RBS 2301

User's Guide

ERICSSON

LZN 302 47 R5B

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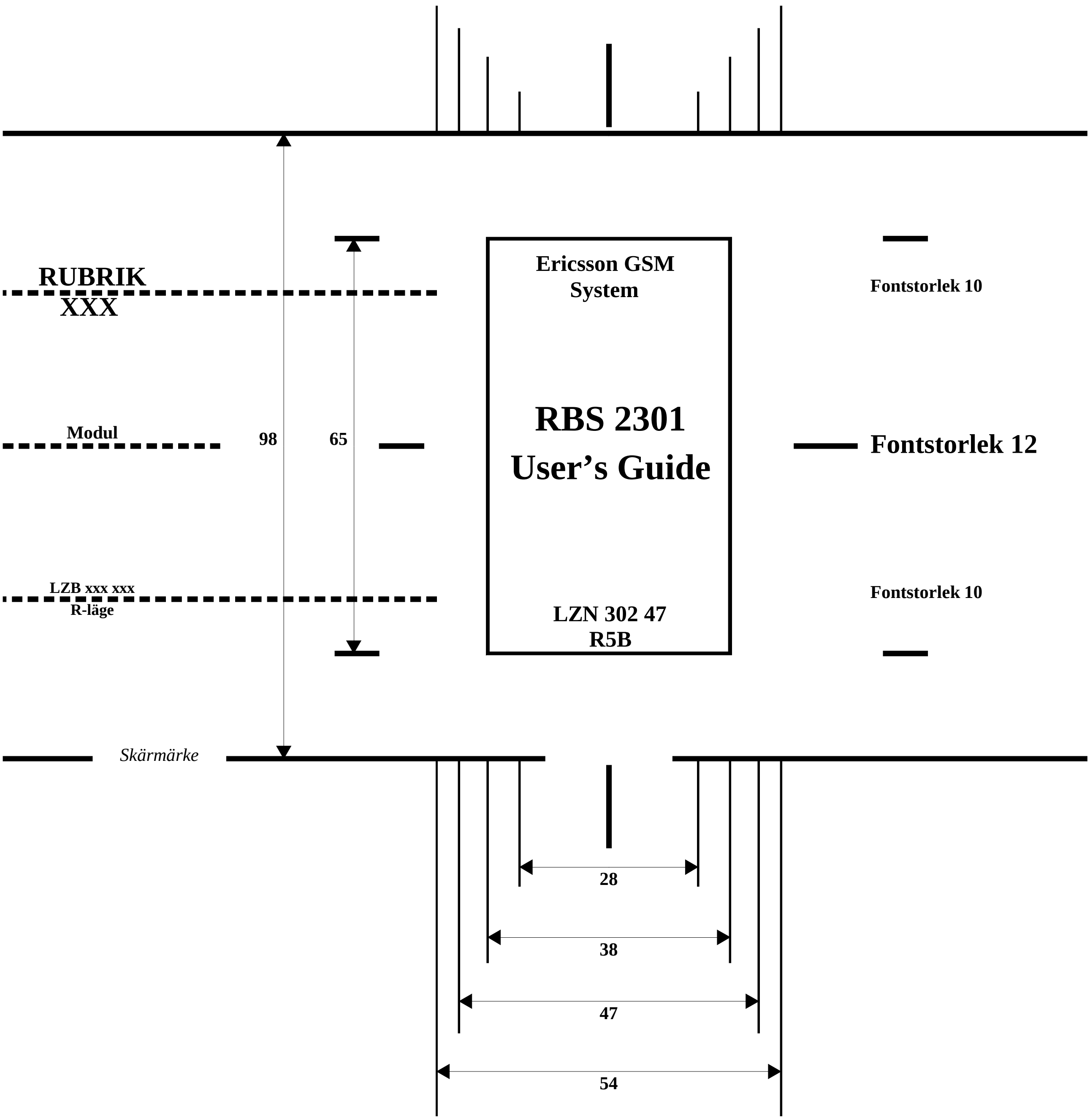

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CAPTION LIST

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User’s Guide RBS 2301

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

Contents

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1 Introduction

The RBS 2301 is a high quality micro base station that enables a simpler site search process, and at the same time, allows for cost-efficient implementations of high capacity radio networks. This makes the RBS 2301 very landlord friendly and easy to place wherever you need it. The RBS 2301 can be mounted on a pole, like a lamp post or in an antenna tower, or directly on the wall. In itself, the RBS 2301 is a complete BTS site, including transmission, integrated power supply, and optionally integrated antennas.

1.1 Customer Documentation Library

The documentation for the RBS 2301 is presented in a different way compared with the other RBS 2000 documentation. See the following figure.

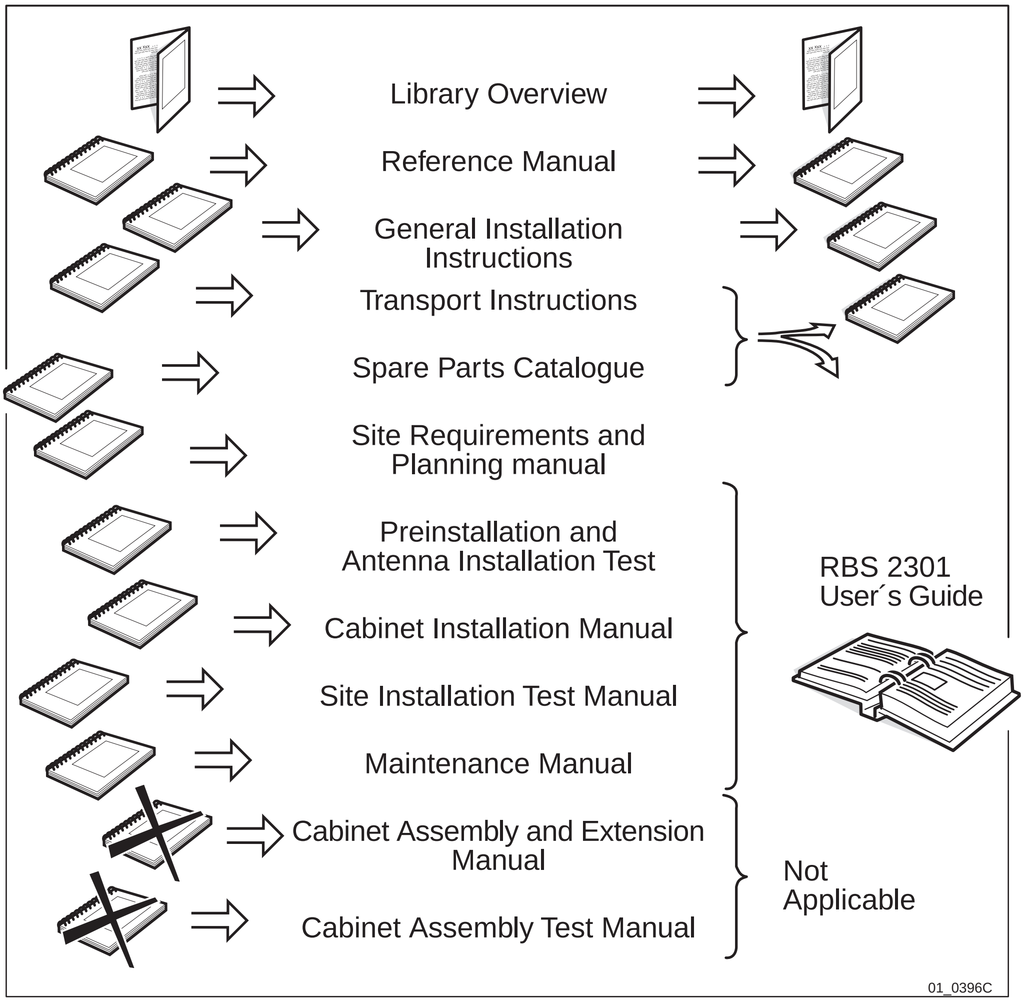

Figure 1 The Customer Documentation Library

The RBS 2301 User’s Guide consists of the chapters listed below. Each chapter describes one process event.

This is a brief summary of the chapters included:

Introduction

This chapter.

Safety

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

Tools and Instruments

Contains lists of all tools and instruments that is recommended.

Site Planning and Requirements

Describes the installation engineering process for the RBS 2301.

Preinstallation

Describes activities for installation of the mounting base, connection of cables and external antenna test.

Installation of RBS 2301

Describes activities for installation of the cabinet on the mounting base.

Antenna System Tests

Describes the external antenna test.

Site Installation Tests

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

Optional Tests

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

Fault Handling

Contains helpful information when an error o 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.

1.2 Target Group

The target group for this binder is all personnel involved in the RBS 2301 activities.

The ambition with the RBS 2301 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	**(For Ericsson internal use only)**
Memo CME 20	ERAC.ERACMEB
Memo CMS 40	ERAC.ERACMSB

1.3 Release History

Except for corrections of spelling, grammar and layout the following changes have been made between releases.

R1A to R2A

Safety

- Illustrations have been updated.
- *Section Radio Frequency Radiation* has been updated.

Tools and Instruments

- Lifting Device information has been updated in *subsection Accessories*.
- New installation materials in *section Tools for Preinstallation and Antenna Installation Test*.

Site Requirements and Planning

- Illustrations have been updated.
- Cascade Connection information added
- New technical information added in *section Transmission*.
- New technical information added in *section External Alarms*.

Preinstallation and Antenna Installation Test

- Illustrations have been updated.
- New technical information added in *section AC Mains Installation*.
- New technical information added in *section Connecting Transmission Cables*.
- New SiteMaster illustrations added to *section Antenna Installation Test*.

Cabinet Installation

- Illustrations have been updated.
- Lifting Device information has been moved to the *chapter General Information*.

Site Installation Test

- Illustrations have been updated.
- Cascade Connection (Line Built Out) infromation added.

Maintenance

- Illustrations have been updated.
- References has been changed.
- Checklist added in *section Preventive Maintenance*.

Spare Parts Catalogue

- New chapter Spare Parts Philosophy for RBS 2301.
- New chapter Numerical Index fro RBS 2301.
- New Spare Parts Sets introduced: 1)EMC-filter 2) Sun-shield accessories 3)Shielding gasket 4)Cover for installation box 5)Screw set 6)Cable lead.
- New Multicasting Box common for GSM 900, 1800 and 1900 replacing two old.

Glossary

- New abbreviations added.

General Information

- New section describing the Lifting Device.
- Fault code list has been updated.

R2A to R3A

Safety

Unchanged.

Tools and Instruments

- New BSCSim kit in *section Tools for Site Installation Test*.
- New calibration kit in *section Tools for Maintenance*.

Site Requirements and Planning

- New technical information added in *section Pole Fixture*.

- New technical information added in *section Power Supply*.
- New technical information added in *section External Antennas*.

Preinstallation and Antenna Installation Test

- Illustrations have been updated.
- New technical information added in *section Connecting AC Mains Power*.
- New technical information added in *section Connecting Transmission Cables*.

Cabinet Installation

Unchanged.

Site Installation Test

- A new illustration regarding Test Setup has been added.
- Technical information has been updated in *section MS Call Test using Simulator*.
- Technical information has been updated in *section LBO for Cascade Network Topology (Multidrop)*.
- New technical information added in *section Alarm Inlets (Define RBS External Alarms/ARAE Fault)*.
- New technical information added in *section Check the IDB*.

Maintenance

- A new section regarding Calibrate Oscillator has been added.

Spare Parts Catalogue

Unchanged.

Glossary

- New abbreviations added.

General Information

- Note has been added in *section Decoding of Fault Maps*.

R3A to R4A

Safety

- Chapter updated.

Tools and Instruments

Unchanged.

Site Requirements and Planning

- Illustrations have been updated.

Preinstallation and Antenna Installation Test

- Illustrations have been updated.
- Information has been added, regarding dimensions associated to the lock in the installation box door.

Cabinet Installation

- Illustrations have been updated.

Site Installation Test

- Illustrations have been updated.

Maintenance

- A new section regarding the IDB has been added.
- Illustrations have been updated.

Spare Parts Catalogue

Unchanged.

Glossary

Unchanged.

General Information

- Information and fault codes added regarding the IDB.
- *Section Optical Indicators* updated.
- Illustrations have been updated.

R4A to R5A

Safety

Unchanged.

Tools and Instruments

- Note "Only instruments that are year 2000 compliant may be used" added.
- Table 2, 3 and 4 updated.
- TEMS Kits corrected.

Site Requirements and Planning

- Information about Lifting Kit added.

- ARAE Fault Test removed.
- *Section AC Mains Power Test* added.
- *Section External Antennas* updated.

Preinstallation and Antenna Installation Test

Unchanged.

Cabinet Installation

Unchanged.

Site Installation Test

Rewritten.

Maintenance Manual

- Information about Internal Battery added.

Spare Parts Catalogue

- Figure 3 and 6 revised.

Glossary

Unchanged.

General Information

- Optical Indicators written in accordance with the information in *chapter Site Installation Test.*

R5A to R5B

In this release of RBS 2301 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:

Tools and Instruments

Chapter Tools and Instruments has been updated.

Site Planning and Requirements

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

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

Preinstallation

The chapter formerly called *Preinstallation and Antenna Installation Test* has been divided into two separate chapters; *Preinstallation* and *Antenna System Tests*.

- *Chapter Preinstallation* now only contains information about activities regarding the preinstallation.

Installation of RBS 2301

This chapter is the same as the chapter formerly called *Cabinet Installation*.

Antenna System Tests

This chapter has been extracted from the chapter formerly called *Preinstallation and Antenna Installation Test*.

- All information has been updated.

Site Installation Tests

- 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 R5B.

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

Fault Handling

This chapter has been added in R5B.

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

Maintenance

- In *section Maintenance — General, subsection Cabinet* has been updated.

Product Data

This chapter has been extracted from the chapter formerly called *Site Requirements and Planning*. It contains the technical data for different units that can be mounted on site.

- *Section Lifting Device* has 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 accordingly to the description above.

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2 Safety Instructions

This chapter shows the system used for presenting safety information.

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

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

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

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

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

2.1 Warnings

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

Figure 2 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 3 Radio frequency radiation

Figure 4 Electrical hazard

Figure 5 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 Beryllium Oxide (BeO)

WARNING

⚠

Do not handle transistors and components without protection. Beryllium Oxide is highly toxic and may be found in transistors, and other components.

Hazard

Beryllium Oxide dust is created by chafing, filing or breakage. It is very dangerous if inhaled, even for only a few seconds. It can cause injury to skin or mucous membranes severe enough to endanger life or cause permanent injury. Particles penetrating the skin through wounds or abrasions are liable to cause chronic ulcerations.

Symptoms of Poisoning

Symptoms of Beryllium poisoning are respiratory troubles or cyanosis (grey-blue discoloration of the skin). These symptoms may develop within a week, or after a period of several years.

First Aid

- A suspected inhalation of Beryllium Oxide should be treated immediately by a doctor at a hospital.
- Wash the area thoroughly if it is suspected that Beryllium Oxide has been in contact with the skin or entered the skin through cuts or abrasions. This should be followed by a medical examination.

Components Containing Beryllium Oxide

Do not store components and washers loose. Do not file or machine them in any way. Do not apply heat except when the components are clamped in a heat sink application.

Power Transistors, Diodes and Thyristors

WARNING

⚠

Do not carry loose components in pockets, bags or containers, or tamper with them in any way that could cause them to break or disintegrate. Do not apply excessive heat during soldering. Do not break open components for inspection.

Components containing Beryllium Oxide are clearly marked in the manufacturer's packing, and identified by attached information.

- Store components in their original packing and do not mix them with other components.
- Ensure that they do not become mechanically damaged. Use care when replacing defective components.
- Beryllium Oxide is encapsulated and components are safe to handle for normal replacement purposes.

Heat Sink Washers

Note: Not all heat sink washers contain Beryllium. Heat sinks containing Beryllium, are individually packed when new.

WARNING

⚠

Do not store washers loose. Do not file or machine them in any way. Do not apply heat, except when the components are clamped in a heat sink.

- Handle with gloves or cloth when removing heat sink washers from packaging and mounting them into place in the equipment.

Cathode Ray Tubes (CRTs) and Ceramic Applications

WARNING

⚠

Do not handle broken glass with bare fingers. Do not blow on exposed surfaces due to the danger of Beryllium Oxide.

Ceramic cylinders or formers containing Beryllium are marked by blue colorations or black lines. They are safe to handle provided they are not damaged. If they are damaged, take precautions as with other components containing Beryllium.

Disposal

Dispose of defective and/or broken Beryllium components in approved containers. Mark them clearly on the outside of the wrapping "COMPONENTS CONTAIN BERYLLIUM"

WARNING

⚠

Never send defective and/or broken components containing Beryllium Oxide through the mail. Instead, return them to the nearest depot by hand.

2.4 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) such as 25072 (goggles in the Common Tool Kit LTT 601 044/1) 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.

2.4.1 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.

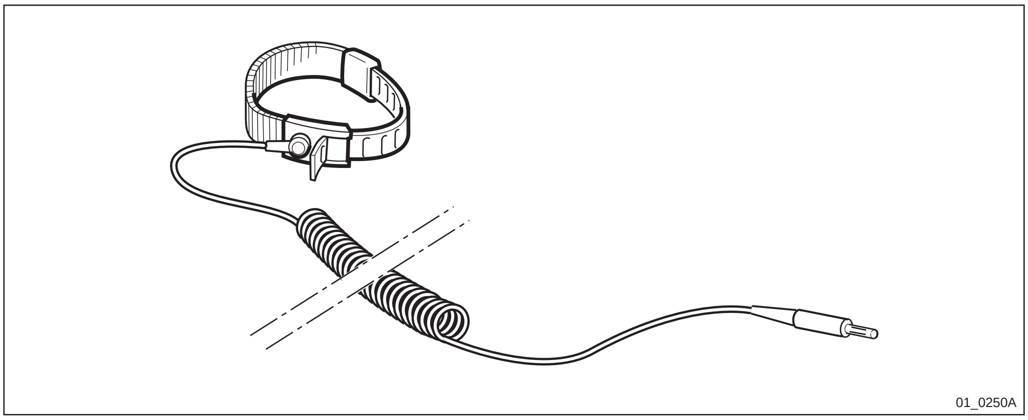

Figure 6 ESD wrist strap LYB 250 01/14

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.

2.5 Batteries

Batteries can be hazardous if improperly handled. Special care must be used to prevent short-circuiting batteries, or loss of electrolyte. Electrolyte contains potentially hazardous material.

Work

DANGER

Read Safety Instructions regarding handling and connecting batteries.

General Precautions

When working with batteries:

- Remove wrist watches, rings, bracelets, etc.
- Use insulated tools.
- Make sure that eye wash facilities, or portable eye wash equipment, is available prior to starting work.

Use all the required PPE (Personal Protective Equipment) such as:

- Rubber gloves and aprons.

- Eye protection (goggles or a face shield).

Short-Circuiting of Batteries

CAUTION

⚠

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

It is necessary to ensure that no metal object, such as a tool, short-circuits the batteries. If necessary, disconnect or remove the batteries before beginning work.

Explosive Gases

Batteries may give off explosive gases. All battery areas must be adequately ventilated and protected from fire.

CAUTION

⚠

Do not use open cell-lead acid batteries. They give off hazardous gases that may cause an explosion or corrosion of the equipment. The battery must be suitable for horizontal operation.

Overheated Batteries

CAUTION

⚠

Excessive heat can cause the battery casings to become soft and to warp, allowing acid to escape.

If the internal temperature of the cabinet exceeds + 60 °C (140 °F), take the following precautions:

- Check that the batteries have not leaked.
- If the batteries have leaked, see the section Hazardous Waste Material from Leaks.

Hazardous Waste Material from Leaks

Ensure that there are sufficient absorbers or neutralizing materials available on site, in case of spillage of hazardous substances. There is a danger of spillage occurring when installing, removing, replacing or servicing batteries. The absorbers and neutralizing materials must be suitable for the hazardous substances involved.

Table 1 Typical Neutralizers

Typical neutralisers	
Baking soda (bicarbonate)	$NaHCO_3$
Sal soda	$Na_2CO_3IOH_2O$
Soda ash	Na_2CO_3

Consult the battery manufacturers for specific details of absorbers and neutralizing materials. Absorbers and neutralizing products will vary, depending on country and manufacturer.

2.6 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.

2.6.1 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

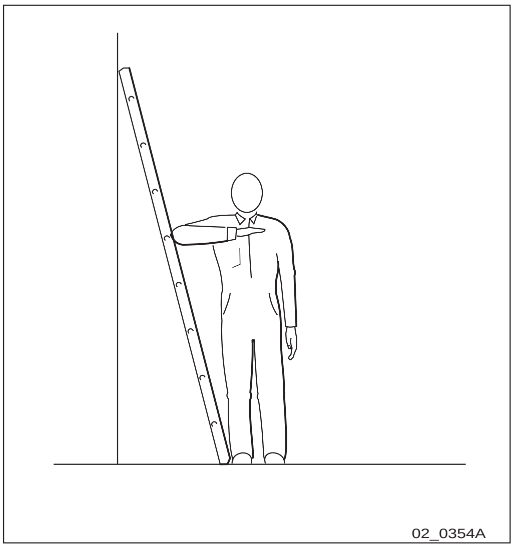

Figure 7 Checking the angle

- 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 8 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.

2.7 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.

2.8 Other Hazards

Handling Heavy Goods

WARNING

⚠

Read the Safety chapter regarding handling of heavy goods.

- Use tested and approved lifting devices only. They must only be used by trained personnel.
- Always check that all parts of the lifting devices are intact.
- Make sure that all lifting devices are properly stabilised or attached to fixed objects such as walls or buildings before lifting.
- Give clear and consistent command signals, for example
  - lift
  - lower
  - stop
- Make sure that there is never an angle of more than 90° between the straps at the point where they are attached to the lifting hook.

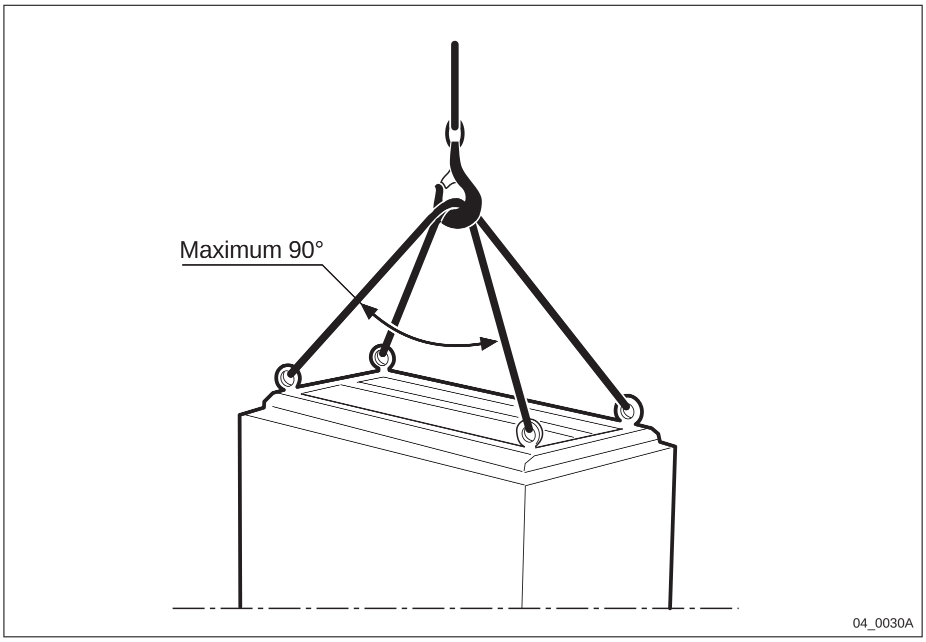

Figure 9 Use long straps

- Too large an angle between the lifting straps increases the strain on them and may cause them to snap. Overloading, or wrong use of lifting devices in other ways, can have catastrophic consequences.

- Never walk under hoisted loads.
- Follow local regulations for safety clothing and safety equipment for hoisting and moving goods.
- Unsecured cabinets have a high centre of gravity. They can easily tip over and harm personnel.

WARNING

⚠

There is a danger of the assembly toppling over, which could cause injury to personnel or damage to the equipment.

Fire

WARNING

⚠

Fire may spread to neighbouring 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.

3 Tools and Instruments

This section contains lists of all tools and instruments recommended for complete installation of the RBS 2301.

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

3.1 Tools for Installation of RBS 2301

3.1.1 Installation Tools

Description
Side cutting pliers, BACHO
Snip nose pliers, Lindström
Slip joint pliers, (Polygrip)
Cable stripper
Screwdriver, TORX, T10, T20, T30
Screwdriver, 8020, wide 3 mm
Screwdriver, 8150, wide 5.5 mm
Adjustable spanner 10″
Penlight , Maglite mini
Knife
Measuring tape, 5m
Voltage tester
Drill cassette 6-10 mm
Drill set 6-10 mm
Drill, 12 mm
Hammer drill machine
Extention cable with 20 m cable
Spirit level
Socket set
Compression tool, T2600
Press Die C sleeve connectors
Press Die 10+75
Press Die 16+35
Press Die 25+35

For detailed information of the toolkit see:

General Installation Instructions *LZN 302 49*

Installation Materials

Description	Product No.	Qty
Sealing Kit	5/NTM 201 230/3	1
Earthing Set	5/NTM 201 201	1
Jumper cable for external antennas	RPM 513 760/1	2
Cover Plate	SXA 117 1926/1	1
Distribution Box	NEJ 123 01	1
Pole mounting Kit for Distribution Box	769 300/1	1

3.1.2 Accessories

Description	Product No.	Qty
Lifting device kit (Lifting Handle SXK 107 5775/1 included)	SXK 107 5723/1	1
Lifting Handle	SXK 107 5775/1	1

The Lifting device may be used for lifting the cabinet up to 5 m and for a weight up to 25 kg.

3.2 Tools Required for Antenna System Test

Table 2 900 MHz Antenna Test

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

Table 3 1800 and 1900 MHz Antenna test

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

3.3 Tools and Instruments for Site Installation Test

Different test methods needs various instruments and cabling kits.

For example:

1. The Network Integration Test is marked with number 7 in *Table 4 on page 37*.
2. According to *Table 5 on page 37* the test method number 7 requires index D.
3. According to *Table 6 on page 38*, the index D equals a TEMS kit. This table also gives you information about the product number and required quantity.

Information regarding the parts included in the various kits, *see Section 3.3.1 on page 38.*

Table 4 Explanations for the different test methods

Test Method No.	**Explanation**
1	Transmission Test 1.5 MBit/s (T1)
2	Transmission Test 2.0 MBit/s (E1)
3	MS-Call test on BCSsim 1.5 MBit/s (T1)
4	MS-Call test on BCSsim 2.0 MBit/s (E1)
5	MS-Call test on BSCSim II, 1.5 Mbit/s (T1)
6	MS-Call test on BSCSim II, 2.0 Mbit/s (E1)
7	Network Integration Test
8	Test Call with BCS connection
9	Antenna Installation Test of External Antennas
10	OMT related tests
11	AC Mains Power Test

Table 5 Test method versus required instruments & accessories

Test Method	**Instruments and Accessories**											
Index	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
1											X	
2										X		
3				X		X		X	X		X	
4				X	X			X	X	X		
5				X			X		X		X	
6				X			X		X	X		
7				X								
8				X								
9	X	X										
10			X									
11												X

Table 6 Explanations for Instruments & accessories

Index	Instrument/accessory	Product No.	Qty
A	SiteMaster S120A (900 MHz) or S235A (1800 and 1900 MHz)	LPK 102 101/2 (900 MHZ) LPK 102 101/3 (1800 & 1900 MHz)	1
B	Adapter N-TNC	LTR 171 101/1	1
C	OMT Kit	NTM 201 1550/1(R6.1, CME 20) [1] NTM 201 2159/1 (R6.1, CME 20) [2] NTM 201 2289/1 (BSS R7) [2]	1
D	TEMS GSM 900 TEMS GSM 1800 TEMS GSM 1900 TEMS GSM Dual Band	LPB 112 01/1 LPB 112 02/1 LPB 112 03/1 LPB 112 12/1	1
E	BSCSim Kit 2.0 MBit/s (E1)	LPP 106 33/12	1
F	BSCSim Kit 1.5 MBit/s (T1)	LPP 106 33/22	1
G	BSCSim II Kit 1.5 MBit/s (T1) and 2.0 MBit/s (E1)	LPP 106 35/03	
H	Diamux 2-1.5 MBit/s	KDU 127 112/1	1
I	Multi-Casting Box (MCB), GSM	KRF 201 439/1	1
J	Cable Kit 2.0 MBit/s (E1)	NTM 201 1617/2	1
K	Cable Kit 1.5 MBit/s (T1)	NTM 201 1616/2	1
L	Fluke 8060 multimeter	LPK 102 024/1	1

[1] Only for 16 bits operating system (Win 3.11).

[2] Only for 32 bits operating system (Win 95, NT 4.0) with OMT and OMT2 in the same SW.

Using the OMT SW and TEMS SW

A Lap Top PC is needed with following minimum requirements:

- 486 processor
- 75 MHz
- 8 MB RAM (for Win 3.11) or 16 MB RAM (for Win 95, NT)
- MS Windows version 3.11 or Windows 95, NT

3.3.1 Kit Specification

Cable Kit 1.5 MBit/s (T1) Product No. NTM 201 1616/2

List of including parts

Item	Description
C27	MS cable
C23	Coaxial cable BNC-BNC
C24	Coaxial cable BNO-Dsub
Ad21	Adapter
Ad23	Loop back connector
A21	Attenuator 30 dB, 2 W

Cable Kit 2.0 MBit/s (E1) Product No. NTM 201 1617/2

List of including parts

Item	Description
C27	MS cable 1
C25	Coaxial cable BNC-Dsub
Ad21	Adapter
Ad23	Loop back connector
A21	Attenuator 30 dB, 2 W

Diamux Kit

Item	Product No.
Diamux Kit	KDU 127 112/1
Included in Diamux Kit	
Diamux Basic System	
Main AC connector (power supply)	
Diamux 20 V.24 cable	
Diamux 20 User’s guide	

BSCSim Kit

BSCSim Kit	Product No.
BSCSim 1.5 MBit/s	LPP 106 33/22
BSCSim 2.0 MBit/s	LPP 106 33/12
Included in BSCSim Kit	
BSCSim	
Adapter Ad25	

BSCSim II Kit

BSCSim II Kit		**Product No.**
BSCSim II		LPP 106 35/03
Item	**Description**	**Qty**
1	BSCSim II platform	1
2	BSCSim II application software	1
3	Cable Kit for RBS 2301	1
4	User's Guide	1

OMT Kit Product No. NTM 204 1550/1 for R6 software

Item
OMT & OMT2 16 bit software
Cable C26 (RS 232)
User's Guide

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

Item
OMT 32 bit software
Cable C26 (RS 232)
User's Guide

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

Item
OMT 32 bit software
Cable C26 (RS 232)
User's Guide

3.4 Tools for Maintenance

General Maintenance Tools

The tools for maintenance process is the same tools described in *Section 3.1 on page 35* and *Section 3.3 on page 36*.

Special Maintenance Tools

The special tool for maintenance is the Loop Forward connector Ad 24, Product No. LPY 107 1003/1, used during change of cabinet or EMC card.

Item	Product no.
Ad24	LPY 107 1003/1

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

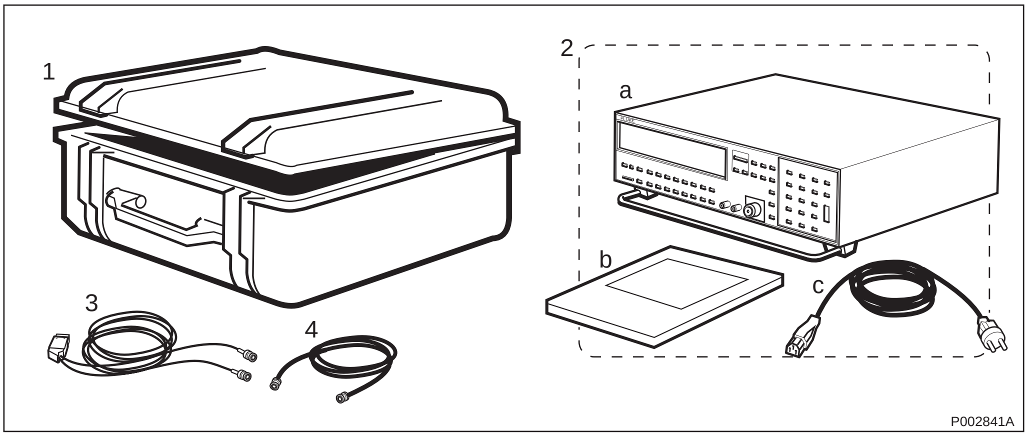

Figure 10 Instrument for Calibrate Oscillator Product No. LPK 102 102/1

Pos	Description	Qty
1	Suitcase	1
2	Instrument Set	
a	Instrument	1
b	Operators Manual	1
c	Power Cord	1
3	Cable Ericsson RNV-2*BNC	1
4	Cable SMB-BNC	1

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4 Site Planning and Requirements

The Site requirements and planning section describes the installation engineering process for RBS 2301. Careful planning of preinstallation activities, such as antennas, cables, power, and sor forth, is essential for fast installation and commissioning of base stations. This section contains document rules that are applicable to Ericsson organizations only.

4.1 Preconditions

The Preconditions section lists general documents needed for installation engineering.

4.1.1 Documents

Ordering Information	*131 62-HRB 105 01/3B*
Antenna Configuration	*155 19-COA 109 117 Uen and 1/ 155 19-COA 109 117 Uen*
Rules and Methods for Installation Engineering	*EN/LZB 119 2935/6*
Standard Site Material Catalogue	*EN/LZT 123 2737*
General Installation Instructions	*LZN 302 49*

4.1.2 Tools and Instruments

See chapter Tools and Instruments.

4.2 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 seven numbers. This number is called the Product Number. The threeletter 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.)

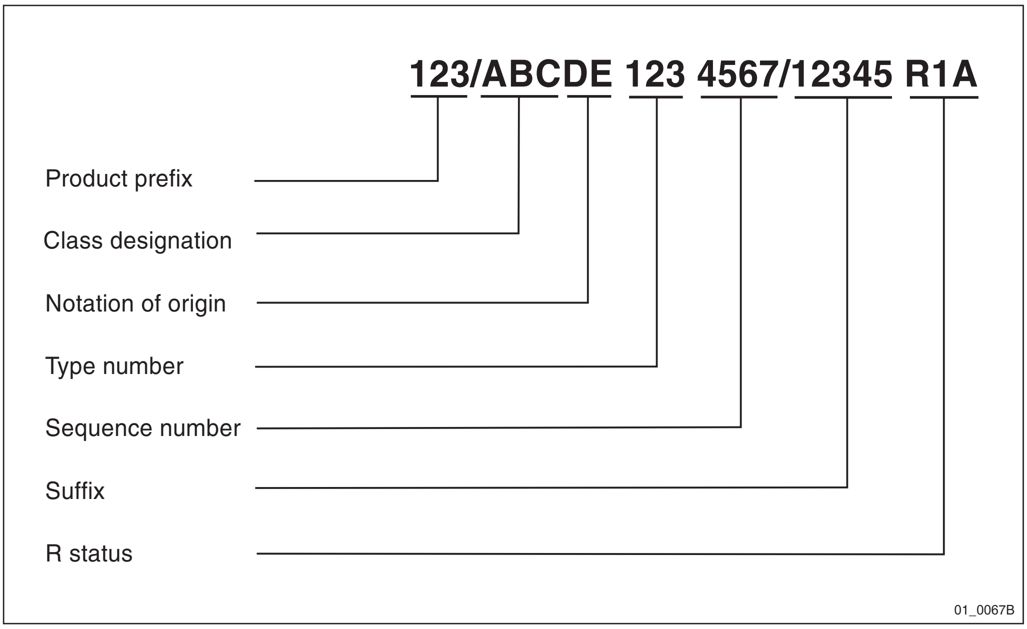

Figure 11 The complete product identity

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 kinds 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 in which we are interested).

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

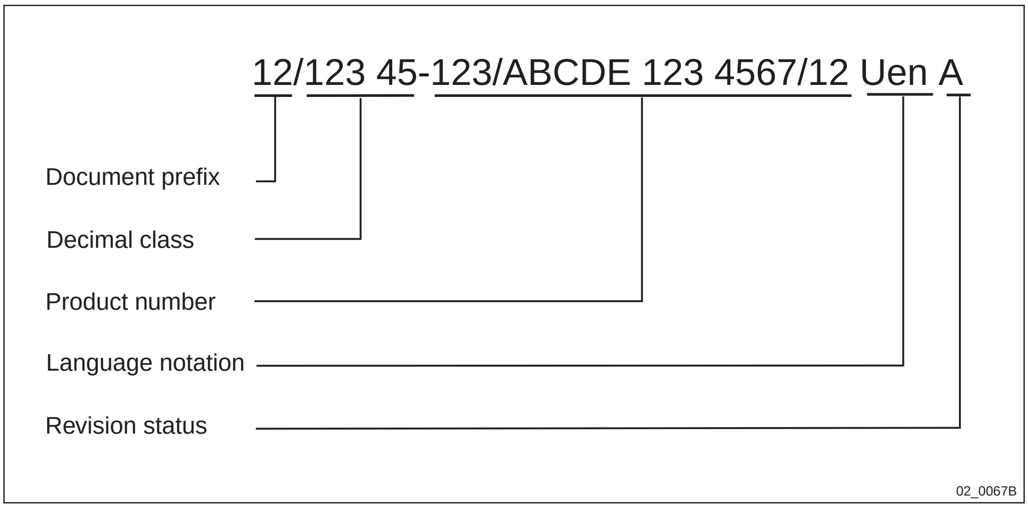

Figure 12 The complete document identity

4.2.1 Site Identity

In installation engineering we consider the whole site as a product. The site is given a product number from the ABC class IPA (Plants).

Example: IPA 110 1001

4.2.2 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, but a base station with a distributed antenna system might need a more detailed documentation.

4.3 Installation Planning Overview

The figure below is a guide for planning an installation.

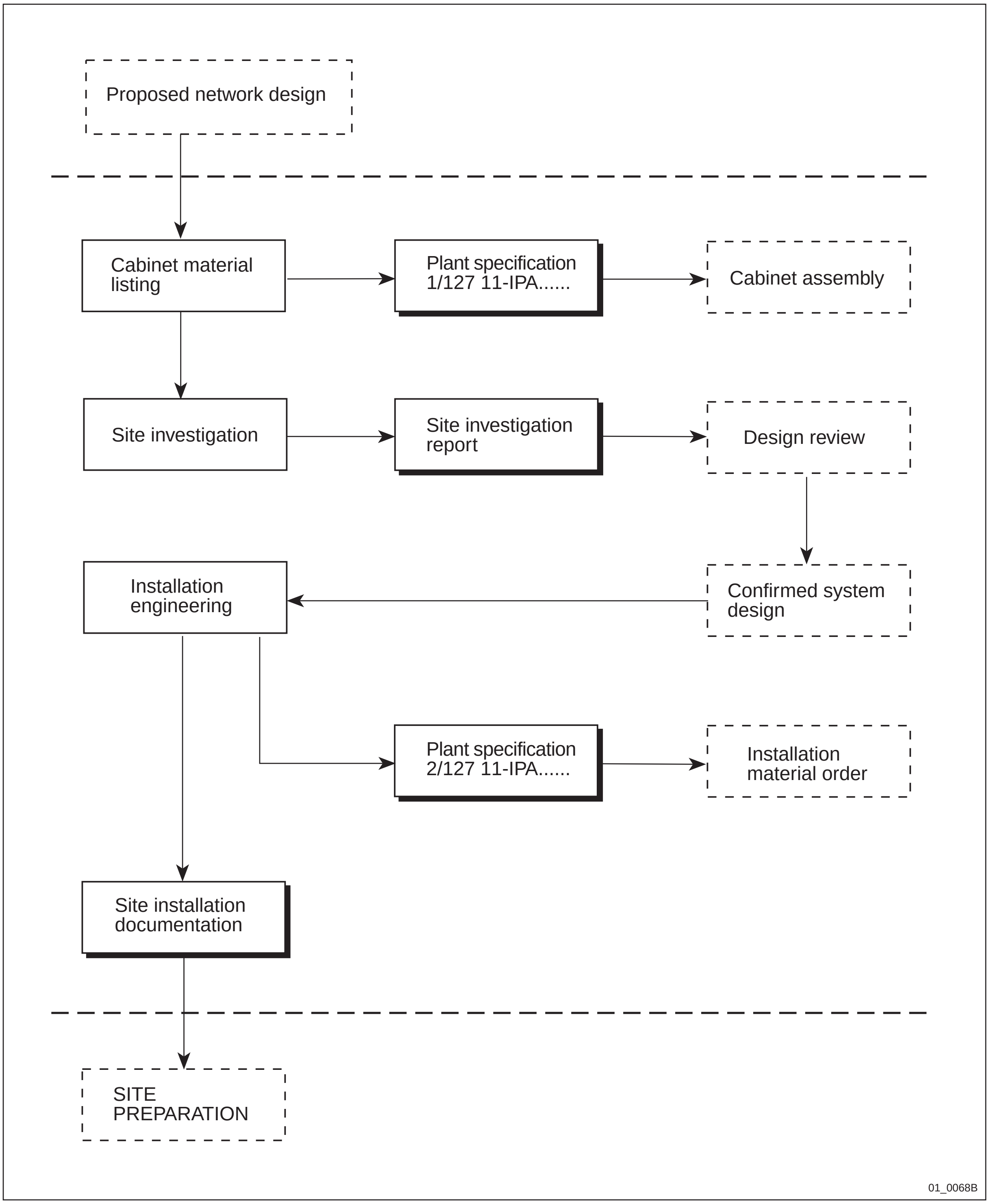

Figure 13 Planning overview

4.3.1 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).

4.3.2 Proposed Network Design

The proposed network design, *see Figure 13 on page 46*, 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 co-ordinates for the desired site.
- Base station configuration - giving the configuration of the antenna system, for example, antenna diversity, duplex configuration or multicasting box.
- 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. Each cell will require a separate base station.
- Antenna directions - the actual direction of separate antennas.
- Antenna height - based on the coverage prediction a desired antenna height is given.

4.4 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.

4.4.1 Preparations

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

- Contact with the Network Design Department to obtain the proposed network design.
- Obtain 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.
- Obtain a map to mark the sites on.

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

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

Fill in the checklist with known data about the site.

4.4.2 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 location, including existing structures. Take measurements.
- Indicate the north direction on the sketch.
- If the base station is to be located indoors, make a floor plan sketch and indicate north on the sketch.
- If an indoor antenna system is to be installed, floor plan drawings must be obtained for the entire coverage area.
- Note heights of supporting structures that are going to be used for the installation.
- Measure dimensions of supporting structures that are going to be used for installation.
- Measure the length of the cable way for antenna cables if external antennas are to be used.
- 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.
- Take photographs to back up the notes.

4.4.3 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), if external antennas are to be used
- Cabinet material list (1/127 11 - Plant specification)

4.4.4 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:

- Mounting structures for base station and antennas
- AC mains power
- Transmission network
- Necessary permits

4.5 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.

4.5.1 Cabinet Material Listing

The ordering information document (131 62-) contains instructions on how to list the equipment for RBS 2301. 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, numbered 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 cabinet equipment, but there might also be need for a plant specification for the installation material or other auxiliary equipment, (2/127 11-.... and so forth).

The plant specification contains the following headings:

Item	Product denomination	Product number	Quantity

The plant specification is used for Site Investigation and Installation Engineering.

The plant specification for cabinet material is delivered to the Cabinet Assembly and Test process for factory assembly.

4.5.2 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 the Standard Site Material catalogue which 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).

4.5.3 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.

4.5.4 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.

Depending of the type of installation, the binder will contain more or less elaborated documentation. 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.

4.5.5 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.

4.6 Site Requirements

This part describes in general terms the requirements for RBS 2301. Requirements related to dimensions, power etc. are described in *chapter Product Data*.

The proposed network design shows the site locations in general. The exact position of the base station depends on available space and possibilities to place an RBS 2301 in that area.

The network design will also show at which height antennas are to be placed, and when RBS 2301 with integrated antennas is used, this is the same as the installation height of the base station.

Space requirements are detailed in *chapter Product Data*. Furthermore the site must be provided with the following facilities:

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

4.6.1 Permits

The need for planning permits has to be investigated. Since the base station is a small unit it is in many cases exempted from the need for planning permit from the council.

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.

4.7 Earthing and Lightning Protection

RBS 2301 shall be connected to separate site earth. This may consist of an existing lightning protection system or an earth electrode.

Installing the base station in an outdoor environment without connection to site earth is not recommended.

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5 Preinstallation

5.1 Preconditions

Ensure that the following conditions are met:

- Site access permission received.
- Ordered mounting base equipment, specified tools and other needed facilities are delivered.
- Earth point is available.
- Transmission cables are available.
- Electrical ducting is made and AC mains power cable is available.
- External antenna cables are available if external antenna is going to be used.

5.1.1 Conditions for Wall-Mounted Cabinet

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

5.1.2 Conditions for Pole-Mounted Cabinet

- The pole must have the required dimension (60 –130 mm in diameter).

5.1.3 Documents

Ensure that the following documents are available:

- This manual
- Filled in and approved record prepared during site preparation
- Site installation documentation

•

General Installation Instructions *LZN 302 49*

5.1.4 Tools and Instruments

The tools needed for Preinstallation can be found in *chapter Tools and Instruments*.

5.2 Overview

The following list shows the recommended installation sequence:

- Make sure that the box to be opened is labelled "Mounting Base".
- Unpack and verify against the packing list that the correct material has been delivered.

- Mount the mounting plate.
- Mount the mounting base.
- Connect AC mains power to the AC box. This step must be carried out by an authorized electrician.
- Connect the mounting base to earth.
- Connect transmission.
- Connect alarms (optional).

5.3 Unpacking

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

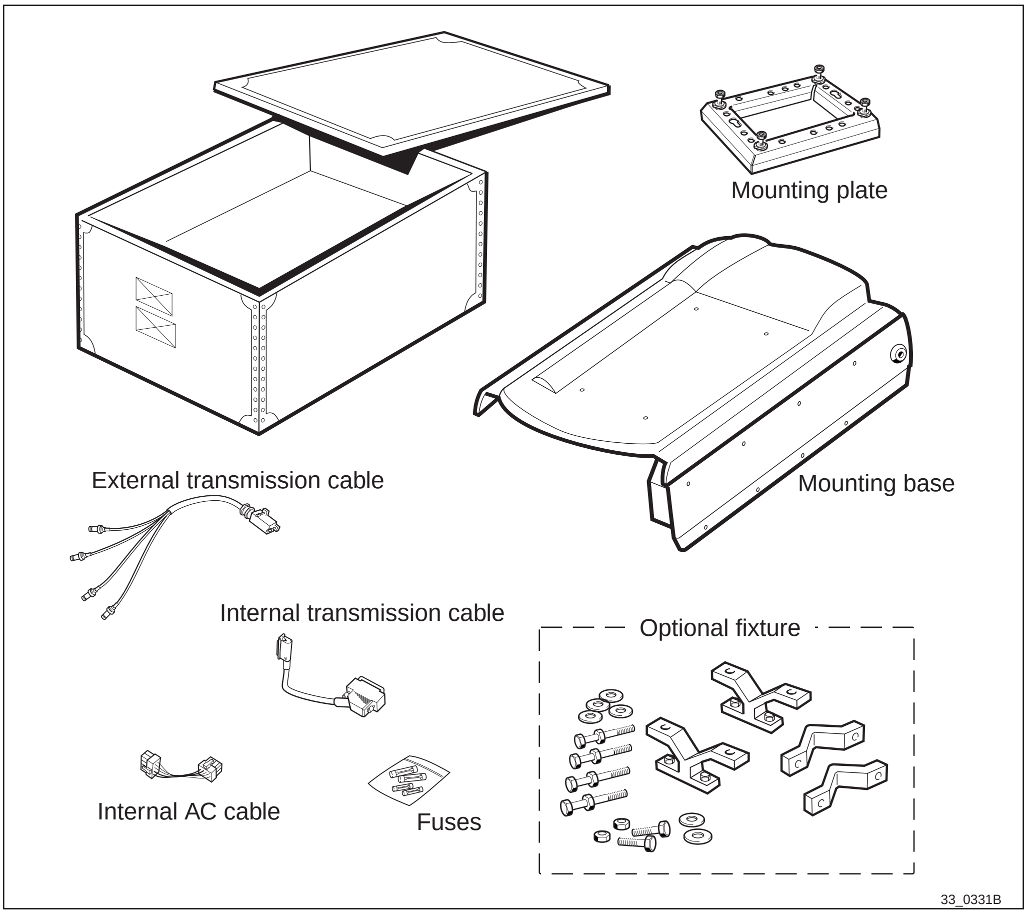

Figure 14 Unpack the mounting base

List of delivered material in the mounting base box.

- Mounting base
- Mounting plate
- Rear sun-shield
- External transmission cable
- Internal cables

- Fuses
- Key
- Mounting details and as an option, clamps for pole mounting

5.4 Installation of External Antennas (Optional)

See:

General Installation Instructions *LZN 302 49*

5.5 Mounting the Mounting Plate

This chapter describes how to mount the mounting plate and the mounting base.

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

DANGER

Make sure that the AC mains is switched off before connecting the AC mains power.

- Check with a voltage tester that the power is disconnected (incoming AC Mains power cable).

5.5.1 Mounting the Mounting Plate on a Wall

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

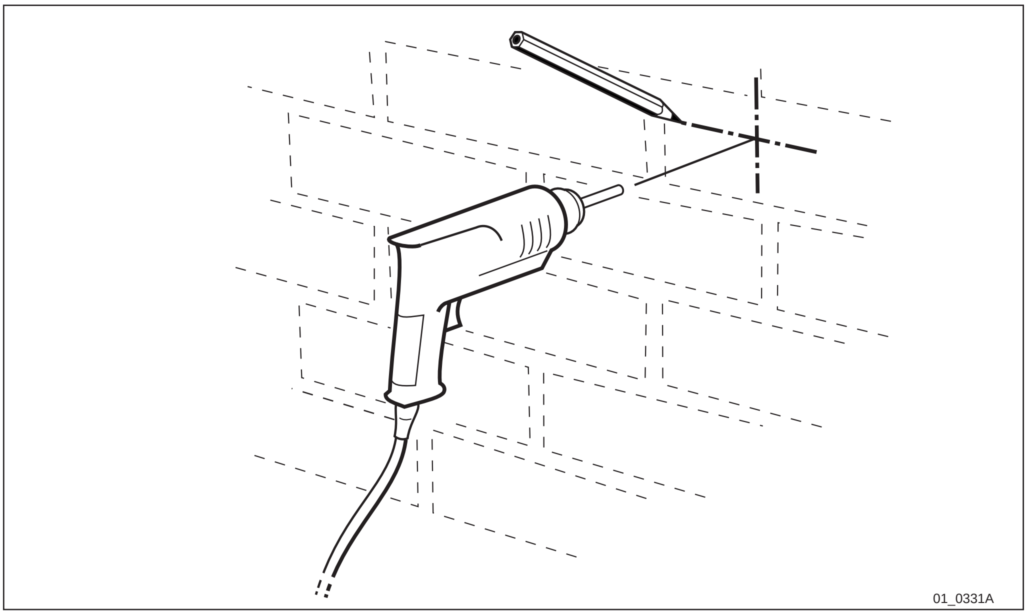

Figure 15   Mark the position of the mounting plate and drill the holes

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

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

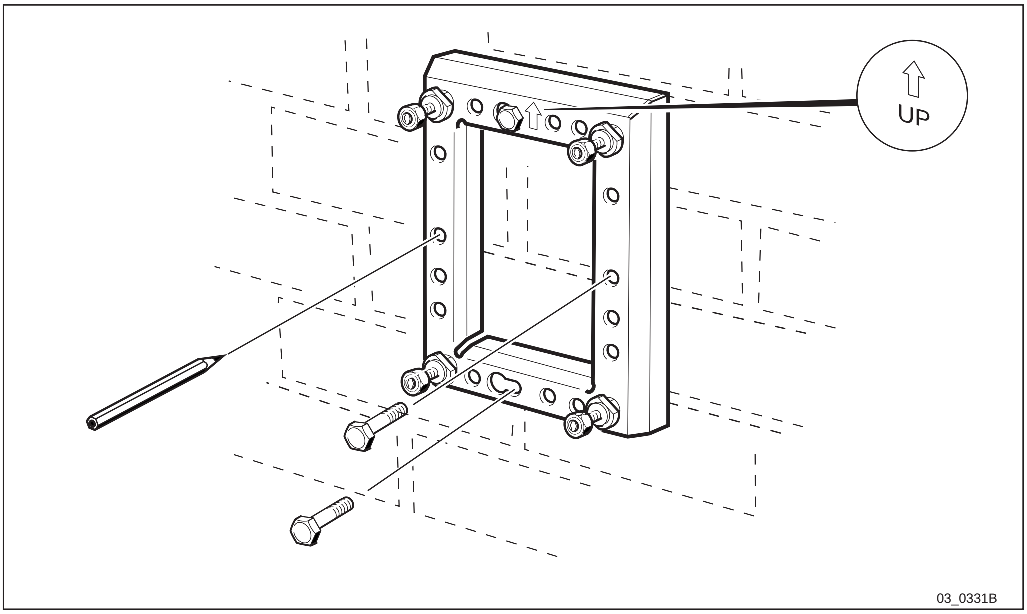

Figure 16   Mark the rest of the holes

4. Fasten the screw and mount the mounting plate. When the mounting plate is hanging horizontally, control it with a spirit-level, then mark the rest of the holes to be used. Remove the mounting plate and drill the rest of the holes.

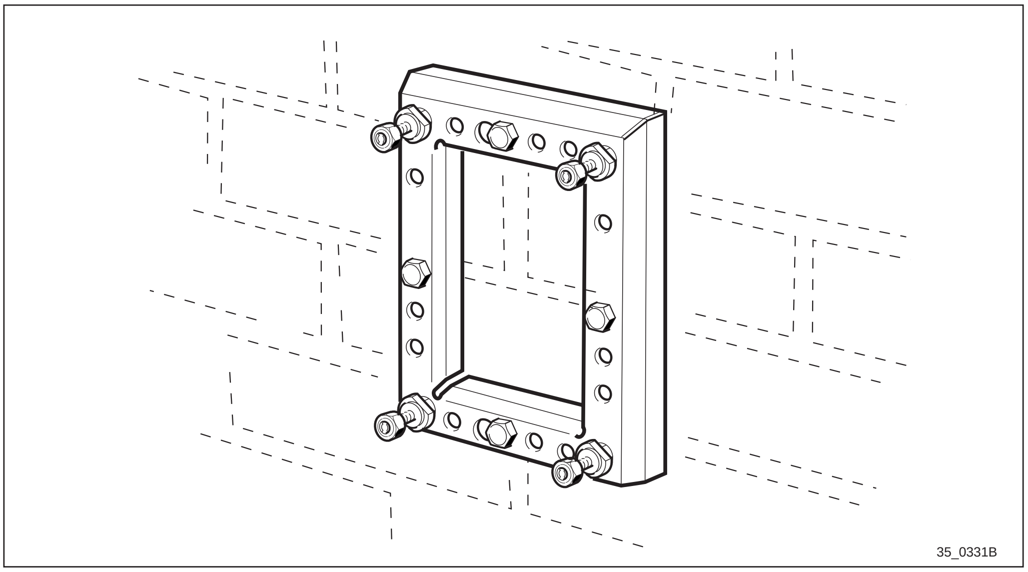

Figure 17 Mount the mounting plate

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

5.5.2 Mounting the Mounting Plate on a Pole

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

Table 7 Choosing the appropriate holes

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

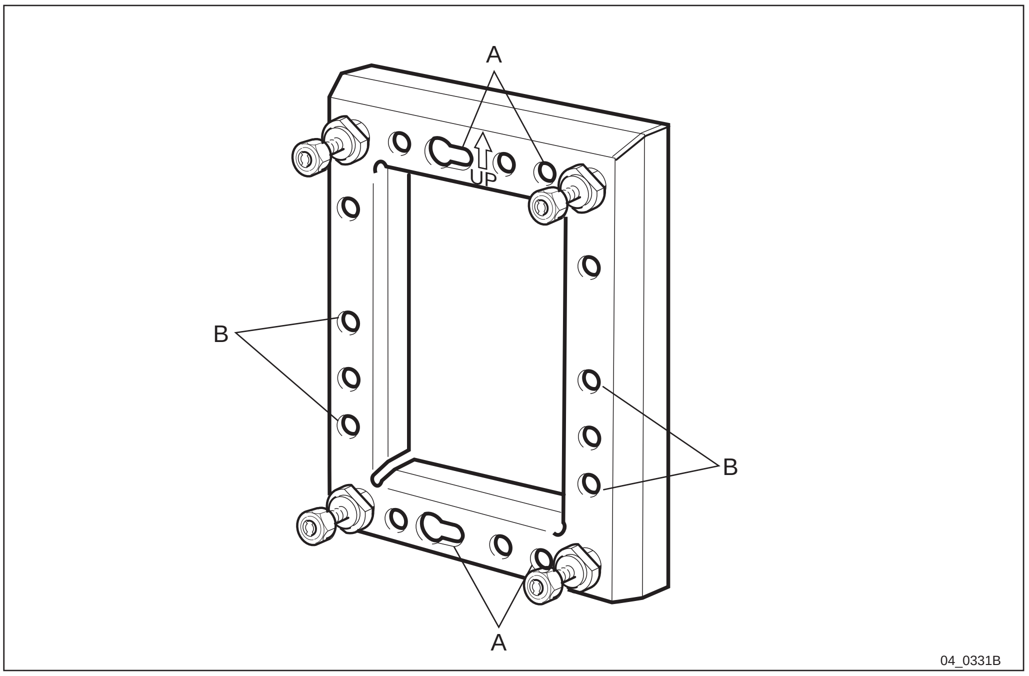

Figure 18 Choose the appropriate holes and mount the clamps on the mounting plate

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

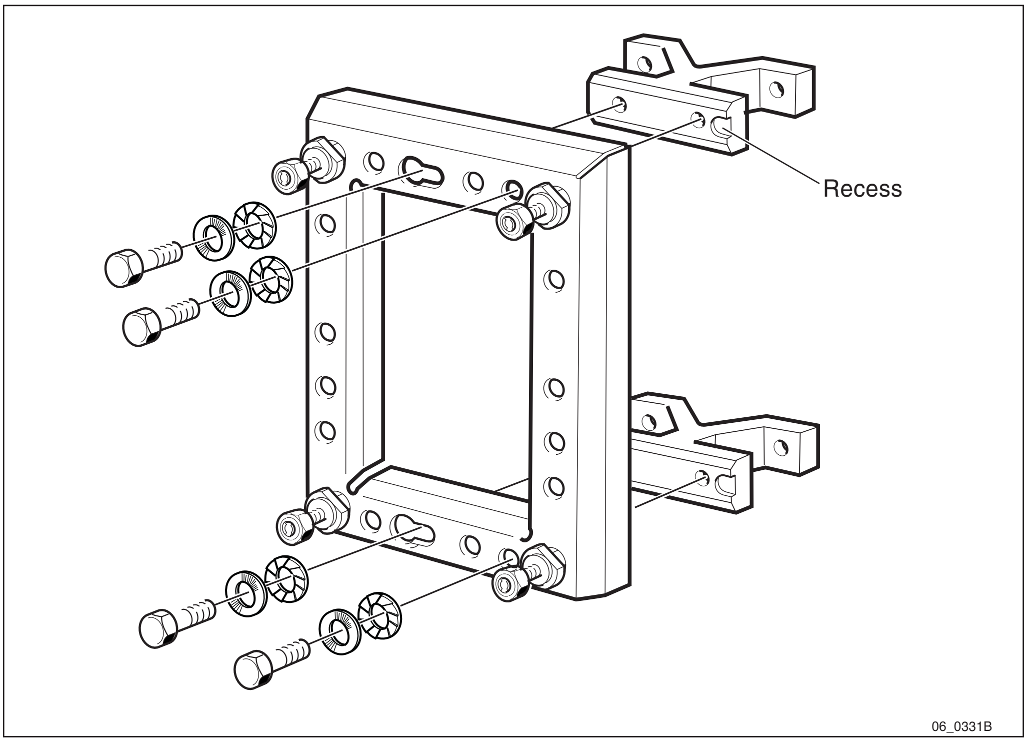

Figure 19 Fastening of clamps and position off recess

2. Fasten the two clamps with the screws, washers and nuts (M10). Make sure that the recess get on the right place, *see Figure 19 on page 58*.

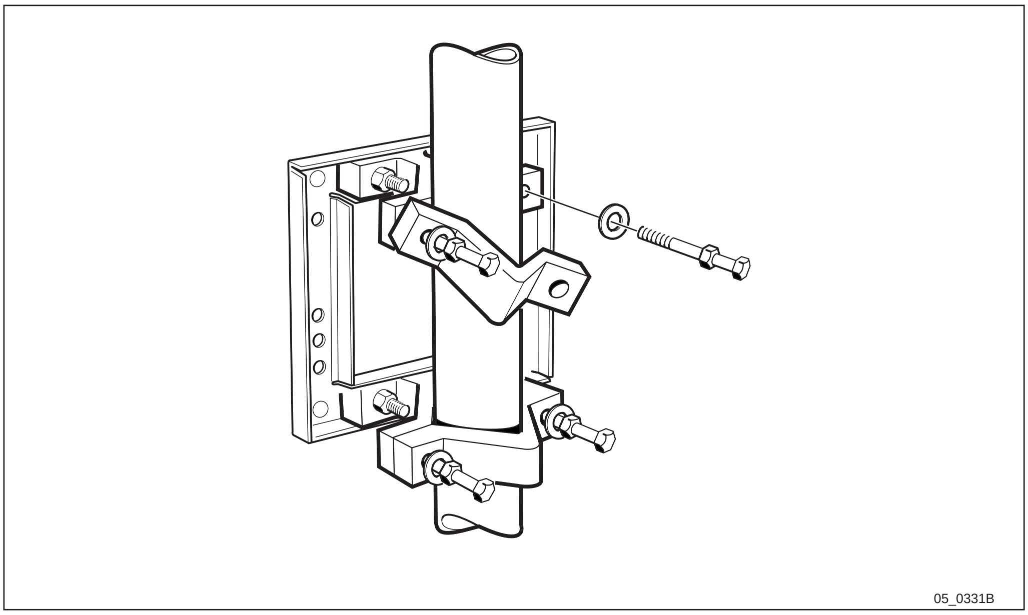

Figure 20 Mount the mounting plate

3. Loosen and remove one screw (M10) from each clamp half.

4. Place the mounting plate at the correct height on the pole and remount the clamp halves. Mount the screws and tighten them alternately (right and left side) so the screws do not bend.

5.6 Mounting the Mounting Base

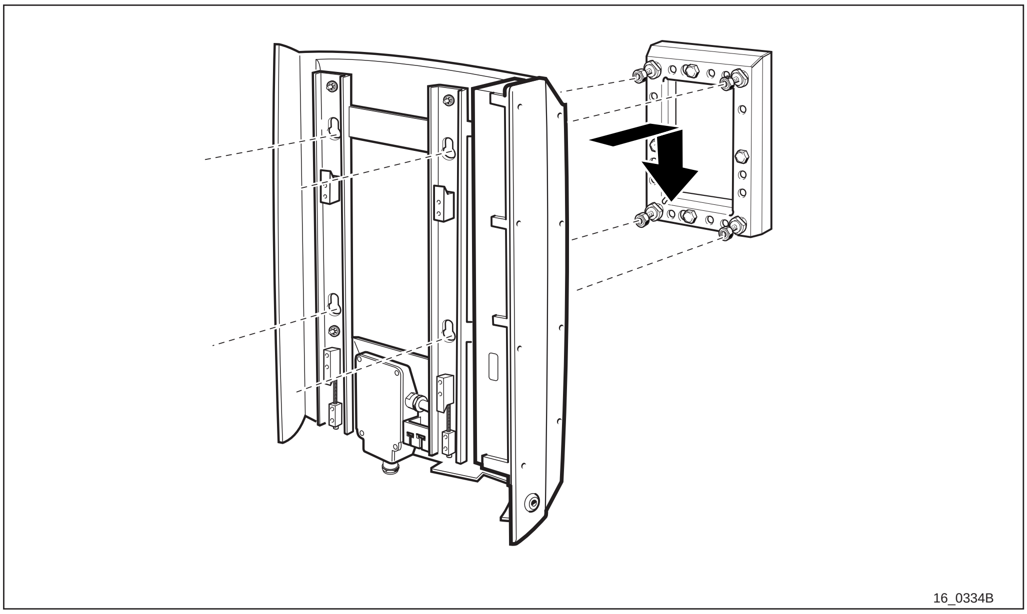

Figure 21 Mount the mounting base on the mounting plate

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

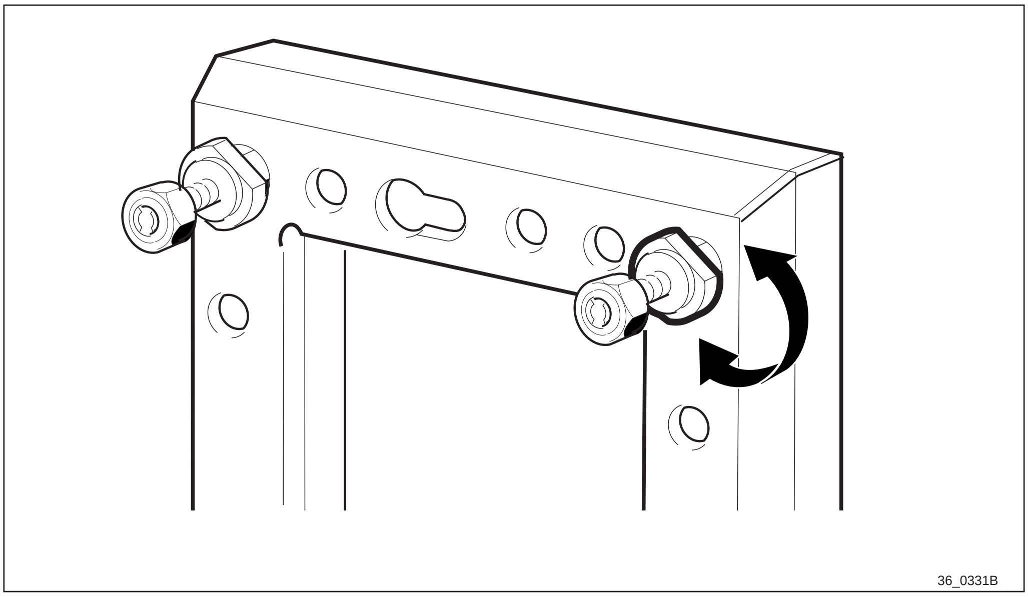

Figure 22 Adjust the threaded distance

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

3. When the mounting base is hanging correctly, tighten the four (M10) nuts.

5.7 Installation Box

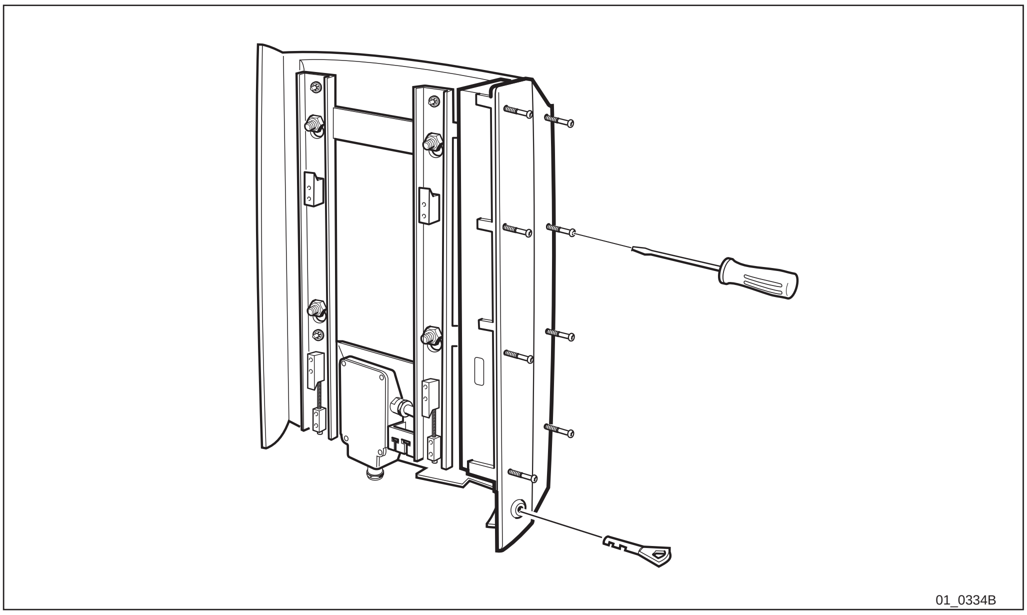

Figure 23 Unscrew the eight torx screws and unlock

1. Unscrew the eight torx screws on the installation box door. Insert the key and unlock.

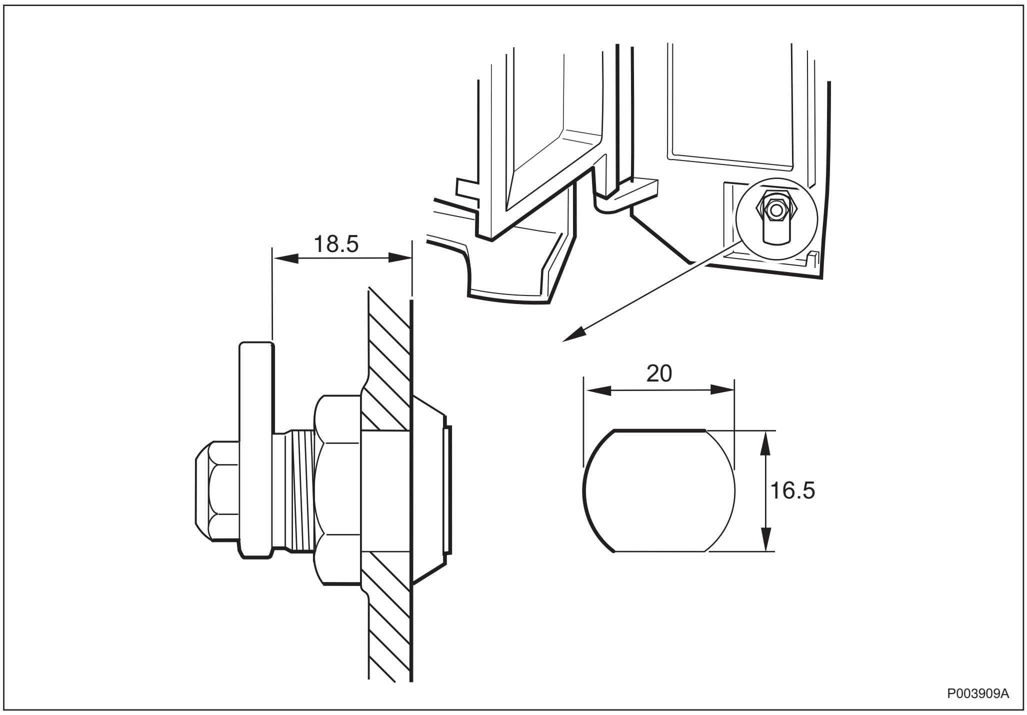

Figure 24 Dimensions associated to the lock

Note: If required, the supplied lock can be replaced with a lock choosen by the customer. The significant dimensions are given in *Figure 24 on page 60*.

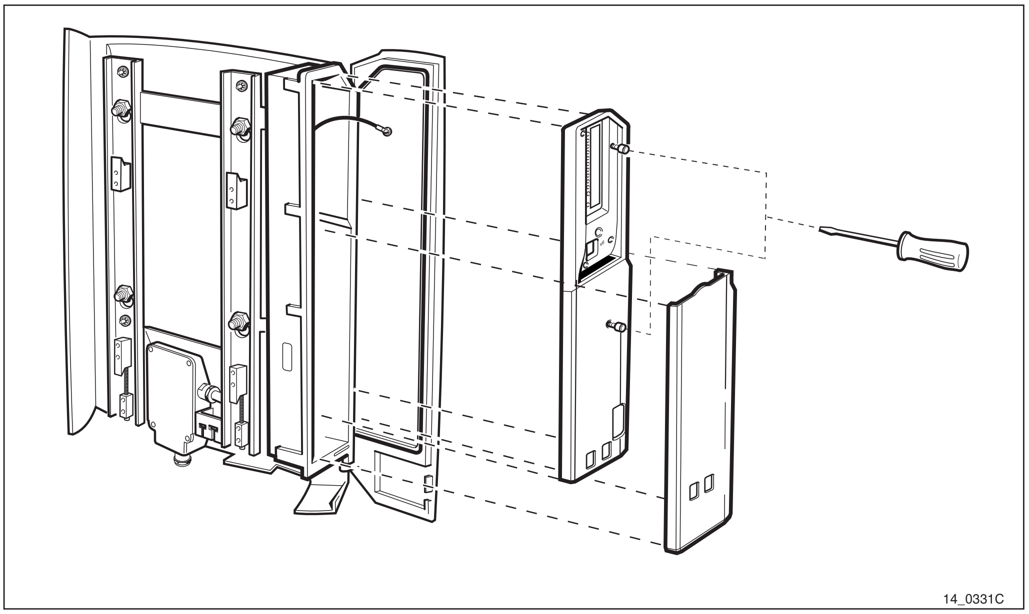

Figure 25 Remove the protection covers

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

Note: There are two different types of outer protection covers. One of them, described above, is snapped to the inner protection cover. The other one is the outer protection cover, and it has a screw.

3. Remove the inner protection cover by unscrewing the two torx screws. The fuses and voltage selector are now visible.

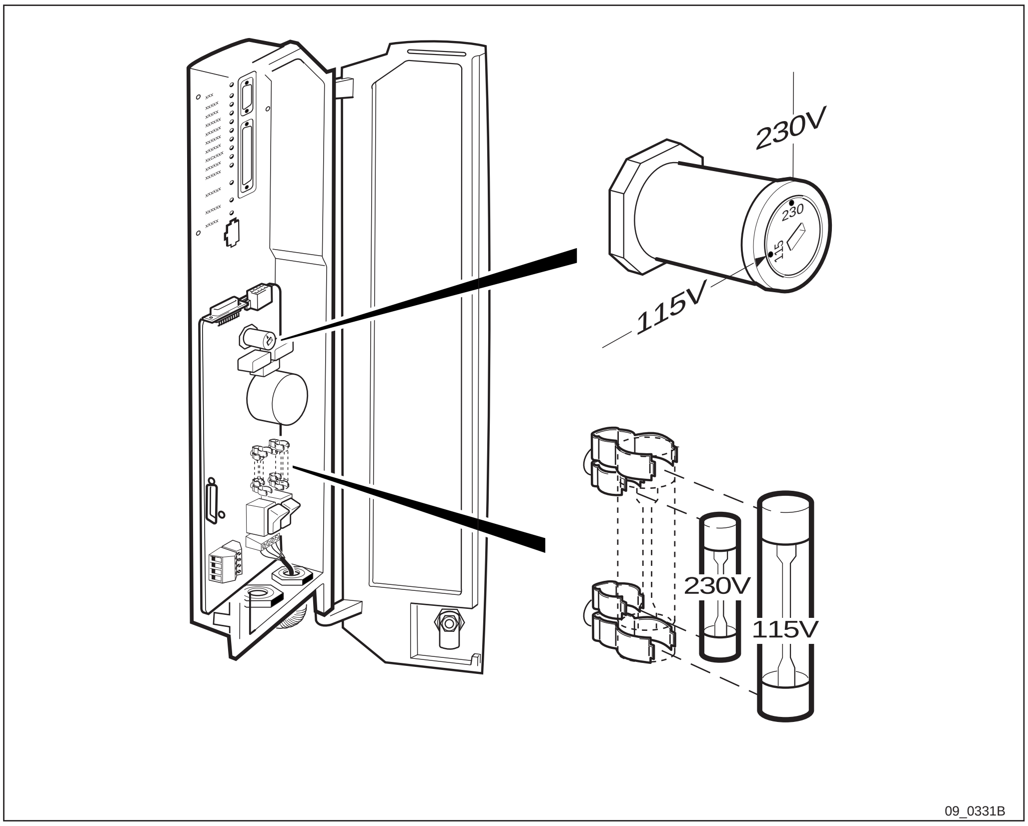

Figure 26 Install the fuses and check the voltage selector

4. Check the voltage of the power that is to be connected. Compare with the *Site Documentation*.
5. Install the recommended fuses.

Table 8 Voltage/fuse table

Voltage	Fuse Data	Dimension	Product no.
100-127 VAC	Slow 8A 250V	6×30 mm	NGH 257 05/8
200-250 VAC	Slow 4A 250V	5×20 mm	NGH 243 01/4000

6. Make sure that the voltage selector is adjusted to the correct voltage.
7. Remount the inner protection cover.

5.8 Connecting Internal Cables

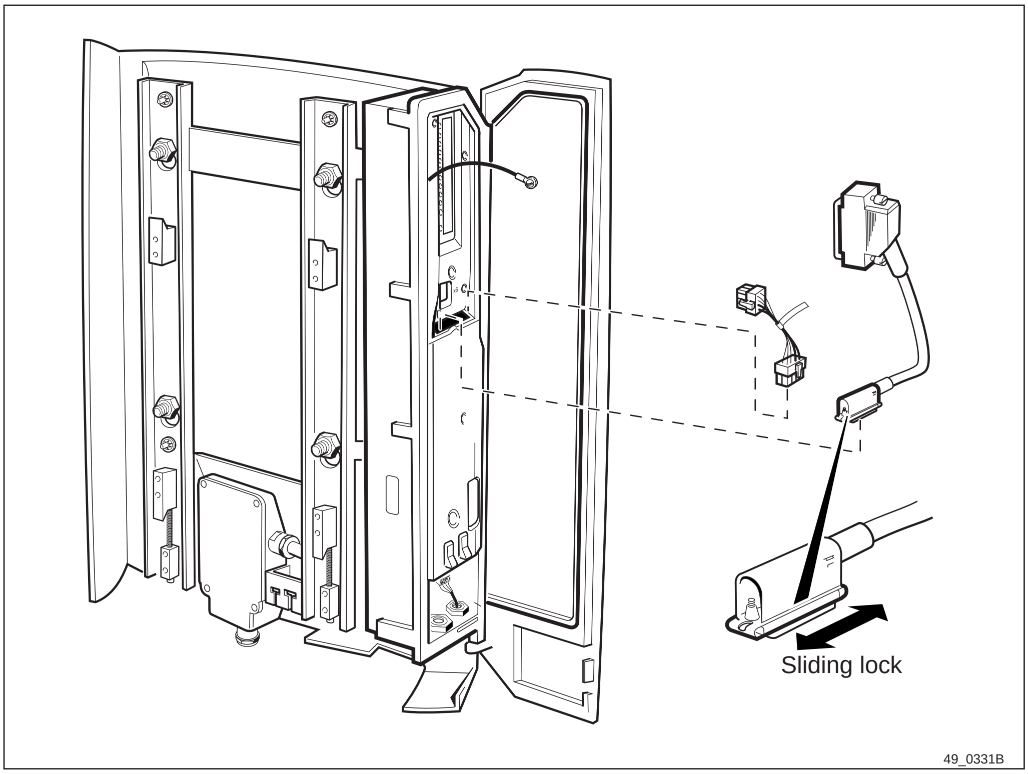

Figure 27 Connecting internal cables

1. Connect the internal AC power cable to the EMC card.
2. Connect the internal transmission cable to the EMC card.

5.9 Connecting Earth and Lightning Protection

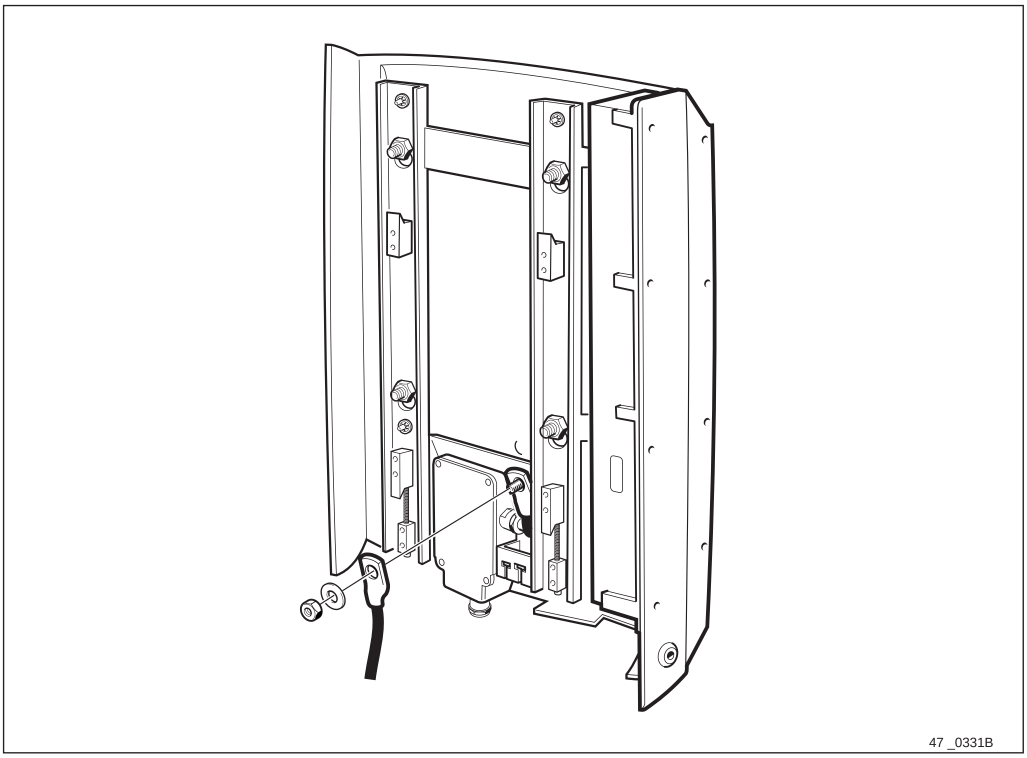

Figure 28 Connecting earth on the mounting base

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

1. Connect the Earth Cable on the mounting base. Use Earthing kit, *see chapter Tools and Instruments*.
2. Connect the other end of the Earth Cable to the existing lightning system close to the equipment.

Note: If no lightning protection system can be found, use the Earthing Bar, see:

General Installation Instructions *LZN 302 49*

5.10 Connecting Transmission Cables

The transmission cable has D–subconnection with a housing with sealing gasket for weather protection. The transmission cable exists in the following variants.

Table 9 Variants of the transmission cables

Product Number	Product Description
RPM 518 906/1	75 Ω coaxial cable with TNC connectors
RPM 518 908/1	100/120 Ω twisted pair with TNO connectors
RPM 518 943/1	100/120 Ω twisted pair with distribution box

RPM 518 941/1	100 Ω twisted pair with open ends
RPM 518 942/1	120 Ω twisted pair with open ends
RPM 518 944/1	100/120 Ω twisted pair with D-sub connectors
-	75 Ω D-subconnector without cable
-	100/120 Ω D-sub connector without cable

The above cables are delivered in kits and may not be ordered separately. For more information regarding the cables, see:

Ordering Information *131 62-HRB 105 01/3B*

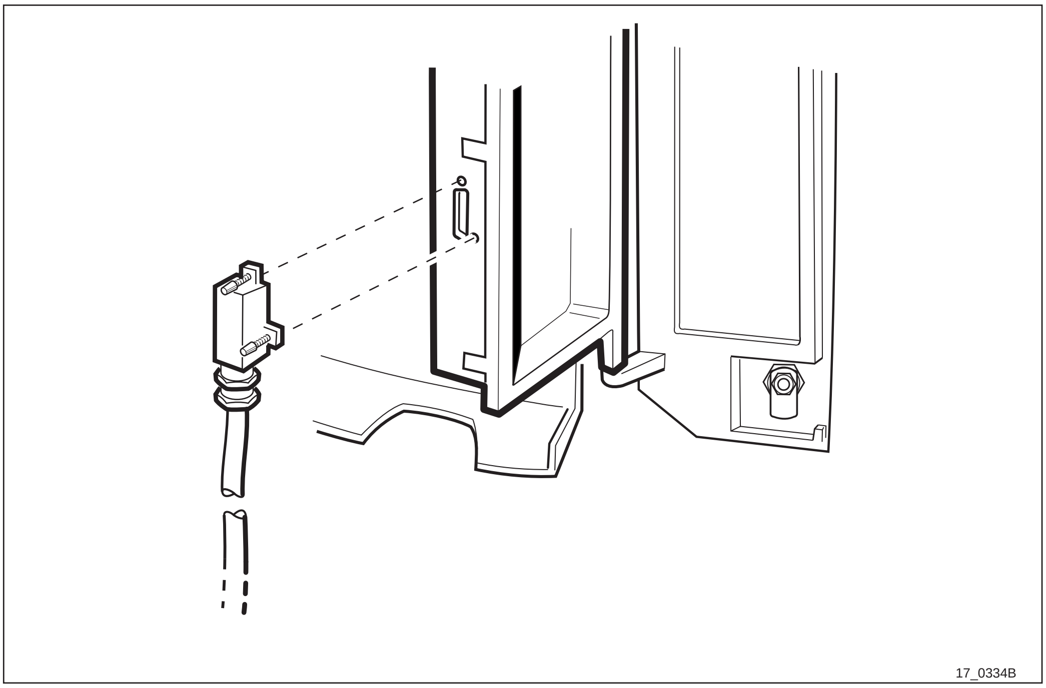

Figure 29 Connect the transmission cable

1. Connect the transmission cable to the installation box. Connect the PCM line depending on the following connections types.

PCM cable with TNC or TNO connection

Depending on the type of PCM line and the impedance of the line, two types of cables with TNC or TNO connectors can be used.

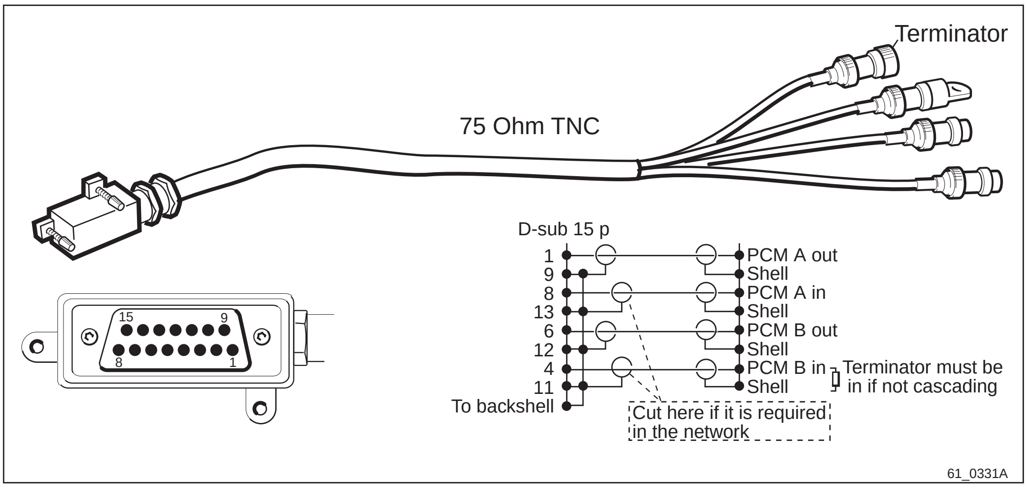

Figure 30 75 Ω coaxial cable with TNC connections

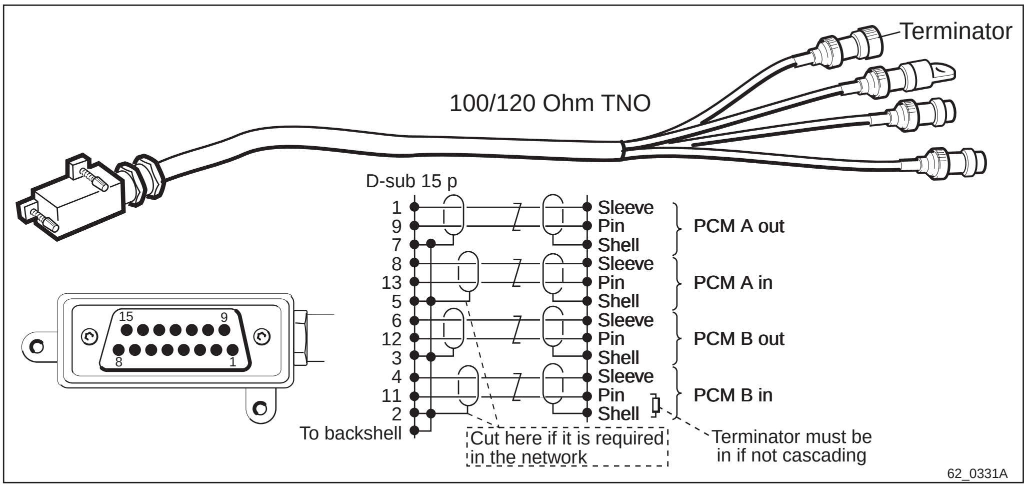

Figure 31 120 Ω twisted pair cable with TNO connectors

Make the following steps to connect the transmission cable.

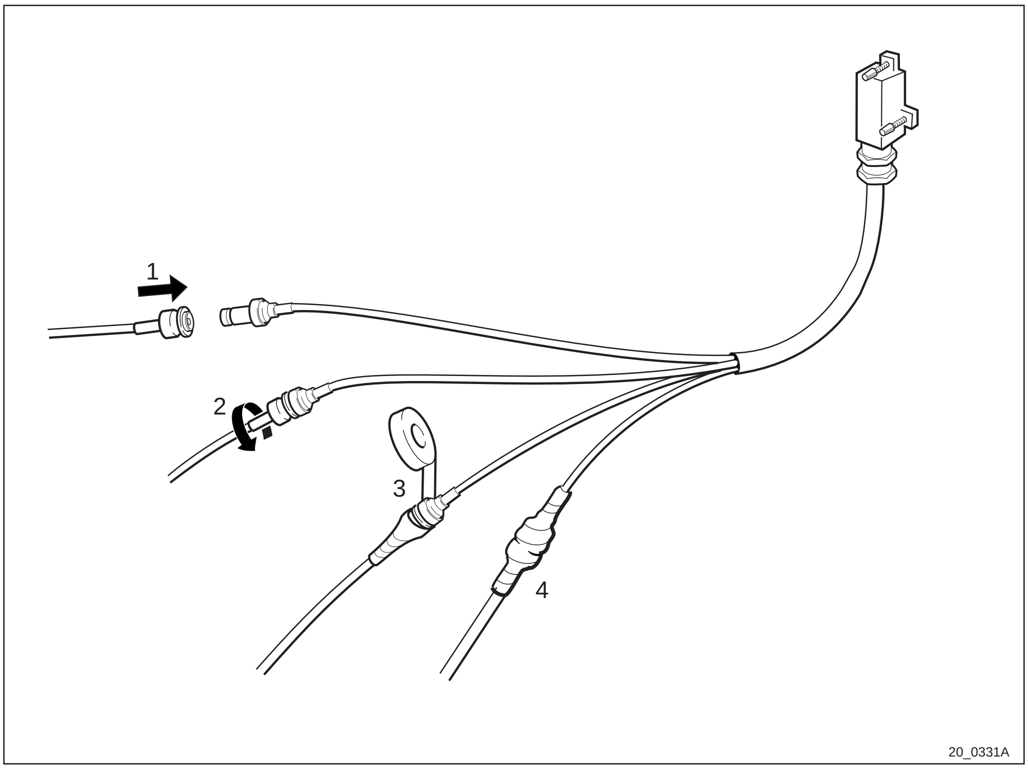

Figure 32 Connecting transmission network cables and sealing connections

1. Connect the cables to the transmission network.
2. Secure the connection by turning one of the contacts against the other one.
3. Seal each connection with self-bonding tape and electrical tape. More information can be found in:

General Installation Instructions *LZN 302 49*

4. If the connection is not used for cascading, a terminating end-connector must be connected to the "PCM B in" connector, (premounted).

This connection sequence must be done for all transmission connectors.

Note: Due to the G–703 requirements the earth connection to the screen must be able to be opened, *see Figure 30 on page 67* or *Figure 31 on page 67*. If the earth connection is opened, the screen must be insulated so it will not come in contact with the connector housing.

PCM cable with Distribution Box

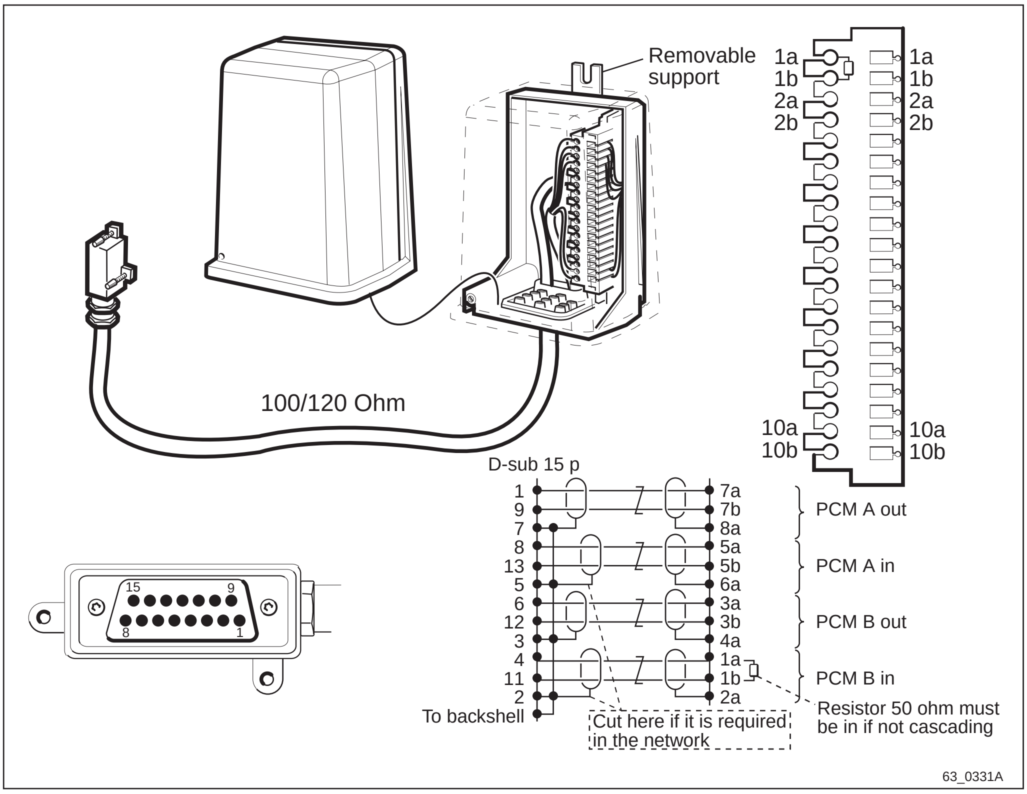

Figure 33 PCM cable with connection box

This connection is supposed to be used when the PCM cable is delivered without connectors. The distribution box is weather-sealed and is recommended for outdoor installation. In some cases the distribution box can be used to protect the other types of connections, *see Section Distribution Box on page 72*.

1. To mount the distribution box to a pole, use screws or straps. To mount the box on a wall, remove the cover and use screws from the inside of the box.

2. Connect the incoming PCM cables to the connection rail. For information of the connections, see the connection scheme.

3. If the connection is not used for cascading, a terminating resistor of 50 Ω must be mounted between connection 1a and 1b.

   The terminating resistor is premounted and must be removed if the cabinet is cascade connected.

Note: Due to the G–703 requirements the earth connection to the screen must be able to be opened, *see Figure 33 on page 68*. If the earth connection is opened the screen must be insulated so it will not come in contact with the connector housing.

PCM cable with open ends

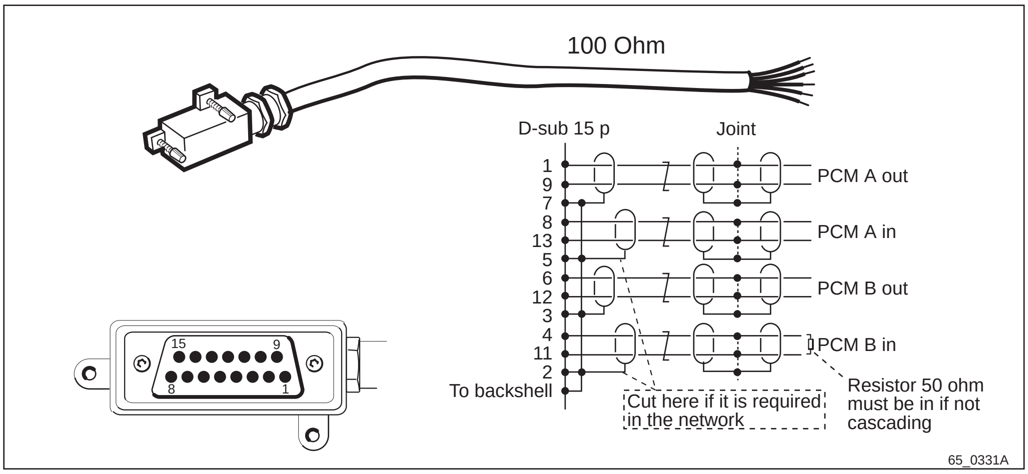

Figure 34 PCM cable 100 Ω with open ends

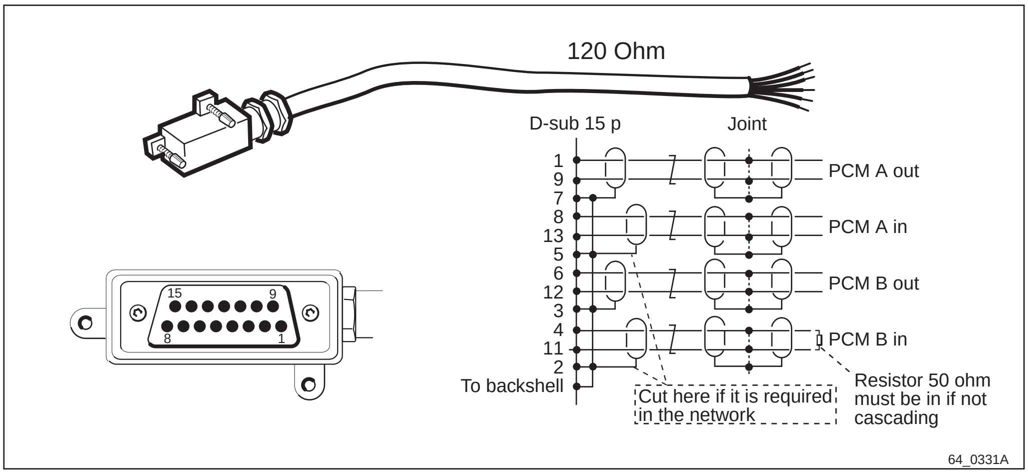

Figure 35 PCM cable 120 Ω with open ends

These cables are delivered with open ends, which makes it possible for the network provider to use their own standard connectors. Any connector can be used. Be sure the connector is weather-sealed if it is used outdoor.

1. Connect the incoming PCM cable to the joint; see the connection above.

2. If the connection is not used for cascading, a terminating resistor of 50 Ω must be mounted between the two wires "PCM B in". The 50 Ω terminating resistor is delivered with the cable.

Note: Due to the G–703 requirements the earth connection to the screen must be able to be opened, *see Figure 34 on page 69* or *Figure 35 on page 69*. If the earth connection is opened, the screen must be insulated so it will not come in contact with the connector housing.

PCM cable with D-sub connection

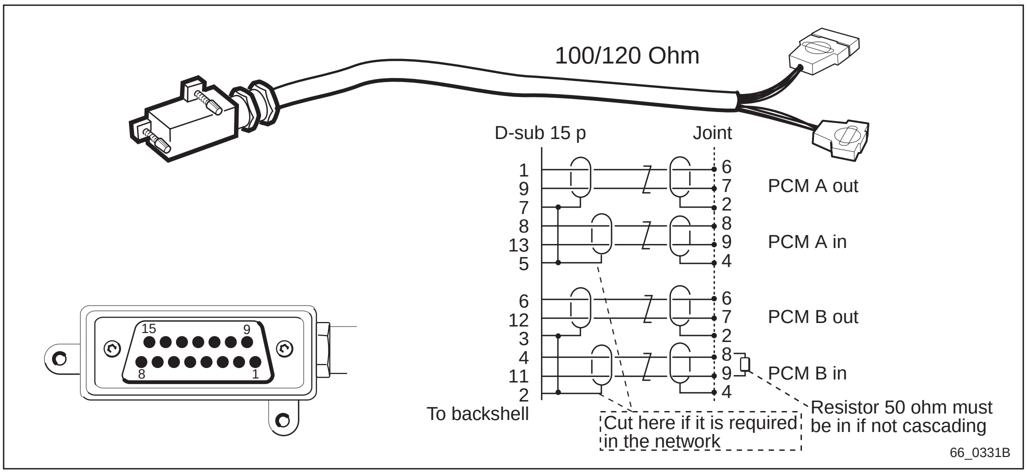

Figure 36 PCM cable 100/120 Ω with D-sub connectors

1. Connect the D-sub connectors to the incoming PCM line.
2. If the connection is not used for cascading, a terminating resistor of 50 Ω must be mounted between connector no. 8 and 9. The terminator resistor is premounted in the D-sub connector "PCM B in". If the cabinet is cascade connected, the D-sub connector "PCM B in"must be opened and the terminator resistor must be removed.

Note: Due to the G–703 requirements the earth connection to the screen must be able to be opened, *see Figure 36 on page 70*. If the earth connection is opened, the screen must be insulated so it will not come in contact with the connector housing.

D–sub Connector without Cable Included in Kit

The incoming PCM line can be connected direct to the cabinet with the separate D-sub connector that is delivered in the kit NTM 185 248/1 (75 Ω connector) or kit NTM 185 249/1 (100/120 Ω connector). For correct connection, *see Figure 37 on page 71* or *Figure 38 on page 71*. Make sure the screen earth is connected properly with a soldering.

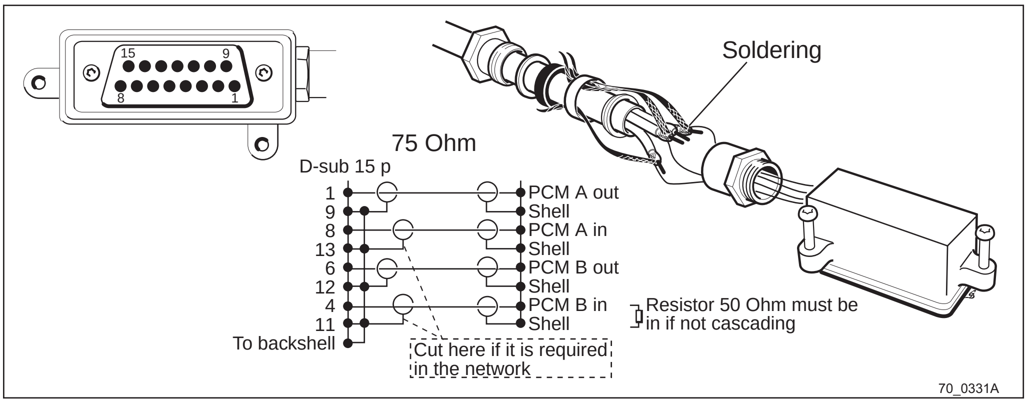

Figure 37 Separate D-sub connector for 75 Ω PCM line

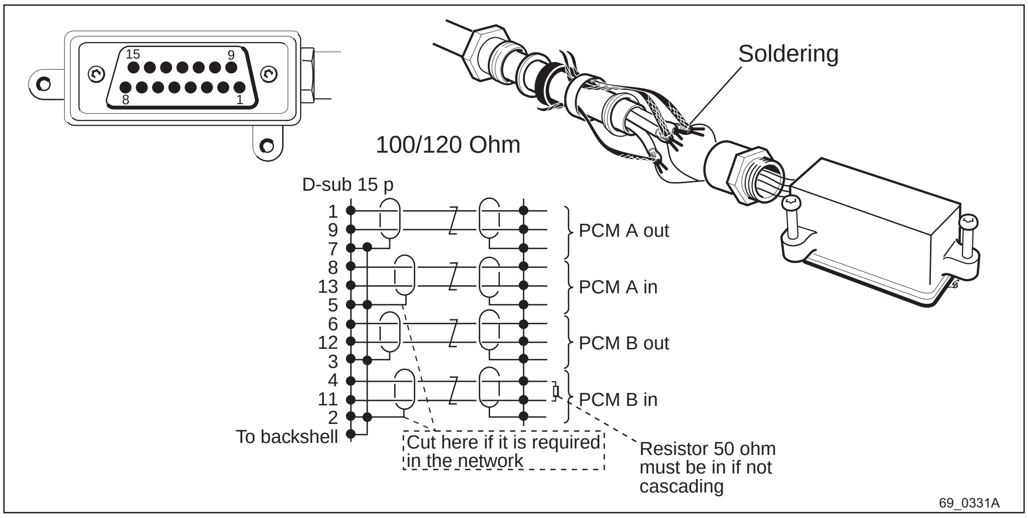

Figure 38 Separate D-sub connector for 100/120 Ω PCM line

If the connection is not used for cascading, a terminating resistor of 50 Ω must be mounted between connector and screen earth PCM B in. If the cabinet is cascade connected, the connector must be opened and the terminator resistor must be removed.

When the PCM line is connected to the D-sub connctor, connect and secure the D-sub connector to the RBS.

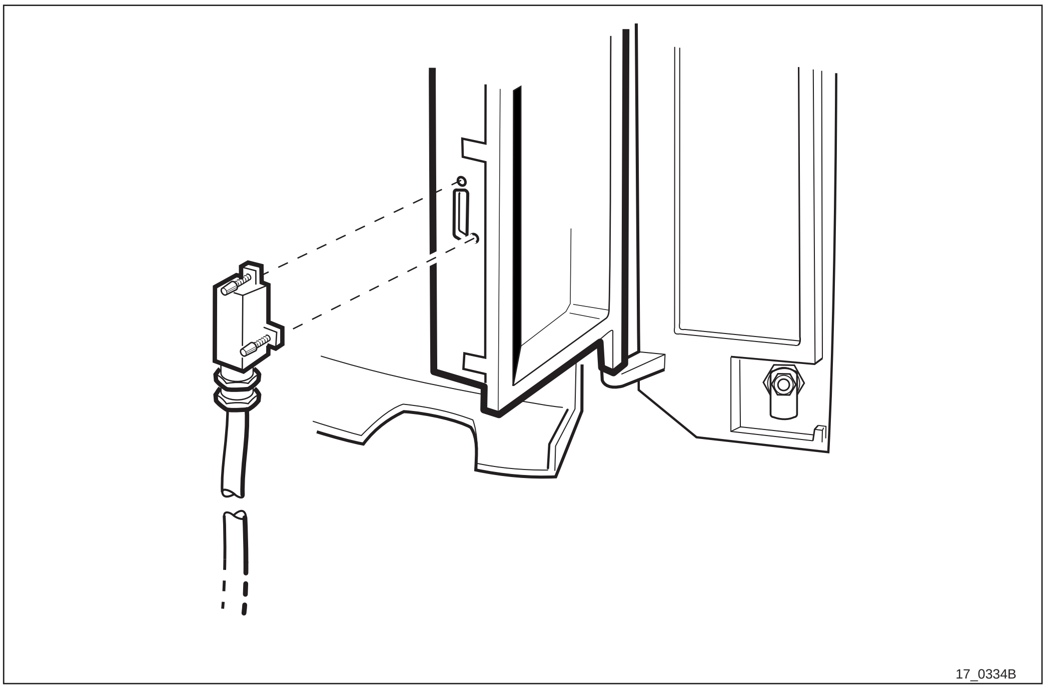

Figure 39 Connect the D-sub connector with the PCM line to the Cabinet

Note: Due to the G–703 requirements the earth connection to the screen must be able to be opened, *see Figure 37 on page 71* or *Figure 38 on page 71*. If the earth connection is opened, the screen must be insulated so it will not come in contact with the connector housing.

Distribution Box

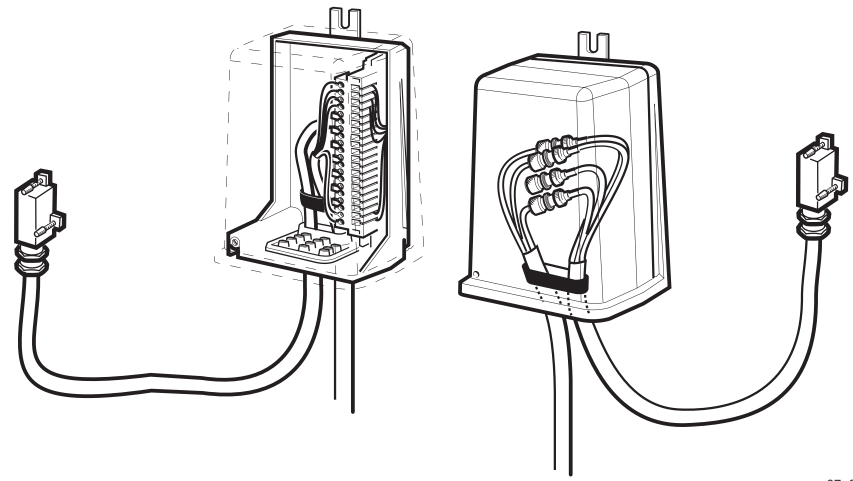

Figure 40 Alternative use of the connection box

For outdoor connection the distribution box is recommended for weather protection of the joint between the PCM cable from the cabinet and the incoming PCM line. The connection rail can be removed from the distribution box. Metal house connectors must be isolated from each other.

The box can be fixed to a pole with the support; use screws or straps. The box can also be fixed on a wall by removing the support; use screws from the inside of the box.

5.11 Connecting AC Mains Power

DANGER

Improper electrical installation may cause fire or electrical shock. Approved circuit breakers for the AC mains and the cables cross section area must be selected in accordance with local laws and regulations. Only an qualified and cerified electrical 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 AC-box, indicated by PE and the earth symbol, *see Figure 41 on page 72*.

Figure 41 Earth symbol

The Protective Earth connection is essential.

Connecting AC

Note: Make sure that the AC Mains power to the RBS is switched OFF before any installation.

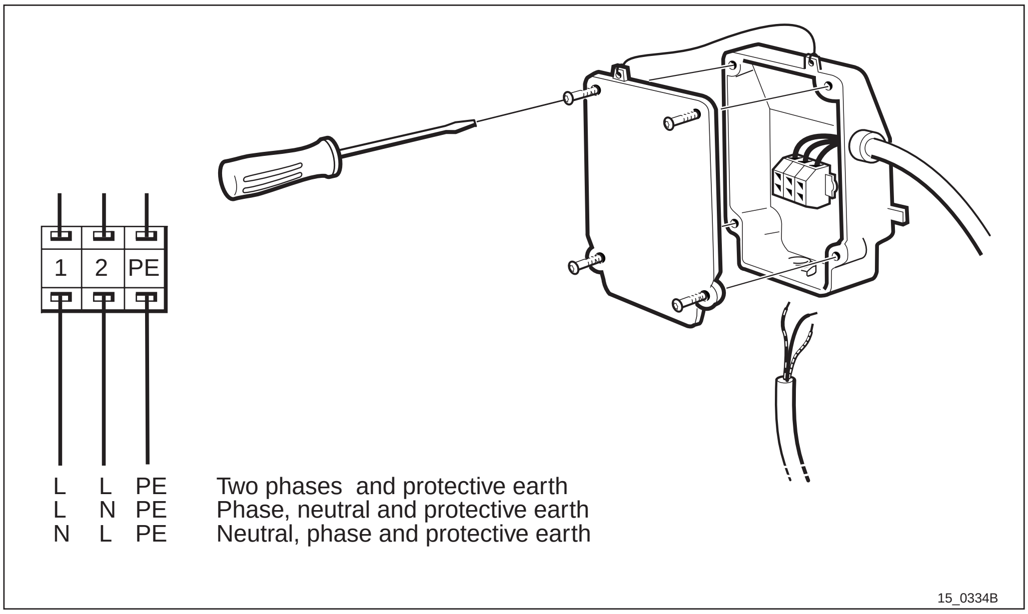

Figure 42 Connect the AC mains power cable

1. Unscrew the four torx screws holding the AC box cover.
2. Run the AC mains power cable through the cable entry.

   Observe that the hole in the AC box has a diameter of 21.5±0.4 mm, if a steel conduit is to be used.
3. Strip the conductors to the appropriate length.
4. Connect them by pressing the locking inside the contact unit.

Note: The cables shall be connected according to *Figure 42 on page 73*. The incoming earth must be connected to the yellow/green terminal marked PE (Protection Earth).

5. Tighten the cable entry to anchor the cable and seal the entrance.
6. Make sure the protective earth is connected.
7. Make sure the AC and battery Power switch inside the installation box is in OFF position.
8. Switch on the power to the AC box, and make sure that the correct voltage is available at the contact unit.
9. Switch OFF the power to the AC box.
10. Remount the AC box cover and tighten the screws.

Connections without Protective Earth

In event that the AC main power has only two wires, Phase and Neutral (without the Protective Earth PE), the Neutral must be connected to both Neutral and Protective Earth on the terminal in the AC box. Take great care to ensure the correct wire is connected to Neutral.

In most countries this connection is not permitted. This method is only an exception to the rule and must be used with care.

This method is only to be used "as a last resort" if there is no other means of providing a Protective Earth (PE).

5.12 Connecting External Alarm Cables (Optional)

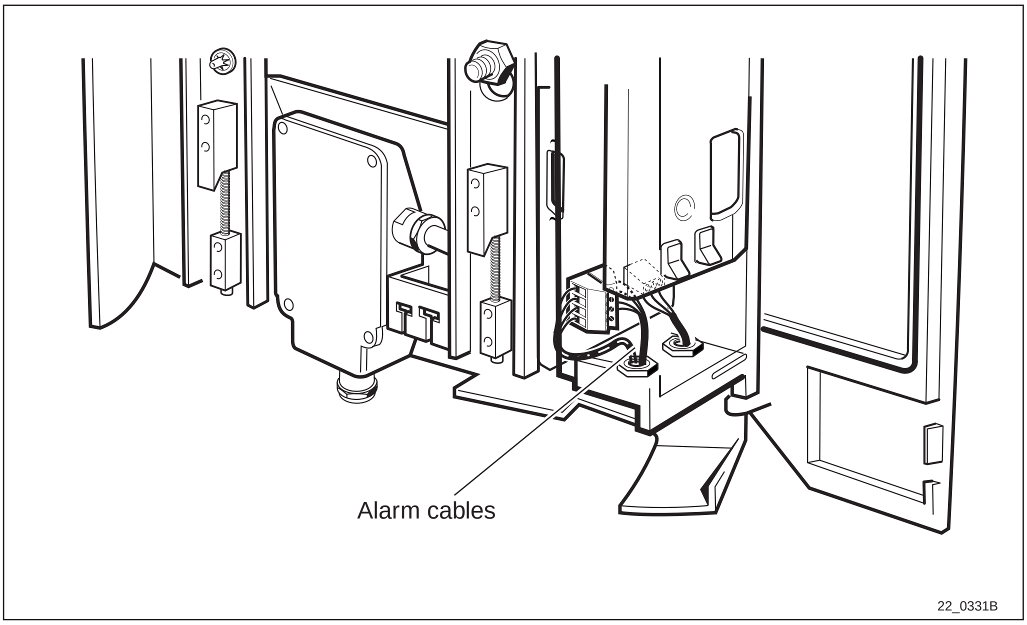

Figure 43 Connect the alarm cables

1. Run the alarm cable through the open cable entrance of the installation box.
2. Strip the conductors to the appropriate length.

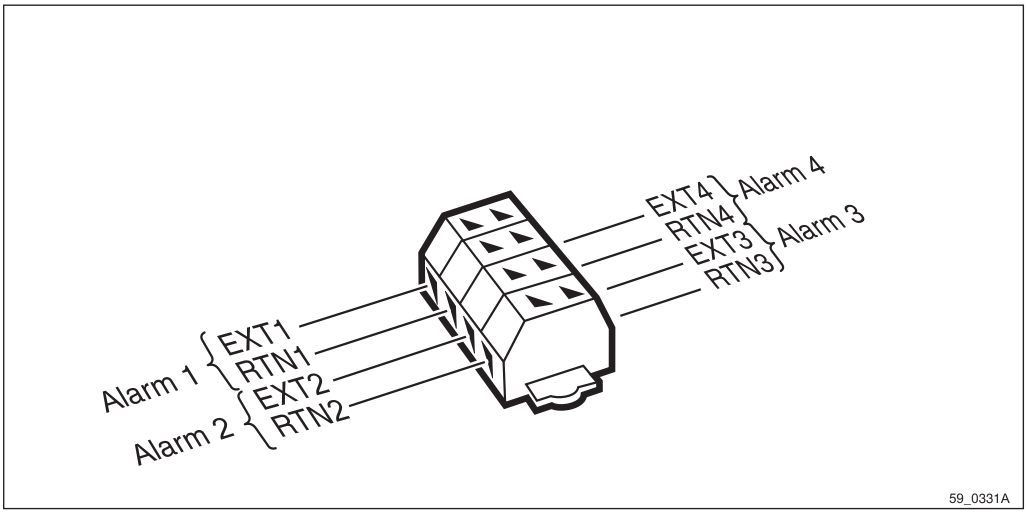

Figure 44 Alarm contact unit

3. Connect them to the external alarm contact unit.
4. Tighten the cable entry to anchor the cable and seal the entrance.

5.13 Concluding Routines

- Make sure that the voltage to the cabinet is OFF, and the switches inside the installation box are in OFF position.
- Remount the outer protection cover.

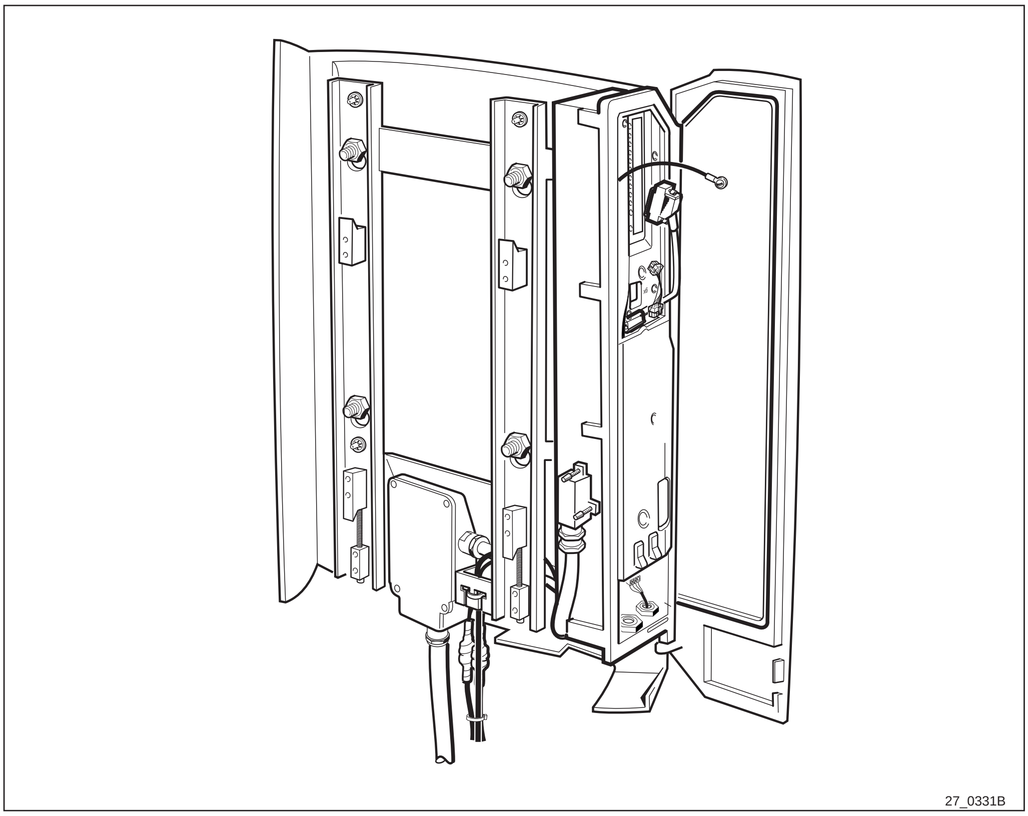

Figure 45 Fastening the cables

- Fasten the cables with approved straps on the mounting base.

Note: If cabinet installation is to follow immediately after the preinstallation, continue the installation according to *chapter Installation of RBS 2301*.

Note: If the cabinet installation is to take place at a later time, take the following actions:

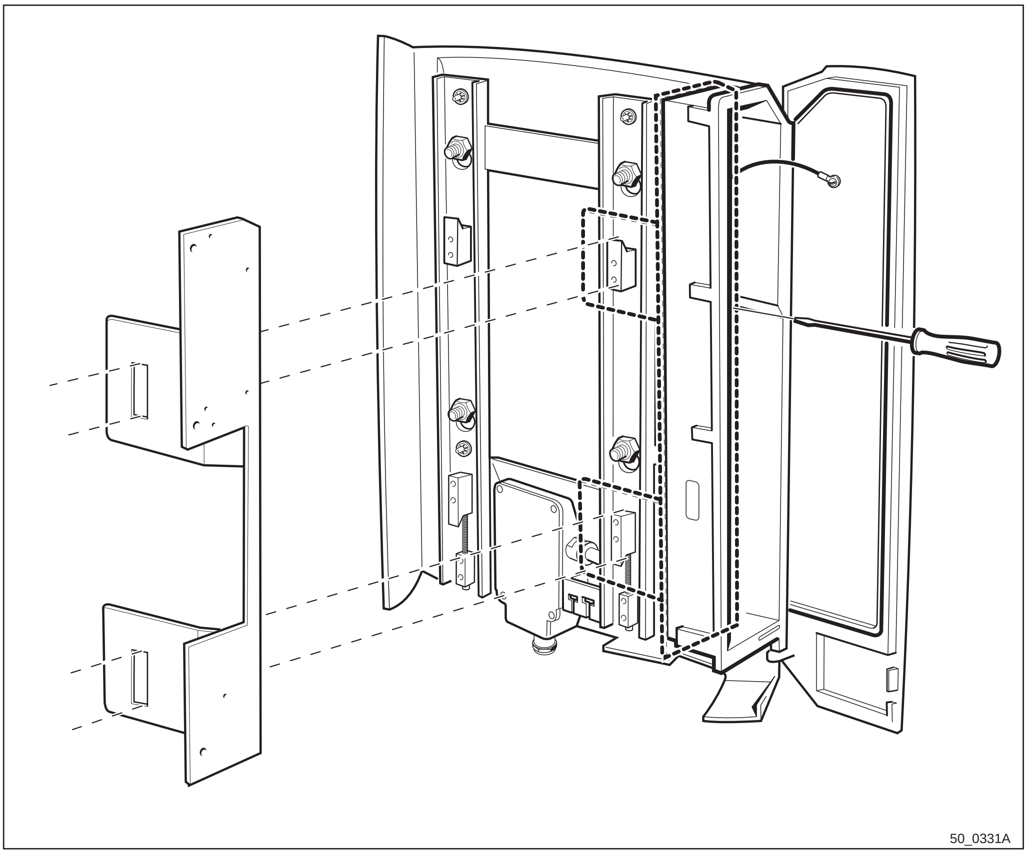

Figure 46 Protection plate

For weather protection, secure the plate as shown above.

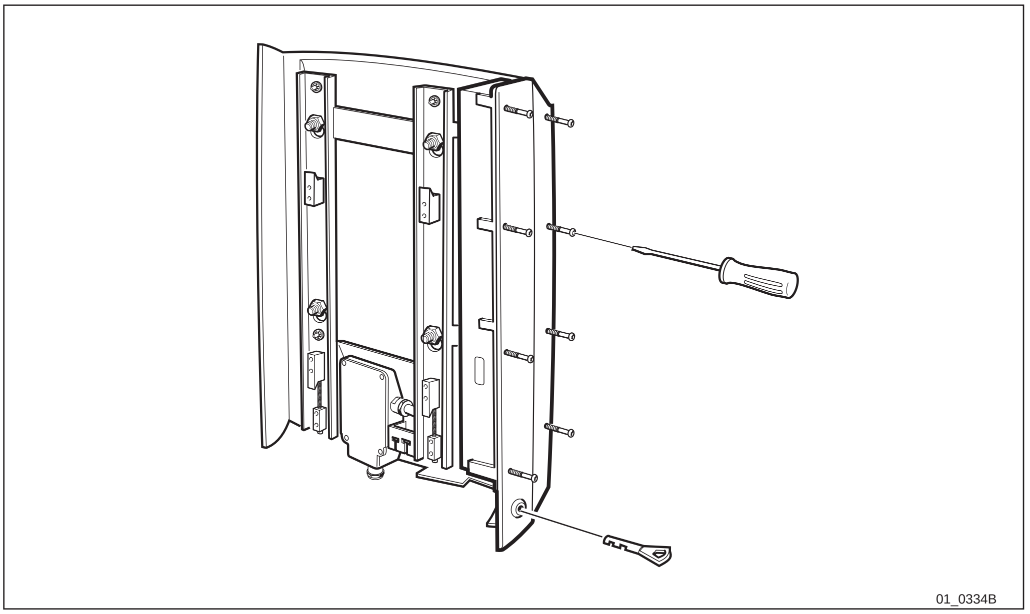

Figure 47 Screw and lock the installation box door

- Screw and lock the installation box door.
- Weather-seal the installation box.
- Collect the packing material and clean the site before leaving.

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6 Installation of RBS 2301

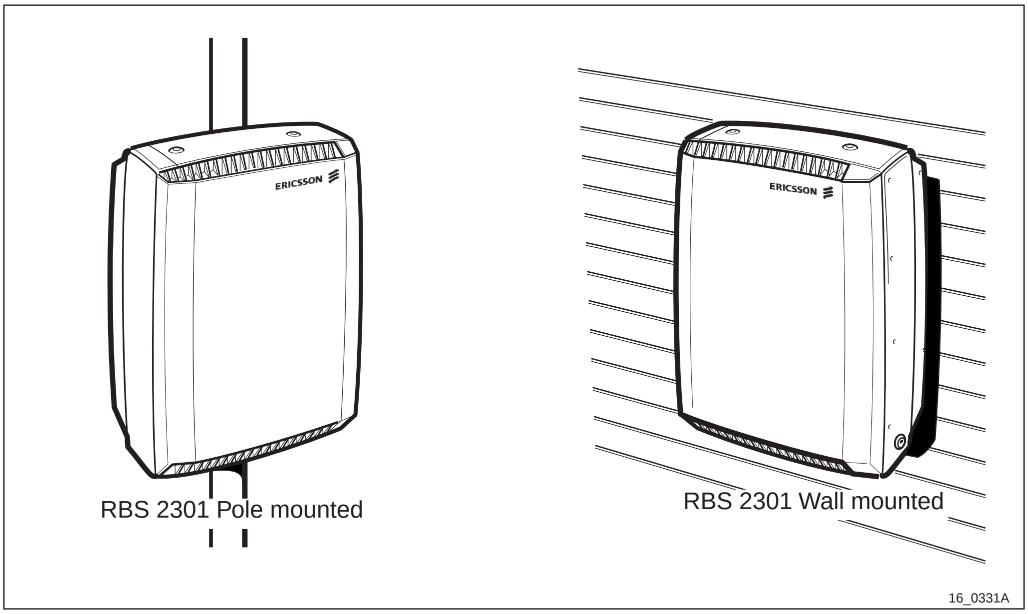

Figure 48 Installation alternatives

6.1 Preconditions

Ensure that the following conditions are met:

- The mounting base is mounted on the mounting plate on a wall or on a pole.
- AC mains power and Transmission Network are present and connected.
- External alarm cable and/or External antenna cables (optional).
- Safety aspects.

6.2 Overview

The recommended installation procedure includes the following activities:

1. Make sure that the box to be opened is labelled **Cabinet**.
2. Unpack and check that the correct material has been delivered.
3. Mount the Sector Antenna, (optional).
4. Mount the cabinet on the mounting base.
5. Connect the cables to the cabinet.
6. Mount the multicasting box, (optional).
7. Connect External Antenna, (optional).
8. Mount the sunshields.
9. Mount the Omnidirectional Antenna, (optional).
10. Concluding routines.

6.3 Unpacking

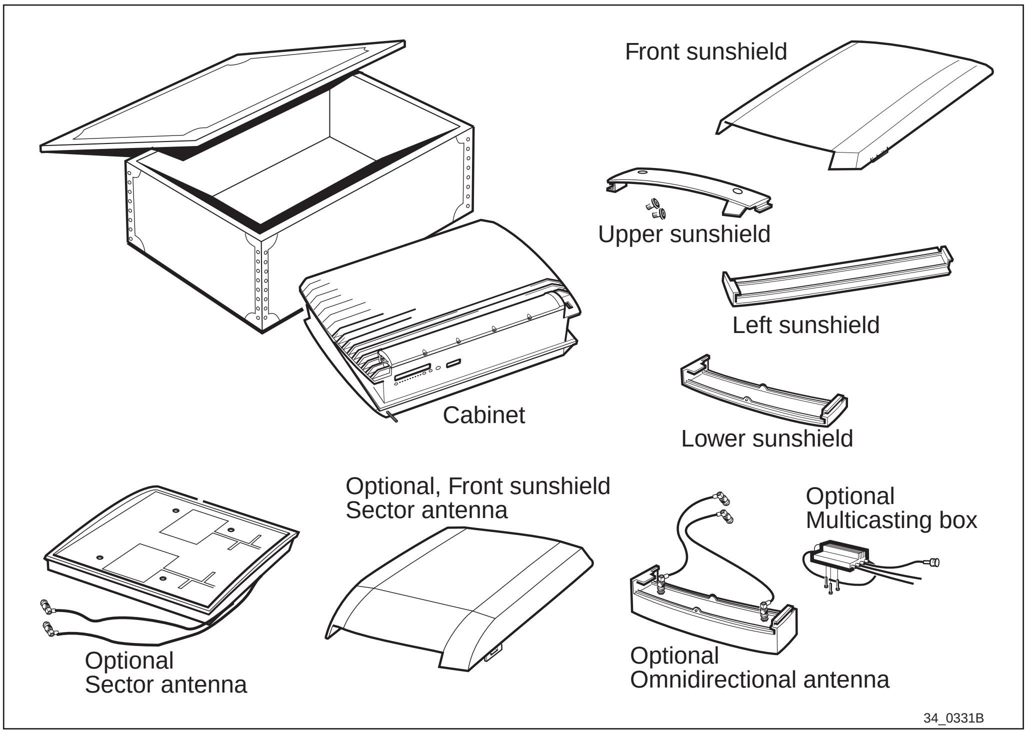

Figure 49 Unpacking the cabinet

Note: Battery is included in the cabinet.

If the packaging is damaged, make an immediate complaint to the supervisor/transport company. Inspect the equipment for transport damage. The equipment shall be checked against the packing list.

6.4 Mounting the Sector Antenna, (optional)

To simplify the installation, mount the sector antenna on the ground.

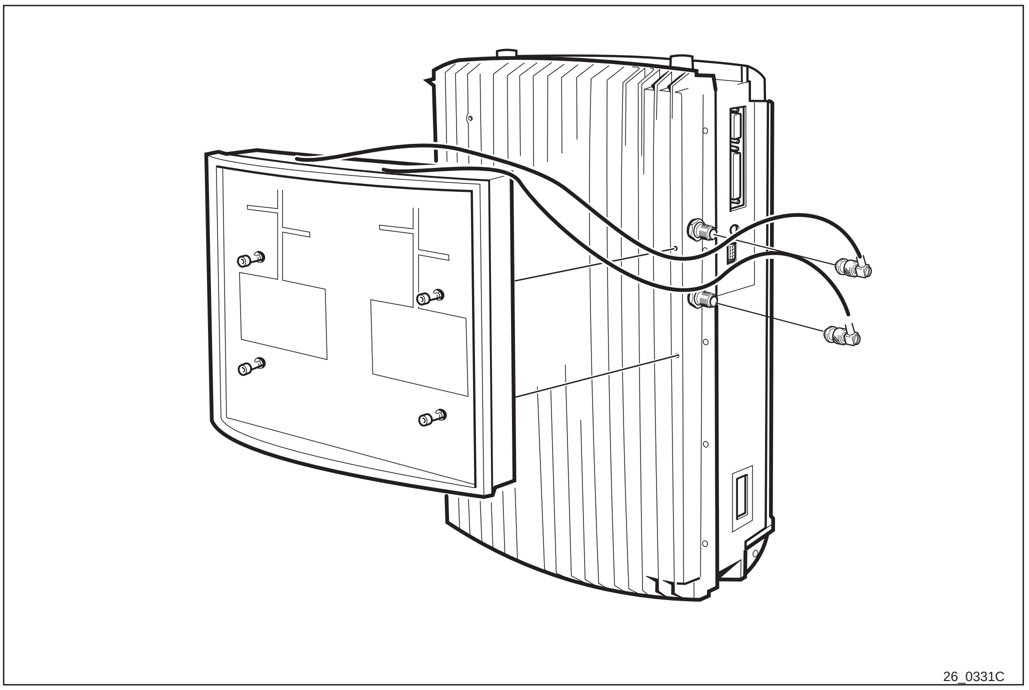

Figure 50 Mounting the sector antenna

1. Mount the antenna and fasten the four screws.

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

2. Connect the antenna cables.

Note: The front sunshield may be mounted to protect the sector antenna during installation to mounting base, *see Section 6.10.1 Front sunshield on page 91*.

6.5 Mounting the Cabinet on the Mounting Base

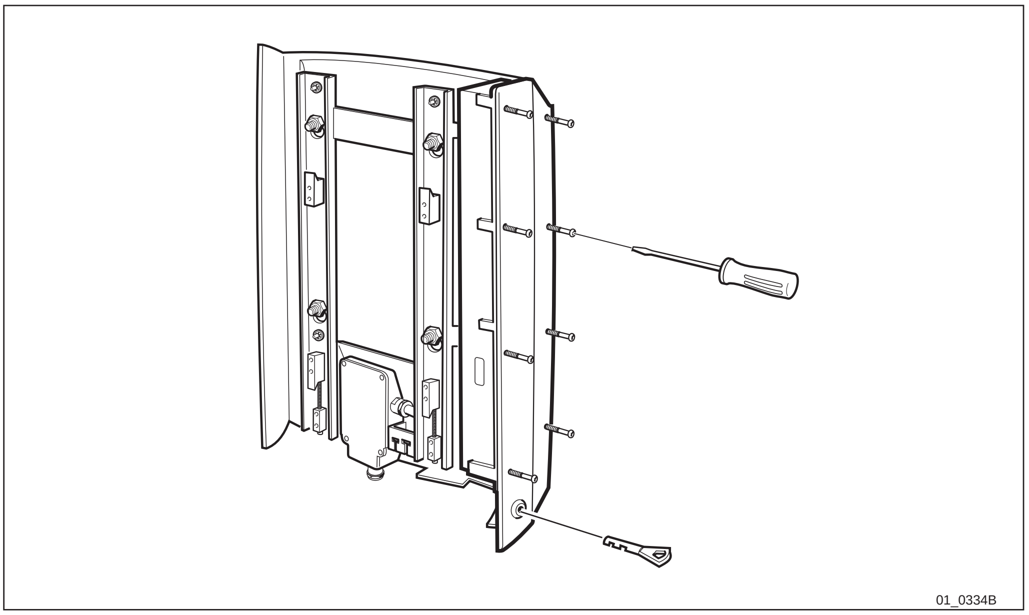

Figure 51 Opening the installation box door

1. Unscrew the eight torx screws on the installation box and unlock.
2. If the covering plate is mounted, loosen the right cleat.

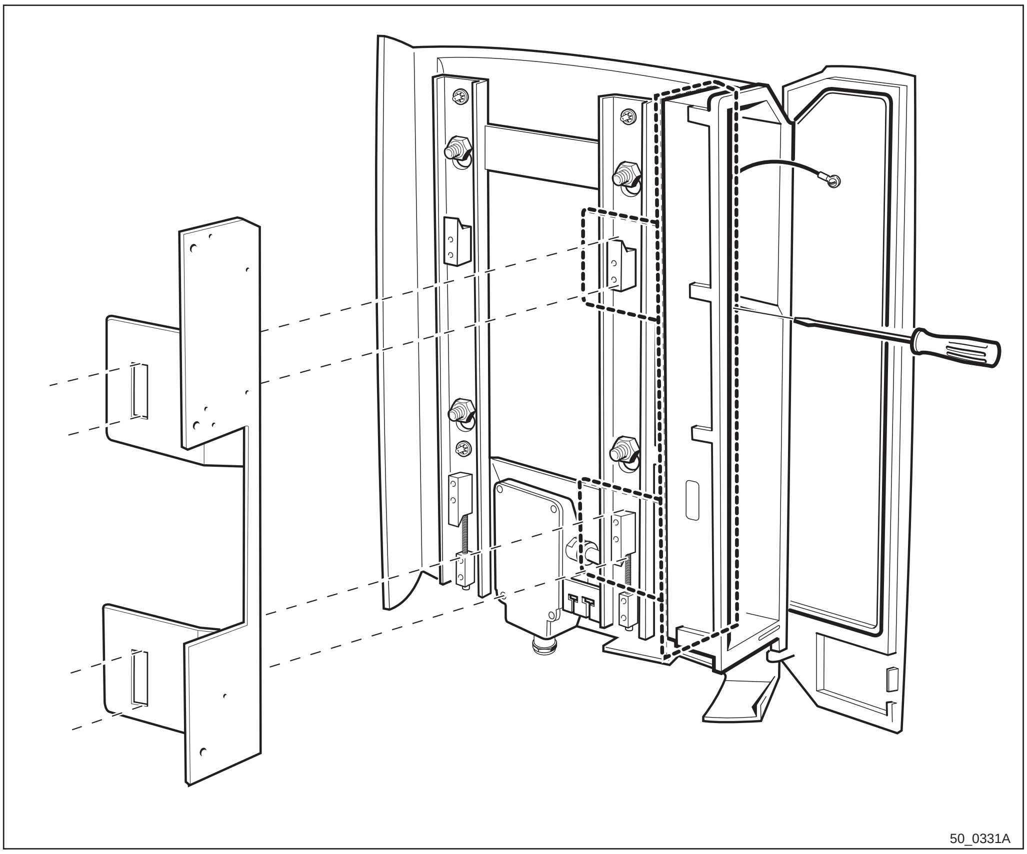

Figure 52 Removing the covering plate, (optional)

3. Remove the covering plate if it is mounted.

Note: If the installation site is at such height that work cannot be done without aid, a skylift or scaffold should be used. A step ladder should only be used as an exception, in order to keep the installation safe. Information regarding the lifting device to facilitate the mounting, *see chapter Product Data*.

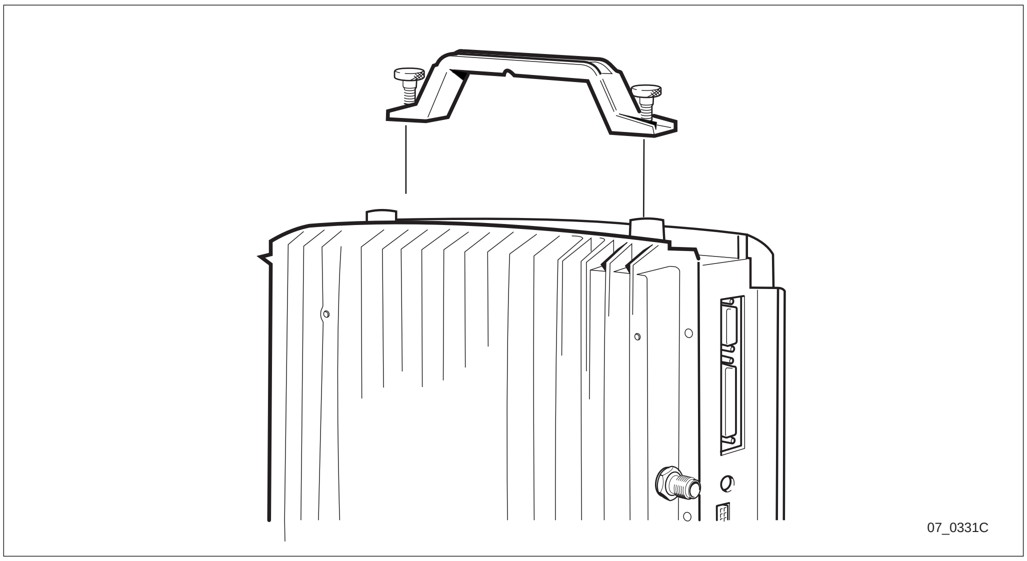

Figure 53 Mounting the handle

4. Mount the lifting handle (optional) on the cabinet.

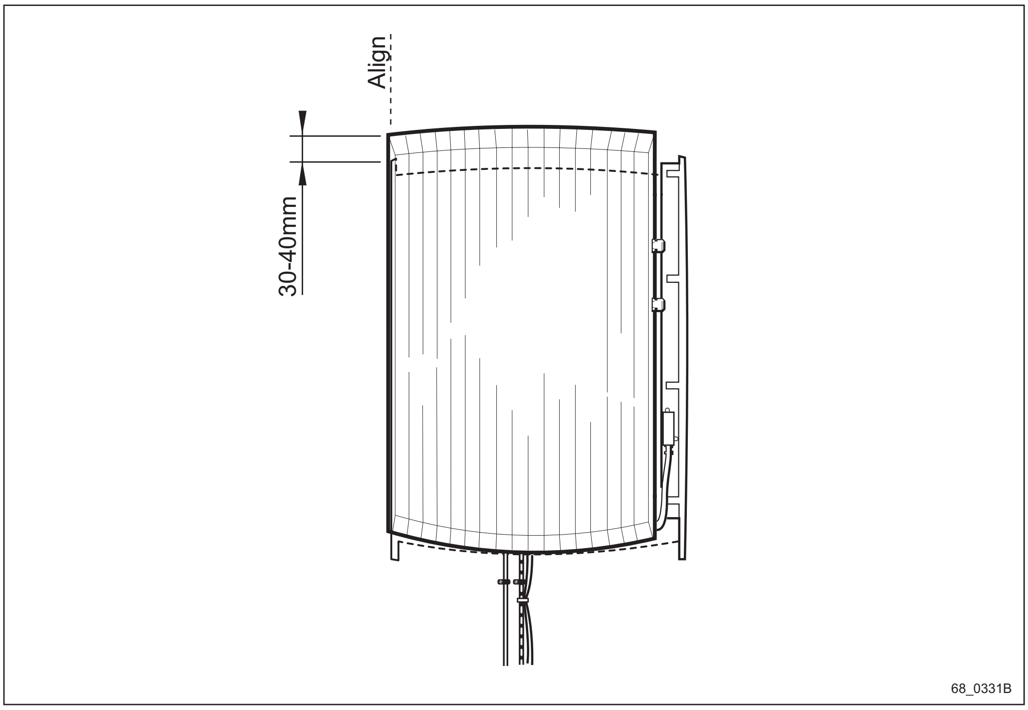

Figure 54 Aiming the cabinet

5. 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.

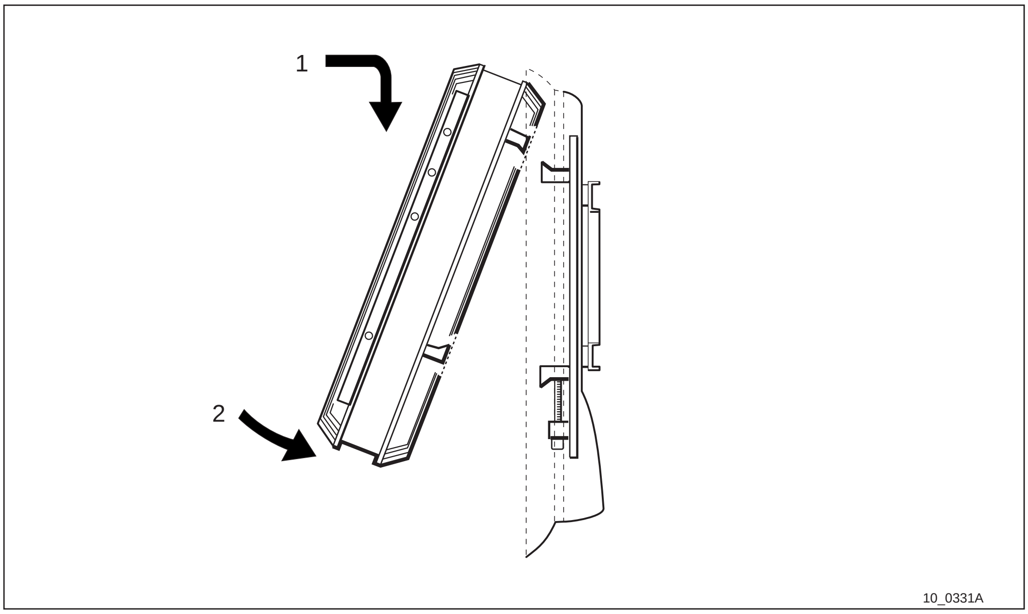

Figure 55 Hooking-on the cabinet

6. Hook-on the cabinet by tilting it slightly against the mounting base and lower the cabinet on to the hooks.

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

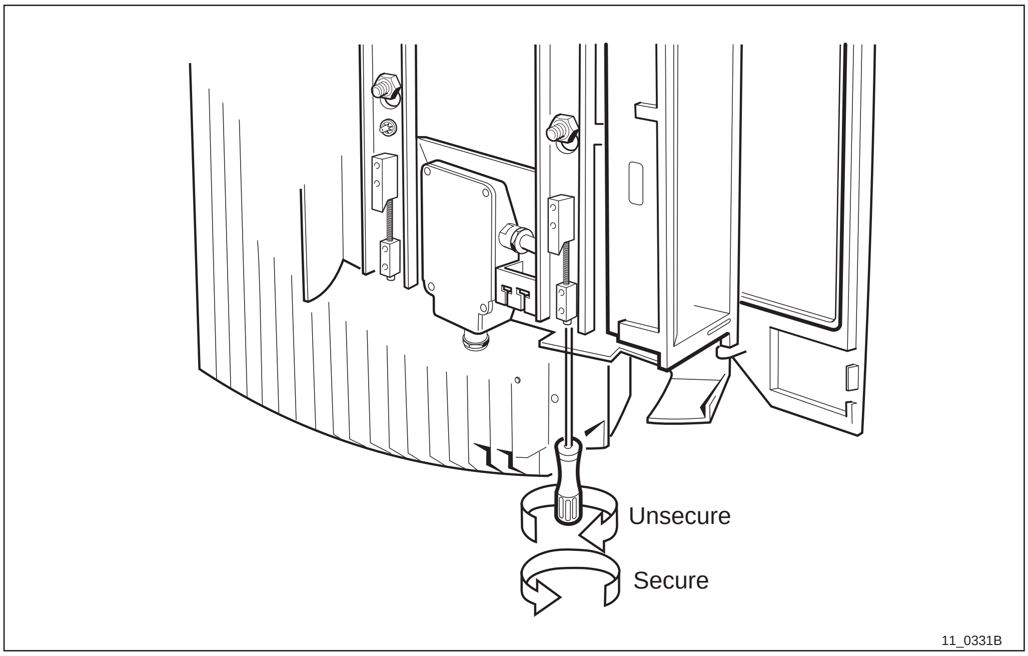

Figure 56 Securing the cabinet

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

9. Remove the lifting handle from the cabinet, if it has been used.

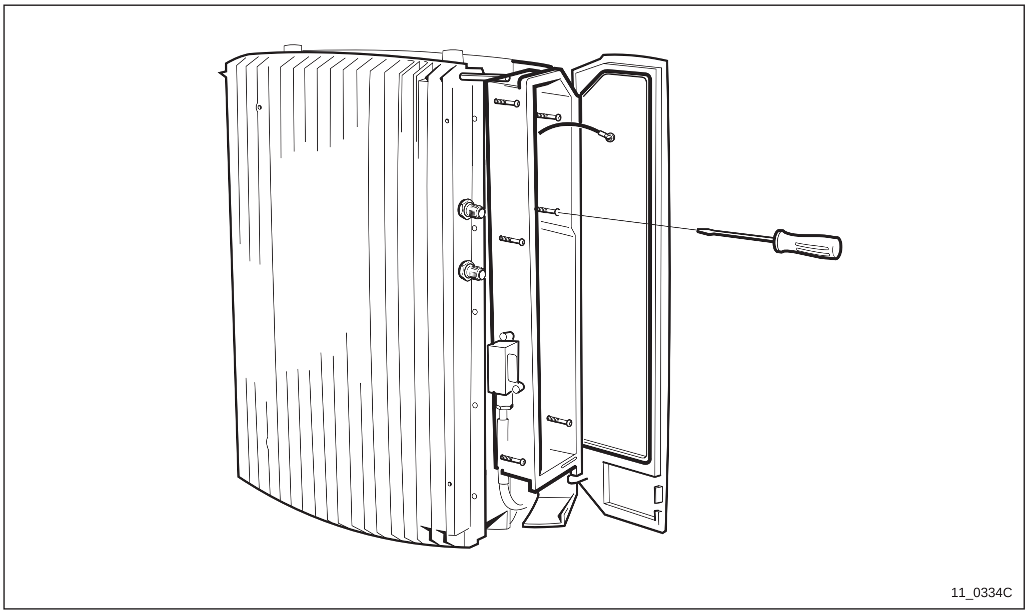

Figure 57 Fastening the installation box

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

6.6 Connecting Cables

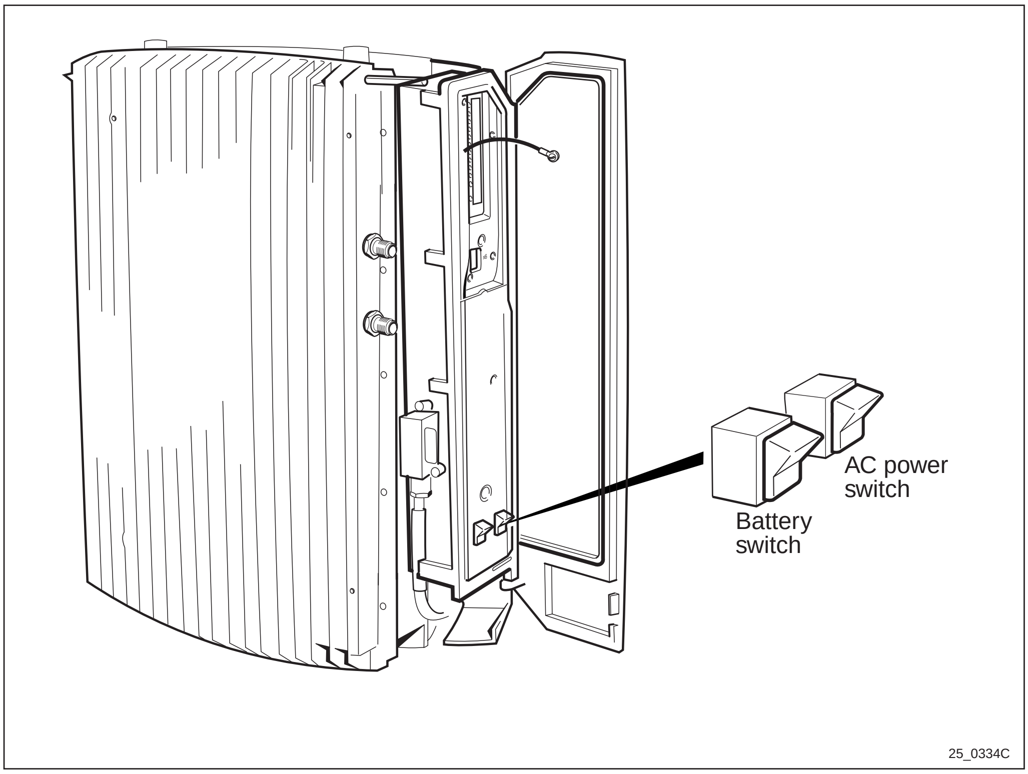

Figure 58 AC power and battery switch

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

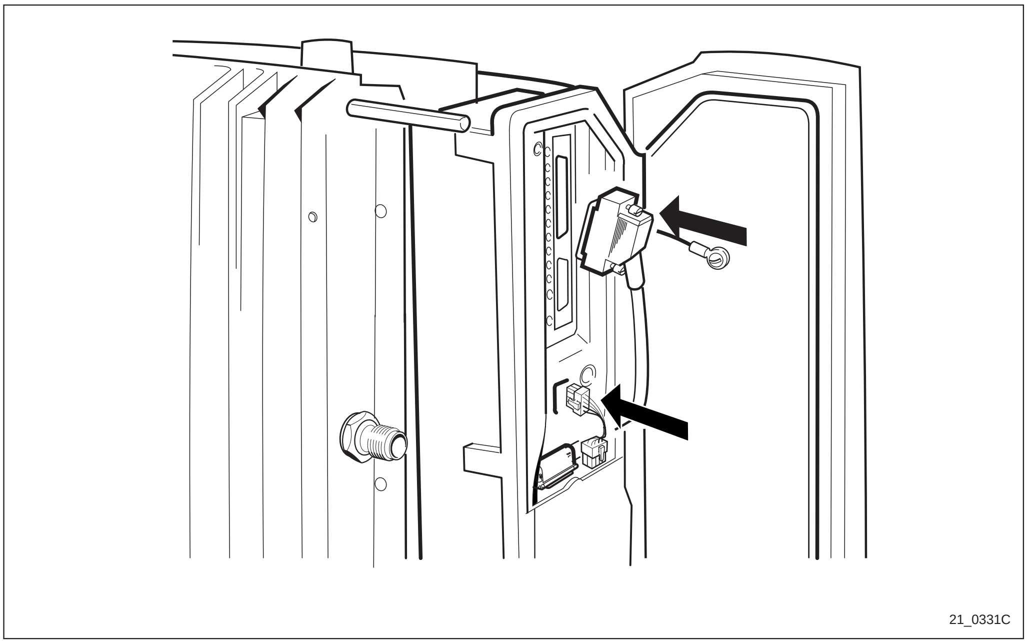

Figure 59 Connecting the cables

2. Connect the internal transmission cable between the EMC card and the cabinet.

3. Connect the internal AC power cable between the EMC card and the cabinet.

6.7 Mounting the Multicasting Box, (optional)

Note: The Multicasting Box must be mounted before the sun-shields.

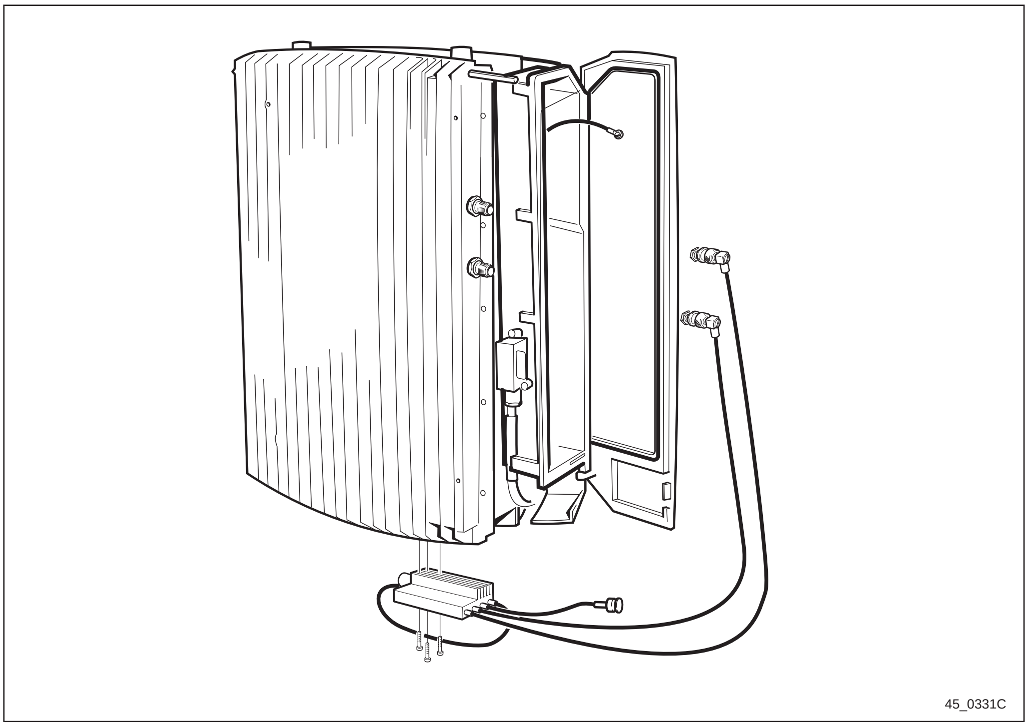

Figure 60 Mount the multicasting box

1. Information regarding antenna configuration, see allocation drawing 193 26–IPA xxxx in the *Site Installation Documentation*.
2. Mount the multicasting box with three torx screws on the bottom of the cabinet.
3. Connect the antenna cables to the TNC connectors on the cabinet.

6.8 Connecting External Antenna, (optional)

Note: The External Antenna must be mounted before the sun-shields.

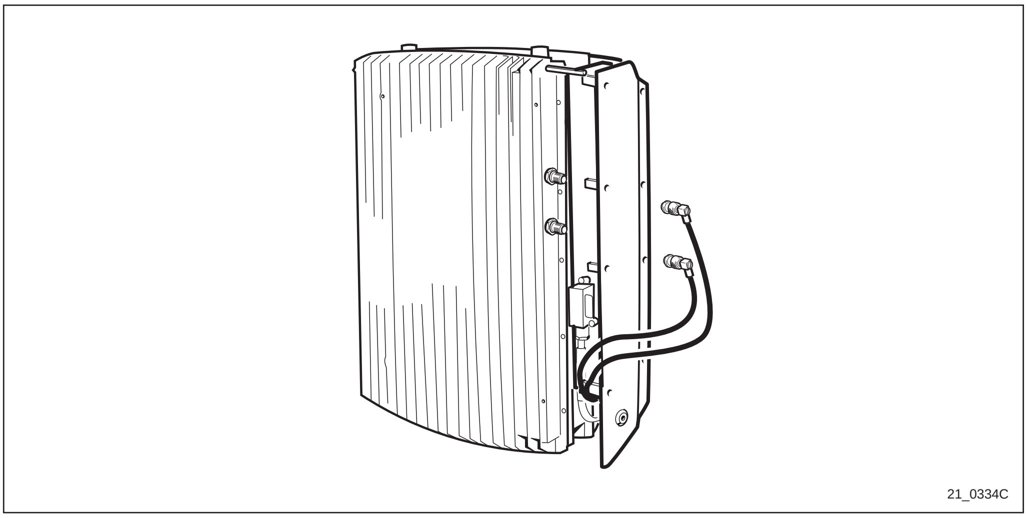

Figure 61 External antenna cables

1. Information regarding antenna configuration, see allocation drawing 193 26–IPA xxxx in the *Site Installation Documentation*.
2. Connect the antenna cables to the TNC connector on the cabinet.
3. Run the cables without sharp turns and fasten them with approved straps.

6.9 Mounting the Sunshields

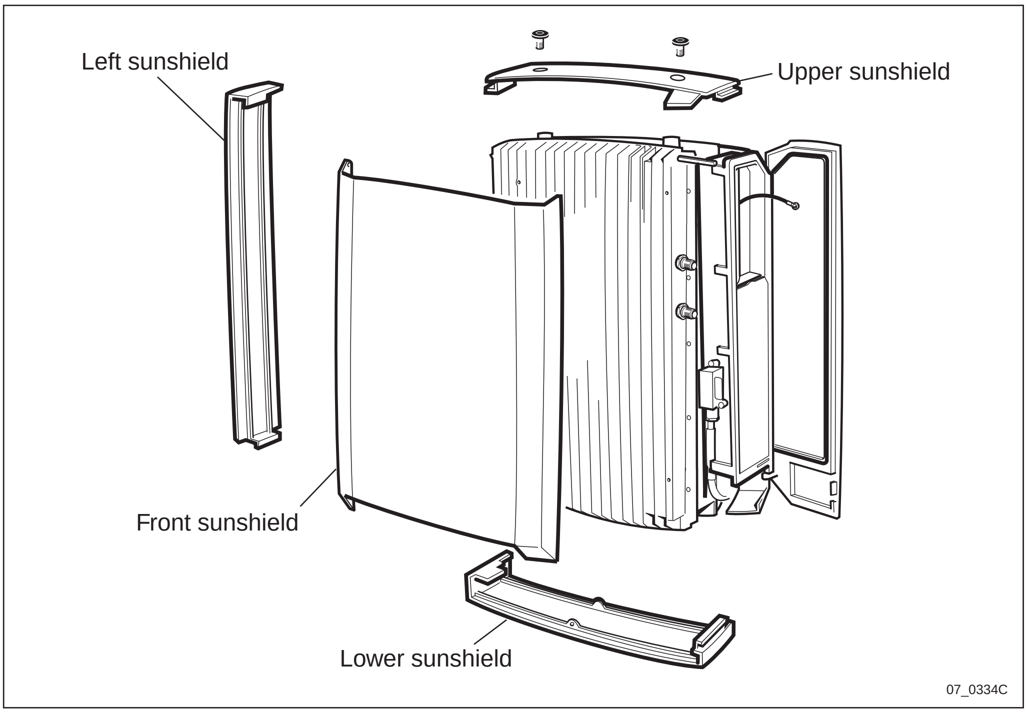

Figure 62 Overview of the sunshields

6.9.1 Upper sunshield

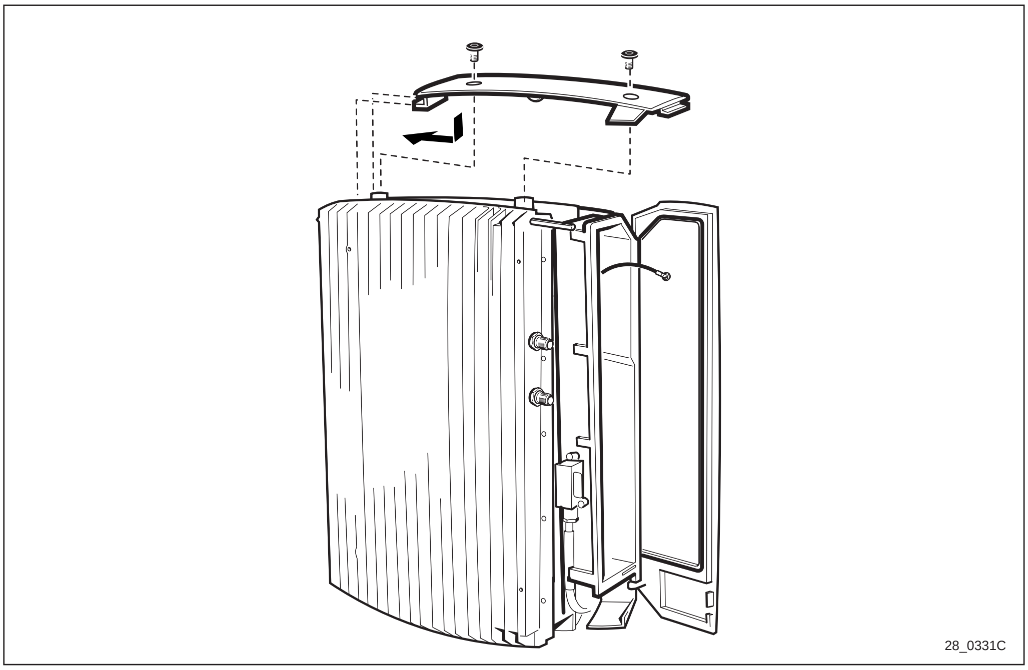

Figure 63 Upper sunshield

1. Hook-on the upper sunshield on the left side.
2. Push it down until it snaps into place.

3. Seal the two holes, intended for the handle, with the supplied plugs.

6.9.2 Left sunshield

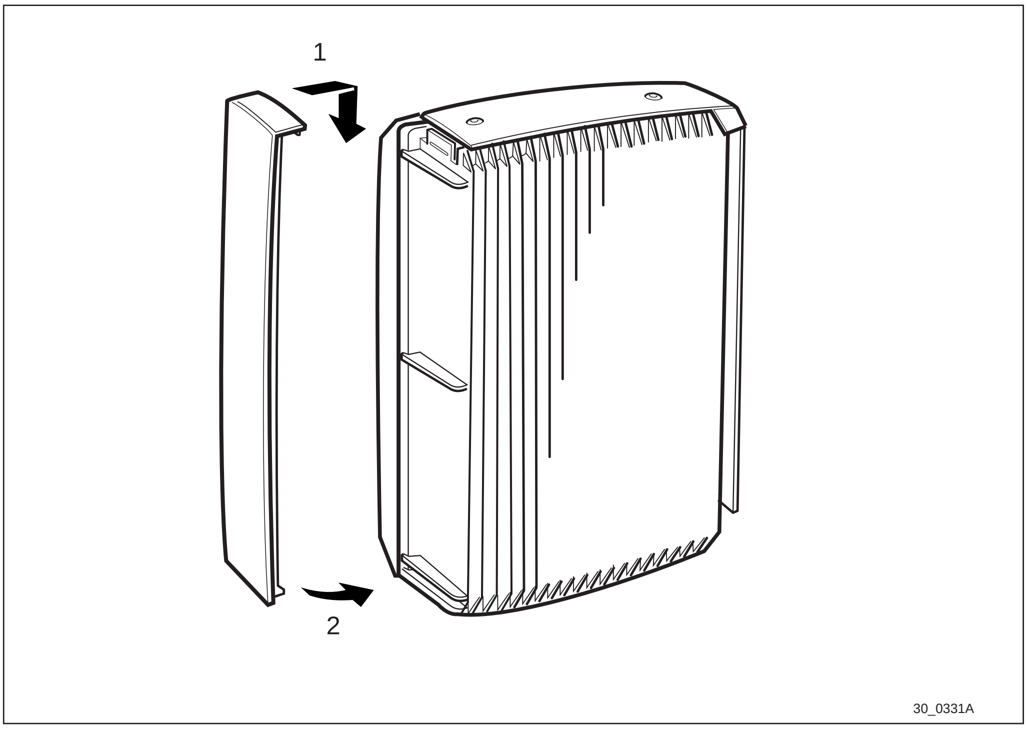

Figure 64 Left sunshield

1. Hook-on the left sunshield on the left side of the cabinet.
2. Push on the lower part of the sunshield until it snaps in place.

6.9.3 Lower sunshield

Note: If the omnidirectional antenna shall be used, *see Section 6.10 Mounting the Omnidirectional Antenna, (optional) on page 90*.

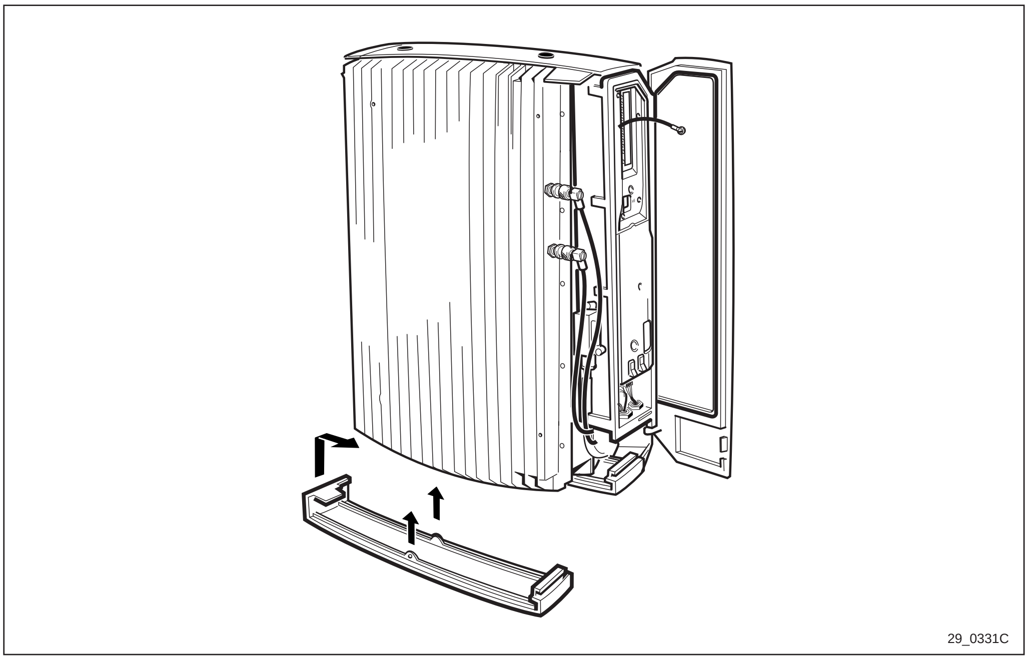

Figure 65 Lower sunshield

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

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

6.10 Mounting the Omnidirectional Antenna, (optional)

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

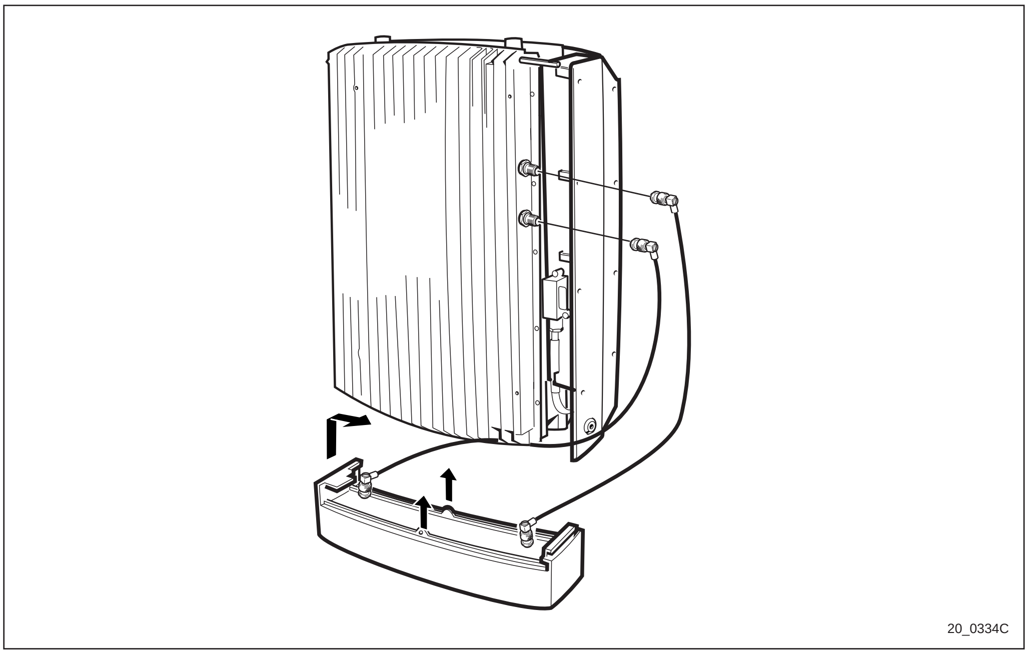

Figure 66 Mounting the omnidirectional antenna

1. Hook-on the omnidirectional antenna, on the cabinets lower left side.

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

2. Push it up until it snaps in place. The fasteners is situated on the middle.
3. Connect the antenna cables.

6.10.1 Front sunshield

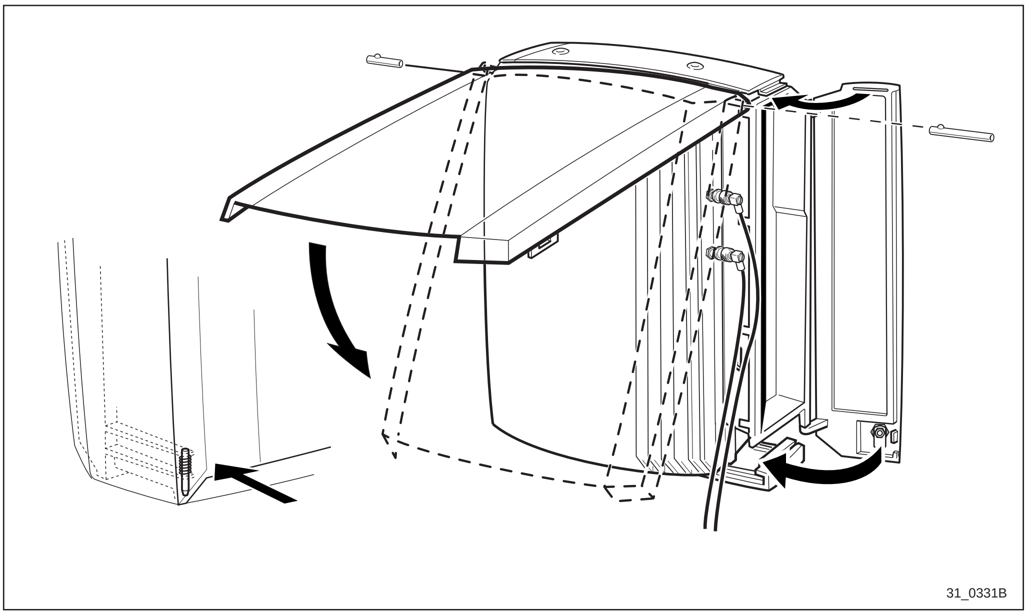

Figure 67 Front sunshield

1. Mount the hinges. The short one on the left side is factory mounted. The long must be mounted on site and is delivered in a plastic bag which is mended with tape on the the cabinet.
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.

6.11 Concluding Routines

Note: When the cabinet is mounted outdoors, it must not be left without power more than 48 hours. This requirement is caused by the risk of humidity damages.

- Make sure that all cables are strapped and run in a proper way.
- Make sure that all sunshields are in the position for being locked by the installation box door.

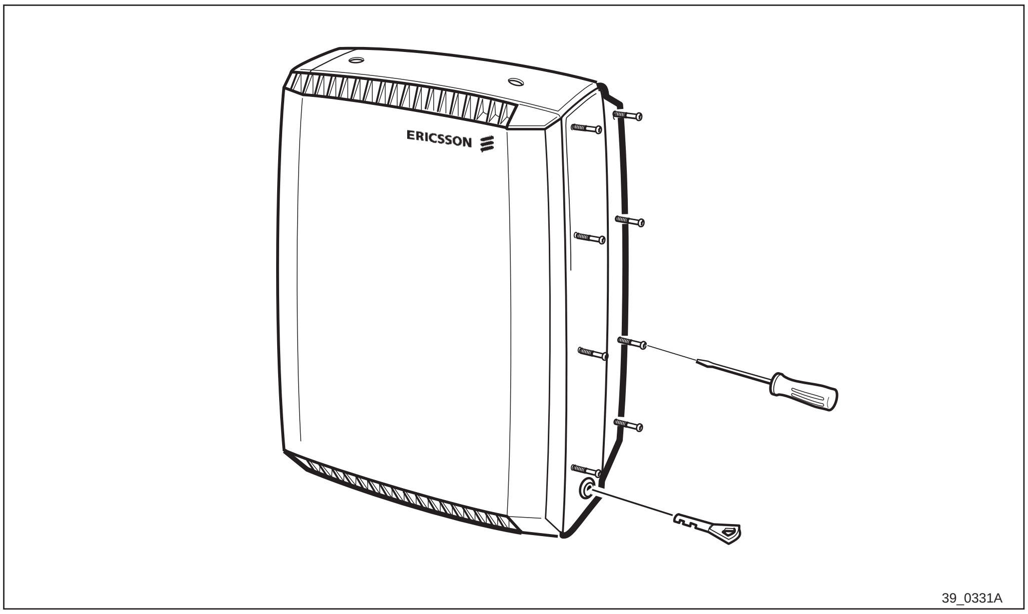

Figure 68 Closing the installation box door

- Close the installation box door, tighten all screws and lock.
- Tidy up the site, remove unnecessary materials and waste.
- Make sure that the installation checklist has been filled in.

7 Antenna System Tests

7.1 Introduction

The purpose of these tests is to verify that the external antenna system is properly installed and fully operational. The tests include the antenna, feeders and jumpers.

The antenna system installation team performs the tests during the installation process, to verify the workmanship and to check that the antenna system is operational.

7.2 Preconditions

The installation of the external antennas and the feeder cables with jumpers must be completed, whereas the connections to the antenna must be left open. The tests must be made as an integrated process during the installation to avoid unnecessary opening and closing of contacts and their sealings. Do not cover the connectors with sealing tape until all testing is completed.

7.2.1 Work Flowchart for Testing the Antenna System

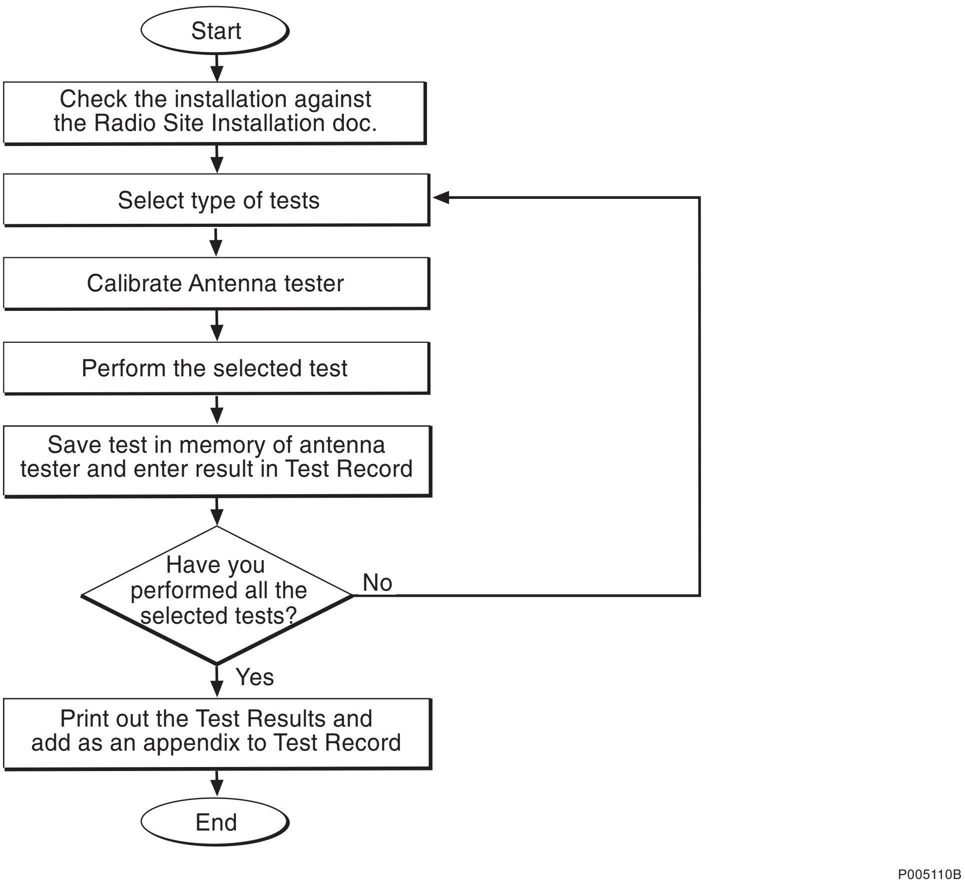

Figure 69 Work flowchart for testing the Antenna system

7.2.2 Installation Check

- ☐ Verify that the installation is in accordance with the *Site Installation Documentation*.
- ☐ Check visually that no cables or connectors are damaged and that all cables (feeders or jumpers) are properly marked.
- ☐ Ensure that all connectors are properly connected and tightened.
- ☐ Verify the directions of directional antennas against the *Site Installation Documentation*. Consider magnetic influences from nearby metallic objects and deviation from the magnetic North when using the compass.
- ☐ Ensure that the correct cable is connected to the correct antenna.
- ☐ Record remarks, if any, in the test record and forward them to the person responsible for the site installation.

Note: *See Section 7.5 on page 104* for an example of a test record.

7.3 Using Antenna Tester

This instruction describes how to make Standing Wave Ratio (SWR) and Distance To Fault (DTF) tests on an antenna system with the Anritsu Site Master S120A or S235A. The tests cover the GSM 900, GSM 1800 and GSM 1900 systems.

After the results have been saved in the Site Master the tester can obtain hard copies by importing the wave forms to a PC. The necessary software and a serial cable are enclosed with the SiteMaster. For more information refer to:

Anritsu Site Master User’s Guide

Test Equipment

To carry out this test, see the list of required test equipment in *chapter Tools and Instruments*.

7.3.1 Anritsu Site Master S120A and S235A

The keys mentioned in the instruction can be found in *Figure 70 on page 95*. In the instructions a "key" is marked with the matching text, while a "soft key" has its text displayed on the screen, next to the key.

Note: The REFL test port is transmitting (out). The TRANS test port is receiving (in).

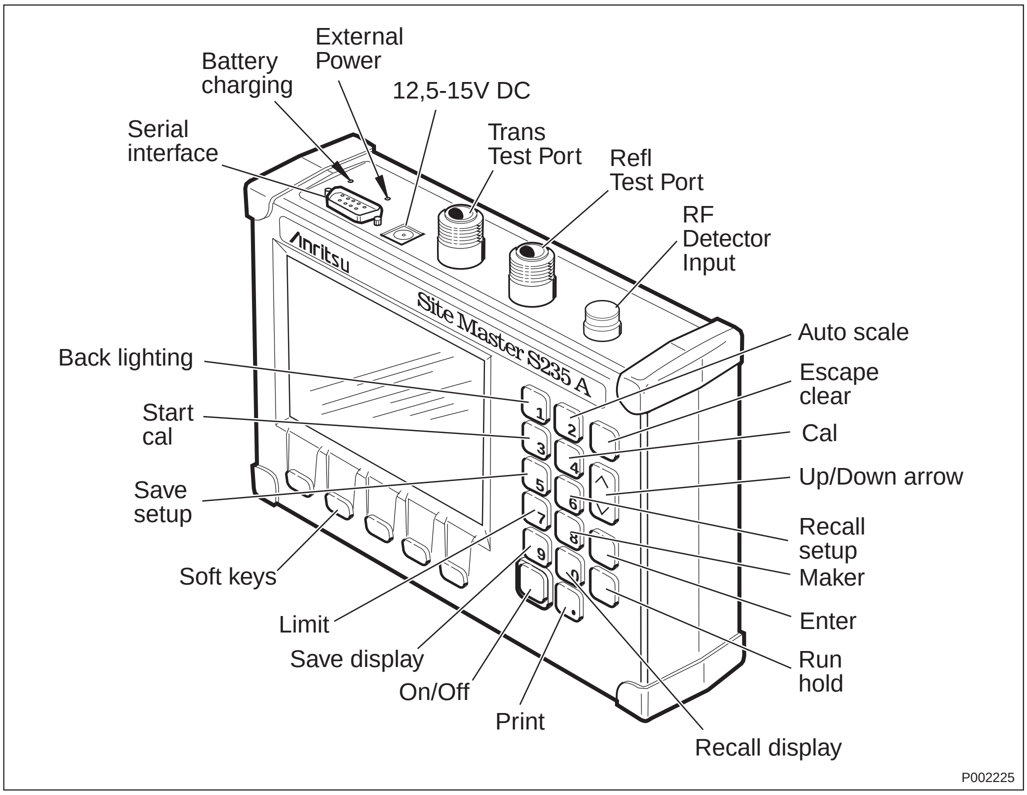

Figure 70 Anritsu Site Master S235A (exterior of S120A is similar to S235A)

7.3.2 Calibration and Adjustments

To achieve accurate results and compensate for measurement uncertainty, the Site Master must be calibrated.

The frequency range has to be selected before calibration.

Selecting a Frequency Range

1. Turn on the Site Master by pressing the ON-button.
2. Press the FREQ soft key, from the Main Menu.
3. Press the F1 soft key from the Frequency Menu.
4. Enter the ‘Lower’ frequency limit in MHz, from the table below, for the antenna system by using the keypad or the Up/Down arrow key and press ENTER.
5. Press the F2 soft key from Frequency Menu.
6. Enter the ‘Higher’ frequency limit in MHz, from the table below, for the antenna system and press ENTER.
7. Check that the FREQ (MHz) scale in the display area indicates the new frequency start and stop values.
8. Press MAIN soft key.

Table 10 Start and stop frequencies

System	RX Band		TX Band	
	Start freq. MHz	**Stop freq. MHz**	**Start freq. MHz**	**Stop freq. MHz**
GSM 900	860	935	905	980
GSM 1800	1690	1800	1795	1900
GSM 1900	1830	1930	1910	2010

Performing a Calibration

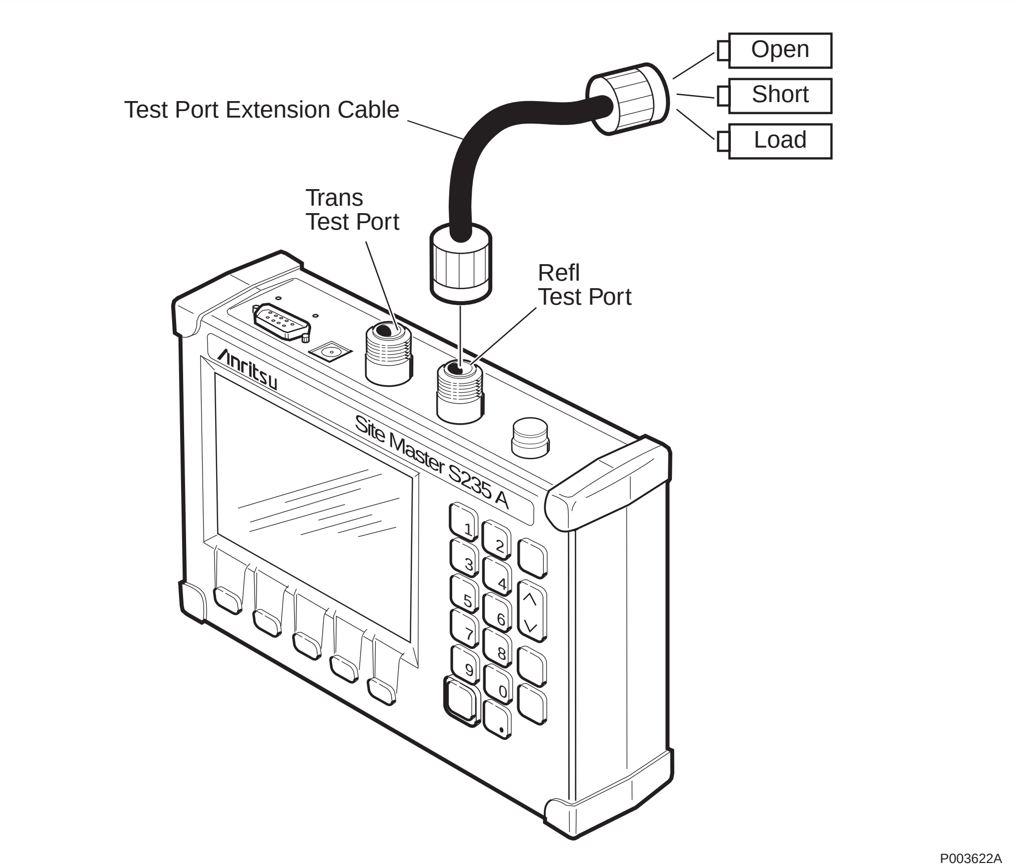

Figure 71 Different connections for calibration

Perform a measurement calibration, using the START CAL key. During the calibration there will be step-by-step instructions on the display throughout the procedure. One of the following messages "Measuring OPEN", "Measuring SHORT" or "Measuring LOAD" appears while the measurement is in progress.

Select calibration type OSL.

Required calibration component is OSL (PRECISION/OPEN/SHORT/ LOAD).

For the best calibration results, ensure that the Short/Open/Load is connected at the end of the Extension Testport Cable, at the same point where the RX/TX jumper will be connected.

1. Connect the Test Port Extension Cable to the Site Master Refl Test Port.
2. Press the START CAL key.
3. Select OSL and press ENTER.
4. Follow the instructions on the screen.
5. When the calibration is performed, disconnect the calibration equipment from the Test Port Extension Cable.

Entering Cable Parameters

1. Press MODE and select DTF-SWR, or DTF-return loss, with the Up/Down key. Press ENTER.
2. Press the DIST soft key.
3. Press the MORE soft key.
4. Press the LOSS soft key.
5. Enter the loss in dB per meter, *see Table 12 on page 103,* for the type of cable being tested and press ENTER.
6. Press the PROP V soft key.
7. Enter the relative velocity, *see Table 12 on page 103,* for the type of cable being tested and press ENTER.
8. Press the MAIN soft key to go back to the Main Menu.

7.3.3 SWR and DTF Test

Note: The SWR and DTF test must be done for each feeder cable.

Test Setup for GSM 900/1800/1900

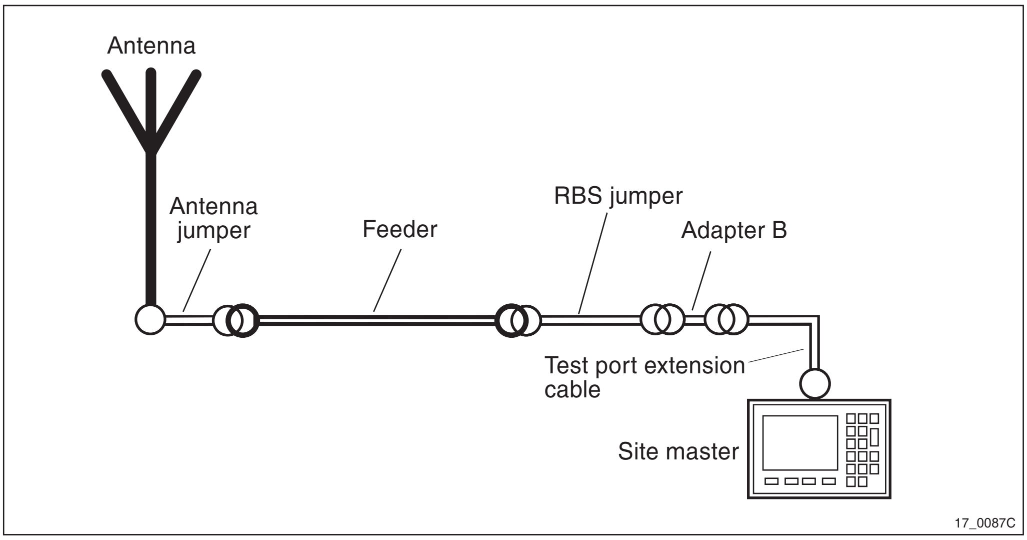

Figure 72

Connect the Adapter B to the Test Port Extension Cable. Adapter B consists of 7/16–N and N-TNC adapters

A complete test setup is shown in *Figure 72 on page 97*.

SWR Test

The purpose of this test is to verify that the antenna system has the right impedance (50 Ω).

1. Press the MODE soft key.
2. Select FREQ-SWR or Return Loss Measurements by using the Up/Down arrow key and press ENTER.
3. Calibrate the Site Master for this setup. *See Section 7.3.2 on page 95*.
4. Connect the test equipment to the antenna system according to *Figure 72 on page 97*.
5. Check that all connections are properly connected and tightened.
6. Press the FREQ soft key.
7. Check that the frequency range is correct.
8. Press the MAIN soft key.
9. Press the SCALE soft key.
10. Press the TOP soft key.
11. Enter 1.5 for topscale and press ENTER.
12. Press LIMIT soft key.

Note: Limit must not be in OFF-mode.

13. Enter 1.4 for a limit and press ENTER.
14. Observe the waveform and check that no return levels are over 1.4 SWR (= 15.6 dB RL). *See Table 11 on page 100*. Enter the test result in the Test Record, *see Section 7.5 on page 104*.
15. Save the measurement by pressing the SAVE DISPLAY key.
16. Type in a non-used number (1 - 40) for the measurement and press ENTER.
17. Return to the main menu by pressing the MAIN soft key.

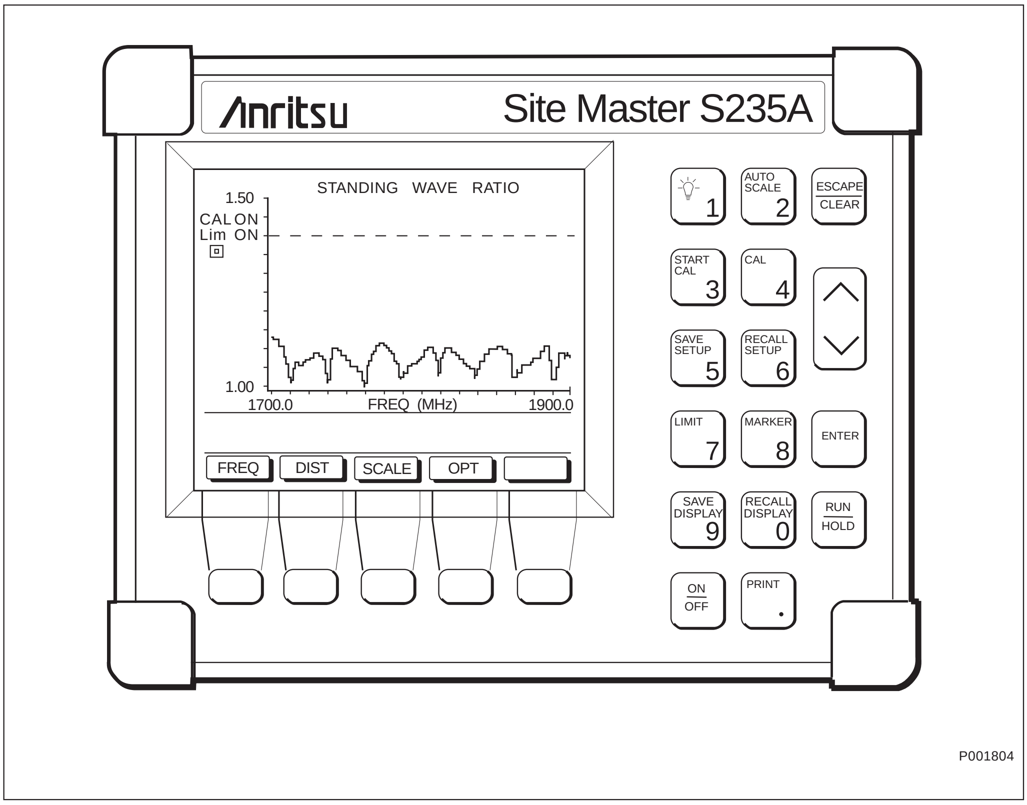

Figure 73 Measurement of an approved cable

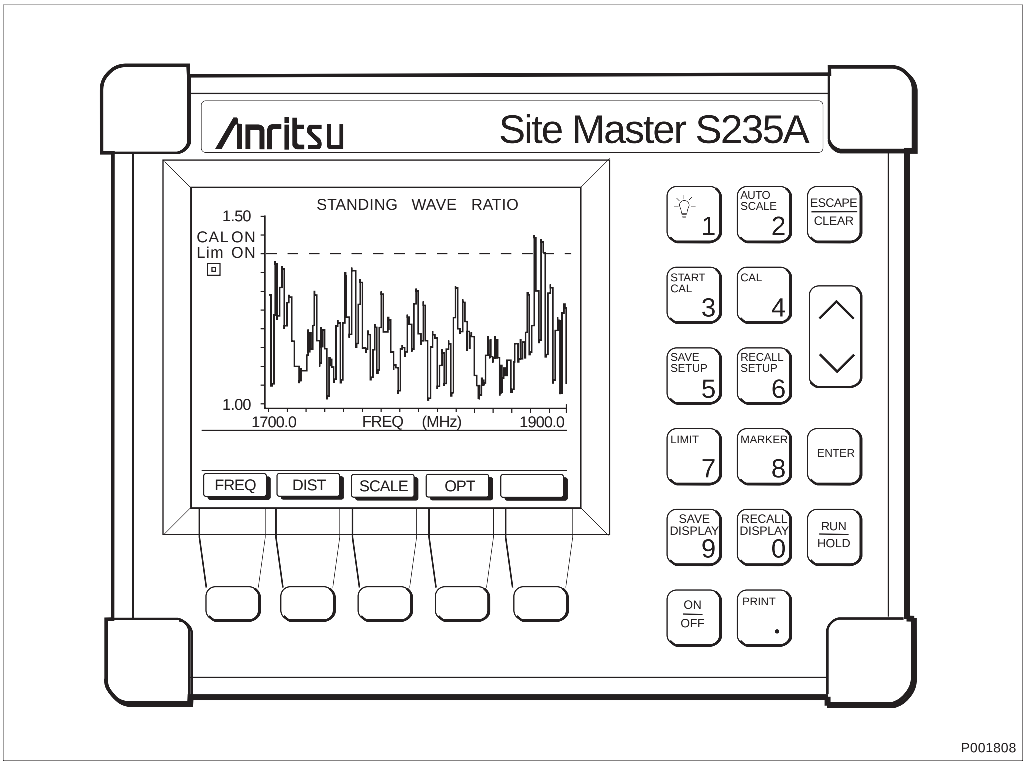

Figure 74 Measurement of non approved cable

Table 11 Conversion table

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

DTF Test

The purpose of this test is to verify that there are no bad connections or other faults (for example sharp bends) in the antenna feeder system.

1. Press the MODE soft key.
2. Select the DTF –SWR measurements using the Up/Down arrow key and press ENTER.
3. Calibrate the Site Master for this test setup. *See Section 7.3.2 on page 95*.

4. Connect the test equipment to the antenna system according to *Figure 72 on page 97*.
5. Check that all connections are properly connected and tightened.
6. Press the DIST soft key.
7. Press the D1 soft key.
8. Enter the desired numerical start value (usually 0.0 m) from the keypad and press the ENTER key.
9. Press the D2 soft key.
10. Enter the desired numerical stop value (usually the total length of the antenna system) from the keypad and press the ENTER key.
11. Press the MORE soft key.
12. Press the MAIN soft key.
13. Press the SCALE soft key.
14. Press the TOP soft key.
15. Enter 1.2 for topscale and press ENTER.
16. Press the LIMIT soft key.

Note: Should not be in OFF-mode.

17. Enter 1.05 for a limit and press ENTER.
18. Wait while the Site Master is calculating (~ 8 sec.).
19. Observe the waveform and check that no reflections are over 1.05 SWR (31.5 dB RL).
20. Save the display and enter Passed or Failed in the Test Record, *see Section 7.5 on page 104*.

Note: The antenna may have a greater reflection than 1.05 SWR but the system is still approved as long as the cables are below the limit.

21. Save the measurement by pressing the SAVE DISPLAY key. Type in a non-used number (1 - 40) for the measurement and press ENTER. The saved display can later be used for cable attenuation calculation. *See Section 7.3.4 on page 102*.
22. Press the MAIN soft key to return to the main menu.

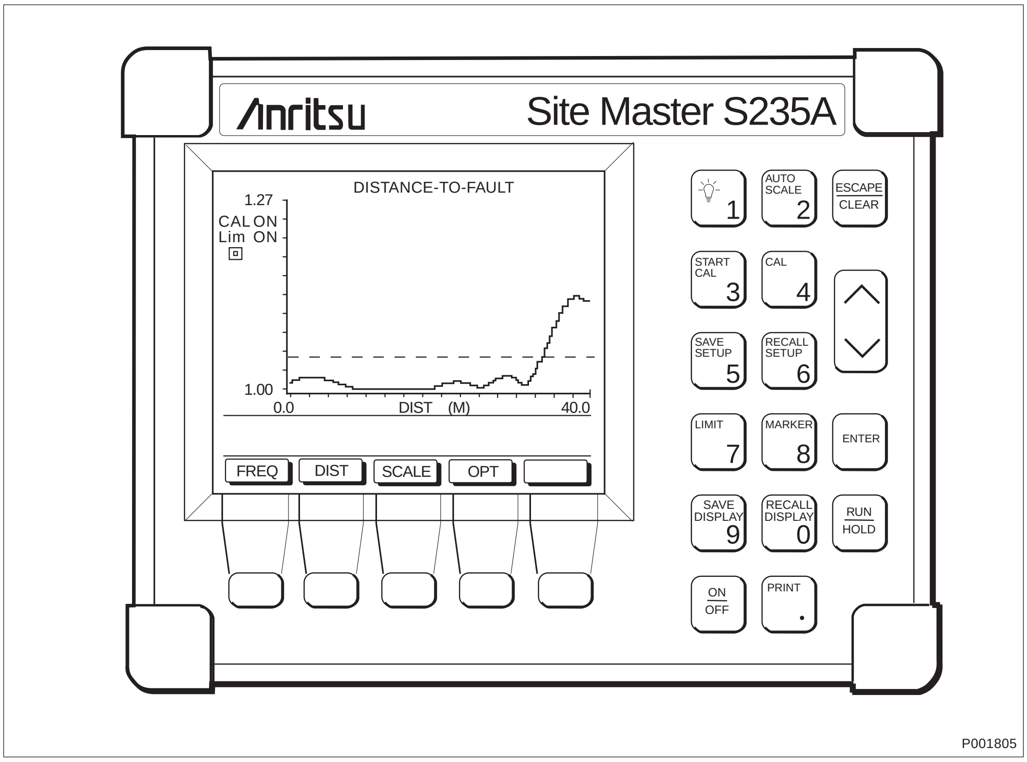

Figure 75 Measurement of an approved cable.

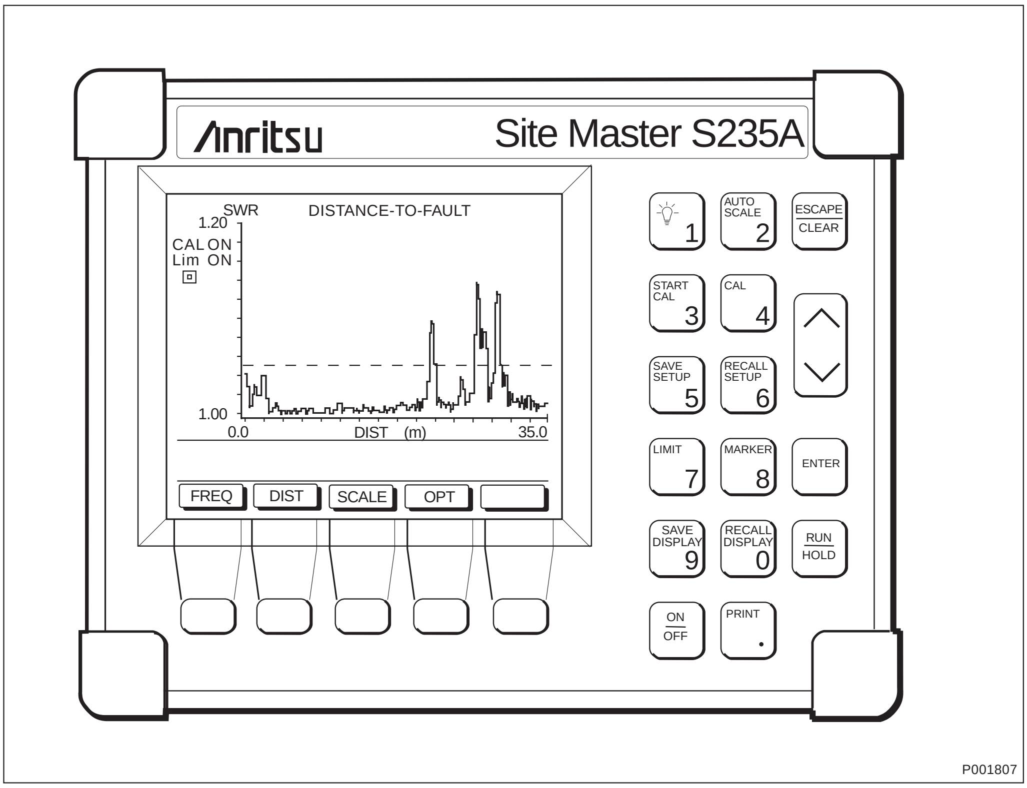

Figure 76 Example showing a bad adapter at the antenna.

7.3.4 Cable Attenuation Calculation

The purpose of this section is to calculate the attenuation of the system.

Note: If the cable type is not found in *Table 12 on page 103*, values must be taken from the manufacturer's specifications.

1. Calculate the total attenuation and record it in the test record. Total attenuation is calculated by multiplying the actual length in meters by the attenuation per m. Each connector is assumed to add 0.1 dB.

   Example for 900 MHz:

   Feeder type LCF 7/8", Length = 63 m, attenuation per m = 0.043 dB. Two connectors = 0.2 dB. Actual attenuation = 63 x 0.043 + 0.2 = 2.9 dB.

   Antenna jumper type LCF 1/2", length 3 m, attenuation per m = 0.073 dB. Two connectors = 0.2 dB. Actual attenuation = 3 x 0.073 + 0.2 = 0.4 dB.

   RBS jumper type HCF 1/2", length 2 m, Attenuation per m = 0.118 dB. Two connectors = 0.2 dB. Actual attenuation = 2 x 0.118 + 0.2 = 0.4 dB.

   Total attenuation = 2.9 + 0.4 + 0.4 = 3.7 dB.

2. Repeat step 1 for all antenna feeders at the base station.

3. Enter the result of the calculation in the test record, *see Section 7.5 on page 104*.

Table 12 Velocity factor (Vp) for different cables

Product No.	**Supplier code**	**Velocity factor V_p**	**Attenuation, dB/m**	
			900 MHz	**1800/1900 MHz**
SXA 105 3060	Kabelmetal HCF (1/2")	0.84	0.118	0.224
TZC 500 15	Kabelmetal LCF (1/2")	0.88	0.073	0.109
TZC 500 17	Kabelmetal LCF (7/8")	0.88	0.043	0.065
SXA 105 3062	Kabelmetal LCF (1 5/8")	0.88	0.027	0.044
TZC 500 26	Andrew FSJ 4-50A (1/2")	0.88	0.116	0.177
TZC 501 26	Anderw LDF 4-50A (1/2")	0.88	0.024	0.039
TZC 501 22	Andrew LDF 5-50A (7/8")	0.89	0.043	0.064
TZC 501 28	Andrew LDF 7-50A (1 5/8")	0.88	0.027	0.039
TZC 500 29	Nokia RF 1/2" -50	0.88	0.071	0.112
TZC 500 21	Nokia RF 7/8"-50	0.88	0.045	0.066
TZC 501 28/2	Nokia RF 1 5/8" -50	0.87	0.024	0.042

7.4 Importing Waveforms to Graphical PC Enviroment

After the results have been saved in the Site Master, the user can obtain hard copies by importing them to a PC with included software and a serial connection. For more detailed information, refer to the:

Anritsu Site Master User's Guide

7.5 Test Record

The test record form should be regarded as a suggestion only and can be modified to suit the actual project.

Test Data

Date: ______________________

Site ID: ______________________

Name of tester: ______________________

Instruments Used (SiteMaster)

Instrument	Serial Number
Wiltron SiteMaster S331 Version 2.00	

Signatures

Responsible for test record

Date: ______________________ Name: ______________________

Customer acceptance

Date: ______________________ Name: ______________________

Test Results

Cell		
Installation check		
Visual check		
Antenna direction		Degrees

Remarks ______________________________

DTF Test	TX 1	RX-A	TX 2	RX-B	
Reflection max					dB[1]
					mρ
Feeder length					m
Bottom jumper length					m
Top jumper length					m
Total attenuation					dB

SWR Test	TX 1	RX-A	TX 2	RX-B	
SWR					dB[1]
Return loss					
Feeder attenuation					dB

[1]From the conversion table, *Table 11 on page 100*

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8 Site Installation Tests

8.1 Preconditions

8.1.1 Testing Personnel

Supervisors and testers should have a sound knowledge and understanding of Ericsson materials, and a basic knowledge of:

- The English language
- Base station testing techniques
- Radio technology
- Ericsson's GSM System
- RBS 2000

8.1.2 Instruments Used

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

8.2 RBS 2301

8.2.1 Introduction

The purpose of this chapter is to familiarize the user with the RBS. The location of the interface is shown, and an explanation on how to read the alarms is supplied.

8.2.2 Location of the RBS User Interface

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

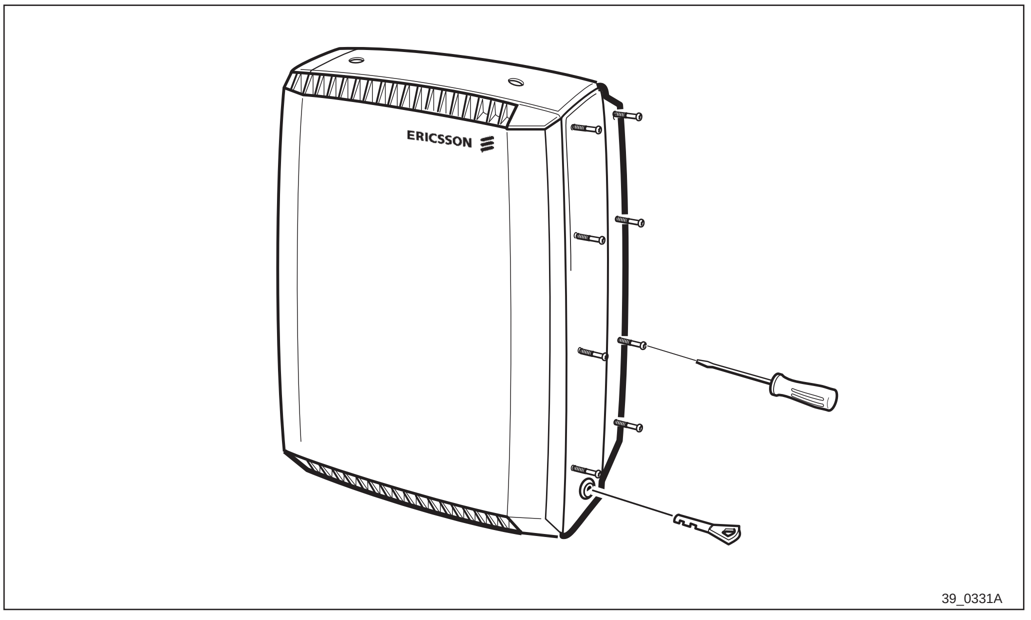

Figure 77 Sealing screws and key for the installation box door

To open the door: loosen the sealing screws and unlock with the key.

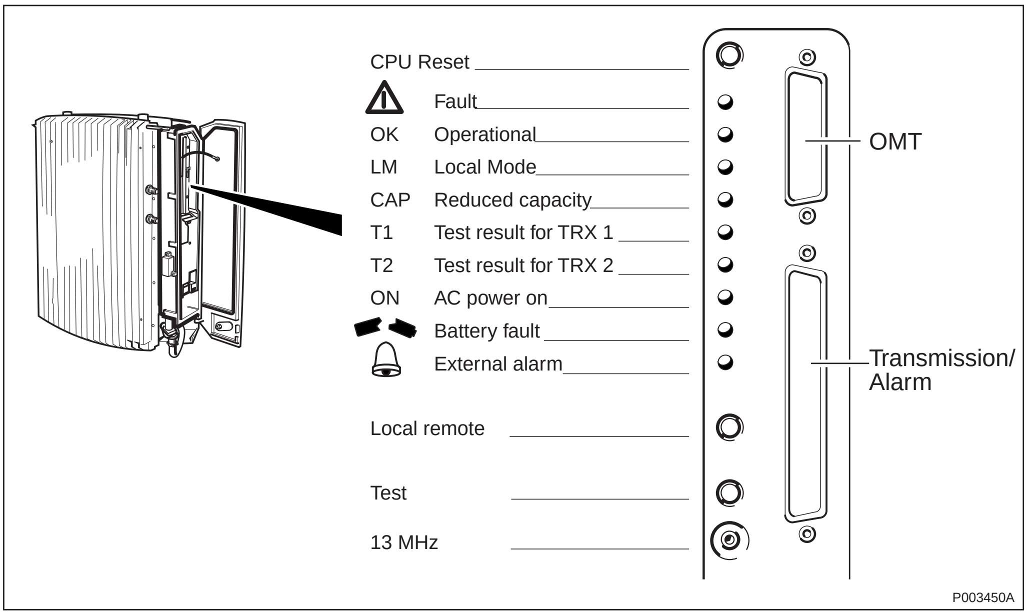

Figure 78 RBS user interface

8.2.3 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 (32 bits) or OMT2 (16 bits).
Yellow:	The RBS is either operational or faulty: - Operational (Local Mode, AC Power On, Reduced Capacity) - Fault (Battery Fault, External Alarms)
Green:	The RBS is working correctly.
Flashing indicators:	Wait, activity in progress.

The optical indicators can indicate that a fault/faults have been detected, and the OMT (32 bits) or OMT2 (16 bits) should therefore be used for more advanced fault localisation.

Explanation of the indicators

Indicator	Mode	Description
Fault	Off	No fault(s) detected.
(Red)	On	Fault(s) detected.
	Flashing	One of the following reasons:

		• IDB Database is missing • Software is missing • Lost communication in the RBS • Running on Base Application
Operational	Off	The RBS is not operational or change of RBS mode is in progress.
(Green)	On	When in local mode: • There is no fault that affects (or may affect) the function of the RBS. When in remote mode: • Connected to BSC and considered operational by the BSC.
	Flashing	One of the following reasons: • Receiving application software • Activation of application software pending • Configuration activitiy in progress (this may take more than 10 seconds to complete)
Local Mode	Off	The RBS is in remote mode.
(Yellow)	On	The RBS is in local mode.
	Flashing	Change of mode in progress.
Reduced Capacity	Off	All TRXs are operational.
(Yellow)	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	Off	No AC power supply.
(Yellow)	On	AC power is switched on to the RBS.
Battery Fault	Off	Battery connected.
(Yellow)	On	Battery disconnected or faulty. Low battery DC voltage.
External Alarms	Off	No external alarm(s) active.
(Yellow)	On	External alarm(s) active.

8.2.4 Switches and Connectors

Switches

Switch	Function
CPU reset button	Reset of the RBS
Local remote button	Change between Local/Remote mode
Test	Not used

Connectors

Connector	Function
OMT	Connector for the OMT cable
13 MHz	Connector for RF instrument and calibration

8.3 Test Sequence

This chapter describes the recommended test sequence for the Site Installation Tests using the OMT software and TEMS.

For information regarding the use of the OMT, see:

OMT User's Manual	*EN/LZT 123 2674*
TEMS User Manual	*LZT 123 2101/1*

Tools and instruments

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

8.3.1 Flowchart

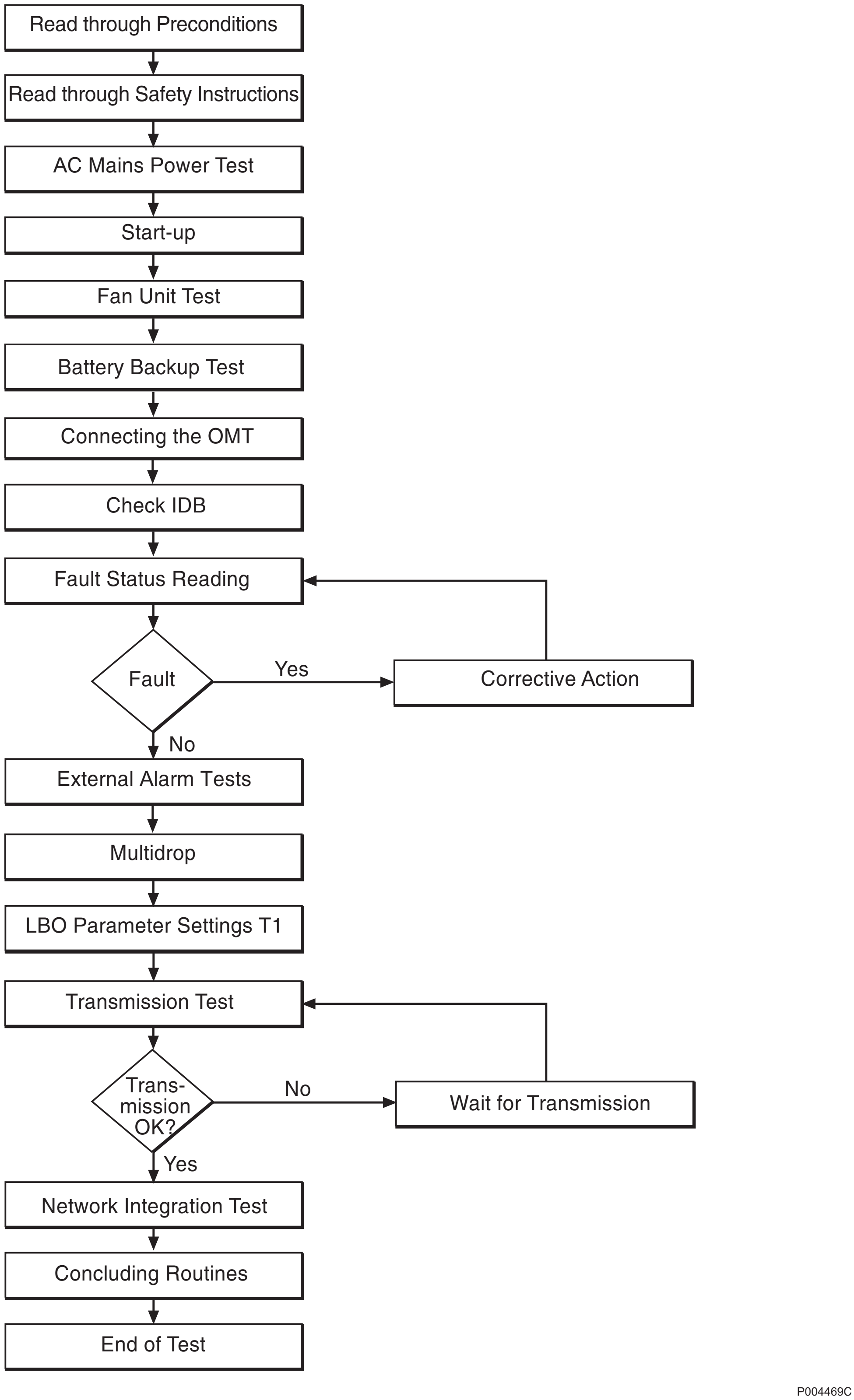

Figure 79 Flowchart

8.3.2 Preparations before Performing Any Test

Before performing any test, the tester must read through the *Safety* and follow the relevant safety instructions.

8.3.3 AC Mains Power Test

1. Switch on the incoming AC Mains Power. (Make sure that all external AC switches are in ON position.)
2. Check with a multimeter that the AC voltage is correct.

8.3.4 Start-Up and Shut-Off of the RBS

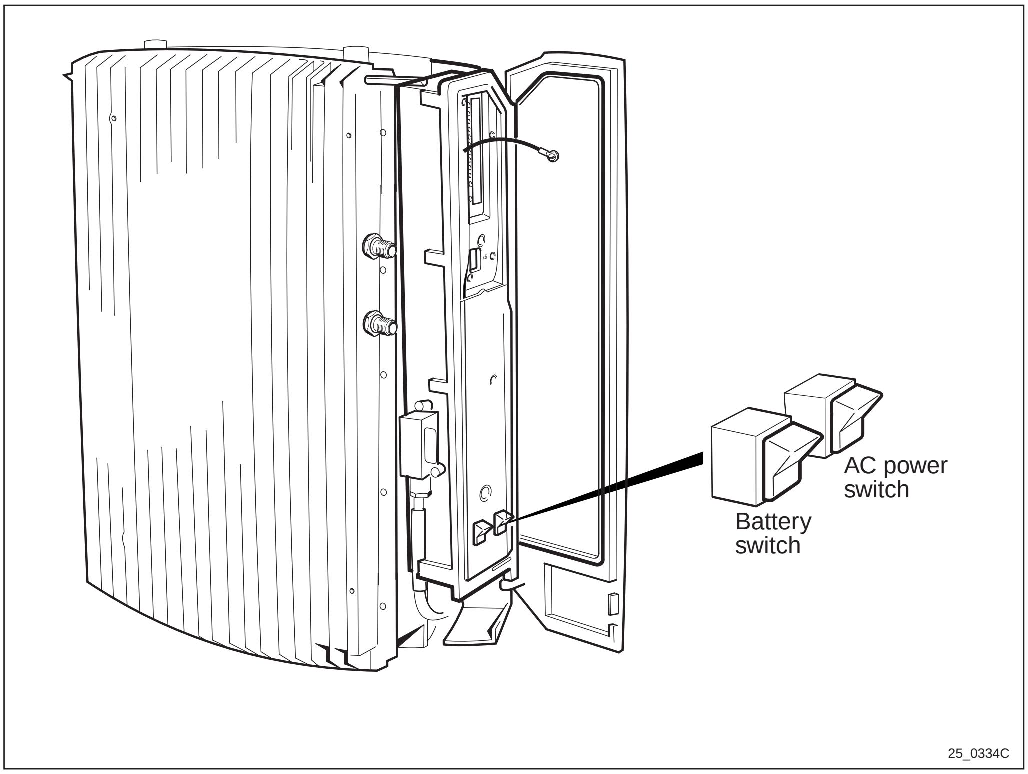

Figure 80 Power switches in the RBS

How to Start-Up

1. Make sure everything is connected according to *chapter Cabinet Installation*.
2. Start-up of the RBS:
    1. Switch on the AC power.
    2. Switch on the DC battery power.

The RBS automatically runs a self-test. For information regarding optical indicators on the RBS user interface, *see Section 8.2.2 Location of the RBS User Interface on page 107*and *Section 8.2.3 Optical Indicators on page 108*.

How to Shut-Off

Shut-off the RBS:

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

8.3.5 Fan Unit Test

If a Fan Unit is used, perform the test according to the instructions below.

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.

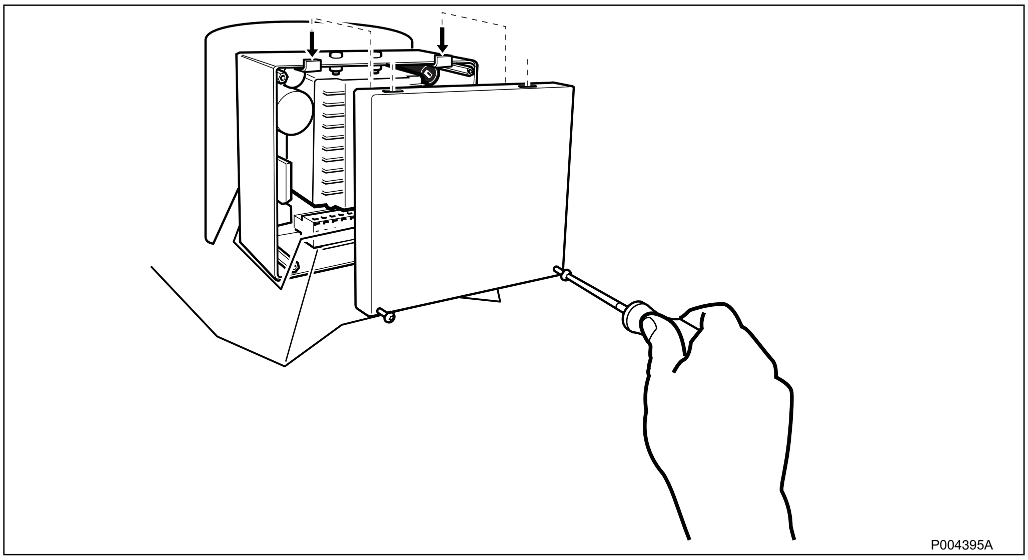

Figure 81 Removing the control box cover on the Fan Unit

1. Remove the control box cover on the Fan Unit by loosening the four screws.
2. Turn on the power for the Fan Unit.

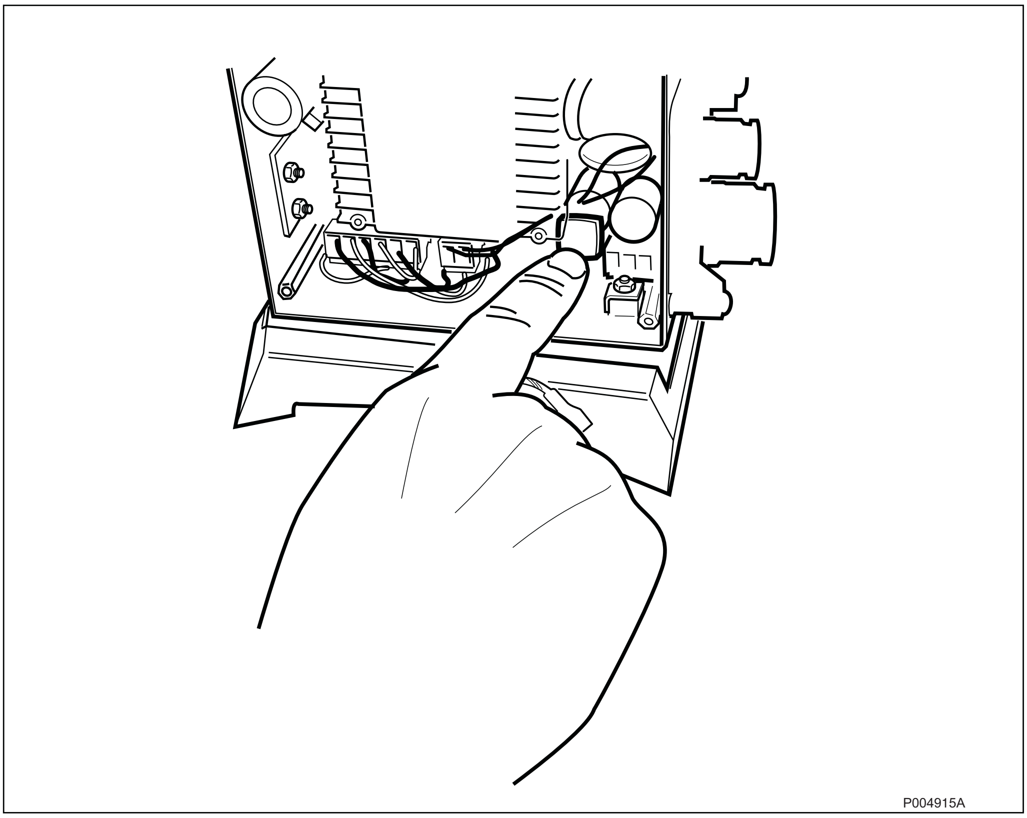

Figure 82 Location of the fan test button in the control box

3. Press the fan test button and check that all three fans are running.

4. Remount the control box cover on the Fan Unit, and tighten the four screws.

8.3.6 Battery Backup Test

Purpose: To test if the battery is able to supply DC when the AC is off.

Note: The battery backup time is about 3 minutes, depending on traffic, for instance.

Test Procedure

1. Make sure that the RBS has been powered up for at least 5 minutes before starting the test.

   After 24 hours the battery is fully charged.

2. Make sure that the battery switch for the RBS is switched on, and the Battery Fault Indicator is off. Low battery voltage makes the Battery Fault Indicator light up (Yellow). In this case, recharge the battery.

3. Switch off the incoming AC for the RBS, and check that the indicator AC Power On is turned off.

   The test is passed if the RBS still is running. (When the RBS is running, the Local Mode indicator is on or flashing.)

4. Switch on the incoming AC for the RBS. Check on the RBS that the AC Power On indicator lights up (Yellow).

Table 13 Power switch settings

Switch Settings in the RBS		Running Conditions
Power	**Batt**	
I	I	Before test
O	I	During test
I	I	After test

8.3.7 Connecting the OMT

Connect the OMT cable (C26) from a PC COM-port to the RBS according to the figure below.

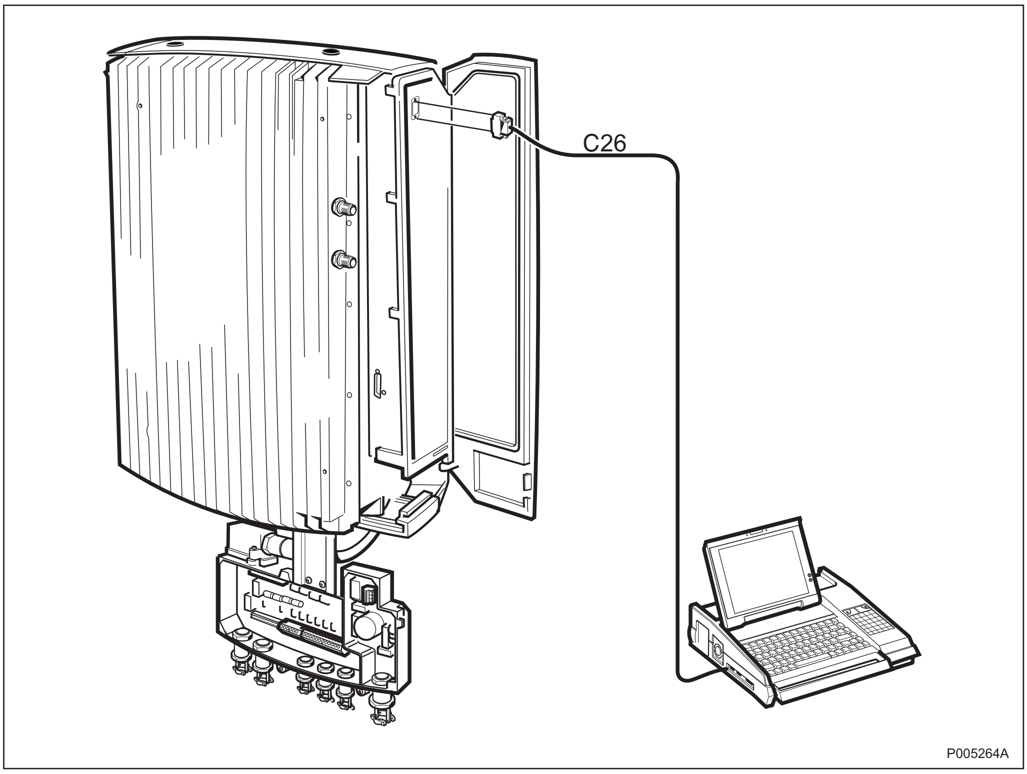

Figure 83

8.3.8 Check IDB

Before starting any test, the RBS must have an Installation Database (IDB) containing correct information about the equipment and the configuration of the cabinet.

The IDB is essential to put the RBS into service.

When using a 16 bits operating system: use the 16 bits OMT/OMT2.

When using a 32 bits operating system: use the 32 bits OMT.

Read IDB

Make sure that the right IDB is installed in the RBS by using the OMT.

- If the IDB is correct, continue with *Section 8.3.9 Fault Status Reading on page 117*.
- If the IDB is incorrect, a new IDB must be created, *see Section Create/Configure IDB and/or Modify IDB on page 116*.

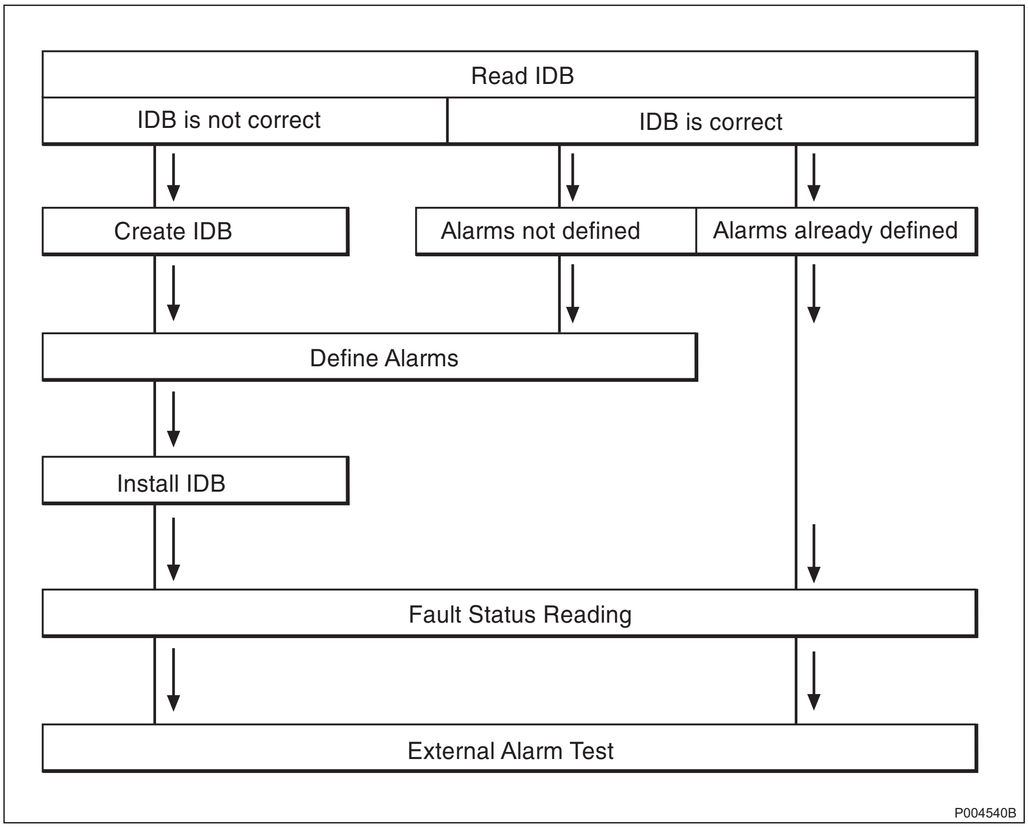

Figure 84 Overview of OMT-related actions

Create/Configure IDB and/or Modify IDB

Example of parameters to be considered:

- CRC-4
- LBO
- TRX
- TNOM USE [1)]
- TNOM NODE ID [1)]
- TNOM TIMESLOT [1)]

[1)] BSS R7 or later

1. Make sure that the OMT is started and the IDB is read.
2. Create/Configure the IDB.
3. Modify the IDB.

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

Define External Alarms

Note: Make sure that the RBS is in local mode.

1. Make sure that the OMT is started and the IDB is read.
2. Define the external alarms.
3. Install the IDB, *see Section Install IDB on page 117*.
4. Check with the OMT that the defined alarms are properly installed.

Install IDB

Note: The RBS has to be in Local mode to accept a new or modified IDB.

If necessary, change the mode by pressing the Local remote button.

1. Establish a link between the OMT and the RBS.
2. Install the IDB.
3. When using the 16 bits OMT: press the reset button on the RBS.

Note: When using the 32 bits OMT: the reset is done automatically.

4. Make sure that the RBS are in Remote mode.

8.3.9 Fault Status Reading

If any fault LED is lit, including the external alarms LED, the fault status must be read.

1. Make sure that the OMT is started and the IDB is read.
2. Read the faults with the OMT (32 bits) or OMT2 (16 bits).
3. If needed, *see chapter Fault Code List* to decode the faults in the Event Monitor field.
4. Take corrective action.

8.3.10 External Alarm Tests (Optional)

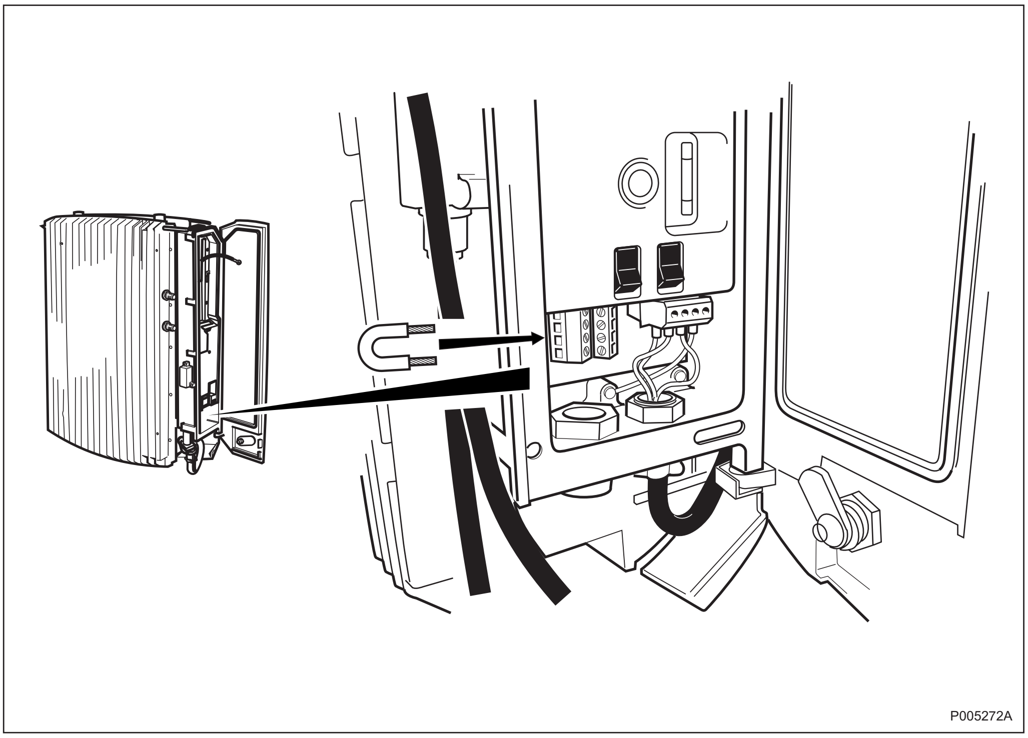

Figure 85 Example of how to apply a breaking alarm

This test is to performed now if it will not be done later during the integration.

The purpose of this test is to make sure that the external alarms are recognized and handled correctly. The test is passed when all defined alarms are recognized.

The external alarms are specified individually for each site.

1. Activate an alarm by applying appropriate closing or breaking depending on definition. The Alarm connectors are located in the installation box.
2. The external alarm indicator should now be lit.
3. Check with the OMT (32 bits) or OMT2 (16 bits) if the correct alarm was recognised.
4. Deactivate the external alarm applied in step 1 so that no faults are indicated.
5. The external alarm indicator on the distribution panel will turn off.
6. Repeat steps 1 to 5 for all alarms.

8.3.11 Multidrop

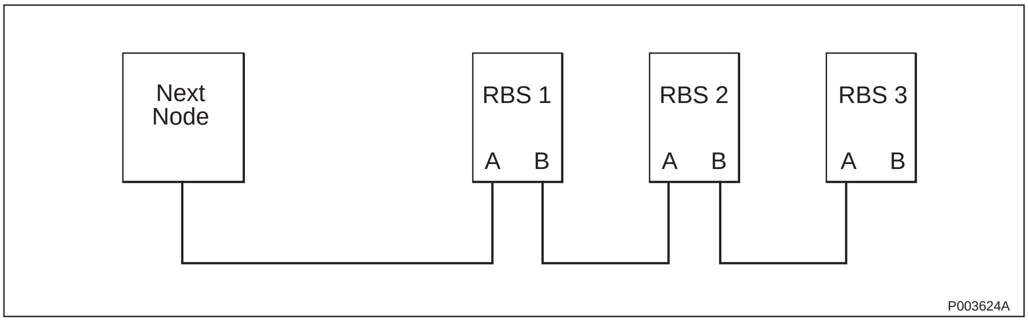

Figure 86 Example of a cascaded network

When cascading two or more RBSs, more than one Transiever Group is connected to the same DIP. Each TG, which is on the same DIP, must have a unique CF TEI value. The TEI value must be changed with the OMT, see instruction in:

OMT User's Manual	*EN/LZT 123 2674*

These TEI values must correspond with the TEI values from the BSC.

Procedure when changing to cascade:

1. Define the TEI value.
2. Define the PCM.
3. In the Network Topology field, select Cascade.
4. Install the updated IDB in the RBS.

8.3.12 LBO Parameter Settings (T1)

Short Haul (0–655 feet)

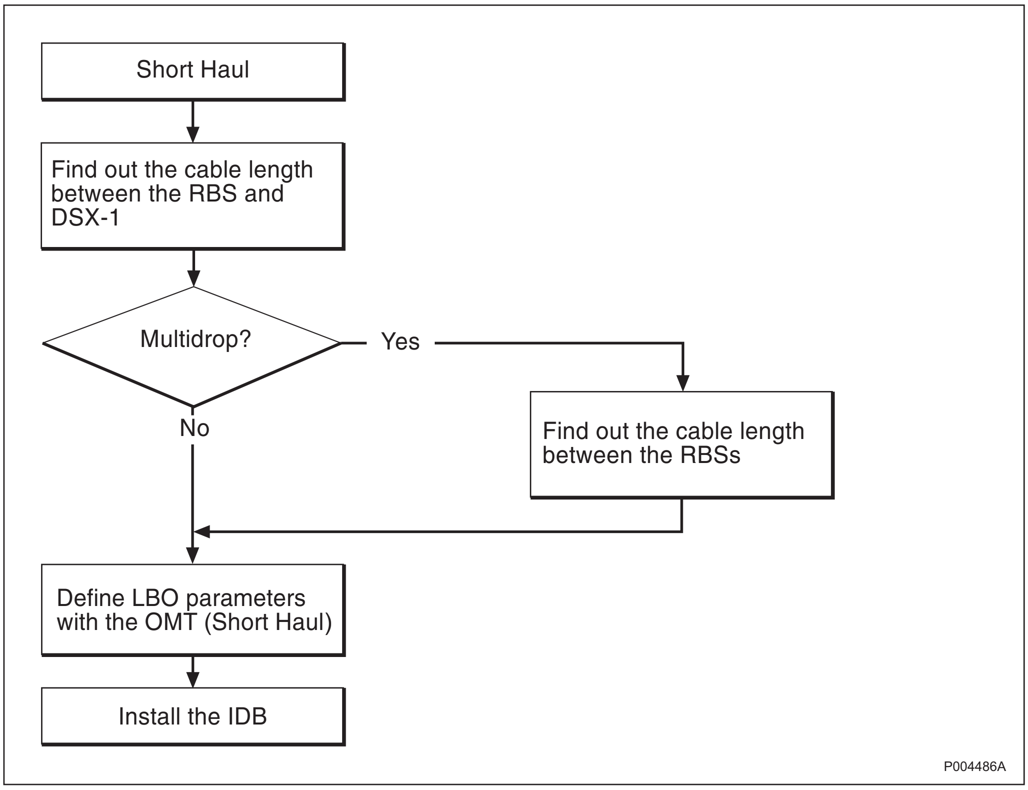

Figure 87 Short Haul

Long Haul (>655 feet)

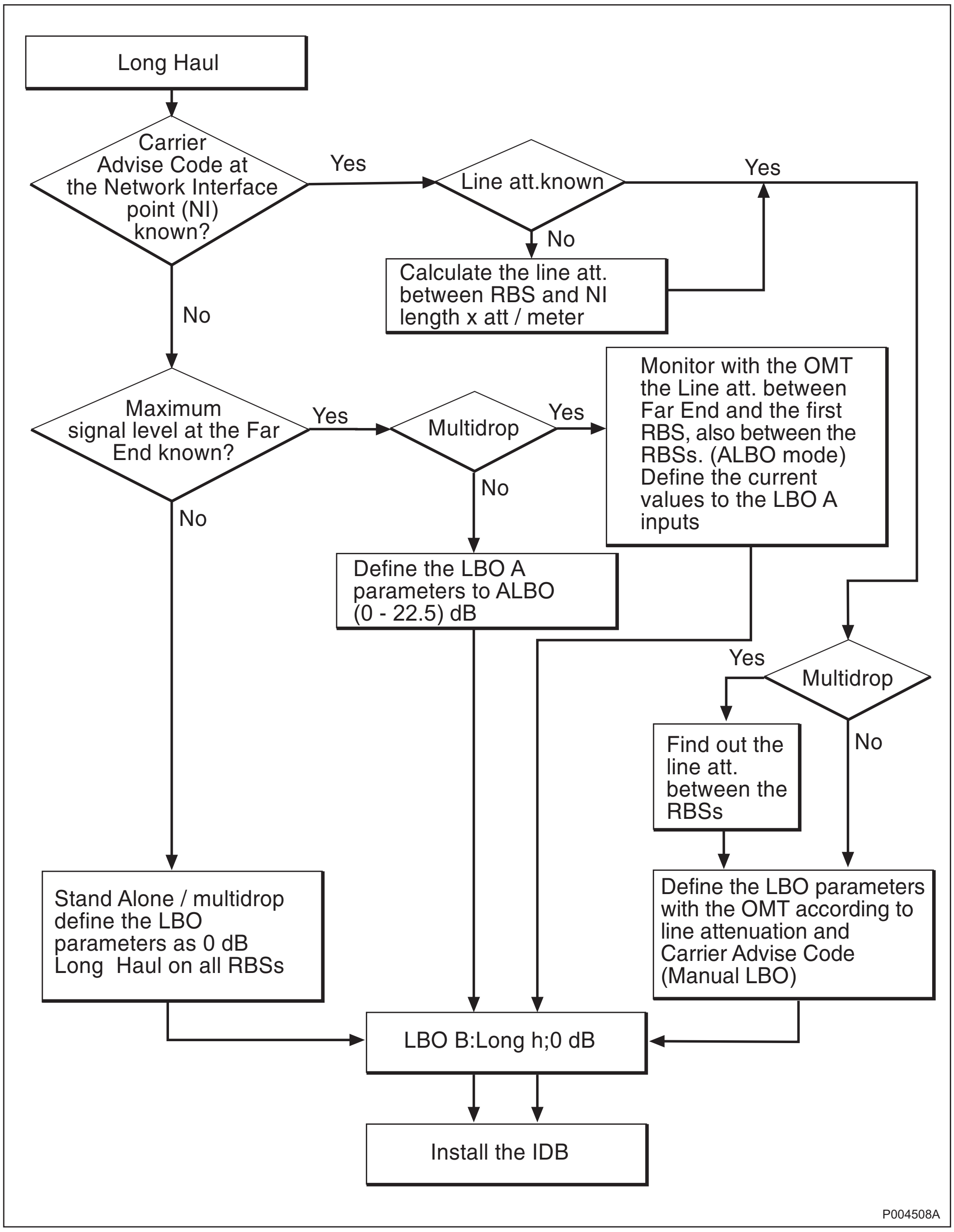

Figure 88 Long Haul

Define LBO Parameters

For more information see:

OMT User's Manual *EN/LZT 123 2674*

Note: When defining PCM, the BTS must be in Local Mode. Define LBO with the OMT is to be used for all LBO parameter settings. In order to monitor the line attenuation with the OMT, the RBS must be reset each time after setting the parameters. Monitoring with the OMT is possible only in ALBO mode.

1. Start the OMT.
2. Choose Connect in the OMT Connection menu.
3. Choose Read IDB in the File menu.
4. Choose Define PCM from the OMT Operation menu. A dialogue box is displayed.
5. Define the LBO parameters.

Short Haul DSX-1

The Short Haul functionality is used to reach a signal level of 0 dB at the DSX-1 cross-connect point.

The length of the cable between the RBS and the DSX-1 must be known to be able to perform Short Haul. If DSX-1 is not used, choose 0-133 feet.

To determine the LBO value for the RBS the line length to the Network Interface Point is required.

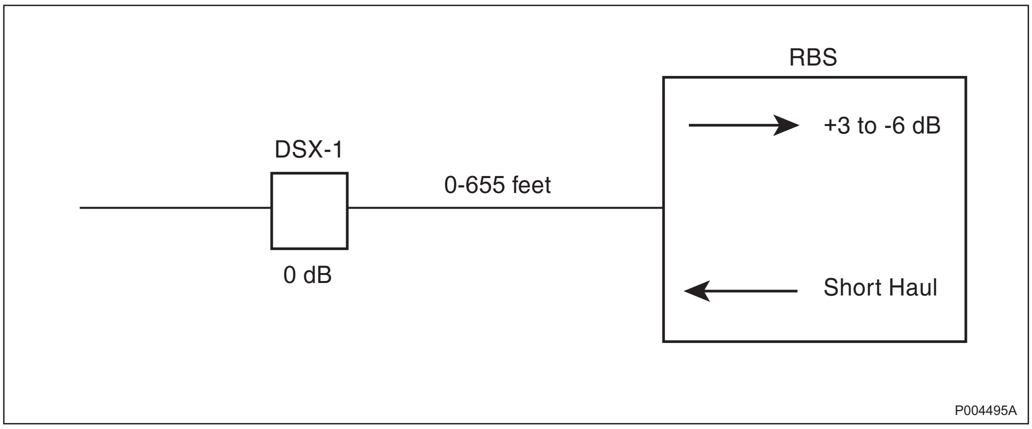

Figure 89

In order to reach 0 dB at the cross-connect point (DSX-1 level), the PCM port output signal can be amplified in five different levels. In the OMT the signal level is chosen according to the cable length between the RBS and the DSX-1 interface. The reference cable is a multi-pair 22 AWG office cable with overall outer shield. The following values are supported:

- 0-133 feet
- 133-266 feet
- 266-399 feet
- 399-533 feet
- 533-655 feet

Example of Short Haul settings in OMT:

- LBO A: Short h; 0-133 feet

- LBO B: Short h; 0–133 feet

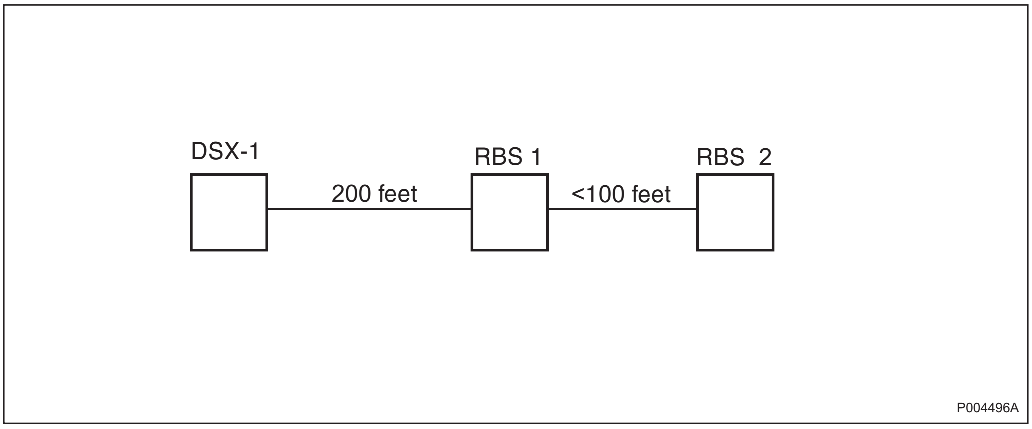

Figure 90

Example of Short Haul Multidrop:(*See Figure 90 on page 123*.)

LBO parameters for RBS 1:

- LBO A: Short h; 133–266 feet
- LBO B: Short h; 0–133 feet

LBO parameters for RBS 2:

- LBO A: Short h; 266–399 feet
- LBO B: Short h; 0–133 feet

Long Haul DSI (T1)

Long Haul is used to optimise line performance.

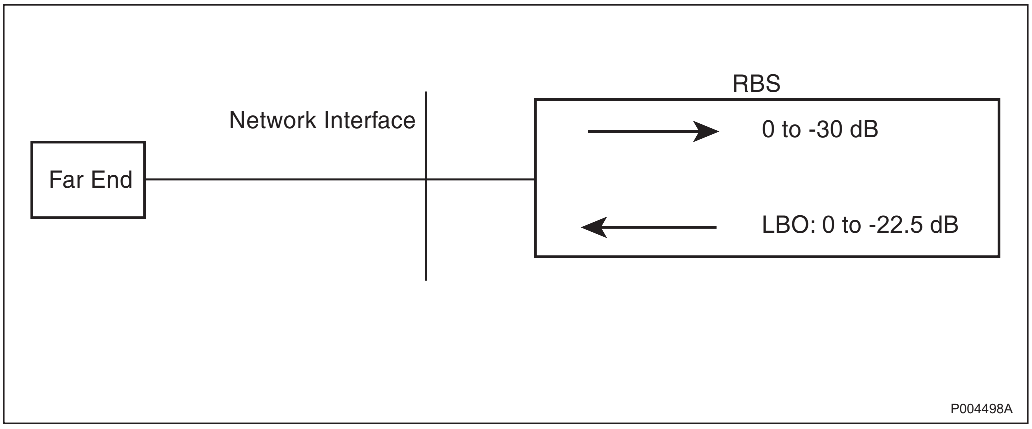

Figure 91

Long Haul makes it possible to transmit and receive over longer distances than Short Haul without additional transmission equipment.

The Long Haul functionality is accomplished by high sensitivity in the receiver. The receiver dynamic range is from 0 down to -30 dB. To cope with noise, a margin should be used.

For T1 it is also possible to attenuate the output signal with LBO.

LBO is used to avoid overloading the receiver at the Far End, and to minimise cross talk.

To take advantage of Long Haul the transmission equipment in both ends must support Long Haul functionality. If two equipments are connected together, the equipment with the least sensitive receiver determines the maximum attenuation of the cables that can be used.

Line Build Out

Line Build Out is only used for T1 transmission interface in Long Haul cases.

Line Build Out is the possibility to attenuate the output signal sent from the RBS. Line Build Out is used to reduce cross talk and to be able to send signals to different kind of Far Ends. For example, if two RBSs are at different distances from the Far End, the signal received from the closest RBS is to be much stronger than the signal received from the RBS far away. To minimise cross talk at the Far End, the output signal from the closest RBS is attenuated. With this, the input signal from both RBSs is kept at the same level at the Far End.

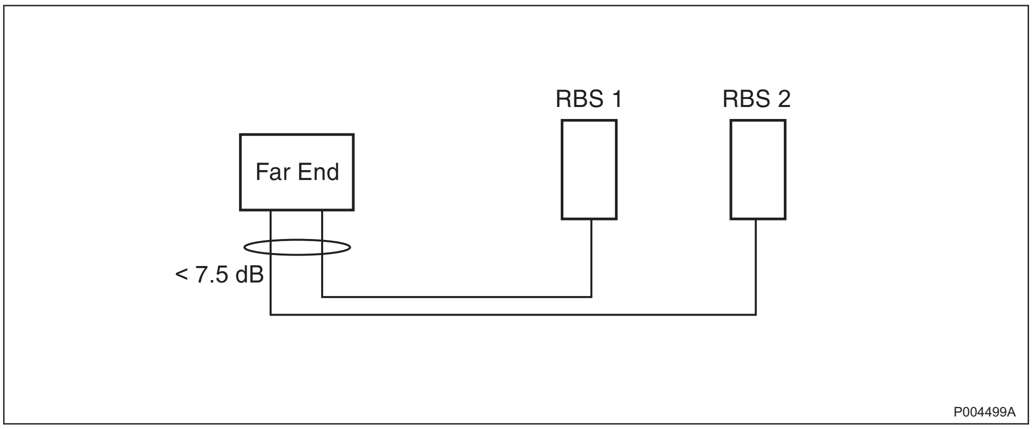

Figure 92

Manual LBO for Carrier Advised Code

Manual LBO is used for T1 transmission interface in Long Haul cases.

In order to manually set the LBO attenuation values in the OMT, the operator has to know:

- Carrier Advised Code at the Network Interface (NI).
- Line attenuation for the customer cable between the RBS and the NI.

Example: (See Table 14 on page 125.)

Carrier Advise Code at NI is -7.5 dB,

Line Attenuation between the RBS and the NI is 12 dB.

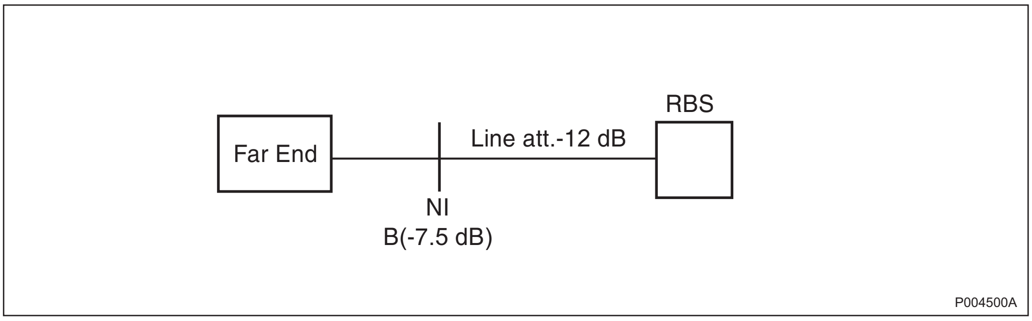

Figure 93

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

Table 14

Line Attenuation (dB)	Carrier Advise Code at NI (dB)			
	A (0 dB)	B (-7.5 dB)	C (-15 dB)	D (-22.5 dB)
0-5.5	0	-7.5	-15	-22.5
7.5-13	N/A	0	-7.5	-7.5
15-20.5	N/A	N/A	0	-7.5
22.5-	N/A	N/A	N/A	0

The port B outputs should always have LBO 0 dB (Long h., 0 dB) attenuation for all RBSs.

Manual LBO for maximum input signal level at the Far End

Manual LBO is used for T1 transmission interface in Long Haul cases.

In order to manually set the LBO attenuation values in the OMT, the operator has to know:

- Maximum input signal level of the equipment at the Far End.
- Line attenuation between the RBS and the Far End.

The Line attenuation should be either calculated or measured. The LBO value is calculated as follows:

Maximum output level = Maximum input signal level at the Far End + Line attenuation.

The LBO standard value with the next higher attenuation is chosen.

Example:

Far End permits a signal level of max. -22.5 dB and the Line Attenuation has been measured to 9 dB. Max. output level from the RBS is - 22.5 + 9 = -13.5 dB. The LBO is set to -15 dB. *See Table 15 on page 126.*

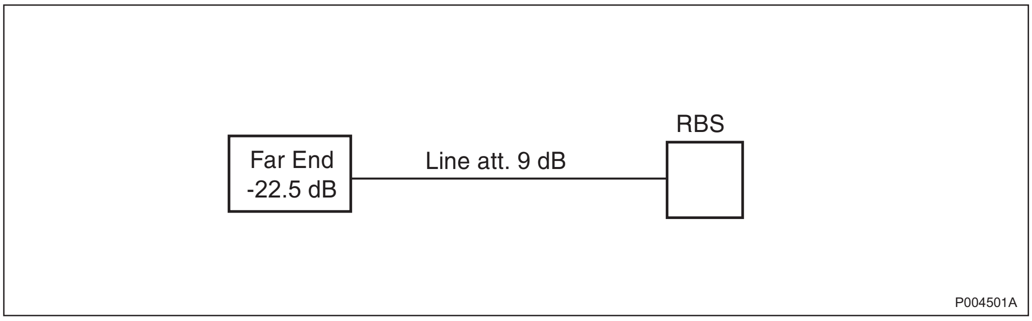

Figure 94

- LBO A: Long h; -15 dB
- LBO B: Long h; 0 dB

Table 15

Line Attenuation (dB)	Maximum signal level at Far End (dB)			
	0	-7.5	-15	-22.5
0 - 7.5	0	-7.5	-15	-22.5
7.5 - 15	0	0	-7.5	-15
15 - 22.5	0	0	0	-7.5
22.5 -	0	0	0	0

Example:

If none of the following are known, Carrier Advise Code, Line Attenuation or maximum input level at the Far End.

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

Automatic LBO for Long Haul

Automatic LBO (ALBO) is used for T1 transmission interface in Long Haul cases. If maximum input signal level at the Far End is known, use this value to set the ALBO in the OMT.

ALBO is to be used also when the Carrier Advised Code and Line attenuation are not known.

The receiver signal level is measured at the PCM port of the RBS. The output signal from the Far End is always assumed to be 0 dB.

1. The Line attenuation is measured in the RBS and can be monitored with the OMT. The displayed value is in deci dB (10 deci dB = 1 dB).
2. From the Line Attenuation and the maximum input signal level at the Far End appropriate LBO value is set automatically.

Example for Stand Alone:

The maximum input signal level at the Far End is: -15 dB, Line Attenuation is not known.

- LBO A: Long h; ALBO –15 dB
- LBO B: Long h; 0 dB

Example for Multidrop:

The maximum input signal level at the Far End is: -15 dB, Line Attenuation is not known.

Settings in order to find out the line attenuation between RBS 1 and RBS 2:

	RBS 1	RBS 2
LBO A	Long h; ALBO –15 dB	Long h; ALBO 0 dB
LBO B	Long h; 0 dB	Long h; 0 dB

To enable measuring the line attenuation, RBS 2 must be reset.

The measurement result can be monitored with the OMT.

When the measurement is completed, change to manual LBO and use the values according to *Table 15 on page 126*.

Manual LBO with Multidrop

LBO parameters are used if one, or several, of the RBSs are in Bypass State (powered off or reset), the signal level will not be affected.

Automatic or manual LBO can be used between the Far End and RBS 1 port A as in the Stand Alone case. The LBO at port A in the other RBSs must be set manually.

The LBO parameter at port A of RBS 2 should be set as if RBS 1 was in Bypass State. For Carrier Advised Code at the Network Interface point, the Line Attenuation is the Line Attenuation between the NI and the RBS 1 added to the Line Attenuation between RBS 1 and RBS 2.

For a maximum input signal level at the Far End, the total Line Attenuation is the Line Attenuation between the Far End and the RBS 1 added to the Line Attenuation between RBS 1 and RBS 2.

The port A of RBS 3 is set as if RBS 1 and RBS 2 were in Bypass State, and so on.

The port B outputs should always have LBO 0 dB (Long h., 0 dB) attenuation for all RBSs.

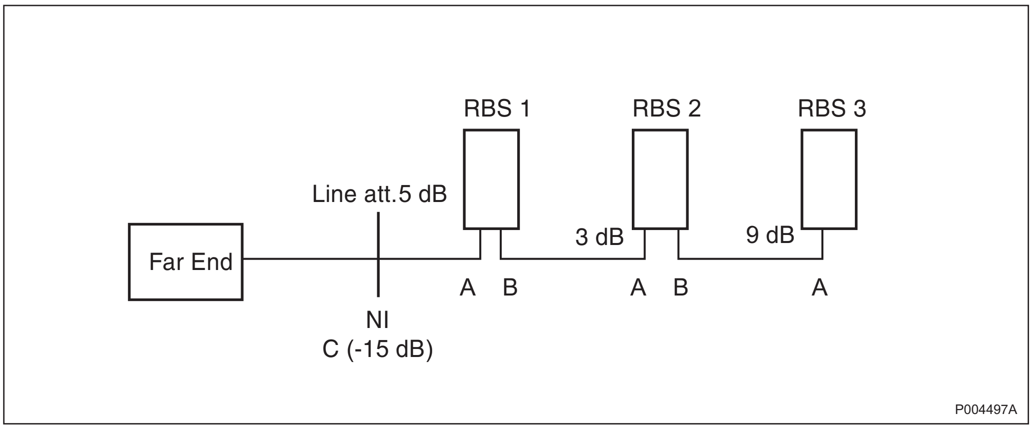

Figure 95

Example 1 of multidrop using manual LBO parameters:

RBS 1: Carrier Advise Code at NI (- 15 dB) and Line Attenuation (5 dB).

RBS 2: Line Attenuation between RBS 1 and RBS 2 (3 dB) + Line Att. between RBS 1 and NI (5 dB) = 8 dB.

RBS 3: Line Attenuation between RBS 2 and RBS 3 (9 dB) + Line Att. between RBS 2 and RBS 1 (3 dB) + Line Att. between RBS 1 and NI (5 dB) = 17 dB.

See Table 14 on page 125.

LBO parameters for RBS 1:

- LBO A: Long h; –15 dB
- LBO B: Long h; 0 dB

LBO parameters for RBS 2:

- LBO A: Long h; – 7.5 dB
- LBO B: Long h; 0 dB

LBO parameters for RBS 3:

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

Example 2 of multidrop using LBO parameters:

When none of the following are known, Carrier Advise Code, and Line attenuation or maximum input signal at the Far End presume that the max. signal at the Far End is 0 dB. Use the following parameters for all RBSs:

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

8.3.13 Transmission Test

The purpose of this test is to ensure that the connection between RBS and BSC is working correctly.

Transmission Test E1

Note: This test does not include the transmission through the installation box.

The test is performed only when the RBS is directly connected to the BSC.

The test is not performed if a transmission network is used.

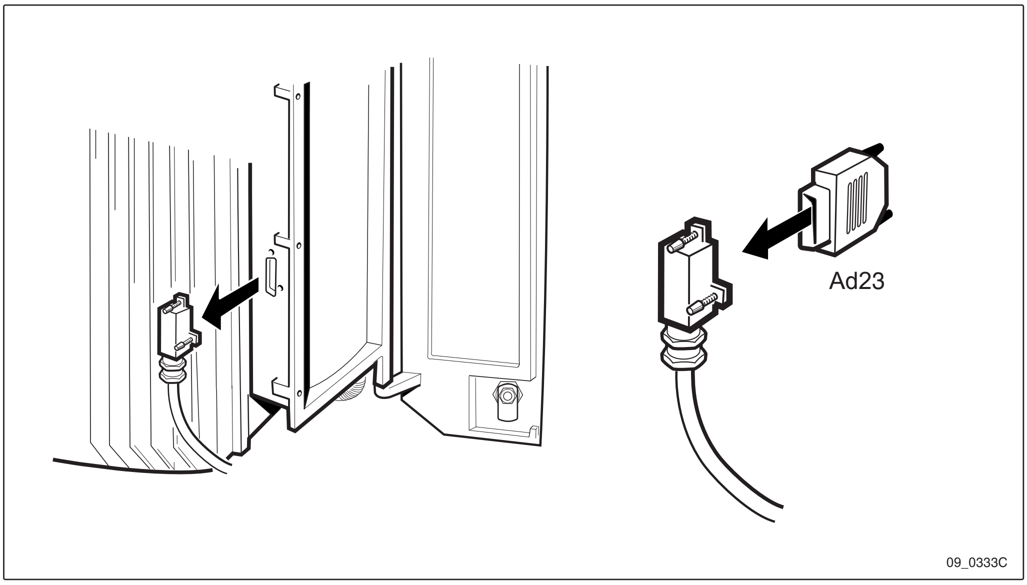

Figure 96 Connect the adapter to the transmission cable

1. Disconnect the 15-pin D-sub transmission cable from the side of the installation box.
2. Connect the adapter Ad23 to the transmission cable.
3. Request the BSC operator to check the digital path on the active RBLT. An appropriate command for this procedure is: <DTSTP:DIP=RBLT-XXX;

Transmission Test T1

A transmission test can be performed in two ways:

a Perform the test according to *Section Transmission Test E1 on page 129.*

b Request the BSC operator to use CSU functionality. The parameter is set (and cleared) with the OMT. The function is initiated during the restart of the CMRU. For further information, refer to:

Reference Manual	*LZN 302 77*

8.3.14 Network Integration Test

The purpose of these tests is to verify that the RBS is ready for traffic. The test is passed when a test call has been made on all TRXs in all cells.

Preparing the Site for Test

The network integration tests of the RBS are done with the RBS connected to the BSC, and in close cooperation with the BSC operator.

To be able to perform the tests, the tester should request the BSC operator to prepare the Data Transcript for the site.

Preparing the RBS for Test

- Ensure that the RBS is in Remote mode. If necessary, change mode by pressing the Local remote button.
- The Local remote indicator is flashing until contact with the BSC has been established.
- When contact with the BSC has been established, the Local remote indicator turns off.

Test setup for Test Call on Air Interface

The purpose of this test is to verify that calls can be made in the cell.

Two test calls should me made in each cell: one to the mobile station and one from the mobile station.

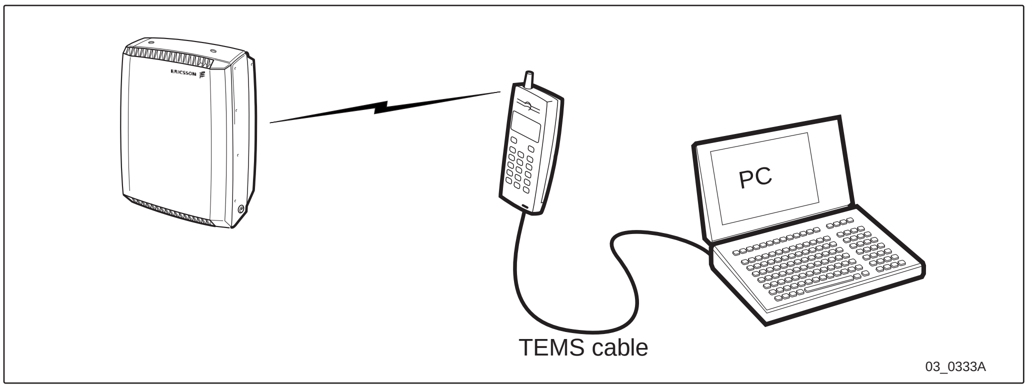

Figure 97 Test setup for test call on air interface

1. Connect the test mobile as shown in *Figure 97 on page 130*.
2. Enter the Windows and start the TEMS program.
3. Select the External menu and go to Enable connections.
4. Select the communication port for the test mobile.

   The communication between the PC and the test mobile is being initiated.

Test call sequence for Test Call on Air Interface

Note: With the ARFCN it is possible to lock the test mobile on to a specific TRX.

1. Check which of the TRXs is defined to carry the BCCH.
2. Choose Cell Selection on the Control menu.
3. Enter the ARFCN for the TRX/TRXs that are going to be tested in the cell.
4. Select Target frequence list and mark the frequency/frequencies.
5. Disable the Handover button in the Cell Selection menu.
6. Select Monitor/Status Information/Dedicated Channel, (information about the channels will appear on the screen).
7. Make two test calls: one call from the test mobile, and one to the test mobile. If two ARFCNs are entered, make calls until both ARFCNs are shown in the Dedicated Channel window.

External Alarm Test

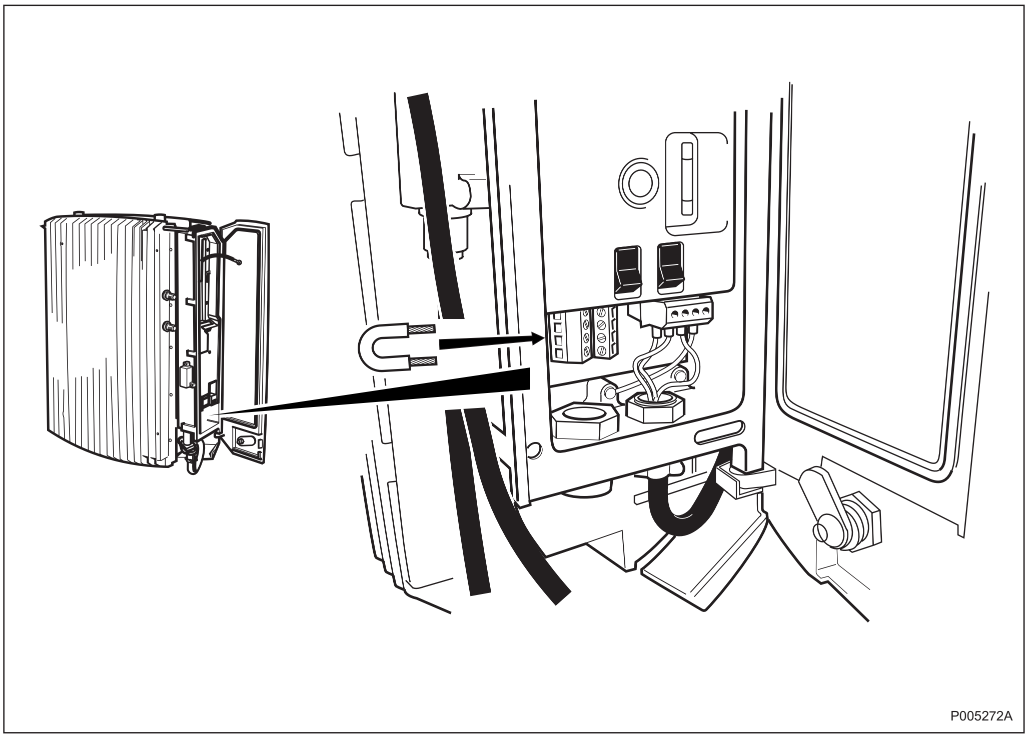

Figure 98 Example of how to apply a breaking alarm

- The external alarms are specified individually for each site.
- The alarm strings are defined in the BTS by the BTS commissioning staff, using the OMT. The BTS commissioning staff will check that the correct alarm string is received for each alarm receiver.
- The definition is correct if the alarm string, received in the BSC, corresponds to the alarm receiver that was trigged in the BTS.

1. Activate an alarm by applying appropriate closing or breaking depending on defenition. The Alarm connectors are located in the installation box.
2. The external alarm indicator should now be lit.
3. Make sure with the BSC personnel that the correct alarm has appeared. An appropriate command for this procedure is ALACP; and then ALLIP[:ALCAT=alcat];.
4. Deactivate the alarm applied in step 1 so that no faults are indicated.
5. The external alarm indicator on the ditribution panel will turn off.
6. Repeat steps 1 to 5 for all alarms.

8.4 Concluding Routines

1. Save the IDB on a diskette. The name of the IDB file must be site-specific.

   Label the diskette according to *Table 16 on page 132*.

Table 16 IDB diskette label

Item	Description
<Date>	Current date (YYMMDD)
<Rev>	Revision state of the product
<Site Name>	Site name for the RBS
<RBS serial number>	Serial number of the RBS
<Backup date>	Date of the backup (YYMMDD)

2. Disconnect all test equipment.
3. Check that all cables are connected.
4. Make sure that no faults on the RBS are indicated.
5. Reset the RBS, if the RBS is not supposed to be in traffic or make sure that the RBS is in remote mode.
6. Close and lock the installation box door.
7. Check that all actions taken have been entered into the log-book, with data concerning time, date and name of the person who took the action(s).
8. Check that all tools and instruments have been removed from the site.

8.5 Test Record

Example of a test record that is be filled in during the tests.

8.5.1 Site Data

Site name ______________________

Date ______________________

Cell configuration

900 MHz	1800 MHz	1900 MHz
☐	☐	☐

Site Hardware Status

Unit	Product No.	Serial No.	Rev.	Manufact. Date
RBS:				
- Radio cabinet				
- Mounting base				
- Battery				

Responsible for Test Record

Name: Date:

Customer Acceptance

Name: Date:

8.5.2 Test Result

Visual Installation Check

OK	Remarks
☐	

Test Checklist

Test	OK	Failed	Remarks
- AC Mains Power Test			
- Start-up of RBS			
- Self-test check			
- Fan Unit Test			
- Battery Backup Test			
- Read IDB			
- Fault Status Reading			
- External Alarm Test			
- MS Test Call using simulator(1)			

(1) *See chapter Optional Tests*.

IDB Status

	ON	OFF
CRC-4 (E1)		
TNOM USE 1)		

TNOM TIMESLOT 1)	
TNOM NODE ID 1)	

1) BSS R7 or later

	TEI-Value	
	Multidrop	Stand Alone
RBS 1		
RBS 2		
RBS 3		
RBS 4		
RBS 5		

LBO-Parameter Settings (T1):

Short Haul ☐

	RBS 1	RBS 2	RBS 3	RBS 4	RBS 5
LBO-A (feet)					
LBO-B (feet)					

Long Haul ☐

	RBS 1	RBS 2	RBS 3	RBS 4	RBS 5
LBO-A (dB)					
LBO-B (dB)					

Network Integration Tests

TEST CALL ON AIR INTERFACE					
TRX	Cell ID	ARFCN	BSIC	MS Originated	MS Terminated
1					
2					

Remarks

	OK	FAIL
EXTERNAL ALARM TEST		

Responsible for Test Record

Name: Date:

Customer Acceptance

Name: Date:

8.5.3 Trouble Report

A trouble report should be written when system components are not operating as expected, or when disturbances occur repetedly. It should not be written for occasional hardware failures.

When writing 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 Maintenance*.

The trouble report should be sent to the nearest FSC (Field Support Centre) for resolution and registration in the Ericsson trouble report system MHS (Modification Handling System). The FSC should forward the trouble report via the node MHO ERA BTS.

8.5.4 Repair Delivery Note "Blue Tag"

When a faulty unit is returned, it must always be accompanied by a repair delivery note. When a 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 64 can be ordered from the local FSC. A description of how to fill in a repair delivery note is included in *chapter Fault Handling*.

9 Optional Tests

9.1 Preconditions

These tests are already performed in the factory and are therefore optional.

All abbreviations for cables, adaptors, attenuators and splitters used in the figures are described in *chapter Tools and Instruments.*

9.1.1 Previous Tests

Before performing any optional test make sure all tests in *chapter Site Installation Tests* have been performed successfully.

9.1.2 Tester qualifications

This instruction is intended for testers with experience of the simulator. The tester should also have knowledge of the different types of base stations in the RBS 2000 family, and be familiar with the different cell and link configurations that the base stations might have.

9.2 MS Test Call Using BSC Simulator

This test is to be performed when no PCM-line from the BSC is available.

> **CAUTION**
>
> **Radio Frequency (RF) radiation from the antenna systems can endanger your health.**

The purpose of this test is to ensure that it is possible to make calls on the base station. The test is passed when a call has been made on all the TRXs.

For more information, refer to:

BSCSim User's Guide	*EN/LZT 123 2759*
BSCSim II User's Guide	*EN/LZT 123 2771/1*

9.2.1 Tester Qualifications

This instruction is intended for testers with experience of using a BSC simulator. The tester should also have knowledge of the different types of base stations in the RBS 2000 family and be familiar with the different cell and link configurations that the base stations might have.

9.2.2 Prerequisites

Only one time slot needs to be tested in each TRX (the HW in the TRXs is common for all time slots).

9.2.3 Test Preparation

1. Connect the BSC simulator to the RBS.
2. Switch on the RBS and the BSC simulator.

9.2.4 Test Setup Using the MS and BSC Simulator

This test setup shows the setup for BSCSim and BSCSim II.

Test setup for RBS 2301 (1.5 Mbit/s: T1) with BSCSim

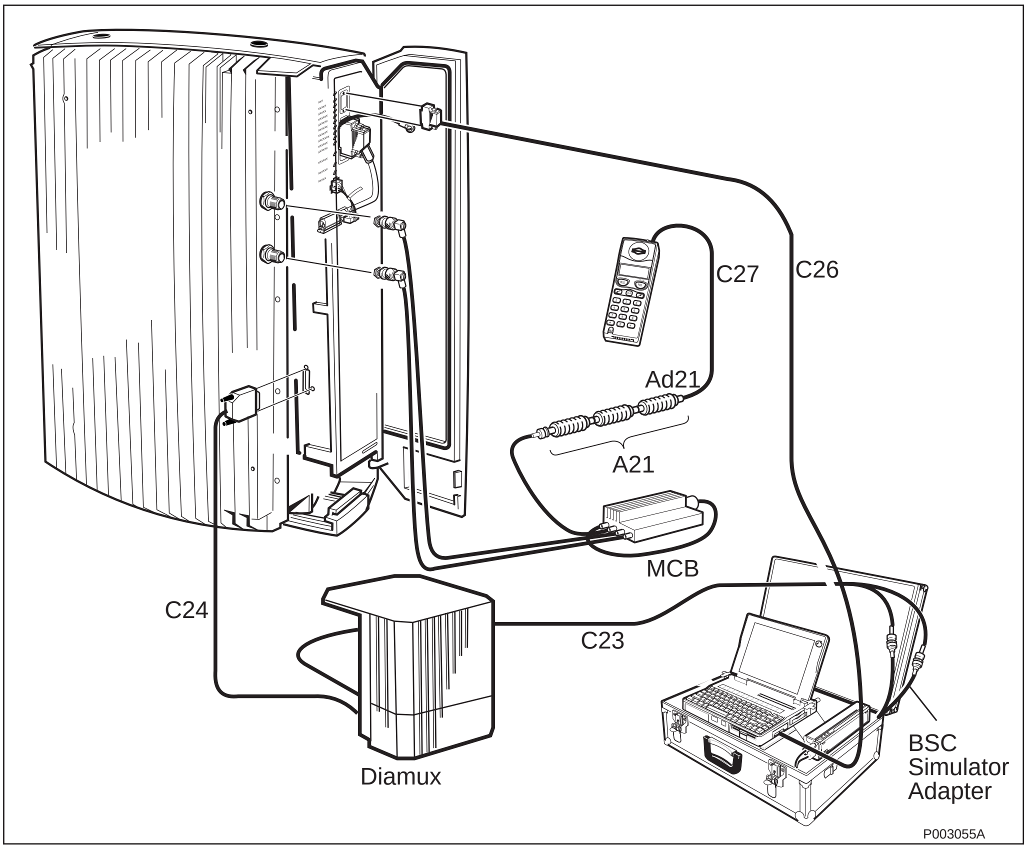

Figure 99 Connection of BSCSim. T1 (1.5 Mbit/s)

1. Connect cable C26 to the BSC simulator, and to the input inside the installation box marked OMT.
2. Connect the BSC simulator adapter to input G.703 at the BSCSim.
3. Connect cables C23 to the BSC simulator adapter.
4. Connect the Diamux connectors marked 2 Mbit/s to the C23 cables.
5. Connect cable C24 to the side of the Installation Box.

6. Connect the Diamux connectors marked 1.5 Mbit/s to the C24 cables.
7. Connect cable C27 to the antenna inlet on the mobile, and to adapter Ad21.
8. Connect adapter Ad21 to the first attenuator A21.
9. Connect the three attenuators A21 together.
10. Connect the third attenuator A21 to the Multicasting Box (MCB).
11. Connect the cables from the MCB to the antenna connectors on the RBS:

    TX/RX Ant A to X2

    TX/RX Ant B to X3

Test setup for RBS 2301 (2.0 Mbit/s: E1) with BSCSim

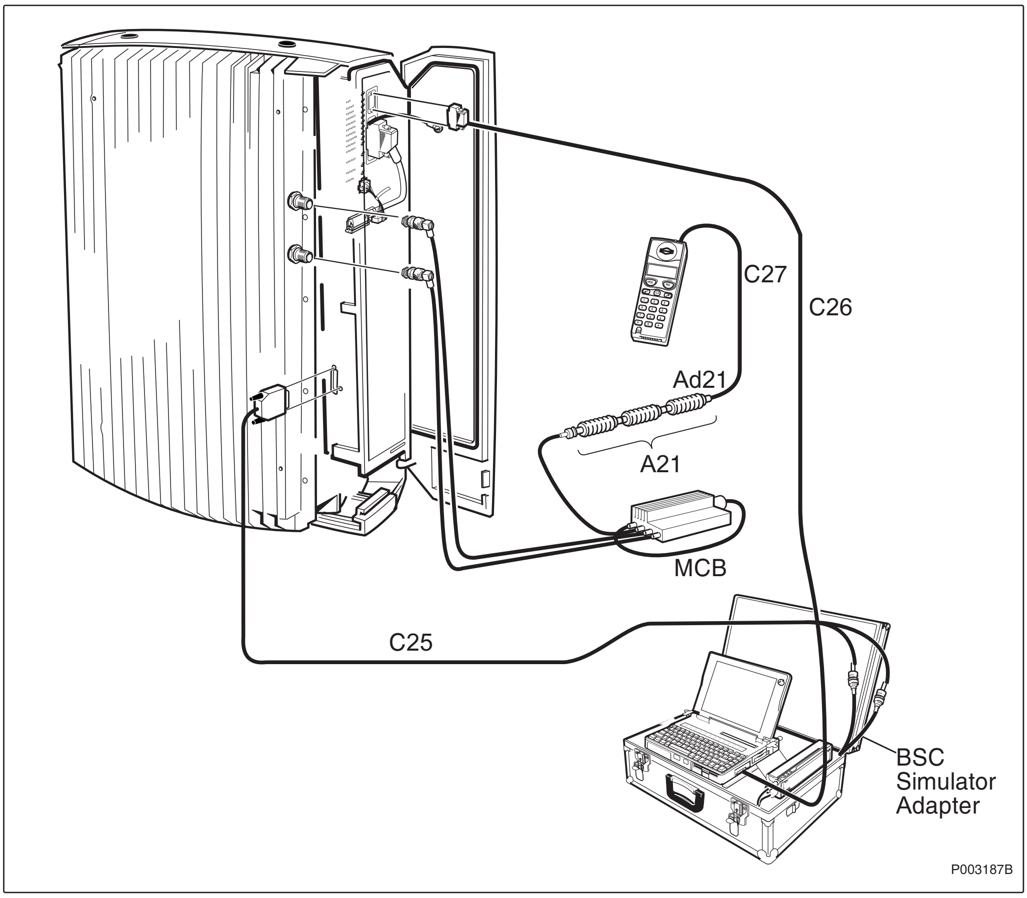

Figure 100 Connection of BSCSim, E1 (2.0 Mbit/s)

1. Connect cable C26 to the BSC simulator, and to the input inside the installation box marked OMT.
2. Connect the BSC simulator adapter to input G.703 at the BSCSim.
3. Connect the cables C25 to the BSC simulation adapter.
4. Connect cable C25 to the side of the Installation Box.

5. Connect cable C27 to the antenna inlet on the mobile, and to the adapter Ad21.
6. Connect adapter Ad21 to the first attenuator A21.
7. Connect the three attenuators A21 together.
8. Connect the third attenuator A21 to the Multicasting Box (MCB).
9. Connect the cables from the MCB to the antenna connectors on the RBS:

   TX/RX Ant A to X2

   TX/RX Ant B to X3

Test Setup for RBS 2301, E1 (2.0 Mbit/s) and T1 (1.5 Mbit/s) with BSCSim II

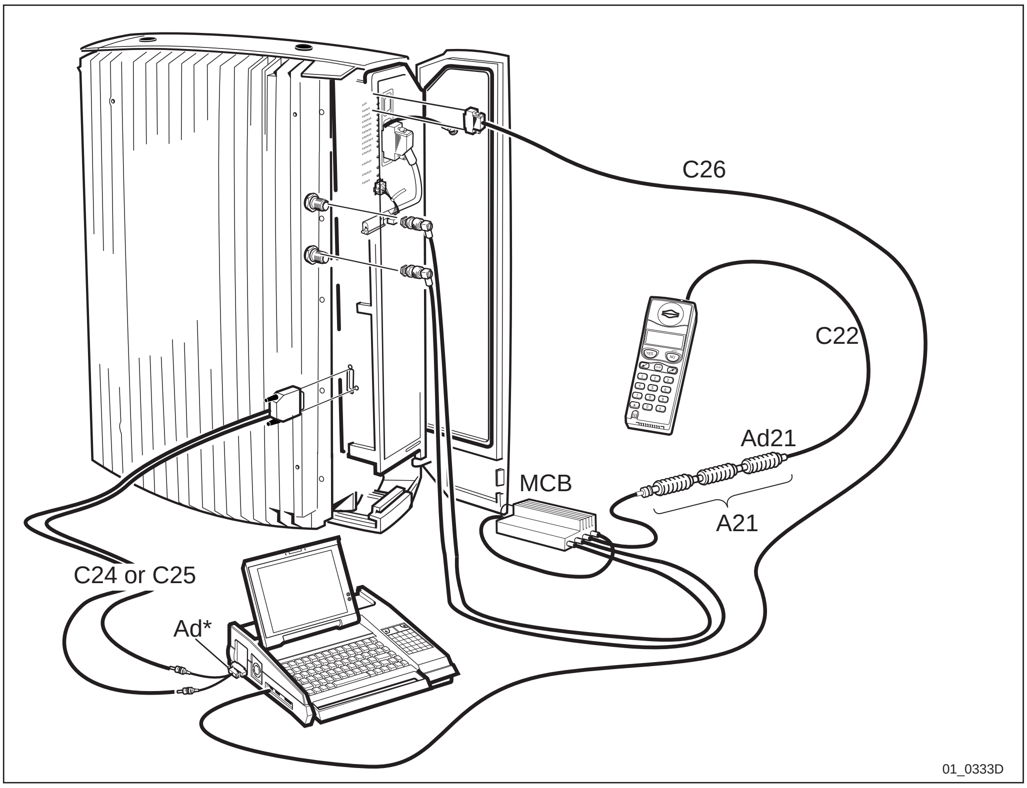

Figure 101 Connection of BSCSim II, E1 (2.0 Mbit/s) and T1 (1.5 Mbit/s)

1. Connect cable C26 to the COM1 port on the BSC simulator, and to the input inside the installation box marked OMT.
2. Connect cable adapter Ad25 to the input on the simulator.
3. Connect cable C25 (75 Ω) or cable C24 (100 Ω) to the side of the Installation Box and to the inputs on the cable adapter Ad25.
4. Connect cable C27 to the antenna inlet, and to the adapter Ad21.
5. Connect adapter Ad21 to the first attenuator A21.
6. Connect the three attenuators A21 together.
7. Connect the third attenuator A21 to the Multicasting Box (MCB).

8. Connect the cables from the MCB to the antenna connectors on the RBS:

   TX/RX Ant A to X2

   TX/RX Ant B to X3

9.2.5 Change between Local and Remote Mode

Ensure that the RBS is in Remote mode. If not, change to Remote mode by pressing the Local remote button on the RBS.

The Local mode indicator starts flashing to indicate that the change to Remote mode is in progress.

9.2.6 Test Parameters

Note: The time from starting the RBS till the RBS is operational can vary, depending on low temperature.

Example: At -15 °C it can take up to 15 minutes; at -33 °C it can take up to 30 minutes.

Before performing any test, the appropriate parameters must be considered when configuring the BSC simulator.

Parameters for BSCSim

- Revision of the RBS SW in the simulator
- System type
- Network
- RBS type
- CDU type
- Location of TRXs
- Cell
- LAC
- Diversity
- Frequency
- TX Power

Table 17 Location ARAE code

LAC GSM 900	**LAC GSM 1800**	**LAC GSM 1900**
1	1	1

Table 18 ARFCNs for different TRXs

TRX	GSM 900	GSM 1800	GSM 1900
1	11	530	530
2	22	550	550

Table 19 Maximum power for different frequencies

TRX	Max. Power GSM 900	Max. Power GSM 1800	Max. Power GSM 1900
1	33 dBm	33 dBm	33 dBm
2	33 dBm	33 dBm	33 dBm
1 [1)]	35 dBm	35 dBm	35 dBm
2 [1)]	N/A	N/A	N/A

[1)] TX-Diversity only

Parameters for BSCSim II

- System type
- Network frequency
- RBS type
- Transmission type
- BTS Software
- Location of TRXs
- Cell
- LAC
- Diversity
- ARFCN
- Power

Test sequence

1. Start the RBS with diversity A.
2. Make a test call.
3. Reconfigure the RBS to diversity B.
4. Make a test call.

9.2.7 Test Record

		TS	RX Level DL	RX Level UL	RX Quality DL	RX Quality UL	TA
RX-A	TRX 1						
	TRX 2						
RX-B	TRX 1						
	TRX 2						

Mobile used for this test

Rev. ____________________ Serial no. ____________________

Responsible for Test Record

Name: Date:

Customer Acceptance

Name: Date:

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10 Fault Handling

10.1 Fault Tracing Hints

Table 20 Fault tracing hints

Fault	Action
Fault LED is flashing.	• Reset the RBS (CPU Reset button). • Check BTS Software. • Install IDB.
The RBS cannot be integrated into the system.	• Make sure that the transmission cable between the RBS and the Installation Box is correctly connected.
The OMT will not install IDB.	• Push the local/remote button until the RBS is in local mode. • Reset the RBS by pushing the CPU Reset button and try again.
The OMT will not read IDB.	• Check that the OMT cable is correctly connected. • Reset the RBS by pushing the CPU Reset button and try again.
The OMT will not define alarm inlets.	• Disconnect the OMT.
The RBS will not take CF into service (when using a BSC simulator to make a test call).	• Check that the cables are correctly connected. • Push the local/remote button until the RBS is in remote mode. • Reset the RBS by pushing the CPU Reset button and try again.
Memory Corrupted	Use the OMT. • For faults Non-Volatile Memory Corrupted and RBS Database Corrupted/ Inconsistent, reset by installing a new IDB. • If this fault arises during Function change or Program Load, wait until the Function change or Program Load is completed. • If the RBS does not recover automatically, check the files and repeat the Function change or Program Load.
Wrong IDB	• Install the correct IDB, using the OMT.
PCM fails when installing BTS SW with the BSC simulator	• Check that the PCM cables are correctly connected (TX has voltage). • Shift the PCM cables.

Battery fault	• Battery disconnected or faulty. • Low battery DC voltage.

10.2 Fault Code List

This chapter describes faults reported to the BSC and HW units suspected of causing the fault.

Where applicable, the fault code lists indicate faults with restricted validity for product release R5 or R6 and above in CME 20 and also for the RBS model RBS 2301.

When using this chapter for CMS 40 the conversion table below applies. The remark "R6 and above" in the fault code lists covers the releases R2 and above in CMS 40.

Table 21 Relation of product releases in CME 20 and CMS 40

CME 20		**CMS 40**
R5	↔	R1
R6.0	↔	R2
R6.1	↔	R3
R7	↔	R7

10.2.1 Terminology

The following terminology is used throughout this chapter.

Fault Number

The fault number is identical with the bit position in the fault map reported over the Abis interface.

Internal Fault Map Class 1A (I1A)

Faults reported in this class are faults that affect MO functionality. Faulty HW is part of the signalling MO.

Internal Fault Map Class 1B (I1B)

Faults reported in this class are faults that affect MO functionality. The origin of the fault is external to the signalling MO.

Internal Fault Map Class 2A (I2A)

Faults reported in this class are faults that do not affect MO functionality. Faulty HW is part of the signalling MO.

External Condition Map Class 1 (EC1)

Conditions reported in this class are conditions that affect MO functionality. The conditions are TG external.

External Condition Map Class 2 (EC2)

Conditions reported in this class are conditions that do not affect MO functionality. The conditions are TG external.

Replacement Unit Map (RU Map)

Units reported in this map are HW units suspected of causing the faults in the internal fault maps described above.

Logical RU

A logical RU is defined as a unit that can be referred to but is not a single physical unit. There are three different kinds of logical RUs:

1. **Buses**. These are often referred to as a single physical unit but are implemented in the backplane of the cabinet with cables. When a bus is pointed out in the RU map it should be understood that faulty HW can be any unit connected to the bus, or the bus, itself. Logical bus RUs are:

   - X bus
   - Local bus
   - Timing bus
   - CDU bus
   - Power communication loop

2. **Antennas**. (Not applicable for RBS 2301). A logical antenna means the whole signal path between the Transmitter/Receiver and the physical antenna. Logical antenna RUs are:

   - RX antenna A (R5 only)
   - RX antenna B (R5 only)
   - TX antenna A (R5 only)
   - TX antenna B (R5 only)
   - 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 localisation of the fault. However, the ambition is still not to point out a logical RU.

10.2.2 Decoding of Fault Maps

Note: No decoding of Fault Maps is necessary from RBS 2000 release HRB 105 01/2 revision R7. The Fault Maps will be presented in plain text (Fault Type).

The following instructions can be used when a fault map sent to OMC must be translated into a decimal number. An example is when the error log has been printed.

All fault and replacement unit codes consist of a number of hexadecimal digits, in most cases twelve. These twelve digits represent a map that consists of 48 bits. Each bit represents a decimal number and can be translated into a description by using the fault code list and the replacement unit map.

Excepted from this rule are codes for external faults. These codes contain only four hexadecimal digits, which means 16 bits. The decoding principle is the same as for the twelve-digit code.

Example 1

SO CF has reported an internal class 1A fault. The fault code is "000000004100".

Table 22 Fault code “000000004100”

47-44	43-40	39-36	35-32	31-28	27-24	23-20	19-16	15-12	11-8	7-4	3-0
0	0	0	0	0	0	0	0	4	1	0	0
0000	0000	0000	0000	0000	0000	0000	0000	0100	0001	0000	0000

Bits number 8 and 14 are set to "1", which means that faults number 8 and 14 are active in the CF class 1A fault list. Translating the numbers by using the information in the fault list gives the two faults "Timing unit VCO fault" (fault number 8) and "Local bus fault" (fault number 14).

Example 2

SO TRXC has reported a replacement unit code, "000000000001".

Table 23 Fault code “000000000001”

47-44	43-40	39-36	35-32	31-28	27-24	23-20	19-16	15-12	11-8	7-4	3-0
0	0	0	0	0	0	0	0	0	0	0	1
0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0001

Bit number 0 is set to "1", which means that replacement unit 0 is suspected of being faulty. Translating this number by using the replacement unit map for SO TRXC will give us the information "Suspected replacement unit is TRU".

Unused Decoding Table

Make a copy of this table and use it as a tool when decoding fault codes and replacement unit codes.

Table 24 Unused decoding table

47-44	43-40	39-36	35-32	31-28	27-24	23-20	19-16	15-12	11-8	7-4	3-0

Hex to Bin Table

Hex	Bin	Hex	Bin
0	0000	8	1000
1	0001	9	1001
2	0010	A	1010
3	0011	B	1011
4	0100	C	1100
5	0101	D	1101
6	0110	E	1110
7	0111	F	1111

10.2.3 SO Fault Lists

Fault codes on the Abis interface are defined per MO. The SO RU map and the I1A/I2A fault maps should be read together. The SO fault map denotes which fault it is, and the RU map denotes where the fault is located.

An AO I1B fault has a corresponding SO I2A fault. So by reading the I2A fault map and the RU map for SO CF or SO TRXC, the HW that is causing the AO I1B fault can be found. This is the case when BTS internal HW affects a single AO.

The AO is not allowed to report the HW itself since this task is assigned to the HW-responsible SO. One could say that the consequence is reported by the AO I1B fault map and the cause is reported by the SO I1A/I2A fault maps and the RU map.

SO CF, external condition map class 1

Fault no.	Fault type
0	
-	
-	
4	L/R SWI (BTS in local mode)

Fault no.	Fault type
5	L/R TI (Local to remote while link lost)
-	
-	
15	

SO CF, external condition map class 2

Fault no.	Fault type	Remark
0		
-		
-		
7	DIP A (PCM link A lost)	R5 only
-		
9	RBS door (RBS cabinet door open)	
-		
-		
15		

SO CF, internal fault map class 1A

Fault no.	Fault type	Remark
0	Reset, failed restart attempt	
1	Reset, power on	
2	Reset, switch	
3	Reset, watchdog	
4	Reset, SW fault	
5	Reset, RAM fault	
6	Reset, internal function change	
7	X bus fault	
8	Timing unit VCO fault	
9	Timing bus fault	
10	Indoor temperature out of safe range	
11		
12	DC voltage out of range	
13		
14	Local bus fault	
15	RBS database corrupted/inconsistent	R5 only
15	RBS database corrupted	R6 and above
16	RU database corrupted	
17	HW and IDB inconsistent	R6 and above

Fault no.	Fault type	Remark
18	Internal configuration failed	R6 and above
19	Indoor temperature above safe range	RBS 2301 only
20	Indoor temperature below safe range	RBS 2301 only
-		
-		
47		

SO CF, internal fault map class 1B

Not used.

SO CF, internal fault map class 2A

Fault no.	Fault type	Remark
0	Reset, failed restart attempt	
1	Reset, power on	
2	Reset, switch	
3	Reset, watchdog	
4	Reset, SW fault	
5	Reset, RAM fault	
6	Reset, internal function change	
7	RXDA A/B amplifier current fault	R5 only
7	RXDA amplifier current fault	R6 and above
8	VSWR limits exceeded	
9	Output power limits exceeded	R5 only
9	Power limits exceeded	R6 and above
10	DXU optional EEPROM checksum fault	
11	ALNA fault	
12	RX maxgain/mingain violated	R6 and above
13	Timing unit VCO ageing	
14	CDU supervision/communication lost	
15	VSWR/Output power supervision lost	R6 and above
16	Indoor temperature out of normal conditional range	
17	Indoor humidity	
18	DC voltage out of range	
19	Power system in stand-alone mode	
20	External power fault	
21	Internal power capacity reduced	
22	Battery backup capacity reduced	
23	Fan capacity reduced	R5 only
23	Climate capacity reduced	R6 and above

Fault no.	Fault type	Remark
24	Cooler capacity reduced	R5 only
24	CU HW fault	R6 and above
25	Heater capacity reduced	
25	Loadfile missing in DXU or ECU	R7 and on
26	Climate sensor fault	
27	System voltage sensor fault	
28	A/D converter fault	
29	Varistor fault	
30	Local bus fault	
31	High-frequency software fault	
32	Non-volatile memory corrupted	
33	RX diversity lost	
34	Output voltage fault	
35	Optional synchronisation source	
36	RU database corrupted	
37	Circuit breaker tripped	
38	Default values used	
39	RX cable disconnected	
40	Reset, DXU link lost	
41	Lost communication to TRU	R6 and above
42	Lost communication to ECU	R6 and above
43	Internal configuration failed	R6 and above
44	Indoor temperature above normal conditional range	RBS 2301 only
45	Indoor temperature below normal conditional range	RBS 2301 only
46	DB parameter fault	R7 and on
47	Auxiliary Equipment Fault	R7 only

SO CF, replacement unit map

No.	Replaceable unit	Remark
0	DXU	
1	ECU	
2	Micro RBS	RBS 2301 only
3		
4		
5	CDU	
6	BFU	
7	PSU	
8	CDU_Cos	
9	BDM	
10	ACCU	

No.	Replaceable unit	Remark
11	Active cooler	
11	Heat exchanger external fan	R5 only (1)
12	ALNA A	
13	ALNA B	
14	Battery	
15	Fan	
16	Heater	
17	Heat exchanger external fan	
18	Heat exchanger internal fan	
19	Humidity sensor	
20		
21	Temperature sensor	
22	CDU HLOUT HLIN cable	
23	CDU RX in cable	
24	CU	R6 and above
25	DU	R6 and above
26	FU	R6 and above
27	FU CU PFWD cable	R6 and above
28	FU CU PREFL cable	R6 and above
29	CAB HLIN cable	R6 and above
30	CDU bus	
31	Environment	
32	Local bus	
33	Power communication loop	
34	RX antenna A	R5 only
34	RBS DB	R7 and on
35	RX antenna B	R5 only
36	Timing bus	
37	TX antenna A	R5 only
38	TX antenna B	R5 only
39	X bus	
40	Antenna	
-		
-		
47		

(1) If the cabinet is an RBS 2101 configured with a heat exchanger.

SO TRXC, external condition map class 1

Fault no.	Fault type
0	
-	

Fault no.	Fault type
-	
4	L/R SWI (TRU in local mode)
5	L/R TI (Local to remote while link lost)
-	
-	
15	

SO TRXC, external condition map class 2

Not used.

SO TRXC, internal fault map class 1A

Fault no.	Fault type	Remark
0	Reset, failed restart attempt	
1	Reset, power on	
2	Reset, switch	
3	Reset, watchdog	
4	Reset, SW fault	
5	Reset, RAM fault	
6	Reset, internal function change	
7		
8	Timing reception fault	
9	Signal processing fault	
10	Tora Dannie communication fault	
11	DSP CPU communication fault	
12	Terrestrial traffic channel fault	
13	RF loop test fault	
14	RU database corrupted	
15	X bus communication fault	
16	Initiation fault	
17	X-interface fault	
18	DSP fault	
19	Reset, DXU link lost	
20	HW and IDB inconsistent	R6 and above
21	Internal configuration failed	R6 and above
-		
-		
47		

SO TRXC, internal fault map class 1B

Fault no.	Fault type	Remark
0	CDU not usable	
1	Indoor temperature out of safe range	R6 and above
2		
3	DC voltage out of range	Rand above
-		
-		
47		

SO TRXC, internal fault map class 2A

Fault no.	Fault type	Remark
0	RX cable disconnected	
1	RX EEPROM checksum fault	
2	RX configuration table checksum fault	
3	RX synthesizer unlocked	
4	RX internal voltage fault	
5	Astra Dixie communication fault	
6	Astra Tracy communication fault	
7	TX EEPROM checksum fault	
8	TX configuration table checksum fault	
9	TX synthesizer unlocked	
10	TX internal voltage fault	
11	TX high temperature	
12	TX output power limits exceeded	
13	TX saturation	
14	Voltage supply fault	
15	VSWR/output power supervision lost	
16	Non-volatile memory corrupted	
17	Loadfile missing in TRU	R7 and on
18	DSP fault	
19	High-frequency software fault	
20	RX initiation fault	
21	TX initiation fault	
22	CDU bus communication fault	
23	Default values used	
24		
25	TX maximum power restricted	
26	DB parameter fault	R7 and on
-		

Fault no.	Fault type	Remark
-		
47		

SO TRXC, replacement unit map

No.	Replaceable unit	Remark
0	TRU	
1		
2	Micro RBS	RBS 2301 only
-		
-		
10	CDU to TRU PFWD cable	
11	CDU to TRU PREFL cable	
12	CDU to TRU RXA cable	
13	CDU to TRU RXB cable	
-		
-		
47		

10.2.4 AO Fault Lists

Fault codes on the Abis interface are defined per MO. The SO RU map and the I1A/I2A fault maps should be read together. The SO fault map denotes which fault it is, and the RU map denotes where the fault is located.

An AO I1B fault has a corresponding SO I2A fault. So by reading the I2A fault map and the RU map for SO CF or SO TRXC, the HW that is causing the AO I1B fault can be found. This is the case when BTS internal HW affects a single AO.

The AO is not allowed to report the HW itself since this task is assigned to the HW-responsible SO. One could say that the consequence is reported by the AO I1B fault map and the cause is reported by the SO I1A/I2A fault maps and the RU map.

AO CON, external condition map class 1 (R6 and above)

Fault no.	Fault type
0	
-	
-	
8	LAPD Q CG (LAPD queue congestion)
-	

Fault no.	Fault type
-	
15	

AO CON, external condition map class 2 (R6 and above)

Fault no.	Fault type
0	
-	
-	
8	LAPD Q CG (LAPD queue congestion)
-	
-	
15	

AO CON, internal condition map class 1A (R6 and above)

Not used.

AO CON, internal condition map class 1B (R6 and above)

Not used.

AO CON, internal condition map class 2A (R6 and above)

Not used.

AO CON, replacement unit map (R6 and above)

Not used. See "SO CF, replacement unit map" for possible HW causing the fault.

AO DP (R6 and above)

AO DP is not supervised.

Note: The Digital Path is supervised by PCM supervision.

AO IS

AO IS is not supervised.

AO RX, external condition map class 1

Not used.

AO RX, external condition map class 2

Not used.

AO RX, internal fault map class 1A

Not used.

AO RX, internal fault map class 1B

Fault no.	Fault type	Remark
0	RXDA A/B amplifier current fault	R5 only
0	RXDA amplifier current fault	R6 and above
1	ALNA fault	
2		
3	RX EEPROM checksum fault	
4	RX configuration table checksum fault	
5	RX synthesizer A/B unlocked	
6	RX synthesizer C unlocked	
7	Astra Dixie communication fault	
8	RX internal voltage fault	
9	RX cable disconnected	
10	RX initiation fault	
11	CDU output voltage fault	
-		
-		
47	RX Auxiliary Equipment Fault	R7 only

AO RX, internal fault map class 2A

Not used.

AO RX, replacement unit map

Not used. *See Section SO CF, replacement unit map on page 152* and *Section SO TRXC, replacement unit map on page 156*for possible HW causing the fault.

AO TF, external condition map class 1

Fault no.	Fault type
0	
1	PCM sync (no usable PCM reference)
-	
-	
15	

AO TF, external condition map class 2

Fault no.	Fault type
0	
1	PCM sync (no usable PCM reference)
-	
-	
15	

AO TF, internal fault map class 1A

Not used.

AO TF, internal fault map class 1B

Fault no.	Fault type
0	Optional synchronisation source
1	DXU optional EEPROM checksum fault
-	
-	
47	

AO TF, internal fault map class 2A

Not used.

AO TF, replacement unit map

Not used. *See Section SO CF, replacement unit map on page 152* for possible HW causing the fault.

AO TS, external condition map class 1

Fault no.	Fault type
0	
1	
2	
3	TRA (Remote transcoder communication lost)
-	
-	
15	

AO TS, external condition map class 2

Not used

AO TS, internal fault map class 1A

Not used

AO TS, internal fault map class 1B

Not used

AO TS, internal fault map class 2A

Not used

AO TS, replacement unit map

Not used. *See Section SO CF, replacement unit map on page 152* and *Section SO TRXC, replacement unit map on page 156*for possible HW causing the fault.

AO TX, external condition map class 1

Not used.

AO TX, external condition map class 2

Not used.

AO TX, internal fault map class 1A

Fault no.	Fault type	Remark
0	TX offending	R6 and above
-		
-		
47		

AO TX, internal fault map class 1B

Fault no.	Fault type	Remark
0	CU not usable	
1	CDU VSWR limits exceeded	
2	CDU output power limits exceeded	
3		
4	TX antenna VSWR limits exceeded	
5		
6	TX EEPROM checksum fault	
7	TX configuration table checksum fault	

Fault no.	Fault type	Remark
8	TX synthesizer A/B unlocked	
9	TX synthesizer C unlocked	
10	Astra Tracy communication fault	
11	TX internal voltage fault	
12	TX high temperature	
13	TX output power limits exceeded	
14	TX saturation	
15	Voltage supply fault	
16	Power unit not ready	
17	TX initiation fault	
18	CU HW fault	R6 and above
19	CU SW load/start fault	R6 and above
20	CU input power fault	R6 and above
21	CU park fault	R6 and above
22	VSWR/Output power supervision lost	R6 and above
23	CU reset, power on	R6 and above
24	CU reset, communication fault	R6 and above
25	CU reset, watchdog	R6 and above
26	CU fine tuning fault	R6 and above
27	TX maximum power restricted	
-		
-		
47	TX Auxiliary Equipment Fault	R7 only

AO TX, internal fault map class 2A

Not used.

AO TX, replacement unit map

Not used. *See Section SO CF, replacement unit map on page 152* and *Section SO TRXC, replacement unit map on page 156*for possible HW causing the fault.

10.3 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. Any comments on this manual can be submitted in a similar way.

When writing a trouble report, always include as much information as possible. Write the trouble report as soon as possible, preferably at the Cabinet 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 for resolution and registration in the Ericsson trouble report system MHS (Modification Handling System). The FSC should forward the trouble report via the node MHO ERA BTS.

Special explanations

Product number	The product number can be found on the label of the unit. For example KRC 131 47/01
R-state	Revision state, found on the label of the unit after the product number. For 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 102 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 103 Trouble report, blank

11 Maintenance

11.1 Maintenance Process Overview

The purpose of this chapter is to provide an overview of the maintenance process and describe how to perform correct maintenance procedures.

11.1.1 General

Note: The cabinet must not be opened at site.

The RBS 2301 is administered and controlled by the BSC. There is an interface between the BSC and the BTS. The BSC has an overview of the status of the radio network and its resources.

11.1.2 Fault Handling Workflow

Step one and two are automatically performed by the BSS. Step three is performed at the OMC by an operator who handles the RBS alarm with support from OPIs. By analysing the fault situation, the OMC operator will be able to choose the appropriate action. At the RBS site, step four is performed by a field technician, who will follow the instructions in this manual.

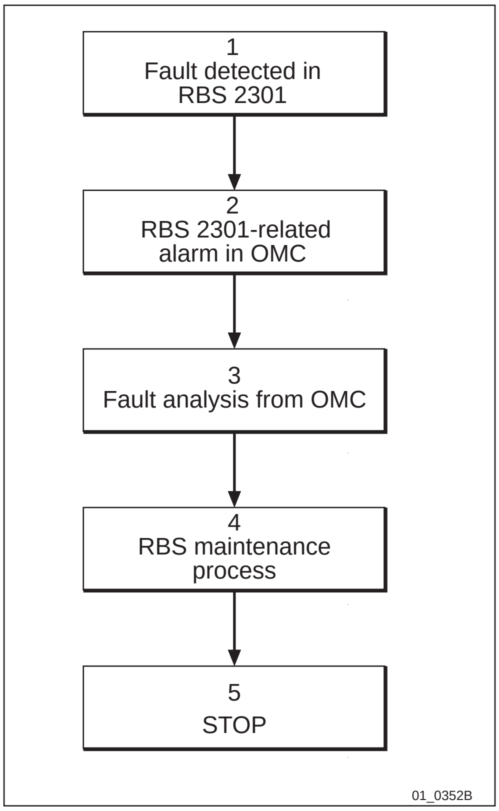

Figure 104 Fault handling workflow

11.1.3 Fault Analysis from OMC

This section describes very briefly a typical fault analysis process, performed from an OMC. It describes procedures that have to be done before sending a field technician to the site.

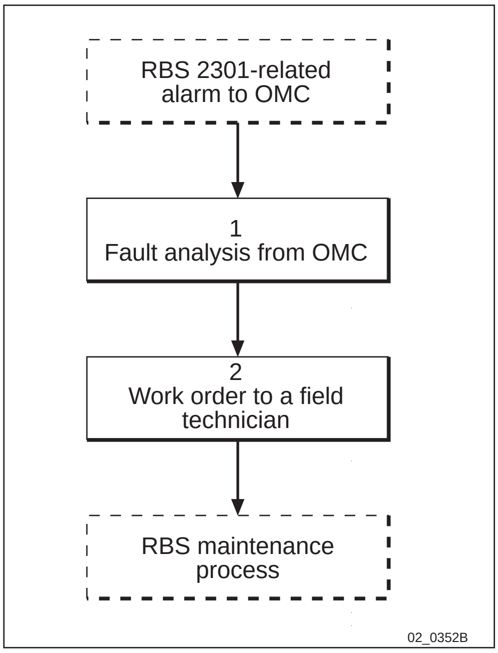

Figure 105 Fault analysis from OMC

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 *chapter Fault Handling*.

Work order to a field technician (2)

Before writing the work order, take the following questions in consideration to optimise the site visit:

- Is preventive maintenance scheduled at this site in the near future?
- Are there any other faults 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
- RBS identity
- The suspected unit

The field technician will now take care of the maintenance at the site. When the work is completed, a report will be written.

11.1.4 RBS Maintenance Process

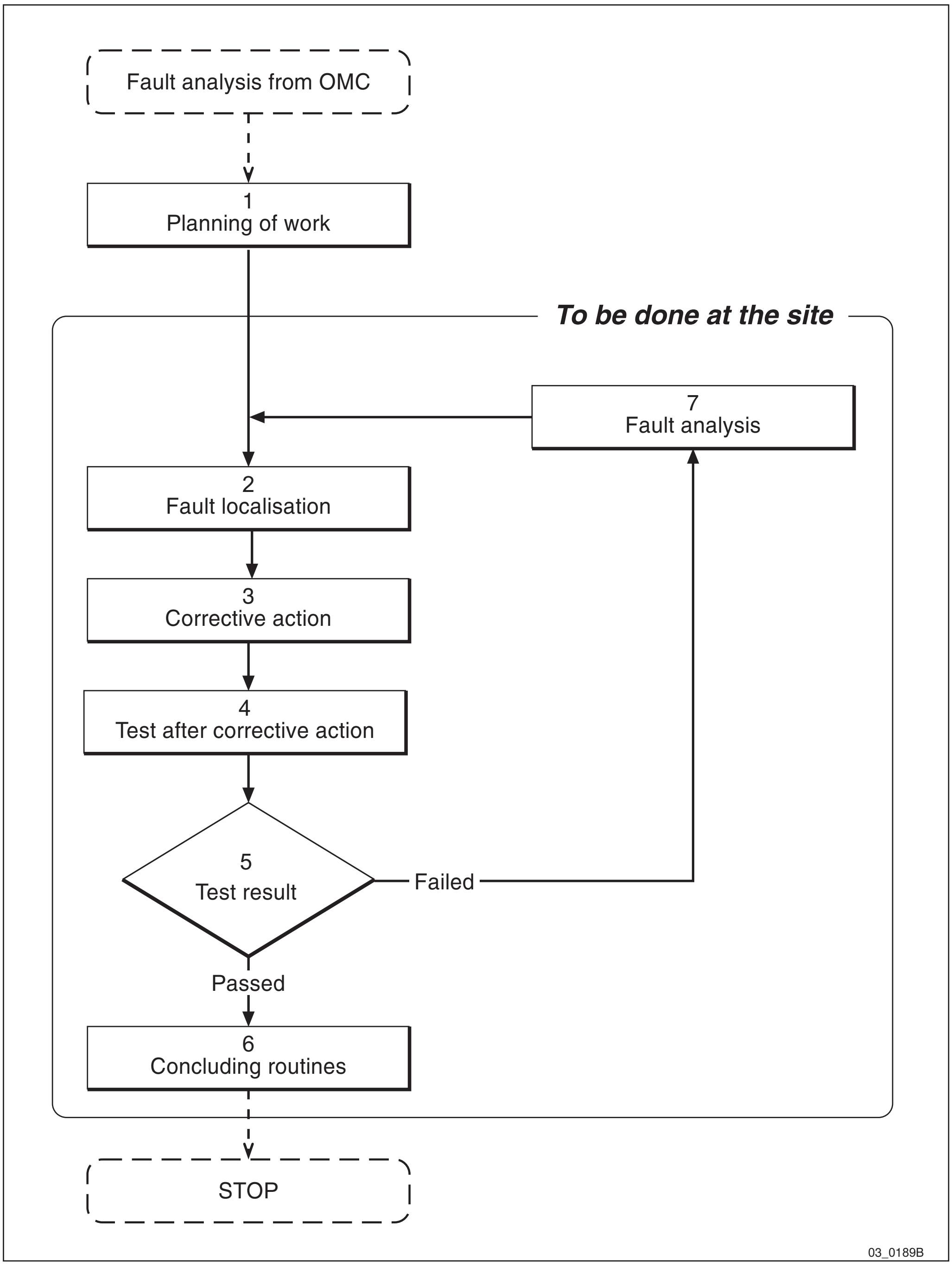

Figure 106 RBS maintenance process

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, cabinet 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 analysed before personnel are sent to the site. Read the flowchart(s) in each *section Fault Localisation* that concern the faulty unit(s). This is done 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 localisation (2)

The *subsection Fault Localisation* provides mapping from fault information to a faulty unit.

Corrective action (3)

The *subsection Replacement* 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 Cabinet is correct.

Test result? (5)

If the test has failed, it will be necessary to perform a fault analysis. Otherwise continue with *Concluding Routines*.

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, contact an FSC.

11.1.5 Fault Cases

Faults are indicated with an LED 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. The set up is stored as Cabinet information in the IDB.

The yellow indicator marked "External alarm" on the DP will light up if any external alarms are activated. When a fault in the external alarm system occurs, the OMT should be used to check the alarm status and the alarm set up.

11.2 Maintenance General

11.2.1 Open the Installation Box Door

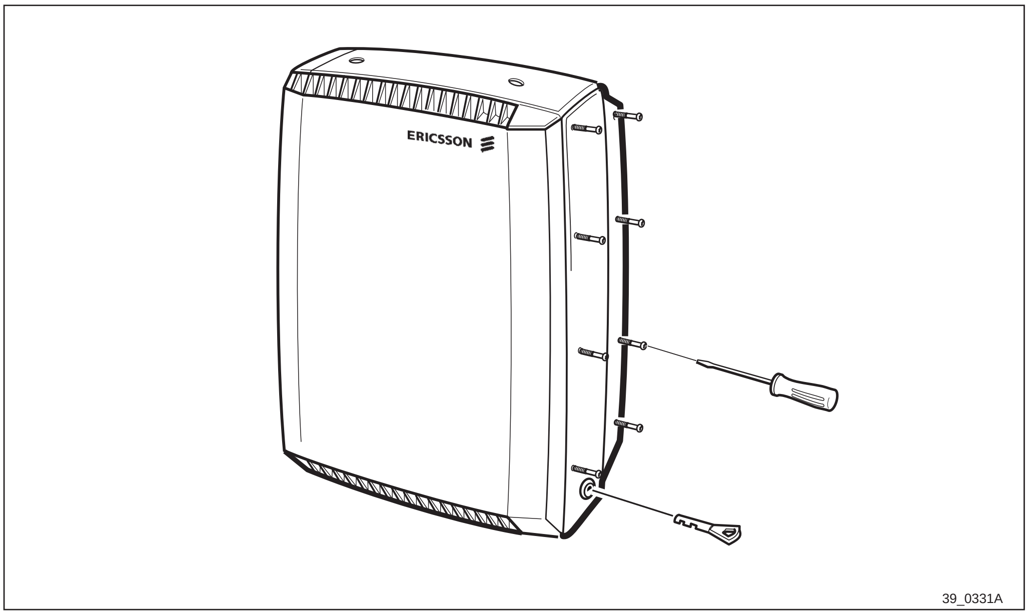

Figure 107 Open the installation box door

1. Unscrew the eight torx screws.
2. Insert the key and unlock.

Note: To close the installation box door do in the reverse order.

11.2.2 Optical Indicators for RBS 2301

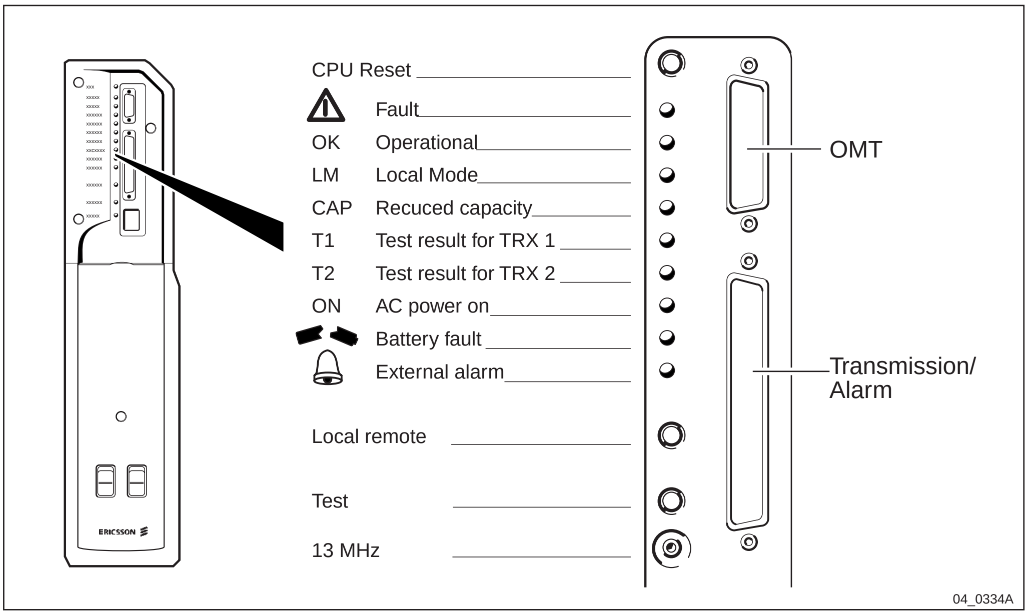

Figure 108 Distribution Panel

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 (32 bits) or OMT2 (16 bits).
Yellow:	The RBS is either operational or faulty: - Operational (Local Mode, AC Power On, Reduced Capacity) - Faulty (Battery Fault, External Alarms)
Green:	The RBS is working correctly.
Flashing indicators:	Wait, activity in progress.

The optical indicators can indicate that a fault/faults have been detected, and the OMT (32 bits) or OMT2 (16 bits) should therefore be used for more advanced fault localisation.

Explanation of the Indicators

Indicator	Mode	Description
Fault	Off	No fault(s) detected.
(Red)	On	Fault(s) detected.
	Flashing	One of the following reasons: • IDB Database is missing • Software is missing

		• Lost communication in the RBS • Running on Base Application
Operational	Off	The RBS is not operational or change of RBS mode is in progress.
(Green)	On	When in local mode: • There is no fault that affects (or may affect) the function of the RBS. When in remote mode: • Connected to BSC and considered operational by the BSC.
	Flashing	One of the following reasons: • Receiving application software • Activation of application software pending • Configuration activity in progress (this may take more than 10 seconds to complete)
Local Mode	Off	The RBS is in remote mode.
(Yellow)	On	The RBS is in local mode.
	Flashing	Change of mode in progress.
Reduced Capacity	Off	All TRXs are operational.
(Yellow)	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	Off	No AC power supply.
(Yellow)	On	AC power is switched on to the RBS.
Battery Fault	Off	Battery connected.
(Yellow)	On	Battery disconnected or faulty. Low battery DC voltage.
External Fault	Off	No external alarm(s) active.
(Yellow)	On	External alarm(s) active.

11.2.3 Local Mode

The Local/remote button can change a cabinet mode to local or remote control. The Local/remote button is located on the DP. A RBS in Local Mode cannot communication with the BSC via the PCM-line and is therefore isolated from the BSC.

The Local/remote button shall be used to isolate the unit from the BSC, for example, when exchanging faulty units.

A cabinet cannot be changed to Remote mode until the database has been downloaded to the DXB. See:

OMT User's Manual	*EN/LZT 123 2674*

Below is a brief description of the two different changes of state and how to stop a change of mode from local to remote.

Change RBS Mode to Local

Note: The Local Mode indicator should be OFF.

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 in order 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.
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 cabinet is in local operation.

Change RBS Mode to Remote

Note: The Local Mode indicator should be ON.

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 Operational indicator turns on in order to indicate that the RBS has been taken out of operation.
4. The communication link on the PCM-line is established by order from BSC. The RBS is changed to Remote mode immediately after the link towards the BSC has been established.
5. The Local Mode indicator turns off.
6. In order to indicate that the RBS is ready to carry traffic the Operational indicator turns on. Note that this will only happen if the RBS is considered as operational by the BSC.

To Stop a Change of RBS Mode to Remote mode

If the Local/remote button is pushed while the Local Mode indicator is flashing, the change of RBS mode to Remote is interrupted. Note that 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.

11.2.4 IDB

Fault Localisation

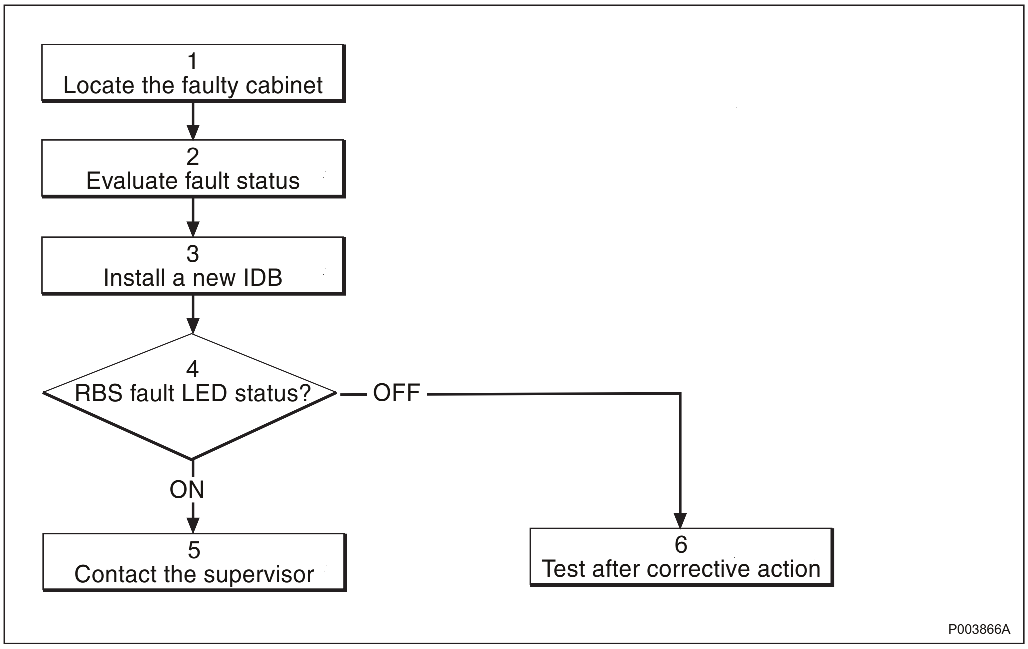

Figure 109 IDB fault localisation

1. Locate the faulty cabinet.

   Locate the faulty cabinet according to work order information.

2. Evaluate fault status.

   The fault status of the RBS can be determined in two ways:

   • The red LED indicator labelled fault indicates that one or more faults have been detected in the cabinet.

   • OMT displays fault code RBS DB. For more information on OMT, *see section Display fault information* in:

OMT User’s Manual *EN/LZT 123 2674*

3. Install a new IDB.

   Install the new IDB according to the specification *subsection Installation of new IDB.*

4. RBS fault LED status.

The red LED indicator labelled fault on the DP indicates that one or more faults have been detected within the cabinet.

5. Contact the supervisor.

   Contact the supervisor or manager who will take further action, for example, to consult an FSC.

6. Test after corrective action.

   • Make a MS test call to verify the new IDB. *See chapter Optional Tests*.

   • Perform the checklist according to *Table 28 on page 237*.

Prior to Installation

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in local mode.

Installation of new IDB

Install the new IDB according to:

OMT User's Manual	*EN/LZT 123 2674*

Test after Corrective Action

1. Make a MS test call to verify the new IDB, *see chapter Optional Tests*.
2. Perform the checklist according to *Table 28 on page 237*.

11.2.5 Sun-Shields

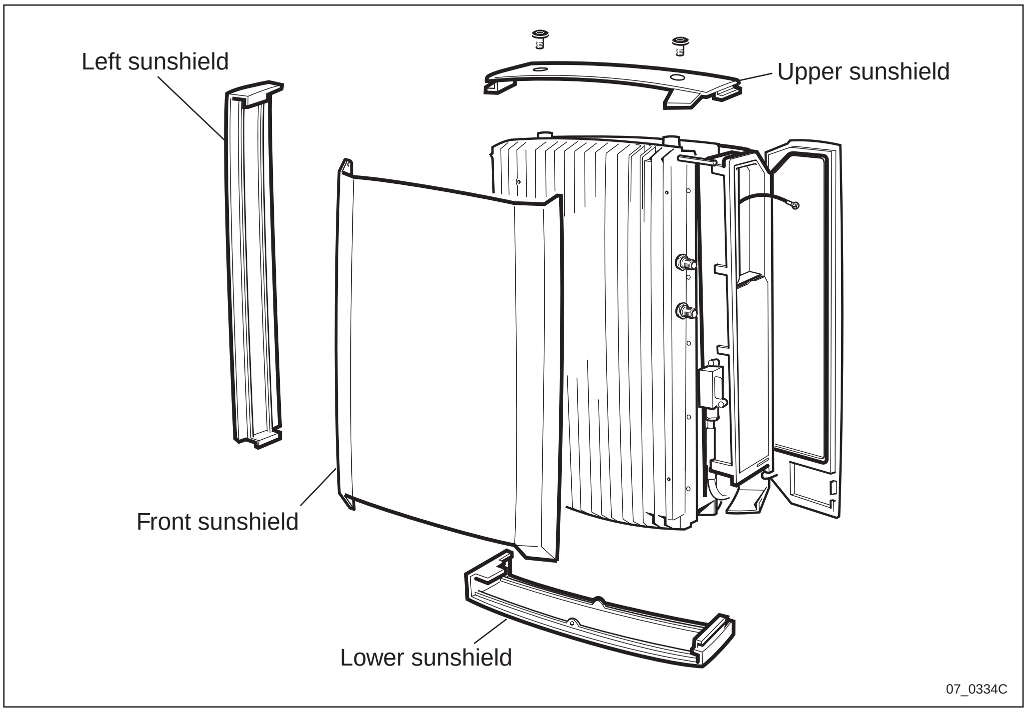

Figure 110 Sun-shields overview

Replacement of the Front Sun-Shield

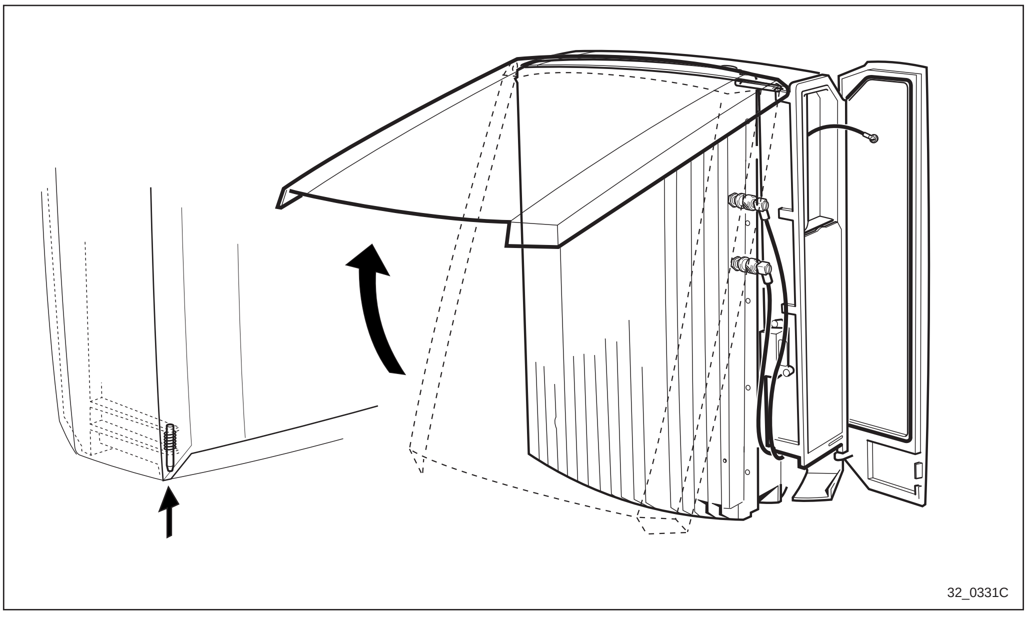

Figure 111 Replacing the front sun-shield

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Push up the pin, located in the lower left hand corner.

5. Pull out the lower part of the cover.
6. Carefully bend out the sides at the top of the cover so that the hinge snaps off and the cover can be removed.

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

7. Mount the new front sun-shield.
8. Carefully bend out the sides on the top, so they can snap on to the hinge.
9. Fold the cover down.
10. Press in the lower left hand corner, so that the spring locking pin snaps into position.
11. Put the RBS in Remote mode.
12. Close the installation box door.

Replacement of the Lower Sun-Shield

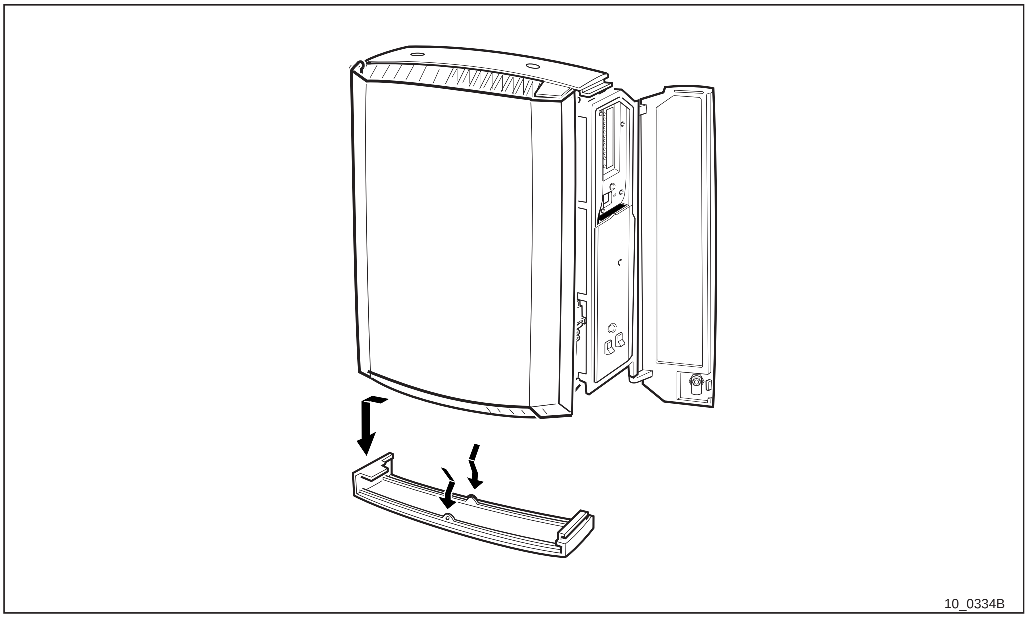

Figure 112 Replacing the lower sun-shield

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Unsnap the sun-shield by pressing the fasteners, located on the middle on the sun-shield.
5. Pull the sun-shield down and unhook it.
6. Mount the new sun-shield in its cut-out in the left side of the cabinet.
7. Snap the sun-shield into its position.

8. Put the RBS in Remote mode.
9. Close the installation box door.

Replacement of the Left Sun-Shield

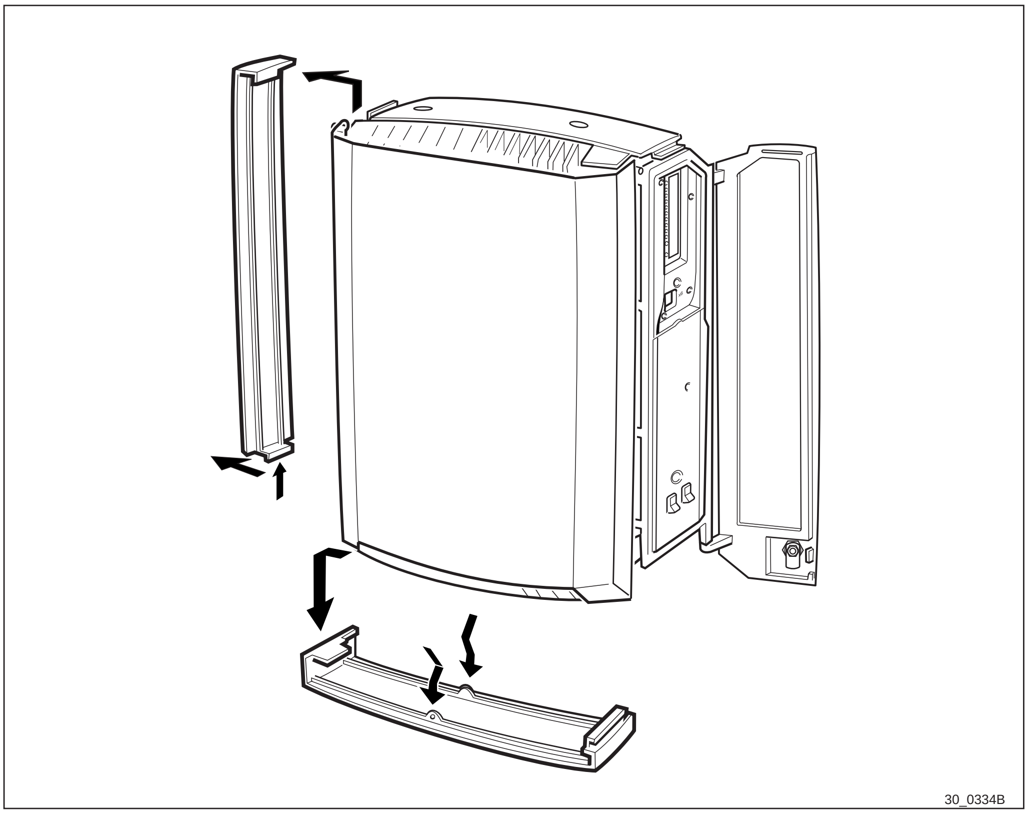

Figure 113 Replacing the left sun-shield

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Remove the lower sun-shield.
5. Unsnap the left sun-shields lower part.
6. Lift it up and unhook it from the cabinet.
7. Hook on the new left sun-shield in its cut-out in the cabinet.
8. Snap the sun-shield into position.
9. Mount the lower sun-shield.
10. Put the RBS in Remote mode.
11. Close the installation box door.

Replacement of the Upper Sun-Shield

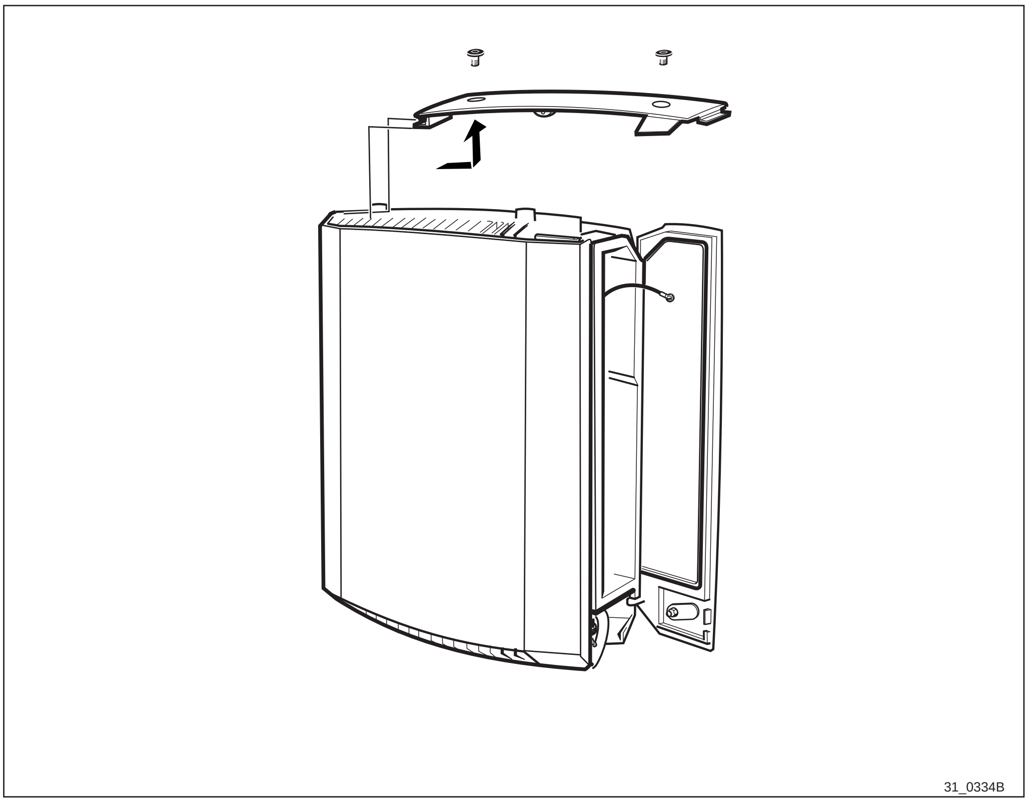

Figure 114 Replacing the upper sun-shield

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Remove the plugs.
5. Unsnap the upper sun-shield, by pressing on the middle.
6. Pull it up and to the right.
7. Remove the old sun-shield.
8. Mount the new sun-shield in its left cut-out in the cabinet.
9. Snap the sun-shield into its middle position.
10. Seal the two holes with the plugs.
11. Put the RBS in Remote mode.
12. Close the installation box door.

Replacement of the Rear Sun-Shield

Note: To remove the rear sun-shield there are specific steps prior to replacement to perform.

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Remove the sun-shields (front, lower, left and upper).

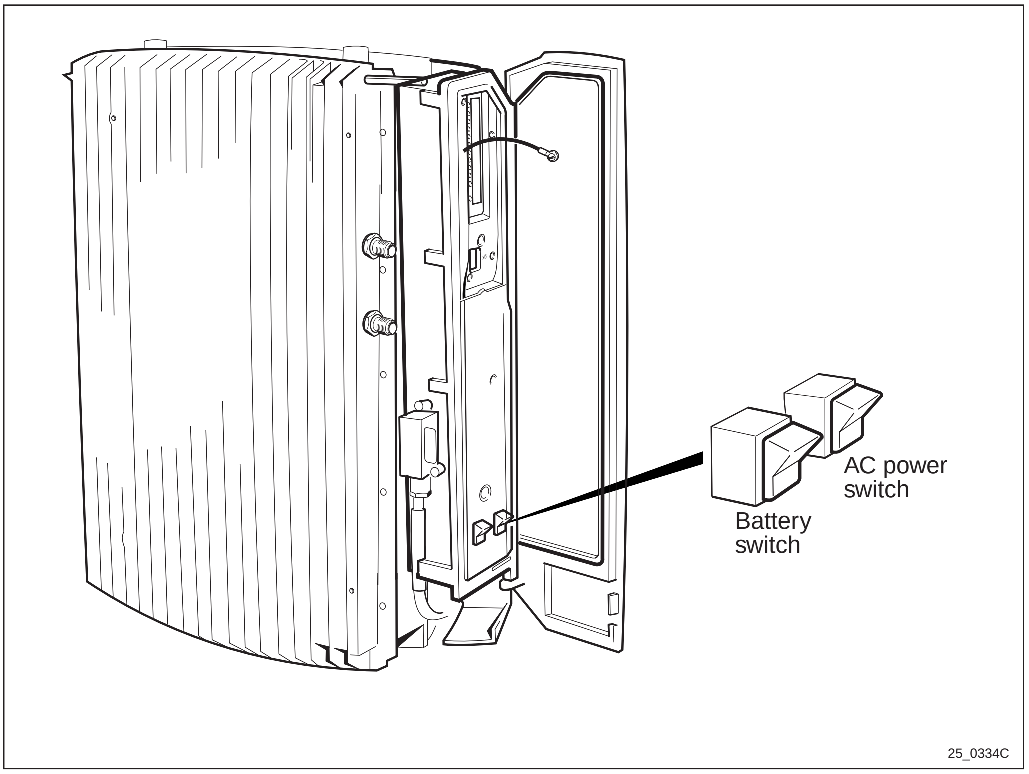

Figure 115 Battery and AC power switch

5. Switch off the battery and AC power switch.

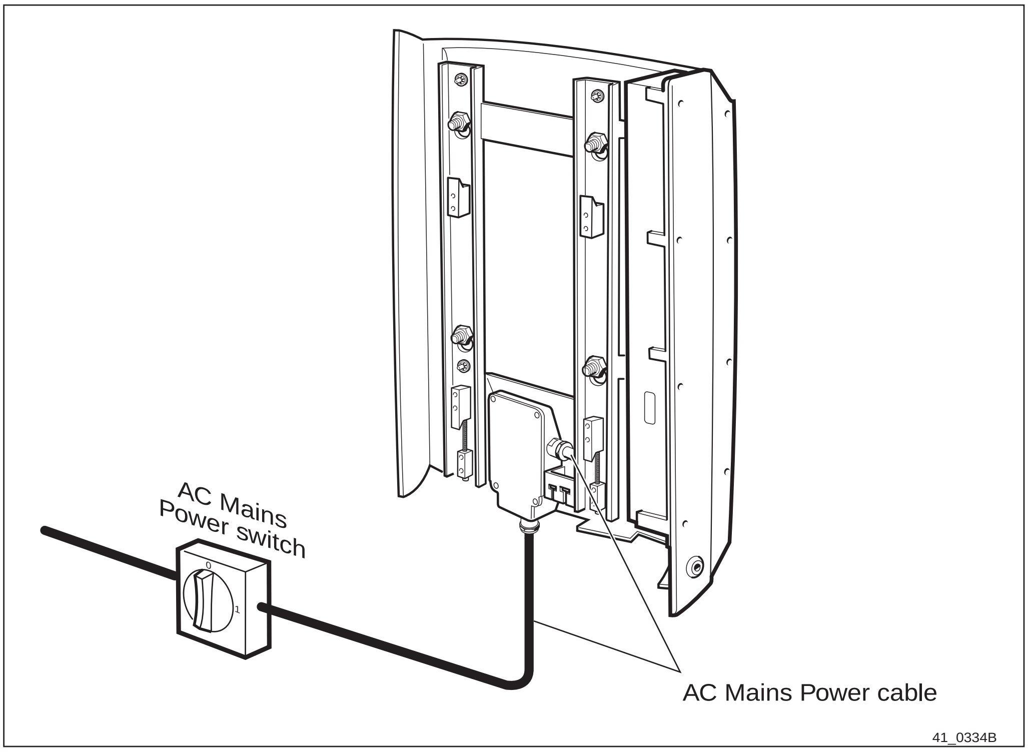

Figure 116   AC mains power switch

6. Switch off the AC mains power switch located outside the RBS.
7. Remove the cabinet, *see Section Replacement on page 189*.

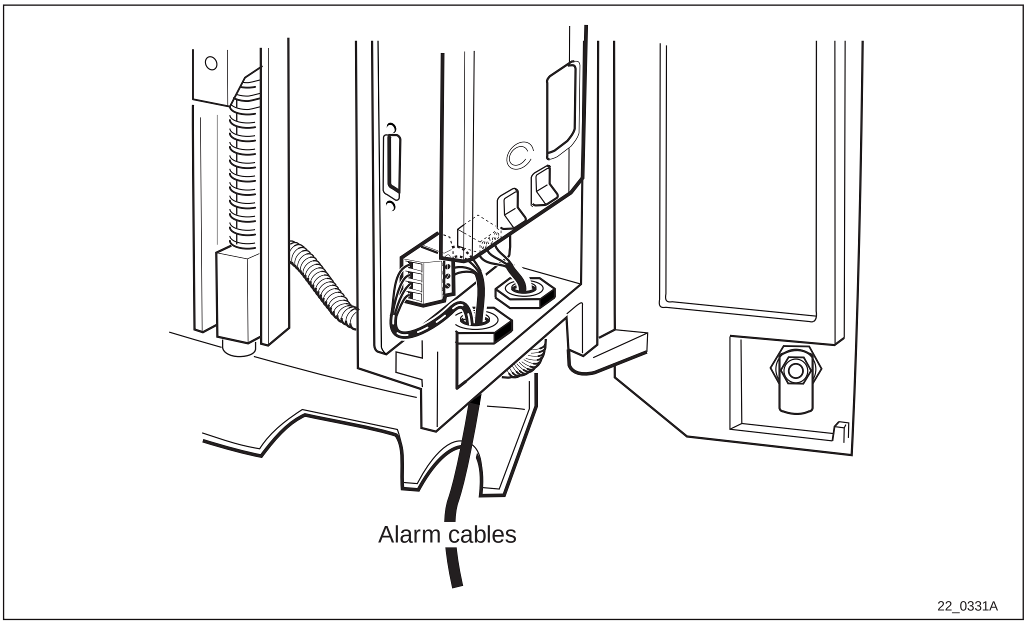

Figure 117

8. Disconnect the external alarm cables.

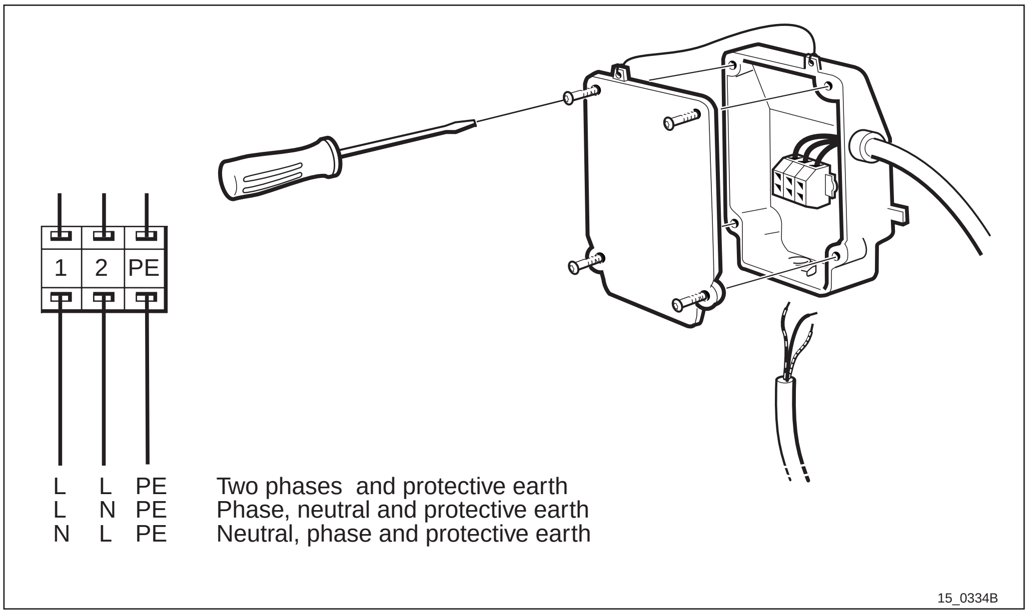

Figure 118 The AC box

9. Remove the AC box cover.
10. Disconnect the AC mains power cable by pressing the spring loaded terminal inside the plinth.
11. Loosen the cable entry and pull out the cable.

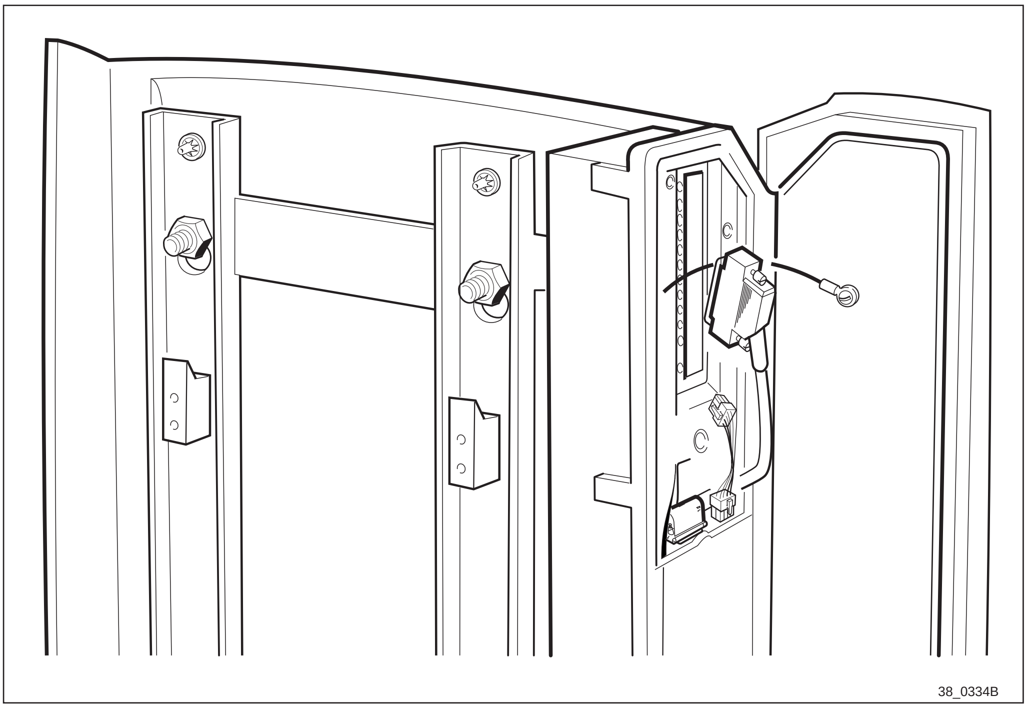

Figure 119 Removing the mounting base

12. Loosen the four nuts.
13. Lift up the mounting base and pull it towards you.
14. Place the mounting base on the ground.

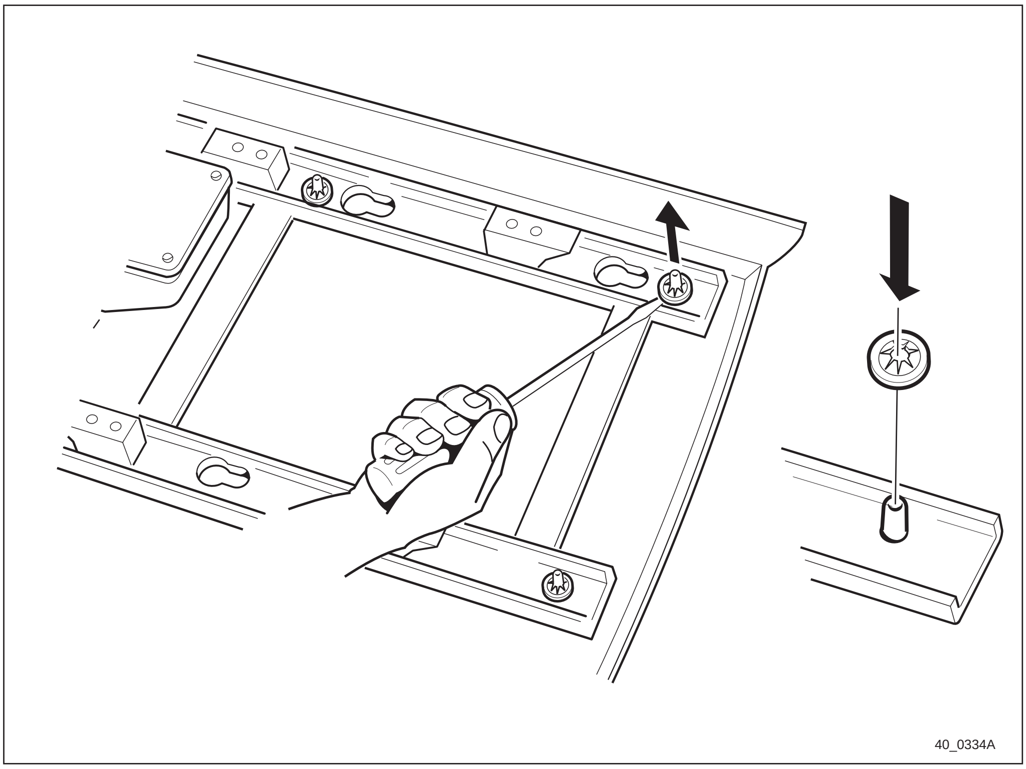

Figure 120 Removing the locking washers

15. Remove the four locking washers using a screwdriver.
16. Separate the rear sun-shield from the mounting base.
17. Mount the new rear sun-shield and the locking washers.
18. Replace the mounting base on the mounting plate. Tighten the nuts.
19. Replace the cables.

Note: For more information, *see chapter Preinstallation, section Connecting AC Mains Power*.

20. To replace and test the cabinet, *see chapter Installation of RBS 2301* and *chapter Site Installation Test*.

11.2.6 Antenna

Fault Localisation

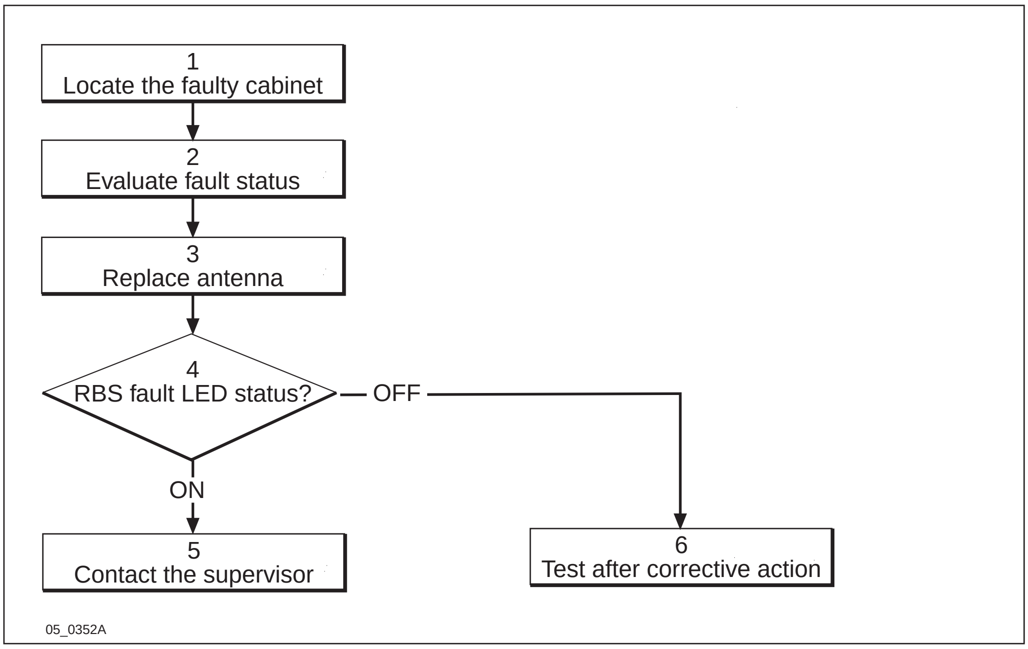

Figure 121 Antenna fault localisation

1. Locate the faulty cabinet.

   Locate the faulty cabinet according to work order information.

2. Evaluate fault status.

   The fault status of the 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 cabinet.

   • Use OMT to display all fault(s) in the RBS. For more information on OMT *see section Display fault information* in:

OMT User's Manual	*EN/LZT 123 2674*

3. Replace antenna.

   Replace the antenna according to instruction in each specific *subsection Replacement of ...*

4. RBS fault LED status.

   The red LED indicator labelled fault on the DP indicates that one or more faults have been detected within the cabinet.

5. Contact the supervisor.

   Contact the supervisor or manager who will take further action, for example, to consult an FSC.

6. Test after corrective action.

- Make a MS test call to verify the antennas. *See chapter Optional Tests*.
- Perform the checklist according to *Table 28 on page 237*.

Replacement of Sector Antenna

WARNING

Radio frequency radiation. The radio frequence radiation from the antenna system might endanger your health. Switch off the transmitter then working with antennas or near them.

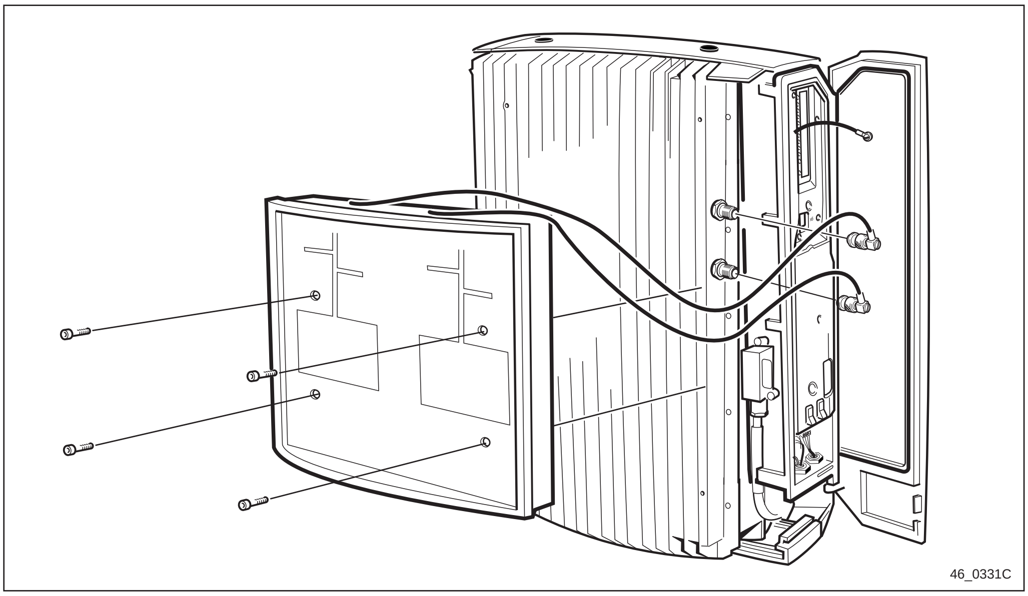

Figure 122 Sector antenna

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Remove the front sun-shield.
5. Disconnect the antenna cabling.
6. Remove the antenna by loosening the four torx screws holding it.
7. Mount the new antenna.

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

8. Fasten the four torx screws.
9. Reconnect the antenna cabling.

10. Mount the front sun-shield back, *see chapter Installation of RBS 2301*.
11. Put the RBS in Remote mode.
12. Close the installation box door.
13. Make a MS test call to verify the antennas. *See chapter Optional Tests*.
14. Perform the checklist according to *Table 28 on page 237*.

Replacement of Omnidirectional Antenna

WARNING

Radio frequency Radiation. The radio frequence radiation from the antenna system might endanger your health. Switch off the transmitter then working with antennas or near them.

The Omnidirectional antenna is placed underneath the cabinet.

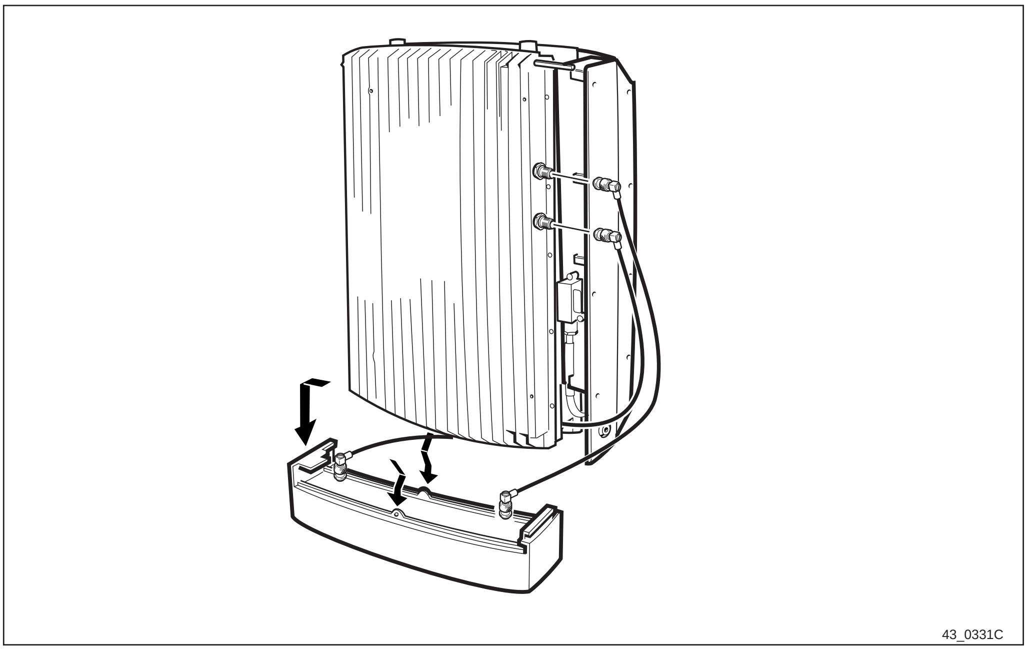

Figure 123 Omnidirectional Antenna

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Disconnect the antenna cabling.

5. Unsnap the antenna by pressing the fasteners, located on the middle on the antenna.
6. Pull the antenna down and unhook it.
7. Replace the old antenna with the new.
8. Reconnect the cabling.
9. Put the RBS in Remote mode.
10. Close the installation box door.
11. Make a MS test call to verify the antennas. *See chapter Optional Tests*.
12. Perform the checklist according to *Table 28 on page 237*.

Replacement of External Antenna

WARNING

Radio frequency Radiation. The radio frequence radiation from the antenna system might endanger your health. Switch off the transmitter then working with antennas or near them.

The antenna is located separate from the RBS.

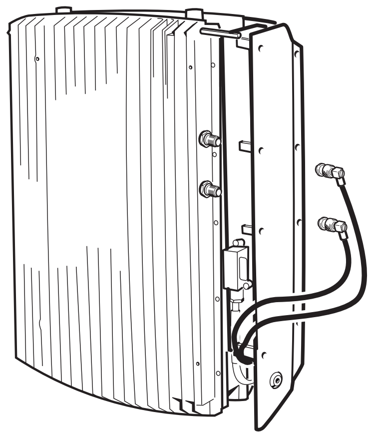

Figure 124 External Antenna

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Remove the front sun-shield and the lower sun-shield.

5. Disconnect the antenna cabling.
6. Remove the antenna.
7. Mount the new antenna.
8. Reconnect the antenna cabling.
9. Mount the front sun-shield and the lower sun-shield back.
10. Put the cabinet in Remote mode.
11. Close the installation box door.
12. Make a MS test call to verify the antennas. *See chapter Optional Tests*.
13. Perform the checklist according to *Table 28 on page 237*.

11.2.7 Multicasting Box

Replacement

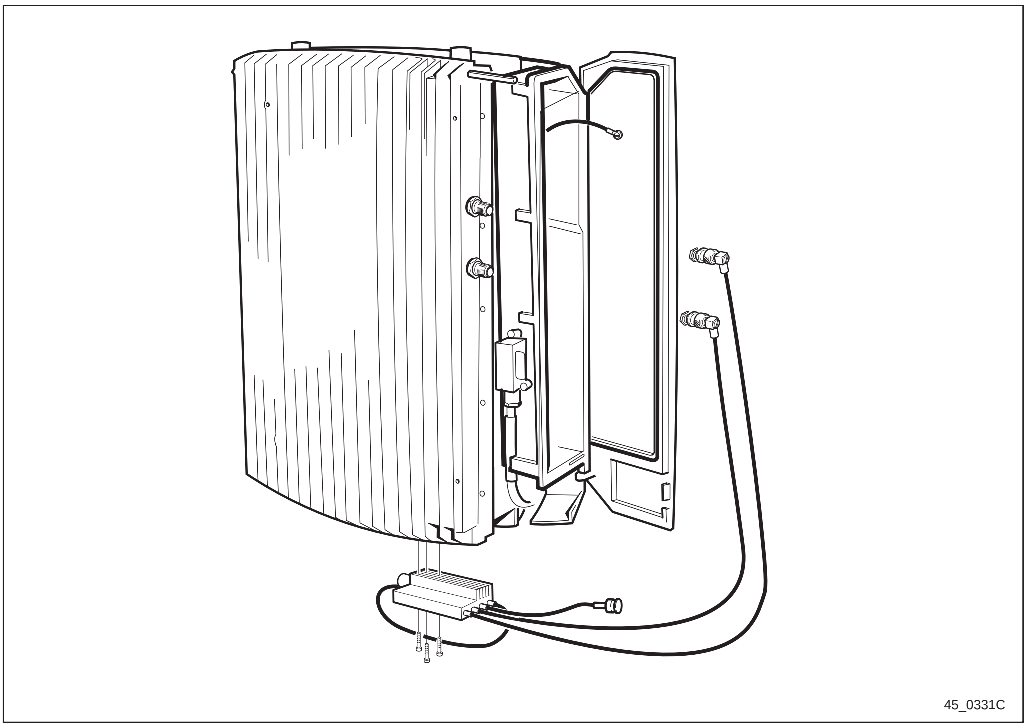

Figure 125 Multicasting box

1. Inform the OMC operator that the Cabinet will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Remove the lower sun-shields by pressing in the middle.
5. Disconnect the antenna cables connected to the cabinet.

6. Disconnect the external antenna cable connected to the multicasting box.
7. Remove the multicasting box by loosening the three torx screws.
8. Mount the new multicasting box.
9. Reconnect the external antenna cable.
10. Reconnect the antenna cables.
11. Mount the lower sun-shield.

Put into Operation

1. Put the RBS into Remote mode.
2. Close the installation box door.

11.2.8 Cabinet

The cabinet must not be opened at site.

Fault Localisation

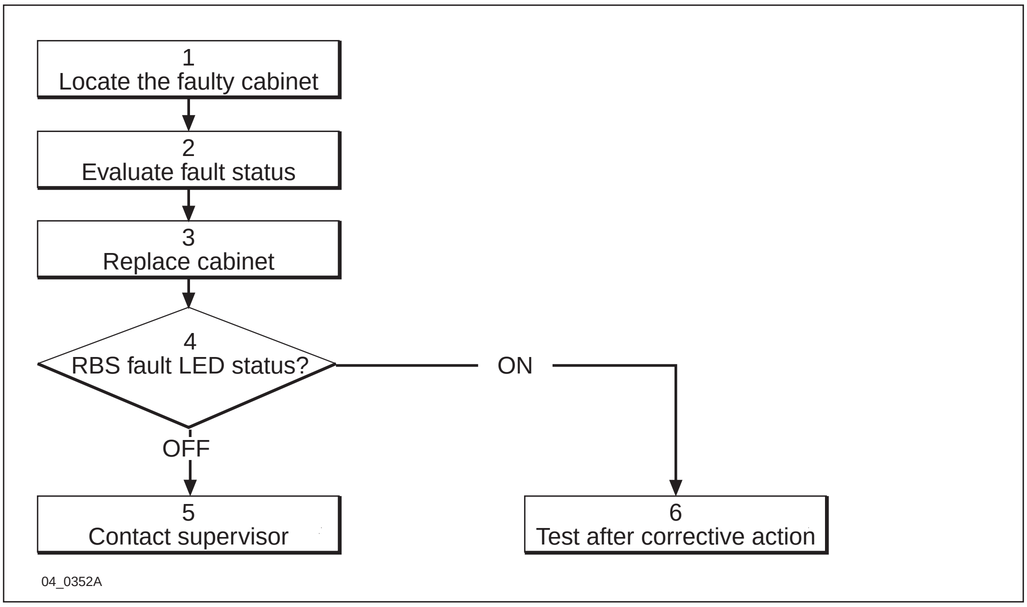

Figure 126 Cabinet fault localisation

1. Locate the faulty cabinet.

   Locate the faulty cabinet according to work order information.

2. Evaluate fault status.

   The fault status of the 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 cabinet.

   • Use OMT to display all fault(s) in the RBS. For more information on OMT *see section Display fault information* in:

OMT User's Manual *EN/LZT 123 2674*

3. Replace cabinet.

   Replace the cabinet according to instructions in *Section Replacement on page 189*.

4. RBS fault LED status.

   The red LED indicator labelled fault on the DP indicates that one or more faults have been detected within the cabinet.

5. Contact the supervisor.

   Contact the supervisor or manager who will take further action, for example, to consult an FSC.

6. Test after corrective action.

   • Make a MS test call to verify the cabinet. *See chapter Optional Tests*.

   • Perform the checklist according to *Table 28 on page 237*.

Replacement

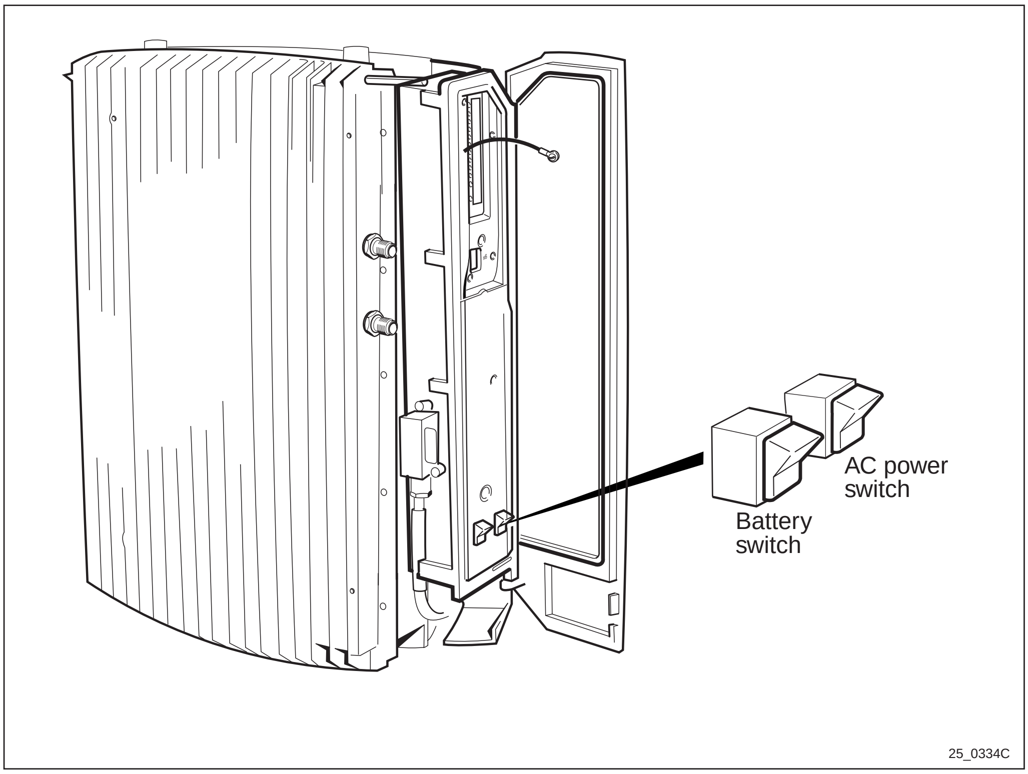

Figure 127 Battery and AC power switches

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Press the Local/remote button.

4. Remove the sun-shields.
5. Switch off the Battery and AC power switch. Make sure that none of the LEDs are lit.

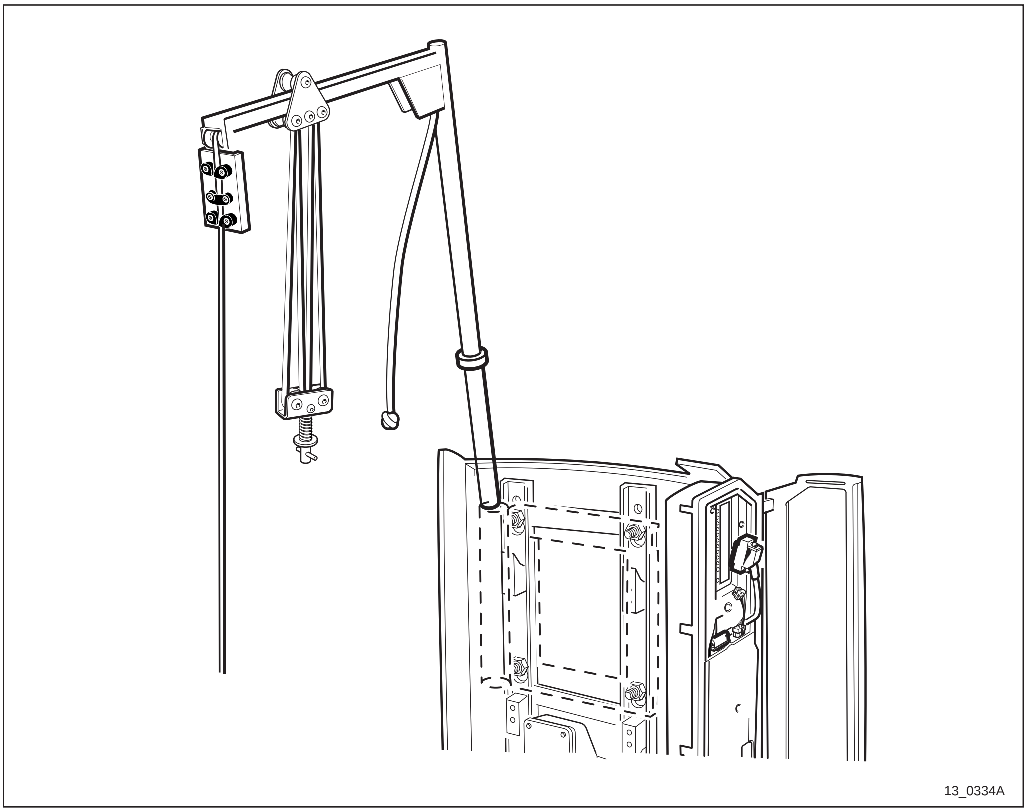

Figure 128 Lifting device

6. Mount the lifting device (if it is to be used) on the left side of the mounting plate.

Note: Information regarding the use of the lifting device, *see chapter Product Data*.

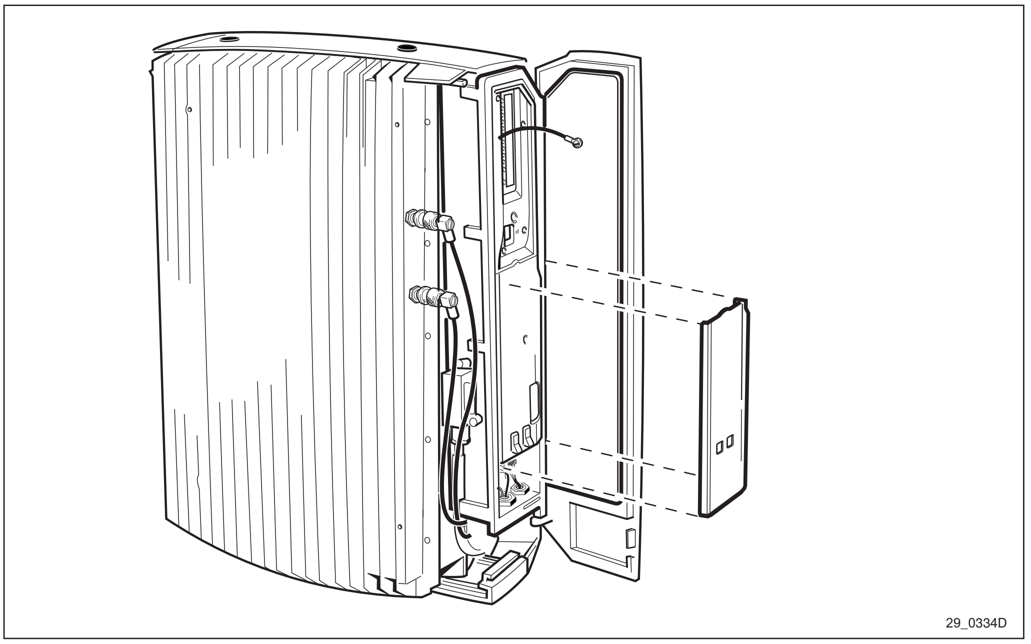

Figure 129   Outer protection cover

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

Note: There are two different types of outer protection covers. One of them, described above, is snapped to the inner protection cover. The other one is the outer protection cover, and it has a screw.

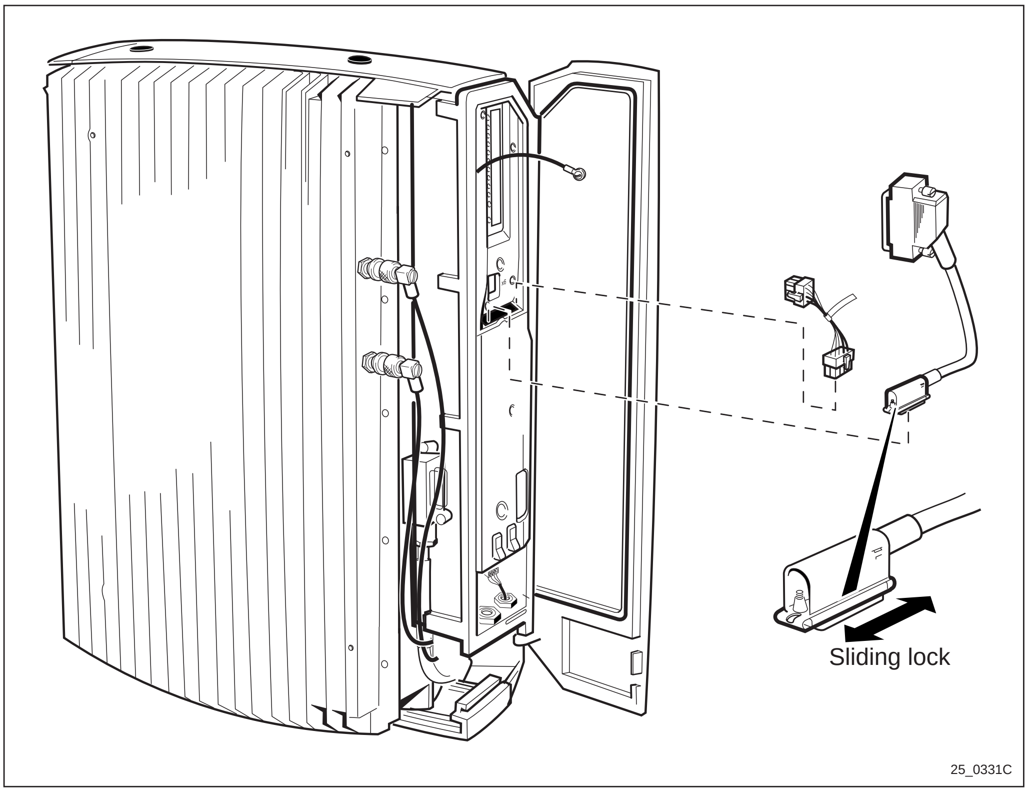

Figure 130   Internal cables

8. Disconnect the internal AC cable and internal transmission cable from the cabinet only.

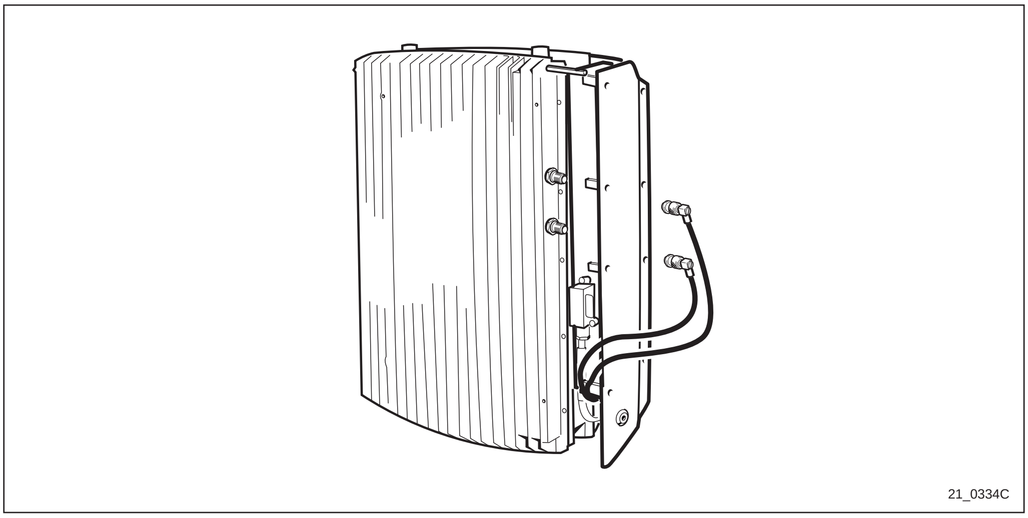

Figure 131 Antenna cables

9. Disconnect the antenna cables.

10. If the lifting device is used, attach the handle to the cabinet.

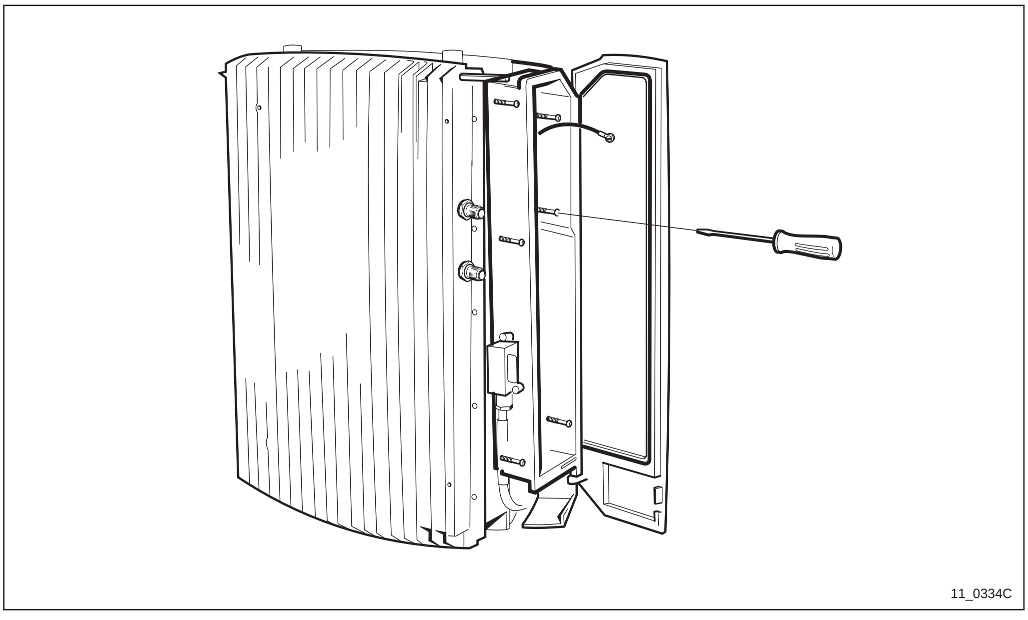

Figure 132 Removing the installation box

11. Unscrew the six torx screws in the installation box.

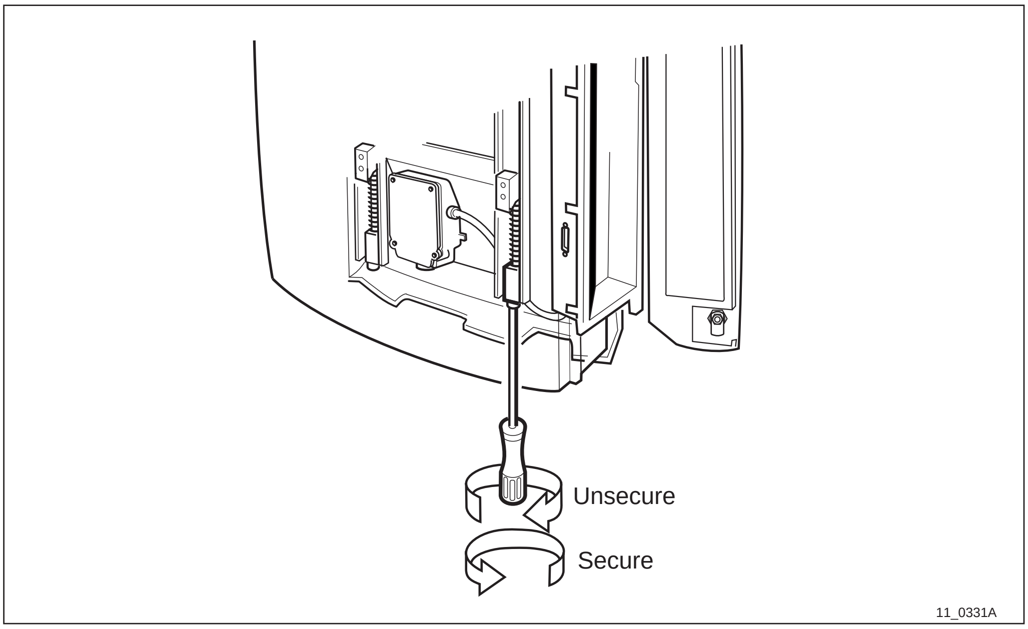

Figure 133 Unsecuring the locking device

12. Unsecure the locking device under/behind the cabinet by turning the torx screws until they stop.

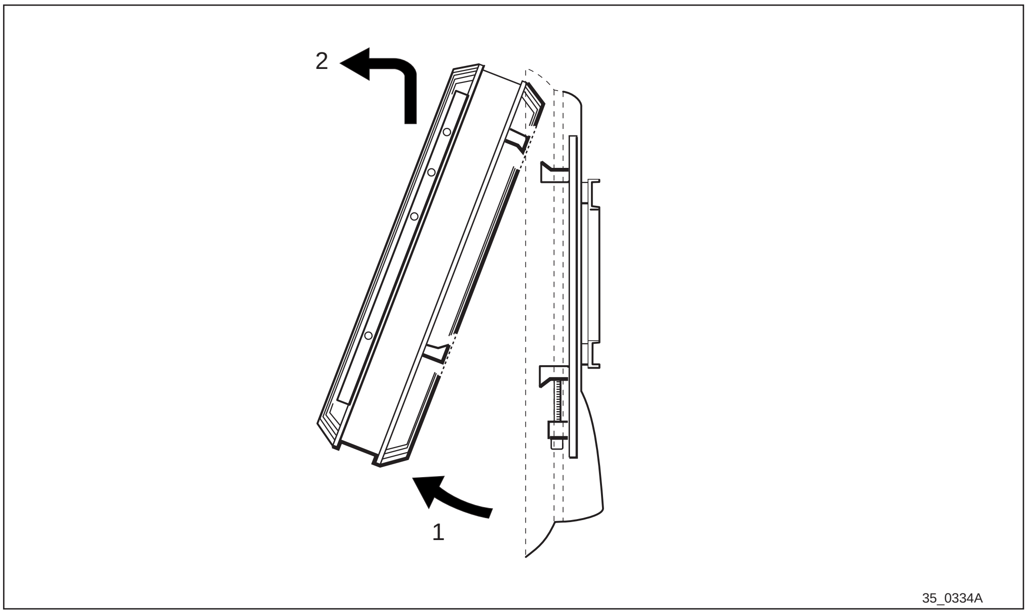

Figure 134 Unhooking the cabinet

13. Grip the bottom of the cabinet and pull it outwards.

Note: The internal battery must be replaced and shipped together with a replaced faulty cabinet.

14. Information regarding mounting the new cabinet, *see chapter Installation of RBS 2301*.

Test after Corrective Action

1. Make a MS test call to verify cabinet function. *See chapter Optional Tests*.
2. Perform the checklist according to *Table 28 on page 237*.

11.2.9 Battery

Fault Localisation

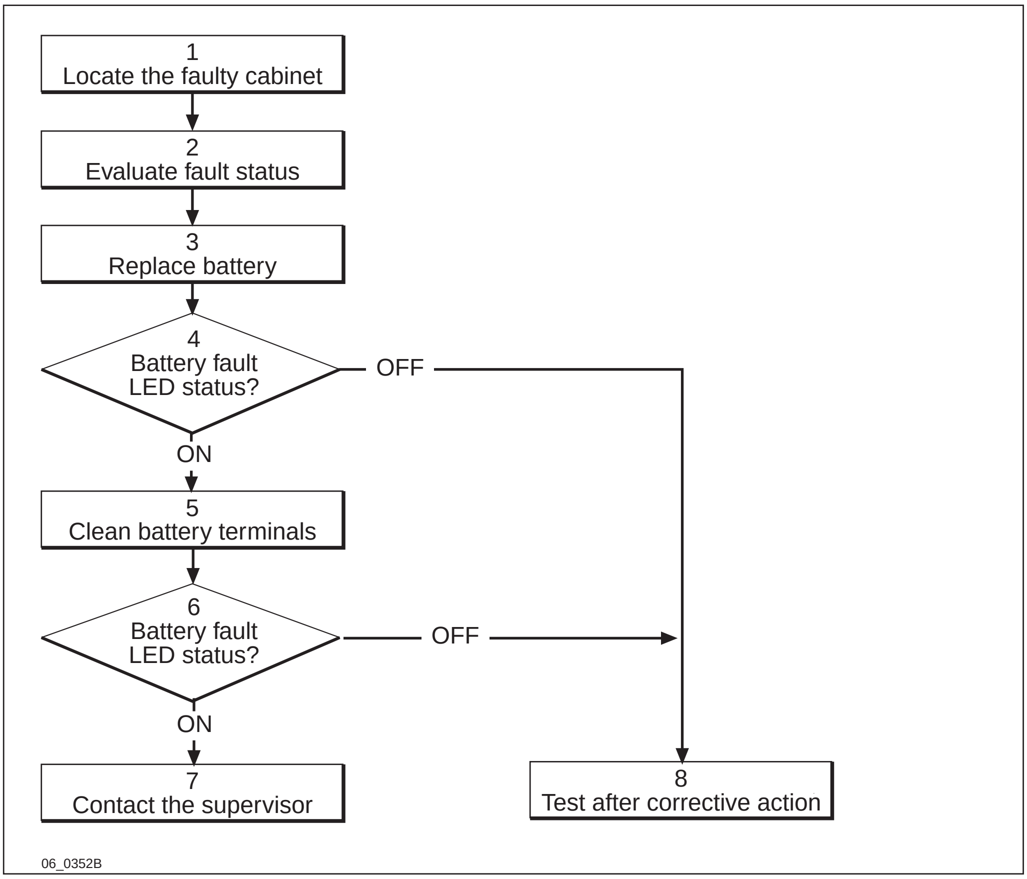

Figure 135 Battery fault localisation

1. Locate the faulty cabinet.

   Locate the faulty cabinet according to work order information.

2. Evaluate fault status.

   The fault status of the 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 cabinet.

   • Use OMT to display all fault(s) in the RBS. For more information on OMT *see section Display more information* in:

	OMT User's Manual	*EN/LZT 123 2674*

3. Replace Battery.

Replace the battery according to instructions in *Section Replacement on page 196*.

4. Battery fault LED status.

   The yellow LED indicator labelled Battery fault on the DP indicates that a fault still is detected in the cabinet.

   The led could be lit for two reasons:

   - If you switched on the battery switch on the EMC card.
   - If the battery is damaged or discharged.

5. Clean the battery terminals.

   To clean the battery terminals, use electronic components spray.

6. Battery fault LED status.

   The yellow LED indicator labelled Battery fault on the DP indicates that a fault still is detected in the cabinet.

   The led could be lit for two reasons:

   - If you switched on the battery switch, on the EMC card.
   - If the battery is damaged or discharged.

7. Contact the Supervisor.

   Contact the supervisor or manager who will take further action, for example, to consult an FSC.

8. Test after corrective action.

   Perform the checklist in *Table 28 on page 237*.

Replacement

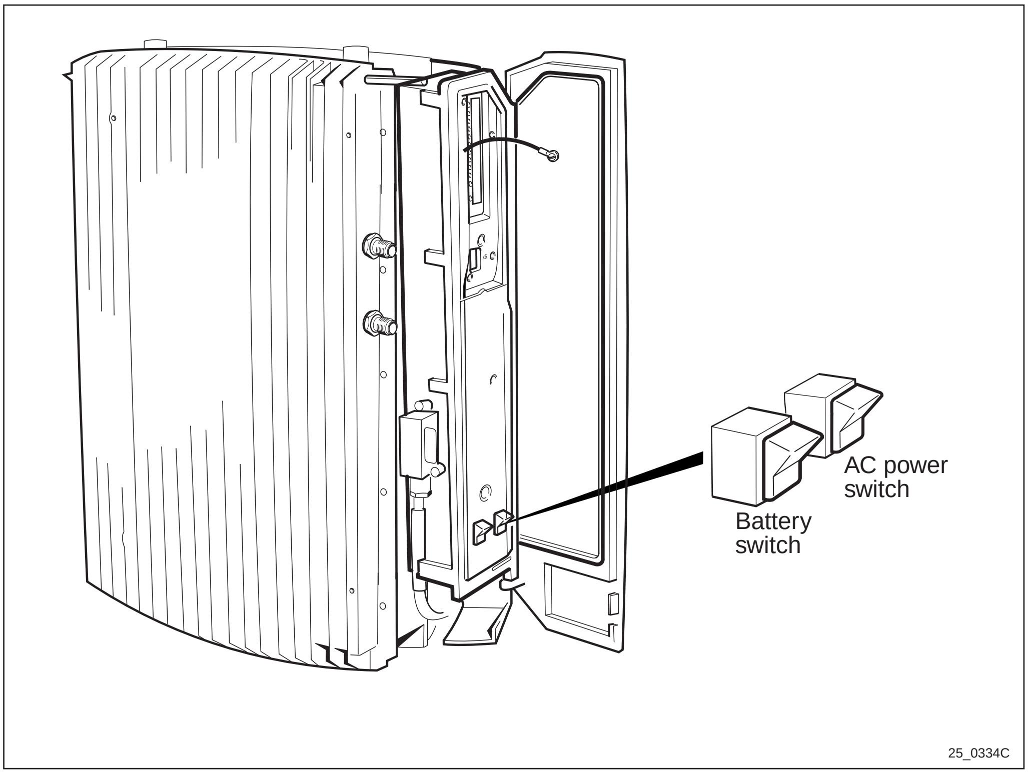

Figure 136 Battery and AC power switch

1. Inform the OMC operator that the Cabinet will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Switch off the battery switch.

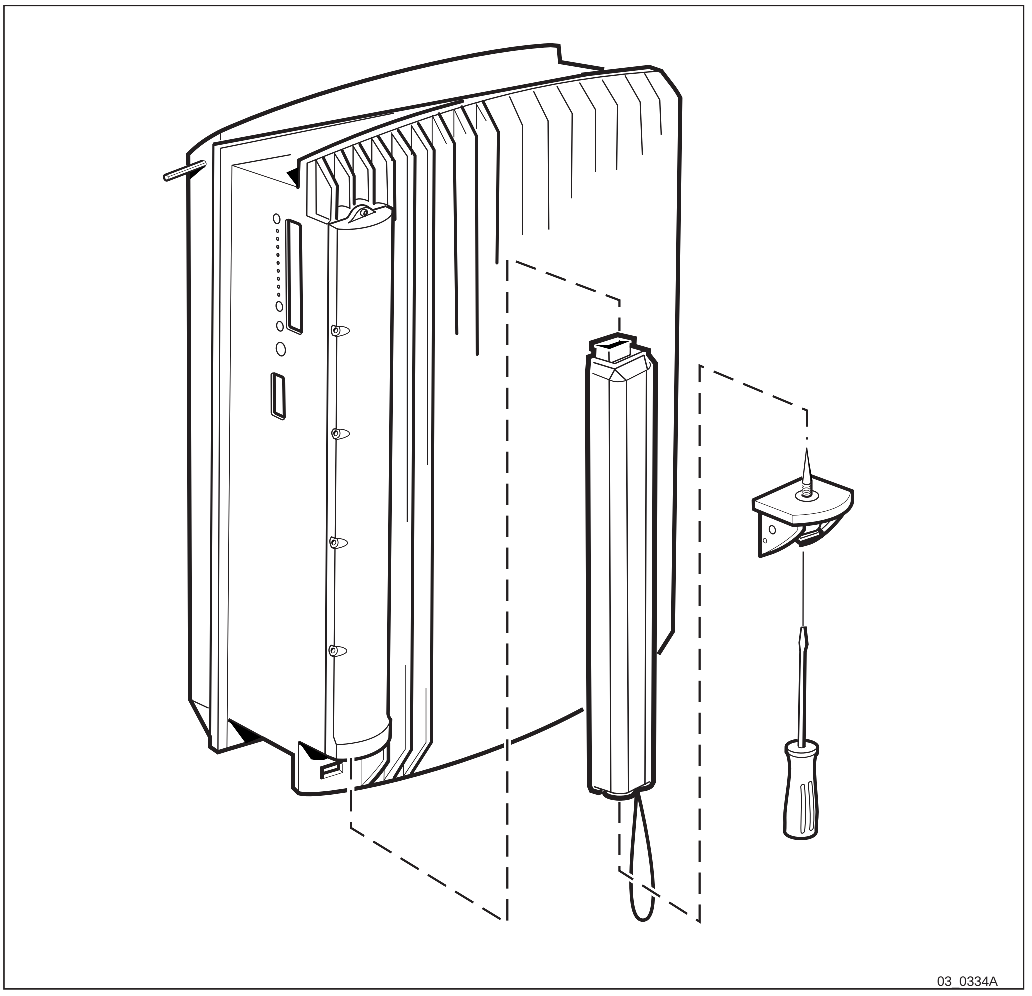

Figure 137 Replacing the battery

5. Unscrew the battery cover.
6. Replace the used battery with a new.
7. Remount the battery cover.
8. Switch on the battery switch.
9. Verify the new battery by switching the AC to on and check the battery fault indicator.
10. Update the IDB.
11. Confirm the new battery in IDB.
12. Put the RBS in Remote mode.
13. Close the installation box door.

11.2.10 Cables

Fault Localisation

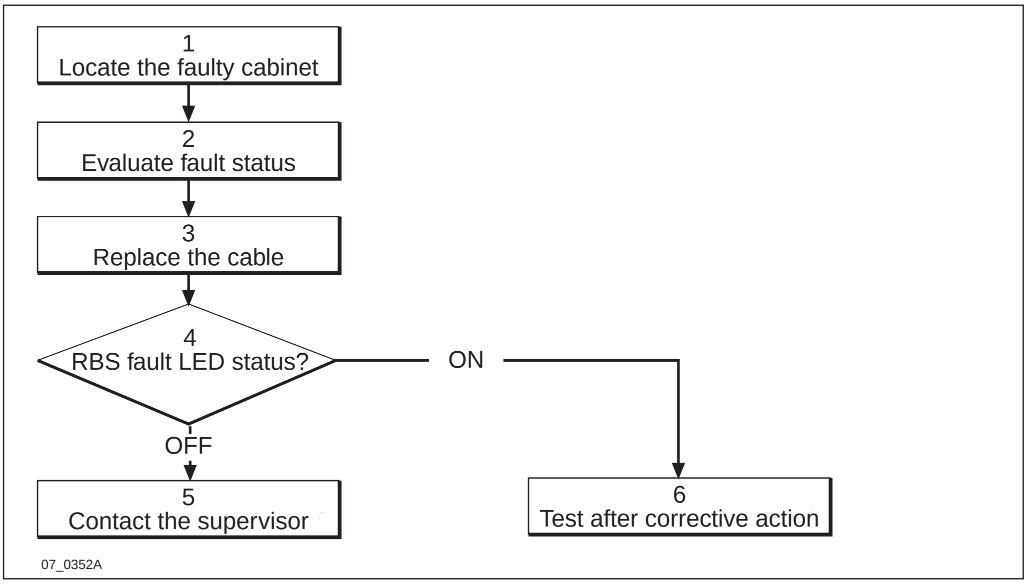

Figure 138 Cables fault localisation

1. Locate the faulty cabinet.

   Locate the faulty cabinet according to work order information.

2. Evaluate fault status.

   The fault status of the 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 cabinet.

   • Use OMT to display all fault(s) in the RBS. For more information on OMT *see section Display more information* in:

OMT User's Manual	*EN/LZT 123 2674*

3. Replace the cable.

   Replace the cable according to instructions in *Section Replacement on page 199*.

4. RBS fault LED status.

   The red LED indicator labelled RBS fault on the DP indicates that a fault has been detected in the cabinet.

5. Contact the supervisor.

   Contact the supervisor or manager who will take further action, for example, to consult an FSC.

6. Test after corrective action

- Make a MS test call to verify the cabinet. *See chapter Optional Tests*.
- Perform the checklist in *Table 28 on page 237*.

Replacement

DANGER

High voltage is used in the operation of this equipment. Not only direct contact, but also indirect contact via damp items or moisture, with mains power can be fatal.

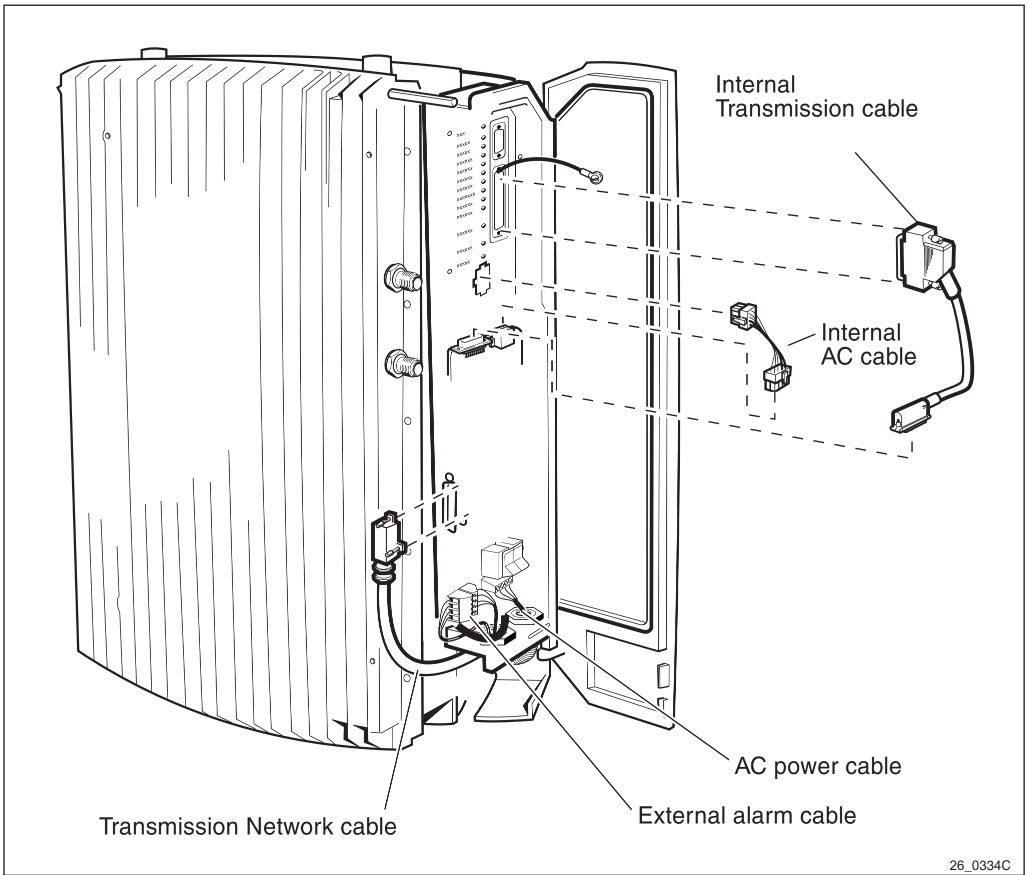

Figure 139 Overview of the cables

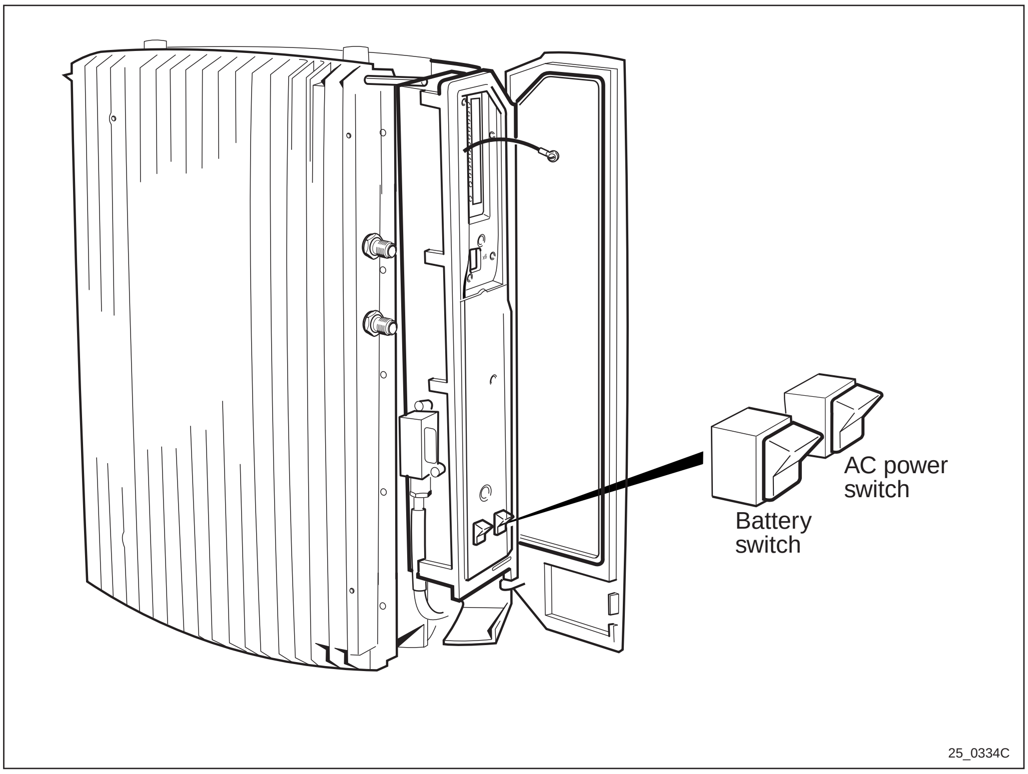

Figure 140 Battery and AC power switch

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Remove the sun-shields.
5. Switch off the battery and AC power switch.

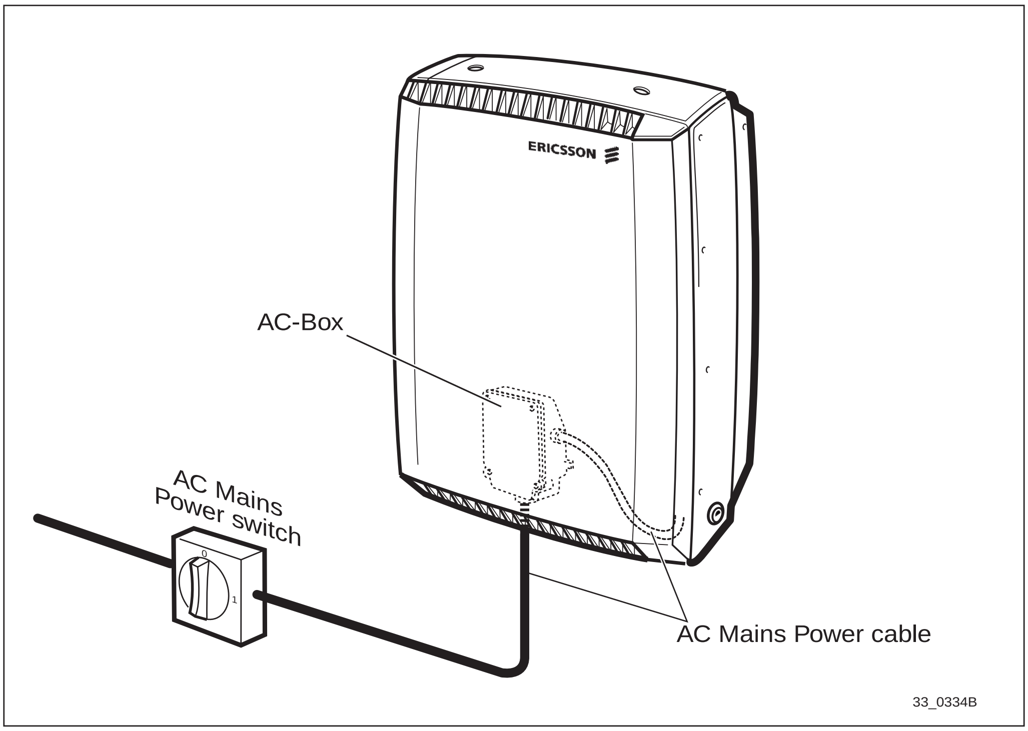

Figure 141 AC mains power switch

6. Switch off the AC mains power switch located outside the RBS.

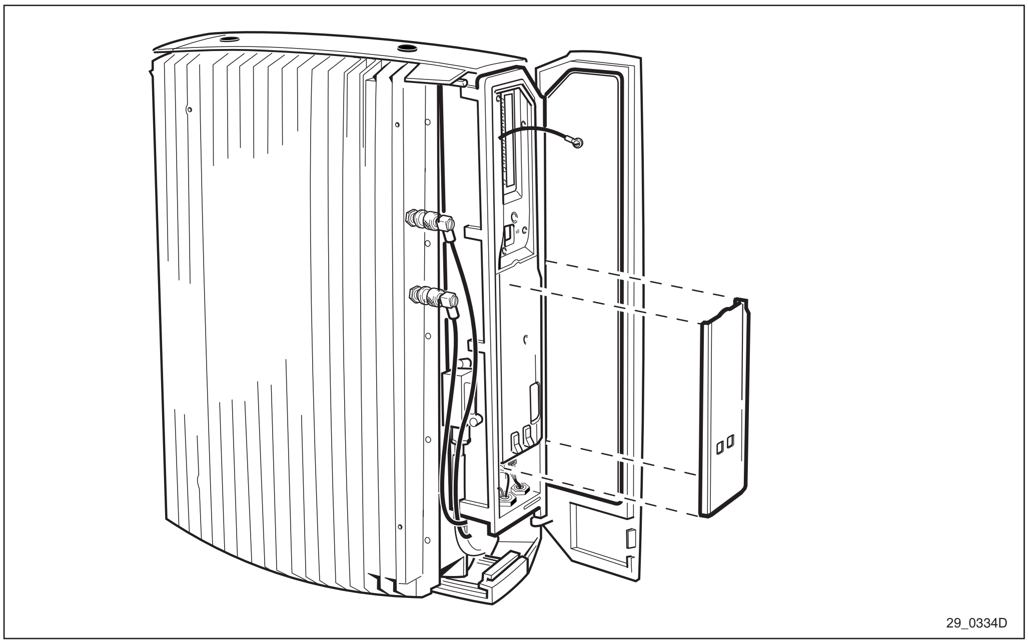

Figure 142 Removing the outer protection cover

7. Remove the outer protection cover.

Note: If the new construction of the covering plate is being used, unsnap it.

8. Disconnect the internal transmission cable and the internal AC cable.

9. Remove the inner protection cover.
10. Disconnect the AC mains power cable going between the AC box and the EMC card.
11. Dismount the sector antenna.
12. Disconnect the transmission network cable and external alarm cable going to the EMC card.
13. Connect the new cable, *see Figure 139 on page 199*.
14. Remount the protection covers.
15. Remount the sun-shields.

Put into operation

1. Switch on the AC mains power switch located outside the RBS.
2. Switch on the AC power and battery switch on the EMC card.
3. Put the cabinet into Remote mode.
4. Close the installation box door.

Test after Corrective Action

1. Make a MS test call to verify the antennas. *See chapter Optional Tests*.
2. Perform the checklist in *Table 28 on page 237*.

11.2.11 Fuses

Fault Localisation

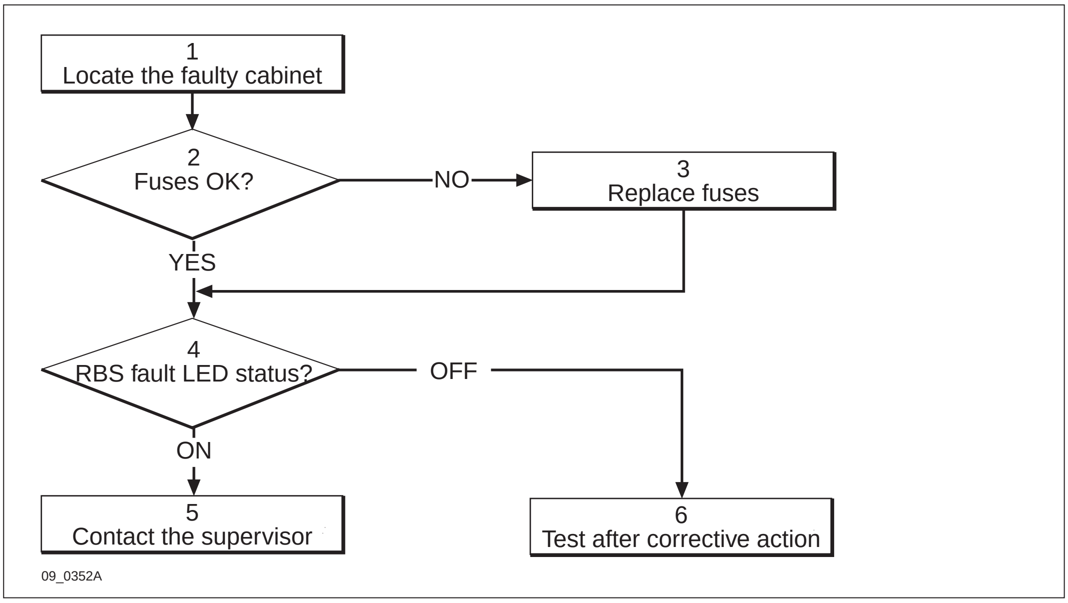

Figure 143 Fuse fault localisation

1. Locate the faulty cabinet.

Locate the faulty cabinet according to work order information.

2. Fuses OK?

   Are the fuses OK?

3. Replace the fuses.

   Replace the fuses according to instructions in *Section Replacement on page 203*.

4. RBS fault LED status.

   The red LED indicator labelled fault on the DP indicates that a fault has been detected in the cabinet.

5. Contact the supervisor.

   Contact the supervisor or manager who will take further action, for example, to consult an FSC.

6. Test after corrective action.

   Perform the checklist in *Table 28 on page 237*.

Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Switch off the AC power and battery swith on the EMC card.

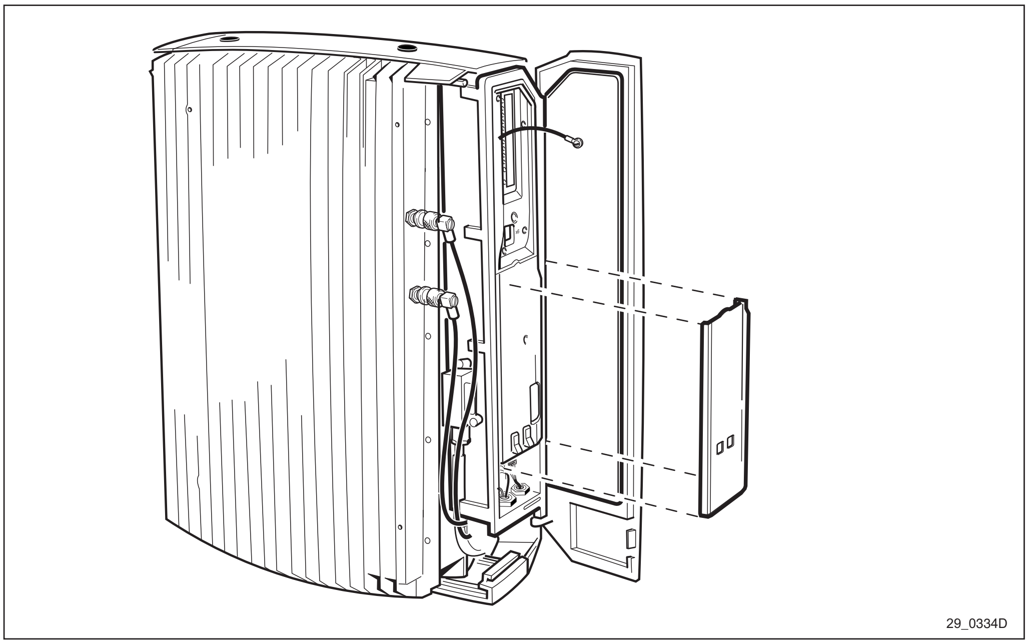

Figure 144 Removing the outer protection cover

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

Note: There are two different types of outer protection covers. One of them, described above, is snapped to the inner protection cover. The other one is the outer protection cover, and it has a screw.

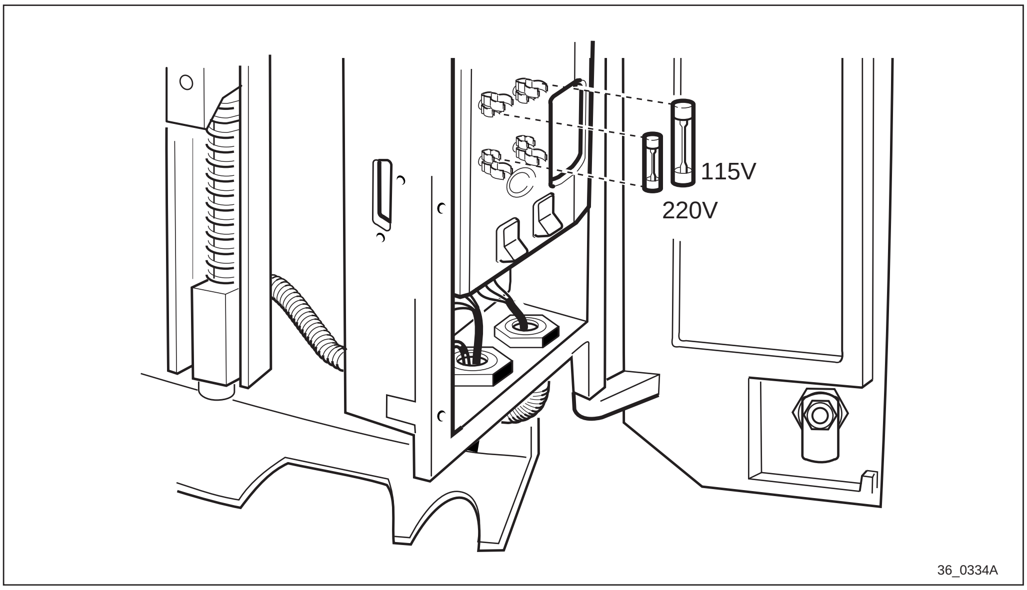

Figure 145 Replacing the fuses

5. Replace the faulty fuse(s) with the new ones.
6. Remount the outer protection cover.

Put into operation

1. Switch on the AC power and battery switch on the EMC card.
2. Put the cabinet in Remote mode.
3. Close the installation box door.

Test after Corrective Action

1. Make a MS test call to verify the antennas. *See chapter Optional Tests*.
2. Perform the checklist in *Table 28 on page 237*.

11.2.12 EMC Card

Fault Localisation

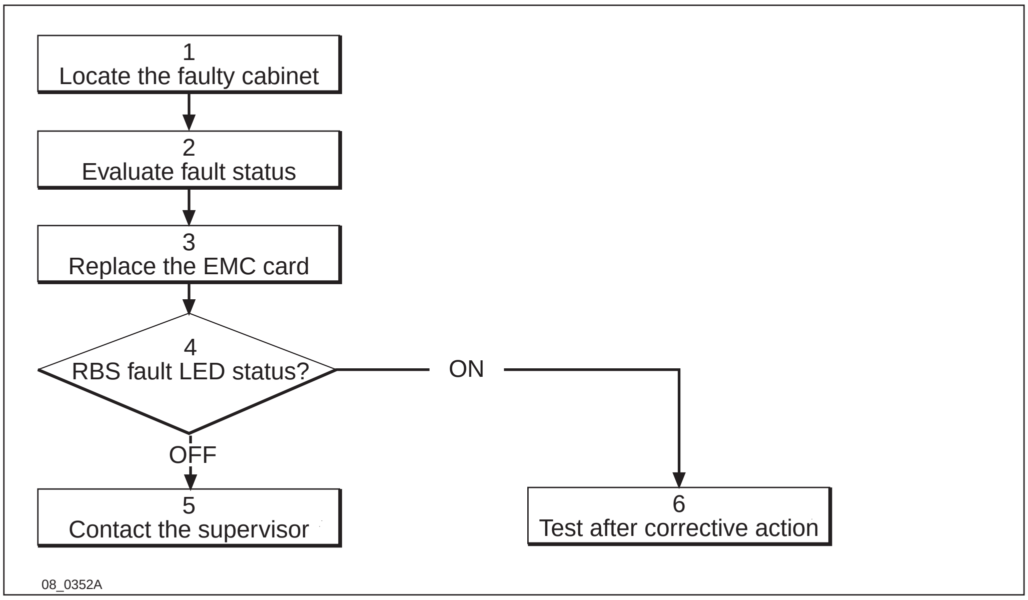

Figure 146 EMC card fault localisation

1. Locate the faulty cabinet.

   Locate the faulty cabinet according to work order information.

2. Evaluate fault status.

   The fault status of the 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 cabinet.

   • Use OMT to display all fault(s) in the RBS. For more information on OMT *see section Display fult information* in:

OMT User's Manual	*EN/LZT 123 2674*

3. Replace the EMC card.

   Replace the EMC card according to instructions in *Section Replacement on page 206.*

4. RBS fault LED status.

   The red LED indicator labelled fault on the DP indicates that one or more a faults have been detected in the cabinet.

5. Contact the supervisor.

   Contact the supervisor or manager who will take further action, for example, to consult an FSC.

6. Test after corrective action.

- Make a MS test call to verify the antennas. *See chapter Optional Tests*.
- Perform the checklist in *Table 28 on page 237*.

Replacement

CAUTION

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

CAUTION

Protection against ESD must be used when replacing a EMC card.

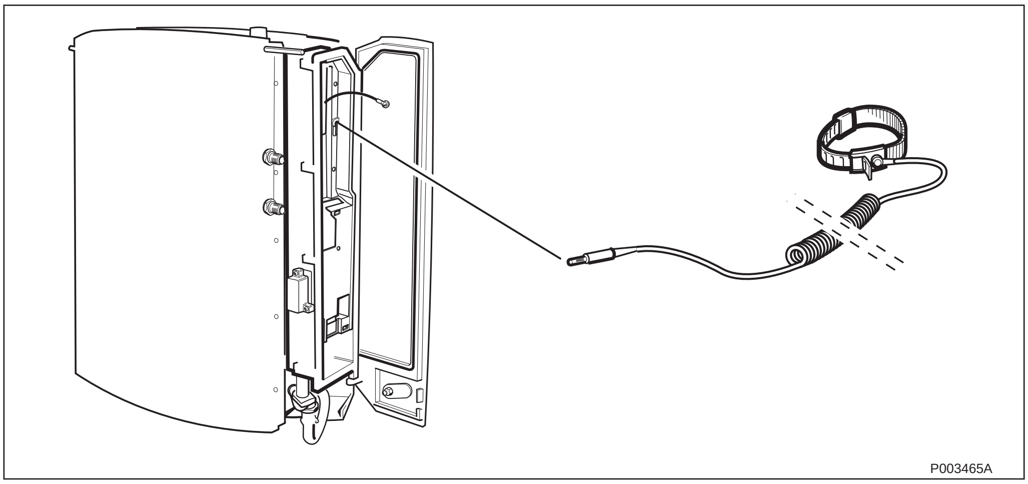

Figure 147 Connecting the ESD wrist strap

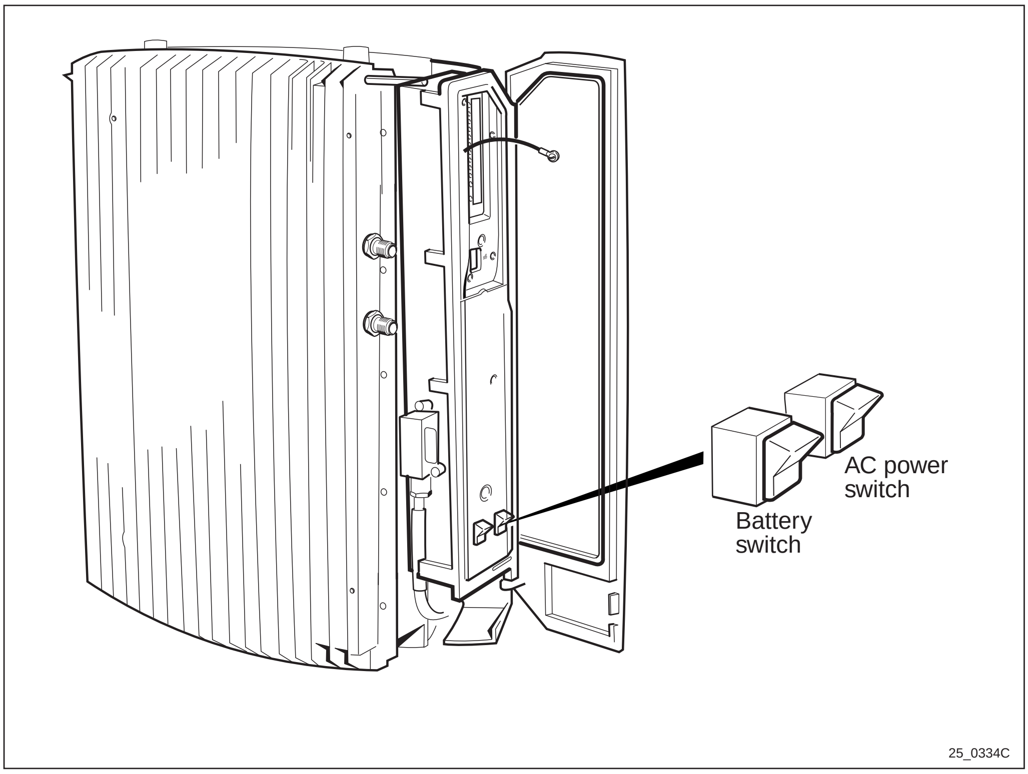

Figure 148 Battery and AC power switch

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Switch off the battery and AC power switch.
5. Switch off the AC mains power switch located outside the RBS.

Note: Make sure that no LED’s are lit.

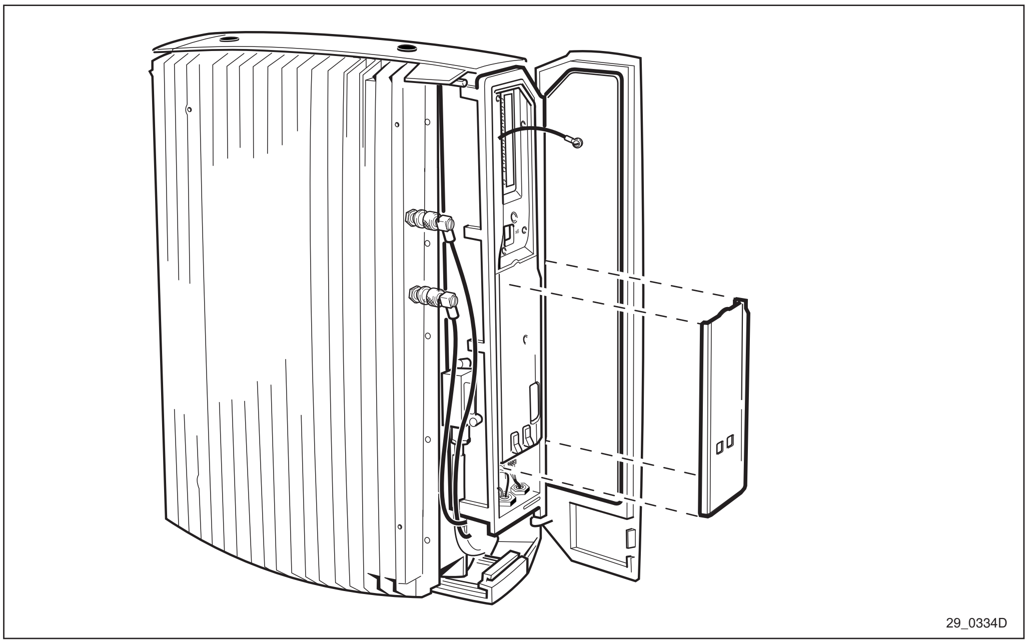

Figure 149 Removing the outer protection cover

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

Note: There are two different types of outer protection covers. One of them, described above, is snapped to the inner protection cover. The other one is the outer protection cover, and it has a screw.

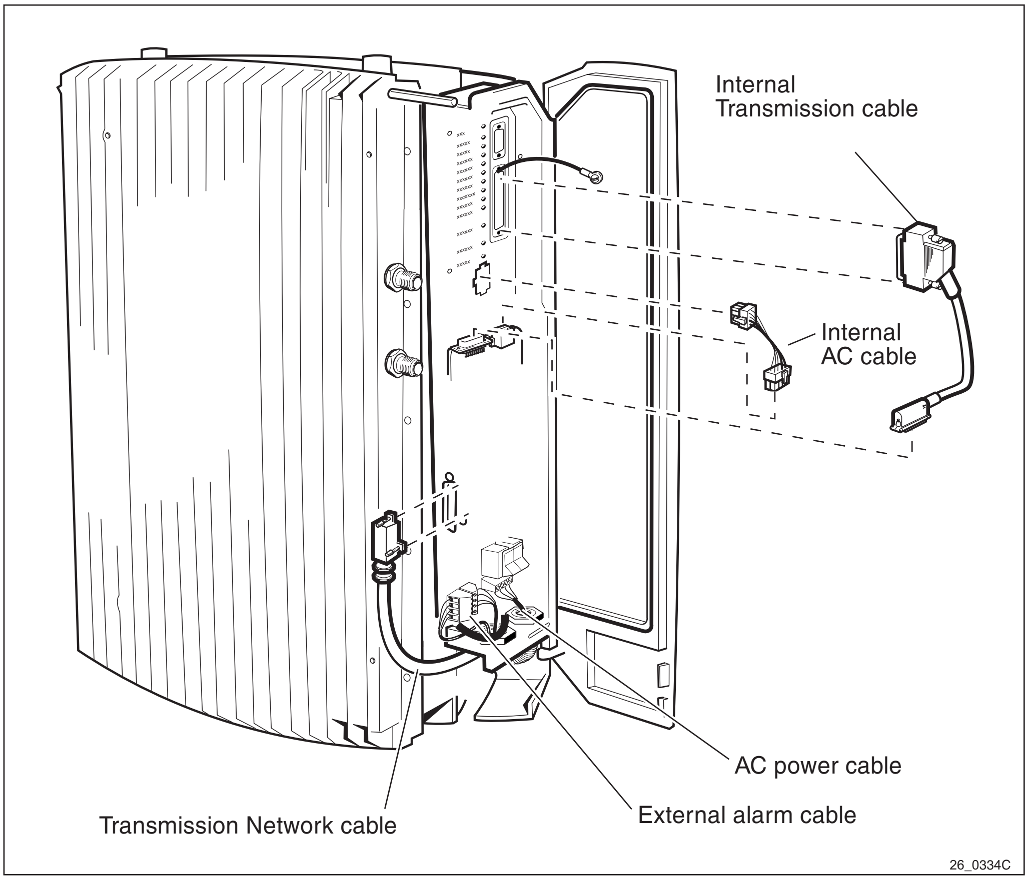

Figure 150 Overview of the cables

Note: You have 10 seconds to make the connection described in steps 4–5. This must be done to keep the PCM-line link between the BSC and other RBS(s).

7. Disconnect the transmission network cable from the installation box.

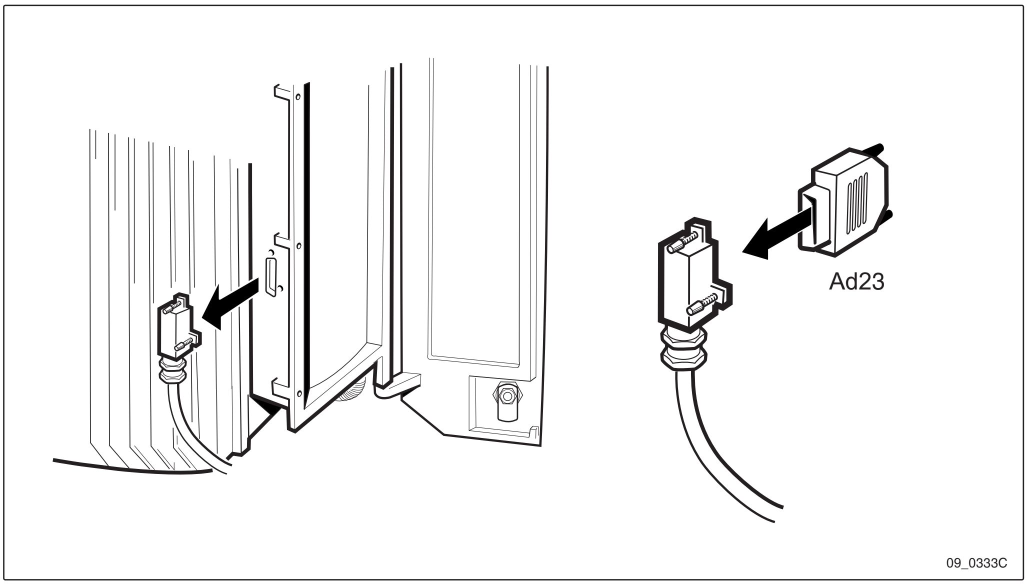

Figure 151 Mounting the adapter

8. Mount the adapter on the transmission network cable within 10 seconds.

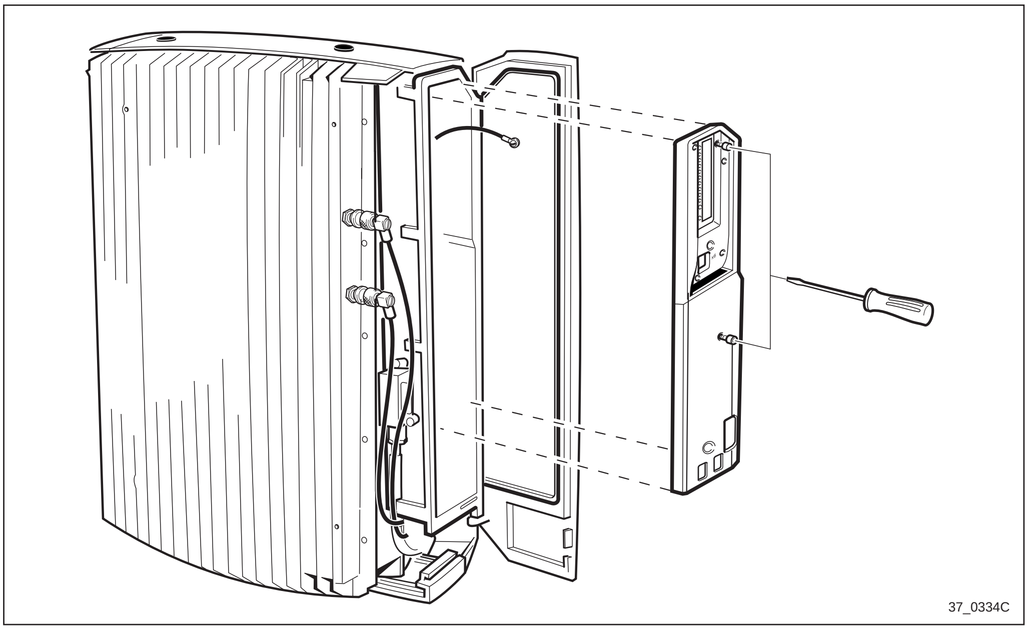

Figure 152 Removing the inner protection cover

9. Remove the inner protection cover by unscrewing the two torx screws.
10. Disconnect the internal AC cable and internal transmission cable going from the EMC card to the Cabinet.
11. Disconnect the AC mains power cable and external alarm cable going to the EMC card.

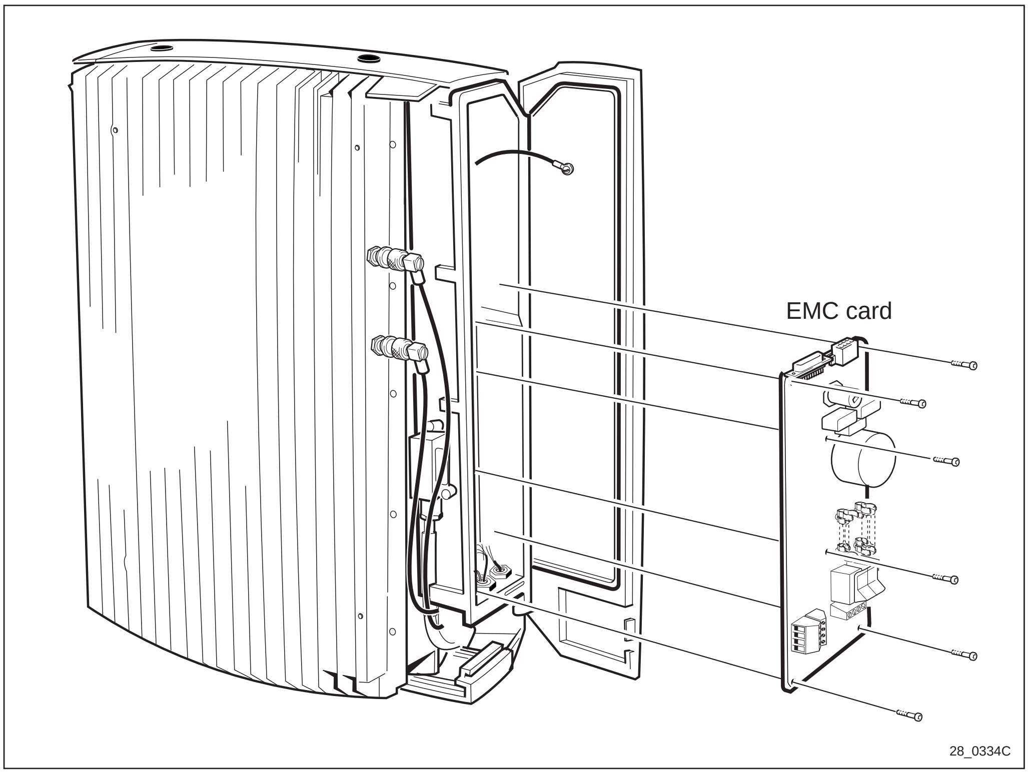

Figure 153 Removing the EMC card

12. Unscrew the six screws and remove the card.
13. Mount the new card.
14. Make sure that the voltage selector is set for the right voltage used at the site.

Note: You have 10 seconds to make the connection described in step 12. This must be done to keep the PCM-line link between the BSC and other RBS(s).

15. Disconnect the adapter and reconnect the transmission network cable in the installation box, *see Figure 151 on page 209*.
16. Reconnect the internal AC cable and internal transmission cable going between the EMC card and the Cabinet.
17. Reconnect the AC mains power cable and external alarm cable going to the EMC card.

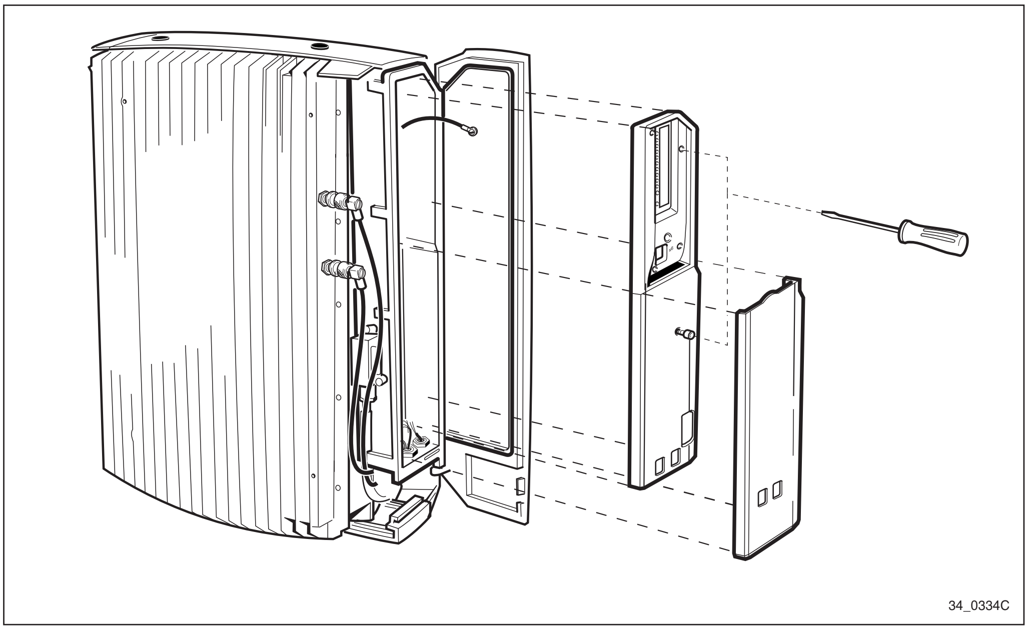

Figure 154 Remounting the protection covers

18. Remount the protection covers.

Put into operation

1. Switch on the AC mains power switch located outside the cabinet.
2. Switch on the AC power and battery switch on the EMC card.
3. Put the RBS into Remote mode.
4. Close the installation box door.

Test after Corrective Action

1. Make a MS test call to verify the antennas. *See chapter Optional Tests*.
2. Perform the checklist in *Table 28 on page 237*.

11.2.13 Mounting Base

Replacement

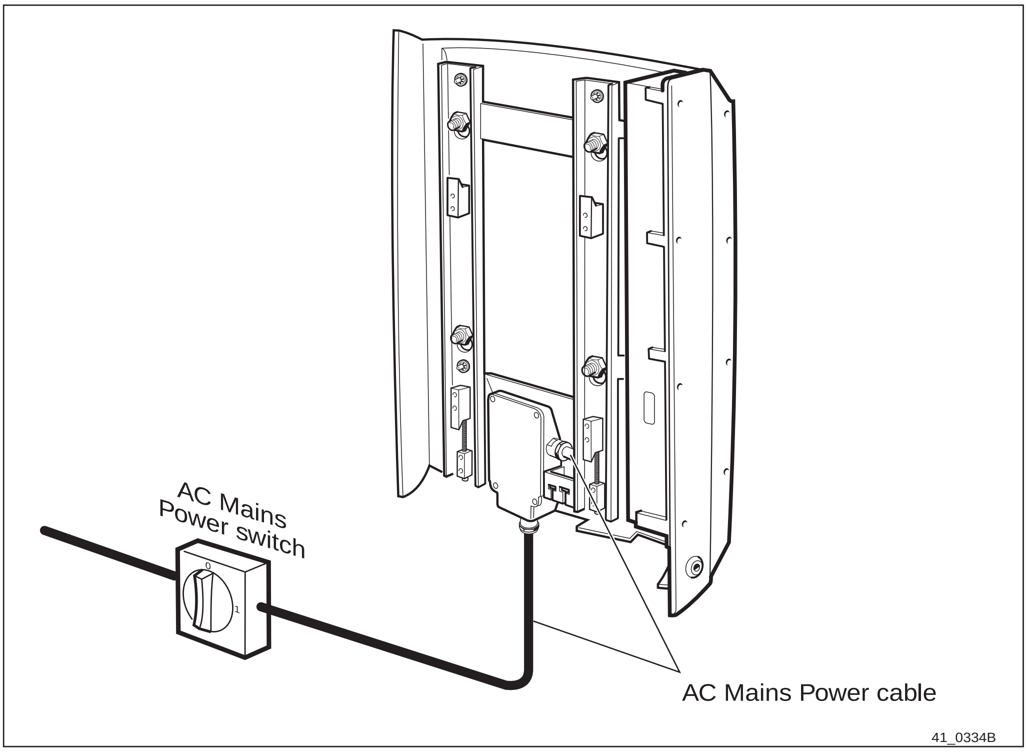

Figure 155 AC main power switch

1. Inform the OMC operator that the Cabinet will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Remove the sun-shields.
5. Remove the cabinet *see Section Replacement on page 189.*
6. Switch off the AC mains power switch located outside the RBS.
7. Disconnect the external alarm cable going to the EMC card.

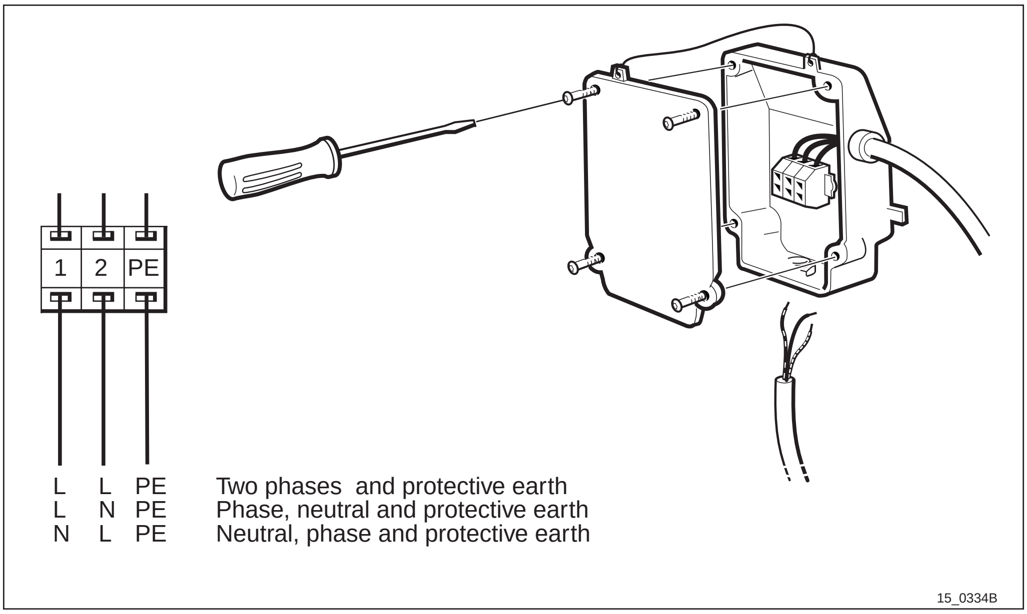

Figure 156 AC box

8. Remove the AC box cover.
9. Disconnect the AC mains power cable by pressing the locking inside the plinth.
10. Loosen the cable entry and pull out the cable.

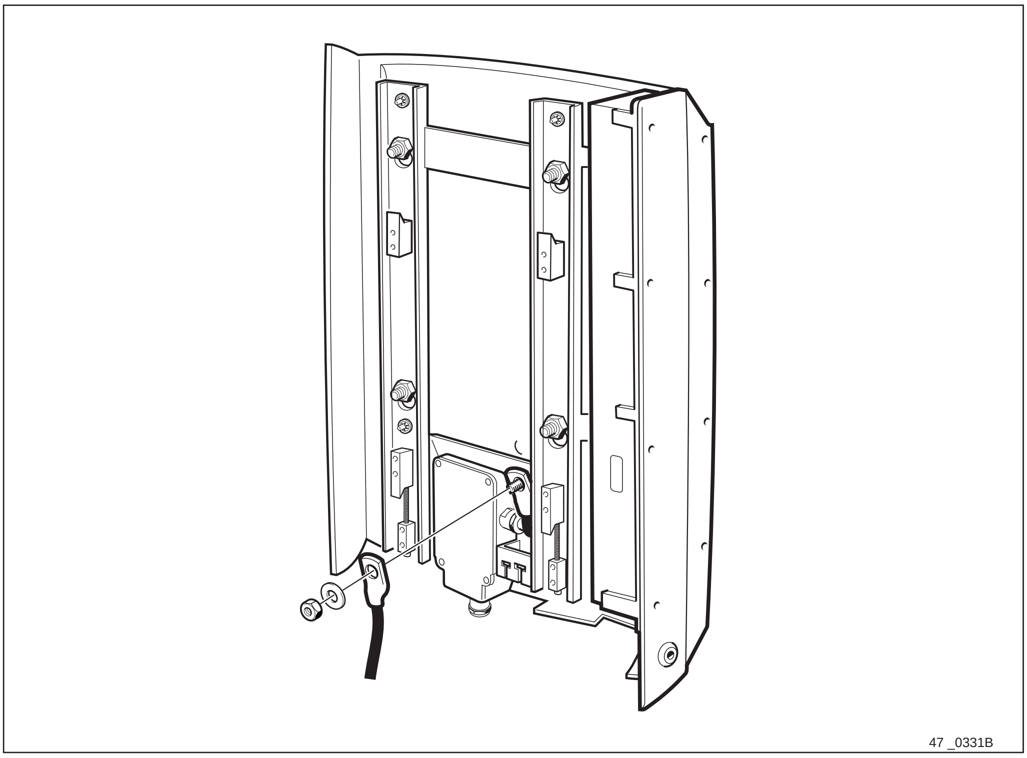

Figure 157 Removing the lightning protection

11. Remove the lightning protection.
12. Unscrew the four screws.

13. Lift up the mounting base and pull it towards you.
14. Place the mounting base on the ground.
15. Mount the new mounting base on the mounting plate.
16. Tighten the four screws.

Note: For more information, *see chapter Preinstallation, section Connecting AC Mains Power*.

17. Open the AC box and reconnect the AC mains power cable.
18. Tighten the cable entry an remount the AC box cover.
19. To remount the cabinet on the mounting base, *see chapter Installation of RBS 2301*.

Put into Operation

1. Switch on the AC mains power switch located outside the cabinet.
2. Switch on the AC power and battery switch on the EMC card.
3. Put the RBS into Remote mode.
4. Close the installation box door.

Test after Corrective Action

1. Make a MS test call to verify the antennas. *See chapter Optional Tests*.
2. Perform the checklist in *Table 28 on page 237*.

11.2.14 Internal Synchronisation (Calibrate Oscillator)

Fault Localisation

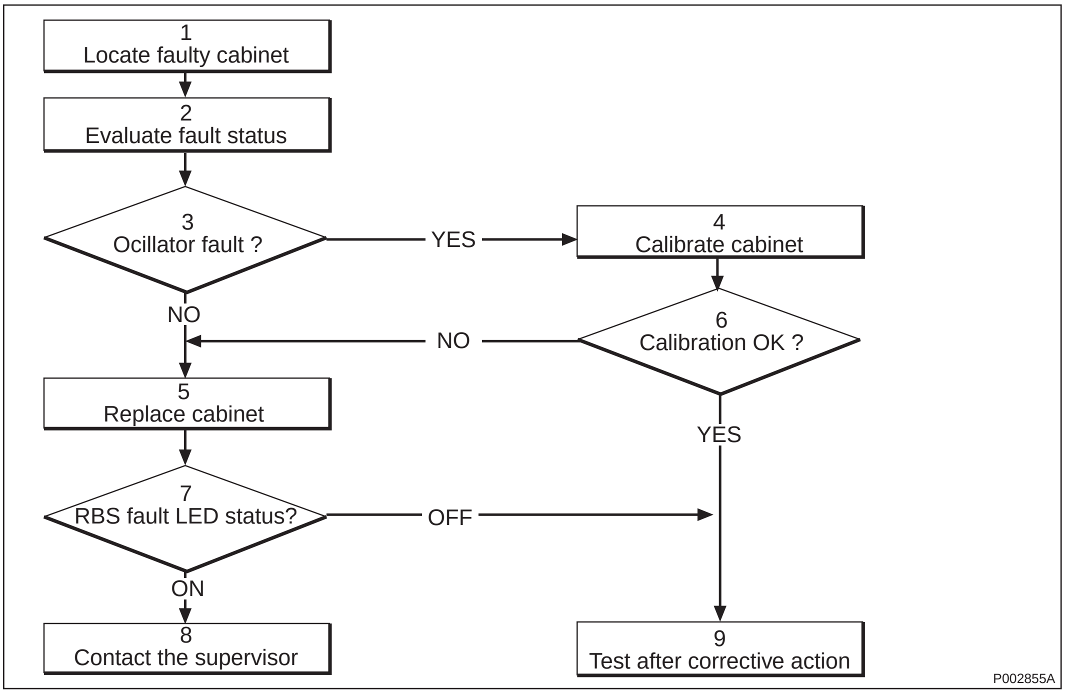

Figure 158 Internal Synchronisation Fault Localisation

1. Locate the faulty cabinet.

   Locate the faulty cabinet according to work order information.

2. Evaluate Fault Status.

   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 cabinet.

   • Use OMT to display all fault(s) in the RBS. Use OMT2 to monitor the cabinet. For more information on the use of OMT2, *see section OMT2 Commands* in

OMT User's Manual	*EN/LZT 123 2674*

3. Oscillator Fault.

   Is the alarm "Timing Unit VCO ageing" in the internal fault map class 2A or "Timing unit VCO fault" in the internal map class 1A?

4. Calibrate Cabinet.

   Perform a calibration on the optional reference oscillator according to instructions in *Section 11.3.6 on page 236*.

5. Replace the Cabinet.

Replace the cabinet according to instruction in *Section Replacement on page 189*.

6. Calibration OK?

   Is the calibration OK?

7. RBS Fault LED Status.

   The red LED indicator labelled fault on the DP indicates that one or more faults have been detected within the cabinet.

8. Contact the Supervisior.

   Contact the supervisior or manager who will take further action, for example to consult an FSC.

9. Test after Corrective Action.

   • Make an MS test call to verify the cabinet, *see chapter Optional Tests*.

   • Perform the checklist, *see Table 28 on page 237*.

Replacement

To perform this activity *see Section Replacement on page 189*.

Test after Corrective Action

1. Make an MS test call to verify the cabinet, *see chapter Optional Tests*.
2. Perform the checklist, *see Table 28 on page 237*.

11.3 Preventive Maintenance

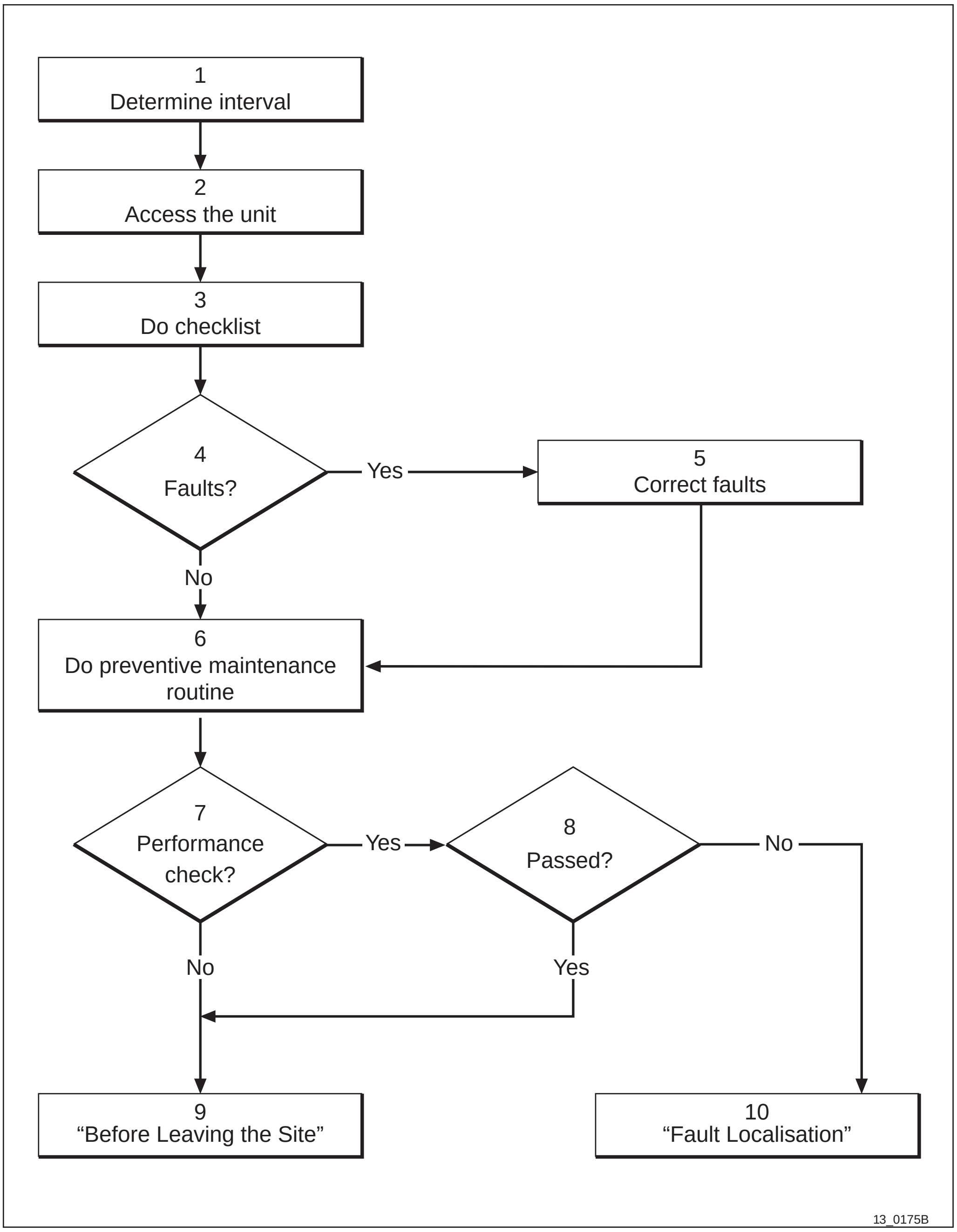

Figure 159 Preventive Maintenance Process

Determine interval (1)

Use the table in *section Preventive Maintenance Intervals*to determine which routines must be performed. Always start with the most frequent routine.

Access the unit (2)

Refer to the beginnning of each section in this chapter for instructions how to access the unit.

Do checklist (3)

Do the checklist first. The purpose of the checklist is to help determine maintenence requirements without affecting the operation of the Cabinet.

Faults? (4)

If the checklist finds a fault, use *section Correct faults*.

Correct faults (5)

This section is created to clear the fault or determine if a person with special qualifications should respond to clear the fault. When possible, correct the faults found when using the checklist before doing the preventive maintenance routine.

Do preventive maintenance routine (6)

Do preventive maintenance routine according to instructions in this chapter. All routines should be performed with power off unless specifically stated otherwise.

Performance check? (7)

Some units have perfomance checks that should be done.

Passed? (8)

If a fault is discovered by the performance check, go to *section Fault Localisation* for instructions on how to correct it.

“Before Leaving the Site” (9)

Look at *section Before Leaving the Site* and perform the checklist provided.

“Fault localisation” (10)

If the performance check uncovers a fault, use *section Fault Localisation*.

11.3.1 Preventive Maintenance Intervals

The interval between inspections at each RBS site may vary depending upon the enviromental conditions found there. Outdoor sites receive greater exposure to larger amounts of contaminants and require more frequent maintenance. As a result, the RBS operator can decide to increase or decrease the recommended interval between inspections.

Table 25 Preventive maintenance table

1) Create and verify a checklist	This checklist shall be performed every time the RBS is visited
2) Change of battery	5 years between changes of the batteries
3) Cleaning of the cooling flanges	3-5 years between cleaning
4) Internal synchronisation (optional).	3 years between calibration
5) Check the Sunshields	Every time the RBS unit is controlled or repaired
6) Change of the EMC card	10 years between changes of the EMC card

11.3.2 Battery

Replacement

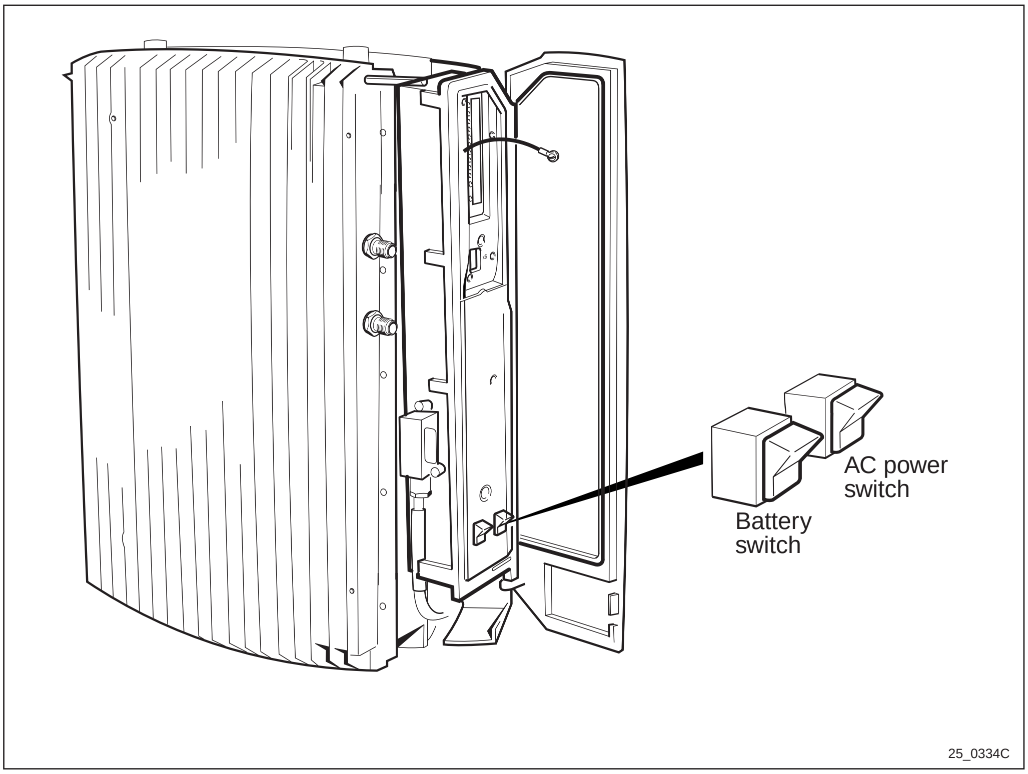

Figure 160 Battery and AC power switch

1. Inform the OMC operator that the Cabinet will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Switch off the battery switch.

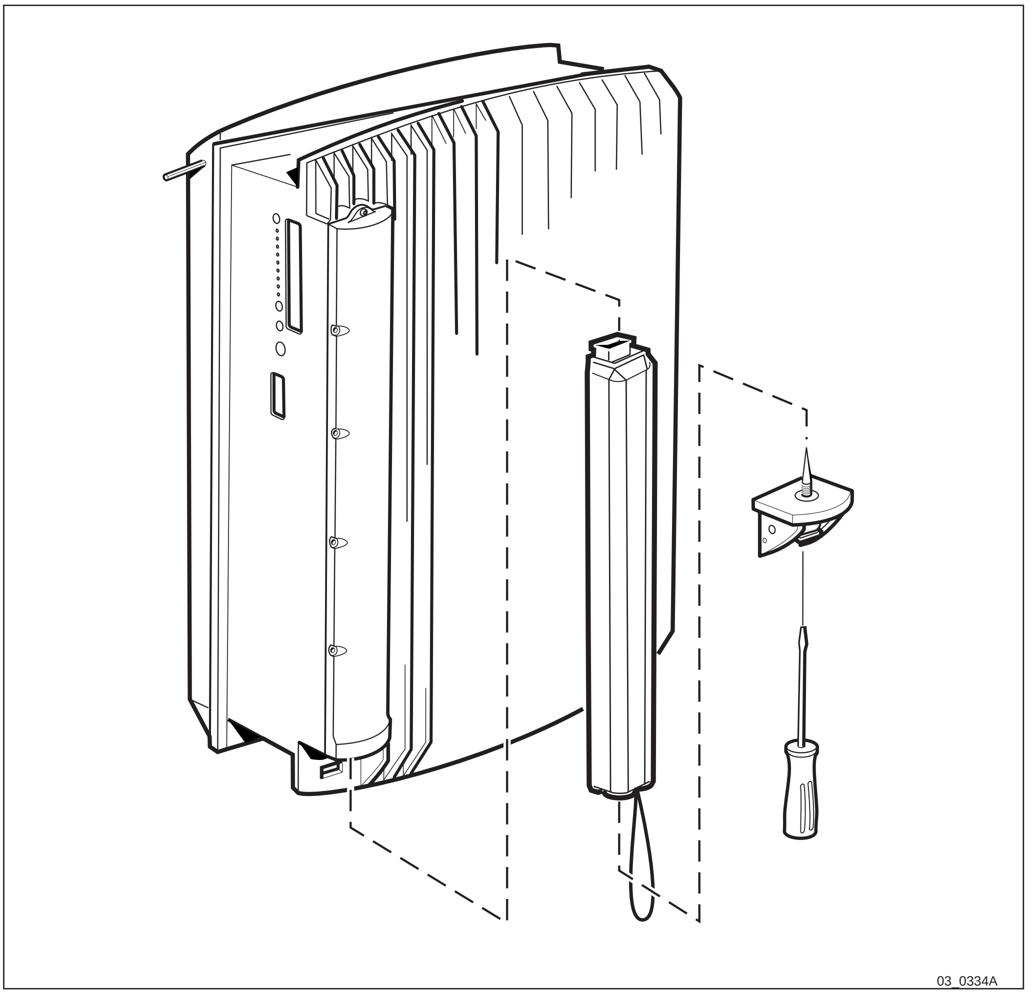

Figure 161 Battery cover

5. Unscrew the battery cover.
6. Replace the used battery with a new.

Note: The internal battery is guaranteed to last six years from the manufacturing date (year-week) on the battery label. Replace the battery before the date expires (manufacturing date + six years). Depending on the circumstances (temperature, frequency power failures, and so forth) at the site, the maintenance period may need to be shortened.

7. Remount the battery cover.
8. Switch on the battery switch.
9. Put the RBS in Remote mode.

Note: Make sure that the battery fault LED is not lit.

10. Close the installation box door.

Battery Checklist

All points in the checklist are written to be answered "Yes". Should any point have a "No" as a answer, complete the checklist first, then proceed to the *section Correction Faults*.

Table 26 Battery ckecklist

Item	**Yes**	**No**
1. Is the battery and battery box free of dirt, excessive grease, oxidation and corrosion?		
2. Is the battery casing free from discoloration and not deformed?		
3. Are the battery terminal free from excessive cuts or slices?		
4. Is the battery still within its replacement date?		
5. Has the battery held its acid? (no acid leaks)		
Signature:		
Date:		

Correct Faults

1. Clean the battery and battery box with a soft detergent and a soft brush. See that the oxidation and corrosion is taken away.
2. If the battery is found deformed or miscoloured, change the battery.
3. If the battery connector has visual damage, change the battery.
4. Replace the battery before the date expires (manufacturing date + six years).
5. If acid has leaked from the battery, change the battery.

11.3.3 Sun-Shields

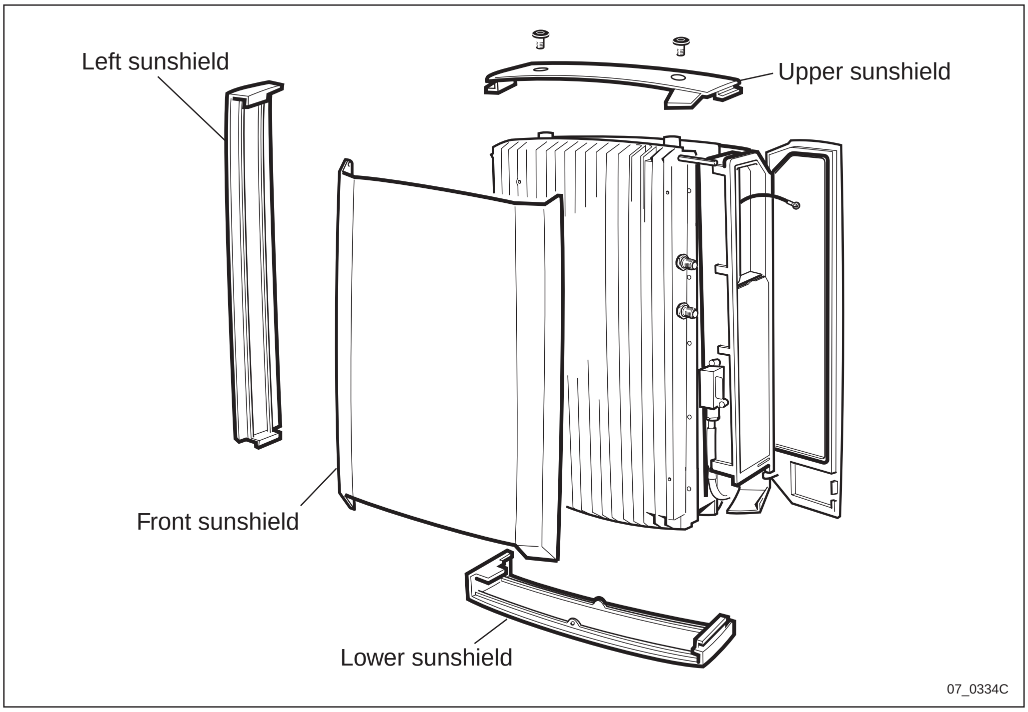

Figure 162 Sun-shields overview

Replacement of the Front Sun-Shield

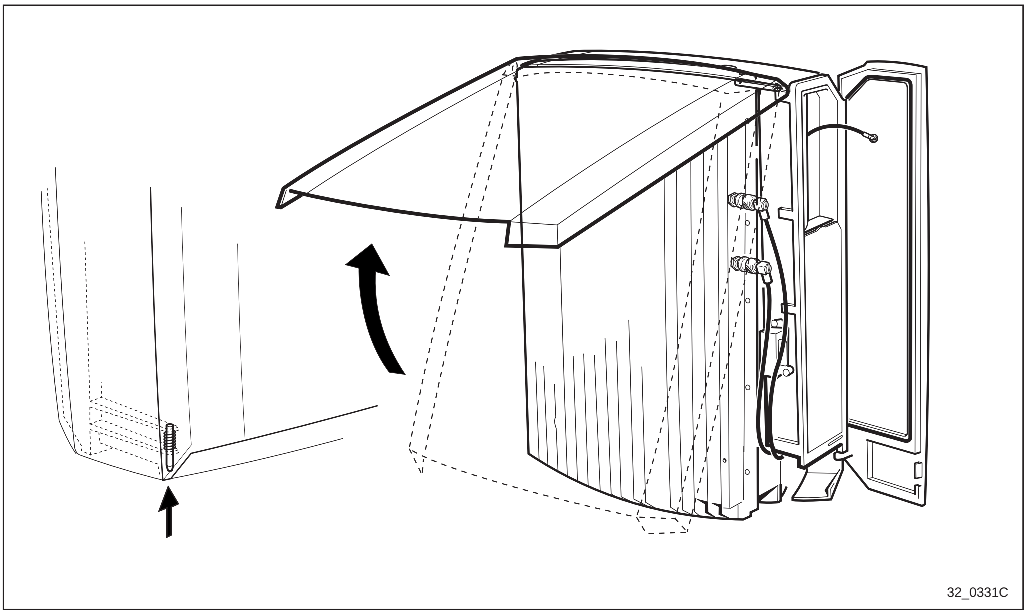

Figure 163 The front sun-shield

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Push up the pin, located in the lower left hand corner.

5. Pull out the lower part of the cover.
6. Carefully bend out the sides at the top of the cover so that the hinge snaps off and the cover can be removed.

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

7. Mount the new front sun-shield.
8. Carefully bend out the sides on the top, so they can snap on to the hinge.
9. Fold the cover down.
10. Press in the lower left hand corner, so that the spring locking pin snaps into position.
11. Put the RBS in Remote mode.
12. Close the installation box door.

Replacement of the Lower Sun-Shield

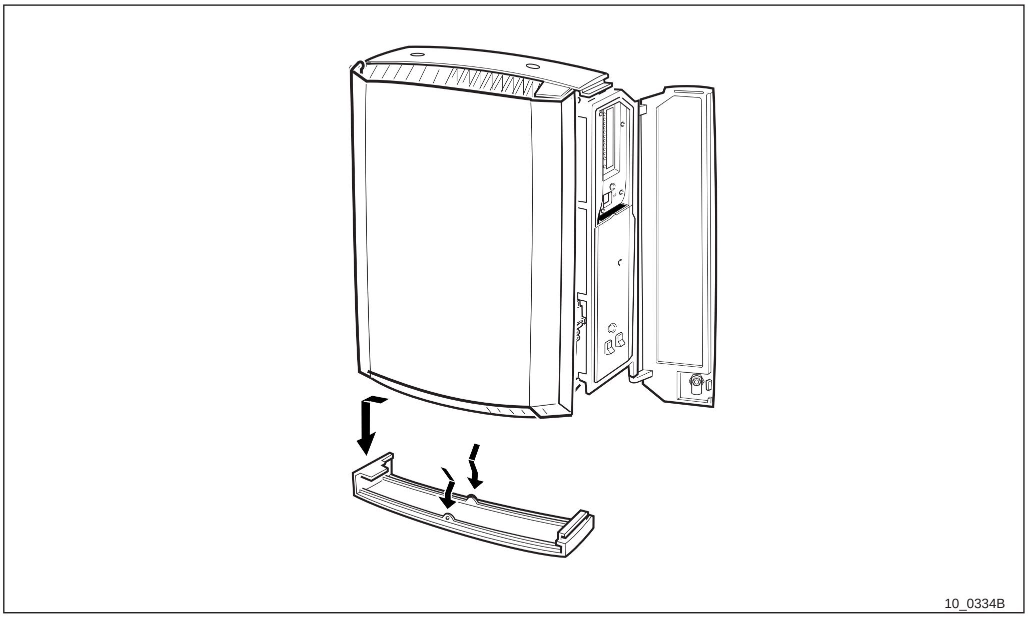

Figure 164 The lower sun-shield

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Unsnap the lower sun-shield by pressing the fasteners, located on the middle on the sun-shield.
5. Pull the lower sun-shield down and unhook it.
6. Mount the new sun-shield in its cut-out in the left side of the cabinet.
7. Snap the sun-shield into its position.

8. Put the RBS in Remote mode.
9. Close the installation box door.

Replacement of the Left Sun-Shield

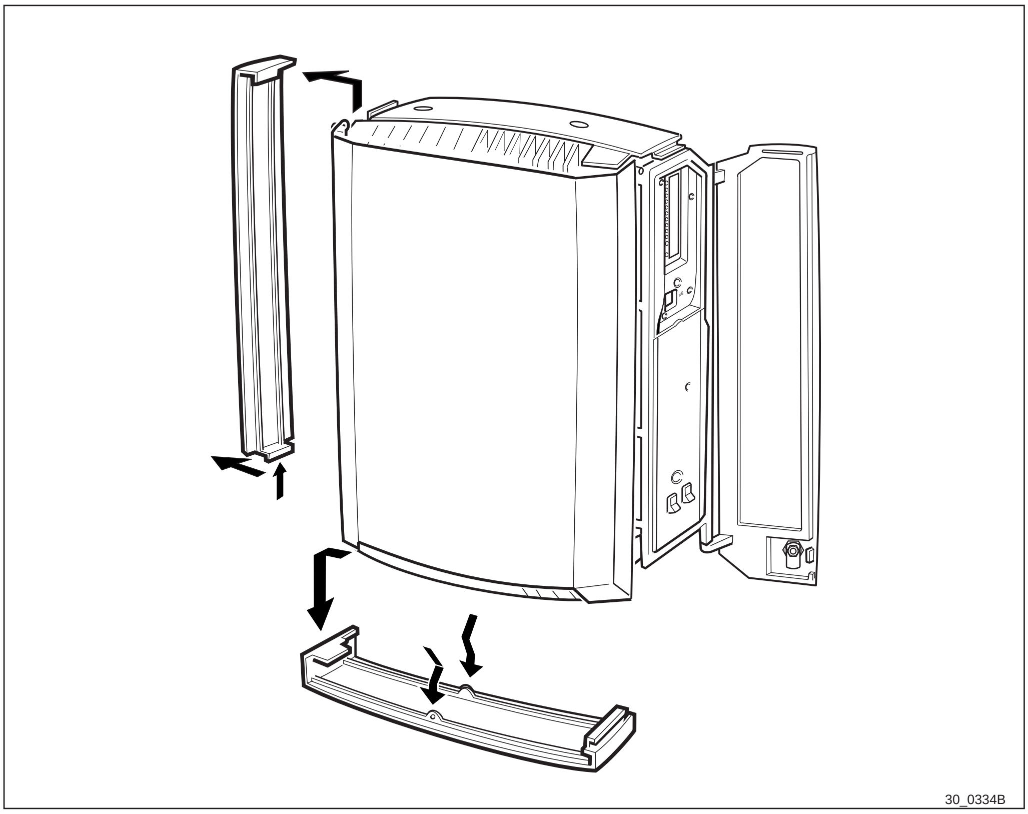

Figure 165 The left and lower sun-shield

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Remove the lower sun-shield.
5. Unsnap the left sun-shields lower part.
6. Lift it up and unhook it from the cabinet.
7. Hook on the new left sun-shield in its cut-out in the cabinet.
8. Snap the sun-shield into position.
9. Mount the lower sun-shield.
10. Put the RBS in Remote mode.
11. Close the installation box door.

Replacement of Upper Sun-Shield

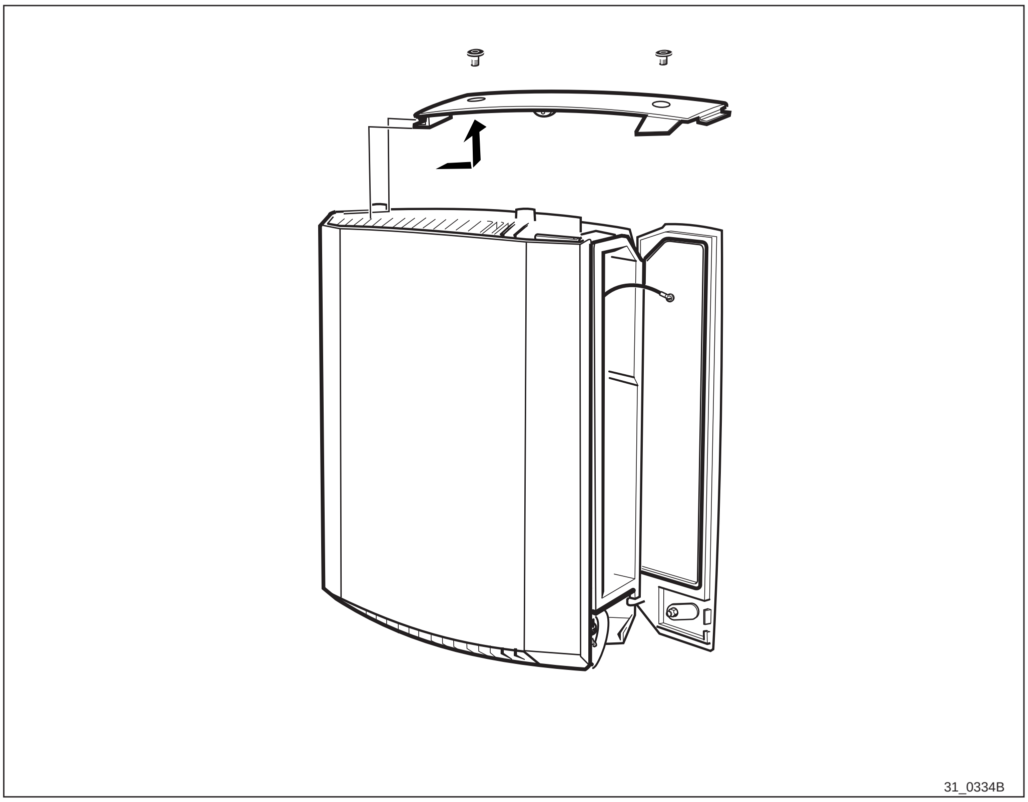

Figure 166 The upper sun-shield

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Remove the plugs.
5. Unsnap the upper sun-shield, by pressing on the middle.
6. Pull it up and to the right.
7. Remove the old sun-shield.
8. Mount the new sun-shield in its left cut-out in the cabinet.
9. Snap the sun-shield into its middle position.
10. Seal the two holes with the plugs.
11. Put the RBS in Remote mode.
12. Close the installation box door.

Replacement of the Rear Sun-Shield

Note: To remove the rear sun-shield there are specific steps prior to replacement to perform.

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.
4. Remove the sun-shields (front, lower, left and upper).
5. Remove the cabinet, *see Section Replacement on page 189*.

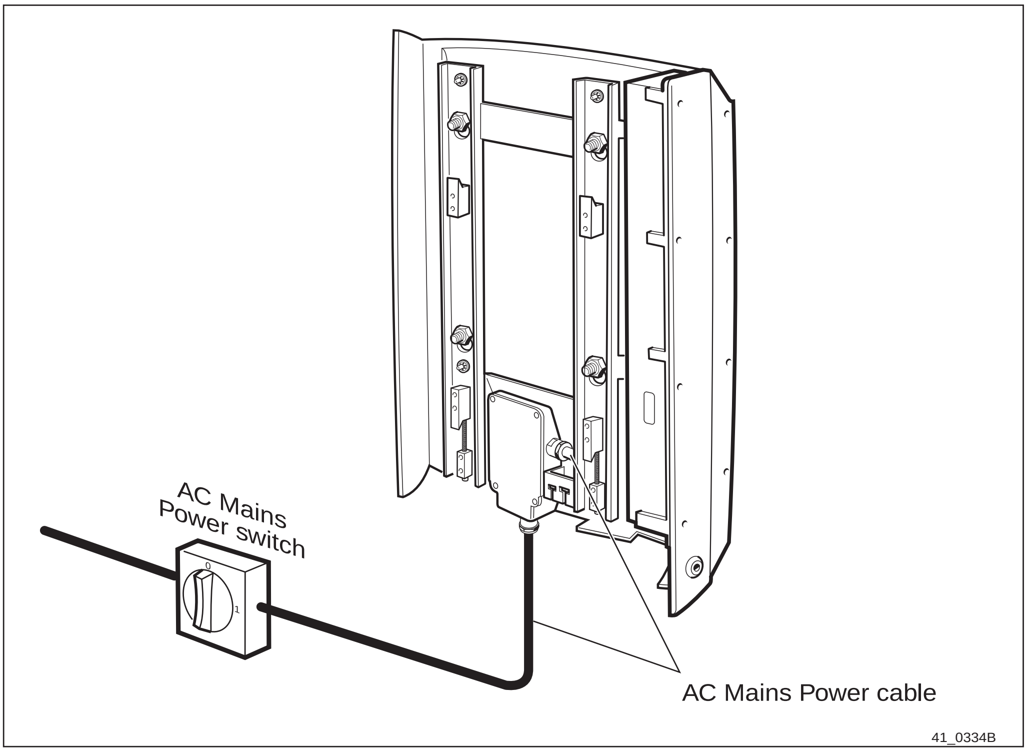

Figure 167 AC mains power switch

6. Switch off the AC mains power switch located outside the RBS.
7. Disconnect the external alarm cables.

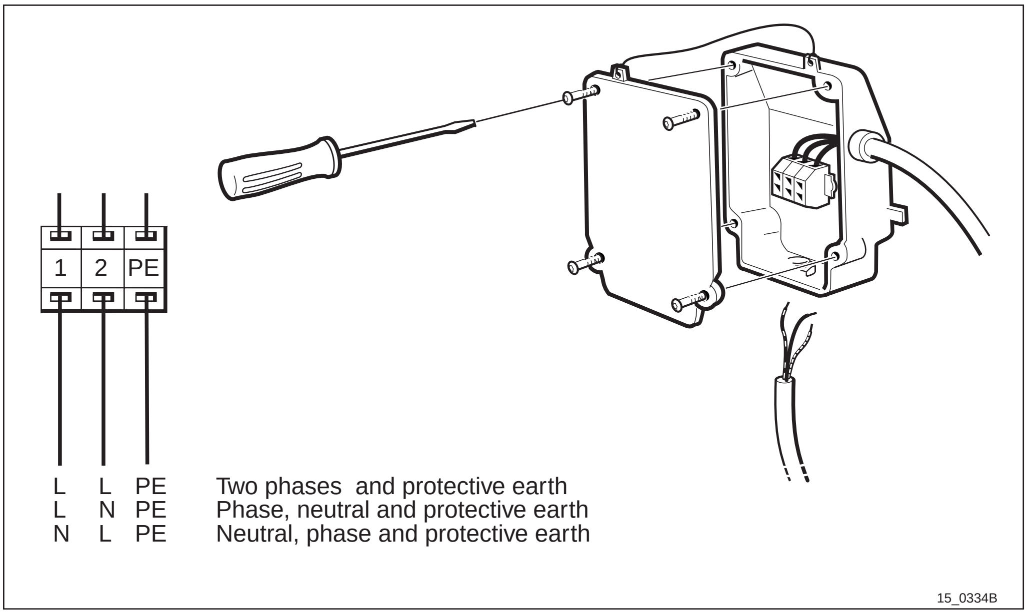

Figure 168 The AC box

8. Remove the AC box cover.
9. Disconnect the AC mains power cable by pressing the locking inside the plinth.
10. Loosen the cable entry and pull out the cable.

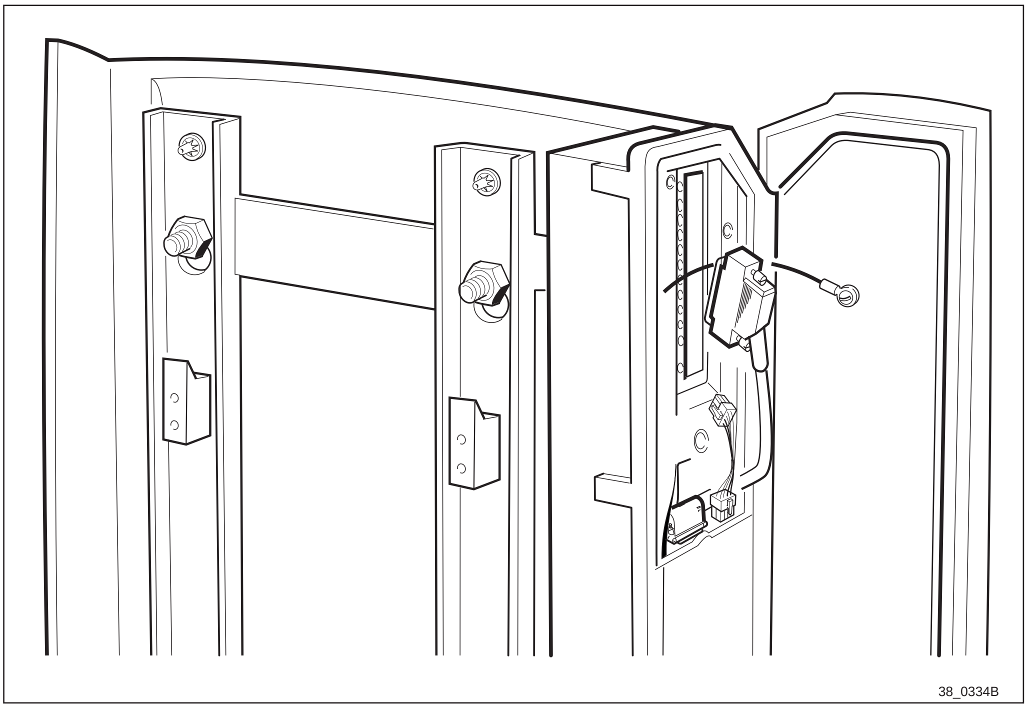

Figure 169 Removing the mounting base

11. Loosen the four nuts.
12. Lift up the mounting base and pull it towards you.
13. Place the mounting base on the ground.

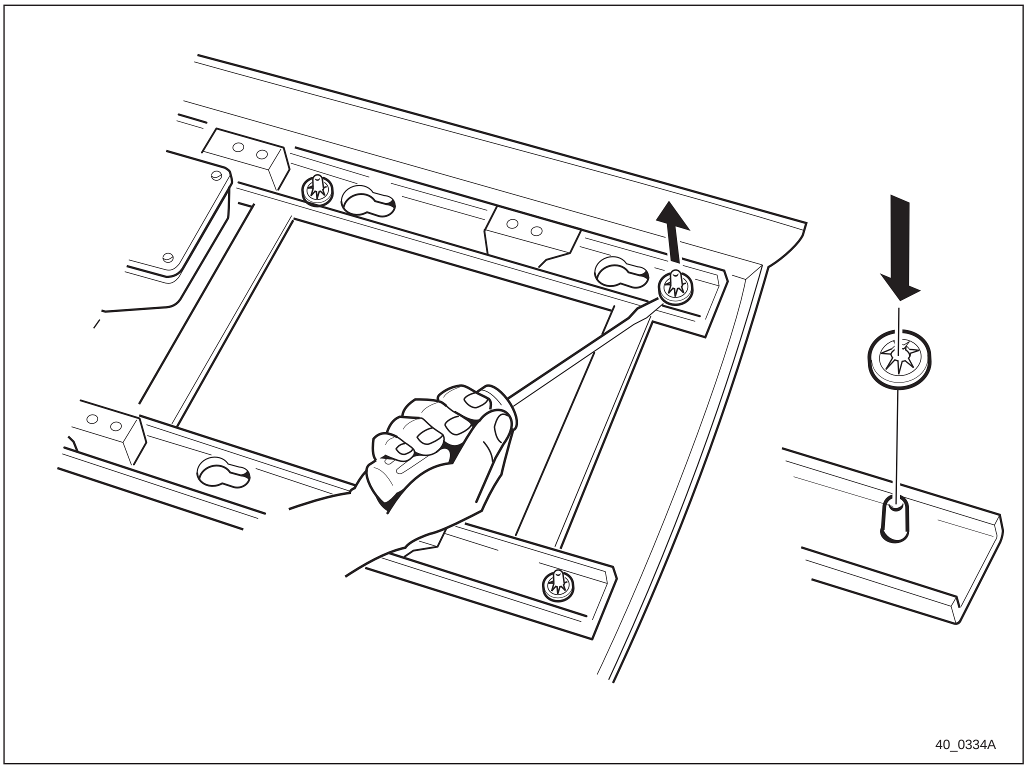

Figure 170 Removing the locking washers

14. Remove the four locking washers using a screwdriver.
15. Separate the rear sun-shield from the mounting base.
16. Mount the new sun-shield and the lock washers.
17. Replace the mounting base on the mounting plate. Tighten the nuts.
18. Replace the cables.

Note: For more information, *see chapter Preinstallation, section Connecting AC Mains Power*.

19. To replace the cabinet, *see chapter Installation of RBS 2301*.

Checklist

Table 27 Checklist sun-shield

Checklist	**Yes**	**No**	**Need of repair**
1) Are the Sun-shield dirty?			
2) Are the Sun-shield damaged?			
3) Are the Sun-shield discolored?			
4) Are the Sun-shield implemented in place ?			
Signature:			
Date:			

Correct Faults

1. Clean the sun-shield with a soft detergent.
2. Change the detail if it is damaged, discolored or deformed due to high temperature.
3. Change the sun-shield if it does not fit properly. Hooks that hold the sun-shield may be missing.

11.3.4 Cooling Flanges

Cleaning the Cooling Flanges

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.

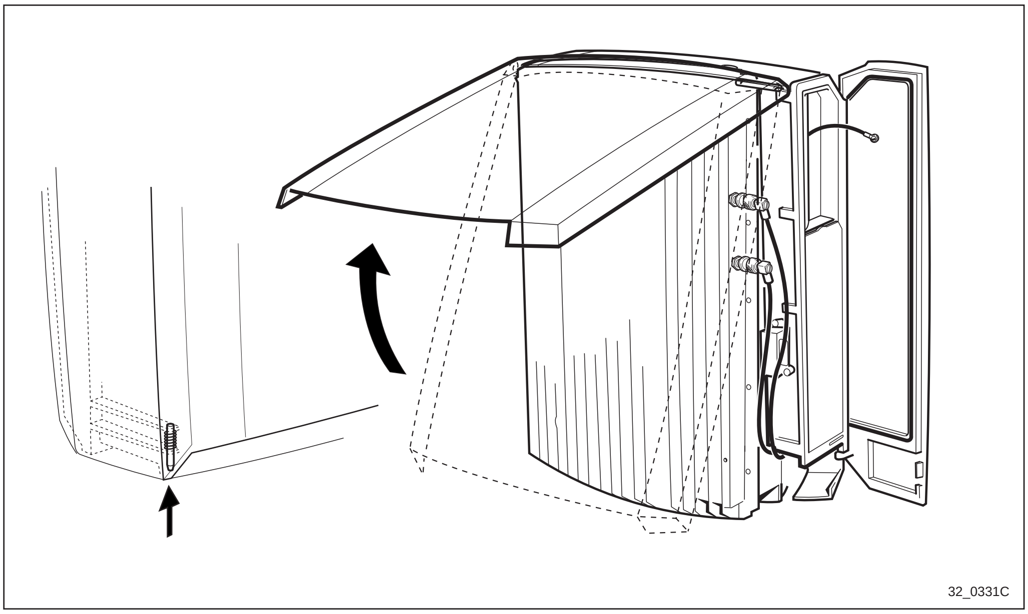

Figure 171 The front sun-shield

4. Push up the pin, located in the lower left hand corner.
5. Pull out the lower part of the cover.
6. Carefully bend out the sides at the top of the cover so that the hinge snaps off and the cover can be removed.
7. Clean the front cooling flanges with a soft brush.
8. Clean the sun-shield, if neccesary.
9. Clean the cooling flanges on the backside of the cabinet.

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

10. Mount the front sun-shield.

11. Carefully bend out the sides on the top, so they can snap on to the hinge.
12. Fold the cover down.
13. Press in the lower left hand corner, so that the spring locking pin snaps into position.
14. Put the RBS in Remote mode.
15. Close the installation box door.

11.3.5 EMC Card

Replacement

CAUTION

Protection against ESD must be used when replacing a EMC card.

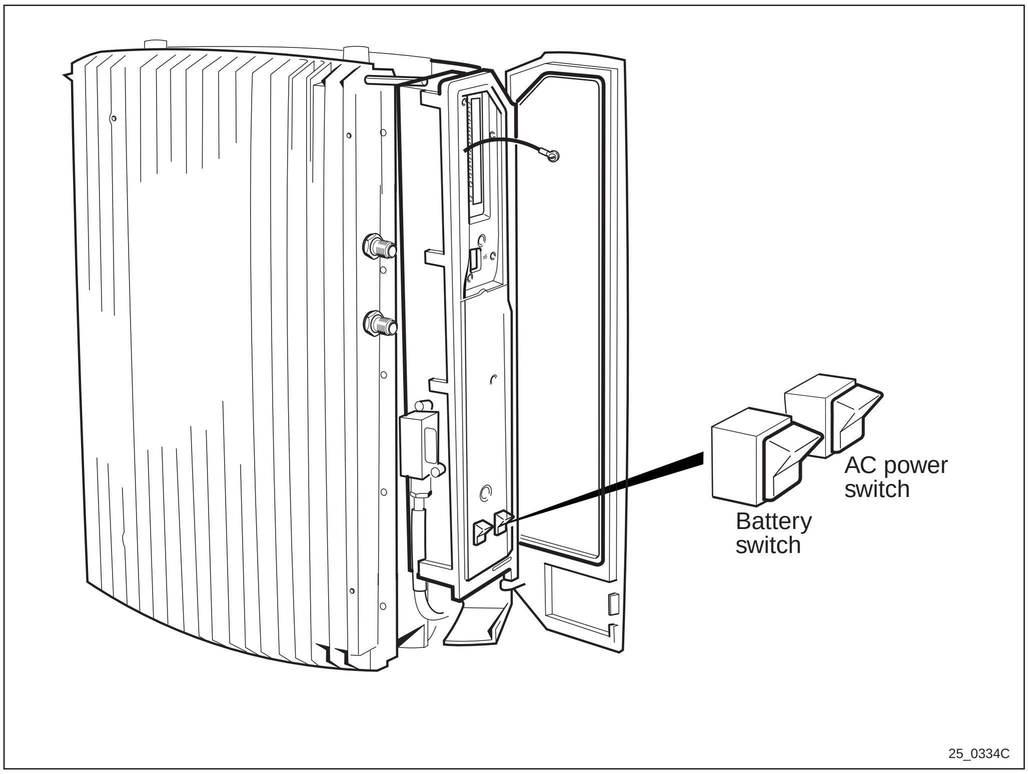

Figure 172 Battery and AC power switch

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Put the RBS in Local Mode.

4. Switch off the battery and AC power switch.
5. Switch off the AC mains power switch located outside the RBS.

Note: Make sure that no LEDs are lit.

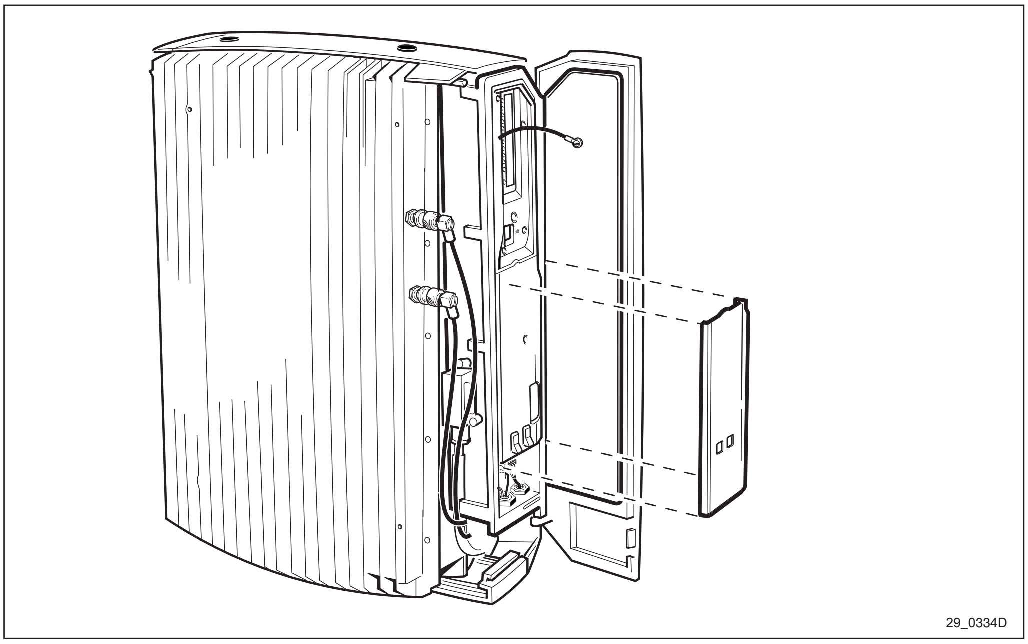

Figure 173 Removing the outer protection cover

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

Note: There are two different types of outer protection covers. One of them, described above, is snapped to the inner protection cover. The other one is the outer protection cover, and it has a screw.

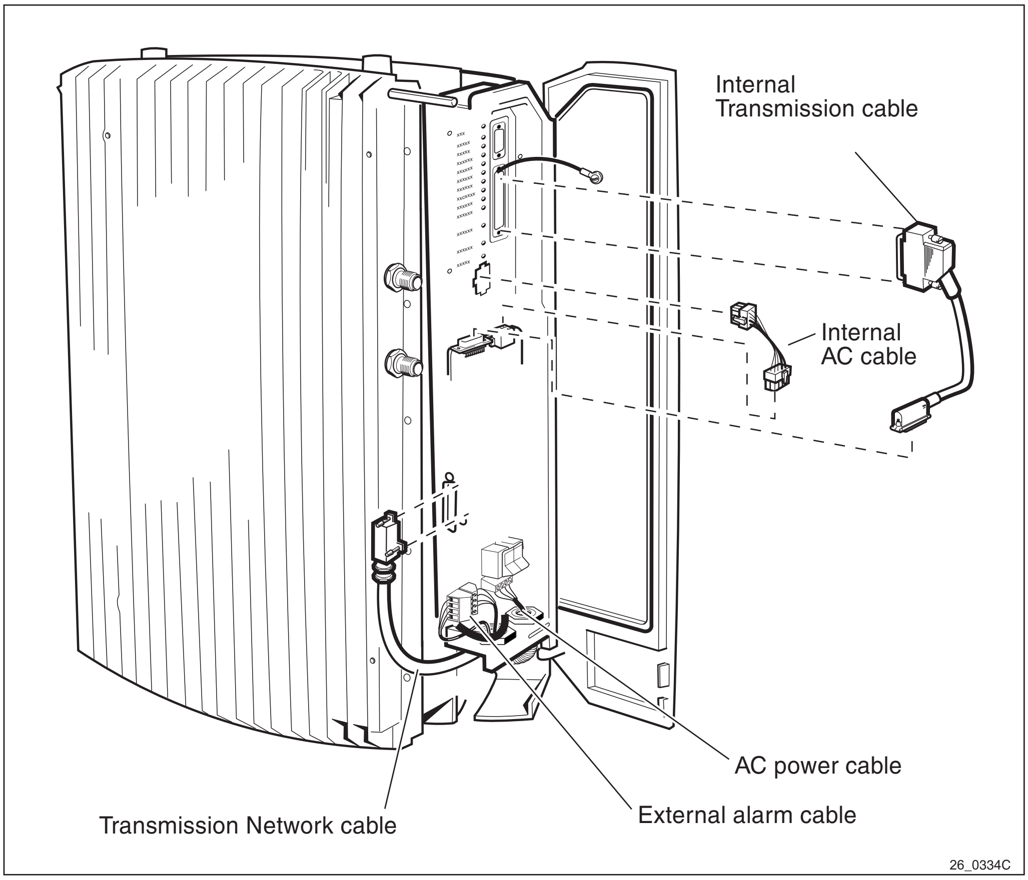

Figure 174 Overview of the cables

Note: You have 10 seconds to make the connection described in steps 4–5. This must be done to keep the PCM-line link between the BSC and other RBS(s).

7. Disconnect the transmission network cable from the installation box.

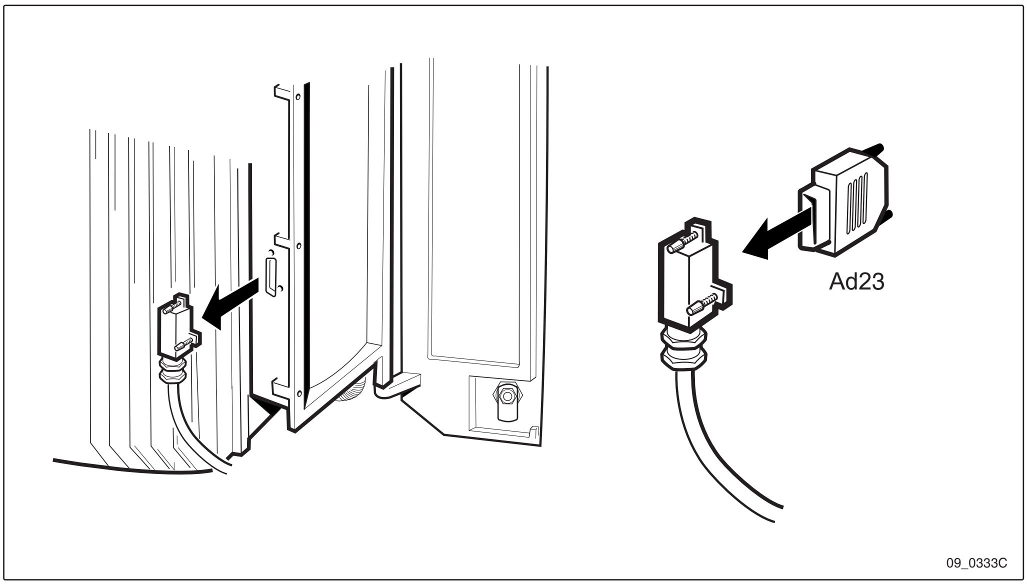

Figure 175 Mounting the adapter

8. Mount the adapter on the transmission network cable within 10 secounds.

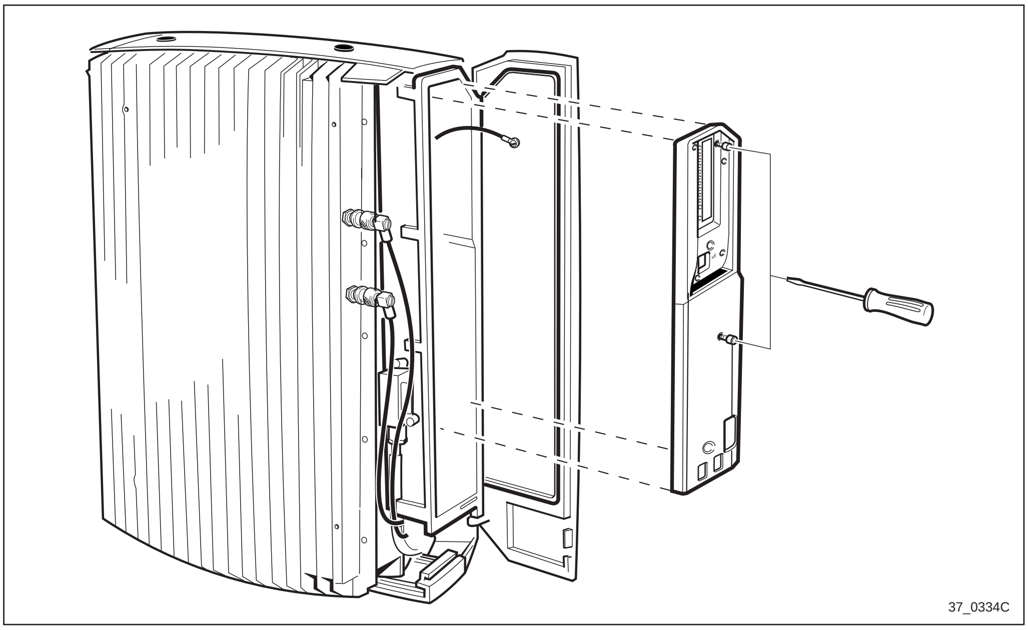

Figure 176 Removing the inner protection cover

9. Remove the inner protection cover by unscrewing the two torx screws.

10. Disconnect the internal AC cable and internal transmission cable going from the EMC card to the Cabinet.

11. Disconnect the AC mains power cable and external alarm cable going to the EMC card.

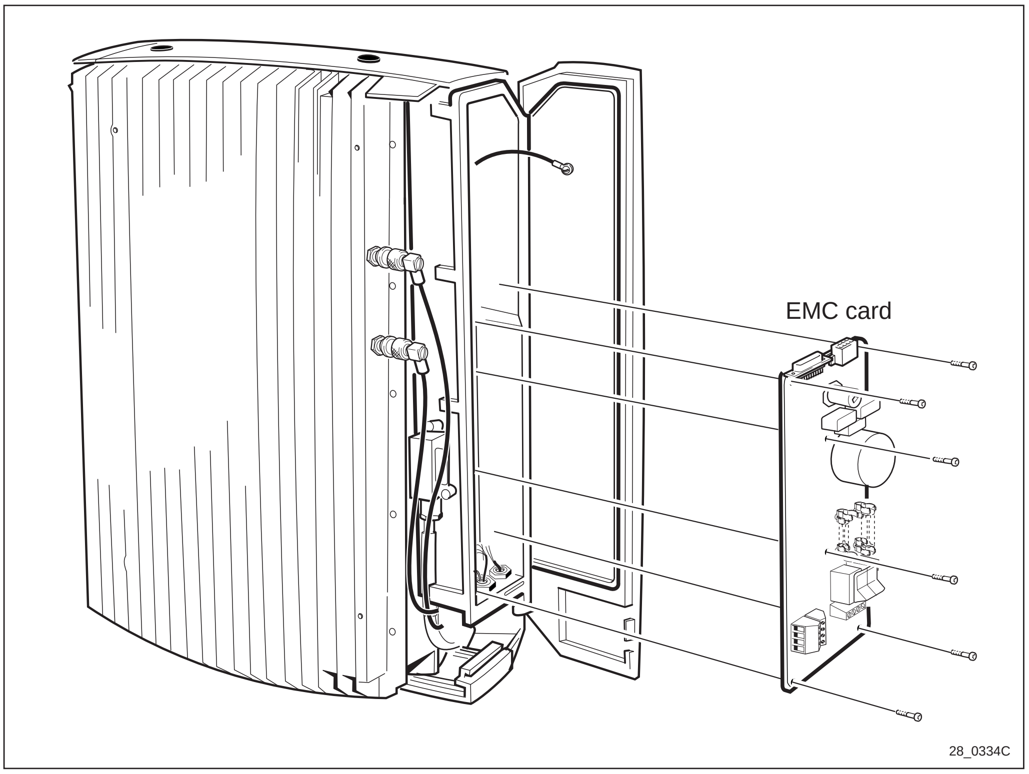

Figure 177 Removing the EMC card

12. Unscrew the six screws and remove the card.
13. Mount the new card.
14. Make sure that the voltage selector is set for the right voltage used at the site.

Note: You have 10 seconds to make the connection described in step 12. This must be done to keep the PCM-line link between the BSC and other RBS(s).

15. Disconnect the adapter and reconnect the transmission network cable in the installation box, *see Figure 175 on page 233*.
16. Reconnect the internal AC cable and internal transmission cable going between the EMC card and the Cabinet.
17. Reconnect the AC mains power cable and external alarm cable going to the EMC card.

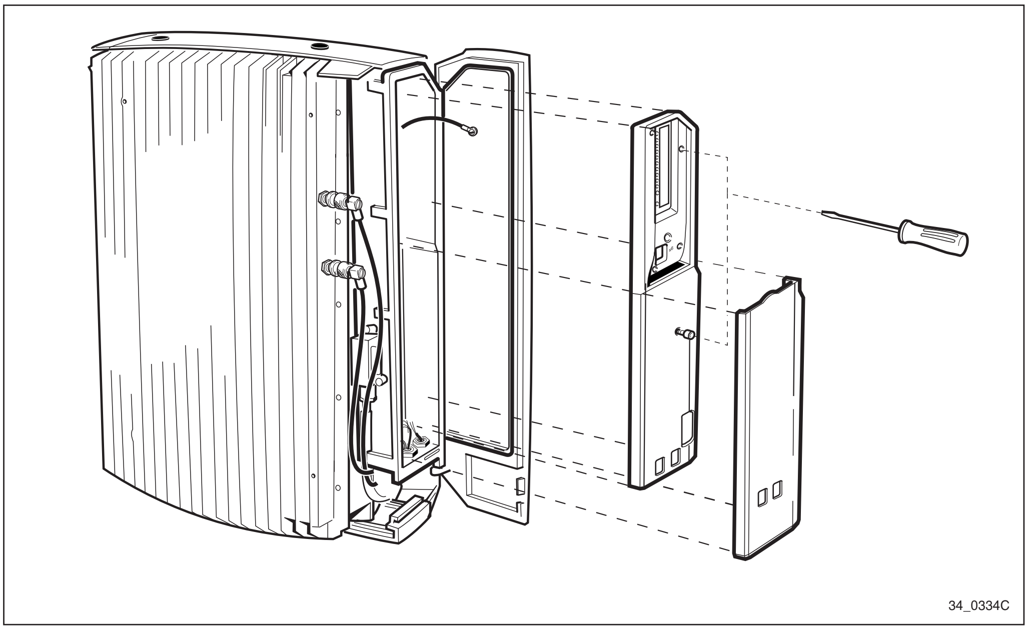

Figure 178 Remounting the protection covers

18. Remount the protection covers.

Put into operation

1. Switch on the AC mains power switch located outside the RBS.
2. Switch on the AC power and battery switch on the EMC card.
3. Put the RBS into Remote mode.
4. Close the installation box door.

Test after Corrective Action

1. Make a MS test call to verify the antennas. *See chapter Optional Tests*.
2. Perform the checklist in *Table 28 on page 237*.

11.3.6 Internal Synchronisation

Note: It is not necessary to remove the RBS from operation in order to calibrate it.

If you need more information than given in this section, *see Section 11.2.14 Internal Synchronisation (Calibrate Oscillator) on page 216*.

This routine is only to be performed on a cabinet with an optional reference oscillator that is in use. Since the frequency counter is depending on environment/external conditions, it is recommended to perform the calibration indoors. For further information about external conditions, see the manual for the Frequnecy Counter.

Note: The limit value for a class 2 fault on the CF is 16 Hz and for a class 1 fault 40 Hz.

Connect the cable SMB-BNC between the 13 MHz-port on the Distribution Panel and on the frequency counter.

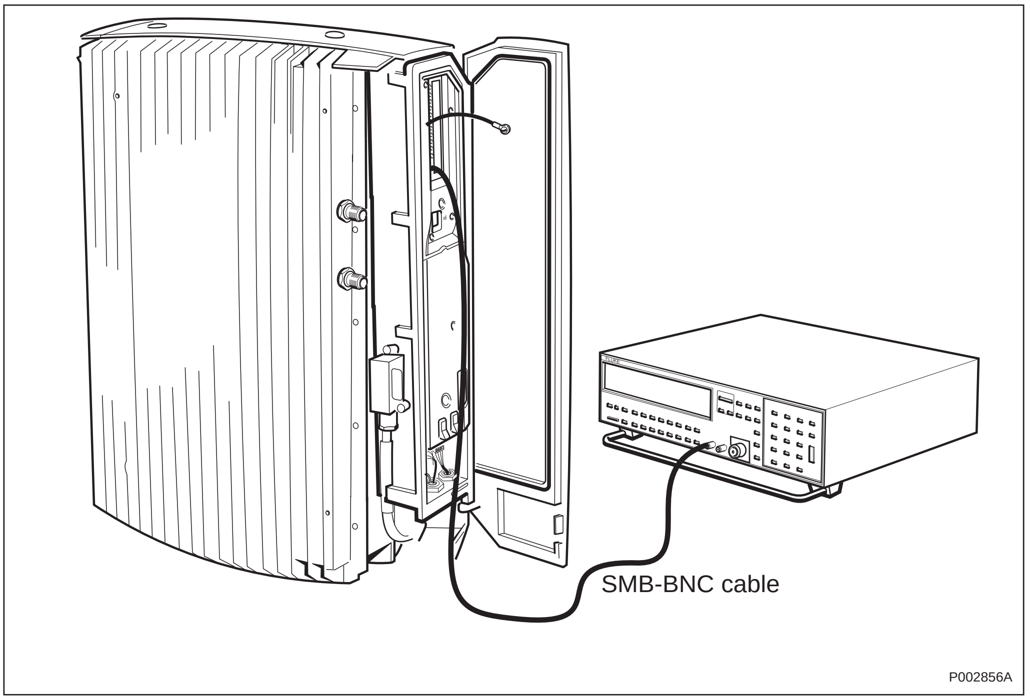

Figure 179 Calibrating the cabinet

Perform the measurement with accuracy higher than 9 digits. Use an OMT R20 or newer to calibrate internal oscillator if the frequency differs more than 8Hz from 13MHz. For further information on the use of the OMT, see:

OMT User's Manual *EN/LZT 123 2674*

11.3.7 Concluding Routines

The following is a description of the different administrative routines that must be carried out as a result of a maintenance procedure. The following checklist is strongly recommended.

Table 28 Checklist

Item	**Yes**	**No**
1. Red fault indicator off?		
2. Operational indicator (green LED lit)?		
3. RBS in remote mode? (yellow local mode on DP is off)		
4. Other yellow indicators OFF?		
5. External alarm OFF? (yellow)		
6. Cabinet locked?		
7. Is the backup copy of the RBS IDB saved in a floppy disc?		
Signature:		
Date:		

Transport of a Faulty Unit

The faulty cabinet should be transported in the same packaging materials as the spare unit was delivered in.

Report of Finished Work

When a maintenance procedure has been completed, a report will be written including a detailed description of actions taken, all observations made in accordance with local routines for work orders, site log-book, and so forth.

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 64 can be ordered from the local FSC. A description of how to fill in a repair delivery note follows below.

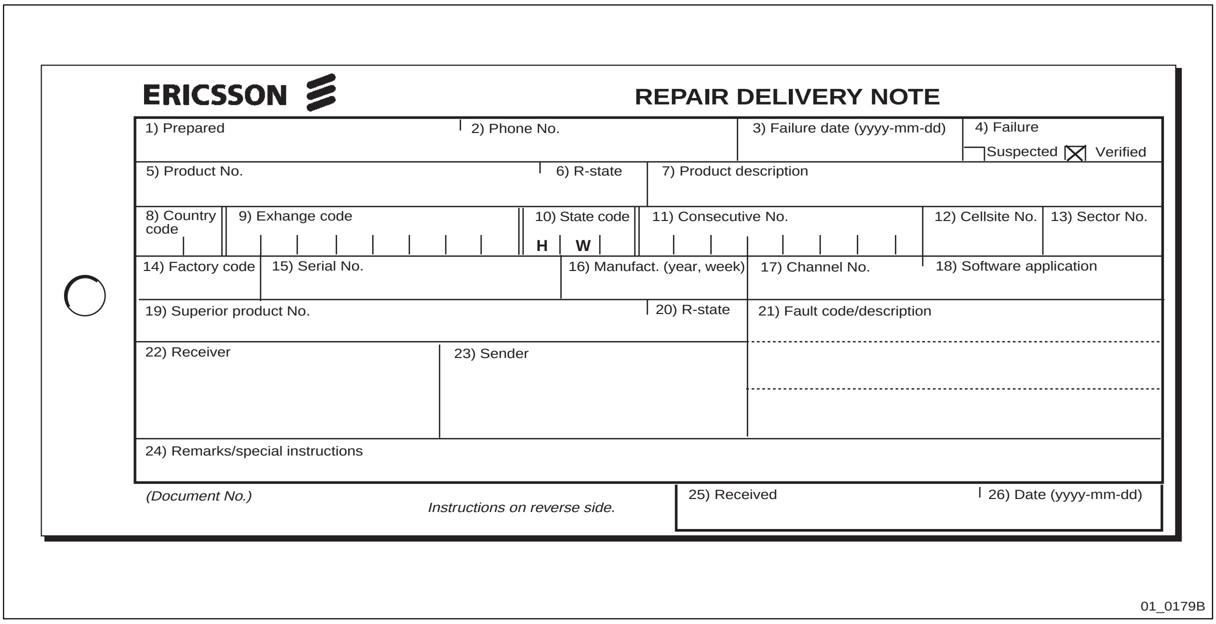

Figure 180 The “Blue tag”

OMT fault log	If there is a OMT fault log, it should be sent in with the "Blue Tag" on the faulty unit

The following explanations to the Repair delivery note are also given on its reverse side.

Field		Instructions	Examples
1)	Prepared	Service technician’s name	
2)	Phone No.	Service technician’s phone number	+ 46 8 757 0000
3)	Failure date (yyyy-mm-dd)	Date when failure occurred	1995-05-16

Field		Instructions	Examples
4)	Failure	Mark with an X if failure is Suspected or Verified	
5)	Product No.	Product number of faulty unit	ROF 123 456/1
6)	R-state	Revision state of faulty unit	R1A
7)	Product description	Product description	ETC, TRM
8)	Country code	Two letter country code	AB
9)	Exchange code	Exchange code, alpha and numeric indicators	123CDE
10)	State code	Status when failure occurred: T = New unit failed during installation or test R = Repaired unit failed during installation or test S = Unit in service when failure occured	
11)	Consecutive number	Consecutive number, numeric indicators	12345
12)	Cellsite No.	Cellsite number, alpha and numeric indicators	HU32
13)	Sector No.	Cellsite sector number, alpha and numeric indicators	A1
14)	Factory code	Code for manufacturing factory	A53 for Ericsson Gavle in Sweden
15)	Serial No.	Serial number of faulty unit	ABC123456
16)	Manufact. (year, week)	Manufacturing date	9412
17)	Channel No.	Channel number, only filled in on request	799
18)	Software application	Software application, only filled in on request	R2A
21)	Fault code/ description	Switch fault code, short description of problem	341
22)	Receiver	Receiver	ERA HWC, EPA RLC
23)	Sender	Sender	ENZ, CEA
24)	Remarks/special instructions	Used for any special attentions or instructions	
25)	Received	Receiver’s name	
26)	Date (yyyy-mm-dd)	Receiving date	1995-05-16

Trouble Report on Equipment or on This Manual

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. Any comments on this manual can be submitted in a similar way.

When writing a trouble report, always include as much information as possible. Write the trouble report as soon as possible, preferably at the Cabinet site. *Chapter Fault Handling* contains an example of a filled-in trouble report and a blank trouble report.

12 Product Data

12.1 RBS 2000 Survey

RBS 2000 is a family of radio base stations included in the digital Mobile Telephone Systems CME 20 and CMS 40. The CME 20 system is used for GSM (900 MHz) and DCS (1800 MHz). CMS 40 is used for PCS (1900 MHz).

12.1.1 The Mobile Telephone System

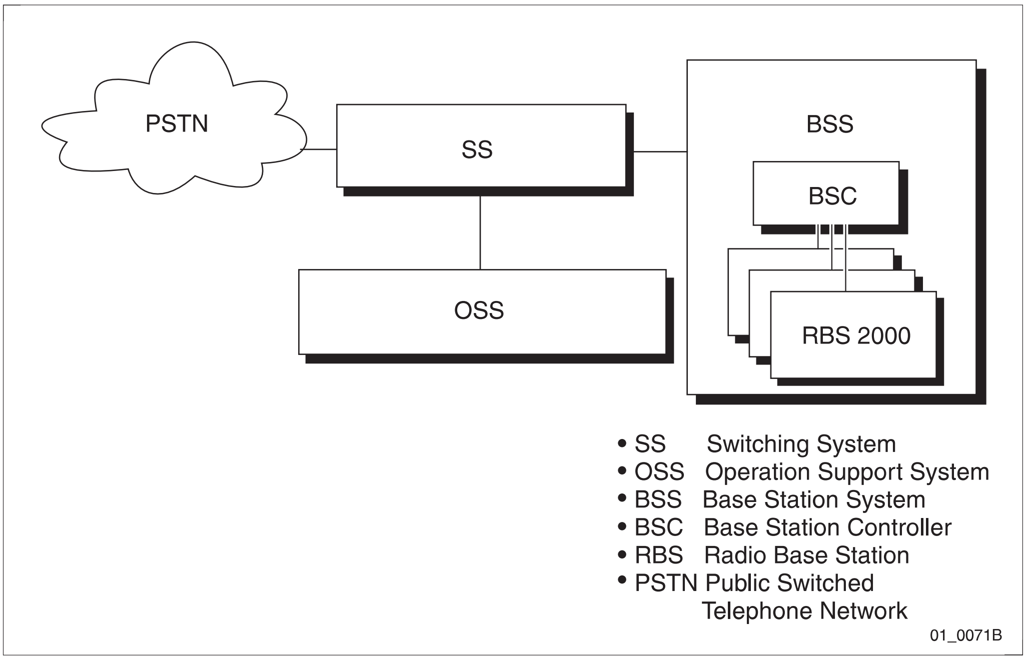

Figure 181 RBS 2000 in the CME 20 or CMS 40 systems

The Base Station System (BSS) contains two functional entities:

The Base Station Controller (BSC) which handles the radio related functions such as handover, management of the radio network resources, and cell configuration data. It also controls radio frequency power levels in base stations and mobile stations.

The Base Transceiver Station (BTS) is the radio equipment needed to serve one cell. It consists of the antenna system, the radio frequency power amplifiers and all the digital signal processing equipment. RBS 2000 contains equipment to serve 1 to 3 cells.

12.1.2 The Radio Base Station

The Radio Base Stations within the RBS 2000 family are available in different versions. They cover indoor and outdoor cabinets and contain the radio equipment. Some versions are supplied with battery backup and space for transport module.

The RBS 2301

RBS 2301 is a member of the RBS 2000 family and is an outdoor or indoor mounted base station. It contains two low power transceivers, and can be equipped with integrated antennas. The main purpose is to supply "hot spot"capacity in small areas.

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

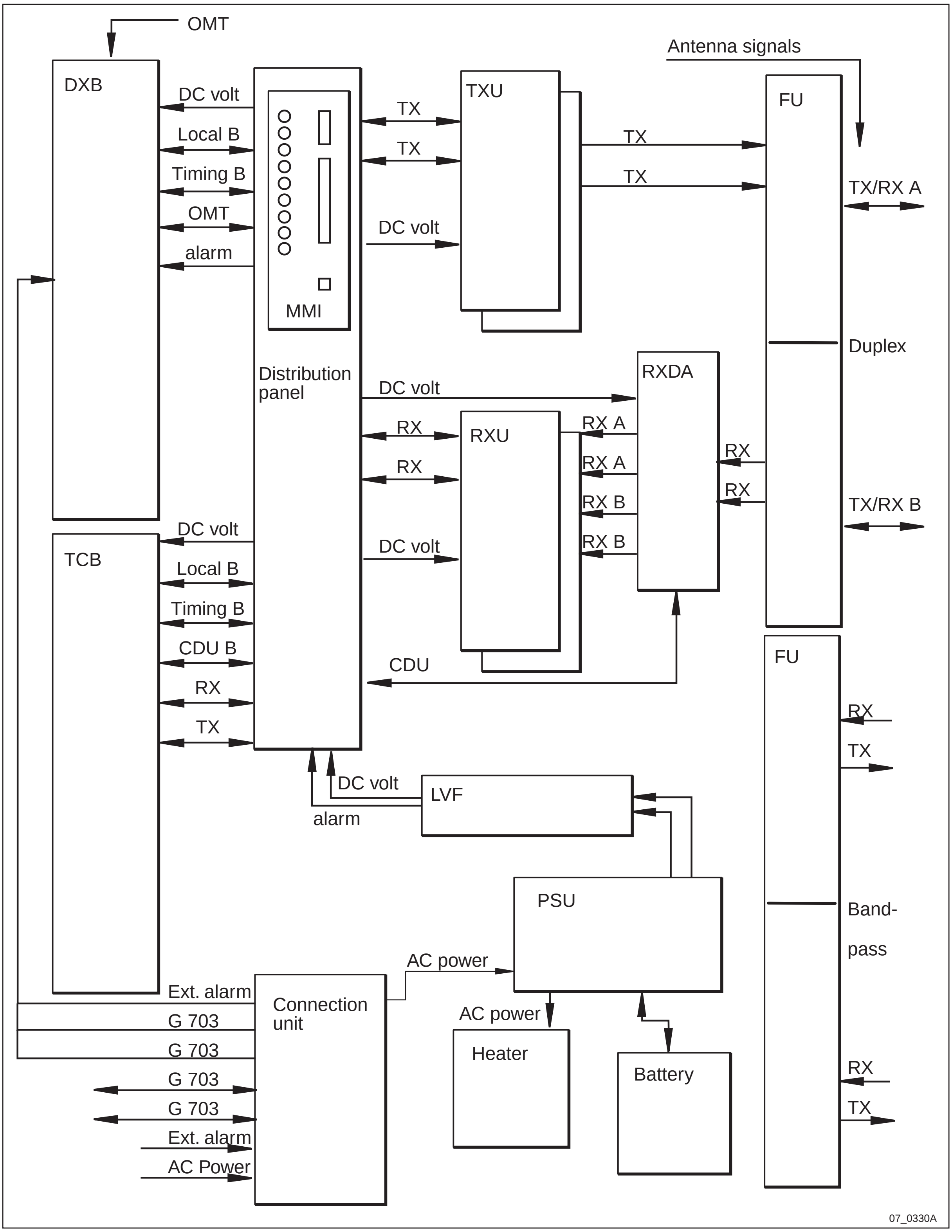

Figure 182 Block diagram

Description of Units

DXB	The Distribution Switch Board is the central control unit for the base station and supports the transmission interface.
TCB	The Transceiver Control Board includes equipment related to signal processing for up to two radio carriers.
TXU	The Transmitter Unit (1 or 2 per RBS) contains equipment for transmission on one radio carrier.
RXU	The Receiver Unit (1 or 2 per RBS) contains equipment for reception on one radio carrier.
RXD A	The Receiver Divider Amplifier contains equipment for low noise amplification of two received antenna signals and distributing each of them to the RXUs.
FU	The Filtering Unit is the interface between the transmitters, receivers and the antenna system. There are two versions of the Filtering Unit: one for duplex and one without duplex.
LVF	The Low Voltage Filtering unit for voltage filtering.
PSU	The Power Supply Unit which rectifies the incoming AC mains to regulated DC voltages, controls and supervises the battery and supervises the temperature inside the cabinet.
Heater	Heats the cabinet when the temperature drops.
Battery	A small battery that will take care of short power interruptions. The battery can power the base station for at least 3 minutes. It is possible to replace the battery without disturbing traffic the handling.
Connection unit	The connection unit connects the RBS to power, transmission and external alarms. Contains components for lightning and EMC protection. It also contains fuses, AC mains and a battery switch.
Distribution Panel	The distribution plane interfaces the DXB, the TCB, the TXUs, the RXUs and the PSU. It also contains switches and indicators for the RBS.

12.2 Optical Indicators for RBS 2301

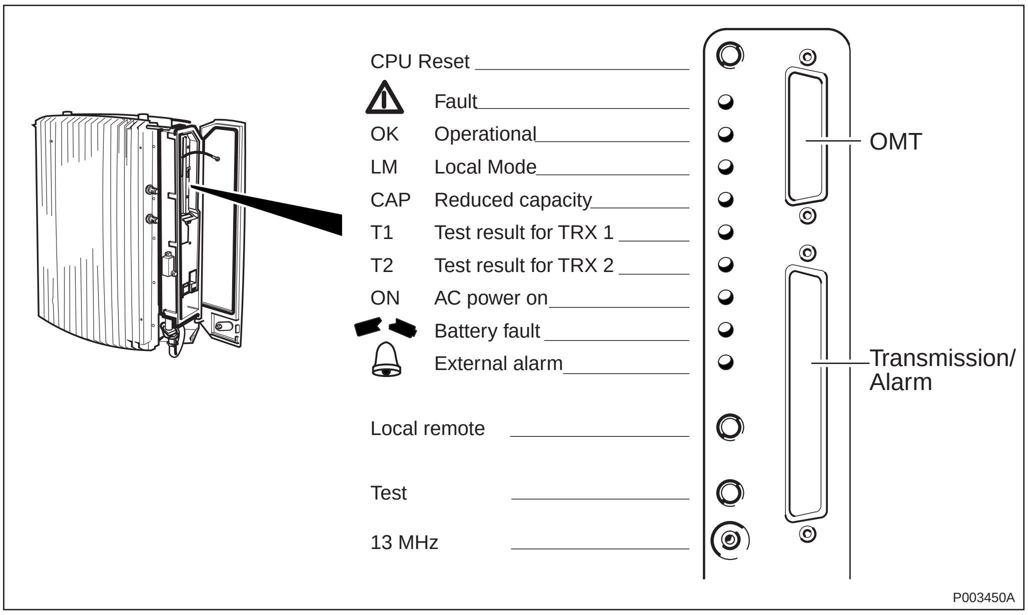

Figure 183 RBS user interface

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 (32 bits) or OMT2 (16 bits).
Yellow:	The RBS is either operational or faulty: - Operational (Local Mode, AC Power On, Reduced Capacity) - Faulty (Battery Fault, External Alarms)
Green:	The RBS is working correctly.
Flashing indicators:	Wait, activity in progress.

The optical indicators can indicate that a fault/faults have been detected, and the OMT (32 bits) or OMT2 (16 bits) should therefore be used for more advanced fault localisation.

Explanation of the Indicators

Indicator	Mode	Description
Fault	Off	No fault(s) detected.
(Red)	On	Fault(s) detected.
	Flashing	One of the following reasons: • IDB Database is missing • Software is missing

		• Lost communication in the RBS • Running on Base Application
Operational	Off	The RBS is not operational or change of RBS mode is in progress.
(Green)	On	When in local mode: • There is no fault that affects (or may affect) the function of the RBS. When in remote mode: • Connected to BSC and considered operational by the BSC.
	Flashing	One of the following reasons: • Receiving application software • Activation of application software pending • Configuration activity in progress (this may take more than 10 seconds to complete)
Local Mode	Off	The RBS is in remote mode.
(Yellow)	On	The RBS is in local mode.
	Flashing	Change of mode in progress.
Reduced Capacity	Off	All TRXs are operational.
(Yellow)	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	Off	No AC power supply.
(Yellow)	On	AC power is switched on to the RBS.
Battery Fault	Off	Battery connected.
(Yellow)	On	Battery disconnected or faulty. Low battery DC voltage.
External Fault	Off	No external alarm(s) active.
(Yellow)	On	External alarm(s) active.

12.3 Antenna Configurations

Three basic antenna configurations are available with RBS 2301:

- With duplexer
- With multicasting box

Note: The same configurations are applicable to all frequency bands: 900, 1800 and 1900 MHz.

12.3.1 Configuration with Duplexer

The CDU has no transmitter combining capability, but contains duplex filters for transmitting and receiving on the same antenna. The RBS has two antenna outputs.

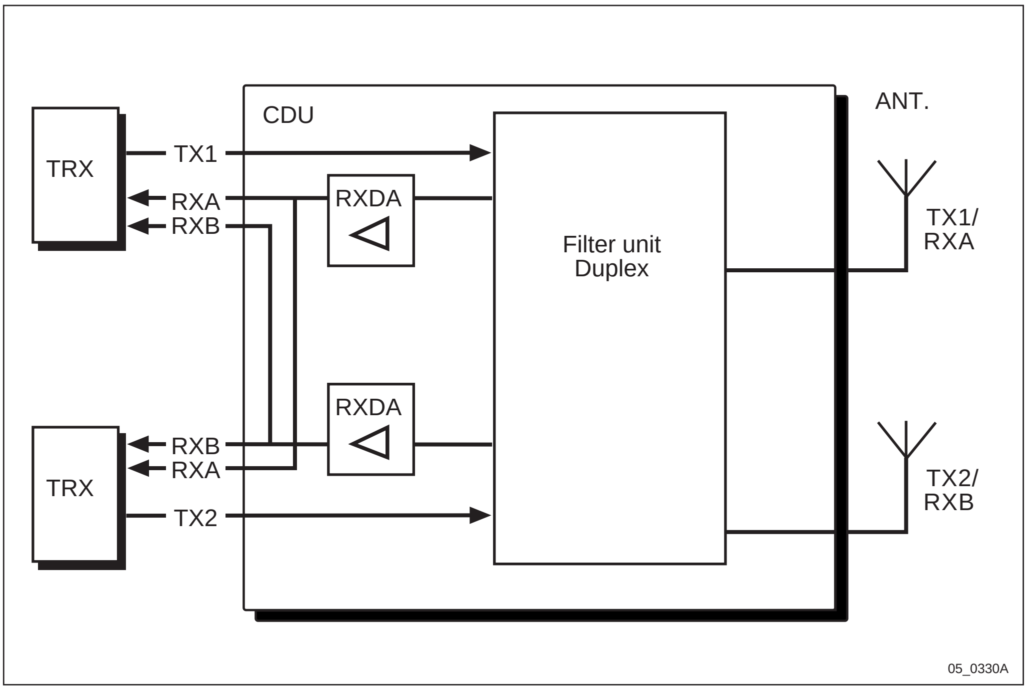

Figure 184 Configuration with duplexer

12.3.2 Configuration with Multicasting Box

The CDU has no transmitter combining capability, but contains duplex filters for transmitting and receiving on the same antenna.

A separate multicasting box is mounted on the RBS, which combines the two antenna outputs to a single feeder system. This system can be used with a leaking coaxial cable or a distributed antenna system inside a building.

The second antenna output on the multicasting box is normally connected to a 50 ohm load. As an alternative, the 50 ohm load can be disconnected and a second distributed antenna system can be connected to this antenna output.

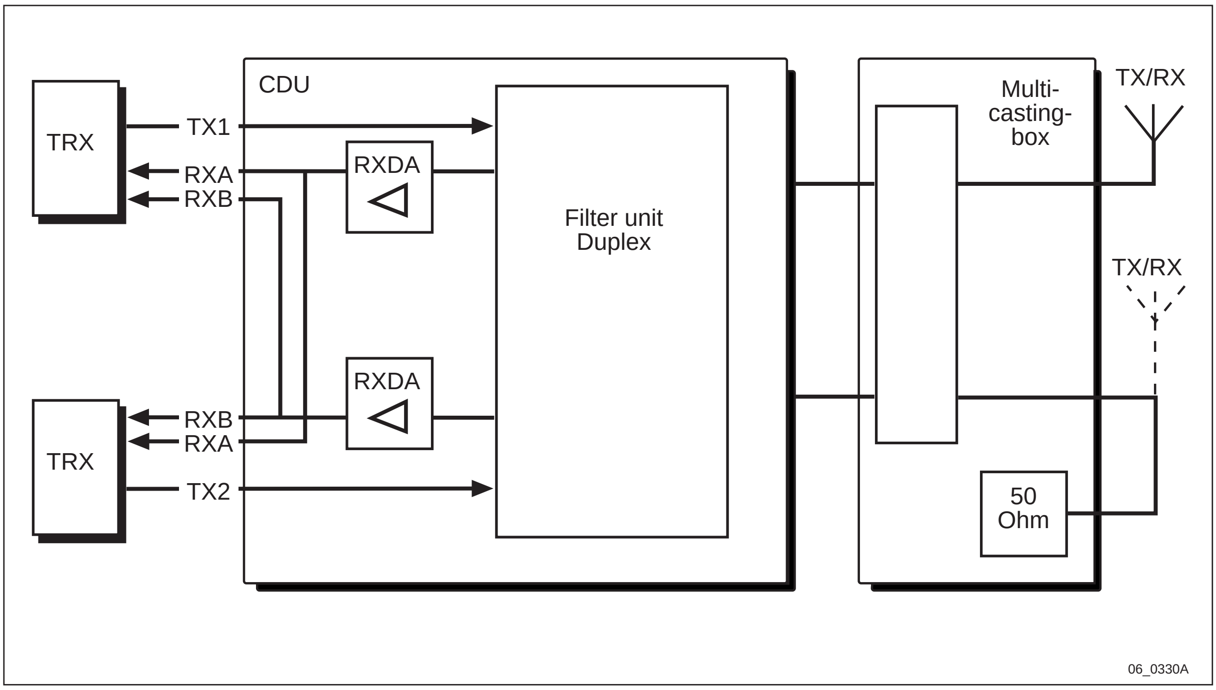

Figure 185 Configuration with multicasting box

12.4 Cabinet Hardware

The base station contains one or two low-power transceivers, and can be equipped with integrated antennas. Integrated sector or omnidirectional antennas are available. Connection to external antennas is always possible.

The RBS consists of the following main units:

- Mounting base
- Cabinet
- Antenna options:
  - omnidirectional antenna unit
  - sector antenna unit
  - multicasting box
- Sunshields

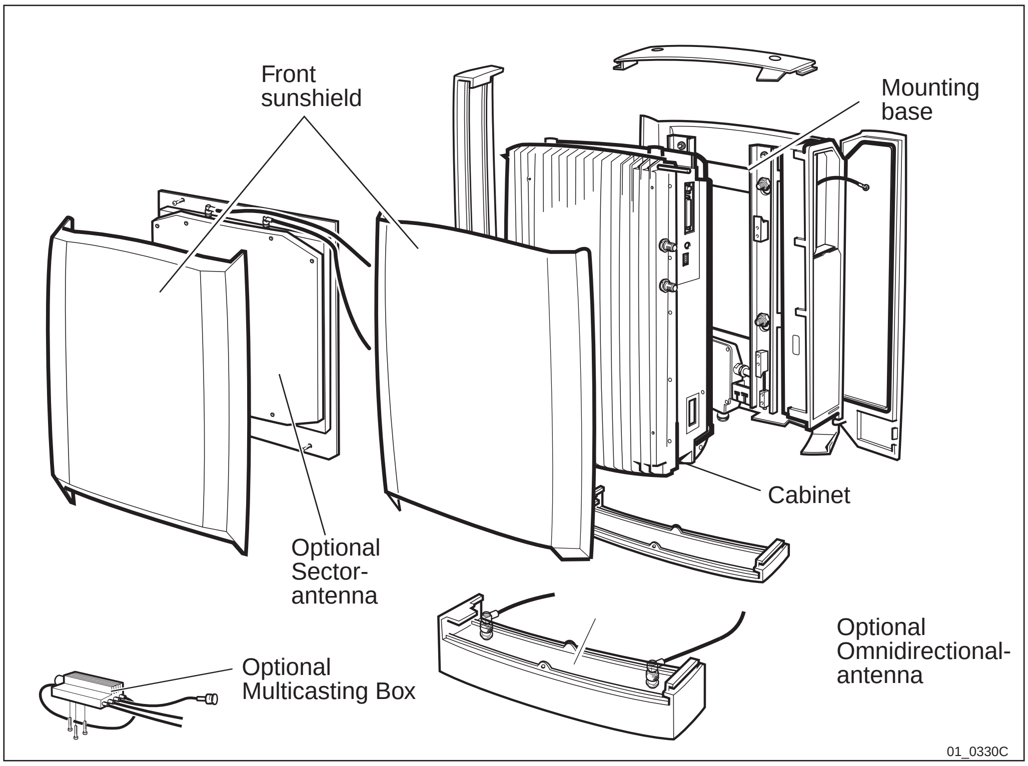

Figure 186 Main units

The following picture shows the hardware units inside the cabinet.

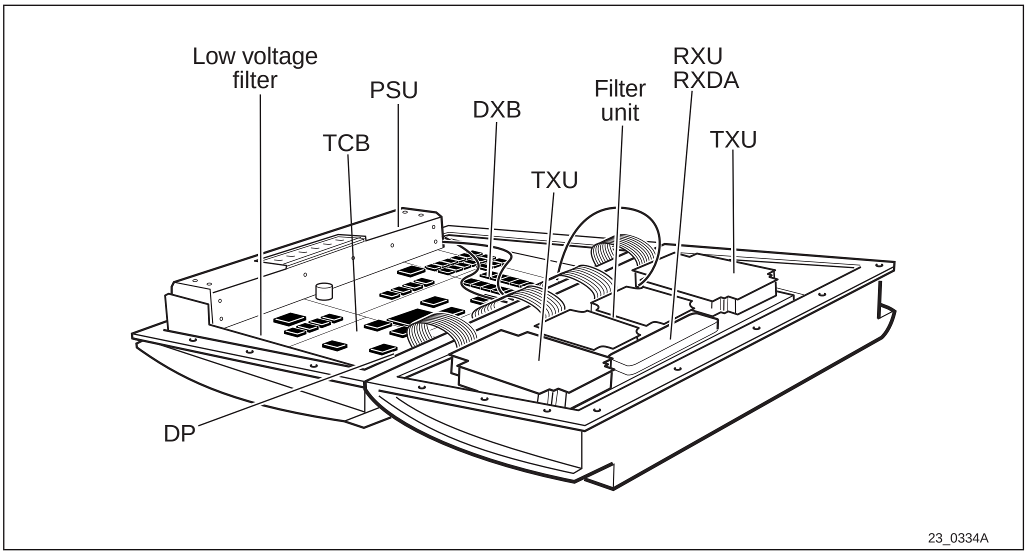

Figure 187 Hardware units in cabinet

PSU	Power Supply Unit
DXB	Distribution Switch Board
TCB	Transceiver Control Board
TXU	Transmitter unit
RXU	Receiver Unit
RXDA	Receiver Divider Amplifier

12.4.1 Mounting Plate

The mounting plate is used to fix the base station to a flat surface. In combination with the pole fixture it is also used to install the base station on a pole.

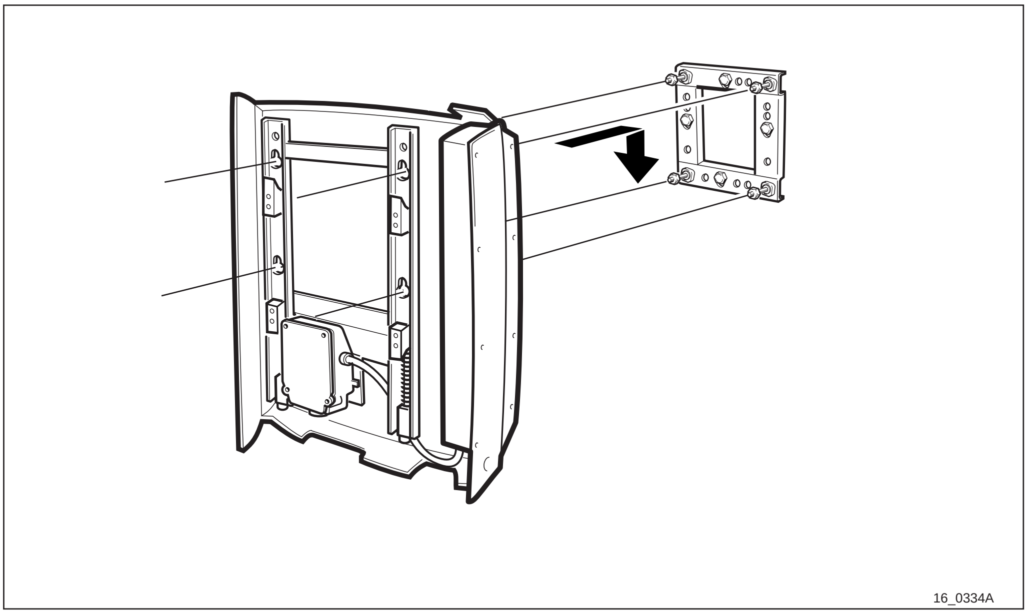

Figure 188 Mounting base and mounting plate

No separate template has to be used when drilling holes. The mounting plate is used as its own drilling template.

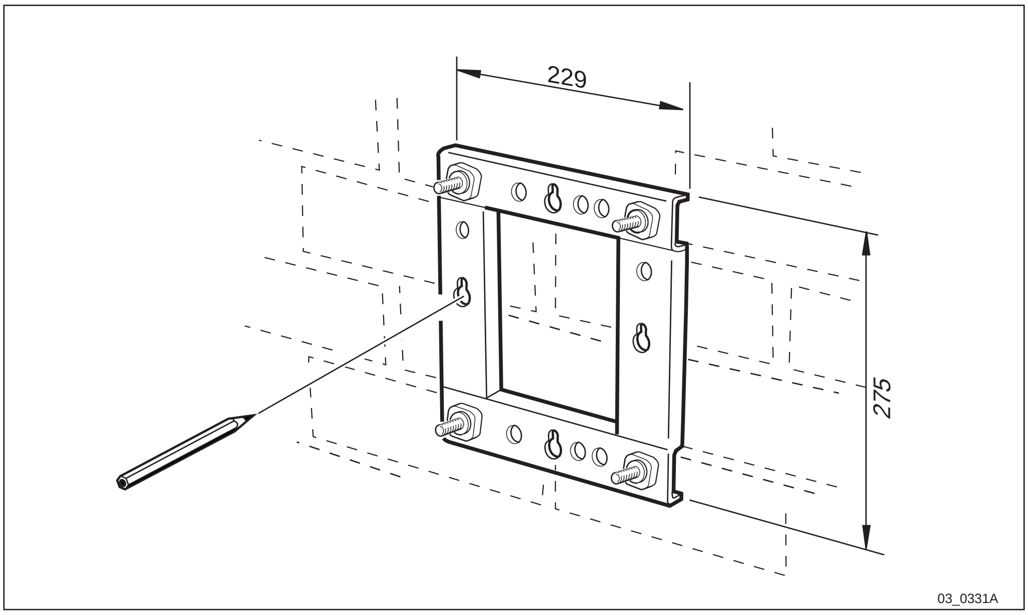

Figure 189 Mounting plate

12.4.2 Pole Fixture

The pole fixture is attached to the mounting plate if the base station is to be mounted on a tubular mast or pole. The pole fixture will attach to a round tube having a diameter of 60–114 mm.

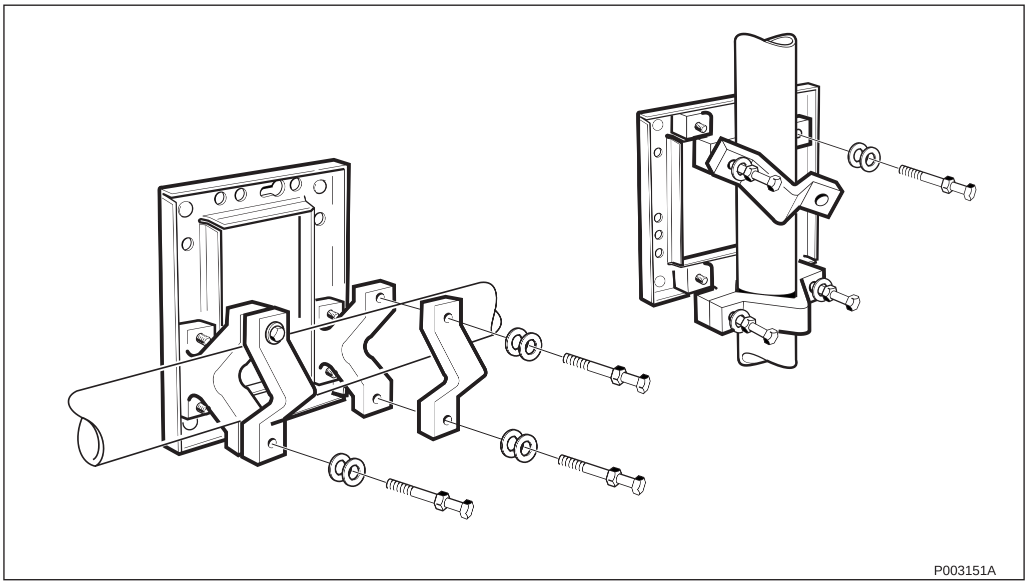

Figure 190 Pole fixture and mounting plate mounted on a tube

12.4.3 Lifting Kit (Optional)

A lifting kit is available as an option.

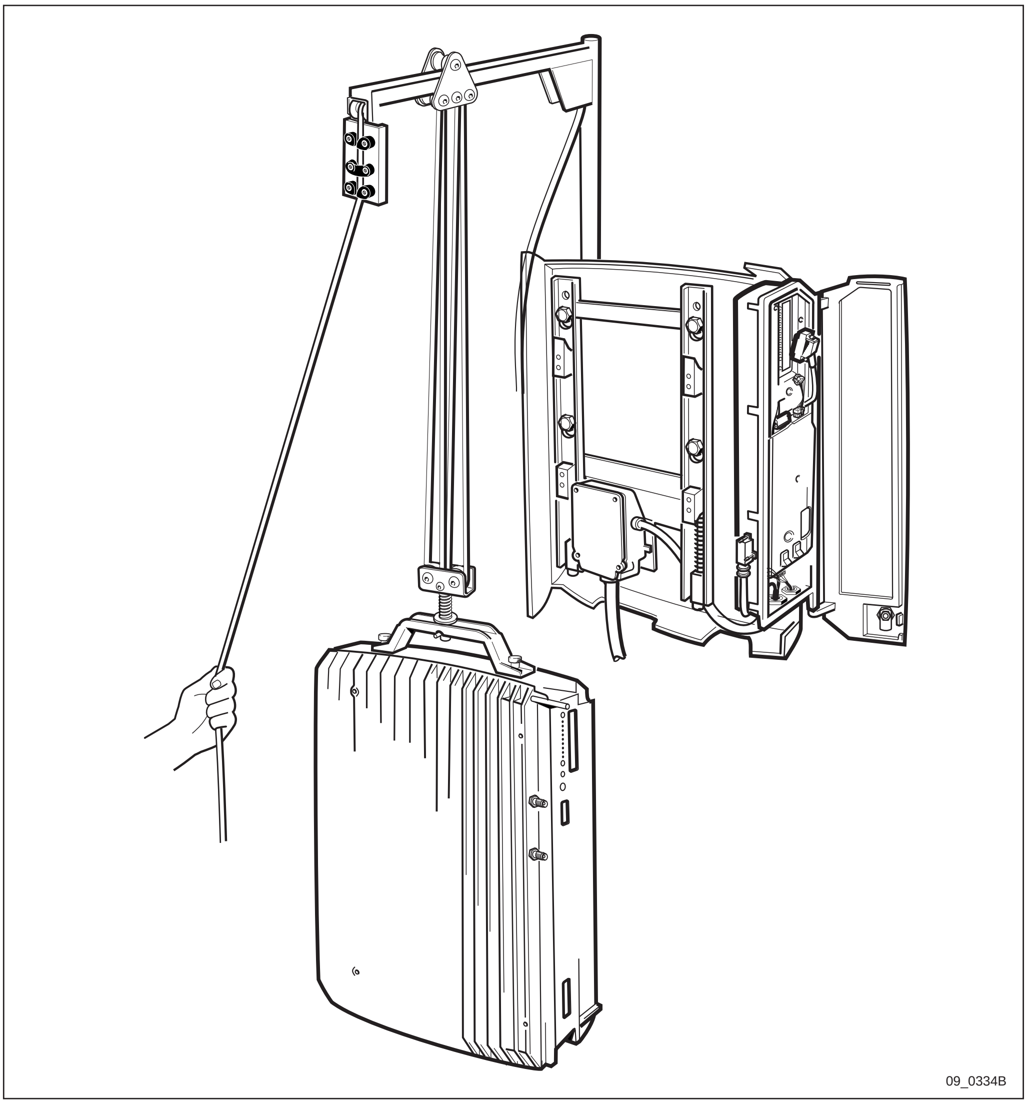

Figure 191 The lifting kit (optional)

Note: The lifting device can only be used for lifting the RBS 2301.

Free space above the radio cabinet must be at least 800 mm to allow the lifting kit to be installed or removed from the mounting plate. Measurements in *Section 12.6 Space Requirements on page 262* do not take care of this requirement.

Note: The Lifting Kit cannot be attached to the mounting fixture when it is mounted on a horizontal tube as shown to the left in *Figure 190 on page 250*. The mounting holes for the lifting kit are blocked by the pole fixture.

Note: The Lifting Kit is designed to lift maximum 25 kg (55 lbs).

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 we recommend you to use it instead.

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

You can find the lifting device serial number situated 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.

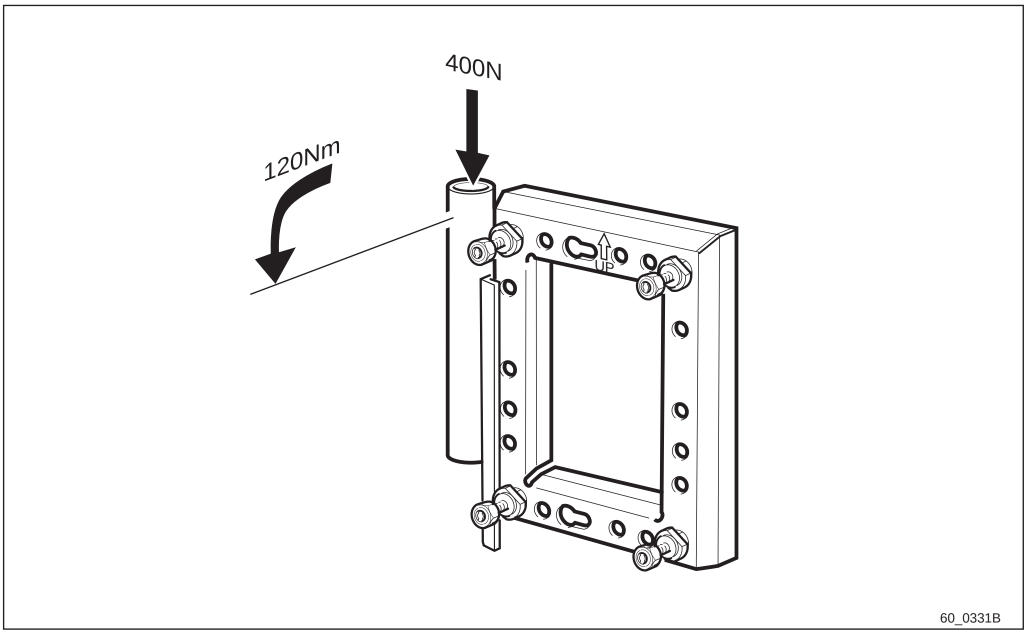

Figure 192 Maximum wall loading values

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.

Handling the Lifting Device

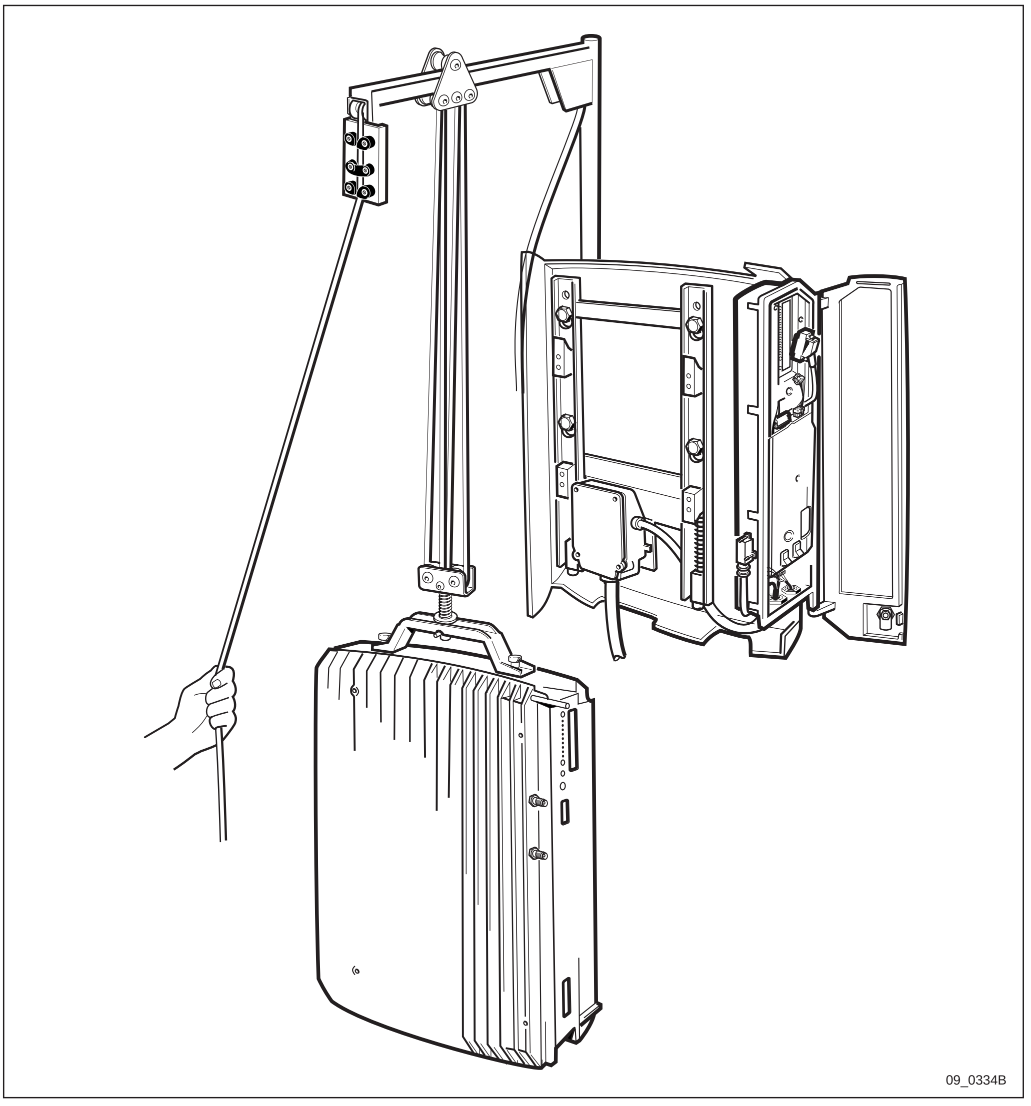

Figure 193 Equipment overview

1. Check the delivered equipment against the packing list.

Figure 194 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.

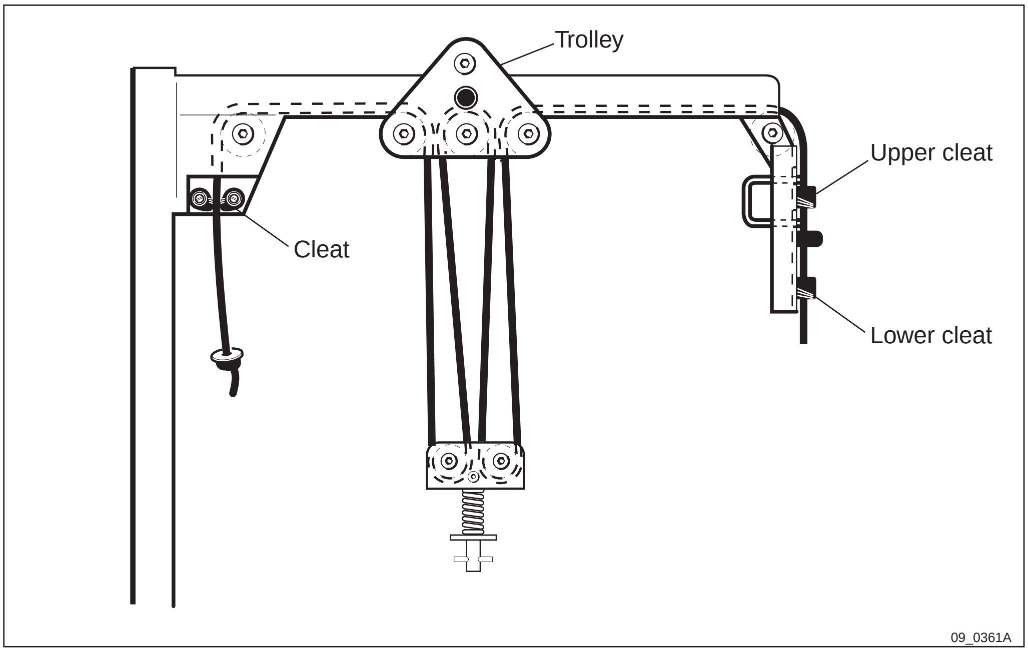

Figure 195 Rope wiring

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

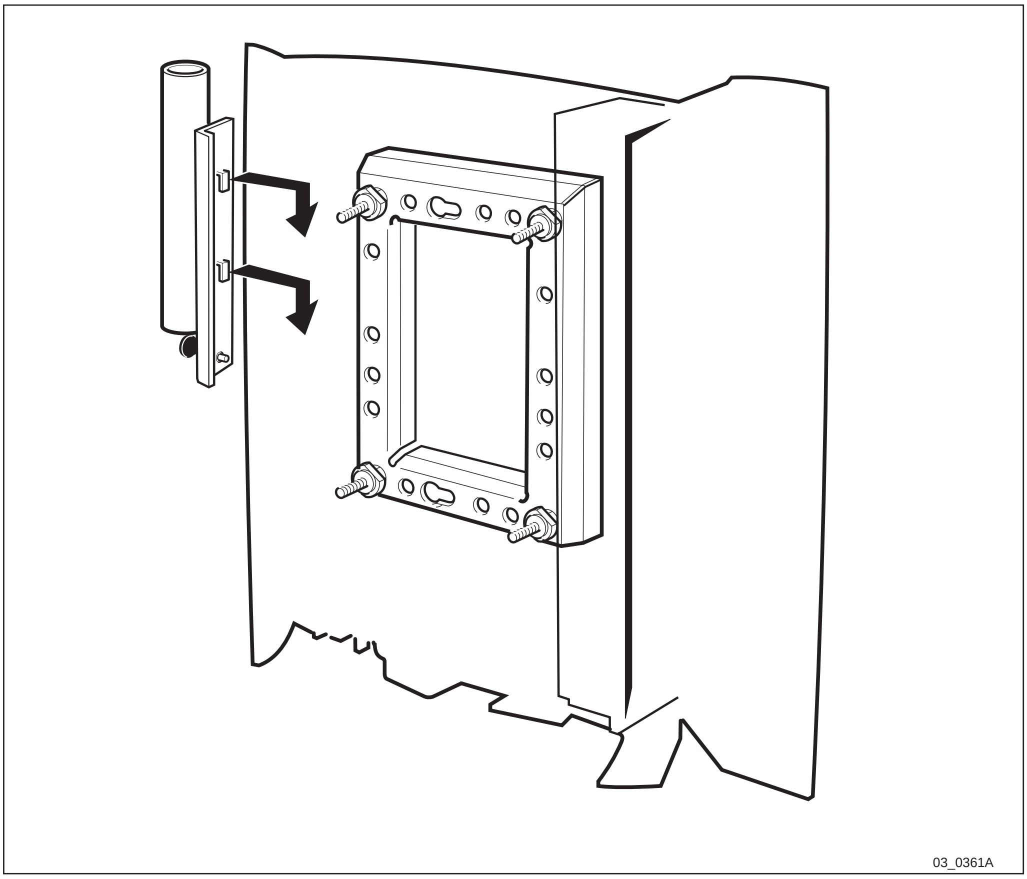

Figure 196   Mounting the lifting device

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

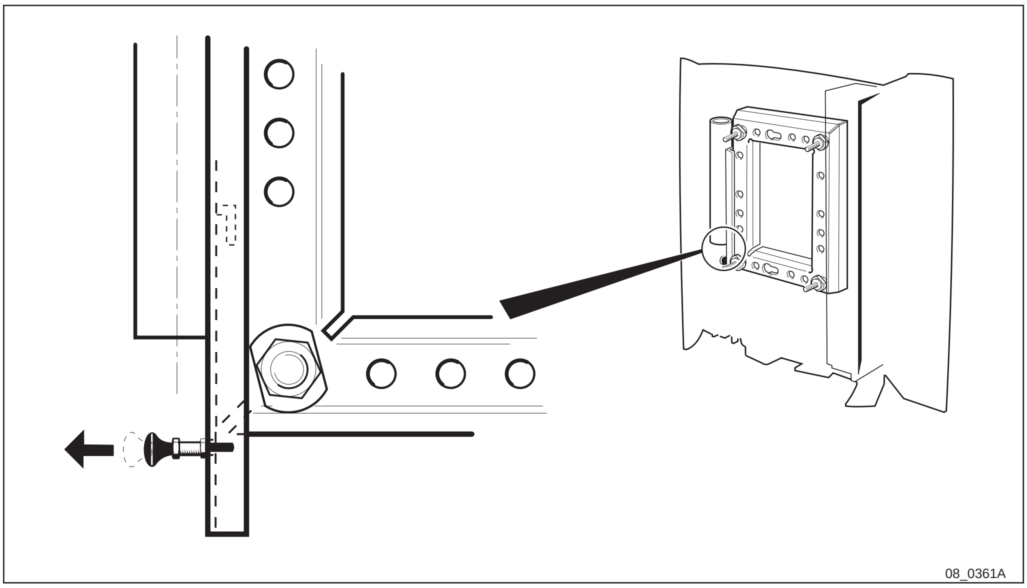

Figure 197   Locking pin position

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

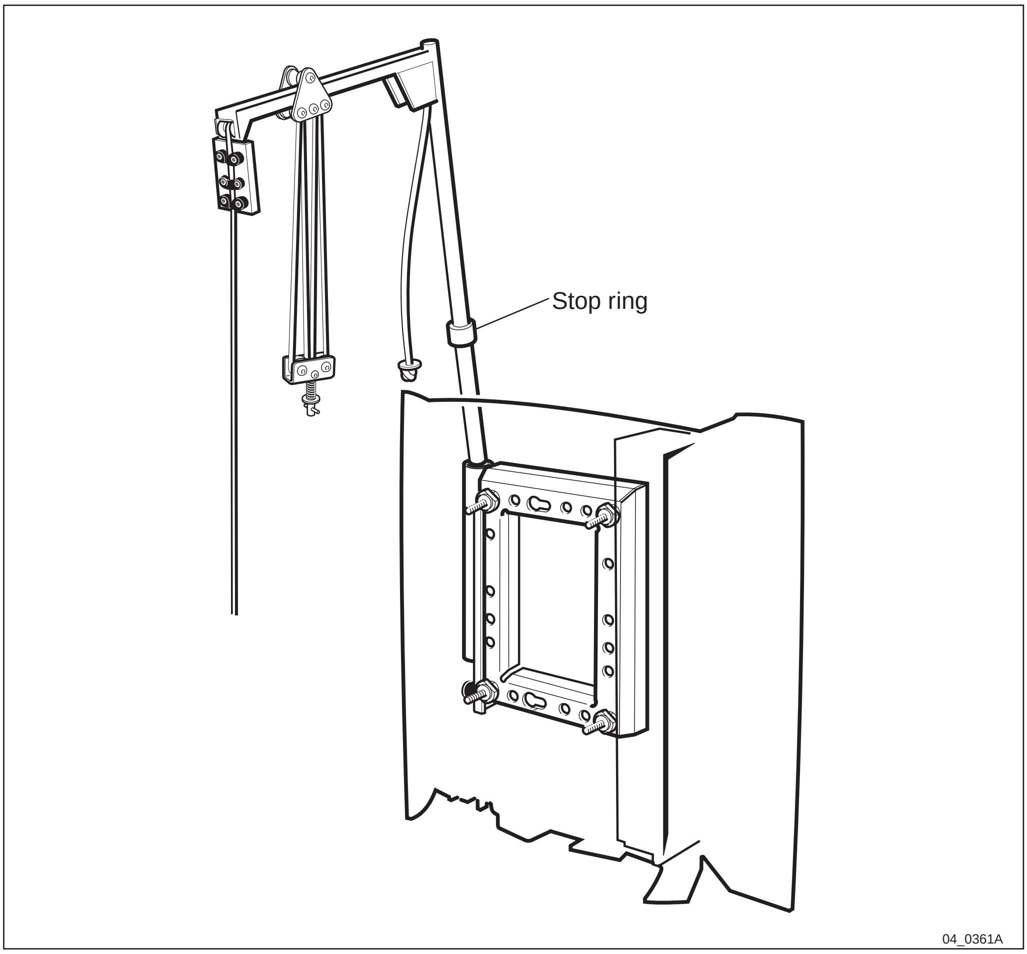

Figure 198 Inserting the lifting device in the tube-bracket

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

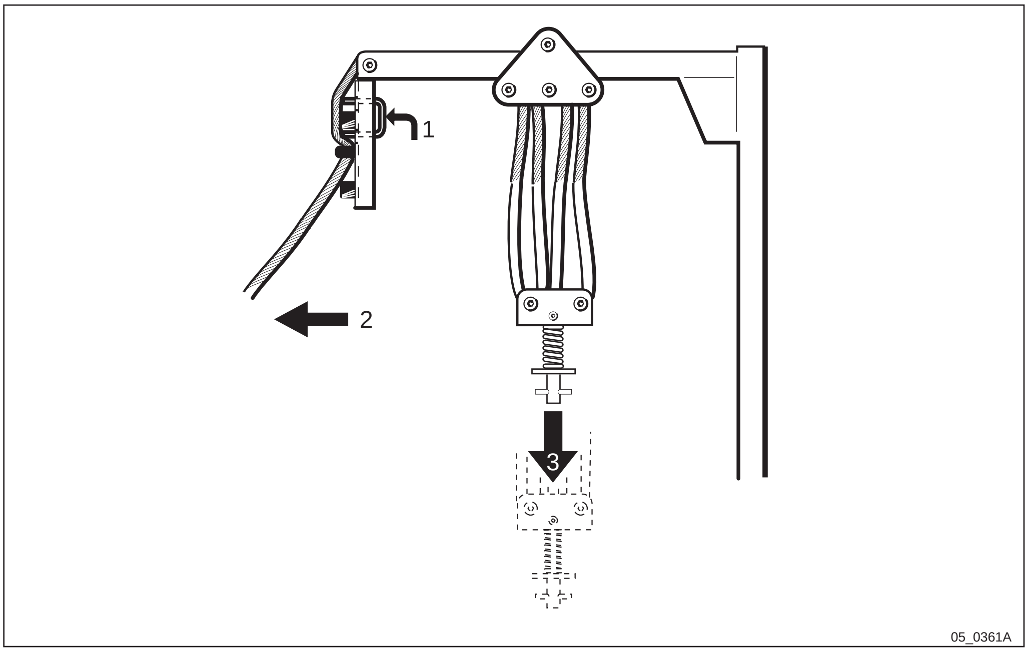

Figure 199 Loosening the rope

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.

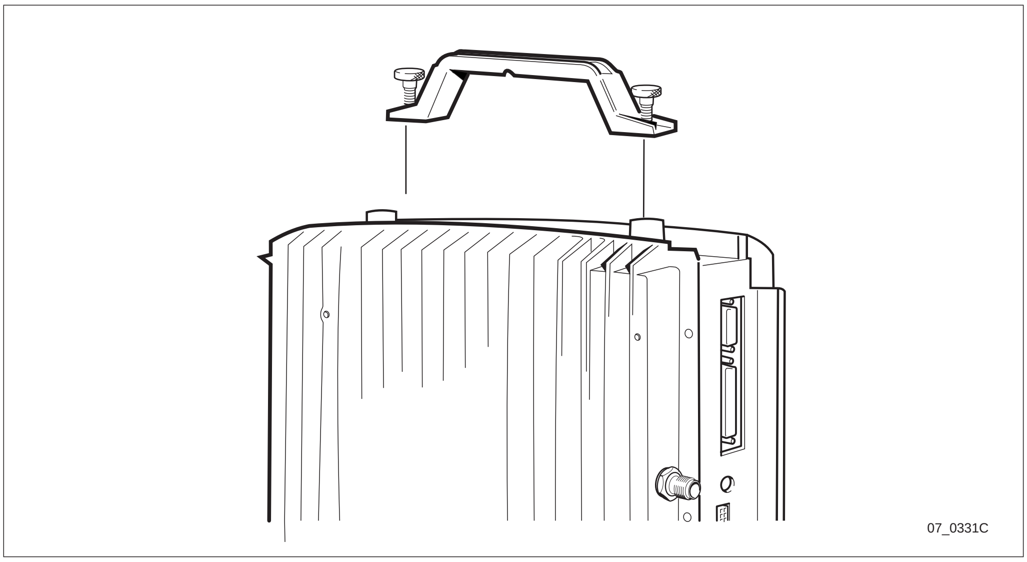

Figure 200 Mounting the handle

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.

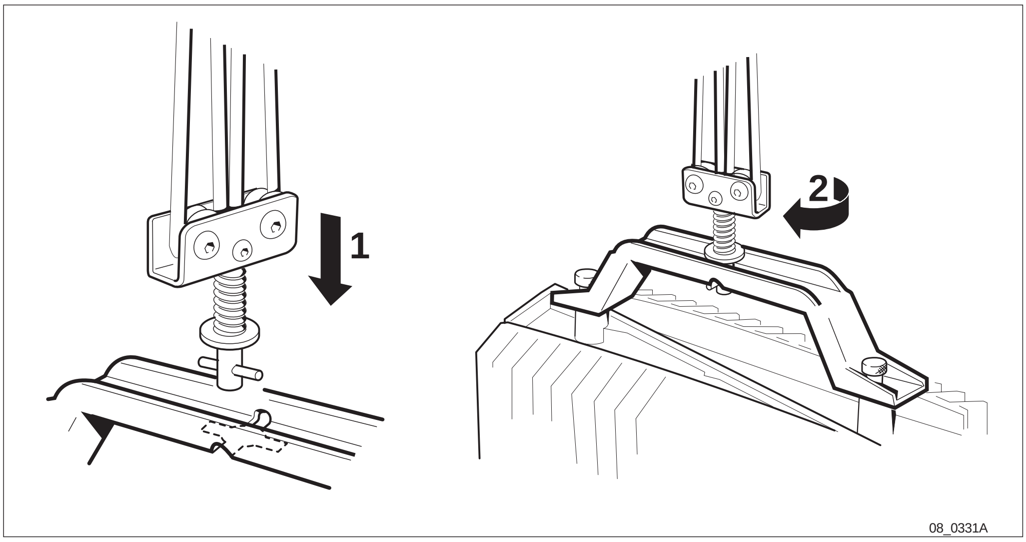

Figure 201 Securing the hook

11. Insert the hook and secure by turning 90°. Make sure that the hook is in the right position.
12. Hoist the cabinet to the same level as the rear sun-shield.

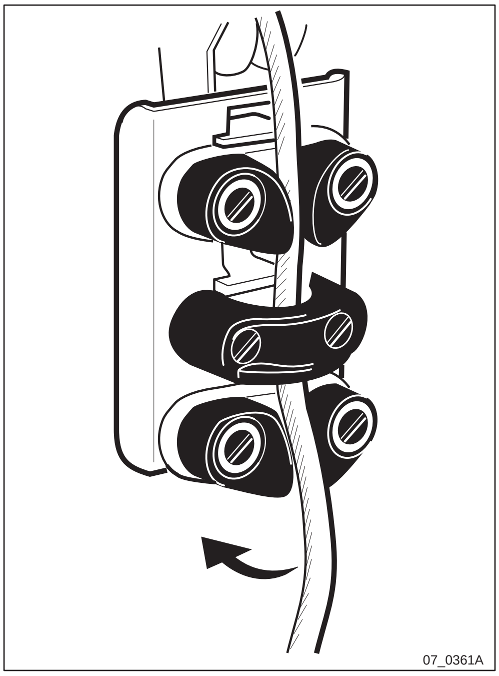

Figure 202 Fastening the rope

13. Fasten the rope in the lower cleat.

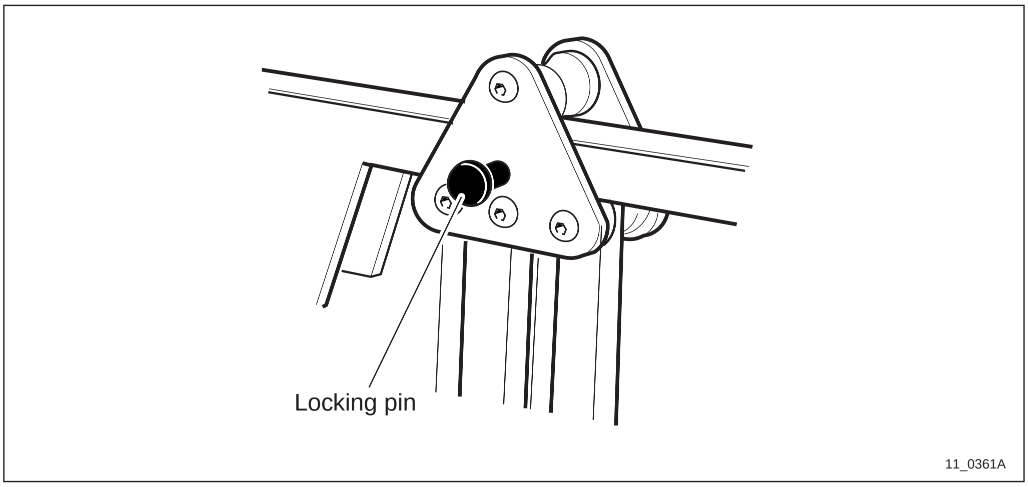

Figure 203 Releasing the trolley

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

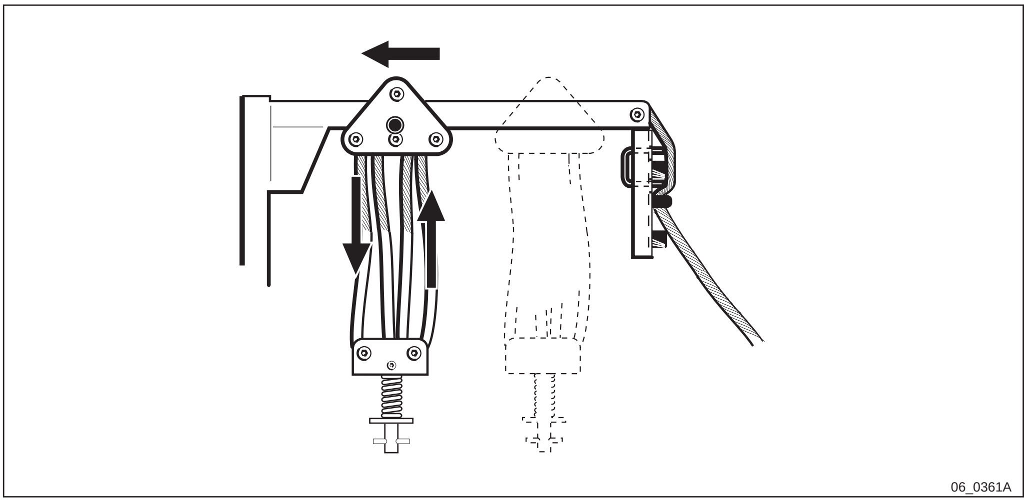

Figure 204 Moving the trolley

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

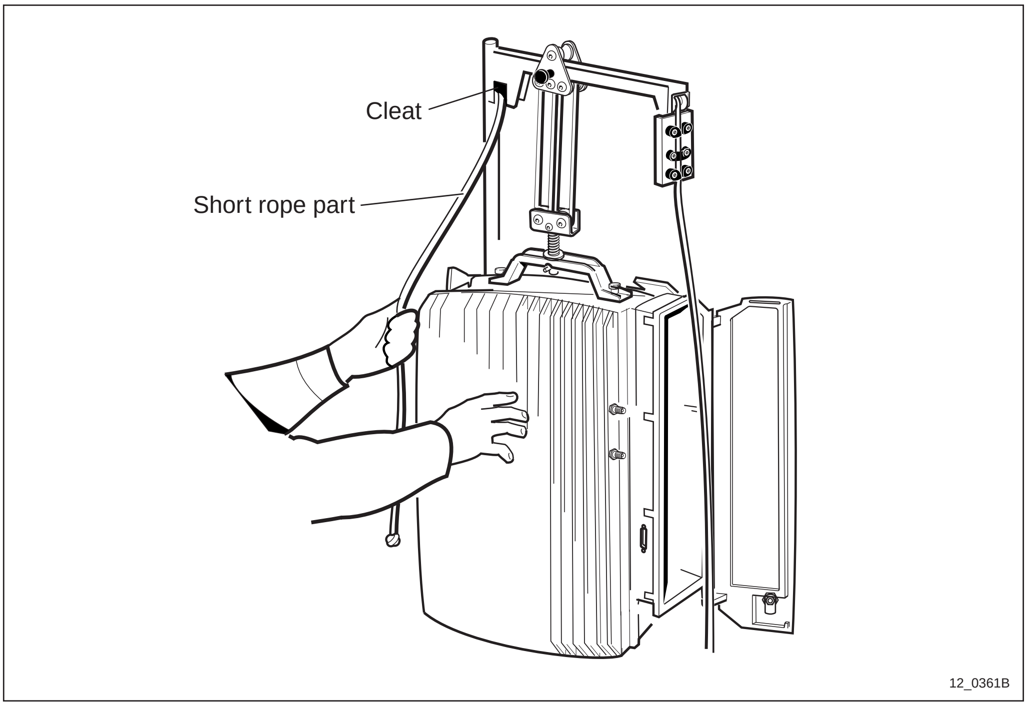

Figure 205 Adjusting the height

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

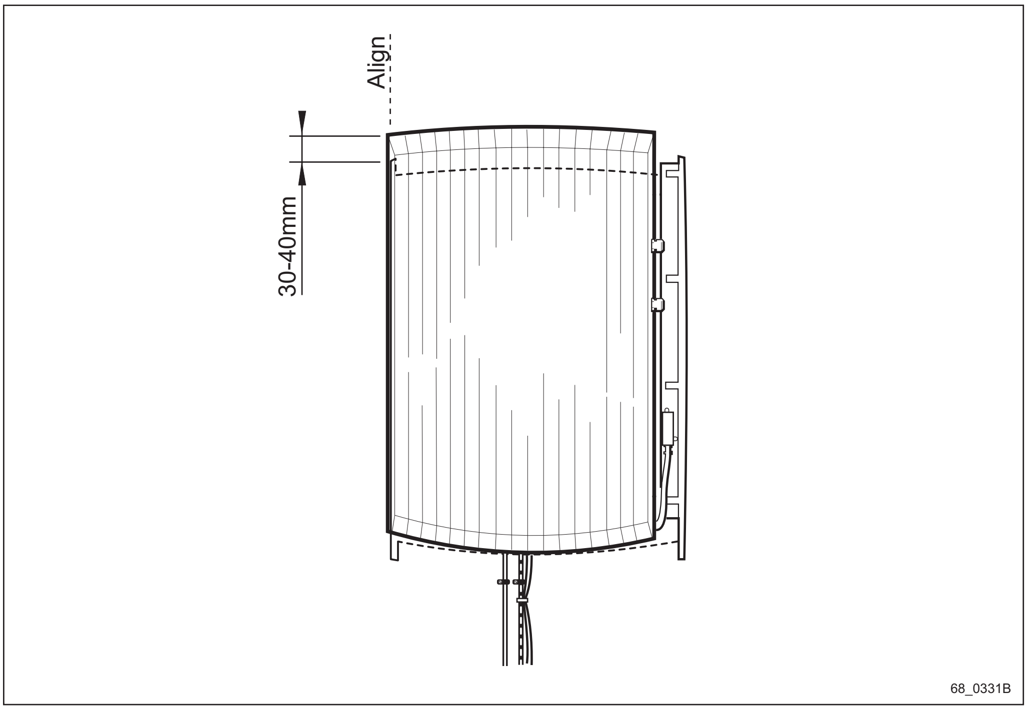

Figure 206 Aiming the cabinet

17. Facilitate the mounting of the cabinet by aiming for the left side of the cabinet. Start by holding the cabinet a few centimeters above the mounting base.

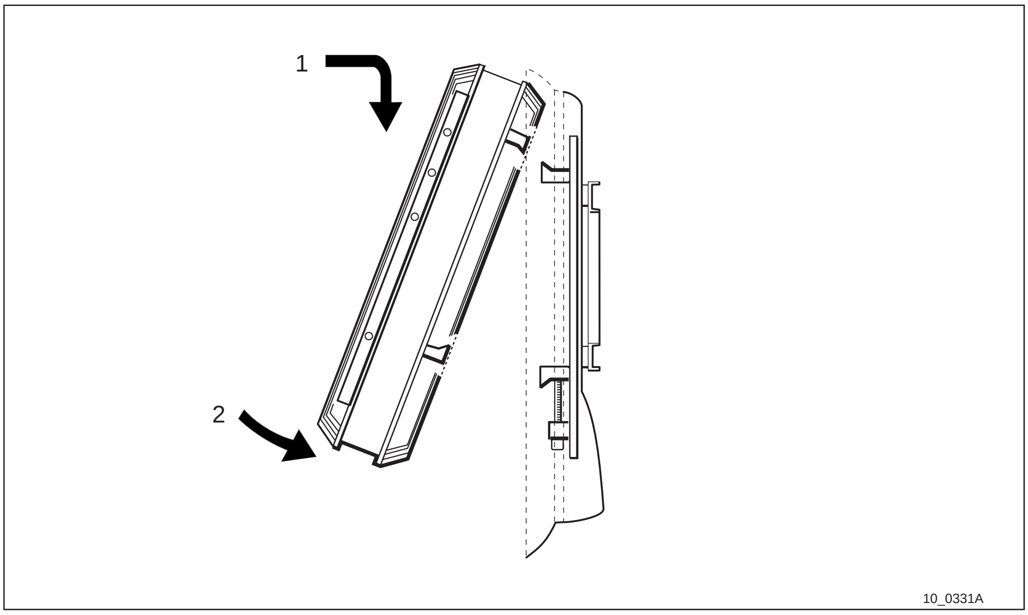

Figure 207 Hooking-on the cabinet

18. Hook-on the cabinet by tilting it slightly against the mounting base and lower the cabinet on to the hooks.

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

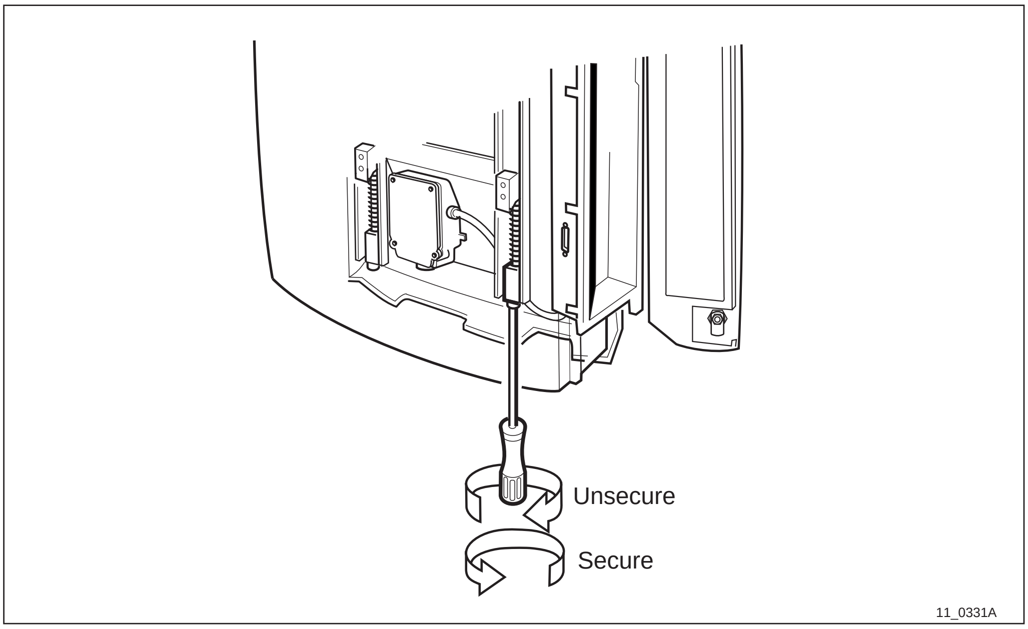

Figure 208   Securing the cabinet

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

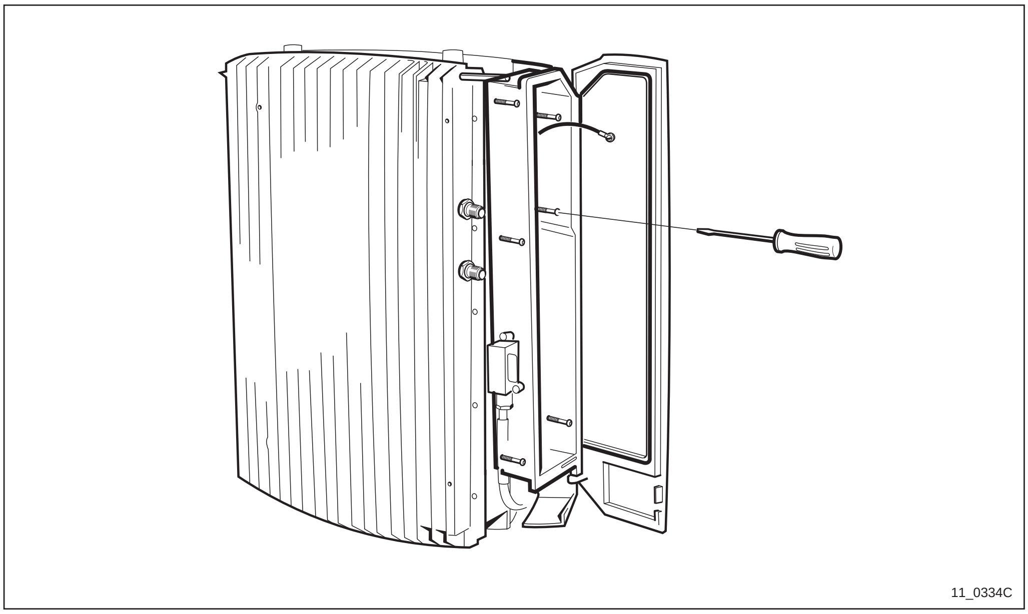

Figure 209   Fastening the installation box

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

12.5 Dimensions and Weight

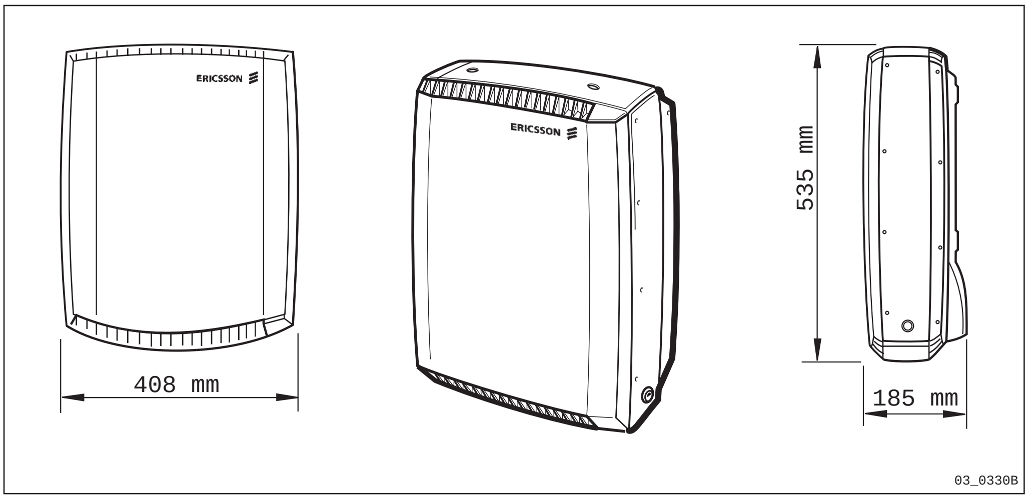

Figure 210 Dimensions

Weight: 28 kg 62 lb.

12.6 Space Requirements

Free space is required around the base station for installation and maintenance. When more than one cabinet is installed at the same site, a certain distance between the cabinets is required for antenna isolation and to provide sufficient working space.

Integrated antennas furthermore require that no large objects in front of the antenna will obstruct the radio beam.

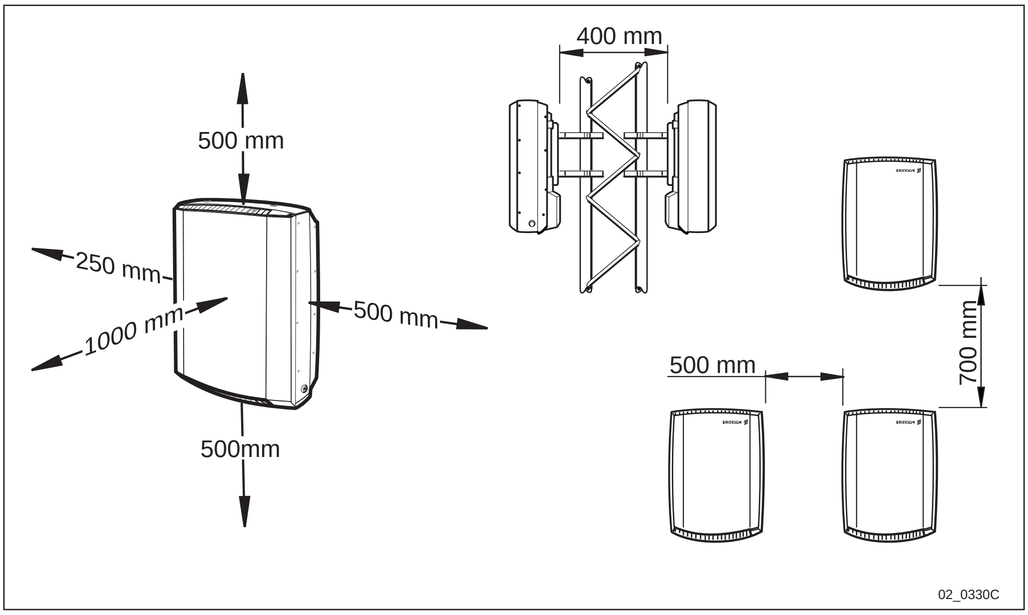

Figure 211 RBS 2301 space requirements

12.7 Climatic Endurance

Table 29 Climatic endurance

Environmental parameter	Units	Normal condition	Non–destructive
Temperature	°C	-33 - +45	-40 - +70
Relative humidity	%	15 - 100	15 - 100
Solar radiation	W/m^2	1120	1120
Design wind speed	m/s	50	50

Normal condition denotes the environmental conditions where all units will function as specified.

Non-destructive range denotes environmental stress above the limits for normal operation during which no function is guaranteed and performance may degrade in an unspecified manner. When the environmental stress is over and the environment has returned to normal conditions, no manual intervention on the site is required to restore full performance of the base station.

Non-destruction refers to a period of not more than 96 consecutive hours, and a total of not more than 5.5 days in a three-year period.

12.8 Vibrations

The base station withstands vibrations below 1.0 G and shocks below 25 G.

12.9 Acoustical Noise

The base station does not emit any acoustical noise.

12.10 Power Supply

The base station can be connected to the nominal mains supply voltages in *Table 30 on page 264*.

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.

Connections are made on screw terminals in the AC connection box on the mounting base. There are three screw terminals for connection to wires having an maximum area of 2.5 mm^2.

The mains voltage is connected between two of the terminals. The third terminal is for connection of protective earth.

The cable gland has capacity for one power cable with an outer sheath diameter of 6 – 12 mm.

The connection box can also be connected to a steel conduit with a diameter of 21.5 mm.

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

12.10.1 Supply Voltage

Table 30 Supply voltages

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

12.10.2 Power Consumption

Table 31 Power consumption

Operation	Power consumption (VA)	Heat generation (W)
Normal operation [1)]	150	150
Maximum power consumption [2)]	500	500

[1)] Both transceivers transmitting on full output power.

[2)] With activated heater.

12.10.3 Battery Backup

The base station will survive cuts in the mains supply for at least 3 minutes. The base station will maintain full performance during the back-up time if the battery is fully charged. The battery will be recharged to at least 80 % of its capacity within 15 hours.

12.11 Transmission

The base station can be connected to transmission interface G 703, 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, 75 ohm coaxial cable or 120 ohm twisted pair cable.

For T1 (DS1) transmission interfaces, 100 ohm twisted pair cable is used.

All connections are made through a special tail cable connected to the transmission interface inside the mounting base. Type of tail cable is selected from the ordering information. The tail cable is provided with four connectors; two for incoming transmission cable (send and receive) and two for cascading to the next base station. Matching connector for transmission network is not supplied.

Types of connections on the tail cable:

1. Twisted pair cable connection
   - Twinax connector with TNC thread
2. Coaxial cable connection
   - TNC connector female

12.12 External Alarms

For supervision of external equipment, external alarm circuits can be connected to a terminal block in the base station.

Connections are made on screw terminals that will accept up to eight wires having a maximum area of 1.5 mm^2.

The cable gland has capacity for one cable with an outer sheath diameter of 5 - 10 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 kohm, and open contact (logic one) is required to be above 125 kohm.

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.

12.13 External Antennas

Antennas are connected to connectors X2 and X3 behind the sunshield on the base station.

Table 32 Antenna connectors

Connector	**Duplex 1, 2 TRX**
X2	TX1/RXA
X3	TX2/RXB

The antenna connectors are of the TNC socket type according to IEC 169-8.

When external antennas are used, a separate document shall be created for the site and included in the Site Installation Documentation. This document is numbered as an allocation drawing, 193 26-IPA......

The base station has no space for connection of thick antenna cables. It is recommended to use a short 6 mm diameter jumper cable to join the base station with external antenna systems. Recommended jumper length is about 1 m, longer cables will add too much attenuation, especially at 1800/1900 MHz. For a suitable jumper cable see:

Ordering Information *131 62-HRB 105 01/3B*

Installation of external antennas and grounding for lightning protection purpose is described in:

General Installation Instructions *LZN 302 49*

12.13.1 Multicasting Box

The antenna connectors on the multicasting box are of the TNC socket type according to IEC 169-17.

12.14 Earthing

The cabinet has one earthing point on the mounting base. The earthing point is a M8 bolt. A suitable earthing kit shall be used to connect the bolt with the lightning protection system of the site, see:

Ordering Information *131 62-HRB 105 01/3B*

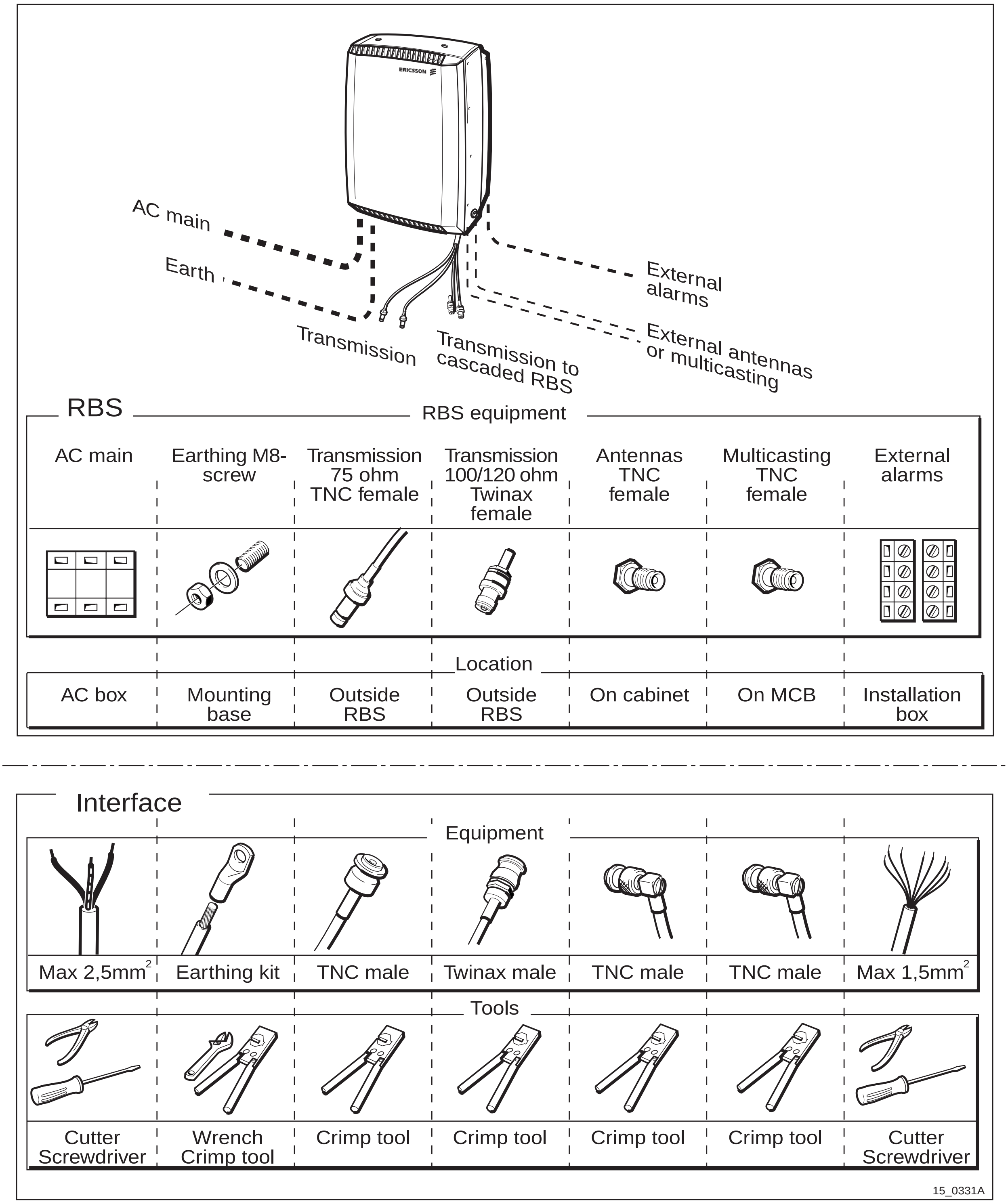

Figure 212 Overview of external connections

The *Figure 212 on page 266* is an overview of cable connections between RBS 2301 and external equipment, such as power, earthing, transmission, antenna system and external alarms. It also shows the necessary tools to make these connections.

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13 Glossary

This glossary lists abbreviations and acronyms used in texts dealing with RBS 2301 and 2302. Some basic terms and acronyms needed for cross-references are included in the list.

In the RBS manuals, terminology defined by GSM is used together with terms related to Ericsson and the CME 20 and CMS 40 projects.

Terms and Abbreviations

An arrow -> is used to indicate a reference to another entry in this list.

AAU	Active Antenna Unit
Abis	GSM interface standard defining attributes of the communication between BSC and BTS.
AC	Alternating Current
A/D converter	Analog to Digital converter
AGW	Abis Gateway
AIS	Alarm Indication Signal
ALBO	Automatic Line Build Out
ALPU	Antenna Lightning Protection Unit
AO	Application Object
ARAE	Antenna Related Auxiliary Equipment
ARFCN	Absolute Radio Frequency Channel Number
ARP	Antenna Reference Point
ASIC	Application Specific Integrated Circuit
Astra	ASIC in the TRU
BCCH	Broadcast Control CHannel Downlink only broadcast channel for broadcast of general information at a base station, on a base station basis.
BER	Bit Error Rate
BSC	Base Station Controller GSM network node for control of one or more BTSs.
BSCSim	Base Station Controller Simulator

BSS	Base Station System GSM network logical unit comprising one BSC and one or more BTSs.
BTS	Base Transceiver Station GSM network unit operating on a set of radio frequency channels in one cell.
Burst	A portion of digital information, the physical content, that is transferred within the time interval of one time slot.
CAN	Canada
Cabinet	The physical housing of a base station.
Cascade connections	Connection of several cabinets by the PCM cable. Similar to serial connection. -> Cascading
Cascading	Connection of several cabinets by the PCM cable. Similar to serial connection. -> Cascade connections
CCCH	Common Control CHannel Channel combining the following common control channels: PCH Paging CHannel RACH Random Access CHannel AGCH Access Grant CHannel
CDU	Combining and Distribution Unit
Cell	An area of radio coverage identified by the GSM network by means of the cell identity.
CEU	Coverage Extension Unit
CF	Central Functions
Channel	The common term channel denotes the virtual connection, consisting of physical and logical channels between BSS and MS, during a call in progress. -> Logical Channel -> Physical Channel
Channel Combination	A physical channel on an air interface carries a defined set of logical channels.

Channel group	A channel group is a group of dedicated logical channels to a specific MS.
CM	Common Mode
CME 20	Cellular Mobile Europe - CME 20 Ericsson digital land mobile telecommunication system based on the GSM standards. - CME 201 Ericsson GSM system comprising Ericsson equipment only.
CMRU	Central Main Replaceable Unit. Main RU. The RBS is physically connected to the Base Station Controller (BSC) via the CMRU. There is only one CMRU in each RBS.
CMS 40	Cellular Mobile System Ericsson digital land mobile telecommunication system based on the Joint Technical Committee (JTC) specification for PCS 1900.
CPI	Communication and Power Interface
CPU	Central Processing Unit
CS	Coding Scheme
CSA	Canadian Standards Association
CSES	Consecutive Severely Errored Second
CSU	Customer Service Unit
Dannie	ASIC in the TRU
dB	decibel
DB	DataBase
DC	Direct Current
DCC	Digital Cross Connector
DCS	Digital Communication System International standard for 1800 MHz based on the GSM standard.
DIP	DIgital Path The name of the function used for supervision of the connected PCM lines.

Dixie	ASIC in the TRU
DM	Degraded Minute
DM	Differential Mode
DMRU	Distributed Main Replaceable Unit If a Main RU is subordinated to the CMRU, it is said to be distributed.
Downlink	Signalling direction, from the system to the MS
DP	Distribution Panel
DPX	Duplexer
DS1	Digital Signal Level 1 (1544 kbit/s)
DSP	Digital Signal Processor
DTF	Distance To Fault
DUT	Device Under Test
DXB	Distribution Switch Board
DXX	Ericsson Cellular Transmission System including NMS
E1	Short for G.703 2048 kbit/s PCM link
EEPROM	Electrically Erasable Programmable Read-Only Memory
EIRP	Effective Isotropic Radiated Power
EMC	Electro Magnetic Compatibility
ES	Errored Second
ESD	ElectroStatic Discharge
ETS	European Telecommunication Standard
EXT	External
FCC	Federal Communications Commission
FDL	Facility Data Link
FDU	Feeder Duplexer Unit
FS	Function Specification
FSC	Field Support Centre
FU	Filtering Unit

GPRS	Global Package Rating System
GS	General Specification
GSM	Global System for Mobile communications International standard for a TDMA digital mobile communication system. Originally, GSM was an abbreviation for Groupe Special Mobile, which is a European mobile telecommunication interest group, established in 1982.
GSM 900	GSM system 900 MHz (generic)
GSM 1800	(GSM-based) Digital Communication System 1800 MHz (generic)
GSM 1900	(GSM-based) Digital Communication System 1900 MHz (generic)
HDLC	High level Data Link Control
HDSL	High bit rate Digital Subscriber Line
HISC	HIghway Splitter Combiner
HLIN	High Level IN
HLOUT	High Level OUT
HW	HardWare
HWU	HardWare Unit An HWU consists of one or more SEs. An HWU is a functional unit within the RBS. The HWU is either active (equipped with a processor) or passive (without processor).
ID	IDentification
IDB	Installation Data Base
IEC	International Electric Commission
IF box	Inter Face Box
INT	Internal
IS	Interface Switch
I1A	Internal Fault Map Class 1A
I1B	Internal Fault Map Class 1B
I2A	Internal Fault Map Class 2A
JTC	Joint Technical Committee

LAN	Local Area Network
LAPD	Link Access Procedures on D-channel LAPD is the data link layer (layer 2) protocol used for communication between the BSC and the BTS on the Abis interface. Abis layer 2 is sometimes used synonymously with LAPD.
LBO	Line Build Out
LED	Light Emitting Diode
LLB	Line Loop Back
LNA	Low Noise Amplifier
Local bus	The local bus offers communication between a central main RU (DXU) and distributed main RUs (TRU and ECU).
Local mode	When the RU is in RU mode Local it is not prepared for BSC communication.
Local/Remote switch	Using the Local/Remote switch, an operator orders the RU to enter Local or Remote mode.
LOF	Loss Of Frame
Logical Channel	A logical channel represents a specified portion of the informationcarrying capacity of a physical channel. GSM defines two major categories of logical channels: TCHs Traffic CHannels, for speech or user data CCHs Control CHannels, for control signalling. -> Physical Channel -> Channel Combination
Logical RU	A unit which can be referred to, but is not a single physical unit. There are three different kinds of logical RUs: 1. Buses 2. Antennas 3. Environment
LOS	Loss Of Signal

LVD	Low Voltage Directive
LVF	Low Voltage Filter
MADT	Mean Accumulated DownTime
Main RU	A main replaceable unit is a replaceable unit that contains one or more processors, to which software can be downloaded from the BSC.
MCB	MultiCasting Box
MHS	Modification Handling System Ericsson trouble report database
MMI	Man-Machine Interface
MO	Managed Object
MRT	Mean Repair Time
MS	Mobile Station
MTBF	Mean Time Between Failure
MTBCF	Mean Time Between Catastrophe Failure
NCS	National Colour System
NMS	Ericsson Network Management System in DXX
Nominal Power	The nominal power is the power level defined when configuring the transceiver.
O&M	Operation and Maintenance General term for activities such as configuration, utilization of channels (frequency bands), cell planning, system supervision, hardware and software maintenance, subscriber administration, etc.
OMC	Operation and Maintenance Centre
OMT	Operation and Maintenance Terminal The OMT is a terminal that supports functions for handling the RBS on site. The terminal can be a portable PC.
Operation	Operation is the normal, everyday running of the RBS with full functionality.
OPI	OPerational Instructions

PA	Power Amplifier
PAM	Power Amplifier Module
PBA	Printed Board Assembly
PBC	Power and Battery Cabinet
PC	Personal Computer
PCB	Printed Circuit Board
PCH	Paging CHannel Downlink only subchannel of CCCH for system paging of MSs. -> CCCH
PCM	Pulse Coded Modulations (used as a name for the G.703 transmission interface)
PCS	Personal Communication Services
PFWD	Power Forward
Physical Channel	An air interface physical channel carries one or more logical channels. A physical channel uses a combination of frequency and time division multiplexing and is defined as a sequence of radio frequency channels and time slots. -> TDMA frame -> Logical channel
PIN	Personal Identification Number
PLB	Payload Loop Back
PREFL	Power Reflected
PSA	Power Supply Adapter
PSU	Power Supply Unit
RACH	Random Access CHannel Uplink only subchannel of CCCH for MS request for allocation of a dedicated channel. -> CCCH
RAI	Remote Alarm Indication
RAM	Random Access Memory
RBS	Radio Base Station

	All equipment forming one or more Ericsson base stations.
	->BTS
RBS 2000	New RBS generation
Remote mode	When the RU is in RU mode Remote, a link is established between the BCS and the central main RU.
RF	Radio Frequency
RLC	Repair Logistic Centre
R-state	Release state
RTN	Return
RU	Replaceable Unit
	An RU consists of one or more HWUs. An RU may be replaced by another RU of the same type. The RU is the smallest unit that can be handled on site.
RX	Receiver
RXA	Receiver antenna branch A
RXB	Receiver antenna branch B
RXDA	Receiver Divider Amplifier
RXDP	Receiver Distribution Plane
RXQUAL	Measure of signal quality as defined in GSM 05.08:8.2.4
SES	Severely Errored Second
SIR	Small Indoor RBS
SO	Service Object
Sub RU	A sub-replaceable unit is always connected to a superior Main RU. This connection is used for example for retrieval of the RU identity. A sub-RU normally does not have a processor. Note that an RU with a processor that is not loadable is classified as a sub-RU.
SW	SoftWare
SWR	Standing Wave Ratio
SYNC	Synchronous

T1	Transmission facility for DS1 (1544 kbit/s).
TCB	Tranceiver Control Board
TCH	Traffic CHannel The traffic channels carry either encoded speech or user data.
TDMA	Time Division Multiple Access Multiplexing of several channels in a common frequency band. Each channel is assigned a certain time division, a time slot.
TDMA frame	GSM air interface time frame comprising eight time slots.
TEI	Terminal Endpoint Identifier TEI is an identification code carried by a LAPD frame as a terminal connection endpoint within a Service Access Point (SAP).
TEMS	TEst Mobile Station
TF	Timing Function
TG	Transceiver Group
Timing bus	The timing bus carries air timing information from the timing unit in the DXU to the TRUs.
TM	Transport Module
TMA	Tower Mounted Amplifier
TN O&M	Transport Network Operation and Maintenance (in general).
Tora	ASIC in the TRU
TRA	Transcoder Rate Adapter The TRA Unit in BSC performs transcoding of speech information and rate adaption of data information.
Tracy	ASIC in the TRU
TRX	Transceiver (combined transmitter and receiver)
TS	Time Slot

	A 0.577 ms period (TDMA frame subunit) corresponding to 156.25 raw bits of information. The eight time slots of each TDMA frame are numbered 0...7. -> Burst
TT	Total Time
TX	Transmitter
TXA	Transmitter antenna branch A
TXB	Transmitter antenna branch B
TXU	Radio Transmitter Unit
UAS	Unavailable Seconds
UL	Underwriters Laboratories Inc.
Uplink	Signalling direction, from the MS to the system.
UPS	Uninterrupted Power Supply
VCO	Voltage Controlled Oscillator
VSWR	Voltage Standing Wave Ratio RF signal measure. The quotient between transmitted and reflected power.
X bus	The X bus carries transmit air data frames between trancievers. This is used for baseband frequency hopping.

Spare Parts Catalogue RBS 2301

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

Contents

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1 Preface for the Spare Parts Catalogue

The purpose of the Catalogue is to provide relevant information necessary to order replaceable parts. (This information is useful for the general planning of a maintenance organisation and in building up a spare parts stock.)

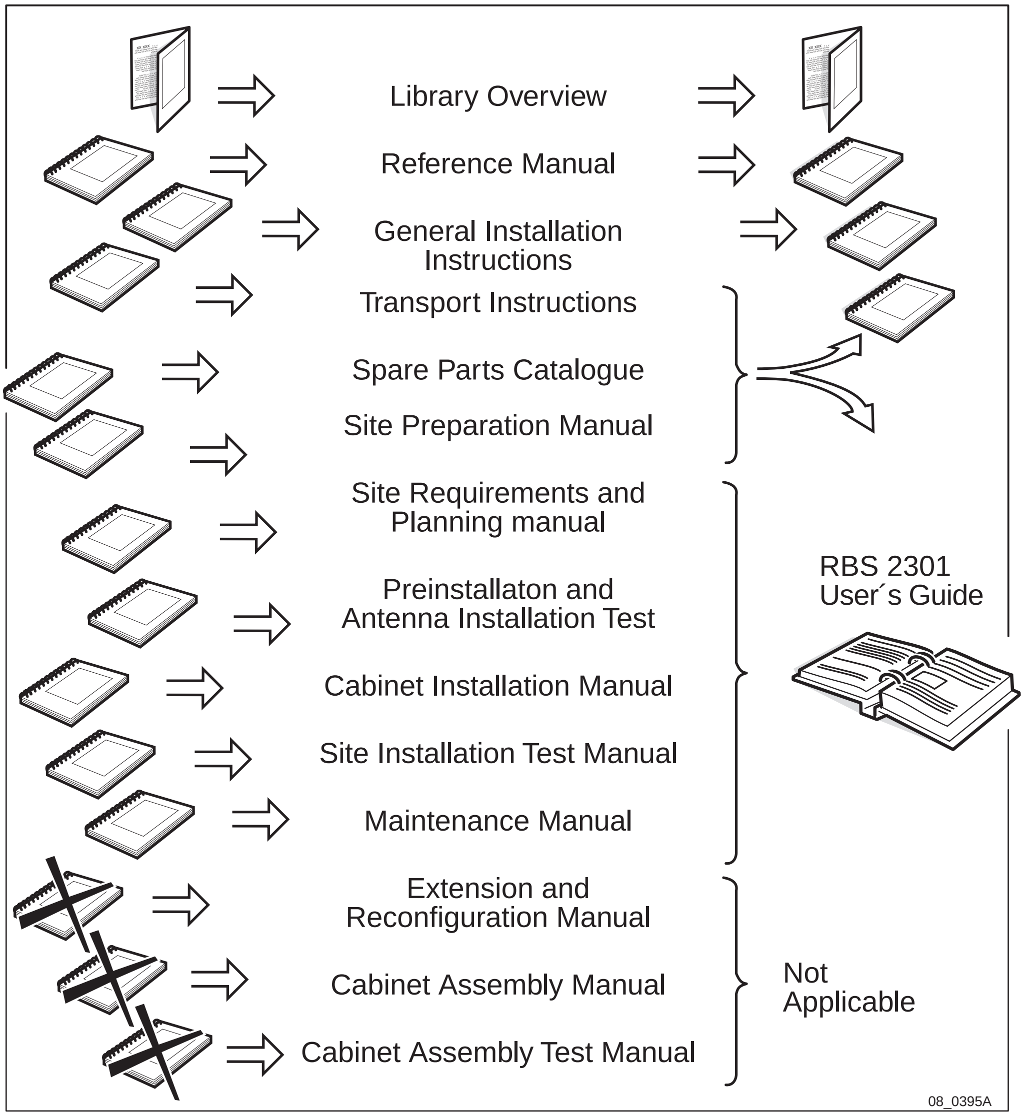

Figure 1

Customer Library	LZN 302 70
Library Overview	LZN 302 73
RBS 2301 User’s Guide	LZN 302 47
Reference Manual	LZN 302 77
General Installation Instructions	LZN 302 49
Spare Parts Catalogue	LZN 302 96

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.

1.1.1 R1A to R2A for the Catalogue

- New Spare Parts Sets introduced: 1) EMC-filter 2) Sun shield accessories, 3) Shielding gasket, 4) Cover for install box, 5) Screw set, 6) Cable lead.
- New Multicasting Box common for GSM 900, 1800, 1900 replacing two old.
- New catalogue structure with three separate chapters for the spare parts: 1) Recommended repairable, 2) Recommended not repairable and 3) Other available.
- A new chapter: "Spare Parts Philosophy for RBS 2301".
- A new chapter: "Numerical index for RBS 2301".
- The Spare Parts Catalogue is separately orderable and also included in the User's Guide.

1.1.2 R2A to R3A for the Catalogue

- Minor changes in graphics.
- New productnumbers for RBS 2301 manuals.

2 Spare Parts Philosophy for RBS 2301

The spare parts catalogue is adapted to the structure below.

The specifying and classifying of spare parts is done during the service preparation process. The result is a spare part list containing three classes of spare parts:

1) Recommended for customer stock. Intended to be replaced on site and intended to be repaired at Ericsson Repair Center.

2) Recommended for customer stock. Intended to be replaced on site or at local shop and intended to be disposed after consumption.

3) Other Available parts not recommended for customer stock.

2.1 General Information

Spare Parts Ordering Address:

Please use the Regional Ericsson Company, else:

Ericsson Radio Systems AB

Customer Services (RMOG)

S-164 80 Stockholm

Repair Delivery Address

Please use the Regional Logistics Center specified in the System Services Contract with the local Ericsson Radio Systems Company.

Catalogue Ordering

To order extra copies of this Spare Parts Catalogue, please contact the Regional Ericsson Company and order Product Number:

LZN 302 96. The latest updated version will be delivered.

The catalogue can also be found on the Ericsson Intranet. The address is:

https://kira.ericsson.se/wsh/cme20/rbs2000/shelf1/CURRENT/bin/webshelf/

Remarks

Comments or questions regarding information in this catalogue should be addressed to:

Spare Parts Documentation Telefax: +46 8 757 1388 or to

a special Mail box, (MEMO): ERAC.ERASPARE or

as e-mail: erac.eracspare@mesmtpse.ericsson.se

3 Recommended Spare Parts for Customer Stock (Repairable)

Handling

This Chapter shows Recommended Parts for customer stock.

The Parts are intended to be replaced on site and to be repaired at Ericsson Repair Center.

RBS 2301 Examples

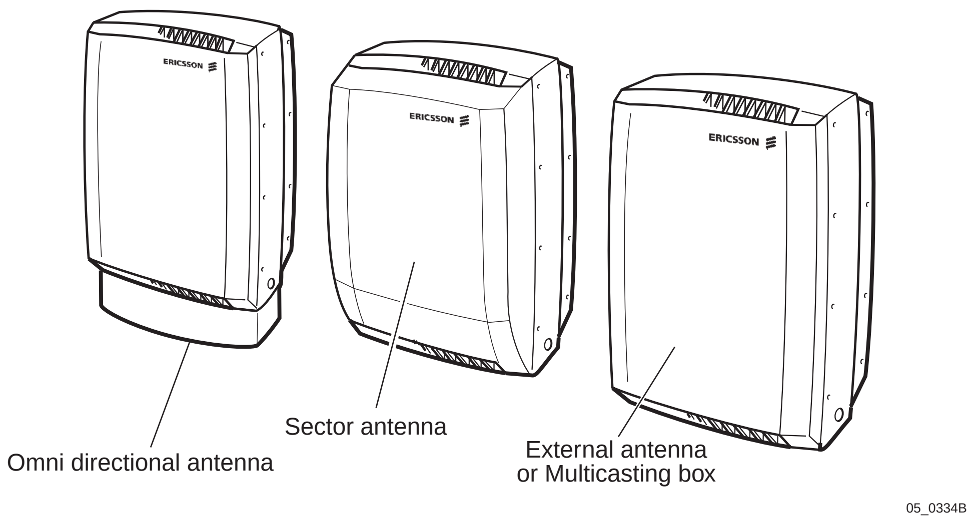

Figure 2

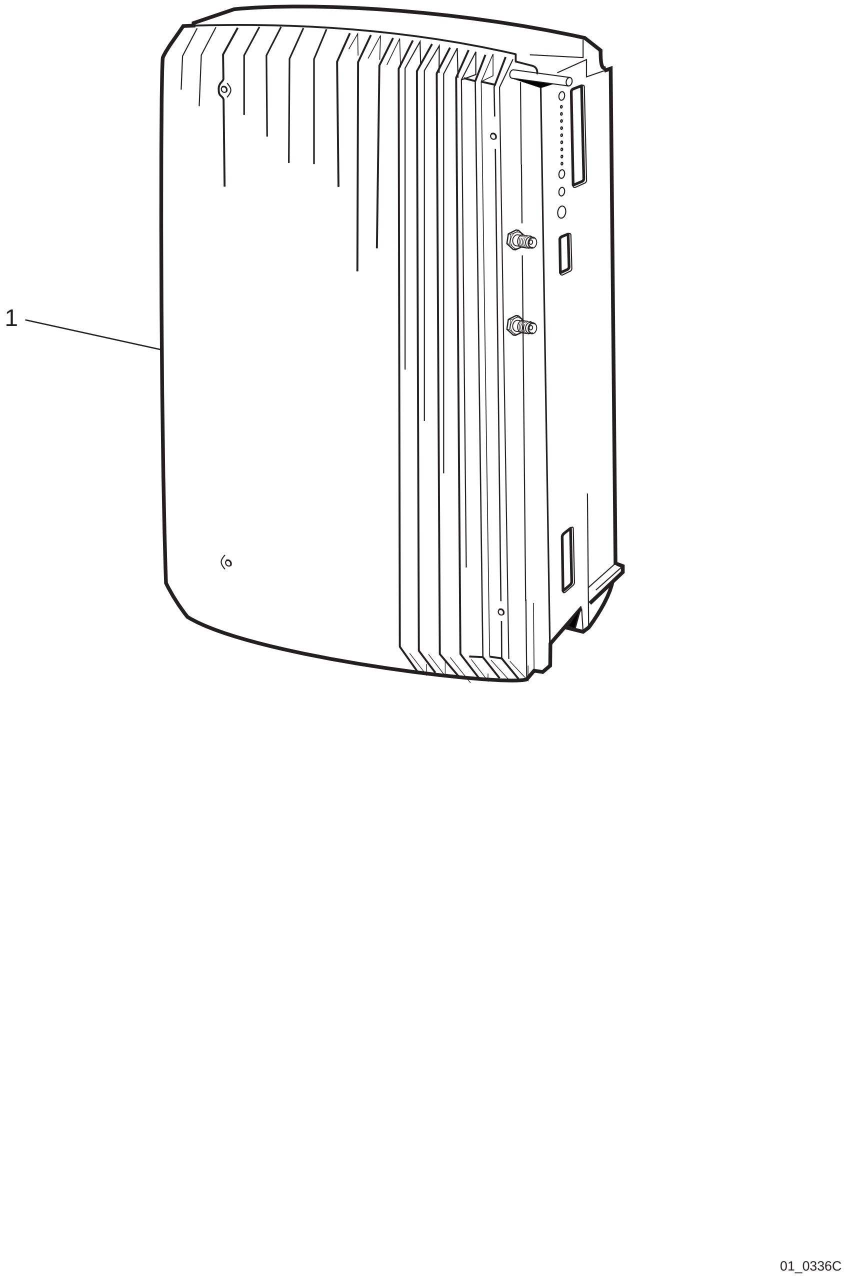

Figure 3

3.1 Cabinet

Pos	Product No	Denom.	System standard	Number of TRX	Transm. Interface	Intern. Synch	Encr	Filter Type
1	BFM 199 04/006	Cabinet	GSM 900 MHz	1	E1	N	A5/1	DPX
	BFM 199 04/008	Cabinet	GSM 900 MHz	1	E1	N	A5/2	DPX
	BFM 199 04/012	Cabinet	GSM 900 MHz	1	T1	Y	A5/2	DPX
	BFM 199 04/016	Cabinet	GSM 900 MHz	1	T1	N	A5/2	DPX
	BFM 199 04/022	Cabinet	GSM 900 MHz	2	E1	N	A5/1	DPX
	BFM 199 04/024	Cabinet	GSM 900 MHz	2	E1	N	A5/2	DPX
	BFM 199 04/028	Cabinet	GSM 900 MHz	2	T1	Y	A5/2	DPX
	BFM 199 04/032	Cabinet	GSM 900 MHz	2	T1	N	A5/2	DPX
	BFM 199 04/038	Cabinet	GSM 1800 MHz	1	E1	N	A5/1	DPX
	BFM 199 04/040	Cabinet	GSM 1800 MHz	1	E1	N	A5/2	DPX
	BFM 199 04/044	Cabinet	GSM 1800 MHz	1	T1	Y	A5/2	DPX
	BFM 199 04/048	Cabinet	GSM 1800 MHz	1	T1	N	A5/2	DPX
	BFM 199 04/054	Cabinet	GSM 1800 MHz	2	E1	N	A5/1	DPX
	BFM 199 04/056	Cabinet	GSM 1800 MHz	2	E1	N	A5/2	DPX
	BFM 199 04/060	Cabinet	GSM 1800 MHz	2	T1	Y	A5/2	DPX
	BFM 199 04/064	Cabinet	GSM 1800 MHz	2	T1	N	A5/2	DPX
	BFM 199 04/072	Cabinet	GSM 1900 MHz	1	E1	N	A5/2	DPX
	BFM 199 04/074	Cabinet	GSM 1900 MHz	1	T1	Y	A5/1	DPX
	BFM 199 04/078	Cabinet	GSM 1900 MHz	1	T1	N	A5/1	DPX
	BFM 199 04/088	Cabinet	GSM 1900 MHz	2	E1	N	A5/2	DPX
	BFM 199 04/090	Cabinet	GSM 1900 MHz	2	T1	Y	A5/1	DPX
	BFM 199 04/094	Cabinet	GSM 1900 MHz	2	T1	N	A5/1	DPX

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03_021

4 Recommended Spare Parts for Customer Stock (Not Repairable)

Handling

This Chapter shows Recommended Parts for customer stock.

The Parts are intended to be replaced on site or at local shop and intended to be disposed after consumption.

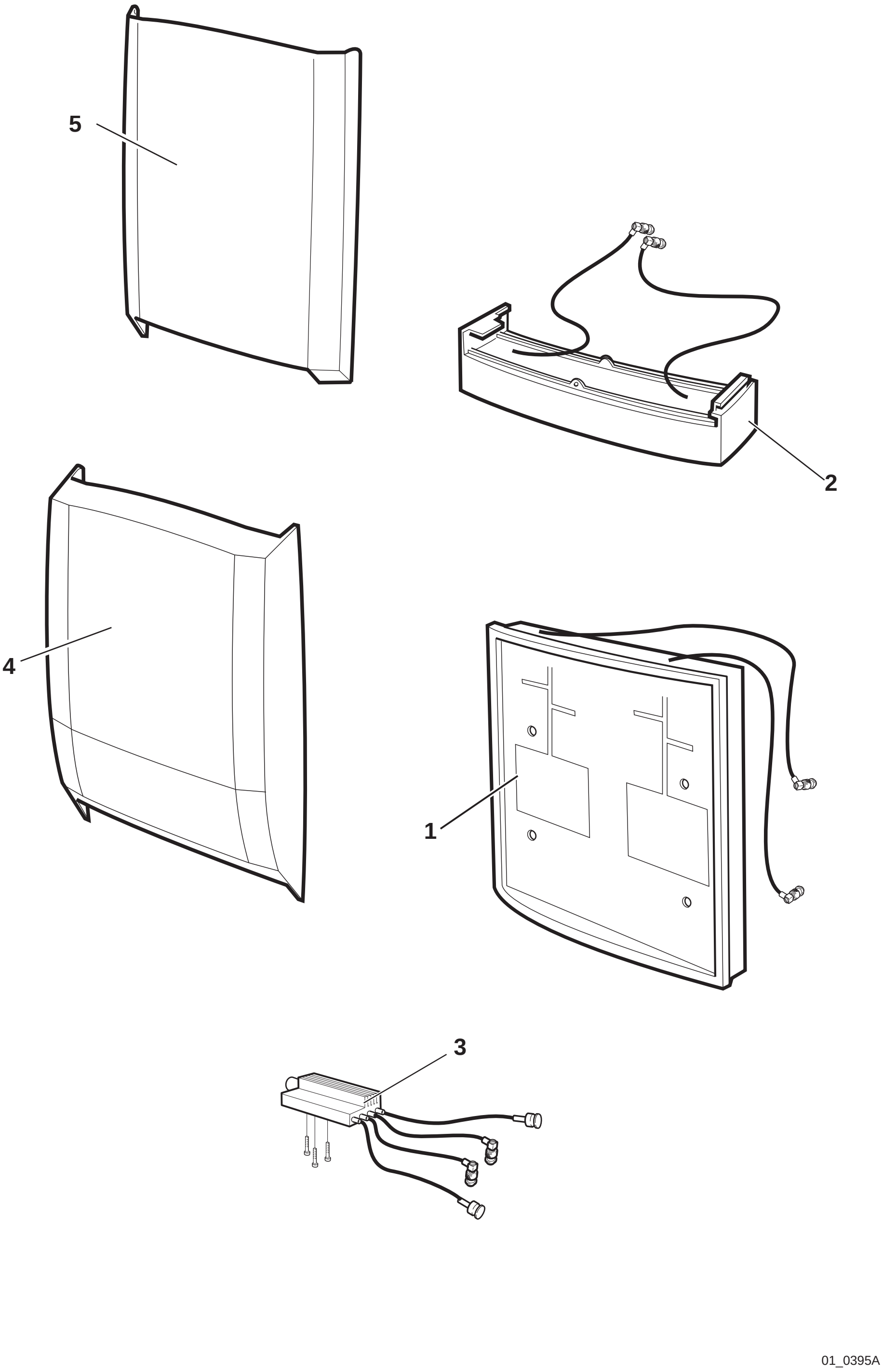

Figure 4

4.1 Antennas and Sunshields

Pos	Product No	Denomination	Functional description /*Comments*
1	KRE 101 1556	Sector Antenna unit	GSM 900 Mhz /*Incl cables*
	KRE 101 1557	Sector Antenna unit	GSM 1800 Mhz /*Incl cables*
	KRE 101 1558	Sector Antenna unit	GSM 1900 Mhz /*Incl cables*
2	KRE 101 1559	Omni Directional Antenna unit	GSM 900 Mhz /*Incl cables*
	KRE 101 1560	Omni Directional Antenna unit	GSM 1800 Mhz /*Incl cables*
	KRE 101 1561	Omni Directional Antenna unit	GSM 1900 Mhz /*Incl cables*
3	KRF 201 439/1	Multicasting Box (Filter unit)	GSM 900,1800,1900 Mhz /*Incl cables*
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*
For Omni Directional Antenna, External Antenna or if Multicasting Box is used			
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*

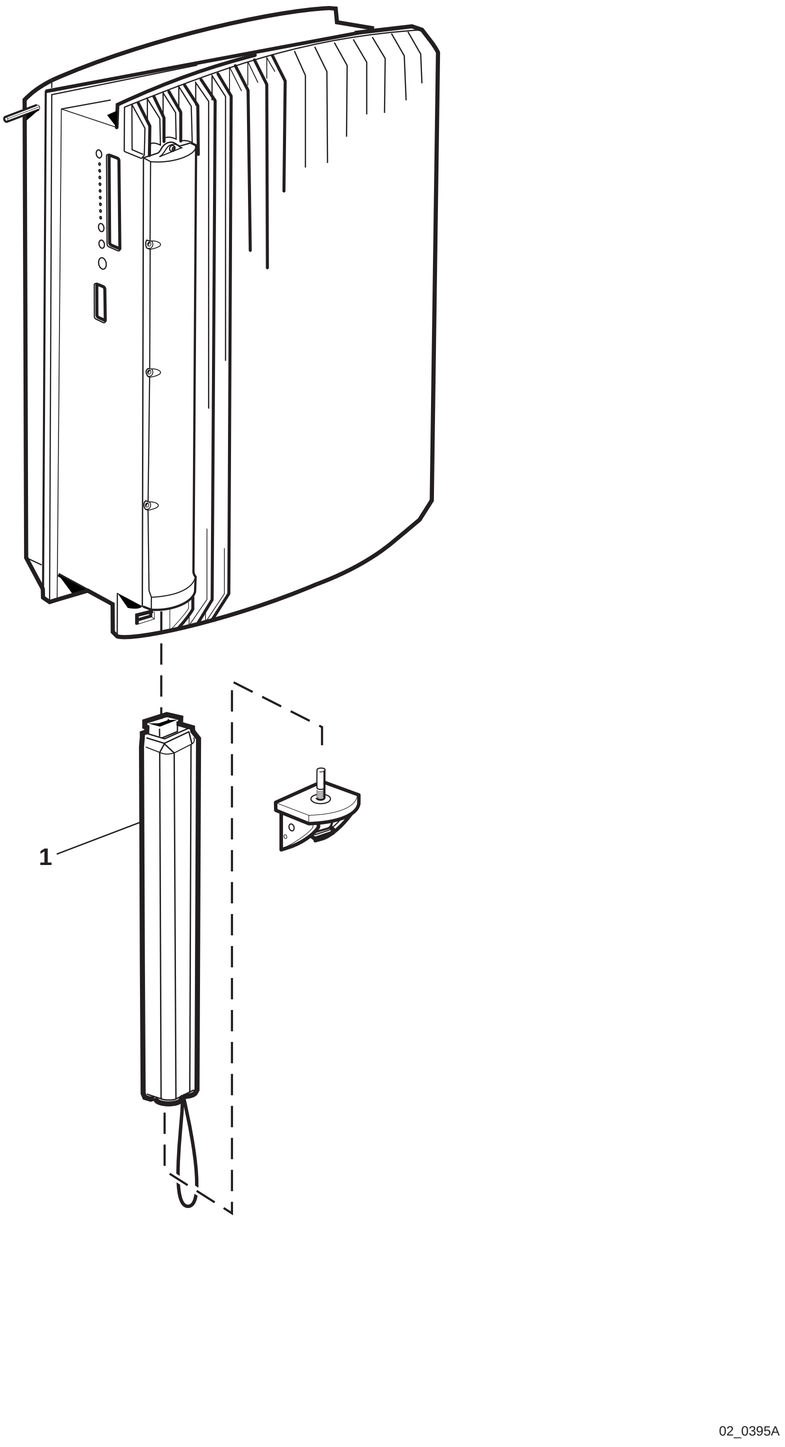

Figure 5

4.2 Battery

Pos	Product No	Denomination	Functional description /*Comments*
1	BKB 191 2022/1	Battery unit	

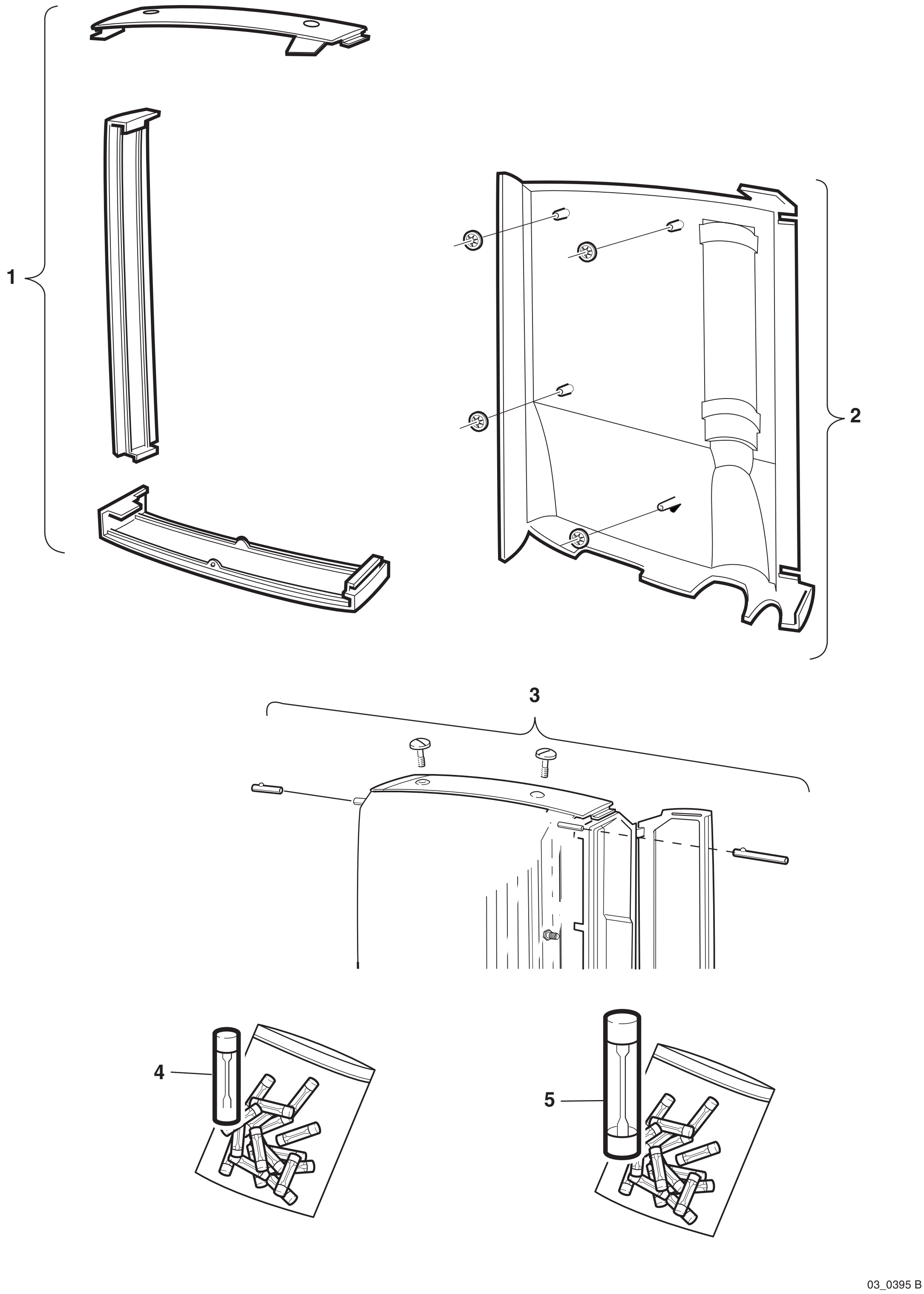

Figure 6

4.3 Spare Parts Sets 1

Pos	Product No	Denomination	Functional description /*Comments*
1	NTZ 112 86/SH01	Spare Parts Set	Sunshields, Grey /*Includes Upper, Left and Lower*
2	NTZ 112 86/SH02	Spare Parts Set	Rear Sunshield, Grey /*Includes Locking washers. Also included in a Complete Mounting Base see Chapter "Other Available Parts, Other Available Parts 1"*
3	NTZ 112 86/SH03	Spare Parts Set	Sun Shield Accessories /*Includes Front Right Shaft, Front Left Shaft and upper end plugs*
4	NTZ 112 86/FU01	Spare Parts Set	Fuses for 230 V /*4A size 5x20 mm, slow blow, 20 pcs*
5	NTZ 112 86/FU02	Spare Parts Set	Fuses for 115 V /*8A size 6.25 x30 mm, slow blow, 20 pcs*

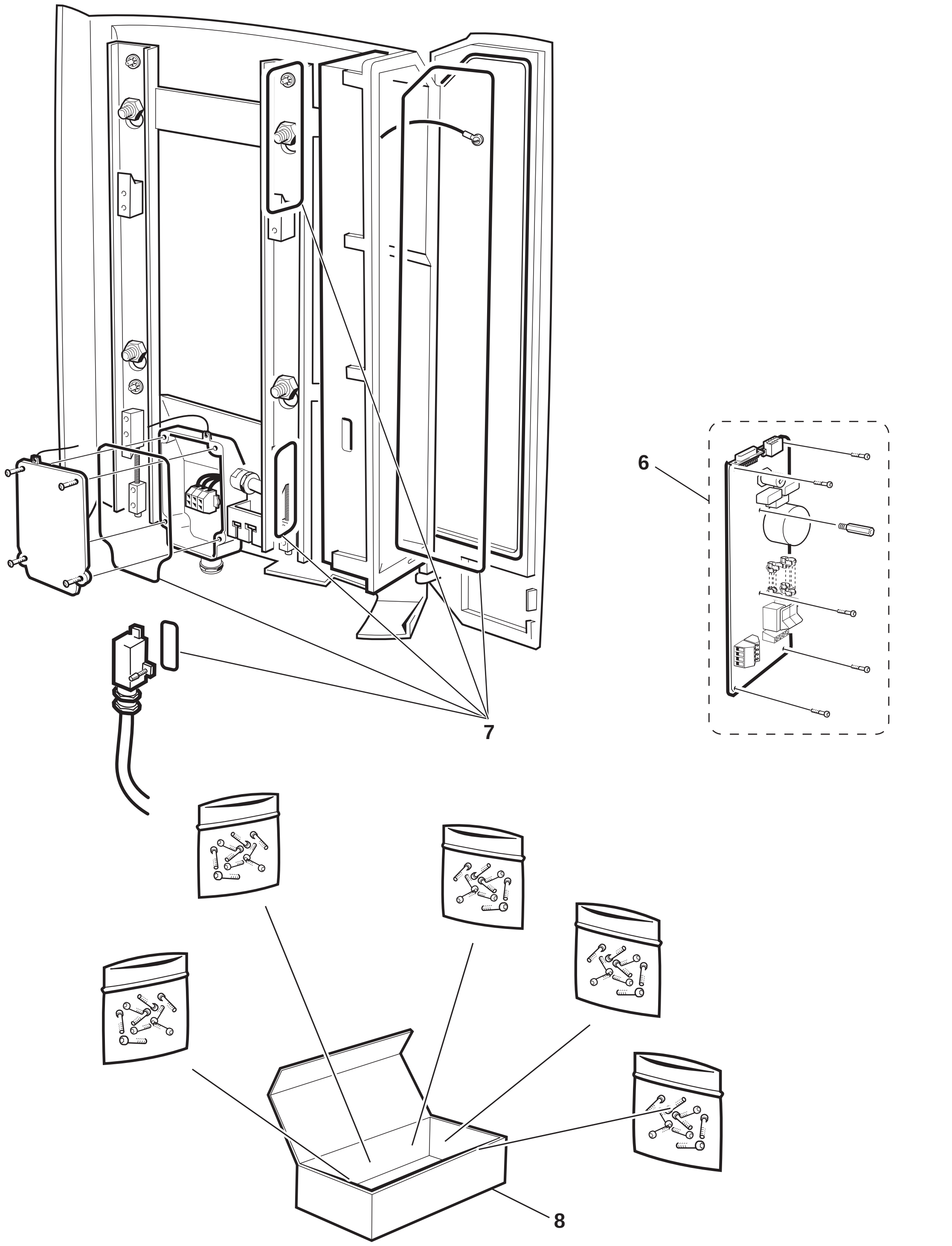

Figure 7

4.4 Spare Parts Sets 2

Pos	**Product No**	**Denomination**	**Functional description /*Comments***
6	NTZ 112 86/EM01	Spare Parts Set	EMC-filter set /*Includes EMC-filter board, spacer and screws*
7	NTZ 112 86/GS01	Spare Parts Set	Shielding gasket set /*Includes shielding gaskets for installation box, AC-box and transmission cable cover*
8	NTZ 112 86/SC01	Spare Parts Set	Screw set/*Includes some of the most common screws, washers and fixing details*

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5 Other Available Parts

Handling

This Chapter shows other parts available if needed.

The parts are Not recommended for customer stock.

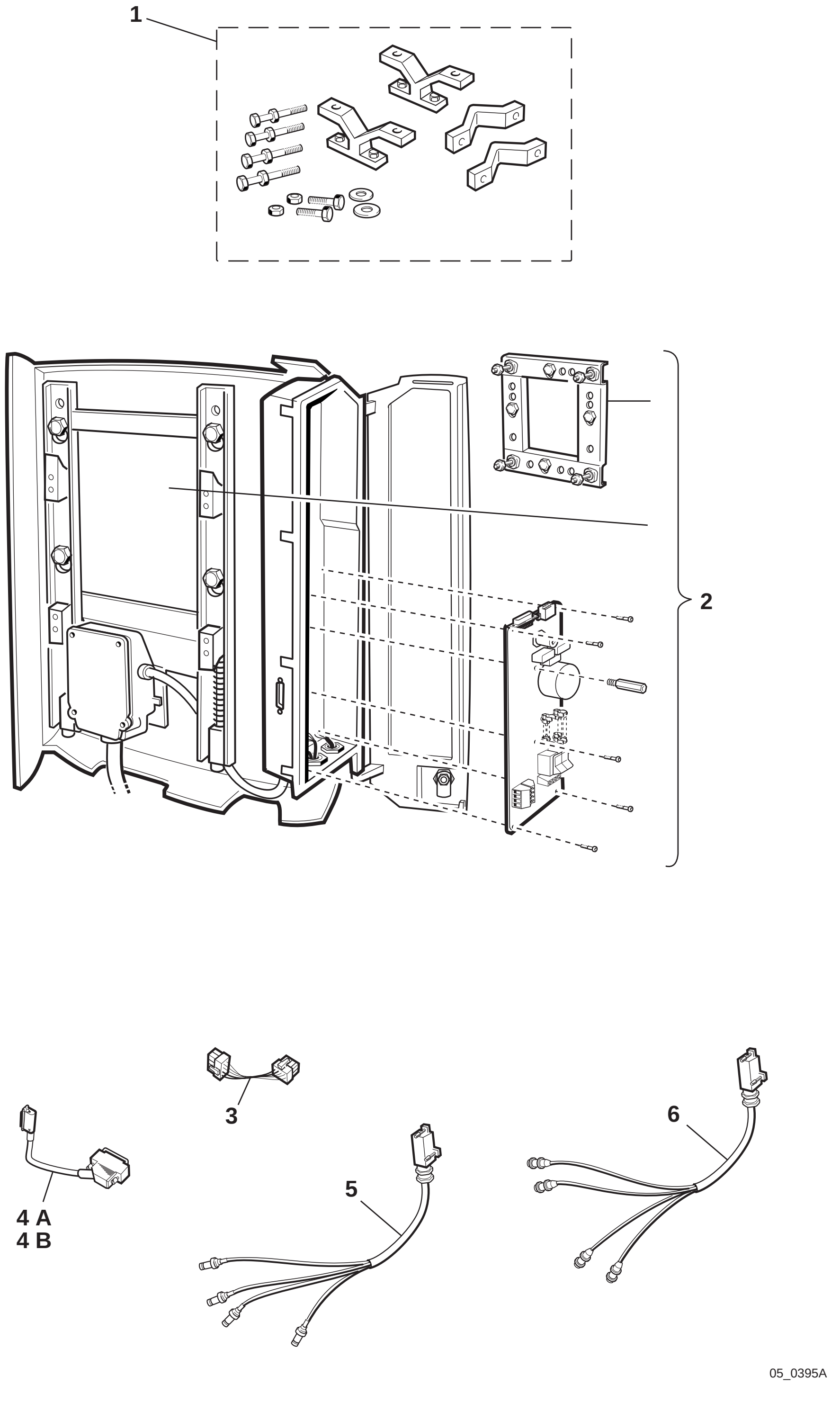

Figure 8

5.1 Other Available Parts 1

Pos	Product No	Denomination	Functional Description /*Comments*
1	NTM 192 08/1	Set of material	Pole /Mast Fixture set
2	SEB 112 1016/1	Mounting Base	Complete Mounting Base
3	RPM 518 903/00130	Cable	AC Cable
Transmission Impedance 75 ohm			
4A	RPM 518 901/1	Cable	75 ohm /*Length = 0.18m*
5	RPM 518 906/1	Cable	75 ohm /*Length = 0.57m*
Transmission Impedance 100/120 ohm			
4B	RPM 518 902/1	Cable	100/120 ohm /*Length = 0.18m*
6	RPM 518 908/1	Cable	100/120 ohm /*Length = 0.57m*

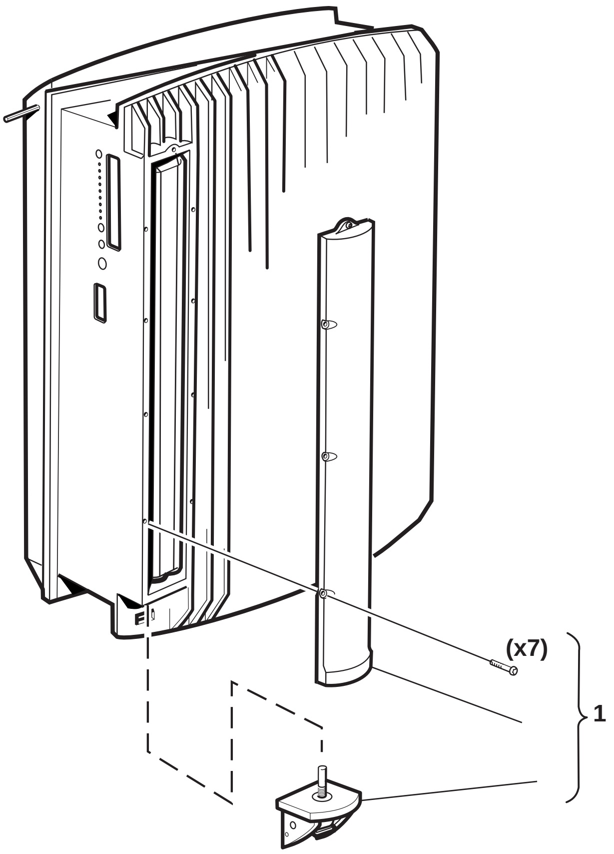

Figure 9

5.2 Other Available Parts 2

Pos	Product No	Denomination	Functional description /*Comments*
1	NTZ 112 86/BA01	Spare Parts Set	Battery Cover set/ *Includes covers and screws.* *For Battery see "Chapter Recommended Spare Parts"*

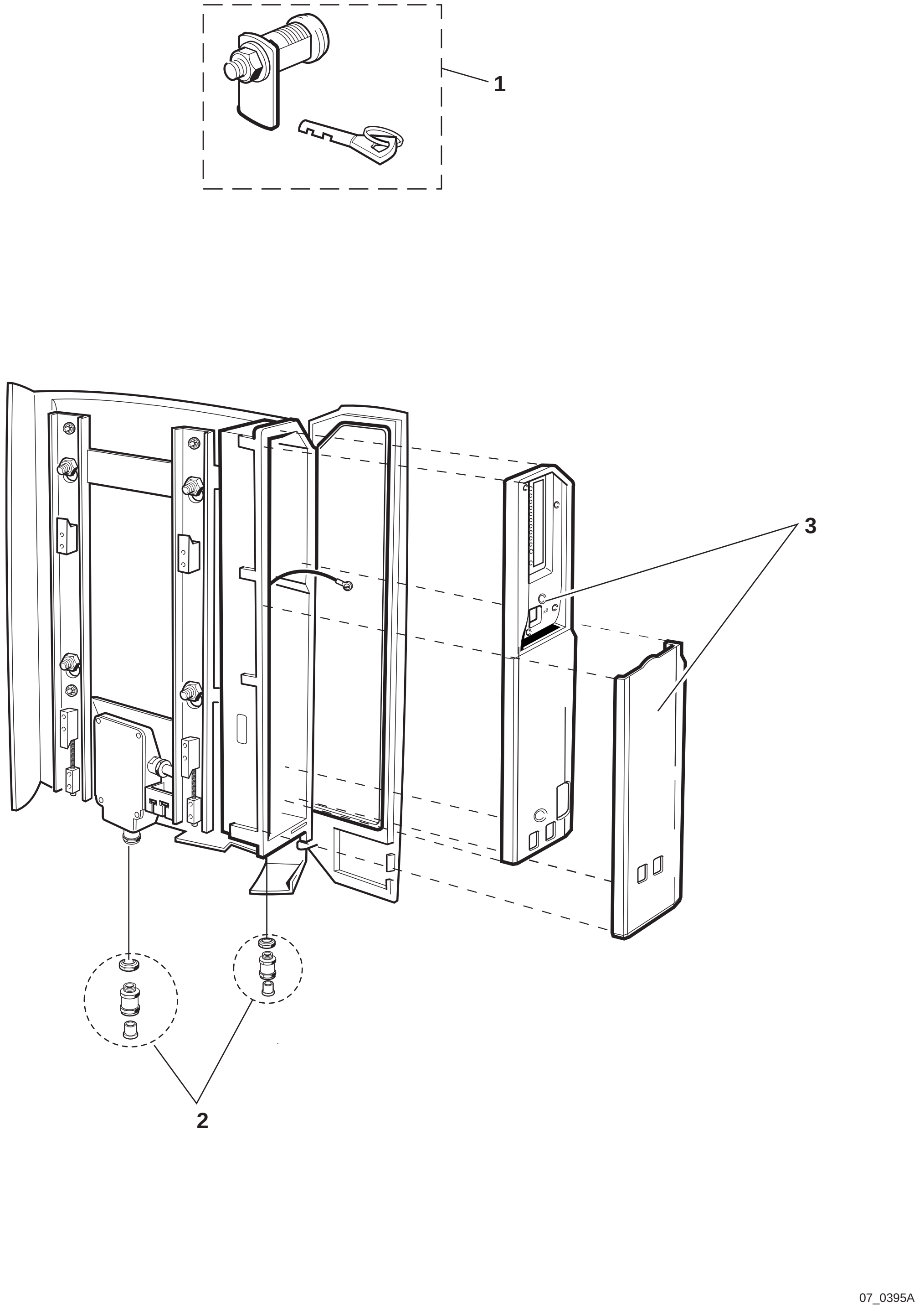

Figure 10

5.3 Other Available Parts 3

Pos	Product No	Denomination	Functional description /*Comments*
1	NTZ 112 86/LK01	Spare Parts Set	Locking Set /*Incl.Lock, Key and Latch*
2	NTZ 112 86/CL01	Spare Parts Set	Cable Lead Set /*Incl cable lead-in, nuts and moisture protection for the AC box inlet and for the External alarm inlet.*
3	NTZ 112 86/CV01	Spare Parts Set	Cover Set for installation box /*Includes cover and protective cover for installation box*

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03_021

6 Numerical index for RBS 2301