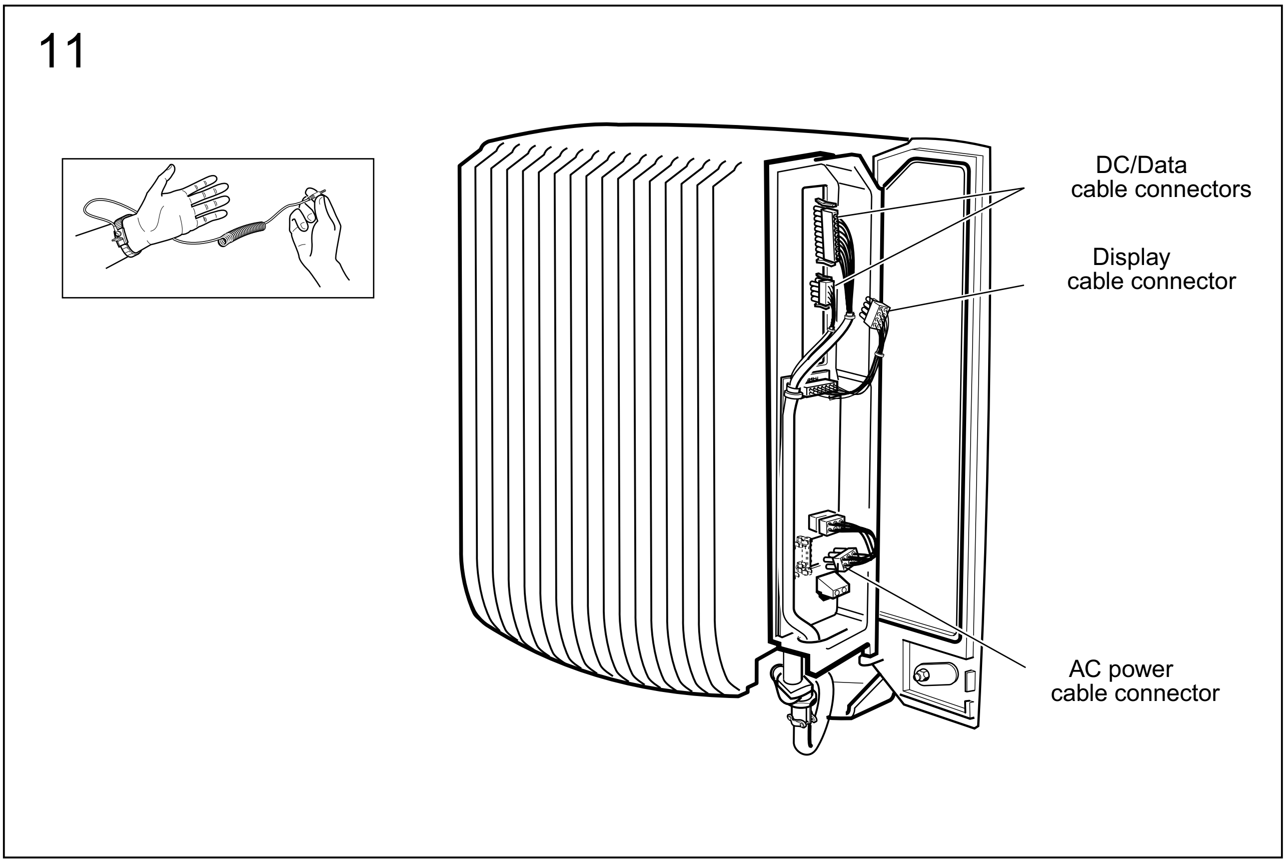
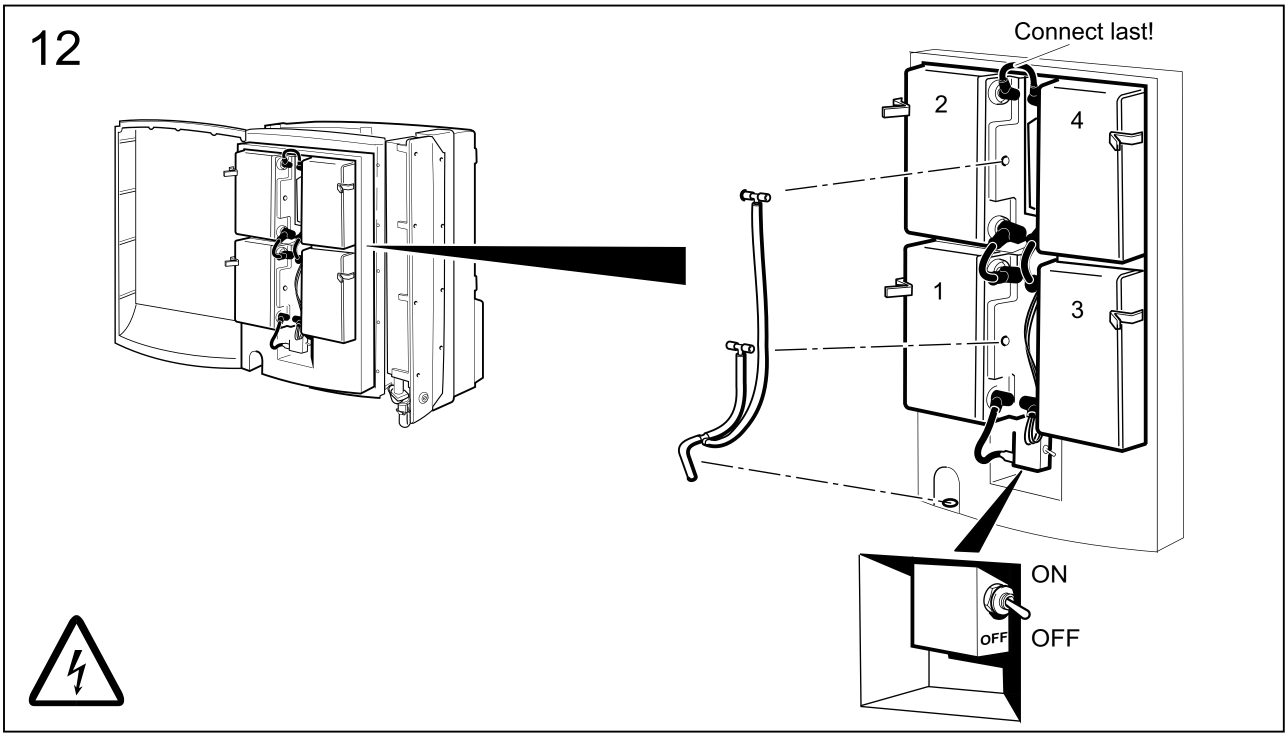
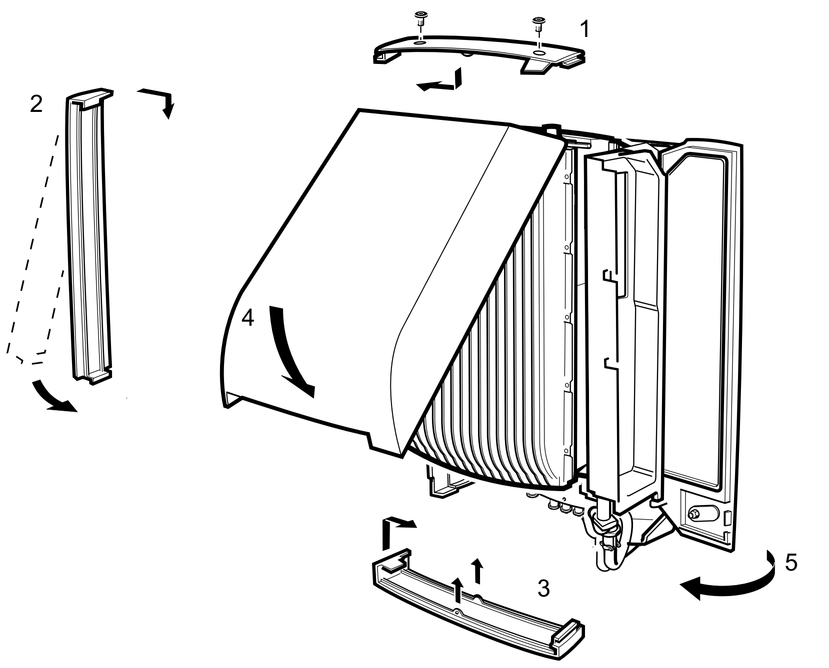





11
DC/Data
cable connectors
Display
cable connector
AC power
cable connector


12
Connect last!
2
4
1
3
ON
OFF
OFF

13



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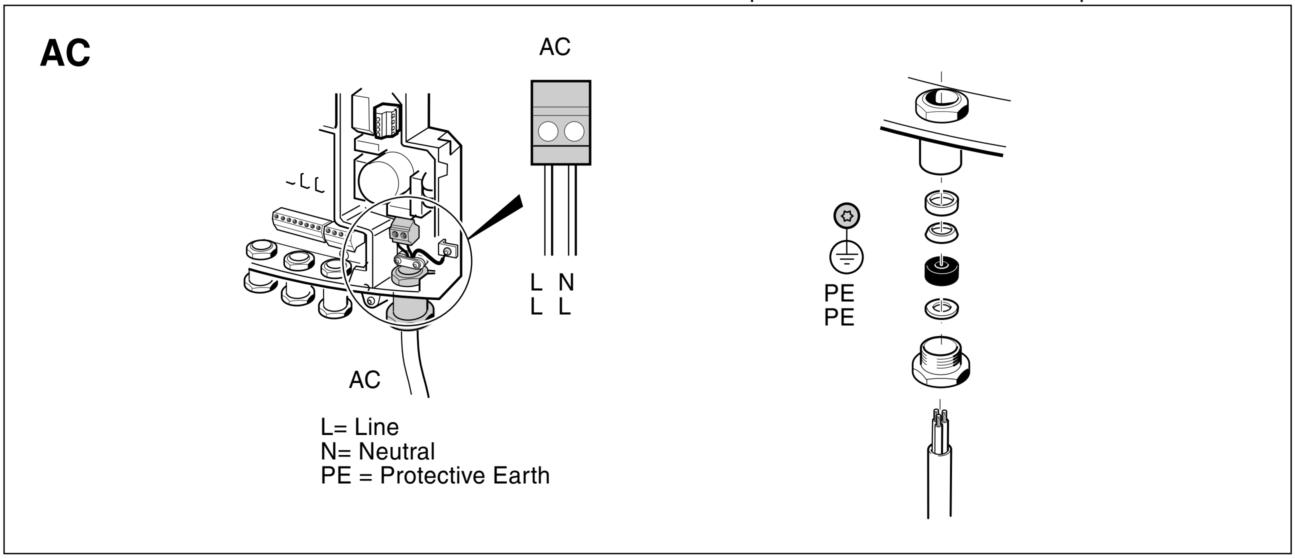
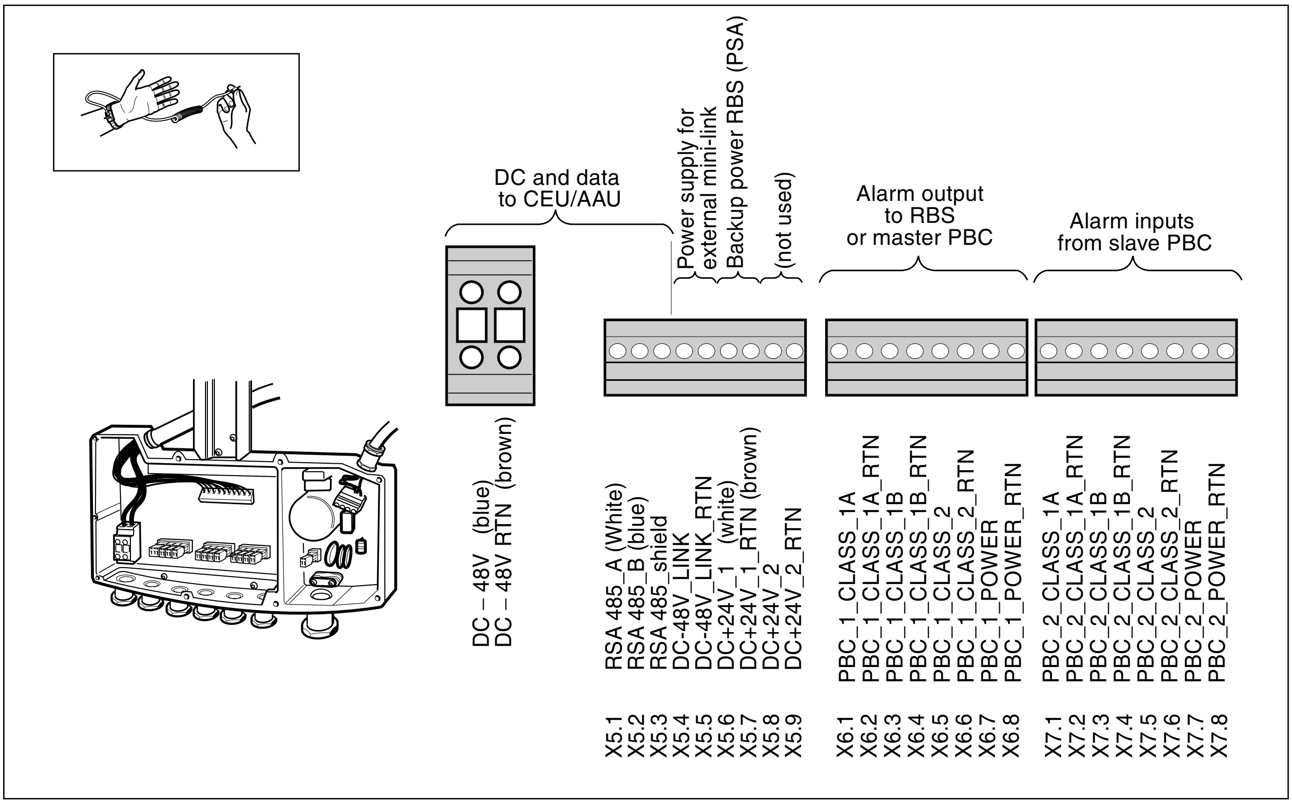
Power and Battery Cabinet

QUICK GUIDE
Interface

EN/LZT 720 0162 R1B

Condensed Information for experienced users based on CPI product LZN 302 74





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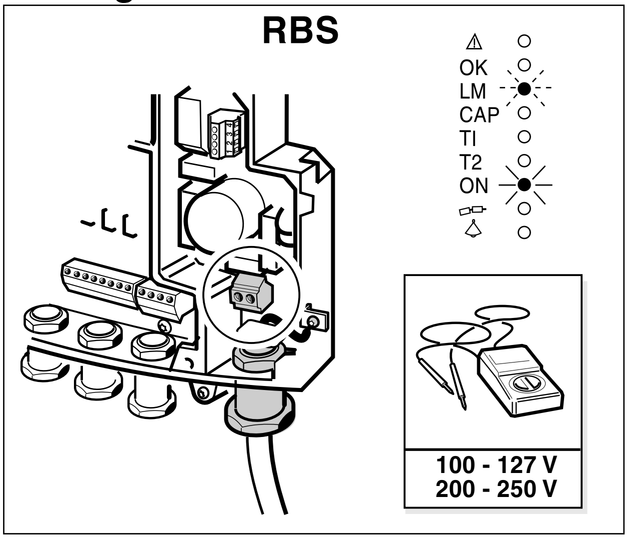
RBS 2302

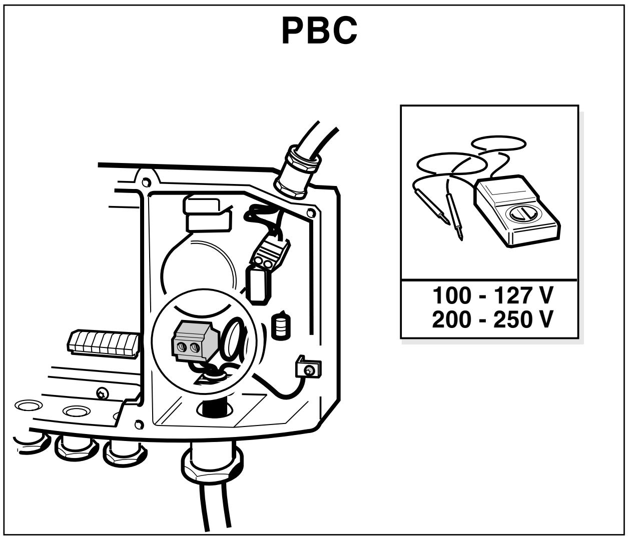
QUICK GUIDE
IDB Configuration and Test

EN/LZT 720 0190 R1B

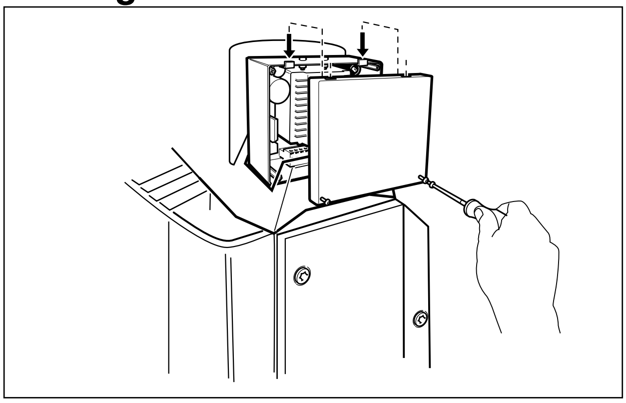
Condensed Information for experienced users based on CPI product LZN 302 74

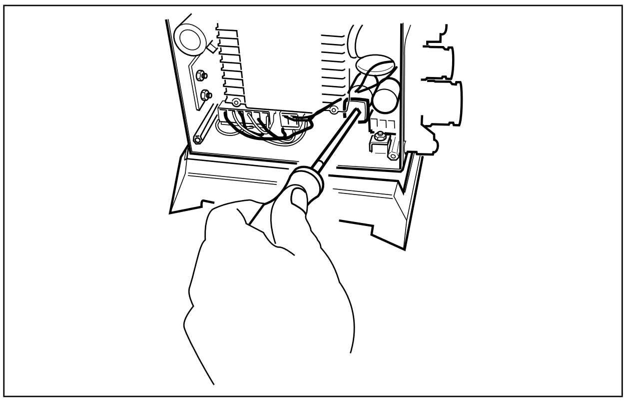
Testing AC Mains Power



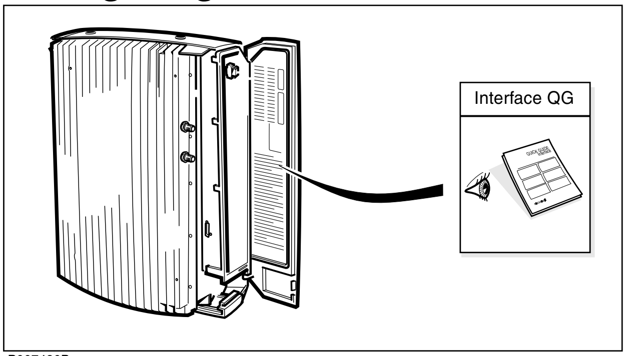


Testing Fan Unit





Configuring HDSL



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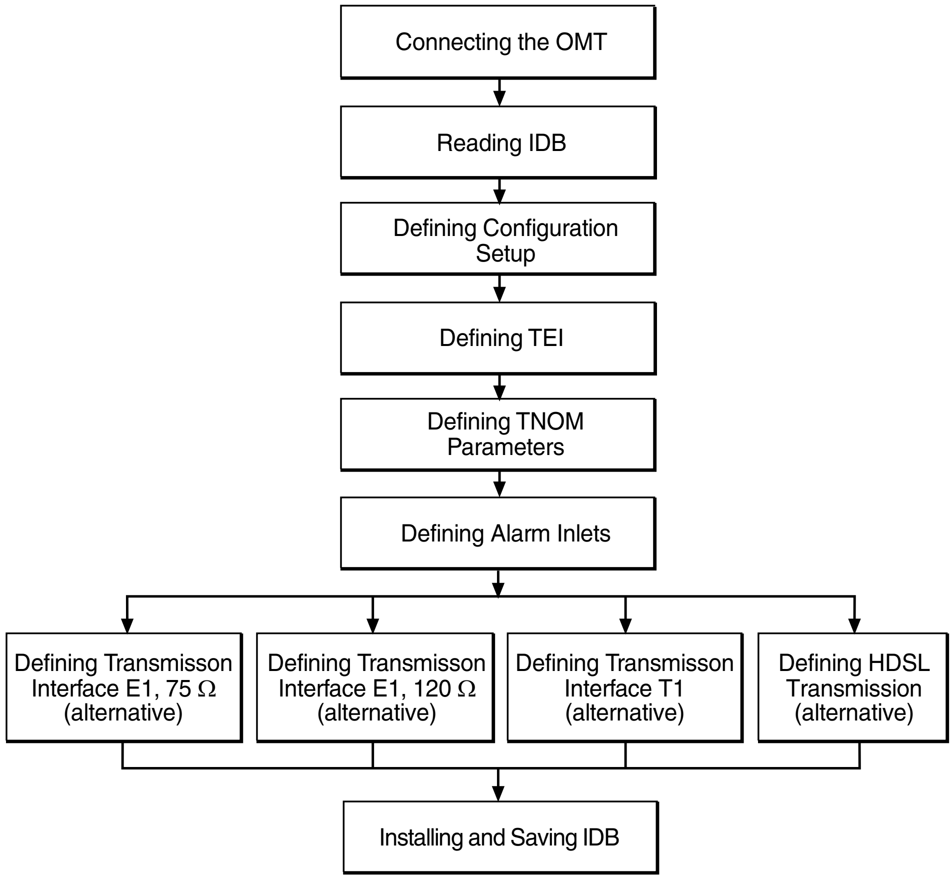
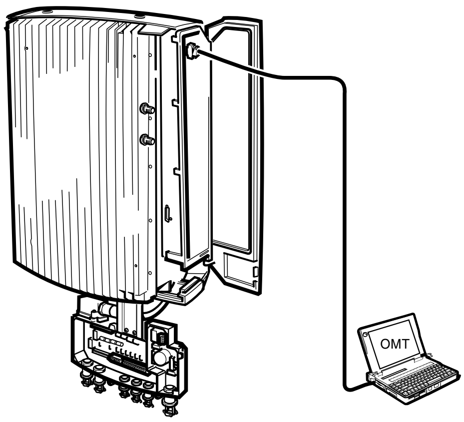
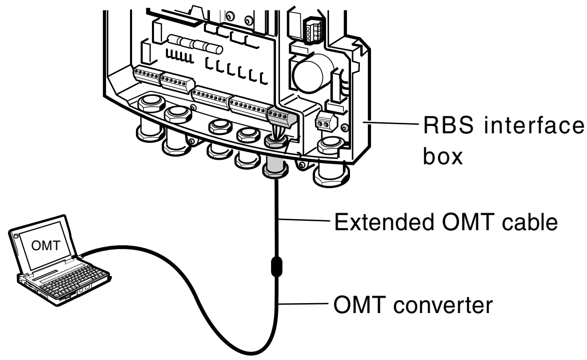
Configuring IDB



Connecting the OMT



Connecting the Extended OMT Cable

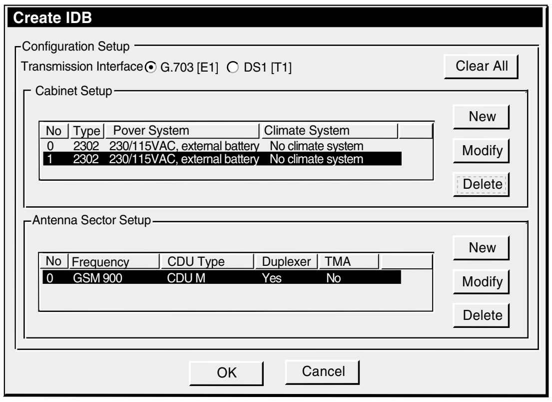


Reading IDB

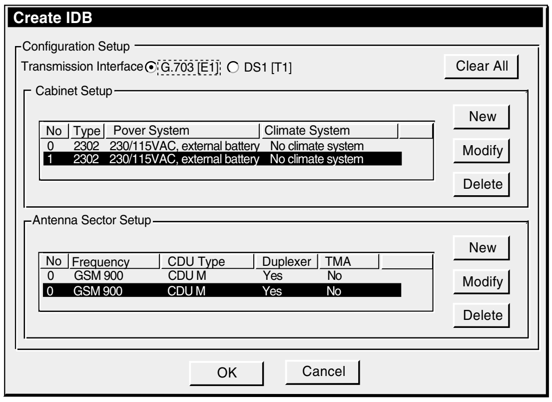
- ☐ Transmission Interface
- ☐ Cabinet Configuration(s)
- ☐ Antenna Sector Configuration(s)
- ☐ Antenna Type(s)
- ☐ TEI Value for Cabinet 0
- ☐ TNOM Parameters
- ☐ PCM Parameters
- ☐ Alarm Inlets

Defining Configuration Setup

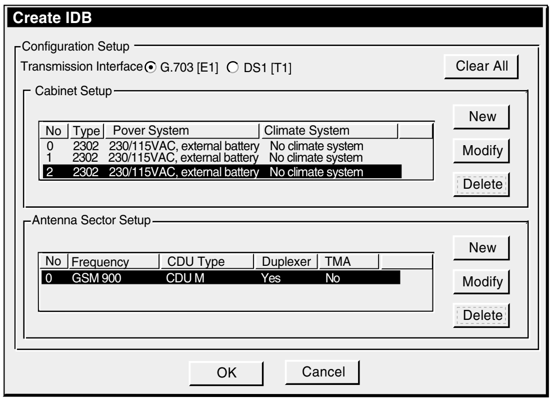
1x4



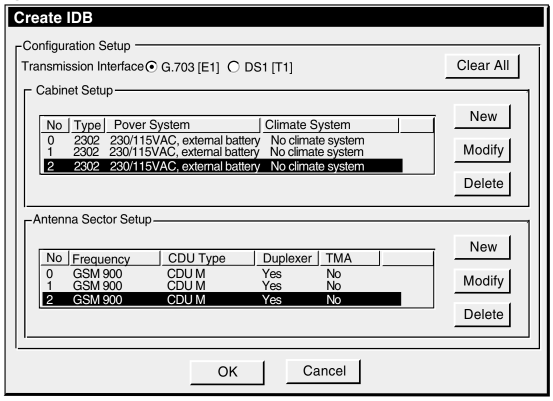
2x2



1x6



3x2



Defining External alarms

PBC Alarms

Alarm Inlet Info	Type	Severity	Comment
RBS 1 0/8	Breaking	Level 2	PBC POWER; WARNING
RBS 2 1/8	Breaking	Level 2	PBC POWER; WARNING
RBS 3 2/8	Breaking	Level 2	PBC POWER; WARNING

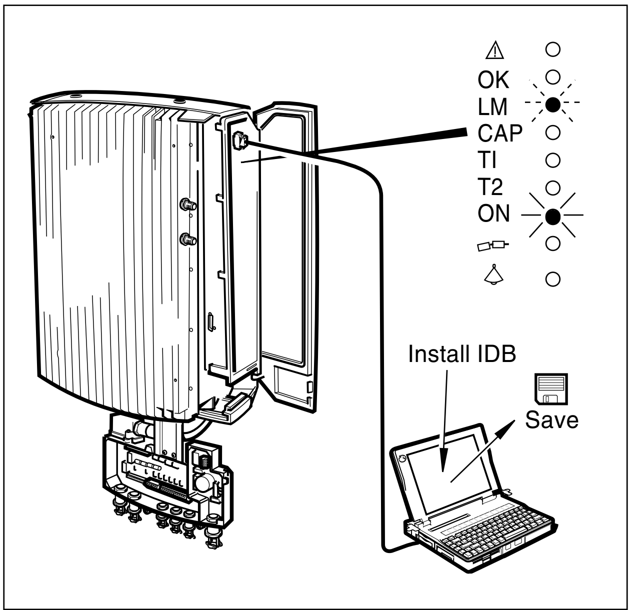
Fan Alarms

Alarm Inlet Info	Type	Severity	Comment
RBS 1 0/2	Breaking	Level 2	FAN UNIT
RBS 2 1/2	Breaking	Level 2	FAN UNIT
RBS 3 2/2	Breaking	Level 2	FAN UNIT

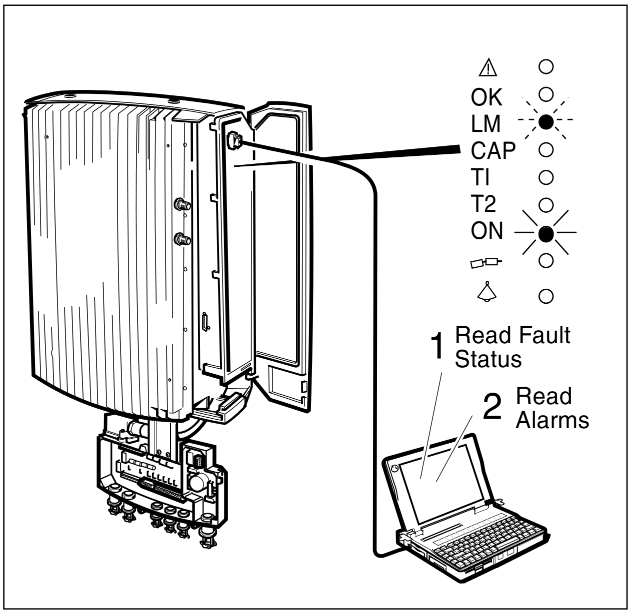
HDSL Alarms

Alarm Inlet Info	Type	Severity	Comment
0/3	Closing	Level 2	HDSL DEGRADATION DOWNSTREAM OR PAIR 1
0/4	Closing	Level 2	HDSL DEGRADATION UPSTREAM OR PAIR 2

Installing and Saving IDB

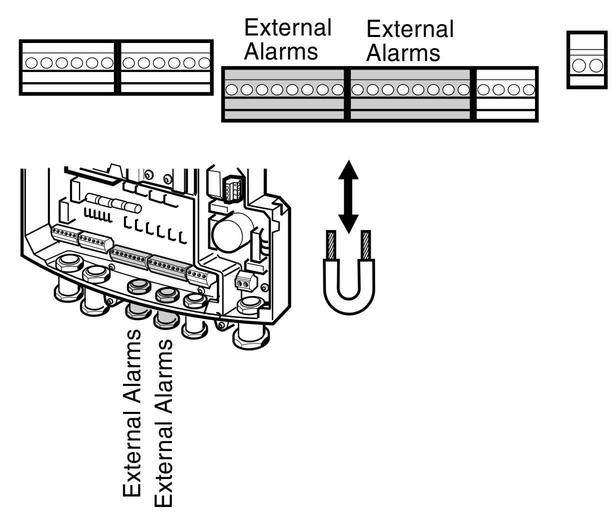


Reading Fault Status

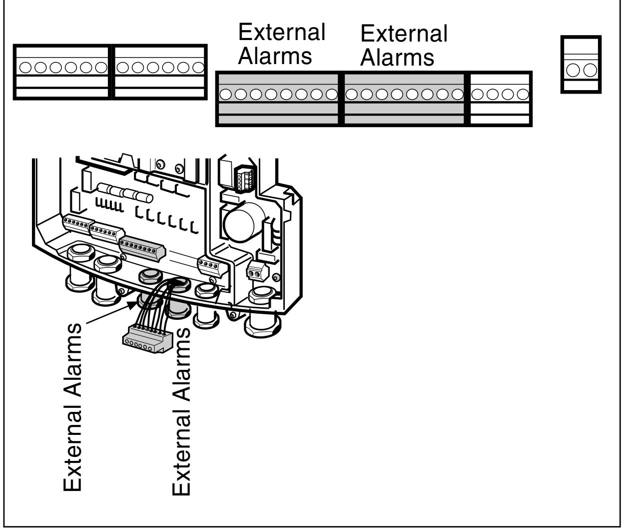


Testing External Alarms

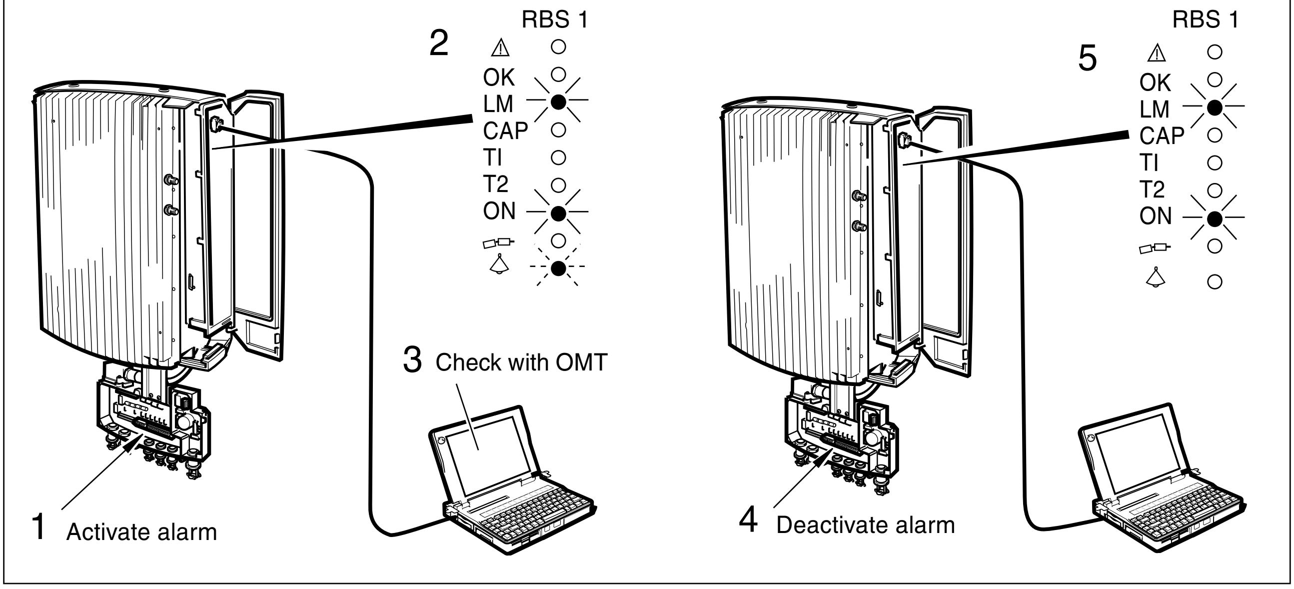
Test of Closing Alarm



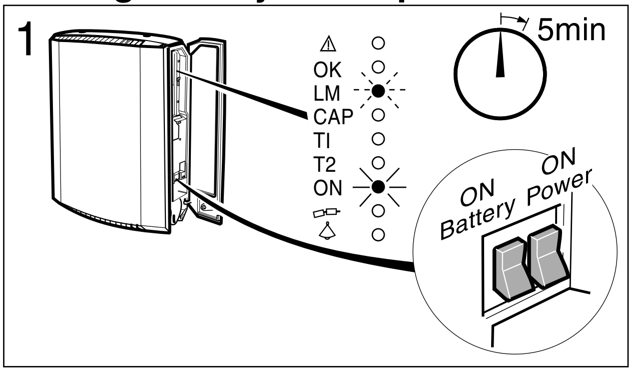
Test of Breaking Alarm

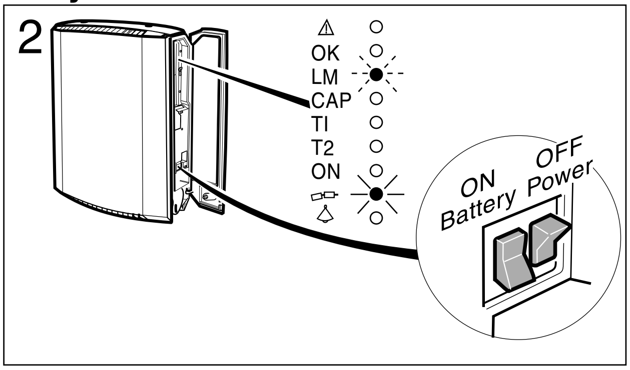


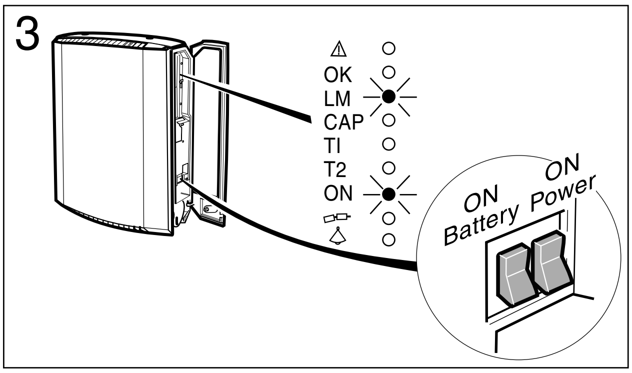
Testing External Alarms for 2-, 4- and 6-TRX Configurations



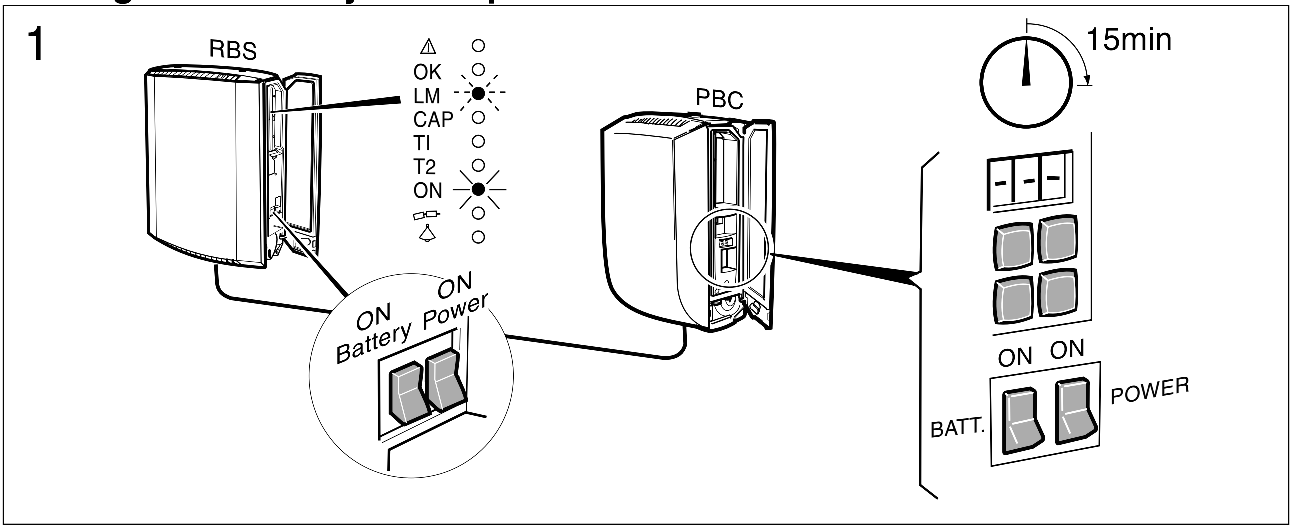
Testing Battery Backup of Internal Battery

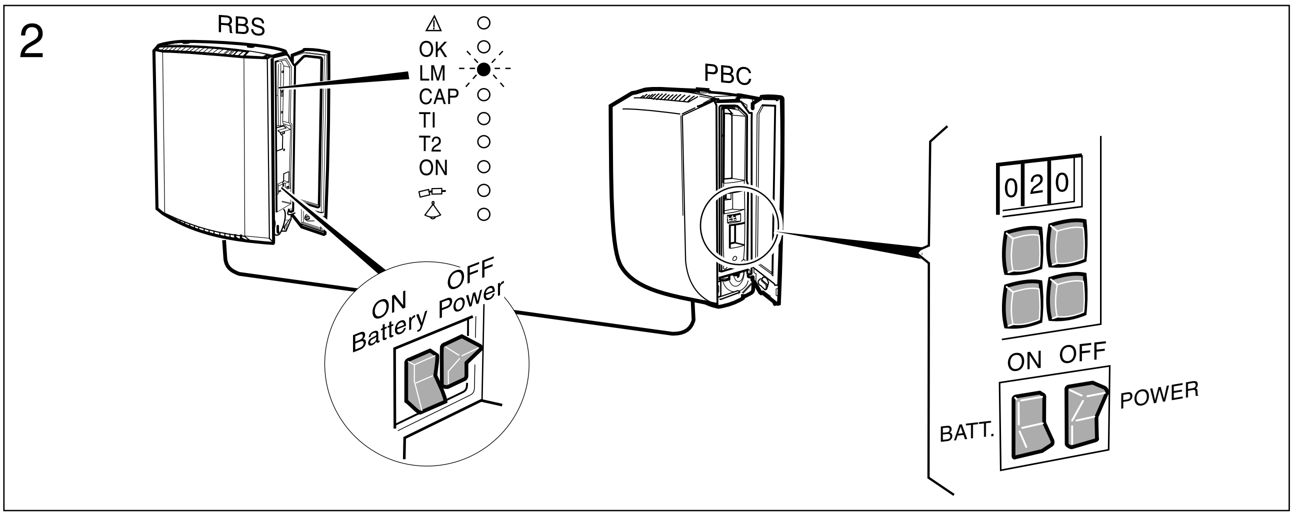


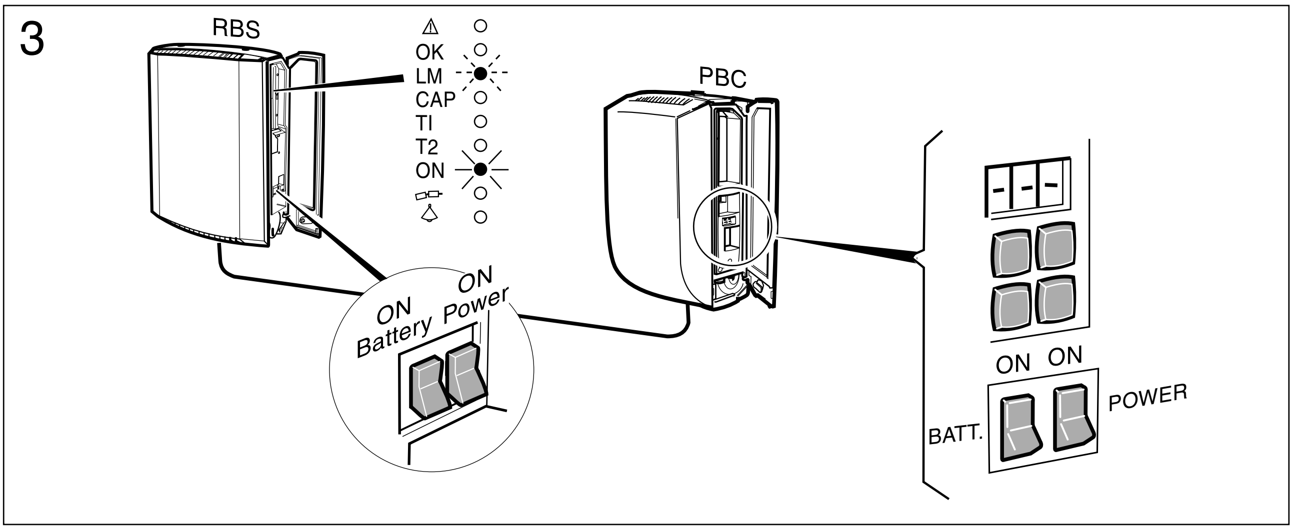




Testing PBC Battery Backup







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Ericsson GSM System

RBS 2302
Spare Parts Catalogue

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LZN 302 97 R3C

RBS 2302 Spare Parts Catalogue

Contents

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1 Preface for the Spare Parts Catalogue

The purpose of this Catalogue is to provide 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 can be ordered separately, but is also included in the User's Guide. See tables below.

This catalogue describes the RBS 2302 and options.

Customer Library RBS 2302	**LZN 302 71**
Library Overview	LZN 302 73
RBS 2302 User's Guide	LZN 302 74
Reference Manual	LZN 302 77
General Installation Instructions	LZN 302 49
Spare Parts Catalogue RBS 2302	LZN 302 97

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.
- Optional cables for 4 and 6 TRX.

1.1.2 R2A to R3A

- Optional external Fan Unit for RBS 2302.
- Optional HDSL modem for RBS 2302.

1.1.3 R3A to R3B

- New productnumbers for RBS 2302 manuals.

1.1.4 R3B to R3C

- Subsection *Packages for Repairable Products* added to section *Other Available Parts*.
- Note Available from Q1 99 removed throughout.
- Multicasting Box (filter unit) changed to
  Filter Unit (Multicasting Box)
- EMC board changed to EMC–In Board.

  DC alarm board changed to DC Surge Board.

  AC board changed to AC Surge Board.
- See *Section 6.1 on page 56*.

2 Spare Parts Philosophy for RBS 2302

Specification and classification of spare parts is done during the service preparation process which is a part of the desing 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 an 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 use (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 requests it..

The dimensioning and recommendation of spare part stocks is and will be done with a computer-based calculation model for BTS equipment.

The tool works with the following parameters:

- Product reliability (MTBF)
- Spare part delivery lead time or repair turn around time.
- Chosen service level, that is, Spare Parts 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 necessarily shown in illustrations. Position numbers with letters, for example 3A, 3B are alternative products.

Parts without a Product number may be shown on illustrations, but are not recommended for customer stock, or may be included in a Spare Parts Set (and cannot be ordered separately). If a reference to another chapter is given, more information will be found there.

Spare Parts Ordering Address:

Please use the Regional Ericsson Company, or contact:

Ericsson Radio Systems AB

Customer Services

S-164 80 Stockholm

Repair Delivery Address:

Please use the Regional Logistics Centre specified in the System Services Contract with the local Ericsson Radio Systems Company.

Catalogue Ordering:

How to order CPI:.

Outside Ericsson:

The CPI can be ordered in the same way as any other Ericsson product. Contact an Ericsson company to place the order.

The CPI is accessible on Extranet at this address:

https://al.cpi.ericsson.net/

A user identity and a password is required for accessing the Extranet from this page. More detailed information can be found at the same address.

Inside Ericsson:

All manuals are available on the Intranet at the CPI Store:

http://cpistore.ericsson.se

Remarks

External users' 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 **erac.eraspare@mesmtpse.ericsson.se**

Internal Ericsson users can e-mail as above or make an MHS Trouble Report on the catalogue's Product No. and R-state.

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. They are intended to be replaced on site and repaired at an Ericsson Repair Centre.

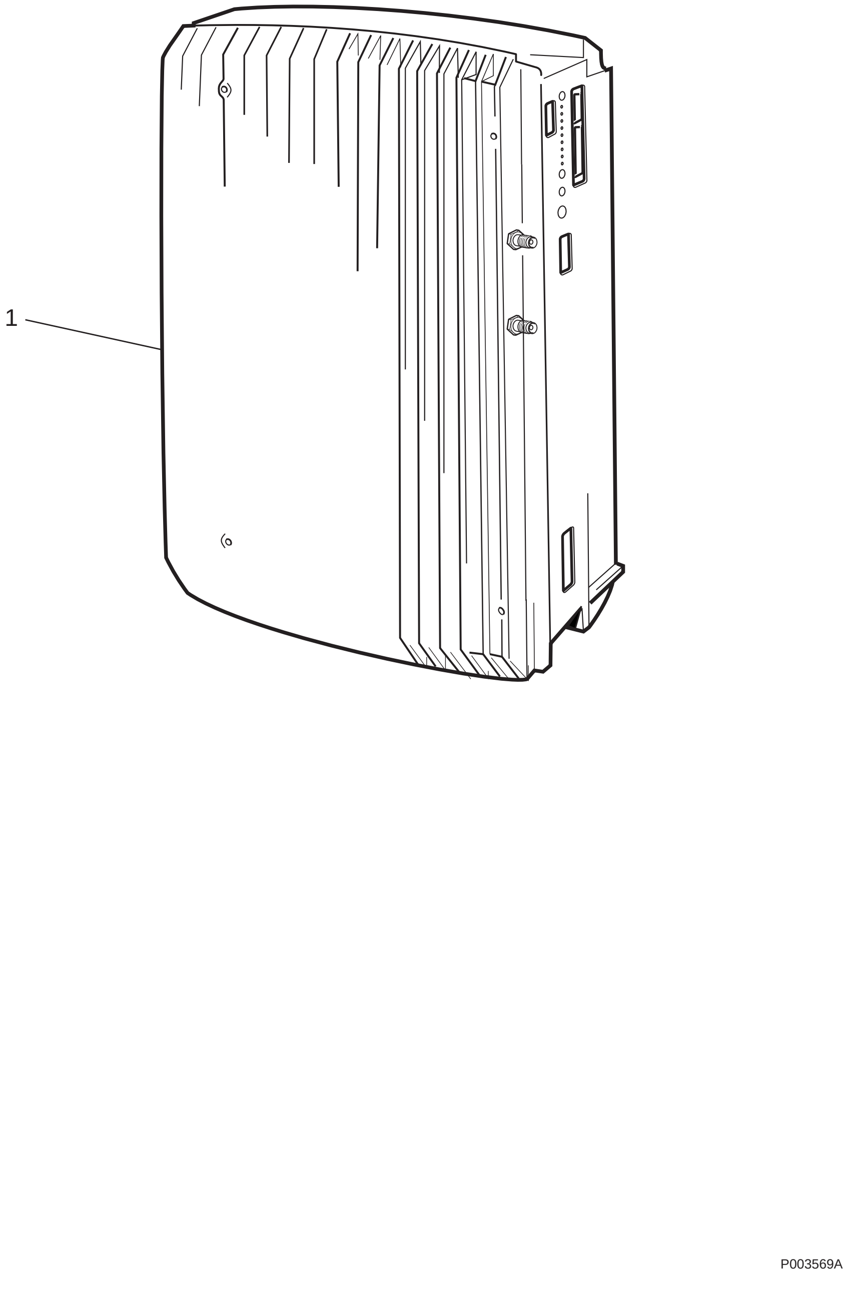

Figure 1

3.1 Radio Cabinet RBS 2302

3.1.1 GSM 900

Pos	Product No.	Product Name	System standard	Number of TRXs	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

3.1.2 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

3.1.3 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.

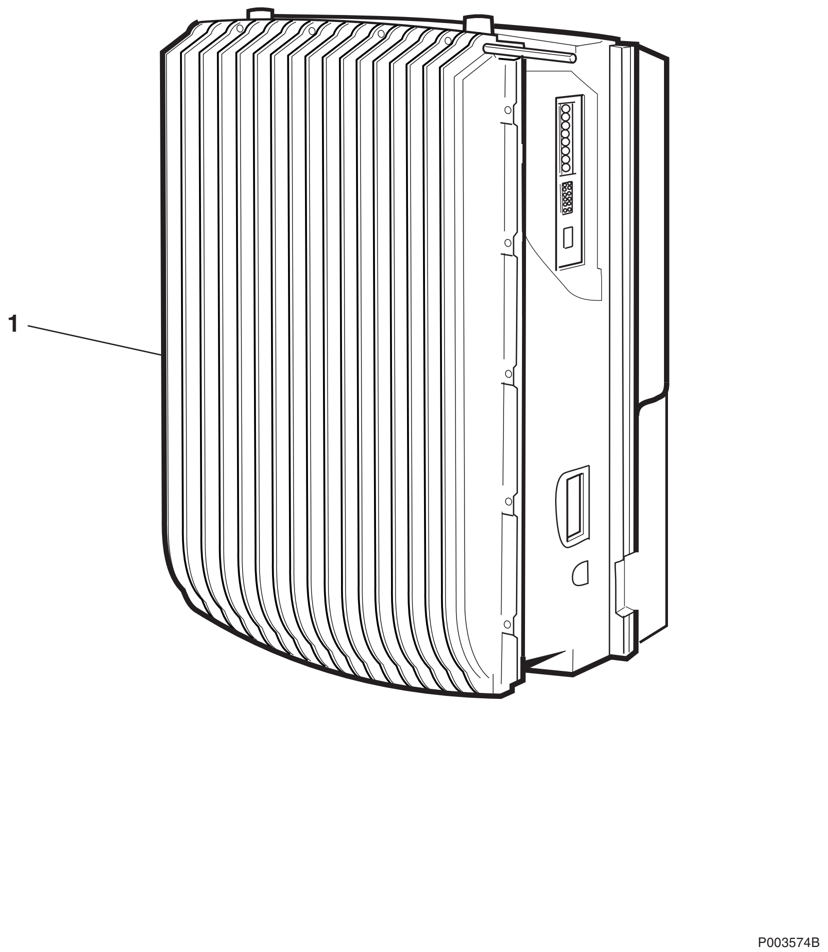

Figure 2

3.2 Power and Battery Cabinet, PBC

Pos.	Product No.	Product Name	Description
1	BMK 905 01/1	Battery Cabinet	*(Not including Mounting Base and Battery)*

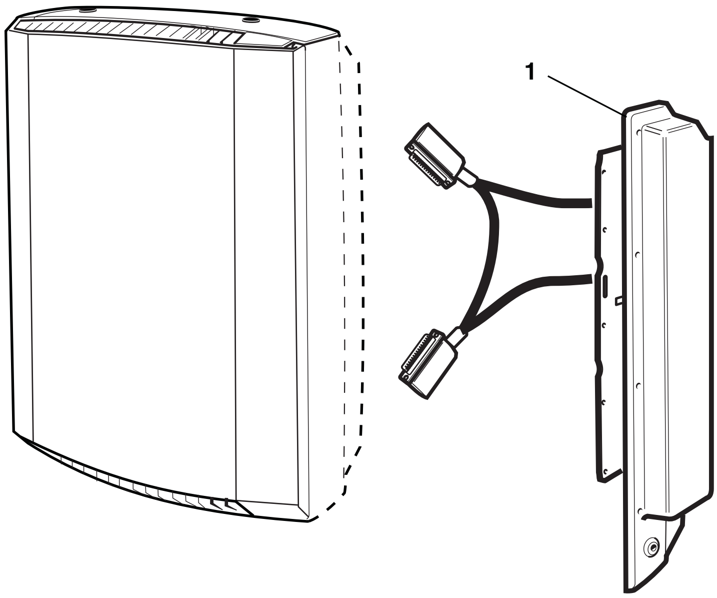

Figure 3

3.3 Optional HDSL Unit for RBS 2302

3.3.1 HDSL Unit

Pos.	Product No.	Product Name	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 Repairable)

About this Chapter

All spare parts in this chapter have the internal code = R.

These parts are recommended for Customer stock. They are intended to be replaced on site and disposed of after use.

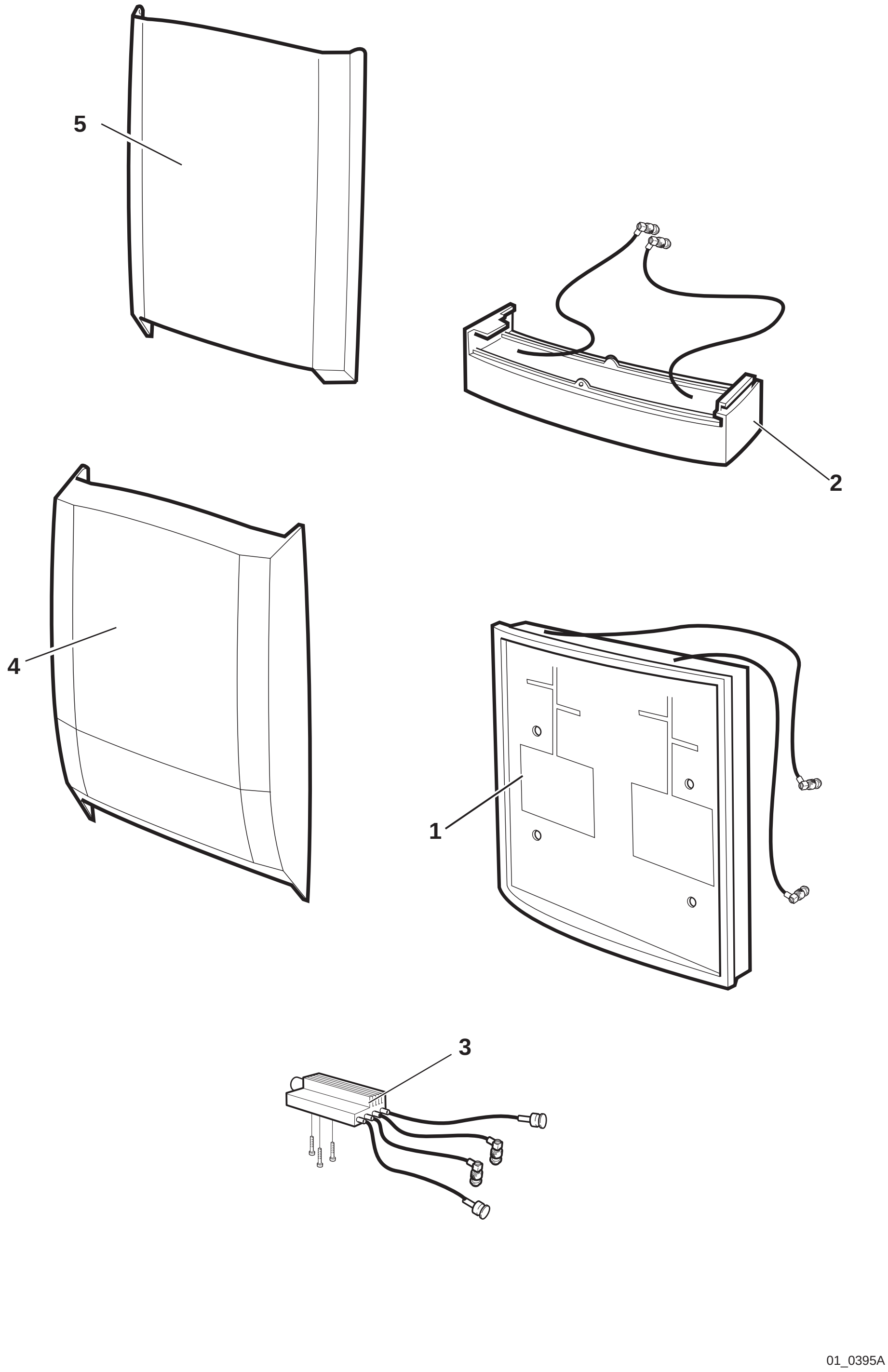

Figure 4

4.1 Antennas and Front Sunshields for RBS 2302

4.1.1 Antennas

Pos.	Product No.	Product Name	Description
1	KRE 101 1556	Antenna unit	Sector antenna, GSM 900 /*Incl cables*
	KRE 101 1557	Antenna unit	Sector antenna, GSM 1800 /*Incl cables*
	KRE 101 1558	Antenna unit	Sector antenna, GSM 1900 /*Incl cables*
2	KRE 101 1559	Antenna unit	Omni directional antenna, GSM 900 /*Incl cables*
	KRE 101 1560	Antenna unit	Omni directional antenna, GSM 1800 /*Incl cables*
	KRE 101 1561	Antenna unit	Omni directional antenna, GSM 1900 /*Incl cables*
3	KRF 201 439/1	Filter Unit (Multicasting Box)	/*Incl cables*

4.1.2 Sunshields

4.1.2.1 Front Sun Shields for Sector Antenna

4	SDF 105 10/1	Sun Shield	Front radom /*Grey*
	SDF 105 10/2	Sun Shield	Front radom /*Green*
	SDF 105 10/3	Sun Shield	Front radom /*Blue*
	SDF 105 10/4	Sun Shield	Front radom /*Red*
	SDF 105 10/5	Sun Shield	Front radom /*Ochre*
	SDF 105 10/6	Sun Shield	Front radom /*Yellow*

4.1.2.2 Front Sun Shields for Omni Directional Antenna (and External Antennas)

5	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*

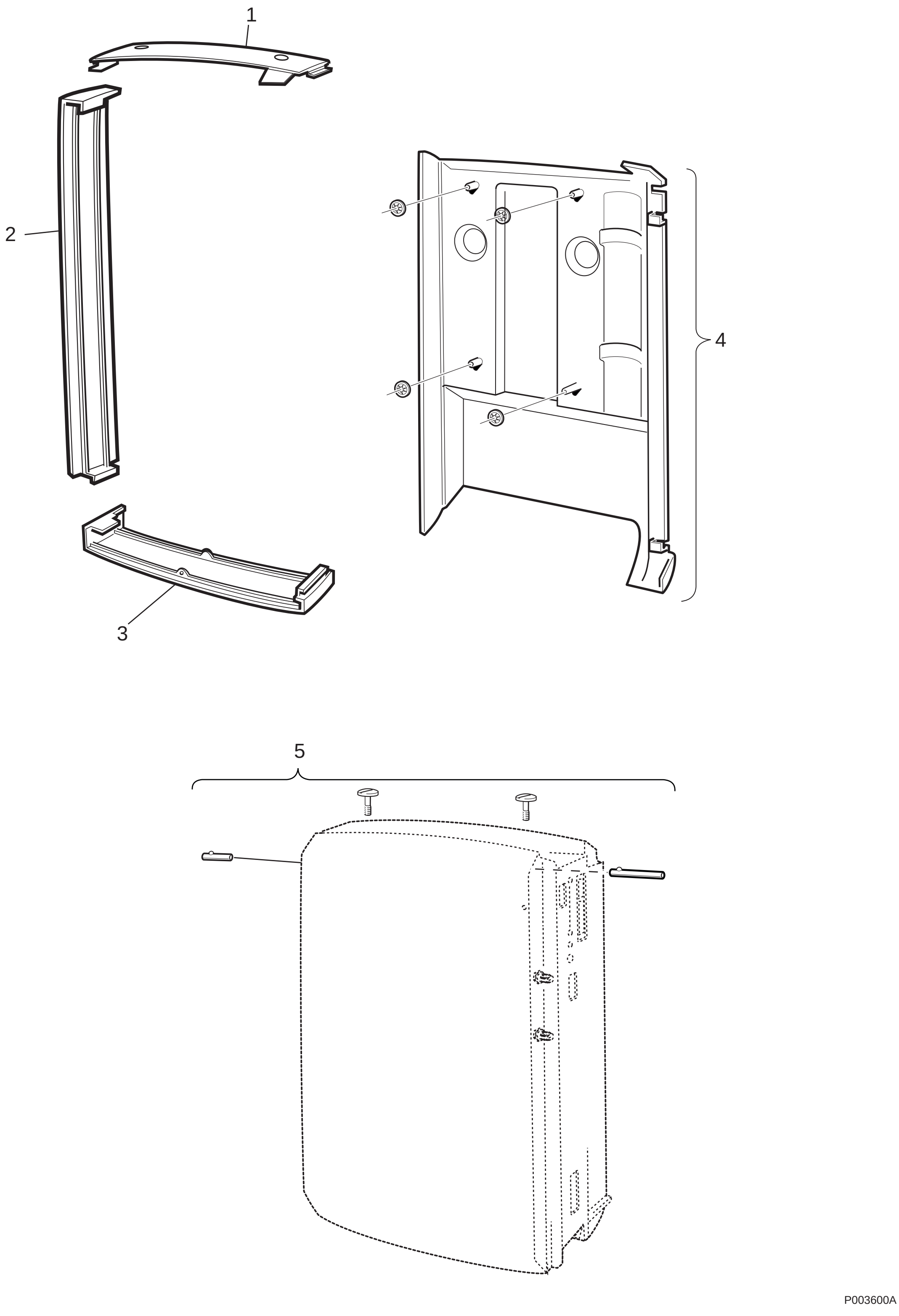

Figure 5

4.2 Other Sunshields and Accessories 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	NTZ 111 44/01	Spare Parts Set	Rear Sunshield, /*Grey. Includes Locking Washers. (Also included in a Mounting Base)*
5	NTZ 112 86/SH03	Spare Parts Set	Sun Shield Accessories/*Includes front right and left shaft (hinge pin) and upper end plugs.*

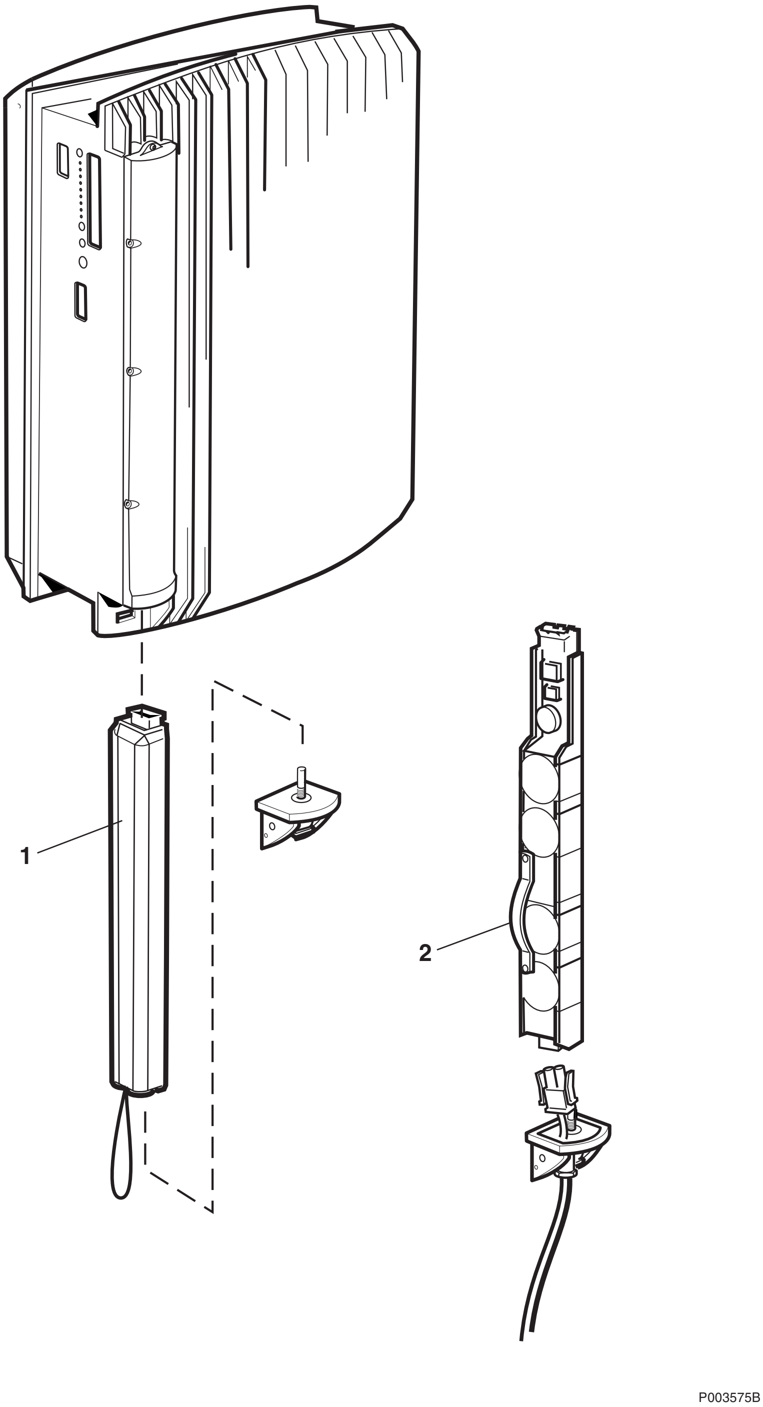

Figure 6

4.3 Internal Battery and Power Supply Adapter for RBS 2302

Pos.	Product No.	Product Name	Description
1	BKB 191 2022/1	Battery Unit	Not used if PBC attached see below.
2	BMY 908 04/1	Adapter	PSA, power supply adapter kit /*Includes cover lid, cable 5.0 m and other details. To be used in RBS 2302 instead of internal battery, when PBC attached.*

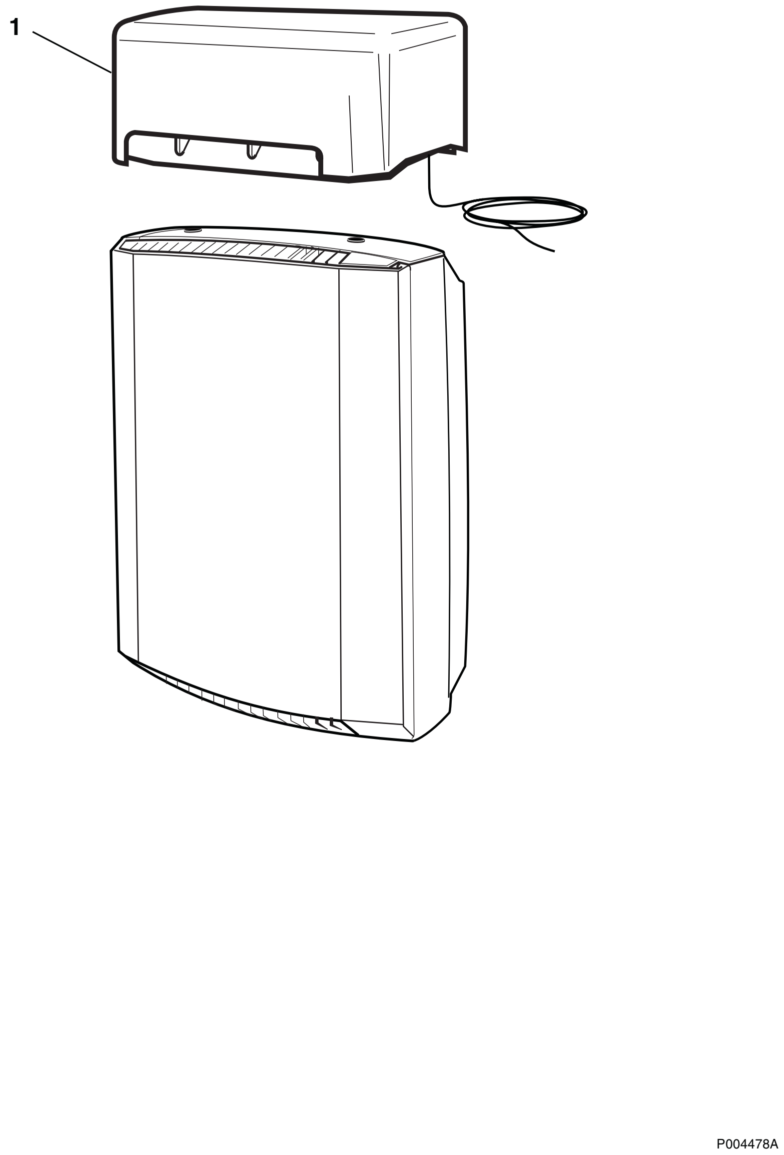

Figure 7

4.4 Optional Fan Unit for RBS 2302

4.4.1 Fan Unit

Pos.	Product No.	Product Name	Description
1	BKV 301 321/1	Fan Unit	Complete Unit to be mounted on top of RBS 2302. Including alarm cable. Not including power cable.

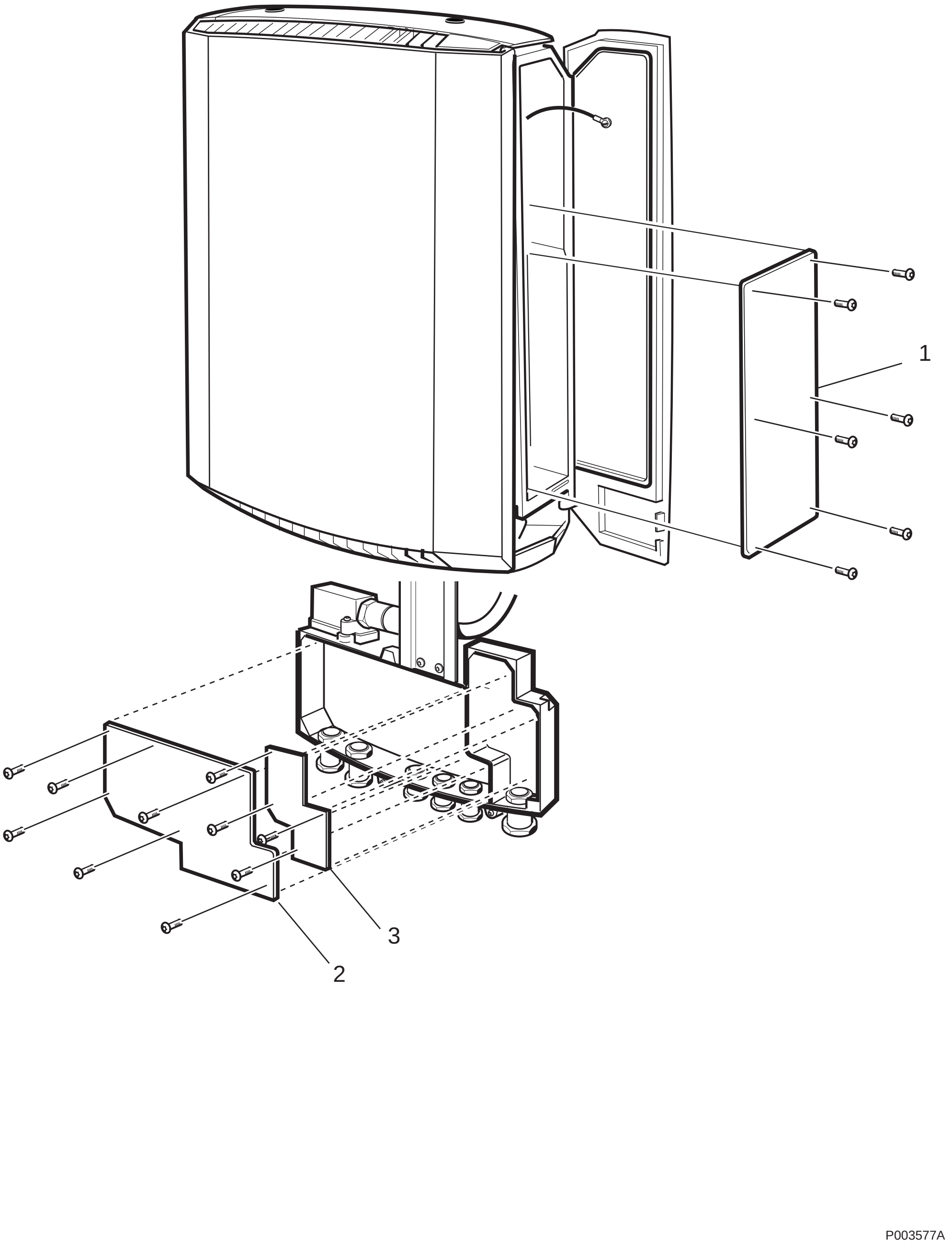

Figure 8

4.5 Replaceable Boards for RBS 2302

Pos.	Product No.	Product Name	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.*

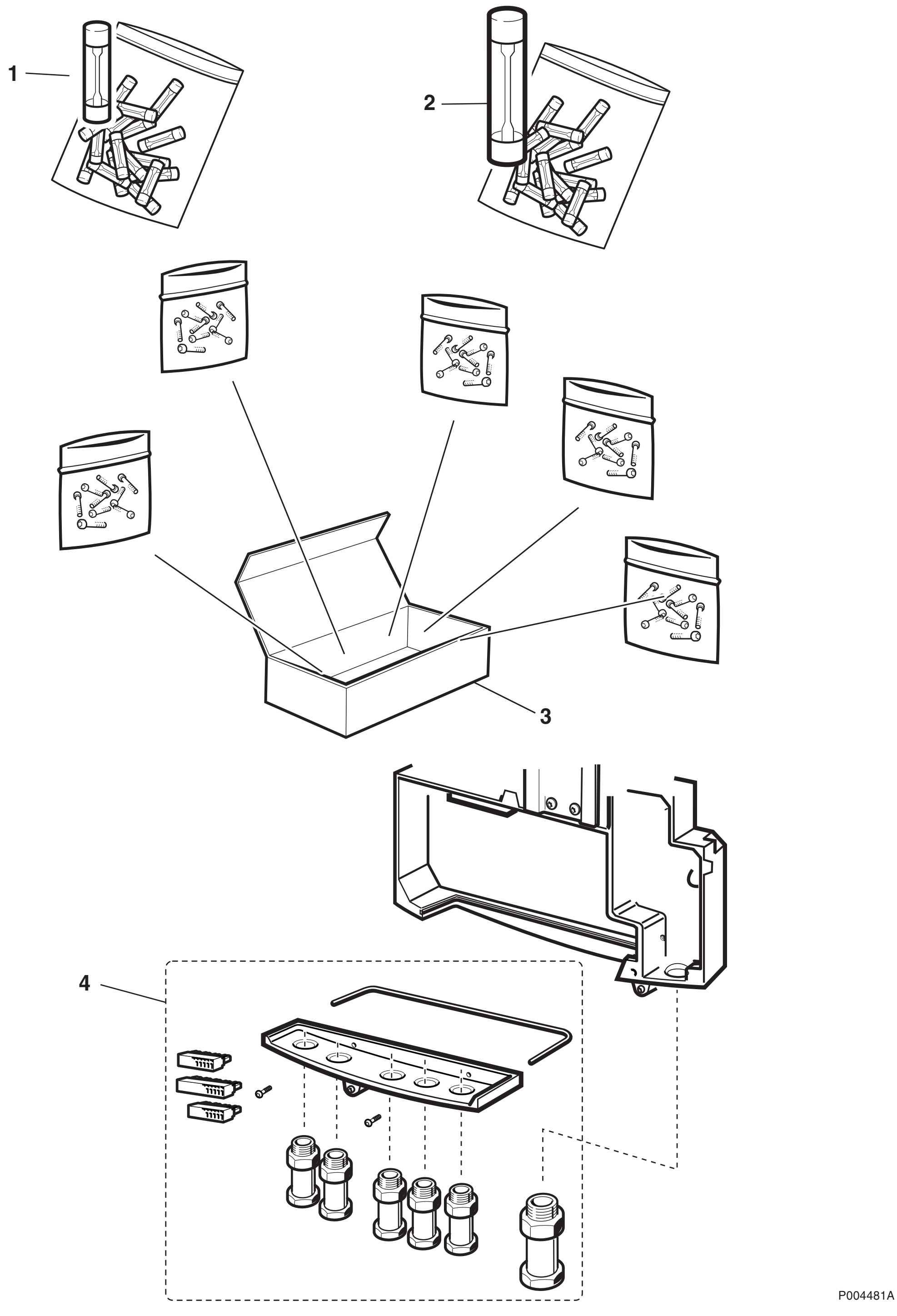

Figure 9

4.6 Fuses, Screws and Installation Details for RBS 2302

Pos.	Product No.	Product Name	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 and O-rings, gland plate with screws and shielding gasket.*

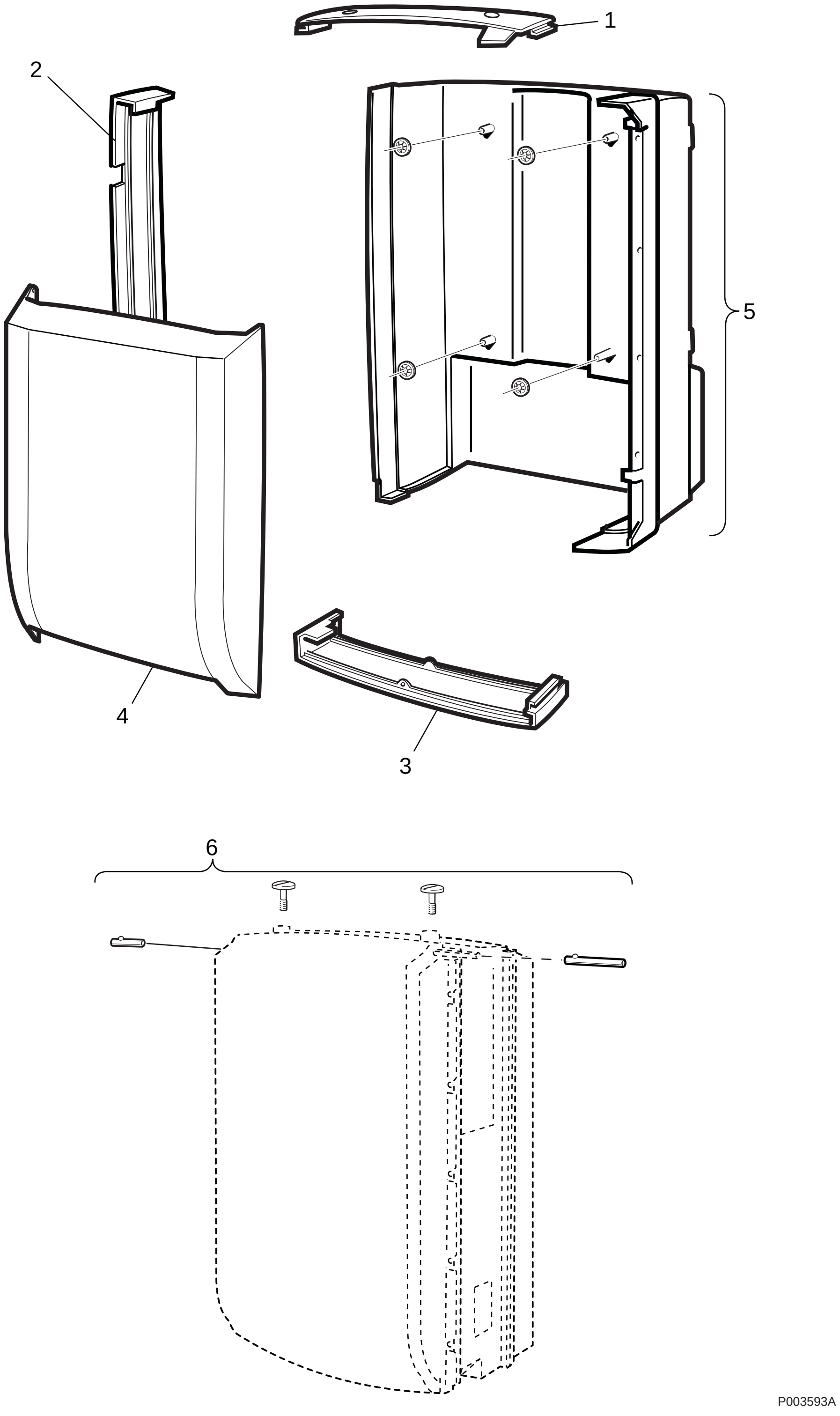

Figure 10

4.7 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.*

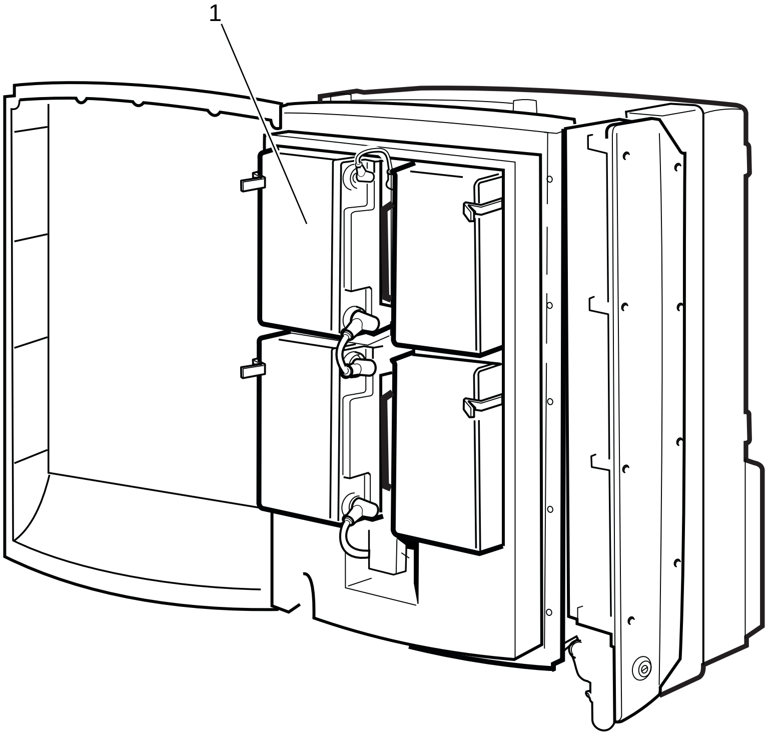

Figure 11

4.8 Batteries for PBC

Pos.	Product No.	Product Name	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)

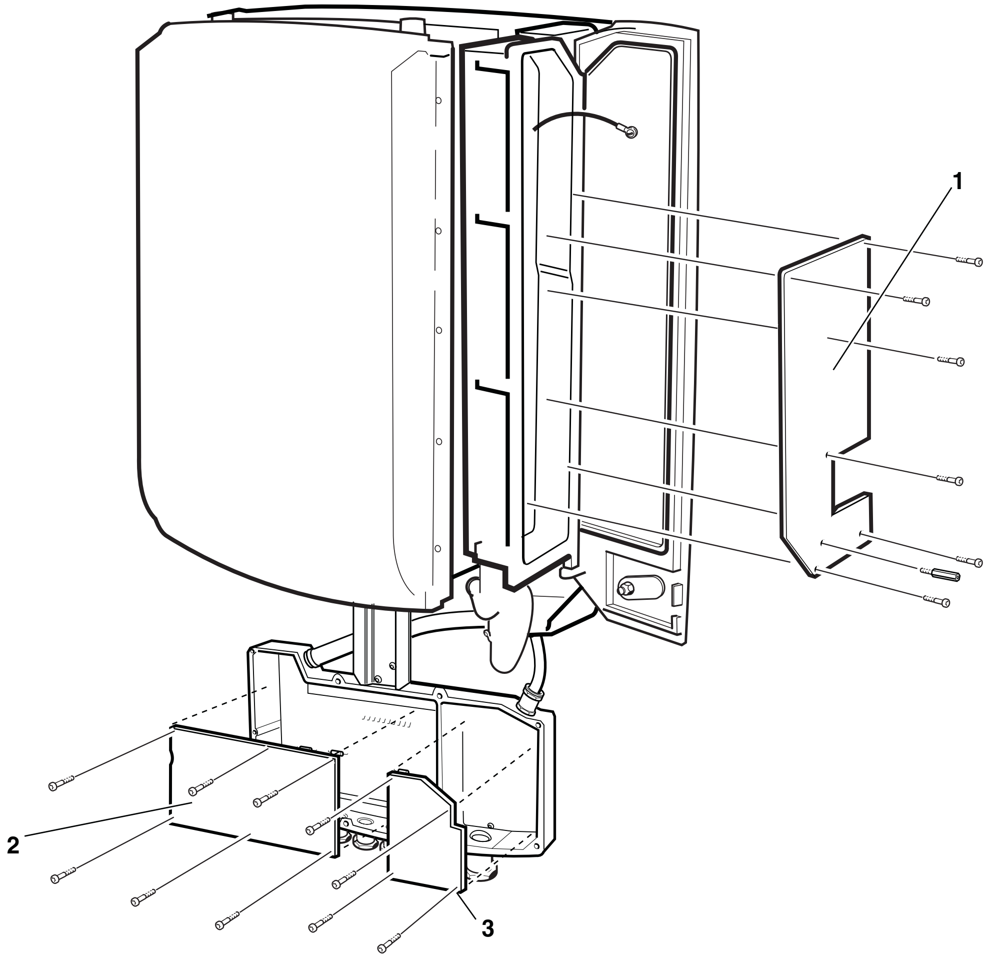

Figure 12

4.9 Replaceable Boards for PBC

Pos.	Product No.	Product Name	Description
1	NTZ 111 45/03	Spare Parts Set	EMC–In Board /*Incl screws and spacer.*
2	NTZ 111 45/04	Spare Parts Set	DC Surge Board /*Incl screws.*
3	NTZ 111 45/05	Spare Parts Set	AC Surge Board /*Incl screws.*

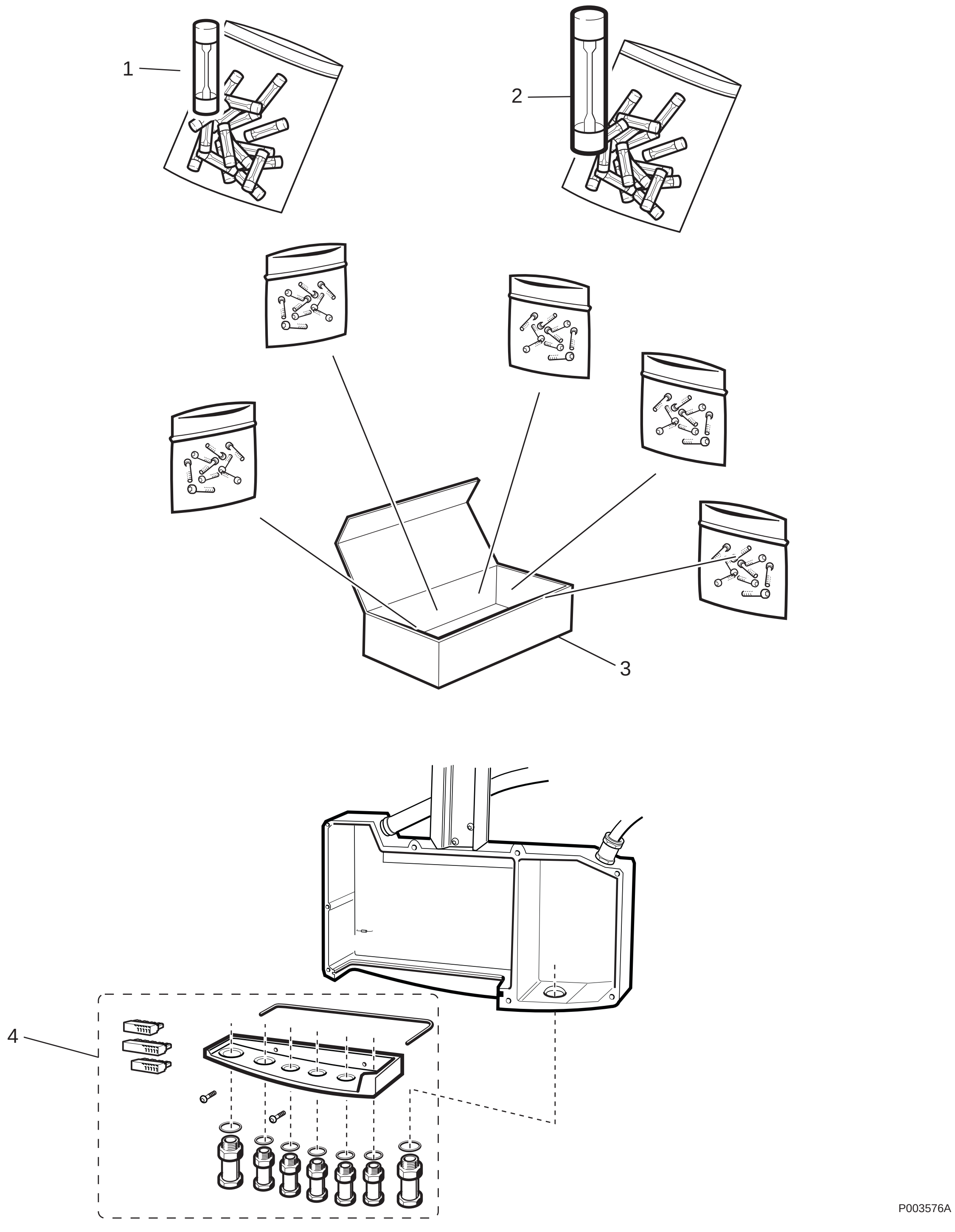

Figure 13

4.10 Fuses, Screws and Installation Details for PBC

Pos.	Product No.	Product Name	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 6.3 x32 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 and O-rings, 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.

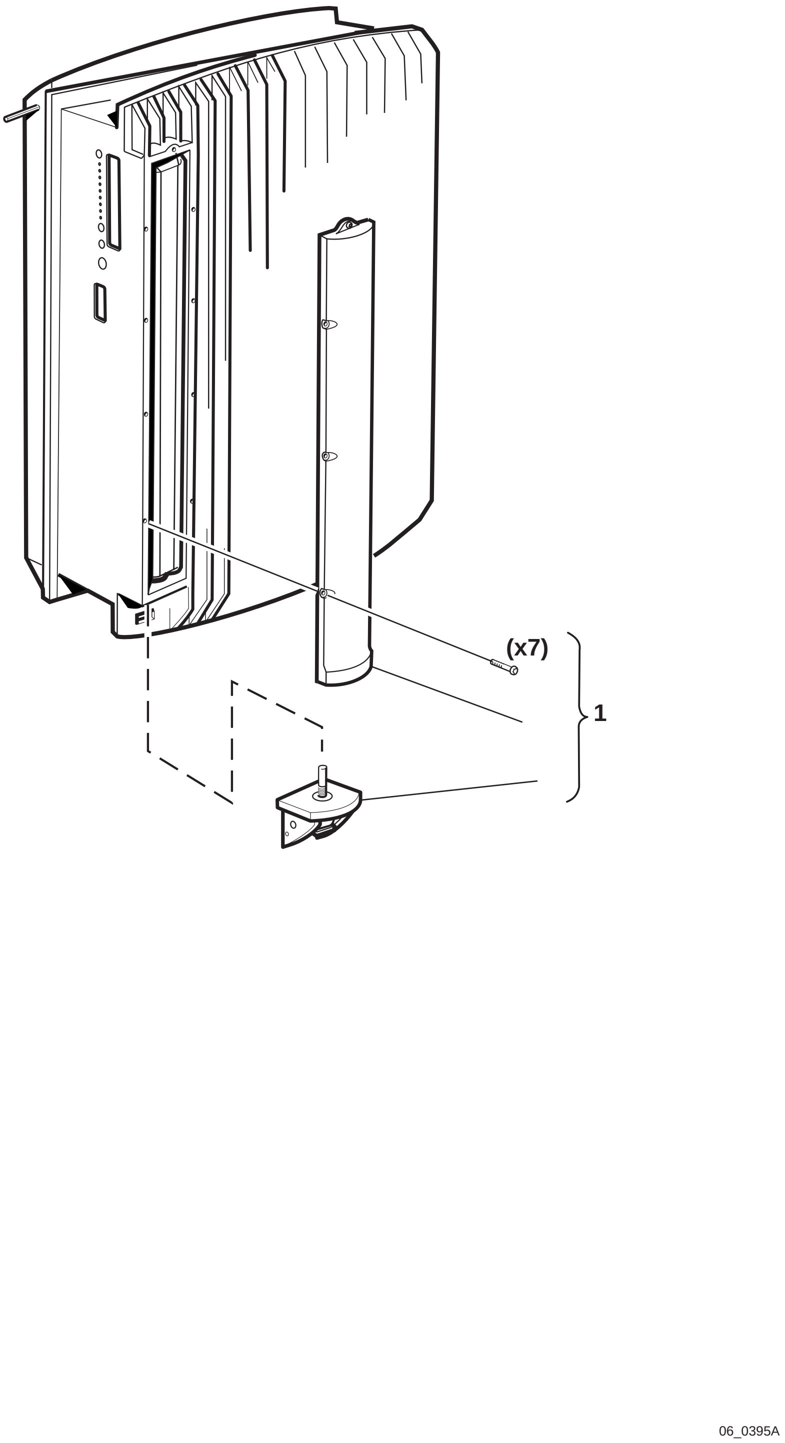

Figure 14

5.1 Battery Accessories for RBS 2302

Pos.	Product No.	Product Name	Description
1	NTZ 112 86/BA01	Spare Parts Set	Internal battery cover set / *Includes covers and screws. For battery see Chapter "Not Repairable"*

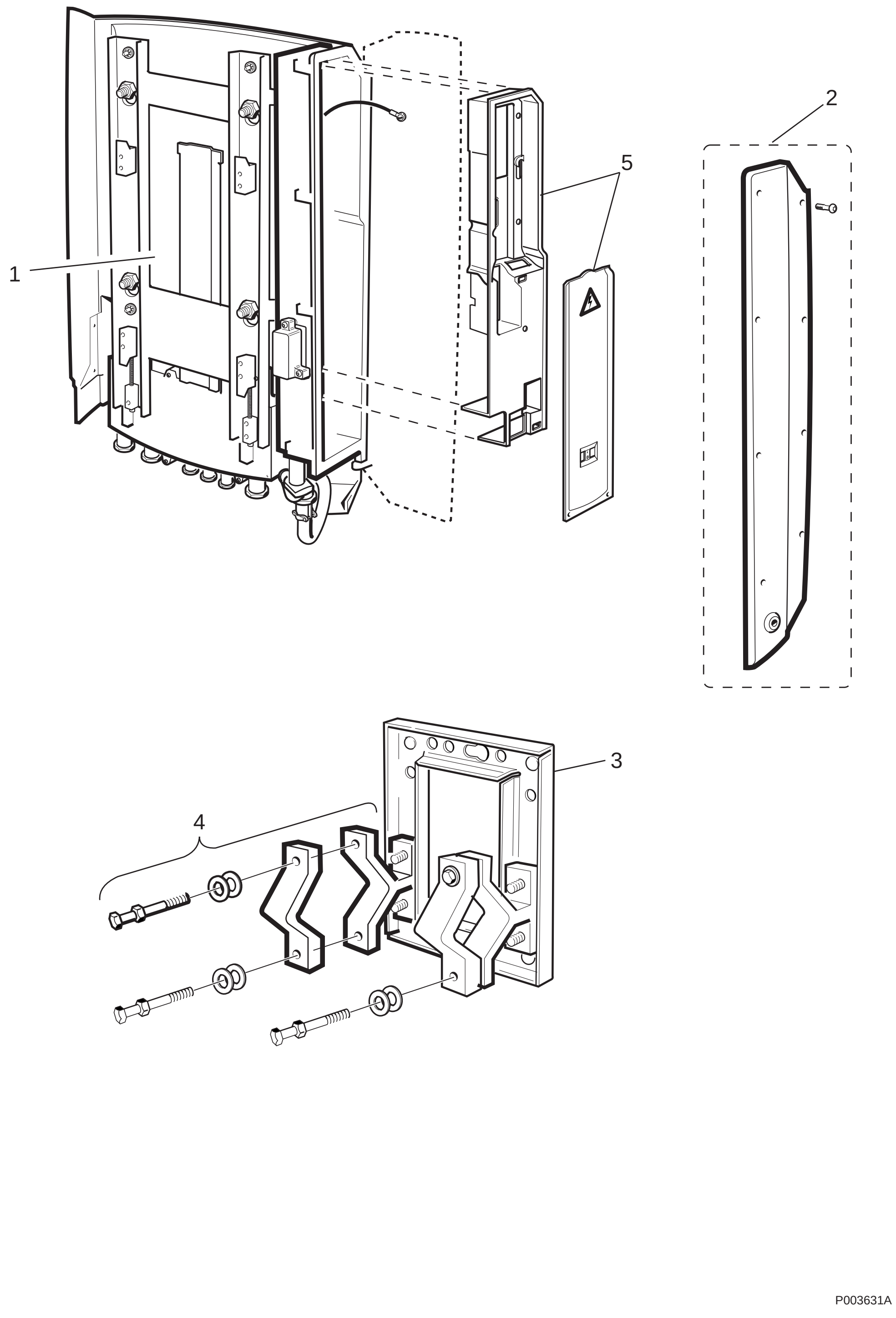

Figure 15

5.2 Other Available Parts for RBS 2302, Mechanics

Pos.	Product No.	Product Name	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.*

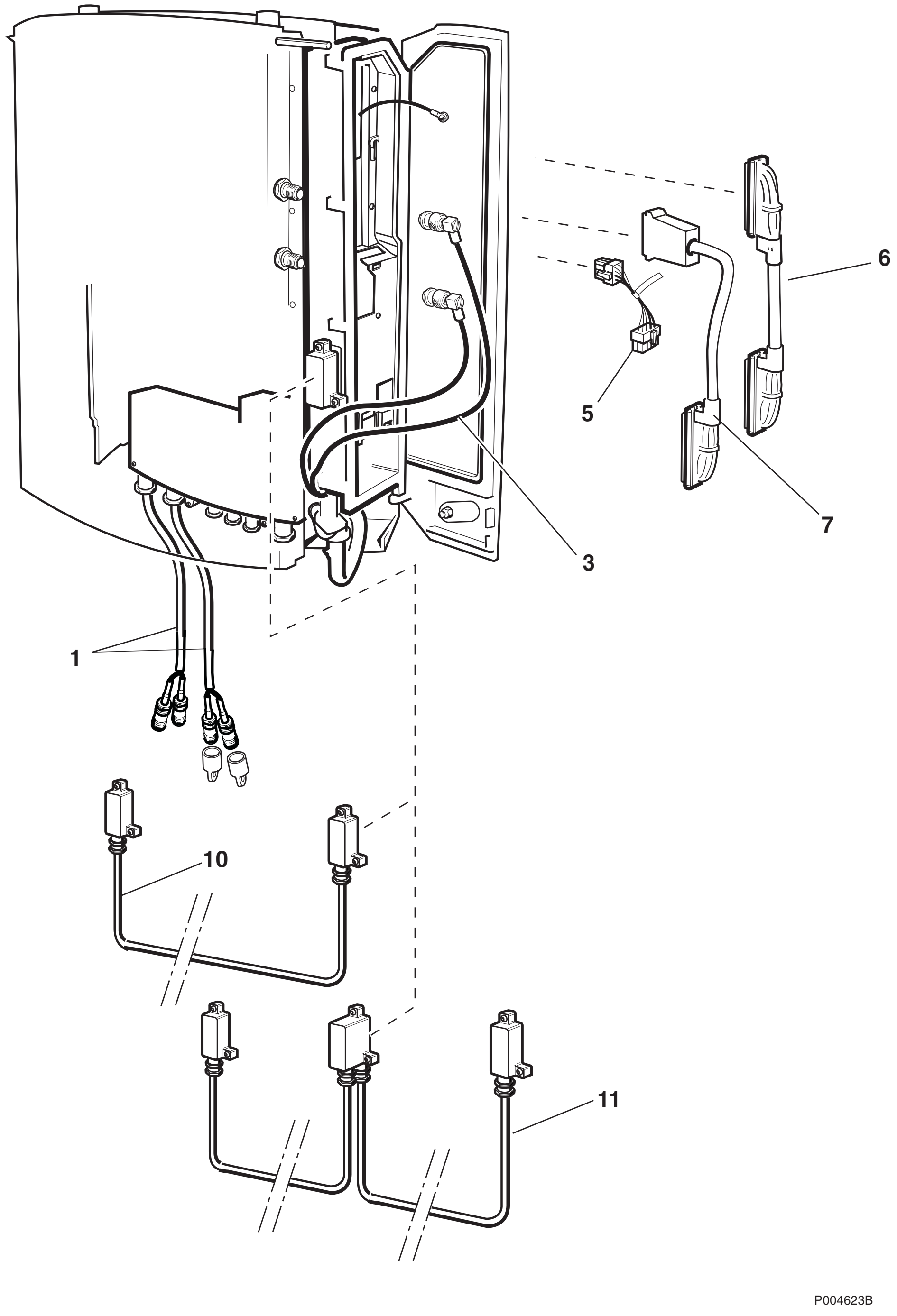

Figure 16

5.3 Other Available Parts for RBS 2302, Cables

Pos.	Product No.	Product Name	Description
1	RPM 518 974/2	Cable with connector	Coaxial 75 ohm TNC/F.
3	RPM 119 87/1	Cable with connector	Jumper N-type/F / *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)*

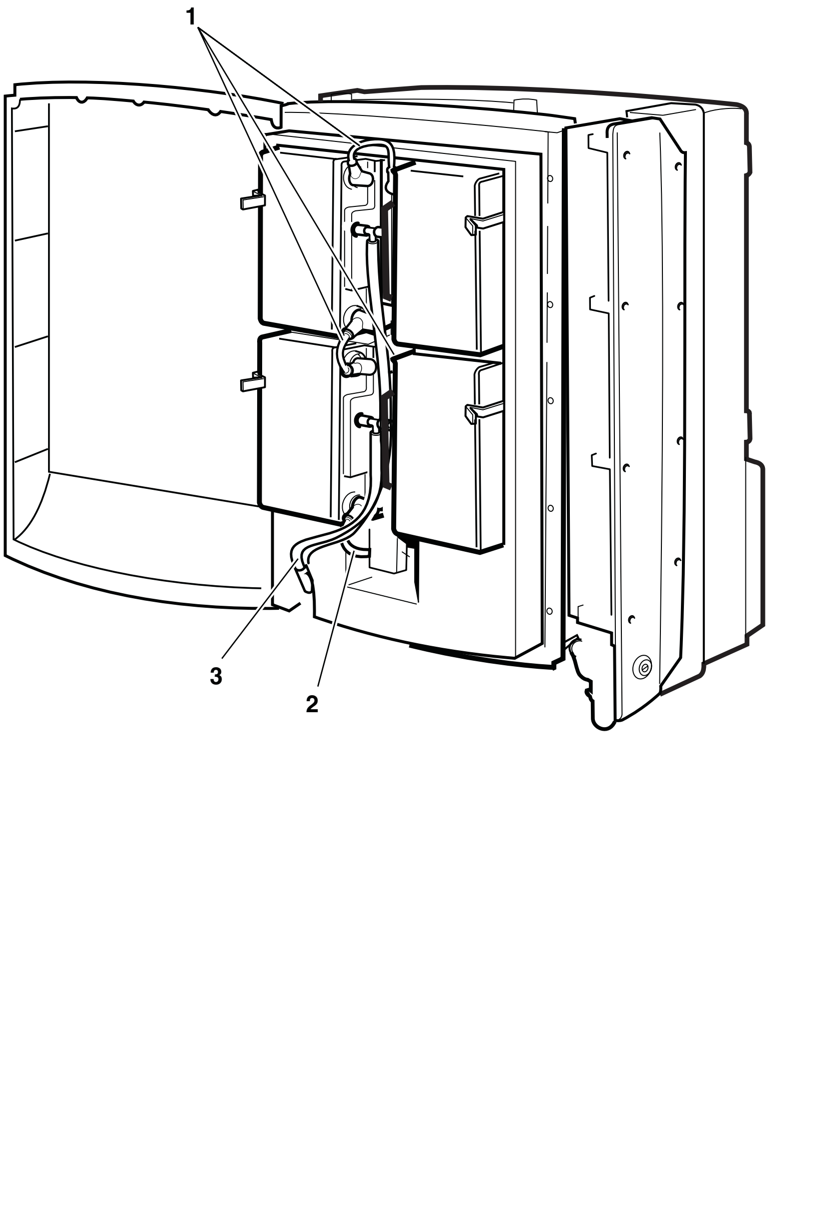

Figure 17

5.4 Battery Accessories for PBC

Pos.	Product No.	Product Name	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

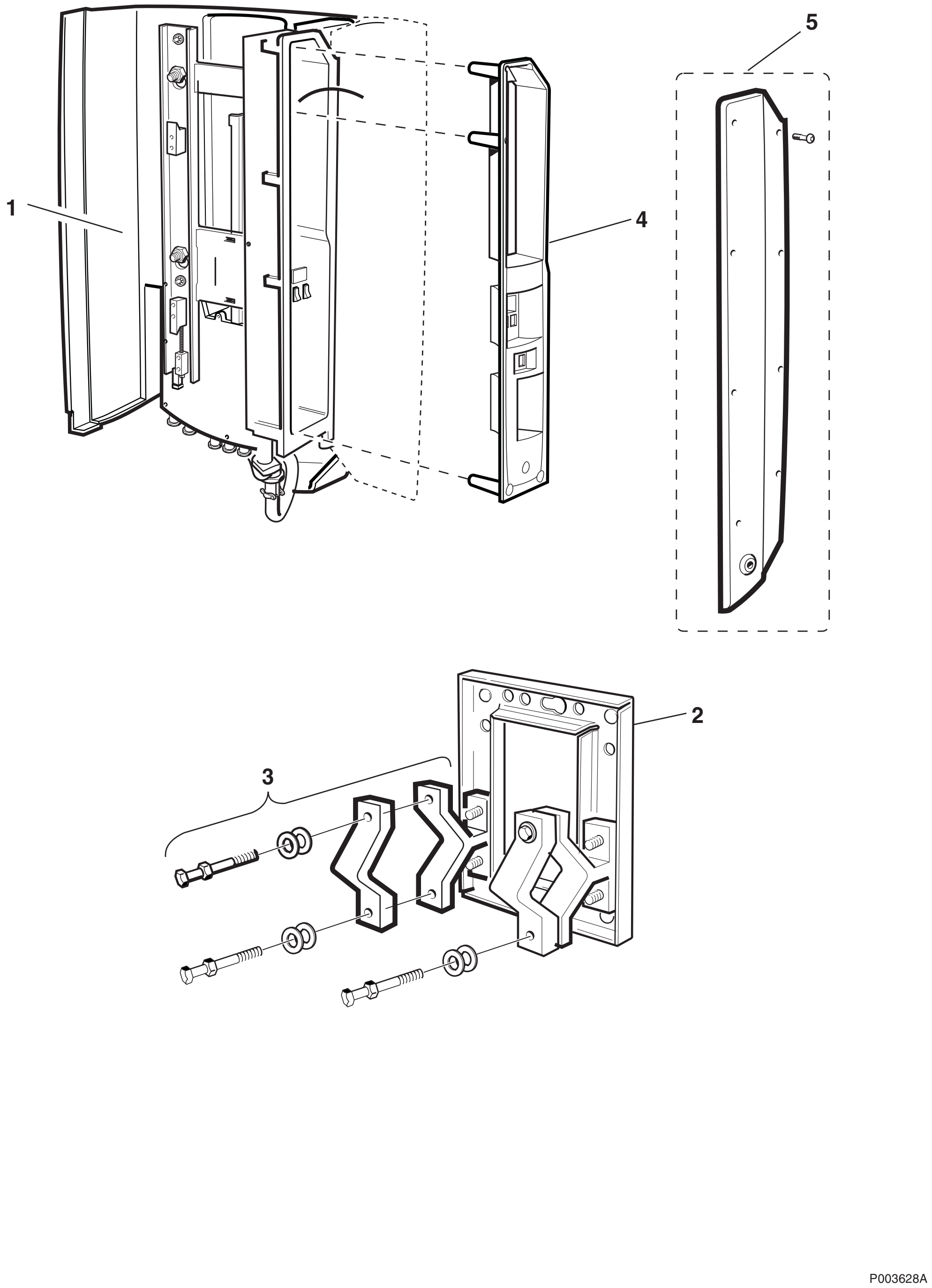

Figure 18

5.5 Other Available Parts for PBC, Mechanics

Pos.	Product No.	Product Name	Description
1	SEB 104 19/2	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	SDD 513 0120/1	Spare Parts set	Side-door for installation box.

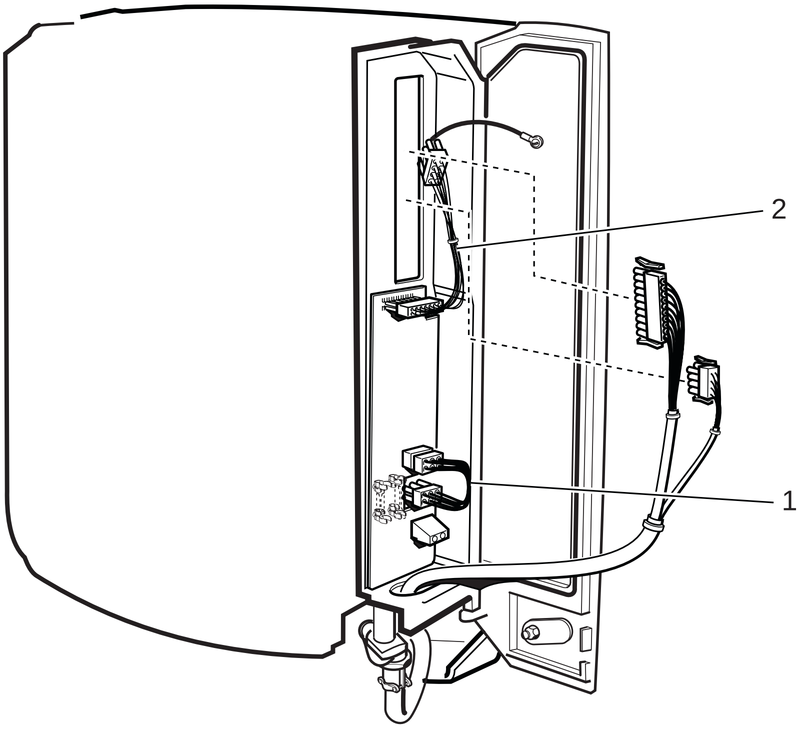

Figure 19

5.6 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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5.7 Packages for Repairable Products

Pos.	Product No.	Product Name	Description
(1)	RTK 994 04/1	Packaging Set	For RBS
(2)	RTK 994 04/7	Packaging Set	For PBC
(3)	RTK 993 4147/44	Box	For HDSL

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6 RBS 2302 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
NTZ 111 45/07	Replaced	SDD 513 0120/1
RPM 513 760/1	Withdrawn	-
RPM 518 954/1	Withdrawn	-
RPM 518 974/1	Replaced	RPM 518 974/2
SEB 104 19/1	Replaced	SEB 104 19/2

7 Numerical index for RBS 2302