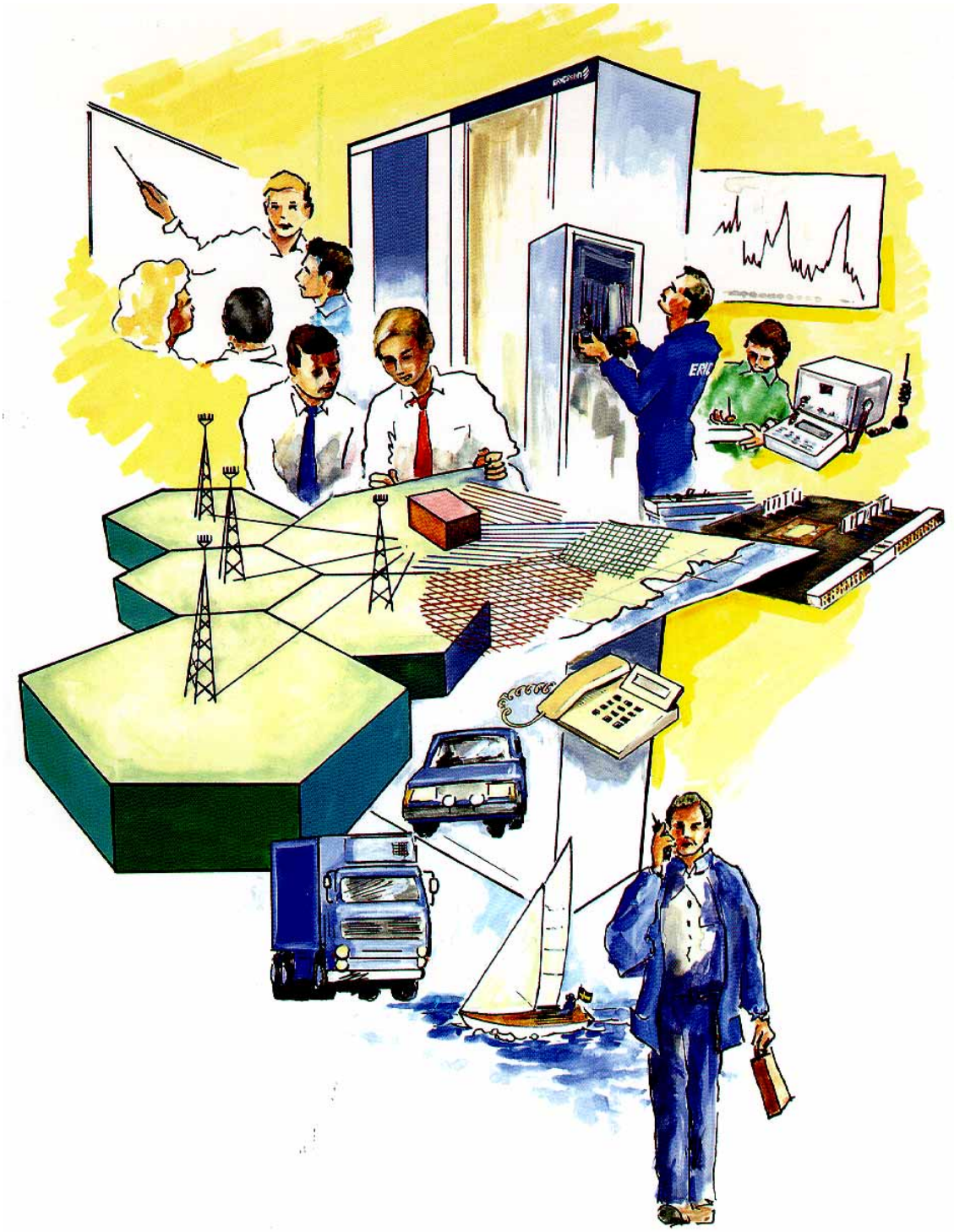

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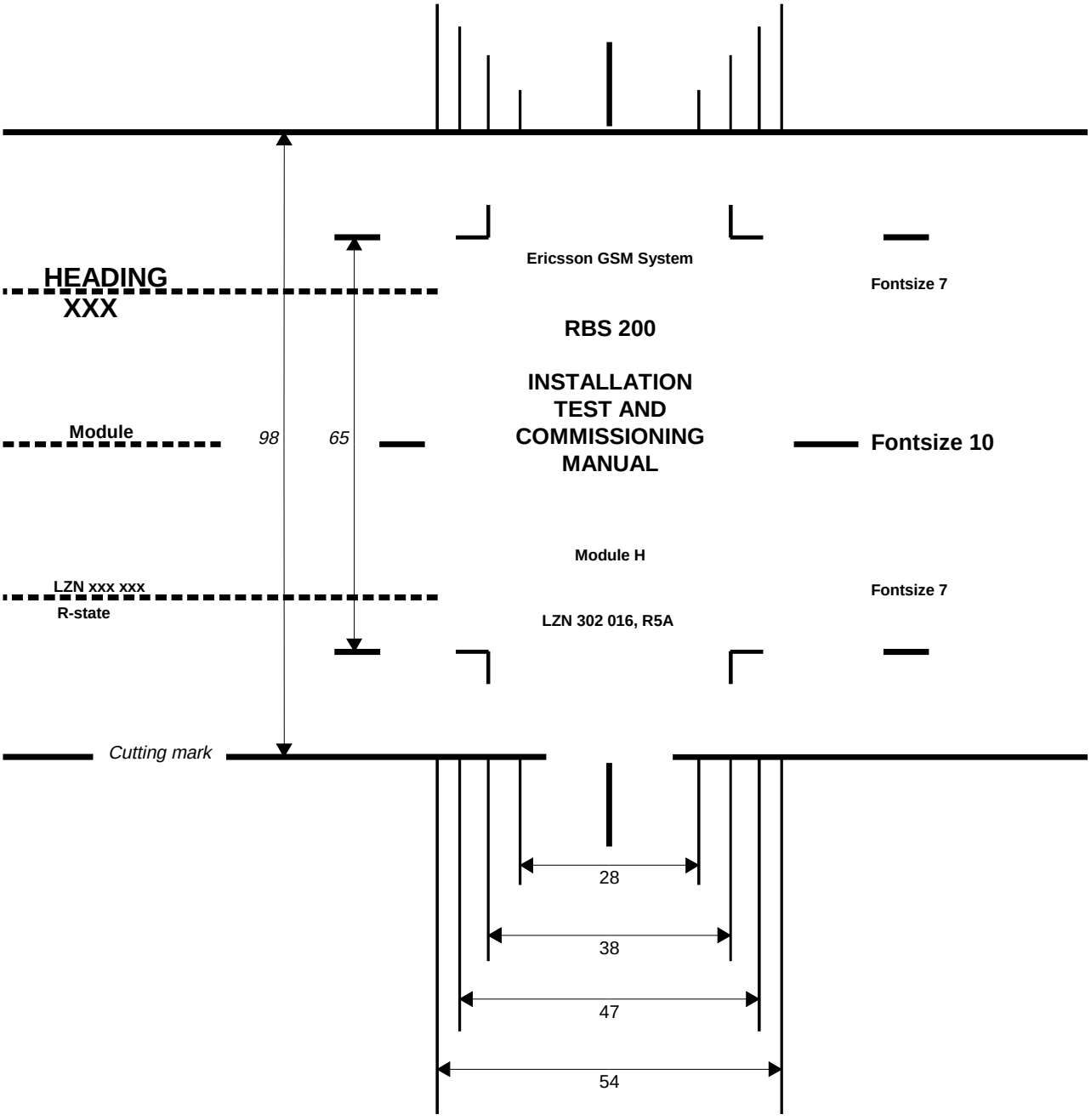

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RBS 200

INSTALLATION TEST AND COMMISSIONING MANUAL

Module H

LZN 302 016 R5A

Uppgjord — *Prepared*		Datum — *Date*	Rev	Dokumentnr — *Document no*
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Introduction

Contents **Page**

1 Introduction

The purpose of the Installation Test and Commissioning Manual is to guide the commissioning engineer through the following activities for the RBS 200 series:

- Performing installation inspection.
- Setting site unique, hardware parameters.
- Verifying RBS functions according to commissioning protocol.

The manual is valid for CME 20 R4, R5, R6 and BSS R7, R8.

R8 only supports SPU+/SPE and SPU++.

1.1 General Test Instructions

The tests apply to the Network Element Test on site. These tests can be divided into two types, with or without integration to the BSC.

Tests needing BSC integrated:

- Transmission Systems Test
- TRS System Test Using BSC
- ACU Test
- External Alarms Test
- TRS Extension Test

Tests with no BSC integrated:

- Installation Check
- Power System Test
- TRS System Test Using BSCSim
- Antenna System Test

Specific site data, as well as which tests to do, should be prepared by project management and recorded in the Market Dependent Special Instructions, see Appendix.

Each sub-test shall be made in accordance with the corresponding Test Instructions document. Test results shall be recorded in the corresponding Test Record, see Appendix.

When all tests have been made on a site, collect all Test Records as well as the plots from the antenna measurements that have been made. Make a copy of them. Put the copy in *Site Documents (C-Module)* and send the original to the nearest Ericsson document archive for filing.

The Test Record shall include the following:

- RBS Test Results
- Faults in the RBS found during the tests
- Statement declaring whether the test passed or failed
- Reference to Trouble reports/Fault reports
- Changes made in RBS hardware or software
- Need for retest

1.2 Trouble Reports/Fault Reports

If the tester finds missing information, or faults in the tests, he shall make a report in Trouble Report EN/LZT 120 384. The Trouble Report can be found in chapter Appendix.

1.3 Audience

The manual is written for commissioning engineers with the following knowledge and skills:

- Basic experience of

  Radio technique

  Telephony technique

  Transmission technique
- General experience of

  Measuring procedures
- Knowledge of RBS acquired through Ericsson training courses

  CME 20 System Survey

  RBS 200 Commissioning and First Line Maintenance

1.4 Scope of Work

State at the beginning of the Installation Test:

- All RBS equipment correctly installed
- All site services available
- Power cables, antenna cables and PCM link cables correctly terminated

State after completed commissioning:

- RBS connected to the Base Station Controller (BSC) and ready for integration

Safety

Contents

1 Safety

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.

All personnel must know how to break the voltage supply to the site.

1.1 Warnings

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

Figure 1 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 and electricity-related hazards.

Three different common hazard symbols are used:

Figure 2 Radio frequency radiation

Figure 3 Electrical hazard

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.

1.2 Notes

Note Notes are used to call the readers attention to key points that might otherwise be overlooked.

1.3 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.

1.3.1 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 mucuous membranes severe enough to endanger life or cause permanent injury. Particles penetrating the skin through wounds or abrasions are liable to cause chronic ulcerations.

1.3.2 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.

1.3.3 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.

1.3.4 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.

1.3.5 Power Transistors, Diodes and Thyristors

WARNING

Do not carry loose components in pockets, bags or containers, nor 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 manufacturers 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 hande for normal replacement purposes.

1.3.6 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.

1.3.7 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.

1.3.8 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.

1.4 Electricity-Related Hazards

1.4.1 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 be carried out by a qualified and certified electrician.
- Remove wrist watch, rings, bracelets, and so forth.
- Switch off the power if the cabinet is damp inside.
- Prevent damp entering the equipment during work in bad weather conditions.

1.4.2 Faulty Electric Tools

WARNING

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

1.4.3 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 LTB 1032, when drilling where live wires might be hidden.
- Always use eye protectors (goggles) such as 25072 (goggles in the Common Tool Kit LTT 601 044/1 when drilling. Flying chips and dust may get into eyes.

1.4.4 Thunderstorms

DANGER

Avoid working on electrical installations or in 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.

1.4.5 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, and so forth. 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 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.

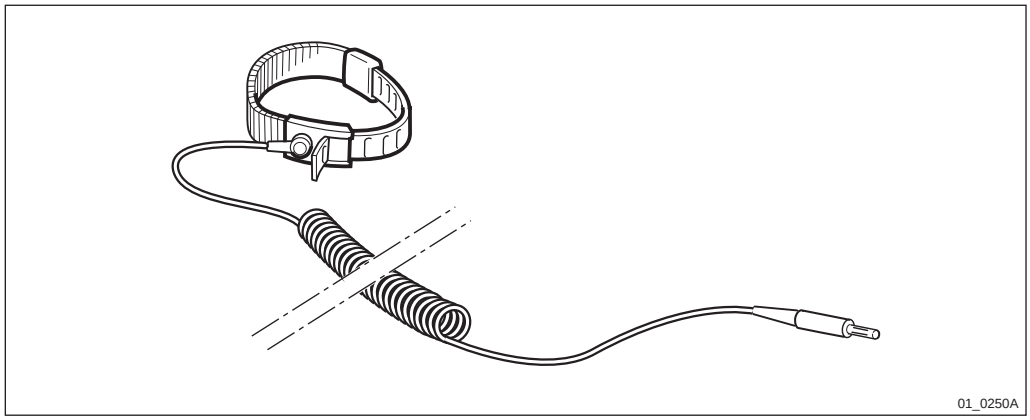

Figure 4 ESD wrist strap LYB 250 01/14

DANGER

To avoid potentially fatal circuits through the body to earth, wrist strap connections must include a resistor of at least 2 Mohm. Test the wrist strap regularly.

1.5 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.

1.5.1 General Precautions

When working with batteries:

- Remove wrist watchs, rings, bracelets, and so forth.
- Use insulated tools.
- Make sure that eye wash facilities, or portable eye wash equipment, are available prior to starting work.

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

- Rubber gloves and aprons
- Eye protection (goggles or a face shield)

1.5.2 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.

1.5.3 Explosive Gases

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

1.5.4 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 section Hazardous Waste Material from Leaks.

1.5.5 Hazardous Waste Material from Leaks

Ensure that there are sufficient absorbents or neutralizing material 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 absorbents and neutralizing materials must be suitable for the hazardous substances involved.

Table 1 Typical neutralizers

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

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

1.6 Working at Heights

WARNING

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

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

- Always use safety belt and safety helmet.
- Adequate protective clothing is essential in cold weather.
- All lifting devices must be tested and approved.
- Personnel working at heights require a medical certificate for such work.
- During work on a mast, all personnel in the area must wear helmets.

1.7 Radio Frequency Radiation

CAUTION

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

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

1.8 Other Hazards

1.8.1 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 degrees between the straps at the point where they are attached to the lifting hook.

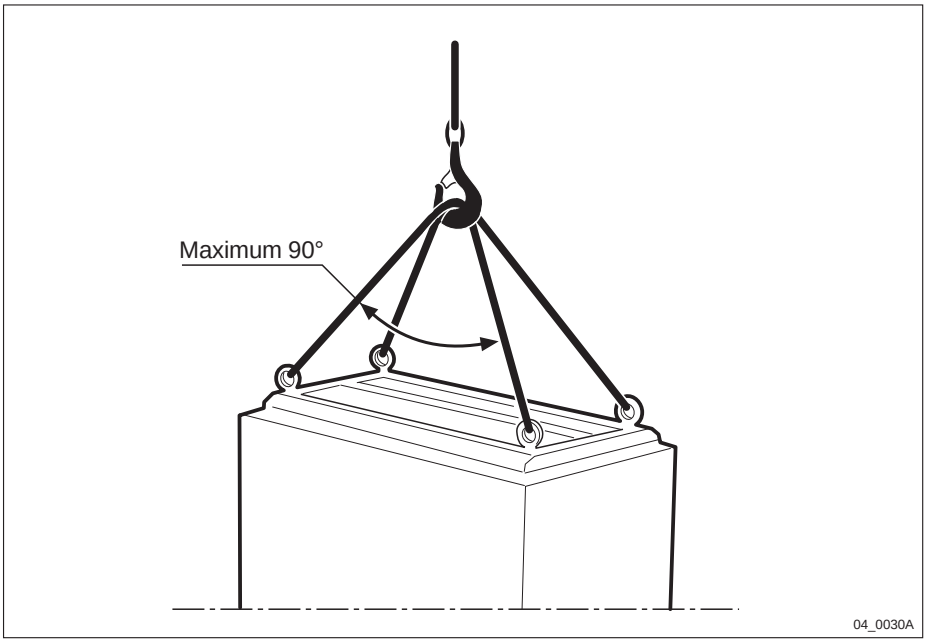

Figure 5 Use long straps

- 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.

1.8.2 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.
- Minimise 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.

1.8.3 Labels on the RBS Indoor Cabinet

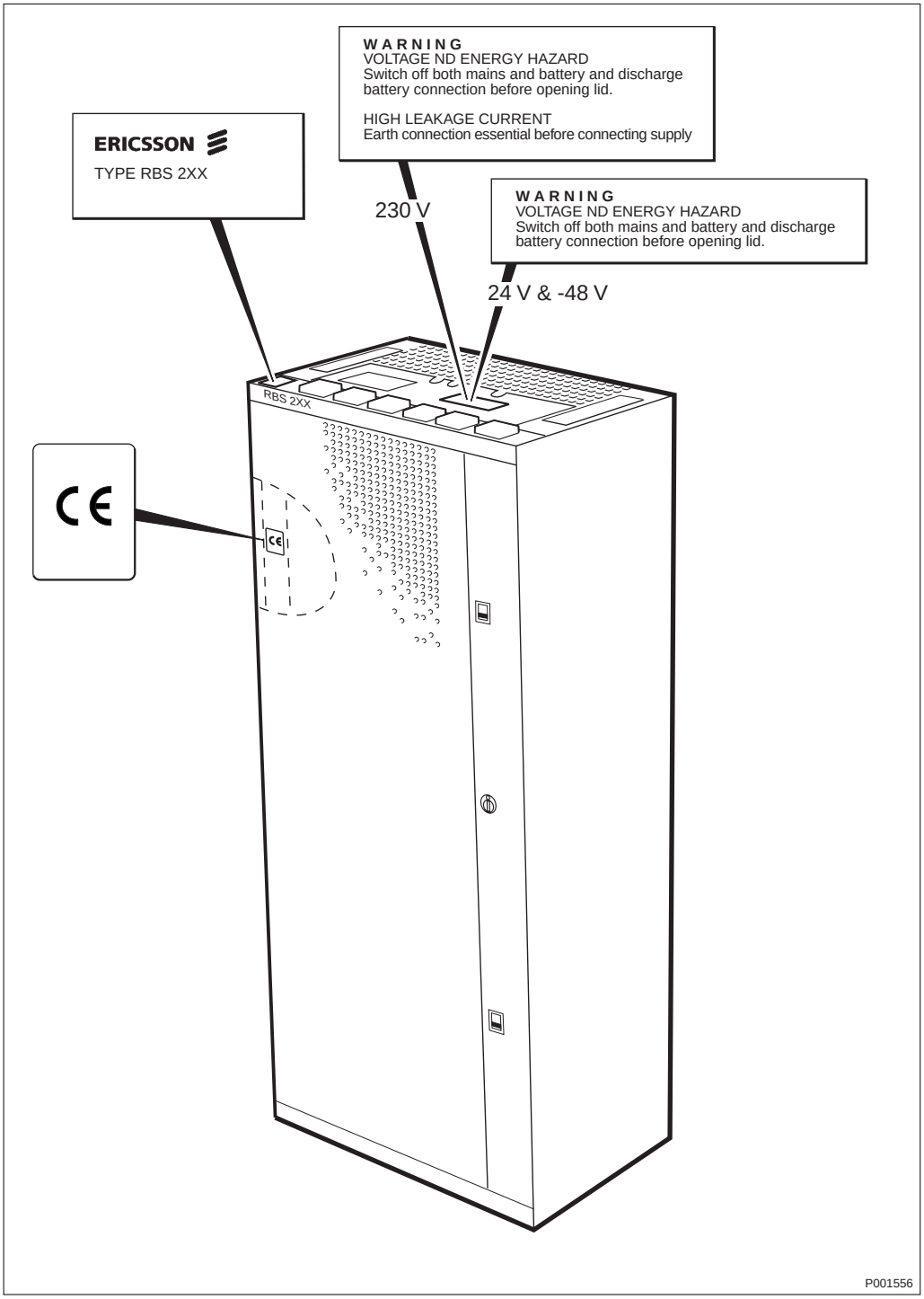

Figure 6

Test Team Equipment

Contents **Page**

1 Test Team Equipment

1.1 Introduction

A standard nodetest has been compiled for the RBS 200, RBS 200 MCC and RBS 205. The complete Test Team Equipment that is to be used during these tests is listed in this document.

1.1.1 Instrument Selection

Test instruments to be used in field activities are selected to be compatible with instruments used by the Design Department and by the factory. By this, complicated faults observed during testing of RBS 200,RBS 200 MCC and RBS 205 can, when necessary, be reproduced and investigated by the Design Department.

All test instruments shall be of lightweight type and easy to carry.

Note Only instruments that are year 2000 compliant are to be used.

1.2 Test Team Equipment Parts List

The following is a Parts List for ordering sets of Test Team Equipment for the RBS 200, RBS 200 MCC and RBS 205.

Table 1 Test team equipment, RBS 200/200MCC/205

Figure	Description	Product Number
1	BSCSim II	LPP 106 35/nn
2	Test Mobile Station kit, TEMS kit	LPB 123 013/2
3	System Test tool FIOL	KDY 196 56/1
4	System Test tool LMT	KDY 196 58/2
5	Compasses	ZTY 203 26/nn
6	Antenna Tester	LPK 102 101/4
7	Testing Aid, Bias Tee Box	LPC 102 272/01
8	Multimeter	LPK 102 024/2
9	Clip-On Ammeter set	LPK 102 039/1
10	Test Unit for External Alarms	LPK 102 025/1
11	Alarm Collection Unit Tester	LPK 102 038/1
12	Power Divider	LPY 107 349/1
13	Attenuator	LPY 107 350/1
14	Attenuator	LPY 107 351/1
15	Cable	RPM 113 761

16	Cable	RPM 513 718/ 03000
17	Cable	NTZ 112 294
18	Cable	RPM 113 764/01
19	Anti-Static Bracelet	LYB 250 01/14
20	Accessories	LTR 171 01/3
21	Tool Set (with common tools)	LTT 601 107/1

1.2.1 Base Station Controller Simulator, BSCSim II: LPP 106 35/nn

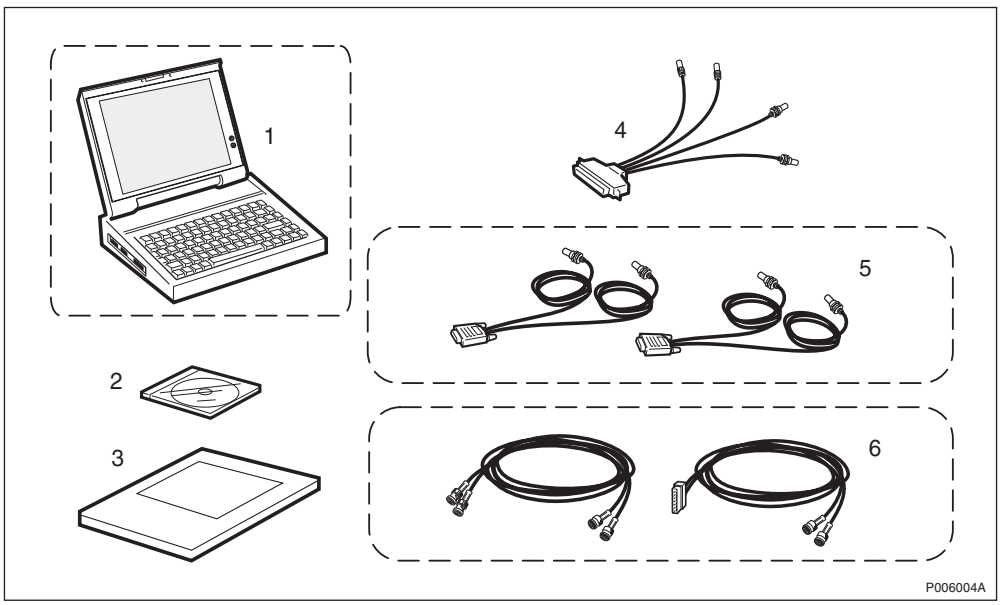

Figure 1 BSCSim II (LPP 106 35/nn)

Table 2 BSC Simulator II kit specification (LPP 106 35/10)

Item	Description	Qty	Product number
1	PC Platform FieldWorks	1	KDV 120 1050
2	RBS Test Tools Software	1	LZY 213 1123/1
3	BSCSim II User's Guide	1	EN/LZT 123 2771/1
4	PCM Communication Kit	1	KDV 120 1048
5	Cable Kit RBS 2000	1	KDY 196 82/1
6	Cable Kit RBS 2302/2401	1	KDY 196 85/1

Table 3 BSC Simulator II kit specification (LPP 106 35/11)

Item	Description	Qty	Product number
1	PC Platform Dolch (1)	1	KDV 120 1080/1
2	RBS Test Tools Software	1	LZY 213 1123/1
3	BSCSim II User's Guide	1	EN/LZT 123 2771/1
4	PCM Communication Kit	1	KDV 120 1048
5	Cable Kit RBS 2000	1	KDY 196 82/1
6	Cable Kit RBS 2302/2401	1	KDY 196 85/1

The three cables in item 3 make the cable kit KDY 196 81/3.

1.2.2 TEMS Mobile Station kit, TEMS kit: LPB 123 013/2

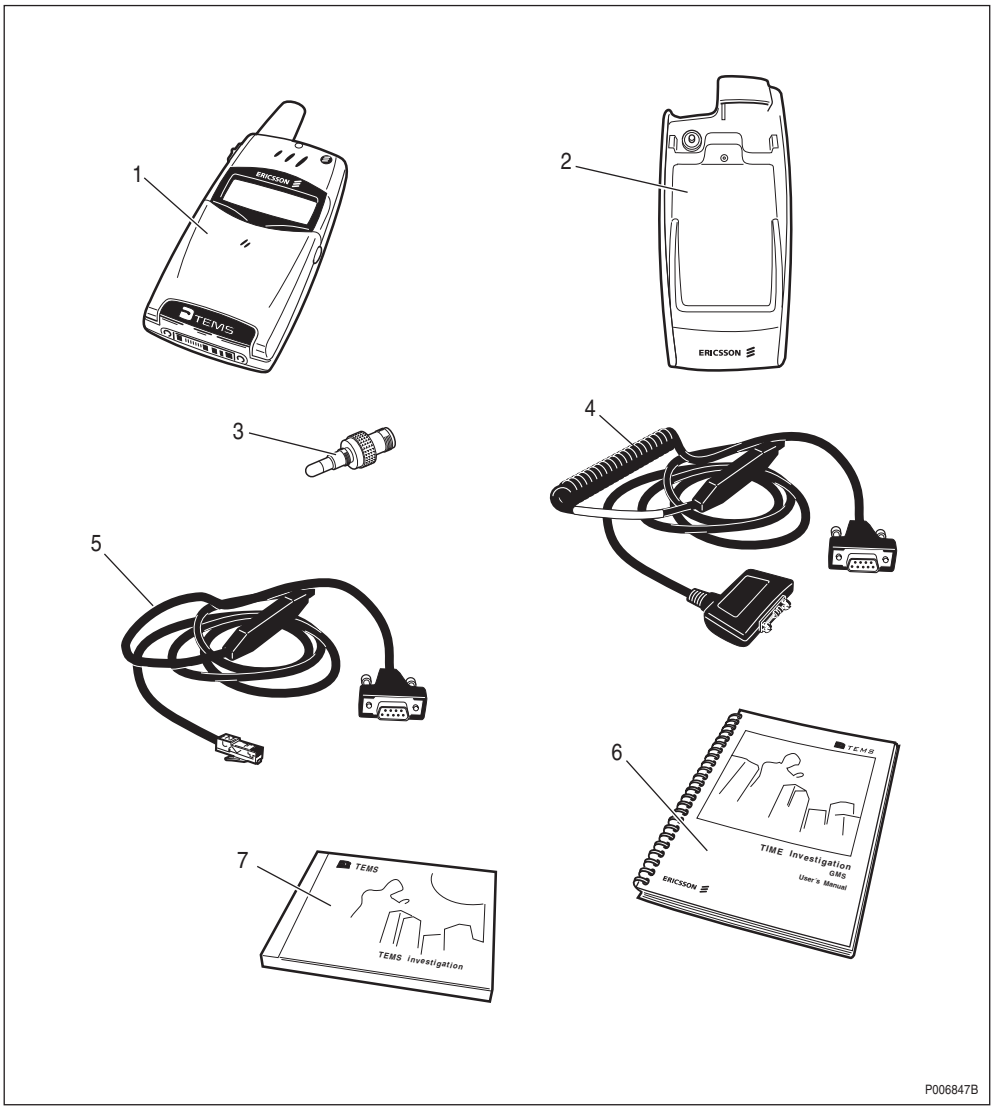

Figure 2 Test Mobile Station kit

Table 4 TEMS kit specification (LPB 123 013/2)

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

1.2.3 System Test Set, FIOL: KDY 196 56/1

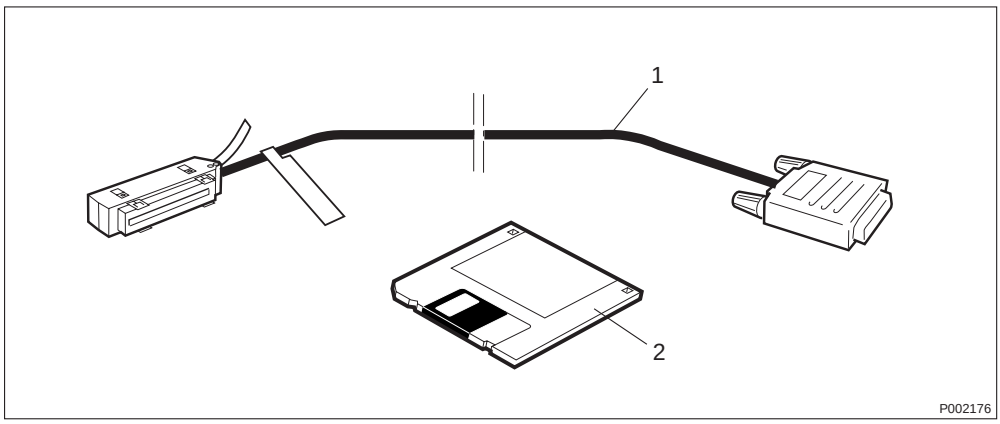

Figure 3 System test set, FIOL

Table 5 Contents of system test set, FIOL

Item	Description	Specification	Product No.	Qty
1	Cable	9-pole D-sub jack to Euroconnector	RPM 113 564	1
2	FIOL software	Latest available version	LZY 214 003/2	1

1.2.4 System Test Set, LMT: KDY 196 58/2

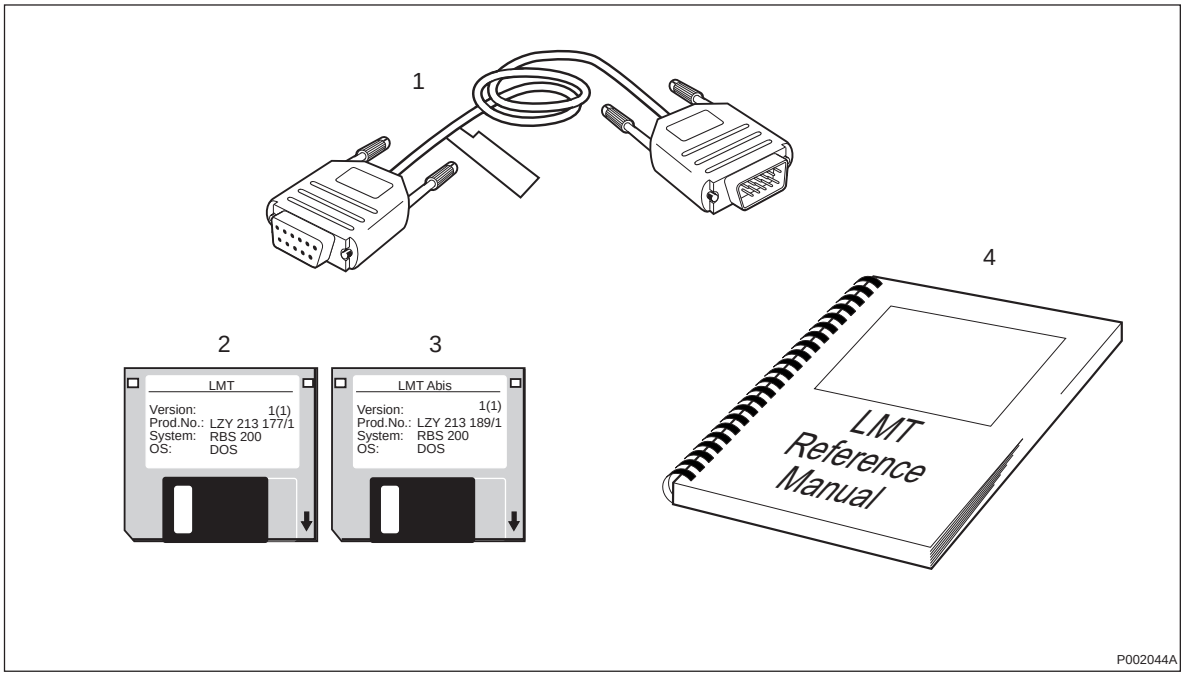

Figure 4 System test set, LMT

Table 6 System test set, LMT

Item	Description	Specification	Product No.	Qty
1	Cable	9-pole D-sub plug to 9-pole D-sub jack	RPM 113 463	1
2	LMT software	Latest available version	LZY 213 177/1	1
3	LMT Abis	Latest available version	LZY 213 189/1	1
4	Printed Matter	Reference Manual	EN/LZT 123 3742	1

For the above mentioned system test sets we recommend using a portable and battery-operated computer with the following minimum configuration:

- 486 processor
- 4 MByte RAM
- 120 Mbyte HD
- 2 serial ports
- 1 parallel port
- 1 mouse port

- VGA monochrome monitor
- Battery pack and carrier bag
- DOS software (ver. 6.2)
- Windows software (ver 3.1)
- Trackball Mouse

1.2.5 Compasses: ZTY 203 26/nn

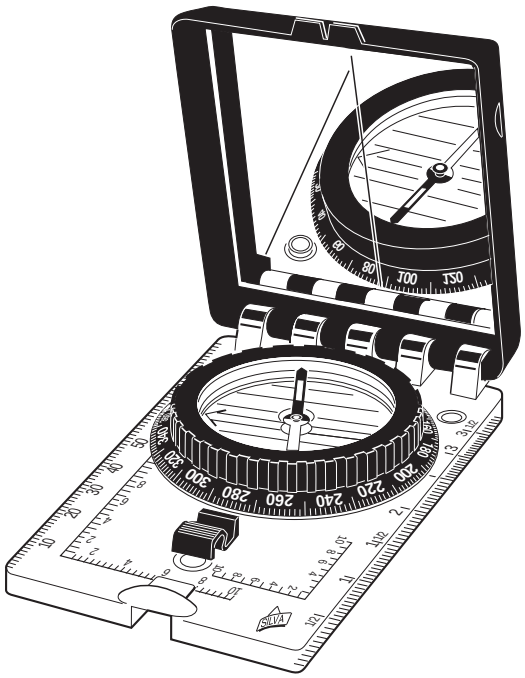

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Figure 5 Compass

Table 7 Available compasses

Item	Description	Specification	Product No.	Qty
1	Compass	SILVA Ranger, Northern Hemisphere	ZTY 203 26/1	1
2	Compass	SILVA Ranger, Equatorial	ZTY 203 26/2	1
3	Compass	SILVA Ranger, Southern Hemisphere	ZTY 203 26/3	1
4	Compass	SILVA Ranger, 15 TDCL	ZTY 203 26/4	1

Note These compasses can be bought from Ericsson, But we recommend that they are bought locally.

1.2.6 Antenna Tester: LPK 102 101/4

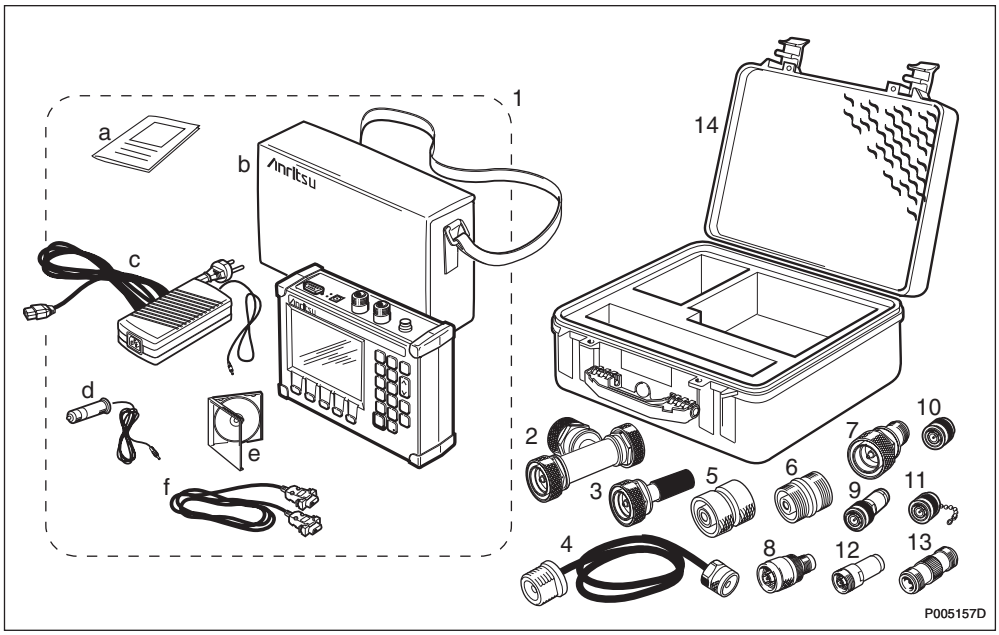

Figure 6 Antenna tester

Table 8 LPK 102 101/4 kit specification

Item	Description	Qty	Product Number
1	Site Master, Anritsu S251B	1	-
a	• Operating Manual	1	
b	• Soft Carrying Case	1	
c	• AC-DC Adapter	1	
d	• Cigarette Lighter/12 V DC Adapter	1	
e	• Site Master SW for PC, CD-ROM	1	
f	• Serial Interface Cable	1	
2	Precision 7/16 Type Short/Open/Load	1	-
3	Standard 7/16 Type Load	1	-
4	Test Port Extension Cable, N plug to 7/16 jack 1.5 m	2	-
5	Adapter 7/16 plug to 7/16 plug	2	-
6	Adapter 7/16 jack to 7/16 jack	2	-
7	Adapter 7/16 plug to N jack	1	-
8	Adapter N plug to TNC jack	1	-
9	TNC Load plug	1	-
10	TNC Short plug	1	-
11	TNC Open plug	1	-
12	Standard N Type Load jack	1	-
13	Adapter N jack to N jack	1	-
14	Transit Case for Site Master	1	-

1.2.7 Testing Aid, Bias Tee Box: LPC 102 272/01

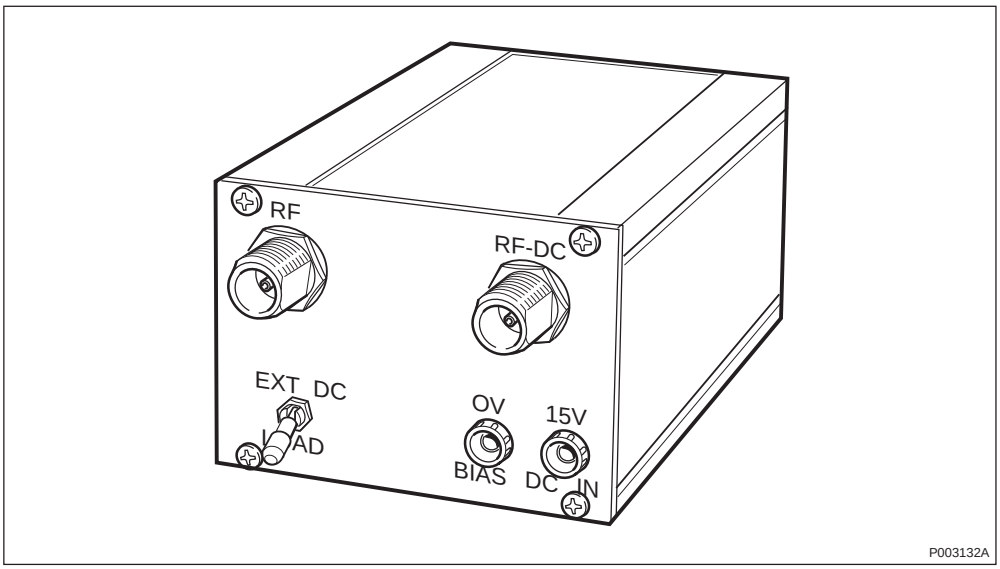

Figure 7 Bias tee box

Table 9 Bias tee box

Item	Description	Specification	Product No.	Qty
1	Testing Aid	Bias Tee Box	LPC 102 272/01	1

1.2.8 AC Equipment

Table 10 AC equipment

Item	Description	Specification	Product No.	Qty
1	Battery eliminator 15 V, >500 m A	Should match the voltage and type of power outlet of the country in question	-	1
2	AC distribution box with 15 m cable	Should match the voltage and type of power outlet of the country in question	-	1

Note These items can be bought locally.

1.2.9 Multimeter: LPK 102 024/2

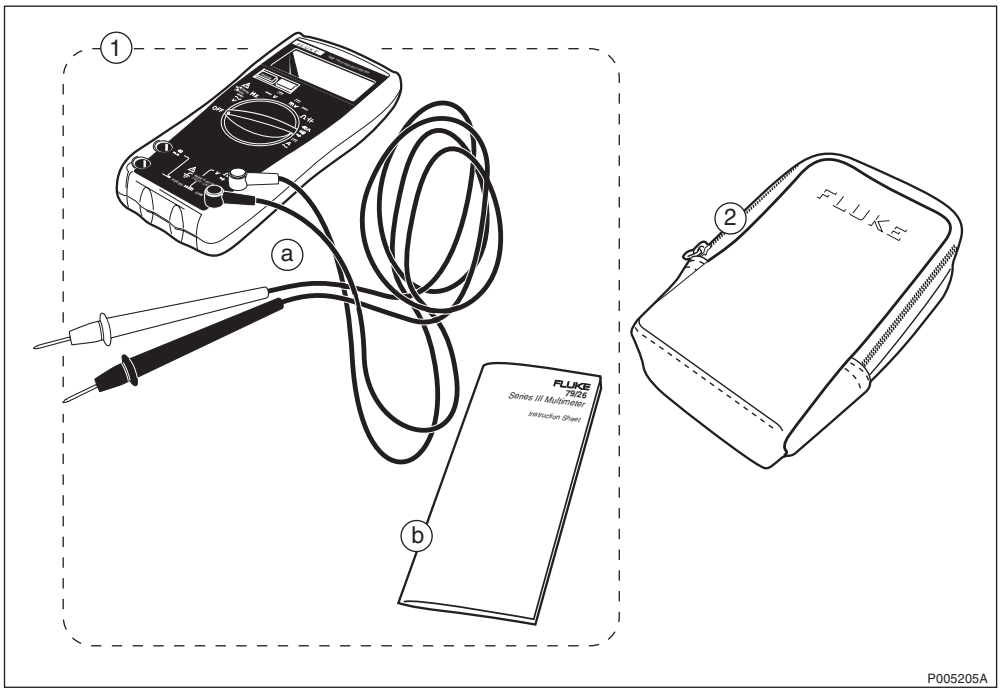

Figure 8 Multimeter

Table 11 Contents of multimeter set

Item	Description	Specification	Product No.	Qty
1	Instrument	Fluke	Fluke 79 lll	1
a	Test Leads			
b	Instruction Sheet			
2	Soft Case		Fluke C25	1

1.2.10 Clip-On Ammeter: LPK 102 039/1

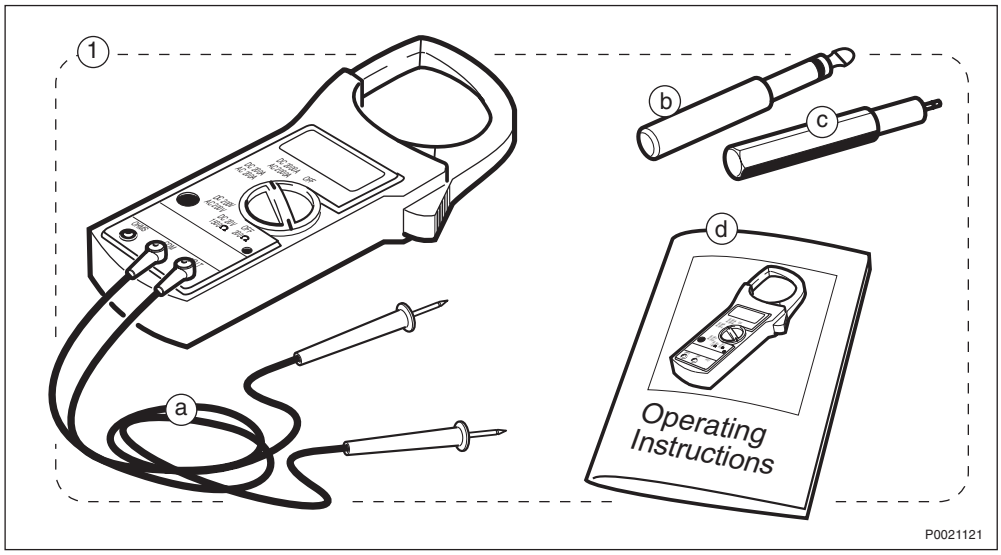

Figure 9 Clip-on ammeter

Table 12 Contents of clip-on ammeter set

Item	Description	Specification	Product No.	Qty
1	Instrument	Kyoritso	KEW 2003	1
a	Test Leads			
b	Plug for Ouutput Jack			
c	Zero Adjust Screwdriver			
d	Operating Instructions			

1.2.11 Test Unit for External Alarms: LPK 102 025/1

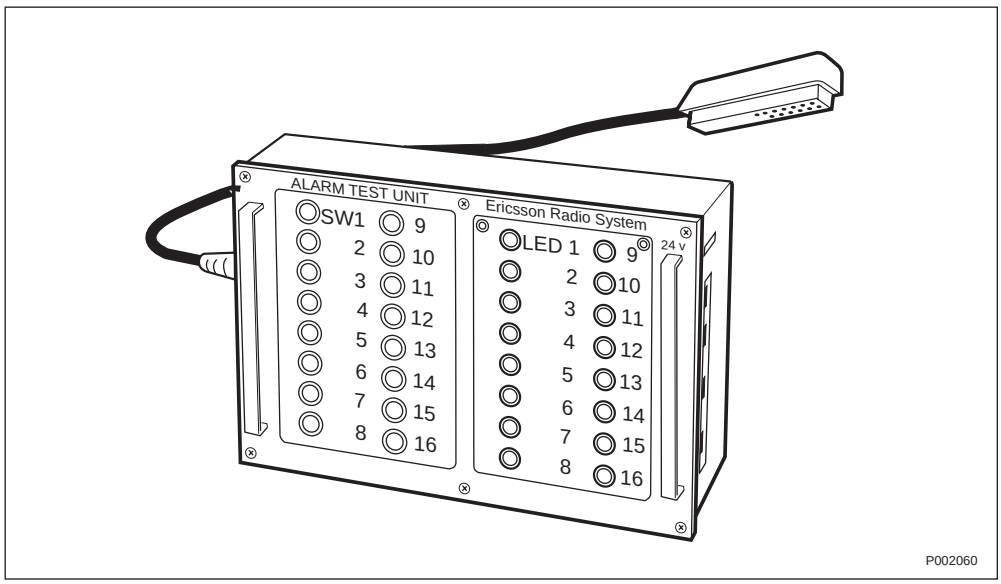

Figure 10 Test unit for external alarms

Table 13 Test unit for external alarms

Description	Specification	Product No.	Qty
Test Box	Alarm Test Unit for RBS 200	LPK 102 025/1	1

1.2.12 Alarm Collection Unit Tester: LPK 102 038/1

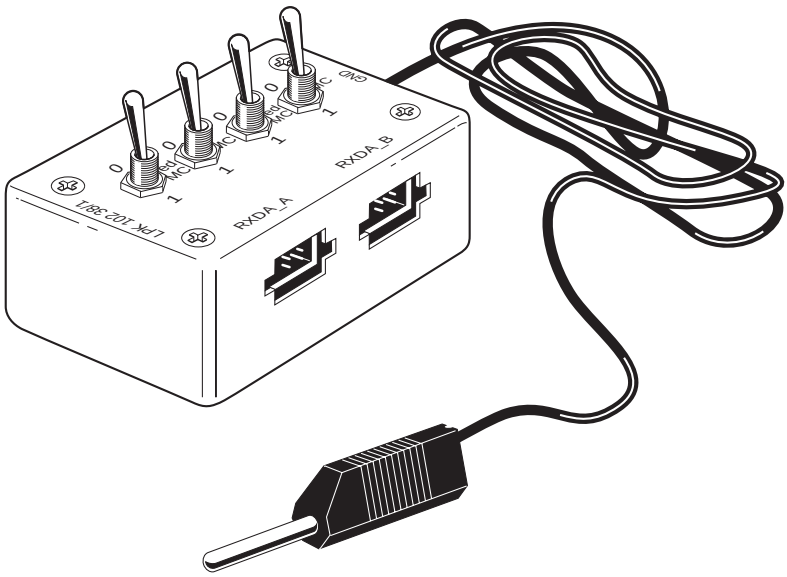

Figure 11 Alarm collection unit tester

Table 14 Alarm collection unit tester

Description	Specification	Product No.	Qty
Test Box	ACU Tester	LPK 102 038/1	1

1.2.13 Power Divider: LPY 107 349/1

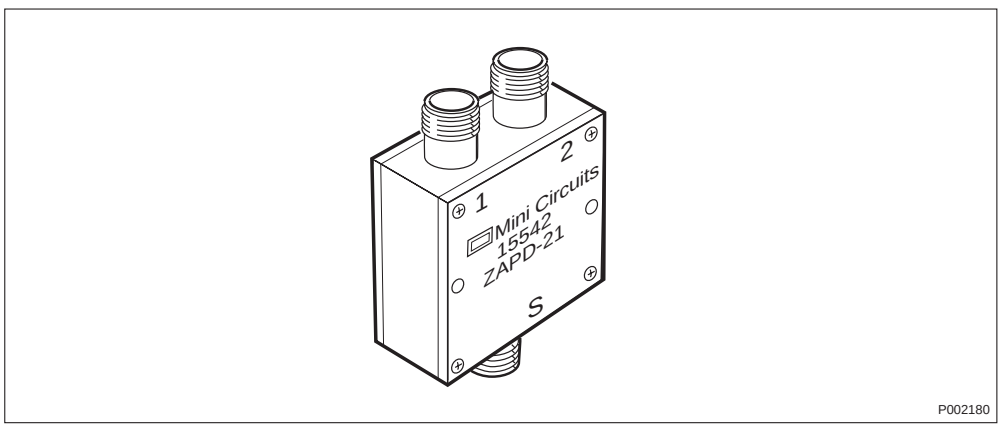

Figure 12 Power divider

Table 15 Power divider

Description	Specification	Product No.	Qty
Power Splitter (0.5 - 2.0 GHz)	Mini-Circuit ZAPD-21N	LPY 107 349/1	1

1.2.14 Attenuator: LPY 107 350/1

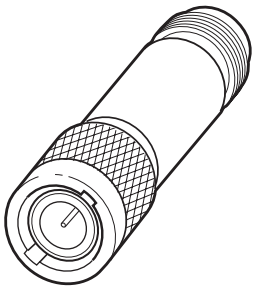

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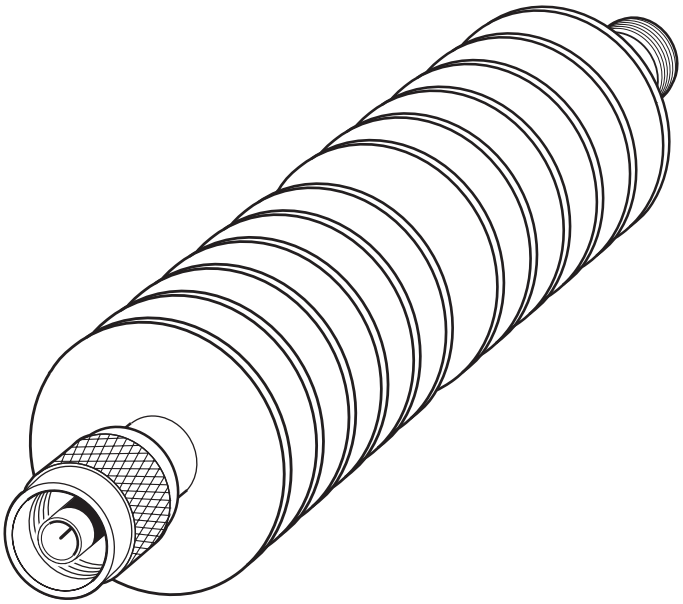
Figure 13 Attenuator

Table 16 Attenuator

Description	Specification	Product No.	Qty
Attenuator (30 dB)	Lucas Weinschel 1-30	LPY 107 350/1	1

1.2.15 Attenuator: LPY 107 351/1



P002678

Figure 14 Attenuator

Table 17 Attenuator

Description	Specification	Product No.	Qty
Attenuator (30 dB)	Lucas Weinschel 47-30-43	LPY 107 351/1	1

1.2.16 Cable: RPM 113 761

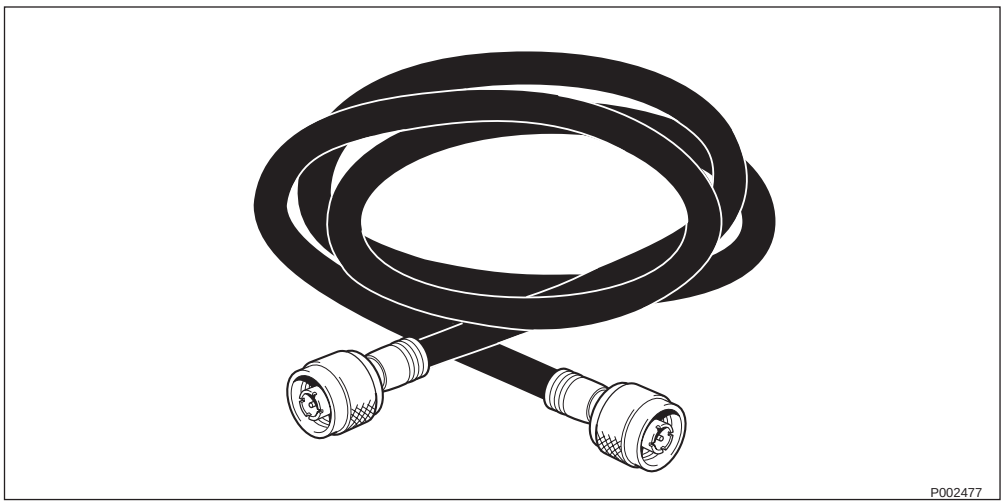


Figure 15 Cable

Table 18 Cable

Description	Specification	Product No.	Qty
Cable	N-plug to N-plug	RPM 113 761	1

1.2.17 Cable: RPM 513 718/03000

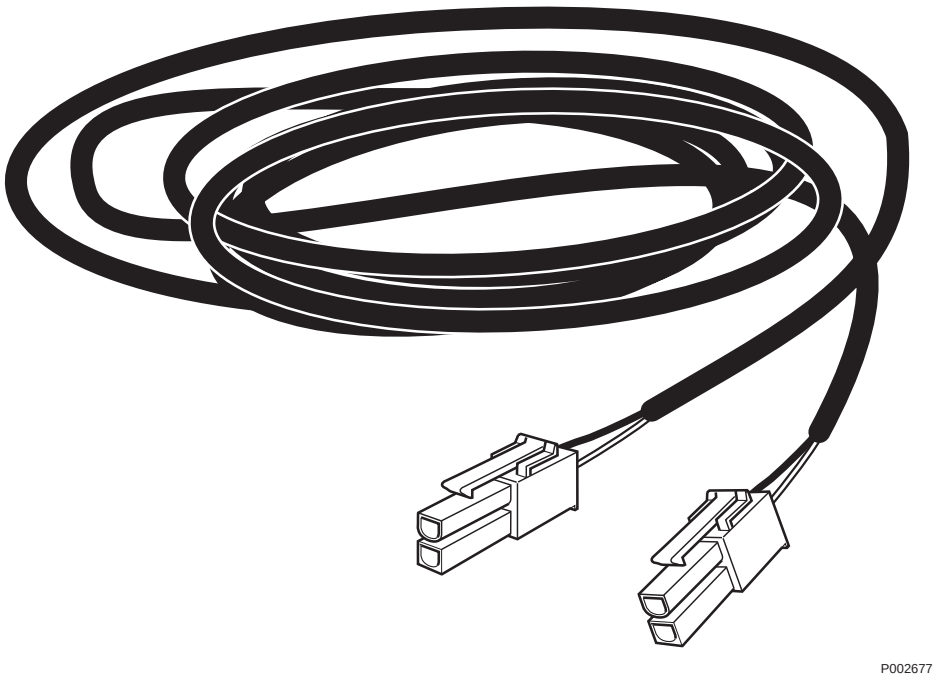


Figure 16 Cable

Table 19 Cable

Description	Specification	Product No.	Qty
Cable	2-pole jack to 2-pole jack	RPM 513 718/ 03000	1

1.2.18 Cable: NTZ 112 294

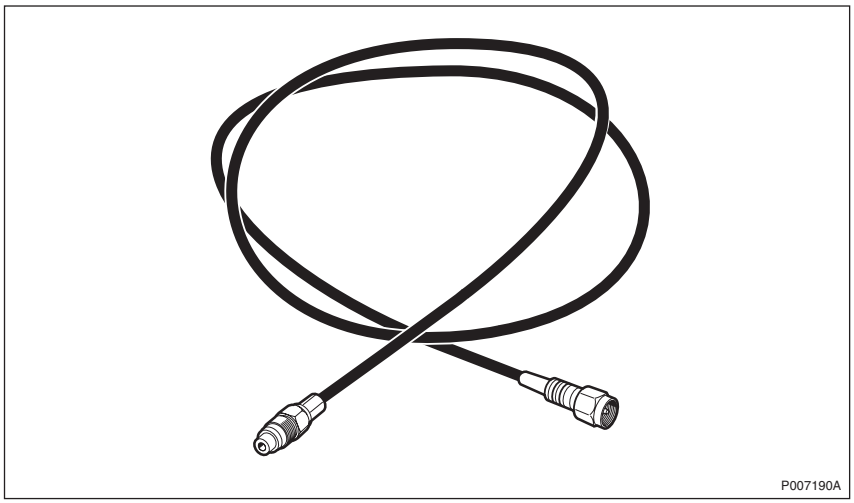


Figure 17 Cable

Table 20 Cable

Description	Specification	Product No.	Qty
Cable	Mobile Station cable, TEMS	NTZ 112 294	1

1.2.19 Cable: RPM 113 764/01

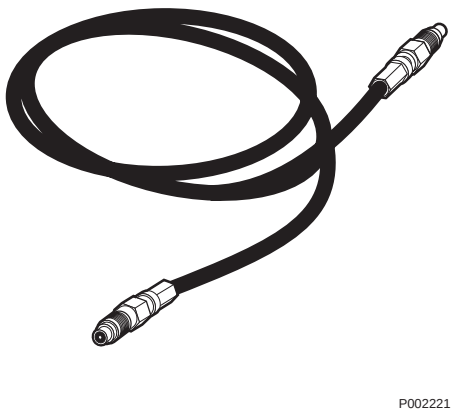


Figure 18 Cable

Table 21 Cable

Description	Specification	Product No.	Qty
Cable	FME jack to FME jack	RPM 113 764/01	1

1.2.20 Anti-Static Bracelet: LYB 250 01/14

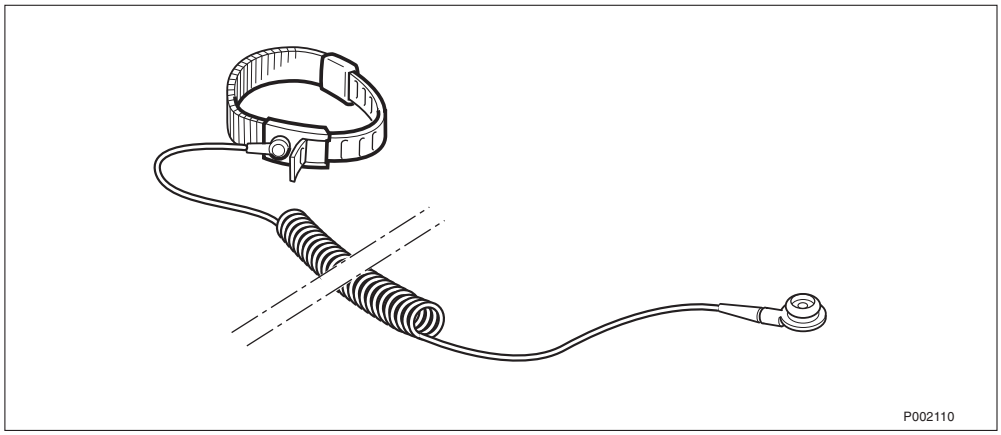


Figure 19 Wrist strap

Table 22 Wrist strap

Description	Specification	Product No.	Qty
Wrist strap	ESD-Protection	LYB 250 01/14	1

1.2.21 Accessories: LTR 171 01/3

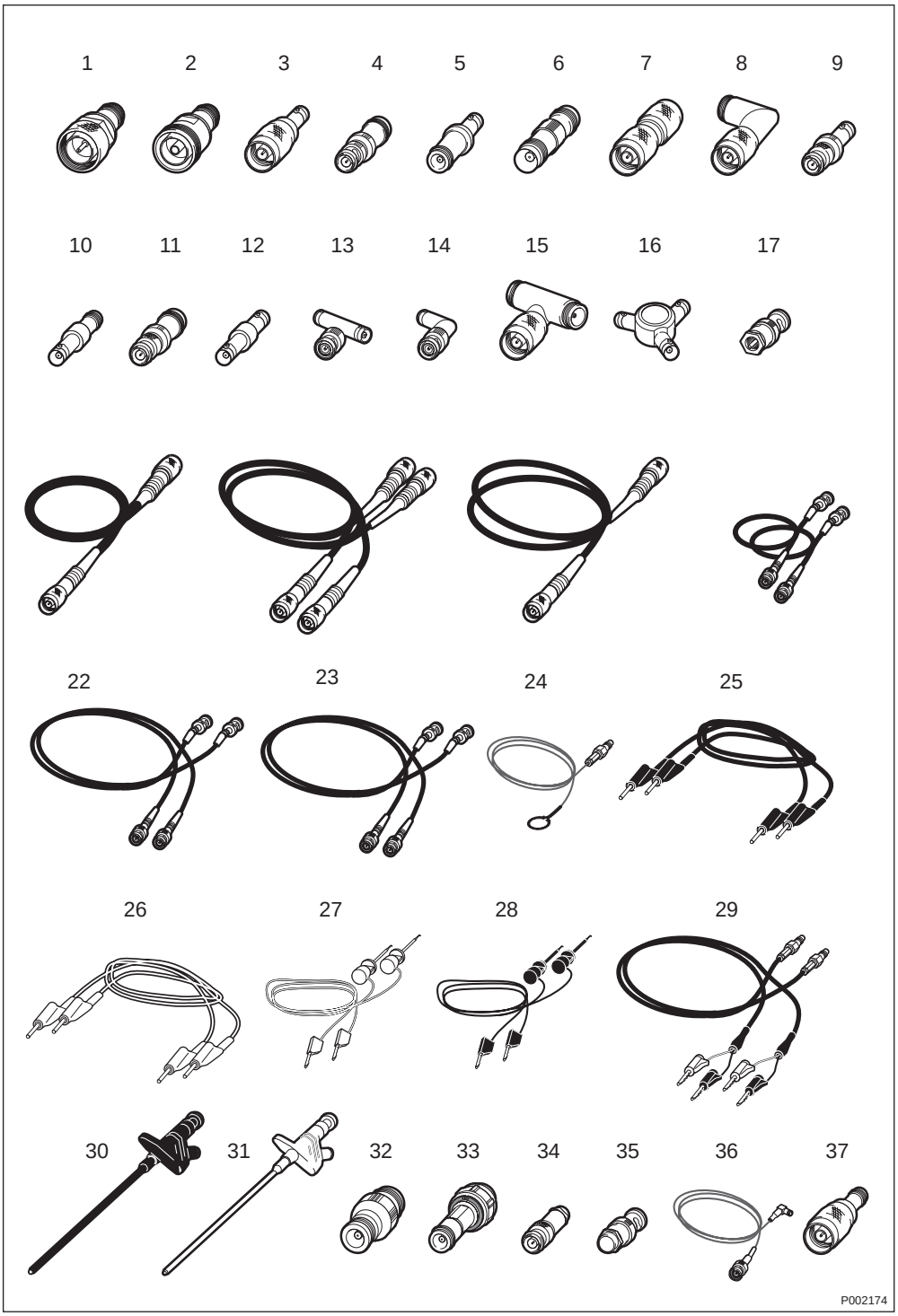


Figure 20 Accessories

Table 23 Accessories

Item	Description	Product No.	Qty
1	Adaptor (7/16 plug to N-jack)	Suhner 33 716-N-50-1 (LRT 171 09/01)	1
2	Adaptor (N-jack to 7/16 jack)	Suhner 31 N-716-50-1 (LRT 171 12/01)	1
3	Adaptor (N-plug to BNC-jack)	Suhner 33 N-BNC-50-1	1
4	Adaptor (BNC-plug to N-jack)	Suhner 33 BNC-N-50-1 (LRT 171 13/01)	1
5	Adaptor (BNC-jack to N-jack)	Suhner 31 BNC-N-50-1	1
6	Adaptor (N-jack to N-jack)	Suhner 31 N-50-0-2 (LRT 171 17/01)	2
7	Adaptor (N-plug to N-plug)	Suhner 32 N-50-0-1	1
8	Adaptor (N-plug to N-jack, right angle)	Suhner 53 N-50-0-1	1
9	Adaptor (TNC-plug to BNC-jack)	Suhner 33 TNC-BNC-50-1	4
10	Adaptor (BNC-jack to TNC-jack)	Suhner 31 BNC-TNC-50-1	1
11	Adaptor (TNC-plug to N-jack)	Suhner 33 TNC-N-50-1	2
12	Adaptor (BNC-jack to BNC-jack)	Suhner 31 BNC-50-0-1	2
13	Adaptor (2 x BNC-jack to BNC-plug)	Suhner 43 BNC-50-0-1 (LRT 171 06/01)	1
14	Adaptor (BNC-jack to BNC-plug)	Suhner 53 BNC-50-0-1	2
15	Adaptor (2 x N-jack to N-plug)	Suhner 43 N-50-0-1	1
16	Three Port Divider (3xBNC-jack)	Suhner 4901.01.A	2
17	Adaptor (BNC-plug to FME-plug)	Suhner 11 BNC 50-0-8c	3
18	Coaxial Cable (N-plug to N-plug, 0.5 m)	Carlberg & Son 160232	1
19	Coaxial Cable (N-plug to N-plug, 1.0 m)	Carlberg & Son 160067	2
20	Coaxial Cable (N-plug to N-plug, 2.0 m)	Carlberg & Son 160231	1
21	Coaxial Cable (BNC-plug to BNC-plug, 0.5 m)	Carlberg & Son 160076	2
22	Coaxial Cable (BNC-plug to BNC-plug, 1.0 m)	Carlberg & Son 160070	4

23	Coaxial Cable (BNC-plug to BNC-plug, 2.0 m)	Carlberg & Son 160230	2
24	Coaxial Cable (FME-jack to ring)	Carant Antenn 1792	1
25	Test Cable, black (banana plug to banana plug)	Scandia Metric OS 1004	2
26	Test Cable, red (banana plug to banana plug)	Scandia Metric OS 1001	2
27	Test Cable, red (mini-hook to banana plug)	L.G. Österbrant ET2 red	2
28	Test Cable, black (mini-hook to banana plug)	L.G. Österbrant ET2 black	2
29	Test Cable (FME-jack to 2 x banana plug)	Carant Antenn 1791	2
30	Test Clips, black	Tesch System AB 930113-100	2
31	Test Clips, red	Tesch System AB 930113-101	2
32	Adaptor (N-jack to N-jack)	Suhner 31 N-4.1/9.5-50-12	1
33	Adaptor (N-plug to N-jack)	Suhner 33 4.1/9.5-N-50-1	1
34	Terminator (TNC-plug)	Suhner 65 TNC 50-0-1	2
35	Terminator (BNC-plug)	Suhner 65 BNC-50-0-1	2
36	Coaxial Cable (BNC-plug to SMB-jack)	Carlberg & Son 161832	1
37	Adaptor (N-plug to TNC-jack)	Suhner 33 N-TNC-50-1 (LRT 171 101/1)	1

1.2.22 Tool Set: LTT 601 107/1

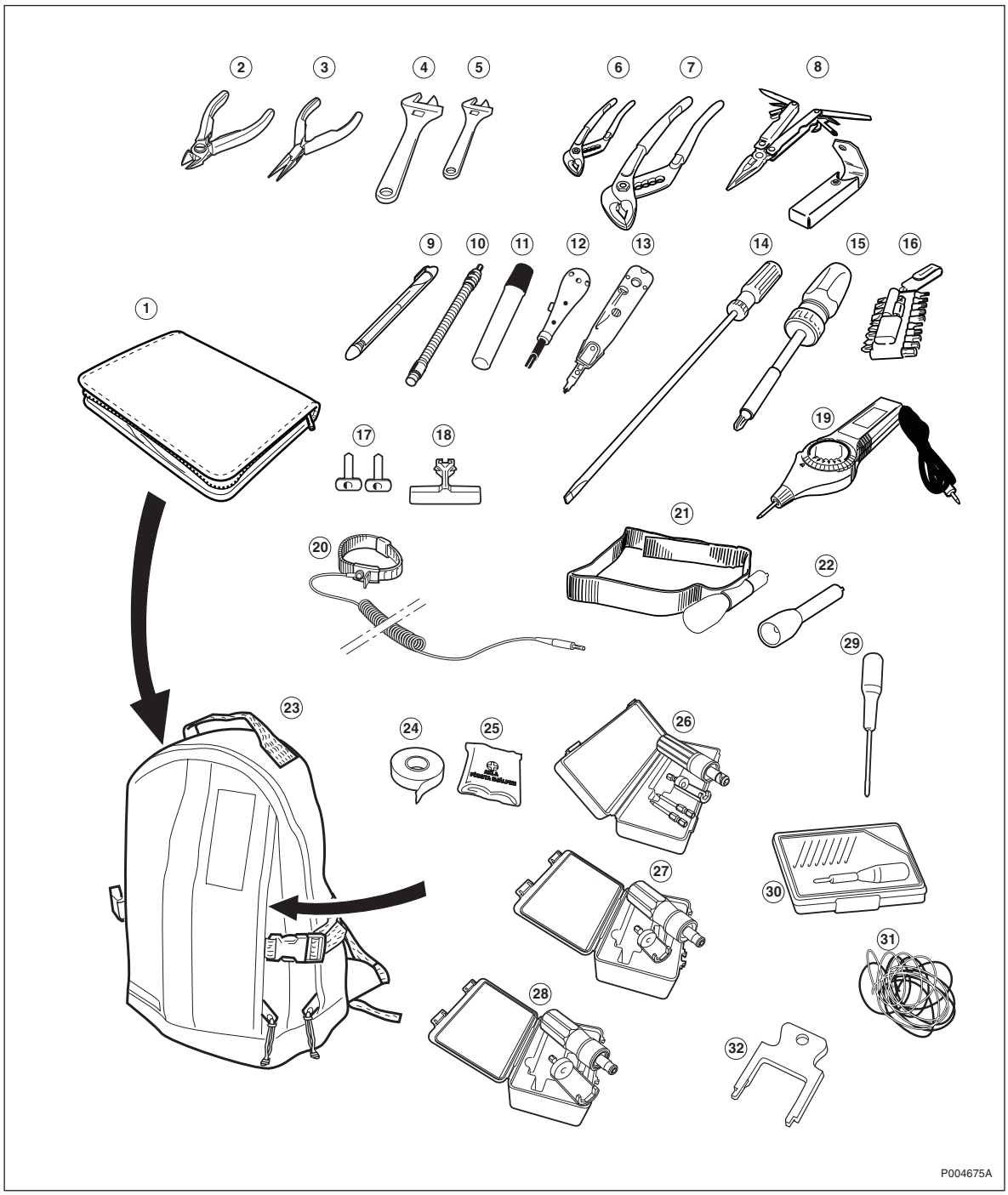


Figure 21 Tool set

Table 24 Tool set

Item	Description	Qty
1	Tool Case	1
2	Side cutting pliers	1
3	Snip node pliers	1
4	Adjustable spanner l=160 mm	2
5	Adjustable spanner l=100 mm	2
6	Slip joint pliers l=125 mm	1
7	Slip joint pliers l=245	1
8	Pocket survival kit	1
9	Marking pen, gold colour	1
10	Flexible shaft 1/4"	1
11	Marking pen	1
12	Termination tool, Ericsson	1
13	Termination tool, Krone	1
14	Screwdriver l=200 mm	1
15	Universal bit holder	1
16	Bits kit	1
17	RU-extractor, button 35 mm	2
18	RU-extractor, handle	1
19	Voltage tester	1
20	Static control wrist strap	1
21	Head band for lamp holding	1
22	Penlight, mini	1
23	Tool rucksack	1
24	Elecrical tape, white	1
25	First Aid kit	1
26	Torque wrenck kit 0.8 Nm LTT 601 83	1
27	Torque wrench kit 1.7 Nm LTT 601 93	1
28	Torque wrench kit 2.8 Nm LTT 601 94	1
29	Screwdriver, Torx T8	1
30	Precision screwdriver set	1
31	Jumper wire (2x0.5 mm) l=10 m	1
32	Handle	1

1.3 Examples for Ordering Test Team Equipment

1. Fill in the name, address, phone and fax number of the orderer.

2. Refer to the section Test Equipment in the chapters that concern the tests to be made.

3. Fill in description, type, product number and quantity in GOLF or the order form used. Include all the parts from the test equipment list, except those included in other kits that have already been ordered, in the order form.

4. Have the order approved and signed by the appropriate superior.

5. Send the order through GOLF, if available. Otherwise send it to:

6. Ericsson Radio Systems AB

   Logistics Department (Order and Delivery)

   S-164 80 Stockholm

   SWEDEN

   (Fax +46 8 752 61 51)

   For example, if all TRS System tests are to be performed, the order form should look like this:

Table 25 Sample order form

Item	Description	Specification	Product no.	Qty
1	Test control, system Base Station		LPP 106 34/12	1
2	Test Mobile Station	Ericsson SH 888	LPB 112 12/1	1
3	Power Splitter	MiniCircuit ZAPD-21N	LPY 107 349/1	1
4	Attenuator	Lucas Weinschel 1-30	LPY 107 350/1	3
5	Attenuator	Lucas Weinschel 47-30-43	LPY 107 351/1	1
6	Inspection tools		LTR 171 01/3	1
7	Cable C	N (male) to N (male)	RPM 113 761	3
8	Cable Q	Nipple Connector - Nipple Connect	RPM 113 764/01	1
9	Cable R	Mobile Station cable, 800 series	NTZ 112 294/5	1

10	LMT	Including software and cable	KDY 196 58/2	1
11	FIOL	Including software and cables	KDY 196 56/1	1

Note that most of the equipment is used both in the TRS System Test Using BSCSim and TRS System Test Using BSC. However, this does not mean that it is necessary to order double quantities of the items. For one test team to be able to carry out the tests, only the quantity from one test equipment list is needed despite the number of tests to be made.

Installation Check

Contents **Page**

1 Installation Check

The purpose of Installation Check is to confirm that the installation is in accordance with site documentation.

The check includes the following:

- Power system (if present)
- Transmission system
- TRSs
- External alarms

Note The installation check of antenna systems is included in chapter Antenna Installation Tests.

1.1 Prerequisite

Check of installation can begin when the site has been reported ready for installation test and commissioning.

1.2 Installation Check

For each subinstallation, a visual check of the installation is to be performed and a Test Record shall be filled in, see chapter Appendix.

1. Check that the installation is in accordance with C- and G-Modules of the BTS library.
2. Check all cables and connectors for damage.
3. Make sure that cables and connectors are properly connected, tightened, labelled, and so forth.
4. Note remarks, if any, in the test record and inform the person responsible for the site installation.

Strapping before Testing

Contents **Page**

1 Strapping Instructions

1.1 About Strapping

It is preferable and highly recommended to strap the different units included in the RBS at the installation and in accordance with the Installation manual, G-Module. The strapping instructions in the H-Module should be the same as in the G-Module. The reason to have the strapping instructions in this manual is to give the possibility to check the strapping.

1.2 Types of Strapping

Strapping is performed with the following methods:

- DIP miniature option switches
- Strap switches
- Strapping plugs
- Strapping cables

1.2.1 DIP Miniature Option Switches

A DIP switch contains a number of switch segments. For strapping the RBS, DIP switches with two, four or eight switch segments are used. The switch segments can be moved between the ON and OFF positions, see figure 1.

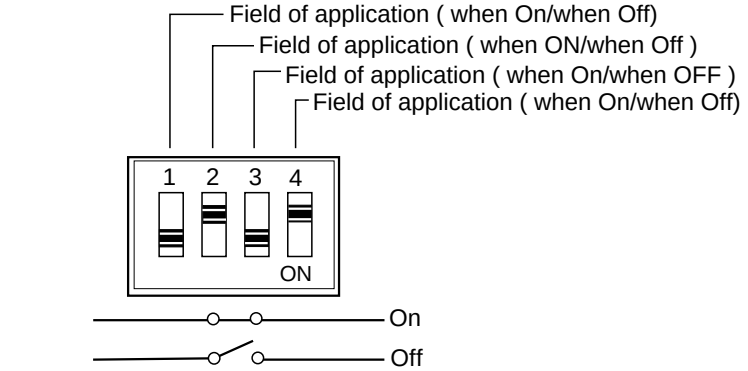


Figure 1 DIP switch

1.2.2 Strap Switches

The strap switches used for strapping the RBS are equipped with three pins. A U-link is used to connect two nearby pins together, see figure 2.

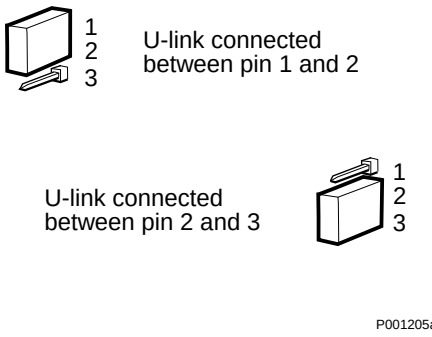


Figure 2 Strap switch

1.3 Strapping Plugs

Three different kinds of strapping plugs are used when strapping the RBS.

- Address plug (RNV 991 03/n)
- Reset and Supervision plug (RNV 991 712/001)
- EMRPB terminator plug (RNV 991 223/004)

1.3.1 Address Plug, RNV 991 03/n

Different addresses are obtained by changing the last character "n" of the product number RNV 991 03/n between 1 and 32. These values correspond to addresses 0-31.

1.3.2 Disassembling the Strapping Plug

1. Slide off the top cover in either direction, depending on how it was mounted in place, see figure 3.
2. Bend apart the cover-halves.
3. The fork contact unit is ready for strapping.

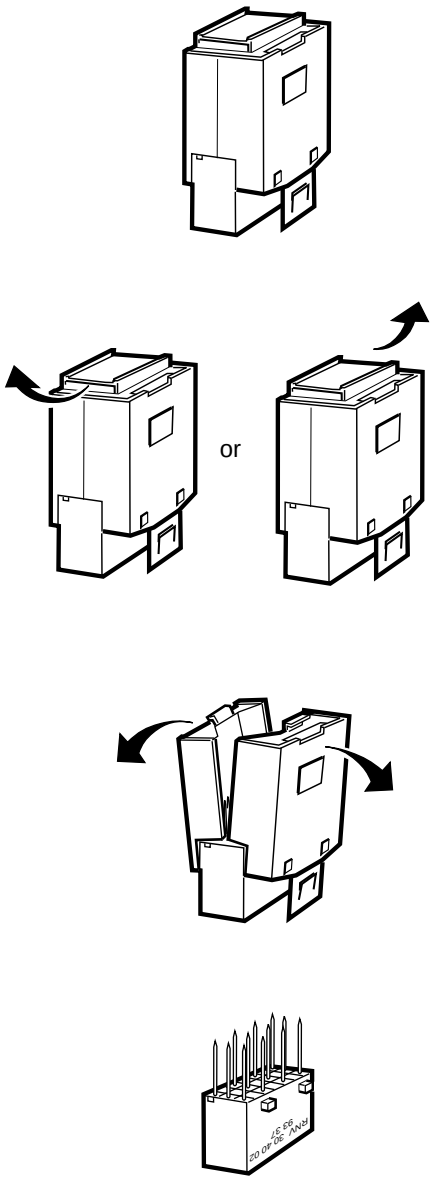


Figure 3 Disassembling the strapping plug

1.3.3 Checking the Wiring

1. Hold the fork contact unit with the notch turned towards you, see the arrow in figure 4.

2. Turn the fork contact unit until you see the wiring, and the notch is pointing downwards.

3. Find the correct wiring diagram and verify that the product number on the label corresponds to the wiring. The notch is marked with an arrow in the circuit diagrams. Wiring diagrams are found under the heading "Wiring Diagrams" in this chapter.

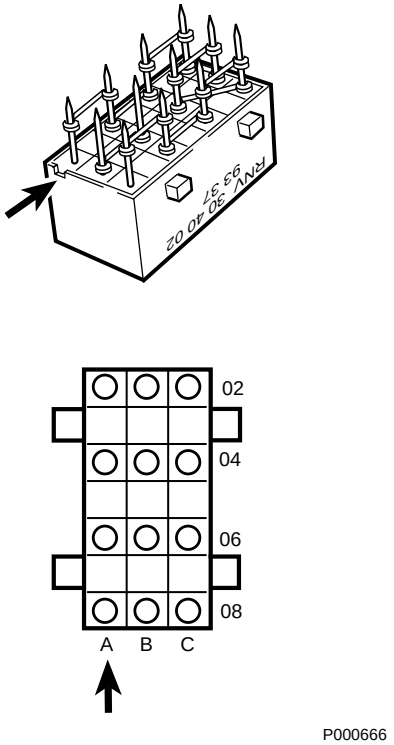


Figure 4 Strapping plug pin configuration

1.3.4 Assembling the Strapping Plug

1. Hold the fork contact unit in your hand.
2. Snap the cover-halves in place on the two shoulders on each side. Note that the cover-half with the tongue must be placed at the side with the fork contact product number imprinted (the cover-halves are of different thickness).
3. Slide the cover on.
4. The strapping plug is ready for mounting.

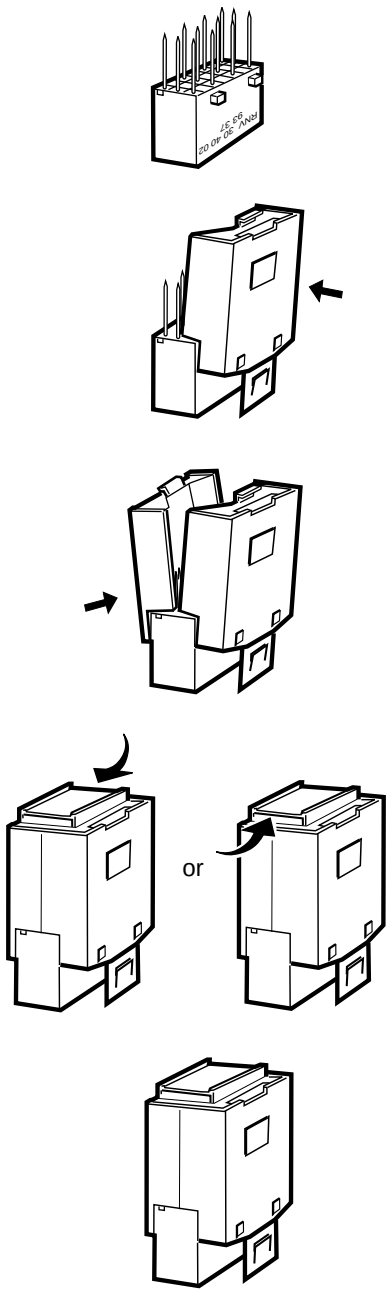


Figure 5 Assembling the strapping plug

1.4 Wiring Diagrams

Note Wiring does not always appear as in the diagrams. Make sure that pin to pin connections are the same as in the diagrams.

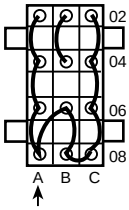
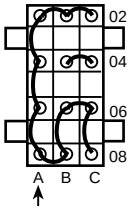
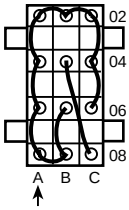
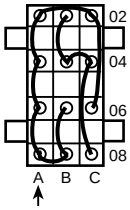
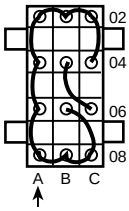
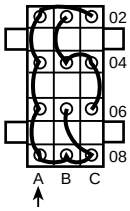
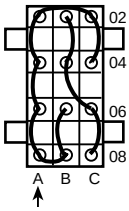
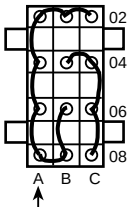
Product No.	Wiring Diagram	Logical address	Product No.	Wiring Diagram	Logical address
RNV 991 03/1		0	RNV 991 03/5		4
RNV 991 03/2		1	RNV 991 03/6		5
RNV 991 03/3		2	RNV 991 03/7		6
RNV 991 03/4		3	RNV 991 03/8		7

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Figure 6 Wiring addresses 0-7

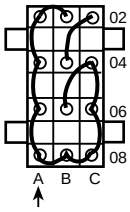
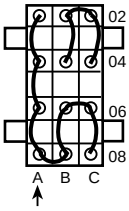
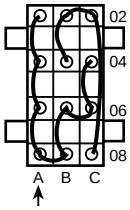
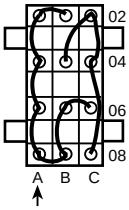
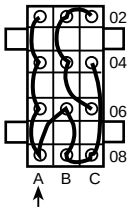
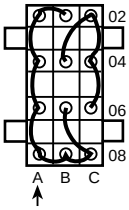
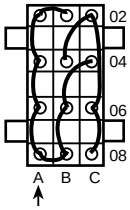
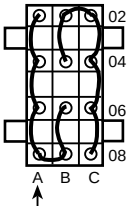
Product No.	Wiring Diagram	Logical address	Product No.	Wiring Diagram	Logical address
RNV 991 03/9		8	RNV 991 03/13		12
RNV 991 03/10		9	RNV 991 03/14		13
RNV 991 03/11		10	RNV 991 03/15		14
RNV 991 03/12		11	RNV 991 03/16		15

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Figure 7 Wiring addresses 8-15

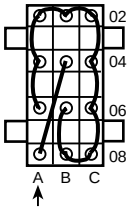
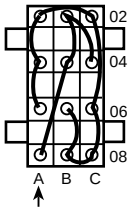
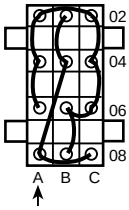
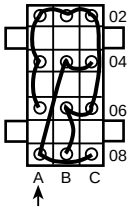
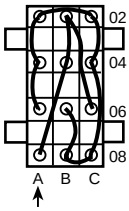
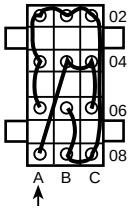
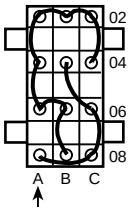
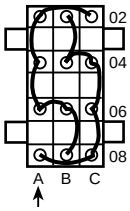
Product No.	Wiring Diagram	Logical address	Product No.	Wiring Diagram	Logical address
RNV 991 03/17		16	RNV 991 03/21		20
RNV 991 03/18		17	RNV 991 03/22		21
RNV 991 03/19		18	RNV 991 03/23		22
RNV 991 03/20		19	RNV 991 03/24		23

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Figure 8 Wiring addresses 16-23

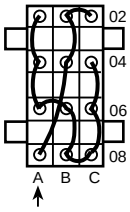
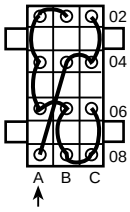
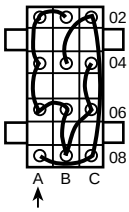
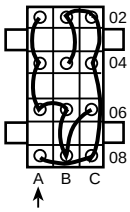
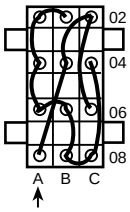
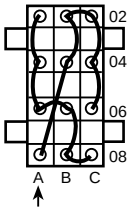
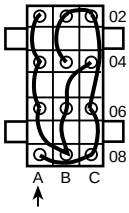
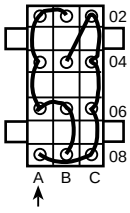
Product No.	Wiring Diagram	Logical address	Product No.	Wiring Diagram	Logical address
RNV 991 03/25		24	RNV 991 03/29		28
RNV 991 03/26		25	RNV 991 03/30		29
RNV 991 03/27		26	RNV 991 03/31		30
RNV 991 03/28		27	RNV 991 03/32		31

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Figure 9 Wiring addresses 24-31

1.4.1 Reset and Supervision Plug, RNV 991 712/001

The Reset and Supervision plug includes a light diode that indicates the status of the supervised unit, see figure 10. It also has a 2-stage reset button that makes it possible to reset the unit.

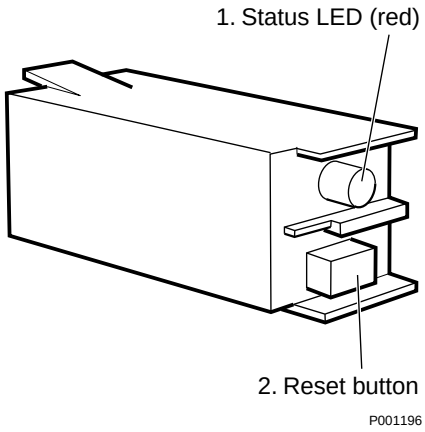


Figure 10 Reset and supervision plug

1.4.2 EMRPB Terminator Plug, RNV 991 223/004

To terminate the EMRPB (Extension Module Regional Processor Bus) correctly, this terminator plug has to be used. It includes a number of resistors that are connected to each of the conductors that is part of the EMRPB.

1.5 Strapping of RTT, ROF 137 7870/1

The RTT-board (Radio Transceiver Terminal) is equipped with a 2-position DIP switch. It is used to select between different PROM addresses. If all 32 time slots (TS) are to be transmitted to the transceivers (TRX), switch number 2 has to be in the OFF position. Otherwise, time slots 16-31 will not be transmitted.

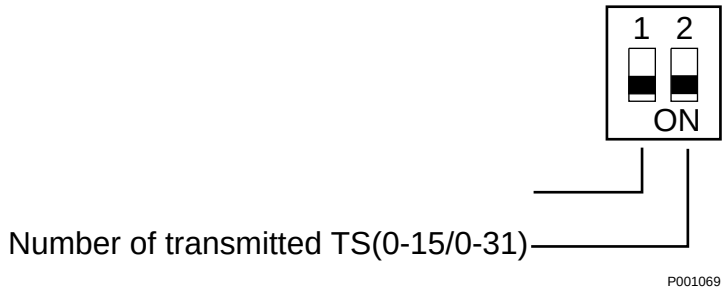
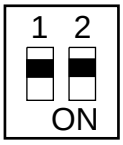


Figure 11 RTT board DIP switch configuration

If no market requirements exist (see the chapter *Market Dependent Special Instruction*), set the switches according to figure 12.



P001070b

Figure 12 Strapping of RTT

1.6 Strapping of ETB, ROF 137 7846/1

The allocation of the DIP switch is shown in figure 13.

ETB (Exchange Terminal Board) is equipped with a 4- or 2-position DIP switch depending of the revision state of the board. It connects either the outer conductor of an 120 ohm symmetrical pair cable or the screen of a 75 ohm coaxial cable to ground (GND) in both transmission directions.

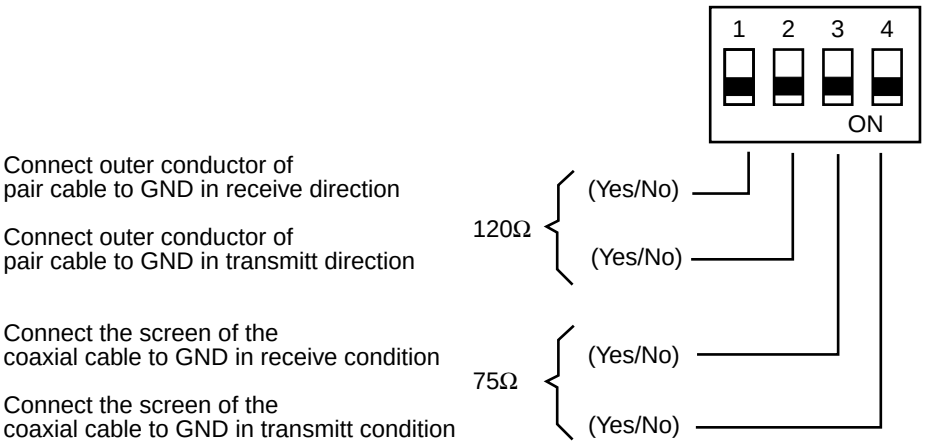


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Figure 13 ETB Rev. 1C, 4-DIP switch configuration

If no market requirements exist, the earth connection shall only be made in the "transmit" direction, and the DIP switch set to the values shown in figure 14.

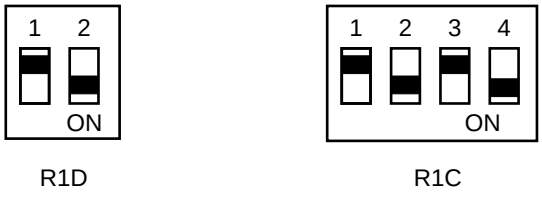


Figure 14 Default setting of ETB DIP switches

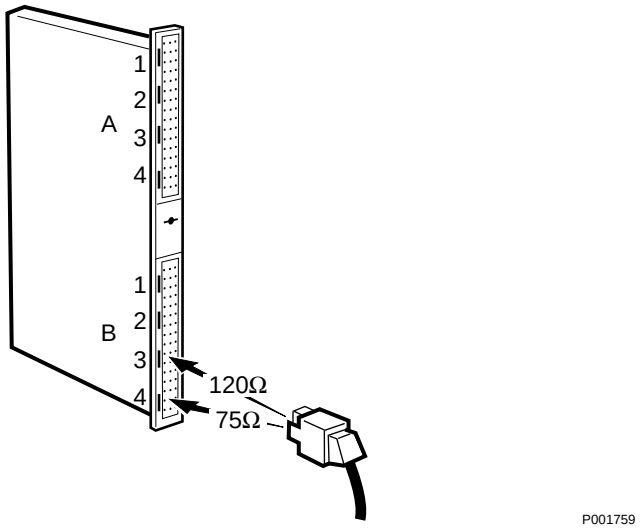


Figure 15 Position of 75 ohm coaxial cable (B:4) and 120 ohm pair cable (B:3) respectively on the ETB board

1.7 Strapping of EMPC, ROF 131 995/2

The EMPC (Extension Module regional Processor Card) is to be provided with front-connected strapping plugs for the following functions:

- EMPC address
- Reset and supervision
- Bus termination of EMRPB (EMRP Bus)

The strapping of the EMPC is described for a TRI equipped without the EMRPS board, as well as for a TRI equipped with the EMRPS board.

1.7.1 Strapping of EMPC, ROF 131 995/2 without EMRPS Board

The strapping of EMPC below is valid for a TRI equipped without EMRPS board (LAPD concentration) and when redundant signalling is used.

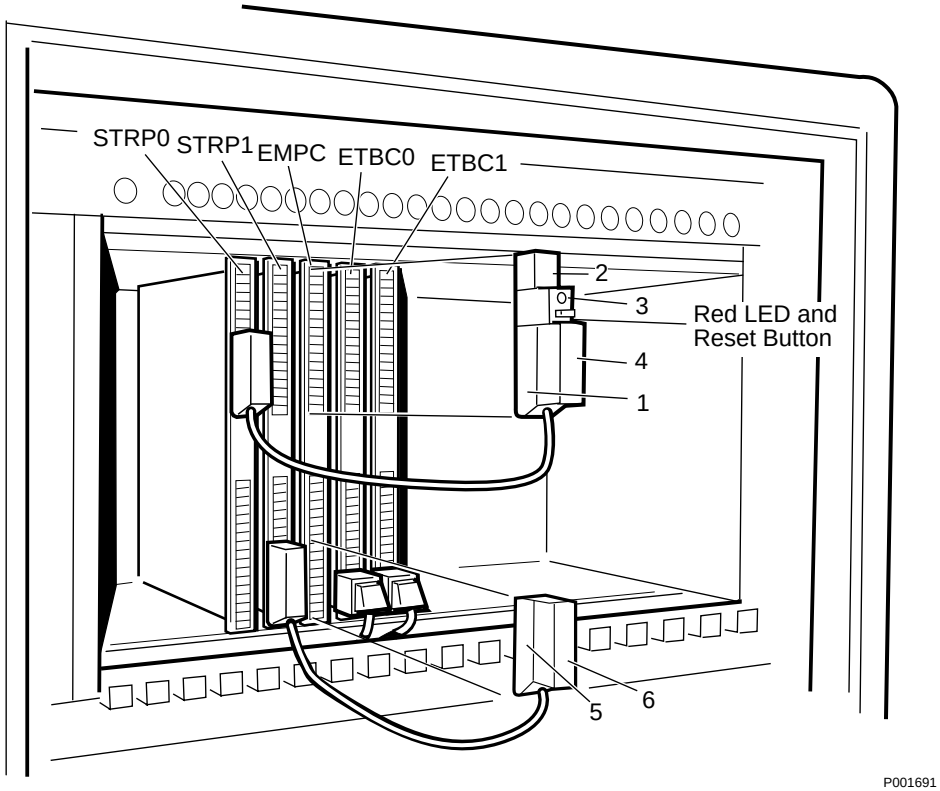


Figure 16 Strapping of EMPC without EMRPS board:

1 EMRPB-A, TSR 204 0201/500

2 Address strap, RNV 991 03/n, n = 1 - 32

3 Reset and supervision strap, RNV 991 712/001

4 EMRPB bus terminator, RNV 991 223/004

5 EMRPB-B, TSR 204 0201/500, optional

6 EMRPB bus terminator, RNV 991 223/004, optional

Strapping of EMPC address

The EMPC communicates with the BSC (Base Station Controller) through the STR (Signalling Terminal Remote) over the EMRPB, and further on to time slot 16 in the G.703 interface. This communication requires a hardwired address on the EMPC corresponding to the EM (Extension Module) value set by the EXEPI command in the data transcript.

To set the address a strapping plug, RNV 991 03, is used. Strapping versions RNV 991 03/n (n = 1-32) correspond to addresses 0 31. For positioning of the strapping plug, see item 2 in figure 16.

Strapping plug RNV 991 03/1 (n = 1) is used, which corresponds to EM = 0.

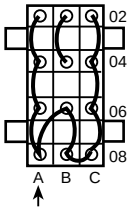
Product No.	Circuit diagram	Decimal address
RNV 991 03/1		**0**

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Figure 17 Strapping plug RNV 991 03/1 without EMRPS board

Reset and supervision

A strapping plug, RNV 991 712/001, is used for light diode indication on working status and reset of the EMPC. For positioning of the strapping plug, see item 3 in figure 16.

Bus termination of EMRPB

The EMPC communicates with STR 0 through EMRPBA and with STR 1 through EMRPBB, if redundant signalling is used. The TRI in figure 16 is equipped for redundant signalling, STR1, ETB1 and EMRPB-B.

Each EMRPB is to be terminated by means of a strapping plug, RNV 991 223/004. For positioning of the strapping plugs, see items 4 and 6 in figure 16.

1.7.2 Strapping of EMPC, ROF 131 995/2 with EMRPS Board

The strapping of EMPC below is valid for a TRI equipped with the EMRPS board (LAPD concentration), and when redundant signalling is used.

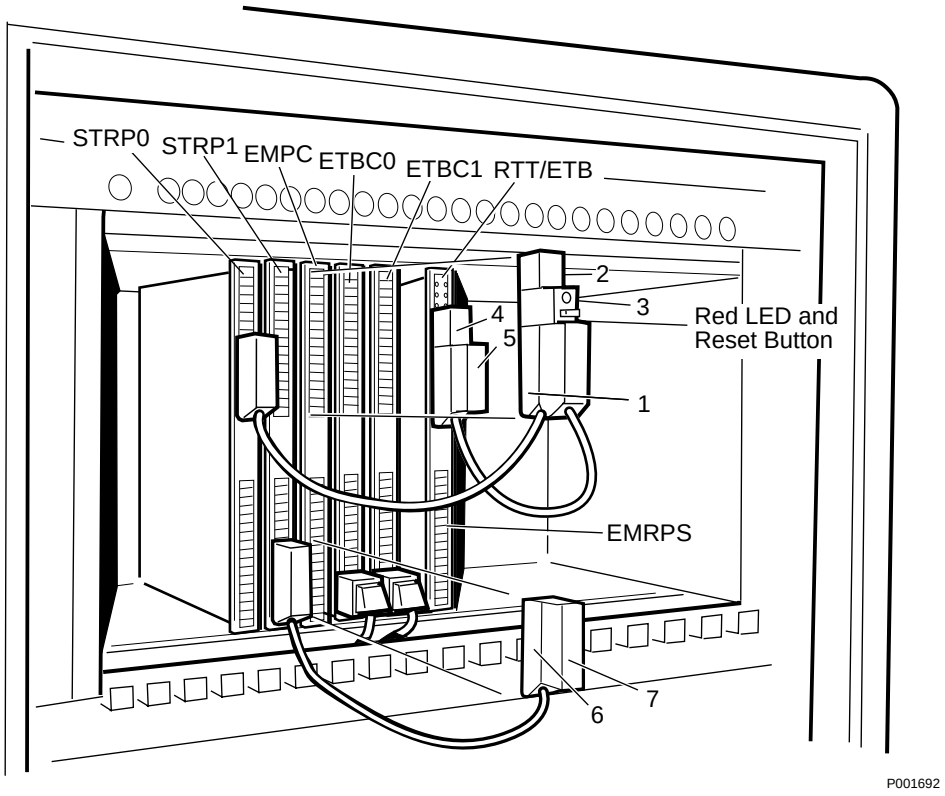


Figure 18 Strapping of EMPC with EMRPS-board:

1 EMRPB-A, TSR 204 0201/500

2 Address strap, RNV 991 03/n, n = 1 - 32

3 Reset and supervision strap, RNV 991 712/001

4 Address strap, RNV 991 03/n, n = 9 - 24

5 EMRPB bus terminator, RNV 991 223/004

6 EMRPB-B, TSR 204 0201/500, optional

7 EMRPB bus terminator, RNV 991 223/004, optional

Strapping of EMRP address

The EMPC communicates with the BSC through the STR over the EMRPB, and further on to time slot 16 in the G.703 interface. This communication requires a hardwired address on the EMPC corresponding to the EM value set by the EXEPI command in the data transcript.

When the TRI is equipped with an EMRPS board, strapping plug RNV 991 03 is also used to set the address for the EMRP. Strapping versions RNV 991 03/n (n = 9 24) can be used, which correspond to EM

addresses 8 23. For positioning of the strapping plug, see item 4 in figure 18. The EM value is set by a command in the data transcript.

The recommended strapping of plug RNV 991 03/n is n = 9, which corresponds to EM addresses 8.

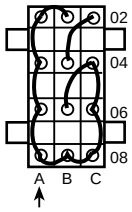
Product No.	Circuit Diagram	Decimal address
RNV 991 03/9		**8**

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Figure 19 Strapping plug RNV 991 03/9 when using LAPD

Reset and supervision

A strapping plug, RNV 991 712/001, is used for light diode indication on working status and reset of the EMPC. For positioning of the strapping plug, see item 3 in figure 18.

Bus termination of EMRPB

The EMPC communicates with STR 0 through EMRPBA and with STR 1 through EMRPBB, if redundant signalling is used.

Each EMRPB is to be terminated by means of a strapping plug, RNV 991 223/004. For positioning of the strapping plugs, see items 5 and 7 in figure 18.

1.8 Strapping Filter Combiner

The strapping information for the filter combiner is described in the G-Module.

1.9 Torque Settings for Antenna Connectors

It is necessary to ensure that the antenna connectors are tightened to the specified torque. A torque wrench should be used. For correct torque settings and tools, follow the connector suppliers recommended specifications.

1.10 Strapping of TRXD Magazine, BFL 119 71/3

The TRXD (Transceiver Digital) magazine is provided with two separate backplanes, one per TRXD position. Each backplane is equipped with an 8-position DIP switch located as shown in figure 20.

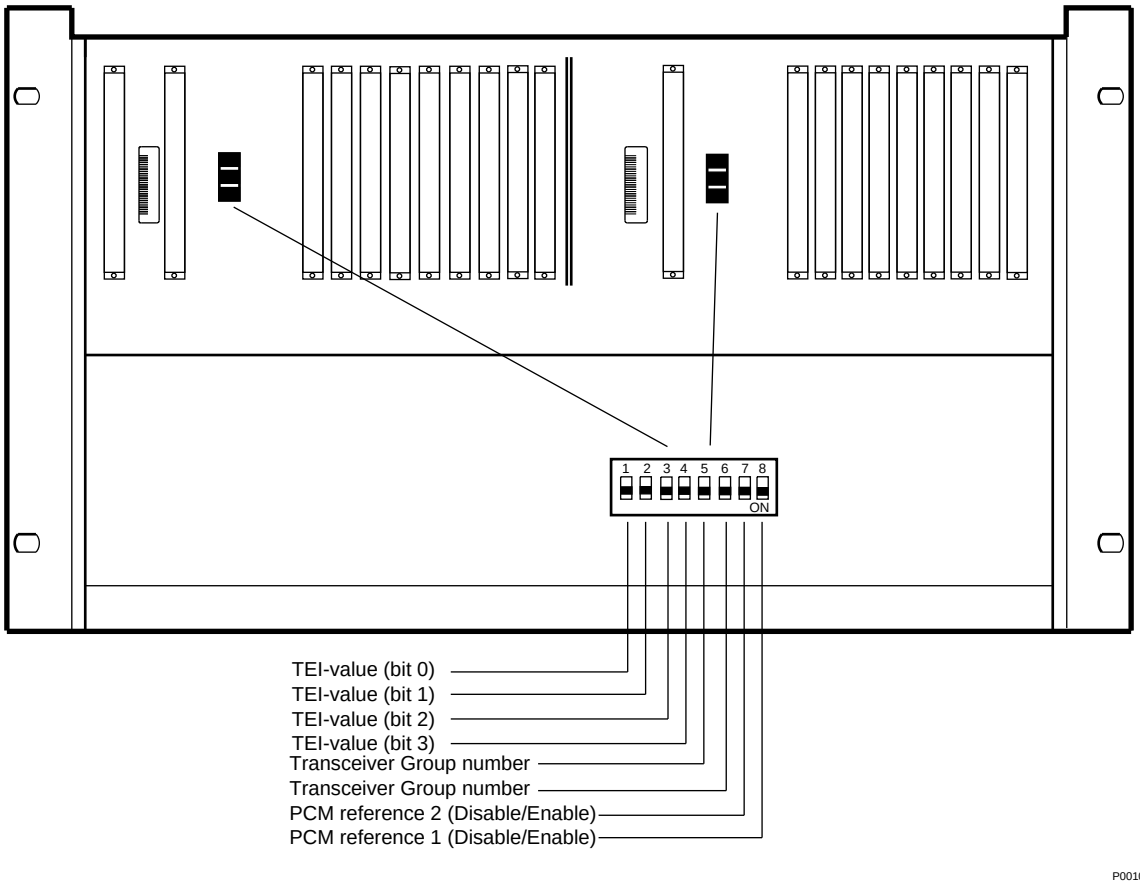


Figure 20 DIP switch location and configuration on backplane of TRXD magazine

1.10.1 Strapping of TEI Value

The BSC (Base Station Controller) uses TEI (Terminal Endpoint Identifier) values to establish and maintain connections with the TRXCs in the Base Station.

The TEI value to be strapped into the backplane shall correspond to the BSC configured TEI for this particular TRXC.

In order to maintain a uniform strapping of the TEI value within each TG (Transceiver Group), switch number 1-4 shall be set according to figure 21 to figure 24.

1.10.2 Strapping of Transceiver Group Number

The Transceiver Group number points out a specific TG (Transceiver Group), which is defined as the set of equipment, associated with radio transmission on one common transmitter antenna. Since this function is not used in the RBS, set switches 5 and 6 according to figure 21 to figure 24.

1.10.3 Strapping of PCM Reference

An 8 kHz signal from an incoming 2 Mbit/s PCM system is used as a long-term reference for the TM (Timing Module) in each TG (Transceiver Group).

To maintain a uniform strapping of the PCM reference within each TG (Transceiver Group), switch number 7 and 8 shall be set according to figure 21 to figure 24.

1.11 Normal Strapping of TRXD Magazine

1.11.1 Master Cabinet

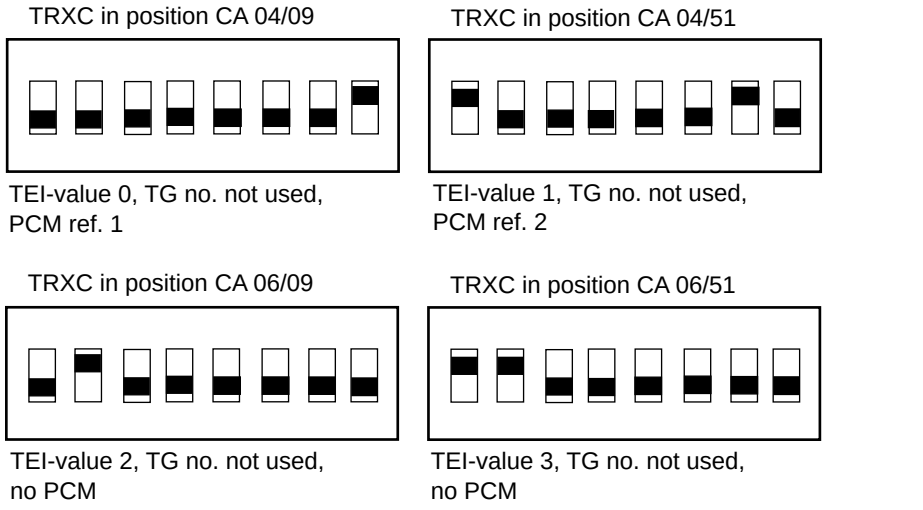


Figure 21 Strapping of TRXD magazine, master cabinet

1.11.2 Extension Cabinet 1

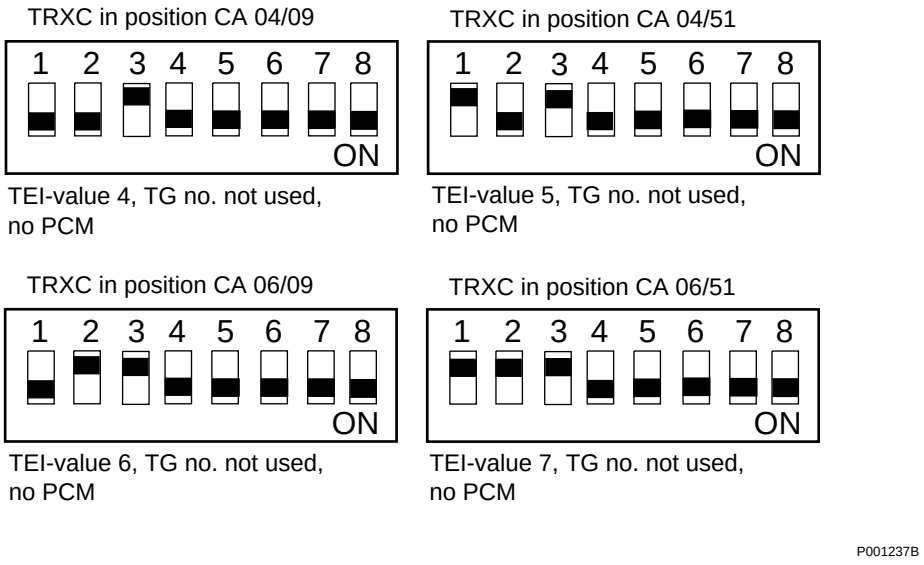


Figure 22 Strapping of TRXD magazine, extension cabinet

1.11.3 Extension Cabinet 2

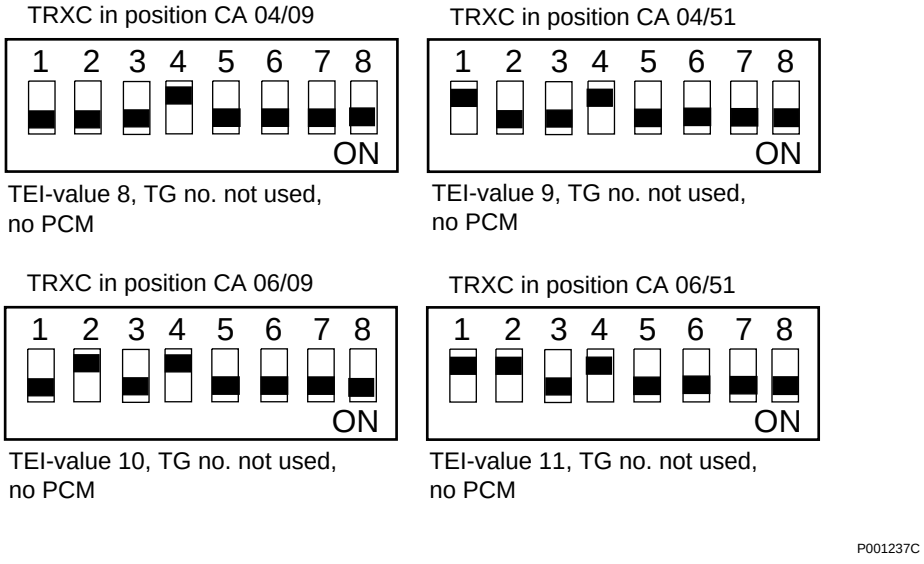


Figure 23 Strapping of TRXD magazine, extension cabinet 2

1.11.4 Extension Cabinet 3

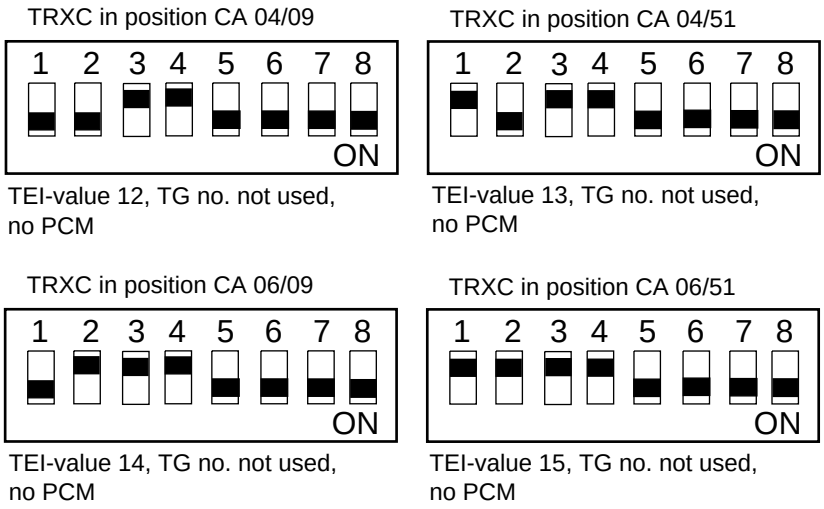


Figure 24 Strapping of TRXD magazine, extension cabinet 3

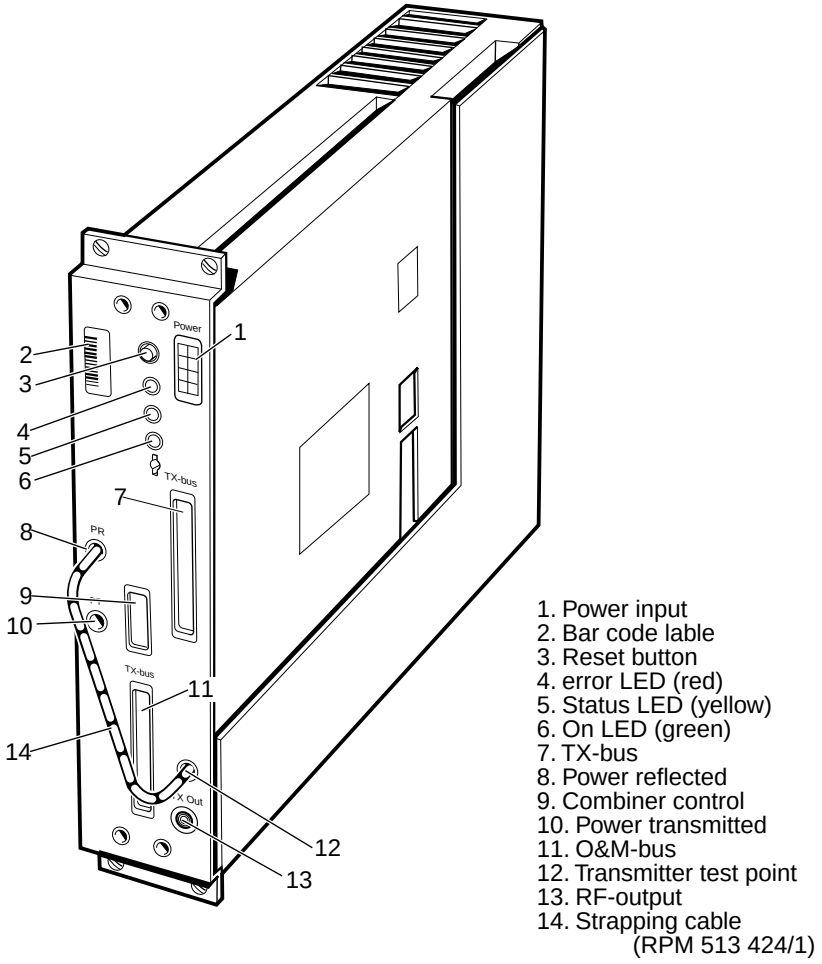
1.12 Strapping of RTX, KRB 111 01/02

The RTX (Radio Transmitter) comprises a number of circuit boards mounted in a common chassis. Strapping is to be done on the chassis front and the TXCU (Transmitter Control Unit) board ROA 119 3193/1.

1.12.1 Strapping on Chassis Front

When using filter combiners, there has to be a connection (item 14 in figure 25) between connectors PR (Power Reflected) and TXTP (Transmitter Test Point) on the chassis front of the RTX.

Use the cable RPM 513 424/1 for the connection.



1. Power input
2. Bar code lable
3. Reset button
4. error LED (red)
5. Status LED (yellow)
6. On LED (green)
7. TX-bus
8. Power reflected
9. Combiner control
10. Power transmitted
11. O&M-bus
12. Transmitter test point
13. RF-output
14. Strapping cable (RPM 513 424/1)

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Figure 25 Strapping of RTX

Note If hybrid combiners are used, the connection shall not be made.

1.12.2 Strapping of Circuit Board TXCU, ROA 119 3193/1

Each RTX has a hardwired address that defines the MOA (Managed Object Address) on the O&M (Operation & Maintenance) bus.

The MOA value is set by means of an 8position DIP switch located as shown in figure 26.

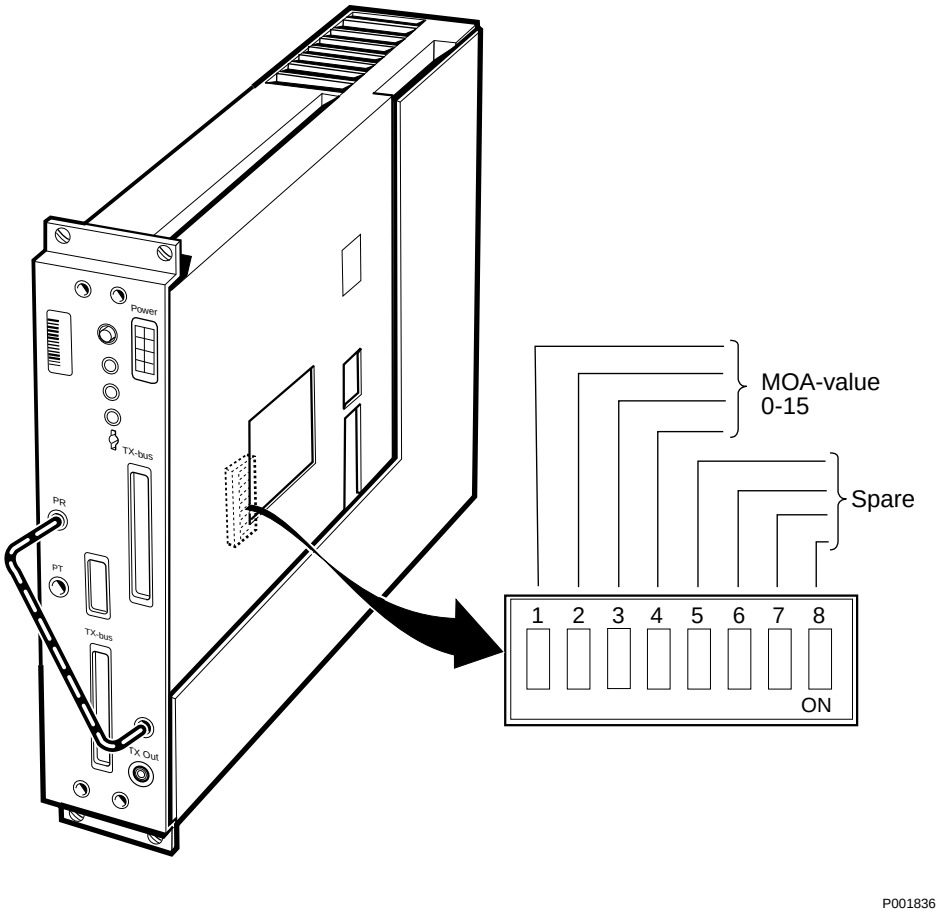


Figure 26 DIP switch, TRXCU board

When frequency hopping is not used, there is a one-to-one correspondence between the TRXC and the RTX. To reflect this relation the MOA value of the RTXs within each transceiver group shall be set according to figure 27 to figure 30.

1.12.3 Master Cabinet

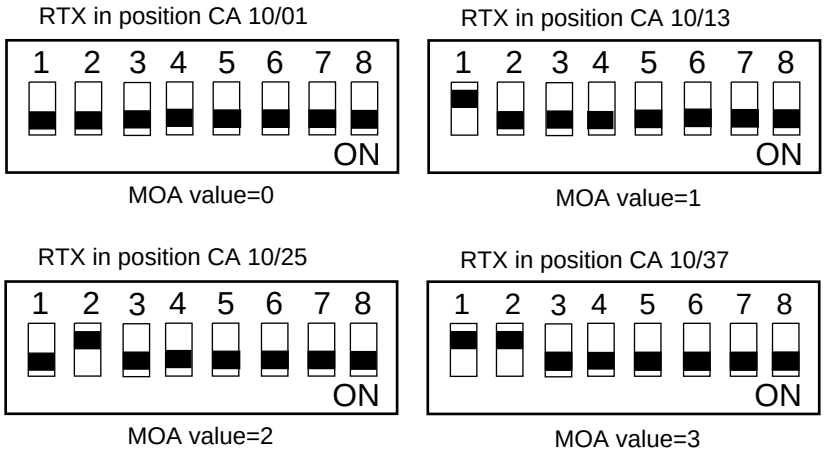


Figure 27 Strapping of TXCU, master cabinet

1.12.4 Extension Cabinet 1

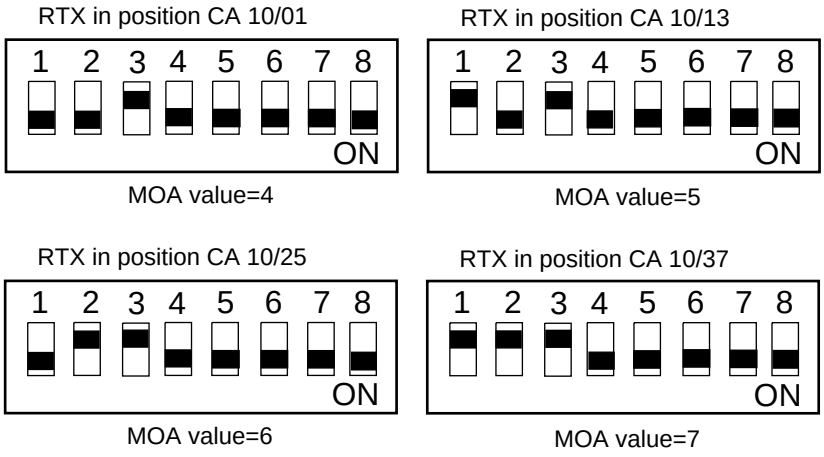


Figure 28 Strapping of TXCU, extension cabinet 1

1.12.5 Extension Cabinet 2

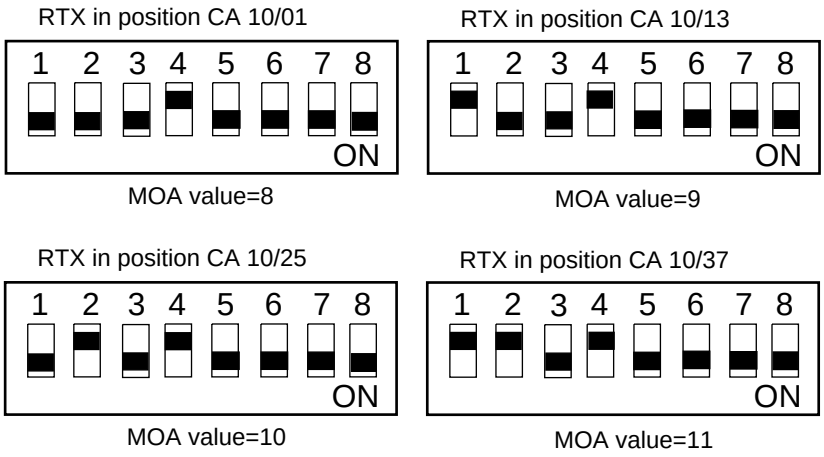


Figure 29 Strapping of TXCU, extension cabinet 2

1.12.6 Extension Cabinet 3

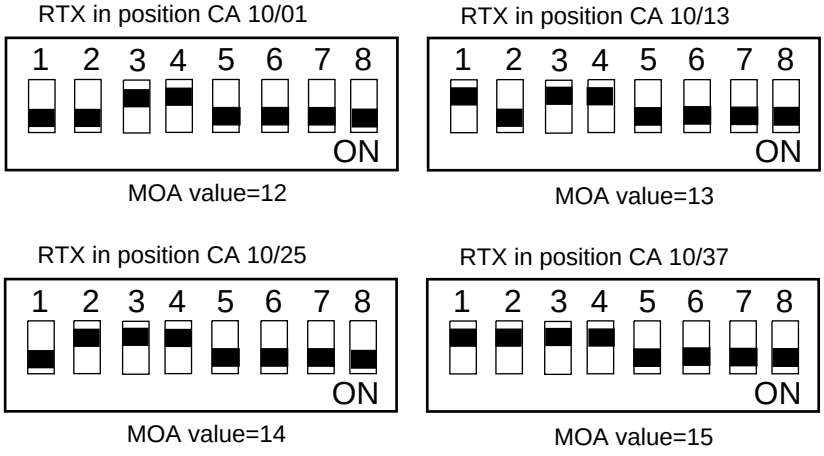


Figure 30 Strapping of TXCU, extension cabinet 3

1.13 Strapping of ACU, KRC 131 42/01

The ACU is configured with one 8-position DIP switch (S4) and one strap switch (S8). Their positions on the Alarm Collection Control Unit (ACCU) board are shown in figure 31.

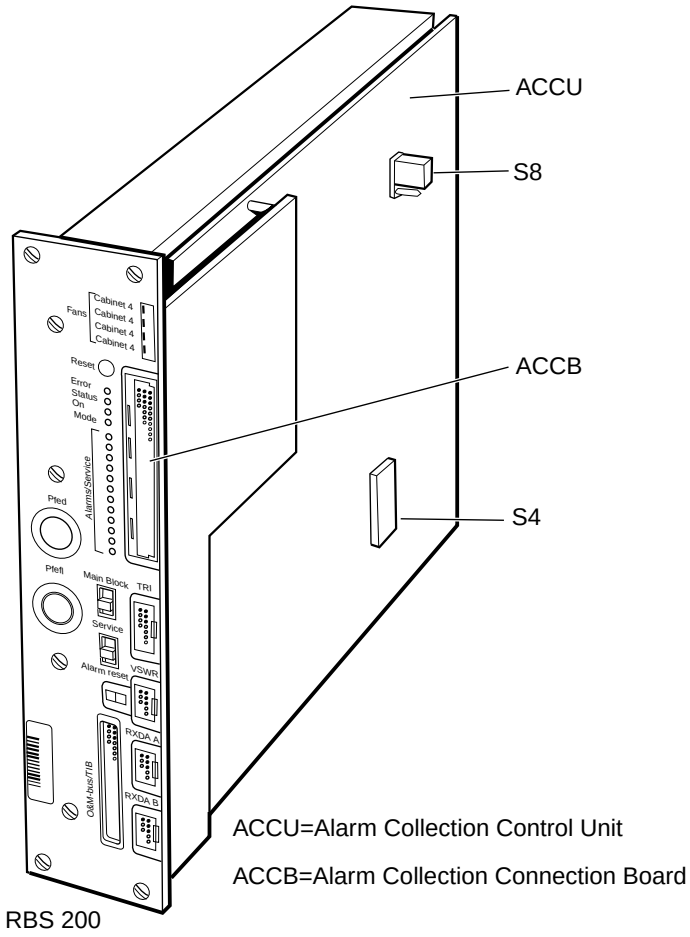


Figure 31 Switch locations on the ACU

1.13.1 DIP Switch S4

The VSWR (Voltage Standing Wave Ratio) alarm threshold, the type of control mode, VSWR alarm output polarity, and the number of fan cassettes to be supervised are strapped with this DIP switch. The configuration and the recommended strapping of the switch is shown in figure 32.

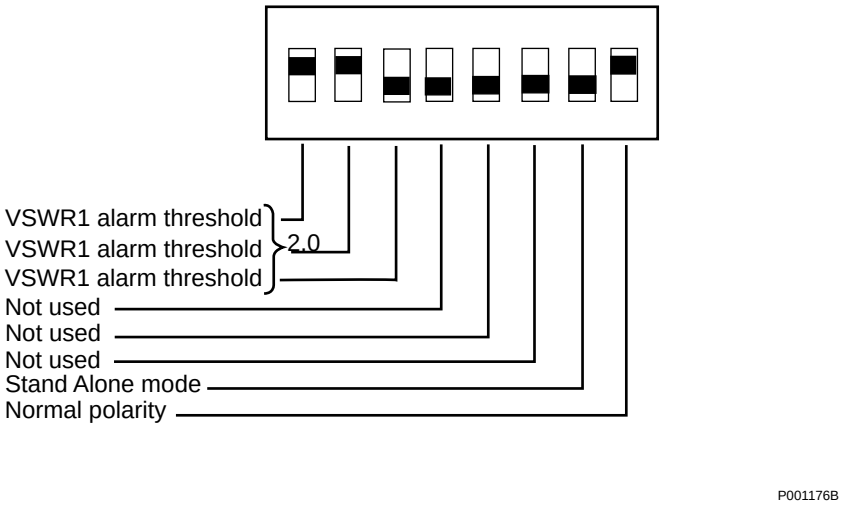


Figure 32 Recommended settings of DIP switch S4

1.13.2 Strapping of VSWR1 Alarm Threshold

There are eight different VSWR alarm threshold values to choose between. These values are obtained by pushing switches number 1 to 3 on DIP switch S4 to the positions described in figure 33.

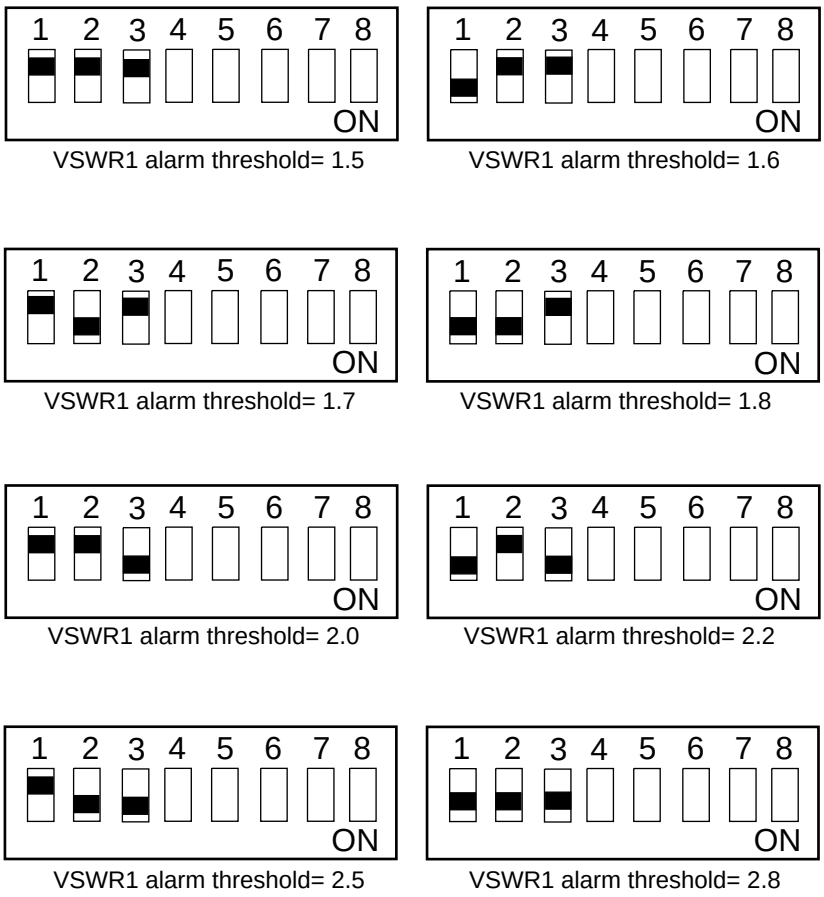


Figure 33 Strapping of VSWR alarm threshold

1.13.3 Strapping of Control Mode

Two different control modes, Stand Alone and Slave, are available. It is possible to choose between them by setting switch number 7 on DIP switch S4 to the ON or OFF position, see figure 34.

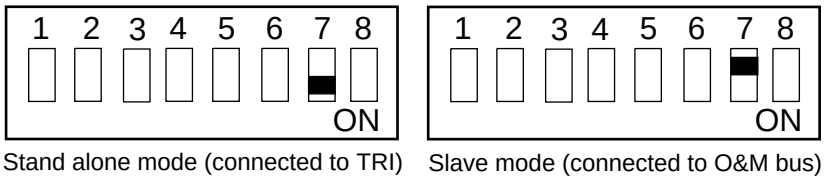


Figure 34 Strapping of control mode

1.13.4 Strapping of VSWR Alarm Output Polarity

Normal or Reverse polarity can be used. This is chosen according to figure 35.

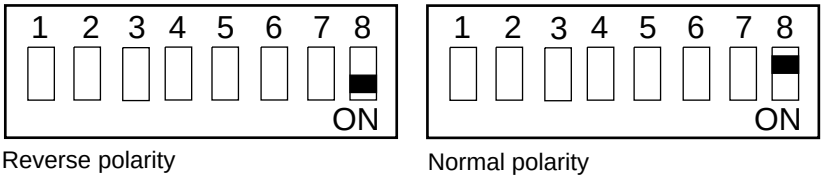


Figure 35 Strapping of VSWR alarm output polarity

1.13.5 Strap Switch S8

The number of fan cassettes to be supervised can be selected with the help of strap switch S8. It is possible to choose supervision of 3 or 4 fan cassettes. The configuration and strapping alternatives of the switch are shown in figure 36. The recommended setting of strap switch S8 is supervision of four fan cassettes.

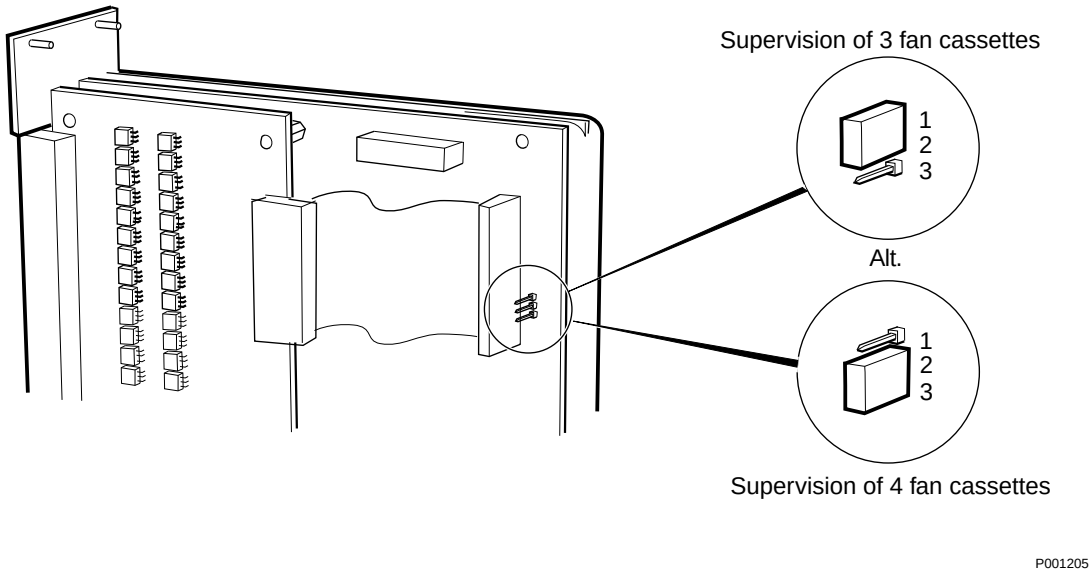


Figure 36 Configuration and strapping alternatives of strap switch S8

Power System Test

Contents **Page**

1 Power System Test

1.1 General

1.1.1 About This Document

This test instruction describes how to test the power system in the RBS. The purpose of the tests is to confirm that the hardware of the power system, cables, backplanes and power units, are fully functional before connecting the Transceiver System (TRS).

Since the RBS can be supplied with three different primary powers (230 V AC, +24 V DC and -48 V DC), this test instruction has been divided into three main sections. This means that different units are checked, depending on which primary power is used.

If 230 V AC primary power is used, incoming 230 V AC, batteries, cables and +24 V AC distribution system, Battery Interconnection Module (BIM), Internal Distribution Module (IDM), and so forth, are checked.

If +24 V DC primary power is used, incoming +24 V DC and output power from the IDM are checked.

If -48 V DC primary power is used, incoming -48 V DC is checked as well as protective circuits and output power of the Power Supply Unit (PSUs).

Tests appropriate with respect to the primary voltage feed used at the site, are to be made in the sequence that they are written. The appropriate Test Record, see the chapter Appendix, is to be filled in during testing.

After completing these tests, all hardware included in the power system shall be ready for use.

1.1.2 About the Power System

The power system, supplying the Transceiver System (TRS), is common for all TRS equipment at the same site. It consists of one primary and one internal part.

Three primary power alternatives are available: 230 V AC, +24 V DC and -48 V DC. The power distribution inside a Radio Base Station (RBS) cabinet is however independent of the primary power supply source. The internal system voltage is always nominal +24 V DC. This means it is denoted +24 V DC, but the actual value is approximately +27 V DC.

Primary power = 230 V AC

Power system (BZZ 207 01) is designed to supply the RBS with power. It consists mainly of Power Supply Unit(s) (PSU), Internal Distribution Unit(s) (IDM), a Power Control Unit (PCU), Battery and

Interconnection Module(s) (BIM) and batteries. During normal operation the PSUs convert the incoming 230 V AC to nominal +24 V DC. The equipment inside the RBS is then supplied high-ohmically with nominal +24 V DC through the IDM. The output side (+24 V DC side) of the PSUs is connected together to achieve a supply system common to all equipment. Since each PSU has the capacity to supply a fully equipped cabinet, it is possible to get a (n+1) redundancy by adding one additional PSU to the master cabinet.

In case of mains or PSU failure, the RBS equipment will be powered from the batteries. To protect batteries from over-discharge, they are connected to the cabinet by means of the BIM which contains a contactor that automatically releases in case of too high a current or when the battery voltage falls below a specified value. When the mains returns after a failure, all PSUs start. The output voltage is set to +24 V DC, after which the battery contactors in the BIM operates. This means that the batteries are reconnected and voltage rises to normal system voltage (+27 V DC).

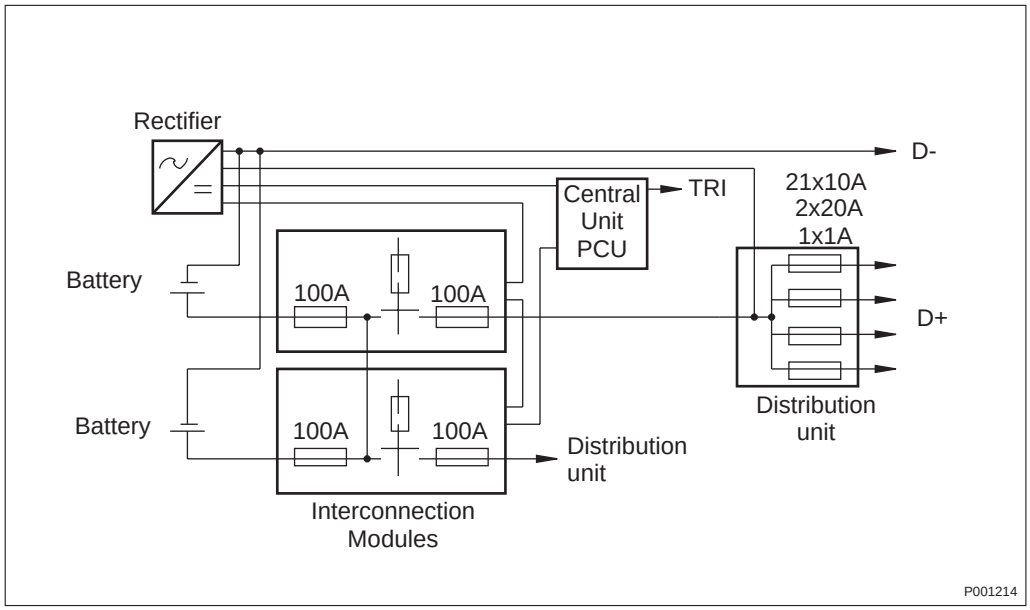


Figure 1 Circuit diagram of power supply system BZZ 207 01

The Power Supply Unit (PSU) BML 435 002/1 is a high frequency 1200 W rectifier that converts incoming 230 V AC to nominal +24 V DC. Since each PSU has the capacity to supply a fully equipped cabinet, it is possible to get (n+1) redundancy by adding one additional PSU to the master cabinet. The first PSU shall always be located in the leftmost position (position 37) in the TM/PSU magazine. The second PSU shall be placed to the right of the first one (position 61).

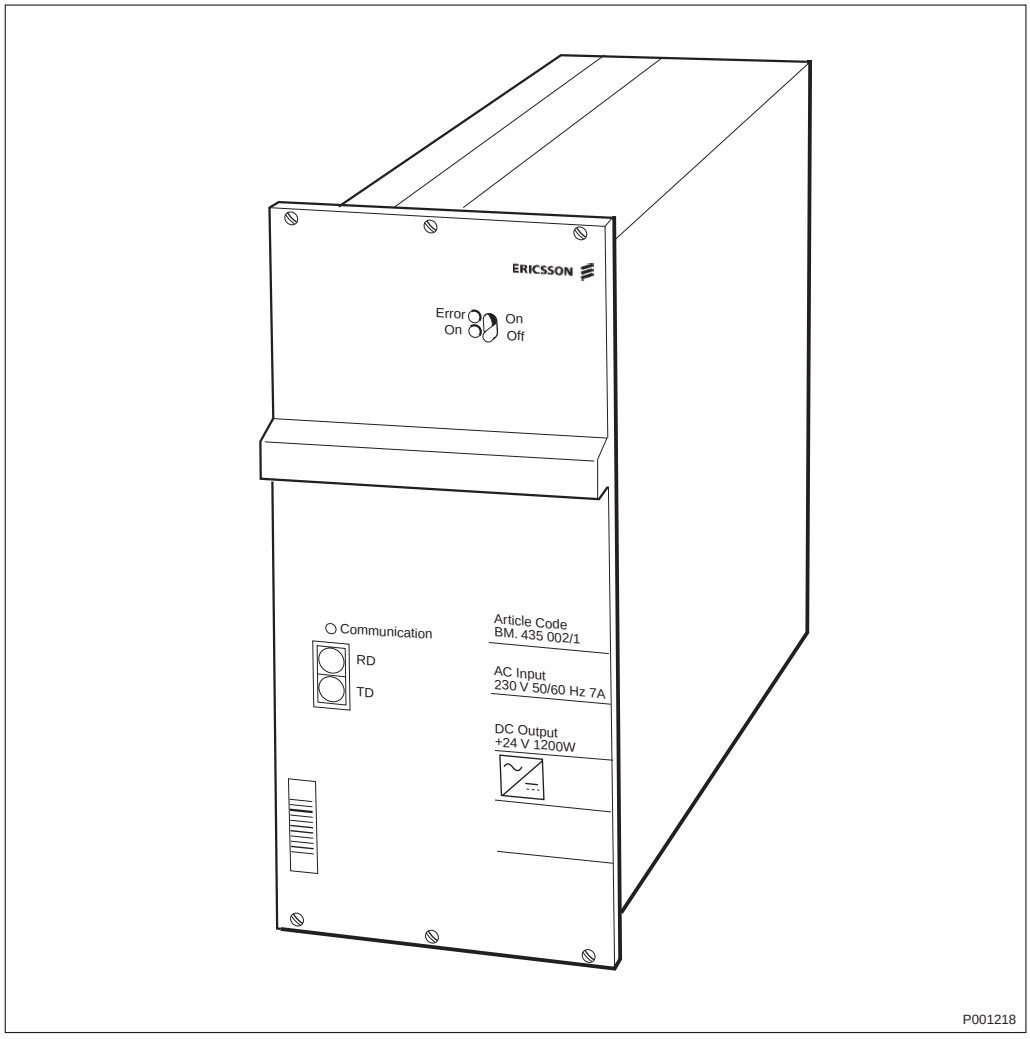


Figure 2 1200 W Power Supply Unit (PSU) BML 435 002/1

The Internal Distribution Unit (IDM) BMG 663 002/- distributes nominal +24 V DC to the different units in the RBS cabinet. It contains filters and a number of fuses. The function of the different fuses is listed in table 1.

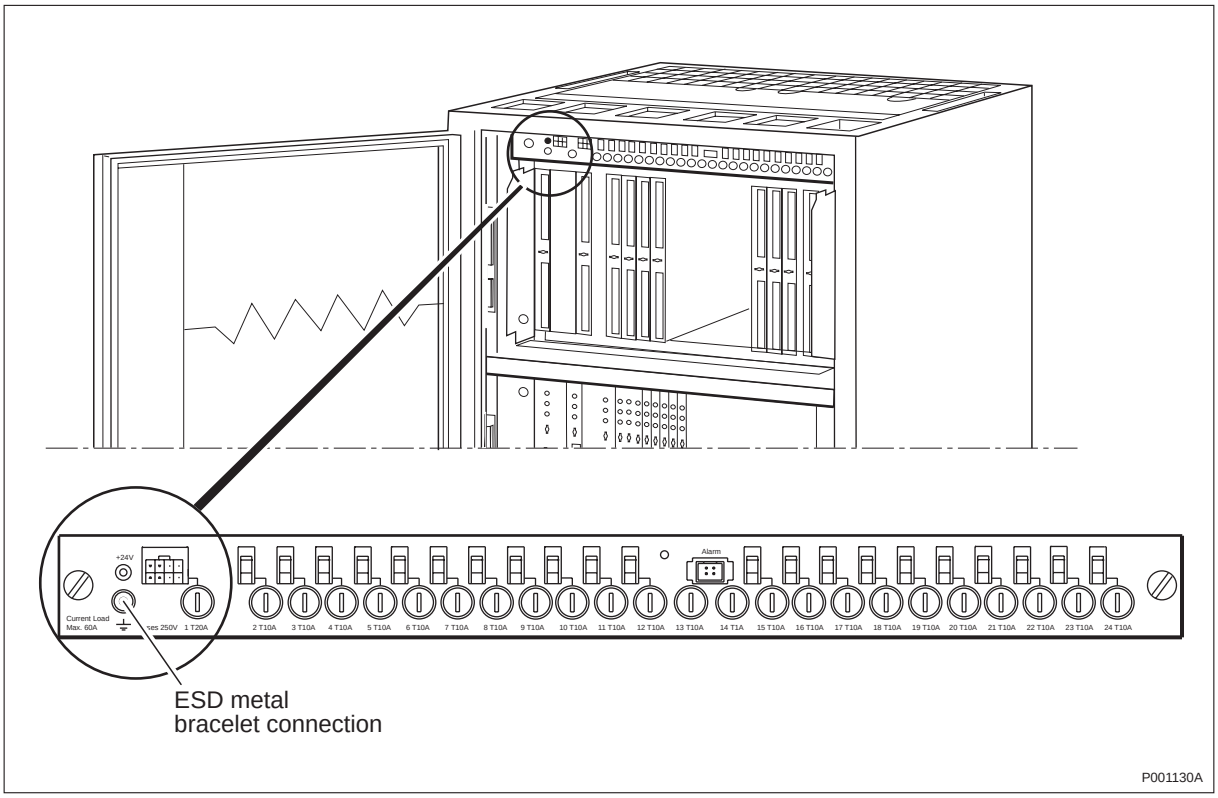


Figure 3 The Internal Distributor Module (IDM) BMG 663 002/-

Table 1 Functions of fuses 1-24 in the IDM unit

Fuse No.	**Function in Master Cabinet**	**Function in Extension Cabinet**
1	Not used	Not used
2	Not used	Not used
3	DC/DC (TRI)	DC/DC (TRI)
4	TRX converter for TRX 1	TRX converter for TRX 1
5	TRX converter for TRX 2	TRX converter for TRX 2
6	TRX converter for TRX 3	TRX converter for TRX 3
7	TRX converter for TRX 4	TRX converter for TRX 4
8	RXDA	Not used
9	RXDA	Not used
10	RTX Power Filter 1	RTX Power Filter 1
11	RTX Power Filter 2	RTX Power Filter 2
12	RTX Power Filter 3	RTX Power Filter 3
13	Fan	Fan

14	Alarm, ACU	Alarm, ACU
15	RTX Power Filter 4	RTX Power Filter 4
16	ACU	Not used
17	TU	Not used
18	TU	Not used
19	TU	Not used
20	PCU	Not used
21	Fan	Fan
22	Fan	Fan
23	Fan	Fan
24	TRXT	TRXT

The Power Control Unit (PCU) ROA 119 807 controls and supervises the power supply system and constitutes the interface between the power units and the rest of the system. It locates errors from PSUs and BIMs and reports them to the Transmission Radio Interface (TRI) with the help of five binary alarms. It also displays the system voltage and the total current consumption of the PSUs.

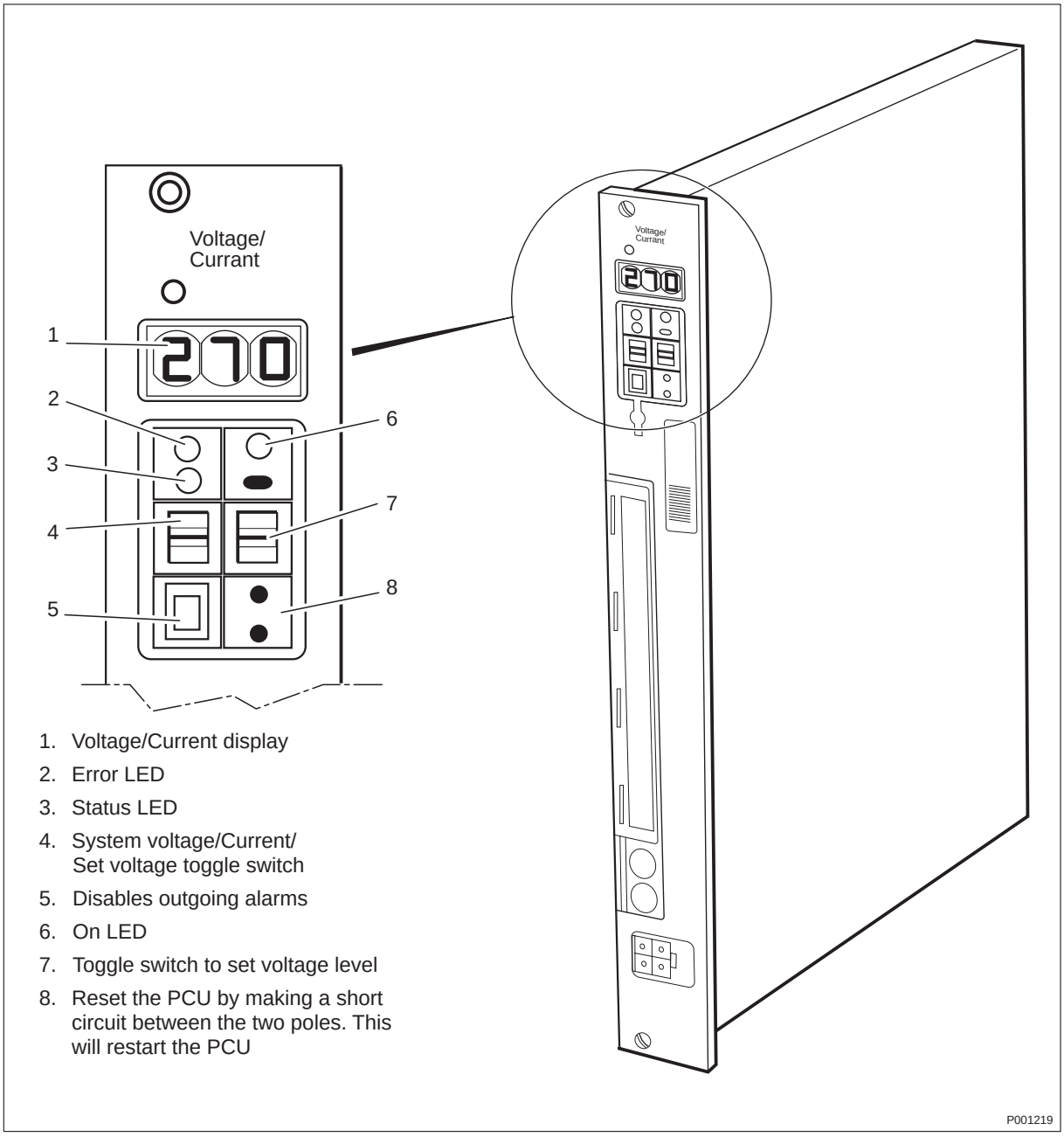


Figure 4 The Power Control Unit (PCU) ROA 119 807

To protect batteries from over-discharge, they are connected to the RBS by means of the Battery and Interconnection Unit (BIM) BMG 701 013/- which contains a contactor that releases automatically in case of too high a current or when the battery voltage falls below a specified value. It is also used as an interconnection between different cabinets to protect them from each other. Besides the contactor, the BIM also comprises one 100 A battery circuit breaker, one 100 A cabinet circuit breaker and a local computer to supervise the module, control the contactor and communicate with the PCU.

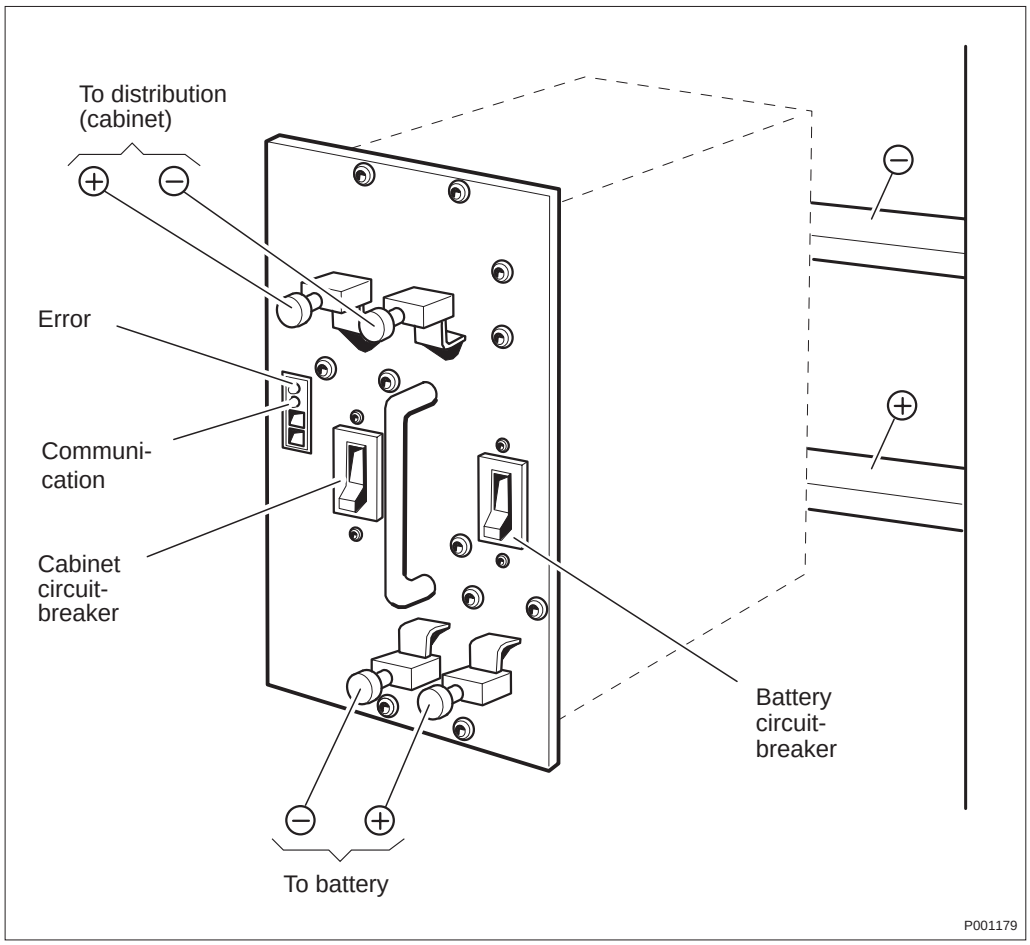


Figure 5 Battery and Interconnection Module (BIM) BMG 701 013/-

Primary power = +24 V DC (nominal)

Since no transformation of power is necessary when +24 V DC primary power is used, only the IDM is needed to distribute the internal power to the different units inside the RBS. The +24 V DC is connected to individual cabinets by means of fuses in the central supply unit.

Primary power = -48 V DC

The Power system (BZZ 207 10) is designed to supply RBS 200 R4 with power. It consists mainly of DC/DC converters, a Capacitor Unit and Internal Distribution Unit(s) (IDM). The DC/DC converters converts the incoming nominal -48 to -60 V DC to nominal +24 V DC. To protect the equipment in the RBS (Radio Base Station) against transients, a 0.6 F capacitor is used on the output side of the DC/DC converters. The equipment in the RBS is then supplied high-ohmically with nominal +24 V DC through the IDM.

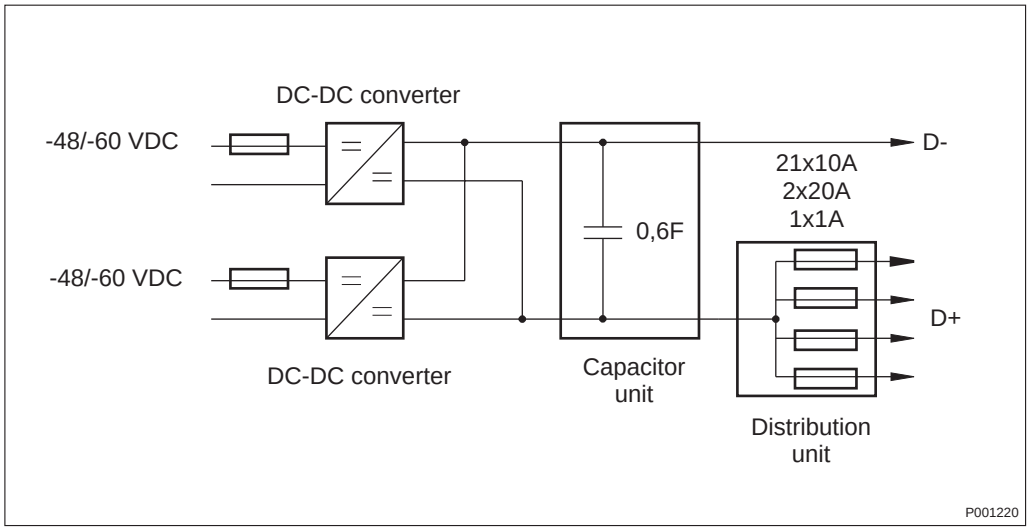


Figure 6 Circuit diagram of power supply system BZZ 207 10

DC/DC converter (BMR 960 009/1) is a high-frequency 1300 W DC/DC converter with an input voltage operating range of -38 to -72 V DC. It has a protective circuit that shuts down the converter if the input voltage exceeds -40 V DC. The converter restarts automatically when the input voltage drops below -45V DC again. An alarm is initiated when the input power is too low or when the output voltage deviates more than 10 % from the set value. When the LEDs "Input OK" and "Output OK" (see figure 7) go off, it indicates an alarm.

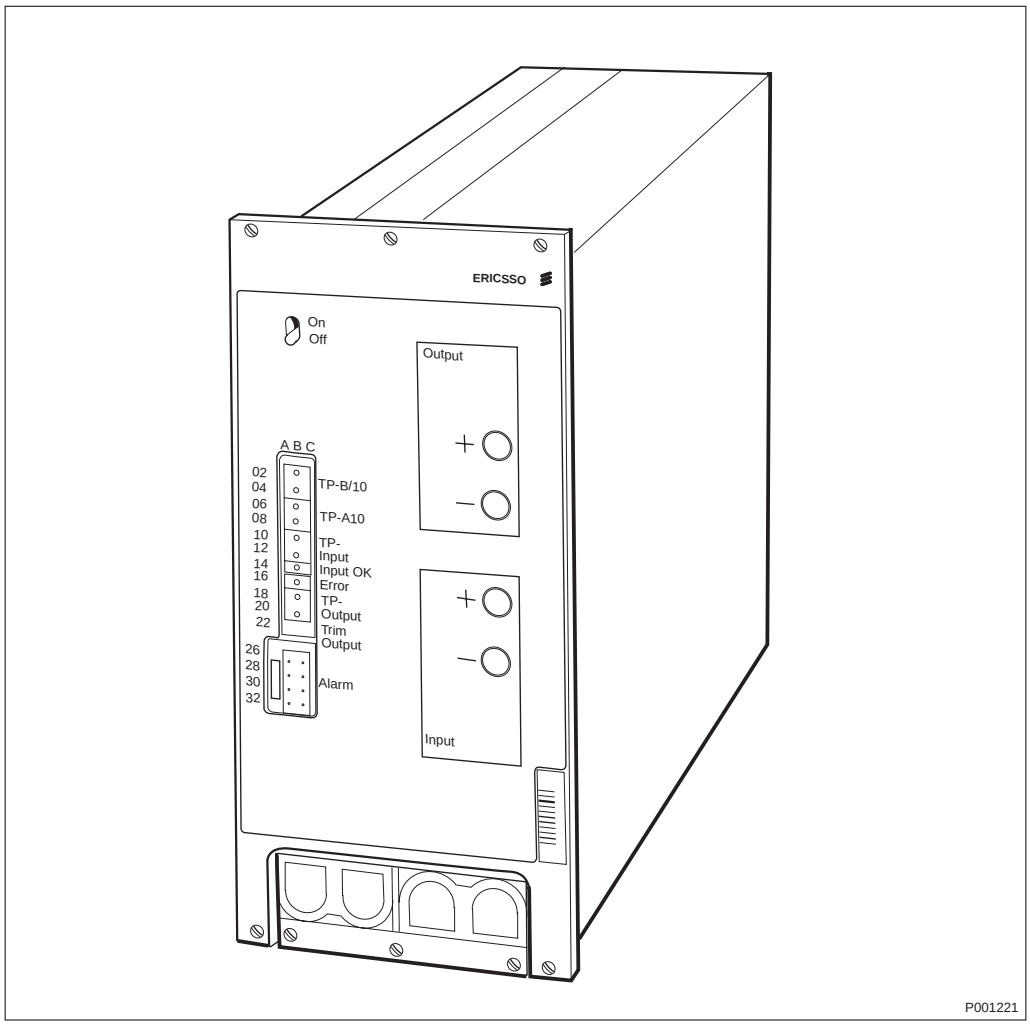


Figure 7 1300 W DC/DC converter BMR 960 009/1

To protect RBS equipment against transients, a Capacitor Unit is used. It is a 0.6 F capacitor connected on the output side of the DC/DC converter. If more than one RBS is used, the same number of capacitor units have to be connected in parallel to ensure low impedance of the nominal +24 V DC feeding.

Information on the IDM BMG 663 002/- is found under the heading Primary power = 230 V AC in section 1.1.2.

1.2 Test Equipment

The equipment in table 2 is needed to carry out this test. This equipment can be ordered by using the ordering information in chapter Test Team Equipment. More instructions on how to order equipment from this manual can also be found there.

Table 2 Test equipment

Item	Description	Specification	Product No.	Qty
1	Multimeter	Fluke 8060A	LPK 102 024/1	1
2	Clip-on anmeter [1)]	KEW 2003	LPK 102 039/1	1

[1)] Only used when primary power = -48V DC.

1.3 Prerequisites

- Check the installation according to chapter Installation Check.
- Perform strapping according to chapter *Strapping Instructions in the G-Module*.
- Remove rings, wrist watches and similar objects that could cause a short-circuit.

1.4 Test when Primary Power Is 230 V AC

1.4.1 Prerequisites

1.4.2 Primary Power

1. Make sure that the feeding of all PSUs is switched off by setting the ON/OFF toggle switches (item 3 in figure 2) on the PSUs to position OFF.
2. Make sure that the battery and cabinet circuit breakers of all Battery Interconnection Modules (BIM) are in position OFF (see figure 5).
3. Remove all distribution fuses in use, except those feeding the PCU and the fans of the cabinet(s) (see figure 3 and table 1).
4. Check with the multimeter that there is no short circuit between the positive and the negative poles of the system. This is done by measuring between the upper two poles (plus and minus) on each BIM and also between the two conductors in the backplane of the BIM magazine (see figure 5).
5. Connect primary power on top of the cabinet(s) (see figure 9).
6. Switch on main power source (main distribution box).
7. Measure the voltage level on top of the cabinet.

Proper value: 230 ±30 V AC

8. Record the voltage level in the Test Record.

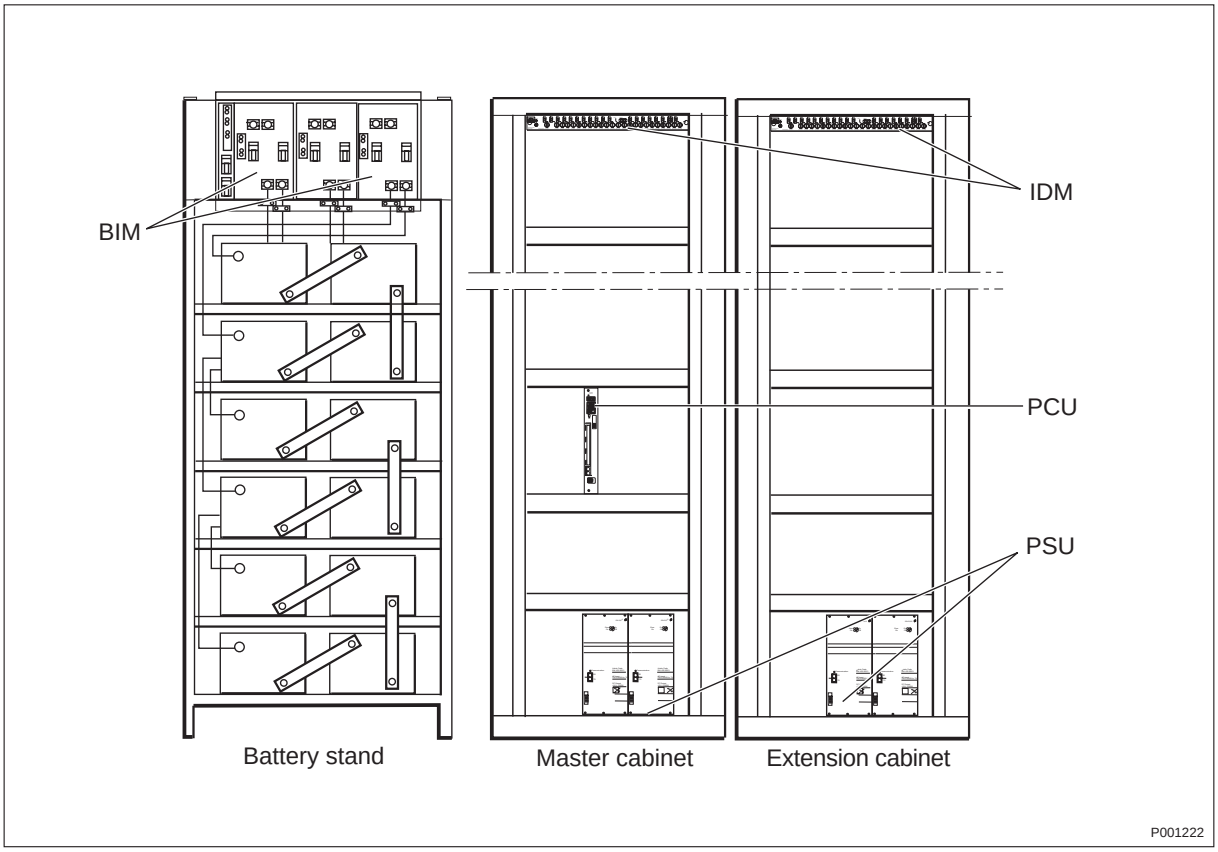
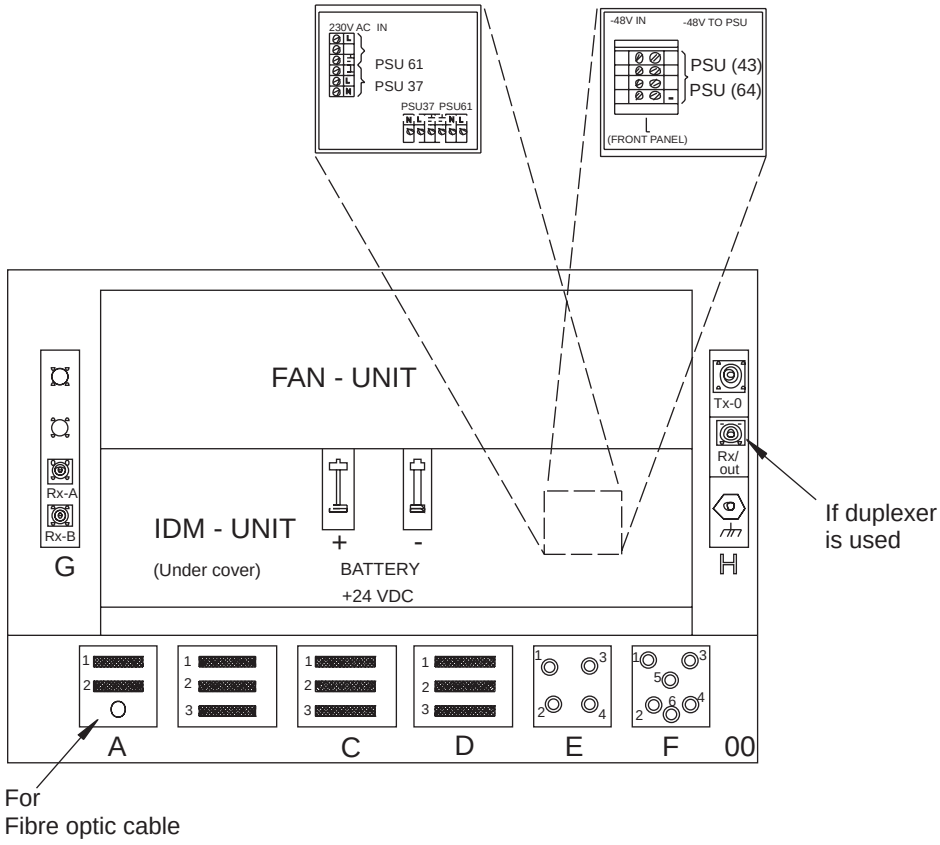


Figure 8 Example of power system based on 230 V AC



A1 = TM SYNC IN
A2 = TM SYNC OUT
B1 = EXTERNAL ALARM
B2 = EXTERNAL ALARM
B3 = LIB TRXD 1-4
C1 = LIB BUS CAB. A1
C2 = LIB BUS CAB. B1 (A2)
C3 = LIB BUS CAB. C1 (A3)
D1 = LIB BUS CAB. A2 (A4)
D2 = LIB BUS CAB. B2
D3 = LIB BUS CAB. C2

*)E1 = PCM INPUT 1 120 ohm
E2 = PCM OUTPUT 1 120 ohm
E3 = PCM INPUT 2 120 ohm
E4 = PCM OUTPUT 2 120 ohm
**)F1 = PCM INPUT 1 75 ohm
F2 = PCM OUTPUT 1 75 ohm
F3 = PCM INPUT 2 75 ohm
F4 = PCM OUTPUT 2 75 ohm
F5 = PCM INPUT 3 75 ohm
F6 = PCM OUTPUT 3 75 ohm

*) If more than 2 ETB cards,
2 contact boxes E (SVK 107
**) If more than 3 ETB cards,
2 contact boxes F (SVK 107 2435/1) are needed.

P001226

Figure 9 Connection field on top of the cabinet

1.4.3 Internal Power

Distribution check

1. Start all PSUs by setting the ON/OFF toggle switches on the PSUs to position ON (item 3 in figure 2).

   Result:

   LEDs "On" and "Communication" on all PSUs light up. The PCU display shows 24±0.5 V. After about 5 seconds the green LED "On" and the red LED "Error" will be turned on and an A2 alarm (see table 4 and figure 10) is initiated from the PCU.

2. Switch on all cabinets and battery circuitbreakers on the BIMs by setting them in position ON (see figure 5).

   Result:

   The load contactors operate. The green LEDs "Communication" on the BIMs are turned ON. The red LEDs "Error" are turned OFF and the A2 alarm (table 4 and figure 10) on the PCU ceases. The system voltage rises to the default set value ±0.5 V.

3. Measure the default set voltage value on the IDM.

   Proper value: 23 - 28.5 V DC

4. Record the voltage level in the Test Record.

Voltage level setup

This procedure is necessary only once, but if the whole system is disconnected and the desired (set) value is set to something other than the preprogrammed 27.0 V, the desired value must be set again.

The recommended voltage levels according to table 3 apply to valve regulator batteries (VR) with or without cell/block voltage equalizers of type BMP 160. The battery voltage stated in the table concerns 12 cells and an ambient temperature of less than 25°C. Other levels may be used where required by the battery manufacturer.

Table 3 Battery voltage levels

Operational tempera-ture	**Battery Voltage**			
	With voltage equalizer		**Without voltage equalizer**	
(°C)	**V**	**V/cell**	**V**	**V/cell**
15 - 24	27.0	2.25	27.3	2.27
25 - 29	27.0	2.25	27.0	2.25
30 - 34	26.7	2.23	26.7	2.23
35 - 40	26.5	2.21	26.5	2.21

1. Set the left toggle switch on the PCU in the lower position "Set V" (see item 4 in figure 4).

   Result:

   The set voltage value of the system appears on the display of the PCU.

2. Set the voltage level according to table 3, or Market Dependent Special Instruction, with the right toggle switch on the PCU (see item 7 in figure 4).

   Result:

   If the switch is brought to position "Up", the voltage increases with a resolution of 0.1 V, and if the switch is brought "Down", the voltage drops with the corresponding resolution.

3. Document the completion of Voltage level setup in the Test Record.

Voltage level check

1. Set the left toggle switch on the PCU in the upper position "V" (see item 4 in figure 4).

   Result:

   The system voltage appears on the display of the PCU.

2. Check the voltage value on the PCU display (item 1 in figure 4).

   Proper value: Set value ±0.2 V DC

3. Record the voltage level in the Test Record.

4. Measure the voltage level in the IDM.

Proper value: Set value ±0.2 V DC

5. Record the voltage level in the Test Record.

Note A difference of 0.1 V between the PCU and the multimeter readouts is possible.

Alarm check

Outgoing alarms from PCU are constituted by five relays with categories according to table 4 below. Also refer to figure 10 on the next page.

Table 4 Alarm categories in the PCU

Alarm	Function	Description
A1	Releases on alarm	Requires immediate action
A2	Operates on alarm	Corrective actions during normal working hours
01	Operates on alarm	Observation alarm for indication of a temporary state
Mains failure	Releases on alarm	Mains failure
Undervoltage	Releases on alarm	The system voltage is below the limit of undervoltage monitor 2

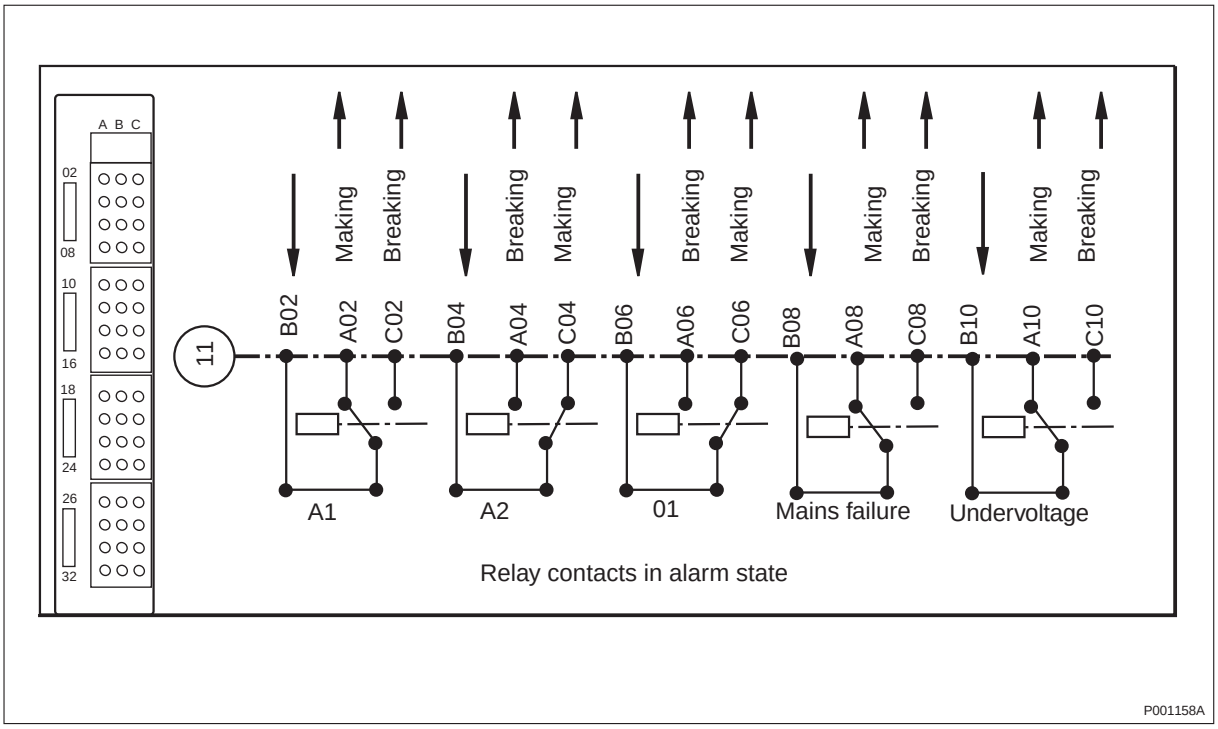


Figure 10 Outgoing alarm terminal block

Use the multimeter to check if the different alarms in table 4 have been activated or not. This is done by measuring if there is a short circuit or not between the corresponding pins in the connector shown in figure 10.

1. Disconnect the mains supply coming into one PSU by removing the mains fuse.

   Result:

   The red LED "Error" on the PCU is turned ON and the A2 alarm (see table 4 and figure 10) is activated. The green LED "On" on the PSU in question starts flashing.

2. Reconnect the mains fuse to the PSU.

   Result:

   The A2 alarm (see table 4 and figure 10) ceases.

3. Repeat items 1 and 2 for all PSUs.

4. Make sure that all ON/OFF switches on the PSUs are in position ON.

Note Item 5 applies only if the site comprises batteries.

5. Disconnect the mains supply of all PSUs by taking out the mains fuses.

   Result:

   The yellow LED "Status" lights on the PCU and Mains failure alarm (see table 4 and figure 10) is activated. The green LED "On" of each PSU starts flashing.

6. Reconnect the mains supply to the PSUs.

   Result:

   All alarms (see table 4 and figure 10) cease.

7. Make a break in the communication loop by removing the cable from some unit.

   Result:

   After about 10 seconds the red LED "Error" (item 2 in figure 4) on the PCU lights. An A2 alarm (see table 4 and figure 10) is activated.

8. Reconnect the cable so that the communication loop is closed.

   Result:

   The A2 alarm (see table 4 and figure 10) ceases.

9. Press the key "Block" (item 5 in figure 4) on the PCU to block the outgoing alarms to the TRI.

   Result:

   The yellow LED "Status" (item 3 in figure 4) on the PCU lights. A 01 alarm (see table 4 and figure 10) is activated.

10. Press the key "Block" (item 5 in figure 4) on the PCU to deblock the outgoing alarms to the TRI.

    Result:

    The 01 alarm (see table 4 and figure 10) ceases.

Note The following step simulates an undervoltage alarm. This alarm occurs when the system voltage falls below 20 V DC, but because it is difficult to simulate, item 11 only shows that the alarm is correctly connected to the DF (Disbribution Frame).

11. Disconnect cable TSR 901 0197/1700 from the PCU and measure on the DF position P4/03ab.

    Result:

    There should be appoximately 33 V DC.

12. Reconnect the cable on the PCU.

13. Document the completion of Alarm check in the Test Record.

Restoration

1. Switch off all battery circuit breakers on the BIMs by setting them in position OFF (see figure 5) and disconnect the mains supply of all PSUs.

   Result:

   The cabinet is switched off.

2. Reconnect the removed distribution fuses.

3. Connect the mains supply to the PSUs and make sure that all ON/OFF toggle switches (see figure 2) on the PSUs are in position "On". At the same time, set all battery circuit breakers in position ON.

4. Check that all cabinet and battery circuit breakers are in position ON. (See figure 5).

   Result:

   The cabinet is in operation and all alarms (see table 4 and figure 10) shall be reset.

5. Check the voltage level on the PCU.

   Proper value: Set value ± 0.2 V DC

6. Document the completion of Restoration in the Test Record.

Function test

Note This test shall be done after the TRS Stand Alone test section or the TRS System test section has been performed.

Batteries shall have been connected and charged for the specified charging time; see the chapter Market Dependent Special Instructions.

Mains OFF

1. On the PCU, set the left toggle switch (item 4 in figure 4) in position C and note the current consumption.

2. Perform call setup with the mobile connected to the TRS.

3. Switch off mains power with the call in progress.

   Result:

   There shall be no effect on the call.

4. Document the completion of Mains OFF in the Test Record.

Battery operation

1. Run the TRS for the time period specified as the battery back-up time, or at the most 20 minutes, with the call still in progress.

   Result:

   There shall be no effect on the call.

2. Document the completion of Battery operation in the Test Record.

Mains ON

1. Switch the mains ON with the call still in progress.

   Result:

   There shall be no effect on the call.

2. Disconnect the call.

3. Document the completion of Mains ON in the Test Record.

Charging

1. On the PCU, check the current consumption as above.

   Result:

   >0.5 A increase from readout before Mains "OFF"

2. Document the completion of Charging in the Test Record.

1.5 Test when Primary Power Is +24 V DC

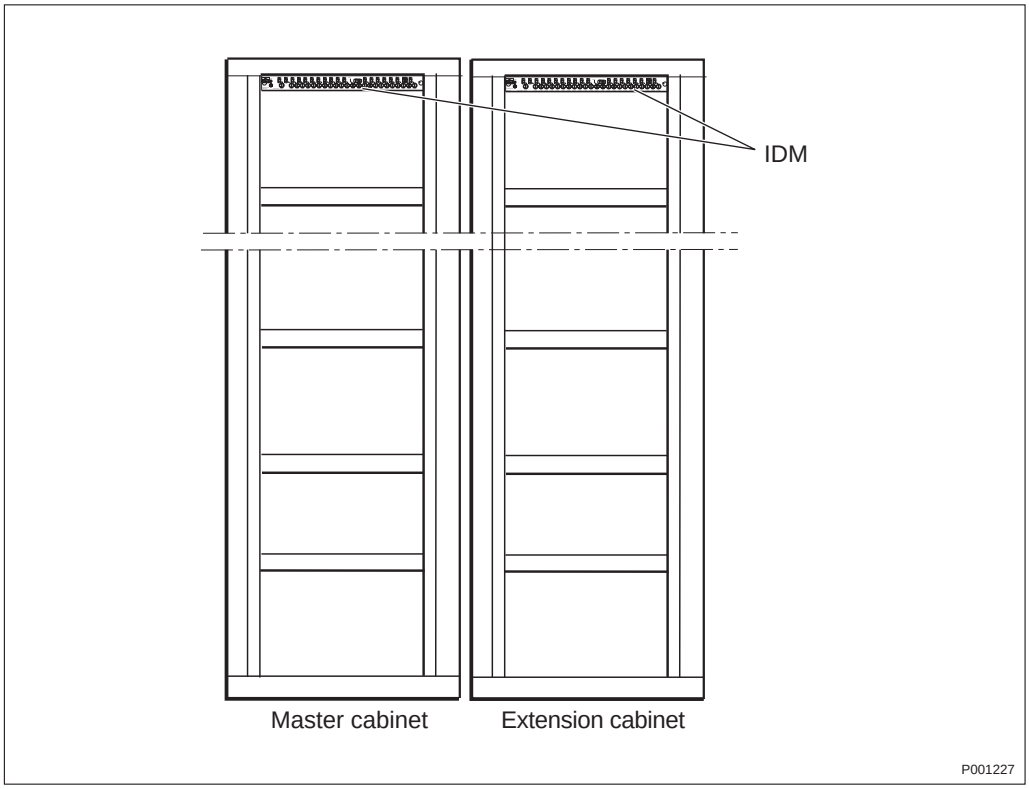


Figure 11 Example of power system based on +24 V DC

1.5.1 Primary Power

1. Remove all the distribution fuses in use (see figure 3).
2. Connect primary power on top of the cabinet (see figure 9).
3. Measure the voltage level on top of the cabinet.

   Proper value: 26.4 - 28 V DC
4. Record the voltage level in the Test Record.

1.5.2 Internal Power

1. Reconnect all the distribution fuses in use (see figure 3).
2. Measure the output power from the IDM (see figure 11).

   Proper value: 26.4 - 28 V DC
3. Record the voltage level in the Test Record.

Repeat Primary Power and Internal Power for all cabinets.

1.6 Test when Primary Power Is -48 V DC

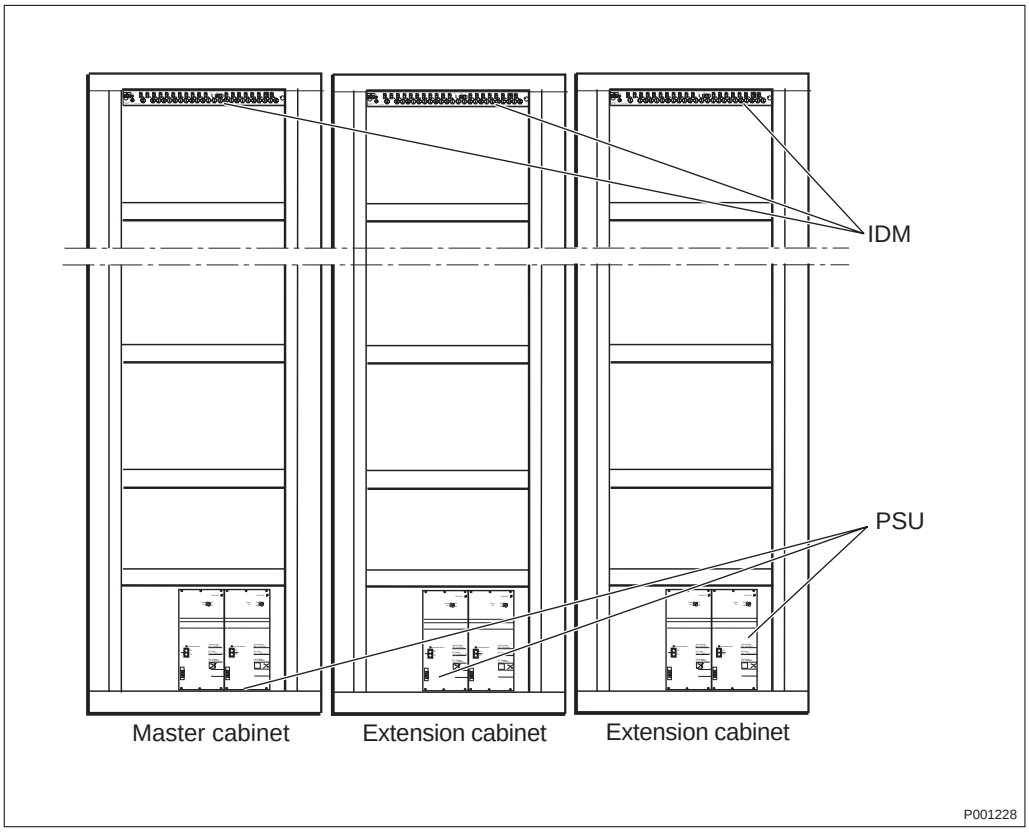


Figure 12 Example of power system based on -48 V DC

1.6.1 Primary Power

1. Make sure that the feeding of all PSUs is switched off by disconnecting the feeding fuses to the PSUs.
2. Remove all distribution fuses in use, except those feeding the fans of the cabinet(s) (see figure 3).
3. Check with the multimeter that there is no short circuit between the positive and the negative poles of the system.
4. Connect primary power on top of the cabinet(s) (see figure 9).
5. Measure the voltage level on top of the cabinet(s).

   Proper value: -40 to -70 V DC
6. Record the voltage level in the Test Record.

1.6.2 Internal Power

Measurements

1. Start both DC/DC converters in the cabinet by connecting the feeding fuses.

   Result:

   LEDs "Input OK" and Output OK" on PSU shall be ON (see figure 7).

2. Check the levels of the protective circuit by connecting the multimeter to test points TPA/10 and TPB/10 (see figure 7). This applies to both DC/DC converters.

   Proper value: Voltage shall be 4.0 V for TPA/10 and 4.5 V forTPB/10. Any adjustment shall be made with potentiometer A-level and B-level respectively (see figure 7).

3. Record the voltage levels in the Test Record.

4. Switch off the feeding voltage to one DC/DC converter by disconnecting the feeding fuse.

   Result:

   Green LED "input OK" of the DC/DC converter in question is turned OFF.

5. Measure output voltage of the DC/DC converter in operation by connecting the multimeter to test point TPOutput (see figure 7).

   Proper value: Voltage shall be 27.9 ±0.1 V. Any adjustment shall be made with potentiometer Trim.Output.

6. Record the voltage level in the Test Record.

7. Restore the feeding to the shutdown DC/DC converter.

   Result:

   Green LED "input OK" is turned ON.

8. Switch off the feeding voltage of the other DC/DC converter by disconnecting the feeding fuse.

   Result:

   Green LED "input OK" of the PSU in question is turned OFF.

9. Measure output voltage of DC/DC converter in operation by connecting the multimeter to test point TPOutput (see figure 7).

   Proper value: Voltage shall be 27.9 ±0.1 V. Any adjustment shall be made with potentiometer Trim.Output.

10. Record the voltage level in the Test Record.

11. Restore feeding to the shutdown DC/DC converter.

    Result:

    Green LED "input OK" is turned ON.

12. Check with the clip-on ammeter that the load is shared between the two DC/DC converters of a cabinet. Measure the current in the positive conductor of the output.

    Proper value: Max. permissible difference in load between the two DC/DC converters is 20 %. Any adjustment can be made with potentiometer Trim.Output. An increase in voltage gives an increase in current.

13. Record the current values for both DC/DC converters and the difference expressed as a percentage in the Test Record.

Restoration

14. Disconnect feeding fuses of all DC/DC converters.

    Result:

    Cabinet is turned off.

15. Reconnect the removed distribution fuses.

16. Connect the feeding voltage to the DC/DC converters.

    Result:

    Cabinet is turned on. LEDs "input OK" and "output OK" on all DC/DC converters shall be ON. All alarms shall be reset.

17. Document the completion of Restoration in the Test Record.

Repeat Primary Power and Internal Power for all cabinets.

1.7 PCU Trip Levels

General

If the PCU is a "ROA 119807/0150" version R6A or later, the PCU trip levels can be changed from the preset values, set by the factory.

Necessary equipment

- Portable PC with serial port and Windows
- Cable (see figure 13)

Instructions

1. Connect the cable between port 2 on the PCU and com1 on the PC.
2. Start the terminal emulation program under "Accessories" in Windows.
3. Select "Communications" under "Settings" and change the settings to:

   Baudrate: 2400

   Data Bits: 8

   Flow Control: Xon/Xoff

   Parity: None

   Stop bit: 1

   Parity Check: OFF

   Connector: COM1
4. Reset the PCU (see figure 4).
5. Type TTY and press RETURN within five seconds from the reset of the PCU.

   The screen shows the following message:

   RBS/CPS TERMINAL INTERFACE

   COPYRIGHT ERICSSON COMPONENTS....

   A prompt occurs >>>
6. Type "show batterytrip" and press RETURN.

   Actual values are displayed, for example:

   batterytrip 22.000000 batteryuntrip 25.500000.

7. Type "set batterytrip x" and press RETURN where x is the wanted battery trip level.

8. The value is now changed.

9. Check the value by typing "show batterytrip".

10. Reset the PCU.

The values are now stored and in function.

The same procedure can be used to set the undervoltage level. Then use commands "set undervoltage/show undervoltage".

Cable drawing

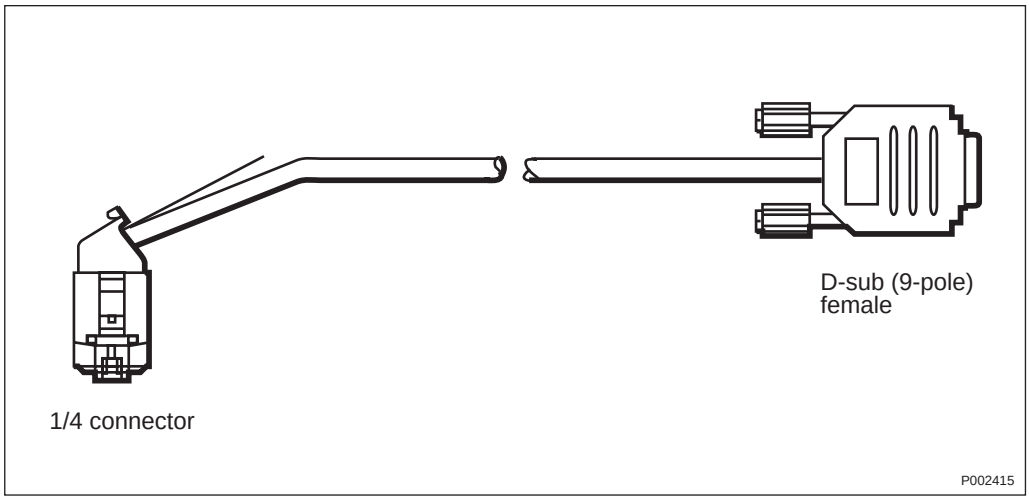


Figure 13 Cable between PC and PCU

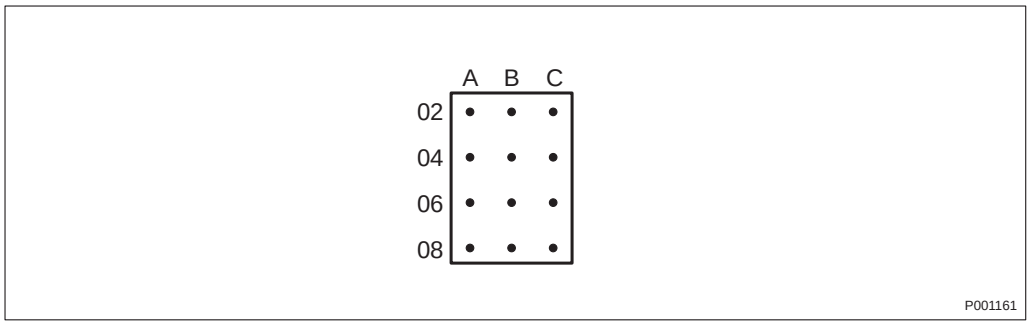


Figure 14 $\frac{1}{4}$ Connector viewed from the male side of the plug

Table 5 Connection scheme

$\frac{1}{4}$ **Connector**	**Signal**	**Name**	**D-sub (9-pole)**
4A06	V24-103	TD	3
4C02	V24-105	RTS	7
4C04	V24-108/2	DTR	4
4A02	V24-104	RD	2
4B04	V24-106	CTS	8
4C06	V24-109	DCD	1
4B02	V24-107	DSR	6
4A04, 4A08	V24-102	0V	5

1.8 Alarm Survey

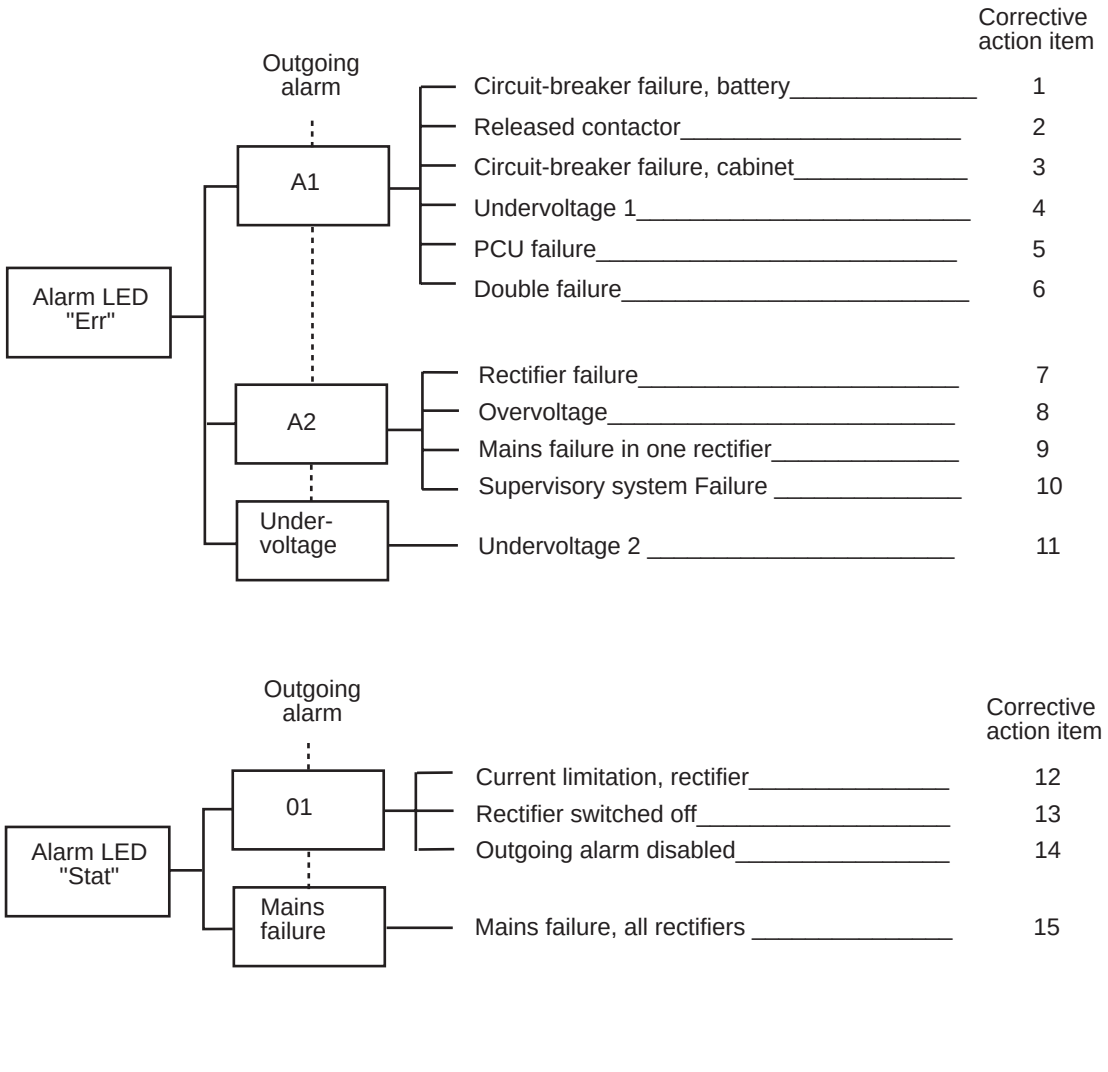


Figure 15 Alarm survey

1. Circuit-Breaker Failure, Battery (red LED "Err" on the unit in question)

   The circuit-breaker failure occurs probably because of an overload of the circuit-breaker, unless a short-circuit has occurred.

   Find out what caused the circuit-breaker to trip, and eliminate it before resetting the circuit-breaker.

2. Released Contactor (red LED "Err" on the units in question)

   The release of the contactor occurs probably because of an undervoltage 2 alarm, which means that the distribu-

tion voltage is less than +20.0 V DC. The low voltage is caused by the load being fed wholly or to a large extent by the batteries, due to a rectifier failure (usually a mains failure).

3. Circuit-Breaker Failure, Cabinet (red LED "Err" on the unit in question)

   The circuit-breaker is probably caused by an overload of the circuit-breaker, unless a short-circuit has occurred.

   Find out and eliminate the cause of the tripped circuit-breaker before resetting it.

4. Undervoltage 1 (red LED "Err" lights on the PCU)

   Indicates that the distribution voltage is below the preset alarm level of +22 V. The low voltage is caused by the load being fed wholly or to a large extent by the batteries, due to a rectifier failure (usually a mains failure).

   Unless there is a mains failure, the rectifiers must be corrected so that they reach a sufficient capacity for recharging the batteries.

5. PCU Failure (red LED "Err" lights on the PCU)

   Usually an internal failure in the unit. Make a reset. If the alarm remains, exchange the PCU for a new one and send the old one to a repair centre.

6. Double Failure (red LED "Err" lights on the PCU)

   Indicates that a failure has appeared in a system in more than one rectifier simultaneously. A failure in one rectifier initiates an A2 alarm. Two simultaneous A2 alarms automatically initiate an A1 alarm from the PCU. Take the adequate action by means of alarm survey.

7. Rectifier Failure (red LED "Err" lights on the rectifier in question)

   Usually an internal failure in a rectifier. Make one attempt at restarting the rectifier by setting the toggle switch at position "Off" and then "On". If the alarm remains, exchange the rectifier for a new one and send the old one to a repair centre.

8. Overvoltage (red LED "Err" lights on the PCU)

   Indicates that the output voltage of the rectifiers exceed +30 V. The high voltage is probably caused by an internal failure in the rectifier. Make one attempt at restarting

the rectifier by setting the toggle switch at position "Off" and then "On".

If the alarm remains, exchange the rectifier for a new one and send the old one to a repair centre.

9. Mains Failure, One Rectifier (green LED "On" starts flashing)

Indicates that the mains supply of a rectifier has failed. This is probably caused by the tripping of a circuit-breaker in the mains supply of the rectifier.

Check the mains supply of the system and exchange or reset the circuit-breaker.

A mains failure for all rectifiers initiates a mains failure alarm on the PCU.

10. Supervisory System Failure (red LED "Err" lights on the PCU)

Indicates that the different units do not communicate with each other. Probably a break in the alarm loop.

Check the optical cable for sharp bends or a misplaced or loose connection. If the failure remains, summon trained personnel.

11. Undervoltage 2 (the system goes down)

Indicates that the distribution voltage is less than the preset alarm level, +20.0 V DC.

This alarm is a consequence of the alarm described in item 4. Also, the battery contactors release to prevent over-discharge of the batteries. Refer to item 2. The contactors operate when the distribution voltage is > 24 V.

12. Power Limitation, Rectifier (green LED "On" flashes on the rectifier in question)

The rectifier capacity is too small in proportion to the load, for instance after a mains failure when the batteries are discharged.

Find out why the capacity is not sufficient.

13. Rectifier Switched Off (yellow LED "Stat" lights on the PCU)

The rectifier is switched off by means of the toggle switch ON/OFF.

Find out why the rectifier is switched off. Normally all rectifiers shall be in operation.

14. Outgoing Alarm Disabled (yellow LED "Stat" lights on the PCU)

The outgoing alarms of the power supply system to the TRI of the RBS cabinet are disconnected. This is done, for instance when a test is to be made, or the power supply system shall be repaired.

15. Mains Failure, All Rectifiers (green LED "On" flashes on all rectifiers)

The load is powered by the batteries only, because of a mains failure. Watch the battery voltage, and take measures, if possible, to prevent the plant from going down because of over-discharging of the batteries (that is undervoltage 2).

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TRS System Test Using BSC Simulator

Contents **Page**

1 TRS System Test Using BSC Simulator

This test instruction describes the procedures for testing the TRS version R3 using a BSC simulator.

All tests in this chapter are performed in stand-alone mode. If the RBS is connected to the BSC, it is recommended to test the TRS by using the BSC.

The purpose of the test is to ensure that the RBS hardware is functionally correct, and to confirm that it is possible to partly load and activate the TRI and to partly load, start, configure and enable all subsystems in the TRS through the TRI.

When the TRS System Test using a BSC simulator has been done, the Test Call on Air Interface and TRXT Test remain to be accomplished. These tests are treated in chapter TRS System Test Using BSC. TRXT Test can be done with BSC Simulator as an option.

In Appendix, at the end of this manual, there is a test record, which has to be filled in during the test.

1.1 Prerequisites

- Installation check shall be done according to chapter Installation Check.
- Strapping shall be performed according to chapter *Strapping Instructions, G-Module*.
- Power system test shall be performed according to chapter Power System Test.
- For detailed information about the test with BSC simulators, see the respective Simulators User Guide.

1.2 Test Equipment

The equipment in table 1 is needed to carry out this test. This equipment can be ordered by using the ordering information in chapter Test Team Equipment. More instructions on how to order equipment from this manual can also be found there.

BSC Simulator Kit

In this chapter, two BSC Simulators can be used. For more information about the BSC Simulators you can see the product specifications and product function specifications.

- BSCSim II LPP 106 35/01 Covers from CME 20 R5 systems up to BSS R8 systems with full functionality.
- BSCSim LPP 106 34/32 Covers up to CME 20 R6.1 systems, but not with full functionality. This simulator cannot be ordered any more, but it is still used by customers.

Table 1 Test equipment

Item	Description	Specification	Product No.	Qty
1	Base Station Controller Simulator	BSCSim II	LPP 106 35/01	1
	BSC Simulator Adaptor		[3]	1
	Cable C5	BNC plug to BNC plug	[3]	2
	Cable M	BNC plug to DIN 41524 PLUG	[3]	2
2	Test Mobile Station	Ericsson SH 888[2]	LPB 112 12/1	1
3	Power Splitter S/C	Mini-Circuit ZAPD-21N	LPY 107 349/1	1
4	Attenuator 1	Lucas Weinschel 1-30	LPY 107 350/1	3
5	Attenuator 2	Lucas Weinschel 47-30-43	LPY 107 351/1	1
6	Adaptor B	Suhner 33 716-N-50-1	[1]	1
7	Adaptor I	Suhner 33 N-BNC-50-1	[1]	1
8	Adaptor J	Suhner 11 BNC 50-0-8c	[1]	1
9	Cable C	N-plug to N-plug	RPM 113 761	2
10	Cable R	Mobile Station cable, 800 series	NTZ 112 294/5	1
11	Cable S	BNC-jack to 1/4-jack	RPM 513 363/1	1

[1] Included in LTR 171 01/3.

[2] Included in TEMS kit.

[3] Included in BSCSim II kit.

1.3 Test Set-Up

This test set-up is generally for both simulators. The equipment that separates the simulators is the BSC Simulator Adaptor, see figure 1. After the figure there is a step-by-step description of how to make the test set-up.

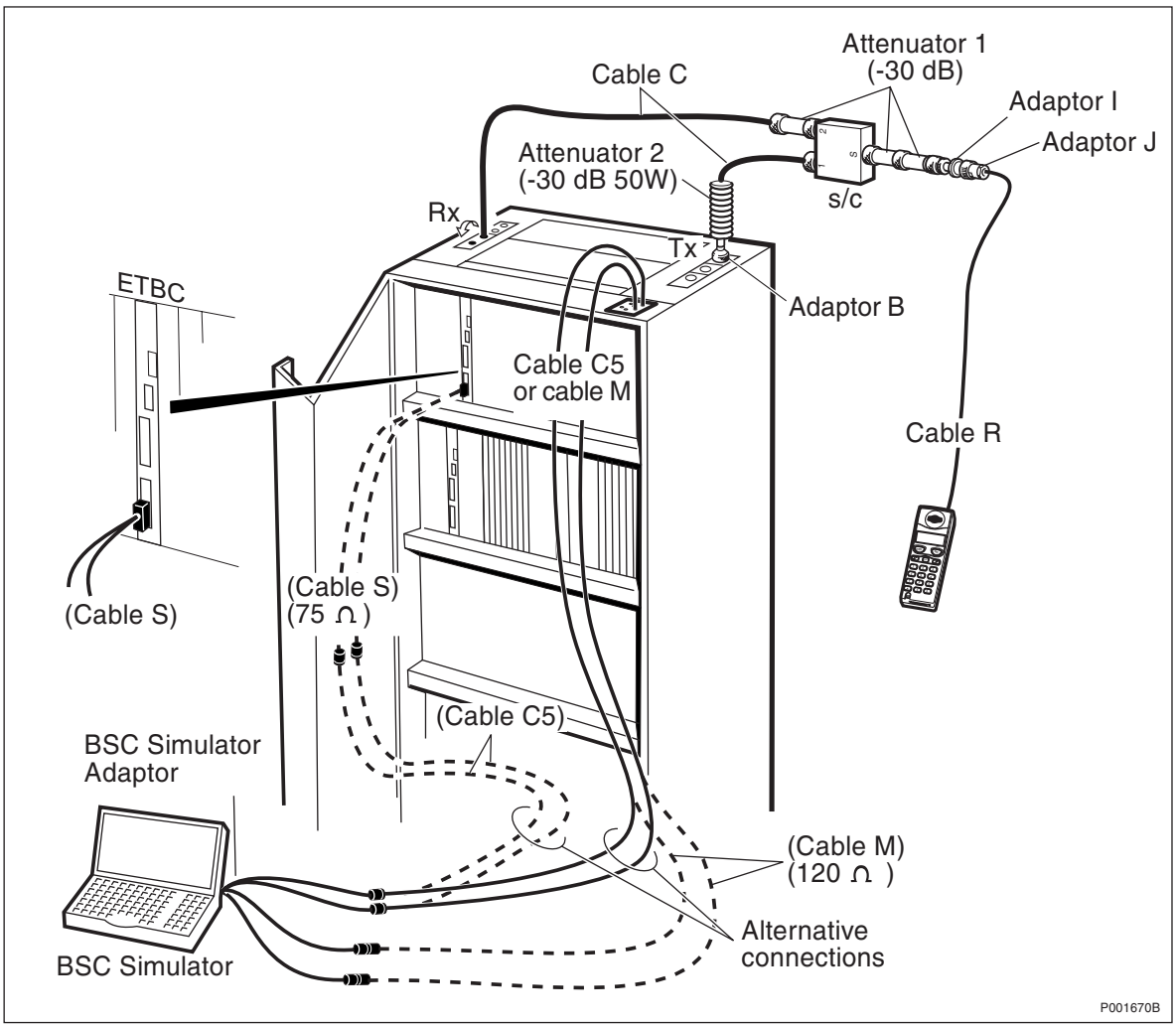


Figure 1 TRS System Test Using BSC simulator set-up

1. Disconnect the receiver antennas (RXA and RXB) from the connection field G and the transmitter antenna (TX) from the connection field H at the top of the cabinet. See figure 2.

2. Connect Attenuator 2 (-30 dB) to the TX, connection field H, at the top of the cabinet. See figure 2.

Note Attenuator 2 must be dimensioned for at least 50 W.

3. Connect the remaining attenuators (Attenuator 1), cables, power splitter and MS to the TX and RXA, connection field G and H, at the top of the master cabinet according to figure 1 and figure 2.

4. There are two equivalent methods to connect the BSC Simulator to the BTS.

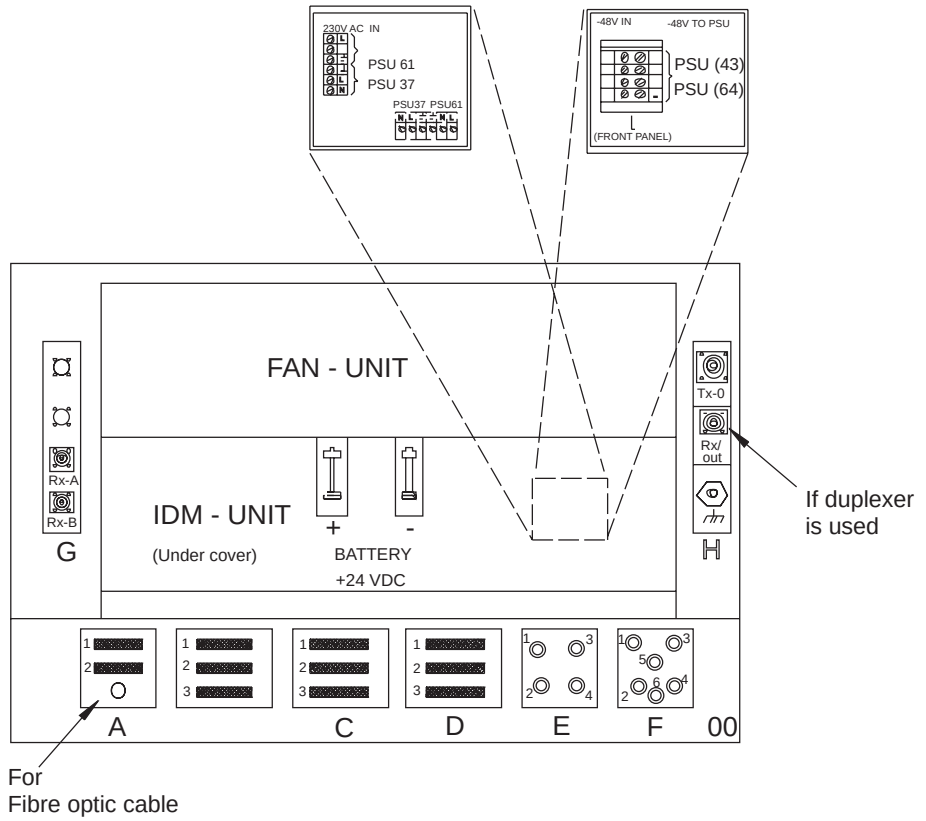
Recommended connections:

- Connect BSC Simulator Adaptor to the BSC Simulator.
- Connect input/output of BSC Simulator Adaptor to cable C5 (75 Ω) or to cable M (120 Ω).
- Connect input/output of cable C5 (75 Ω) to connection field F, or input/output of cable M (120 Ω) to connection field E at the top of the cabinet, PCM input and PCM output. See figure 2.

Alternative connections:

- Connect BSC Simulator Adaptor to the BSC Simulator.
- Connect input/output of BSC Simulator Adaptor to cable C5 (75 Ω) or to cable M (120 Ω).
- Connect output of cable C5 (75 Ω) to input/output of cable S. Connect the 1/4 Euroconnector of cable S to the ETBC board in the TRI magazine (75 Ω to position B:4 or 120 Ω to B:3, see the figure under "Strapping ETB" in chapter Strapping Instructions).

For connection to extension cabinets, use the same test set-up.



A1 = TM SYNC IN
A2 = TM SYNC OUT
B1 = EXTERNAL ALARM
B2 = EXTERNAL ALARM
B3 = LIB TRXD 1-4
C1 = LIB BUS CAB. A1
C2 = LIB BUS CAB. B1 (A2)
C3 = LIB BUS CAB. C1 (A3)
D1 = LIB BUS CAB. A2 (A4)
D2 = LIB BUS CAB. B2
D3 = LIB BUS CAB. C2

*)E1 = PCM INPUT 1 120 ohm
E2 = PCM OUTPUT 1 120 ohm
E3 = PCM INPUT 2 120 ohm
E4 = PCM OUTPUT 2 120 ohm
**)F1 = PCM INPUT 1 75 ohm
F2 = PCM OUTPUT 1 75 ohm
F3 = PCM INPUT 2 75 ohm
F4 = PCM OUTPUT 2 75 ohm
F5 = PCM INPUT 3 75 ohm
F6 = PCM OUTPUT 3 75 ohm

*) If more than 2 ETB cards,
2 contact boxes E (SVK 107
**) If more than 3 ETB cards,
2 contact boxes F (SVK 107 2435/1) are needed.

P001226

Figure 2 Connection field on top of the cabinet

1.4 Test Preparation

The preparations before the test can be done are:

1. Power on the RBS.
2. Power on the BSC simulator.
3. Make sure that the BSC simulator is connected to the RBS according to Test Set-Up and that the simulator is configured for the right CME 20 system revision. Do this according to the BSC simulators User's Guide.

1.5 Test Instructions

Continue the test from here by reading the instructions written in the User's Guide for the BSC simulator used in the test. For help during the simulation there is a test flow, a list of parameters and options used to set up the BTS and run the test. See section Test Parameters. See also section RXLEV Reference Values for reference values used, to decide if the test is accepted. The test record in this manual has to be filled in during the test. For details about the test flow steps, see the following sections.

1.6 Test Flow

In order to test all the equipment in the RBS, the following test flow has to be done.

- Steps 1-3 will detect possible faults within the TRXs.
- Steps 4-18 will detect possible faults mainly located in the RF path, that is testing the combiners, the MCU, and so forth.
- Step 20 covers steps 1-19 except 9 and 16, but in the extension cabinets.
- Step 21 restores the equipment to be ready to be tested according to TRS System Test Using BSC at Site (the less extensive version).

Table 2 Test flow

Step	Action	FCOMB 200	HCOMB 200
1	Load and activation of TRI	-	-
2	Load and activation of TRX	Use ARFCN 1, 4, 7, 10	Use ARFCN 1, 3, 5, 7
3	Park all filter combiners [1)]	-	-
4	Test call from MS on receiver A	Make one test call per TRX [2)]	Make one test call per TRX [2)]
5	Reconfigure TRXs to new frequencies	Use ARFCN 57, 60, 63, 66	Use ARFCN 60, 62, 64, 66
6	Test call from MS on receiver A	Make one test call per TRX	Make one test call per TRX
7	Reconfigure TRXs to new frequencies	Use ARFCN 124, 121, 118, 115	Use ARFCN 124, 122, 120, 118
8	Test call from MS on receiver A	Make one test call per TRX	Make one test call per TRX
9	Test of TRXT (if included in the cabinet) [3)]	-	-
10	Reconfigure TRXs to new diversity (move cable on connection field to RX-B)	to RXB	to RXB
11	Test call from MS on B	Make one test call per TRX [2)]	Make one test call per [2)]
12	Reconfigure TRXs to new frequencies	Use ARFCN 57, 60, 63, 66	Use ARFCN 60, 62, 64, 66
13	Test call from MS on receiver B	Make one test call per TRX	Make one test call per TRX
14	Reconfigure TRXs to new frequencies	Use ARFCN 1, 4, 7, 10	Use ARFCN 1, 3, 5, 7
15	Test call from MS on receiver B	Make one test call per TRX	Make one test call per TRX
16	Test of TRXT (if included in the cabinet) [3)]	-	-
17	Move BCCH	Only if SPP	Only if SPP
18	Test call from MS on TS0 and TS1	Only if SPP	Only if SPP
19	Park the filter combiners	-	-
20	Test of extension cabinets	-	-
21	Restoration of cell	-	-

[1] Only necessary when the RBS is taken into operation for the first time after installation. Park all combiners in all cabinets. Continue from step two in the step test flow.

[2] When using SPPs, do the call test on all traffic channels.

[3] This is an optional test. See BSCSim User's Guide.

The above table shows the test flow. Choose one of the columns "FCOMB 200" or "HCOMB 200", depending on if you have Filter COMBiners or Hybrid COMBiners in the cabinet.

1.7 Park All Filter Combiners

A filter combiner has two cavities; each cavity is controlled by a stepper motor. The stepper motors can by chance be moved away from their parking positions during transportation and must therefore always be parked on site.

Note The parking of the stepper motors is mandatory when the RBS is taken into operation for the first time after installation. Once this is done, unused stepper motors will not move, and the parking must not be repeated.

CAUTION

Moving the RF cables incorrectly can cause RF burns to the person doing this procedure. Therefore, all TXs must be disabled when the cables are moved, and the yellow LEDs on all TRXs must be flashing.

1. All TRXs shall be enabled/started. If this is not the case, redo "Load and Activation of TRX" from step 2.

2. Park all connected cavities of the combiners by using the BSC simulator.

   Result: The yellow LEDs on all RTXs shall be flashing.

3. Park the unconnected cavity on the combiner by moving the cables on the filter combiners, see figure 3.

   Move the Tuning Control cable (RPM 513 369/1) from the first cavity to the corresponding position on the second unused cavity on the same combiner.

Move the RF cable (the TX out cable from RTX, RPM 513 368/5) from the first cavity to the corresponding position on the second unused cavity on the same combiner.

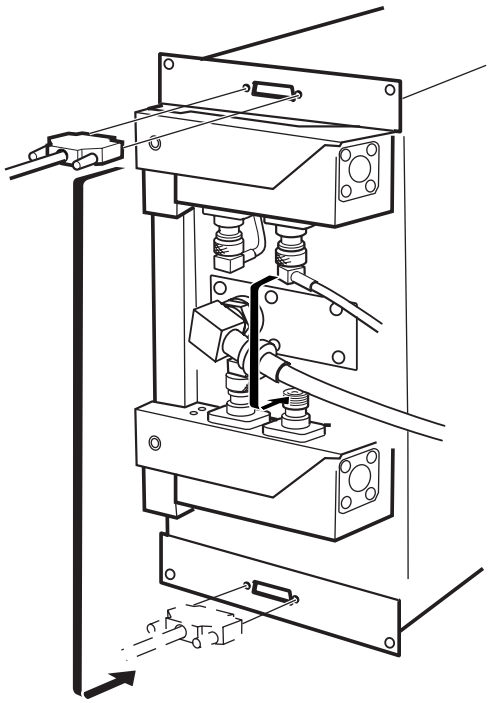


Figure 3 Moving the cables on the filter combiner

4. Park all unconnected cavities of the combiners by using the BSC simulator.

   Park cavity 2 or 4 depending on whether the unconnected cavity is on the first or the second combiner.

5. Reconnect all cables.

6. Activate the transceivers by using the BSC simulator.

   Result: The yellow LEDs on all RTXs shall be on.

1.8 Test of Extension Cabinets

1. Reconfigure TRI:

   Start from "Load and activation of TRI" in the test flow, but do not reset the TRI, just reconfigure the TRI. A test of the TRXT is not needed, as it has already been tested when testing the master cabinet.

2. Park the combiners.

Park the TRXs used during the test.

Check that the yellow LEDs on the RTX are flashing.

1.9 Test Parameters

To start up the BTS and to do a call test, several parameters have to be set. Most parameters are common for all BSC simulators. If there are some special parameters for a simulator, it will be described in respective User's Guide. The general parameters to consider are:

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

Table 3 Location area code (LAC) for the different cells

Cell	**GSM 900**
A	1
B	2
C	3

1.10 RXLEV Reference Values

$RXLEV_{ref}$ uplink/downlink are reference values for power levels measured by the BTS and the MS.

$RXLEV_{ref}$ is valid for a specific MS, the same type of cables, power splitter, attenuators, combiners and specific output power level of the TX. This means that if one or more of the mentioned parameters are changed, new $RXLEV_{ref}$ values have to be obtained the way described above.

The test is passed when Rxqual = 0, Timing Advance = 0, and the tester is satisfied with the sound quality. The reference values shall be within the following limits:

For the BSC	$RXLEV_{ref}$ downlink = -50 ± 10 dBm
Example for MS:	$RXLEV_{ref}$ uplink = -60 ± 10 dBm

Table 4 The RXLEVref uplink value differs depending on the power class of the mobile

Power Class	**GSM 900 Max Output Power**		**$RXLEV_{ref}$ Uplink dBm**
	W	**dBm**	
1	-	-	-
2	8	39	-54 ± -10
3	5	37	-56 ± -10
4	2	33	-60 ± -10
5	0.8	29	-64 ± -10

1.11 Restoring the Cell

1. Leave the BTS powered up and with all cavities parked.
2. Check that the yellow LEDs on the RTX are flashing.
3. Disconnect the MS, the BSC simulator and all the cables from the connection field at the top of the cabinet or from the ETBC board in the TRI magazine.
4. Reconnect all BTS cables.
5. Reconnect the antenna system using a torque wrench. Use torque settings as defined in chapter Strapping Instructions.
6. Record the result of Restoring the cell in the Test Record.

1.12 Faults during Simulation

If anything fails during the configuration of the BTS, the problem is normally that some parameters are wrong or the communication between the BCS simulator and the RBS is lost.

If anything fails during the execution, when the RBS is up and running, there is probably an error within the BTS HW (cables or circuit boards).

For more information about the faults finding, see User's Guide for the BSC simulator used in the test.

Antenna Installation Tests

Contents **Page**

1 Antenna Installation Tests

The purpose of this test is to verify that the antenna system is properly installed and fully operational. The test includes the antenna, feeder, jumpers and, if applicable, the TMA/ALNA.

The TMA/ALNA is mounted close to the antenna. The main functions of the unit are:

- Combining receive and transmit signals to a duplex antenna.
- Pre-amplification of the receive signal
- Supervision of the TMA/ALNA from the base station

The antenna system installation team should perform the test during the installation process, to verify the workmanship and to check that the antenna system is operational.

1.1 Test Method

We recommend using the Anritsu Site Master for our test methods.

If a Site Master Instrument with only one test port is used, it is only possible to carry out Standing Wave Ratio (SWR) and Distance To Fault (DTF) measurement. Not the TMA/ALNA test.

To test TMA/ALNA you need a Site Master with two test ports.

1.1.1 Test Record

The sample of test records should be regarded as a suggestion only and can be modified to suit the actual project.

The test record must be written on Ericsson document form LZF 032 41/1M. The decimal class for the test record must be 152 83-IPA xxxxx (product number for the site). See *Site Requirements and Planning Manual*.

1.2 Preconditions

The installation of the antennas, feeder cables with jumpers and, if applicable, TMA/ALNA should be completed, but the connections to

the antenna and TMA/ALNA should be left open. The test shall be done as an integrated process during the installation to avoid unnecessary opening and closing of contacts and sealings. Do not cover the connectors with sealing tape until all testing is completed.

1.3 Test Equipment

The following equipment is needed to carry out this test:

Table 1 LPK 102 101/4 kit specification

Item	Description	Qty	Product Number
1	Site Master, Anritsu S251B	1	-
a	• Operating Manual	1	
b	• Soft Carrying Case	1	
c	• AC-DC Adapter	1	
d	• Cigarette Lighter/12 V DC Adapter	1	
e	• Site Master SW for PC	1	
f	• Serial Interface Cable	1	
2	Precision 7/16 Type Short/Open/Load	1	-
3	Standard 7/16 Type Load	1	-
4	Test Port Extension Cable, N plug to 7/16 jack 1.5 m	2	-
5	Adapter 7/16 plug to 7/16 plug	2	-
6	Adapter 7/16 jack to 7/16 jack	2	-
7	Adapter 7/16 plug to N jack	1	-
8	Adapter N plug to TNC jack	1	-
9	TNC Load plug	1	-
10	TNC Short plug	1	-
11	TNC Open plug	1	-
12	Standard N Type Load jack	1	-
13	Adapter N jack to N jack	1	-
14	Transit Case for Site Master	1	-

Note Items 3, 5 and 6 to 11 are only needed when testing 1800 and 1900 MHz systems including TMA/ALNA. Item 12 is needed for Installation Check.

1.4 Installation Check

1. Verify that the installation is in accordance with the *Site Installation Documentation*.

2. Check visually that no cables or connectors are damaged and that all cables (feeders or jumpers) are properly marked.

3. Check that connectors are properly connected and tightened.

4. Verify the directions of directional antennas against the *Site Installation Documentation*. Consider magnetic influence from nearby metallic objects and deviation from magnetic North when using the compass.

5. Check that the right cable is connected to the right antenna.

6. Record remarks, if any, in the test record and forward them to the person responsible for the site installation.

Note If a TMA/ALNA is used, mixing the transmitter and receiver jumpers or feeder cables will damage the TMA/ALNA. Verify that the cable markings are correct.

1.5 Using The Anritsu Site Master

These instructions describes how to carry out SWR, DTF, Antenna Feeder and TMA/ALNA test on an antenna system with the Anritsu Site Master. The tests cover the GSM 900, 1800 and 1900 MHz systems. The following instrument is recommended.

Table 2

Model	Frequency Range	Product Number
S251B	625 to 2500 MHz	LPK 102 101/4

With the Site Master you can export copies of the wave forms to a PC. Necessary software and serial cable are enclosed with the Site Master. For more detailed information see the Site Master User's Guide.

Anritsu Site Master S251B

The keys mentioned in the instruction can be found in figure 1.

In the instructions, a "key" is marked with the matching text, while a "soft key" has its text displayed on the screen, above the key.

Note The **REFL** test port transmits (Out).

The **TRANS** test port receives (In).

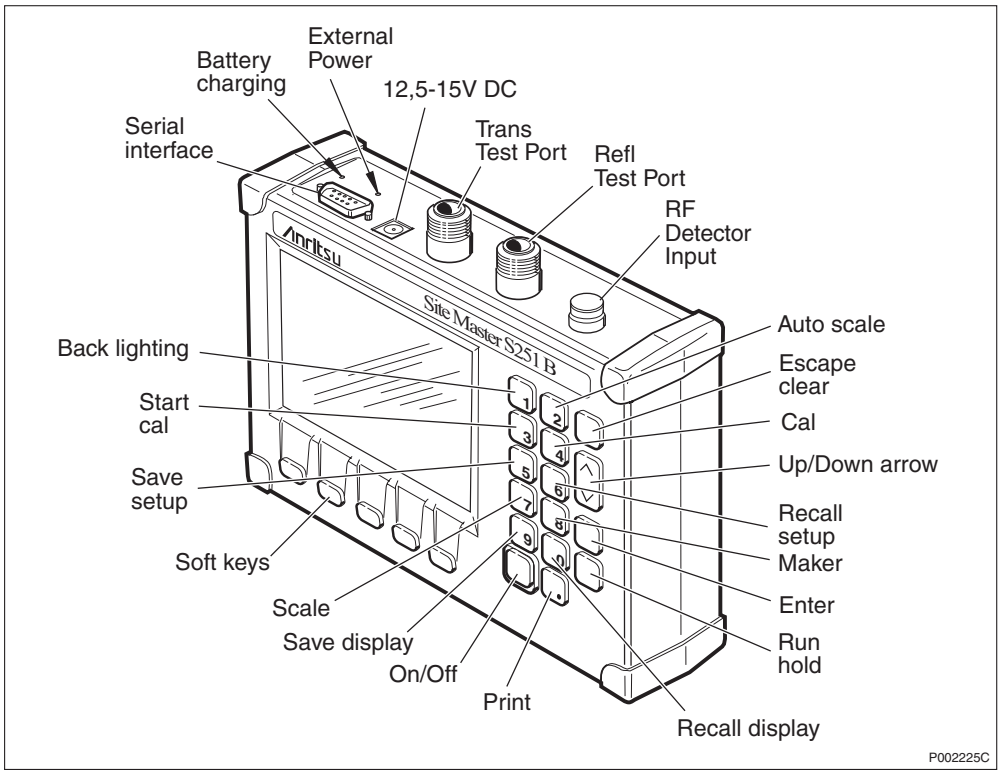


Figure 1 Anritsu Site Master S251B

1.5.1 Calibration and Adjustments

To achieve accurate results, and to eliminate noise and disturbance, the Site Master must be calibrated. the frequency has to be selected before calibration.

Selecting a Frequency Range

1. Turn on the Site Master by pressing the **ON/OFF** button.
2. Press the **FREQ** soft key in the Main Menu.
3. Press the **F1** soft key in the Frequency Menu.
4. Enter the lower frequency limit in MHz for the antenna system by using the keypad or the Up/Down Arrow key and press **ENTER**.
5. Press the **F2** soft key in the Frequency Menu.
6. Enter the higher frequency limit in MHz for the antenna system by using the keypad or the Up/Down Arrow key and press **ENTER**.

7. Check that the FREQ (MHz) scale in the display area indicates the new frequency start and stop values.

8. Press the **MAIN** soft key.

Table 3 Start and stop frequencies

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

Table 4 Start and stop frequencies for Dual Duplex TMA 900/1800/ 1900 MHz

System	RX Band		TX Band	
	Start freq. MHz	**Stop freq. MHz**	**Start freq. MHz**	**Stop freq. MHz**
GSM 900	880	905	925	950
	890	915	935	960
GSM 1800	1710	1740	1805	1835
	1730	1760	1825	1855
	1755	1785	1850	1880
GSM 1900	1850	1880	1930	1960
	1865	1895	1945	1975
	1880	1910	1960	1990

Note The RX band is written on the label of the Dual Duplex TMA.

Performing a calibration

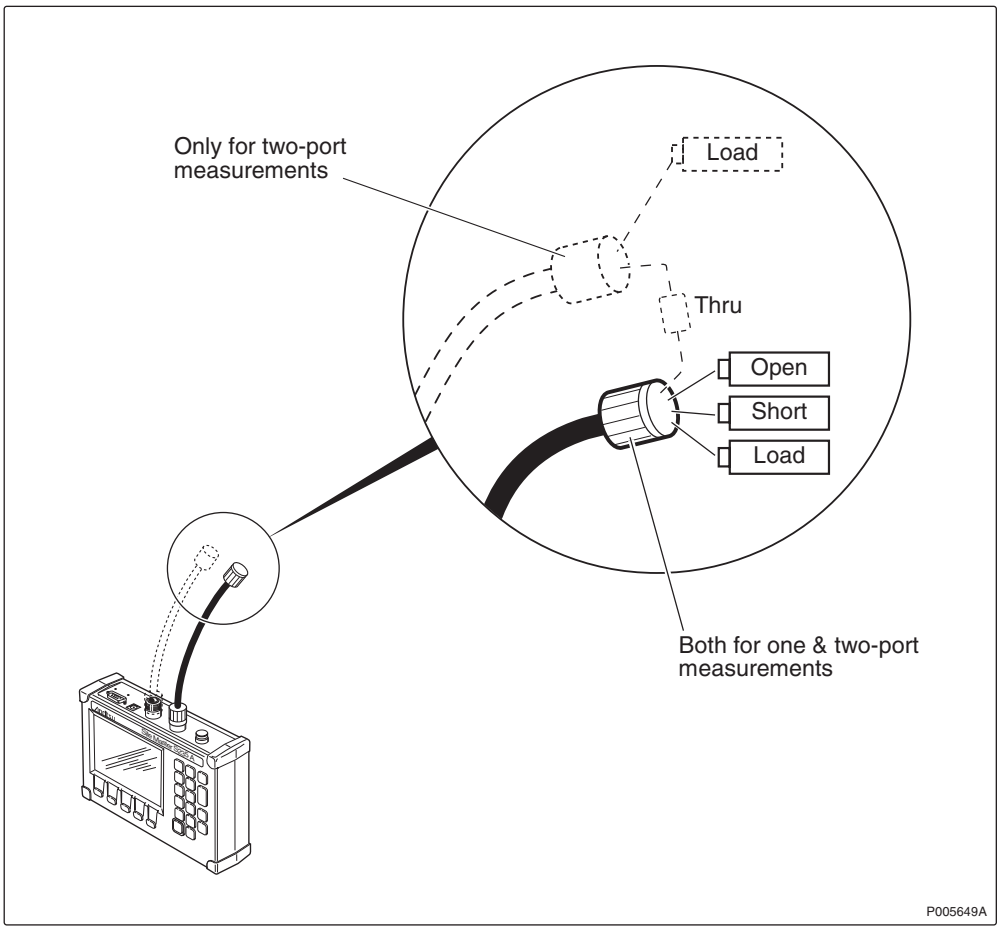


Figure 2 Connecting the calibration components

Perform a measurement calibration, using the **START CAL** key. During calibration there will be instructions on the display showing steps for the procedure. When the Site Master is in FREQ - Gain/Insertion Loss mode, the calibration will start at once.

When the Site Master is in another mode, a menu will appear on the display. The menu shows two types of calibrations:

1. OSL	(When doing SWR and DTF)
2. OSL THRU ISOL	(When doing TMA/ALNA and Antenna Feeder Test)

Depending on the calibration type, different calibration components are needed.

1. OSL	OPEN/SHORT/PRECISION LOAD
2. OSL THRU ISOL	OPEN/SHORT/PRECISION LOAD, STANDARD LOAD ADAPTOR E

For the best results, ensure that the Open/Short/Load/Adaptor E is at the end of the Extension Test Port Cable or other test equipment, at the same point where you will connect the antenna or the device to be tested. In this case, the point where you will connect to the RX/TX Jumper.

This means that for different test setups you have to do different calibrations. Look at the actual test setup figure to see where you have to connect the Short/Open/Load and Adaptor E.

1. Press the **START CAL** key.
2. Choose calibration type and press **ENTER**.
3. Follow the instructions on the screen.
4. When the calibration is done, disconnect the calibration equipment.

Note OSL THRU ISOL Test:

REFL test port = PRECISION LOAD

TRANS test port = STANDARD LOAD

Connect REFL port to TRANS port: Use Adaptor E.

Entering cable parameters

1. Press **MODE** and select the **DTF** choice using the Up/Down arrow key.
2. Press the **DIST** soft key.
3. Press the **MORE** soft key.
4. Press the **LOSS** soft key.
5. Enter the loss in dB per metre (or foot) for the type of cable being tested and press **ENTER**.
6. Press the **PROP V** soft key.
7. Enter the relative velocity for the type of cable being tested and press **ENTER**.
8. Press the **MAIN** soft key to go back to the main menu.

Note Only correct values from the manufacturer will give reliable test results.

1.5.2 SWR and DTF Test SetUp

This section contains information about how to perform the Standing Wave Ratio Test (SWR) and Distance to Fault Test (DTF).

Test setup for GSM 900/1800/1900 antenna systems

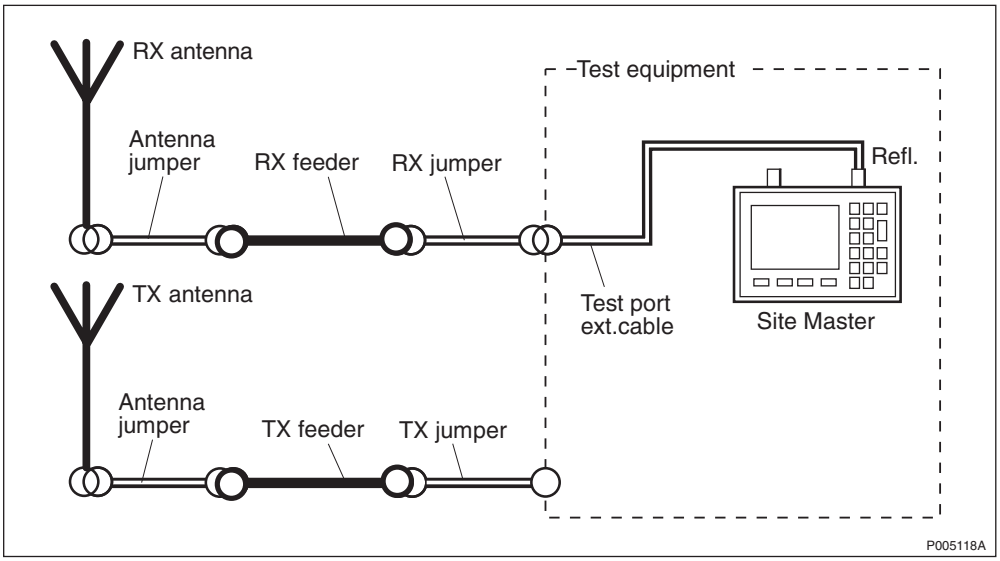


Figure 3 Test setup for GSM 900/1800/1900 antenna systems

The test has to be performed separately on the RX and TX feeder.

Test setup for GSM 1800/1900 antenna systems with TMA

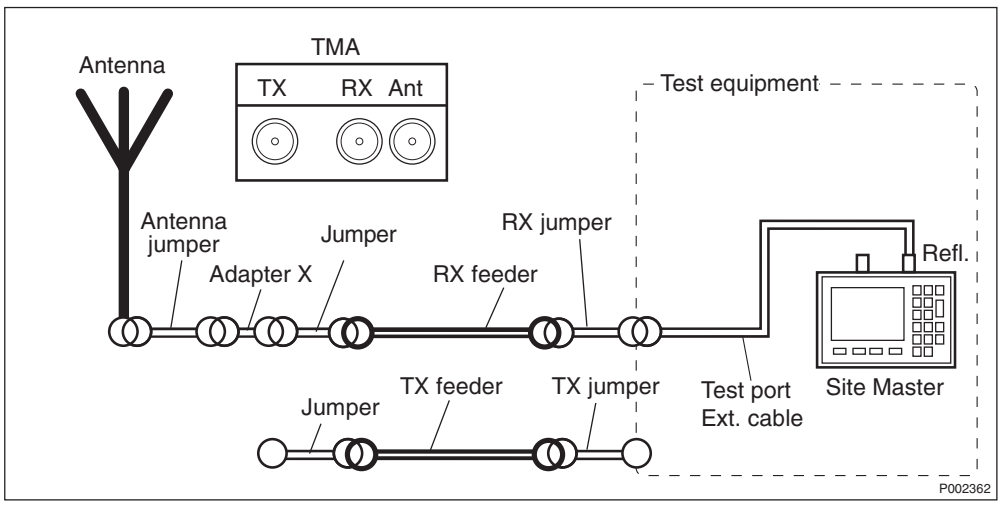


Figure 4 Test setup for 900 MHz, 1800 MHz and 1900 MHz with the TMA/ALNA disconnected

Test setup for GSM 900 antenna systems with Dual Duplex TMA

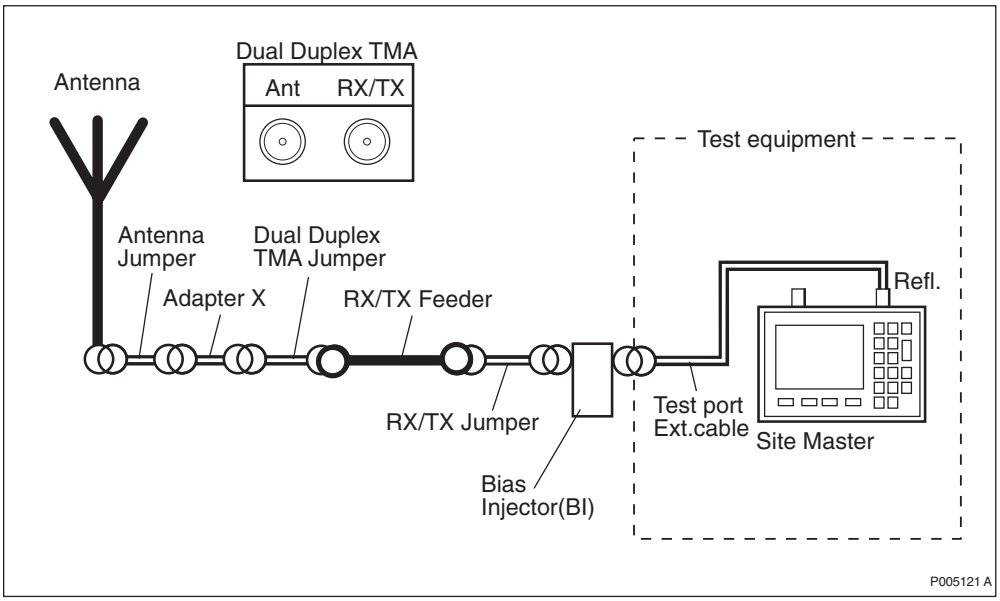


Figure 5 Test setup for GSM 900 antenna systems with Dual Duplex TMA

1. Disconnect all cables leading to and from the Dual Duplex TMA.

2. Connect Adapter X between the Antenna Jumper and the Dual Duplex TMA Jumper.

3. Connect the Bias injector according *to the picture above*.

Test setup for GSM 1800/1900 antenna systems with Dual Duplex TMA

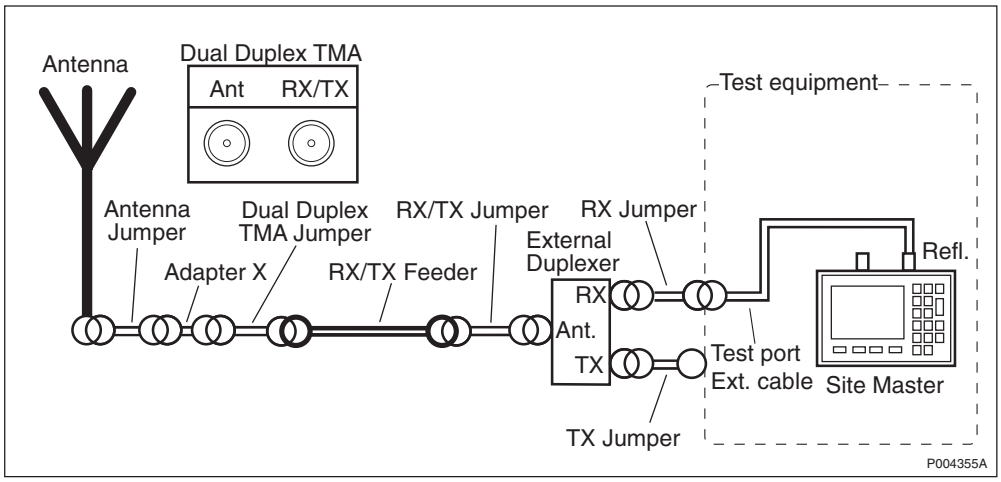


Figure 6 Test setup for GSM 1800/1900 antenna systems with Dual Duplex TMA

When testing GSM 1800/1900 systems fitted with Dual Duplex TMA, the test has to be performed separately on the RX and TX jumpers on the External Duplexer.

1. Disconnect all cables leading to and from the Dual Duplex TMA.
2. Connect Adapter X between the Antenna Jumper and the Dual Duplex TMA Jumper.
3. Connect the External Duplexer according to *the figure above*.

SWR Test

When testing 1800/1900 MHz systems including TMA/ALNA, the test has to be performed separately on the RX and TX Feeders.

1. If you are testing a 1800/1900 MHz system including TMA/ALNA, disconnect all cables leading to and from the TMA/ALNA.
2. Connect the test equipment to the Site Master according to figure 4.
3. Press the **MODE** soft key.
4. Select FREQ - SWR or Return Loss measurements using the Up/Down Arrow key. Press **ENTER**.
5. Make sure that the Site Master is calibrated for this SWR test. See section Calibration and Adjustments.
6. Make the connections to the Antenna system according to figure 4.
7. Check that all connections are properly connected and tightened.
8. Press the **FREQ** soft key.
9. Check that the frequency range is correct.
10. Press the **MAIN** soft key.
11. Press the **SCALE** soft key.
12. Press the **TOP** soft key.
13. Enter 1.5 for topscale and press **ENTER**.
14. Press the **LIMIT** soft key. Note: Should not be in OFF mode.
15. Enter 1.4 for a limit and press **ENTER**.

16. Observe the wave form and check that no return levels are over 1.4 SWR (= 15.6 dB RL). Enter the test result in the Test Record.

17. Save the measurement by pressing the **SAVE DISPLAY** key.

18. Type in an un-used number (1 - 50) for your measurement and press **ENTER**.

19. Return to the main menu by pressing the **MAIN** soft key.

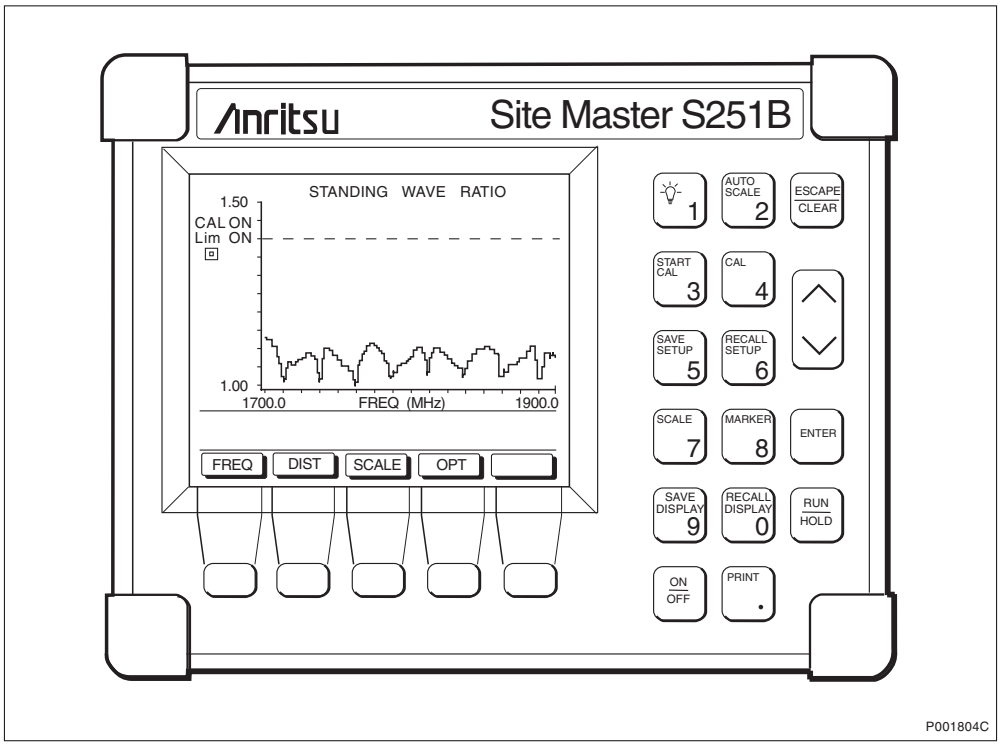


Figure 7 Example of an approved cable

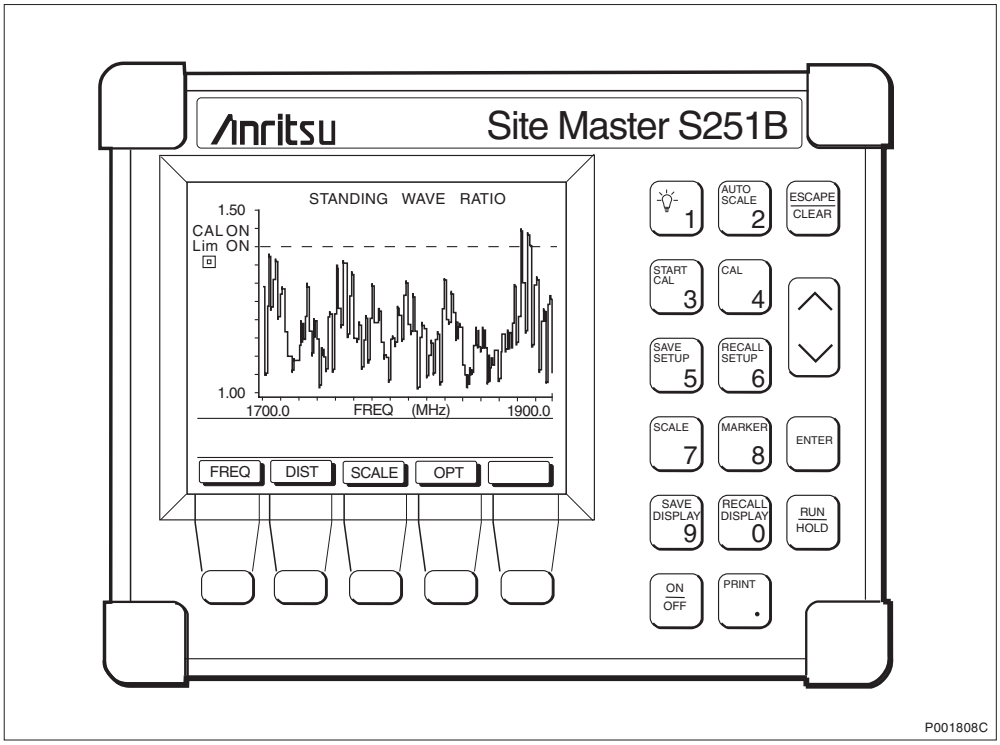


Figure 8 Example of an un-approved cable

Table 5 Conversion table

Return Loss (dB)	SWR	Return Loss (dB)	SWR	Return Loss (dB)	SWR
4.0	4.42	16.0	1.38	28.0	1.08
6.0	3.01	16.2	1.37	28.5	1.07
8.0	2.32	16.4	1.36	29.0	1.07
10.0	1.92	16.6	1.35	29.5	1.07
10.5	1.85	16.8	1.34	30.0	1.06
11.0	1.79	17.0	1.33	30.5	1.06
11.2	1.76	17.2	1.32	31.0	1.05
11.4	1.74	17.4	1.31	31.5	1.05
11.6	1.71	17.6	1.30	32.0	1.05
11.8	1.69	17.8	1.29	32.5	1.04
12.0	1.67	18.0	1.29	33.0	1.04
12.2	1.65	18.5	1.27	33.5	1.04
12.4	1.63	19.0	1.25	34.0	1.04

12.6	1.61	19.5	1.23	34.5	1.03
12.8	1.59	20.0	1.22	35.0	1.03
13.0	1.58	20.5	1.21	35.5	1.03
13.2	1.56	21.0	1.20	36.0	1.03
13.4	1.54	21.5	1.18	36.5	1.03
13.6	1.53	22.0	1.17	37.0	1.02
13.8	1.51	22.5	1.16	37.5	1.02
14.0	1.50	23.0	1.15	38.0	1.02
14.2	1.48	23.5	1.14	38.5	1.02
14.4	1.47	24.0	1.13	39.0	1.02
14.6	1.46	24.5	1.12	39.5	1.02
14.8	1.44	25.0	1.12	40.0	1.02
15.0	1.43	25.5	1.11	40.5	1.01
15.2	1.42	26.0	1.10	41.0	1.01
15.4	1.41	26.5	1.10	41.5	1.01
15.6	1.40	27.0	1.09	42.0	1.01
15.8	1.39	27.5	1.08	42.5	1.01

DTF Test

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

When testing the1800 MHz system including TMA/ALNA, the test has to be performed separately on the RX and TX Feeders.

1. When testing an 1800 MHz system including TMA/ ALNA, disconnect all cables leading to and from the TMA/ALNA.

2. Connect the test equipment to the Site Master according to figure 4.

3. Press the **MODE** soft key.

4. Select DTF - SWR measurements using the Up/Down Arrow key. Press **ENTER**.

5. Make sure that the Site Master is calibrated for this DTF test. See section Calibration and Adjustments.

6. Make the connections to the Antenna system according to figure 4.

7. Press the **DIST** soft key.

8. Press the **D1** soft key.

9. Enter the desired numerical start value (usually 0.0 m) using the keypad and press the **ENTER** key.

10. Repeat steps 8 and 9 for the stop value, **D2** (usually the total length of the antenna system).

11. Press the **MORE** soft key.

12. Press the **MAIN** soft key.

13. Press the **SCALE** soft key.

14. Press the **TOP** soft key.

15. Enter 1.2 for topscale and press **ENTER**.

16. Press the **LIMIT** soft key. Note: Should not be in OFF mode.

17. Enter 1.05 for a limit and press **ENTER**.

18. Wait while the Site Master is calculating (~ 8 sec.).

19. Observe the waveform and check that no reflections are over 1.05 SWR (= 25 mρ). Enter the test result in the Test Record.

Note The antenna may have a greater reflection than 1:1.05 SWR, but the system is still approved as long as the cable is below the limit.

20. Save the measurement by pressing the **SAVE DISPLAY** key. Type in an un-used number (1 - 40) for your measurement and press **ENTER**.

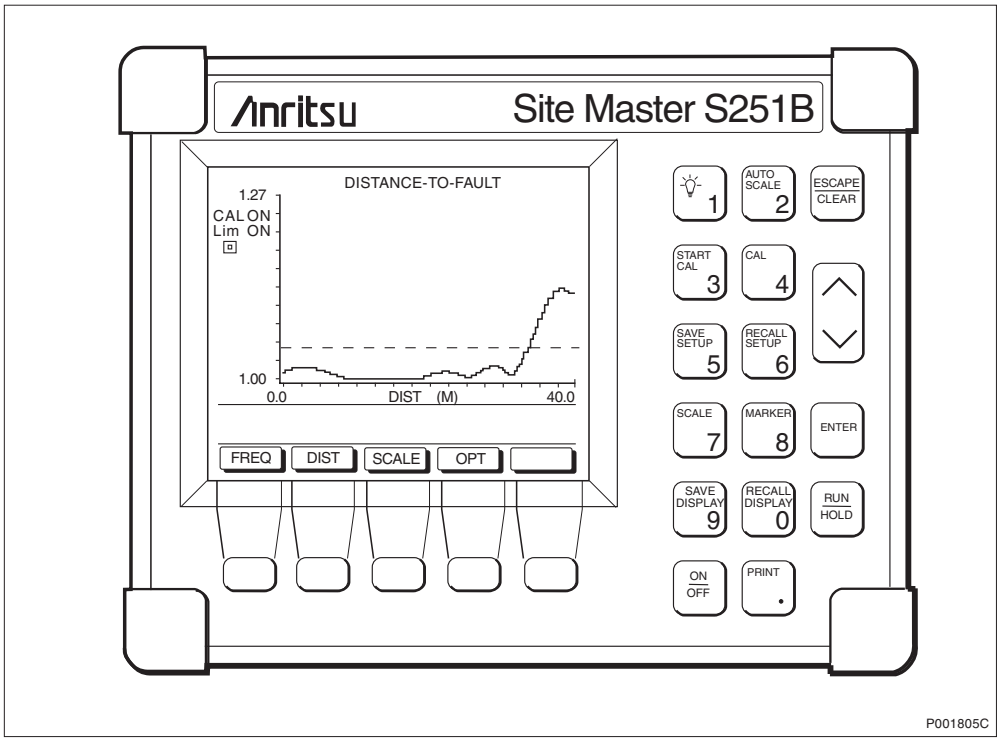


Figure 9 Example of an approved cable

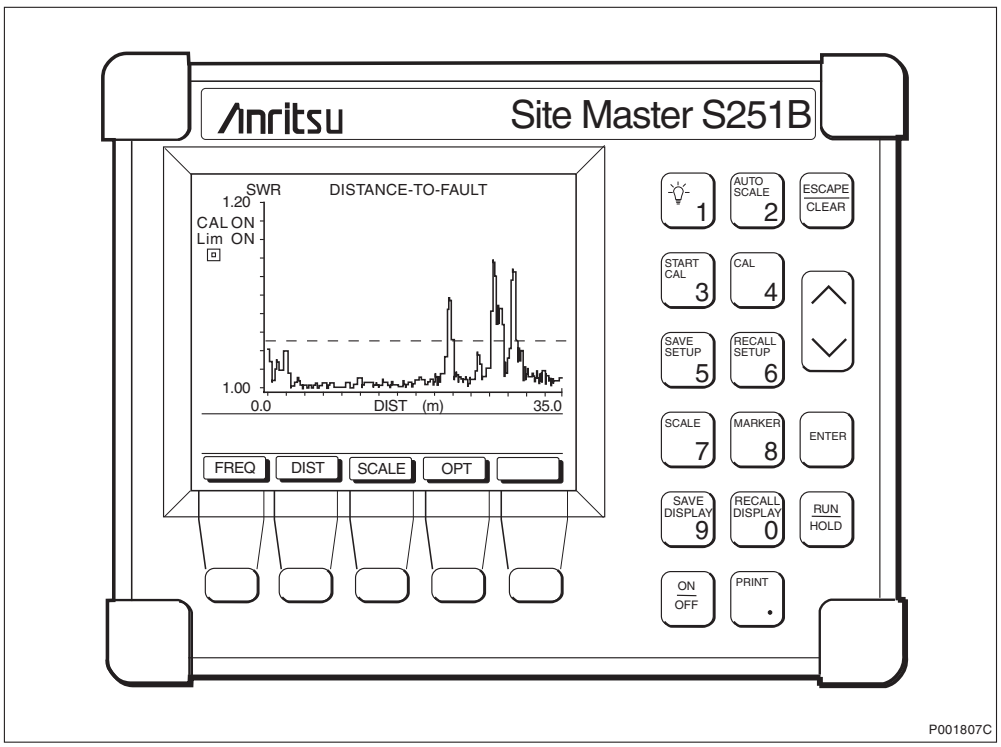


Figure 10 Example showing a bad adaptor at the antenna

1.5.3 Test Setup for Feeder Attenuation Test

Test setup for GSM 900/1800/1900 antenna systems

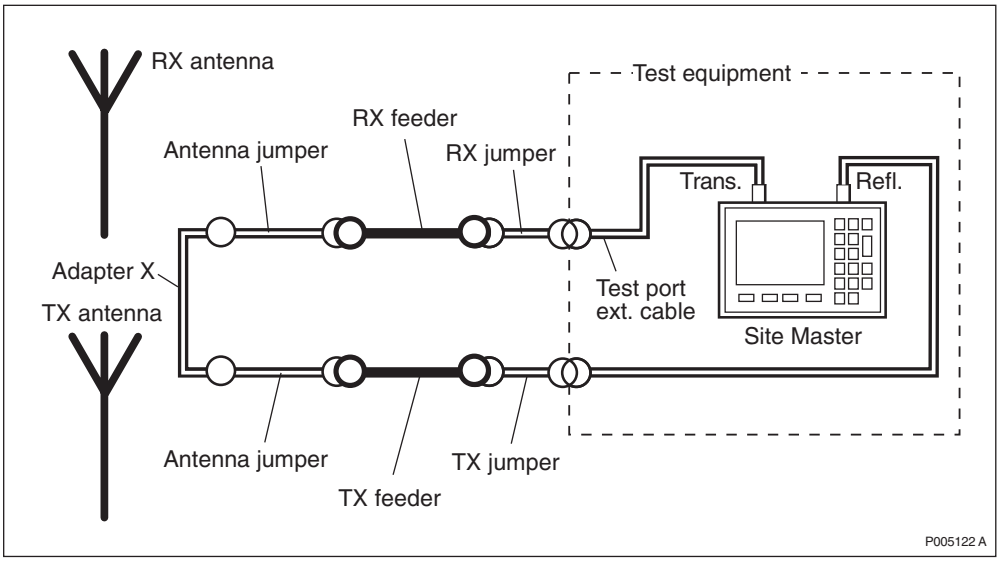


Figure 11 Test setup for GSM 900/1800/1900 antenna systems

Test setup for GSM 1800/1900 antenna systems with TMA

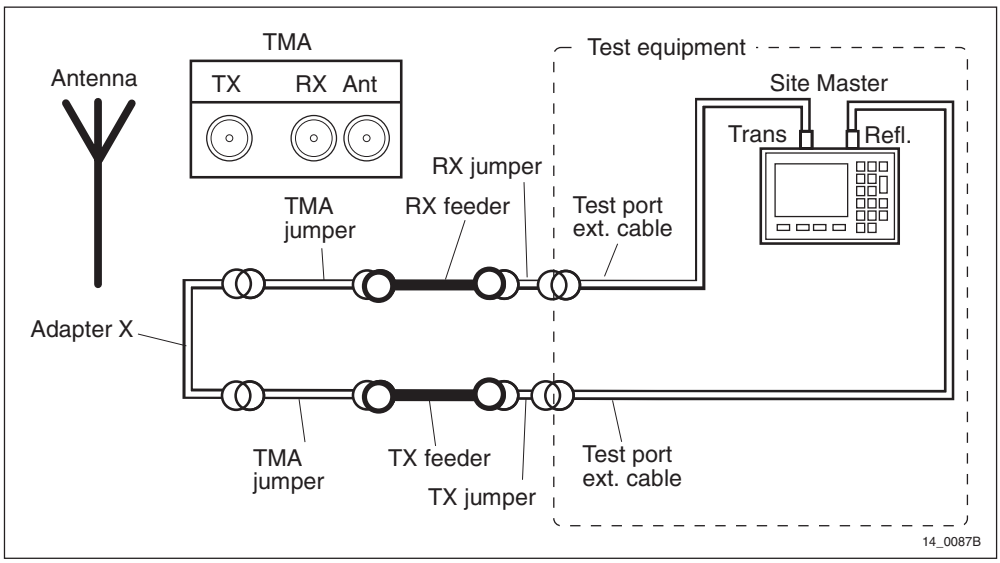


Figure 12 Test setup for GSM 1800/1900 antenna systems with TMA

1. Disconnect all cables leading to and from the TMA.

2. Connect Adapter X between the RX TMA Jumper and TX TMA Jumper.

1.5.4 Test execution

1. Press the **MODE** soft key.
2. Select **FREQ** - Insertion Loss (+ 6 dBm) by using the Up/Down arrow key, and press **ENTER**.
3. Calibrate the Site Master for this test setup, *see* 1.5.1.
4. Connect the antenna system to the test equipment according to which system is going to be tested.
5. Check that all connections are properly connected and tightened.
6. Press the **FREQ** soft key.
7. Check that the frequency range is correct.
8. Press the **MAIN** soft key on the Site Master.
9. Press the **AUTOSCALE** key.
10. Press the **MARKER** key.
11. Press the **M1** soft key (if the marker is not activated press **ON/OFF** to activate the marker).
12. Press the **EDIT** soft key.
13. Move the marker with the Up/Down arrow key to the mean value of the trace and make a note of the attenuation value. Enter the test result in the Test Record.
14. Save the measurement by pressing the **SAVE DISPLAY** key.
15. Type in a non-used number (1 - 50) for the measurement and press **ENTER**. Use the keypad or the up/down arrow key to enter the time, date and trace designator for the saved display. Press **ENTER** after each operation.
16. Press the **BACK**soft key.
17. Press the**MAIN** soft key.

1.5.5 Feeder Attenuation Test

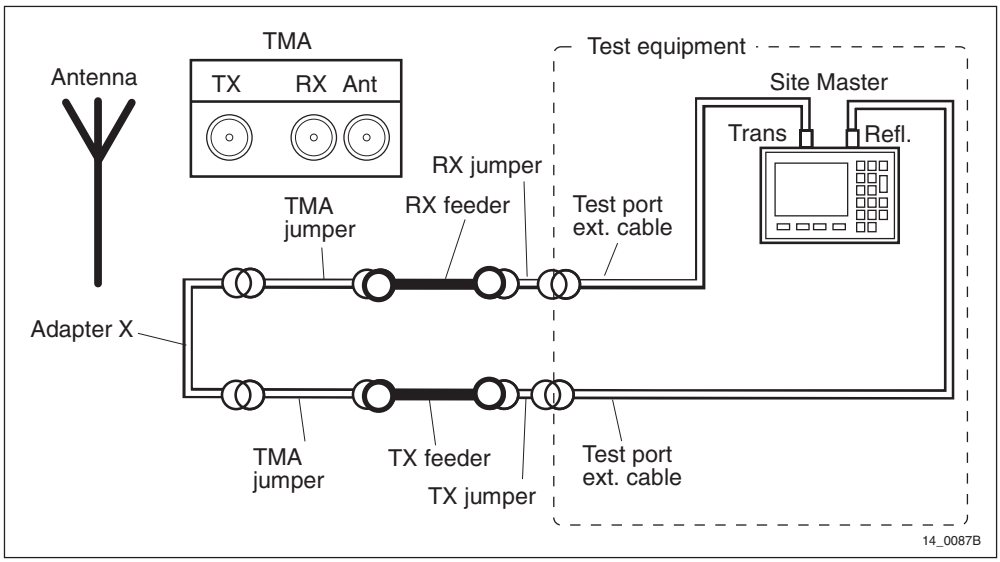


Figure 13 Test setup for feeder attenuation test

Purpose: To determine the attenuation of the system.

1. Disconnect all cables leading to and from the TMA/ ALNA.
2. Press the **MODE** soft key.
3. Select FREQ - Gain/Insertion Loss using the Up/Down Arrow key. Press **ENTER**.
4. Connect the test equipment to the Site Master according to figure 13.
5. Press the **FREQ** soft key.
6. Check that the frequency range is correct. If not, change to the correct frequency (see section Calibration and Adjustments).
7. Go to MAIN Menu (press the **MAIN** soft key).
8. Make sure that the Site Master is calibrated for this Feeder Attenuation test. See section Calibration and Adjustments.
9. Make the connections to the Antenna system according to figure 13.
10. Press the **AUTO SCALE** key.
11. Press the **MARKER** key.

12. Press the **M1** soft key.

13. Press the **EDIT** soft key.

14. Move the marker with Up/Down Arrow key to a central point on the edge and make note of the attenuation. Enter the test result in the Test Record.

15. Press the **BACK** soft key.

16. Press the **MAIN** soft key.

1.5.6 TMA/ALNA Test

Test setups

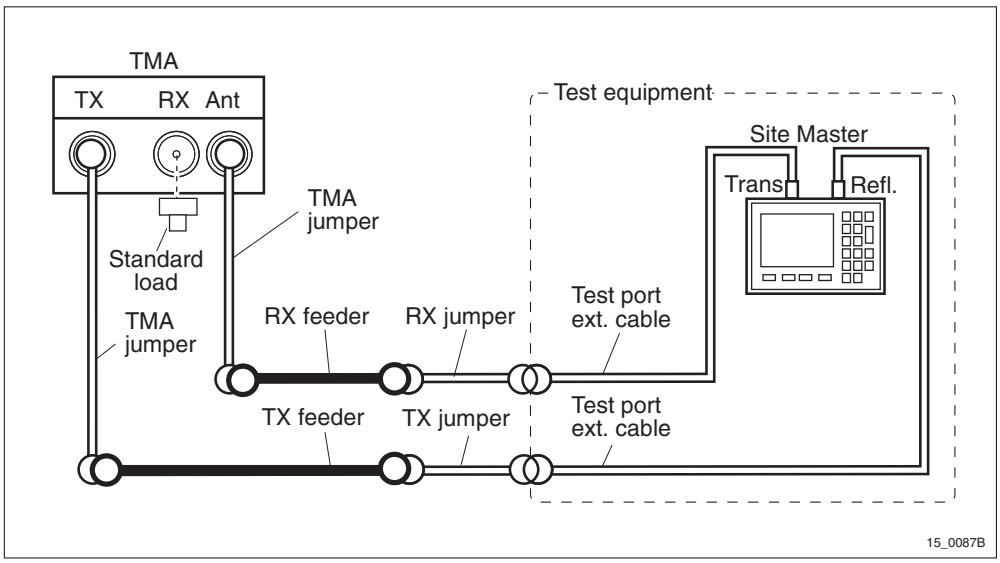


Figure 14 TMA/ALNA TX test setup

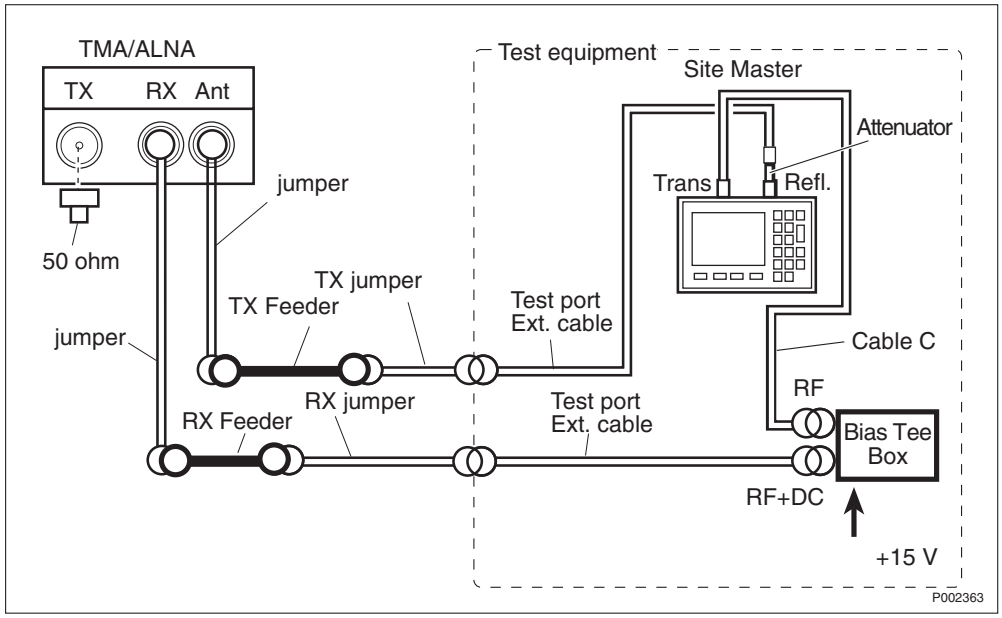


Figure 15 TMA/ALNA RX test setup

TX test

1. Connect the test equipment to the Site Master according to figure 14.
2. Press the **MODE** soft key.
3. Select FREQ - Gain/Insertion Loss using the Up/Down Arrow key. Press **ENTER**.
4. Press the **FREQ** soft key.
5. Check that the frequency range is correct. If not, change to the correct frequency (see section Calibration and Adjustments).
6. Go to MAIN Menu (press the **MAIN** soft key).
7. Make sure that the Site Master is calibrated for this TX test. See section Calibration and Adjustments.
8. Make the connections to the Antenna system according to figure 14.
9. Press the **AUTO SCALE** key.
10. Press the **MARKER** key.
11. Press the **M1** soft key.
12. Press the **EDIT** soft key.

13. Move the marker with the Up/Down Arrow key to a central point on the edge and make note of the attenuation.

14. Attenuation Test. The result is the attenuation of the TMA/ALNA.

15. Enter the test result in the Test Record (negative gain value).

16. Press the **BACK** soft key.

17. Press the **MAIN** soft key.

18. Subtract the attenuation value obtained in the section Feeder Attenuation Test

RX test

1. Connect the test equipment to the Site Master according to figure 15.

2. Press the **MODE** soft key.

3. Select Gain/Insertion Loss using the Up/Down Arrow key. Press **ENTER**.

4. Press the **FREQ** soft key.

5. Check that the frequency range is correct. If not, change to the correct frequency (see section Calibration and Adjustments).

6. Go to MAIN Menu (press the **MAIN** soft key).

7. Make sure that the Site Master is calibrated for this RX test. See section Calibration and Adjustments.

8. Make the connections to the Antenna system according to figure 15. Do not switch on the 15 V DC power supply yet. The switch on Bias Tee Box should be in the position Ext. DC (On).

Note RF - DC on the Bias Tee Box must not be connected to the Site Master.

RF - DC and RF connections must be made on the same side of the Bias Tee Box.

9. Switch on the 15 V DC supply.

10. Press the **AUTO SCALE** key.

11. Press the **MARKER** key.

12. Press the **M1** soft key.

13. Press the **EDIT** soft key.

14. Move the marker with the Up/Down Arrow key to a central point on the edge and make note of the attenuation.

15. Subtract the attenuation value obtained in section Feeder Attenuation Test. The result is the attenuation of the TMA/ALNA .

16. Enter the test result in the Test Record.

17. Press the **BACK** soft key.

18. Press the **MAIN** soft key.

If required, continue to test the TMA/ALNA s for all cells on the site.

1.6 Cable Loss Test

The purpose of this test is to determine the loss from the antenna cable (jumper and feeder) system. This test can be done instead of the feeder attenuation test when a Dual Duplex TMA is used.

1.6.1 Test setup for cable loss test

Test setup for GSM 900/1800/1900 antenna systems

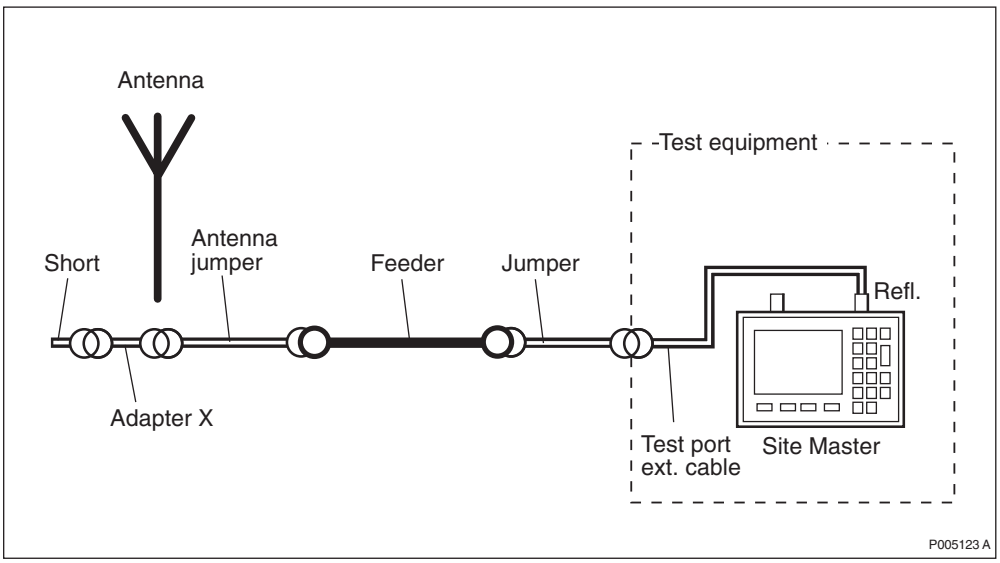


Figure 16

1. Disconnect the Antenna jumper from the Antenna.

2. Connect Adapter X to the Antenna Jumper.

3. Connect Short to Adapter X.

Test setup for GSM 900 antenna systems with Dual Duplexer TMA

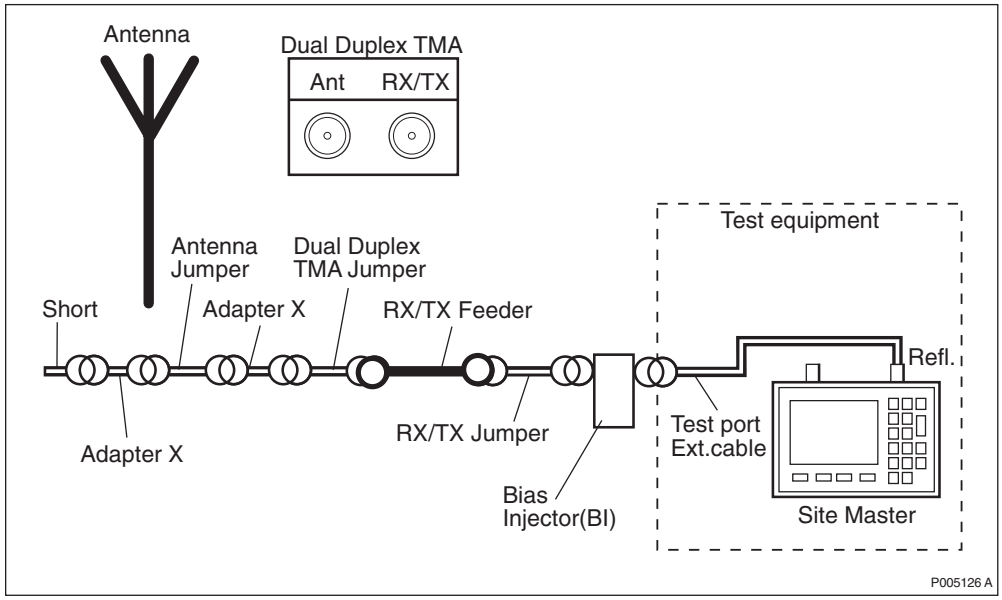


Figure 17

1. Disconnect the Antenna jumper from the Antenna.
2. Connect Antenna X to the Antenna Jumper.
3. Connect Short to Adapter X.
4. Connect the Bias injector according to *figure 17*

Test setup for the GSM 1800/1900 antenna systems with Dual Duplex TMA

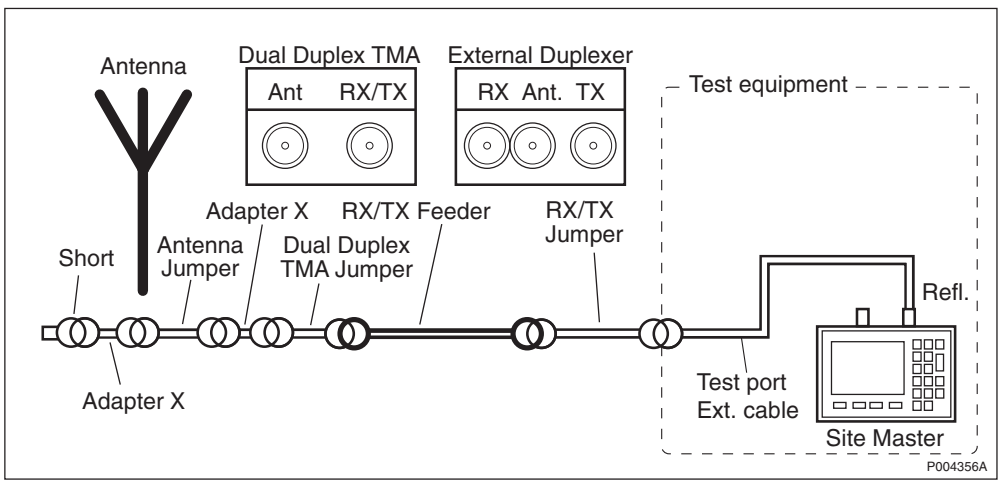


Figure 18

1. Disconnect all cables leading to and from the Dual Duplex TMA and the External Duplexer.
2. Connect Adapter X between the Dual Duplex TMA jumper and the Antenna Jumper.
3. Connect Adapter X to Antenna Jumper.
4. Connect the SHORT to Adapter X.

1.6.2 Test execution

1. Press the **MODE** soft key.
2. Select FREQ - Cable Loss - one port measurement using the UP/Down arrow key, and press **ENTER**.
3. Calibrate the Site Master for this test setup, *see section 1.5.*.
4. Connect the antenna system to the test equipment according to which system is going to be tested.
5. Check that all connections are properly connected and tightened.
6. Press the **FREQ** soft key.
7. Check that the frequency range is correct.
8. Press the **AUTO SCALE** key.
9. Press the **MARKER** key.
10. Press the **M1** soft key (if the marker is not activated press ON/OFF to activate the marker).
11. Press the **EDIT** soft key.
12. Move the marker with the UP/Down arrow to the mean value of the trace and make a note of the cable loss. Enter the test result in the Test Record.
13. Save the measurement by pressing the **SAVE DISPLAY** key.
14. Type in a non-used number (1 - 50) for the measurement and press ENTER. Use the keypad or the up/down arrow key to enter the time, date and trace designator for the saved display. Press ENTER after each operation.
15. Press the **BACK** soft key.
16. Press the **MAIN** soft key.

1.7 Cable Attenuation Calculation

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

Note If the cable type is not found in *table 6*, values must be taken from the manufacturer's specifications. If the cable lengths are unknown, perform the DTF test to determine the cable lengths.

1. Calculate the total attenuation and enter it in the test record. Total attenuation is calculated by multiplying the actual length in metres by the attenuation per m. Assume that each connector adds 0.1 dB.

   Example for 900 MHz:

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

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

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

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

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

3. Enter the result of the calculation in the test record.

Table 6 Velocity factor (Vp) for different cables

Product No.	**Supplier Code**	**Velocity Factor V_p**	**Attenuation, dB/m**	
			900 MHz	**1800/1900 MHz**
SXA 105 3060	Kabelmetal HCF, 1/2"	0.84	0.118	0.224
TZC 500 15	Kabelmetal LCF, 1/2"	0.88	0.073	0.109
TZC 500 17	Kabelmetal LCF, 7/8"	0.88	0.043	0.065
SXA 105 3062	Kabelmetal LCF, 1 5/8"	0.88	0.027	0.044

1.8 Importing Waveforms to Graphical PC Environment

After the results have been saved in the Site Master, the user can obtain copies by importing them to a PC using the included software and a serial connection to the PC. For more detailed information refer to the Site Master User's Guide.

Uppgjord — *Prepared*	Faktaansvarig — *Subject responsible*	Nr — *No.*		
ERA/LZ/TI		6/1532-COH 109 2016/11 Uen		
Dokansv/Godk — *Doc respons/Approved*	Kontr — *Checked*	Datum — *Date*	Rev	File
ERA/LZ/THC (ERANETT)		1998-02-06	A	

Transmission System Test

Contents **Page**

1 Transmission System Test

This test instruction describes how to check that the transmission line between the BSC and the BTS is present and working.

The test includes the whole transmission line: Cables, connectors and terminal boards at the BSC and the BTS site, as well as the actual transmission equipment (line terminals, radio links, fibres, and so forth).

In chapter *Appendix*, at the end of this manual, there is a test record, which has to be filled in during the test.

1.1 Prerequisites

- Installation check done according to chapter Installation Check
- Strapping performed according to chapter *Strapping Instructions, G-Module*
- Power system test performed according to chapter Power System Test
- BSC present and running
- Transmission system present and running

1.2 Transmission Test

1. Switch ON the power in the TRI.
2. Deblock the DIP and the control link in the BSC from the BSC site.

   Result:

   DIP = WO

   Control link = WO

   (DIP=Digital Path, WO=working)
3. Ensure that the CLC is not sealed.

   EXCLP:EQM=CLC-xx;(xx=CLC number)
4. Deblock the TRI using either EXEEE: or RECEI; ensuring that the TRI functions OK by EXEEP:EMG=xxx,EM=ALL;.

TRS System Test Using BSC

Contents **Page**

1 TRS System Test Using BSC

This test instruction describes how to test all hardware in the RBS.

The tests are performed with the RBS connected to the BSC. All MML commands necessary for control of the BTS are sent through the V24 interface card in the TRI, using a PC installed with FIOL software. Due to the slow IO device link and the amount of printouts generated for certain commands, it is recommended that MML commands within this instruction should be performed by the BSC personnel.

After this test is completed, all TRS hardware has been tested, including the optional TRXT (TRX Tester), and the cells will be ready for operational use.

If the TRS System Test Using BSCSim has been performed, only the Test call on Air Interface has to be tested.

Perform the tests in the sequence that they are written, and fill in the Test Record, see chapter Appendix, during the tests.

1.1 Prerequisites

- Installation check done according to chapter Installation Check
- Strapping performed according to chapter *Strapping Instructions, G-Module*
- Power system test performed according to chapter Power System Test
- Antenna system test done according to chapter Antenna Installation Tests
- Transmission system test performed according to chapter Transmission System Test
- The Integration test of TRI in the H-Module in the BSC library must have been done
- MSC/BSC present and running
- If Half Rate has to be tested, use a Half Rate mobile.

1.2 Test Equipment

The equipment in table 1 is needed to carry out this test. This equipment can be ordered by using the ordering information in chapter Test Team Equipment. More instructions on how to order equipment from this manual can also be found there.

Table 1 Test equipment

Item	Description	Specification	Product No.	Qty
1	Test Mobile Station, TEMS	Ericsson SH 888	LPB 112 12/1	1
2	Personal Computer	[2]		1
3	Power Splitter/ Combiner	MiniCircuit ZAPD-21N	LPY 107 349/1	1
4	Attenuator	Lucas Weinschel 1-30	LPY 107 350/1	3
5	Attenuator	Lucas Weinschel 47-30-43	LPY 107 351/1	1
6	Adaptor B	Suhner 33 716-N-50-1	[1]	1
7	Adaptor I	Suhner 33 N-BNC-50-1	[1]	1
8	Adaptor J	BNC	[1]	1
9	Cable C	N (male) to N (male)	RPM 113 761	2
10	Cable R	Mobile Station cable, 800 series	NTZ 112 294/5	1
11	FIOL	Including software and cables	KDY 196 56/1	1

[1] Included in LTR 171 01/3.

[2] See chapter Test Team Equipment.

1.3 TRS System Tests

1.3.1 RXLEV Reference Values

$RXLEV_{ref}$ uplink/downlink are reference values for power levels measured by the BTS and the MS.

Reference values are obtained by running the TRS in stand alone mode on a BTS that is known to be correct, measuring the RXLEV uplink and downlink values. If no such BTS is available, run the test on at least four different BTSs.

$RXLEV_{ref}$ is valid for a specific MS, the same type of cables, power splitter, attenuators, combiners and specific output power level of the TX. This means that if one or more of the mentioned parameters are changed, new $RXLEV_{ref}$ values have to be obtained in the way described above.

The reference values shall be within the following limits:

For the BSC	$RXLEV_{ref}$ downlink = -50 ±10 dBm
For the MS	$RXLEV_{ref}$ uplink = -60 ±10 dBm

1.3.2 FIOL Hints

In the following tests the using of log on and log off FIOL is not included. After sending of some MML commands you will get the result ORDERED, then do the procedure below:

1. Push F1 (log off FIOL).
2. Wait for a result printout, it ends with "EXECUTED" if everything went well.
3. Push F5 (log on FIOL).

Now you can send the next MML command.

1.3.3 Test Set-Up

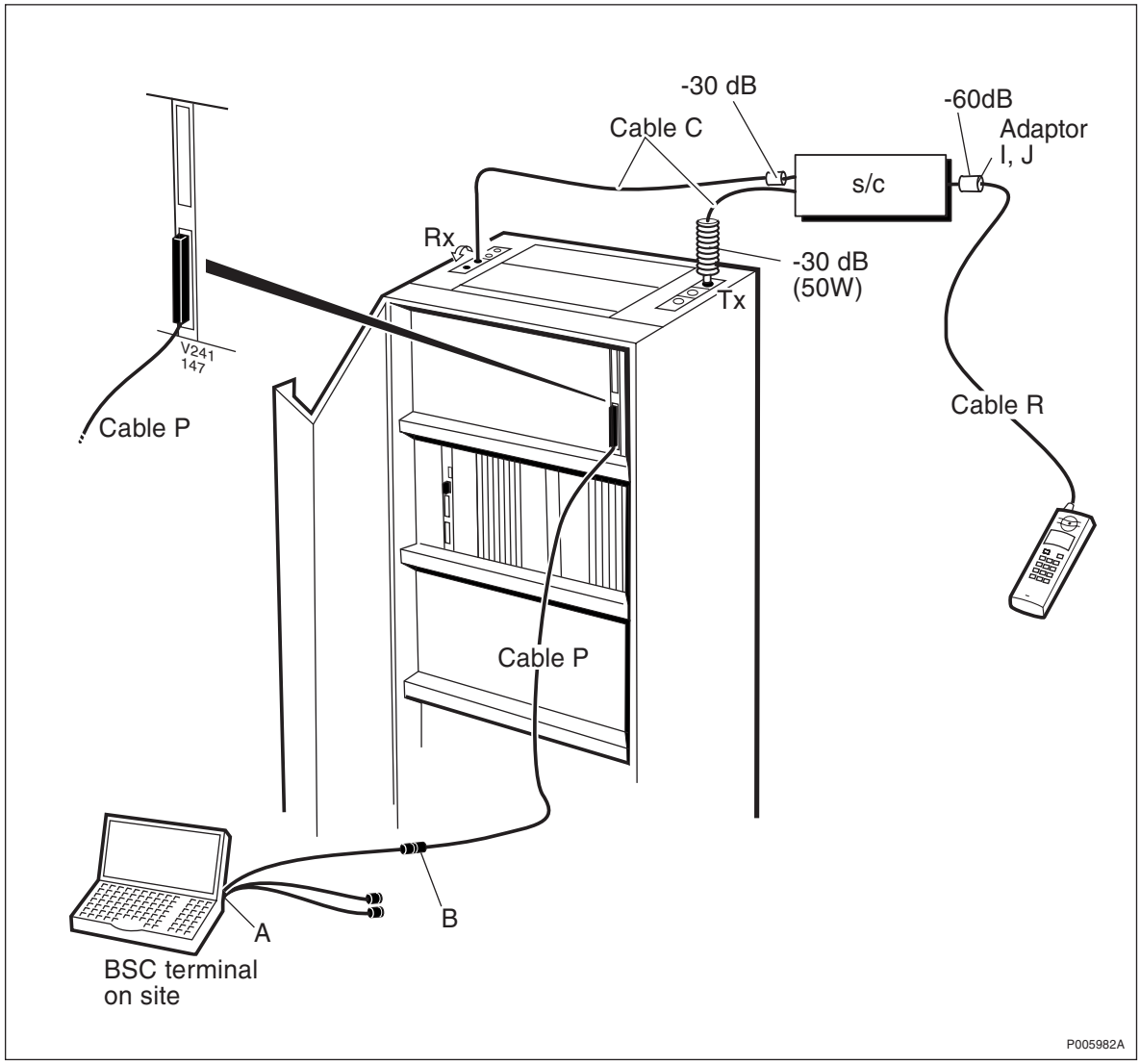


Figure 1 TRS system test set-up

1.3.4 Test Preparations

Before a test:

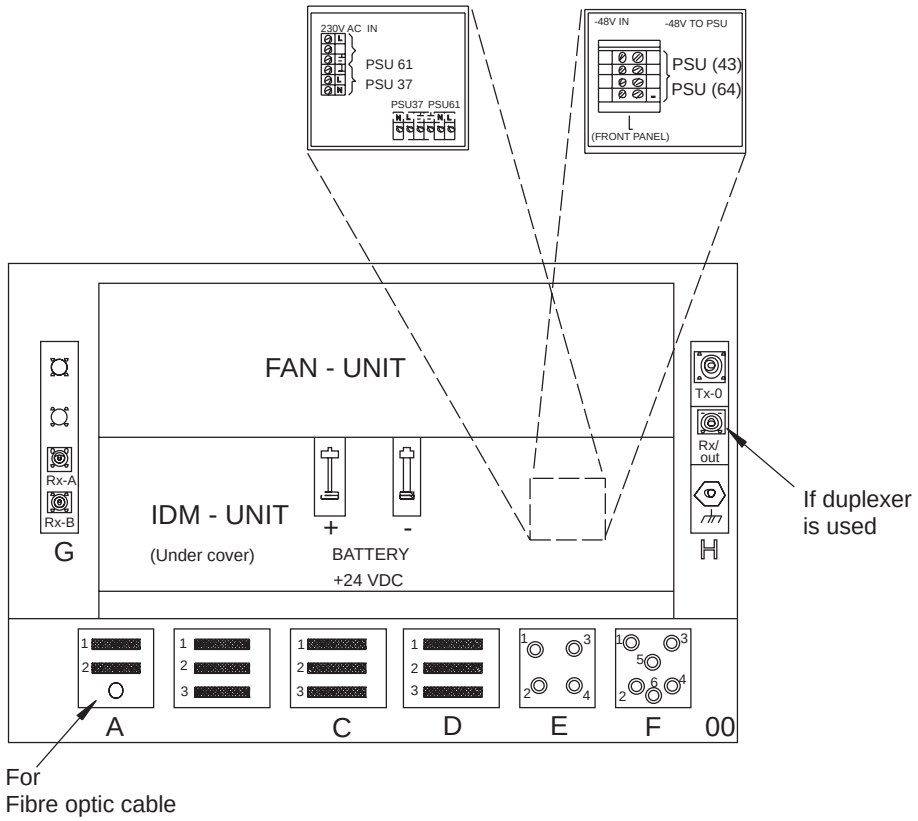
1. Obtain the appropriate data transcript file(s) for the site.
2. Inform the BSC personnel when the cell(s) in question will be tested.

When testing:

1. Connect the IO device (FIOL) to the TRI.

2. Disconnect the antenna system from the TRS and connect the coaxial network as in figure 1.

3. Connect the LMT to the TRXC in the first TRX.



A1 = TM SYNC IN
A2 = TM SYNC OUT
B1 = EXTERNAL ALARM
B2 = EXTERNAL ALARM
B3 = LIB TRXD 1-4
C1 = LIB BUS CAB. A1
C2 = LIB BUS CAB. B1 (A2)
C3 = LIB BUS CAB. C1 (A3)
D1 = LIB BUS CAB. A2 (A4)
D2 = LIB BUS CAB. B2
D3 = LIB BUS CAB. C2

*)E1 = PCM INPUT 1 120 ohm
E2 = PCM OUTPUT 1 120 ohm
E3 = PCM INPUT 2 120 ohm
E4 = PCM OUTPUT 2 120 ohm
**)F1 = PCM INPUT 1 75 ohm
F2 = PCM OUTPUT 1 75 ohm
F3 = PCM INPUT 2 75 ohm
F4 = PCM OUTPUT 2 75 ohm
F5 = PCM INPUT 3 75 ohm
F6 = PCM OUTPUT 3 75 ohm

*) If more than 2 ETB cards,
2 contact boxes E (SVK 107
**) If more than 3 ETB cards,
2 contact boxes F (SVK 107 2435/1) are needed.

P001226

Figure 2 Connection field on top of the cabinet

1.3.5 TRI Set-Up

The following must be done from the BSC in order to start up the TRS:

- The time slots to be used between the BSC and the TRS must be defined and the DIP deblocked.
- The RBLT devices must be deblocked.
- The RXCTRD devices must be deblocked.
- The control link must be defined and deblocked.
- The STC and EM must be deblocked.
- The EMRP in the TRI must be deblocked (loaded).
- The TSW must be deblocked and tested.
- The ETB/RTT must be deblocked.
- If the TRI is equipped with EMRPSs they must be defined and deblocked
- The semipermanent connections in the TRI must be set up.
- The RHDEV must be deblocked.
- The IO device must be defined and deblocked.
- The correct cell data must be loaded in the BSC from the DT.

For more information about the TRI, see the H-Module in the BSC library.

1.3.6 Load and Activation of Cell

1. Call up the Data Transcript file with the IO device.
2. Deblock and activate the cell with the file, sending the commands line by line.
3. Check that all units in the TRS are working, use the commands `RLCRP` and `RXMSP` and the error log for the BTS:

   ```
   RLCRP:CELL="cellname";

   RXMSP:MO=mo...;

   RXELP:CELL=cell;
   ```
   (error log)

Note Command RLCRP shows the configuration of all TSs and BCCHs, CBCHs and SDCCHs that are correct within the TG. If the number of TCHs is less than the number allocated in the TRXs, or equals 0 in the cell, there is a fault within the TG. If instead of cell= "cellname" you put cell=all, it will show the cell resources for all cells.

More details can be found in the BSC B-Module command descriptions.

Result:

All TRXCs shall be started.

All LUs shall be enabled.

The LEDs shall indicate a status according to chapter External Alarms Test and Status Indicators.

4. Note which TSs are configured as BCCH and SDCCH in the Test Record at the end of this instruction, in the appropriate time slot fields.

```
RXCDP:MO=RXETS-x-y-z&&-zz;
```

1.3.7 Park all Filter Combiners

A filter combiner has two cavities, each controlled by a stepper motor. The stepper motors can be moved away from its parking positions under transportation. Therefore, all cavities, connected or not, must always be parked on site once and for all, when the RBS is taken into operation for the first time.

CAUTION

Moving the RF cables incorrectly can cause RF burns to the person doing this procedure. Therefore, all TXs must be disabled when moving the cables. The yellow LEDs on all RTXs must be flashing.

1. Park all connected cavities of the combiners. Halt the cell:

```
RLSTC:CELL="cellname",STATE=HALTED;
```

Result: All RTXs are now disabled. The yellow LEDs on all RTXs shall be flashing.

2. Park the unconnected cavity on the combiner by moving the cables on the filter combiner:

   Move the Tuning Control cable (RPM 513 369/1) from the first cavity to the corresponding position on the second unused cavity on the same combiner.

   Move the RF cable (the TX out cable from RTX, RPM 513 368/5) from the first cavity to the corresponding position on the second unused cavity on the same combiner.

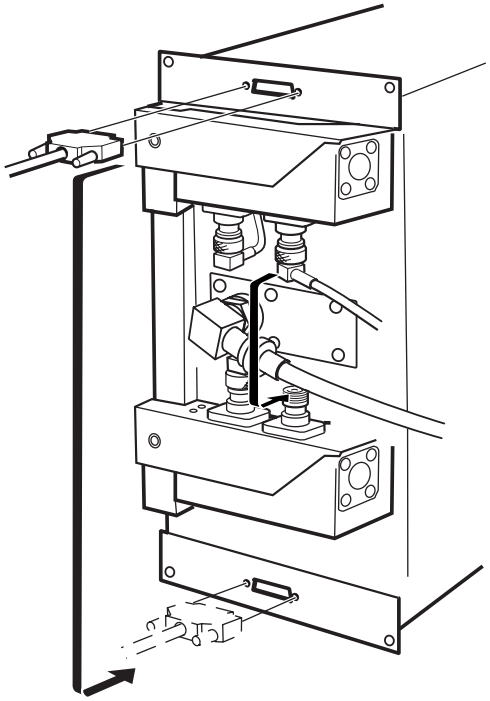


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Figure 3 Park all filter combiners

3. Activate the cell:

   ```
   RLSTC:CELL="cellname",STATE=ACTIVE;
   ```

4. Halt the cell:

   ```
   RLSTC:CELL="cellname",STATE=HALTED;
   ```

   The unconnected cavity is now parked.

5. Reconnect the cables to the combiner which the cables were first removed from.

6. Activate the cell.

Result: The yellow LEDs on all RTXs shall be lighted.

1.3.8 Test Call from MS on Diversity A

Note If the TRS System Test Using BSCSim has been performed, only the Test call on Air Interface has to be done.

Configure Diversity A

1. Halt the cell and wait for result printout:

   ```
   RLSTC:CELL="cellname",STATE=HALTED;
   ```

2. If necessary, disable frequency hopping in the cell:

   ```
   RLCHC:CELL="cellname",HOP=OFF;
   ```

3. Check the frequencies defined in the cell

   ```
   RLDEP:CELL="cellname";
   ```

   ```
   RLCFP:CELL="cellname";
   ```

   Use the market allocated frequencies as much as possible in the test calls.

   If necessary, change to frequencies allocated for use during the test. DCHNO frequencies depend on how many TRXs are used in the cabinet. Minimum channel spacing is three channels. The channels are: BCCHNO=1, and DCHNO=4&7&10.

   ```
   RLDEC:CELL="cellname",BCCHNO="bcchno";
   ```

   ```
   RLCFE:CELL="cellname",DCHNO="dchno";
   ```

   ```
   RLCFI:CELL="cellname",DCHNO="dchno";
   ```

4. Block the RXs in the TG (Force Block):

   ```
   RXBLI:MO=RXERX-x-y&&-z,FORCE;
   ```

5. Take the RXs out of service:

   ```
   RXESE:MO=RXERX-x-y&&-z;
   ```

6. Configure the diversity parameter to RXD=A:

   ```
   RXMOC:MO=RXERX-x-y&&-z,RXD=A;
   ```

   The diversity configuration can be checked with the RXMOP command.

7. Take the RXs into service:

   ```
   RXESI:MO=RXERX-x-y&&-z;
   ```

8. Deblock the RXs:

   ```
   RXBLE:MO=RXERX-x-y&&-z;
   ```

9. Activate the cell:

   ```
   RLSTC:CELL="cellname",STATE=ACTIVE;
   ```

10. Check all MOs enabled+configured within the TG by the RLCRP command as before.

    Result:

    All TRXCs shall be started.

    All LUs shall be enabled.

    The LEDs shall indicate a status according to chapter External Alarms Test and Status Indicators.

Perform the test calls on Diversity A

Note When using SPU/SPU+ only one test call per diversity is needed to be done per TRX. When using SPP all TS shall be tested.

1. Block all TSs carrying TCHs in a TRX and repeat the command for the rest of the TRXs in the cell.

   ```
   RXBLI:MO=RXETS-x-y-z&&-zz;
   ```

Test of TCH time slot

1. Deblock TS to be tested:

   ```
   RXBLE:MO=RXETS-x-y-z;
   ```

2. Switch on the mobile.

3. Dial a designated phone number from the mobile.

4. Check the state of all the TCHs:

   ```
   RLCRP:CELL="cellname";
   ```

   Check that the TCH is in state BUSY.

5. Check the RXLEV and the RXQUAL values for uplink in the LMT. Check also that the correct time slot is active.

6. Check the RXLEV and the RXQUAL values for downlink inTEMS. Check also that the correct time slot is used.

   Result:

   When speaking in the mobile, speech quality shall be good in both directions. RXLEV and RXQUAL values shall be according to the test record.

7. Document the result in the Test Record.

8. Terminate the call and block the tested TS:

   ```
   RXBLI:MO=RXETS-x-y-z;
   ```

Test of other TCH time slots in the TRX

1. Repeat Test of TCH time slot as described above for all TCHs in the TRX if using SPPs, otherwise only one call is enough.

2. Document the result for each TS in the Test Record.

Test of other TCH time slots in the cell

1. Repeat Test of TCH time slot as described above when testing TCHs in other TRXs in the cell. This implies that the LMT is moved to the actual TRX.

2. Document the result for each TS in the Test Record.

Reconfiguration of test frequencies

Note Frequencies are reconfigured so that testing is performed for tuning of filter combiners, test of power out/ reflected of BTS and test of sensitivity of RX and BP filters over the GSM band. Therefore, only one test call per TRX is needed.

1. Halt the cell:

   ```
   RLSTC:CELL="cellname",STATE=HALTED;
   ```

2. Change to frequencies allocated for use during the test. DCHNO frequencies depend on how many TRXs are used in the cabinet. Minimum channel spacing is three channels. The channels are: BCCHNO=57, DCHNO=60&63&66.

   ```
   RLDEC:CELL="cellname",BCCHNO="bcchno";

   RLCFE:CELL="cellname",DCHNO="dchno";

   RLCFI:CELL="cellname",DCHNO="dchno";
   ```

3. Activate the cell:

   `RLSTC:CELL="cellname",STATE=ACTIVE;`

4. Check that the cell is configured with logical channels:

   `RLCRP:CELL="cellname";`

Perform the test call on new frequencies

All TSs carrying TCHs in the cell shall be blocked.

Test of one TCH time slot per TRX

1. Deblock a TS to be tested in the TRX:

   `RXBLE:MO=RXETS-x-y-z;`

2. Dial a designated phone number from the mobile.

3. Check the state of all the TCHs:

   `RLCRP:CELL="cellname";`

   Check that a TCH is in state BUSY.

4. Check the RXLEV and the RXQUAL values for uplink in the LMT. Check also that the correct time slot is active.

5. Check the RXLEV and the RXQUAL values for downlink in TEMS. Check also that the correct time slot is used.

   Result:

   When speaking in the mobile, speech quality shall be good in both directions. RXLEV and RXQUAL values shall be according to the test record.

6. Document the result in the Test Record.

7. Terminate the call and block the used TS:

   `RXBLI:MO=RXETS-x-y-z`

Test of other TCH time slots in the cell

1. Repeat the test call as described above for one TCH time slot per TRX in the cell.

Reconfiguration of test frequencies

1. Reconfigure the TRXs to the following frequencies: BCCHNO=124, DCHNO=121 & 118 & 115. Repeat the test calls with the new frequencies as described above for "Reconfiguration of test frequencies".

2. Document the result in the Test Record.

1.3.9 Test Call from MS on Diversity B

Configure Diversity B

1. Halt the cell:

   ```
   RLSTC:CELL="cellname",STATE=HALTED;
   ```

2. If necessary, disable frequency hopping in the cell:

   ```
   RLCHC:CELL="cellname",HOP=OFF;
   ```

3. Block the RXs in the TG (Force Block):

   ```
   RXBLI:MO=RXERX-x-y&&-z,FORCE;
   ```

4. Make connections according to figure 1 and figure 2 (RXB).

5. Take the RXs out of service.

   ```
   RXESE:MO=RXERX-x-y&&-z;
   ```

6. Configure the diversity parameter to RXD=B:

   ```
   RXMOC:MO=RXERX-x-y&&-z,RXD=B;
   ```

   The diversity configuration can be checked with the RXMOP command.

7. Take the RXs into service:

   ```
   RXESI:MO=RXERX-x-y&&-z;
   ```

8. Deblock the RXs:

   ```
   RXBLE:MO=RXERX-x-y&&-z;
   ```

9. Activate the cell:

   ```
   RLSTC:CELL="cellname",STATE=ACTIVE;
   ```

10. Check all MOs enabled / configured within the TG by the RLCRP command as before.

    Result:

    All TRXCs shall be started.

    All LUs shall be enabled.

    The LEDs shall indicate a status according to chapter External Alarms Test and Status Indicators.

Perform the test calls on Diversity B

1. "Perform the Test Calls on Diversity B" as described above for "Perform the Test calls on Diversity A".

2. Document the results in the Test Record.

1.3.10 Test Call Market Allocated Frequencies

Repeat Test Call from MS on Diversity A and Diversity B with market specific frequencies according to Market Dependant Special Instructions.

Note For one Diversity, only one call per frequency and TRX is needed independently of SPP cards or not.

1. Repeat "Test Call from MS on Diversity A". Set Diversity A and use bottom, middle and top ARFCNs for the market allocated frequency spectrum.

2. Document the results in the Test Record.

3. Repeat "Test Call from MS on Diversity B". Set Diversity A and use bottom, middle and top ARFCNs for the market allocated frequency spectrum.

4. Document the results in the Test Record.

1.3.11 Test Calls from MS on SDCCH and BCCH Time Slots on Diversity B

1. Check that all TSs carrying TCH in the cell are blocked with command:

   ```
   RLCRP:CELL= "cellname";
   ```

2. Deblock one TCH time slot:

   ```
   RXBLE:MO=RXETS-x-y-z;
   ```

Check of SDCCH time slots

1. Check which TSs are configured as SDCCH in the cell:

   ```
   RXCDP:MO=RXETS-x-y-z&&-zz;
   ```

2. Block and deblock a time slot configured as SDCCH:

   ```
   RXBLI:MO=RXETS-x-y-z,FORCE;
   ```

   ```
   RXBLE:MO=RXETS-x-y-z;
   ```

3. Check that the TS that was previously configured as SDCCH is now configured as TCH:

```
RXCDP:MO=RXETS-x-y-z;
```

4. Make a call from the MS.

5. Check the state of the TCH:

```
RLCRP:CELL="cellname";
```

6. Document the result in the Test Record.

Test of other SDCCH time slots in the cell

1. Repeat the above mentioned procedure for all SDCCHs configured in the cell.

Check of BCCH time slot

1. Check which TS is configured as BCCH:

```
RXCDP:MO=RXETS-x-y-z&&-zz;
```

2. Block and deblock the time slot that is configured as BCCH:

```
RXBLI:MO=RXETS-x-y-z,FORCE;
```

```
RXBLE:MO=RXETS-x-y-z;
```

3. Check that the TS that was previously configured as BCCH is now configured as TCH:

```
RXCDP:MO=RXETS-x-y-z;
```

4. Make a call from the MS.

5. Check the state of the TCH:

```
RLCRP:CELL="cellname";
```

6. Document the result in the Test Record.

1.3.12 Test Calls from MS on SDCCH and BCCH Time Slots on Diversity A

1. Configure diversity A as above for "Configure Diversity B" but note:

   Set parameter RXD=A.

   Make connections according to figure 1 and figure 2 (RXA).

2. Perform the "Test Calls from MS on SDCCH and BCCH time slots on Diversity A" as described above for "Test

calls from MS on SDCCH and BCCH time slots on Diversity B".

3. Document the result in the Test Record.

1.3.13 Restoration after Test Calls from MS

Note If, for some reson, "Test calls on Air Interface" will not be performed then follow the instruction below "Restoration after Test call on Air Interface"

1. Halt the cell:

```
RLSTC:CELL="cellname",STATE=HALTED;
```

2. Block all TSs carrying TCHs in a TRX and repeat the command for the rest of the TRXs in the cell.

```
RXBLI:MO=RXETS-x-y-z&&-zz;
```

3. Restore frequencies according to the exchange data transcript:

```
RLDEC:CELL="cellname",BCCHNO="bcchno";

RLCFE:CELL="cellname",DCHNO="dchno";

RLCFI:CELL="cellname",DCHNO="dchno";
```

4. If necessary, enable frequency hopping in the cell:

```
RLCHC:CELL="cellname", HOP=ON;
```

1.3.14 Test Calls on Air Interface

The purpose of this test is to test TX, RXA and RXB for each cell.

1.3.15 Test Call from MS on RXB

Configure Diversity B

1. Halt the cell if necessary:

```
RLSTC:CELL="cellname",STATE=HALTED;
```

2. Connect the antenna system using torque wrenches; torque settings as defined in chapter Strapping Instructions.

3. If RXD=A, then continue with the item 4 "Block all RXs...".

   If RXD=B, go to item 7 "Activate the cell".

4. Block all RXs in the TG and bring them out of service:

   ```
   RXBLI:MO=RXERX-x-y&&-z,FORCE;
   ```

   ```
   RXESE:MO=RXERX-x-y&&-z;
   ```

5. Configure diversity parameter to RXD=B for all RXs in the TG:

   ```
   RXMOC:MO=RXERX-x-y&&-z,RXD=B;
   ```

6. Bring all RXs in the TG into service and deblock them:

   ```
   RXESI:MO=RXERX-x-y&&-z;
   ```

   ```
   RXBLE:MO=RXERX-x-y&&-z;
   ```

7. Activate the cell:

   ```
   RLSTC:CELL="cellname",STATE=ACTIVE;
   ```

   Configuration is started.

8. Wait for Cell Configuration Result. The number of traffic channels should equal the number configured in the TRXs.

Perform the test call from MS on RXB

Note Other users might access the cell in an area with low call coverage or high population.

1. Deblock all TSs in a TRX and repeat the command for the rest of the TRXs in the cell.

   ```
   RXBLE:MO=RXETS-x-y-z&&-zz;
   ```

2. Check that all the TCHs are in state IDLE:

   ```
   RLCRP:CELL="cellname";
   ```

3. Make a call from the MS.

4. Check the states of the TCHs:

   ```
   RLCRP:CELL="cellname";
   ```

   A TCH should be BUSY.

Check of cell sector boarders for RXB

If not stated otherwise in Market Dependent Special Instructions, perform the following Drive Test if the site is a sector site.

1. Drive around the site towards the cell sector border with the call in progress, until a handover is performed or the call is dropped.

   Result:

   The call shall be dropped/handed over at the same place for RXA and RXB.

   Check that the coverage of the cell is according to cell planning (which means that the BTS has been connected to the correct antenna).

2. Terminate the call, if necessary.

3. Check the state of all the TCHs:

   ```
   RLCRP:CELL="cellname";
   ```

   Now the used TCH should be back in state IDLE.

4. Document the result in the Test Record.

1.3.16 Test Call to MS on RXB

Perform a test call to MS on RXB

1. Make one call to the MS from a designated test phone.

2. Check the state of all the TCHs:

   ```
   RLCRP:CELL="cellname";
   ```

   A TCH should now be in state BUSY.

3. Terminate the call.

4. Check the state of all the TCHs:

   ```
   RLCRP:CELL="cellname";
   ```

   Now the used TCH should be back in state IDLE again.

5. Block all TSs carrying TCH.

   ```
   RXBLI:MO=RXETS-x-y-z&&-zz;
   ```

6. Document the result in the Test Record.

1.3.17 Test Call from MS on RXA

Configure Diversity A

1. Block the RXs in the TG (Force Block) and bring them out of service:

```
RXBLI:MO=RXERX-x-y&&-z,FORCE;

RXESE:MO=RXERX-x-y&&-z;
```

2. Configure the diversity parameter to RXD=A for all RXs in the TG:

```
RXMOC:MO=RXERX-x-y&&-z,RXD=A;
```

3. Bring all RXs in the TG into service and deblock them:

```
RXESI:MO=RXERX-x-y&&-z;

RXBLE:MO=RXERX-x-y&&-z;
```

Perform the test call from MS on RXA

Note Other users might access the cell in an area with low call coverage or high population.

1. Follow the same procedure as above for "Perform the Test call from MS on RX".

2. Document the result in the Test Record.

Check of cell sector boarders for RXA

1. If this test shall be done follow the same procedure as above for "Check of cell sector boarder for RXB".

2. Document the result in the Test Record.

1.3.18 Test Call to MS on RXA

Perform a test call to MS on RXA

1. Follow the same procedure as for "Test call to MS on RXB".

2. Document the result in the Test Record.

1.3.19 Restoration after Test Call on Air Interface

Note After the restoration the cell is ready for traffic.

1. Halt the cell:

```
RLSTC:CELL="cellname",STATE=HALTED;
```

2. Block the RXs in the TG (Force Block) and bring them out of service:

```
RXBLI:MO=RXERX-x-y&&-z,FORCE;

RXESE:MO=RXERX-x-y&&-z;
```

3. Configure RXD=AB, if diversity is supported:

   `RXMOC:MO=RXERX-x-y&&-y,RXD=AB;`

4. Configure RXD=A, if diversity is not supported:

   `RXMOC:MO=RXERX-x-y&&-z,RXD=A;`

5. Make sure that the Antenna Systems are correctly connected to the BTS.

6. Bring all RXs in the TG into service and deblock them:

   `RXESI:MO=RXERX-x-y&&-z;`

   `RXBLE: MO=RXERX-x-y&&-z;`

7. Activate the cell:

   `RLSTC:CELL="cellname",STATE=ACTIVE;`
   Configuration is started.

8. Deblock all TSs:

   `RXBLE:MO=RXETS-x-y-z&&-zz;`

9. Check the status of the cell. Logical channels should be configured:

   `RLCRP:CELL="cellname";`

10. Check the error-log with command `RXELP`.

    Check (on the screen) that no errors have occurred during restoration of cell.

    Result:

    All TRXCs shall be started.

    All LUs shall be enabled.

    The LEDs shall indicate a status according to chapter External Alarms Test and Status Indicators.

1.3.20 Definition of TRXT

1. Define the transceiver test and supervision equipment in a cell.

   Command: `RATTI:CELL=cell, IMSI=791770123456789,ATTDL=attdl, ATTUL=attul, TRXTPWR=trxtpwr;`

Note The IMSI number for the TRXT is always 791770123456789.

Note If measured signal strength is outside the limits, the reason can be that attenuation values are set either too low or too high. By undefining the TRXT and then redefining the TRXT, attenuation values can be changed.

Note ATTDL=Attenuation downlink in dB.

Note ATTUL=Attenuation uplink in dB.

Note Cell=Cell designation.

Note IMSI=International mobile subscriber Indentity of the Transceiver Tester, TRXT.

Note TRXTPWR=trxtpwr: Transmit power in dBm for TRXT on connection.

2. Check the default settings of the TRXT supervision.

   Command: `RATTP:CELL=cell...;`

3. Printout: TRANSCEIVER TEST AND SUPERVISION DATA.

Note The range values are 10 dBm for uplink and downlink, and a bit error rate of 4. Any of these values can be changed by means of the MML command "RATTC", but that is not recommended until you have used the TRXT functionality for a period of time and have more statistics.

Note See Configuration of TRXT.

4. Order a printout of the cell configuration power data for the internal cell.

   Command: `RLCPP:CELL=cell;`

Note The interesting values are BSPWRT (for TCHs = Traffic Channels) and BSPWRB (for BCCH). The estimated power level is obtained from the BSPWR values minus the ATT values given in the RATTI command. If you are using frequency hopping and have the BCCH frequency in the hopping list, the estimate for Downlink is calculated by ESSDL=((BSPWRB + (NoOfFreq-1)*BSPWRT)/ NoOfFreq)-ATTDL. The same applies for Uplink.

5.

1.3.21 Test of TRXT

1. Test the equipment in the cell.

Command: `RATMI:CELL=cell...;`

2. Result: Ordered.

3. Action: Press F1 to release the terminal.

4. Result: TRANSCEIVER MANUAL TEST RESULT.

   If no faults are detected in a time slot, the result is APPROVED for that specific time slot.

5. Result: Executed.

6. Action: Press F5 to reconnect the terminal.

Note If the TRXT passed the tests with no faults (all time slots are APPROVED), the TRXT is working OK.

7. Document in the Test Record if the test of TRXT was OK.

1.4 Man Machine Language

Man Machine communication consists of commands (input) from man to machine and outputs from machine to man.

A command is either an order or a request for information.

An output is a message from the exchange. It could be either an answer or a command or a result of abnormal performance in the exchange. Outputs are obtained on displays or printers.

A command consists of a command code (identifier) and a parameter list separated by colon (:). A command is always ended by a semicolon (;).

The command code in AXE is a five-letter identifier. The first two letters define the subfunction to which the command belongs. The following two letters define the unit or function that is desired to influence, and the last letter defines the actions performed.

The command code is built up as follows:

`RLSTC:CELL=C1B01,STATE=HALTED;`

function group = `RL`

order in function group = `ST`

type of action = `C`

The command `RLSTC` is an abbreviation for Radio control celL STate Change and used to change the state of a cell.

In the above form, the command orders the cell called C1B01 to change into state halted.

The most important function groups for BSC commands related to BTS are:

RI Radio (remote) Interface

RL Radio control cell

RX Radio control X-ceiver administration

RA Radio control Administration

The last character of the command indicates the following types of action:

C Change

E End or Edit

I Initiate

L Load

P Print

R Remote

T Transfer

1.4.1 Writing Commands

A parameter argument normally consists of at least one information unit. If a parameter value contains several parameter arguments, these are separated by an ampersand (&).

Example:

Blocking of timeslot 0 and 4.

```
RXBLI:MO=RXETS-0-0-0&-4;
```

If the parameter argument forms a sequence, it is permitted to give only the first and the last value separated by a double ampersand (&&).

Example:

Blocking of timeslot 0, 1, 2, 3 and 4.

```
RXBLI:MO=RXETS-0-0-0&&-4;
```

All commands are stated in the B-11 module in the BSC library.

The following rules are valid for how the command format is to be interpreted when writing a command.

The format of the command is written in capital and small letters (and separators). The capital letters indicate that exactly those letters are to be printed in the real command. The small letters imply that they are to be replaced in the real command by a numeral or a symbol.

Example:

```
RLSTP:CELL=cell;
```

In this command "cell" is to be replaced by the actual name of the cell.

```
RLSTP:CELL=CELL21;
```

Outputs

The outputs from AXE can be divided into several groups:

- Automatically initiated

  Initiated when an abnormal situation occurs.

- Result printouts

  Initiated in answer to commands, but they occur later.

- Check printouts

  Check printouts reflect the command exactly as written by the operator. The operator is required to either order (with an extra semicolon) or inhibit the execution.

  A control printout is primarily given on dangerous commands.

  Example:

  ```
  RLSTC:CELL=CELL21,STATE=HALTED;

  RLSTC:CELL=CELL21,STATE=HALTED;

  ;
  ```

- Procedure outputs

  A procedure output is received immediately by the following:

  – Execution order of command

  – Cancellation order of command

  – Execution order after control printout

– The procedure output acknowledges a command input or a cancellation when a direct answer cannot be given.

  Examples could be ORDERED or FUNCTION BUSY.

- Answer outputs

  Initiates in answer to commands.

ACU Test

Contents **Page**

1 ACU Test

This test instruction describes how to test the Alarm Collection Unit (ACU) intended for use in the RBS. The purpose of the test is to confirm that the ACU hardware, cables to and from the ACU and connections to the Base Station Controller (BSC) are fully functional.

The tests are to be performed in the sequence that they are written, and the Test Record, see the chapter Appendix, is to be filled in during the tests.

All tests are performed with the Base Transceiver Station (BTS) in use, that is, with the cell being in traffic.

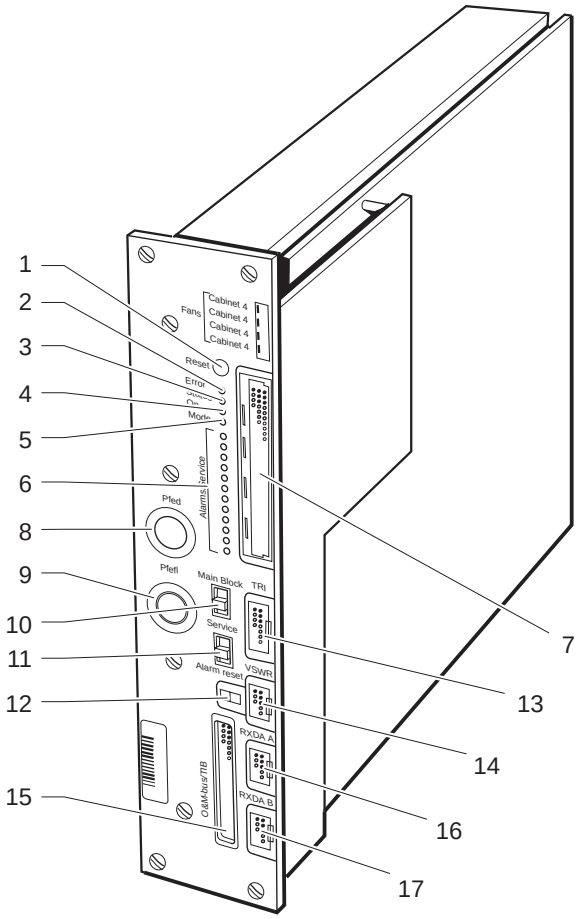
After completion of these tests all hardware in the ACU, connection cables to and from the ACU and alarm functions in the ACU and BSC shall be tested and the ACU shall be ready for use.

1.1 About the ACU

ACU is a microprocessor based unit belonging to the Transceiver System (TRS). It consists of three boards called Alarm Collection Connection Board (ACCB), Alarm Collection Control Unit (ACCU), and Alarm Collection Radio Frequency unit (ACRF). Its purpose is to supervise and report alarms that originate from the Receiver Divider Amplifiers (RXDAs), Fan Cassettes and faulty Voltage Standing Wave Ratio (VSWR). Detected alarms are displayed on the ACU front panel with the help of LEDs (item 6 in figure 1). Alarms are also reported to the BSC through the Transmission Radio Intreface (TRI). The exact location of a fault inside a BTS cabinet is, however, not reported to the BSC but displayed on the ACU LEDs.

As a first release, the ACU will operate as a stand alone unit only. This means the ACU must always remain in full operation and will restart automatically if necessary.

The software is PROMed and the configuration is performed manually on site. This means that an operator on site will have the possibility to manually take over the ACU control by means of buttons and switches (item 10 and 11 in figure 1). The ACU will automatically take back the control some time after the last performed manual operation, and thereafter continue with autonomonous actions.



1. Reset button
2. Error LED
3. Status LED
4. On LED
5. Mode LED
6. Alarm/Service LED´s
7. Fan alarm connection
8. Power reflected
9. Power forward
10. Toggleswitch(Mablock)
11. Toggle switch (Alarm reset)
12. Power condector
13. To TRI
14. VSWR
15. O&M bus
16. RXDA A Alarm conn.
17. RXDA B Alarm conn.

P001145A

Figure 1 ACU (Alarm Collection Unit)

1.2 Prerequisites

- Installation check according to chapter Installation Check
- Strapping according to chapter Strapping before Testing
- Power system test according to chapter Power System Test
- Test of TRXT (optional) according to chapter TRS System Test Using BSC at Site
- All tests are performed with the BTS (Base Transceiver Station) in use, that is, with the cell being in traffic

1.3 Test Equipment

The equipment in table 1 is needed to carry out this test. This equipment can be ordered by using the ordering information in chapter Test Team Equipment. More instructions on how to order equipment from this manual can also be found there.

Table 1 Test equipment

Item	Description	Specification	Product no.	Qty
1	Power Splitter	Mini-Circuit ZAPD-21N	LPY 107 349/1	1
2	Alarm Collection Unit Tester (ACUT)		LPK 102 38/1	1
3	Cable C	N male to N male	RPM 113 761	2
4	Adaptor G	Suhner 33 TNC-N-50-1	[1)]	2
5	Adaptor H	Suhner 33 N-TNC-50-1	[1)]	1

[1)] Included in LTR 171 01/3

1.4 ACU Tests

1.4.1 Self Test

Power up

1. Power up the ACU by connecting the power cable (item 12 in figure 1). The ACU will first go into RESET state and then, when reset is released, perform a hardware initialisation, memory test, self test and supervision sequence in DISABLED state. After that a configuration will be made before entering the ENABLED state.

2. Check that the ACU goes into the above mentioned states during power up. If no fault occurs, it enters ENABLED state after the completion of power up. Otherwise it will be reset again until no more fault occurs or until the restart counter has been incremented to Max_No_of_Restarts (50 times). If the counter is incremented to Max_No_of_Restarts the ACU will be locked from performing new restarts.

   Result:

   The ACU shall be in ENABLE state (see table 2).

Table 2 All main states of the front panel LEDs

Status	**Front Panel LEDs**			
	ON (Green)	**STATUS (Yellow)**	**ERROR (Red)**	**MODE (Yellow)**
Power Off	0	0	0	0
Power On	1	X	X	X
Power On, HW Reset	1	1	1	1
Reset State	1	0	1	X
Disabled State	1	F1	X	X [1)]
Supervision Mode (Disabled State)	1	F1	0	1
Manual Mode (Disabled State)	1	F1	0	F1
Service Mode	1	F1	0	F1
Supervision Mode (Enabled State)	1	1	0	1

[1)] The red (ERROR) LED is switched off when the ACU has successfully gone through the self supervision and test sequence.

0 = OFF

1 = ON

X = ON or OFF

F1 = flashing

3. Document the completion of Self Test after Power up in the Test Record.

Reset

1. Reset by pushing the RESET button (item 1 in figure 1) on the ACU front panel.

2. Check that the ACU goes through the same states and gives the same result as during Power up.

   Result:

   The ACU shall be in ENABLE state (see table 2).

3. Record the completion of Self Test after Reset in the Test Record.

1.4.2 Test of Connected Cables

Prerequisites

Make a reset by pushing the RESET button (item 1 in figure 1 on the ACU front panel.

Reason: This has to be done to ensure that the on-board software is updated to match the number of units present.

MCU cables

1. Go to Manual Mode by pushing the upper DIP switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

2. Go to Service Submode 1 by pushing the upper DIP switch (item 10 in figure 1) on the ACU front panel to position Service once.

Table 3 Service LED presentation in Service Submode 1

	Alarms/Service LED Number											
VSWR	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**
No input	F1	0	0	0	0	0	0	0	0	0	0	0
VSWR<1.5	F1	0	0	0	0	0	0	0	0	0	0	1
1.5<VSWR<1.6	F1	0	0	0	0	0	0	0	0	0	1	1
1.6<VSWR<1.7	F1	0	0	0	0	0	0	0	0	1	1	1
1.7<VSWR<1.8	F1	0	0	0	0	0	0	0	1	1	1	1
1.8<VSWR<2.0	F1	0	0	0	0	0	0	1	1	1	1	1
2.0<VSWR<2.2	F1	0	0	0	0	0	1	1	1	1	1	1
2.2<VSWR<2.5	F1	0	0	0	0	1	1	1	1	1	1	1
2.5<VSWR<2.8	F1	0	0	0	1	1	1	1	1	1	1	1
2.8<VSWR	F1	0	0	1	1	1	1	1	1	1	1	1

0 = OFF

1 = ON

X = ON or OFF

F1 = flashing

3. Check that the Alarm/Service LEDs indicate VSWR value <1.5 dB.

   Result:

Alarms/Service LED 01 shall be flashing, LEDs 02-11 (item 6 in figure 1) shall be OFF, and LED 12 (item 6 in figure 1) shall be ON (see table 3).

4. Return to Supervision Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

5. Document the completion of MCU Cable Test in the Test Record. Also record the VSWR value at the end of the Test Record.

RXDA-A/B and fan cables

1. Go to Manual Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

2. Go to Service Submode 5 by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Service five times.

3. Check that the Alarm/Service LEDs (item 6 in figure 1) indicate that the correct number of RXDAs and fans are connected. Depending on how many cabinets are used, different combinations of LEDs 09-12 will be ON or OFF (see table 4).

   Result:

   Alarms/Service LEDs (item 6 in figure 1) 06, 07 and 09 (10, 11, 12) shall be ON.

Table 4 Service LED presentation in Service Submode 5

	Alarms/Service LED Number											
Configuration	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**
No cabinet conn.	0	0	0	0	F1	X	X	0	0	0	0	0
Cabinet 1 conn.	0	0	0	0	F1	X	X	0	1	X	X	X
Cabinet 2 conn.	0	0	0	0	F1	X	X	0	X	1	X	X
Cabinet 3 conn.	0	0	0	0	F1	X	X	0	X	X	1	X
Cabinet 4 conn.	0	0	0	0	F1	X	X	0	X	X	X	1
No RXDA conn.	0	0	0	0	F1	0	0	0	X	X	X	X
RXDA-A conn.	0	0	0	0	F1	1	X	0	X	X	X	X
RXDA-B conn.	0	0	0	0	F1	X	1	0	X	X	X	X

0 = OFF

1 = ON

X = ON or OFF

F1 = flashing

4. Return to Supervision Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

5. Document the completion of RXDA_A/B and Fan Cables Test in the Test Record.

1.4.3 Test of Voltage Standing Wave Ratio (VSWR) Alarm Function

Test set-up

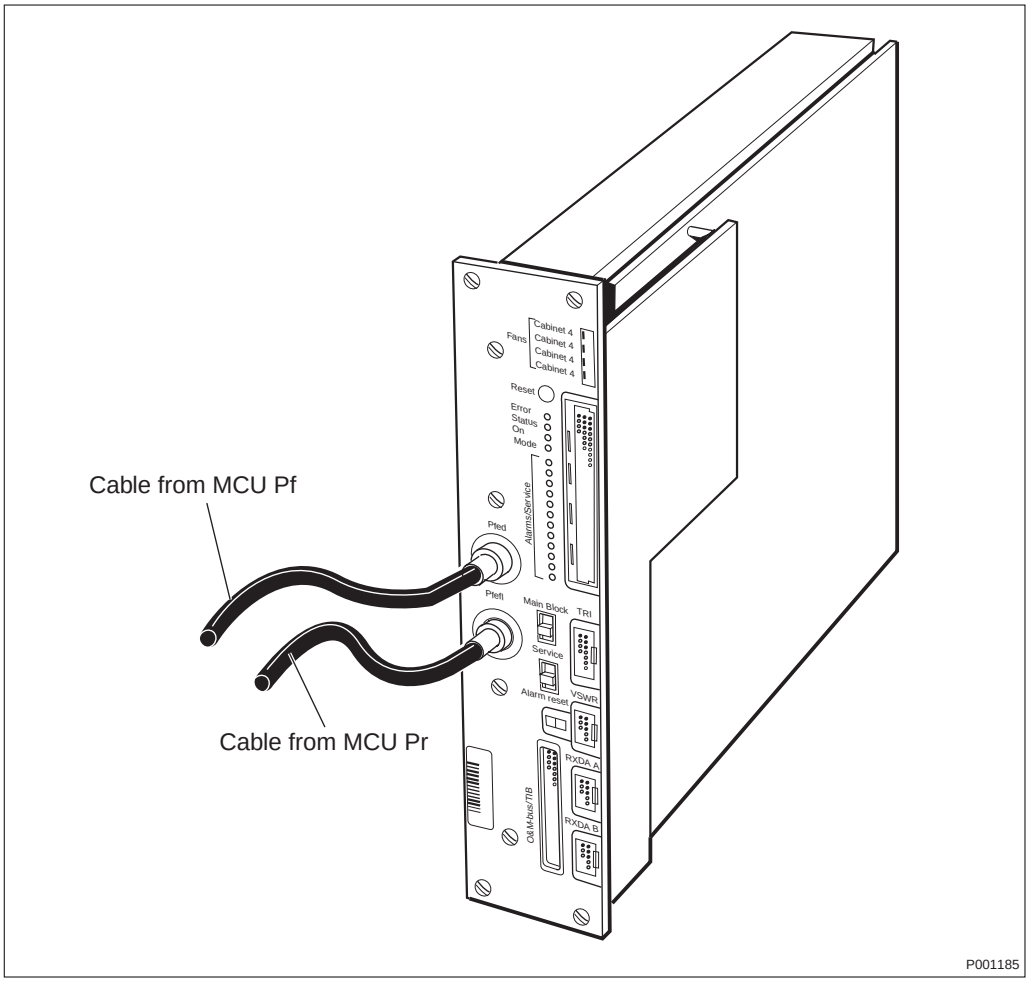


Figure 2 VSWR alarm function test set-up

VSWR alarm test

1. Switch the Pf and the Pr cables on the ACU board.

2. Go to Supervision Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block twice.

3. Check that the VSWR alarm is active.

   Result:

   Alarms/Service LED 01 (item 6 in figure 1) shall be ON (see table 5).

Table 5 Service LED presentation in Supervision Mode

	Alarms/Service LED Number											
Alarm Condition	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**
No alarm	0	0	0	0	0	0	0	0	0	0	0	0
VSWR alarm	1	0	X	X	X	X	0	X	X	X	X	X

0 = OFF

1 = ON

X = ON or OFF

F1 = flashing

4. Check that the VSWR alarm in the BSC is activated. This is done with the MML command ALLIP plus the alarm category for BTS alarms.

   Result:

   VSWR alarm in BSC active.

5. Switch back the Pf and the Pr cables on the ACU board.

6. Reset the alarm(s) by pushing the lower Dip switch (item 11 in figure 1) on the ACU front panel to position Alarm Reset once.

7. Document the completion of VSWR Alarm Test in the Test Record.

1.4.4 Test of RXDA A/B Alarms

Test set-up

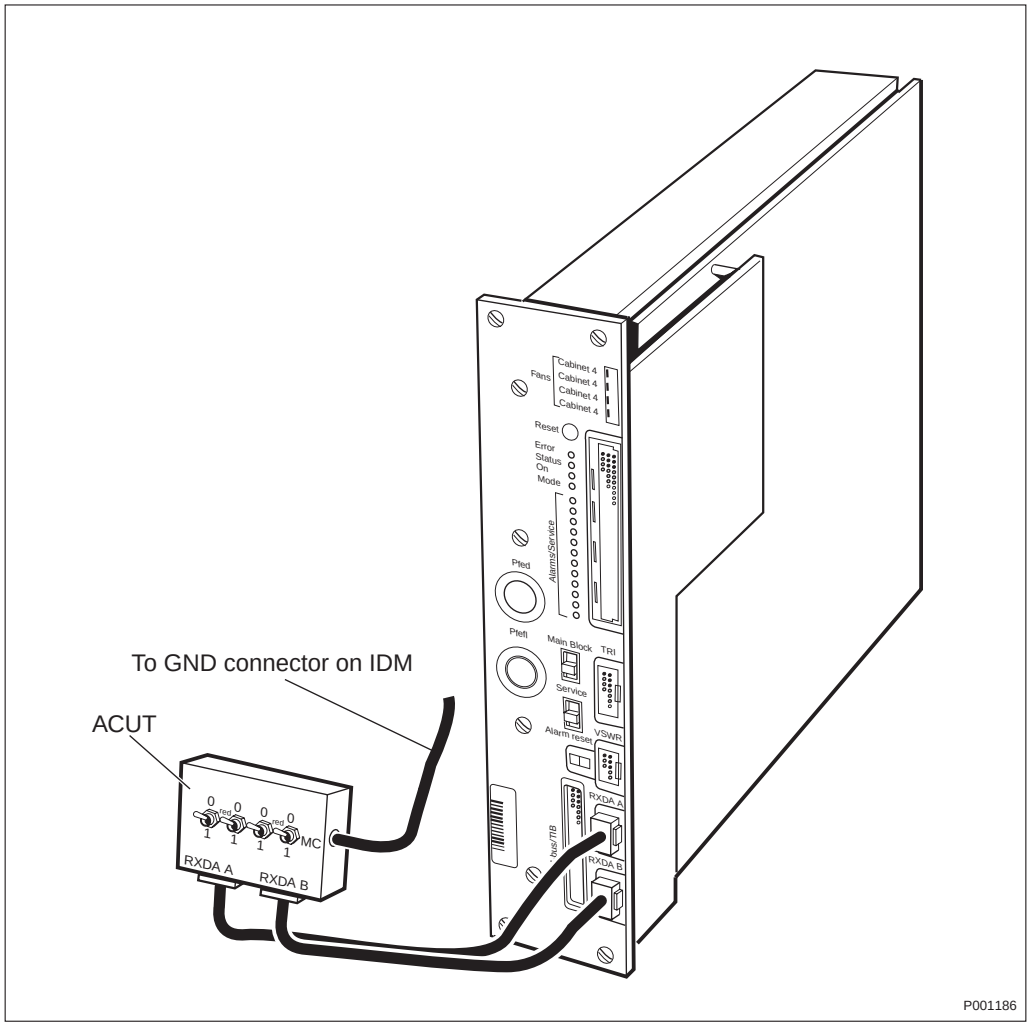


Figure 3 RXDA A/B = Alarm test set-up

RXDA A/B alarm test

1. Disconnect the Alarm ACU cables from RXDA(s) (item 16 and 17 in figure 1).

2. Set the Dip switches on the ACUT (ACU Tester) to "No Alarm" condition (see table 6).

3. Connect the test equipment according to figure 3.

4. Reset the alarm(s) by pushing the lower Dip switch on the ACU front panel to position Alarm Reset once.

5. Go to Supervision Mode by pushing upper Dip switch on ACU front panel to position Man Block twice.

6. Generate input stimuli according to table 6 using the Dip switches on the ACUT.

Table 6 Input stimuli to RXDA A/B and BSC alarms with one or two RXDAs

Alarm Condition	**RXDA_A Inputs on ACUT**		**RXDA_B Inputs on ACUT**		**ACU LEDAlarm / Service RXDA**	**BSC Alarms for One RXDA**	**BSC Alarms for Two RXDAs**
	red_MC	**MC**	**red_MC**	**MC**			
No Alarm	1	0	1	0	Off	-	-
RXDA_A MC	0	1	1	0	LED 3 ON	RXDA1	RXDA1
RXDA_B MC	1	0	0	1	LED 4 ON	RXDA1	RXDA1
RXDA_A & B_MC	0	1	0	1	LED 3, 4 ON	-	RXDA1
RXDA_A red_MC	0	0	1	0	LED 5 ON	RXDA1	RXDA2
RXDA_B red_MC	1	0	0	0	LED 6 ON	RXDA1	RXDA2
RXDA_A & B red_MC	0	0	0	0	LED 5, 6 ON	-	RXDA1
RXDA_A not connected	1	1	1	0	LED 3 ON LED 5 OFF	RXDA1	RXDA1
RXDA_B not connected	1	0	1	1	LED 4 ON LED 6 OFF	RXDA1	RXDA1

0 = OFF

1 = ON

X = ON or OFF

F1 = Flashing

MC = Failure of one amplifier

Red MC = Failure of both amplifiers

7. Check that the correct Alarms/Service LEDs light up (see table 6).

Result:

Alarms/Service LEDs 01-12 shall light up according to table 6, depending on the number of RXDAs used.

8. Check that the current RXDA alarm in the BSC is activated. This is done with MML command ALLIP plus alarm category for BTS alarms.

   Result:

   Alarms/Service LEDs 01-12 shall light up according to table 6, depending on the number of RXDAs used.

9. Generate input stimuli for alarm condition "No alarm" according to table 6 using the Dip switches on the ACUT.

10. Check that no Alarms/Service LEDs light up (indicating "No Alarm" condition).

    Result:

    All Alarms/Service LEDs 01-12 shall be OFF.

11. Reset the alarm by pushing the lower Dip switch on the ACU front panel to position Alarm Reset once.

12. Repeat the procedure for every alarm condition in table 6.

13. Record the completion of RXDA A/B Alarm Test in the Test Record.

1.4.5 Test of Fan Alarms

Preparations

To prepare the cabinet for testing the following steps should be taken.

1. Go to Supervision Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block twice.

2. Disconnect the fan cable (item 7 in figure 1) from the ACU.

3. Check that the "Cable Not Connected" alarm is activated.

   Result:

   Alarms/Service LEDs (item 6 in figure 1) 09-12 shall be ON.

4. Check that the FAN alarm in the BSC is activated. This is done with the MML command ALLIP plus alarm category for BTS alarms.

   Result:

FAN alarm in BSC active.

5. Reconnect the fan cable (item 7 in figure 1) to the ACU.

6. Reset the alarm by pushing the lower Dip switch (item 11 in figure 1) on the ACU front panel to position Alarm Reset once.

Continue the testing procedure for respective cabinet as described below.

Master cabinet

Before carrying out the test, make sure the cabinet is prepared for testing according to steps 1-6 above.

7. Produce the fan alarm by disconnecting the below mentioned fuses one at a time (see figure 1).

Table 7 Fan positions in Supervision Mode

Fuse No. in IDM	**Fan Position**	**Alarms/Service LED Number**											
		01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**
13	00	0	0	0	0	0	0	0	0	1	X	X	X
21	09	0	0	0	0	0	0	0	0	X	1	X	X
22	11	0	0	0	0	0	0	0	0	X	X	1	X
23	05	0	0	0	0	0	0	0	0	X	X	X	1

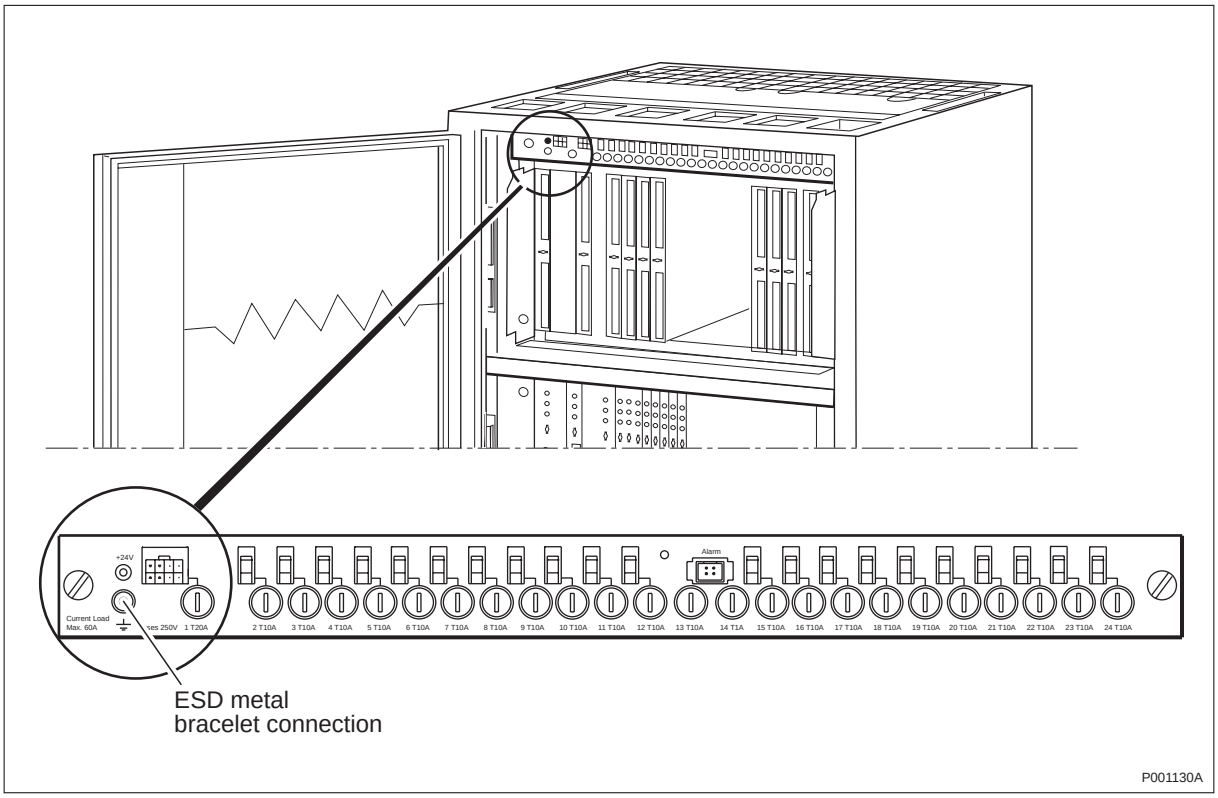


Figure 4 The Internal Distribution Unit (IDM)

8. Check that the correct fan alarm is activated (see table 7).

   Result:

   Corresponding Alarms/Service LED (item 6 in figure 1) shall be ON.

9. Check that the FAN alarm in the BSC is activated. This is done with the MML command ALLIP plus alarm category for BTS alarms.

   Result:

   FAN alarm in BSC active.

10. Reconnect the fuse.

11. Reset the alarm by pushing the lower Dip switch (item 11 in figure 1) on the ACU front panel to position Alarm Reset once.

12. Repeat steps 7-11 for all the above mentioned fan positions (see table 7).

13. Document the completion of Fan Alarm Check for Master Cabinet in the Test Record.

Extension cabinet 1

Before carrying out the test, make sure the cabinet is prepared for testing according to steps 1-6 above.

1. Produce the fan alarm by disconnecting the below mentioned fuses one at a time (see figure 4).

Table 8 Fan positions in Service Submode 6

Fuse No. in IDM	**Fan Position**	**Alarms/Service LED Number**											
		01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**
13	00	0	0	0	0	0	F1	0	0	1	X	X	X
21	09	0	0	0	0	0	F1	0	0	X	1	X	X
22	11	0	0	0	0	0	F1	0	0	X	X	1	X
23	05	0	0	0	0	0	F1	0	0	X	X	X	1

0 = OFF

1 = ON

X = ON or OFF

F1 = flashing

2. Check, in Supervision mode, that the fan alarm is activated.

   Result:

   Alarms/Service LED (item 6 in figure 1) shall be ON.

3. Go to Manual Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

4. Go to Service Submode 6 by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Service six times.

5. Check that the correct fan alarm is activated (see table 8).

   Result:

   Corresponding Alarms/Service LED (item 6 in figure 1) shall be ON.

6. Check that the FAN alarm in the BSC is activated. This is done with the MML command ALLIP plus alarm category for BTS alarms.

   Result:

   FAN alarm in BSC active.

7. Reconnect the fuse.

8. Go to Supervision Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

9. Reset the alarm by pushing the lower Dip switch (item 11 in figure 1) on the ACU front panel to position Alarm Reset once.

10. Repeat steps 7-15 for all the above mentioned fan positions (seetable 8).

11. Document the completion of Fan Alarm Check for Extension Cabinet 1 in the Test Record.

Extension cabinet 2

Before carrying out the test, make sure the cabinet is prepared for testing according to steps 1-6 above.

1. Produce the fan alarm by disconnecting the below mentioned fuses one at a time (see figure 4).

Table 9 Fan positions in Service Submode 7

Fuse No. in IDM	**Fan Position**	**Alarms/Service LED Number**											
		01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**
13	00	0	0	0	0	0	0	F1	0	1	X	X	X
21	09	0	0	0	0	0	0	F1	0	X	1	X	X
22	11	0	0	0	0	0	0	F1	0	X	X	1	X
23	05	0	0	0	0	0	0	F1	0	X	X	X	1

0 = OFF

1 = ON

X = ON or OFF

Fl = flashing

2. Check, in Supervision mode, that the fan alarm is activated.

Result:

Alarms/Service LED (item 6 in figure 1) shall be ON.

3. Go to Manual Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

4. Go to Service Submode 7 by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Service seven times.

5. Check that the correct fan alarm is activated (see table 9).

   Result:

   Corresponding Alarms/Service LED (item 6 in figure 1) shall be ON.

6. Check that the FAN alarm in the BSC is activated. This is done with the MML command ALLIP plus alarm category for BTS alarms.

   Result:

   FAN alarm in BSC active.

7. Reconnect the fuse.

8. Go to Supervision Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

9. Reset the alarm by pushing the lower Dip switch (item 11 in figure 1) on the ACU front panel to position Alarm Reset once.

10. Repeat steps 7-15 for all the above mentioned fan positions (see table 9).

11. Document the completion of Fan Alarm Check for Extension Cabinet 2 in the Test Record.

Extension cabinet 3

Before carrying out the test, make sure the cabinet is prepared for testing according to steps 1-6 above.

1. Produce the fan alarm by disconnecting the below mentioned fuses one at a time (see figure 4).

Table 10 Fan positions in Service Submode 8

Fuse No. in IDM	Fan Position	Alarms/Service LED Number											
		01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**
13	00	0	0	0	0	0	0	0	F1	1	X	X	X
21	09	0	0	0	0	0	0	0	F1	X	1	X	X
22	11	0	0	0	0	0	0	0	F1	X	X	1	X
23	05	0	0	0	0	0	0	0	F1	X	X	X	1

0 = OFF

1 = ON

X = ON or OFF

F1 = flashing

2. Check, in Supervision mode, that the fan alarm is activated.

   Result:

   Alarms/Service LED (item 6 in figure 1) shall be ON.

3. Go to Manual Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

4. Go to Service Submode 8 by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Service eight times.

5. Check that the correct fan alarm is activated (see table 10).

   Result:

   Corresponding Alarms/Service LED (item 6 in figure 1) shall be ON.

6. Check that the FAN alarm in the BSC is activated. This is done with the MML command ALLIP plus alarm category for BTS alarms.

   Result:

   FAN alarm in BSC active.

7. Reconnect the fuse.

8. Go to Supervision Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

9. Reset the alarm by pushing the lower Dip switch (item 11 in figure 1) on the ACU front panel to position Alarm Reset once.

10. Repeat steps 7-15 for all the above mentioned fan positions (see table 10)

11. Document the completion of Fan Alarm Check for Extension Cabinet 3 in the Test Record.

1.4.6 Check of Configured VSWR Alarm Threshold

1. Go to Manual Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

2. Go to Service Submode 3 by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Service three times.

3. Check that Alarm/Service LEDs (item 6 in figure 1) indicate a VSWR Threshold according to the one chosen in chapter Strapping before Testing. The recommended value is 2.0.

   Result:

   Alarms/Service LEDs (item 6 in figure 1) shall be according to one row of table 11, depending on which VSWR Threshold has been chosen.

Table 11 Service LED presentation in Service Submode 3

	Alarms/Service LED Number											
VSWR	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**
1.5	0	0	F1	0	0	X	0	0	0	0	0	0
1.6	0	0	F1	0	0	X	0	0	0	0	0	1
1.7	0	0	F1	0	0	X	0	0	0	0	1	0
1.8	0	0	F1	0	0	X	0	0	0	0	1	1
2.0	0	0	F1	0	0	X	0	0	0	1	0	0
2.2	0	0	F1	0	0	X	0	0	0	1	0	1
2.5	0	0	F1	0	0	X	0	0	0	1	1	0
2.8	0	0	F1	0	0	X	0	0	0	1	1	1

0 = OFF

1 = ON

X = ON or OFF

F1 = flashing

4. Go back to Supervision Mode by pushing the upper Dip switch (item 10 in figure 1) on the ACU front panel to position Man Block once.

5. Record the completion of VSWR Alarm Threshold Check in the Test Record.

External Alarms Test and Status Indicators

Contents **Page**

1 External Alarms Test and Status Indicators

1.1 External Alarms

This test instruction describes how to test the installation of the external alarms and the transmission to the BSC.

Included in the test are the cables and connectors to the EXALI board in the TRI.

The EXALI board and its connection to the BSC is also tested.

1.1.1 Prerequisites

- Installation check done according to chapter Installation Check
- Strapping performed according to chapter *Strapping Instructions, G-Module*
- Power system test performed according to chapter Power System Test
- Transmission test done according to chapter Transmission System Test
- TRI set-up performed according to chapter TRS System Test Using BSC
- BSC present and running

1.1.2 Test Equipment

To carry out this test, the equipment in table 1 is needed. This equipment can be ordered by using the ordering information in the chapter Test Team Equipment. More instructions on how to order equipment from this manual can also be found there.

Table 1 Recommended equipment

Item	Description	Specification [1)]	Product No.	Qty
1	Personal Computer			1
2	FIOL		KDY 196 56/1	1
3	Test unit for external alarms		LPK 102 025/1	1
4	Cable F	2pole female to 2pole female	RPM 513 351/1	1

[1)] See chapter Test Team Equipment.

1.1.3 Test Set-Up

Inform the BSC before performing this test. Also check that the external alarms are defined in the BSC.

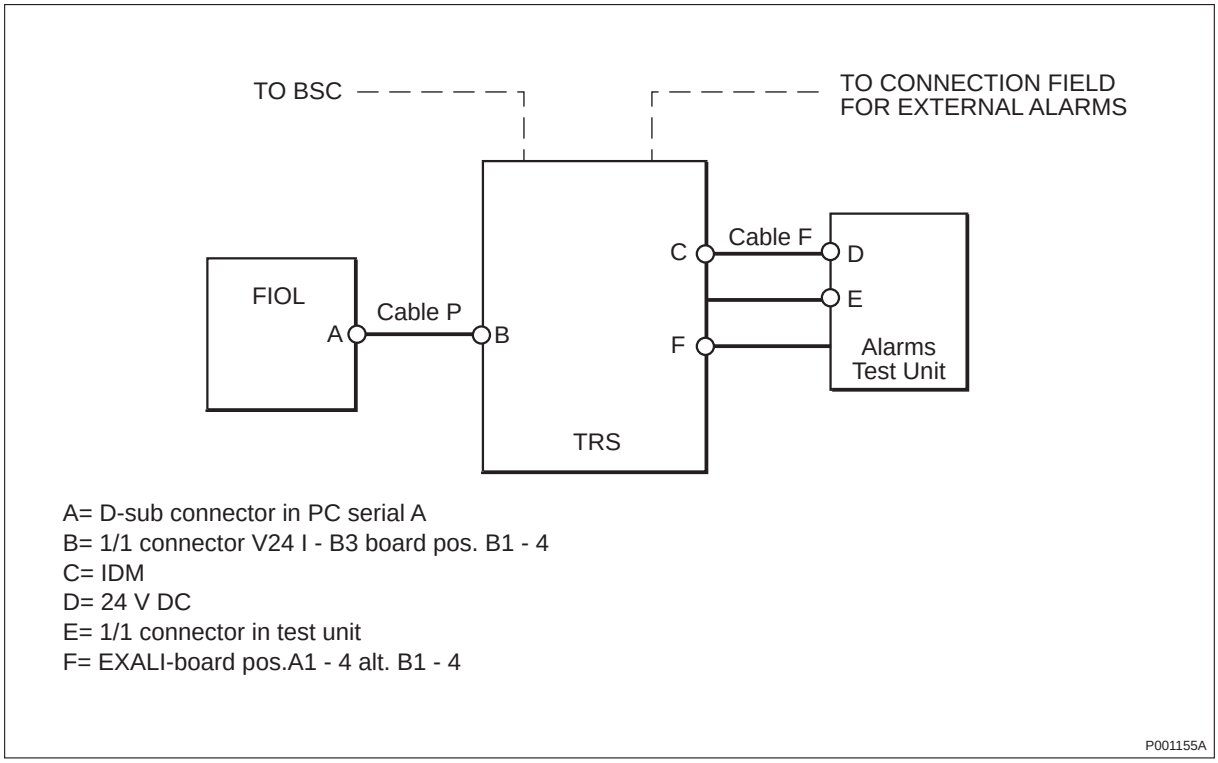


Figure 1 External alarms test set-up

Installation test: alarms 0-15

1. Make necessary connections according to figure 1.

   (Connection F=pos. A1-4)

2. Connect the EXALI upper connector to the Alarm Test Unit.

3. Make a short circuit as close to the alarm sensor as possible and check in the Alarm Test Unit that the correct LED is activated.

4. Repeat the test for defined alarms 0-15 at the site.

   Result:

   All defined alarm LEDs shall light up and go off accordingly.

Transmission test: alarms 0-15

Check in the IO device that all defined alarms can be activated and reset, using the switches on the Alarm Test Unit.

Result:

All defined alarms shall be activated and reset accordingly.

Installation test: alarms 16-31

1. Make necessary connections according to figure 1.

   (Connection F=pos. B1-4)

2. Connect the EXALI lower connector to the Alarm Test Unit.

3. Make a short circuit as close to the alarm sensor as possible and check in the Alarm Test Unit that the correct LED is activated.

4. Repeat the test for defined alarms 16-31 at the site.

   Result:

   All defined alarm LEDs shall light up and go off accordingly.

Transmission test: alarms 16-31

Check in the IO device that all defined alarms can be activated and reset, using the switches on the Alarm Test Unit.

Result:

All defined alarms shall be activated and reset accordingly.

End of test

1. Reconnect all cables.

2. Check in the IO device that no alarm defined in the BSC is active.

   Result:

   No activated alarm

1.2 Status Indicators

This document describes the function of LED indicators within the Transceiver Subsystem (TRS), and gives a short description of the concepts Managed Object (MO) and Logical Unit (LU).

1.2.1 Managed Objects (MO)

All functional entities in the TRS, being subject to Operation and Maintenance (O&M) procedures, are referred to as Managed Objects.

An MO has no one-to-one physical correspondence to hardware or software units, but is a way to generalize O&M handling from a functional point of view.

MOs are divided into three classes, each with a characteristic location and functionality:

- Transceiver Group (TG)
- Transceiver Controller (TRXC)
- Logical Units (LU)

Transceiver Group (TG)

A TG is defined as a set of RBS equipment that can be connected with respect to the TG internal buses.

Within such a TG, certain resources are shared between all transceivers and controlled by a Transceiver Group Control (TGC), implemented as software in one TRXC.

Shared resources within a TG are:

- Radio transmitters
- Timing unit
- O&M bus

Transceiver Controller (TRXC)

The TRXC entity is the owner and controller of colocated Logical Units RX (radio receiver) and TS (time slot).

The TRXC also forms the physical platform for the TGC mentioned above.

Logical Units (LU)

LUs are subunits to and controlled by either TGC or TRXC.

An LU comprises a processor system and one or more function related blocks in the Transceiver Control System (TCS). An LU is thus realized across a subsystem border, but is addressed as a single entity by O&M procedures.

Physical identities of LUs, as well as dependence on TGC and TRXC, are shown in table 2.

Table 2 Logical Units (LU)

Logical Unit	Full Name	Controlled by	Max. No. of Instances	Physical Identity
TF	Timing function	TGC	1	TU
TX	Radio transmitter	TGC	4	RTX
RX	Radio receiver	TRXC	4	RRX
TS	Time slot	TRXC	32/4	SPP/SPU

1.2.2 Status of Managed Objects

Managed Objects TRXC and LU can have the following statuses:

- TRXC: "Reset", "Started", "TGC active"
- LU: "Reset", "Disabled", "Enabled"

The MO status is closely related to the software load and activation/ deactivation procedure initiated from the BSC, or is a result of a fault condition.

Status “Reset”

On power-up all MOs will enter status "Reset" after the prom based boot-tests are completed.

During these tests the yellow LED will be lit for a few seconds.

An MO may also enter status "Reset" if the CPU owned by MO is lost.

Status "Reset" is signalled on different units according to table 3.

Table 3 Status “Reset”

	Green LED +5 V	Yellow LED status "Reset"	Red LED No error	Error
TRXC	ON	OFF	OFF	ON
RRX	ON	OFF	OFF	ON
SPP	ON	OFF	OFF	ON
SPU	ON	OFF	OFF	ON
RTX	ON	OFF	OFF	ON
TU	ON	OFF	OFF	ON

Status “Started” and “TGC Active”

TRXC is loaded from the BSC, with application software and files for logical units TF, TX, TS, and RX.

After TRXC load, TRXC start is performed, and the TGC is activated.

Status "Started" and "TGC active" are signalled on TRXC according to table 4.

Table 4 Status “Started” and “TGC active”

	Green LED +5 V	**Yellow LED "Started"**	**"TGC active"**	**Red LED No error**	**Error**
TRXC	ON	ON	FLASHING	OFF	ON

Status “Disabled” and “Enabled”

When the LU has been loaded with software from TRXC file buffer, it will enter status "Disabled". This status indicates that the loaded software is running, but that LU has not been configured and is not fully operative.

On activation of Transceiver Group from the BSC, configuration will take place, and the BCCH for the cell is activated. At this point, LUs will enter status "Enabled".

Status "Disabled" and "Enabled" are signalled according to table 5.

Table 5 Status “Disabled” and “Enabled”

	Green LED	**Yellow LED**		**Red LED**	**Error**
	+5 V	**"Disabled"**	**"Enabled"**	**No error**	
RRX	ON	FLASHING	ON	OFF	ON
SPP	ON	FLASHING	ON	OFF	ON
SPU	ON	FLASHING	ON	OFF	ON
RTX	ON	FLASHING	ON	OFF	ON
TU	ON	FLASHING	ON	OFF	ON

1.2.3 Power Control Unit, PCU

PCU is equipped with a display, three LEDs, a push button, two switches and reset contact.

The push button blocks the alarm function from the DC system to the EXALI board.

The two switches are used for voltage display and settings or to display the present current consumption.

The LEDs indicate the following status:

LED	**Status**
On (Green)	PCU in operation
Status (Yellow)	Attention
Error (Red)	Serious Fault, degraded function in the DC supply system

1.2.4 Power Supply Unit, PSU

The PSU is equipped with four LEDs and an ON/OFF switch on the front.

The ON/OFF switch will turn on or off the function of the PSU.

The LEDs indicate the following status:

LED		**Status**
On (Green)		PSU in operation
Error (Red)		Serious fault, PSU is not in operation
Communication (Green)	ON	Indicates fibre optic communication is OK
	Flash	Indicates fault in the fibre optic communications

-48 V DC/DC converter

The -48 V DC/DC converter is fitted with three LEDs to indicate its operational status: one green and two red LEDs.

The green LED is on when the converter is working properly. The red LEDs light if there is a fault in the input and/or output supply lines.

The LEDs indicate the following status:

LED		**Status**
On (Green)	ON	-48 V within normal range (-45.4 - -52 V)
Fault (Red)	ON	The input voltage is not in the correct range (17 - 32 V).
Error (Red)	ON	The input or output voltage is not in range(input 17 - 32 V or output -45.4 - -52 V)

1.2.5 Battery Interconnection Module, BIM

The BIM is equipped with two red LEDs: one green LED and two 100 A circuit breakers.

The two circuit breakers are used to disconnect the battery backup. There is one fuse (circuit braker) for the positive cable and one for the negative cable in the BIM.

The LEDs indicate the following status:

LED		**Status**
Error (Red)	ON	Serious fault
Communication (Green)	ON	Indicates fibre optic communication is OK
	Flash	Indicates fault in the fibre optic communications

1.2.6 Internal Distribution Module, IDM

One green LED is placed at the top left side of the IDM.

The LEDs indicate the following status:

LED		**Status**
+24 V (Green)	ON	+24 V present in the IDM

TRS Extension Test

Contents **Page**

1 TRS Extension Test

This test instruction describes how to test all new hardware in the RBS when extending the cabinet with new TRXs and/or a TRXT (TRX Tester).

The tests are performed with the RBS connected to the BSC. All MML commands necessary for control of the BTS can be sent through the V24 interface card in the TRI, using a PC installed with FIOL software. Due to the slow IO device link and the amount of printouts generated for certain commands, it is recommended that MML commands within this instruction should be performed by the BSC personnel.

When extending the TRS it is important to perform the below described tests without delay, since the cell will be taken out of service during these tests, thus affecting the traffic.

After this test is completed, all new hardware installed in the TRS is tested and the cell is in traffic with all the correct parameters set from the BSC.

When the tests are performed according to the paragraph above, use the Test Record for TRS Extension Test in chapter *Appendix*.

1.1 Prerequisite

The cell to be extended shall have been commissioned according to chapter TRS System Test Using BSC, and shall be in traffic.

1.2 Test Equipment

The equipment in table 1 is needed to carry out this test. This equipment can be ordered by using the ordering information in chapter Test Team Equipment. More instructions on how to order equipment from this manual can also be found there.

Table 1 Test equipment

Item	Description	Specification	Product no.	Qty
1	Test Mobile Station	ERicsson SH 888	LPB 112 12/1	1
2	Personal computer	2)		1
3	Power Splitter	MiniCircuit ZAPD-21N	LPY 107 349/1	1
4	Attenuator	Lucas Weinschel 1-30	LPY 107 350/1	3
5	Attenuator	Lucas Weinschel 47-30-43	LPY 107 351/1	1

6	Adaptor B	Suhner 33 716-N-50-1	[1]	1
7	Adaptor I	Suhner 33 N- BNC-50-1	[1]	1
8	Adaptor J	BNC	[1]	1
9	Cable C	N (male) to N (male)	RPM 113 761	2
10	Cable Q	Nipple Connector - Nipple Connector	RPM 101 764/01	1
11	Cable R	Mobile Station cable, 800 series	NTZ 112 294/5	1
12	LMT	Including software and cables	KDY 196 58/2	1
13	FIOL	Including software and cables	KDY 196 56/1	1

[1] Included in LTR 171 01/3.

[2] See chapter Test Team Equipment.

1.3 TRS Extension Test

1.3.1 RXLEV Reference Values

$RXLEV_{ref}$ uplink/downlink are reference values for power levels measured by the BTS and the MS.

Reference values are obtained by running the TRS in stand alone mode on a BTS that is known to be correct, and by measuring the RXLEV uplink and downlink values. If no such BTS is available, run the test on at least four different BTSs.

$RXLEV_{ref}$ is valid for a specific MS, the same type of cables, power splitter, attenuators, combiners and specific output power level of the TX. This means that if one or more of the mentioned parameters are changed, new $RXLEV_{ref}$ values have to be obtained in the way described above.

The reference values shall be within the following limits:

For the BSC	$RXLEV_{ref}$ downlink = -50 ±10 dBm
For the MS	$RXLEV_{ref}$uplink = -60 ±10 dBm

1.3.2 FIOL Hints

In the following tests the using of log on and log off FIOL is not included. After sending some MML commands you will get the result ORDERED, then do the following procedure:

1. Push F1 (log off FIOL).
2. Wait for a result printout that ends with "EXECUTED" if everything went well.

3. Push F5 (log on FIOL).

Now you can send the next MML command.

1.3.3 Test Set-Up

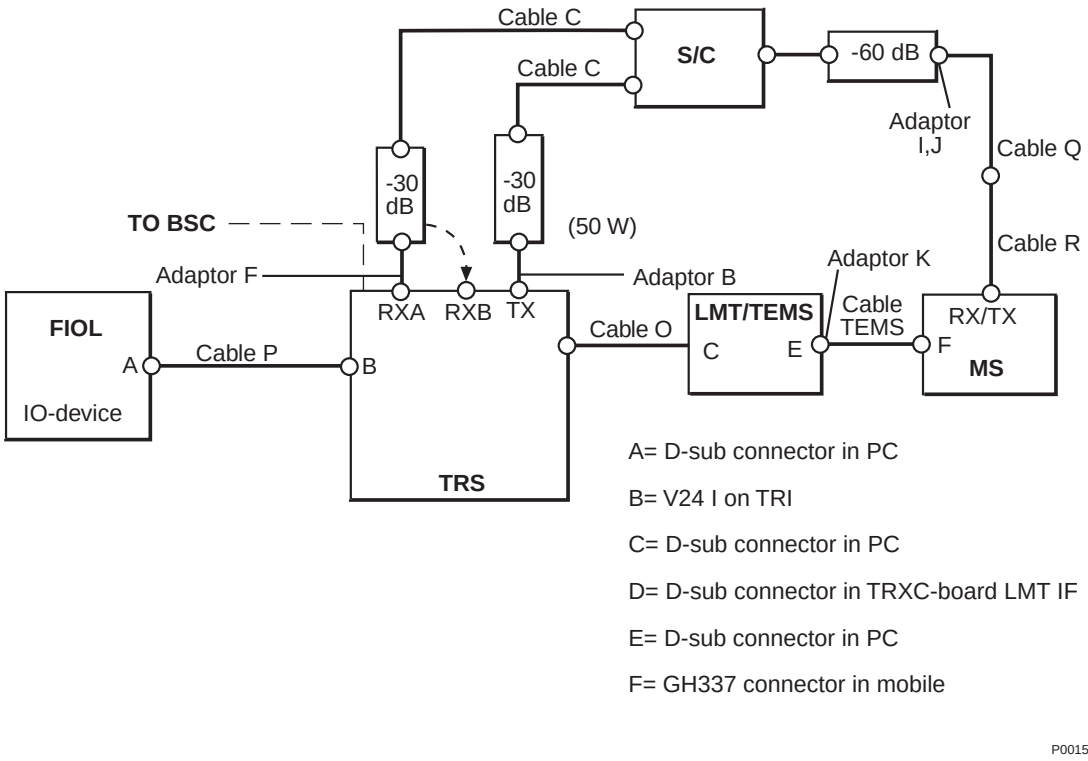


Figure 1 TRS Extension test set-up

1.3.4 Test Preparations

Observe that the cell must be halted before disconnecting the antenna.

Before the test:

1. Obtain the appropriate data transcript file(s) for the site.
2. Inform the BSC personnel when the cell(s) in question will be tested.

When testing:

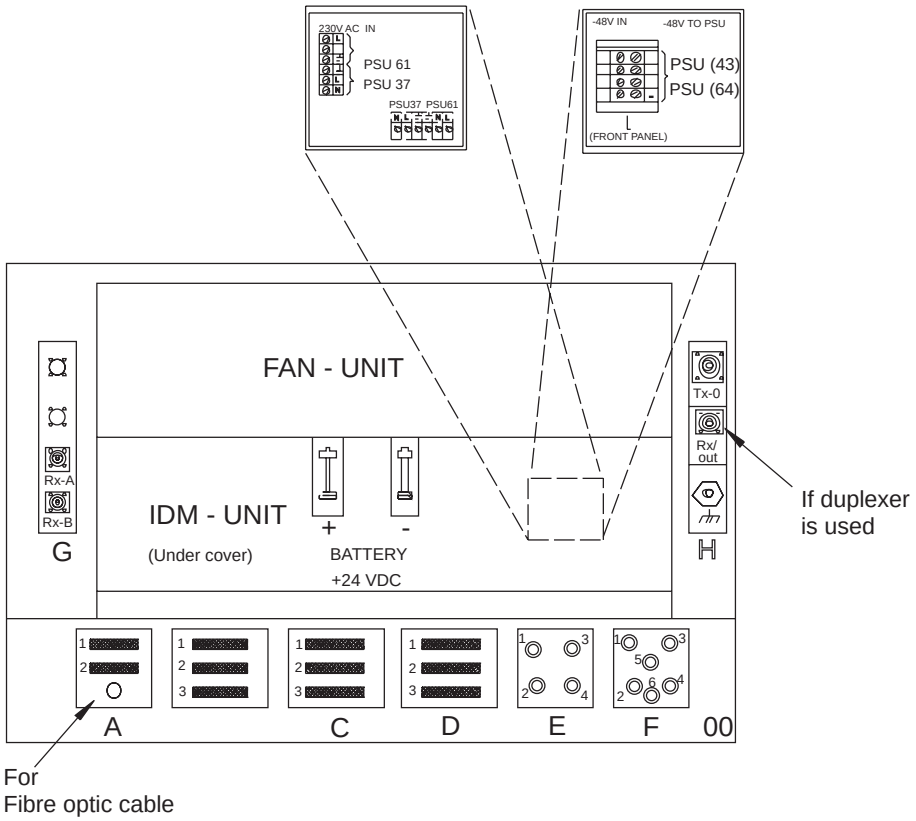
1. Connect the IO device (FIOL) to the TRI.
2. Halt the cell:

   RLSTC:CELL=cell, STATE=HALTED;

3. Disconnect the antenna system from the TRS and connect the coaxial network as in figure 1.

4. If the TG consists of a master cabinet and one extension cabinet, connect the MS to the TRS RXA input and to the TX output on the master cabinet. See figure 1 and figure 2.

5. Connect the LMT to the TRXC in the first new TRX.



A1 = TM SYNC IN
A2 = TM SYNC OUT
B1 = EXTERNAL ALARM
B2 = EXTERNAL ALARM
B3 = LIB TRXD 1-4
C1 = LIB BUS CAB. A1
C2 = LIB BUS CAB. B1 (A2)
C3 = LIB BUS CAB. C1 (A3)
D1 = LIB BUS CAB. A2 (A4)
D2 = LIB BUS CAB. B2
D3 = LIB BUS CAB. C2

*)E1 = PCM INPUT 1 120 ohm
E2 = PCM OUTPUT 1 120 ohm
E3 = PCM INPUT 2 120 ohm
E4 = PCM OUTPUT 2 120 ohm
**)F1 = PCM INPUT 1 75 ohm
F2 = PCM OUTPUT 1 75 ohm
F3 = PCM INPUT 2 75 ohm
F4 = PCM OUTPUT 2 75 ohm
F5 = PCM INPUT 3 75 ohm
F6 = PCM OUTPUT 3 75 ohm

*) If more than 2 ETB cards,
2 contact boxes E (SVK 107
**) If more than 3 ETB cards,
2 contact boxes F (SVK 107 2435/1) are needed.

P001226

Figure 2 Connection field on top of the cabinet

1.3.5 Installation of New Equipment

1. Make installation according to *Installation Manual (G-Module)*, chapter *Radio Cabinet(s)*.

2. Perform strapping according to chapter *Strapping Instructions, G-Module.*

1.3.6 Load and Activation of Cell

1. Call up the Data Transcript file with the IO device.

2. Deblock and activate the cell with the file, sending the commands line by line.

3. Check that all units in the TRS are working, use the commands RLCRP and RXMSP and the error log for the BTS:

   RXELP:CELL=cell;.

Note The command RLCRP shows the configuration of all TSs and BCCHs, CBCHs and SDCCHs that are correct within the TG. If the number of TCHs is less than the number allocated in the TRXs, or equals 0 in the cell, there is a fault within the TG. If instead of cell= "cell-name" you put cell=all, it will show the cell resources for all cells.

More details can be found in the BSC B module command descriptions.

Result:

All TRXCs shall be started.

All LUs shall be enabled.

LEDs shall indicate status according to the chapter "Status Indicators".

4. Note which TSs are configured as BCCH and SDCCH in the Test Record at the end of this instruction, in the appropriate time slot fields.

   RXCDP:MO=RXETS-x-y-z&&-zz;

1.3.7 Park Combiners Not Used

Park the combiners not used. If you are not sure if a combiner is going to be used, park it.

1. Halt the cell:

RLSTC:CELL="cellname",STATE=HALTED;

Control that the TXs are disabled, the yellow LEDs are blinking.

2. Move the two cables (Controlling and RF cables coming from TX) from a combiner that is going to be used to the corresponding positions on a combiner that is not going to be used.

3. Activate the cell:

   RLSTC:CELL="cellname",STATE=ACTIVE;

4. Halt the cell:

   RLSTC:CELL="cellname",STATE=HALTED;

   The unused cavity is now parked.

5. If there are more combiners that are not going to be used, they shall be parked. Use the same cables as above. Move the cables from the parked combiner to the corresponding positions on the not parked combiner. Do the procedure as described above, that is, activate and then halt the cell. Continue like this until all combiners that are not going to be used are parked.

6. Reconnect the cables to the combiner which the cables were first removed from.

   All combiners that are not going to be used are now parked.

7. Activate the cell.

1.3.8 Test Call from MS on Diversity A

Configure Diversity A

1. Halt the cell and wait for result printout:

   RLSTC:CELL="cellname",STATE=HALTED;

2. If necessary, disable frequency hopping in the cell:

   RLCHC:CELL="cellname",HOP=OFF;

3. Check the frequencies defined in the cell

   RLDEP:CELL="cellname";

   RLCFP:CELL="cellname";

If necessary, change to allocated frequencies. DCHNO frequencies depend on how many TRXs are used in the cabinet. Minimum channel spacing is three channels.

RLDEC:CELL="cellname",BCCHNO="bcchno";

RLCFE:CELL="cellname",DCHNO="dchno";

RLCFI:CELL="cellname",DCHNO="dchno";

4. Block the RXs in the TG (Force Block):

   RXBLI:MO=RXERX-x-y&&-z,FORCE;

5. Take the RXs out of service:

   RXESE:MO=RXERX-x-y&&-z;

6. Configure the diversity parameter to RXD=A:

   RXMOC:MO=RXERX-x-y&&-z,RXD=A;

   The diversity configuration can be checked with the RXMOP command.

7. Take the RXs into service:

   RXESI:MO=RXERX-x-y&&-z;

8. Deblock the RXs:

   RXBLE:MO=RXERX-x-y&&-z;

9. Activate the cell:

   RLSTC:CELL="cellname",STATE=ACTIVE;

10. Check all MOs enabled+configured within the TG by the RLCRP command as before.

    Result:

    All TRXCs shall be started.

    All LUs shall be enabled.

    LEDs shall indicate status according to the chapter Status Indicators.

Perform the test calls on Diversity A

Make all tests on the old TRXs first.

1. Block all TSs carrying TCHs in a TRX and repeat the command for the rest of the TRXs in the cell.

RXBLI:MO=RXETS-x-y-z&&-zz;

Test of TCH time slot

1. Deblock TS to be tested:

   RXBLE:MO=RXETS-x-y-z;

2. Switch on the mobile.

3. Dial a designated phone number from the mobile.

4. Check the state of all the TCHs:

   RLCRP:CELL="cellname";

   Check that the TCH is in state BUSY.

5. Check the RXLEV and the RXQUAL values for uplink in the LMT. Check also that the correct time slot is active.

6. Check the RXLEV and the RXQUAL values for downlink in TEMS. Check also that the correct time slot is used.

   Result:

   When speaking in the mobile, speech quality shall be good in both directions. RXLEV and RXQUAL values shall be according to the test record.

7. Document the result in the Test Record.

8. Terminate the call and block the tested TS:

   RXBLI:MO=RXETS-x-y-z;

Test of TCH time slots in old TRXs

For an old TRX only one test call per diversity is needed to be done.

9. Repeat Test of TCH time slot as described above for each old TRX in the cell. This implies that the LMT is moved to the actual TRX.

10. Document the result in the Test Record.

Test of TCH time slots in new TRXs

For a new TRX all TSs have to be tested.

11. Repeat Test of TCH time slot as described above for all TCH time slots in a new TRX and for each new TRX. This implies that the LMT is moved to the actual new TRX.

12. Document the result for each TS in the Test Record.

1.3.9 Test call from MS on Diversity B

Configure Diversity B

1. Halt the cell:

   RLSTC:CELL="cellname",STATE=HALTED;

2. If necessary, disable frequency hopping in the cell:

   RLCHC:CELL="cellname",HOP=OFF;

3. Block the RXs in the TG (Force Block):

   RXBLI:MO=RXERX-x-y&&-z,FORCE;

4. Make connections according to figure 1 and figure 2 (RXB).

5. Take the RXs out of service

   RXESE:MO=RXERX-x-y&&-z;

6. Configure the diversity parameter to RXD=B:

   RXMOC:MO=RXERX-x-y&&-z,RXD=B;

   The diversity configuration can be checked with the RXMOP command.

7. Take the RXs into service:

   RXESI:MO=RXERX-x-y&&-z;

8. Deblock the RXs:

   RXBLE:MO=RXERX-x-y&&-z;

9. Deblock all TSs in the cell:

   RXBLE:RXETS-x-y-z&&-z;

10. Check that all TSs are deblocked:

    RXCDP:MO=RXETS-x-y-z&&-zz;

    If any in state blocked, deblock them.

11. Activate the cell:

    RLSTC:CELL="cellname",STATE=ACTIVE;

12. Check all MOs enabled+configured within the TG by the RLCRP command as before.

    Result:

    All TRXCs shall be started.

    All LUs shall be enabled.

    LEDs shall indicate status according to the chapter *Status Indicators*.

Perform the test calls on Diversity B

1. Perform the test calls as described above at "Perform the Test calls on Diversity A", but set RXD=B.

2. Document the results in the Test Record.

1.3.10 Restoration of the Cell

1. Halt the cell:

   RLSTC:CELL="cellname", STATE=HALTED;

2. Connect the antenna system using torque wrenches; torque settings as defined in the chapter *Strapping Instructions*.

3. Deblock all blocked TSs:

   RXBLE:MO=RXETS-x-y-z&&-zz;

4. If necessary, enable frequency hopping in the cell:

   RLCHC:CELL="cellname",HOP=ON;

5. Configure RXD=AB, if diversity is supported:

   RXMOC:MO=RXERX-x-y&&-y,RXD=AB;

6. Configure RXD=A, if diversity is not supported:

   RXMOC:MO=RXERX-x-y&&-z,RXD=A;

7. Bring all RXs in the TG into service and deblock them:

   RXESI:MO=RXERX-x-y&&-z;

   RXBLE:MO=RXERX-x-y&&-z;

8. Activate the cell:

   RLSTC:CELL="cellname",STATE=ACTIVE;

Configuration is started.

9. Check the status of the cell. Logical channels should be configured:

   RLCRP:CELL="cellname";

10. Check the error-log with command RXELP.

    Check (on the screen) that no errors have occurred during restoration of cell.

    Result:

    All TRXCs shall be started.

    All LUs shall be enabled.

    LEDs shall indicate status according to chapter Status Indicators.

Note The cell is now ready for traffic.

1.3.11 Test of TRXT

1. Define your TRXT with MML command:

   RATTI:CELL=cell, IMSI=791770123456789,

   ATTDL=110, ATTUL=93;

   ATTDL is ATTenuation DownLink, ATTUL is ATTenuation UpLink.

2. Check the default settings of the TRXT supervision with MML command:

   RATTP:CELL="cellname";

   The printout is "TRANSCEIVER TEST AND SUPERVISION DATA".

   The default values are 10 dBm for uplink and downlink, and a bit error rate of 4. Any of these values can be changed by means of the MML command RATTC, but that is not recommended until you have used the TRXT functionality for a period of time and have more statistics.

3. Check what the estimated values for power will be by means of MML command:

   RLCPP:CELL="cellname";

The interesting values are BSPWRT (for TCH's) and BSPWRB (for BCCH).

The estimated power level shall be these BSPWR values minus the ATT values that were given in the RATTI command.

If you are using frequency hopping and have the BCCH frequency in the hopping list, the estimate for DownLink is calculated by ESSDL = ((BSPWRB + (NoOfFreq - 1)*BSPWRT) / NoOfFreq) - ATTDL. The same applies for UpLink.

4. Test the RBS by means of the TRXT with MML command:

   RATMI:CELL="cellname";

   You will get "ORDERED", so you have to release the link (press F1).

   The result will be "TRANSCEIVER MANUAL TEST RESULT". If no faults are detected in a timeslot, the result is "APPROVED" for that specific timeslot.

5. If the TRXT passed the tests with no faults (all timeslots are "APPROVED"), the TRXT is working OK (presumed that no faults were present in the cabinet on forehand, and that these possible faults have not yet been corrected).

6. Document if the test of TRXT went OK in the Test Record.

Uppgjord — *Prepared*	Faktaansvarig — *Subject responsible*	Nr — *No.*		
ERA/LZ/TI		11/1532-COH 109 2016/1 Uen		
Dokansv/Godk — *Doc respons/Approved*	Kontr — *Checked*	Datum — *Date*	Rev	File
ERA/LZ/THC (ERANETT)		1998-02-09	A	

Second TRI Test

Contents **Page**

1 Second TRI Test

1.1 General

This test instruction describes how to test the part of the TRS system in second TRI which are controlled through a PCM-line connected between the first and the second TRI. The test is performed from the BSC and is only valid if no LAPD concentration is used.

All cabling to and from the TRI is done through the connection field located on top of each cabinet. The connection field has six connector positions for outgoing LIB-buses, each originating in an RTT and supporting four TRXs or one cabinet. One TRI can thus handle up to 24 TRXs. For site configurations exceeding 24 TRXs a second TRI must be installed. TRI-1 and TRI-2 will together have a capacity for up to 48 TRXs 12 cabinets.

Requirements on TRI hardware, software and exchange data as well as transmission capacity towards the BSC will be dependent on whether LAPD concentration is used or not. In cases where LAPD concentration is used, the second TRI is implemented without any connection towards TRI-1 and testing is performed independently for each TRI.

1.2 Block Diagram

This block diagram shows how up to 48 TRXs can be connected to two TRIs. The two TRIs are connected as two separate EMGs to the BSC.

Due to the PCM-6 connection, it is possible to save a PCM line between the BSC and the site, when no LAPD concentration is used.

The two first device positions in the two TRIs are used as synchronisation inlets. ETB4 in TRI-1 and ETB3 in TRI-2 must not be connected in these positions. See figure 1. PCM-3 and PCM-6 are not required if LAPD concentration is used.

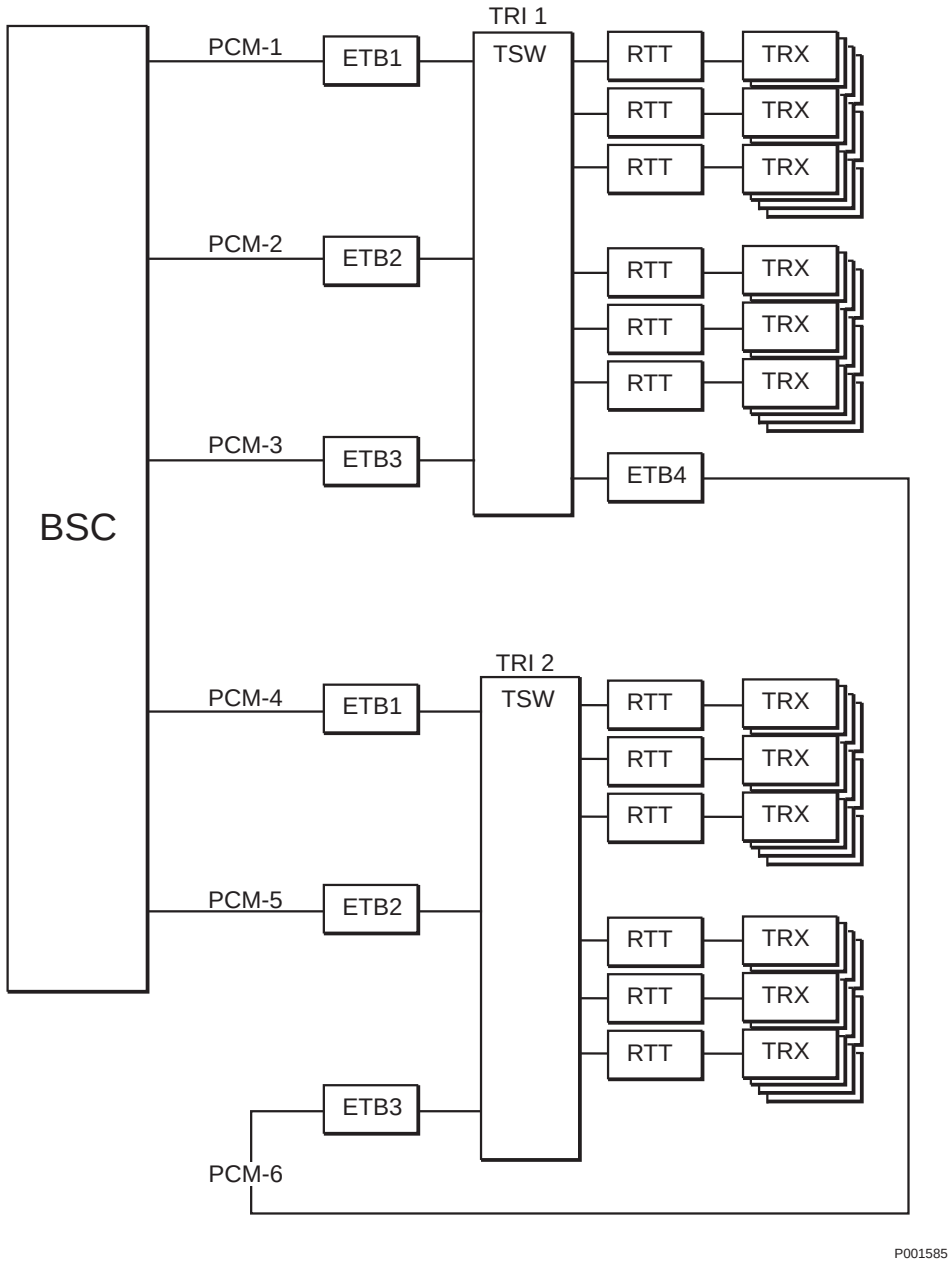


Figure 1 Block diagram for connection of two TRIs

1.3 Test without LAPD Concentration

1.3.1 Purpose

The purpose of the test is to confirm that it is possible to load, start, configure and enable selected TRX in TRI-2 through the connection, PCM-6, between the two TRIs.

The test is performed from a BSC by educated BSC personnel.

To test the remaining ETB and RTT cards in the two TRIs see H-Module in the BSC library. To perform a test call on the wanted TRX see TRS System Test Using BSCSim in this manual.

1.3.2 Preparations

All prerequisites and test preparations are to be found in the H-Module in the BSC library.

1.3.3 Set-Up

The test is an example how to test the connection between the two TRIs.

Note The reader must translate the test to their own BSC set-up.

The following diagram describes how to set up a path from BSC to TRI-2 by means of TRI-1. RBLT devices 4, 5 and 6 are to be connected to TRX-1-1 in TG-1 of the TRI-2.

The path is:

ETRBLT-0 → RILT-O → RILT-2 through the TSW in TRI-1 → RILT-18 → RILT-25 through the TSW in TRI-2 → TRX-1-1.

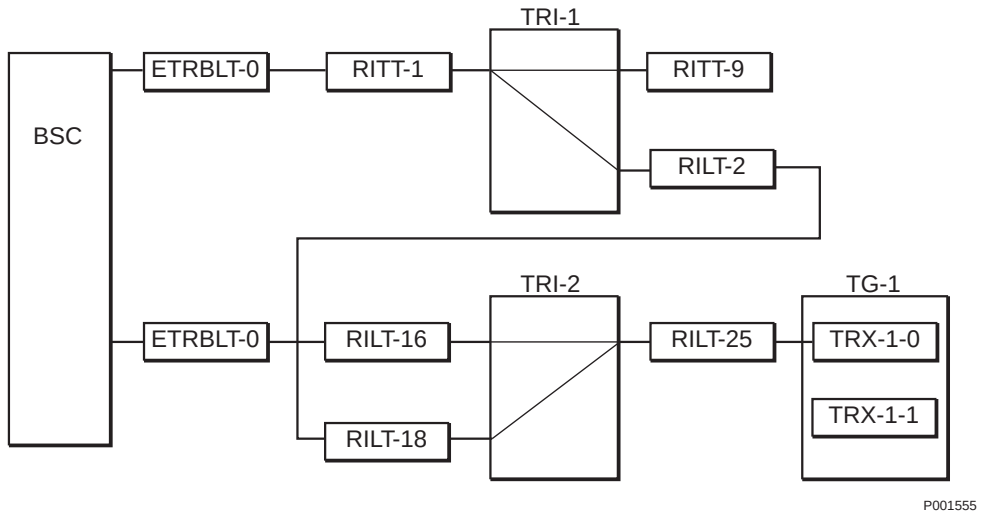


Figure 2 Diagram of test set-up

1.3.4 Exchange Data

Connection of equipment to EQMTYPE

```
RIETI : DEV=RILT-0, EQMTYPE=ETB ;

RIETI : DEV=RILT-2, EQMTYPE=ETB ;
```

```
RIETI : DEV=RILT-9, EQMTYPE=RTT ;

RIETI : DEV=RILT-16, EQMTYPE=ETB ;

RIETI : DEV=RILT-18, EQMTYPE=ETB ;

RIETI : DEV=RILT-25, EQMTYPE=RTT ;
```

Definition of digital path

```
DTDII : DIP=RILT18, DEV=RILT-18 ;

DTDII : DIP=RILT2, DEV=RILT-2 ;
```

Initial data for digital path

```
DTIDC : DIP=RILT18, MODE=0; !  no CLC defined !

DTIDC : DIP=RILT2, MODE=0; !  no CLC defined !
```

Define TG and MO

```
RXMOI:MO=RXETRX-1-1, TEI=1, CTEI=58, DEV1=RBLT-4,

DEV2=RBLT-5&-6;
```

Deblocking of TRI

MUNIN1

```
DTBLE:DIP=RBLT0;

EXDAI:DEV=RBLT-1&&-15&-17&&-31; !  CLC-0 in RBLT-16!

BLODE:DEV=RBLT-1&&-15&-17&&-31;
```

Deblocking of RP/EM/CLC for MUNIN1

```
BLRPE:RP=110;

BLEME:RP=110, EM=1;

BLCLE:EQM=CLC-0;
```

Deblocking of EMPR device

```
BLEEE:EMG=MUNIN1, EM=0;

DTBLE:DIP=RILT0;

DTBLE:DIP=RILT2;

RIBLE:DEV=RILT-0;

RIBLE:EMG=MUNIN1,EMRS=0;

RIBLE:DEV=RILT-2;
```

```
RIBLE:DEV=RILT-9;
```

Deblocking of TRI

MUNIN2

```
DTBLE:DIP=RBLT1;

EXDAI:DEV=RBLT-33&&-47&-49&&-63; !  CLC-1 in RBLT-48
!

BLODE:DEV=RBLT-33&&-47&-49&&-63;
```

Deblocking of RP/EM/CLC for MUNIN2

```
BLRPE:RP=111;

BLEME:RP=111, EM=1;

BLCLE:EQM=CLC-1;
```

Deblocking of EMPR device

```
BLEEE:EMG=MUNIN2, EM=0;

DTBLE:DIP=RILT16;

DTBLE:DIP=RILT18;

RIBLE:DEV=RILT-16;

RIBLE:EMG=MUNIN2, EMRS=0;

RIBLE:DEV=RILT-18;

RIBLE:DEV=RILT-25;
```

TRI Semipermanent Paths

Set up semipermanent path for MUNIN1

```
RISPI:TSLOT1=RILT-0-4, TSLOT2=RILT-2-1, REL,
NAME=TEST1CTRL;

RISPI:TSLOT1=RILT-0-5, TSLOT2=RILT-2-2,
NAME=TEST1TCH0;

RISPI:TSLOT1=RILT-0-6, TSLOT2=RILT-2-3,
NAME=TEST1TCH1;
```

TRI Semipermanent Paths

Set up semipermanent path for MUNIN2

```
RISPI:TSOLT1=RILT-18-1, TSLOT2=RILT-25-9, REL,
NAME=TEST1CTRL;

RISPI:TSLOT1=RILT-18-2, TSLOT2=RILT-25-10,
NAME=TEST1TCH0;
```

```
RISPI:TSLOT1=RILT-18-3, TSLOT2=RILT-25-11,
NAME=TEST1TCH1;
```

Deblocking of MOs and activation of cell

Equipment in service

```
RXESI:MO=RXETRX-1-1;

RXESI:MO=RXERX-1-1;

RXESI:MO=RXETX-1-1;

RXESI:MO=RXETS-1-1-0&&-7;

RXBLE:MO=RXETRX-1-1;

RXBLE:MO=RXERX-1-1;

RXBLE:MO=RXETX-1-1;

RXBLE:MO=RXETS-1-1-0&&-7;
```

Glossary

Contents **Page**

1 Glossary

1.1 General

This glossary lists abbreviations and acronyms that occur in the RBS 200 Installation Test and Commissioning Manual (Module H). 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 Ericsson terminology.

GSM definitions are listed in GSM recommendation 01.04. Definitions of general (mobile) communication terminology are given in CCITT Red book, volume X.

1.2 Terms and Abbreviations

An arrow (→) is used to indicate a reference to another entry in this list. Terminology defined by GSM is marked with an asterisk (*).

A1	Designation of RBS cabinet Radio cabinets on a site are designated A1, B1, C1, A2.... according to site configuration.
Abis*	GSM standard BSC-BTS interface GSM interface standard, defining attributes of the communication between the BSC and the BTS.
ACB	Alarm Collection Board The ACB is used to cross-connect internal and external alarms.
ACU	Alarm Collection Unit A unit in the TM/PSU and TM magazines that collects and processes common TG alarm signals.
ARFCN	Absolute Radio Frequency Channel Number
B1	Designation of RBS cabinet → A1
BIM	Battery Interconnection Module RBS hardware unit for fused connection of batteries to the system and for fused interconnection of power circuits between cabinets.
BPC	Basic Physical Channel Denotes the air interface transport vehicle formed by repetition of one time slot on one or several radio frequency channels.

	If frequency hopping is not enabled, only one frequency is used to convey the BPC. →TS, →RFCH
BSC*	Base Station Controller GSM network unit for the control of one or several BTSs.
BTB	Bus Terminal Board The BTB board is used for connecting the internal cabinet bus to units in the cabinet.
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. GSM defines four burst types: - AB Access Burst - FB Frequency correction Burst - NB Normal Burst - SB Synchronization Burst A fifth burst is defined that may replace an NB when no information is to be transmitted: - DB Dummy Burst
C1	Designation of RBS cabinet → A1
Cabinet bus	- The vertical cabinet bus cabling at the left side of the cabinet distributes the TX and TIB/O&M buses. →TX-bus, →TIB, →O&M-bus.
CCB	Cable Connection Board Mounted in the left cable shaft of the cabinet, one at each rack position.
CME 20	Ericsson GSM system Ericsson digital land mobile telecommunication system based on the GSM standards.
COMB	Combiner →FCOMB, →HCOMB
DF	Distribution Field (cabinet)
DFA	Distribution Field A in DF Panel for connection of, for instance external alarms to the TRI.

DFB	Distribution Field B in DF Coaxial connection field used for PCM cabling between the DF and the ETB card(s) in the TRI magazine.
E1-3	Extension cabinet 1-3
ECU	Environmental Control Unit
EFU	External Fuse Unit Distribution unit containing two 10 A circuit breakers for powering of external units, for instance DC/DC converters.
EMPC	Extension Module Regional Processor A module in the TRI magazine. →EMRP
EMRP	Extension Module Regional Processor Processor unit in the BSC.
EMRPS	Extension Module Regional Processor-Speech Processor unit in the BSC.
ERP	Effective Radiated Power
ESD	Electrostatic Discharge Discharge of static electricity, often in the form of a spark. ESD may damage components such as integrated circuits.
ETB	Exchange Terminal Board Interface board in the TRI handling communication with the BSC or cascaded Rbs sites.
ETC	Exchange Terminal Circuit Interface in the BSC between a group switch and a PCM system.
EXALI	External Alarm Interface Card in the TRI magazine.
FCB	Fan Control Board
FCOMB	Filter Combiner

RBS hardware unit for connection of several radio transmitters to one common transmitter antenna.

The FCOMB is a narrow-band, motor tuned filter coupler.

GSM — Global System for Mobile communications

International standard for a TDMA digital mobile communication system. Originally, GSM was an abbreviation for Groupe Spécial Mobile, which is a European mobile telecommunication interest group, established 1982.

HCOMB — Hybrid Combiner

RBS hardware unit for connection of several radio transmitters to one common transmitter antenna.

The HCOMB is a broad-band directive coupler, sometimes named 3-dB Coupler.

IDM — Internal Distribution Module

RBS hardware unit for internal distribution and fusing of 24 V DC in a cabinet.

bus — Internal Transmitter Bus

TG internal bus for interconnection of a TRXC and its subordinated RRX and SPPs.

LIB — Line Bus

RBS internal bus for interconnection of a TRXC to a TRI.

LMT — Local Maintenance Terminal

Terminal equipment (PC) that can be connected to a TG for operation and maintenance activities at site.

LU — Logical Unit

LU is a class of Managed Objects (MO).

TRS defines four LUs:

- TS Time Slot
- RX Receiver
- TX Transmitter
- TF Timing Function

M1 — Master cabinet 1

MCC — Multicell Cabinet Configuration

MO — Managed Object

A concept used to denote an object, addressed by means of operation and maintenance procedures on Abis OML, in accordance with the TRS operation and maintenance object model.

Two classes of MOs are defined:

- MO TRXC Managed Object Transceiver Controller

- MO LU Managed Object Logical Unit

O&M	Operation and Maintenance A general term for activities such as configuration, utilization of channels (frequency bands), cell planning, system supervision, hardware and software maintenance, subscriber administration, and so forth.
O&Mbus	Operation and Maintenance bus TG internal bus for interconnection of all TRXCs, RTXs and a TM. The O&M-bus is duplicated for redundancy reasons.
PCB	Printed Circuit Board RBS hardware substrate for multifaceted electron dispersion to predetermined connectorized junctions.
PCU	Power Control Unit RBS hardware unit for control and supervision of the 230 V power supply system.
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.
PRI	Battery rack designation Battery racks (PR) at one site are designated PR1, PR2...., according to site configuration. →A1
PSU	Power Supply Unit RBS hardware unit for AC/DC conversion and 24 V DC supply.
RBS	Radio Base Station All equipment forming an Ericsson base station. →RBS, →TRS, →BTS
RBS 200	Radio Base Station Indoor version of an Ericsson radio base station based on the GSM 900 MHz standard. An RBS 200 comprises both hardware and software.
RBS 203	Radio Base Station 203

Outdoor version of an Ericsson radio base station for max. two TRXs based on the GSM 900 MHz standard. An RBS 203 comprises both hardware and software.

RBS 204 Radio Base Station 204

Outdoor version of an Ericsson radio base station for max six TRXs based on the GSM 900 MHz standard. An RBS 204 comprises both hardware and software.

RBS 205 Radio Base Station 205

Indoor version of an Ericsson radio base station based on the GSM 1800 standard. An RBS 205 comprises both hardware and software.

Receiver Multicoupling System —

Set of RBS hardware units for filtration, amplification and division of received RF signals from one receiver antenna to several radio receivers.

It comprises an RXBP, an RXDA and RXDs.

RF Radio Frequency

RFCH* Radio Frequency Channel

A radio frequency carrier with its associated bandwidth.

RHDEV Remote Handling Device

RRX Radio Receiver

RBS hardware unit for reception and decomposition of received RF signal. →RTX

RTP Redundant Transmission Power

DC/DC converter powered from the External Fuse Unit (EFU).

RTT Radio Transceiver Terminal

Interface board in TRI handling communication with TRXs.

RTX Radio Transmitter

RBS hardware unit for modulation and RF transmission. →TG, →RRX

RTXPB Radio Transmitter Power Booster

Combines the RTXPF function with a constant supply voltage to the RTX. →RTXPF

RTXPF Radio Transmitter Power Filter

Filter to avoid interference caused by the RTX power supply ramping voltage.

RX Receiver

	Logical Unit associated with the RRX. →LU
RX-A	Receiver antenna A
	Antenna jacks Rx-A and Rx-B in the connection field at the top of the cabinet provide for Rx antennas arranged in a space diversity configuration.
RX-B	Receiver antenna B →RX-A
RXBP	Receiver Band Pass filter
	RBS hardware unit for filtration of received RF signals from a receiver antenna. Receiver Multicoupling System
RXD	Receiver Divider
	RBS hardware unit for division of received RF signals from an RXDA. →Receiver Multicoupling System
RXDA	Receiver Divider Amplifier
	RBS hardware unit for amplification and division of received RF signals from an RXBP. →Receiver Multicoupling System
SPE	Signal Processing Extension
SPP	Signal Processing Part
	RBS hardware unit for digital signal processing on one BPC.
SPU	Signal Processing Unit
	The same function as for the SPP. One SPU equals eight SPPs.
SPU++	Signal Processing Unit
	The same function as for the SPP. One SPU equals eight SPPs.
STC	Signalling Terminal Central
	To extend the BSC control functions to remote locations, a pair of signalling terminals STC/STR is used. They provide the transport mechanism for communication with the remote regional processor (EMPC) in TRI.
STR	Signalling Terminal Remote →STC
STRP	Signalling Terminal Remote Processor
TDMA	Time Division Multiple Access
	Multiplexing of several channels in one common frequency band. Each channel is assigned a certain time division, a time slot, to use.
TDMA frame*	-

GSM air interface time frame structure comprising eight time slots. →TS

Terrestrial Lines -

Communication lines between a BSC site and an RBS site, based on the CCITT G.703 standard.

TF Timing Function

Logical unit associated with the TM. →LU

TG Transceiver Group

Set of RBS equipment associated with RF transmission on one common transmitter antenna.

TGC Transceiver Group Control

Application for control of the logical units TX and TF, as well as O&M-bus communication.

TGC is implemented as software running in the TRXC. The TGC application software exists in all TRXCs, though active in one only.

TIB Timing Bus

TG internal bus for distribution of synchronization information from a TM to all TRXCs and RTXs.

TM Timing Module

Set of RBS hardware units for generation of high accuracy synchronization information. Comprises a TMCB and TUs.

TMCB Timing Module Connection Board

RBS hardware unit for connection of cables to a TM →TM

TRI Transmission Radio Interface

RBS hardware unit for switching of time slots, and conversion of electrical characteristics between the Terrestrial Lines and the RBS internal LIBs.

TRS Transceiver System

Within the Ericsson GSM system CME 20, the Transceiver System (TRS) has been developed to meet the GSM recommendations of a Base Transceiver Station (BTS).

TRS is a functional structure and shall therefore not be seen as a particular set of hardware or software.

TRS is decomposed into five subsystems:

- TCS Transceiver Control Subsystem

- RTS Radio Transceiving Subsystem

- SPS Signal Processing Subsystem
- TMS Timing Subsystem
- CAB Cabinet Subsystem

TRX* Transceiver

GSM network entity for radio transmission/reception and signal processing, associated with traffic on eight BPCs, that is, all BPCs belonging to one TDMA frame. →RRX, →RTX

TRXC Transceiver Controller SPP/SPU++

RBS hardware unit for control of eight BPCs, by means of a subordinated RRX and SPP/SPU++.

A TRXC that is TGC host controls the TG common resources, RTXs and the TM.

TRXCONV Transceiver DC/DC Converter

RBS hardware unit for conversion of 24 V DC to 5 V DC and 12 V DC, feeding a TRXC and its subordinated RRX and SPP/SPU++.

TRXD Transceiver Digital

Set of RBS hardware units strictly associated with one TRXC, that is, a TRXC, eight SPPs/one SPU++ and one RRX.

TRXT Transceiver Tester

A functional unit in the TRS system used for testing the functionality of the TRXs.

TS* Time Slot

A 0.577 ms time 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

It is also the name of the logical unit associated with the SPP/SPU++ →LU

TSW Time Switch

TU Timing Unit

RBS hardware unit for generation of high accuracy synchronization signals. →TM

TX Transmitter

Logical unit associated with the RTX. →LU

TX-bus Transmitter bus

TX internal bus for interconnection of all RTXs to all TRXC. The TX-bus is an extension of an Int. TX-bus.

TXD	Transmitter Divider RBS hardware unit for division of transmitted RF signals for feedback to the radio transmitters.
V24I	V.24 Interface

Appendix

Contents **Page**

1 Appendix

This appendix comprises a number of forms for copying:

- A form for Market Dependent Special Instructions
- Test records to be filled out on site during tests
- A trouble report form about this manual

1.1 Market Dependent Special Instructions

Date:

By:

Signature:

General

This instruction is to be completed by the project management at the beginning of each project. The instruction shall be copied and added to the Installation Test and Commissioning Manual before commissioning.

The document gives the test engineer information and instructions for adapting the Installation Test and Commissioning Manual to a specific country or customer.

General information

Customer:

Country:

Parameters

MCC = Mobile Country Code

MNC = Mobile Network Code

IMSI number for TRXT

ARFCNs for the customer

What to test

Table 1 Test scheme

General Test Instructions (Introduction)	
Installation Check	
Power System Test	
TRS System Test Using BSC Simulator	
Antenna Installation Test	
Transmission System Test	
TRS System Test Using BSC	
ACU Test	
External Alarms Test	
TRS Extension Test	
Comments:	

Technical data

Table 2 Technical data

Battery system:	charging time	[hours]
	backup time	[hours]
Transmission lines:	balanced	
	unbalanced	
Earth connection between TRS and Transmission system:	see Strapping before Testing	
	see Comments	
Comments:		

GSM frequency list

Base station frequency band:

Downlink (TX) 935.200 - 959.800 MHz => Ch. 1-124

Uplink (RX) 890.200 - 914.800 MHz => Ch. 1-124

ARFCN separation: 200 kHz

Duplex Space: 45 MHz

Frequency Calculation:

RX frequency = ARFCN * 0.200 MHz + 890 MHz

TX frequency = RX frequency + 45 MHz

B1 = Bottom frequency

M62 = Middle frequency

T124 = Top frequency

Table 3 GSM frequency list

ARFCN	Downlink TX	Uplink RX	ARFCN	Downlink TX	Uplink RX
B 1	935.200	890.200	**63**	947.600	902.600
2	935.400	890.400	**64**	947.800	902.800
3	935.600	890.600	**65**	948.000	903.000
4	935.800	890.800	**66**	948.200	903.200
5	936.000	891.000	**67**	948.400	903.400
6	936.200	891.200	**68**	948.600	903.600
7	936.400	891.400	**69**	948.800	903.800
8	936.600	891.600	**70**	949.000	904.000
9	936.800	891.800	**71**	949.200	904.200
10	937.000	892.000	**72**	949.400	904.400
11	937.200	892.200	**73**	949.600	904.600
12	937.400	892.400	**74**	949.800	904.800
13	937.600	892.600	**75**	950.000	905.000
14	937.800	892.800	**76**	950.200	905.200
15	938.000	893.000	**77**	950.400	905.400
16	938.200	893.200	**78**	950.600	905.600
17	938.400	893.400	**79**	950.800	905.800

18	938.600	893.600	**80**	951.000	906.000
19	938.800	893.800	**81**	951.200	906.200
20	939.000	894.000	**82**	951.400	906.400
21	939.200	894.200	**83**	951.600	906.600
22	939.400	894.400	**84**	951.800	906.800
23	939.600	894.600	**85**	952.000	907.000
24	939.800	894.800	**86**	952.200	907.200
25	940.000	895.000	**87**	952.400	907.400
26	940.200	895.200	**88**	952.600	907.600
27	940.400	895.400	**89**	952.800	907.800
28	940.600	895.600	**90**	953.000	908.000
29	940.800	895.800	**91**	953.200	908.200
30	941.000	896.000	**92**	953.400	908.400
31	941.200	896.200	**93**	953.600	908.600
32	941.400	896.400	**94**	953.800	908.800
33	941.600	896.600	**95**	954.000	909.000
34	941.800	896.800	**96**	954.200	909.200
35	942.000	897.000	**97**	954.400	909.400
36	942.200	897.200	**98**	954.600	909.600
37	942.400	897.400	**99**	954.800	909.800
38	942.600	897.600	**100**	955.000	910.000
39	942.800	897.800	**101**	955.200	910.200
40	943.000	898.000	**102**	955.400	910.400
41	943.200	898.200	**103**	955.600	910.600
42	943.400	898.400	**104**	955.800	910.800
43	943.600	898.600	**105**	956.000	911.000
44	943.800	898.800	**106**	956.200	911.200
45	944.000	899.000	**107**	956.400	911.400
46	944.200	899.200	**108**	956.600	911.600
47	944.400	899.400	**109**	956.800	911.800
48	944.600	899.600	**110**	957.000	912.000
49	944.800	899.800	**111**	957.200	912.200
50	945.000	900.000	**112**	957.400	912.400
51	945.200	900.200	**113**	957.600	912.600
52	945.400	900.400	**114**	957.800	912.800

53	945.600	900.600	**115**	958.000	913.000
54	945.800	900.800	**116**	958.200	913.200
55	946.000	901.000	**117**	958.400	913.400
56	946.200	901.200	**118**	958.600	913.600
57	946.400	901.400	**119**	958.800	913.800
58	946.600	901.600	**120**	959.000	914.000
59	946.800	901.800	**121**	959.200	914.200
60	947.000	902.000	**122**	959.400	914.400
61	947.200	902.200	**123**	959.600	914.600
M 62	947.400	902.400	**T 124**	959.800	914.800

1.2 General Test Record

The Test Record for each subtest performed at the site shall be filled out together with this General Test Record.

1.2.1 Network Element Test Performed

Tested site

Site ID:

Site name:

Table 4 Test record

Tested site				
Site ID:				
Site name:				
Tests performed	**Pass**	**Date**	**Tester**	**Department**
Installation Check				
Power System Test				
TRS System Test Using BSC Simulator				
Antenna Installation Test				
Transmission System Test				
TRS System Test Using BSC				
ACU Test				
External Alarms Test				
TRS Extension Test				
General comments:				

1.3 Installation Check - Test Record

Table 5 Test record

Date:		
Site ID:		
Tester		
Name:	Signature:	
Power system (if present)		
Visual check of the installation	Checked OK	
Remarks:		
Transmission links		
Visual check of the installation	Checked OK	
Remarks:		
TRSs		
Visual check of the installation	Checked OK	
Remarks:		
External alarms		
Visual check of the installation	Checked OK	
Remarks:		

1.4 Power System Test (Incoming 230 V AC) - Test Record

Table 6 Test record

Date:	Site ID:	Cell:			
Tester Name:		Signature:			
Fill in test results for the relevant cabinet(s) according to site configuration.					
Cabinet(s) present		Master	Ext 1	Ext 2	Ext. 3
Primary power					
Voltage level on top of cabinet	230 ± 30 V AC				
Internal power					
Distribution check	23 - 28.5 V DC				
Voltage level set-up	OK				
Voltage level on the PCU					
Voltage level on the IDM					
Alarm check	OK				
Restoration	OK				
Function test					
Mains OFF	OK				
Battery operation	OK				
Mains ON	OK				
Charging	OK				
Comments:					

1.5 Power System Test (Incoming +24 V DC) - Test Record

Table 7 Test record

Date:		Site ID:			
Tester Name:		Signature:			
Fill in test results for the relevant cabinet(s) according to site configuration.					
Cabinet(s) present		Master	Ext 1	Ext 2	Ext. 3
Primary power					
Voltage level on top of cabinet	26.4 - 28 V DC				
Internal power					
Output from IDM	26.4 - 28 V DC				
Comments:					

1.6 Power System Test (Incoming -48 V DC) - Test Record

Table 8 Test record

Date:		Site ID:			
Tester Name:		Signature:			
Fill in test results for the relevant cabinet(s) according to site configuration.					
Cabinet(s) present		Master	Ext 1	Ext 2	Ext. 3
Primary power					
Voltage level on top of cabinet	-40 to -70 V DC				
Internal power					
Measurements					
TP-A/10	4.0 V				
TP-B/10	4.5 V				
TP-Output, 1st PSU	27.9 ± 0.1 V				
TP-Output, 2nd PSU	27.9 ± 0.1 V				
Current consumption, 1st DC/DC converter					
Current consumption, 2nd DC/DC converter					
Difference in load between DC/DC converters					
Restoration	OK				
Comments:					

1.7 TRS System Test Using BSC Simulator - Test Record

Table 9 Test record

Date:				
Site ID:	Cell:			
Tester Name:	Signature:			
MS used for the test Make:				
Rev:	Ser. no.:			
$RXLEV_{ref}$ uplink:	TRX1	TRX2	TRX3	TRX4
	Upper		Lower	
$RXLEV_{ref}$ downlink:	1	2	1	2
Load and activation of TRX				
Master cabinet				
Extension cabinet 1				
Extension cabinet 2				
Extension cabinet 3				
MASTER CABINET				
Test call from MS on RXA				
TS 0				
TS 1				
TS 2				
TS 3				
TS 4				
TS 5				
TS 6				
TS 7				
TX output power and received power level:				
- RXLEV downlink				
($RXLEV_{ref}$ downlink ± 4 dB)				
- RXLEV uplink				
($RXLEV_{ref}$ uplink ± 4 dB)				
- RXQUAL downlink (0)				

- RXQUAL uplink (0)					
TRXT (optional), RXA	OK				
TRXT (optional), TS 0 and TS 1	OK				
Test call from MS on RXB					
TS 0					
TS 1					
TS 2					
TS 3					
TS 4					
TS 5					
TS 6					
TS 7					
TX output power and received power level:					
- RXLEV downlink					
($RXLEV_{ref}$ downlink ± 4 dB)					
- RXLEV uplink					
($RXLEV_{ref}$ uplink ± 4 dB)					
- RXQUAL downlink (0)					
- RXQUAL uplink (0)					
TRXT (optional), RXB	OK				
TRXT (optional), TS 0 and TS 1					
EXTENSION CABINET 1					
Test call from MS on RXA					
TS 0					
TS 1					
TS 2					
TS 3					
TS 4					
TS 5					
TS 6					
TS 7					
TX output power and received power level:					
- RXLEV downlink					
($RXLEV_{ref}$ downlink ± 4 dB)					

- RXLEV uplink				
($RXLEV_{ref}$ uplink ± 4 dB)				
- RXQUAL downlink (0)				
- RXQUAL uplink (0)				
Test call from MS on RXB				
TS 0				
TS 1				
TS 2				
TS 3				
TS 4				
TS 5				
TS 6				
TS 7				
TX output power and received power level:				
- RXLEV downlink				
($RXLEV_{ref}$ downlink ± 4 dB				
- RXLEV uplink				
($RXLEV_{ref}$ uplink ± 4 dB)				
- RXQUAL downlink (0)				
- RXQUAL uplink (0)				
EXTENSION CABINET 2				
Test call from MS on RXA				
TS 0				
TS 1				
TS 2				
TS 3				
TS 4				
TS 5				
TS 6				
TS 7				
TX output power and received power level:				
- RXLEV downlink				
($RXLEV_{ref}$ downlink ± 4 dB)				
- RXLEV uplink				

($RXLEV_{ref}$ uplink ± 4 dB)				
- RXQUAL downlink (0)				
- RXQUAL uplink (0)				
Test call from MS on RXB				
TS 0				
TS 1				
TS 2				
TS 3				
TS 4				
TS 5				
TS 6				
TS 7				
TX output power and received power level:				
- RXLEV downlink				
($RXLEV_{ref}$ downlink ± 4 dB)				
- RXLEV uplink				
($RXLEV_{ref}$ uplink ± 4 dB)				
- RXQUAL downlink (0)				
- RXQUAL uplink (0)				
EXTENSION CABINET 3				
Test call from MS on RXA				
TS 0				
TS 1				
TS 2				
TS 3				
TS 4				
TS 5				
TS 6				
TS 7				
TX output power and received power level:				
- RXLEV downlink				
($RXLEV_{ref}$downlink ±4 d dB)				
- RXLEV uplink				
($RXLEV_{ref}$uplink ±4 dB)				

- RXQUAL downlink (0)				
- RXQUAL uplink (0)				
Test call from MS on RXB				
TS 0				
TS 1				
TS 2				
TS 3				
TS 4				
TS 5				
TS 6				
TS 7				
TX output power and received power level:				
- RXLEV downlink				
($RXLEV_{ref}$downlink ±4 dB)				
- RXLEV uplink				
($RXLEV_{ref}$uplink ±4 dB)				
- RXQUAL downlink (0)				
- RXQUAL uplink (0)				
RESTORATION OF CELL				
All cables reconnected				
Comments:				

1.8 Antenna Installation Test - Test Record

1.8.1 Test Data

Date:

Site ID:

Name of tester:

1.8.2 Instruments Used

Instrument	**Serial number**
Spectrum analyser HP8594E	
TDR Tektronix 1502C	
Directional coupler Narda N3020A	

1.8.3 Signatures

Responsible for test record

Date: Name:

Customer acceptance

Date: Name:

1.8.4 Test Results

Table 10 Test results

Cell		
Installation Check		
Visual check		
Antenna direction		Degrees
Remarks:		

TDR Tests

	TX	RX-A	RX-B	
Reflection, max.				mρ
Feeder length				m
Bottom jumper length				m
Top jumper length				m
Total attenuation				dB

TDR Tests

	TX	RX-A	RX-B	
Return loss				dB
SWR (conv. table)				

Remarks:

1.9 Transmission System Test - Test Record

Table 11 Test record

Date:	Site ID:	
Tester Name:	Signature:	
Transmission test		
DIP = WO	OK	
Control link = WO	OK	
Comments:		

1.10 TRS System Test Using BSC - Test Record

Table 12 Test record

Date:					
Site ID:		Cell:			
Tester Name:		Signature:			
MS used for the test Make:					
Rev:		Ser. no.:			
		TRX	TRX2	TRX3	TRX4
$RXLEV_{ref}$ uplink		Upper		Lower	
$RXLEV_{ref}$ downlink		1	2	1	2
Present in TG					
Master cabinet		TRX	TRX2	TRX3	TRX4
Extension cabinet 1		TRX	TRX2	TRX3	TRX4
Extension cabinet 2		TRX	TRX2	TRX3	TRX4
Extension cabinet 3		TRX	TRX2	TRX3	TRX4
Load and activation of cell	All OK				
Test call from MS on RXA					
Configure RXD=A	All OK				
Perform test call, RXD=A					
- Speech quality					
- $RXLEV_{ref}$ downlink ± 4 dB					
- $RXLEV_{ref}$ uplink ± 4 dB					
- RXQUAL uplink/downlink = 0					
Master cabinet (bottom frequencies):					
TS 0	All OK				
TS 1	All OK				
TS 2	All OK				
TS 3	All OK				
TS 4	All OK				
TS 5	All OK				
TS 6	All OK				

TS 7	All OK				
Extension cabinet 1 (bottom frequencies):					
TS 0	All OK				
TS 1	All OK				
TS 2	All OK				
TS 3	All OK				
TS 4	All OK				
TS 5	All OK				
TS 6	All OK				
TS 7	All OK				
Extension cabinet 2 (bottom frequencies):					
TS 0	All OK				
TS 1	All OK				
TS 2	All OK				
TS 3	All OK				
TS 4	All OK				
TS 5	All OK				
TS 6	All OK				
TS 7	All OK				
Extension cabinet 3 (bottom frequencies					
TS 0	All OK				
TS 1	All OK				
TS 2	All OK				
TS 3	All OK				
TS 4	All OK				
TS 5	All OK				
TS 6	All OK				
TS 7	All OK				

		Frequencies	
		Middle	Top
Master cabinet	All TRXs OK		
Extension cabinet 1	All TRX OK		
Extension cabinet 2	All TRX OK		
Extension cabinet 3	All TRX OK		

Test of SDCCH	All OK					
Test of BCCH	OK					
Test call from MS on RXB						
Configure RXD=B						
Perform test call, RXD=B						
- Speech quality						
- $RXLEV_{ref}$ downlink ± 4 dB						
- $RXLEV_{ref}$ uplink ± 4 dB						
- RXQUAL uplink/downlink = 0						
Master cabinet (bottom frequencies):						
TS 0	All OK					
TS 1	All OK					
TS 2	All OK					
TS 3	All OK					
TS 4	All OK					
TS 5	All OK					
TS 6	All OK					
TS 7	All OK					
Extension cabinet 1 (bottom frequencies):						
TS 0	All OK					
TS 1	All OK					
TS 2	All OK					
TS 3	All OK					
TS 4	All OK					
TS 5	All OK					
TS 6	All OK					
TS 7	All OK					
Extension cabinet 2 (bottom frequencies):						
TS 0	All OK					
TS 1	All OK					
TS 2	All OK					
TS 3	All OK					
TS 4	All OK					
TS 5	All OK					

TS 6	All OK					
TS 7	All OK					
Extension cabinet 3 (bottom frequencies):						
TS 0	All OK					
TS 1	All OK					
TS 2	All OK					
TS 3	All OK					
TS 4	All OK					
TS 5	All OK					
TS 6	All OK					
TS 7	All OK					

		Frequencies	
		Middle	Top
Master cabinet	All TRXs OK		
Extension cabinet 1	All TRXs OK		
Extension cabinet 2	All TRXs OK		
Extension cabinet 3	All TRXs OK		
Test of SD CCH	All OK		
Test of BCCH	OK		

Test call on market allocated frequencies

Configure RXD=A	All OK			
		Bottom	Middle	Top
Perform test call, RXD=A	All TRXs OK			
Configure RXD=B	All OK			
		Bottom	Middle	Top
Perform test call, RXD=B	All TRXs OK			

Restoration after test call from MS OK

Test calls on Air Interface

Test call from MS on RXB	OK	
Test call to MS on RXB	OK	
Test call from MS on RXA	OK	
Test call to MS on RXA	OK	

Restoration after test call on Air Interface

	LED status OK	

Test of TRXT	OK	
Comments:		

1.11 ACU Test - Test Record

Table 13 Test record

Date:	Site ID:	Cell:
Tester		
Name:		Signature:

Self Test					
Power up				OK	
Reset				OK	
MCU Cable Test				OK	
RXDA A/B and Fan Cables Test					
RXDA_A cable				OK	
RXDA_B cable				OK	
Fan cables				OK	
VSWR Alarm Test in ACU/BSC				OK	
RXDA A/B Alarm Test					
No alarm in ACU/BSC				OK	
RXDA_A MC in ACU/BSC				OK	
RXDA_B MC in ACU/BSC				OK	
RXDA_A & B MC in ACU/BSC				OK	
RXDA_A red_MC in ACU/BSC				OK	
RXDA_B red_MC in ACU/BSC				OK	
RXDA_A & B red_MC in ACU/BSC				OK	
RXDA_A not connected in ACU/BSC				OK	
RXDA_B not connected in ACU/BSC				OK	

Fan Alarm Test		Mast.	Ext 1	Ext 2	Ext 3
No cable connected	OK				
Fan position 00	OK				
Fan position 09	OK				
Fan position 11	OK				
Fan position 05	OK				
VSWR threshold	OK				
VSWR value					

Comments:

1.12 External Alarms Test - Test Record

Table 14 Test record

Date:		
Site ID:		
Tester Name:	Signature:	
Installation test: Alarms 0-15	OK	
Transmission test: Alarms 0-15	OK	
Installation test: Alarms 16-31	OK	
Transmission test: Alarms 16-31	OK	
End of test	OK	
Comments:		

1.13 TRS Extension Test - Test Record

Table 15 Test record

Date:					
Site ID:		Cell:			
Tester Name:		Signature:			
MS used for the test Make:					
Rev:		Ser. no.:			
		TRX	TRX2	TRX3	TRX4
$RXLEV_{ref}$ uplink		Upper		Lower	
$RXLEV_{ref}$ downlink		1	2	1	2
Present in TG old equipment previously tested					
Master cabinet		TRX1	TRX2	TRX3	TRX4
Extension cabinet 1		TRX1	TRX2	TRX3	TRX4
Extension cabinet 2		TRX1	TRX2	TRX3	TRX4
Extension cabinet 3		TRX1	TRX2	TRX3	TRX4
Present in TG, new equipment to be tested					
Master cabinet		TRX1	TRX2	TRX3	TRX4
Extension cabinet 1		TRX1	TRX2	TRX3	TRX4
Extension cabinet 2		TRX1	TRX2	TRX3	TRX4
Extension cabinet 3		TRX1	TRX2	TRX3	TRX4
Load and activation of cell	All OK				
Test call from MS on Diversity A					
Configure Diversity A	All OK				
Perform test calls on Diversity A - Speech quality - $RXLEV_{ref}$ downlink ± 4 dB - $RXLEV_{ref}$ uplink ± 4 dB - RXQUAL uplink/downlink = 0					
Master cabinet:					
TS 0	All OK				

TS 1	All OK				
TS 2	All OK				
TS 3	All OK				
TS 4	All OK				
TS 5	All OK				
TS 6	All OK				
TS 7	All OK				
Extension cabinet 1:					
TS 0	All OK				
TS 1	All OK				
TS 2	All OK				
TS 3	All OK				
TS 4	All OK				
TS 5	All OK				
TS 6	All OK				
TS 7	All OK				
Extension cabinet 2:					
TS 0	All OK				
TS 1	All OK				
TS 2	All OK				
TS 3	All OK				
TS 4	All OK				
TS 5	All OK				
TS 6	All OK				
TS 7	All OK				
Extension cabinet 3:					
TS 0	All OK				
TS 1	All OK				
TS 2	All OK				
TS 3	All OK				
TS 4	All OK				
TS 5	All OK				
TS 6	All OK				
TS 7	All OK				

Test calls from MS on Diversity B						
Configure Diversity B	All OK					
Perform test call on Diversity B						
- Speech quality						
- $RXLEV_{ref}$ downlink ± 4 dB						
- $RXLEV_{ref}$ uplink ± 4 dB						
- RXQUAL uplink/downlink = 0						
Master cabinet:						
TS 0	All OK					
TS 1	All OK					
TS 2	All OK					
TS 3	All OK					
TS 4	All OK					
TS 5	All OK					
TS 6	All OK					
TS 7	All OK					
Extension cabinet 1:						
TS 0	All OK					
TS 1	All OK					
TS 2	All OK					
TS 3	All OK					
TS 4	All OK					
TS 5	All OK					
TS 6	All OK					
TS 7	All OK					
Extension cabinet 2:						
TS 0	All OK					
TS 1	All OK					
TS 2	All OK					
TS 3	All OK					
TS 4	All OK					
TS 5	All OK					
TS 6	All OK					
TS 7	All OK					

Extension cabinet 3 (bottom frequencies):					
TS 0	All OK				
TS 1	All OK				
TS 2	All OK				
TS 3	All OK				
TS 4	All OK				
TS 5	All OK				
TS 6	All OK				
TS 7	All OK				
Restoration of the cell	LED status OK				
Test of TRXT	OK				

Comments:

1.14 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 page contains 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.

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:	R-state
KRC 131 47/01	*R 1A*

Site name:	Site id:	Site status:
Hillfield, Ohio	*EOA 043*	*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.

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Figure 1 Example of a filled-in trouble report

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:		

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Figure 2 Trouble report, blank