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Ericsson GSM System

RBS 2103

Maintenance Manual

ERICSSON

LZN 302 90 R6A

Maintenance Manual

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

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1 Preface

This Maintenance Manual is valid for CME 20 from release R6.1 up to R7 respectively CMS 40 all releases up to R7.

Note: For systems CME 20 releases R5 and R6.0, respectively CMS 40 releases R1 and R2, please refer to revision R2A of this manual.

The purpose of the manual is to provide the information necessary for first line maintenance. First line maintenance includes the following activities:

- Repairs that are done by replacement on site. Only Replaceable Units (RUs) are handled.
- Preventive maintenance.

The instructions apply only to a Base Station Controller (BSC) connected to the Radio Base Station (RBS), and it is assumed that the RBS is installed and in operation.

The instructions in this manual presuppose that the replaced units are always put into operation. An example of a situation where units are not put into operation is the installation of a Transceiver Unit (TRU) to ensure redundancy.

1.1 Customer Documentation Library

The user documentation for all RBS 2000 models consists of customer manuals divided to suit different process events. The *Library Overview* contains the following information for each manual:

- Short description
- Recommended target group
- Product number

Library Overview *LZN 302 73*

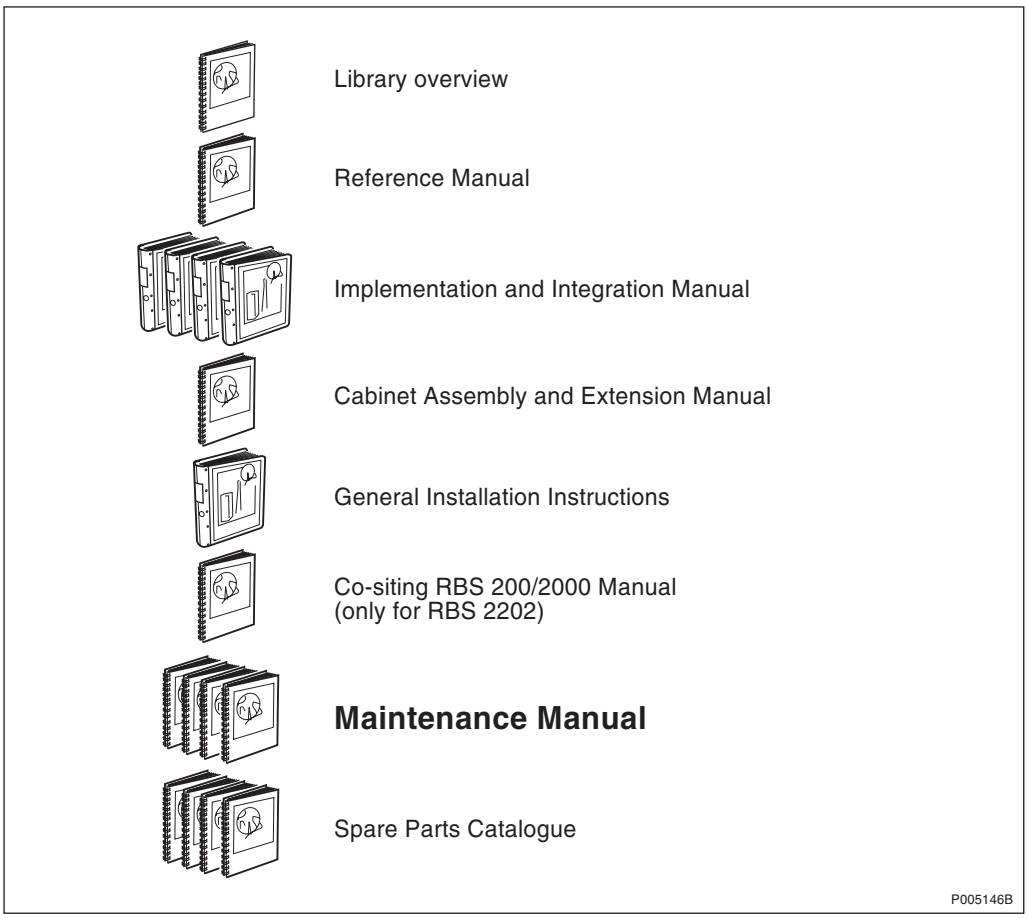

Figure 1 The customer documentation library

1.2 Target Group

This manual has been written for an RBS 2000 field technician. The section "Fault Analysis from OMC" in the chapter "Maintenance Process Overview" has been written for the Operation and Maintenance Centre (OMC) Operator.

Local safety regulations may require that all work (installation, repair, revision, etc.) with high-voltage equipment must be done by a qualified or certified electrician only.

The field technician is expected to be experienced in radio and mobile communications, and have a good understanding of technical English. The required knowledge of the equipment can be acquired by following the CME 20 training path for RBS 2000 field technicians. Call an Ericsson Training Centre for a complete training plan.

1.3 How to Use this Manual

Detailed information about the use of this manual and how to perform maintenance in the correct order, will be found in the chapter "Maintenance Process Overview". A brief description of the contents of each chapter is given below.

Chapter		Brief description
1.	Preface	An introduction to this manual.
2.	Safety	Describes the risks involved in the handling of RBS equipment.
3.	Tools and Instruments	Specification of recommended equipment.
4.	Maintenance Process Overview	An introduction to RBS operation and maintenance activities.
5.	Handling of RBS 2000 During Maintenance	Important information that is required before starting a maintenance process on the RBS 2000.
6.	Fault Localisation	Recommended actions for each suggested replaceable unit. The purpose is to find the faulty unit so it can be replaced.
7.	Corrective Action	Actions to be performed as soon as the suspected unit has been localised.
8.	Test After Corrective Action	Describes verification procedures for the corrective action.
9.	Concluding Routines	Administrative routines resulting from a maintenance activity.
10.	Fault Code List	Provides a translation from a fault code to a comprehensible fault description. The Replaceable Unit (RU) map suggests a replaceable unit.
11.	Optical Indicators	Recommendations for the interpretation of optical indicators.
12.	Preventive Maintenance	Recommendations for preventive maintenance activities.
13.	Cable Connections	Information about cabling of the backplanes and the IDMs.
14.	Positioning of RUs	Gives the positioning of RUs for each RBS model
15.	Frequency Lists	Gives frequency lists for GSM 900, GSM 1800 and GSM 1900
16.	Country Codes	Country Codes
17.	Glossary	Explanation of terms and abbreviations.

1.4 Release History

1.4.1 Product Change

Note: With this release a new product number, LZN 302 90 has been assigned to the *Maintenance Manual*.

Sub-section Section 1.4.2 on page 12 describes updates of the preceding *Maintenance Manual* EN/LZT 123 2766. Sub-

section Section 1.4.3 on page 12 describes updates from the old *Maintenance Manual* EN/LZT 123 2766 rev. R4A to the new *Maintenance Manual* LZN 302 90.

1.4.2 EN/LZT 123 2766 rev R3A to R4A

General update of the manual

- Many figures have been updated to better correspond to the text.

Update of the chapter "Tools and Instruments"

- A note regarding year 2000 compliance has been added.

Update of the chapter "Maintenance Process Overview"

- The section "RBS Maintenance Process" has been updated.

Update of the chapter "Fault Localisation"

- General update of texts describing the use of the OMT.
- The section "Environment" has been updated.

Update of the chapter "Test after Corrective Action"

- The section "Before Leaving the Site" has been updated.

1.4.3 EN/LZT 123 2766 rev R4A to LZN 302 90 rev R5A

This is the first official release of the *Maintenance Manual* with the new product number LZN 302 90 The manual is based upon the preceding *Maintenance Manual* EN/LZT 123 2766 rev R4A. The following paragraphs describe changes that have been made in between these two versions of the *Maintenance Manual*.

General update of the manual

- Many figures have been updated to better correspond to the text.

Update of the chapter "Tools and Instruments"

- The section "Special Tools" has been updated.

Update of the chapter "Maintenance Process Overview"

- The section "RBS Maintenance Process" has been updated.

Update of the chapter "Fault Localisation"

- The following sections have been added:
  - "CAB HLIN Cable"
  - "DPX RXIN"
- The following sections have been updated:
  - "CDU"
  - "CDU HLOUT HLIN Cable"
  - "CDU RXin Cable"
  - "Power Communication Loop"

- "TRU"

Update of the chapter "Corrective Action"

- The following sections have been updated:
  - "CDU"
  - "HLIN and HLOUT Cables"
  - "TRU"

Update of the chapter "Frequency Lists"

- The section "Frequency List for R-GSM 900" has been removed.

1.4.4 LZN 302 90 rev R5A to rev R6A

The following paragraphs describe changes that have been made in between these two versions of the *Maintenance Manual*.

General update of the manual

- The OMT User's Manual has a new product number.

Update of the chapter "Preface"

- The following section has been updated:
  - "Customer Documentation Library"

Update of the chapter "Fault Localisation"

- The following section has been added:
  - "PSU DC Cable"
- The following sections have been updated:
  - "Battery"
  - "BFU"
  - "Environment"
  - "PSU"

Update of the chapter "Corrective Action"

- The following section has been added:
  - "PSU DC Cable"
- The following sections have been updated:
  - "DXU"
  - "PSU"

Update of the chapter "Concluding Routines"

- The following section has been updated:
  - "Repair Delivery Note — Blue Tag"

Update of the chapter "Fault Code List"

- The Fault Code List has been updated according to SW release RBS 2000 R7D.

Update of the chapter "Cable Connections"

- The complete chapter has been updated.

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) 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.

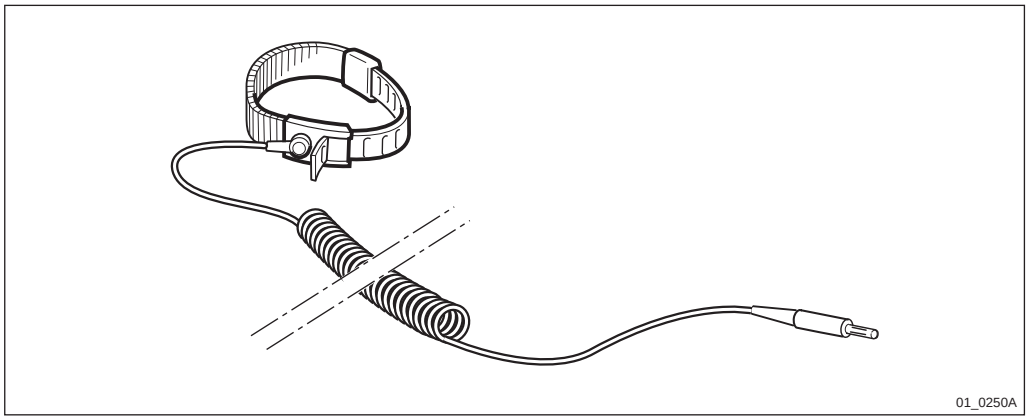

Figure 6 ESD wrist strap LYB 250 01/14

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

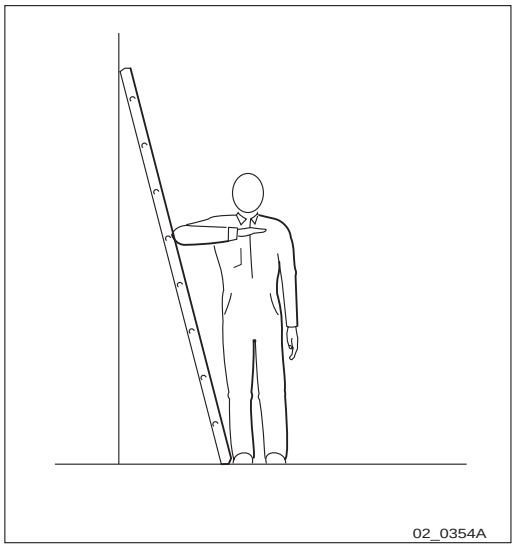

Figure 7 Checking the angle

- 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

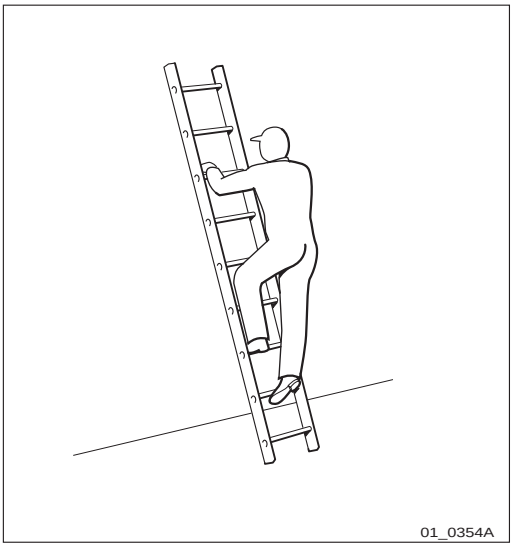

Figure 8 Climbing the ladder

- 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.

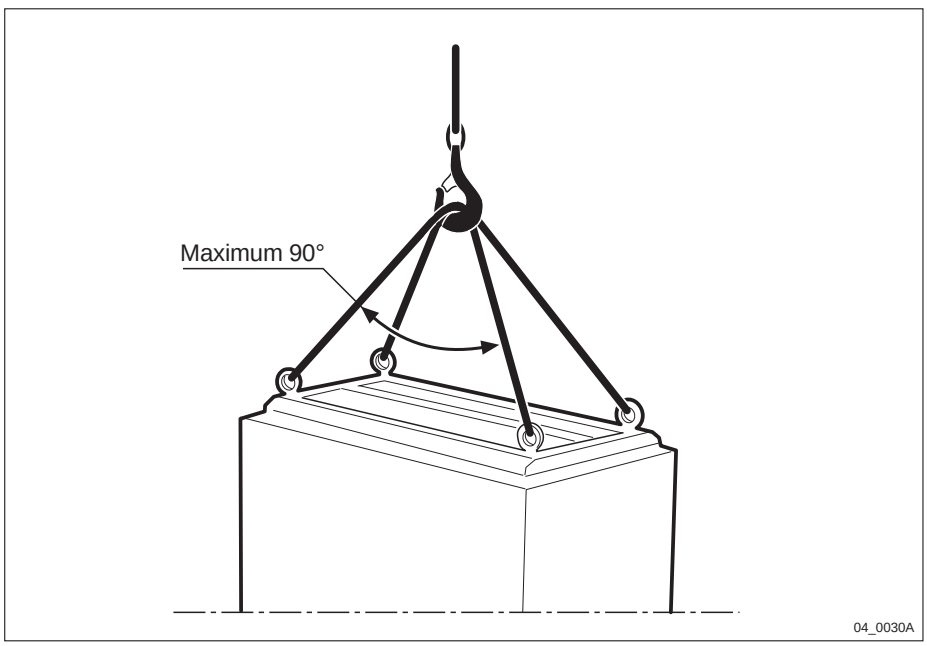

Figure 9 Use long straps

- 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 chapter describes tools and instruments required for maintenance activities.

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

3.1 Test Equipment

Table 2 Ordering information for test equipment

Product No	Description	Specification / Remark
LPB 112 01/1	TEMS SW TEMS cable User's manual Test mobile GH 337 for 900 MHz	TEMS
LPB 112 02/1	TEMS SW TEMS cable User's manual Test mobile PH 337 for 1800 MHz	TEMS
LPB 112 03/1	TEMS SW TEMS cable User's manual Test mobile CH 337 for 1900 MHz	TEMS
LTR 171 05/01	Ad8, adapter	Suhner 31SMA50-0-1/111
LTR 171 08/01	Ad10, adapter	ELFA 46-631-59
RPM 113 765/01	C4, test cable	Ericsson
RPM 113 764/01	C3, test cable	Carant Antenna Cable VGG1000
RPM 113 763/01	C2, test cable	Smart Design 11017
LPY 107 353/01	A2 attenuator 10 dB. Qty. 3.	Suhner 6610-19AA
LPY 107 721/1	S2 power splitter	ZA3PD-2-SMA
LPK 102 024/1	Digital multimeter	Fluke 8060A
LPK 102 102/1	Frequency counter set (including cables)	Only for DXU-03

3.2 OMT

The OMT is used for installation, installation testing, site acceptance and maintenance of the RBS 2000 system.

Table 3 Ordering information for OMT

Product No	Description
NTM 201 2159/1	OMT kit containing the items given below
• LZY 213 1034/1	• OMT software
• LZN 302 01	• OMT User's Manual
• RPM 113 463	• Connection cable

3.2.1 Hardware Requirements

An IBM compatible PC with:

- 80486 processor or higher
- 3.5 inch floppy disk drive
- At least 10 Mb free hard disk space
- At least 16 Mb RAM
- 1 serial port
- 1 mouse port or serial port
- Mouse
- Display compatible with Video Graphics Array (VGA) and Microsoft Windows™ NT4.0 or Microsoft Windows™ 95.

3.2.2 Software Requirements

- Microsoft Windows™ NT4.0 or Microsoft Windows™ 95.

3.3 Personal Tool Kit, LTT 601 042/1

The contents of the kit may be subject to change without notice.

Table 4 Dimensions and weight of the personal tool kit

Specification	Metric	UK/US
Width	480 mm	18.9 inches
Height	370 mm	14.6 inches
Depth	240 mm	9.5 inches
Total weight (with tools)	9 kg	19.9 lbs.

Table 5 Contents of the personal tool kit

Item	Description	Specification	Qty
1	Tool case	ST 8	1
2	Assortment box	Assortment box	1
3	Tray	Plast teknik (106/32)	2
4	Soldering iron tip	9170-0104	1
5	Soldering iron tip	9170-0500	2

Item	Description	Specification	Qty
6	Soldering iron tip	9170-0609	2
7	Soldering vacuum pump	6750-0108	1
8	Small-nosed pliers	5822-0104	1
9	Small tin tip	Small tin tip	1
10	Scissors	205-150	1
11	Pincer	150 mm 1278-0102	1
12	Sheath knife	9165-0101	1
13	Flexible tape measure	7301-0100	1
14	Polygrip	74296145	1
15	Polygrip	74296191	1
16	Crimping pliers	5834-0209	1
17	Side cutter	0829-0256	1
18	Side cutter	5064-0101	1
19	Flat-nosed pliers	0850-0100	1
20	Round-nosed pliers	4.5″ 7590-970	1
21	Flat-nosed pliers	0850-0100	1
22	Instrument screwdriver set	919	1
23	Screwdriver	33612014	1
24	Screwdriver	33632017	1
25	Screwdriver	33614014	1
26	Screwdriver	33666014	1
27	Screwdriver	33881000	1
28	Screwdriver	33882000	1
29	Screwdriver	33883000	1
30	Adjustable spanner	31806901	1
31	Adjustable spanner	31807201	1
32	Electrical tape	8342-0208	1
33	Solder	AG52/063	1
34	Hexagonal key set	1.5 mm - 5 mm, 6 mm	1
35	Hexagonal key set	5/64″ - 3/16″, 1/4″	1
36	Needle file set	7001-0103	1
37	Knife	9 RX	1
38	Knife blade	TCS 38	1
39	Magnetic screwdriver	33576005	1
40	Bits	7076-0046	1
41	Bits	7076-0202	1
42	Bits	7076-0400	1
43	Bits	7076-0509	1

Item	Description	Specification	Qty
44	Bits	7076-0707	1
45	Bits	33581001	1
46	Bits	33582001	1
47	Bits	33583001	1
48	Set of trimming tools	64-740-01	1

3.4 Special Tools

General

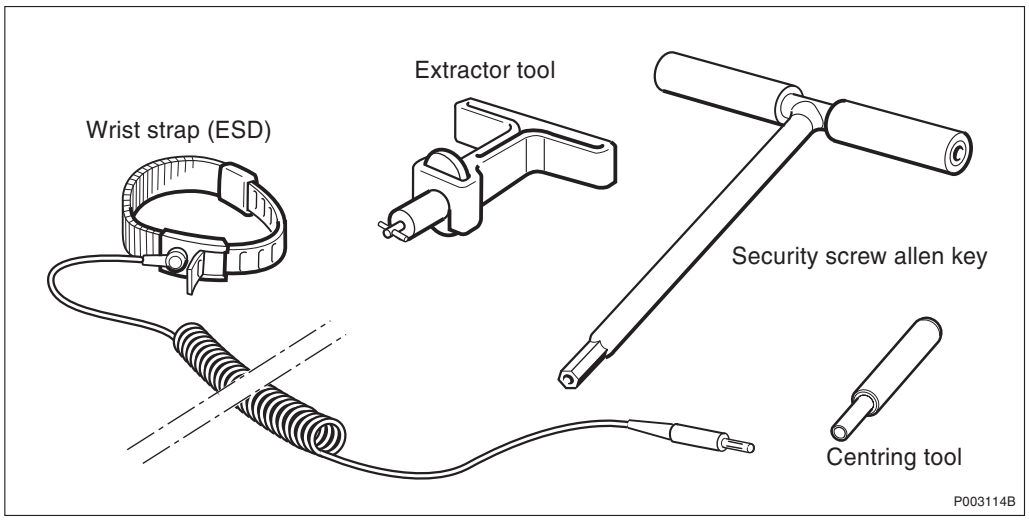

Figure 10 Special tools

Table 6 Special tools

Product No	Denomination	Function/Description
LTT 601 83	Torque wrench set, 0.8 Nm	For TRU, CDU and DXU TX and RX cables
LSY 133 22	Extractor	For removing type NFD 495+ protectors in the EACU
LTD 117 02	Handle	Part of Extractor tool
LTD 117 12	Button	Part of Extractor tool
LYB 250 01/14	Wrist strap	Earthing bracelet (ESD)
Orbitel (1)	Security screw allen key	Tool for accessing the climate system
SXK 107 2300/1	Centring tool	Tool for aligning coaxial pins on TRUs

(1) Product number will be included in a later release

Compressor specifications for preventive maintenance

The table below lists the specifications for the air compressor needed to perform cleaning during preventive maintenance routines.

Table 7 Compressor specifications

Voltage	Locally dependent (230 V AC, 110 V AC, etc.)	
Power consumption	1.1 kW (maximum) (The service outlet in the mounting base is rated at 1.5 kW)	
Air Pressure	8 kPa/bar (maximum) 5 kPa/bar (minimum)	116 PSI (maximum) 72 PSI (minimum)
Air Flow	200 l/min	7.06 CFM
Motor speed	2800 rpm	

3.5 References

Information about general cable connections can be found in the *Cabinet Assembly and Extension Manual*.

Product numbers of replaceable units and other spare parts can be found in the *Spare Parts Catalogue.*

Table 8 Product numbers of the Cabinet Assembly and Extension Manual and the Spare Parts Catalogue

Product No.	Description
LZN 302 78	Cabinet Assembly and Extension Manual for RBS 2101, RBS 2102, RBS 2103, RBS 2202
LZN 302 94	Spare Parts Catalogue for RBS 2103

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4 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.

4.1 General

RBS 2000 is administered and controlled by the BSC. There is a master/slave relationship between the BSC and the RBS, and the BSC has an overview of the status of the radio network and its resources.

The BSC manages the O&M of the RBS via the Abis Interface. The RBS equipment is seen as MO by the BSC. This is a way of describing the RBS, in a functionally oriented way and as a logical model, in the BSC. All O&M actions are based on this logical model structure created in the BSC. An MO does not necessarily have a one-to-one relationship with a physical unit in the RBS.

The MO model, describing RBS 2000 (G12), is divided into two sub-classes: AO and SO. The SO is the abstract sub-class of MO that owns hardware. The AO only handles functionality.

The RBS can be set in local or remote mode. The local mode means that the RBS has been disconnected and isolated from the BSC, while in remote mode the RBS is controlled by the BSC.

When the RBS is in remote mode, the BSC is acting as a master in the BSC-RBS relationship and all RBS maintenance actions are ordered by the BSC. Faults in the RBS are reported to the BSC on an MO basis. All faults reported by the MOs in the RBS are stored in the BSC error log.

Tests on MOs with RBS hardware can be ordered by a BSC operator in order to check the status of the RBS. The operator can also test the connection between the BSC and an RBS transceiver unit by ordering a loop test. A test pattern is passed through the loop created between the BSC and one specific time slot in a specified transceiver unit.

The RBS contains test and supervision functions that detect malfunctions and report them to BSC. Tests and supervision are performed on an MO basis, which means that the different MOs supervise their own equipment.

Statistics are collected on an MO basis in the BSC. Examples are the number of call setup attempts or the number of abnormally terminated calls.

4.2 Fault Handling Workflow

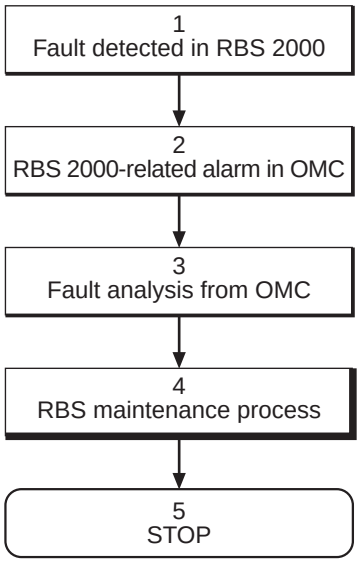

Figure 11 Fault handling workflow

Steps 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 OPI. 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.

4.3 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.

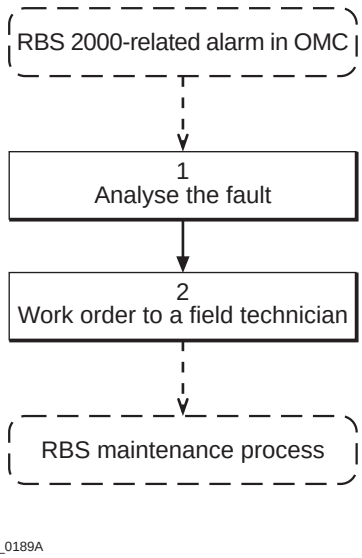

Figure 12 Fault analysis from OMC

(1) Analyse the fault

The fault is given in plain text at the BSC. The faults are divided into class 1 and class 2 alarms. Some of the alarms also indicate the suspected faulty HW unit in an RU map.

The alarm classes are described in the chapter "Fault Code List" in this manual. The "Fault Code List" also lists all faults that can be reported from an RBS.

(2) Work order to a field technician

Before writing the work order, ask the following questions 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.
- Cabinet identity.
- The suspected RU.
- The error log must be included, if a logical RU is faulty.
- If the fault situation is unclear, site history must be included; for example, whether the same type of fault has been detected and repaired a few weeks earlier.

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

4.4 RBS Maintenance Process

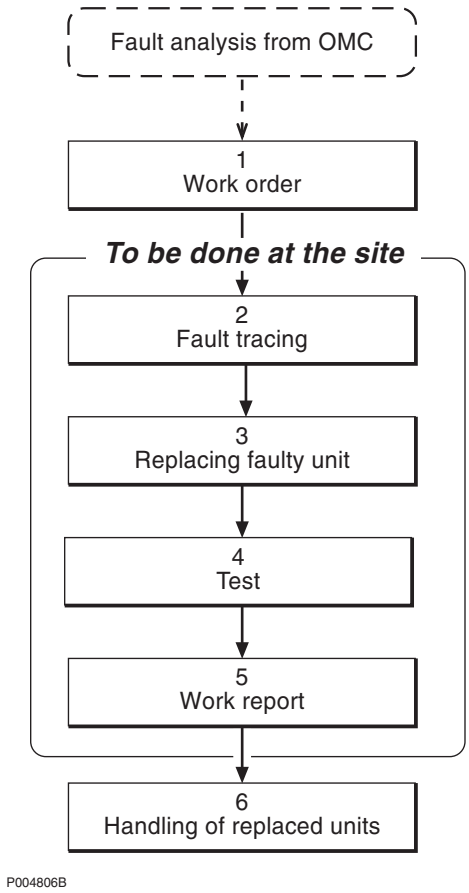

Figure 13 The “RBS Maintenance Process”

4.4.1 Preparatory Actions

(1) Work order

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 RU, and site history. An error log will also be included if the fault is defined as logical.

Note: 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 the chapter "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 take the RBS out of traffic or reduce RBS functionality.

This procedure is not further described in this manual.

4.4.2 To be done At the Site

(2) Fault tracing

1. dfdfg

The chapter "Fault Localisation" provides methods for finding the faulty unit in the RBS that causes the alarm reported to the BSC. For example, when the work order denotes "Faulty unit is TRU", fault localisation will point out the position of the faulty TRU.

All alarms given in the replacement unit maps correspond to a section in the chapter "Fault Localisation".

(3) Replacing faulty unit

The chapter "Corrective Action" describes how to replace a faulty unit.

(4) Test

The RBS must be tested before leaving the site. The chapter "Test After Corrective Action" describes how to verify that the functionality of the RBS is correct.

(5) Work report

The chapter "Concluding Routines" provides information on the different administrative routines that must be performed before leaving the site.

4.4.3 After Maintenance

(6) Handling of replaced units

The chapter "Concluding Routines" also describes which units are repairable and which are disposable and the different administrative routines connected with that.

4.5 Fault Cases

The purpose of this section is to explain the different fault cases that can arise in the RBS 2000. This forms the basis for choosing between different methods when localising a detected fault.

- Unambiguous indication with an LED and an RU map.
- Unambiguous indication with an RU map only.
- Unit that is unambiguously indicated, but consists of several replaceable parts.
- Logical RU indicated.

Note that the BSS only pinpoints one RU in the RU Map.

4.5.1 Indication with an LED and an RU Map

Examples of units

DXU, TRU, PSU, BFU, ECU and CDU.

Method of localisation

The work order states which unit is affected. When the cabinet is opened, a red light will be on in the faulty unit. If this light should be defective, only a BS fault light is lit. In that case the OMT is used to localise the faulty unit.

4.5.2 Indication with an RU Map

Examples of units

RX cables.

Method of localisation

The work order states the unit concerned. The Maintenance Manual is used to find out where the unit is located.

4.5.3 Indication of Units that Consist of Several Replaceable Parts

Examples of units

Fan Unit.

Method of localisation

The work order states which unit is affected. The OMT is used to identify which parts are faulty, for example, which fan is faulty.

4.5.4 Logical RU Indicated

The logical RU is identified when it is not sure which physical RU is faulty. It can, for example, be a Logical Bus, which means that anything connected to it can be faulty.

Examples of units

Local bus, X bus, Timing bus, and Environment.

Method of localisation

A systematic order of replacement is used to determine the unit that has generated the fault.

The following applies to the logical RU Environment

This logical RU records conditions that cannot be affected from the RBS. The RU is divided into two parts:

- External Power and Climate (condensation, air humidity and temperature). When this RU is identified, the OMC Operator must analyse the fault to determine possible corrective actions. The OMC Operator must be able to determine whether the reported fault requires maintenance personnel to respond or not.
- In the case of the fault message "Indoor temperature out of safe range", the trouble may cease when local weather conditions change, that is, the sun sets or the temperature changes. Alternatively, in the case of "External Power Fault" it would be necessary to determine whether or not the cause of the fault was a commercial power failure, prior to dispatching maintenance. If a technician is sent, the work order must include a historical account of faults.

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5 Handling of the RBS during Maintenance

5.1 Numbering of RUs

Note that the RU numbers always starts from 0 (zero) when they are read from the OMT, while they are starting from 1 (one) in the mechanical positioning system. This means, for example, that TRU 1 is called TRU 0 in the OMT and that PSU 2 is called PSU 1 in the OMT.

This numbering system includes **all** RUs in the RBS, see the chapter "Positioning of RUs".

5.2 Update of IDB

The DXU must be in Local mode before it is possible to update the IDB backup copy from the OMT.

Whenever an RU is replaced, the IDB in the DXU is updated automatically. Every time the IDB changes, save the IDB to the IDB backup disk. The OMT can read the updated IDB from the DXU when the RBS is in either local or remote mode.

For procedures in saving the IDB to backup disk, refer to:

OMT User's Manual *LZN 302 01*

5.3 Working in Cold Weather Conditions

When the ambient temperature is below 0 °C (32 °F) it is necessary to use a tent and an electric heater. Otherwise the ECU will shut off the power supply to the RBS.

5.4 Temperature Requirements for an RU

All units included in the RBS have been designed to operate according to specifications in the temperature range of +5 °C to +45 °C (41 °F to 113 °F). It is very important to ensure that the temperature of a spare unit is within the specified limits before inserting it into the RBS, otherwise the specified functions of that unit cannot be guaranteed.

5.5 General Instructions for Replacement of an RU

Protection against ESD

CAUTION

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

To avoid damage due to ESD the use of a wrist strap is required. Wear the wrist strap on the wrist and connect the lead to the earth outlet of the IDM panel, or to the negative outlet if earth is missing. The wrist strap must be worn at all times when handling units.

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.

Note that the functionality of the wrist strap must be checked at regular intervals.

Restart of TRU

To be able to restart in a correct way, the TRU must have been out of power for at least three seconds.

Instructions for removal of a magazine-mounted RU

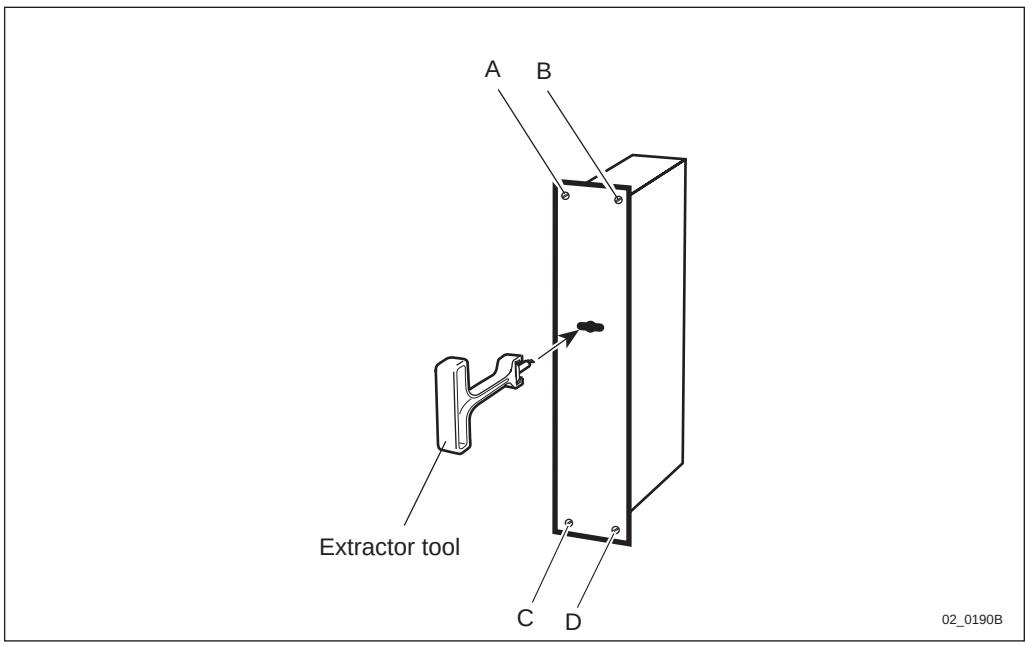

Figure 14 How to handle the extractor tool

2. Put the unit in local mode (TRU and DXU only).
3. Release the associated circuit breaker or pull the associated fuse. The location of either can be found in the chapter "Fault Localisation".
4. Remove all the connections on the front of the unit.
5. Loosen the screws (A - D) that fasten the unit to the magazine.
6. Pull out the unit with the extractor tool.
7. Insert the new unit, and restore in reverse order.

5.6 Cable Connections

The TX and RX cables between the TRU, CDU and DXU are connected with SMA connectors. The connectors must be tightened with a torque wrench/spanner 0.8 Nm.

Please note the following when using the torque wrench:

- Grasp the cable to prevent the connector rotating.
- Fit the wrench key to the SMA connector as shown below.
- Rotate the wrench handle clockwise until the wrench clutch begins to slip

This results in the correct torque setting.

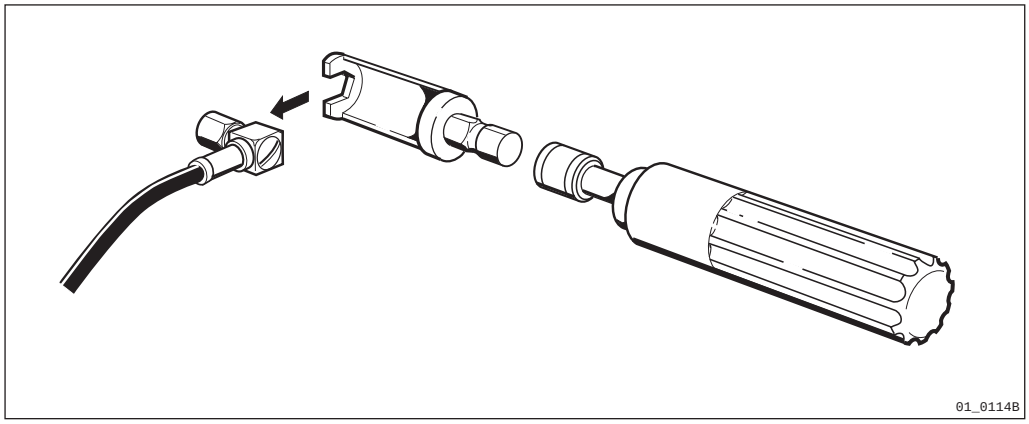

Figure 15 SMA connector and torque wrench (LTT 601 83)

5.7 About the Locking Mechanism

A lock is fitted to the radio sub-cabinet, only.

6 Fault Localisation

The instructions in this chapter describe the handling of a fault situation in the RBS. Information from the replacement unit map is required as input when starting to read this chapter.

The flow charts in this chapter are for quick reference only. The text accompanying each flow chart contains more detailed instructions. Maintenance personnel should therefore use the charts only to locate the information in the text.

6.1 Circuit Breakers and Fuses

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.

Note: Use only Ericsson recommended fuses of the correct voltage and amperage ratings as replacements.

Use of any other type of fuses could cause serious damage to the RBS, fire or personnel injury and affect RBS product type approvals (such as UL, CSA etc.).

Part numbers for fuses can be found in the appropriate RBS *Spare Parts Catalogue*.

Spare Parts Catalogue

When a fault occurs in the RBS, inspect the circuit breaker or fuse corresponding to the unit generating the fault, and reset or replace if necessary. Resetting a released circuit breaker or replacing a blown fuse is not a complete fault-eliminating action. The HW RU corresponding to the released circuit breaker or blown fuse should be replaced. This is necessary to prevent a recurrence of the fault.

This section contains figures showing the location of circuit breaker panels and fuses for the base station. All circuit breakers and most fuses are labelled. Due to varying configurations and unique site requirements, local installation documentation should be consulted if in doubt as to which HW RU a given circuit breaker or fuse corresponds.

6.1.1 Positions of Circuit Breakers and Fuses

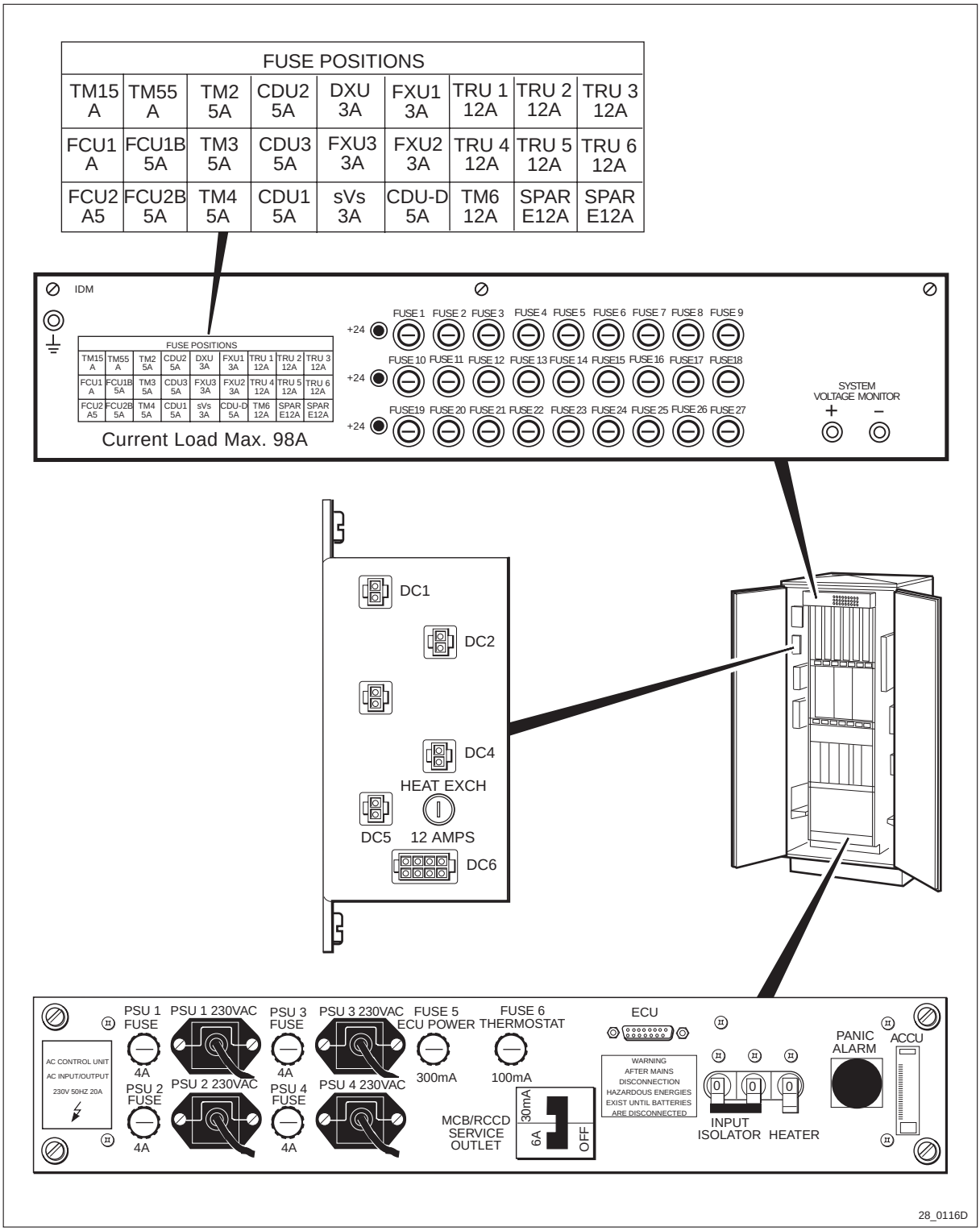

Figure 16 AC fuses in the ACCU and DC fuses in the IDM and on the patch panel

Table 9 Relations between fan numbers and fuse denominations

Fan number	Fan 1	Fan 2	Fan 3	Fan 4
Fuse denomination	FCU1A	FCU1B	FCU2A	FCU2B

6.2 ACCU

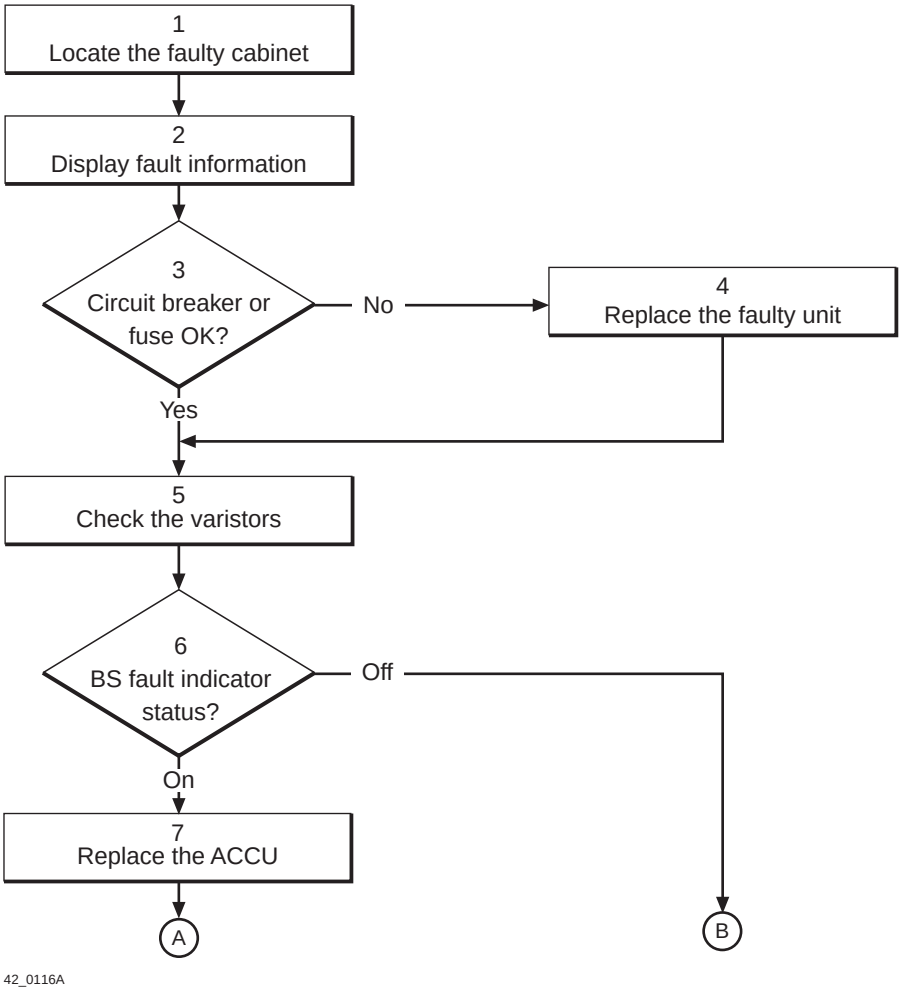

Figure 17 ACCU (part 1 of 2)

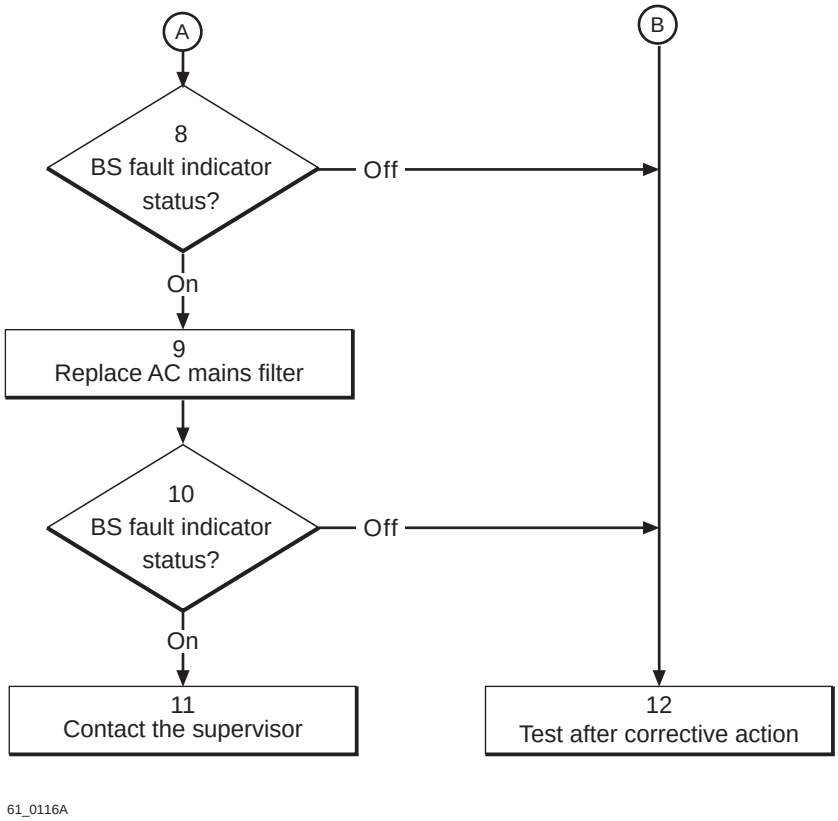

Figure 18 ACCU (part 2 of 2)

DANGER

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

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Circuit breaker or fuse OK?

See the section "Circuit Breakers and Fuses" in this chapter for location of the circuit breakers and fuses. If an AC circuit breaker has released, or a fuse has blown, the unit associated with it must be replaced.

Circuit breaker or fuse OK?

- No: Proceed to step (4).
- Yes: Proceed to step (5).

(4) Replace the faulty unit

Replace the unit associated with the released circuit breaker or blown fuse. Replacement procedures can be found in the chapter "Corrective Action".

(5) Check the varistors

Varistors have been installed in the ACCU for lightning protection. Check for defective varistors (located inside the ACCU). Defective varistors are indicated by a red flag with the text "DEFECT" in their display window. If defective, see the section "Varistors" in the chapter "Corrective Action" for replacement instructions.

(6) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (12). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(7) Replace ACCU

Replace the ACCU according to instructions in the section "ACCU" in the chapter "Corrective Action".

(8) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (12). No fault is detected in the RBS.
- On: Proceed to step (9). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(9) Replace AC mains filter

Replace the AC mains filter according to instructions in the section "AC Mains Filter " in the chapter "Corrective Action".

(10) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (12). No fault is detected in the RBS.
- On: Proceed to step (11). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(11) Contact the supervisor

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

(12) Test after corrective action

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.3 Antenna

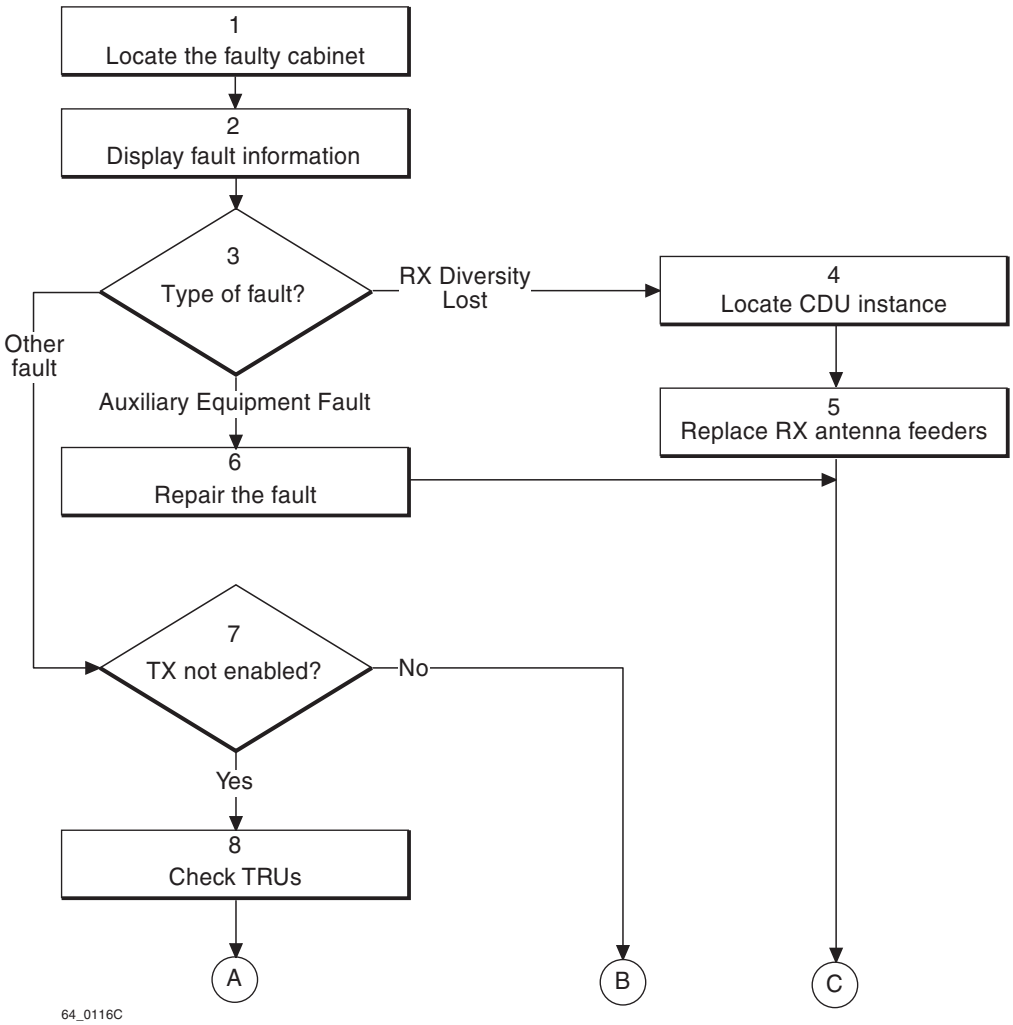

Figure 19 Antenna (part 1 of 2)

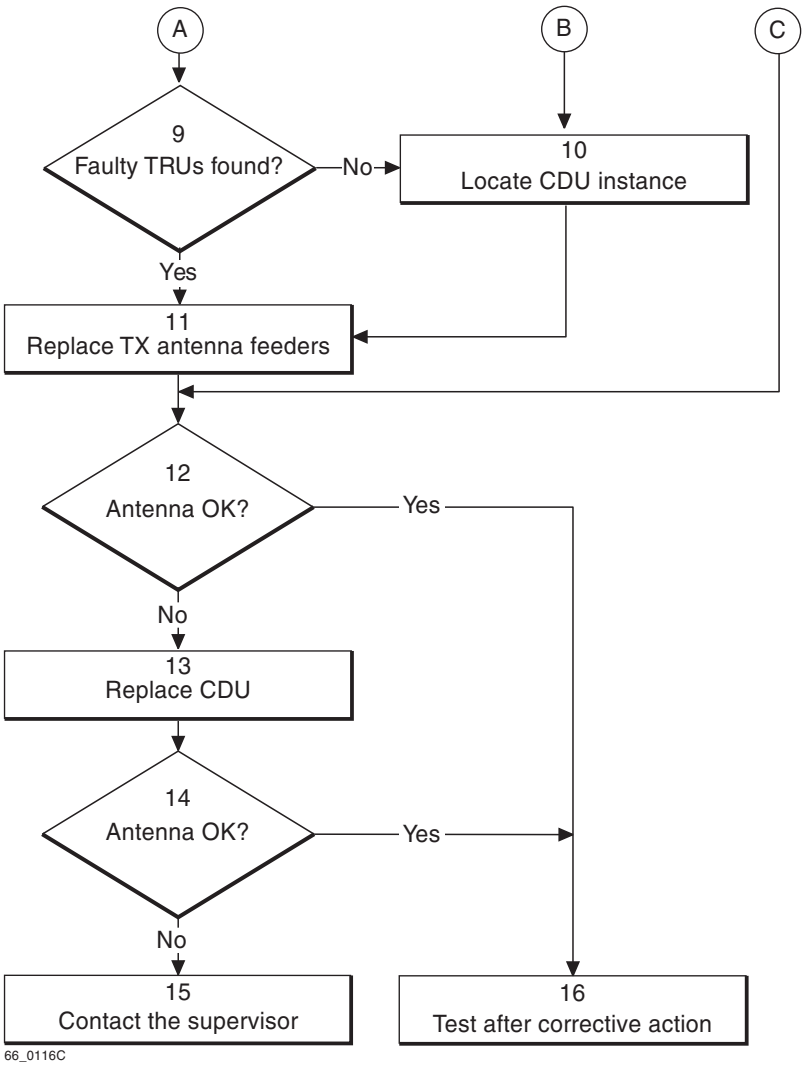

Figure 20 Antenna (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

1. Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.
2. Use the monitor "Fault Status" in the OMT to display the type of fault.

(3) Type of fault?

Which type of fault was found in step (2)?

- "RX Diversity Lost": Proceed to step (4).
- "Auxilliary Equipment Fault": Proceed to step (6).
- Other fault: Proceed to step (7).

(4) Locate CDU instance

1. Select "Hardware view" in the OMT.
2. – Display "Info" for one TRU at a time.

   – Search for the faulty antenna instance in either the RXA-way or the RXB-way.

   – Repeat the search for each TRU until the faulty antenna instance is found.
3. When the faulty antenna instance is found, check which CDU it is connected to. This information indicates which RX antenna feeder to replace in step (5).

(5) Replace RX antenna feeders

The following instruction is valid for CDU-A and CDU-D only:

1. Replace the RXA or RXB feeder according to instructions in the section "RX Antenna Feeder" in the chapter "Corrective Action".
2. Proceed to step (12).

The following instructions are valid for CDU-C and CDU-C+ only:

1. Check if the CDUs in the cabinet are cross-connected via the HL connectors. If that is the case, check which outlet the RXA or RXB cable from TRU is connected to.
2. If the RXA or RXB cable is connected to outlet number 1 or outlet number 2 on the CDU, replace the RXA or RXB feeder on the CDU twin according to instructions in the section "RX Antenna Feeder" in the chapter "Corrective Action".
3. If the RXA or RXB cable is connected an other outlet than number 1 and number 2, or if no cross-connection is in use, replace the RXA or RXB feeder on the current CDU according to instructions in the section "RX Antenna Feeder" in the chapter "Corrective Action".
4. Proceed to step (12).

(6) Repair the fault

1. Replace or repair the faulty auxilliary equipment.
2. Proceed to step (12).

(7) TX not enabled?

Check all TRUs in the cabinet(s).

Is the LED "TX not enabled" lit on any TRU?

- Yes: Proceed to step (8).
- No: Proceed to step (10).

(8) Check TRUs

Select the object RBS 2000 in System View in the OMT. Use the monitor "Fault Status" to find the alarm "TX antenna VSWR limits exceeded" in the AOTX map. This will point at which TRU(s) generated the alarm. The indicated TRU(s) should match those indicated in step (7) above.

(9) Faulty TRUs found?

Could the faulty TRU(s) be found by the OMT?

- Yes: Proceed to step (11).
- No: Proceed to step (10).

(10) Locate CDU instance

1. Select "Hardware view" in the OMT.
2. – Display "Info" for one TRU at a time.

   – Search for the faulty antenna instance in the TX-way.

   – Repeat the search for each TRU until the faulty antenna instance is found.
3. When the faulty antenna instance is found, check which CDU it is connected to. This information indicates which TX antenna feeder to replace in step (11).

(11) Replace TX antenna feeders

Replace all the TX feeders in the cell according to instructions in the section "TX Antenna Feeders" in the chapter "Corrective Action".

(12) Antenna OK?

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. Check if the alarm has disappeared.

- If the fault was "RX Diversity Lost", it will take at least 100 minutes for the BSC to cease the alarm.
- If the fault was "VSWR Limits Exceeded", the TX has to be re-initiated from the BSC.

For further information, see the section "TX Antenna Feeders" in the chapter "Corrective Action".

Is the antenna OK?

- Yes: Proceed to step (16).
- No: Proceed to step (13).

(13) Replace CDU

Replace the CDU according to instructions in the section "CDU" in the chapter "Corrective Action".

(14) Antenna OK?

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. Check if the alarm has disappeared.

- If the fault was "RX Diversity Lost", it will take at least 100 minutes for the BSC to cease the alarm.
- If the fault was "VSWR Limits Exceeded", the TX has to be re-initiated from the BSC.

For further information, see the section "TX Antenna Feeders" in the chapter "Corrective Action".

Is the antenna OK?

- Yes: Proceed to step (16).
- No: Proceed to step (15).

(15) Contact the supervisor

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

(16) Test after corrective action

Take the following actions:

1. After replacing a CDU only: Make a test call according to the section "Test Call" in the chapter "Test after Corrective Action".
2. Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.4 Battery

The fault localisation for "Battery" is divided into two subsections:

- External Batteries
- Internal Batteries

6.4.1 Internal Batteries

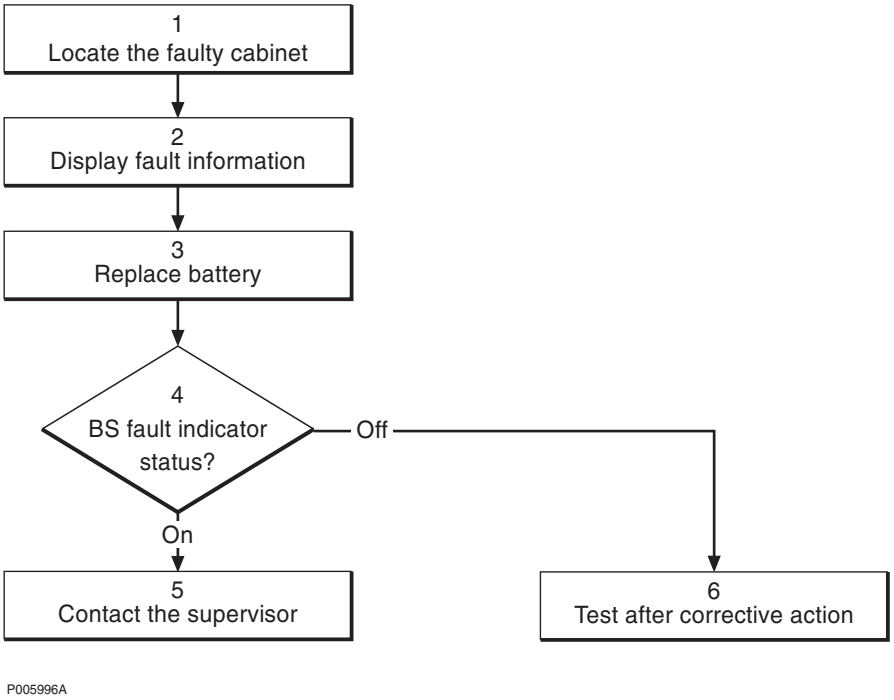

Figure 21 Internal batteries

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

	OMT User's Manual	*LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Replace battery

Replace the faulty battery according to instructions in the section "Batteries" in the chapter "Corrective Action".

(4) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (6). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(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

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.5 BFU

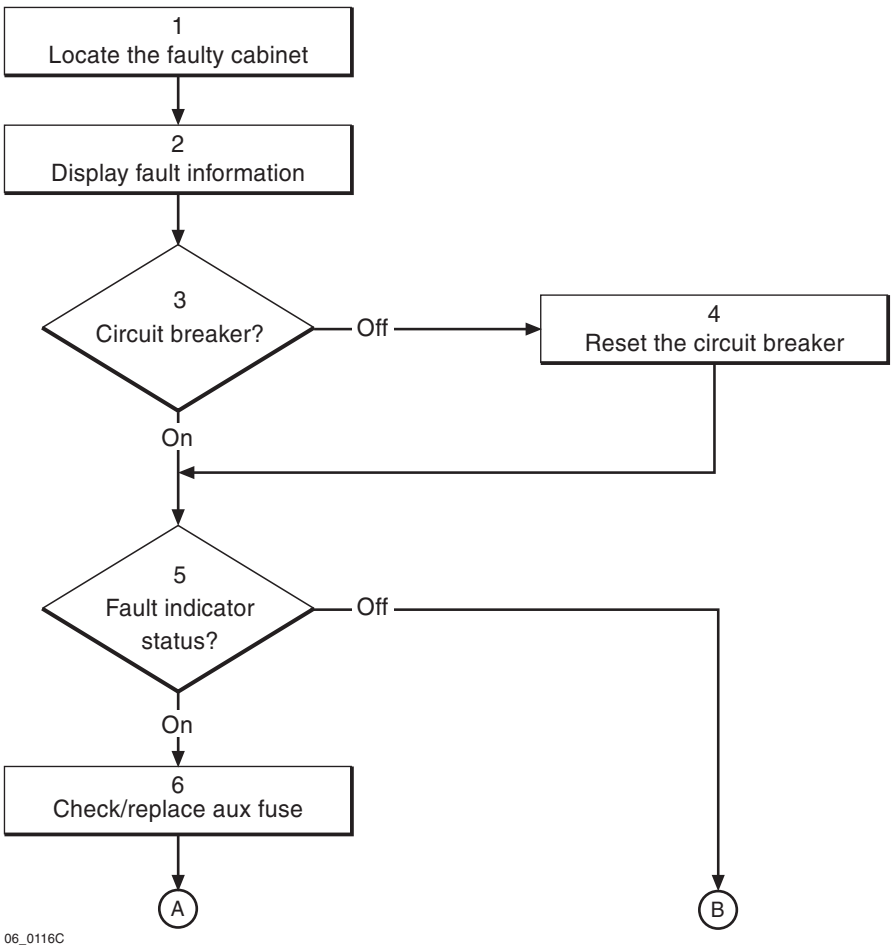

Figure 22 BFU (part 1 of 2)

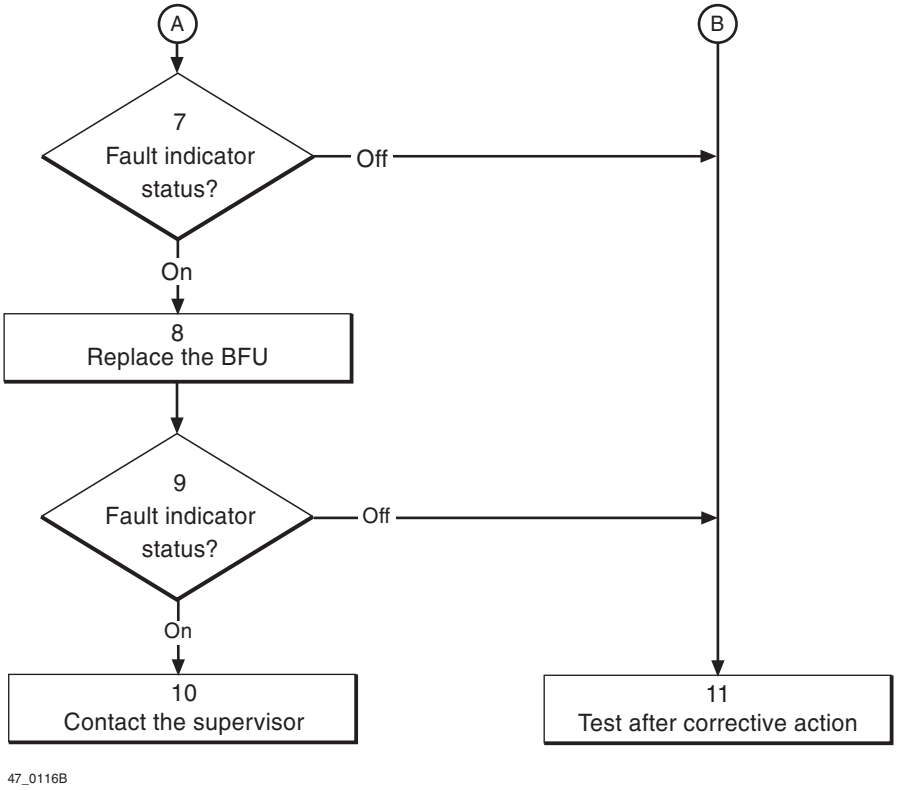

Figure 23 BFU (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

	OMT User's Manual	*LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Circuit breaker?

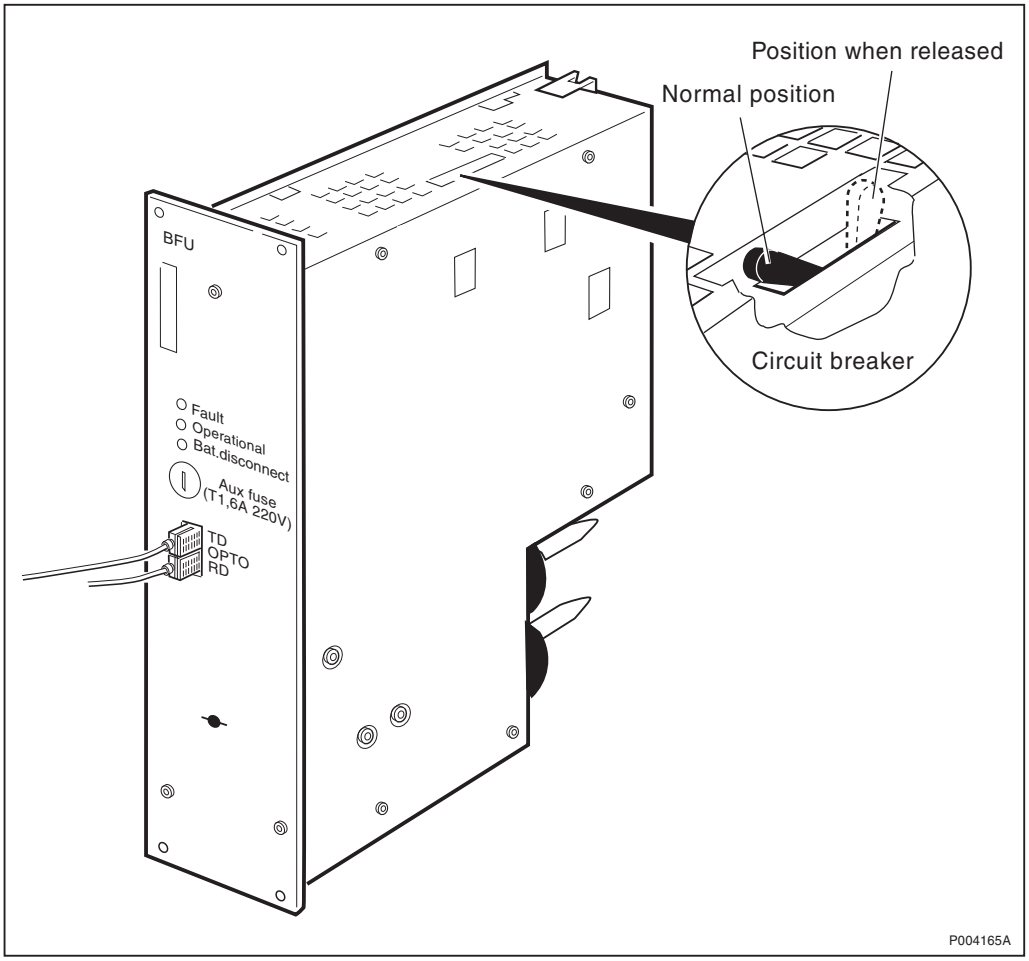

Figure 24 BFU with circuit breaker

The BFU is equipped with a circuit breaker.

Is the circuit breaker released?

- No: Proceed to step (5).
- Yes: Proceed to step (4).

(4) Reset the circuit breaker

Refer to the picture above and reset the circuit breaker. This can be done by, for example, using a screwdriver.

(5) Fault indicator status?

The red indicator labelled Fault on the BFU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (11). No fault is detected in the BFU.
- On: Proceed to step (6). One or more faults are detected in the BFU.
- *BFU revision R2A or later.* Flashing (red Fault indicator): Proceed to step (6). The BFU has lost communication with the ECU.

- *BFU revision R1A.*Flashing (green Operational indicator): Proceed to step (6). The BFU has lost communication with the ECU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (11). No fault is detected in the RBS.
- On: Proceed to step (6). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(6) Check/replace aux fuse

Check the auxiliary fuse on the front of the BFU, replace when needed.

(7) Fault indicator status?

The red indicator labelled Fault on the BFU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (11). No fault is detected in the BFU.
- On: Proceed to step (8). One or more faults are detected in the BFU.
- Flashing (red Fault indicator): Proceed to step (8). The BFU has lost communication with the ECU (BFU revision R2A or later).
- Flashing (green Operational indicator): Proceed to step (8). The BFU has lost communication with the ECU (BFU revision R1A).

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (11). No fault is detected in the RBS.
- On: Proceed to step (8). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(8) Replace the BFU

Replace the faulty BFU according to instructions in the section "BFU" in the chapter "Corrective Action".

(9) Fault indicator status?

The red indicator labelled Fault on the BFU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (11). No fault is detected in the BFU.
- On: Proceed to step (8). One or more faults are detected in the BFU.
- Flashing (red Fault indicator): Proceed to step (8). The BFU has lost communication with the ECU (BFU revision R2A or later).
- Flashing (green Operational indicator): Proceed to step (8). The BFU has lost communication with the ECU (BFU revision R1A).

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (11). No fault is detected in the RBS.
- On: Proceed to step (8). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(10) Contact the supervisor

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

(11) Test after corrective action

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.6 CAB HLIN Cable

Refer to "CDU HLOUT HLIN Cable", Section 6.10 on page 74.

6.7 CDU

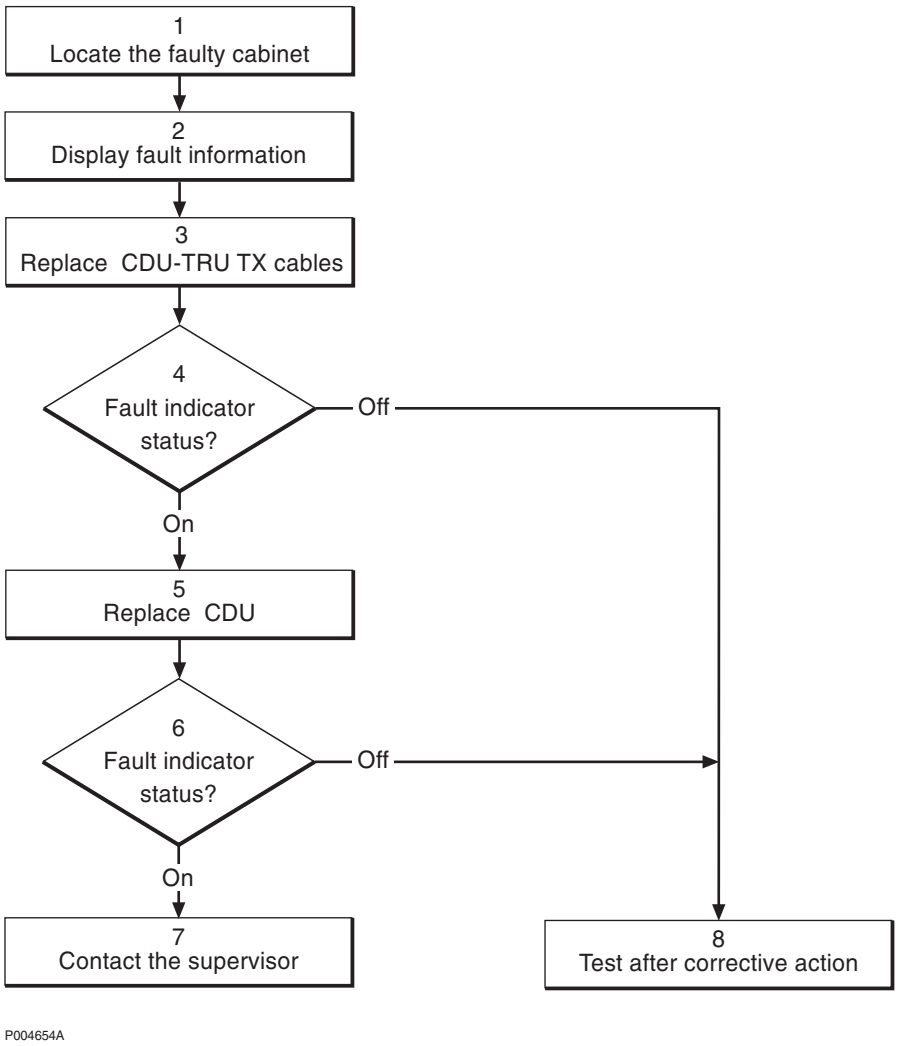

Figure 25 CDU

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Replace CDU-TRU TX cables

Replace one or both CDU-TRU TX cables according to instructions in the section "CDU-TRU TX Cables" in the chapter "Corrective Action".

(4) Fault indicator status?

The red indicator labelled Fault on the CDU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (8). No fault is detected in the CDU.
- On: Proceed to step (5). One or more faults are detected in the CDU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(5) Replace the CDU

Replace the faulty CDU according to instructions in the section "CDU" in the chapter "Corrective Action".

(6) Fault indicator status?

The red indicator labelled Fault on the CDU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (8). No fault is detected in the CDU.
- On: Proceed to step (7). One or more faults are detected in the CDU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(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

Take the following actions:

1. Make a test call over the CDU concerned according to the section "Test Call" in the chapter "Test after Corrective Action".
2. Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.8 CDU Bus

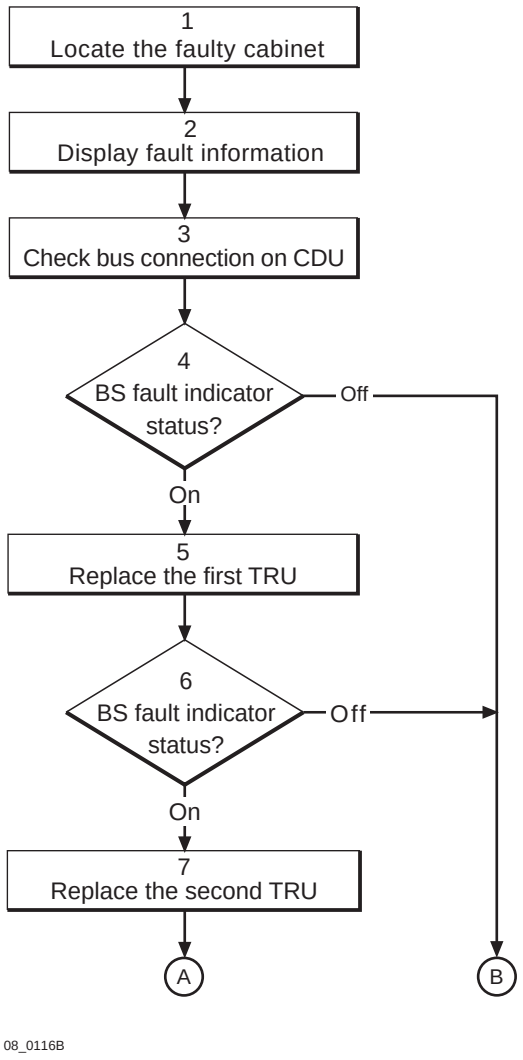

Figure 26 CDU bus (part 1 of 2)

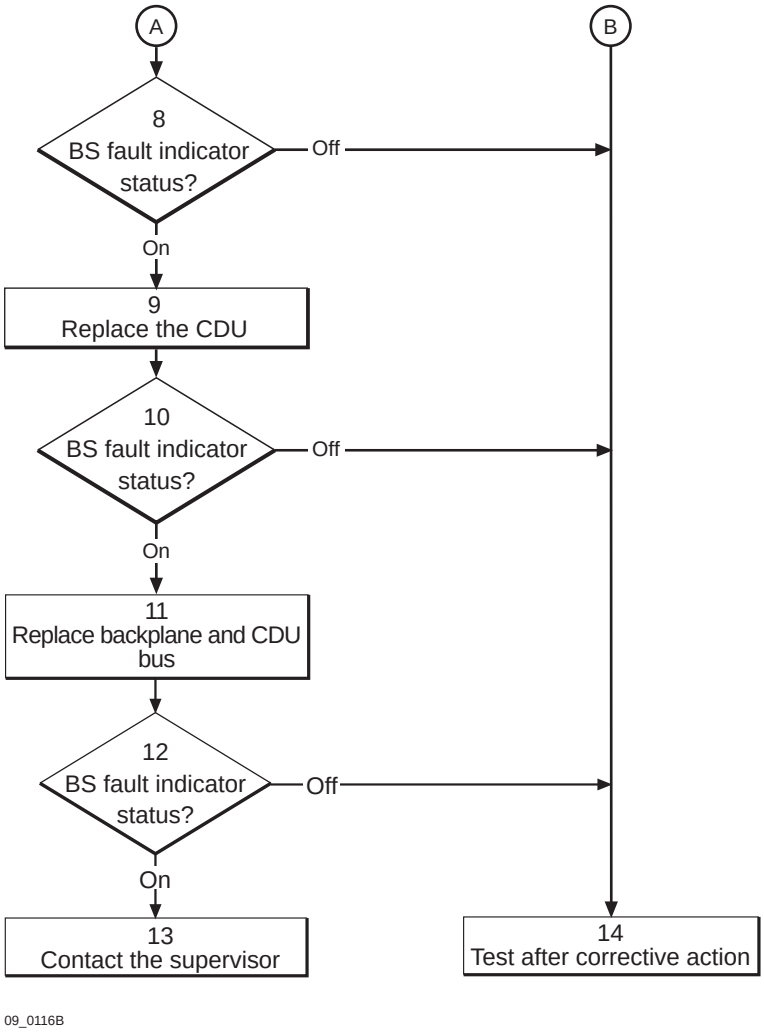

Figure 27 CDU bus (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

	OMT User's Manual	*LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

- CDU bus 1 is connected to CDU 1.
- CDU bus 2 is connected to CDU 2.
- CDU bus 3 is connected to CDU 3.

Note: When using CDU-C in an extension cabinet with for example a 1+4+1 configuration, one TRU can be connected to two CDUs (cable RPM 513 1396/1). The CDU bus number will then be the same as the lowest numbered CDU.

For example, if TRU 1 is connected to CDU 1 and CDU 2. The CDU bus number then is CDU 1.

(3) Check bus connection on CDU

Check that the connection between the CDU bus and the CDU is OK.

(4) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (14). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(5) Replace the first TRU

Replace one of the TRUs (that connects to the suspected CDU bus) according to instructions in the section "TRU" in the chapter "Corrective Action".

- CDU bus 1 is connected to TRU 1 and TRU 2.
- CDU bus 2 is connected to TRU 3 and TRU 4.
- CDU bus 3 is connected to TRU 5 and TRU 6.

Note: When using CDU-C in an extension cabinet with for example a 1+4+1 configuration, one TRU can be connected to two CDUs (cable RPM 513 1396/1). The CDU bus number will then be the same as the lowest numbered CDU.

For example, if TRU 1 is connected to CDU 1 and CDU 2. The CDU bus number then is CDU 1.

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

(6) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (7). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(7) Replace the second TRU

Replace the other TRU (that connects to the suspected CDU bus) according to instructions in the section "TRU" in the chapter "Corrective Action".

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

(8) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (14). No fault is detected in the RBS.
- On: Proceed to step (9). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(9) Replace the CDU

Replace the CDU (that connects to the suspected CDU bus) according to instructions in the section "CDU" in the chapter "Corrective Action".

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

(10) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (14). No fault is detected in the RBS.
- On: Proceed to step (11). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(11) Replace backplane and CDU bus

The fault is located in the backplane or in the CDU bus.

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

1. Replace the TRU backplane according to instructions in the section "TRU Backplane" in the chapter "Corrective Action".
2. Replace the CDU bus.

(12) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (14). No fault is detected in the RBS.
- On: Proceed to step (13). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(13) Contact the supervisor

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

(14) Test after corrective action

Take the following actions:

1. Make a test call over the CDU that connects to the CDU bus concerned according to instructions in the section "Test Call" in the chapter "Test after Corrective Action".
2. Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.9 CDU-D RUs

Note: This procedure is common for the three RUs in the CDU-D: CU, DU and FU (FUd).

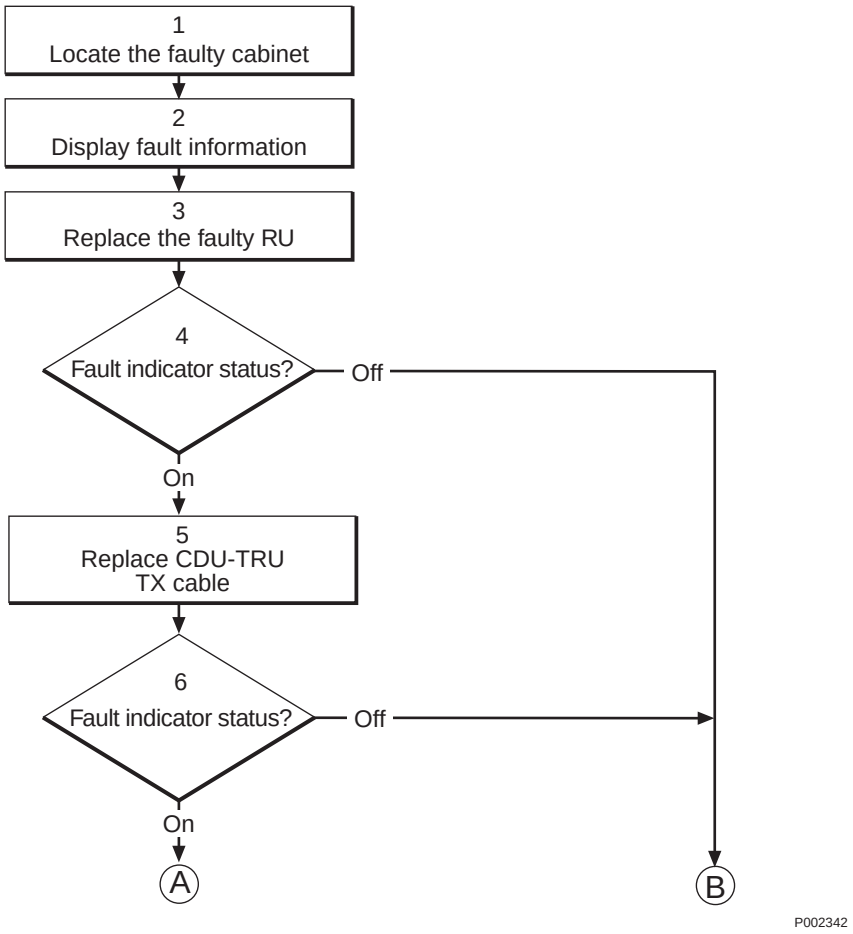

Figure 28 CDU-D RUs (part 1of 2)

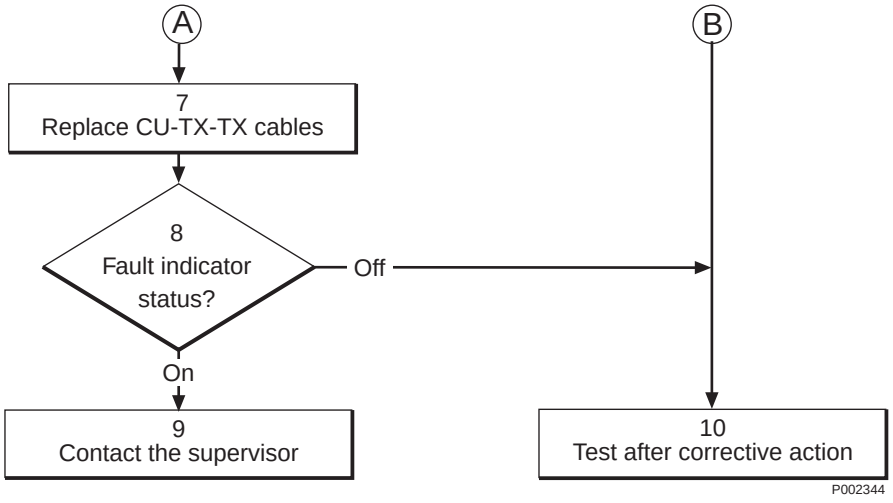

Figure 29 CDU-D RUs (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Replace the faulty RU

Replace the faulty RU according to instructions in the section "CDU-D RUs" in the chapter "Corrective Action".

Note: If the unit to be replaced is a DU and part of an extension cabinet system using ALNA, always work in the master cabinet first, then in the extension cabinet.

(4) Fault indicator status?

The red indicator labelled Fault on an RU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RU.
- On: Proceed to step (5). One or more faults are detected in the RU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(5) Replace CDU-TRU TX cables

Replace one or both CDU-TRU TX cables according to instructions in the section "CDU-TRU TX Cables" in the chapter "Corrective Action".

(6) Fault indicator status?

The red indicator labelled Fault on an RU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RU.
- On: Proceed to step (7). One or more faults are detected in the RU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(7) Replace CU-TX-TX cables

Replace one or both CU-TX-TX cables according to instructions in the section "CU-TX-TX Cable" in the chapter "Corrective Action".

(8) Fault indicator status?

The red indicator labelled Fault on an RU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RU.
- On: Proceed to step (9). One or more faults are detected in the RU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.
- On: Proceed to step (9). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(9) Contact the supervisor

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

(10) Test after corrective action

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.10 CDU HLOUT HLIN Cable

Note: This procedure is common for the two RUs CDU HLOUT HLIN Cable and CAB HLIN Cable. CAB HLIN Cable connects the master and the extension cabinet.

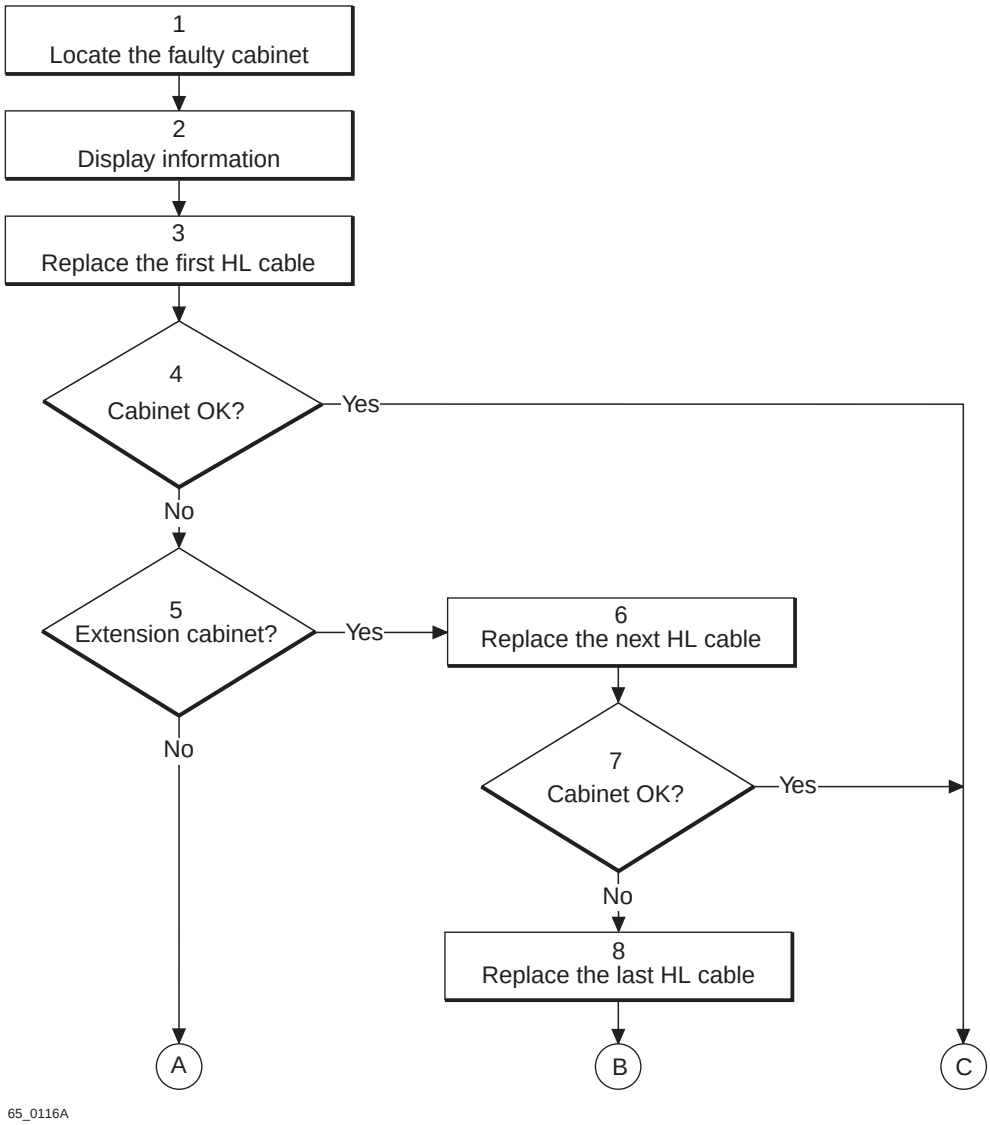

Figure 30 CDU HLOUT HLIN cable (part 1 of 2)

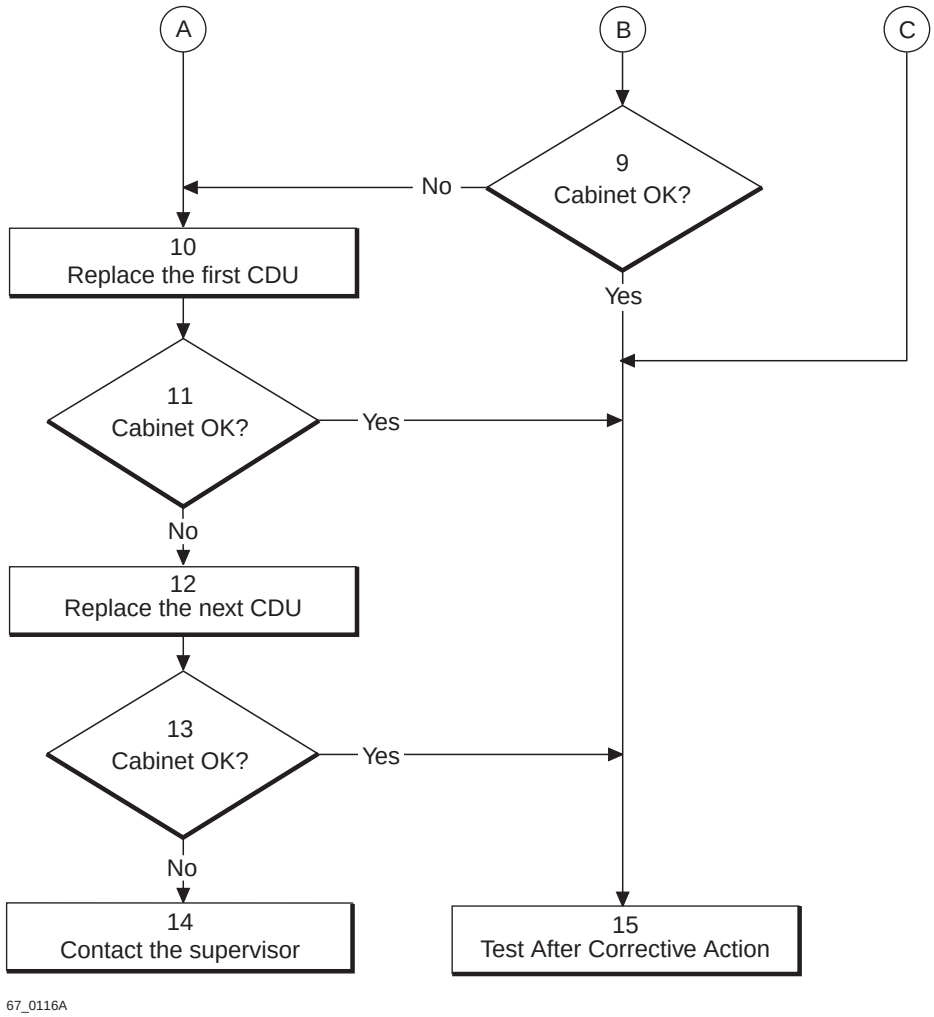

Figure 31 CDU HLOUT HLIN cable (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

	OMT User's Manual	*LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the OMT to determine which cable is faulty. Select object = DXU and search for "Fault Status CDU HLOUT HLIN CABLE-#1". Monitor all cables (0, 1, 2…) one by one. For example, if number 0 is faulty, it means that the faulty cable is connected to the HLOUT connector on CDU 0.

(3) Replace the first HL cable

Replace the faulty HL cable that is connected between the CDUs or between the CDU and the connection field if an extension cabinet is used. Refer to instructions in the section "HLIN and HLOUT Cables" in the chapter "Corrective Action".

(4) Cabinet OK?

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. Check in particular that the fault "22 CDU HLOUT HLIN cable" has disappeared from the SO CF Replacement Unit Map.

Has the fault disappeared and is the RBS free from other faults?

- No: Proceed to step (5).
- Yes: Proceed to step (15).

(5) Extension cabinet?

Is there an extension cabinet connected?

- No: Proceed to step (10).
- Yes: Proceed to step (6).

(6) Replace the next HL cable

Replace the HL cable that connects the extension cabinet to the master cabinet (CAB HLIN Cable) according to instructions in the section "HLIN and HLOUT Cables" in the chapter "Corrective Action".

(7) Cabinet OK?

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. Check in particular that the fault "22 CDU HLOUT HLIN cable" has disappeared from the SO CF Replacement Unit Map.

Has the fault disappeared and is the RBS free from other faults?

- No: Proceed to step (8).
- Yes: Proceed to step (15).

(8) Replace the last HL cable

Replace the faulty HL cable that is connected between the CDU and the connection field in the extension cabinet according to instructions in the section "HLIN and HLOUT Cables" in the chapter "Corrective Action".

(9) Cabinet OK?

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. Check in particular that the fault "22 CDU HLOUT HLIN cable" has disappeared from the SO CF Replacement Unit Map.

Has the fault disappeared and is the RBS free from other faults?

- No: Proceed to step (10).
- Yes: Proceed to step (15).

(10) Replace the first CDU

Replace the CDU with the faulty HL cable according to instructions in the section "CDU" in the chapter "Corrective Action".

(11) Cabinet OK?

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. Check in particular that the fault "22 CDU HLOUT HLIN cable" has disappeared from the SO CF Replacement Unit Map.

Has the fault disappeared and is the RBS free from other faults?

- No: Proceed to step (12).
- Yes: Proceed to step (15).

(12) Replace the next CDU

Replace the CDU that the other end of the HL cable is connected to according to instructions in the section "CDU" in the chapter "Corrective Action".

(13) Cabinet OK?

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. Check in particular that the fault "22 CDU HLOUT HLIN cable" has disappeared from the SO CF Replacement Unit Map.

Has the fault disappeared and is the RBS free from other faults?

- No: Proceed to step (14).
- Yes: Proceed to step (15).

(14) Contact the supervisor

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

(15) Test after Corrective Action

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action". If the CDU has been replaced, a test call has also to be made.

6.11 CDU RX in Cable

Note: In configurations with *CDU-C+ and duplexer*, the cable DPX RXIN is, in case of malfunction, also identified as CDU RX in cable in the SO CF, replacement unit map. However, the OMT can distinguish between the two cables. The fault handling procedure is common for the DPX RXIN and CDU RX in cables. See also the section "CDU-C+" in the chapter "Cable Connections".

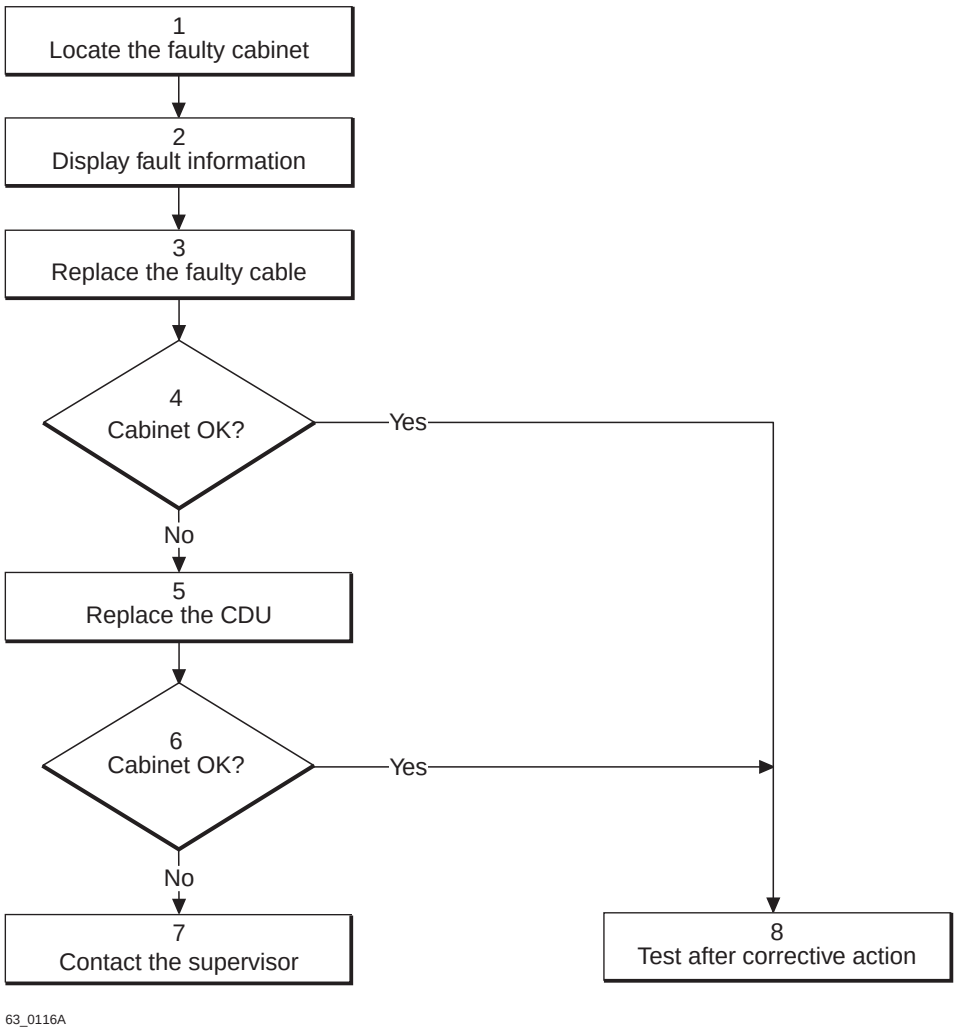

Figure 32 CDU RX in cable

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

1. Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).
2. Use the window "Display Status" to list faults for all CDUs in the cabinet until "Fault Status CDU RX IN CABLE-#1" is found. For example, if CDU RX IN CABLE 2 is faulty, it means that the faulty cable is located on CDU 2.

(3) Replace the faulty cable

Replace the faulty cable according to instructions in the section "CDU-TRU RX Cables" in the chapter "Corrective Action".

(4) Cabinet OK?

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. Check in particular that the fault "23 CDU RX in cable" has disappeared from the SO CF Replacement Unit Map.

Has the fault disappeared and is the RBS free from other faults?

- No: Proceed to step (5).
- Yes: Proceed to step (8).

(5) Replace the CDU

Replace the CDU according to instructions in the section "CDU" in the chapter "Corrective Action".

(6) Cabinet OK?

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. Check in particular that the fault "23 CDU RX in cable" has disappeared from the SO CF Replacement Unit Map.

Has the fault disappeared and is the RBS free from other faults?

- No: Proceed to step (7).
- Yes: Proceed to step (8).

(7) Contact the supervisor

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

(8) Test after Corrective Action

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action". If the CDU has been replaced, a test call has also to be made.

6.12 CDU-TRU PFWD Cable and CDU-TRU PREFL Cable

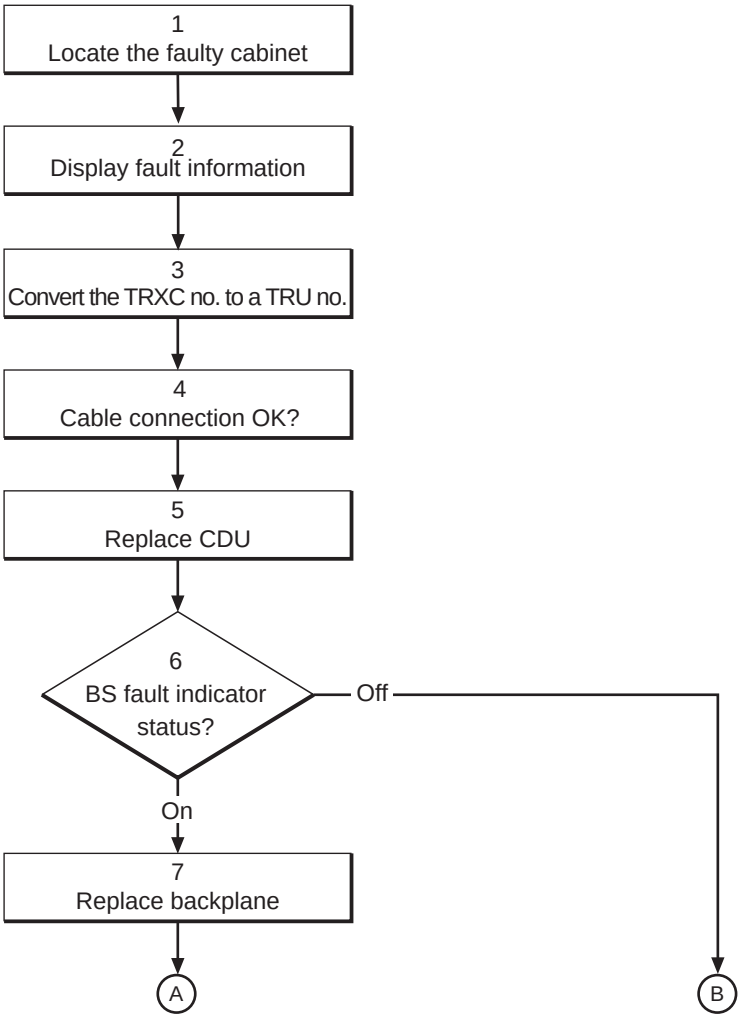

Figure 33 CDU-TRU PFWD and PREFL cable (part 1 of 2)

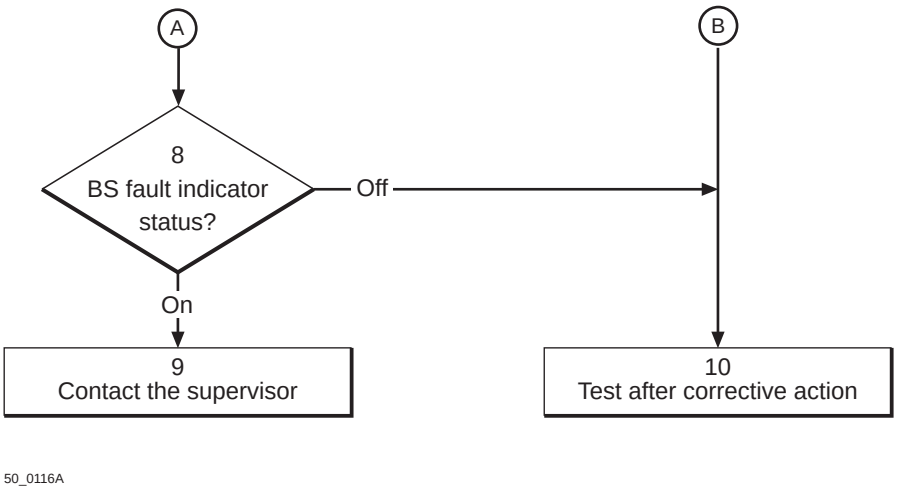

Figure 34 CDU-TRU PFWD and PREFL cable (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Convert the TRXC no. to a TRU no.

Read the work order to see which TRXC is reporting the cable as faulty. The TRXC number is converted according to the information below.

- TRXC 0 = TRU 1
- TRXC 1 = TRU 2
- TRXC 2 = TRU 3
- TRXC 3 = TRU 4
- etc.

For further information, see the chapter "Positioning of RUs".

(4) Cable connection OK?

Check that the cable is properly connected to the CDU.

To properly tighten the cable connections, refer to the section "Cable Connections" in the chapter "Handling of RBS during Maintenance".

(5) Replace CDU

If the cable was connected properly, replace the CDU (that connects to the suspected cable) according to instructions in the section "CDU" in the chapter "Corrective Action".

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

(6) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.

- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(7) Replace backplane

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

1. Replace the TRU backplane according to instructions in the section "TRU Backplane" in the chapter "Corrective Action".

(8) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.
- On: Proceed to step (9). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(9) Contact the supervisor

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

(10) Test after corrective action

1. Make a test call over the TRUs concerned according to instructions in the section "Test Call" in the chapter "Test after Corrective Action". (Over all TRUs, if the backplane was replaced. Over TRUs connected to the CDU, if that unit was replaced.)
2. Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.13 CDU-TRU RXA Cable and CDU-TRU RXB Cable

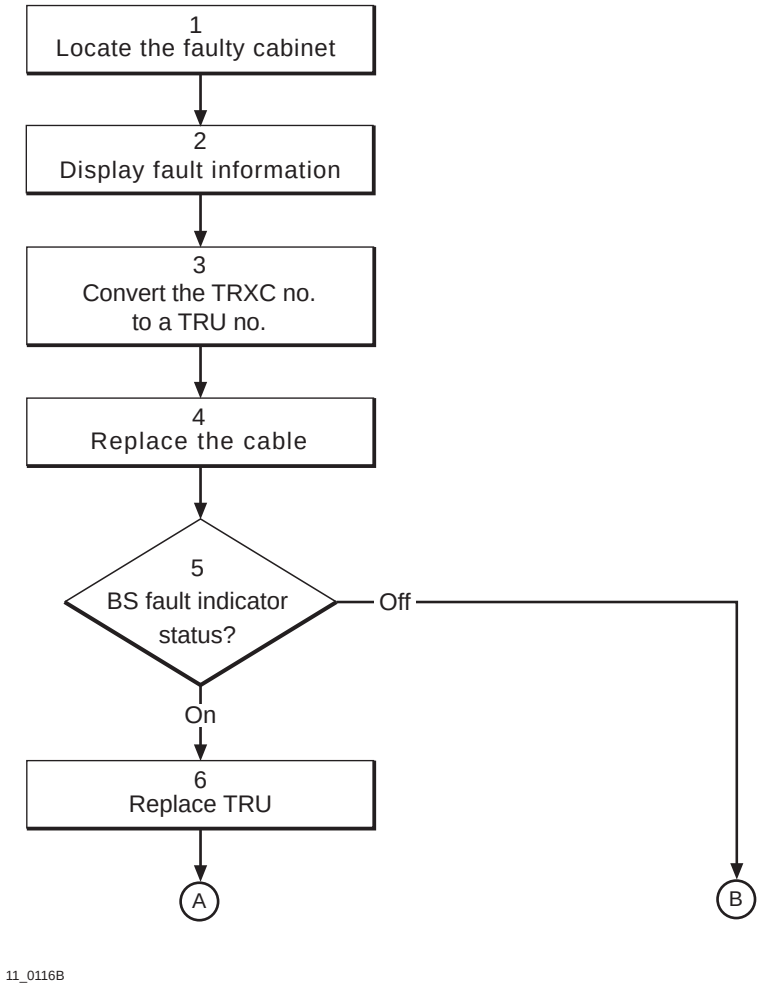

Figure 35 CDU-TRU RXA and RXB cable (part 1 of 2)

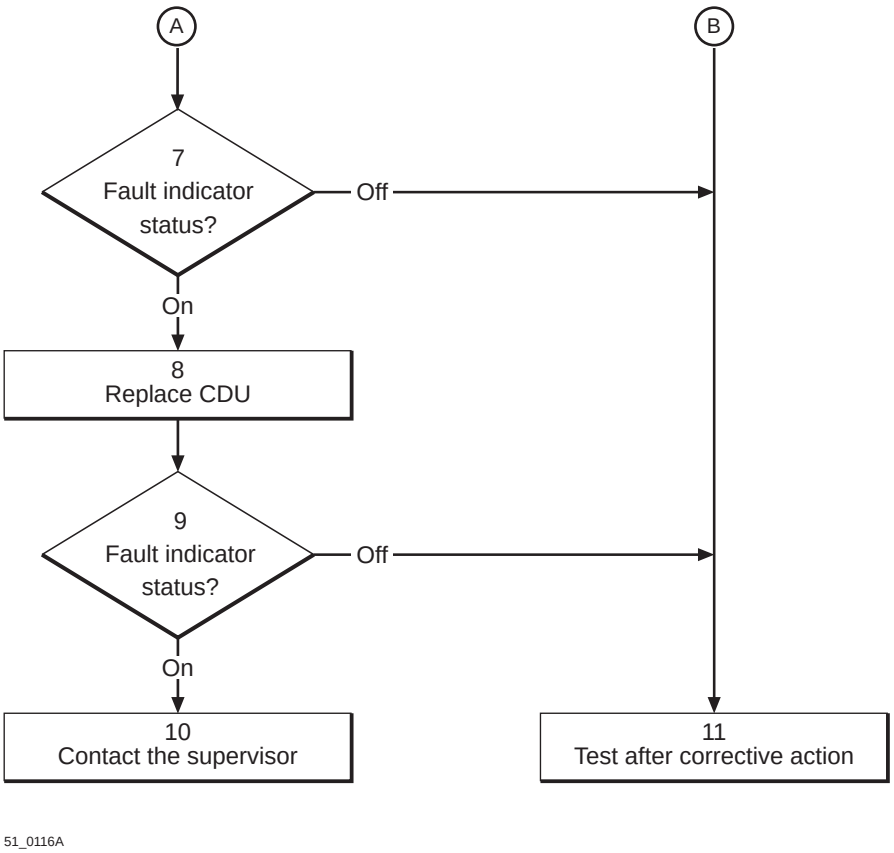

Figure 36 CDU-TRU RXA and RXB cable (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Convert the TRXC no. to a TRU no.

Read the work order to see which TRXC is reporting the cable as faulty. The TRXC number is converted according to the information below.

- TRXC 0 = TRU 1
- TRXC 1 = TRU 2
- TRXC 2 = TRU 3

- TRXC 3 = TRU 4

  etc.

For further information, see the chapter "Positioning of RUs".

(4) Replace the cable

Check the connections on the TRU and CDU. If the connections are OK, replace the CDU-TRU RX cable according to instructions in the section "CDU-TRU RX Cables" in the chapter "Corrective Action".

(5) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (11). No fault is detected in the RBS.
- On: Proceed to step (6). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(6) Replace TRU

Replace the TRU (that connects to the suspected cable) according to instructions in the section "TRU" in the chapter "Corrective Action".

(7) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (11). No fault is detected in the RBS.
- On: Proceed to step (8). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(8) Replace CDU

Replace the CDU (that connects to the suspected cable) according to instructions in the section "CDU" in the chapter "Corrective Action".

(9) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (11). No fault is detected in the RBS.
- On: Proceed to step (10). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(10) Contact the supervisor

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

(11) Test after corrective action

Take the following actions:

1. Make a test call over the TRU(s) concerned according to the section "Test Call" in the chapter "Test after Corrective Action".
2. Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.14 CU

Refer to Section 6.9 CDU-D RUs on page 70.

6.15 DC/DC Converter

Faults in the DC/DC converter are reported to the network operator via an external alarm.

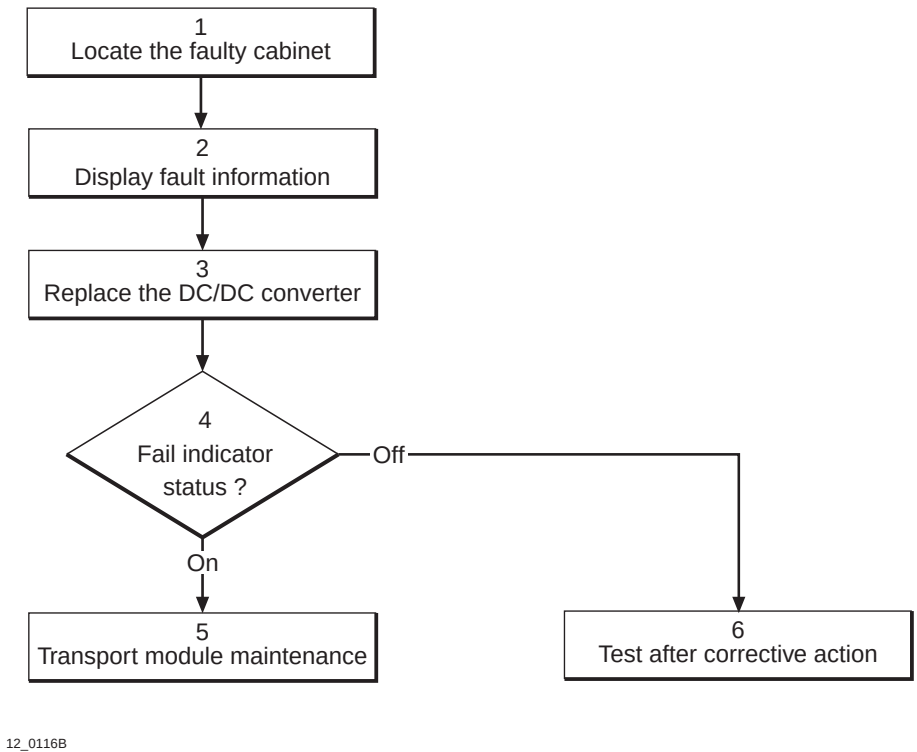

Figure 37 DC/DC converter

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Replace the DC/DC converter

Replace the DC/DC converter. No special instructions are required.

(4) Fail indicator status?

The red indicator labelled Fail on the DC/DC converter indicates output voltage out of alarm limits.

- Off: Proceed to step (6). The output voltage is within limits.
- On: Proceed to step (5). The output voltage is out of alarm limits due to overload, overvoltage or failure.

(5) Transport module maintenance

Perform maintenance according to documentation for the transport module.

(6) Test after corrective action

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.16 DPX RXIN Cable

Refer to the section "CDU RX in Cable", Section 6.11 on page 77.

6.17 DU

Refer to the section Section 6.9 CDU-D RUs on page 70.

6.18 DXU

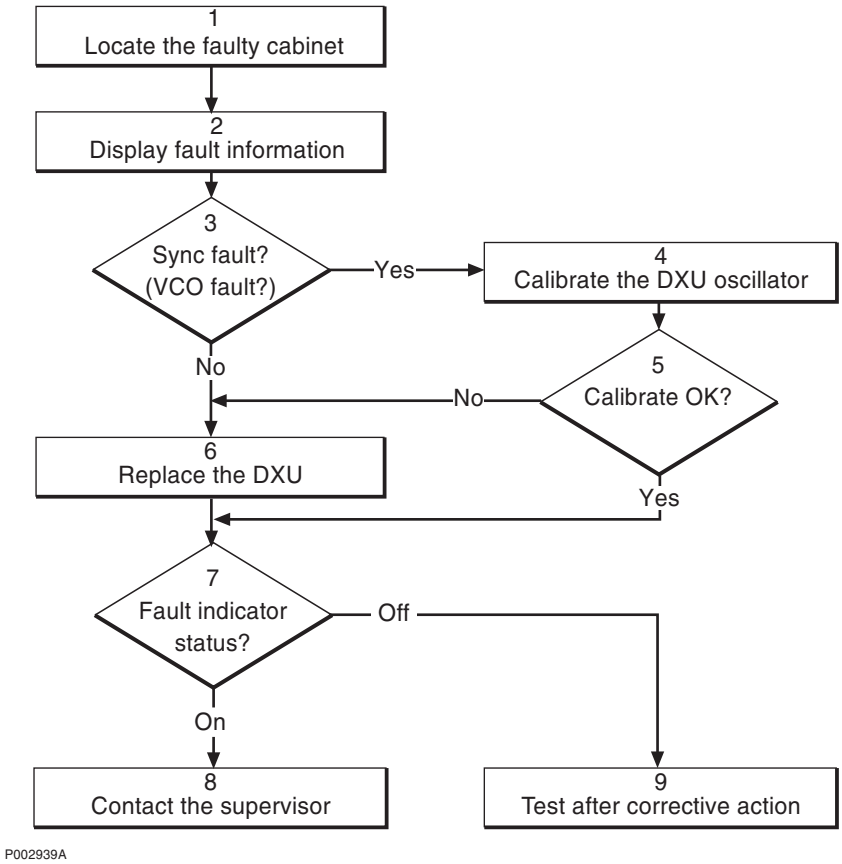

Figure 38 DXU

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

	OMT User's Manual	*LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

1. Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.
2. In the window "Select Object", select the DXU.
3. Use the window "Display Status" to list faults in the DXU.

(3) Sync fault? (VCO fault?)

Check for any of the following two alarms:

- "Timing unit VCO ageing" in "SO CF Internal Fault Map Class 2A"

- "Timing unit VCO fault" in "SO CF Internal Fault Map Class 1A"

Is any of these faults indicated in the OMT?

- Yes: Proceed to step (4).
- No: Proceed to step (6).

(4) Calibrate the DXU oscillator

Calibrate the DXU oscillator according to instructions in the section "DXU Maintenance" in the chapter "Preventive Maintenance".

(5) Calibration OK?

Was the calibration of the DXU oscillator OK?

- Yes: Proceed to step (7).
- No: Proceed to step (6).

(6) Replace the DXU

Replace the faulty DXU according to instructions in the section "DXU" in the chapter "Corrective Action".

(7) Fault indicator status?

The red indicator labelled Fault on the DXU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (9). No fault is detected in the DXU.
- On: Proceed to step (8). One or more faults are detected in the DXU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (9). No fault is detected in the RBS.
- On: Proceed to step (8). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(8) Contact the supervisor

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

(9) Test after corrective action

Take the following actions:

1. Make a test call over all TRUs, including those in an extension cabinet (if connected), handled by the DXU according to the section "Test Call" in the chapter "Test after Corrective Action".
2. Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.19 ECU

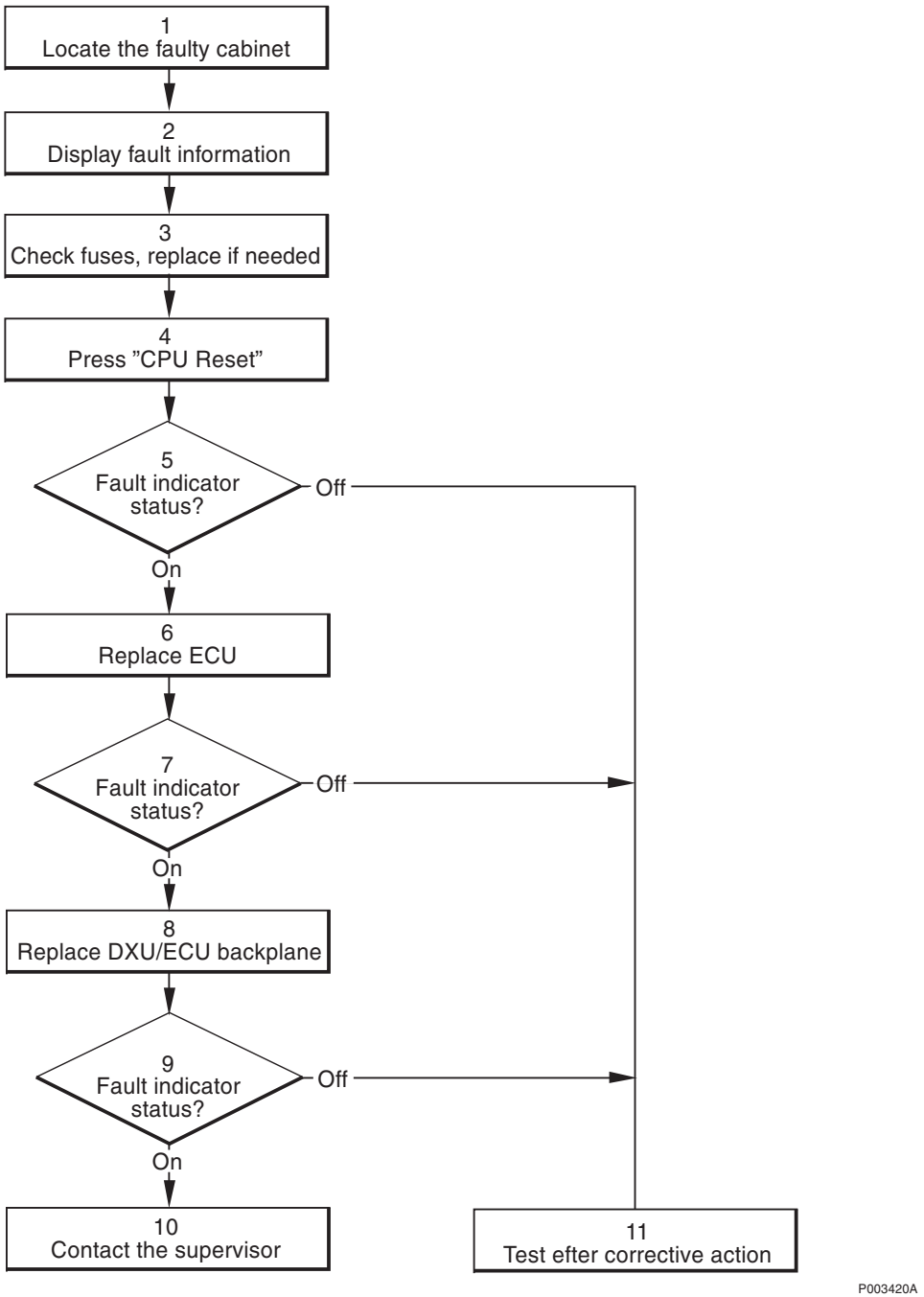

Figure 39 ECU

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

For further information on the use of OMT, see the *OMT User's Manual*.

(3) Check fuses, replace if needed

Check and replace the ECU fuses on the ACCU control board according to instructions in the section "ACCU" in the chapter "Corrective Action".

(4) Press CPU Reset

Press the button labelled "CPU Reset" on the ECU for approximately 3 seconds. Wait at least 30 seconds to allow the ECU to restart.

(5) Fault indicator status?

The red indicator labelled Fault on the ECU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (11). No fault is detected in the ECU.
- On: Proceed to step (6). One or more faults are detected in the ECU.
- Flashing: Proceed to step (6). The communication is lost with either the DXU, PSU(s) or BFU(s).

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (11). No fault is detected in the RBS.
- On: Proceed to step (6). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(6) Replace the ECU

Replace the faulty ECU according to instructions in the section "ECU" in the chapter "Corrective Action".

(7) Fault indicator status?

The red indicator labelled Fault on the ECU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (11). No fault is detected in the ECU.
- On: Proceed to step (8). One or more faults are detected in the ECU.
- Flashing: Proceed to step (8). The communication is lost with either the DXU, PSU(s) or BFU(s).

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (11). No fault is detected in the RBS.
- On: Proceed to step (8). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(8) Replace the DXU/ECU backplane

The fault is probably located in the DXU/ECU backplane. Replace the DXU/ECU backplane according to the section "DXU/ECU Backplane" in the chapter "Corrective Action".

(9) Fault indicator status?

The red indicator labelled Fault on the ECU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (11). No fault is detected in the ECU.
- On: Proceed to step (10). One or more faults are detected in the ECU.
- Flashing: Proceed to step (10). The communication is lost with either the DXU, PSU(s) or BFU(s).

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (11). No fault is detected in the RBS.
- On: Proceed to step (10). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(10) Contact the supervisor

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

(11) Test after corrective action

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.20 Environment

This RU records conditions that cannot be affected from the base station. For example, if the temperature in the cabinet is outside the specified range or if the incoming AC mains power is faulty, the RU "Environment" is reported as faulty. The RU "Environment" can be divided into two sub-groups: "Climate" and "Power".

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

- BS fault indicator ON means that one or more faults are detected in the RBS.
- BS fault indicator OFF means that no fault is detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. For further information on the use of OMT, see the *OMT User's Manual*.

OMT User's Manual *LZN 302 01*

The environmental alarms are given in Section 6.20.1 SO CF internal fault map, class 1A on page 93 and Section 6.20.2 SO CF internal fault map, class 2A on page 94.

6.20.1 SO CF internal fault map, class 1A

Fault: 10 Indoor Temp Out Of Safe Range

Note: This fault is valid only for master cabinet.

Description

The temperature inside the cabinet is out of permissible range for safe function. An alarm will be sent before the DC is disconnected.

Fault localisation

1 Heat exchanger external/internal fan, see Section 6.26 on page 109

Description

2 Fan, see Section 6.22 on page 101

3 ECU, see Section 6.19 on page 90

Fault: 12 DC Voltage Out Of Range

Note: This fault is valid only for master cabinet.

Description

The batteries have been discharged so that cut-out will be made. Alarm will be sent to main supervision before the DC supply of the load is disconnected by the AC unit and the contactor of the BFU is broken.

Fault localisation

1 BFU, see Section 6.5 on page 59

2 PSU, see Section 6.30 on page 118

3 ECU, see Section 6.19 on page 90

4 Battery, see Section 6.4 on page 57

6.20.2 SO CF internal fault map, class 2A

Fault: 16 Indoor Temp Out Of Normal Conditional Range

Note: This fault is valid only for extension cabinet.

Description

The temperature inside the cabinet is out of permissible range.

Fault localisation

1 Heat exchanger external/internal fan, see Section 6.26 on page 109

2 Fan, see Section 6.22 on page 101

Fault: 17 Indoor Humidity

Description

Air humidity exceeds the permissible value.

Fault localisation

1 Heat exchanger external/internal fan, see Section 6.26 on page 109

Fault: 18 DC Voltage Out Of Range

Description

This fault type has two causes:

Overvoltage. A fault report is sent if the DC voltage is above the overvoltage level.

Undervoltage. The RBS is powered from batteries. Therefore, the DC supply will only last for a limited time.

Fault localisation

1 ACCU, see Section 6.2 on page 49

2 PSU, see Section 6.30 on page 118

3 Battery, see Section 6.4 on page 57

Description

4 BFU, see Section 6.5 on page 59

5 ECU, see Section 6.19 on page 90

Fault: 20 External Power Fault

Description

Incoming mains failure. System powered by batteries.

Fault localisation

1 Check incoming power for disturbances.

6.21 External Alarms

This procedure should be used when there is a fault in the external alarm system.

External alarms are customer-defined alarms in the RBS. The alarm detector activates the alarm input by an open or closed external alarm sensor loop. For each alarm inlet it is possible to define and change an alarm set-up with the OMT. The set-up is stored as RBS information in the IDB.

The yellow indicator marked External alarm on the DXU 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.

Two cases are described in the following fault localisation procedure:

- An alarm is active in the BSC, but there should be no alarm. This can happen where an open sensor circuit should indicate an alarm.
- An alarm is not active in the BSC when it should be. This can happen where a closed sensor circuit should indicate an alarm.

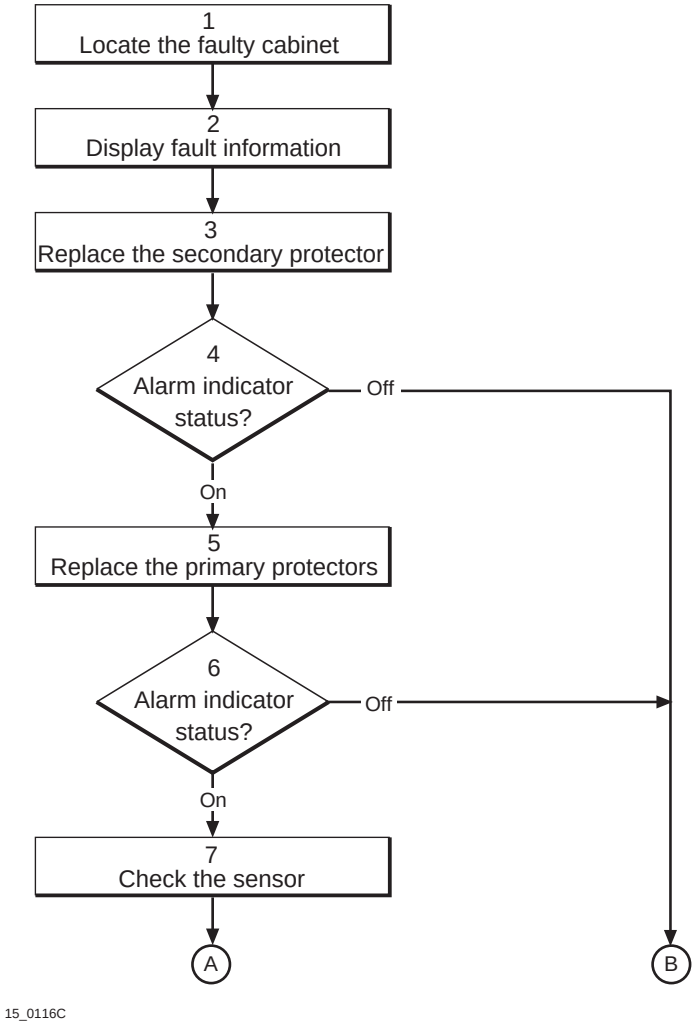

Figure 40 External alarms (part 1 of 2)

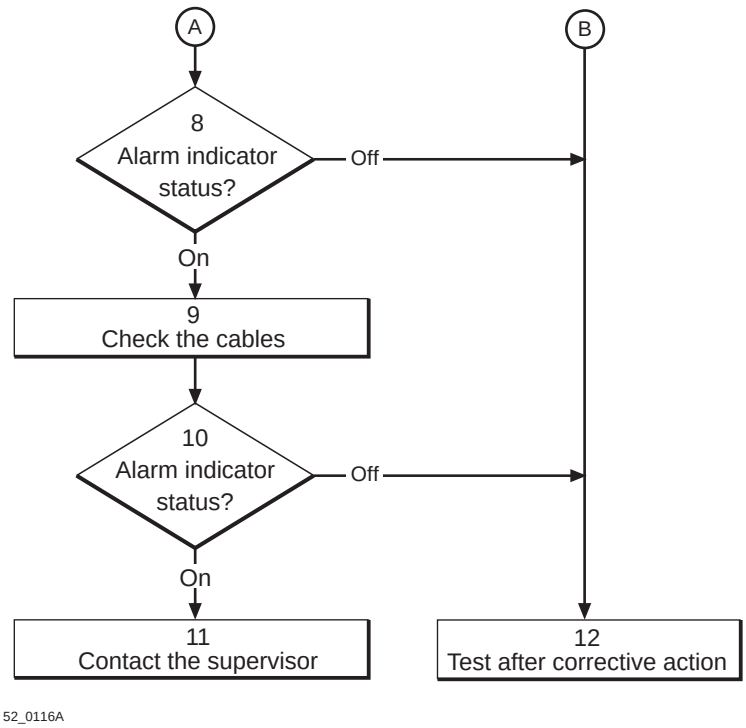

Figure 41 External alarms (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

	OMT User's Manual	*LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the OMT to monitor the external alarm that is activated.

Look at the alarm set-up concerned to investigate whether the alarm should be activated by a closed or open sensor circuit. Find out which module number in the EACU the alarm is associated with. The information will be used later in the fault localisation procedure.

(3) Replace the secondary protector

The secondary protectors are located in the EACU.

The EACU for RBS 2103 is located externally to the RBS and connected to the ACB. Refer to local documentation for the location of the EACU. The location of the ACB is shown in the figure below.

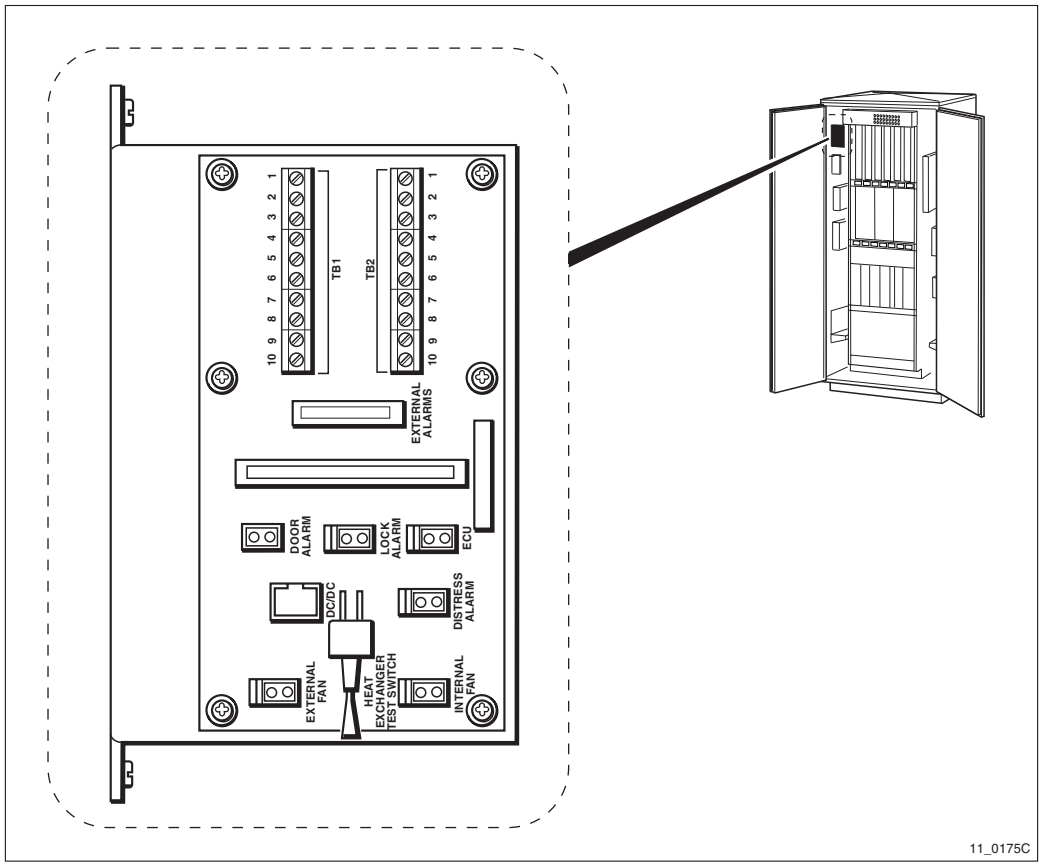

Figure 42 Location of the ACB

(4) Alarm indicator status?

The yellow indicator labelled External alarm indicates that one or more alarms are activated. The External alarm indicator is located on the DXU.

External alarm indicator status?

- Off: Proceed to step (12). No external alarms are activated.
- On: Proceed to step (5). One or more alarms are activated.

Additionally, use the OMT to monitor Fault status.

When an open sensor circuit activates the alarm concerned:

- Continue with the fault localisation until the External alarm indicator on the DXU goes off.

When a closed sensor circuit activates the alarm concerned:

- Continue with the fault localisation until the External alarm indicator on the DXU is lit.

(5) Replace the primary protectors

The primary protectors (rare-gas tubes) are located in the EACU, see applicable figure above. One of the two primary protectors in the external alarm circuit concerned could be faulty. Replace both primary protectors. Continue the fault localisation procedure if the fault does not disappear.

(6) Alarm indicator status?

The yellow indicator labelled External alarm indicates that one or more alarms are activated. The External alarm indicator is located on the DXU.

External alarm indicator status?

- Off: Proceed to step (12). No external alarms are activated.
- On: Proceed to step (7). One or more alarms are activated.

Additionally, use the OMT to monitor Fault status.

When an open sensor circuit activates the alarm concerned:

- Continue with the fault localisation until the External alarm indicator on the DXU goes off.

When a closed sensor circuit activates the alarm concerned:

- Continue with the fault localisation until the External alarm indicator on the DXU is lit.

(7) Check the sensor

1. Determine whether or not the sensor works. Measure the resistance with a multimeter directly in the connection points where the external alarm sensor cables are connected in the EACU. A closed sensor should have a resistance close to zero and an open sensor should have an infinite resistance.
2. Replace the sensor if it is suspected of being faulty.

(8) Alarm indicator status?

The yellow indicator labelled External alarm indicates that one or more alarms are activated. The External alarm indicator is located on the DXU.

External alarm indicator status?

- Off: Proceed to step (12). No external alarms are activated.
- On: Proceed to step (9). One or more alarms are activated.

Additionally, use the OMT to monitor Fault status.

When an open sensor circuit activates the alarm concerned:

- Continue with the fault localisation until the External alarm indicator on the DXU goes off.

When a closed sensor circuit activates the alarm concerned:

- Continue with the fault localisation until the External alarm indicator on the DXU is lit.

(9) Check the cables

There could be something wrong with the cables to the DXU or the external alarm sensor cables.

Instructions when an open sensor circuit activates the alarm.

1. Short-circuit the connection point for the external alarm concerned, see the figure below. This should be done on the DXU side of the EACU, where the cables to the DXU are connected. If the external alarm indicator on the DXU goes off, there is probably something wrong with the external alarm sensor cables. Otherwise the DXU cables may be faulty.
2. Change the faulty cable(s).
3. Restore the units.

Instructions when a closed sensor circuit activates the alarm.

1. Short-circuit the connection point for the external alarm concerned, see the figure below. This should be done on the DXU side of the EACU, where the cables to the DXU are connected. If the external alarm indicator on the DXU lights up, there is probably something wrong with the external alarm sensor cables. Otherwise the DXU cables may be faulty.
2. Change the faulty cable(s).
3. Restore the units.

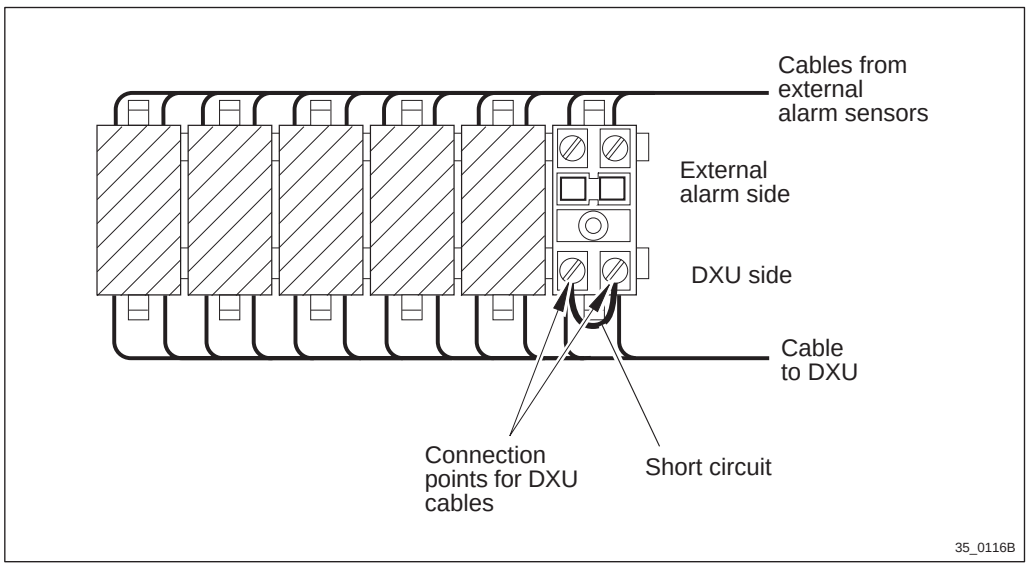

Figure 43 Short circuit in a connection point in the EACU

(10) Alarm indicator status?

The yellow indicator labelled External alarm indicates that one or more alarms are activated. The External alarm indicator is located on the DXU.

External alarm indicator status?

- Off: Proceed to step (12). No external alarms are activated.
- On: Proceed to step (11). One or more alarms are activated.

Additionally, use the OMT to monitor Fault status.

When an open sensor circuit activates the alarm concerned:

- Continue with the fault localisation until the External alarm indicator on the DXU goes off.

When a closed sensor circuit activates the alarm concerned:

- Continue with the fault localisation until the External alarm indicator on the DXU is lit.

(11) Contact the supervisor

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

(12) Test after corrective action

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.22 Fan

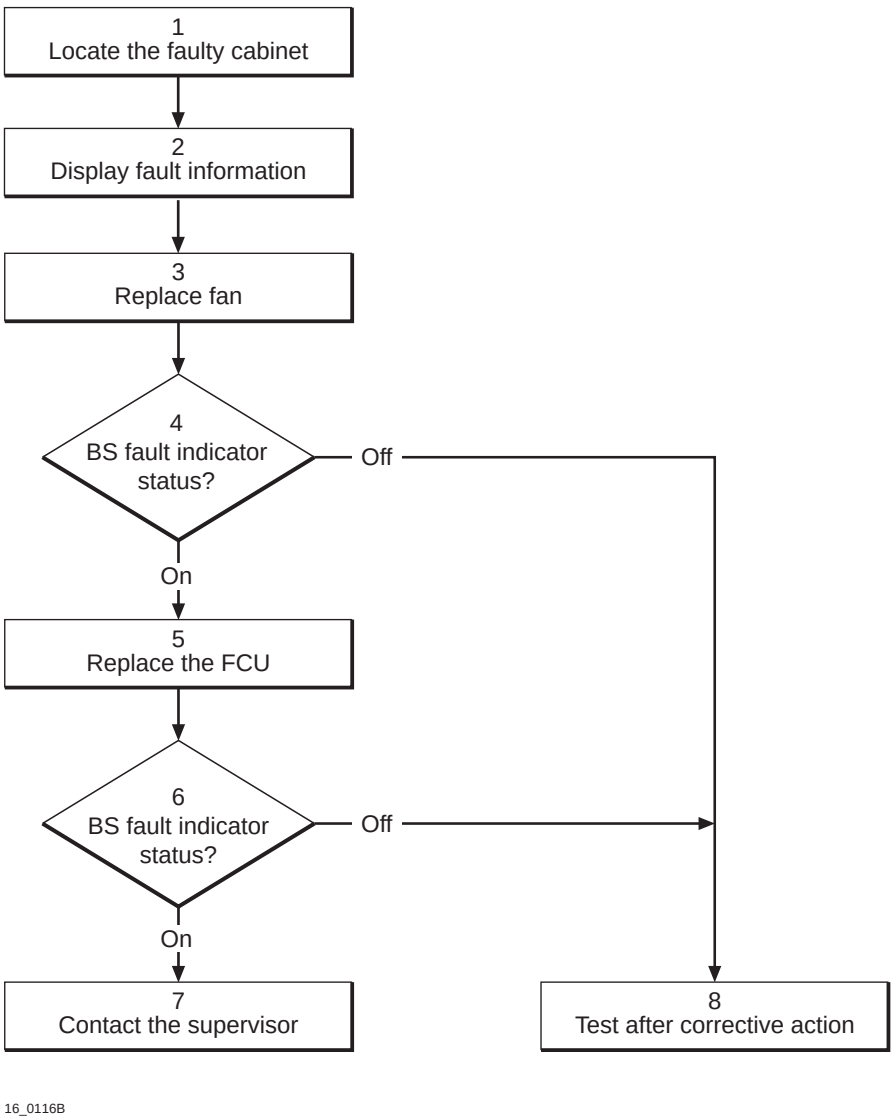

Figure 44 Fans

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Replace fan

Replace the faulty fan according to instructions in the section "Fans" in the chapter "Corrective Action".

Note: It is not always possible to tell visually if a fan is failing as an alarm is raised when a fan rotates at less than 85 % of its normal speed. Replace the fan if OMT identifies it as faulty, although it appears to operate.

(4) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(5) Replace the FCU

Replace the FCU according to instructions in the section "FCU" in the chapter "Corrective Action".

(6) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(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

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.23 FU (FUd)

Refer to Section 6.9 CDU-D RUs on page 70.

6.24 FU CU PFWD Cable and FU CU PREFL Cable

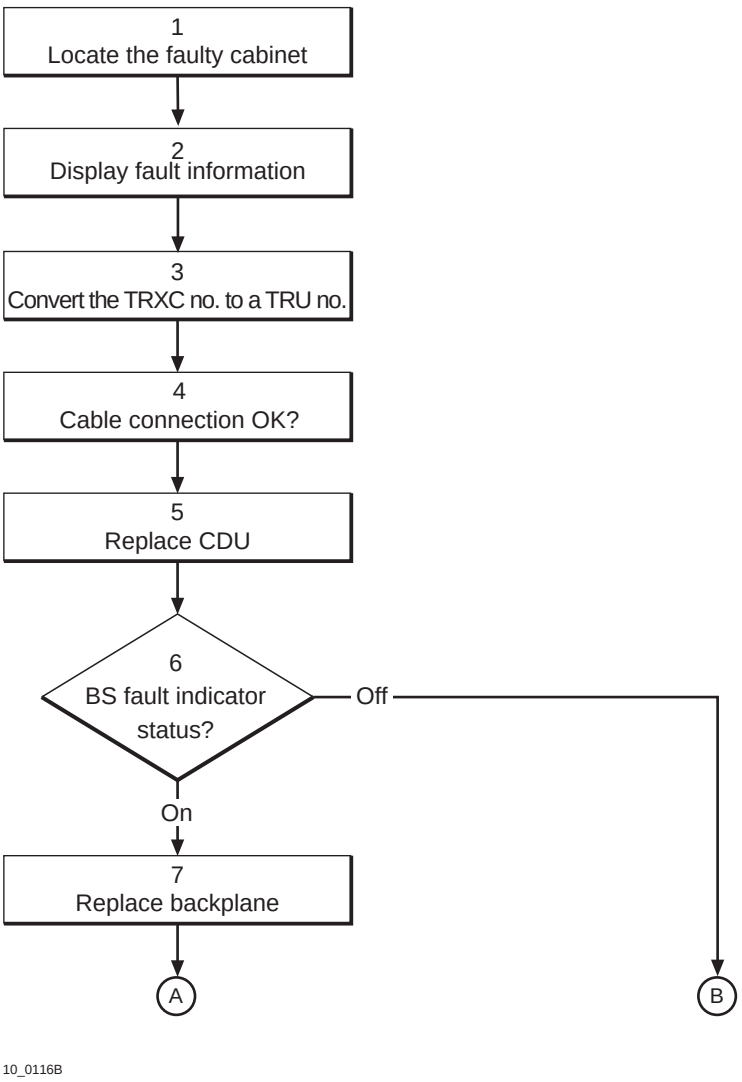

Figure 45 FU CU PFWD and PREFL Cables (part 1 of 2)

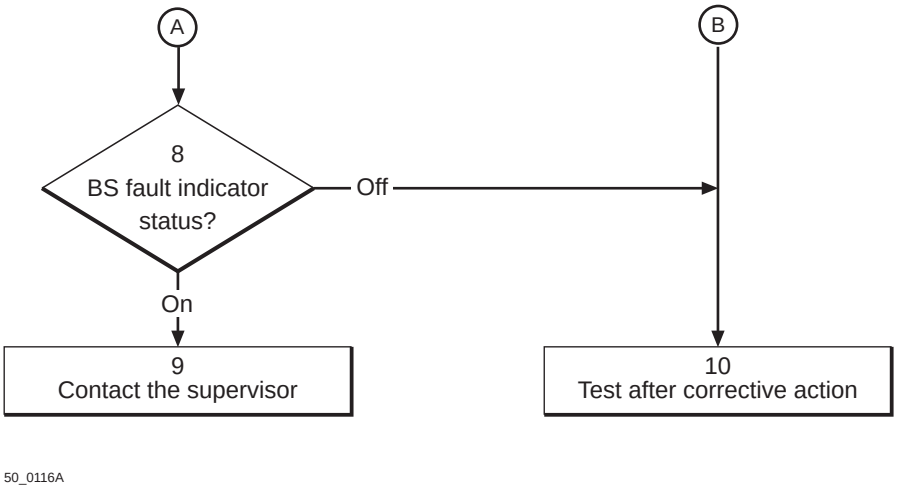

Figure 46 FU CU PFWD and PREFL Cables (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Convert the TRXC no. to a TRU no.

Read the work order to see which TRXC is reporting the cable as faulty. The TRXC number is converted according to the information below.

- TRXC 0 = TRU 1
- TRXC 1 = TRU 2
- TRXC 2 = TRU 3
- TRXC 3 = TRU 4
- etc.

For further information, see the chapter "Positioning of RUs".

(4) Cable connection OK?

1. Check that the cable is properly connected to the CDU.

2. To properly tighten the cable connections, refer to the section "Cable Connections" in the chapter "Handling of RBS during Maintenance."

3. If the cable has to be replaced, refer to the section "CDU-D" in the chapter "Cable Connections".

(5) Replace CDU

If the cable was connected properly, replace the CDU (that connects to the suspected cable) according to instructions in the section "CDU" in the chapter "Corrective Action".

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

(6) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(7) Replace backplane

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

1. Replace the TRU backplane according to instructions in the section "TRU Backplane" in the chapter "Corrective Action".

(8) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.
- On: Proceed to step (9). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(9) Contact the supervisor

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

(10) Test after corrective action

1. Make a test call over the TRUs concerned according to instructions in the section "Test Call" in the chapter "Test after Corrective Action". (Over all TRUs, if the backplane was replaced. Over TRUs connected to the CDU, if that unit was replaced.)
2. Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.25 Heater

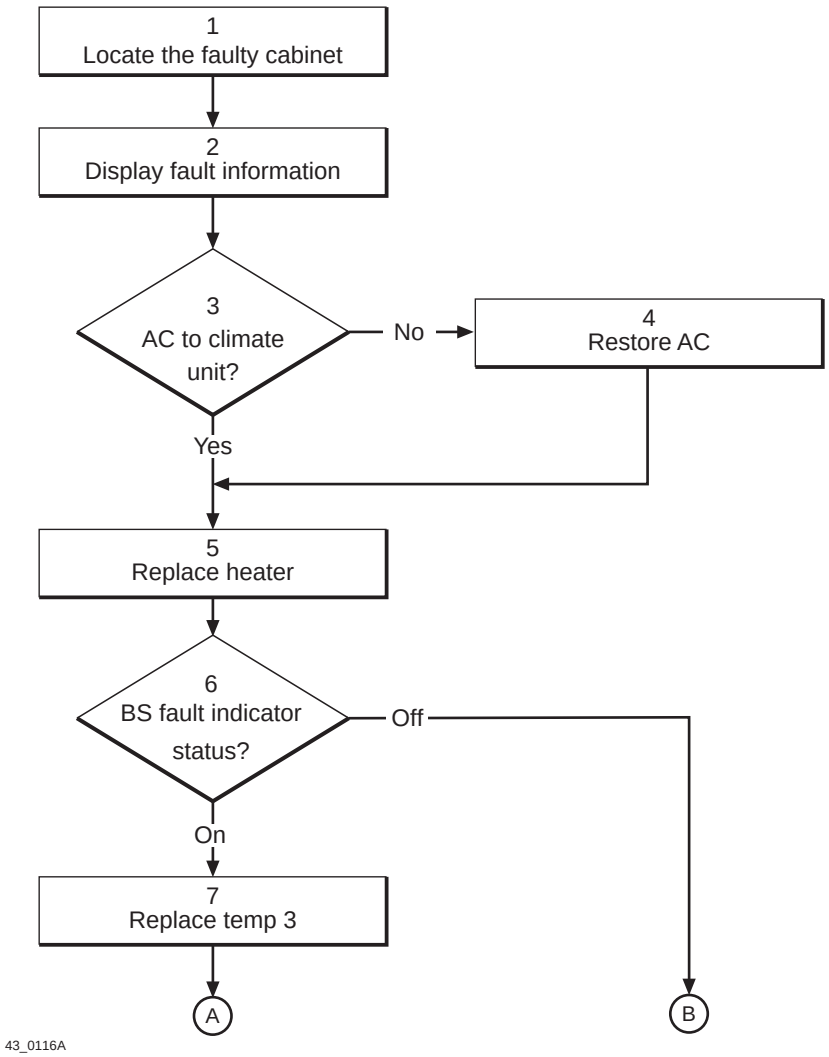

Figure 47 Heater (part 1 of 2)

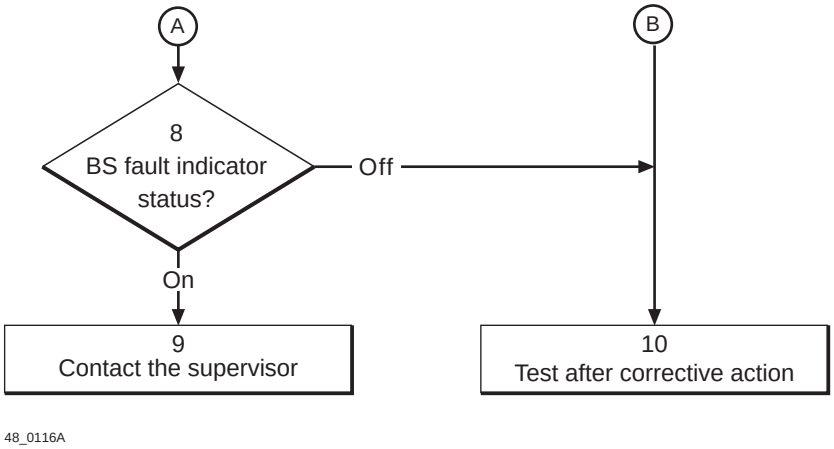

Figure 48 Heater (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) AC to climate unit?

Check the AC power cable to the climate unit with a multimeter.

Is there AC power to the climate unit?

- No: Proceed to step (4).
- Yes: Proceed to step (5).

(4) Restore AC

Take one of the folowing actions:

- If the AC power cable is defective, replace it.
- If the AC power cable is OK, but there is still no power to the climate unit, proceed to the section "ACCU" in this chapter to perform fault localisation of the ACCU.

(5) Replace heater

Replace the faulty heater according to instructions in the section "Heater" in the chapter "Corrective Action".

(6) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(7) Replace temp sensor 3

Replace temperature sensor number 3 according to instructions in the section "Temperature Sensors" in the chapter "Corrective Action".

(8) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.
- On: Proceed to step (9). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(9) Contact the supervisor

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

(10) Test after corrective action

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.26 Heat Exchanger External/Internal Fan

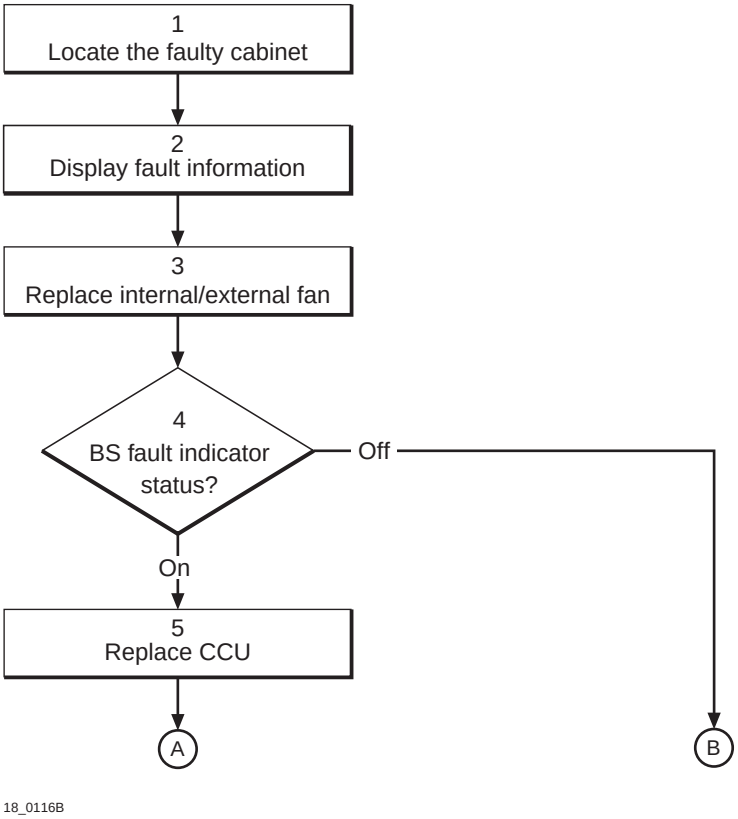

Figure 49 Heat exchanger fans (part 1 of 2)

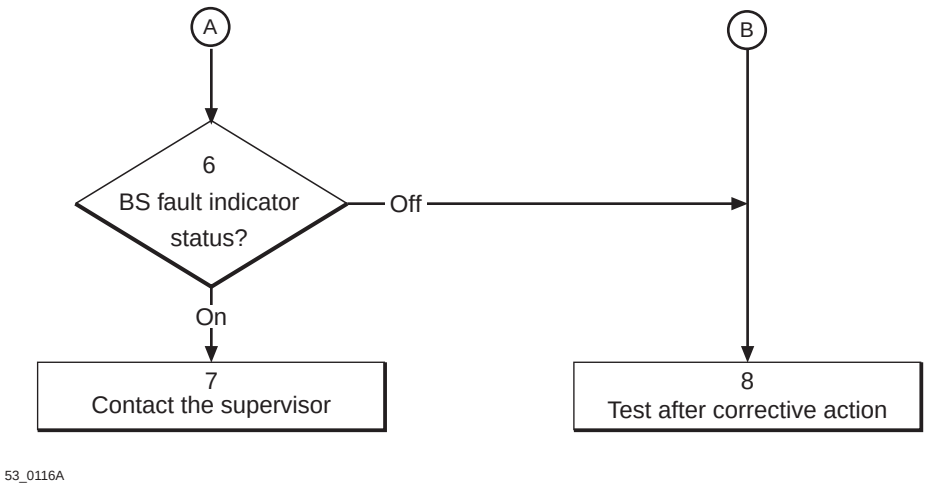

Figure 50 Heat exchanger fans (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Replace internal/external fan

Note: It is not always possible to tell visually if a fan is failing as an alarm is raised when a fan rotates at less than 85 % of its normal speed. If OMT identifies a fan as faulty, and it appears to operate, replace the fan anyway.

Replace the heat exchanger fan (internal or external depending on the fault type in the RU map) according to instructions in the section "Heat Exchanger Fans" in the chapter "Corrective Action".

(4) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(5) Replace CCU

Replace the CCU according to instructions in the section "CCU" in the chapter "Corrective Action".

(6) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(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

1. Test the replaced fan by using the test switch on the ACB.
2. Proceed with the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.27 Humidity Sensor

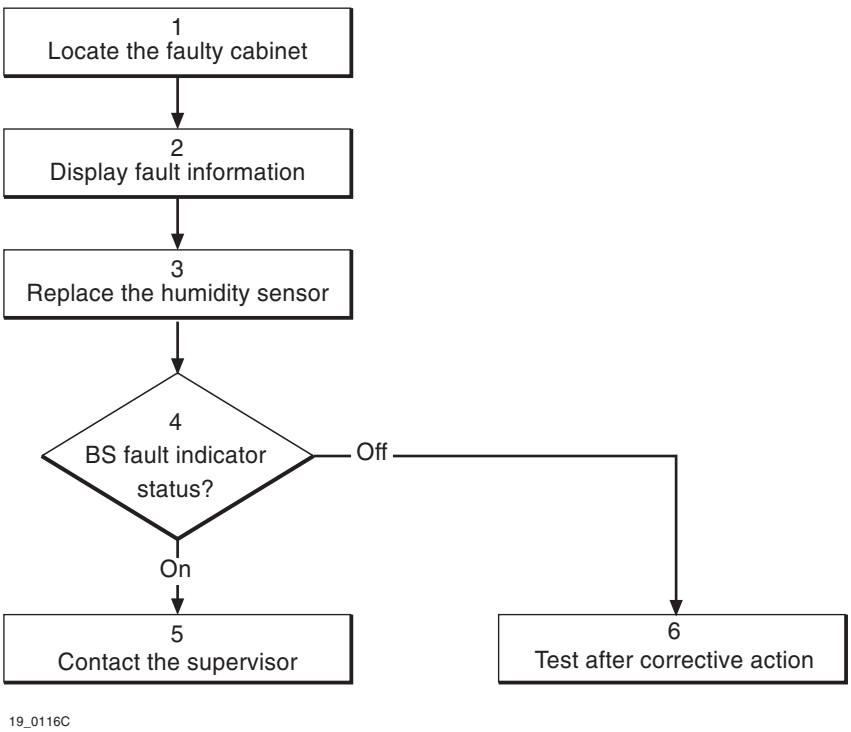

Figure 51 Humidity sensor

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Replace the humidity sensor

Replace the humidity sensor according to instructions in the section "Humidity Sensor" in the chapter "Corrective Action".

(4) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (6). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(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

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.28 Local Bus

To localise a fault on the local bus, proceed as follows:

1. Choose the appropriate section below depending on fault class and situation.
2. Use the BS fault indicator on the DXU to detect the alarm.
3. Use the OMT to determine if the fault lies in a master cabinet or in an extension cabinet.
4. Replace the suspected faulty units, or perform the required actions, one at a time, in the specified order until the fault disappears.
5. Verify that the fault is cleared by making a test call according to the section "Test Call" in the chapter "Test after Corrective Action".

6.28.1 Local Bus Fault Class 1

Note: Some of the following instructions will affect traffic. Inform the OMC before taking any further action.

Fault indicator on one TRU is flashing (but not on ECU)

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

1. Replace the flashing TRU according to instructions in the section "TRU" in the chapter "Corrective Action".
2. Replace the backplane according to instructions in the section "TRU Backplane" in the chapter "Corrective Action".

Fault indicators on more than one TRU are flashing (but not on ECU)

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

1. Replace the cable that connects the TRU backplane and the DXU/ECU backplane.
2. If an extension cabinet is used, replace the cable from the TRU backplane to the connection field. Replace the cable in the extension cabinet first, then the master cabinet.
3. If an extension cabinet is used, replace the cable between the master cabinet and the extension cabinet.
4. Replace the TRU backplane according to instructions in the section "TRU Backplane" in the chapter "Corrective Action".
5. Replace the DXU/ECU backplane according to instructions in the section "DXU/ECU Backplane" in the chapter "Corrective Action".

Fault indicators on more than one TRU and ECU are flashing

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

1. Replace the DXU according to instructions in the section "DXU" in the chapter "Corrective Action".
2. Disconnect units from the bus to isolate the defective unit. When the unit is found the fault indicators on the other units will stop flashing.
3. Replace the DXU/ECU backplane according to instructions in the section "DXU/ECU Backplane" in the chapter "Corrective Action".

6.28.2 Local Bus Fault Class 2

Note: Some of the following instructions will affect traffic. Inform the OMC before taking any further action.

Fault indicator on one TRU or ECU is flashing

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

1. Replace the flashing TRU or ECU according to instructions either in the section "TRU" or in the section "ECU" in the chapter "Corrective Action".

2. Replace one of the suggested backplanes.

   • If a TRU is flashing, replace the TRU backplane according to instructions in the section "TRU Backplane" in the chapter "Corrective Action".

   • If an ECU is flashing, replace the DXU/ECU backplane according to instructions in the section "DXU/ECU Backplane" in the chapter "Corrective Action".

Fault indicators on several TRUs are flashing

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

1. Replace the cable that connects the TRU backplane and the DXU/ECU backplane or the cable that connects the extension cabinet.
2. If an extension cabinet is used, replace the cable from the TRU backplane to the connection field.
3. If an extension cabinet is used, replace the cable between the master cabinet and the extension cabinet.
4. Replace the TRU backplane according to instructions in the section "TRU Backplane" in the chapter "Corrective Action".

No fault indicator is flashing

1. The bus is terminated at both ends by a termination unit. Replace the termination units. If an extension cabinet is used, replace the termination unit in the extension cabinet first, then in the master cabinet.
2. Replace the DXU according to instructions in the section "DXU" in the chapter "Corrective Action".

Note: If an extension cabinet is used, there is only a DXU in the master cabinet.

6.29 Power Communication Loop

The power communication loop is a fibre optic loop used for control and supervision of the power system. When the loop is opened, the power system switches to stand alone mode and the RU "Power Communication Loop" is set in the RU map.

Possible faults are a faulty RU or a faulty fibre optic cable. A LED on an RU will start flashing when the unit has lost communication with the ECU.

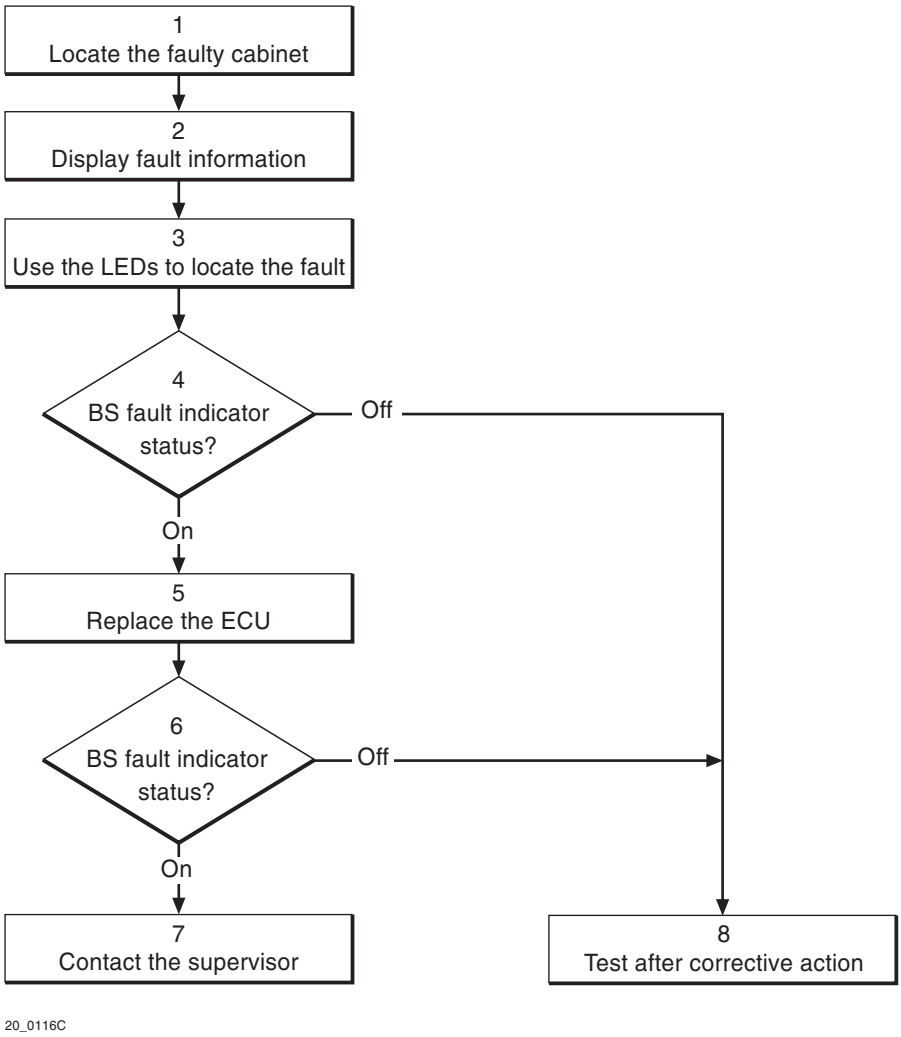

Figure 52 Power communication loop

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

	OMT User's Manual	*LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Use the LEDs to locate the fault

1. **Locate the fault.** Use by-passing of the suspected faulty units in order to get a closed loop, that is when the LEDs stop flashing.

(By-passing means that, for example, the opto bus cable from TD output on BFU 2 goes directly to RD input on PSU 2. Refer to the figure below.)

Repeat until the faulty RU or cable is identified.

2. **Replace the faulty unit** according to instructions in the section "PSU" and "BFU"in the chapter "Corrective Action", or replace the opto bus cable if it is found being faulty.

Note: The opto bus cables must have a bent radius of at least 35 mm.

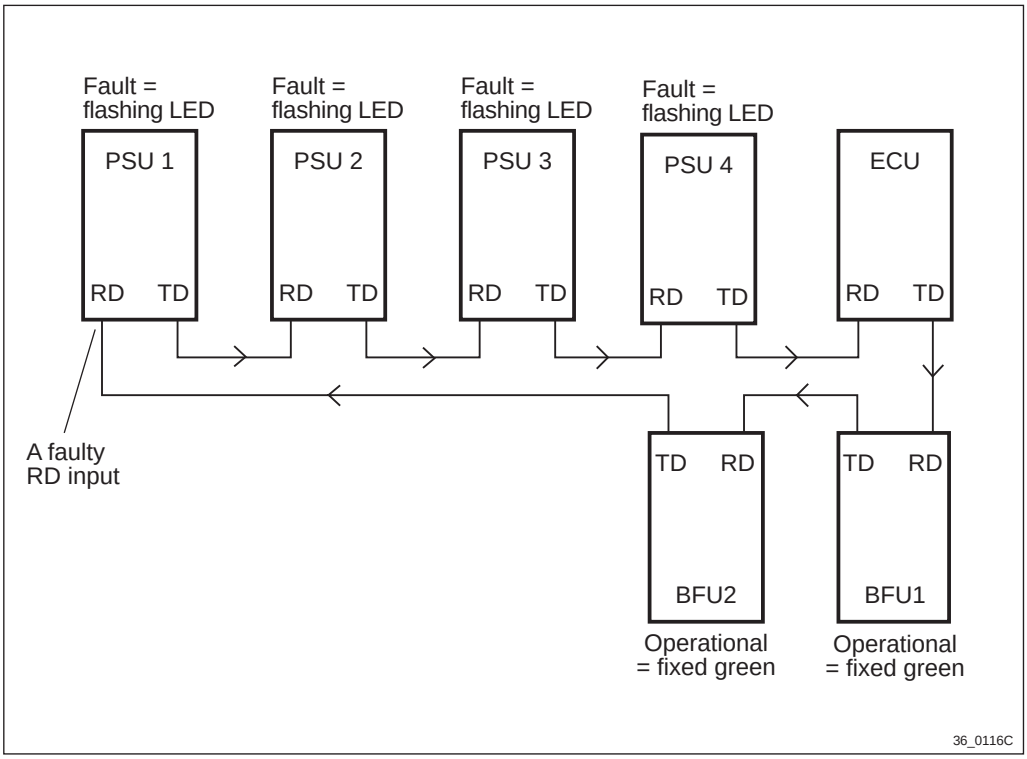

Figure 53 Example of a fault situation in the power communication loop

Flashing behaviour

If a unit gets a faulty RD input, the LED on that unit and on the following units, starts flashing.

- BFU revision R1A: The green LED "Operational" will start flashing.

  In BFU revision R1A, the green LED "Operational" on BFU2 will also after some time start flashing if there is a break anywhere in the power communication loop, for example between BFU2 and PSU1. BFU2 will not stop flashing until the power communication loop is fully operational again. This will not happen from BFU revision R2A and on.

- BFU revision R2A or later: The red LED "Fault" will start flashing.

- PSU revision R3A or earlier: The green LED "Operational" will start flashing.

- PSU revision R4A or later: The red LED "Fault" will start flashing.
- A BFU or a PSU that is still in communication with the ECU will show a fixed green "Operational" indicator.

(4) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(5) Replace the ECU

Replace the ECU according to instructions in the section "ECU" in the chapter "Corrective Action".

(6) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(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

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.30 PSU

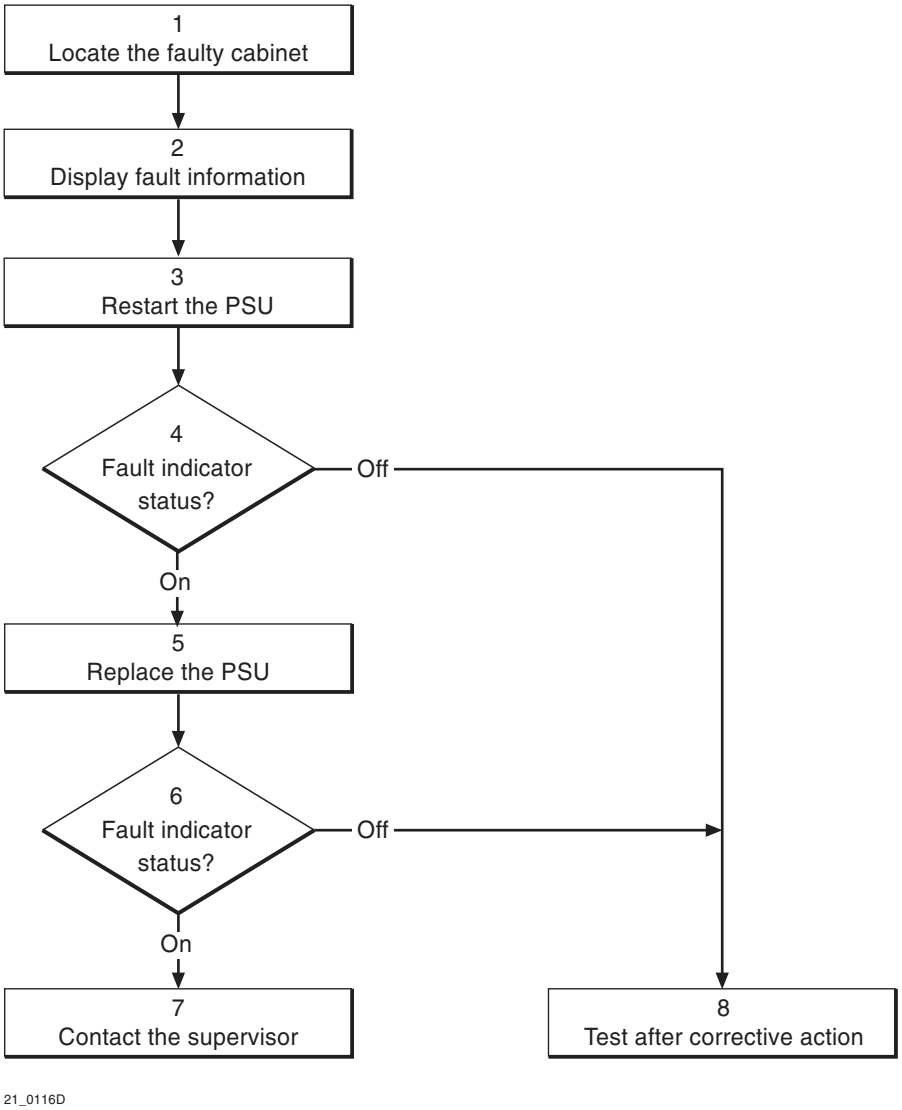

Figure 54 PSU

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Restart the PSU

Disconnect all cables from the PSU, wait a few seconds and then reconnect the cables again, see the section "PSU" in the chapter "Corrective Action". If the PSU is in a so-called "overvoltage stop" condition it will function properly after being disconnected.

(4) Fault indicator status?

The red indicator labelled Fault on the PSU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (8). No fault is detected in the PSU.
- On: Proceed to step (5). One or more faults are detected in the PSU.
- *PSU revision R4A or later.*

  Flashing (red Fault indicator): Proceed to step (5). The PSU has lost communication with the ECU.
- *PSU revision R3A or earlier.*

  Flashing (green Operational indicator): Proceed to step (5). The PSU has lost communication with the ECU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(5) Replace the PSU

Replace the faulty PSU according to instructions in the section "PSU" in the chapter "Corrective Action".

(6) Fault indicator status?

The red indicator labelled Fault on the PSU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (8). No fault is detected in the PSU.
- On: Proceed to step (7). One or more faults are detected in the PSU.
- *PSU revision R4A or later.*

Flashing (red Fault indicator): Proceed to step (7). The PSU has lost communication with the ECU.

- *PSU revision R3A or earlier.*

  Flashing (green Operational indicator): Proceed to step (7). The PSU has lost communication with the ECU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(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

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.31 PSU DC Cable

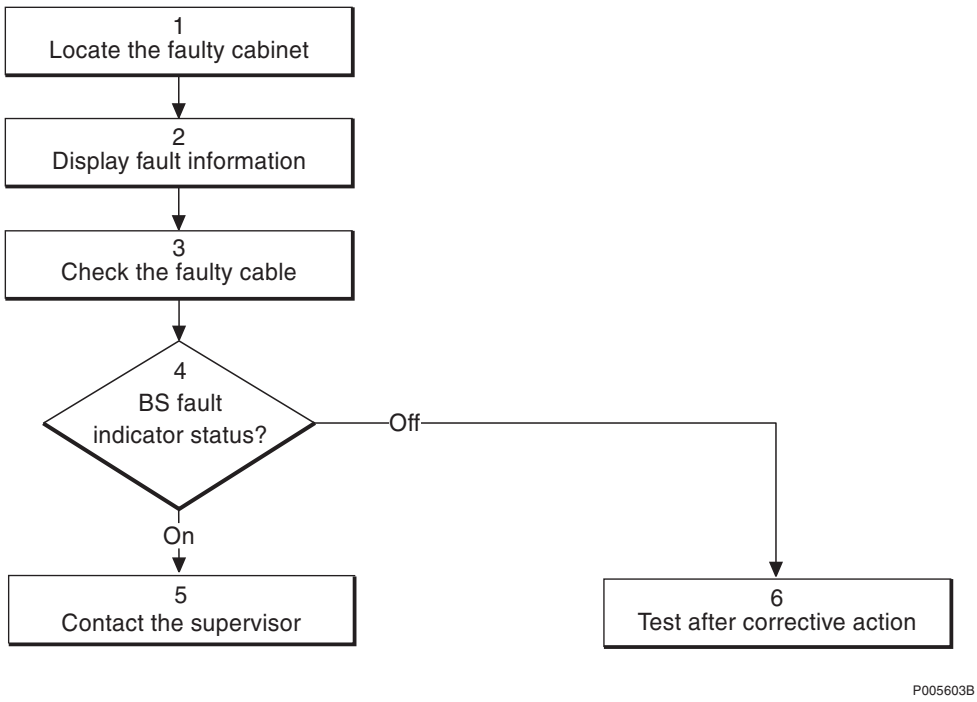

Figure 55 PSU DC cable

Note: This alarm only applies to a PSU DC cable connected to a PSU 230, not to a PSU –48.

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Check the faulty cable

1. Check that the cable connector is fastened properly to the PSU.
2. Check that the cable connector as well as the matching connector in the PSU is not burned or mechanically damaged.
3. Replace the cable if necessary according to instructions in the section "PSU DC Cable" in the chapter "Corrective Action".

(4) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

Note: It can take up to ten minutes for the alarm to cease.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (6). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(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

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.32 RBS DB

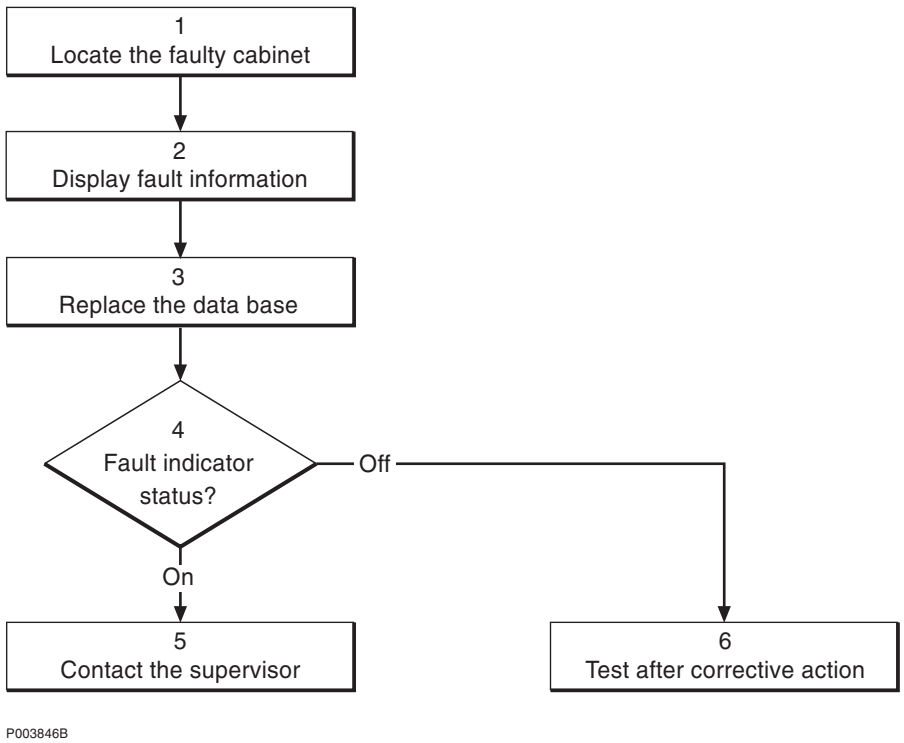

Figure 56 RBS DB

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

	OMT User's Manual	*LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(3) Replace the data base

Replace the faulty data base according to instructions in the section "RBS DB" in the chapter "Corrective Action".

(4) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (6). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(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

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.33 Temperature Sensors

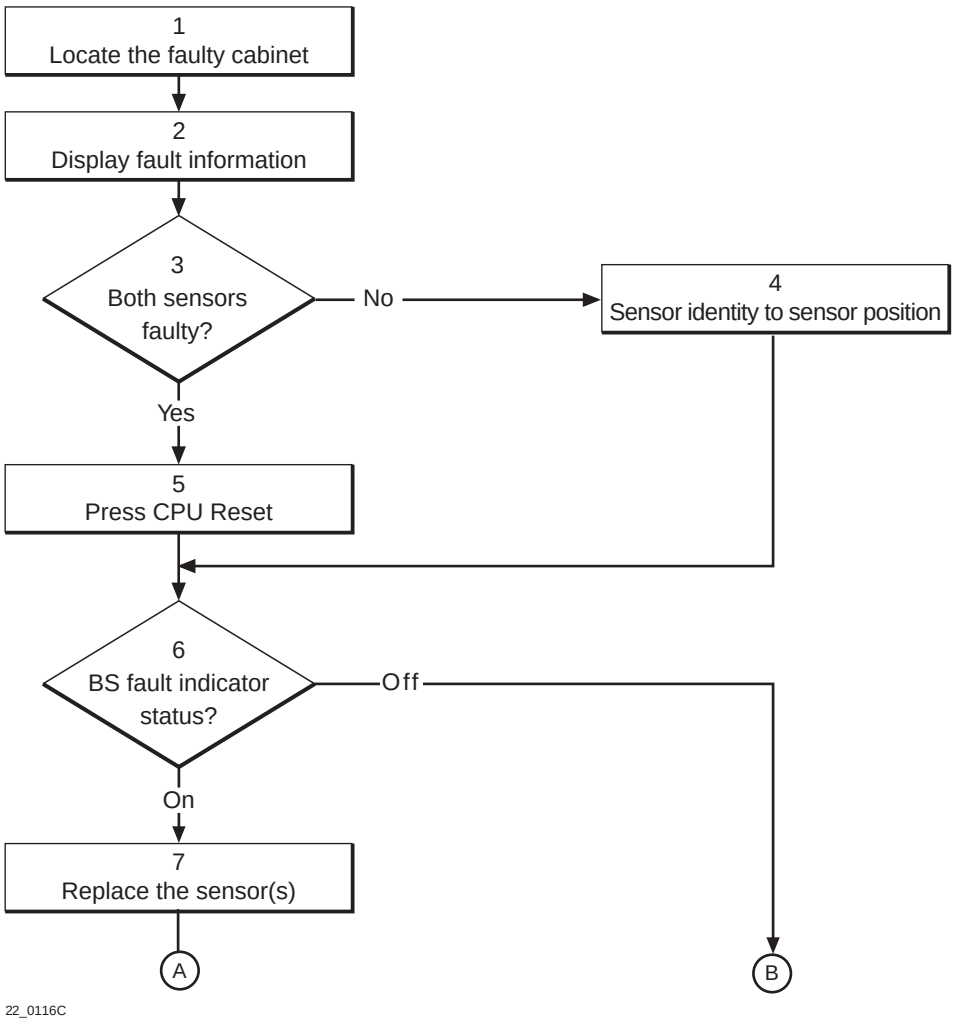

Figure 57 Temperature sensors (part 1 of 3)

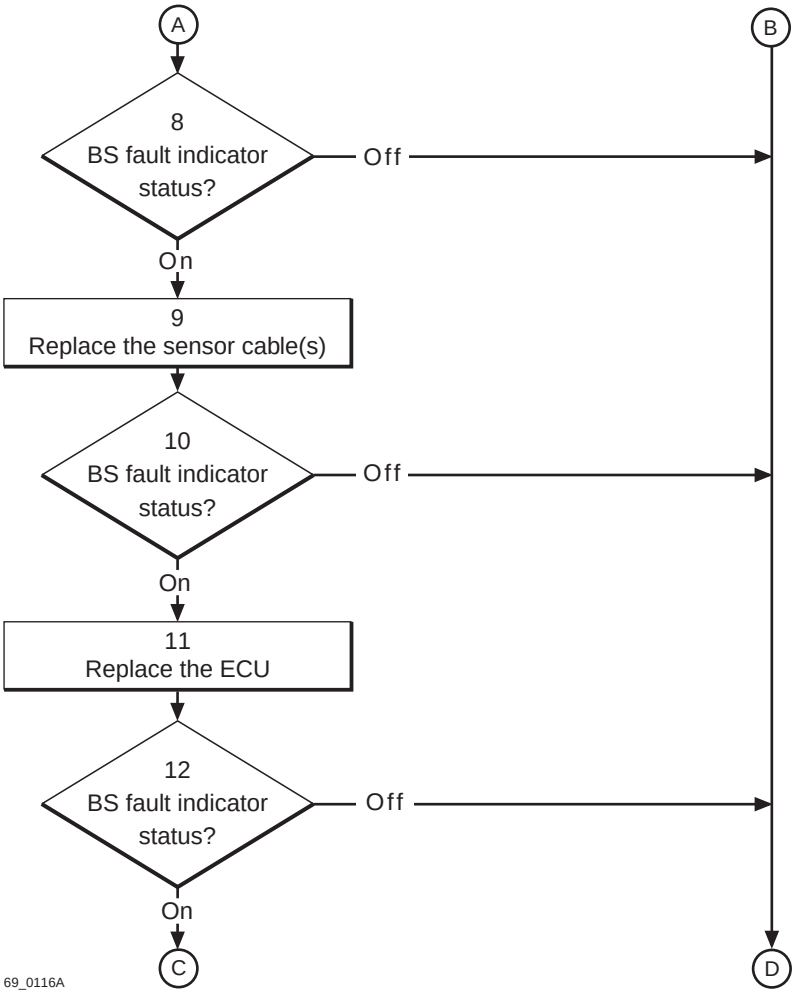

Figure 58 Temperature sensors (part 2 of 3)

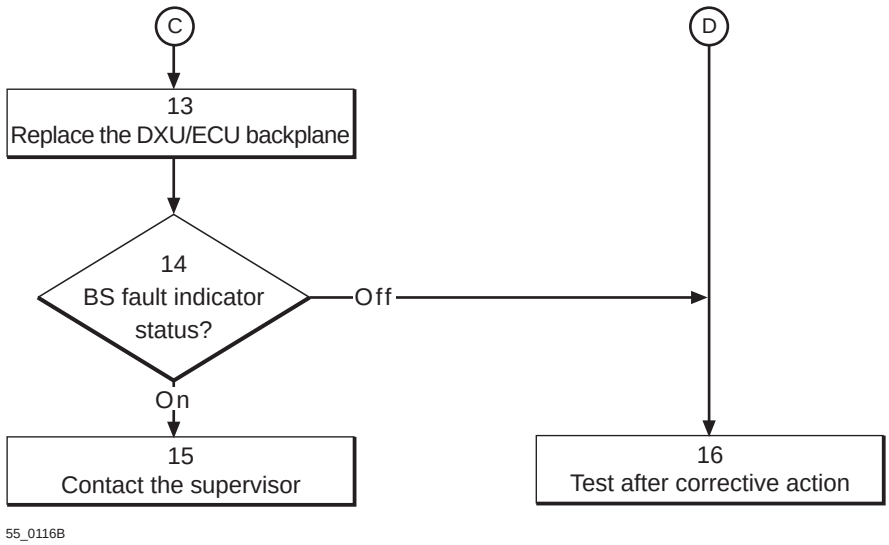

Figure 59 Temperature sensors (part 3 of 3)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Both sensors faulty?

Both sensors faulty?

- No: Proceed to step (4). Only one temperature sensor is faulty.
- Yes: Proceed to step (5). Both temperature sensors are faulty.

(4) Sensor identity to sensor position

Convert the sensor identity to a sensor position. For further information, see the chapter "Positioning of RUs".

(5) Press CPU Reset

Press the button CPU Reset on the ECU for approximately 3 seconds.

After approximately 30 seconds, the system should function without alarm, and the Fault indicator on the ECU should go out.

(6) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (16). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(7) Replace the sensor(s)

Replace the faulty temperature sensor(s) according to instructions in the section "Temperature Sensors" in the chapter "Corrective Action".

(8) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (16). No fault is detected in the RBS.
- On: Proceed to step (9). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(9) Replace the sensor cable(s)

For information about cable connections, refer to the section "DXU/ ECU Backplane" in the chapter "Cable Connections".

(10) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (16). No fault is detected in the RBS.
- On: Proceed to step (11). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(11) Replace the ECU

Replace the ECU according to instructions in the section "ECU" in the chapter "Corrective Action".

(12) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (16). No fault is detected in the RBS.
- On: Proceed to step (13). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(13) Replace the DXU/ECU backplane

Replace the DXU/ECU backplane according to instructions in the section "DXU/ECU Backplane" in the chapter "Corrective Action".

(14) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (16). No fault is detected in the RBS.
- On: Proceed to step (15). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(15) Contact the supervisor

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

(16) Test after corrective action

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.34 Timing Bus

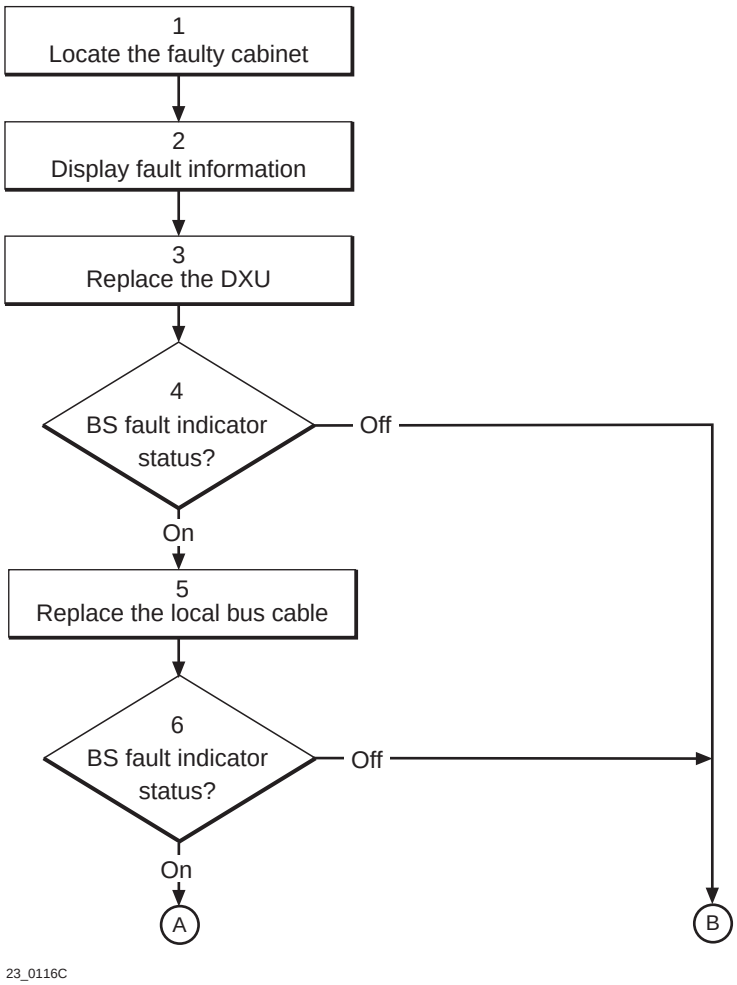

Figure 60 Timing bus (part 1 of 2)

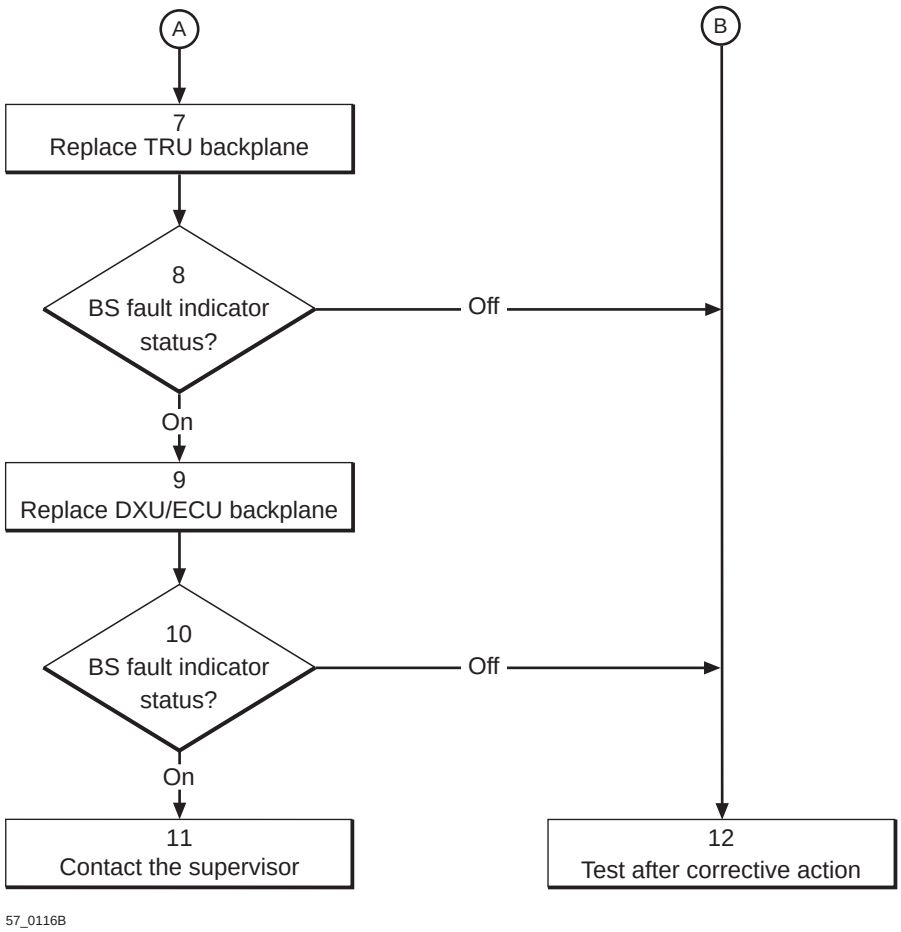

Figure 61 Timing bus (part 2 of 2)

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

	OMT User's Manual	*LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(3) Replace DXU

Replace the DXU according to instructions in the section "DXU" in the chapter "Corrective Action".

(4) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (12). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(5) Replace the local bus cable

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

Replace the local bus cable connecting the DXU/ECU backplane with the TRU backplane. Cable information for backplanes can be found in the chapter "Cable Connections".

(6) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (12). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(7) Replace TRU backplane

Replace the TRU backplane according to the section "TRU Backplane" in the chapter "Corrective Action". If an extension cabinet is used, replace the TRU backplane in the master cabinet first, then in the extension cabinet.

(8) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (12). No fault is detected in the RBS.
- On: Proceed to step (9). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(9) Replace DXU/ECU backplane

Replace the DXU/ECU backplane according to the section "DXU/ECU Backplane" in the chapter "Corrective Action". If an extension cabinet is used, replace the DXU/ECU backplane in the master cabinet first, then in the extension cabinet.

(10) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (12). No fault is detected in the RBS.
- On: Proceed to step (11). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(11) Contact the supervisor

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

(12) Test after corrective action

Take the following actions:

1. Make a test call over all TRUs according to the section "Test Call" in the chapter "Test after Corrective Action".
2. Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.35 TRU

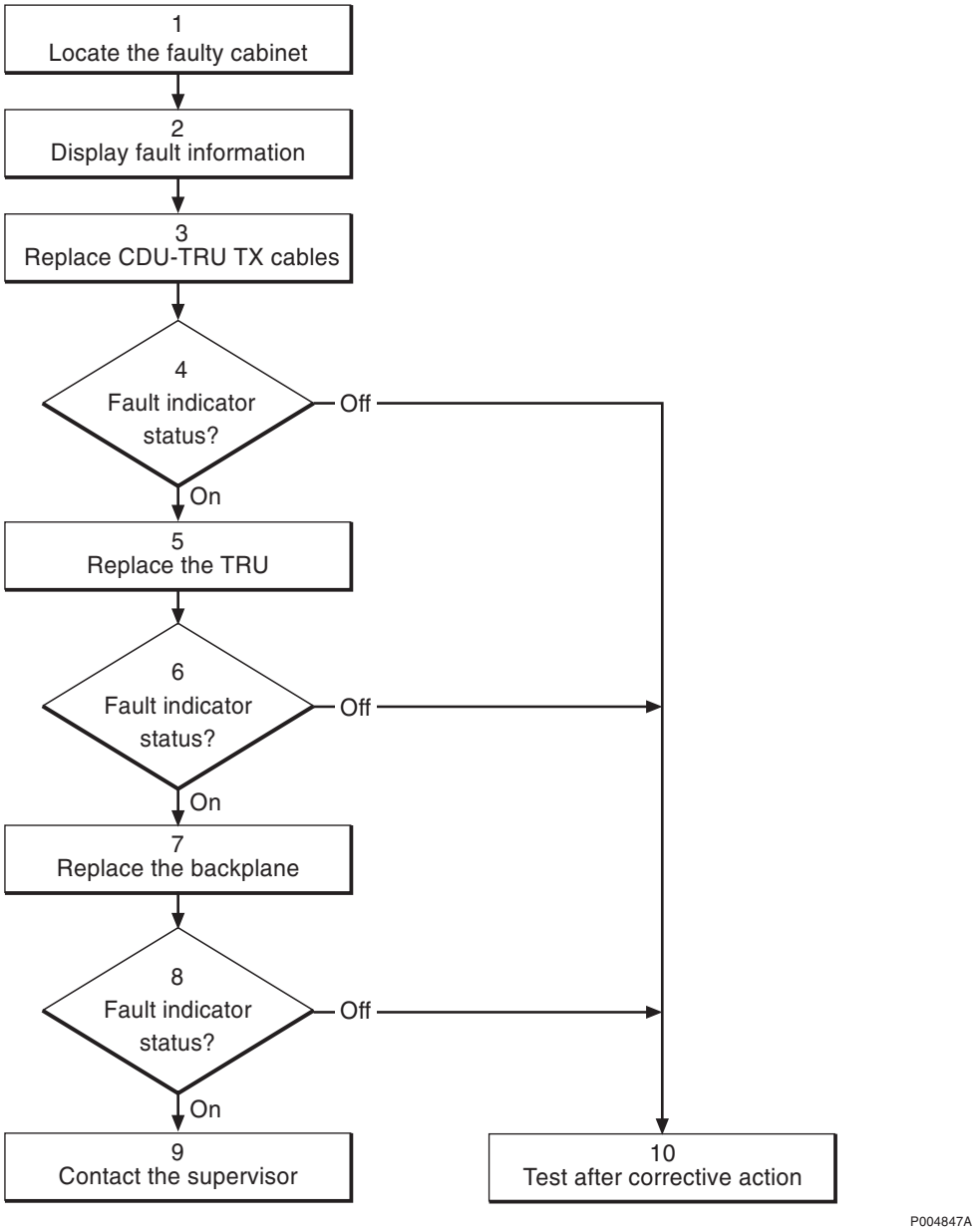

Figure 62 TRU

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

	OMT User's Manual	*LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Replace CDU-TRU TX cables

Replace one or both CDU-TRU TX cables according to instructions in the section "CDU-TRU TX Cables" in the chapter "Corrective Action".

(4) Fault indicator status?

The red indicator labelled Fault on the TRU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (10). No fault is detected in the TRU.
- On: Proceed to step (5). One or more faults are detected in the TRU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(5) Replace the TRU

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

Replace the faulty TRU according to instructions in the section "TRU" in the chapter "Corrective Action".

(6) Fault indicator status?

The red indicator labelled Fault on the TRU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (10). No fault is detected in the TRU.
- On: Proceed to step (7). One or more faults are detected in the TRU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(7) Replace the backplane

The fault is probably located in the backplane.

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

1. Replace the TRU backplane according to the section "TRU Backplane" in the chapter "Corrective Action".

(8) Fault indicator status?

The red indicator labelled Fault on the TRU indicates the fault status of the unit.

Fault indicator status?

- Off: Proceed to step (10). No fault is detected in the TRU.
- On: Proceed to step (9). One or more faults are detected in the TRU.

There are two additional methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (10). No fault is detected in the RBS.
- On: Proceed to step (9). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(9) Contact the supervisor

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

(10) Test after corrective action

Take the following actions:

1. Make a test call:

- If a TRU was replaced, make a test call over just that TRU according to the section "Test Call" in the chapter "Test after Corrective Action".
- If a backplane was replaced, make a test call over all TRUs according to the section "Test Call" in the chapter "Test after Corrective Action".

2. Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

6.36 X Bus

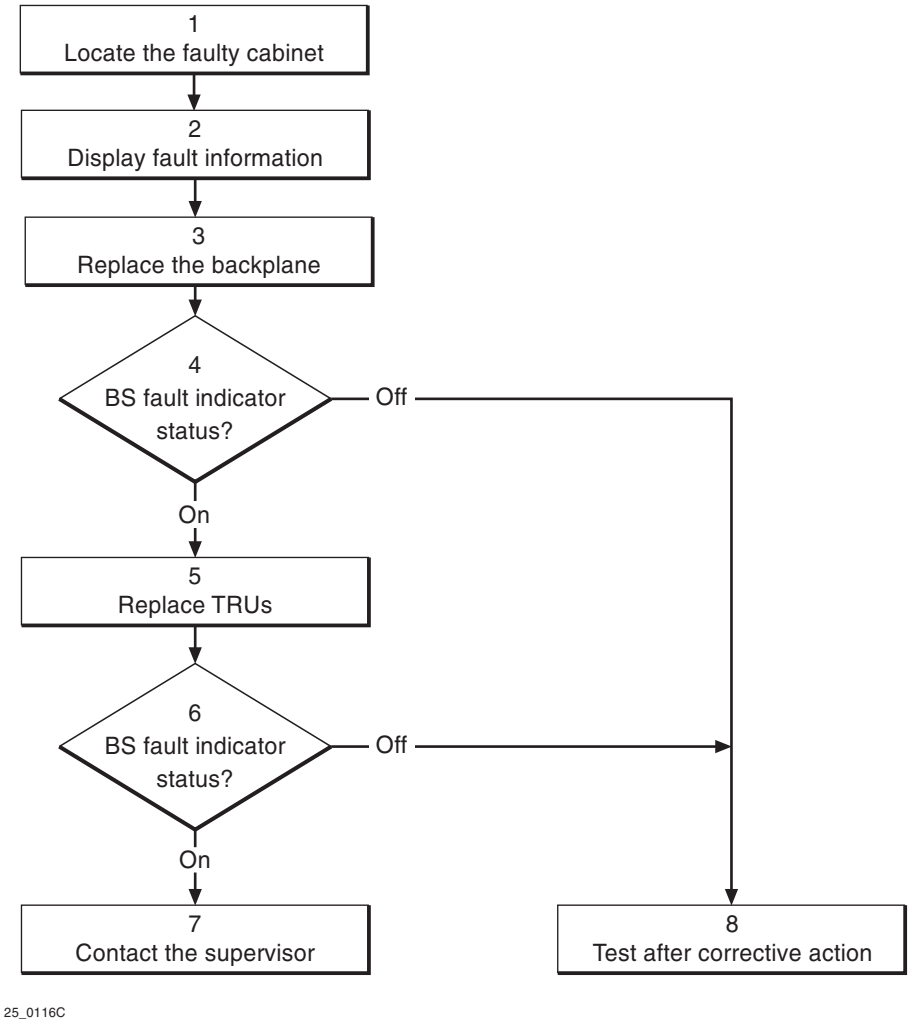

Figure 63 X bus

Note: Several instructions in this section requires the OMT. For further information on the use of OMT, see:

	OMT User's Manual	*LZN 302 01*

(1) Locate the faulty cabinet

Locate the faulty cabinet according to work order information.

(2) Display fault information

Use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty. The monitor also determines whether the fault is in the master cabinet, or in an extension cabinet (if connected).

(3) Replace the backplane

The fault is probably located in the backplane.

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

1. Replace the TRU backplane according to the section "TRU Backplane" in the chapter "Corrective Action".

(4) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (5). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(5) Replace TRUs

Note: If the unit to be replaced is part of an extension cabinet system, always work in the extension cabinet first, then in the master.

1. Replace the (first) TRU according to the section "TRU" in the chapter "Corrective Action".
2. Put the replacement TRU in remote mode.
3. Make a test call according to one of the following alternatives:

   • If the fault is cleared, the BS fault will be off and test calls over all TRUs according to the section "Test Call" in the chapter "Test after Corrective Action" should be made.

   • If the faulty TRU was not found (BS fault = ON at the DXU), continue to replace the next TRU as described in step 1.

(6) BS fault indicator status?

There are two methods to determine whether the fault has been cleared.

The first method is to inspect the yellow indicator labelled BS fault on the DXU.

BS fault indicator status?

- Off: Proceed to step (8). No fault is detected in the RBS.
- On: Proceed to step (7). One or more faults are detected in the RBS.

The second method is to use the monitor "Display Faulty RUs" in the OMT to list all RUs that are faulty.

(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

Take the following actions:

1. Make a test call over all TRUs according to the section "Test Call" in the chapter "Test after Corrective Action".
2. Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action".

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7 Corrective Action

The instructions in this chapter describe the replacement of an RU and how to put the RBS into operation after a fault has been localised in an RU.

7.1 Local/remote Mode

The Local/remote button can change an RU mode to local or remote control. A Local/remote button is located on the DXU and the TRUs. An RU in local mode does not have communication with the BSC via the Abis interface 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 in the RBS.

An RU cannot be changed to remote mode until the database has been downloaded to the DXU.

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

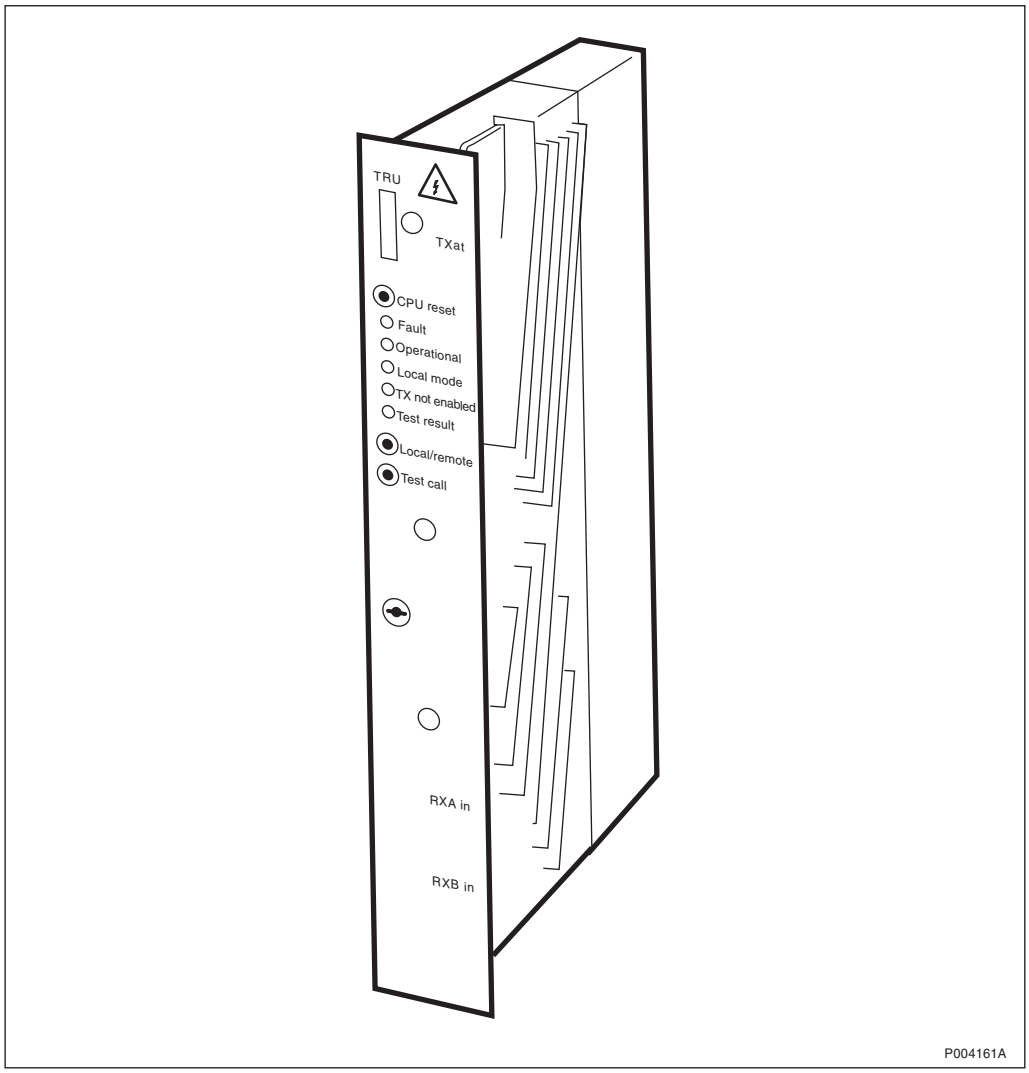

Figure 64 Control panel on TRU

7.1.1 Change RU Mode to Local

- The Local/remote button is pressed.
- The Local/remote button is disabled in order to prevent mistakes.
- The Local mode indicator starts flashing to indicate that a change of RU mode to local is in progress.
- The Operational indicator turns off in order to indicate that the RU has been taken out of operation.
- A fault report message is sent to the BSC via the Abis interface. This means that an external condition class 1 alarm will be raised in the BSC.
- The communication link on the Abis interface is disconnected and the RU mode is changed to local.
- The Local mode indicator turns on. The Operational indicator is also turned on if the RU is free from class 1 faults, in order to indicate that the RU is in local operation.
- The Local/remote button is enabled again.

7.1.2 Change RU Mode to Remote

- The Local/remote button is pressed.
- The Local mode indicator starts flashing to indicate that a change of RU mode to remote is in progress.
- The Operational indicator turns off in order to indicate that the RU has been taken out of operation.
- The communication link on the Abis interface is established by order from BSC. The RU is changed to remote mode immediately after the link towards the BSC has been established.
- The Local mode indicator turns off.
- In order to indicate that the RU is ready to carry traffic the Operational indicator turns on. Note that this will only happen if the RU is considered as operational by the BSC. (For example, the unit may be blocked from BSC.)

7.1.3 To Stop a Change of RU Mode to Remote Mode

If the Local/remote button is pushed while the Local mode indicator is flashing, the change of RU mode to remote is interrupted. Note that this function is only valid during a change of RU mode to remote.

- The Local/remote button is pressed.
- The attempt to enable a connection with the BSC will stop.
- The RU will then remain in local mode with the communication link disconnected and the Local mode indicator on.

7.2 ACCU

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.

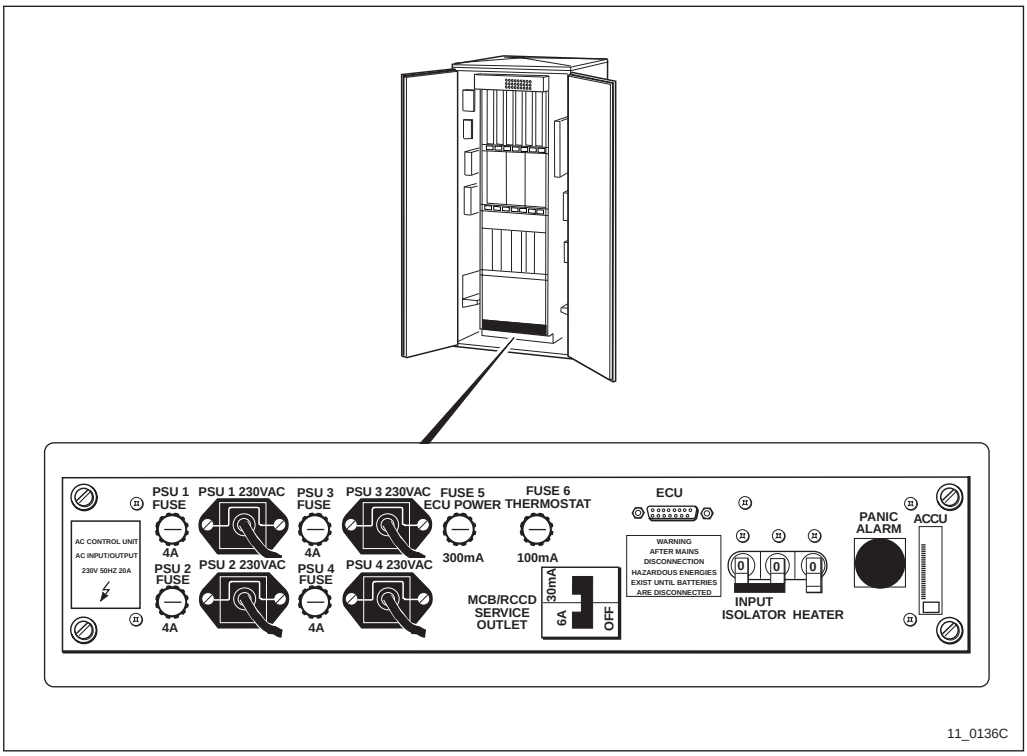

Figure 65 ACCU

Prior to replacement

Note: Use this procedure only if the RBS does not have a battery backup facility.

1. Inform the OMC operator that the replacement procedure will remove the RBS from service temporarily.
2. Press the Local/remote button on the DXU. The Local mode indicator will start flashing.
3. Wait until the Local mode indicator has a fixed yellow light. This indicates that the DXU is in local mode.

Replacement

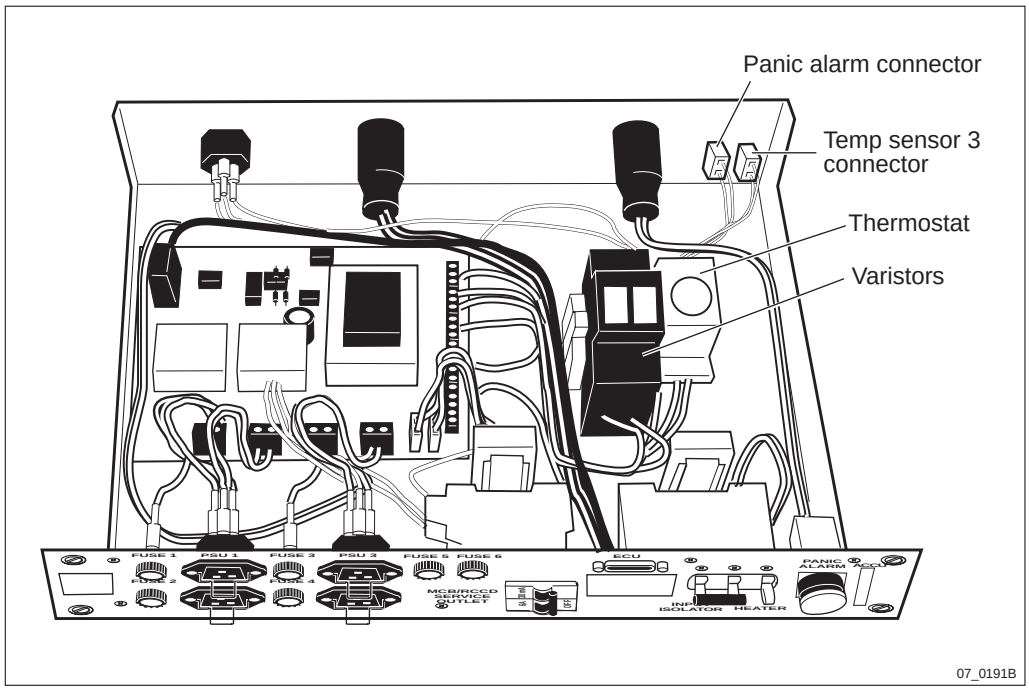

Figure 66 ACCU cable connectors

1. Isolate the entire cabinet from AC mains power. The AC mains switch is located somewhere external to the cabinet.
2. Turn off the AC mains input isolator switch on the ACCU.
3. Disconnect all cables attached to the front of the ACCU.
4. Loosen the four screws holding the ACCU to the mounting rack and pull out the unit.
5. Disconnect all external cable connectors from the rear of the ACCU.
6. Verify that the AC mains input isolator switch is off on the replacement unit.
7. Connect the cables to the rear of the replacement ACCU.
8. Install the new ACCU in the mounting rack.
9. Connect all cables to the front of the replacement ACCU.
10. Return AC mains power to the cabinet.
11. Switch on the AC mains input isolator switch on the ACCU.

Note: Unless under contractual warranty, after replacement, the ACCU shall be repaired locally at the RBS site or in a local repair shop. If the ACCU is unrepairable, it shall be disposed of locally by the customer. Do not return the ACCU to Ericsson for replacement, repair or disposal.

Take into operation

Note: Use this procedure only if the RBS does not have a battery backup facility.

1. Press the Local/remote button on the DXU. The local mode indicator will start flashing.
2. Wait until the Local mode indicator is off. This indicates that the DXU is in remote mode.

7.3 AC Mains Filter

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.

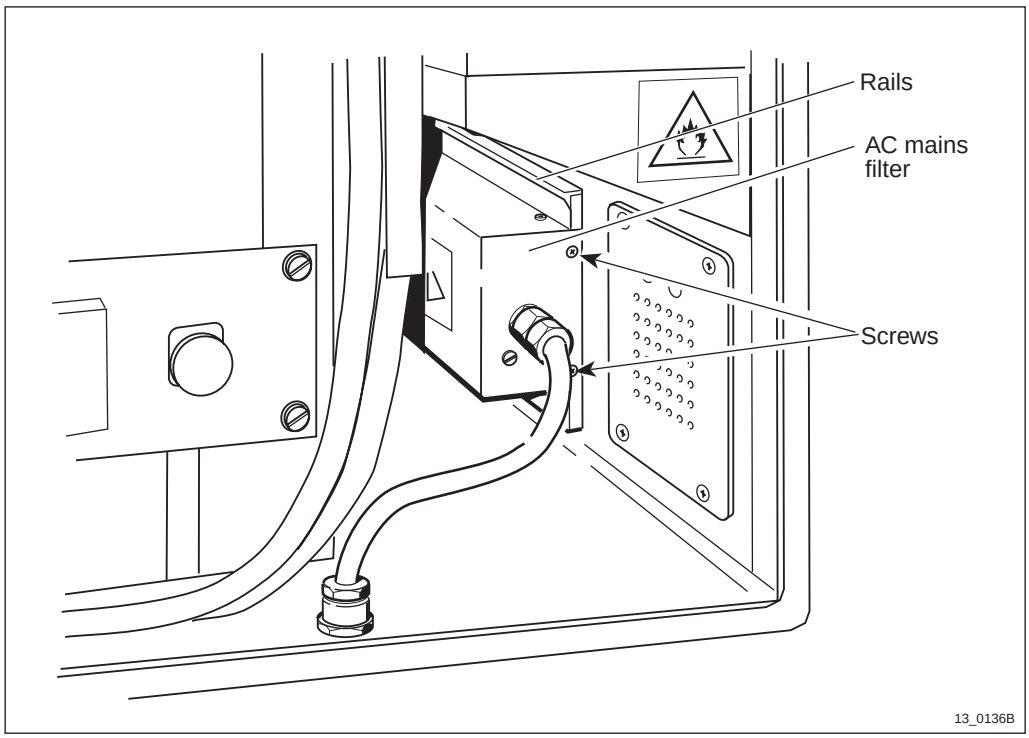

Figure 67 AC mains filter

1. Isolate the entire cabinet from AC mains power. The AC mains switch is located somewhere external to the cabinet.
2. Loosen the two screws (shown in the picture above) holding the unit to the side of the cabinet.
3. Remove the six screws (three on top and three on bottom) holding the cover over the filter.

4. Disconnect the input and output cables from the filter.
5. Replacement is the reverse of the above.

Note: Unless under contractual warranty, after replacement, the AC mains filter shall be disposed of locally. Do not return the AC mains filter to Ericsson for replacement, repair or disposal.

7.4 Batteries

7.4.1 General

DANGER

Read Safety Instructions regarding handling and connecting batteries.

The battery temperature alarm is generated when the temperature of the battery is > +60 °C (+140 °F). When the temperature is > +65 °C (+149 °F), the BFU disconnects the batteries from the radio equipment to prevent them from becoming damaged. When the battery temperature falls to < +55 °C (+131 °F), the batteries are reconnected to the radio equipment by the BFU and the alarm ceases.

The battery under-voltage alarm is generated by the BFU to the ECU when the voltage of the batteries drops to 20.5 V DC (BFU R1A) respectively 21.0 V DC (R2A and on). After a delay of approximately 30 seconds, the BFU disconnects the battery from the entire system except the DXU and ECU. With the resulting decrease in load, the voltage rises. If the voltage drops again to 20.5 V DC (BFU R1A) respectively 20.8 V DC (R2A and on), the DXU and ECU are disconnected from the batteries. When the battery voltage returns to 25.0 V DC, the alarm ceases and the batteries are reconnected to the entire system.

The table below shows the output float voltage of the batteries (V DC) in relation to the battery temperature.

Table 10 Table 1 Float voltage in relation to battery temperature (±0.1 V DC)

°C	°F	V DC	°C	°F	V DC	°C	°F	V DC	°C	°F	V DC	°C	°F	V DC
±0	+32	28.5	+10	+50	28.0	+20	+68	27.5	+30	+86	26.9	+40	+104	26.4
+1	+34	28.4	+11	+52	27.9	+21	+70	27.4	+31	+88	26.9	+41	+106	26.4
+2	+36	28.4	+12	+54	27.9	+22	+72	27.4	+32	+90	26.8	+42	+108	26.3
+3	+37	28.3	+13	+55	27.8	+23	+73	27.3	+33	+91	26.8	+43	+109	26.3
+4	+39	28.3	+14	+57	27.8	+24	+75	27.2	+34	+93	26.7	+44	+111	26.2
+5	+41	28.2	+15	+59	27.7	+25	+77	27.2	+35	+95	26.7	+45	+113	26.2
+6	+43	28.2	+16	+61	27.7	+26	+79	27.2	+36	+97	26.6			
+7	+45	28.1	+17	+63	27.6	+27	+81	27.1	+37	+99	26.6			
+8	+46	28.0	+18	+64	27.6	+28	+82	27.0	+38	+100	26.5			
+9	+48	28.0	+19	+66	27.5	+29	+84	27.0	+39	+102	26.5			

7.4.2 Replacement Procedure

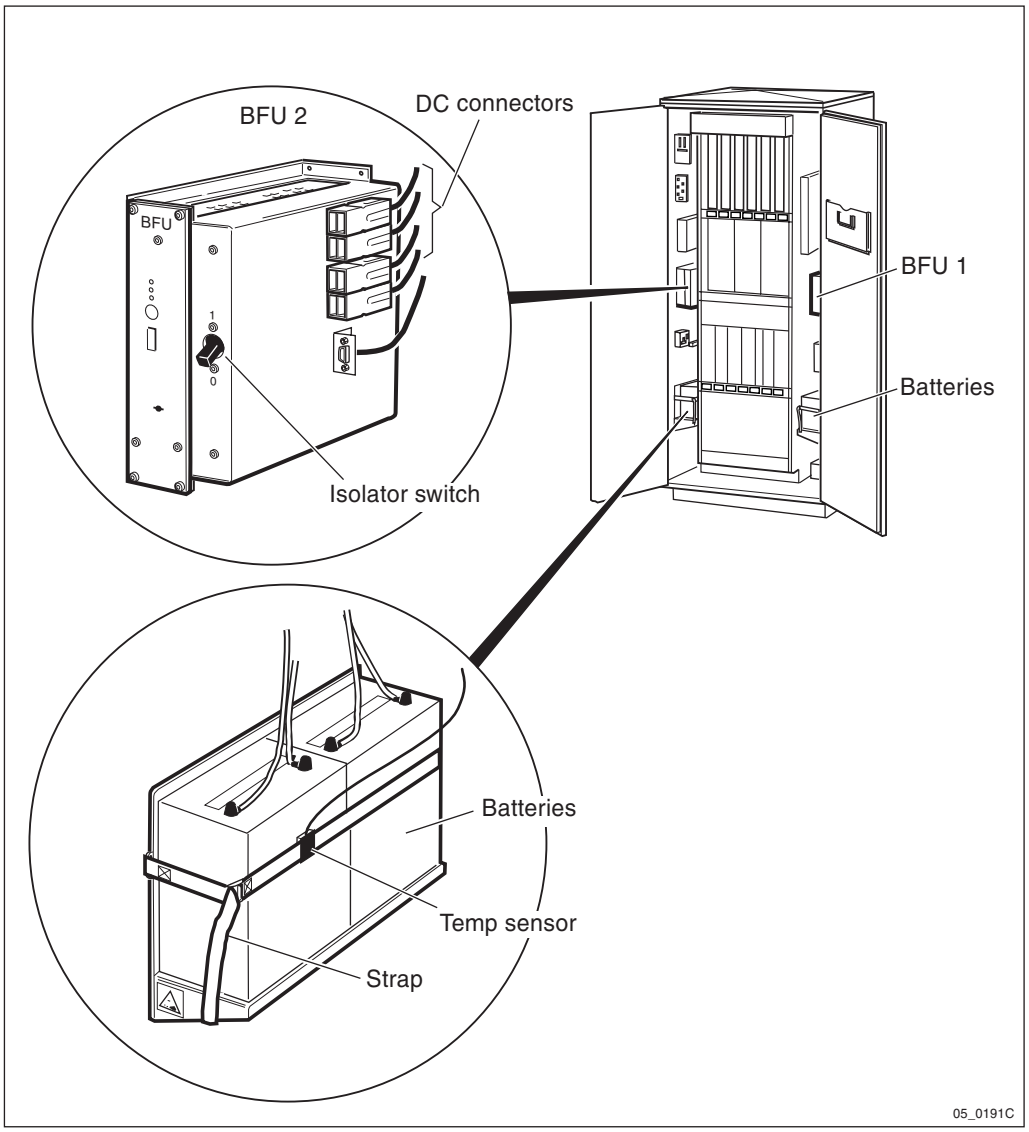

Figure 68 BFU 2 and batteries

Batteries

Refer to the figure above when performing the following procedures. BFU 1 is configured the same. To guarantee optimum operation, replace both batteries at the same time, even if only one is defective. After replacement, adjust the replacement date of the batteries for preventive maintenance accordingly.

1. Isolate the BFU with the battery isolator switch.
2. Disconnect the battery cables to the DC connectors.
3. Loosen the strap that holds the battery in the cabinet.
4. Lift the batteries out of the cabinet.
5. Disconnect the battery cables from the battery terminals, negative (–) first, then positive (+).
6. Replacement is the reverse of the above.

7. Reset the ECU by pressing the button labelled CPU Reset on the ECU for approximately 3 seconds. After approximately 30 seconds, the system should function without alarm, and the Fault LED on the ECU should go out.

Note: Unless under contractual warranty, after replacement, the batteries shall be disposed of locally. Do not return the batteries to Ericsson for replacement, repair or disposal.

7.5 BFU

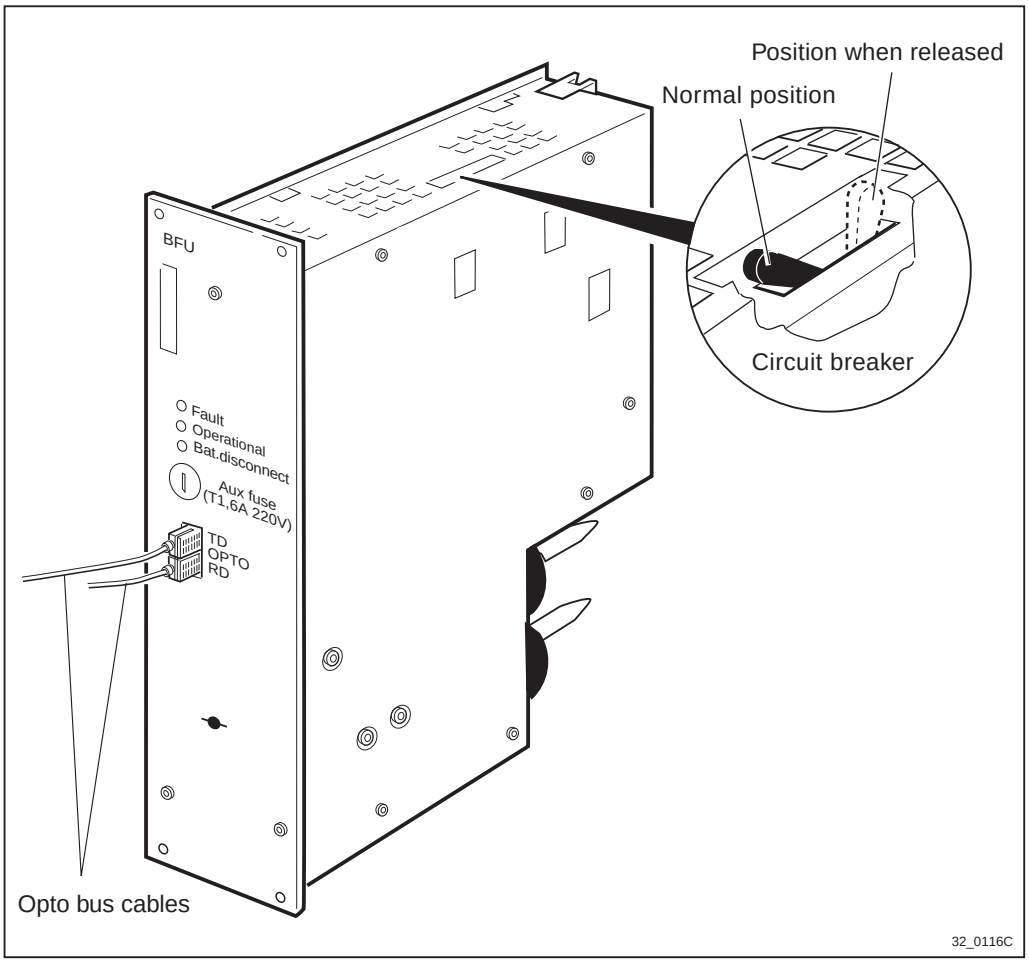

Figure 69 BFU with cicuit breaker

Note: The opto bus cables must have a bent radius of at least 35 mm.

1. Disconnect the opto bus cables connected to the BFU.
2. Make sure that the safety switch is not released.
3. Replace the faulty BFU.
4. Reset the ECU by pressing the button labelled CPU Reset on the ECU for approximately 3 seconds. After approximately 30 seconds, the system should function without alarm, and the Fault indicator on the ECU should go out.
5. Connect the opto bus cables.

Note: After replacement, the BFU must be returned to Ericsson for repair. Maintenance personnel must attach a repair delivery note, LZF 084 64 (Blue Tag), to the BFU. The repair delivery note shall include a clear description of the fault found. Refer to the chapter "Concluding Routines" for instructions on completing a repair delivery note.

7.6 CCU

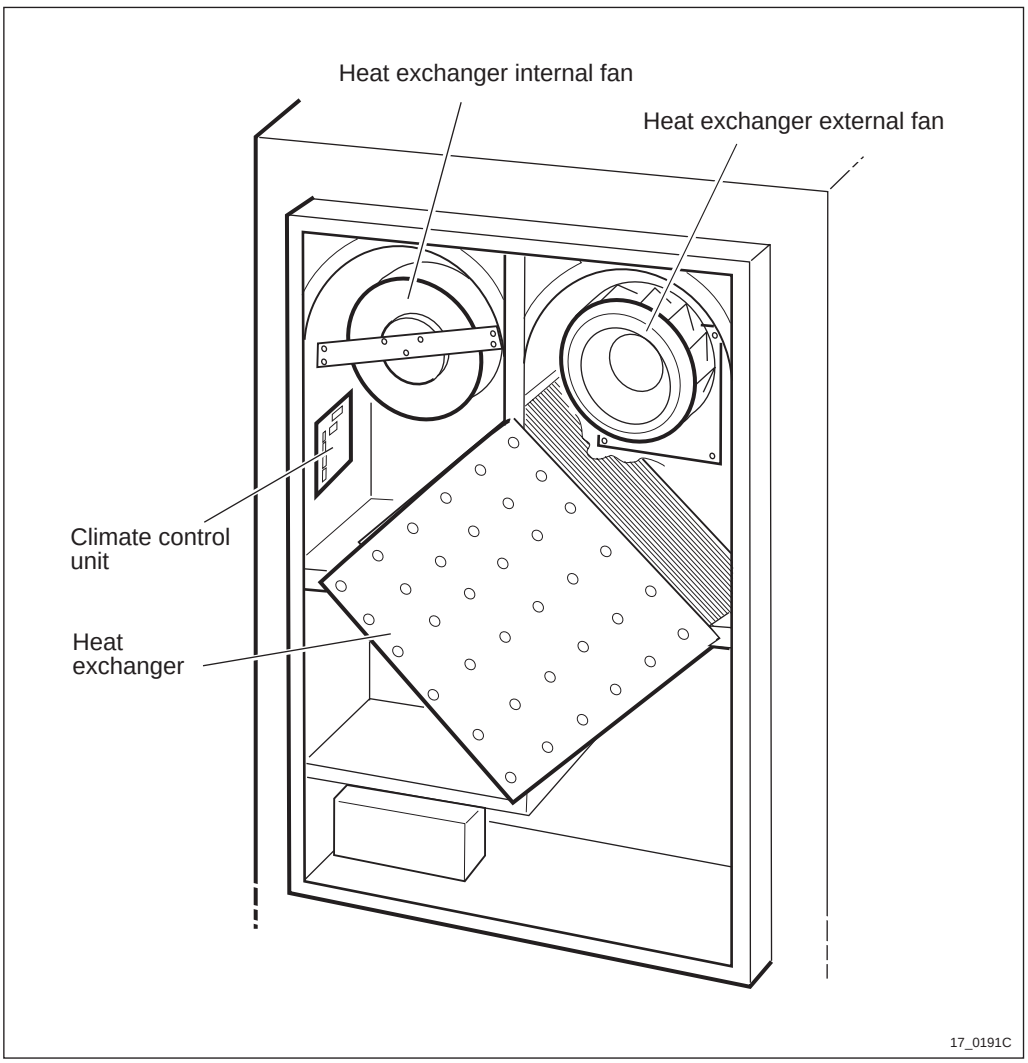

Figure 70 Climate unit and the position of the CCU

1. Remove the DC fuse for the climate unit from the ACB in the cabinet.
2. Remove all cables from the climate control board.
3. Remove the four screws holding the climate control board to the climate unit.
4. Replacement is the reverse of the above procedures.

Note: Unless under contractual warranty, after replacement, the CCU shall be disposed of locally. Do not return the CCU to Ericsson for replacement, repair or disposal.

7.7 CDU

Note: CDUs will successively be marked on the front with a coloured label showing the frequency. To simplify identification, different frequencies have different colours. Be sure to have the appropriate CDU.

Further information about colour coding versus frequency and encryption can be found in the *Spare Parts Catalogue*.

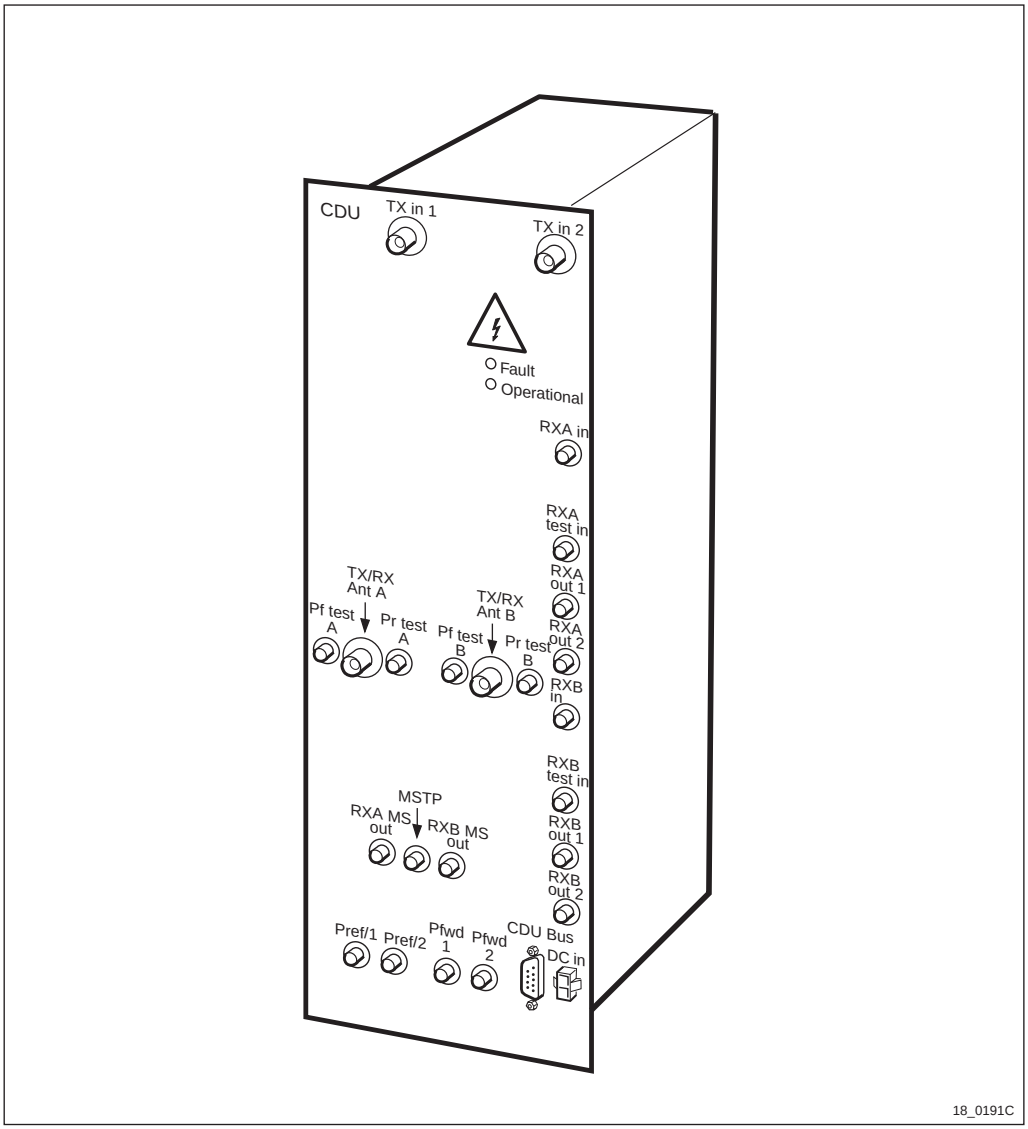

Figure 71 CDU, this example shows a CDU-A

Prior to replacement

Note: During the replacement procedure of the CDU, either the RBS will have reduced traffic handling capability due to the loss of one of the CDUs, or the RBS will be temporarily removed from service if there is only one CDU in the cabinet.

1. Inform the OMC operator that the CDU will be replaced.

2. Press the Local/remote button on the TRUs that are connected to the faulty CDU. The Local mode indicator will start flashing on the TRU.
3. Wait until the Local mode indicator on the TRU concerned has a fixed yellow light. This indicates that the TRU is in local mode.

Replacement

CAUTION

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

Note: To prevent damage to TRUs and exposure to RF radiation, be sure that the Local mode indicators on the TRUs that are connected to the faulty CDU, have a fixed yellow light before taking any further actions.

1. Replace the CDU.
2. Press CPU Reset on the DXU. The RU information from the new CDU will then be loaded into the RBS database.

Note: After replacement, the CDU must be returned to Ericsson for repair. Maintenance personnel must attach a repair delivery note, LZF 084 64 (Blue Tag), to the CDU. The repair delivery note shall include a clear description of the fault found. Refer to the chapter "Concluding Routines" for instructions on completing a repair delivery note.

Put into operation

Note: If base band hopping is used, the hopping sequence can only be re-initiated by the BSC/MSC. After placing the TRU(s) in remote mode, contact them and request they take the required actions.

1. Press the Local/remote buttons on both TRUs that are connected to the new CDU.
2. The Local mode indicators will start flashing.
3. Wait until the Local mode indicators turn off. This indicates that the TRUs are in remote mode.

7.8 CDU Bus

WARNING

Read the Safety chapter regarding handling of heavy goods.

Prior to replacement

Note: The opto bus cables must have a bent radius of at least 35 mm.

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Press the Local/remote button on the DXU. The yellow Local mode indicator will start flashing. Wait until it has a fixed yellow light. This indicates that the DXU is in local mode.
3. Switch off the AC mains power to the cabinet with the AC mains switch on the ACCU.
4. Disconnect the 24 V DC battery voltage from the RBS with the battery islator switch on the BFU.

Replacement

Note: An earthing wire attaches the inside of the cabinet cover over the climate unit to the cabinet. Use care when taking the cover off the cabinet so as not to break or damage it.

1. Inside the radio sub-cabinet, disconnect the three cables to the climate unit.
2. Remove the green cabinet cover over the climate unit.
3. Remove the earthing wire from the green cabinet cover to the cabinet.
4. Remove the screws around the climate unit that hold it to the cabinet.
5. Remove the earthing wire from the climate unit to the cabinet.
6. Remove the climate unit.
7. Replace the CDU bus (located on the side of the magazines).
8. Reset in reverse order.

Note: Unless under contractual warranty, after replacement, the CDU bus shall be disposed of locally. Do not return the CDU bus to Ericsson for replacement, repair or disposal.

Put into operation

Note: The opto bus cables must have a bent radius of at least 35 mm.

1. Connect AC mains power to the cabinet with the AC mains switch on the ACCU.
2. Connect the 24 V DC battery voltage to the RBS with the battery isolator switch on the BFU.
3. Check that the Operational indicator on the DXU has a fixed green light and that the BS fault indicator is off.
4. Press the Local/remote button on the DXU. The Local mode indicator will start flashing.
5. Wait until the Local mode indicator on the DXU is off. This indicates that the DXU is in remote mode.

7.9 CDU-D RUs

Note: This procedure is common for the three RUs in the CDU-D: CU, DU and FU (FUd).

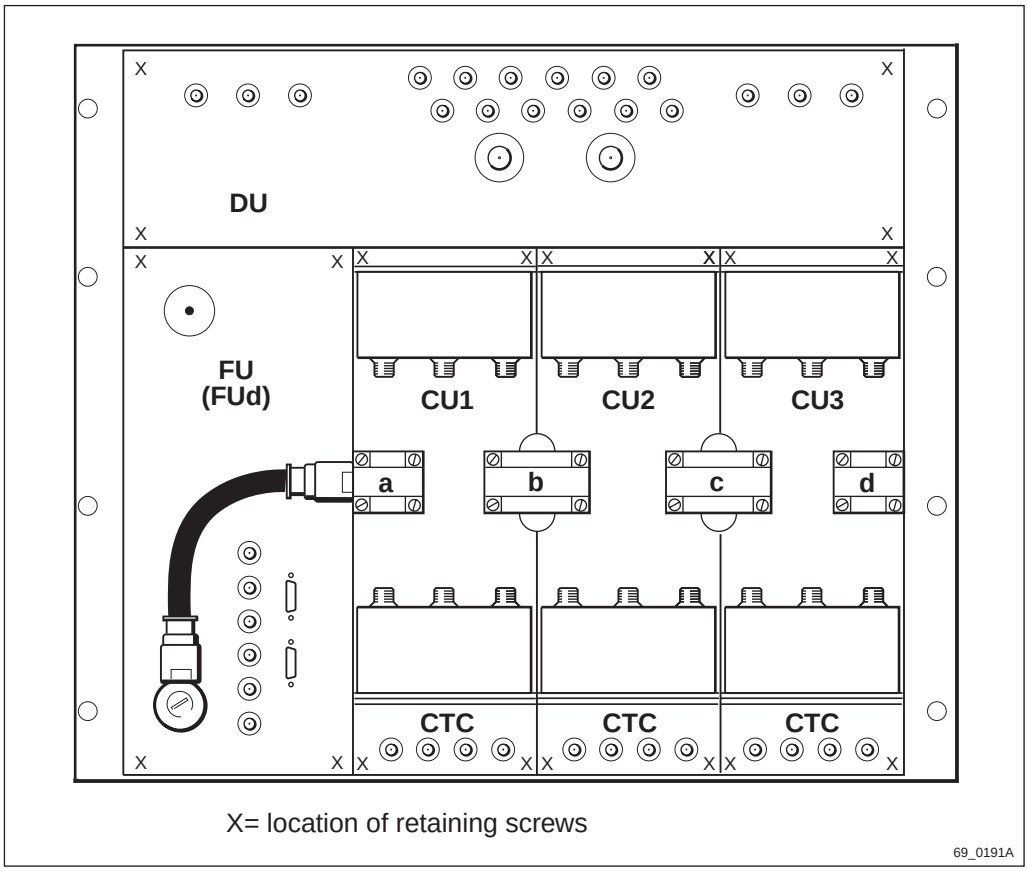

Figure 72 CDU-D, front view of typical variant

Prior to replacement

Note: During the replacement procedure of CDU-D RUs, the RBS will be temporarily removed from service.

1. Inform the OMC operator that a RU is going to be replaced.
2. Press the Local/remote button on all TRUs that are connected to the CDU-D. The Local mode indicator will start flashing on the TRUs.
3. Wait until the Local mode indicator on each TRU concerned has a fixed yellow light. This indicates that the TRU is in local mode.

Replacement

CAUTION

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

Note: To prevent damage to TRUs and exposure to RF radiation, be sure that the Local mode indicators on the TRUs that are connected to the faulty CDU-D, have a fixed yellow light before taking any further actions.

1. Press once the Local/remote switch on each TRU listed in Table 11 on page 153 to take them out of traffic.

   It is safe to work on the CDU-D when the Local mode indicators on the TRUs are continuously illuminated.

Table 11 TRUs to take out of traffic

CDU-D RU to be replaced	TRUs required in Local mode
DU	1, 2, 3, 4, 5 and 6
FU (FUd)	1, 2, 3, 4, 5 and 6
CU1	1, 2, 3, 4, 5 and 6(1)
CU2	3, 4, 5 and 6(1)
CU3	5 and 6(1)

(1) If the CDU variant uses a single coaxial link, instead of the four separate links a, b, c and d, then **all** TRUs must be put into local mode.

2. Remove all external cables connected to the faulty RU.
3. (CU only). Remove the coaxial links a, b, c and d.

Note: If the CDU variant uses a single coaxial link, instead of the four separate links a, b, c and d, then remove the single link.

4. Loosen the four retaining screws securing the faulty RU.
5. Replace the faulty RU.
6. Secure the new RU by tightening the four screws.

7. Reconnect all cables.
8. Press again the Local/remote switch on each TRU in local mode to return them to traffic.

Put into operation

Note: If base band hopping is used, the hopping sequence can only be re-initiated by the BSC/MSC. After placing the TRUs in remote mode, contact the BSC/MSC and request that they take the required action.

1. Press the CPU reset button on the DXU and wait approximately 1 minute.
2. Make sure that the TRUs are in remote mode, that is, the Local mode indicator is off.

   If not, press the Local/remote button on the TRUs that are connected to the repaired CDU-D. The Local mode indicator will start flashing.
3. Wait until the Local mode indicators on the TRUs are turned off. This indicates that the TRUs are in remote mode.

Note: After replacement, the CU, DU or FU (FUd) must be returned to Ericsson for repair. Maintenance personnel must attach a repair delivery note, LZF 084 64 (Blue Tag), to the CU, DU or FU (FUd). The repair delivery note shall include a clear description of the fault found. Refer to the chapter "Concluding Routines" for instructions on completing a repair delivery note.

7.10 CDU-TRU RX Cables

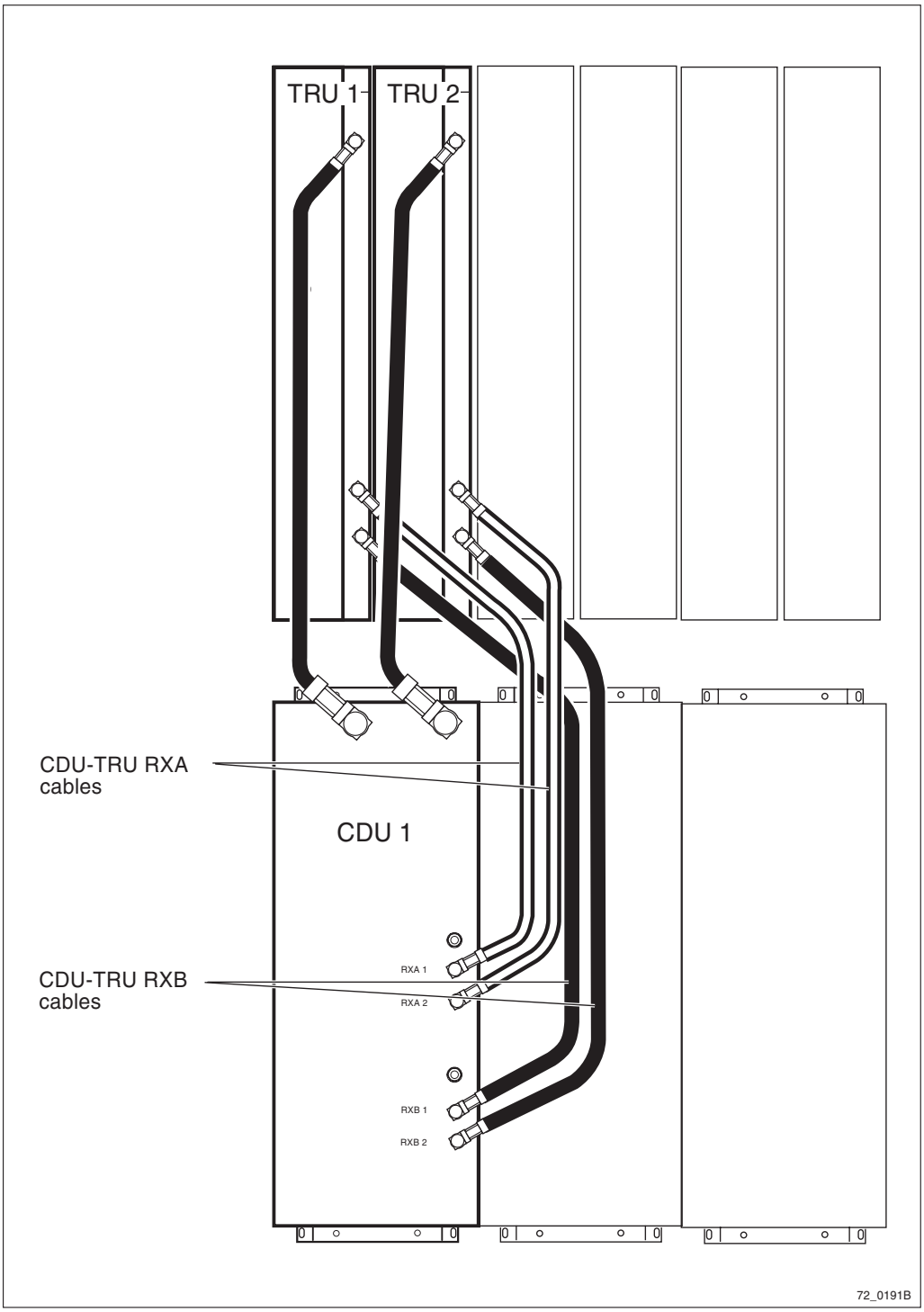

Figure 73 CDU-TRU RXA and RXB cables

Prior to replacement

1. Press the Local/remote button on the TRU that is connected to the faulty cable. This will set the TRU in local mode.
2. Wait until the Local mode indicator has a fixed yellow light.

Replacement

CAUTION

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

Note: To prevent damage to TRUs and exposure to RF radiation, be sure that the Local mode indicator on the TRU that is connected to the faulty CDU-TRU RX cable has a fixed yellow light before taking any further actions.

1. Replace both the RXA and RXB cables. The fault indicator on the CDU will still be lit.
2. Press the CPU reset button on the TRU.
3. Press the Local/remote button on the TRU that is connected to the new cable(s) and wait until the Local mode indicator turns off. This will set the TRU in remote mode.
4. Check that the BS fault indicator (DXU) is off. This means that there are no active faults in the RBS.

Note: Unless under contractual warranty, after replacement, the cables shall be disposed of locally. Do not return the cables to Ericsson for replacement, repair or disposal.

7.11 CDU-TRU TX Cables

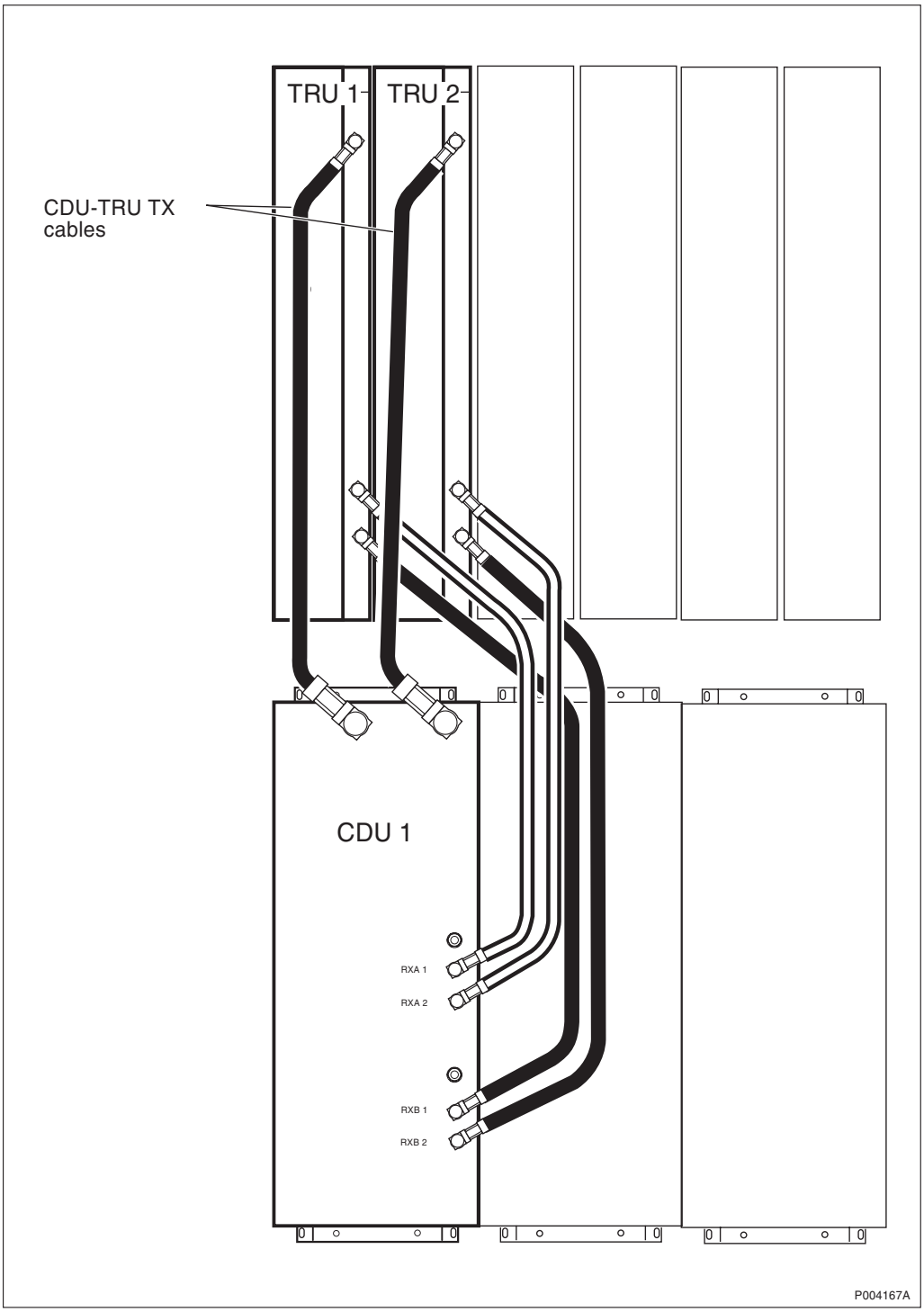

Figure 74 CDU-TRU TX cables

Prior to replacement

1. Press the Local/remote button on the TRU that is connected to the faulty cable. This will set the TRU in local mode.
2. Wait until the Local mode indicator has a fixed yellow light.

Replacement

CAUTION

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

Note: To prevent damage to TRUs and exposure to RF radiation, be sure that the Local mode indicator on the TRU that is connected to the faulty CDU-TRU TX cable has a fixed yellow light before taking any further actions.

1. Replace the cable. The fault indicator on the CDU will still be lit.
2. Press the CPU reset button on the TRU.
3. Press the Local/remote button on the TRU that is connected to the new cable and wait until the Local mode indicator turns off. This will set the TRU in remote mode.
4. Check that the BS fault indicator (DXU) is off. This means that there are no active faults in the RBS.

Note: Unless under contractual warranty, after replacement, the cables shall be disposed of locally. Do not return the cables to Ericsson for replacement, repair or disposal.

7.12 CU–TX–TX Cable

Prior to replacement

1. Press the Local/remote button on the TRUs that are connected to the CU with the faulty cable. The Local mode indicator will start flashing.
2. Wait until the Local mode indicators have a fixed yellow light. This indicates that the TRUs are in local mode.

Replacement

CAUTION

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

Note: To prevent damage to TRUs and exposure to RF radiation, be sure that the Local mode indicator on the TRU that is

connected to the faulty CU-TX-TX cable has a fixed yellow light before taking any further actions.

1. Replace the cable.
2. Press the CPU reset button on the TRUs that are connected to the CU with the faulty CU-TX-TX cable.

Note: Unless under contractual warranty, after replacement, the CU-TX-TX cable shall be disposed of locally. Do not return the CU-TX-TX cable to Ericsson for replacement, repair or disposal.

Put into operation

1. Press the Local/remote buttons on the TRUs that are connected to the CU with the new cables and wait until the Local mode indicators turn off. This will set the TRU in remote mode.
2. Check that the BS fault indicator (DXU) is off. This means that there are no active faults in the RBS.

7.13 DXU

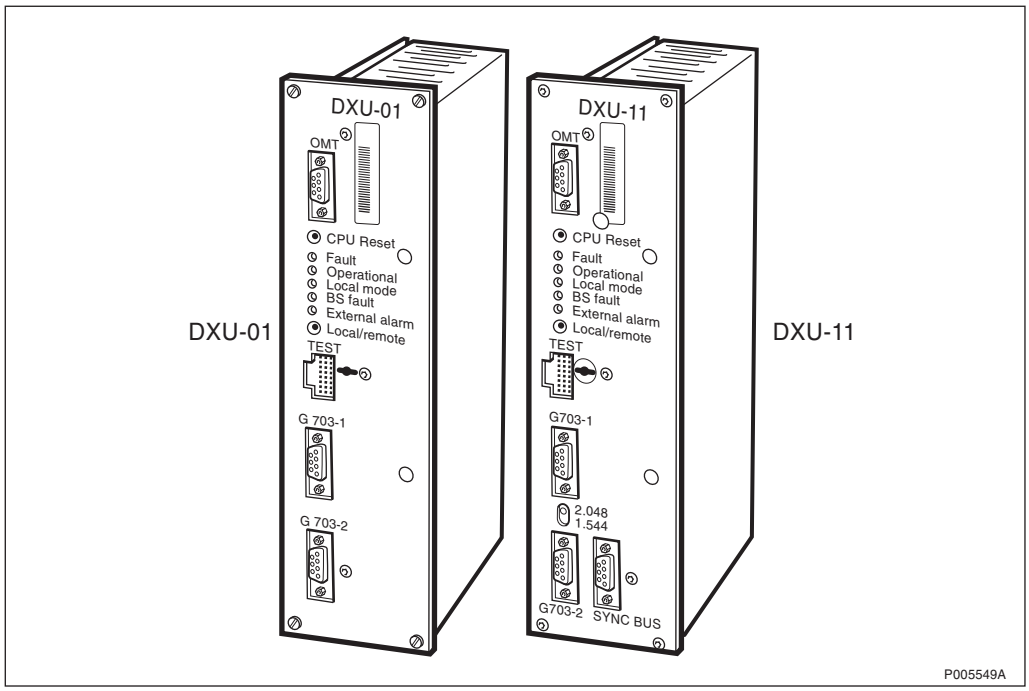

Figure 75 DXU-01 and the new DXU-11

Note: Prior to the installation of the new DXU, update it with the same BTS SW as used in the network.

Note: DXU-11 requires R7 or higher and is backwards compatible with DXU-01 and DXU-03.

Prior to replacement

1. Make a request to the OMC operator to halt the cell(s).

2. Press the Local/remote button on the DXU. The Local mode indicator will start flashing.
3. Wait until the Local mode indicator has a fixed yellow light. This indicates that the DXU is in local mode.
4. Connect an OMT and read the RBS IDB. This may not be possible depending on the nature of the fault in the DXU.

   The alternative is to use the original RBS IDB that was saved on a floppy disk during installation. On outdoor versions the floppy disk is stored inside the cabinet. Note that it is important to remember to verify that the information on the disk is up to date when using this alternative.

Replacement

5. Remove all cables connected to the DXU.
6. Replace the DXU and reconnect the disconnected cables.
7. *DXU-11 only*

   Set the switch labelled 2.048/1.544 in the correct position:

   - Position 2.048 is used for GSM connection.
   - Position 1.544 is used for DS1 connection.

8. Connect the OMT and download the original RBS IDB into the DXU. There are three alternative ways:

   - Use the database that was acquired when reading the RBS database.
   - Use the database that is stored on a floppy disk. This disk should be stored inside the cabinet.
   - Create a new database.

9. Press the CPU reset button on the DXU. This will distribute the IDB to the RUs.
10. Check that the Operational indicator on the new DXU has a fixed green light.

Note: After replacement, the DXU must be returned to Ericsson for repair. Maintenance personnel must attach a repair delivery note, LZF 084 64 (Blue Tag), to the DXU. The repair delivery note shall include a clear description of the fault found. Refer to the chapter "Concluding Routines" for instructions on completing a repair delivery note.

Put into operation

11. Check that the TRUs are in remote mode. If not, press the Local/ remote button on the respective TRU.
12. Press the Local/remote button on the new DXU. The Local mode indicator will start flashing.

13. Wait until the Local mode indicator is off. This indicates that the new DXU is in remote mode.
14. Make a request to the OMC operator to check that all MOs are operational.
15. Make a request to the OMC operator to activate the cell(s).
16. Carry out the following checks:
    - BS fault on DXU will be off.
    - Operational on DXU will be on.
    - The TX not enabled indicator on all TRUs will be off.

Note: The reason why the TX not enabled indicator does not turn off can be that the TRU is not configured and therefore not able to carry traffic.

7.14 DXU/ECU Backplane

Note: When changing the DXU/ECU backplane, refer to the chapter "Cable Connections". Note the position of RUs within the original magazine, so that they can be replaced into the correct position without changing the IDB. Refer to the drawings of switch settings in this section to make sure that replacement DXU/ECU backplane switches are set correctly.

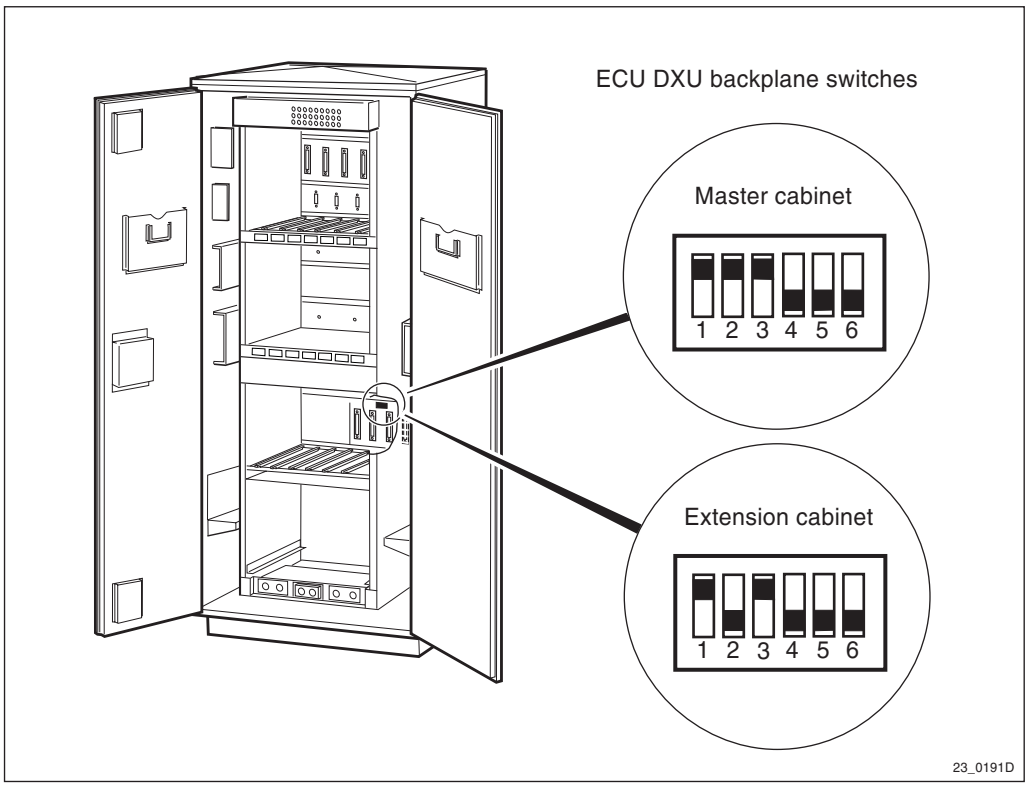

Figure 76 Location and settings of DXU/ECU backplane switches

Prior to replacement

Note: The opto bus cables must have a bent radius of at least 35 mm.

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Press the Local/remote button on the DXU. The yellow Local mode indicator will start flashing. Wait until it has a fixed yellow light. This indicates that the DXU is in local mode.
3. Isolate the cabinet from the AC mains power by turning off the AC mains input isolator on the ACCU.
4. Disconnect the opto bus cables connected to the BFU(s).
5. Pull out the BFU(s) to isolate the 24 V DC from the RBS.

Replacement

1. Loosen the panel covering fans 3 and 4 above the PSU magazine.
2. Remove the fan clamps that keep the fans in place.
3. Remove the fans and disconnect their cables.
4. Take out the PSUs, the ECU and the DXU.
5. Disconnect all the cables to the DXU/ECU backplane.
6. Remove the screws that hold the PSU magazine to the cabinet.
7. Pull out the PSU magazine.
8. Loosen the screws that keep the printed circuit board assembly in place on the DXU/ECU backplane.
9. Put in a new printed circuit board assembly.
10. Check that the switch settings for the replacement part are set in accordance with the figure above.
11. Replacement is the reverse of the above procedures.

Note: Unless under contractual warranty, after replacement, the DXU/ECU backplane shall be disposed of locally. Do not return the DXU/ECU backplane to Ericsson for replacement, repair or disposal.

Put into operation

Note: The opto bus cables must have a bent radius of at least 35 mm.

1. Put the BFU(s) back and reconnect the opto bus cables.
2. Return the AC mains power to the cabinet by turning on the AC mains input isolator on the ACCU.
3. Check that the Operational indicator on the DXU has a fixed green light and that the BS fault indicator is off.

4. Press the Local/remote button on the DXU. The Local mode indicator will start flashing.

5. Wait until the Local mode indicator on the DXU is off. This indicates that the DXU is in remote mode.

7.15 ECU

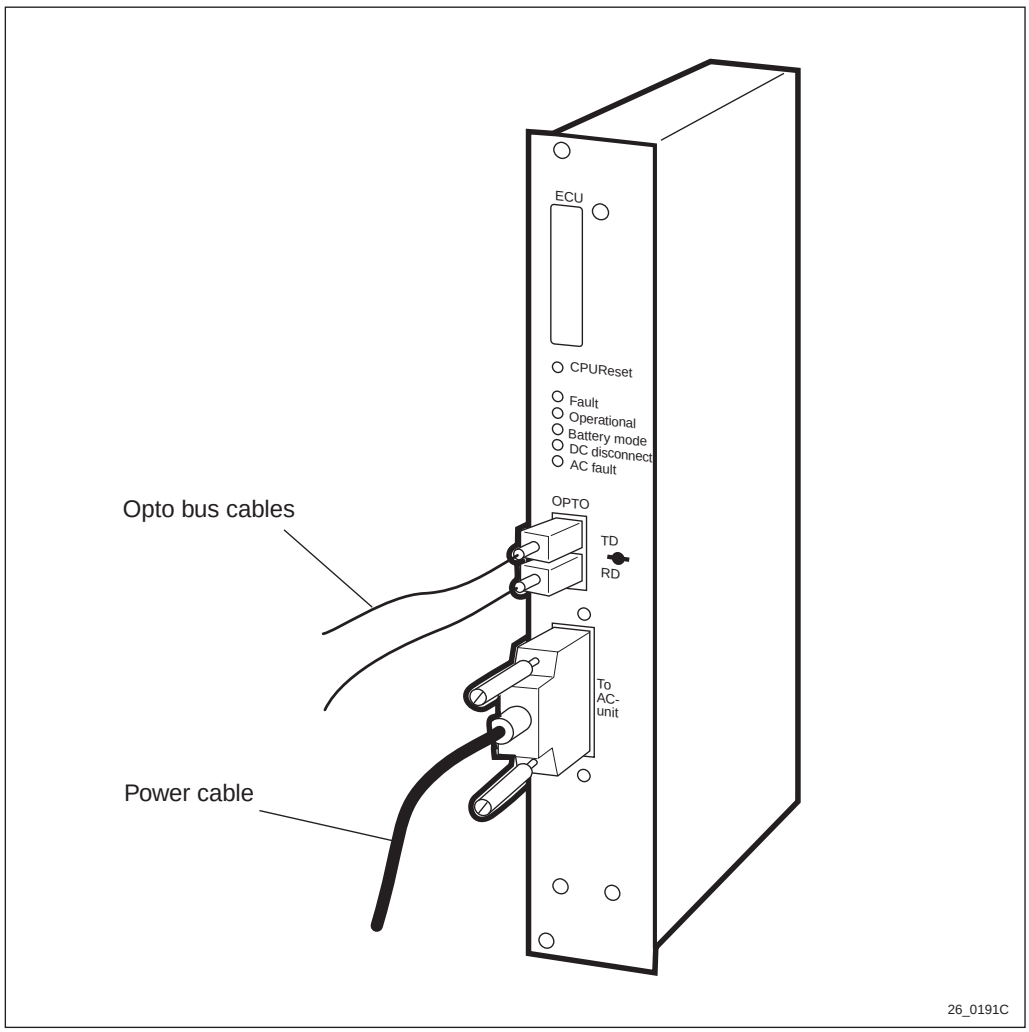

Figure 77 ECU

Note: The opto bus cables must have a bent radius of at least 35 mm.

1. Disconnect the cables connected to the ECU.

2. Replace the faulty ECU.

3. Press the button labelled CPU Reset for approximately 3 seconds. After approximately 30 seconds, the unit should function without alarm.

4. Reconnect the cables.

Note: After replacement, the ECU must be returned to Ericsson for repair. Maintenance personnel must attach a repair delivery note, LZF 084 64 (Blue Tag), to the ECU. The

repair delivery note shall include a clear description of the fault found. Refer to the chapter "Concluding Routines" for instructions on completing a repair delivery note.

7.16 Fans

Note: It is important to replace only one fan at a time because changing the air flow can cause equipment to become too warm. A defective fan operating at reduced speed may not be detectable by eye.

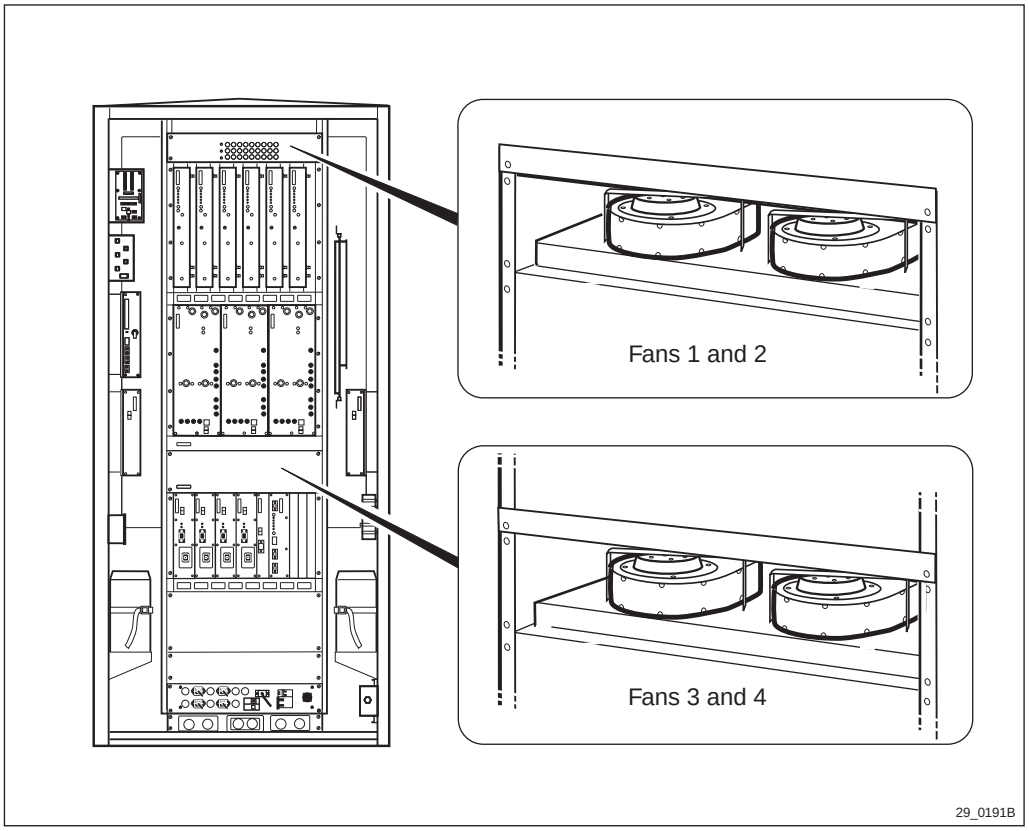

Figure 78 Cabinet fans

Fans 1 and 2

CAUTION

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

Note: When the IDM panel is lowered during the following procedure, the 24 V DC is live. Remove all rings, watches and jewellery prior to proceeding.

1. Remove the fuse for FCU1A or FCU1B, as appropriate, from the IDM.
2. Open the front plate of the IDM to provide access to FCU 1.
3. Loosen the four screws (two on each side) of the IDM that hold it in the cabinet.
4. Pull the IDM away from the cabinet to provide access to the fan.
5. Remove the three screws that hold the protective screen in place over the top of the IDM.
6. Unplug the defective fan from FCU 1.
7. Remove the fan clamp that holds the fan in place.
8. Remove the fan from the cabinet.
9. Replacement.

Note: Care must be taken when replacing the IDM to prevent damage to the main DC power cables to the right side, and the DC power distribution cables at the back of the IDM.

Replacement is the reverse of the above.

Note: Unless under contractual warranty, after replacement, the fan shall be disposed of locally. Do not return the fan to Ericsson for replacement, repair or disposal.

Fans 3 and 4

1. Remove the fuse for FCU2A or FCU2B, as appropriate, from the IDM.
2. Remove the four screws (two on each side) which hold the panel in front of the fan to the cabinet.
3. Remove the fan clamp that holds the fan in place.
4. Unplug the cable from the fan to the connector on the cable that goes behind the backplanes to FCU 2.
5. Remove the fan from the cabinet.
6. Replacement is the reverse of the above.

Note: Unless under contractual warranty, after replacement, the fan shall be disposed of locally. Do not return the fan to Ericsson for replacement, repair or disposal.

7.17 FCU

7.17.1 General

Note: The loss of air flow from the fans during replacement can quickly cause other RUs to overheat. Therefore do not stop the fans more than 1 minute when replacing the FCU.

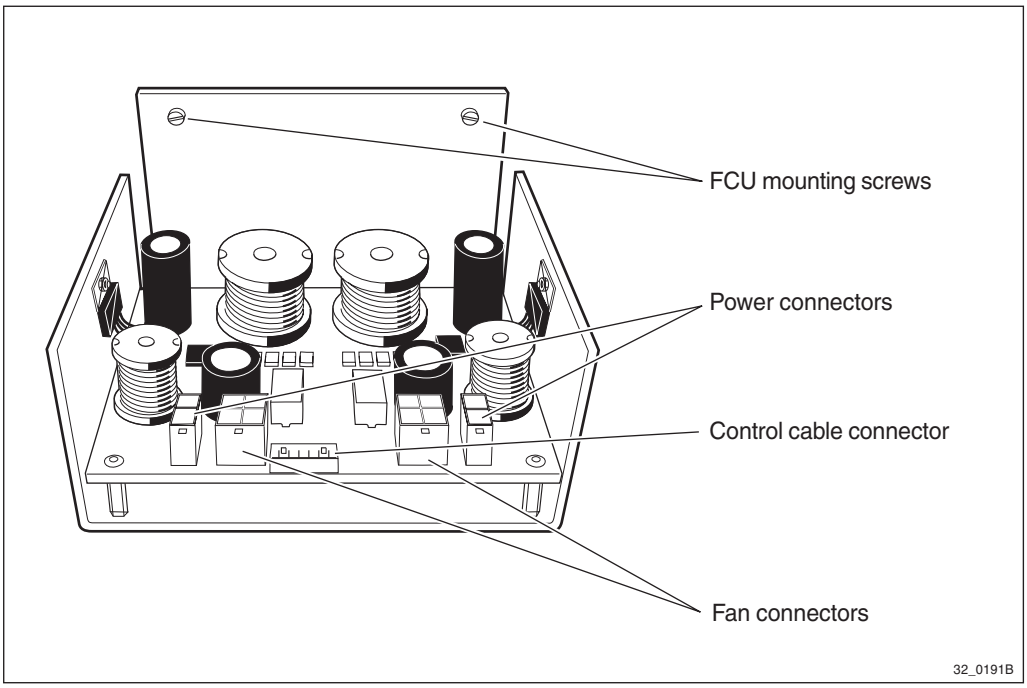

Figure 79 FCU

Note: During these procedures, DC power is still connected to the FCU. Therefore, the unit must be handled carefully.

7.17.2 Replacement

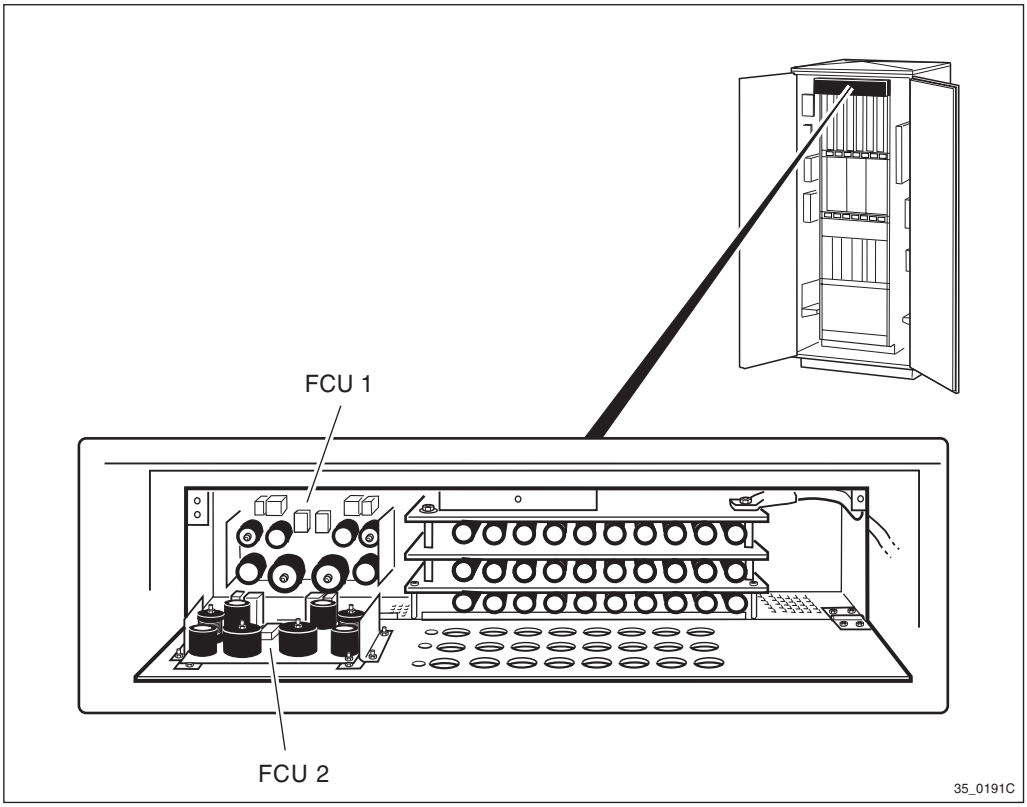

Figure 80 FCU 1 and FCU 2

CAUTION

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

Note: When the back of the IDM panel is exposed during the following procedure, the 24 V DC connection block is live. Remove all rings, watches and jewellery prior to proceeding.

1. Lower the front panel of the IDM to access the FCUs.
2. Remove the four nuts holding the defective FCU in the IDM panel.
3. Install the replacement FCU on the IDM panel.
4. Disconnect the control cable connector from the defective unit and attach it to the replacement unit.
5. Move the power and fan connectors (for one fan at a time) from the defective FCU to the replacement FCU. This allows enough airflow, so that the RBS will not overheat.
6. Replace the IDM panel.

Note: Unless under contractual warranty, after replacement, the FCU shall be disposed of locally. Do not return the FCU to Ericsson for replacement, repair or disposal.

7.18 Heater

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.

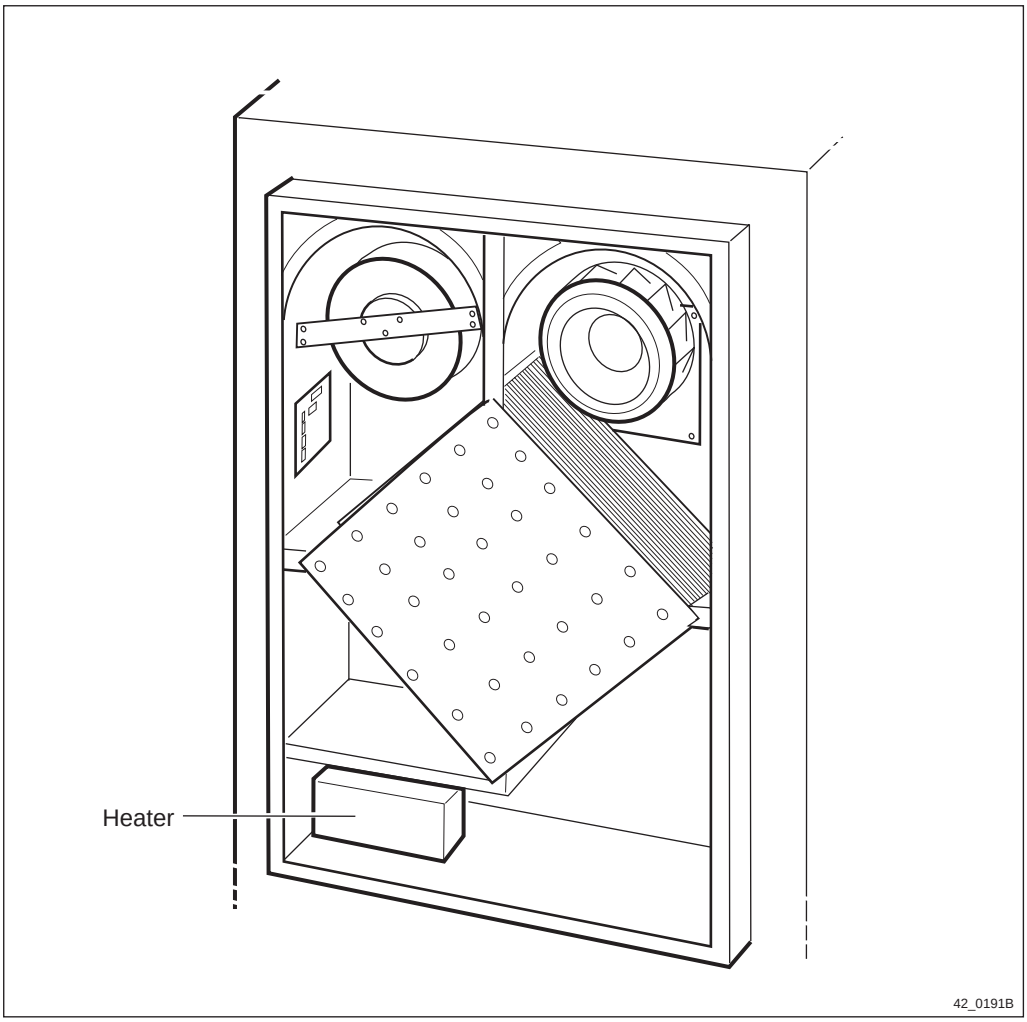

Figure 81 Heater

Note: An earthing wire attaches the inside of the cabinet cover over the climate unit to the cabinet. Use care when taking the cover off the cabinet so as not to break or damage it.

1. Open the radio sub-cabinet and turn off the AC circuit breaker for the heater on the ACCU.

2. Remove the green cabinet cover over the climate unit and disconnect the earthing wire attached to it.
3. Loosen the spring loaded screws holding the inner cover over the climate unit.
4. Swing the heater out on its hinge to gain access to the power cable connectors on top of the heater.
5. Remove the power cable connectors on top of the heater.
6. Free the heater hinge from its bracket and remove the heater.
7. Replace the heater and reconnect the power cable connectors.
8. Turn on the heater circuit breaker on the ACCU.
9. Replace the inner and outer covers over the climate unit.

Note: Unless under contractual warranty, after replacement, the heater shall be disposed of locally. Do not return the heater to Ericsson for replacement, repair or disposal.

7.19 Heat Exchanger Fans

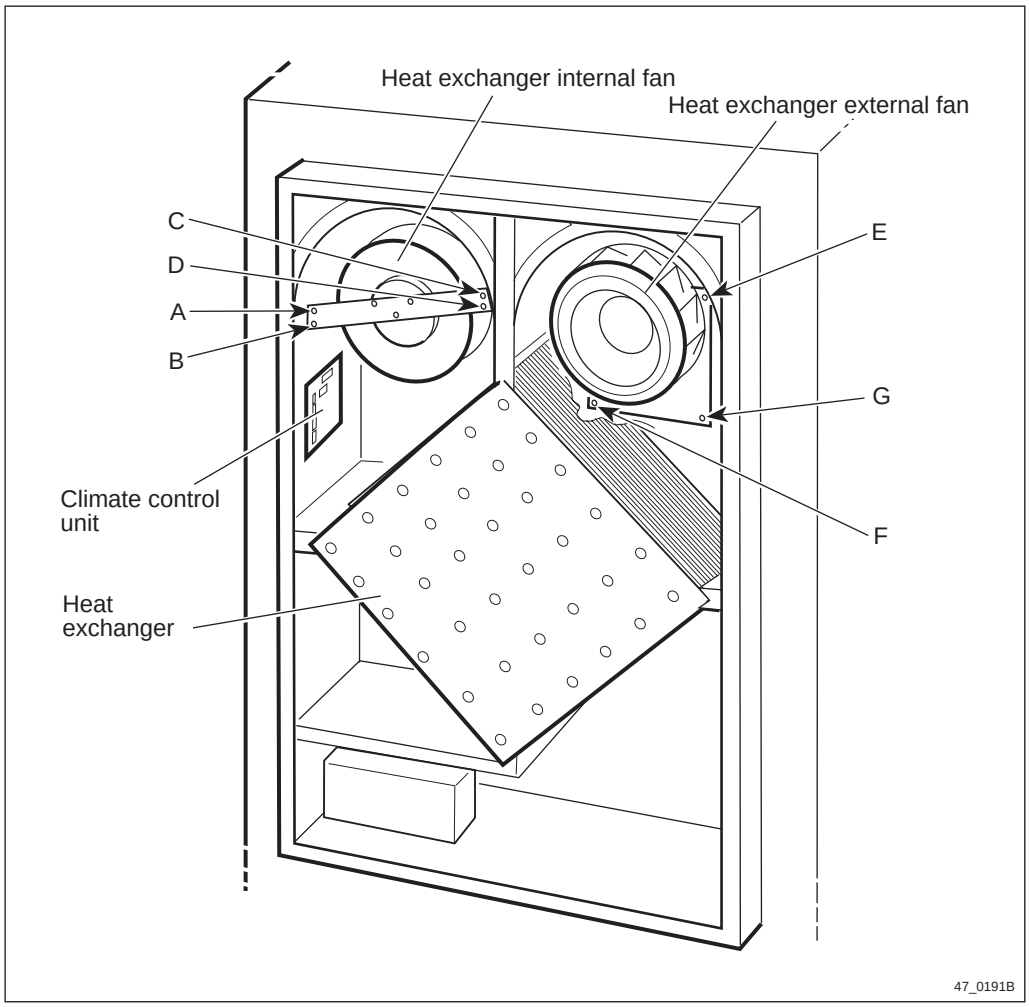

Figure 82 Heat exchanger fans

External fan

1. Remove the cover plate to the heat exchanger unit.
2. Open the radio sub-cabinet and isolate the DC voltage to the climate unit by pulling the fuse on the patch panel.
3. Remove the connections for the faulty fan on the connection block in the CCU.
4. Unscrew screws E-F-G.
5. Replace the fan and reset in the reverse order.
6. Test the replacement fan with the test switch on the ACB. The Figure 83 on page 171 gives the position of the test switch.

Note: Unless under contractual warranty, after replacement, the fan shall be disposed of locally. Do not return the fan to Ericsson for replacement, repair or disposal.

Internal fan

1. Remove the cover plate to the heat exchanger unit.
2. Open the radio sub-cabinet and isolate the DC voltage to the climate unit by pulling the fuse on the patch panel.
3. Remove the connections for the faulty fan on the connection block in the CCU.
4. Unscrew screws A-B-C-D.
5. Replace the fan and reset in the reverse order.

Note: Unless under contractual warranty, after replacement, the fan shall be disposed of locally. Do not return the fan to Ericsson for replacement, repair or disposal.

6. Test the replacement fan with the test switch on the ACB. The Figure 83 on page 171 gives the position of the test switch.

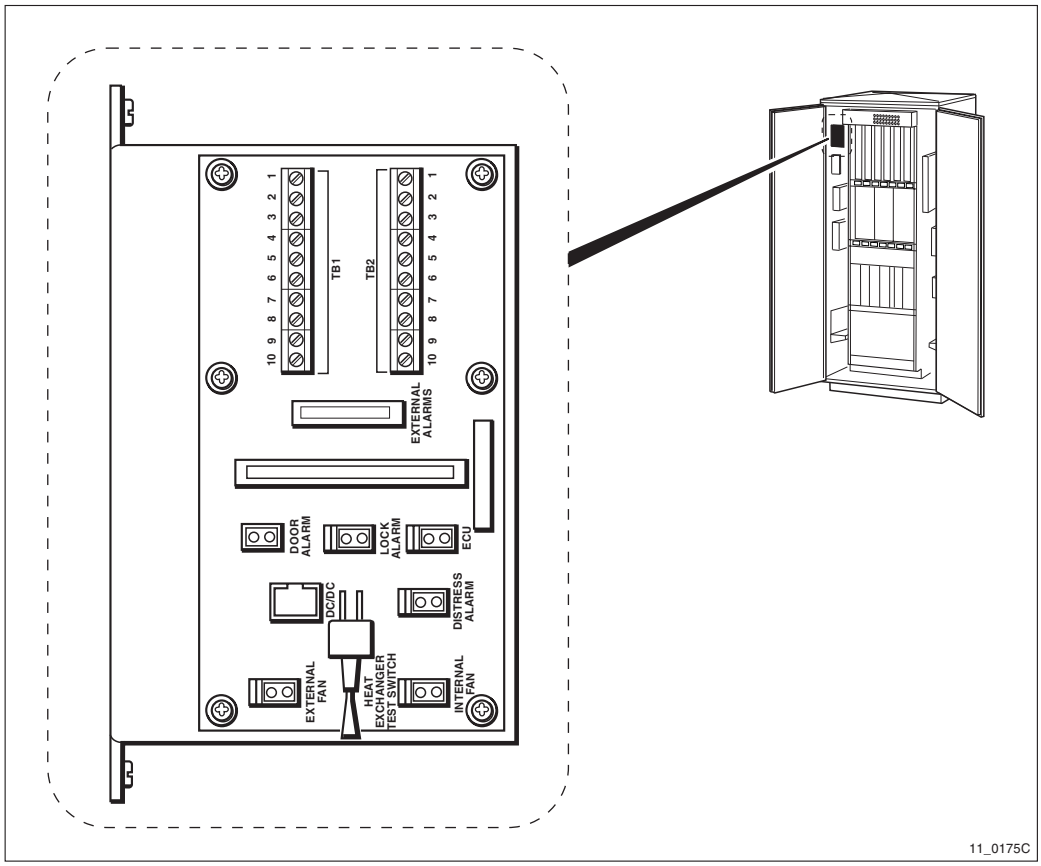

Figure 83 Test switch on the ACB

7.20 HLIN and HLOUT Cables

This section is divided into the following sub-sections:

- "HL Cable between Two CDUs"
- "HL Cable between the CDU and the Connection Field"
- "CAB HLIN Cable, connects the Master Cabinet and the Extension Cabinet"

7.20.1 HL Cable between Two CDUs

Replacement

1. Remove carefully the faulty HL cable that is connected between the HL-out connector on the CDU (that was pinpointed by OMT) and its CDU twin.

Note: Unless under contractual warranty, after replacement, the HL cable shall be disposed of locally. Do not return the HL cable to Ericsson for replacement, repair or disposal.

2. Carefully connect the new HL cable between the two CDUs.
3. Tighten the cable connectors in both ends of the HL cable with a torque of 0.6 – 0.8 Nm

7.20.2 HL Cable between the CDU and the Connection Field

Replacement

1. Remove the faulty HL cable that is connected between the HL-out connector on the CDU (that was pinpointed by OMT) and the connection field.

Note: Unless under contractual warranty, after replacement, the HL cable shall be disposed of locally. Do not return the HL cable to Ericsson for replacement, repair or disposal.

2. Carefully connect the new HL cable between the CDU and the connection field.
3. Tighten the cable connector in the CDU end of the HL cable with a torque of 0.6 – 0.8 Nm.

7.20.3 CAB HLIN cable

Replacement

1. Remove the faulty HL cable that is connected between the master and extension cabinets.

Note: Unless under contractual warranty, after replacement, the HL cable shall be disposed of locally. Do not return the HL cable to Ericsson for replacement, repair or disposal.

2. Connect the new HL cable between the connection fields of the master and extension cabinets.

7.21 Humidity Sensor

Note: When changing the humidity sensor, refer to the chapter "Cable Connections". Note the position of RUs within the original magazine, so that they can be replaced into the correct position without changing the IDB.

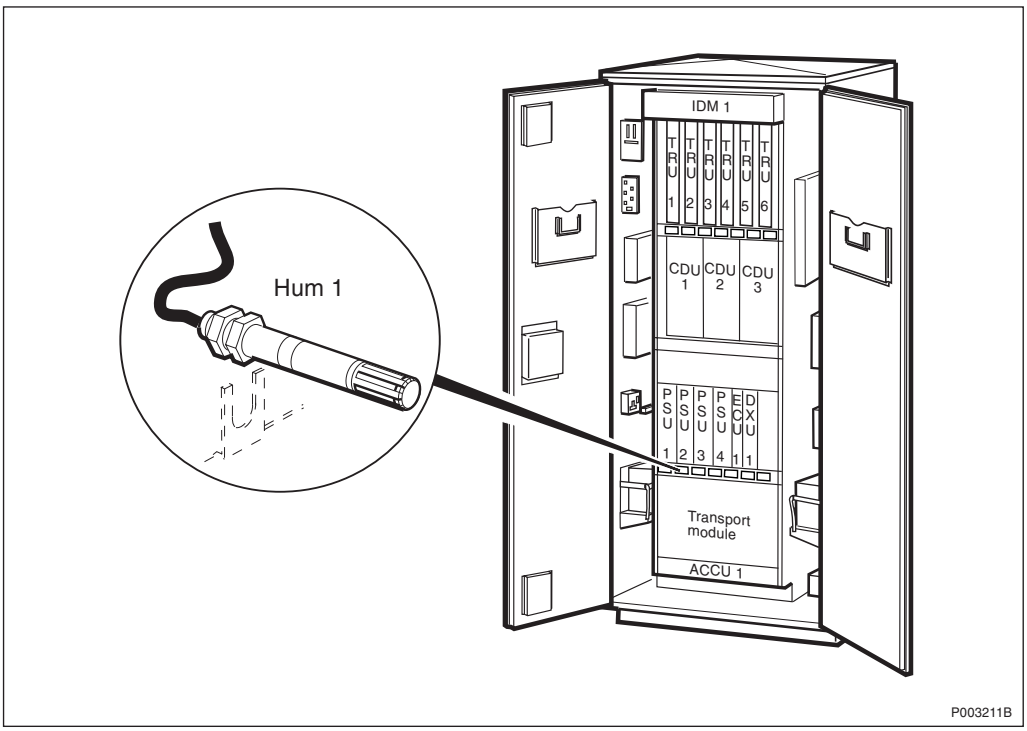

Figure 84 Humidity sensor

1. Loosen the four screws and remove the cover plate in front of fans 3 and 4 and lower the cover plate gently away from the cabinet.
2. Remove the cover plate directly above the cover plate just removed.
3. Loosen the four screws and remove the tray containing the humidity sensor and temp sensor 2 to the cabinet.
4. Remove the fuse labelled FCU2B 5A, on the IDM.
5. Remove the fan clamp holding fan 4 on top of the PSU magazine.
6. Remove fan 4 from the cabinet but do not disconnect the cable from it.
7. Remove the connector from P26 on the exposed top of the DXU/ ECU backplane. Refer to the chapter "Cable Connections" and the section "DXU/ECU Backplane" for the location of the connector.
8. Loosen the rear nut holding the humidity sensor to its mounting bracket and gently pull the humidity sensor and its cable free.
9. Remove the nut on the cable side of the sensor.
10. Feed the sensor’s cable through the hole in the bracket on the mounting tray approximately 10 cm (4 inches), then feed the cable through the nut removed in the step above.
11. Feed the sensor cable behind the PSU magazine from the bottom up and reconnect it to P26 on the DXU/ECU backplane.
12. Replace fan 4 in the cabinet.
13. Replace the fan clamp holding fan 4 on top of the PSU magazine.

14. Replace the fuse labelled FCU2B 5A, on the IDM.
15. Replace the tray holding the humidity sensor in the cabinet.
16. Replace the cover plate in front of fans 3 and 4.
17. Replace the cover plate above the cover plate for fans 3 and 4.

Note: Unless under contractual warranty, after replacement, the humidity sensor shall be disposed of locally. Do not return the humidity sensor to Ericsson for replacement, repair or disposal.

7.22 IDM

The IDM is a repairable unit. The only replacement parts within the IDM are the circuit breakers and the FCU.

- For replacement of the FCU, refer to the section "FCU" of this chapter.
- When returning the IDM for repair, ensure that the FCU is included.
- The instructions below give the procedures for replacing the IDM.

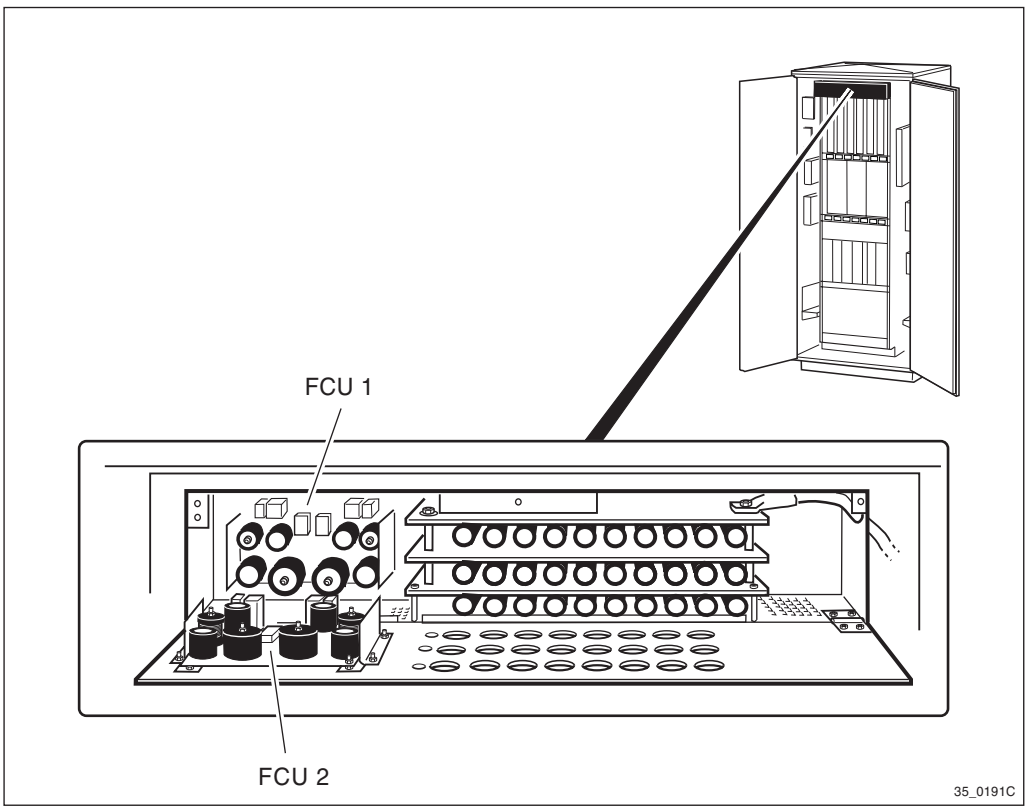

Figure 85 IDM

Prior to replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.

2. Press the Local/remote button on the DXU. The yellow Local mode indicator will start flashing. Wait until it has a fixed yellow light. This indicates that the DXU is in local mode.
3. Switch off the AC mains power to the cabinet with the AC mains switch on the ACCU.
4. Isolate the batteries with the battery isolator switches on the BFU(s).

Replacement

Note: Care must be taken when replacing the IDM to prevent damage to the main DC power cables to the right side and the DC power distribution cables at the back of the IDM.

1. Loosen the IDM panel from the cabinet.
2. Remove all the external wires from the back of the IDM panel.
3. Lower the front panel of the IDM to gain access to the DC power cables.
4. Disconnect the DC power cables.
5. Connect the DC power cables to the replacement IDM and tighten them to 5 Nm.
6. Reconnect all external wires to the back of the IDM. Refer to the section "IDM" in the chapter "Cable Connections" for information on the wiring connections.
7. Fasten the IDM to the cabinet.

Take into operation

1. Connect AC mains power to the cabinet with the AC mains switch on the ACCU.
2. Connect the batteries by turning on the isolator switches on the BFU(s).
3. Press the Local/remote button on the DXU. The Local mode indicator will start flashing.
4. Wait until the Local mode indicator on the DXU is off. This indicates that the DXU is in remote mode.

7.23 PSU

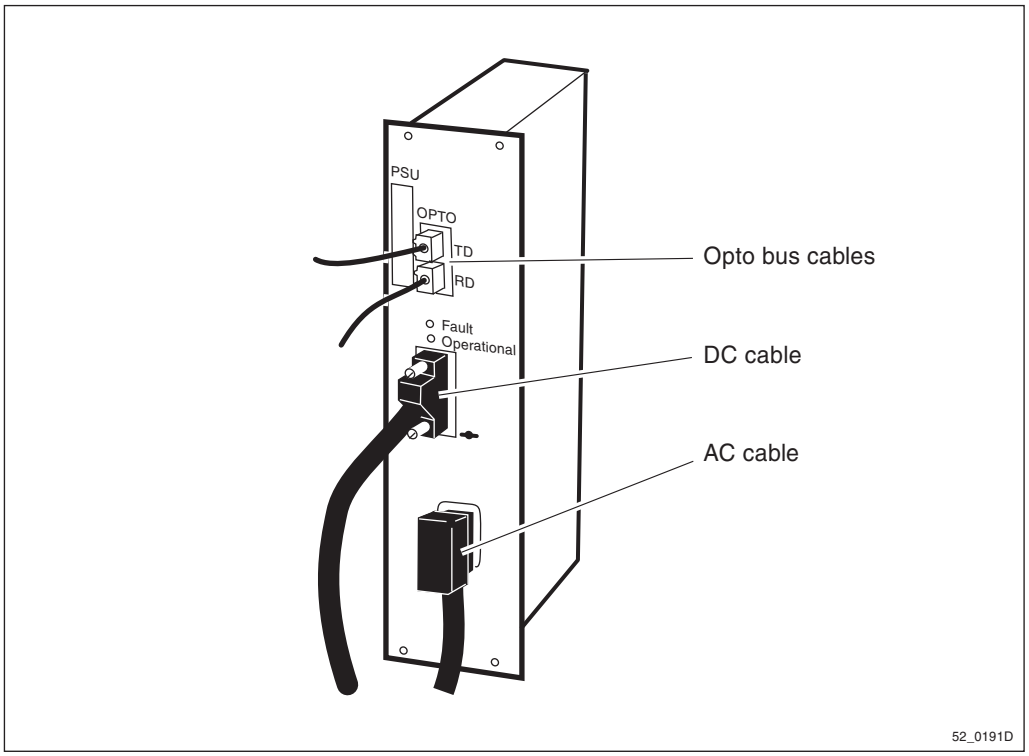

Figure 86 PSU

Note: The opto bus cables for the power communication loop must have a bend radius of at least 35 mm.

Note: If the cabinet, from which the PSU is being removed, has either internal or external battery backup, the DC cable will be live when disconnecting it from the PSU.

1. Disconnect the opto bus cables.
2. Disconnect the AC cable.
3. Disconnect the DC cable.
4. Replace the faulty PSU.
5. Connect the AC cable.
6. Connect the DC cable and the opto bus cables.
7. Reset the ECU by pressing the button labelled CPU Reset on the ECU for approximately 3 seconds. After approximately 30 seconds, the system should function without alarm, and the Fault indicator on the ECU should go out.

Note: After replacement, the PSU must be returned to Ericsson for repair. Maintenance personnel must attach a repair delivery note, LZF 084 64 (Blue Tag), to the PSU. The repair delivery note shall include a clear description of the fault found. Refer to the chapter "Concluding Routines" for instructions on completing a repair delivery note.

7.24 PSU DC Cable

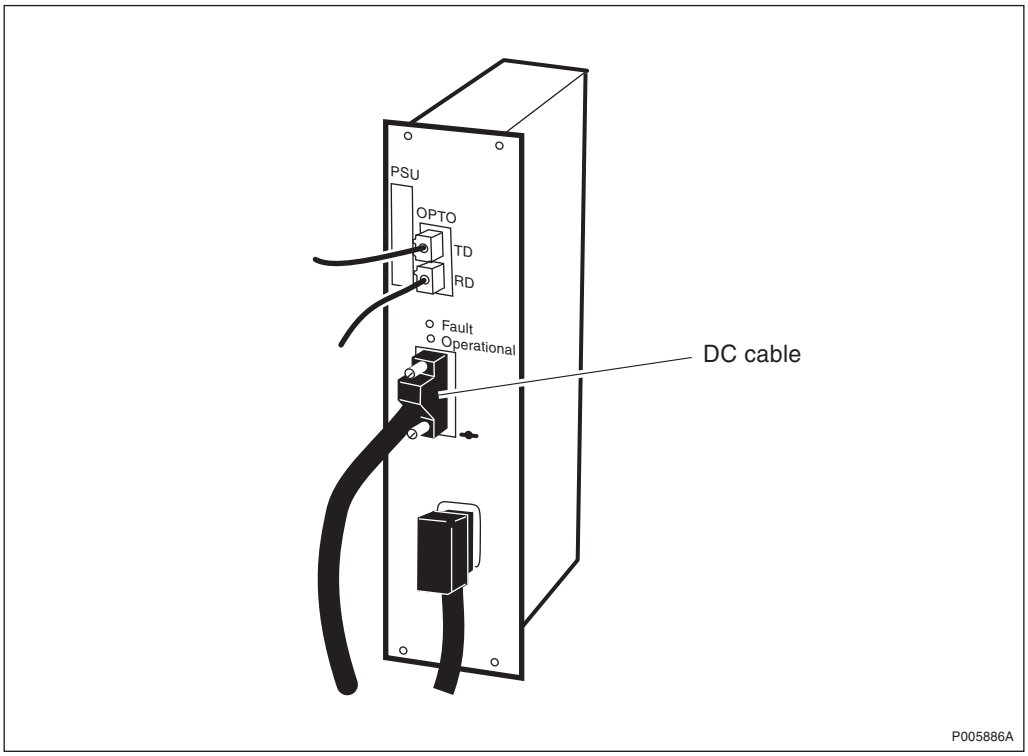

Figure 87 PSU DC cable

Prior to replacement

Note: The opto bus cables must have a bent radius of at least 35 mm.

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Press the Local/remote button on the DXU. The yellow Local mode indicator will start flashing. Wait until it has a fixed yellow light. This indicates that the DXU is in local mode.
3. Switch off the AC mains power to the cabinet with the AC mains switch on the ACCU.
4. Disconnect the opto bus cables.
5. Pull out the BFU(s) to isolate the 24 V DC from the RBS.

Replacement

The cable is connected to the bus bar behind and to the right of the DXU magazine.

6. Remove the DXU magazine.
7. Remove the faulty PSU DC cable.
8. Replacement is the reverse of above.
9. Restart the RBS.

7.25 RBS DB

Use the OMT to install a new IDB. For further information on the use of OMT, see:

OMT User's Manual *LZN 302 01*

7.26 RX Antenna Feeder

Note: When changing antenna feeders, refer also to the chapter "Cable Connections".

Prior to replacement

CAUTION

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

Note: To prevent exposure to RF radiation and damage to TRU(s), check before taking any further actions, that the TRU(s) that are connected to the CDU with the faulty RX antenna feeder have Local mode indicators with a fixed yellow light.

These instructions are valid when a CDU-C or a CDU-C+ is used only:

1. Press the Local/remote button on all TRU(s) that are transmitting on the faulty RX cable. The Local mode indicators will start flashing.
2. Wait until the Local mode indicators have fixed yellow lights. This indicates that the TRUs are in local mode.

Replacement

1. Remove the faulty antenna feeder that connects the CDU to the connection plate by unscrewing it carefully at both ends.

Note: Unless under contractual warranty, after replacement, the antenna feeder shall be disposed of locally. Do not return the antenna feeder to Ericsson for replacement, repair or disposal.

2. Put the new cable in and attach it to the CDU with a torque of 8 Nm ±1 Nm and to the connection plate with a torque of 15 Nm ±1 Nm.

Put into operation (only if CDU-C or CDU-C+ is used)

Note: If base band hopping or mixed hopping was used, the hopping sequence can only be re-initiated by the BSC or

MSC. After placing the TRU(s) in remote mode, contact the BSC or MSC and request they take the required actions.

1. Press the "Local/remote" button on the concerned TRU(s). The "Local mode" indicator will start flashing.
2. Block the following MOs from the BSC in the given order: RX, TS, TX, TRX.

   Use the MML command RXBLI.
3. Deblock the following MOs from the BSC in the given order: TRX, TX, TS, RX.

   Use the MML command RXBLE.
4. Wait until the "Local mode" indicators turn off. This indicates that the TRU(s) are in remote mode.

7.27 Temperature Sensors

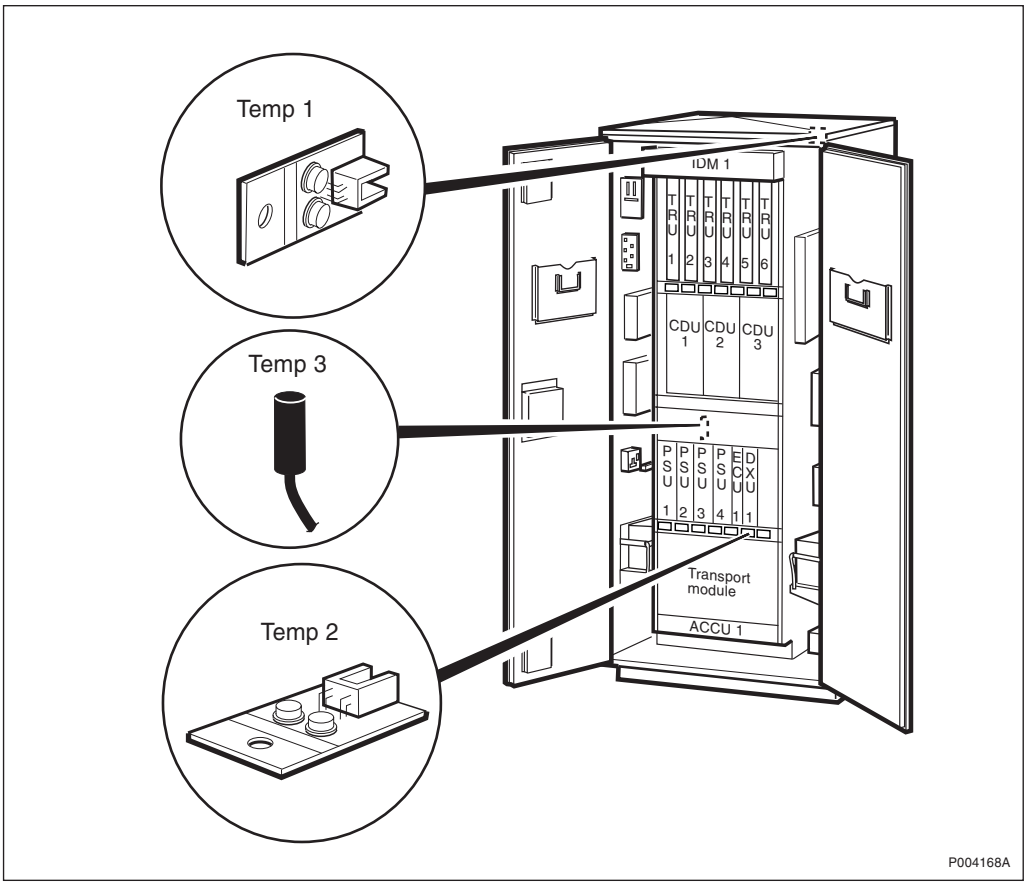

Figure 88 Temperature sensors

Temperature sensor 1

Temperature sensor 1 is located behind the TRU magazine. To minimise any disruption to the RBS operation, use the following procedures.

WARNING

Read the Safety chapter regarding handling of heavy goods.

Note: Due to the weight and size of the climate unit, the following procedure requires two personnel to safely perform.

Note: An earthing wire attaches the inside of the cabinet cover over the climate unit to the cabinet. Use care when taking the cover off the cabinet so as not to break or damage it.

1. On the ACCU, turn off the circuit breaker for the heater.
2. On the patch panel, remove the DC fuse for the climate unit.
3. Inside the radio sub-cabinet, disconnect the three cables to the climate unit.
4. Remove the green cabinet cover over the climate unit.
5. Remove the earthing wire from the green cabinet cover to the cabinet.
6. Remove the screws around the climate unit that hold it to the cabinet.
7. Remove the earthing wire from the climate unit to the cabinet.
8. Unplug the cable from temperature sensor 1.
9. Remove the screw holding the temperature sensor to the cabinet.
10. Replacement is the reverse of the above.

Note: Unless under contractual warranty, after replacement, the temperature sensor shall be disposed of locally. Do not return the temperature sensor to Ericsson for replacement, repair or disposal.

Temperature sensor 2

1. Remove the four screws holding the tray containing temperature sensor 2 and the humidity sensor to the cabinet.
2. Remove the tray, remove the screw holding the temperature sensor to the tray and disconnect the cable from the temperature sensor.
3. Replacement is the reverse of the above.

Note: Unless under contractual warranty, after replacement, the temperature sensor shall be disposed of locally. Do not

return the temperature sensor to Ericsson for replacement, repair or disposal.

Temperature sensor 3

Note: This temperature sensor is not supervised.

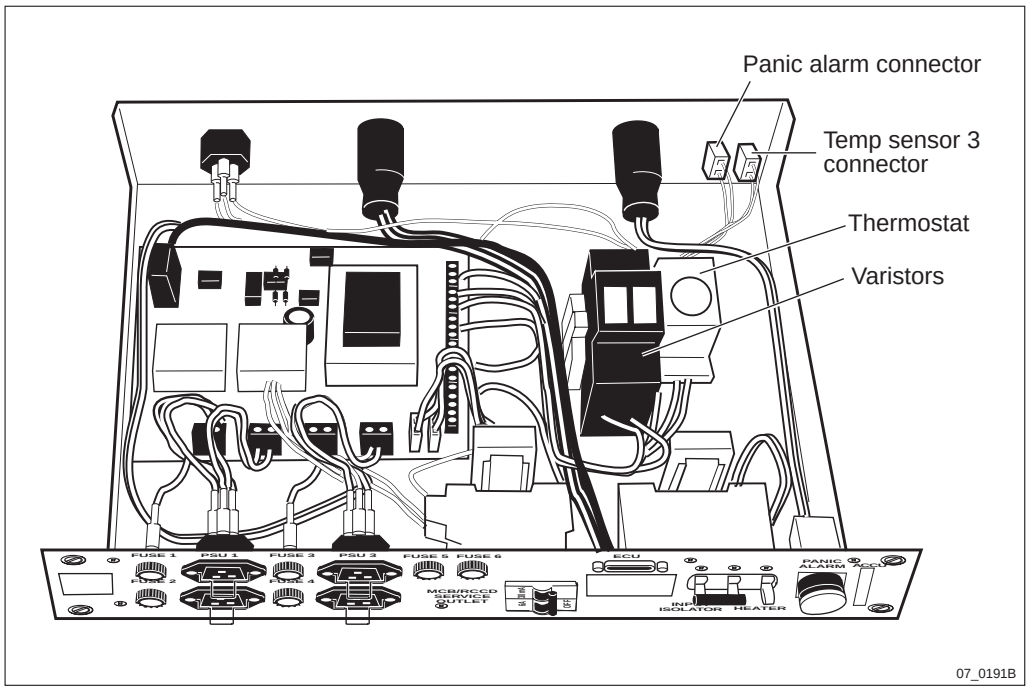

Figure 89 Temperature sensor 3

1. Cut the tie wraps holding the sensor cable to the side of the equipment rack within the cabinet.
2. Loosen the four screws holding the ACCU to the equipment rack and slide it out.
3. Disconnect the temperature sensor cable from the back of the ACCU.
4. Replacement is the reverse of the above.

Note: Unless under contractual warranty, after replacement, the temperature sensor shall be disposed of locally. Do not return the temperature sensor to Ericsson for replacement, repair or disposal.

7.28 TRU

Note: TRUs will successively be marked on the front with a coloured label showing frequency and encryption. To simplify identification, different frequencies have different colours. Be sure to have the appropriate TRU.

Further information about colour coding versus frequency and encryption can be found in the *Spare Parts Catalogue*.

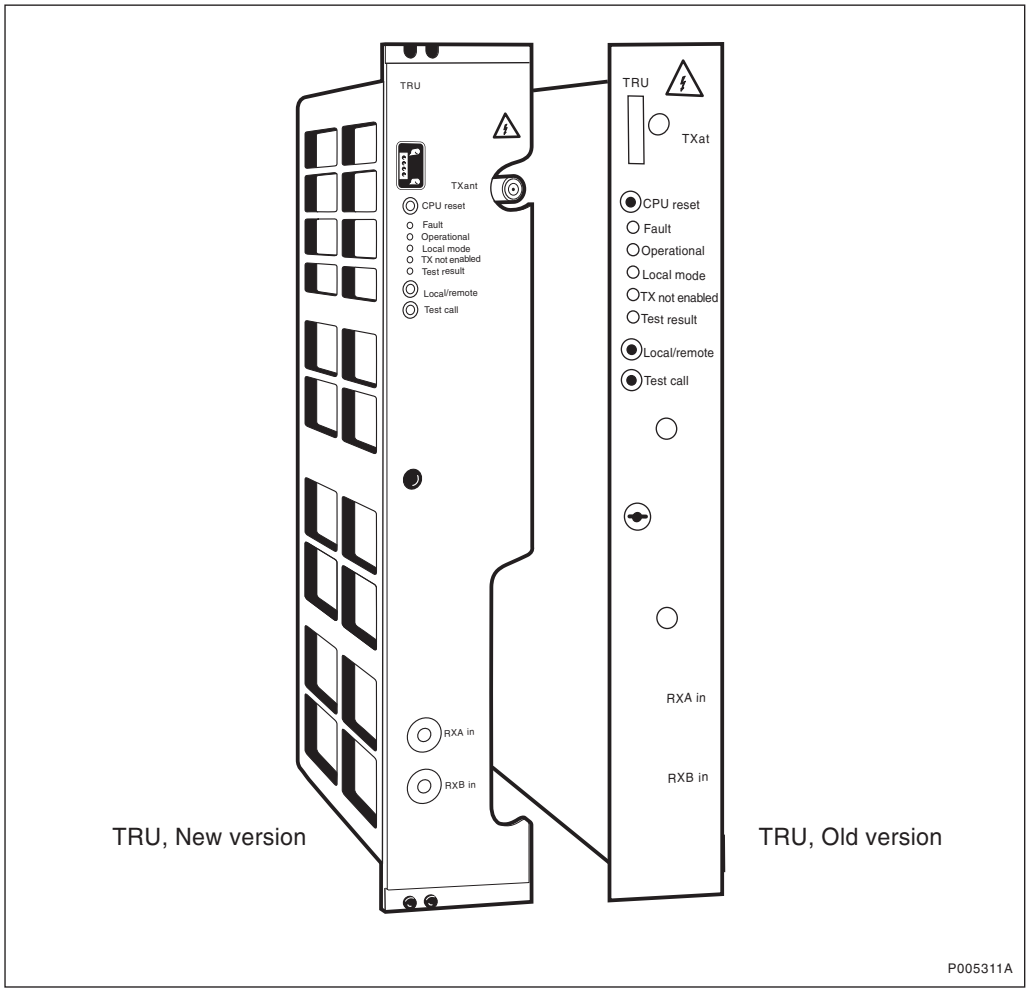

Figure 90 TRU, new version and old version

Replacement

1. Press the Local/remote button on the TRU. The Local mode indicator will start flashing.
2. Wait until the Local mode indicator has a fixed yellow light. This indicates that the TRU is in local mode.
3. Remove all cables connected to the TRU.
4. Replace the TRU.

   Make sure that the coaxial pins in the connector on the replacement TRU are centered in order not to damage the backplane. See figure below. If the coaxial pins are ok and the TRU slides easily into the magazine, proceed with step 6 otherwise proceed with step 5.
5. Some TRUs do not fit in the magazine. The main cause for this problem is that the coaxial pins in the TRU connector are not centered.

   a) Make sure that the coaxial pins in the backplane are not damaged.

b) Use the centring tool, part no. SXK 107 2300/1, to gently align the TRU coaxial pins. See figure below.

c) With care, try to fit the TRU into the magazine. The TRU should slide in to its position without need of extreme force.

Note: If the TRU can not be installed do not apply extra force since this will destroy the coaxial pins in the backplane.

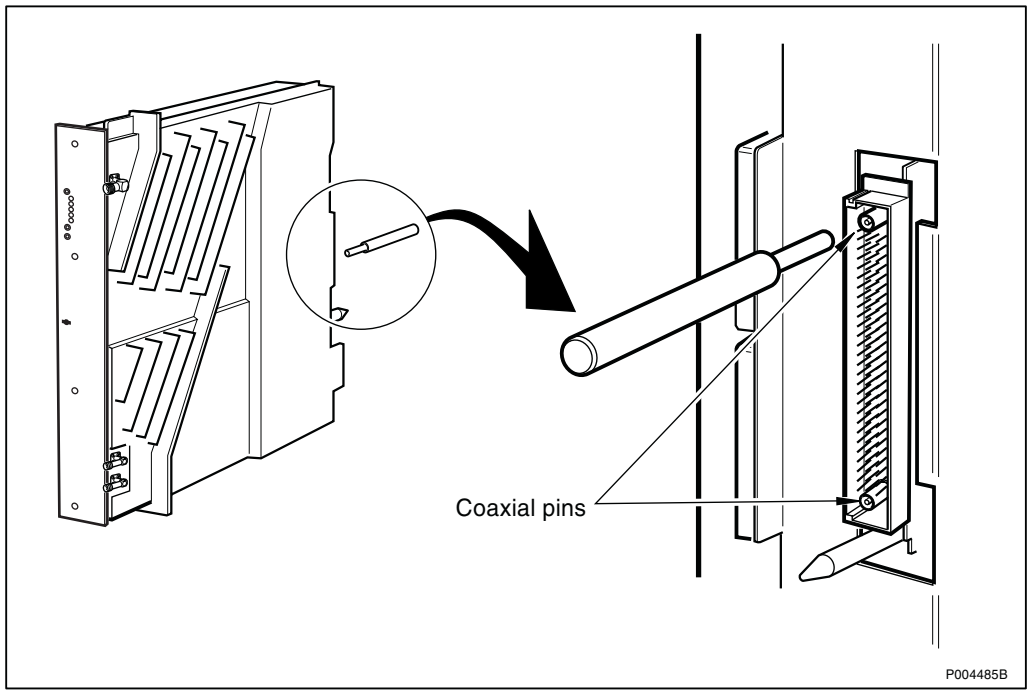

Figure 91 Aligning the TRU coaxial pins

6. Reconnect the disconnected cables.
7. Wait until the Operational indicator has a fixed green light. If the new TRU contains an old software version the DXU will automatically download the correct version. The software-download procedure is indicated by a flashing Operational indicator and may take some time (up to 10 minutes).

Note: After replacement, the TRU must be returned to Ericsson for repair. Maintenance personnel must attach a repair delivery note, LZF 084 64 (Blue Tag), to the TRU. The repair delivery note shall include a clear description of the fault found. Refer to the chapter "Concluding Routines" for instructions on completing a repair delivery note.

Put into operation

Note: If base band hopping is used, the hopping sequence can only be re-initiated by the BSC/MSC. After placing the TRU(s) in remote mode, contact them and request they take the required actions.

1. Press the Local/remote button on the new TRU. The Local mode indicator will start flashing.

2. Wait until the Local mode indicator is off. This indicates that the new TRU is in remote mode.

7.29 TRU Backplane

Note: When changing the TRU backplane, refer to the chapter "Cable Connections". Note the position of RUs within the original TRU magazine, so that they can be replaced into the correct position without changing the IDB. Refer to the drawings of switch settings in this section to make sure that replacement TRU backplane switches are set correctly.

Note: If the reason for changing the TRU backplane is a fitting problem between the TRU and the TRU backplane, it is recommended to change the TRU sub-rack instead of just the TRU backplane.

Prior to replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Press the Local/remote button on the DXU. The yellow Local mode indicator will start flashing. Wait until it has a fixed yellow light. This indicates that the DXU is in local mode.
3. Isolate the cabinet from the AC mains power by turning off the AC mains input isolator on the ACCU.
4. Isolate the batteries with the isolator switches on the BFU(s).

Replacement

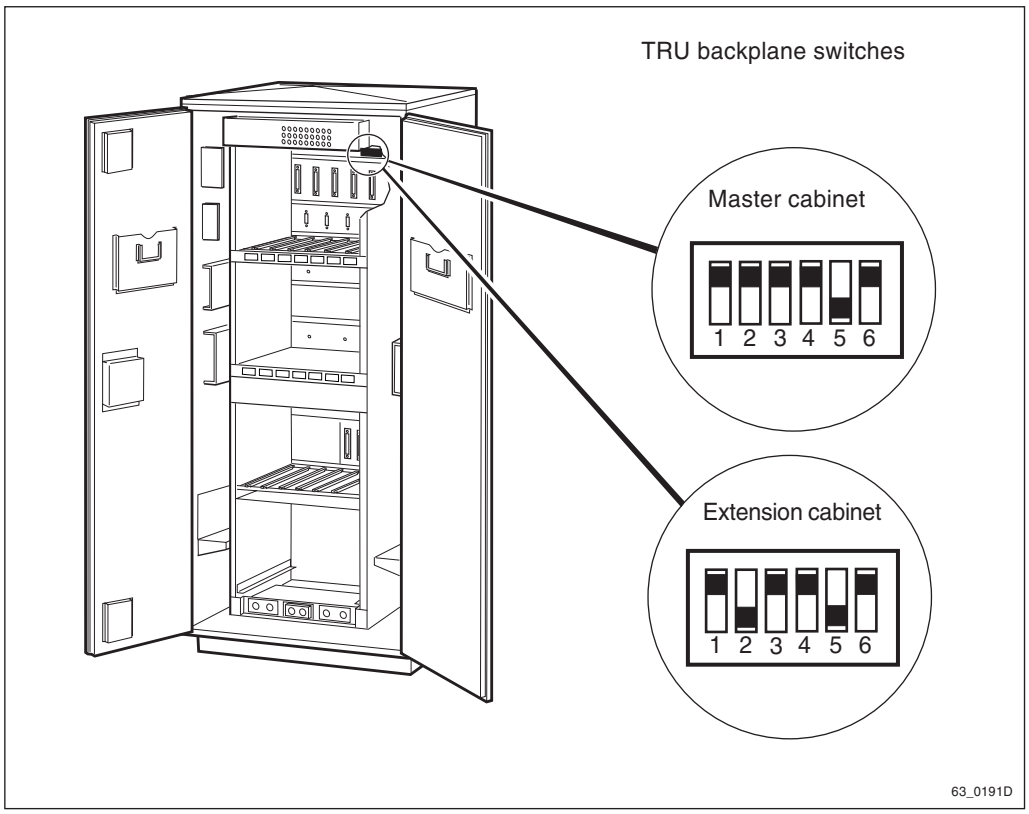

Figure 92 Location and setting of TRU backplane switches

1. Loosen the four screws (two on each side) which hold the IDM panel above the TRU magazine to the cabinet.
2. Gently pull the IDM away from the cabinet to access fans 1 and 2.
3. Remove the fan clamps that keep the fans in place.
4. Remove the fans.
5. Disconnect all the cables that go from the TRU backplane up to the IDM. The connectors are located on the back of the IDM on the right-hand side.
6. Put the IDM back temporarily.
7. Disconnect the cables to the CDUs.
8. Remove the TRUs.
9. Loosen the screws that hold the TRU magazine.
10. Disconnect all the local bus cables that are connected to the top of the TRU backplane.
11. Cut the tie wraps binding the RF cables, which run along the side of the equipment rack, from the TRU magazine to the CDUs.
12. Pull out the TRU magazine. The cables to the CDUs and the IDM will come out with the TRU magazine since they are integrated with the connectors on the rear of the TRU backplane.

13. Loosen the twelve screws to the TRU magazine back cover and remove the cover.
14. Loosen the twelve screws that hold the printed circuit board assembly in place.
15. Put in a new printed circuit board assembly.
16. Ensure that the switch settings for the replacement part are in accordance with the figure above.
17. Reset in reverse order. Refer to the section "IDM" in the chapter "Cable Connections" for information on the wiring connections.

Note: Unless under contractual warranty, after replacement, the TRU backplane shall be disposed of locally. Do not return the TRU backplane to Ericsson for replacement, repair or disposal.

Put into operation

1. Return the AC mains power by turning on the AC mains input isolator on the ACCU.
2. Connect the batteries by turning on the isolator switches on the BFU(s).
3. Check that the Operational indicator on the DXU has a fixed green light and that the BS fault indicator is off.
4. Press the Local/remote button on the DXU. The Local mode indicator will start flashing.
5. Wait until the Local mode indicator on the DXU is off. This indicates that the DXU is in remote mode.

7.30 TX Antenna Feeders

Note: When changing antenna feeders, refer also to the chapter "Cable Connections".

Prior to replacement

CAUTION

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

Note: To prevent exposure to RF radiation and damage to TRU(s), check before taking any further actions, that the TRU(s) that are connected to the CDU with the faulty TX antenna feeder have Local mode indicators with a fixed yellow light.

1. Press the "Local/remote" button on the TRU(s) that are transmitting on the faulty TX cable. The Local mode indicators will start flashing.
2. Wait until the "Local mode" indicator has a fixed yellow light. This indicates that the TRUs are in local mode.

Replacement

1. Remove the faulty antenna feeder that connects the CDU to the connection plate by unscrewing it carefully at both ends.

Note: Unless under contractual warranty, after replacement, the antenna feeder shall be disposed of locally. Do not return the antenna feeder to Ericsson for replacement, repair or disposal.

2. Put the new cable in and attach it to the CDU with a torque of 8 Nm ±1 Nm and to the connection plate with a torque of 15 Nm ±1 Nm.

Put into operation

Note: If base band hopping or mixed hopping was used, the hopping sequence can only be re-initiated by the BSC or MSC. After placing the TRU(s) in remote mode, contact the BSC or MSC and request they take the required actions.

1. Press the "Local/remote" button on the concerned TRU(s). The "Local mode" indicator will start flashing.
2. Block the following MOs from the BSC in the given order: RX, TS, TX, TRX.

   Use the MML command RXBLI.
3. Deblock the following MOs from the BSC in the given order: TRX, TX, TS, RX.

   Use the MML command RXBLE.
4. Wait until the "Local mode" indicators turn off. This indicates that the TRU(s) are in remote mode.

7.31 Varistors

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.

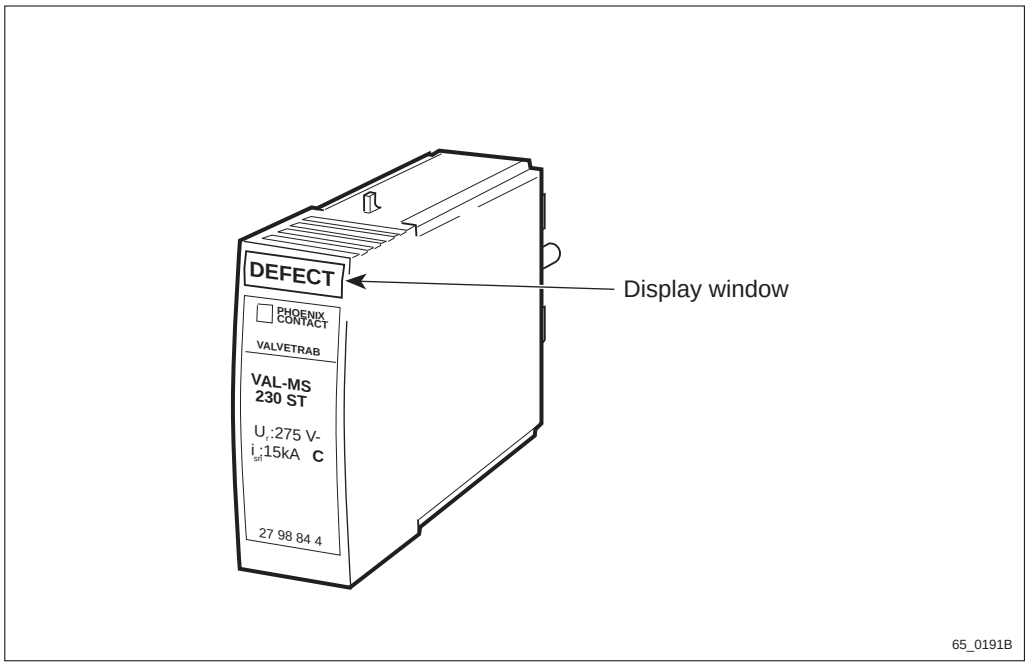

Figure 93 Varistor

1. Access the ACCU.
2. Remove the defective varistor by hand.

Note: A damaged mounting frame for the varistor can cause a short circuit and consequently a fire.

Replace the mounting frame if it is damaged in any way.

3. Inspect the mounting frame of the varistor.

   Replace the mounting frame if it is

   – burned

   – mechanically damaged

   – covered with dust

4. Replace the defective varistor.

Note: Unless under contractual warranty, after replacement, the varistor shall be disposed of locally. Do not return the varistor to Ericsson for replacement, repair or disposal.

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8 Test after Corrective Action

This chapter describes the methods for verification after a corrective action. The intention is to prove that the problem has been solved and that the RBS is in a state of full functionality.

8.1 How to Use Test after Corrective Action

Note that after replacing some types of unit, only the section "Before Leaving the Site" is used as a verification test.

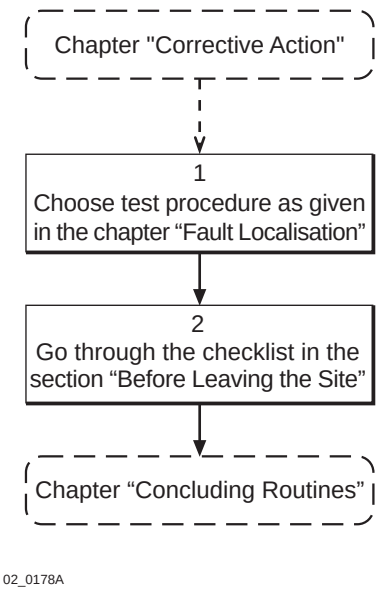


Figure 94 How to use “Test after Corrective Action”

8.2 Test Call

Test calls must be made when TRU(s) or CDU(s) have been replaced to ensure that the replaced unit(s) carry traffic.

To be able to make a test call on a specific Replacement Unit, you need information on the ARFCN(s) for the TRU(s). Contact the BSC personnel for information on ARFCN(s).

The test procedure is divided into two parts, that shall be made sequentially. The first test sequence of the downlink connection is monitored by the TEMS program. The second test sequence of the uplink connection is monitored by the OMT.

Note: Before starting with the test call, the Operational indicators on the DXU and TRUs should be lit. Set all units to remote mode.

Monitoring the Dedicated channel with TEMS

1. Connect the TEMS mobile to the PC serial port.
2. Start the TEMS program in the Windows environment.
3. Select "Enable Connections" in the Externals menu. Specify the serial port for the TEMS mobile.

4. Find out which ARFCN and TS that a testcall should be performed on. Contact the BSC personnel to find out the data. Use for example the printout command

```
RXCDP:MO=RXOTG-tg;
```

Note: The RXCDP gives, for the TG specified, the ARFCN and TN (timeslot number in air interface) that corresponds to the equipment TS. The TS and TN are normally the same, but there are exceptions. Therefore always check the TN with RXCDP.

5. Choose "Cell Selection" in the Control menu.

   Choose Target frequency and select the ARFCN for the TRU that is to be tested. Mark the frequency in the list.

6. Disable the Handover button in the Cell Selection menu.

7. Select Status information in the Monitor menu. Choose Dedicated channel.

8. Make a call from the TEMS mobile.

9. Monitor the Dedicated channel in TEMS and verify the downlink (DL) by checking that the targeted ARFCN and TN appear in the monitor.

   Make repeated calls until the desired information appears in the monitor, see the figure below.

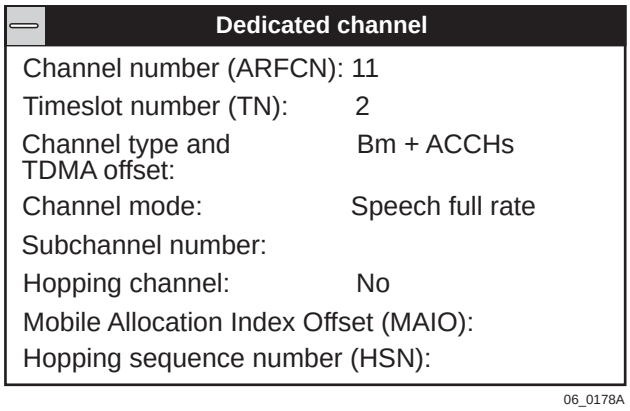


Figure 95 TEMS Dedicated channel monitor

Supervising the traffic channel with OMT

1. Connect the OMT cable between the OMT connector on the DXU and the PC Serial port.

2. Start the OMT program in Windows environment.

3. Select "Connect" in the "Connection" menu.

4. Select the "Read IDB" function in the "File" menu.

5. Change view mode to "MO view".

6. Select the appropriate TRXC object.
7. Choose "Operation Monitor".
8. In the Monitor Setup dialogue box, scroll down the list and select the desired Supervision value TCH-TS# to monitor.
9. Make a call on the TEMS mobile.
10. While a call is in progress in the correct timeslot, select the "Start monitor" button.
11. Check the "RX-LEV full" and "RX_LEV sub" values, see the figure below.

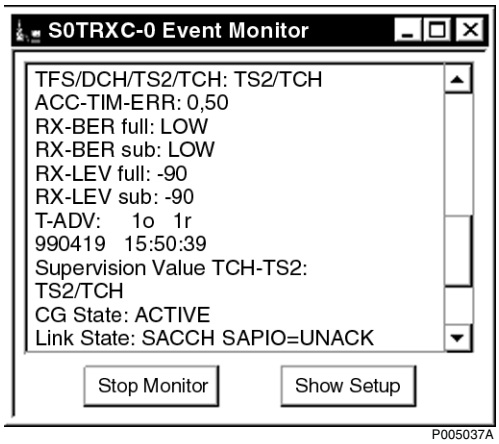


Figure 96 OMT Supervision value TCH-TS # monitor

12. Repeat the procedure above for additional TN values and as well as other TRUs.

    Compare the RX-LEV values. The values should be in the same range for all TRUs.

8.3 Before Leaving the Site

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

If the answer to any of the items is NO, do not depart from the site until the problem/fault has been cleared or investigated.

Table 12 Recommended checklist, Before leaving the site. N/A means not applicable

ITEM		N/A	YES	NO
1	BS fault light off on DXU?			
2	Red fault indicators off?			
3	All operational green LEDs lit?			
4	RBS in remote mode? (Yellow local mode indicator on DXU is off)			
5	Other yellow indicators off?			
6	External alarms off?			
7	Are all warning signs fixed and located correctly in the cabinet?			
8	Is the cabinet dry with no water in it?			
9	Is the inside and outside of the cabinet free from mechanical damage or rust?			
10	Are the radio sub-cabinet and mounting base free from foreign objects and all cables undamaged?			
11	Is the backup copy of the RBS IDB saved on a floppy disk?			
12	All tools accounted for?			
13	Cabinet locked (including mounting base)?			
14	Is the external air intake free from obstructions?			
15	Defective part packed for shipment, including repair delivery note?			
16	All other necessary paper work completed?			
17	Are the hazard lights on the antenna operational?			
18	Do the antennas, towers, and RF cables appear in operational order?			
19	OMC notified? Alarms ceased?			
Signature:				
Date:				

9 Concluding Routines

The following is a description of the different administrative routines that must be carried out as a result of a maintenance procedure.

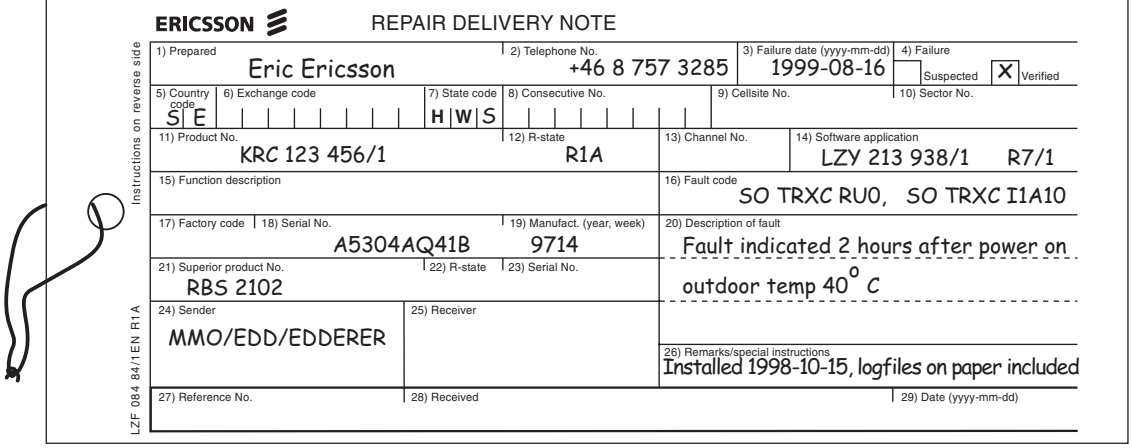
9.1 Report of Finished Work

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, etc.

9.2 Repair Delivery Note – “Blue Tag”

When a faulty unit is returned, it must always be accompanied by a repair delivery note. When the repair delivery note has been completed it must be attached to the faulty unit before sending it for repair.

The repair delivery note LZF 084 84 can be ordered from the local FSC. A description of how to fill in a repair delivery note follows below.



The following fields are mandatory. Use block letters.

1	Prepared	Service technician´s name
2	Telephone	Service technician´s telephone number
3	Failure date	
4	Failure	Mark with an X if failure is Suspected or Verified
5	Country code	Two letter country code
7	State code	Hardware (HW) status when failure occurred: S = Unit in service when failure occurred (Repair) T = New unit failed during installation or test (Claim) R = Repaired unit failed during installation or test (Claim or Repair)
11	Product No.	Faulty unit
12	R-state	Faulty unit
14	Software application	RBS load, product number and R-state
16	Fault code	Check OMT or work order
18	Serial No.	Faulty unit
19	Manufact. (year week)	
20	Description of fault	Observations and external factors
21	Superior product No.	RBS type
24	Sender	Customer, Company, Corporate ID
26	Remarks/special instructions	Information about installation date, logfiles and modification requirements

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Figure 97 The “Blue tag”

The above explanations to the Repair delivery note are also given on its reverse side.

9.3 Handling of Replaced Parts and RUs

Replaced parts and RUs are divided into three categories:

- Customer disposable
- Customer repairable
- Depot repairable

The definitions of these categories as well as explanations how to treat the parts is given below.

Customer disposable

Customer disposable parts are consumable parts, which have no lower sub-assembly or component that can be used to repair them.

These items are identified in the appropriate RBS *Spare Parts Catalogue* as "Recommended spare parts for customer stock (not repairable)" or "Other available parts".

Spare Parts Catalogue

Examples of these parts are:

- Cables and wiring
- Connectors
- Fuses, circuit breakers, varistors and overvoltage arresters
- Fans, compressors and heaters
- Printed circuit board assemblies (cicuit cards, backplanes, temperature sensors and humidity sensors)
- Batteries
- Antennas
- Transformers
- Capacitors
- Mechanical hardware (doors, hinges, plates, locks, seals, gaskets, brackets and other parts of the RBS cabinet)

Unless under contractual warranty, after replacement, these parts shall be disposed of locally. Do not return these parts to Ericsson for replacement, repair or disposal.

Customer repairable

Customer repairable parts are such parts, which have a lower sub-assembly or component that can be used to repair them.

These items are identified in the appropriate RBS *Spare Parts Catalogue* as "Recommended spare parts for customer stock (not repairable)" or "Other available parts".

Spare Parts Catalogue

Examples of these parts are:

- Climate units (air conditioners, active coolers and heat exchangers)
- ACCUs
- IDMs

Unless under contractual warranty, after replacement, these parts shall be repaired locally at the RBS site or in a local repair shop. If the ACCU is unrepairable, it shall be disposed of locally by the customer. Do not return the ACCU to Ericsson for replacement, repair or disposal.

Depot repairable

Depot repairable parts are for direct one to one replacement at the RBS site.

These items are identified in the appropriate RBS *Spare Parts Catalogue* as "Recommended spare parts for customer stock (repairable)".

Spare Parts Catalogue

Examples of these parts are:

- ALNAs
- BFUs
- CDUs
- DC/DC converters
- DXUs
- ECUs
- PSUs
- TRUs

After replacement, these parts must be returned to Ericsson for repair. Maintenance personnel must attach a repair delivery note, LZF 084 64 (Blue Tag), to the returned part. The repair delivery note shall include a clear description of the fault found. Refer to the section "Repair Delivery Note – 'Blue Tag'" for instructions on completing a repair delivery note.

9.4 Transport of a Repairable Unit

The repairable unit must be protected against ESD and damage due to transport. Therefore the repairable unit must be packed in an ESD-insulated plastic bag and transported in a shock-absorbing box. This must be done by re-using the same packing material as the spare unit was delivered in. Refer to the appropriate *Spare Parts Catalogue* to determine which repairable units should be returned for repair.

Spare Parts Catalogue

9.5 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 RBS site. The next pages contain an example of a filled-in trouble report and a blank trouble report.

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

9.5.1 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”

9.5.2 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 Description: 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_0179B

Figure 98 Example of filled-in trouble report

9.5.3 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 Description:		
Comments:		

02_0179B

Figure 99 Trouble report, blank

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10 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, R6.0, R6.1 or R7 and on in CME 20 and also for the RBS models RBS 2301 and RBS 2302.

When using this chapter for CMS 40 the conversion table below applies.

Table 13 Relation of product releases in CME 20 and CMS 40

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

Note: Unused fault numbers are not indicated in the fault maps of sections Section 10.3 on page 206 and Section 10.4 on page 212.

10.1 Terminology

The following terminology is used throughout this chapter.

10.1.1 Fault Number

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

10.1.2 Fault Maps

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.

10.1.3 Logical RU

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

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.

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

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

2. **Antennas**. (Not applicable for RBS 2301 and RBS 2302). A logical antenna means the whole signal path between the Transmitter/Receiver and the physical antenna. 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 data base is regarded as a replaceble unit despite it is not a physical unit. It comprises the data in the data base only, not the medium it resides in.

10.2 Decoding of Fault Maps

Note: No decoding of fault maps is necessary when using RBS 2000 release HRB 105 01/2, revision R7 and on. 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.

10.2.1 Example 1

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

Table 14 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).

10.2.2 Example 2

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

Table 15 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". (The TRXC number corresponds

to the TRU number, see the chapter "Positioning of RUs" for further information.)

10.2.3 Unused Decoding Table

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

Table 16 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

10.2.4 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

10.3 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.

10.3.1 SO CF

SO CF, external condition map class 1

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

SO CF, external condition map class 2

Fault no.	Fault type	Remark
7	DIP A (PCM link A lost)	R5 only
9	RBS door (RBS cabinet door open)	(1)

(1) The alarm ceases 5 minutes after the door has been closed.

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	
12	DC voltage out of range	
14	Local bus fault	
15	RBS database corrupted/inconsistent	R5 only
15	RBS database corrupted	R6.0 and on
16	RU database corrupted	
17	HW and IDB inconsistent	R6.0 and on
18	Internal configuration failed	R6.0 and on
19	Indoor temperature above safe range	Micro RBS only
20	Indoor temperature below safe range	Micro RBS only

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	R6.0 and on
8	VSWR limits exceeded	
9	Output power limits exceeded	R5 only
9	Power limits exceeded	R6.0 and on
10	DXU optional EEPROM checksum fault	
11	ALNA fault	Up to R7.0
11	ALNA/TMA fault	R7C and on
12	RX maxgain/mingain violated	R6.0 and on
13	Timing unit VCO ageing	
14	CDU supervision/communication lost	
15	VSWR/Output power supervision lost	R6.0 and on
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	R6.0 and on
24	Cooler capacity reduced	R5 only
24	CU HW fault	R6.0 and on
25	Heater capacity reduced	R5 only
25	Loadfile missing in DXU or ECU	R7.0 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	

Fault no.	Fault type	Remark
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	R6.0 and on
42	Lost communication to ECU	R6.0 and on
43	Internal configuration failed	R6.0 and on
44	Indoor temperature above normal conditional range	Micro RBS only up to R7.0
45	Indoor temperature below normal conditional range	Micro RBS only up to R7.0
46	DB parameter fault	R6.1 and on
47	Auxiliary Equipment Fault	R7.0 and on

SO CF, replacement unit map

No.	Replaceable unit	Remark
0	DXU	
1	ECU	
2	Micro RBS	Micro RBS only
5	CDU	
6	BFU	
7	PSU	
8	CDU_Cos	
9	BDM	
10	ACCU	
11	Active cooler	R5 only
11	Heat exchanger external fan [(1)]	
11	Air conditioner	R6.0 and on
12	ALNA A	Up to R7.0
12	ALNA/TMA A	R7C and on
13	ALNA B	Up to R7.0
13	ALNA/TMA B	R7C and on
14	Battery	
15	Fan	
16	Heater	
17	Heat exchanger external fan	
18	Heat exchanger internal fan	
19	Humidity sensor	

No.	Replaceable unit	Remark
21	Temperature sensor	
22	CDU HLOUT HLIN cable	
23	CDU RX in cable	
24	CU	R6.0 and on
25	DU	R6.0 and on
26	FU	R6.0 and on
27	FU CU PFWD cable	R6.0 and on
28	FU CU PREFL cable	R6.0 and on
29	CAB HLIN cable	R6.0 and on
30	CDU bus	
31	Environment	
32	Local bus	
33	Power communication loop	
34	RX antenna A	R5 only
34	RBS DB	R6.1 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	
41	PSU DC cable	R7D and on

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

10.3.2 SO TRXC

SO TRXC, external condition map class 1

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

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	

Fault no.	Fault type	Remark
3	Reset, watchdog	
4	Reset, SW fault	
5	Reset, RAM fault	
6	Reset, internal function change	
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	R6.0 and on
21	Internal configuration failed	R6.0 and on
22	Voltage supply fault	R7C and on

SO TRXC, internal fault map class 1B

Fault no.	Fault type	Remark
0	CDU not usable	
1	Indoor temperature out of safe range	R6.0 and on
3	DC voltage out of range	R6.0 and on
4	Indoor temperature above safe range	R7C and on
5	Indoor temperature below safe range	R7C and on

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	

Fault no.	Fault type	Remark
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	R7.0 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	
25	TX maximum power restricted	
26	DB parameter fault	R6.1 and on

SO TRXC, replacement unit map

No.	Replaceable unit	Remark
0	TRU	
2	Micro RBS	Micro RBS 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	

10.4 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.

10.4.1 AO CON (R6.0 and on)

AO CON, external condition map class 1

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

AO CON, external condition map class 2

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

AO CON, internal condition map class 1A

Not used.

AO CON, internal condition map class 1B

Not used.

AO CON, internal condition map class 2A

Not used.

10.4.2 AO DP (R6.0 and on)

AO DP is not supervised.

Note: The Digital Path is supervised by PCM supervision.

10.4.3 AO IS

AO IS is not supervised.

10.4.4 AO RX

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	R6.0 and on
1	ALNA	Up to R6.1
1	ALNA/TMA fault	R7C and on
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	R7.0 and on

AO RX, internal fault map class 2A

Fault no.	Fault type
0	TRA (Remote transcoder communication lost)

10.4.5 AO TF

AO TF, external condition map class 1

Fault no.	Fault type
0	EXT synch (no usable external reference)
1	PCM synch (no usable PCM reference)

AO TF, external condition map class 2

Fault no.	Fault type
0	EXT synch (no usable external reference)
1	PCM synch (no usable PCM reference)

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

AO TF, internal fault map class 2A

Fault no.	Fault type	Remark
3	ESB distribution failure, faulty DXU driver	(1)

(1) R7 only, temporary solution. The Fault indicator on the DXU shall be lit when this fault occurs.

10.4.6 AO TS

Not used.

10.4.7 AO TX

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	R6.0 and on

AO TX, internal fault map class 1B

Fault no.	Fault type	Remark
0	CU not usable	R6.0 and on
1	CDU VSWR limits exceeded	
2	CDU output power limits exceeded	
4	TX antenna VSWR limits exceeded	

Fault no.	Fault type	Remark
6	TX EEPROM checksum fault	
7	TX configuration table checksum fault	
8	TX synthesizer A/B unlocked	
9	TX synthesizer C unlocked	
10	Astra Tracy communication fault	
11	TX internal voltage fault	
12	TX high temperature	
13	TX output power limits exceeded	
14	TX saturation	
15	Voltage supply fault	Up to R6.1
16	Power unit not ready	Up to R6.1
17	TX initiation fault	
18	CU HW fault	R6.0 and on
19	CU SW load/start fault	R6.0 and on
20	CU input power fault	R6.0 and on
21	CU park fault	R6.0 and on
22	VSWR/Output power supervision lost	R6.0 and on
23	CU reset, power on	R6.0 and on
24	CU reset, communication fault	R6.0 and on
25	CU reset, watchdog	R6.0 and on
26	CU fine tuning fault	R6.0 and on
27	TX maximum power restricted	
47	TX Auxiliary Equipment Fault	R7.0 and on

AO TX, internal fault map class 2A

Fault no.	Fault type	Remark
0	TX diversity fault	R7C and on

11 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 as follows:

Red:	A fault is localised, check with OMT.
Yellow:	Warning! All the necessary preconditions, before putting into operation or leaving the site, have not been fulfilled.
Green:	The unit is working correctly.
Flashing indicator:	Wait, activity is in progress.

Note: Always check with the OMT for possible faults if a red indicator is lit or flashing.

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12 Preventive Maintenance

During normal use, parts of the RBS become dirty or worn. To prevent a fault within the RBS, regularly scheduled cleaning or replacement of parts is necessary.

This chapter gives the information needed to perform preventive maintenance. The process causes a minimum of interruption to the RBS's operation.

12.1 Preventive Maintenance Process

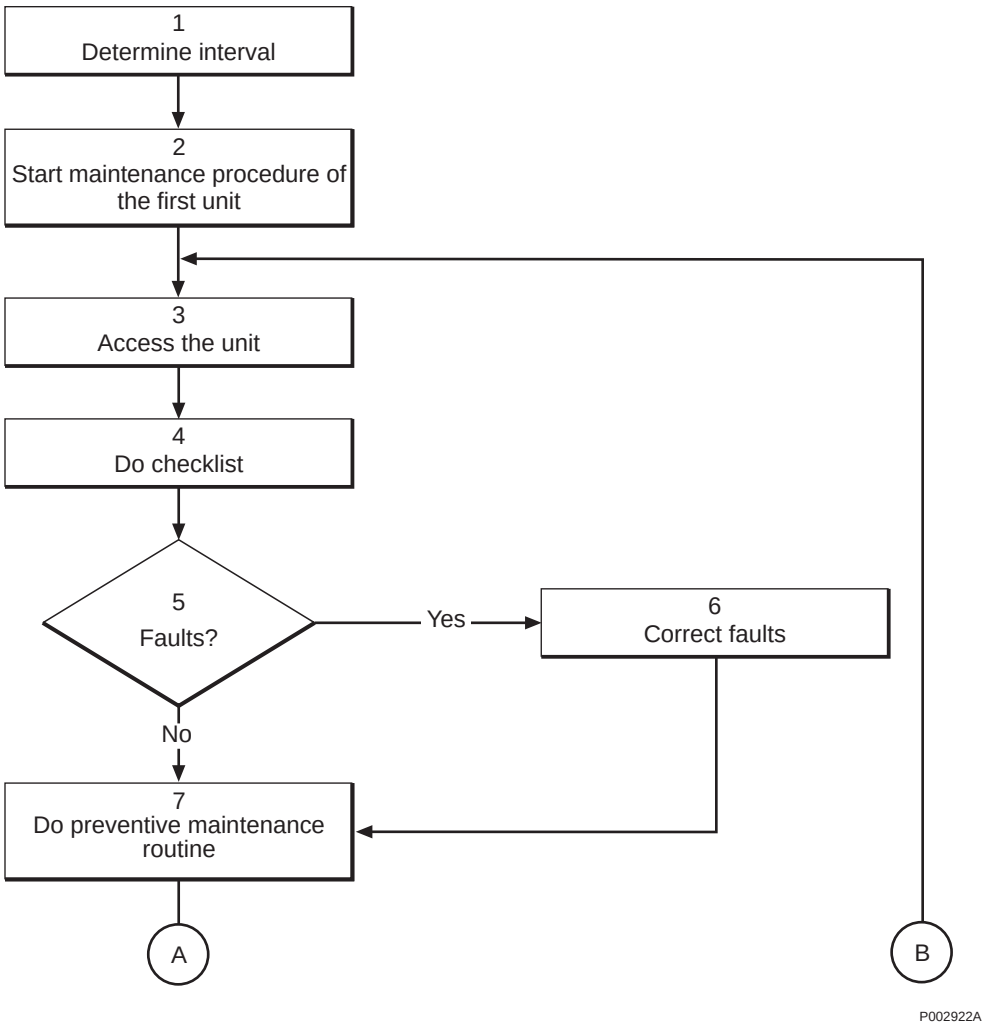

Figure 100 The "Preventive Maintenance Process"

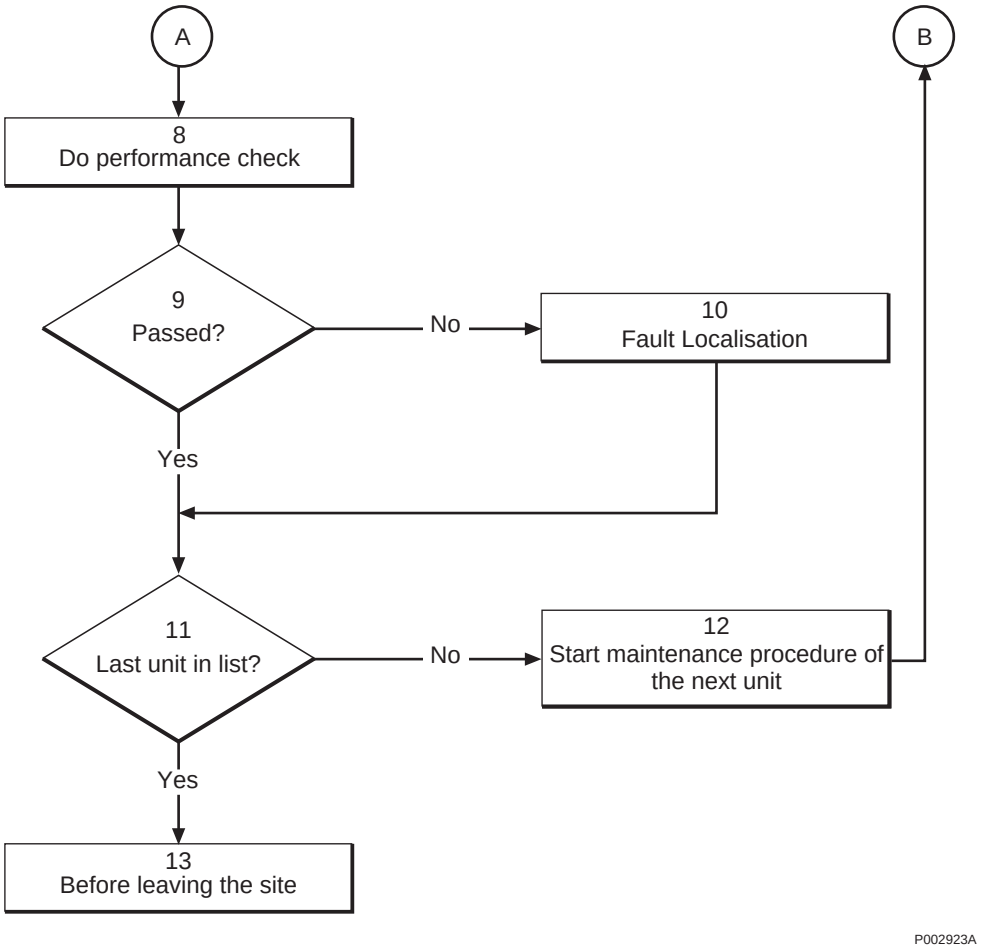

Figure 101 The "Preventive Maintenance Process"

(1) Determine interval

Determine the appropriate preventive maintenance interval according to work order information.

(2) Start maintenance procedure of the first unit

Use the table in the section "Preventive Maintenance Intervals"to determine which routines must be performed. Always perform the routines in the same order as they appear in the table.

Note: It is in particular important that the DXU maintenance is the first routine, as it requires a waiting time of 10 minutes before it is finished. During this waiting time, other maintenance routines can be performed.

(3) Access the unit

Start the preventive maintenance routine by accessing the appropriate unit.

(4) Do checklist

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

All questions on the checklist are written to get a "yes" response. Should the answer to any of the questions be "no", use the section "Correct Faults".

(5) Faults?

Were any faults found while doing the checklist?

- Yes: Proceed to step (6) Correct faults.
- No: Proceed to step (7) Do preventive maintenance routines.

(6) Correct faults

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

(7) Do preventive maintenance routines

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

(8) Do performance check

Some units have performance checks that shall be done.

(9) Passed?

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

(10) Fault localisation

If the performance check uncovers a fault, use the chapter "Fault Localisation".

(11) Last unit in list?

Has the last unit been treated in the preventive maintenance routine?

- No: Proceed to step (12) Start maintenance procedure of the next unit.
- Yes: Proceed to step (13) Before leaving the site.

(12) Start maintenance procedure of the next unit

Select the next unit for the preventive maintenance routine.

(13) Before leaving the site

Proceed to the section "Before Leaving the Site" in the chapter "Test after Corrective Action" and perform the checklist provided.

12.2 Preventive Maintenance Intervals

The interval between inspections at each RBS site may vary depending upon the environmental conditions found there. Outdoor sites receive greater exposure to large 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 17 Preventive maintenance intervals

Action	Every site visit	Twice a year	Once a year	Every five years
DXU maintenance (1)			X	X
Climate unit maintenance		X	X	X
Antenna system maintenance			X	X
Battery maintenance (2)			X	X
Replace batteries (2) (3)				X
Replace fans				X
DXU maintenance, oscillator verification (1)			X	X
Checklist "Before Leaving the Site"	X	X	X	X

(1) This activity applies to DXU-03 only.
(2) It is recommended that batteries be purchased locally. Refer to information supplied by the manufacturer for the correct inspection and replacement interval.
(3) This procedure is included in the "Battery maintenance procedure"

12.3 DXU Maintenance

Note: The preventive maintenance process for the DXU comprises "DXU access" and "DXU preventive maintenance routines" only.

Note: This procedure only applies to DXU–03 and system release R7 and on.

Note: Climatic requirements, specified for the frequency counter being used, must be met during the calibration procedure.

DXU access

Open the RBS cabinet to allow access to the DXU.

DXU preventive maintenance routines

Note: The calibration procedure requires that a high precision frequency counter is used. Refer to the section "Test Equipment " in the chapter "Tools and Instruments".

1. Connect the frequency counter to the Test connector on the DXU-03, see Figure 102 on page 223.

   The connector labelled "Ext. trig." shall not be connected anywhere.

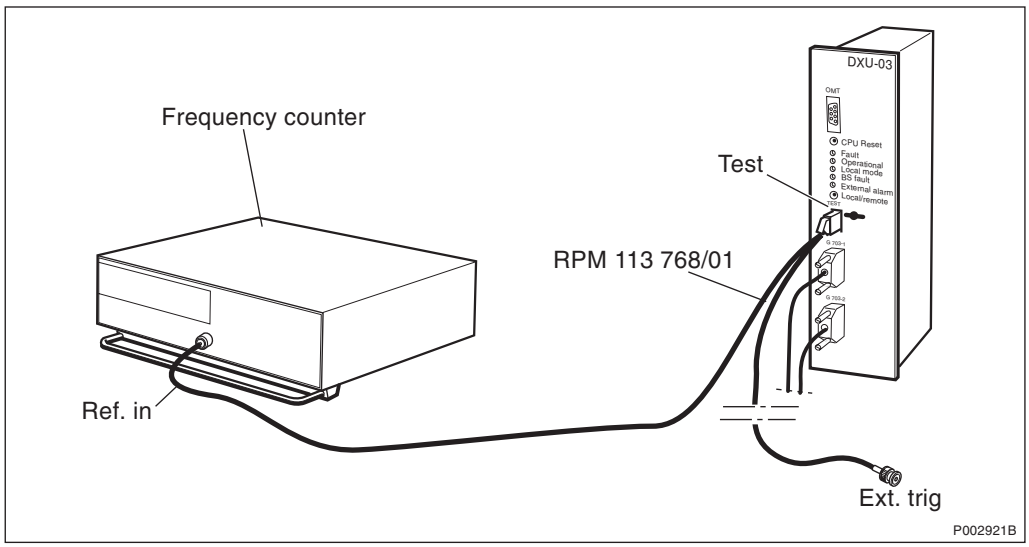

Figure 102 Connection of the frequency counter to DXU-03

2. Read off the measurement of the frequency counter.

   Is the reading within 13 MHz ±0.65 Hz?

   • Yes: The DXU oscillator frequency is within limits and no calibration shall be performed. The calibration procedure is finished.

   • No: Proceed to step 3.

3. Use the OMT to make the calibration of the DXU oscillator. For further information on the use of the OMT, see the *OMT User's Manual*.

Note: The GSM specification states that the frequency shall be 13 MHz ±0.65 Hz. The calibration shall thus give a result that is as close as possible to 13 MHz.

However, a class 2 alarm will not be raised until the frequency is above or below 13 MHz ±8 Hz.

4. Wait 10 minutes before a new measurement is made. This is necessary for the oscillator to stabilise at the adjusted frequency.

5. The preventive maintenance routine will be finished in Section 12.8 DXU maintenance, oscillator verification on page 233. During the 10 minutes waiting time, other units in the cabinet can be maintained.

12.4 Climate Unit Maintenance

12.4.1 Introduction

The recommended interval for climate unit preventive maintenance is twice a year. One time should be in the spring (or beginning of the hot season) and the other in the autumn (or beginning of the cold season).

In the spring, inspect and clean the entire unit paying special attention to the cooling portion of the unit.

In the autumn, only cleaning and a general inspection, with special attention to the heater and fans, should be necessary.

12.4.2 Maintenance Procedures

Climate system access

1. Open the radio sub-cabinet and connect an air compressor to the service outlet on the ACCU.
2. Turn on the air compressor. Adjust the pressure for a minimum of 5 bars (approximately 70 PSI) to a maximum of 8 bars (approximately 116 PSI).
3. Remove the external cabinet cover and the internal climate unit cover over the climate unit.

Climate unit checklist

All points in the checklist are written to be answered "yes". Should any point have a "no" answer, complete the checklist first, then proceed to the section "Correct Faults".

Table 18 Climate Units checklist. N/A means not applicable

ITEM		N/A	YES	NO
1	Are the fans, heater and the compressor clean and free of corrosion?			
2	Are the fan, heater and compressor mounts secure and free of excessive vibration?			
3	Is the compressor free of excessive noise?			
4	Are the coolant pipes free of obstructions, damage, corrosion and show no obvious signs of leakage?			
5	Are the lamellas and heat exchangers clean and damage-free?			
6	Is excess condensation draining properly from the unit?			
7	Are all climate fans still within their replacement date?			
8	Are all fan blades free of obstruction, cracks, missing blades and in balance?			
9	Do all fans rotate freely and are free from excessive vibration or noise?			
10	Is the heater unit coil intact and serviceable?			
11	Is all wiring and insulation free of damage?			
12	Are all connectors seated properly and in good condition?			
Signature:				
Date:				

Correct faults

Note: Switch off the AC circuit breaker on the ACCU and the DC circuit breaker on the BDM/IDM, or remove the DC fuse on the ACB, prior to using compressed air within the climate unit.

1. If a unit is found dirty, use compressed air to clean it. It may also be necessary to use a soft bristle brush and a mild detergent (both purchased locally). If corrosion is found, treat it accordingly.
2. Tighten any loose mounts discovered. If the mounts cannot be tightened enough to stop excessive vibration, replace the entire unit according to the appropriate section in the chapter "Corrective Action".
3. Excessive compressor noise will require a qualified refrigeration specialist to repair on site, or replacement of the entire unit and returning it to a central location for repair. For replacement instructions see the section "Air Conditioner" in the chapter "Corrective Action".

4. Faults with the coolant pipes will require either a qualified refrigeration specialist to repair on site, or replacement of the entire unit and returning it to a central location for repair. For replacement instructions see the section "Air Conditioner" in the chapter "Corrective Action".

5. Clean the lamellas and heat exchangers using compressed air. If the damage affects the units, replace the entire unit and return it to a central location for repair. For replacement instructions see the section "Active Cooler" in the chapter "Corrective Action".

6. Clear the drain pipe.

7. If the replacement date of a fan has passed, replace all fans at the same time according to the appropriate instructions in the chapter "Corrective Action".

8. Go to step 9.

9. If a fan is found defective, replace it according to instructions located in the chapter "Corrective Action".

10. If the heater coil is broken or unserviceable, replace the unit according to instructions in the chapter "Corrective Action".

11. Damaged wiring or insulation may necessitate unit replacement. Replacement instructions are found in the chapter "Corrective Action".

12. Reset all loose connectors. If a defective connector is found, and the whole cable cannot be replaced easily on site, it will be necessary to replace the entire unit. For replacement instructions see the section "Air Conditioner" in the chapter "Corrective Action".

Preventive maintenance routines

Note: The fan blades must be held while they are being cleaned with compressed air. This is necessary to prevent the blades from rotating too fast and damaging the fan motor.

Refer to the drawings of the various climate units, for locations of fans and heaters.

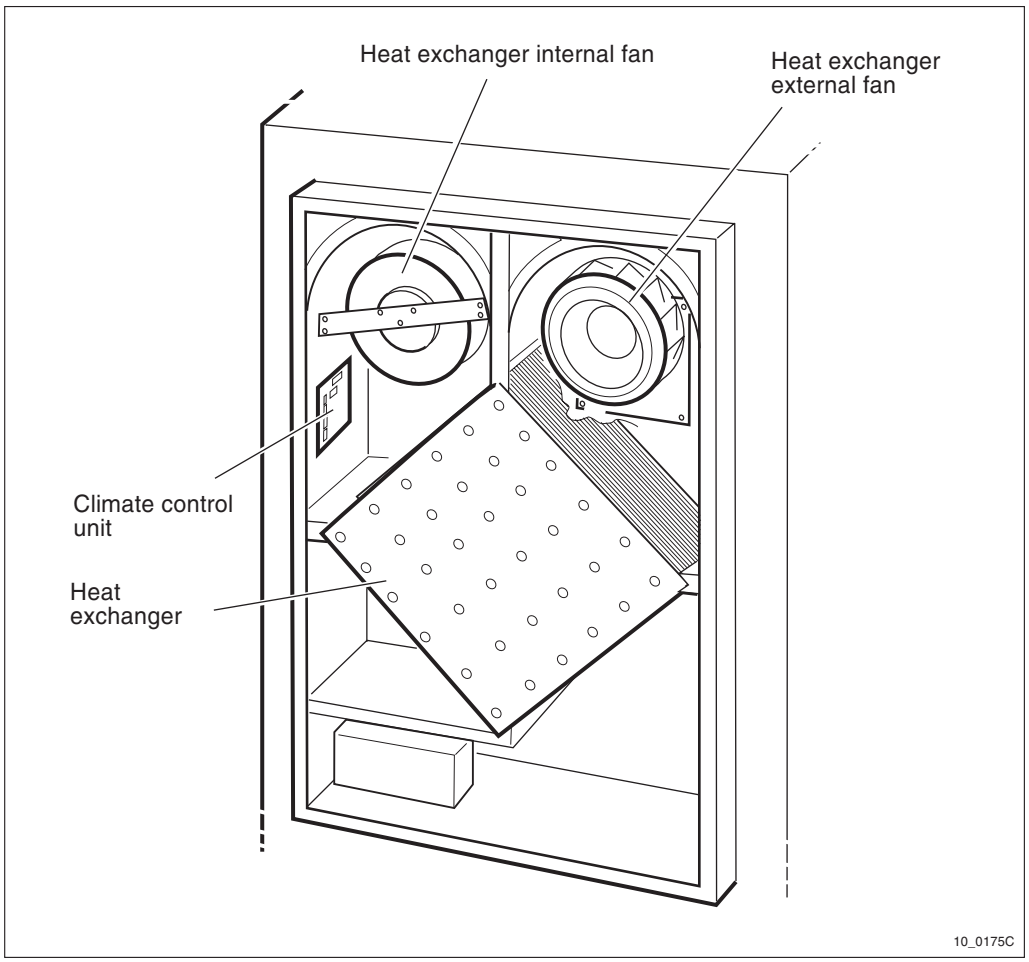

Figure 103 Climate unit, location of fans

1. Switch off the AC circuit breaker for the climate unit on the ACCU.
2. Pull the DC fuse for the climate unit from the patch panel.
3. Use the air compressor to clean all fans in the climate unit.
4. Switch off the air compressor. Unplug it from the service outlet in the ACCU.
5. Return the climate unit to operation by reversing the access procedures described in this chapter.
6. Close and lock the door first for the radio sub-cabinet.

Performance check

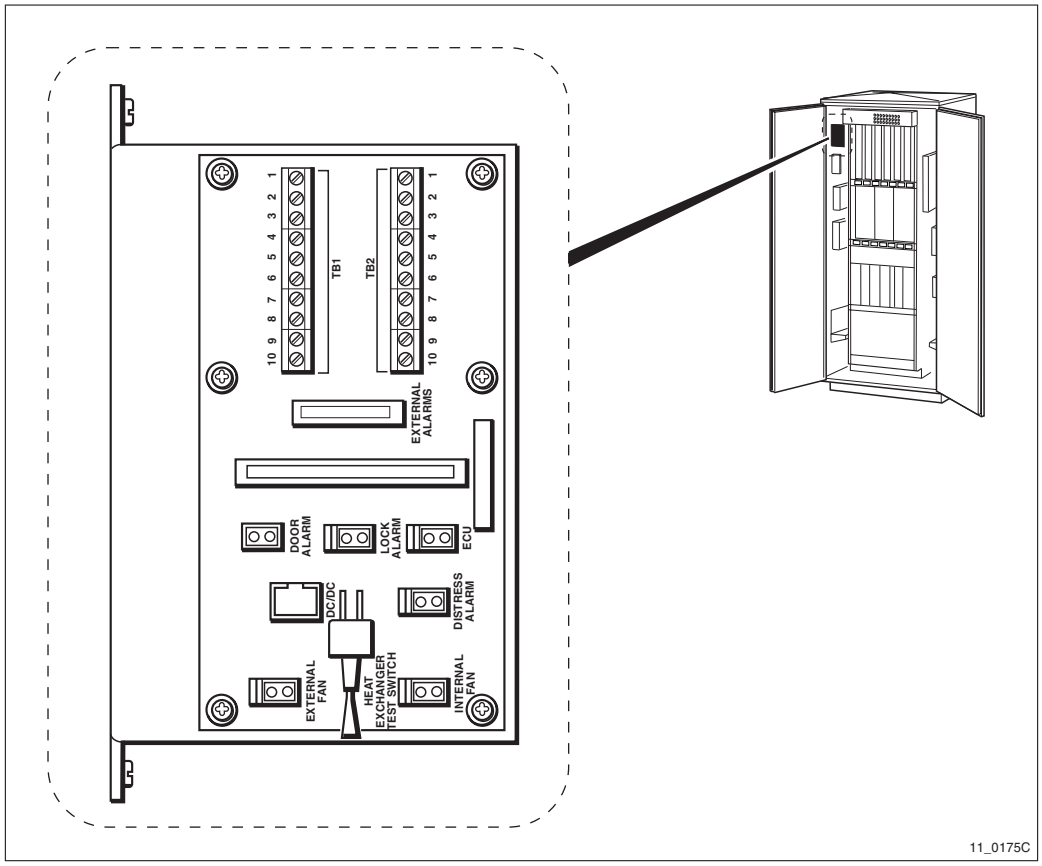

Figure 104 Heat exchanger test switch

There is no specific performance test for the climate system. The internal or external fan can be activated by using the momentary switch shown in the above picture.

12.5 Antenna System Maintenance

The checklist below is designed for a visual inspection of the antenna system. Refer to the safety warning below.

WARNING

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

Note: Local safety regulations may require that any maintenance on antennas, or antenna towers, be performed by an individual who has been certified to climb antenna poles and masts.

Antenna access

Open the RBS cabinet to allow for an inspection of the RF cables.

Antenna checklist

All points in the checklist are written to be answered "yes". Should any point have a "no" answer, complete the checklist first, then proceed to the section "Correct Faults".

Table 19 Antenna checklist. N/A means not applicable

ITEM		N/A	YES	NO
1	Are poles in safe condition, that is, free of cracks, not bent or loose?			
2	Is lightning protection secure and functional?			
3	Is the ALNA firmly mounted and in good condition?			
4	Do cables still have markers?			
5	Are cables secured to poles (approximately once every 0.6 meters)?			
6	Are the cable seals at the entry point into the cabinet in good condition?			
7	Are all cables free from abrasions, cuts and cracks?			
8	Are all cable connector seals in good condition?			
9	Are all cable ducts dry and the seals in good condition?			
10	Are all pressurised cables identified and in good condition?			
11	Are antenna towers and legs free of corrosion?			
12	Are antenna towers free of bowing or bends?			
13	Are hazard lights in operational order?			
14	Are support pedestals free of signs of wear and/or cracks?			
15	Are the guy wires relatively free of corrosion?			
16	Are the guy wires free of signs of slipping?			
17	Are the guy wires free of broken strands?			
18	Are the antennas correctly orientated?			
19	Are the antennas firmly mounted?			
20	Is the RBS transmission path free of obstructions? (No new buildings, towers, etc. blocking it since installation.)			
Signature:				
Date:				

Correct faults

Only tighten loose connections, or replace RF cables in the cabinet. Contact the supervisor to inform them of any other faults found when performing the checklist as further corrective action may require individuals trained and certified to climb towers.

Preventive maintenance routines

Except for the checklist provided, there are no preventive maintenance routines for the antenna system.

Performance Check

There are no performance checks for the antenna system.

12.6 Battery Maintenance

DANGER

Read Safety Instructions regarding handling and connecting batteries.

Note: It is recommended that batteries be purchased locally. Refer to information supplied by the manufacturer for the correct inspection and replacement interval.

Battery access

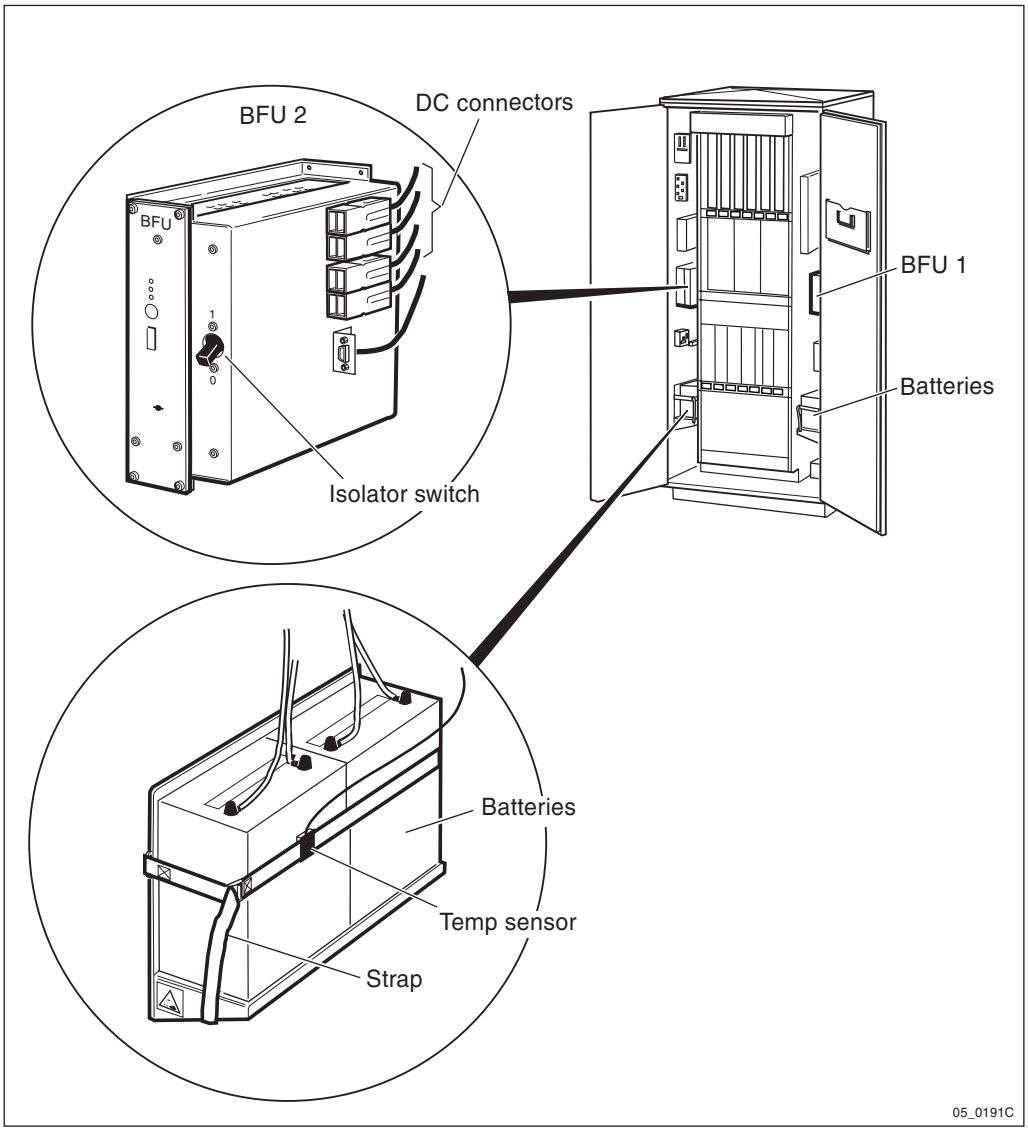

Figure 105 Battery and DC isolator switch

1. Open the door to the radio sub-cabinet.
2. Perform the battery checklist.
3. If the batteries require replacement, refer to the section "Batteries" in the chapter "Corrective Action".

Battery checklist

All points in the checklist are written to be answered "yes". Should any point have a "no" answer, complete the checklist first, then proceed to the section "Correct Faults".

Table 20 Battery checklist. N/A means not applicable

ITEM		N/A	YES	NO
1	Are the batteries and battery box free of dirt, excessive grease, oxidation and corrosion?			
2	Are all cables firmly connected and in good condition?			
3	Are the battery casings free from discoloration and not deformed?			
4	Are the battery terminals unbent and free from excessive cuts or slices?			
5	Are the batteries still within their replacement date?			
6	Have the batteries held their acid? (No acid leaks)			
Signature:				
Date:				

Correct faults

1. Clean dirt and grease off the batteries and battery box with a mild detergent, a soft bristle brush and rags. All cleaning items should be purchased locally. Treat all corrosion or oxidation in accordance with local procedures.
2. Reset any loose cables found, or replace them if necessary.
3. If a discoloured or deformed battery is found during the inspection, replace all batteries in the same battery box at the same time. See the section "Battery" in the chapter "Corrective Action" for replacement instructions.
4. If the poles show signs of excessive damage, replace both batteries in the same battery box at the same time. See the section "Battery" in the chapter "Corrective Action" for replacement instructions.
5. If the expiration date on a battery has passed, replace all batteries in the battery box at the same time. See the section "Batteries" in the chapter "Corrective Action" for replacement instructions.
6. If the batteries have leaked acid (or are leaking), replace both batteries in the Battery Box or BDM. See the section "Battery" in the chapter "Corrective Action" for replacement instructions.

Preventive maintenance routines

Except for the checklist provided, there are no specific preventive maintenance routines for the battery system for first line maintenance.

Performance check

There are no specific performance checks for the battery system for first line maintenance.

12.7 Fans Replacement

Note: The only preventive maintenance included in this procedure is replacement.

When replacement is necessary for preventive maintenance, refer to the following sections:

Cabinet fans	Section "Fans" in the chapter "Corrective Action"
Heat exchanger fans	Section "Heat Exchanger Fans" in the chapter "Corrective Action"

12.8 DXU maintenance, oscillator verification

Note: This is the concluding part of the maintenance routine of the Section 12.3 DXU Maintenance on page 222.

1. Read off the measurement of the frequency counter.

   Is the reading within 13 MHz ±0.65 Hz?

   • Yes: The calibration of the DXU oscillator frequency was successful. The calibration procedure is finished.

   • No: The calibration of the DXU oscillator frequency was unsuccessful. Replace the DXU according to instructions in the section "DXU" in the chapter "Corrective Action".

12.9 Checklist Before Leaving the Site

Refer to the section "Before Leaving the Site" in the chapter "Test after Corrective Action" and perform the checklist provided.

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13 Cable Connections

The purpose of this chapter is to provide maintenance personnel assistance when replacing any of the following units where applicable:

- CDU
- DXU/ECU backplane
- IDM
- TRU backplane
- Any RU which has a cable terminated on a backplane, a CDU or an IDM

General information about cable connections can be found in:

Cabinet Assembly and Extension Manual LZN 302 78

13.1 Interchanging CDU-C and CDU-C+

As previously stated, the CDU-C+ may replace a CDU-C but there are differences between the front panel legends of the CDU-C variants. The difference in the legends occur between:

- CDU-C 900 MHz (with duplexer)
- CDU-C 1800 / 1900 MHz (without duplexer)
- CDU-C+ all bands (with or without duplexer)

The following table lists the connectors with identical functions.

Table 21 CDU-C and CDU-C+ connector comparison

CDU-C		**CDU-C+**
With duplexer	**Without duplexer**	**With / without duplexer**
None	None	= RX in B
None	None	= HL out B
HL-in	HL-in	= HL in
HL-out	HL-out	= HL out
TX/RX Ant A	TX Ant B	= TX/RX Ant
RX Ant	RX Ant	= RX in A
RX-out1	RX-out1	= RX out1
RX-out2	RX-out2	= RX out2
RX-out3	RX-out3	= RX out3
RX-out4	RX-out4	= RX out4
RX-out5	RX-out5	= RX out5
RX-out6	RX-out6	= RX out6
CDU-Bus	CDU-Bus	= CDU Bus
RXA MS out	RX MS out	= None
MSTP	MSTP	= None

DC in, Pfwd1, Pfwd2, Prefl1 and Prefl2 are all identical in all three variants.

13.2 CDU-A and CDU-C

Each CDU is to be connected to antenna sockets located on the connection field of the cabinet. The connection field is located in the floor of the cabinet.

The lower ends of the antenna coaxial cables must be terminated to the CDUs and are marked accordingly. The upper ends of these cables are connected to RF sockets in the roof connection panel of the cabinet for termination to antennas.

The following information details the roof panel sockets and the CDU connections to which they are terminated.

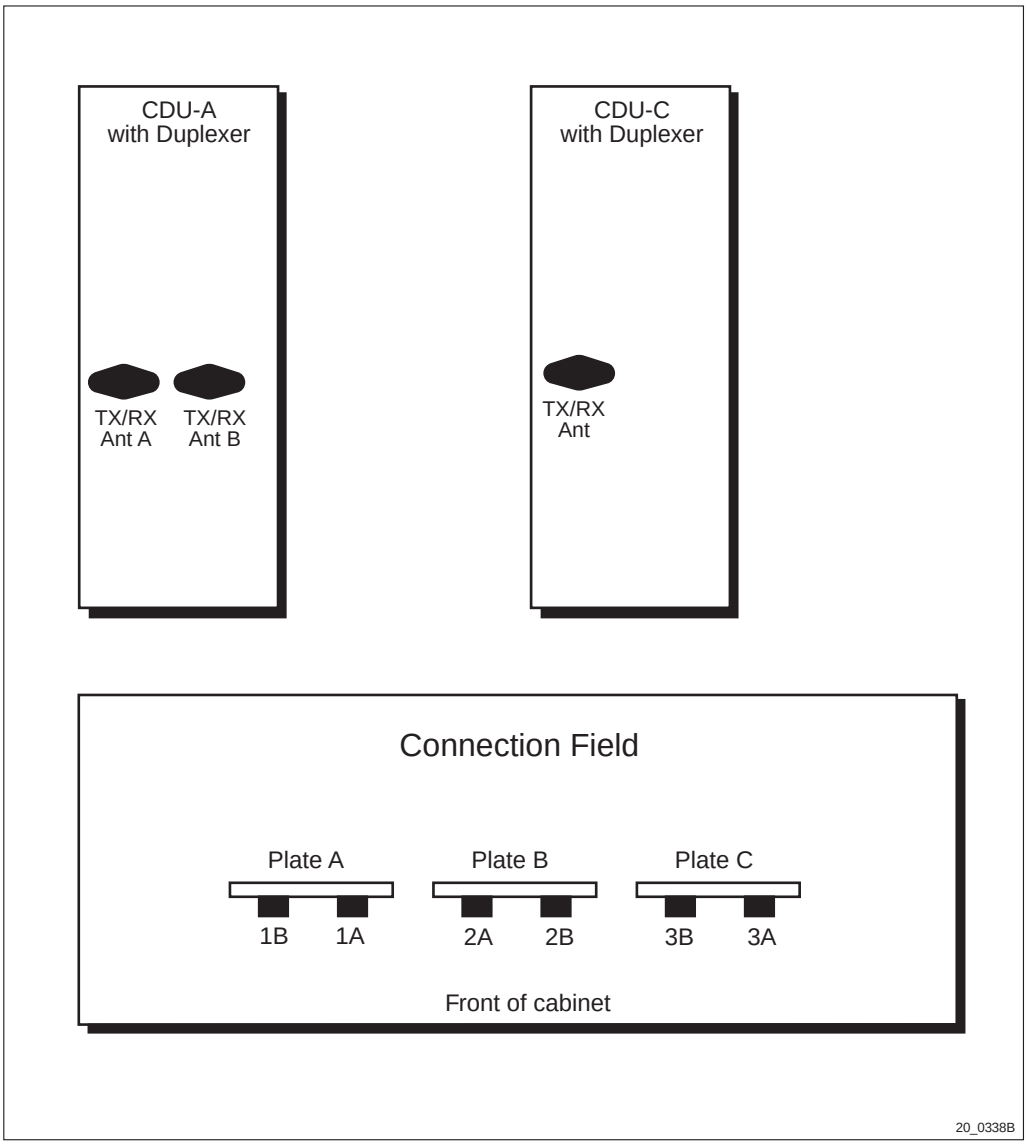

Figure 106 CDU-A and CDU-C at the top, connection field at the bottom

The CDUs are numbered 1 to 3 from left to right as they appear in the cabinet.

13.2.1 Cabinet Wiring

Table 22 CDU-A with duplexer

CDU	CDU Connector	Connection Field		Signal
1	TX/RX Ant A	Plate A	1A	TX A + RX A
	TX/RX Ant B	Plate A	1B	TX B + RX B
2	TX/RX Ant A	Plate B	2A	TX A + RX A
	TX/RX Ant B	Plate B	2B	TX B + RX B
3	TX/RX Ant A	Plate C	3A	TX A + RX A
	TX/RX Ant B	Plate C	3B	TX B + RX B

Table 23 CDU-C with duplexer, multi-cabinet.

CDU	CDU Connector	Connection Field		Signal
1	TX/RX Ant A	Plate A	1A	TX + RX
2	TX/RX Ant A	Plate B	2A	TX + RX
3	TX/RX Ant A	Plate C	3A	TX + RX
3 (M)	HL in	Plate B	2B	HL in
-	HL out	Plate C	3B	HL out
1 (E)	HL in	Plate B	2B	HL in
	HL out	Plate C	3B	HL out
M	Master Cabinet			
E	Extension Cabinet			

13.3 CDU-C+

Each CDU is to be connected to antenna sockets located on the connection field of the cabinet. The connection field is located in the floor of the cabinet.

The lower ends of the antenna coaxial cables must be terminated to the CDUs and are marked accordingly. The upper ends of these cables are connected to RF sockets in the roof connection panel of the cabinet for termination to antennas.

The following information details the roof panel sockets and the CDU connections to which they are terminated.

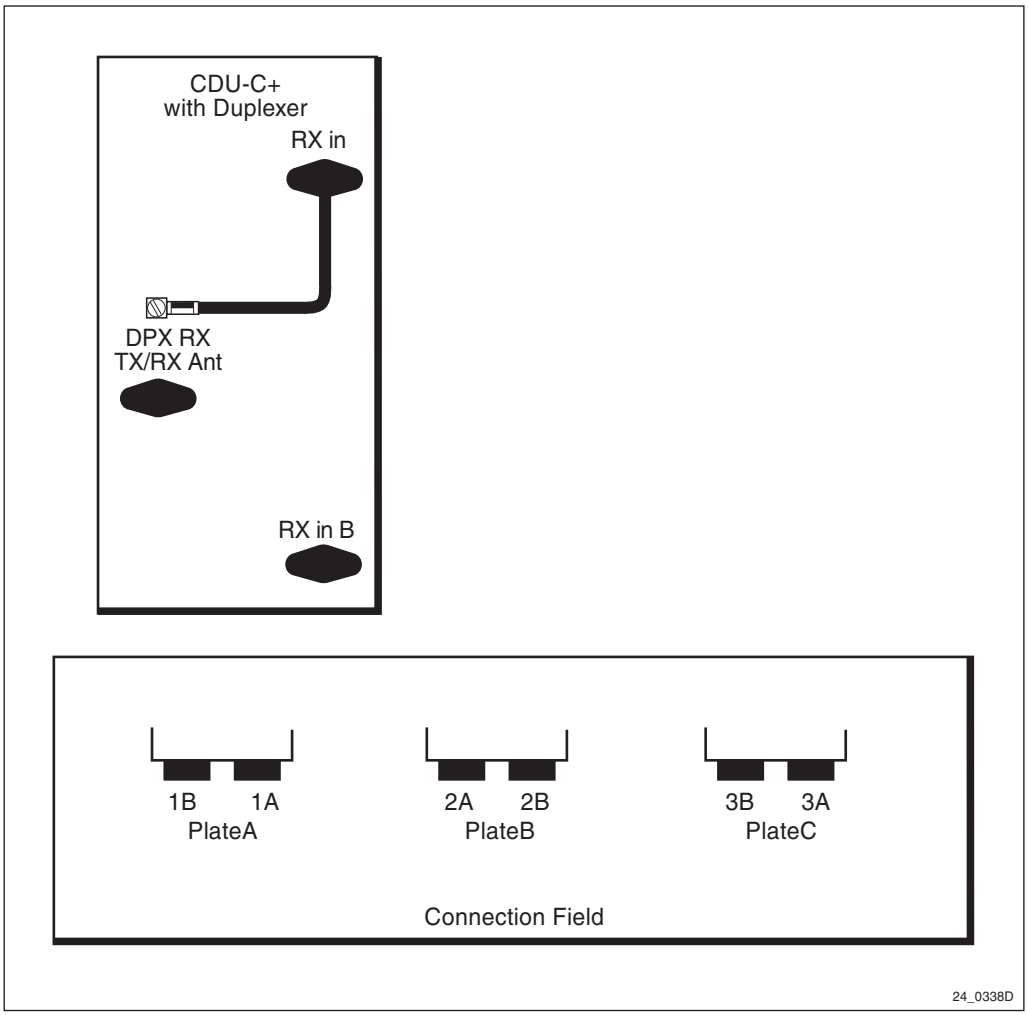

Figure 107 CDU-C+ at the top, connection field at the bottom

The CDUs are numbered 1 to 3 from left to right as they appear in the cabinet.

13.3.1 Cabinet Wiring

Table 24 CDU-C+ with Duplexer, single CDU only

CDU	CDU Connector	Connection Field	Signal
1	TX/RX Ant	TX 1	TX A + RX A
	RX in B	RX 1	RX B
2	TX/RX Ant	TX 3	TX A + RX A
	RX in B	RX 3	RX B
3	TX/RX Ant	TX 5	TX A + RX A
	RX in B	RX 5	RX B

Table 25 CDU-C+ with duplexer, multi-cabinet.

CDU	CDU Connector	Connection Field		Signal
1	TX/RX Ant	Plate A	1A	TX + RX
2	TX/RX Ant	Plate B	2A	TX + RX
3	TX/RX Ant	Plate C	3A	TX (+ RX**)
3 (M)	HL in	Plate B	2B	HL in
-	HL out	Plate C	3B	HL out
1 (E)	HL in	Plate B	2B	HL in
	HL out	Plate C	3B	HL out
M	Master Cabinet			
E	Extension Cabinet			
**	only TX in single cell			

13.4 CDU-D

Each CDU is to be connected to antenna sockets located on the connection field of the cabinet. The connection field is located in the floor of the cabinet.

The lower ends of the antenna coaxial cables must be terminated to the CDUs and are marked accordingly. The upper ends of these cables are connected to RF sockets in the roof connection panel of the cabinet for termination to antennas.

The following information details the roof panel sockets and the CDU connections to which they are terminated.

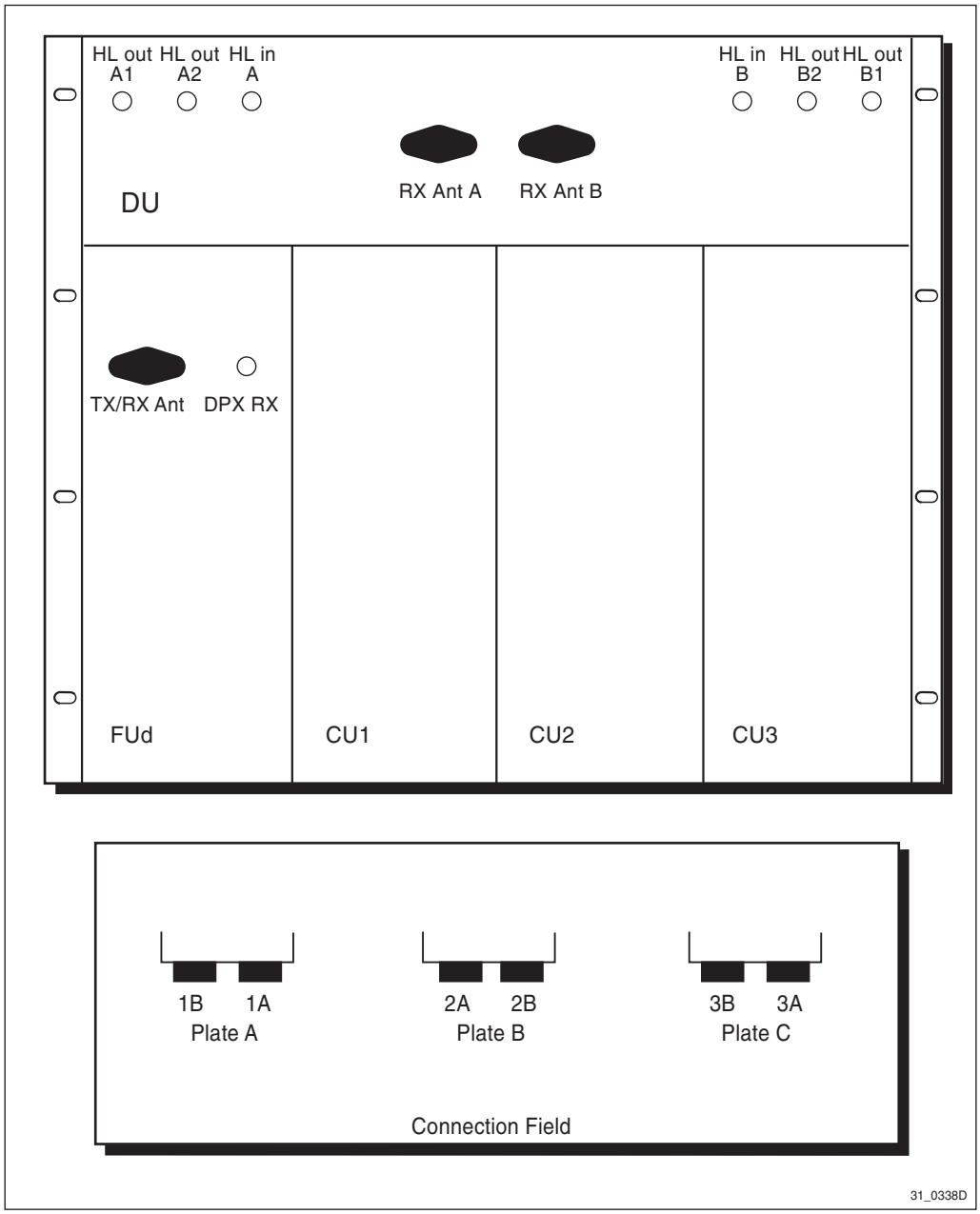

Figure 108 CDU-D at the top, connection field at the bottom

Table 26 CDU-D to connection field, single cabinet

CDU Connector	Connection Field		Signal
TX Ant	Plate A	1A	TX + RXA
RX Ant B	Plate B	2A	RXB

Table 27 CDU-D to connection field, master cabinet

CDU Connector	Connection Field		Signal
TX Ant	Plate A	1A	TX + RXA
HL in B	Plate B	2B	HLin B
HL out A2	Plate C	3B	HLout A2

Table 28 CDU-D to connection field, extension cabinet

CDU Connector	Connection Field		Signal
TX Ant	Plate A	1A	TX + RXB
HL in A	Plate B	2B	HLin A
HL out B2	Plate C	3B	HLout B2

13.5 DXU/ECU Backplane

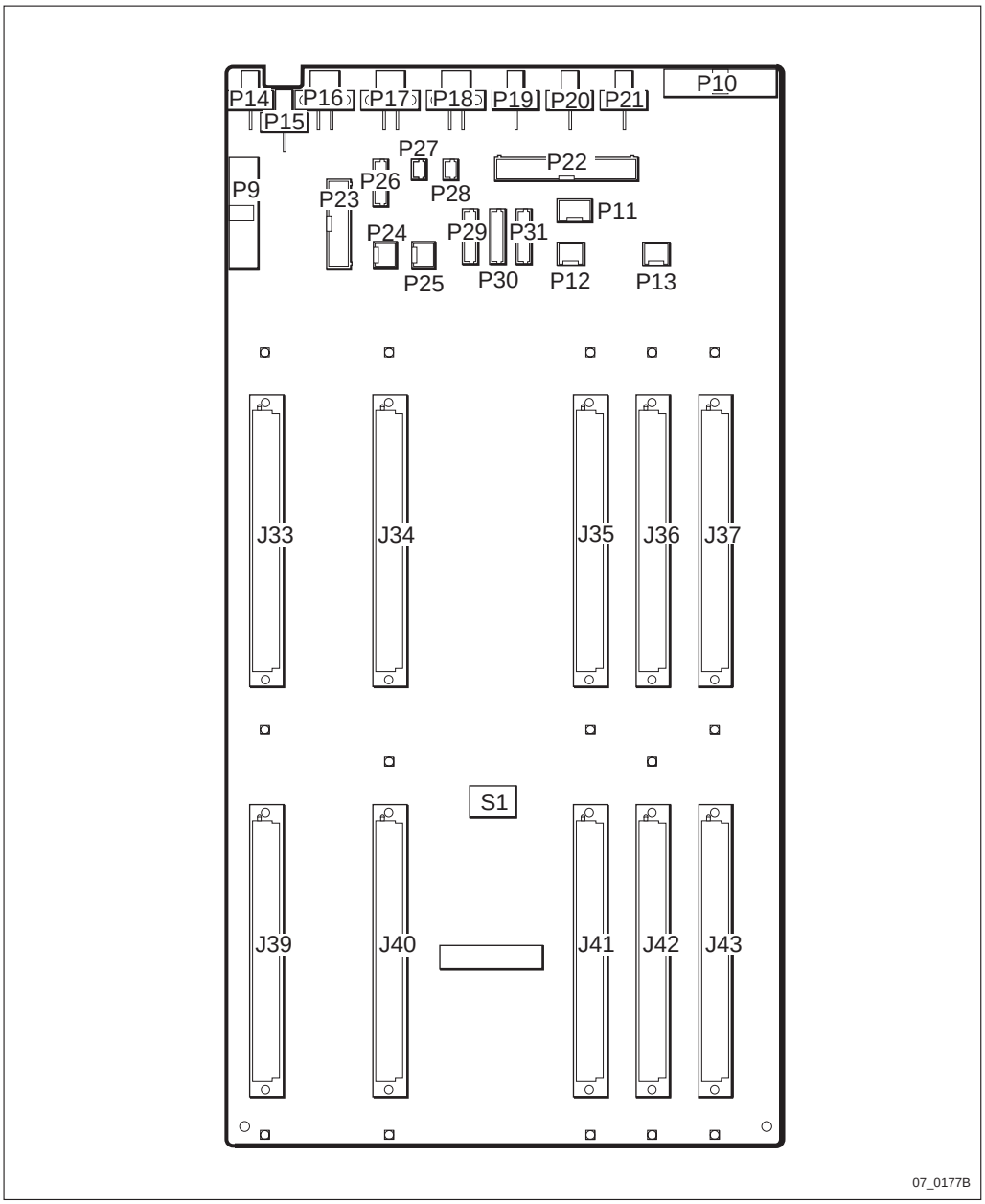

Figure 109 DXU/ECU backplane connections

Table 29 DXU/ECU backplane cable connections

A-End Connection	← Cable Number →	B-End Connection
120 Ω bus termination	← ROA 117 2130/1 →	P9
P7 TRU backplane (Local bus)	← RPM 513 696/02180 →	P10
(Not used)		P11
(Not used)		P12
(Not used)		P13
24 V DC to ECU from IDM	← RPM 513 718/03000 →	P14
24 V DC to DXU from IDM fuse 14	← RPM 513 718/03000 →	P15
BFU 1 24 V DC and control	← RPM 513 872/02000 →	P16
BFU 2 24 V DC and control	← RPM 513 872/01700 →	P17
(Not used)		P18
24 V DC to FXU 1 from IDM fuse 6	← RPM 513 718/01700 →	P19
24 V DC to FXU 2 from IDM fuse 14	← RPM 513 718/03000 →	P20
24 V DC to FXU 3 from IDM fuse 13	← RPM 513 718/02710 →	P21
ACB alarm	← RPM 513 1140/01500 →	P22
Heat exchanger	← RPM 513 1154/0200 →	P23
Temp sensor 1	← RPM 513 425/1 →	P24
Temp sensor 2	← RPM 513 425/1 →	P25
Humidity sensor	← RPM 513 743/00700 →	P26
2 Pin jumper (self terminated)	← RPM 513 1151 →	P27
Door alarm from ACB	← RPM 513 1150/02250 →	P28
FCU 1	← RPM 513 738/0200 →	P29
FCU 2	← RPM 513 738/0200 →	P30
(Not used)		P31

13.6 IDM

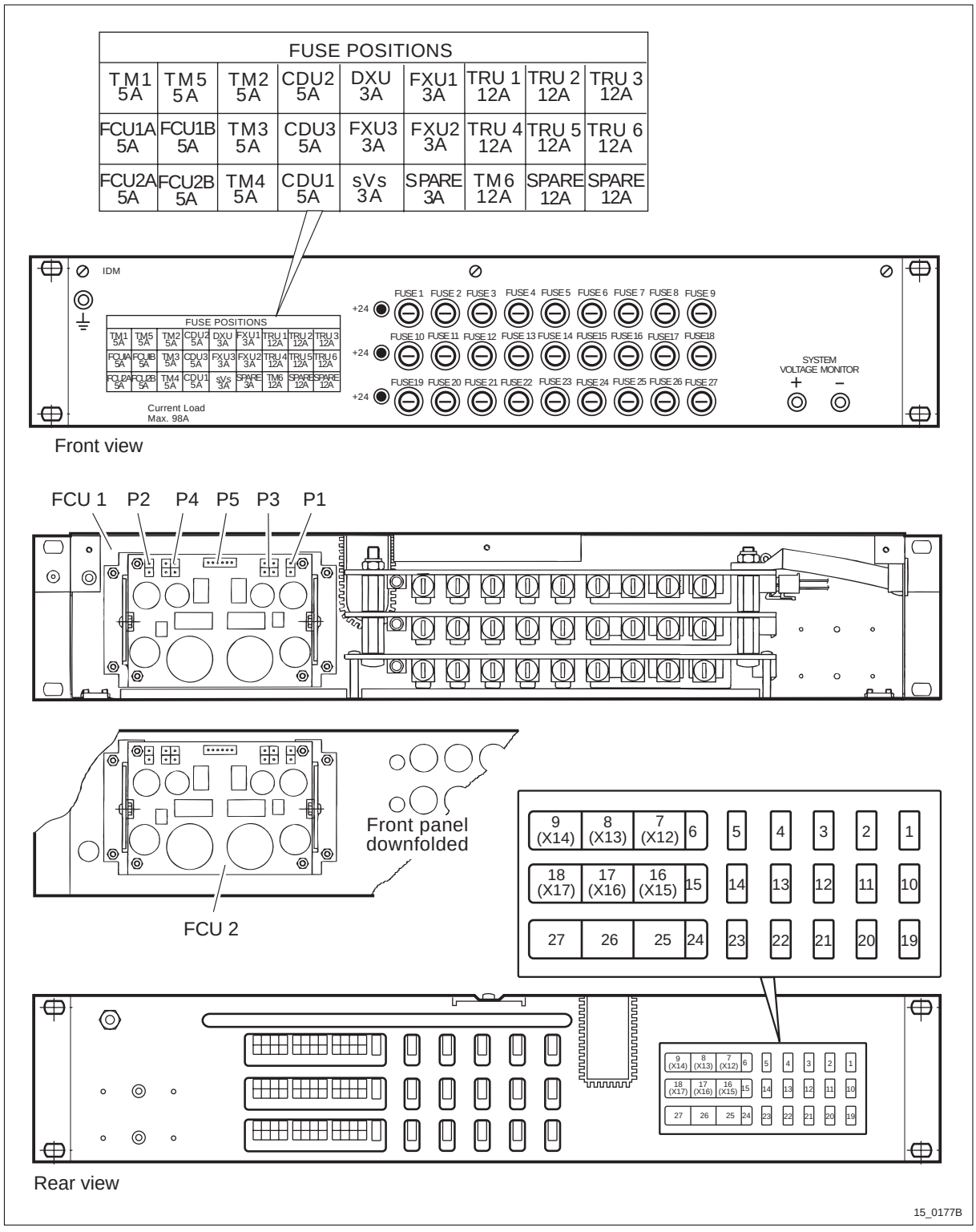

Figure 110 IDM

Table 30 IDM cable connections

A-End Connection	← Cable Number →	B-End Connection		
Patch panel DC 1	← RPM 513 1135/01700 →	1	TM 1	5 A
Patch panel DC 5	← RPM 513 1135/01700 →	2	TM 5	5 A
Patch panel DC 2	← RPM 513 1135/01700 →	2	TM 2	5 A
DC in connector CDU 2	← RPM 513 718/02700 →	4	CDU 2	5 A
DXU/ECU backplane P15	← RPM 513 718/03000 →	5	DXU	3 A
DXU/ECU backplane P19	← RPM 513 718/03000 →	6	FXU 1	3 A
TRU backplane T1	← RPM 513 715/01100 →	7	TRU 1	12 A
TRU backplane T2	← RPM 513 715/01100 →	8	TRU 2	12 A
TRU backplane T3	← RPM 513 715/01100 →	9	TRU 3	12 A
FCU 1 P1	← RPM 513 718/00300 →	10	FCU 1A	5 A
FCU 1 P2	← RPM 513 718/00300 →	11	FCU 1B	5 A
Patch panel DC 3	← RPM 513 1135/01700 →	12	TM 3	5 A
DC in connector CDU 3	← RPM 513 718/02700 →	13	CDU 3	5 A
DXU/ECU backplane P21	← RPM 513 718/03000 →	14	FXU 3	3 A
TRU backplane P20	← RPM 513 718/03000 →	15	FXU 2	3 A
TRU backplane T4	← RPM 513 715/01100 →	16	TRU 4	12 A
TRU backplane T5	← RPM 513 715/01100 →	17	TRU 5	12 A
TRU backplane T6	← RPM 513 715/01100 →	18	TRU 6	12 A
FCU 1 P1	← RPM 513 718/00300 →	19	FCU 2A	5 A
FCU 1 P2	← RPM 513 718/00300 →	20	FCU 2B	5 A
Patch panel DC 4	← RPM 513 1135/01700 →	21	TM 4	5 A
DC in connector CDU 1	← RPM 513 718/02700 →	22	CDU 1	5 A
DXU/ECU backplane P14	← RPM 513 718/03000 →	23	sVs	3 A
(Not used)		24	SPARE	3 A
Patch panel DC 6	← RPM 513 1159/01700 →	25	TM 6	12 A
(Not used)		26	SPARE	12 A
(Not used)		27	SPARE	12 A

13.7 TRU backplane

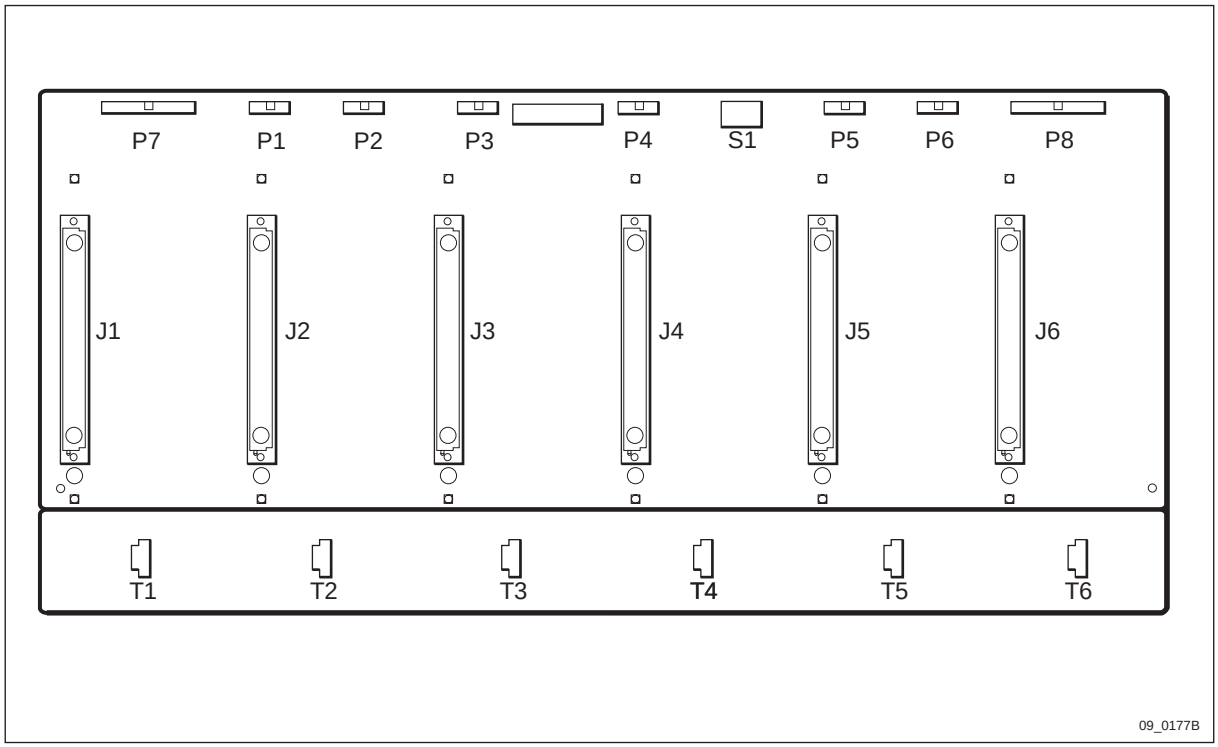

Figure 111 TRU backplane

Table 31 TRU backplane cable connections

A-End Connection	←Cable Number →	B-End Connection
(Not used)		P1
CDU 1 CDU bus	←RPM 513 717/02000 →	P2 (jumper to P1)
(Not used)		P3
CDU 2 CDU bus	←RPM 513 717/02000 →	P4 (jumper to P3)
(Not used)		P5
CDU 3 CDU bus	←RPM 513 717/02000 →	P6 (jumper to P5)
P10 on DXU/ECU backplane (Local bus)	←RPM 513 696/02180 →	P7
120 Ω bus termination	←ROA 117 2130/1 →	P8
CDU 1 Pfwd1	←RPM 513 703/02000 →	J1 top
CDU 1 Prefl1	←RPM 513 703/02000 →	J1 bottom
CDU 1 Pfwd2	←RPM 513 703/02000 →	J2 top
CDU 1 Prefl2	←RPM 513 703/02000 →	J2 bottom
CDU 2 Pfwd1	←RPM 513 703/02000 →	J3 top
CDU 2 Prefl1	←RPM 513 703/02000 →	J3 bottom
CDU 2 Pfwd2	←RPM 513 703/02000 →	J4 top
CDU 2 Prefl2	←RPM 513 703/02000 →	J4 bottom
CDU 3 Pfwd1	←RPM 513 703/02000 →	J5 top
CDU 3 Prefl1	←RPM 513 703/02000 →	J5 bottom
CDU 3 Pfwd2	←RPM 513 703/02000 →	J6 top
CDU 3 Prefl2	←RPM 513 703/02000 →	J6 bottom
DC power from IDM fuse 7 (TRU 1)	←RPM 513 715/01100 →	T1 DC power for TRU 1
DC power from IDM fuse 8 (TRU 2)	←RPM 513 715/01100 →	T2 DC power for TRU 2
DC power from IDM fuse 9 (TRU 3)	←RPM 513 715/01100 →	T3 DC power for TRU 3
DC power from IDM fuse 16 (TRU 4)	←RPM 513 715/01100 →	T4 DC power for TRU 4
DC power from IDM fuse 17 (TRU 5)	←RPM 513 715/01100 →	T5 DC power for TRU 5
DC power from IDM fuse 18 (TRU 6)	←RPM 513 715/01100 →	T6 DC power for TRU 6

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14 Positioning of RUs

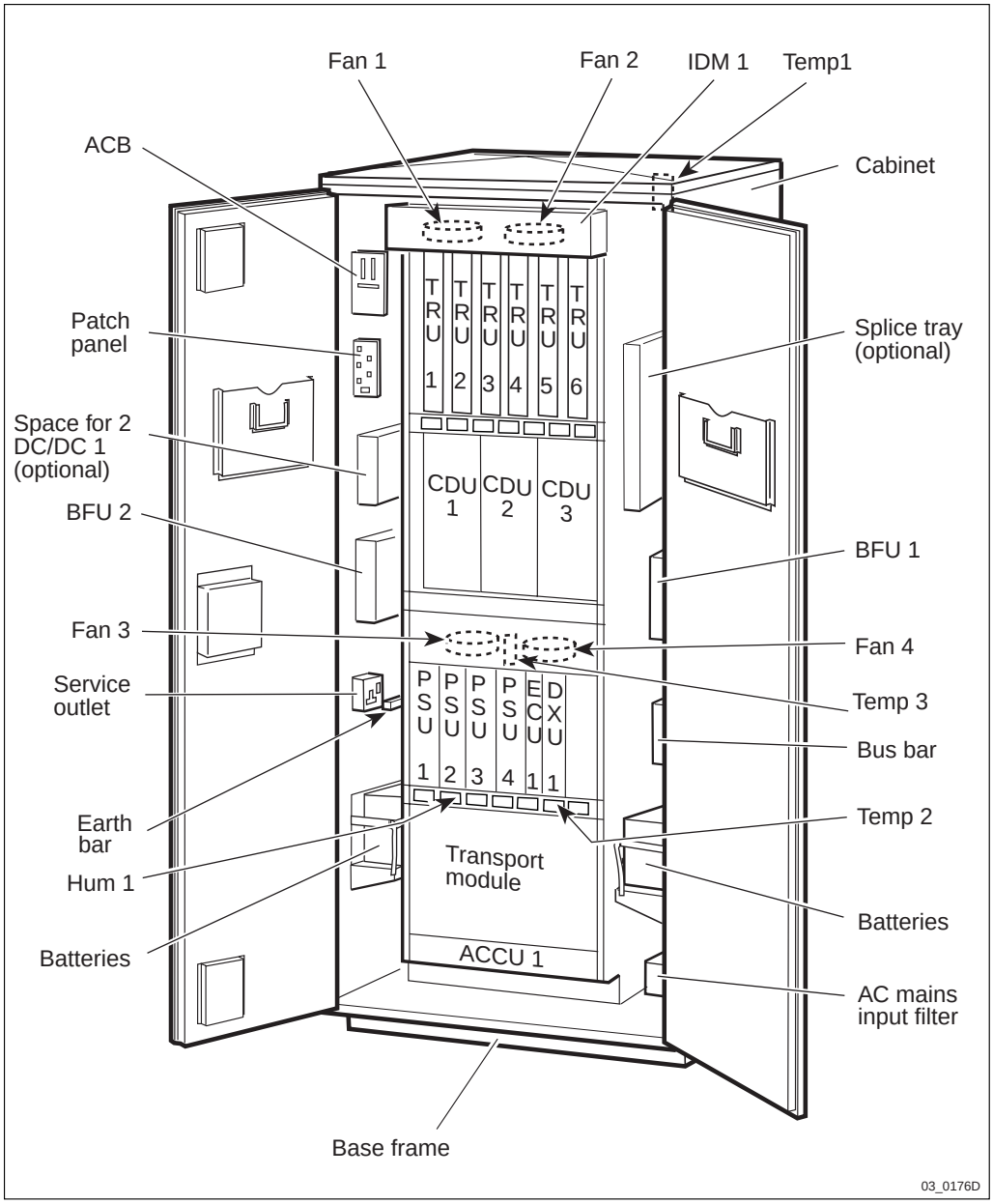

Figure 112 Positioning of RUs

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15 Frequency Lists

This chapter gives frequency lists for GSM 900, GSM 1800 and GSM 1900.

15.1 GSM 900

To find the frequency of a given ARFCN, use the table at the end of this section. Not all ARFCNs for GSM 900 are listed. To calculate the frequency for an ARFCN which is not shown, go to the nearest ARFCN below it which ends in either 5 or 0, find the difference between the two numbers and add the appropriate MHz.

E-GSM 900

E-GSM 900 covers the primary frequency band as well as the extended frequency band for GSM 900.

- 880.2 – 914.8 MHz, RX (uplink)
- 925.2 – 959.8 MHz, TX (downlink)

P-GSM 900

P-GSM 900 covers the primary frequency band for GSM 900.

- 890.2 – 914.8 MHz, RX (uplink)
- 935.2 – 959.8 MHz, TX (downlink)

Calculation Example

To find the TX and RX frequencies for ARFCN 64, follow the steps in the table below:

Table 32 ARFCN calculation example for GSM 900

Action		RX (uplink)	TX (downlink)
1	Find the frequencies for ARFCN 60 in the ARFCN table (ARFCN 60 is the closest one shown below ARFCN 64)	902.000	947.000
2	Add the differential frequency from the differential frequency table 64 – 60 = 4. Add 0.800 MHz	0.800	0.800
3	Add the values to get the correct ARFCN frequencies	902.800	947.800

Table 33 ARFCN differential frequencies for GSM 900

ARFCN difference	Differential frequency
1	0.200
2	0.400
3	0.600
4	0.800

Frequency List for E-GSM 900

Table 34 ARFCN frequencies for E-GSM 900

ARFCN	RX (uplink)	TX (downlink)		ARFCN	RX (uplink)	TX (downlink)
975	880.200	925.200		35	897.000	942.000
976	880.400	925.400		40	898.000	943.000
977	880.600	925.600		45	899.000	944.000
978	880.800	925.800		50	900.000	945.000
979	881.000	926.000		55	901.000	946.000
984	882.000	927.000		60	902.000	947.000
989	883.000	928.000		65	903.000	948.000
994	884.000	929.000		70	904.000	949.000
999	885.000	930.000		75	905.000	950.000
1004	886.000	931.000		80	906.000	951.000
1009	887.000	932.000		85	907.000	952.000
1014	888.000	933.000		90	908.000	953.000
1019	889.000	934.000		95	909.000	954.000
1023	889.800	934.800		100	910.000	955.000
0	890.000	935.000		105	911.000	956.000
1	890.200	935.200		110	912.000	957.000
5	891.000	936.000		115	913.000	958.000
10	892.000	937.000		120	914.000	959.000
15	893.000	938.000		121	914.200	959.200
20	894.000	939.000		122	914.400	959.400
25	895.000	940.000		123	914.600	959.600
30	896.000	941.000		124	914.800	959.800

Frequency List for P-GSM 900

Table 35 ARFCN frequencies for P-GSM 900

ARFCN	RX (uplink)	TX (downlink)		ARFCN	RX (uplink)	TX (downlink)
1	890.200	935.200		65	903.000	948.000
2	890.400	935.400		70	904.000	949.000
3	890.600	935.600		75	905.000	950.000
4	890.800	935.800		80	906.000	951.000
5	891.000	936.000		85	907.000	952.000
10	892.000	937.000		90	908.000	953.000
15	893.000	938.000		95	909.000	954.000
20	894.000	939.000		100	910.000	955.000
25	895.000	940.000		105	911.000	956.000
30	896.000	941.000		110	912.000	957.000
35	897.000	942.000		115	913.000	958.000
40	898.000	943.000		120	914.000	959.000
45	899.000	944.000		121	914.200	959.200
50	900.000	945.000		122	914.400	959.400
55	901.000	946.000		123	914.600	959.600
60	902.000	947.000		124	914.800	959.800

15.2 GSM 1800

To find the frequency of a given ARFCN, use the table at the end of this section. Not all ARFCNs for GSM 1800 are listed. To calculate the frequency for an ARFCN which is not shown, go to the nearest ARFCN below it which ends in either 6 or 1, find the difference between the two numbers and add the appropriate MHz.

Calculation Example

To find the TX and RX frequencies for ARFCN 764, follow the steps in the table below:

Table 36 ARFCN calculation example for GSM 1800

Action		RX (uplink)	TX (downlink)
1	Find the frequencies for ARFCN 761 in the ARFCN table (ARFCN 761 is the closest one shown below ARFCN 764)	1760.000	1855.000
2	Add the differential frequency from the differential frequncy table 764 – 761 = 3. Add 0.600 MHz	0.600	0.600
3	Add the values to get the correct ARFCN frequencies	1760.600	1855.600

Table 37 ARFCN differential frequencies for GSM 1800

ARFCN difference	Differential frequency
1	0.200
2	0.400
3	0.600
4	0.800

Frequency List for GSM 1800

Table 38 ARFCN frequencies for GSM 1800

ARFCN	RX (uplink)	TX (downlink)	ARFCN	RX (uplink)	TX (downlink)
512	1710.200	1805.200	701	1748.000	1843.000
513	1710.400	1805.400	706	1749.000	1844.000
514	1710.600	1805.600	711	1750.000	1845.000
515	1710.800	1805.800	716	1751.000	1846.000
516	1711.000	1806.000	721	1752.000	1847.000
521	1712.000	1807.000	726	1753.000	1848.000
526	1713.000	1808.000	731	1754.000	1849.000
531	1714.000	1809.000	736	1755.000	1850.000
536	1715.000	1810.000	741	1756.000	1851.000
541	1716.000	1811.000	746	1757.000	1852.000
546	1717.000	1812.000	751	1758.000	1853.000
551	1718.000	1813.000	756	1759.000	1854.000
556	1719.000	1814.000	761	1760.000	1855.000
561	1720.000	1815.000	766	1761.000	1856.000
566	1721.000	1816.000	771	1762.000	1857.000
571	1722.000	1817.000	776	1763.000	1858.000
576	1723.000	1818.000	781	1764.000	1859.000

ARFCN	RX (uplink)	TX (downlink)	ARFCN	RX (uplink)	TX (downlink)
581	1724.000	1819.000	786	1765.000	1860.000
586	1725.000	1820.000	791	1766.000	1861.000
591	1726.000	1821.000	796	1767.000	1862.000
596	1727.000	1822.000	801	1768.000	1863.000
601	1728.000	1823.000	806	1769.000	1864.000
606	1729.000	1824.000	811	1770.000	1865.000
611	1730.000	1825.000	816	1771.000	1866.000
616	1731.000	1826.000	821	1772.000	1867.000
621	1732.000	1827.000	826	1773.000	1868.000
626	1733.000	1828.000	831	1774.000	1869.000
631	1734.000	1829.000	836	1775.000	1870.000
636	1735.000	1830.000	841	1776.000	1871.000
641	1736.000	1831.000	846	1777.000	1872.000
646	1737.000	1832.000	851	1778.000	1873.000
651	1738.000	1833.000	856	1779.000	1874.000
656	1739.000	1834.000	861	1780.000	1875.000
661	1740.000	1835.000	866	1781.000	1876.000
666	1741.000	1836.000	871	1782.000	1877.000
671	1742.000	1837.000	876	1783.000	1878.000
676	1743.000	1838.000	881	1784.000	1879.000
681	1744.000	1839.000	882	1784.200	1879.200
686	1745.000	1840.000	883	1784.400	1879.400
691	1746.000	1841.000	884	1784.600	1879.600
696	1747.000	1842.000	885	1784.800	1879.800

15.3 GSM 1900

To find the frequency of a given ARFCN, use the table at the end of this section. Not all ARFCNs for GSM 1900 are listed. To calculate the frequency for an ARFCN which is not shown, go to the nearest ARFCN below it which ends in either 6 or 1, find the difference between the two numbers and add the appropriate MHz.

Calculation Example

To find the TX and RX frequencies for ARFCN 764, follow the steps in the table below:

Table 39 ARFCN calculation example for GSM 1900

Action		RX (uplink)	TX (downlink)
1	Find the frequencies for ARFCN 761 in the ARFCN table (ARFCN 761 is the closest one shown below ARFCN 764)	1900.000	1980.000
2	Add the differential frequency from the differential frequncy table 764 – 761 = 3. Add 0.600 MHz	0.600	0.600
3	Add the values to get the correct ARFCN frequencies	1900.600	1980.600

Table 40 ARFCN differential frequencies for GSM 1900

ARFCN difference	Differential frequency
1	0.200
2	0.400
3	0.600
4	0.800

Frequency List for GSM 1900

Table 41 ARFCN frequencies for GSM 1900

ARFCN	RX (uplink)	TX (downlink)	ARFCN	RX (uplink)	TX (downlink)
512	1850.200	1930.200	666	1881.000	1961.000
513	1850.400	1930.400	671	1882.000	1962.000
514	1850.600	1930.600	676	1883.000	1963.000
515	1850.800	1930.800	681	1884.000	1964.000
516	1851.000	1931.000	686	1885.000	1965.000
521	1852.000	1932.000	691	1886.000	1966.000
526	1853.000	1933.000	696	1887.000	1967.000
531	1854.000	1934.000	701	1888.000	1968.000
536	1855.000	1935.000	706	1889.000	1969.000
541	1856.000	1936.000	711	1890.000	1970.000
546	1857.000	1937.000	716	1891.000	1971.000
551	1858.000	1938.000	721	1892.000	1972.000
556	1859.000	1939.000	726	1893.000	1973.000
561	1860.000	1940.000	731	1894.000	1974.000
566	1861.000	1941.000	736	1895.000	1975.000
571	1862.000	1942.000	741	1896.000	1976.000
576	1863.000	1943.000	746	1897.000	1977.000

ARFCN	RX (uplink)	TX (downlink)		ARFCN	RX (uplink)	TX (downlink)
581	1864.000	1944.000		751	1898.000	1978.000
586	1865.000	1945.000		756	1899.000	1979.000
591	1866.000	1946.000		761	1900.000	1980.000
596	1867.000	1947.000		766	1901.000	1981.000
601	1868.000	1948.000		771	1902.000	1982.000
606	1869.000	1949.000		776	1903.000	1983.000
611	1870.000	1950.000		781	1904.000	1984.000
616	1871.000	1951.000		786	1905.000	1985.000
621	1872.000	1952.000		791	1906.000	1986.000
626	1873.000	1953.000		796	1907.000	1987.000
631	1874.000	1954.000		801	1908.000	1988.000
636	1875.000	1955.000		806	1909.000	1989.000
641	1876.000	1956.000		807	1909.200	1989.200
646	1877.000	1957.000		808	1909.400	1989.400
651	1878.000	1958.000		809	1909.600	1989.600
656	1879.000	1959.000		810	1909.800	1989.800
661	1880.000	1960.000				

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16 Country Codes

This chapter gives all country codes being used.

Table 42 Country codes

Code	Country
AD	Andorra
AE	United Arab Emirates
AF	Afghanistan
AG	Antigua and Barbuda
AI	Anguilla
AL	Albania
AM	Armenia
AN	Netherlands Antilles
AO	Angola
AQ	Antarctica
AR	Argentina
AS	American Samoa
AT	Austria
AU	Australia
AW	Aruba
AZ	Azerbaijan
BA	Bosnia-Herzegovina
BB	Barbados
BD	Bangladesh
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BH	Bahrain
BI	Burundi
BJ	Benin
BM	Bermuda
BN	Brunei
BO	Bolivia
BR	Brazil
BS	Bahamas
BT	Bhutan
BV	Bouvet Island
BW	Botswana

Code	Country
BY	Belarus
BZ	Belize
CA	Canada
CC	Cocos Islands
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Côte d'Ivoire
CK	Cook Islands
CL	Chile
CM	Cameroon
CN	China
CO	Colombia
CR	Costa Rica
CU	Cuba
CV	Cape Verde
CX	Christmas Island
CY	Cyprus
CZ	Czech Republic
DE	Germany
DJ	Djibouti
DK	Denmark
DM	Dominica
DO	Dominican Republic
DZ	Algeria
EC	Ecuador
EE	Estonia
EG	Egypt
EH	Western Sahara
ES	Spain
ET	Ethiopia
FI	Finland
FJ	Fiji
FK	Falkland Islands
FM	Micronesia
FO	Faeroe Islands
FR	France

Code	Country
GA	Gabon
GB	United Kingdom
GD	Grenada
GE	Georgia
GF	French Guyana
GG	Guernsey, C.I.
GH	Ghana
GI	Gibraltar
GL	Greenland
GM	Gambia
GN	Guinea
GP	Guadeloupe
GQ	Equatorial Guinea
GR	Greece
GT	Guatemala
GU	Guam
GW	Guinea-Bissau
GY	Guyana
HK	Hong Kong
HM	Heard and McDonald
HN	Honduras
HR	Croatia
HT	Haiti
HU	Hungary
ID	Indonesia
IE	Ireland
IL	Israel
IM	Isle of Man
IN	India
IO	British Indian Ocean Territory
IQ	Iraq
IR	Iran
IS	Iceland
IT	Italy
JE	Jersey, C.I.
JM	Jamaica
JO	Jordan

Code	Country
JP	Japan
KE	Kenya
KG	Kyrgyzstan
KH	Cambodia
KI	Kiribati
KM	Comoros
KN	St Christopher and Nevis
KP	Korea, North
KR	Korea, South
KW	Kuwait
KY	Cayman Islands
KZ	Kazakhstan
LA	Lao People’s Democratic Republic
LB	Lebanon
LC	St Lucia
LI	Liechtenstein
LK	Sri Lanka
LR	Liberia
LS	Lesotho
LT	Lithuania
LU	Luxembourg
LV	Latvia
LY	Libyan Arab Jamahiriya
MA	Morocco
MC	Monaco
MD	Moldova, Republic of
MG	Madagascar
MH	Marshall Islands
MK	Macedonia
ML	Mali
MM	Myanmar (formerly Burma)
MN	Mongolia
MO	Macao
MP	Northern Mariana Islands
MQ	Martinique
MR	Mauritania
MS	Montserrat

Code	Country
MT	Malta
MU	Mauritius
MV	Maldives
MW	Malawi
MX	Mexico
MY	Malaysia
MZ	Mozambique
NA	Namibia
NC	New Caledonia
NE	Niger
NF	Norfolk Island
NG	Nigeria
NI	Nicaragua
NL	Netherlands
NO	Norway
NP	Nepal
NR	Nauru
NT	Neutral Zone (between Saudi/Iraq)
NU	Niue
NZ	New Zealand
OM	Oman
PA	Panama
PE	Peru
PF	French Polynesia
PG	Papua New Guinea
PH	Philippines
PK	Pakistan
PL	Poland
PM	St. Pierre and Miquelon
PN	Pitcairn
PR	Puerto Rico
PT	Portugal
PW	Palau
PY	Paraguay
PZ	Panama Canal Zone
QA	Quatar
RE	Réunion

Code	Country
RO	Romania
RU	Russian Federation
RW	Rwanda
SA	Saudi Arabia
SB	Solomon Islands
SC	Seychelles
SD	Sudan
SE	Sweden
SG	Singapore
SH	St Helena
SI	Slovenia
SJ	Svalbard and Jan Mayen Islands
SK	Slovakia
SL	Sierra Leone
SM	San Marino
SN	Senegal
SO	Somalia
SR	Surinam
ST	Sao Tome and Principe
SV	El Salvador
SY	Syrian Arab Republic
SZ	Swaziland
TC	Turks and Caicos Islands
TD	Chad
TF	French Southern Territories
TG	Togo
TH	Thailand
TJ	Tajikistan
TK	Tokelau
TM	Turkmenistan
TN	Tunisia
TO	Tonga
TP	East Timor
TR	Turkey
TT	Trinidad and Tobago
TV	Tuvalu

Code	Country
TW	Taiwan
TZ	Tanzania
UA	Ukraine
UG	Uganda
UM	United States Minor Outlying Islands
US	United States
UY	Uruguay
UZ	Uzbekistan
VA	Vatican City States
VC	St Vincent and the Grenadines
VE	Venezuela
VG	Virgin Islands, British
VI	Virgin Islands, US
VN	Vietnam
VU	Vanuatu
WF	Wallis and Futuna Islands
WS	Samoa
YE	Yemen, Republic of
YU	Yugoslavia
ZA	South Africa
ZM	Zambia
ZR	Zaire
ZW	Zimbabwe

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17 Glossary

This glossary lists abbreviations and acronyms used in texts dealing with RBS 2000. 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.

Abis	GSM interface standard defining attributes of the communication between BSC and BTS.
AC	Alternating Current
ACB	Alarm Collection Board
ACCH	Associated Control CHannel
ACCU	Alternating Current Connection Unit
A/D converter	Analog to Digital converter

Air conditioner (Active cooler) One version of the climate unit.

AIS	Alarm Indication Signal
ALNA	Antenna Low Noise Amplifier
AO	Application Object
ARAE	Antenna Related Auxiliary Equipment
ARFCN	Absolute Radio Frequency Channel Number
ARU	Active Replaceable Unit
ASIC	Application Specific Integrated Circuit
Astra	ASIC in the TRU
AT	Alphanumeric Terminal
Batt	Battery
BB	Battery Box
BBS	Battery Backup Stand
BCCH	Broadcast Control CHannel Downlink only broadcast channel for broadcast of general information at a base station, on a base station basis.

BDM	Battery Distribution Module The BDM is an IDM with a battery and a local processor.
BER	Bit Error Rate
BFU	Battery Fuse Unit
BIAS-IC	BIAS Injector
Bm	Denotes a full rate traffic channel
BPC	Basic Physical Channel Denotes the air interface transport vehicle formed by repetition of one time slot on one or more radio frequency channels.
BS	Base Station
BSC	Base Station Controller GSM network node for control of one or more BTSs.
BSCSim	Base Station Controller Simulator
BSS	Base Station System GSM network logical unit comprising one BSC and one or more BTSs.
BTS	Base Transceiver Station GSM network unit operating on a set of radio frequency channels in one cell.
Burst	A portion of digital information, the physical content, that is transferred within the time interval of one time slot.
Cabinet	The physical housing of a base station.
CBCH	Cell Broadcast CHannel This is a downlink only channel used by the GSM defined SMSCB function.
CCCH	Common Control CHannel Channel combining the following common control channels: PCH Paging CHannel RACH Random Access CHannel AGCH Access Grant CHannel
CCU	Climate Control Unit

CDU	Combining and Distribution Unit
CE	Conformité Européenne
Cell	An area of radio coverage identified by the GSM network by means of the cell identity.
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	Control Module (for TMA)
CMD	Digital Radio Communication Tester
CME 20	Cellular Mobile Europe Ericsson GSM system - 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.
Compr	Compressor
CON	LAPD concentrator LAPD concentration is used to reduce the number of required physical links between the BSC and BTS.

Config	Configuration
Co-siting	Co-siting is to operate the radio base station in GSM together with the radio base station in Total Access Communication System (TACS) or Nordic Mobile Telephone system (NMT) on the same site by sharing common equipment.
CPU	Central Processing Unit
CSA	Canadian Standards Association
CSES	Consecutive Severely Errored Second
CSU	Channel Service Unit
CU	Combining Unit (RU in CDU_D)
Dannie	ASIC in the TRU
DB	DataBase
DC	Direct Current
DCC	Digital Cross Connector
DCCH	Dedicated Control CHannel Dedicated control channels carry signalling data.
DCS	Digital Communication System International standard for 1800 MHz based on the GSM standard.
DDTMA	Dual Duplexer Tower Mounted Amplifier This type needs only one combined TX/ RX feeder from the BTS to the TMA. –>DTMA –>RTMA –>TMA –>BTS
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	System Voltage Distribution Module
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	Digital Path
DPX	Duplexer
DS1	Digital Signal level 1 (1544 kbit/s)
DSP	Digital Signal Processor
DT	Data Transcript
DTMA	Duplex TMA DTMA is similar to the old ALNA except for different characteristics. –>DDTMA –>RTMA –>TMA
DU	Distribution Unit (RU in CDU_D)
DX	Direct Exchange
DXU	Distribution Switch Unit
DXX	Ericsson Cellular Transmission System including NMS
E1	Short for G.703 2048 kbit/s PCM link
E-GSM	Extended GSM
EACU	External Alarm Connection Unit
ECU	Energy Control Unit
EC1	External Condition Map Class 1
EC2	External Condition Map Class 2
EEPROM	Electrically Erasable Programmable Read-Only Memory
EMC	Electro Magnetic Compatibility
EMF	ElectroMotive Force
ENV	Environmental
ES	Errored Second
ESB	External Synchronization Bus
ESD	ElectroStatic Discharge
ESO	Ericsson Support Office
EXT	External

FACCH	Fast Associated Control CHannel Main signalling channel in association with a TCH.
FCC	Federal Communications Commission
FCCH	Frequency Correction CHannel
FCOMB	Filter COMBiner
FCU	Fan Control Unit
FDL	Facility Data Link
FER	Frame Erasure Ratio
FIU	Fan Interface Unit
FS	Function Specification
FSC	Field Support Centre
FU	Filter Unit (RU in CDU_D)
FUd	Filter Unit with duplexer (RU in CDU_D)
FXU	Future Expansion Unit
G01	MO model for RBS 200.
G12	MO model for RBS 2000.
GSM	Global System for Mobile communications International standard for a TDMA digital mobile communication system. Originally, GSM was an abbreviation for Group Special Mobile, which is a European mobile telecommunication interest group, established in 1982.
HCOMB	Hybrid COMBiner
HDLC	High level Data Link Control
HDSL	High bit rate Digital Subscriber Line
Heat Exchanger	One version of the climate unit
HEU	Heat Exchanger Unit
HLIN	High Level IN
HLOUT	High Level OUT
HMS	Heat Management System
Hum	Humidity

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).
IC	Integrated Circuit
ID	Identification
IDB	Installation DataBase
IDM	Internal Distribution Module
IEC	International Electric Commission
IMSI	International Mobile Subscriber Identity
INIT	Initial
INT	Internal
IR	InfraRed
IS	Interface Switch
IWD	InterWork Description
I1A	Internal Fault Map Class 1A
I1B	Internal Fault Map Class 1B
I2A	Internal Fault Map Class 2A
JTC	Joint Technical Committee
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.
Logical Channel	A logical channel represents a specified portion of the information carrying 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
LOF	Loss Of Frame
LOS	Loss Of Signal
Magazine	A magazine is a reserved space in the cabinet, which may hold one or more RUs.
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.
MHS	Modification Handling System Ericsson trouble report database
MMI	Man-Machine Interface
MO	Managed Object
MS	Mobile Station
MSC	Mobile services Switching Centre

	GSM network unit for switching, routing and controlling calls to and from the Public Switched Telephone Network (PSTN) and other networks.
MSTP	Mobile Station Test Point
Multidrop	Two or more RBSs are connected in a chain to the same transmission system. All the relevant timeslots are dropped out by each RBS. (This function is sometime called cascading.)
NMS	Ericsson Network Management System in DXX
Nominal Power	The nominal power is the power level defined when configuring the transceiver.
N terminal	Neutral terminal in a AC mains connection.
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
OML	Operation and Maintenance Link Layer 2 communication link for operation and maintenance services on Abis.
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
OVP	OverVoltage Protection
P-GSM	Primary GSM
Passive RU	A passive replaceable unit has a very low level of intelligence and is independent of the processor system.
PCH	Paging CHannel

	Downlink only subchannel of CCCH for system paging of MSs. -> CCCH
PCM	Pulse Code Modulation
PCS	Personal Communication Services
PE terminal	Protective Earth terminal in a AC mains connection.
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
PLMN	Public Land Mobile Network A network, established and operated by an administration or its licensed operator(s), for the specific purpose of providing land mobile communication services to the public. It provides communication possibilities for mobile users. For communication between mobile and fixed users, interworking with a fixed network is necessary.
PPE	Personal Protective Equipment
PREFL	Power Reflected
PSU	Power Supply Unit
PWU	Power 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

RBER	Radio Bit Error Ratio
RBS	Radio Base Station All equipment forming one or more Ericsson base stations. ->BTS
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
RFCH	Radio Frequency CHannel A radio frequency carrier with its associated bandwidth.
RFTL	Radio Frequency Test Loop
RLC	Repair Logistic Centre
R-state	Release state
RTMA	Receiver TMA RTMA has no duplexers. It is used for amplification of the RX signal. –>DDTMA –>DTMA –>TMA
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
RXD	Receiver Divider
RXDA	Receiver Divider Amplifier
RXLEV	Measure of signal strength as defined in GSM 05.08:8.1.4
RXQUAL	Measure of signal quality as defined in GSM 05.08:8.2.4
SACCH	Slow Associated Control CHannel
SCH	Synchronization CHannel
SDCCH	Stand alone Dedicated Control CHannel

	Main dedicated signalling channel on the air interface, mainly used for call locating and establishment.
SE	Supervised Entity
SES	Severely Errored Second
SIM	Subscriber Identity Module
SMS	Short Message Service (point to point) A short message, up to 160 alphanumeric characters long, can be sent to or from an MS (point to point).
SO	Service Object
SS	Swedish Standard
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.
SVS	System Voltage Sensor
SW	Software
SWR	Standing Wave Ratio
SYNC	Synchronous
T1	Transmission facility for DS1 (1544 kbit/s).
TA	Timing Advance A signal sent by the BTS to the MS which the MS uses to advance its timing of transmissions to the BTS to compensate for propagation delay.
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.
TDR	Time Domain Reflectometer
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 The Transport module is non-RBS equipment belonging to the transport network.
TMA	Tower Mounted Amplifier There are three types of TMAs: DTMA, RTMA and DDTMA. –>DTMA –>RTMA –>DDTMA
TN	Timeslot Number
TN O&M	Transport Network operation and Maintenance (in general).
Tora	ASIC in the TRU
TRA	Transcoder Rate Adapter The TRA Unit performs transcoding of speech information and rate adaption of data information.
Tracy	ASIC in the TRU
TRS	Transceiver System
TRU	Transceiver Unit
TRXC	Transceiver Controller
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
TU	Timing Unit
TX	Transmitter
TXA	Transmitter Antenna A
TXB	Transmitter Antenna B
TXBP	Transmitter BandPass filter
UAS	Unavailable Seconds
UL	Underwrither Laboratories
Uplink	Signalling direction, from the MS to the system.
UPS	Uninterrupted Power Supply
VCO	Voltage Controlled Oscillator
VSWR	Voltage Standing Wave Ratio RF signal measure. The quotient between transmitted and reflected power.
X bus	The X bus carries transmit air data frames between transceivers. This is used for baseband frequency hopping.