ERICSSON

Base Station F800

Field Service Manual

EN/LZB 115 681 R1

ERICSSON

RUBRIKFÖRTECKNING
LIST OF HEADINGS

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FIELD SERVICE MANUAL F800

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
KL/ESE Rune Tapper		ECS/S/LT-96:1036		
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KI/ESE (Rune Tapper)		1999-05-25	D	

F800 Field Service Manual
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	Document list (this document)	ECS/S/LT-96:1036	D
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KL/ESE (Rune Tapper)		1999-10-27	A	

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WARNING, HEALTH RISK!

Beryllium oxide

The transistors in the power amplifier's driver stage and in the power amplifier contain beryllium oxide ceramics (BeO). Dust particles of this substance may be dangerous to your health if you inhale or get them on your skin.

Therefore, *DO NOT IN ANY WAY INTERFERE WITH THE TRANSISTORS*. It is, vital that you comply with the directions given in the appended "Beryllia safety precautions".

BERYLLIA SAFETY PRECAUTIONS

Introduction

This appendix details the safety precautions when handling components containing Beryllium oxide. Dust from this material can present a health hazard unless adequate precautions are taken.

The hazard

The material is highly dangerous in a dust form when it might be inhaled or enter a cut or skin irritation area.

If dust is caused as a result of chafing, filing or breakage and is inhaled, a single exposure lasting minutes or seconds can cause injury to skin or mucous membranes severe enough to endanger life or cause permanent injury. Particles penetrating the skin through wounds or abrasions are liable to cause chronic ulceration's.

Symptoms of poisoning indicated by respiratory troubles or cyanosis (grey blue discoloration of the skin), may develop within a week, or after a period extending to several years.

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COMPONENTS

Power transistors, diodes and thyristors

Power transistors, diodes and thyristors, as received in the manufacturers packing, are clearly identified by attached information. They should be stored in the original packing and not mixed with other items. The Beryllia is encapsulated and components are safe to handle for replacement purposes. Care should be exercised in removing defective items to ensure that they do not become physically damaged.

They MUST NOT:

- be carried loosely in a pocket, bag or container with other components where they may rub together or break and disintegrate into dust
- be heated excessively (normal soldering is quite safe)
- be broken open for inspection or in any way abrased by tools.

Heat sink washers

Some of the heat sink washers contain Beryllia. When new these are packed individually.

They MUST NOT:

- be stored loosely
- be filed, drilled or any way tooled
- heated other than when clamped in heat sink application.

They are best handled with gloves or cloth when being removed from equipment.

Cathode ray tubes and ceramic applications

Some products of cathode ray tube are coated on the inside with a ceramic beryllium oxide mixture. The tube is safe unless the glass is broken but should this occur.

DO NOT:

- handle the broken glass with bare fingers
- blow on the exposed surface (because of the danger of inhalation).

Ceramic cylinders or formers, identified by blue coloration or black lines, are safe to handle provided they are not damaged. In the latter event take precautions as with other components.

Disposal

Defective and broken components MUST NOT be disposed of in containers used for general refuse.

Defective components should be individually wrapped, clearly identified as “DEFECTIVE BERYLLIA COMPONENTS” and returned for subsequent disposal. Such components securely packed and with inside identification, may also be returned directly to the manufacturer.

Broken components should be individually wrapped and identified as “BROKEN BERYLLIA COMPONENTS”. They MUST NOT be sent through the post and should be returned to a depot by hand.

Medical precautions

If Beryllia is believed to be on, or have entered the skin through cuts or abrasions, the area should be thoroughly washed and treated by normal first aid methods followed by subsequent medical inspection.

Suspected inhalation should be treated as soon as possible by a doctor, preferably at a hospital.

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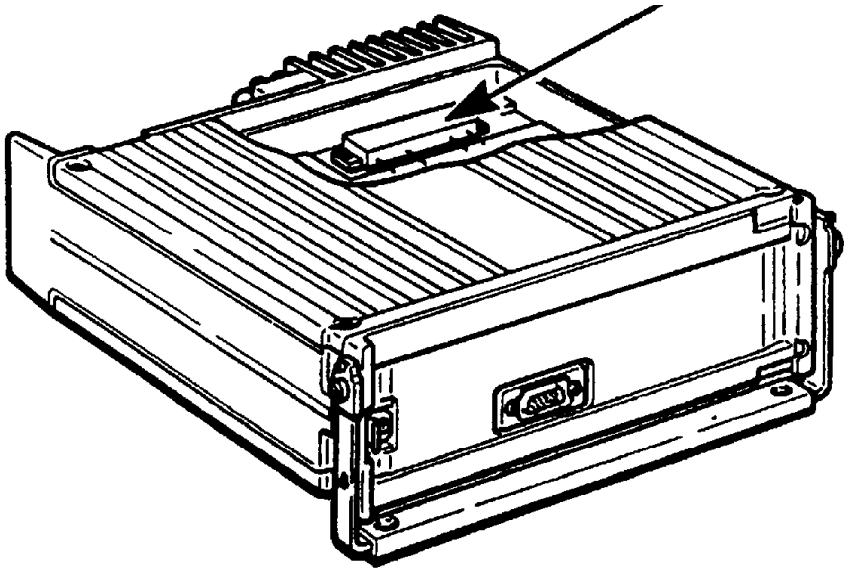
HANDLING THE BERYLLIUM OXIDE COMPONENT

In the radio station one or more components contains beryllium oxide. Dust from this material is highly toxic and can present a health hazard.

These components must not be incinerated or damaged in any way. Exercise care when removing or installing this component to prevent physical damage.

The component which contains beryllium oxide is the RF-amplifier. It is located on the radio board inside the radio station.



The components have the beryllium oxide encapsulated and the component is safe to handle for replacement purpose.

Defective components or complete radio stations must not be disposed in containers used for general refuse.

Therefore, return defective components or radio stations that contain beryllium oxide, individually wrapped, clearly identified as “Defective beryllia components” to your local Ericsson dealer or service facility.

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WARNING, HEALTH RISK!

Radio frequency radiation

Exposure to the antenna RF field may be dangerous to your health. Therefore, *SWITCH OFF THE TRANSMITTERS* if you work with or near the antennas.

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HANDLING MOS DEVICES

Though all MOS integrated circuits incorporate some protection against electrostatic discharge, they can nevertheless be damaged by accidental over-voltages. In storing and handling them, the following precautions are recommended.

Caution

Handling and mounting call for special attention to personal safety. Personnel handling MOS devices should normally be connected to ground via a 1 MΩ resistor.

Storage and transport

Store and transport the circuits in their original packing. Alternatively, use a conductive material or special IC carrier that either short-circuits all leads or insulates them from external contact.

Testing or handling

Work on a conductive surface (e.g. metal table top) when testing the circuits or transferring them from one carrier to another. Electrically connect the person doing the testing or handling to the conductive surface, for example by a metal bracelet and a conductive cord or chain. Connect all testing and handling equipment to the same surface. Signals should not be applied to the inputs while the device power supply is off. All unused input leads should be connected to either the supply voltage or ground.

OBSERVE: *USE ONLY SPECIAL DESIGNED, ORIGINAL SAFETY DEVICES!*

Mounting

Mount MOS integrated circuits on printed circuit boards after all other components has been mounted. Take care that the circuits themselves, metal parts of the board, mounting tools, and the person doing the mounting are kept at the same electric (ground) potential. If it is impossible to ground the printed-circuit board the person mounting the circuits should touch the board before bringing MOS circuits into contact with it.

Soldering

Soldering iron tips, including those of low-voltage irons, or soldering baths should also be kept at the same potential as the MOS circuits and the board.

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Static charges

Clothing of non-electrostatic material should be worn. Clothes made of material like wool, silk or synthetic fibres can give very high static voltages and should therefore NOT be worn.

After the MOS circuits have been mounted on the board proper handling precautions should still be observed. Until the sub-assemblies are inserted into a complete system in which the proper voltages are supplied, the board is no more than an extension of the leads of the devices mounted on the board. To prevent static charges from being transmitted through the board wiring to the device it is recommended that conductive clip or conductive tape is put on the circuit board terminals.

Transient voltages

To prevent permanent damage due to transient voltages, do not insert or remove MOS devices, or printed-circuit boards with MOS devices, from test sockets or systems with power on.

Voltage surges

Beware of voltage surges due to switching electrical equipment on or off, relays and D.C. lines.

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WARNING, HIGH VOLTAGE!

High voltage warning (over 200 v)

Is used in the operation of this equipment.

Death on contact

May result if personnel fail to observe safety precautions.

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and the hazards of the equipment, and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Be careful not to contact high-voltage connections when installing or operating this equipment.

Whenever the nature of the maintenance permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

OBSERVE! Do not be misled by the term “low voltage”. Potentials as low as 50 volts may cause death under adverse conditions.

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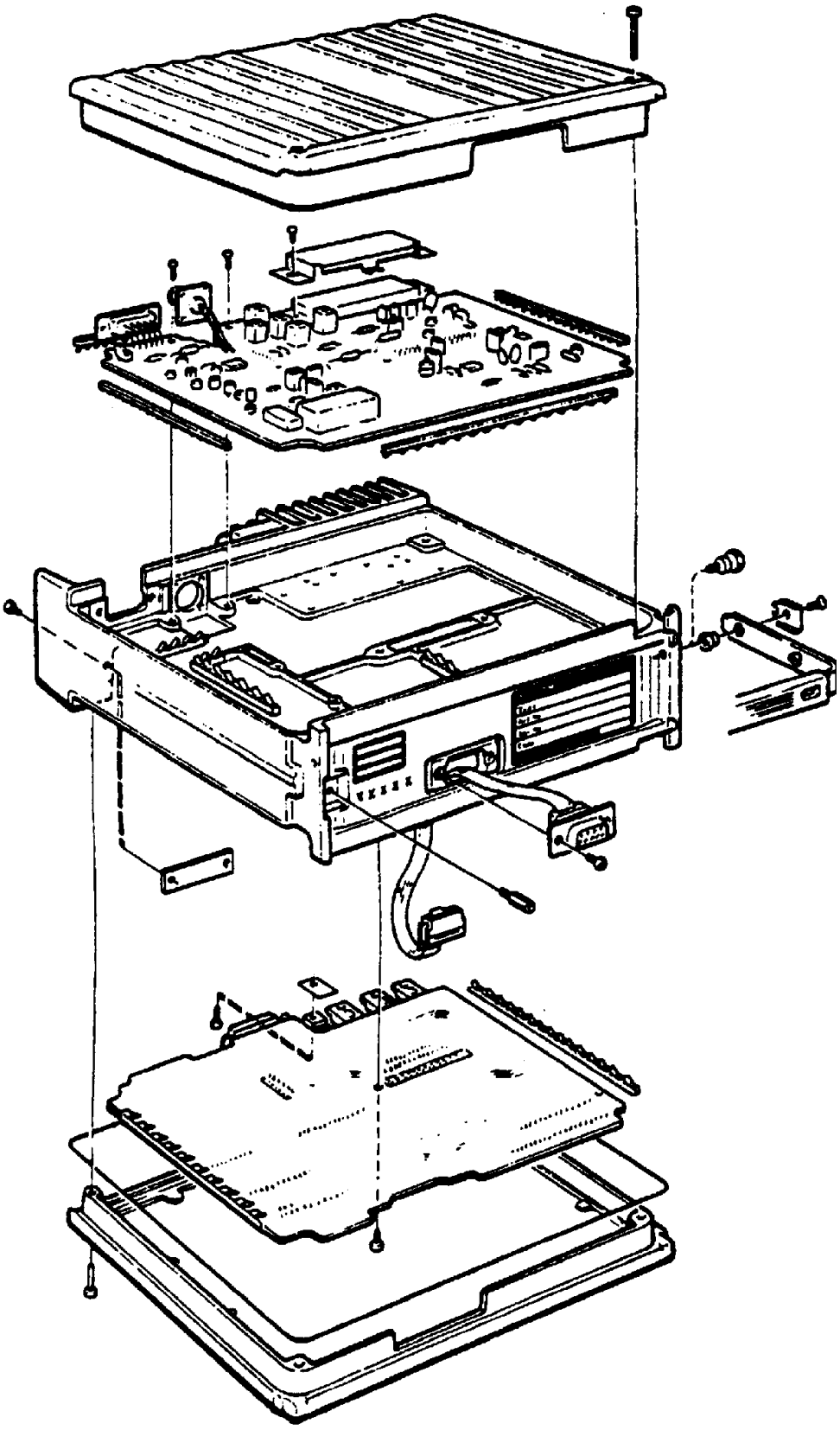

Base Station F800 - Technical Data

TYPE OF STATION	F802	F804	F805
GENERAL			
Operating mode	Simplex or Duplex		
Frequency range	68 - 88 MHz	146 - 174 MHz	370 - 415 MHz
			378 - 415 MHz
			400 - 443 MHz
			430 - 470 MHz
No of channels	15 (255 as option)		
Channel separation	25 kHz		25 or 12.5 kHz
Frequency stability	± 1.35 kHz	± 2 kHz	± 2.5 kHz
Signal/noise ratio, SINAD CCITT	>40 dB		25 kHz >40dB 12.5 kHz >37 dB
AF in and output level	-10dBm at 600 ohm		
Antenna impedance	50 ohm		
Supply voltage	13.8 V_{DC} (10.8-15.6 V)		
Voltage to interface	13.2 V_{DC} max. 1 A		
Power consumption			
-transmission	<7 A at 13.8 V DC and 20 W incl. Interface		
-reception	<0.8A at 13.8 V DC (<1.5A incl. Interface)		
-stand by	<0.8A at 13.8 V DC (<1.5A incl. Interface)		
Weight	< 15 kg		
Dimensions (WxHxD)	Approx. 439 x 177 x 325 mm, equipped with brackets for 19" rack mount, 3HE		
Operating temperature range	-25°C to +55°C		
Storage temperature range	-40°C to +85°C		
Standards	Meets or exceeds ETS 300 086, ETS 300279		
TRANSMITTER			
Output power, High	20 W ±1 dB		6 W ±1 dB for 370 - 415 MHz
Output power, Low	2 W ±1 dB		0.6 W ±1 dB for 370 - 415 MHz
Adjacent channel power	> 70 dBc or 0.2μW		
Spurious emissions at operation	< -36 dBm (9 kHz - 1 GHz)		
Spurious emissions at standby	< -57 dBm (9 kHz - 1 GHz)		
RECEIVER			
Sensitivity 20 dB SINAD CCITT	≤ -116 dBm	≤ -116 dBm	25 kHz = ≤ -115 dBm 12.5 kHz = ≤-113 dBm
Adjacent channel selectivity	>70 dB		
Intermodulation attenuation	>70 dB		
Spurious response rejection	>70 dB		

telenor

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Error! Unknown switch argument.		**Error! Unknown switch argument.**		
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KI/ECS/S/LTC		**Error!**	**Error!**	

F800 Commissioning

Contents:

Introduction

The intent of this form is to make sure that the installation is performed and tested in such way, that the customers and our requirements will be fulfilled.

Site Information Form

On completion of installation of a station unit, please place a completed form of this information including F800 Base Station Information and Installation Check in the Site Documentation that is prepared for the site (customer). One copy must be filed at the local workshop.

Site identification: .....

.....

Owner: .....

.....

The key is available at:.....

Telephone no, main operator: .....

Telephone no at site: .....

Number or name for the control line: .....

Servicing organised by: .....

Local workshop: .....

Telephone no: .....

Other important names, telephone numbers etc.: .....

.....

.....

.....

.....

.....

Prepared by	Place	Date
.....	.....	.....

F800 Base Station Information

Station unit number: .....

F80X transceiver unit type: KRD 103 10/.....

- Serial number: .....

Line panel type: .....

- Serial number: .....

Frequencies: TX= ..... RX= .....

Traffic mode simplex/duplex: .....

Power supply:

- Mains power unit type: .....
- Type of batteries: .....
- Others: .....
- .....

Antenna installation etc.: .....

.....

.....

.....

.....

If necessary please make up separate sketches and/or drawings.

Installation Check

Customer: .....

Installation site: .....

	Yes	No	Date and sign
Hardware installation checked	❑	❑	.....
Main power installation, checked and tested	❑	❑	.....
Backup power installation, checked and tested	❑	❑	.....
Antenna installation, checked and tested	❑	❑	.....
Constant load .....W			
Antenna .....W			
Reflected .....W			
Equipment alarm system, checked and tested	❑	❑	.....
Control lines installed, checked and tested	❑	❑	.....
Earthing installed and checked	❑	❑	.....
Lightning protection installation checked	❑	❑	.....
Radio test to mobile units, function OK	❑	❑	.....
Control unit(-s) installed, checked and tested	❑	❑	.....

Site completed

	Customer	*Technician*
Date:	.....	.....
Signature:	.....	.....

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INSTALLATION

Contents

INTRODUCTION

Incorrectly planned or badly equipped station sites generally result in higher maintenance costs, malfunction of the radio equipment and may even create the breakdown of the radio equipment.

To facilitate servicing and to create reasonable working conditions and a safe working environment for service personnel, the following points should be observed when planning a new station site:

- The service workshop should be consulted. Local problems may arise which make it more difficult, or even prevent, service personnel visiting the proposed station site under certain conditions or certain periods of the year.
- In the event of planned extension or modification of radio equipment at an existing station site, the service workshop concerned should be consulted. Modification of a station site which is already fully utilized may interfere with rational servicing of the existing radio equipment.

Station unit

The F800 station consists of up to four separate sub-systems:

- Transceiver unit
- Line panel
- Duplex filter/isolators
- Power supply unit

The transceiver unit, line panel , duplex filter and isolator are normally mounted together in the F800 enclosure, see installation drawing at the end of this chapter.

Other alternatives may arise due to the final configuration of the actual radio system.

The Power supply unit is a sub-unit which is separated from the station unit.

Base station

When the station unit, power supply and antenna system have been installed and put into service, together with the other accessories, a functional Base station is obtained.

PREPARATION OF INSTALLATION SITE

The installation site should meet the requirements for station units:

- Normal temperature range +15°C to +35°C.
- Extreme temperature -25°C to +15°C and +35°C to +55°C. (During operation in extreme temperatures reduced radio data is accepted).
- Atmospheric humidity 93%, non condensing.

The proposed installation site is prepared as follows:

- Check that the wall is sufficiently strong to carry the load of the station unit.
- Install the antenna and lay the antenna cable to the proposed installation site.

For lightning protection of antenna masts, see the recommendations given in chapter 5.

- Arrange for an authorized electrician to lay the mains power cables or battery power supply to the installation site.
- Arrange with the Telecommunications Administration for installation of telephone lines to the installation site and the lightning protection kit(s).

INSTALLATION

Packaging

When delivered, the station unit is packed in a special carton with shock-absorbent material.

- Check if the package is undamaged before opening it.
- Examine the contents carefully, if the package has been damaged.

If there is any damage to the contents, contact the transport/forwarding company shown on the Delivery Note.

Unpacking

- Check that the accessories shown on the Packing Note are complete. If not, notify our shipping department in Kumla, Sweden at once. Telephone international +46 19 584100. (national 019-584100.) or FAX No. +46 19 584510.

The station unit is basically supplied without accessories. Note that this also applies to all external connection cables. Accessories must be ordered from a separate list.

Wall mounting

Refer to Installation instruction 1531-SXK 107 2274/1 UX or 1531-SXK 107 2274/4 UX in the Appendix of this chapter, which shows an example of wall mounting.

- Drill holes as shown in the hole-drilling instruction in the Installation instruction.
- Mount the wall consoles, in position on the wall. Note that the consoles are only enclosed if specially ordered.
- Turn the front panel 180° before installation. This will give you the possibility of folding out the lid and making the service more convenient.
- Please note the space required for service, Installation instruction 1531-SXK 107 2274/1 UX or 1531-SXK 107 2274/4 UX.

The station unit is now ready for connection.

Rack mounting

It is also possible to install the F800 Base Station in a 19 inch rack.
Refer to Installation instruction 1531-SXK 107 2274/1 UX or 1531-SXK 107 2274/4 UX in the Appendix of this chapter, which shows an example of rackl mounting.

Safeguards for installation of lead-acid accumulators

When installing lead-acid accumulators for standby power supply, it must be kept in mind that hydrogen is produced during charging and this may cause an explosion. It is, therefore, of the greatest importance to ensure that the room is well ventilated.

The best position for installation of accumulators is in a separate room or in a battery box - in both cases well ventilated.

CONNECTION INSTRUCTIONS

Connection of power supply

The operating voltages for the station unit are obtained by:

- supplying the Power supply unit with 110/220 V AC 50/60 Hz. The power required is approx. 100 W. External gas-tight accumulators can be maintenance-charged.
- external supply of 13.8 V DC. Power required approx. 100 W.

When connecting to a mains power supply:

- before connection check that the rating plate on the Power supply unit indicates that the correct unit has been supplied
- connect the mains cable that has been laid to the site, to the connector marked 13-15 V DC on the rear of the station unit.

When connecting to a battery power supply:

- Prepare the cable for the battery supply as shown in chapter 8.
- Connect to the connector marked 13-15 V DC on the rear of the station unit.

Cable area required: The voltage drop from the battery must be less than 0.1 V at 20 A.

Connection of antenna

- Connect the antenna cable to the connector marked ANT(Tx) on the rear of the station unit.

Please note that other alternatives are available, depending on the final configuration of the antenna and filter system.

Connection of signal cables

- Connect the telephone line from the “control unit” to the connector marked LINES OUT, on the rear of the station unit.
- Make sure that the lightning protection kits are installed properly.
- Control the connections of “Alarm unit” if applicable.

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INSTALLATION DOCUMENTATION

On completion of installation, the technician should prepare installation documentation which should include specific instructions and documents to facilitate servicing of the installation. The installation documentation should be available at the installation site and at the local workshop.

The installation documentation may include, for example:

- How access is obtained to the site (keys, etc.)
- General information on the power supply (location of fuses and switches)
- Information on control and maintenance of the air-conditioning equipment, if provided, etc.

Further, copies of the forms in chapter 5, Commissioning, must be filled in and included with the documentation.

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LIGHTNING PROTECTION FOR MASTS

Contents

Introduction

It is in the nature of the subject that no complete solutions suitable for all situations can be given, but merely general recommendations. The possibilities that can be utilized are described below, together with the rules that should be followed and some information on materials.

Lightning protection should primarily be used to avoid the screening of the antenna lead functioning as a conductor in the event of a lightning strike on the antenna mast. The consequences of a strike may involve risks to service personnel. Effective earthing of the mast should be carried out with an earth electrode and a connection to a common earthing point, close to the incoming high-voltage earth. Before connection to the high-voltage earth, permission must be obtained from the power supply company. Any parts of the installation which are hidden (buried) must be marked on the site drawing.

The purpose of these measures is to protect personnel and equipment from transients caused by lightning. High voltages may arise through direct lightning strike to the antenna or other metal objects such as support wires, roof fittings or power lines. Other strikes in the surrounding area may also give rise to voltage transients through induction in leads, masts and support wires. Free conductivity in power and telephone lines may also transfer high voltages caused by distant lightning strikes.

Need for lightning protection

To prevent injury and damage to equipment, certain reasonable precautions must be taken.

The degree of lightning protection that is required must be assessed in the light of the consequences that may occur. Failure of a radio installation may cause users in considerable difficulties. Lightning protection giving 100% protection cannot, however, be installed. The cost of materials and labour must also be taken into account.

Explanation of terms

- Lightning conductor

  A conductor dimensioned to withstand the direct action of lightning and capable of conducting the lightning current without becoming damaged.

- Earth electrode

  A conductor laid in the ground, giving good contact with the surrounding soil.

- Earth electrode system

  A number of interconnected earth electrodes.

- Deep earth electrode

  A conductor driven vertically into the ground; also known as an earthing bar.

- Down lead

  The connection between the collector and the earth electrode system. Metal masts with good conductivity may be used as down leads.

- Ring leads

  Conductors, usually buried in the ground, connecting one or more down leads with one or more earth electrodes. Often placed in the form of a closed circuit around a mast or building to give symmetrical current conduction.

- Protection distance

  The minimum air gap between two objects, over which a lightning discharge cannot take place.

- Surge voltage protection

  Spark gap with voltage - dependent components.

- Lightning frequency

  Number of days with lightning per year.

- Lightning - exposed object or conductor

  Object or conductor on which lightning strikes can be anticipated, for example, antennas, masts, support wires and down leads.

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Lightning frequency

The number of days with lightning in a year varies considerably with geographical location. Local variations occur, depending on differing ground conditions.

Properties of lightning strikes

A lightning strike consists of a number of current pulses of varying strength and duration. The following are mean values observed in Sweden:

Lightning current,	peak value	≈ 25 KA
	charge	≈ 25 AS
	duration	≈ 0.25 s

Because of the high heating effect at the point of strike, conductors which are of too low cross-section may burn off and roof sheet metal may burn through. A 10 mm copper conductor may increase in temperature to around 100°C.

Ground conditions

The ability of the ground to carry away and distribute lightning strikes varies considerably between different places. Consequently, it may be difficult to provide earth electrodes where conductivity is low.

Inspection of installations

Modifications to, or around, a building or mast fitted with lightning protection may impair the functioning of the protection system. Such modifications may include, for example:

- sheet-metal work (window-sills, ventilation ducts)
- pipework (water, heating systems)
- electrical work (changes or additions to the power supply or telephone cables)

The owner of a lightning protection installation is responsible for ensuring that any work carried out on, or around, the building or mast does not have an adverse effect on the functioning of the lightning protection. If necessary, additional work should be carried out in order to maintain the same degree of protection. Further, regular inspections should be made; the visible parts should be inspected annually and the buried parts should be checked every 3 - 6 years.

To assist in inspection of the buried part of the installation, there must be drawings showing the layout. These should be placed in the building, preferably in the central switchboard.

Choice of materials

Since an installation for lightning protection is a relatively major investment, it must function for many years. Corrosion should be avoided, as far as possible, through selection of the correct materials.

Above ground level, copper, aluminium and galvanized steel can be used, but these should not be mixed in the same installation.

Earth electrodes and conductors buried in the ground may be of copper or galvanized steel. Aluminium should not be used in soil.

Copper should be used if a non - insulated copper cable has previously been installed at a distance of less than two metres. This may, for example be an earth line associated with electrical installations or existing earth electrodes.

Galvanized steel should be used if there are objects in the ground, in direct contact with the soil, which are not made of copper, for example lead - covered cable, steel or cast - iron water pipes.

If it is not possible to guide the choice of materials, insulation must be created for one or the other or both metals to ensure that the distance through the soil, in the electrical sense, is more than two metres.

Connections or branches of the component of the installation above ground level should be carried out so that moisture cannot collect at the connection point. This is particularly important if differing materials must be joined. Attachment components must also be selected with possible corrosion effects in mind.

Dimensions

Conductors used in lightning conductor systems must be sufficiently strong - both mechanically and chemically.

The minimum recommended area for conductors and earth electrode leads laid in or above the ground are: copper cable, 25 mm²; steel cable 50 mm²; aluminium cable (not underground) 50 mm².

Conductors connecting surge voltage protectors with lightning conductors or mains earths at common terminals must be at least 6 mm copper wire with insulation. The wire should be laid by the shortest possible route, max. 10 m

The connection between the lightning earth electrode and the common mains neutral terminals must be so dimensioned that any earth leakage currents do not cause heat damage or high voltages loss through induction. The link between the radio rack and the earth electrode must not be less than 10 mm² copper.

NOTE: All connections involving the mains power supply must be carried out by an authorized electrician and with the approval of the power supply company.

Suggestions for installation sites: see figure 1.

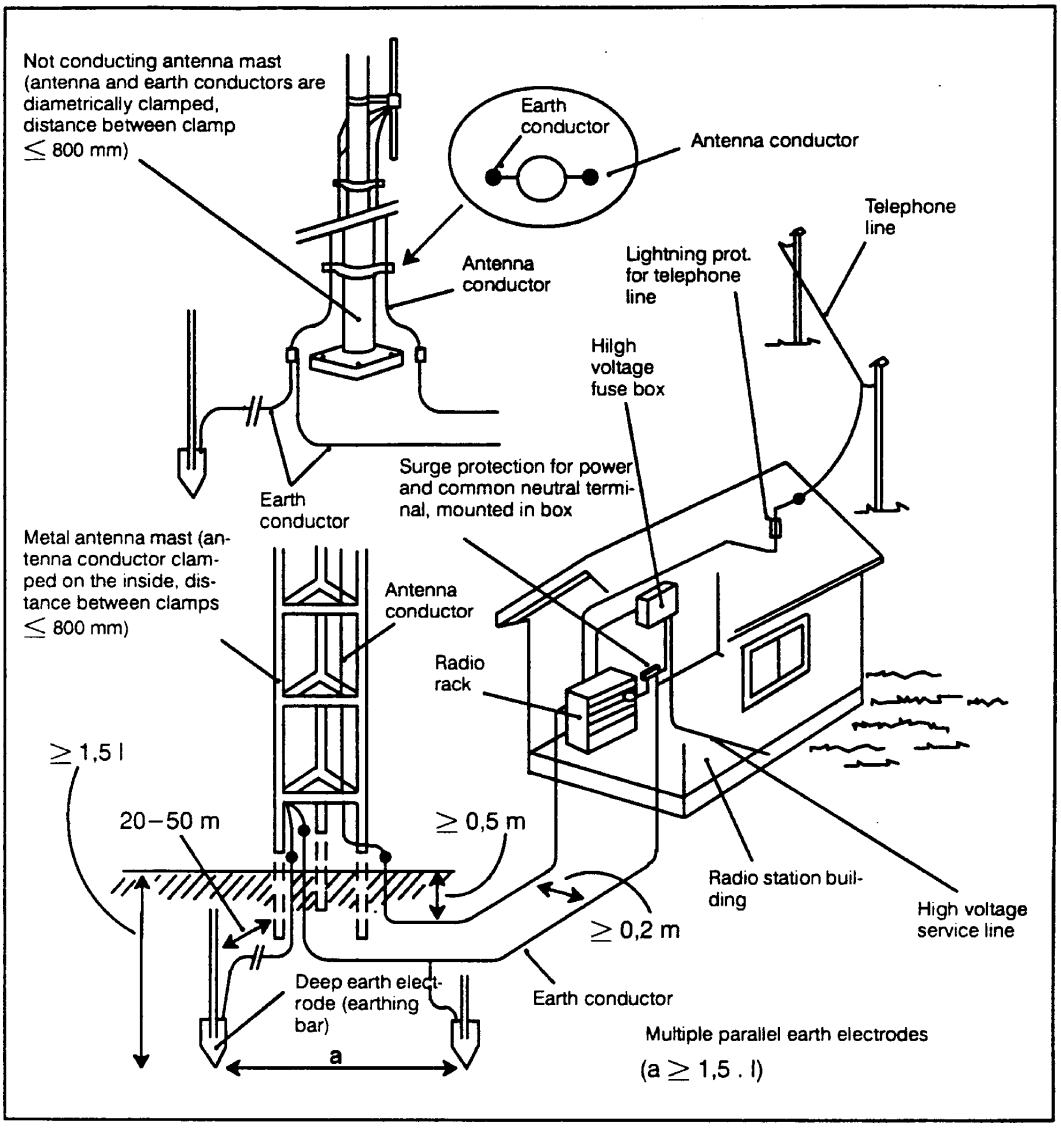

Figure 1. Suggestion for installation

High voltage input

See Figure 2.

The lightning protection system must be linked to the incoming neutral lead of the electrical system. A terminal or busbar for this purpose must be available in the fuse box. This terminal must be marked ”Lightning conductor earth”. The terminal must be so placed in the electrical system that the functioning of any earth leakage trip circuit breaker is not affected.

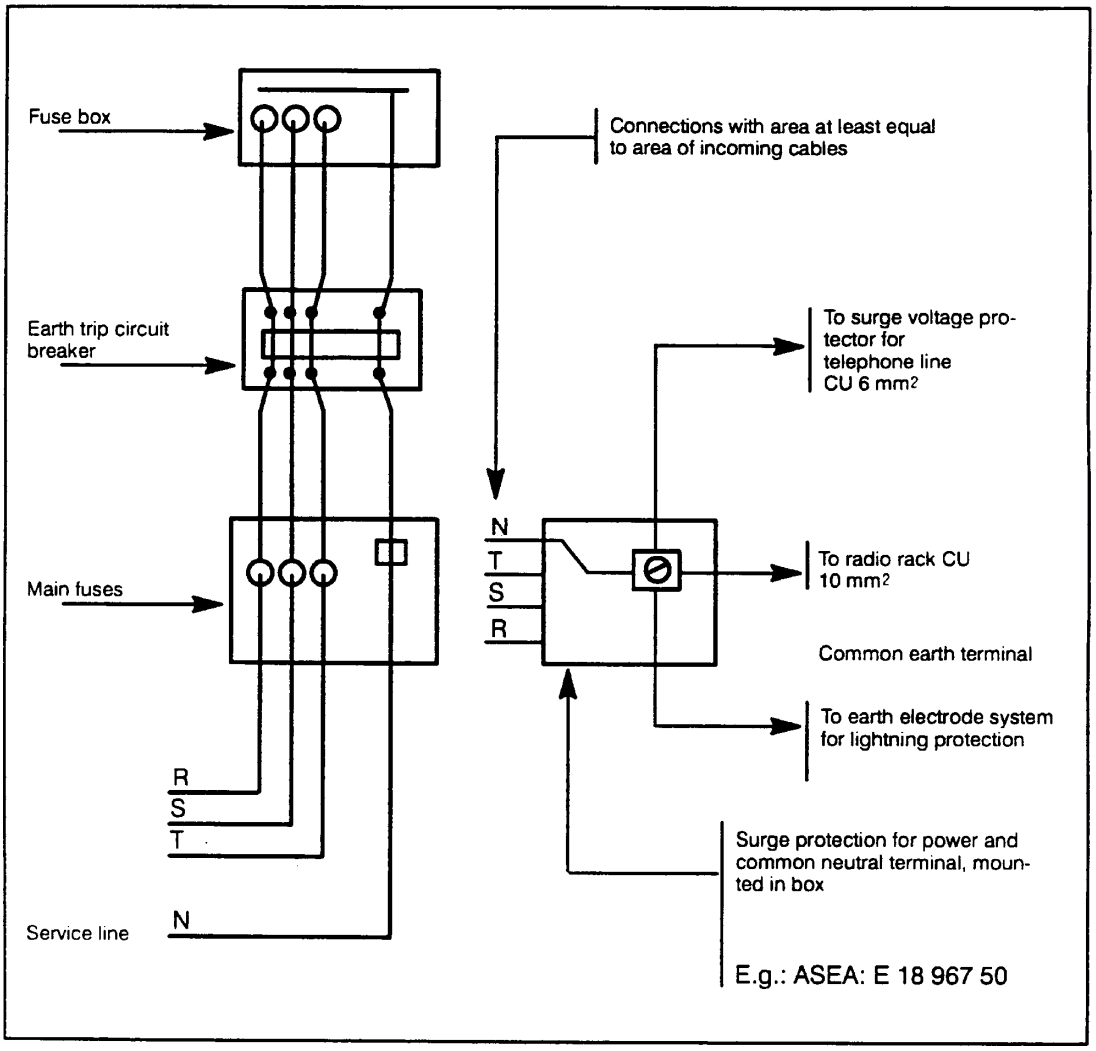

Figure 2. Mains power supply input with common neutral terminal for lightning protection.

Low voltage input

See Figure 3.

Incoming low-voltage inputs, usually telephone lines must, if not an earth cable, be protected by lightning protection RR-192500. This is a surge and transient protection.

Assembly must be such that there is no obvious fire hazard.

The earth connection must be to the earth electrode system or common earth terminal.

The connecting leads must be at least 6 mm copper and insulated.

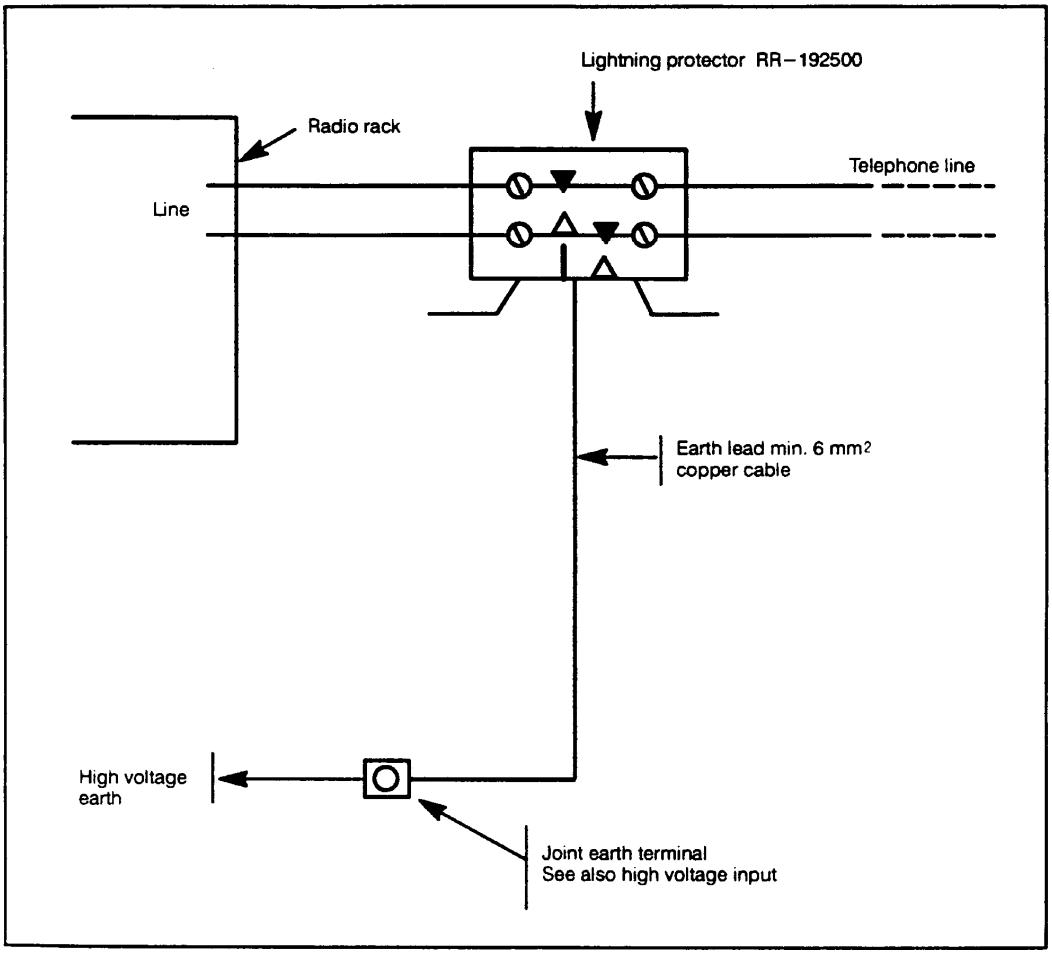

Figure 3. Low voltage input

Operating Instructions F800

The F800 base station is normally not operated locally other than for maintenance and service by a radio technician.

The back plane of F800 is equipped with tree LED (Light Emitting Diodes) to indicate the following states:

Sign on back plane	***Color***	***Comment***
+12V	Green	Lights when 12VDC is connected
TX	Red	Lights when the transmitter is on
SQ	Yellow	Lights when the carrier is received

See fig 1.

There is also a 16 positions channel switch that can be operated by a small screw driver. The 16 positions are marked: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. The channel number is selected by setting the switch to any position between 1 and F. In systems where the line panel is controlling the channel setting, the channel switch should be set to position 0.

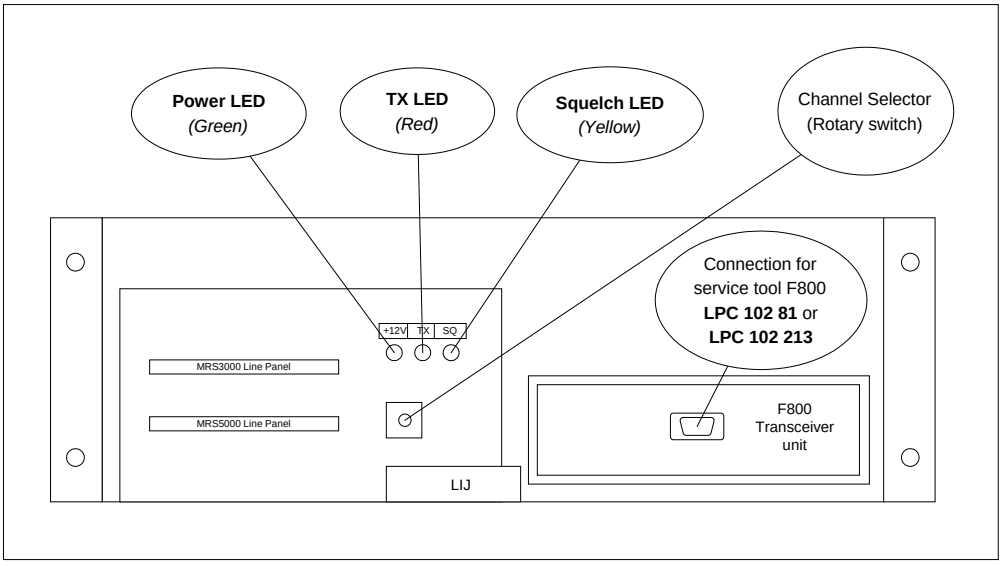

Fig 1, F800 seen from the front with the front cover removed

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STRUCTURE FOR SPARE PARTS & ACCCESSORIES
F800 BASE STATION

Title		Product No.	Notes
Enclosures			
Enclosures MRS2000 / MRS3000		SXK 107 2274/4	
Enclosures MRS5000		SXK 107 2274/4	
-Power supply 220 V_{AC}/12 V_{DC}		BMJ 142 106/1	
-Cable for DC input		RPM113 669	Cable with connectors
-Cable for line input		860 7724/11	Cable with connectors
-Telephone jack		HE 500011-0001	Swedish version
-Line unit		ROA 119 7534/2	Only 4-wire
-Fan		BKV 301 203	For SXK 107 2274/1, /2 and /4
Accessories			
-Bracket for wall mounting		SXA 105 9585	2 per F800
-Lightning protection kit		RR-192500	2 per 4 wire line
-OEM kit		NTM 201 1010	
-MRS 5000 kit		NTM 201 1009	Incl. Line unit and cables
-255 Channel kit		NTM 201 1020	Incl. OEM kit
-Duplex kit		NTZ 112 65	Filter plate, cables and connectors
Transceiver F80X			
80 MHz	Simplex	KRD 103 10/8S	
80 MHz	Duplex	KRD 103 10/8S	
160 MHz	Simplex	KRD 103 10/16S	
160 MHz	Duplex	KRD 103 10/16D	
450 MHz low	Simplex	KRD 103 10/45LS	
450 MHz low	Duplex	KRD 103 10/45LD	
450 MHz low	Duplex	KRD 103 10/45LD2	Link
450 MHz mid	Simplex	KRD 103 10/45MS	
450 MHz mid	Duplex	KRD 103 10/45MD	
450 MHz high	Simplex	KRD 103 10/45HS	
450 MHz high	Duplex	KRD 103 10/45HD	

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Title		Product No.	Notes
Radio board			
80 MHz	Simplex	ROA 119 7527/5	
80 MHz	Duplex	ROA 119 7539/10	
160 MHz	Simplex	ROA 119 7533/5	
160 MHz	Duplex	ROA 119 7540	
450 MHz low	Simplex	ROA 119 3004	
450 MHz low	Duplex	ROA 119 3030	
450 MHz low	Duplex	ROA 119 3030/2	Link ”LD2”
450 MHz mid	Simplex	ROA 119 8734	
450 MHz mid	Duplex	ROA 119 3031	
450 MHz high	Simplex	ROA 119 7553	
450 MHz high	Duplex	ROA 119 7541	
Power modules			
80 MHz	Simplex/Duplex	XTE519003-0101	
160 MHz	Simplex/Duplex	XTE519002-0101	
450 MHz low	Simplex/Duplex	RYT 901 6024/1	incl. link ”LD2”
450 MHz mid	Simplex/Duplex	TE 519006-0001	
450 MHz high	Simplex/Duplex	TE 519006-0002	
Logic board			
-Logic board		ROA 119 8736	
-Prom kit		RYS 105 354	Latest version= R3A
Mechanical parts			
-Distance		SXA 105 0757	To avoid connection of regular and service CU C700 at the front of F80X

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F800 Personality Programming

Contents

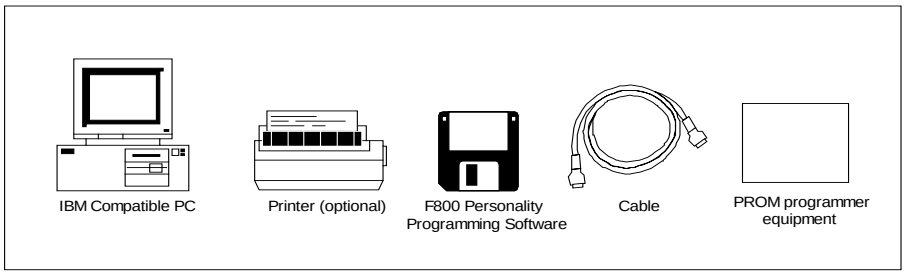
Introduction

The F800 has a synthesised frequency generator, which means that the operating frequency can be programmed without changing crystals or tuning the radio. The frequency data is stored in a EEPROM which is 8 bits * 1FFFh in size. The type is Xicor 28C64. The EEPROM must be removed from the radio to be programmed in a PROM programmer equipment and can not be programmed in place in the radio. In a standard F800, 15 channels (frequency pairs) can be programmed. As an option the F800 can be equipped with a 255 channel kit.

What do I need?

To be able to program the F800 radio you will need the following:

- IBM compatible PC with one serial port
- The F800 personality programming software
- A printer (optional)
- PROM programmer equipment
- Cable between PC and programming equipment
- A Xicor 28C64 EEPROM



You will probably be able to use any PC to do this work, just an ordinary machine will do the job. No problems have been discovered on any PC:s. We have also tested various types of programming equipment from *Data I/O, Stag, Elan*, and *Dataman* without any problems.

You will also need the following knowledge:

- Basic knowledge about your PC, how to operate from the DOS prompt, how to make directories, how to use the mode command, how to edit your AUTOEXEC.BAT file etc.

- Knowledge of how to operate your PROM programmer equipment, how to receive files from the PC etc.
- You also need information about those frequencies that will be programmed in the radio.

How to install the software

Make a directory on your hard drive called \ERICSSON\FAST.

Copy all files from the distribution diskette to the \ERICSSON\FAST directory.

Use the MODE command on your PC to set the preferred speed, parity and stop bit for the selected port. Usually it is 9600 baud, one stop bit, no parity.

Example: **C:\DOS\MODE COM1:96,N,8,1**

To make this setting permanent, edit your AUTOEXEC.BAT file to include the MODE command. See your DOS manual for how to use the MODE command.

Change directory with the CD command to the \ERICSSON\FAST directory. Start the program by typing the program name and press enter.

Example: **CD \ERICSSON\FAST [Enter]**

F800 [Enter]

The program will now start. From the main menu, choose SET-UP. Make any settings of programmer equipment, printer (ports), screen colors, directories etc. Save your settings while leaving the set-up menu.

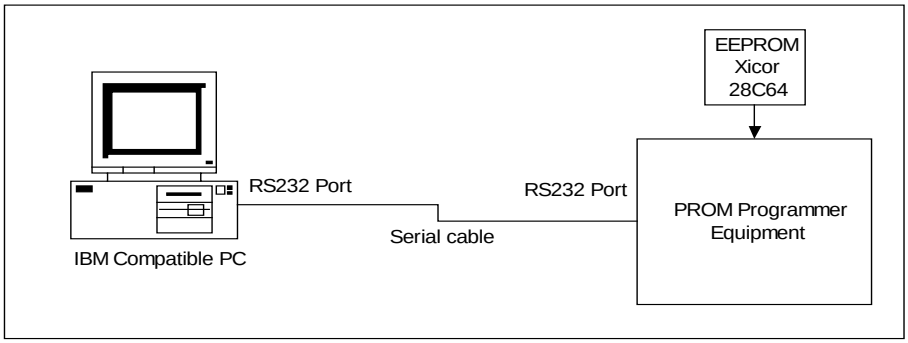
If you want to be able to start your programs without changing to the \ERICSSON\FAST directory, make the following two changes to your AUTOEXEC.BAT file:

Add **C:\ERICSSON\FAST** to your PATH-statement

Add the statement **SET FAST=C:\ERICSSON\FAST**

See your DOS manual for how to edit your AUTOEXEC.BAT file.

Electrical connections



Connect your PROM programmer equipment to one of the serial, RS232, ports on the PC. Usually it is COM1 or COM2. See your PROM programmer equipment manual for how to make this connection.

How to set up your PROM programmer equipment

Set the prom programmer equipment to the preferred speed and file format. Usually it is 9600 baud, no parity, 1 stop bit. The recommended file format is "Motorola S-record". Set the programmer to receive a file from the PC. See the user manual for your prom programmer equipment on how to do this setting.

What can be programmed?

The F800 can be programmed with some basic radio data:

- Frequency band (depending on hardware)
- Traffic mode (usually simplex or duplex, depending on hardware)
- TX frequency for each channel
- RX frequency for each channel
- RF output power for each channel, high or low (usually 20 or 2 Watt)

How to use the program

Change directory with the CD command to the \ERICSSON\FAST directory. Start the program by typing the program name and press enter.

Example: **CD \ERICSSON\FAST [Enter]**

F800 [Enter].

Select PROGRAMMING from the main menu to start working on your code prom. Choose frequency band and traffic mode. Enter the frequency menu and enter the frequencies and the output power for each channel.

When you have finished frequency programming, return to the main menu and save your work by selecting the ”file menu” and ”save as”**.** You will be prompted for a file name and a comment that will be saved together with the file. Your file is now saved for later use. You can at any time retrieve your file for editing or printing. When your file is saved, the program will automatically return to the main menu.

From the main menu you can select ”Printing” to print the result of the programming on any printer connected to the PC.

To make the prom, choose ”Make prom” from the main menu. Press return once more to transfer the PROM contents to the PROM programmer equipment. When the transfer is ready the PROM checksum will be presented on the screen. Verify that the data in the PROM programmer equipment has the same checksum. Burn the PROM according to the instruction manual for your PROM programmer equipment.

Do not forget to label your PROM with file name, date and checksum.

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KTR M. Andersson		1997-11-15	A	

LPC 102 213 F800 TEST HANDSET

1 GENERAL

The test handset LPC 102 213 replaces test box LPC 102 81 and handset RR-164870/5 and is used together with all versions of Ericsson F800. It has a built-in earphone and microphone that allows the service engineer to listen to ongoing radio traffic and talk to radio users over the F800.

The test handset connects to the service connector on the transceiver's front and provides access to audio signals and enables channel selection, PTT etc.. The test unit is powered from the transceiver unit and a LED (12V) indicates power on. With sliding switches located at the handset's upper edge allows enabling or disabling of the built-in microphone and earphone.. The handset has a PTT switch on the lower edge that is used when talking into the handset. The modulation signal is connected from the external line input (TX line) to the transmitter when the built-in microphone is disabled. The received audio signal is available at the RX line connectors when the earphone is disabled. Channel is selected with a rotary dial on the handset's rear.

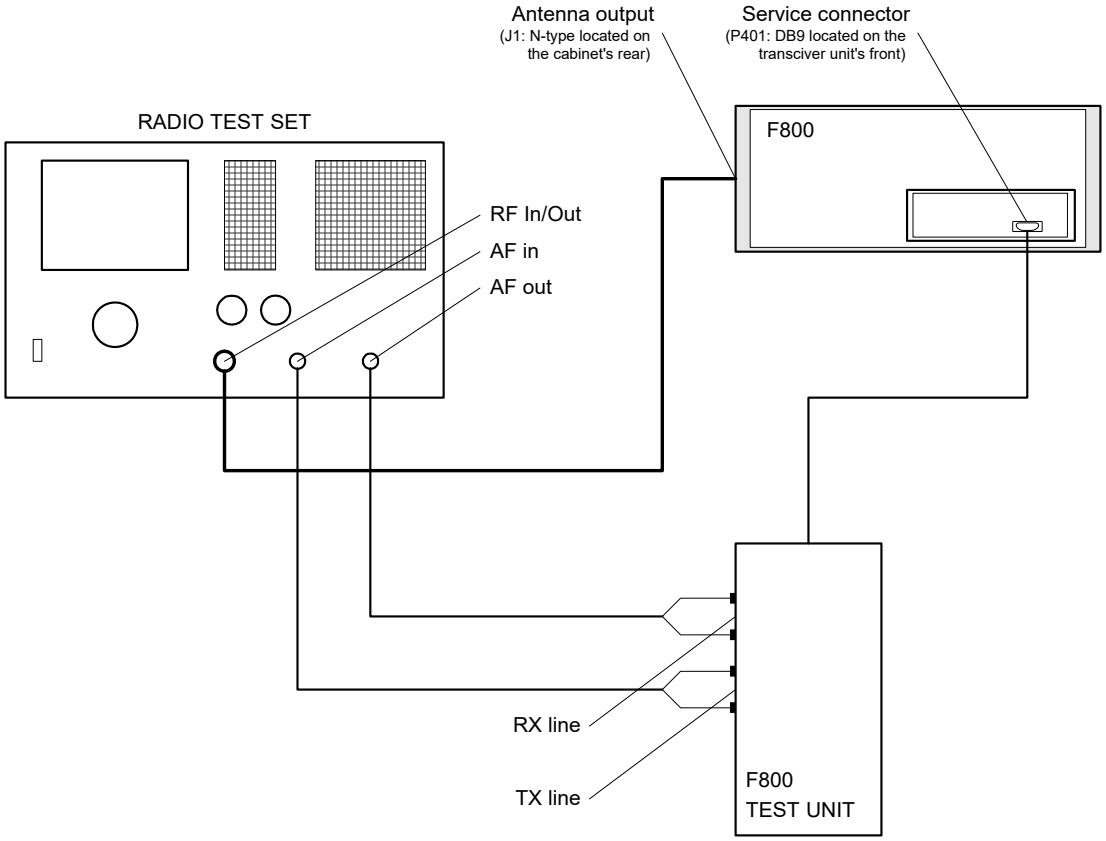

Figure 1: Typical test set up

2 CONNECTIONS

Connection	Type	Comment
RX line	AF output	600 Ω, Nominal level -10 dBm
TX line	AF input	600 Ω, Nominal level -10 dBm

The above listed connectors are located on the unit's front.

The test unit is connected to the transceiver unit by connecting the DB9 connector on the spiraled cord to the transceiver's service connector.

3 SWITCHES

Channel setting is made with the rotary dial on the test unit's rear. The dial is labelled 0 - 15 which corresponds to the channels of the F800. Set the internal rotary switch on the F800 backplane to 0. If the line panel is programmed to select channel, it should be removed.

The transmitter is keyed either by the built-in PTT switch on the unit's side or by the switch labelled PTT on the front.

The sliding switches on the unit's upper edge is used to select either internal signal sources microphone and earphone) or external signal sources (line connectors).

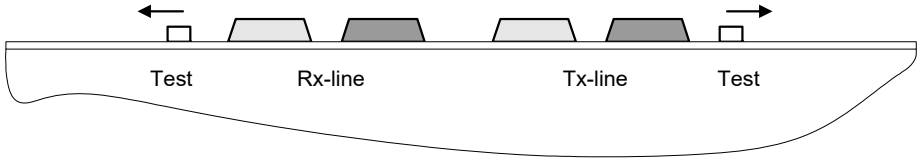

Figure 2: Part of test handset showing line connections and sliding switches.

The table show the appropriate setting for the different signals. The unit is seen from front.

	Rx-line Test (left most switch)	Tx-line Test (right most switch)
Internal signals	Right	Left
External signals	Left	Right

4 INDICATORS

Power on is indicated by a green LED labelled 12V. This indicates that the transceiver provides 12VDC to the test unit.

Transmission is indicated by the LED labelled PTT. This LED is on when the transceiver is in transmit mode.

Selected channel is shown by LED:s labelled CH1 to CH8. They represent the binary value of the selected channel.

CH8	CH4	CH2	CH1	Selected channel
○	○	○	○	Channel 0*
○	○	○	●	Channel 1
○	○	●	○	Channel 2
○	○	●	●	Channel 3
○	●	○	○	Channel 4
○	●	○	●	Channel 5
○	●	●	○	Channel 6
○	●	●	●	Channel 7
●	○	○	○	Channel 8
●	○	○	●	Channel 9
●	○	●	○	Channel 10
●	○	●	●	Channel 11
●	●	○	○	Channel 12
●	●	○	●	Channel 13
●	●	●	○	Channel 14
●	●	●	●	Channel 15

● LED On, ○ LED Off

When channel selector is set to 0, the LED:s indicate the transceiver's internal channel setting.

5 RECEIVER TESTING WITH LPC 102 213

1. Set the sliding switches for external signal sources.

2. Connect the Radio test set's AF input to the test unit's RX line out and set up the radio test set for AF measurements (AF voltmeter). Select CCITT or Psofometric filter.

3. Apply a RF signal from the radio test set to the antenna input of the F800. Use antenna jack for simplex stations and stations with built-in duplex filter, use the RX jack for duplex stations with external filters.

4. Set the RF generator's frequency to the channel frequency and set the RF level to -80 dBm. Modulate the RF signal with 1 kHz test tone and ±3.0 kHz deviation.

5. Measure line output and distortion with the radio test set.

6. Reduce the RF level until the SINAD meter shows 20 dB. Note the RF level.

7. Reduce the RF level until the AF voltmeter indicates 0, the squelch circuit mutes the AF output. Note the value.
   Increase the RF level until the AF voltmeter shows -10 dBm, the squelch circuit un-mutes the AF output. Note the value.
   The squelch circuits hysterisis is the difference between the two values.

6 TRANSMITTER TESTING WITH LPC 102 213

1. Set the sliding switches for external signal sources.
2. Connect the Radio test set's AF output to the test unit's TX line in and set up the radio test set for TX measurements.
3. Connect the antenna output from F800 to the radio test set's RF input.
4. Set the AF generator's frequency to 1 kHz and the level to -10 dBm.
5. Start the transmitter by setting the PTT switch in PTT position.
6. Measure TX output power and modulation with the radio test set.
7. Switch of the transmitter.
8. Set up the radio test set for signal to noise measurements.
9. Start the transmitter and measure the S/N ratio.

7 LPC 102 213 AS SERVICE HANDSET

The test unit can be used as a service handset when connected to F800. This enables the service engineer to monitor ongoing traffic and key and modulate the transmitter.

1. Set the sliding switches in position for internal signal sources.
2. Connect the RF input of the radio test set to the antenna connector of F800.
3. Set up the test set for duplex testing.
4. Set the RF generator to the channel frequency and set the level to -100 dBm. Modulate the RF signal with 1 kHz tone and 3.0 kHz deviation.
5. Check that the test tone is heard in the earphone.
6. Press the PTT button and talk normally in the microphone. Check that the radio test set indicate output power and modulation.

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KTR M. Andersson		1997-12-07	A	

FAULT TRACING F800

1 GENERAL

This document provides fault tracing guide lines for field or first line maintenance of all F800 versions. Maintenance instructions for the various control and line panels used in F800 are not covered by this document.

This document applies to F800 stations with cabinet SXK 107 2274/4

2 TOOLS AND INSTRUMENTS

To perform first line maintenance of F800 requires a minimum of tools and instruments. The list below serves as a recommendation only.

Type	*Model*	*Comment*
Radio test set	Marconi 2945 or equivalent.	
Wattmeter	Bird 43 or equivalent	
Test hand set	Ericsson LPC 102 213	
Voltmeter	Fluke 77 or equivalent.	
RF cable	RG224 or equivalent	Connections to F800 require N male connector.
Test leads		Connections to the test hand set require 3.5 mm plugs.
Torx screwdrivers	TX8, TX10 and TX15	

In addition to this, normal hand tools are required.

3 FAULT TRACING

As with all fault tracing, start with a visual inception and make sure that all cables are connected, the boards are inserted, etc.. To gain access to the various indicators and test points in F800, you have to remove the front cover.

3.1 NORMAL SETTINGS

The interconnection board located in the cabinet has three (3) jumpers and one rotary switch.

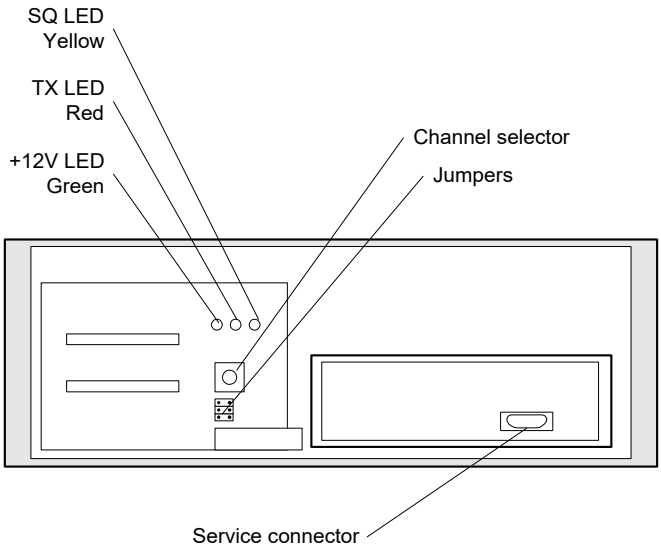


Figure 1: F800 front view with front cover removed.

All jumpers are normally open when the station is configured as a base or repeater station. Closing all jumpers will configure the station as a link.

The rotary switch selects the working channel for the station. It is normally set to the 0 position. To set the channel manually, i.e., with the rotary switch, it requires that the line panel is either removed or programmed not to select channel.

3.2 NO OUTPUT POWER

Step	*Check*	*Likely fault(s)*
1	Check that the green led indicating 12VDC on the interconnection board is lit.	1. Power supply 2. Transceiver unit
2	Connect the test handset and check that the line panel selects a valid channel number.	1. Line panel 2. Transceiver unit 3. Interconnection board
3	Key the unit from the test handset. Check that the red led indicating transmission is lit and that the fan is working.	1. Transceiver unit
4	Connect the watt-meter in the antenna feeder line. Key the unit and measure the RF output power and SWR.	Low output power: 1. Transceiver unit 2. Power supply Low output power and high SWR: 1. Antenna system 2. Transceiver unit

3.3 NO MODULATION OR LOW MODULATION

Step	*Check*	*Likely fault(s)*
1	Connect the test handset to the transceiver unit and connect the RF test set to the station's antenna output. Set up the test set for transmitter testing. Set the switches on the test handset for internal audio sources. Key the unit and talk into the microphone.	No or low modulation: 1. Transceiver unit Normal modulation: 1. Line panel 2. Interconnection board
2	Check audio level on the incoming line. Refer to service manual for line panel used.	No or low line level: 1. Line problem Normal line level: 1. Line panel 2. Interconnection board

3.4 NO OR LOW AUDIO SIGNAL FROM STATION

Step	*Check*	*Likely fault(s)*
1	Connect the test handset to the transceiver unit and connect the RF test set to the station's antenna output. Set up the test set for receiver testing. Set the switches on the test handset for internal audio sources. Apply an on-frequency signal to the station and listen in the test handset..	No or low audio level: 1. Transceiver unit 2. Line panel 3. Interconnection board Normal audio level: 1. Line panel 2. Interconnection board
2	Check audio level on the incoming line. Refer to service manual for line panel used.	No or low line level: 1. Line panel 2. Interconnection board Normal line level: 1. Line problem

3.5 LOW SENSITIVITY OR POOR AUDIO QUALITY

Step	*Check*	*Likely fault(s)*
1	Connect the test handset to the transceiver unit and connect the RF test set to the station's antenna output. Set up the test set for receiver testing. Set the switches on the test handset for external audio sources and connect the RX line signal from the handset to the RF test set. Apply an on-frequency signal to the station and measure the sensitivity (SINAD).	Low sensitivity: 1. Transceiver unit 2. Internal RF cabling 3. Built-in filters, if any. Normal sensitivity: 1. Line panel 2. Interconnection board

3.6 NO COMMUNICATION WITH REMOTE CONTROLLER/RADIO EXCHANGE

Step	*Check*	*Likely fault(s)*
1	Check that the green led indicating 12VDC on the interconnection board is lit.	1. Power supply 2. Transceiver unit
2	Check status indications on the line panel.	Refer the service manual for the concerned line panel for information.

3.7 VOLTAGE CHECK

The transceiver unit provides +12V and +5V to external units such as the line panel and the interconnection board. The transceiver unit includes fuses for +12V supply. The fuses are located on the transceiver's radio board. The fuses are of SMD type.

+12VDC Transceiver unit P405:1
Interconnect board P2:6, J2:A11, J1:A31, J1:B31 and P8:6

+5VDC Transceiver unit P405:13
Interconnection board P2:8, J1:A32

3.8 FAN TEST

The fan is controlled by the transceiver unit and operating only when the station is keyed.

If the fan does not start when the station is keyed, check that the transceiver unit supplies 12V on P7:1 on the interconnection board. If 12V is present, replace the fan. If the transceiver does not provide 12V on P7:1 it is faulty.

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
KL/ECS/S/LT Magnus Lindahl		ECS/S/LT-96:5045		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
KI/ECS/S/LTC		1996-06-06	A	

SPECIAL SERVICE TOOLS FOR F800

Contents

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
KL/ECS/S/LT Magnus Lindahl		ECS/S/LT-96:5045		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
KI/ECS/S/LTC		1996-06-06	A	

General

Recommended service tools are:

- Service unit LPC 102 81
- Service handset RR-164870/5

Otherwise - standard radio test equipment and 12V power supply.

Instructions for service unit LPC 102 81

Purpose: Service control of radio unit F800

> ***Caution!***
> *The service unit LPC 102 81 is designed **only** for the F800 radio unit. It must NOT be connected to any other device!*

Connection: The 9 pin male connector on the cable will be connected into the front connector of the F800 radio unit.

SWITCHES	S1 -S4 ”CH1 - CH8”	Binary code for channel selection. 0 - 15. See the channel table.
SWITCH	S5 ”PTT”	PTT control ON/OFF. Parallel function with PTT- switch in the service handset.
INDICATORS	”12V”	LED for 12V DC from radio unit.
	”CH1 - CH8”	LED for channel binary code.
	”PTT”	LED for PTT function from PTT - switch or service handset.
MEASUREMENT Input Output	”12V MEAS”	Test socket ”12V DC with radio on”. **NOTE**: Not DC power input!
	”TX - LINE”	Measurement jack for signal *to* the radio. Input for AF - signal.
	”RX - LINE”	Measurement jack for signal *from* the radio. Output for AF - signal.
	”SERVICE HANDSET” *)	Connector for service handset. RR-164870/5

**) The service handset must NOT be connected when line level adjustment is carried out. If so, the signal level will be incorrect*

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*
KL/ECS/S/LT Magnus Lindahl

Dokansv/Godk - *Doc respons/Approved*
KI/ECS/S/LTC

Kontr - *Checked*

Nr - *No.*
ECS/S/LT-96:5045

Datum - *Date*
1996-06-06

Rev
A

File

Channel table

Switch / LED **)				Channel
CH8	CH4	CH2	CH1	
0	0	0	0	0*)
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	10
1	0	1	1	11
1	1	0	0	12
1	1	0	1	13
1	1	1	0	14
1	1	1	1	15

**) Channel 0 is not used in regular operation. It has the same status as when the test equipment is disconnected.*

***) "0" = LED off, high signal level.*
"1" = LED on, low signal level.

SERVICE INFORMATION

ERICSSON MOBILE COMMUNICATIONS AB, SWEDEN

Prepared
KL/ECS/S/LT Rune Tapper

Approved
KL/ECS/S/LTC Ulf Brömster

Date
Error! Unknown switch argument.

Document
SI96-004.DOC

Rev
A

Reference
F800:007

New cabinet for F800

The old cabinets SXK 107 2274/1, SXK 107 2274/2 and SXK 107 2274/3 for F800 have been replaced with a new product. The new cabinet is a universal cabinet that replace the old ones completely. The old ones can not be ordered any more. The new cabinet have the following features:

- Same cabinet for all different F800 models
- New back plane board added
- Different slots for line panels MRS3000 and MRS5000
- LED indicators for 12V, squelch and TX
- Internal channel switch for 15 channels
- Integrated link function with jumpers, old link kit not needed
- Integrated filter for fan interference
- New OEM connector on rear (option)
- 255 channel kit (option)

Part number for new cabinet is: **SXK 107 2274/4**

SERVICE INFORMATION

ERICSSON MOBILE COMMUNICATIONS AB, SWEDEN

Prepared	*Date*	*Document*	*Rev*
KL/ECS/S/XT Rune Tapper	**Error! Unknown switch argument.**	SI95-011.DOC	A
Approved		*Reference*	
KL/ECS/S/XTC A. Jonsson		F800:004	

100W Power Amplifier

The power stage transistor for the 100W power amplifier RS214 (144 - 174 Mhz) has been unavailable fore a long time. Now it is in stock again, it can be ordered from our spare parts department in Kumla.

Part number: **MRF245**

The power amplifier itself, however, is not in our product range any more!

SERVICE INFORMATION

ERICSSON MOBILE COMMUNICATIONS AB, SWEDEN

Prepared
KL/ECS/S/LT Rune Tapper

Approved
KL/ECS/S/LTC Ulf Brömster

Date
Error! Unknown switch argument.

Document
SI96-003.DOC

Rev
A

Reference
F800:006

Service Tool for F800

The old service tool LPC 102 81 for F800 have been replaced by a new product. The new service tool have the following features:

- Channel switch for 15 channels
- PTT switch
- LED indicators for channel, PTT and 12V
- Switchable connections for AF signals RX-line and TX-line
- Integrated hand set for speech (old handset not needed)
- Connects directly to F800 9-pole front connector on transceiver unit

Part number for the new service tool F800 is: **LPC 102 213**

Servicemeddelande
Service information

Ämne/Subject:
Placering av linjepanel MRS3000/MRS5000 för F800/F850.

Mounting of line panel MRS3000/MRS5000 for base station F800/F850

Dokument nummer/ Document number:
TC-1347se

Datum/Invitation issued, date:
2002-06-06

Handläggare/Prepared
Magnus Lindahl

Placering av linjepanel MRS3000/MRS5000 för basstation F800/F850.

Placeringen av linjepanel i basstationen skall göras på följande sätt:
I den övre kontakt positionen skall linjepanel för MRS3000 placeras (bild 1), och i den undre placeras linjepanel för MRS5000 (bild 2), kortstyrskenorna flyttas då till de nedre hålen i plåten.

VARNING I F850 så kan fel placering av linjepanel orsaka skador både på linjepanel och på stationsenhet.

Mounting of line panel MRS3000/MRS5000 for base station F800/F850.

Mounting of line panel should be done as following:
In upper slot should line panel for MRS3000 be placed (picture 1), and in lower slot should line panel for MRS5000 be placed (picture 2), rails are moved to lower holes in the bracket.

WARNING In F850 can wrong mounting of line panels cause damage on transceiver unit and line panel.

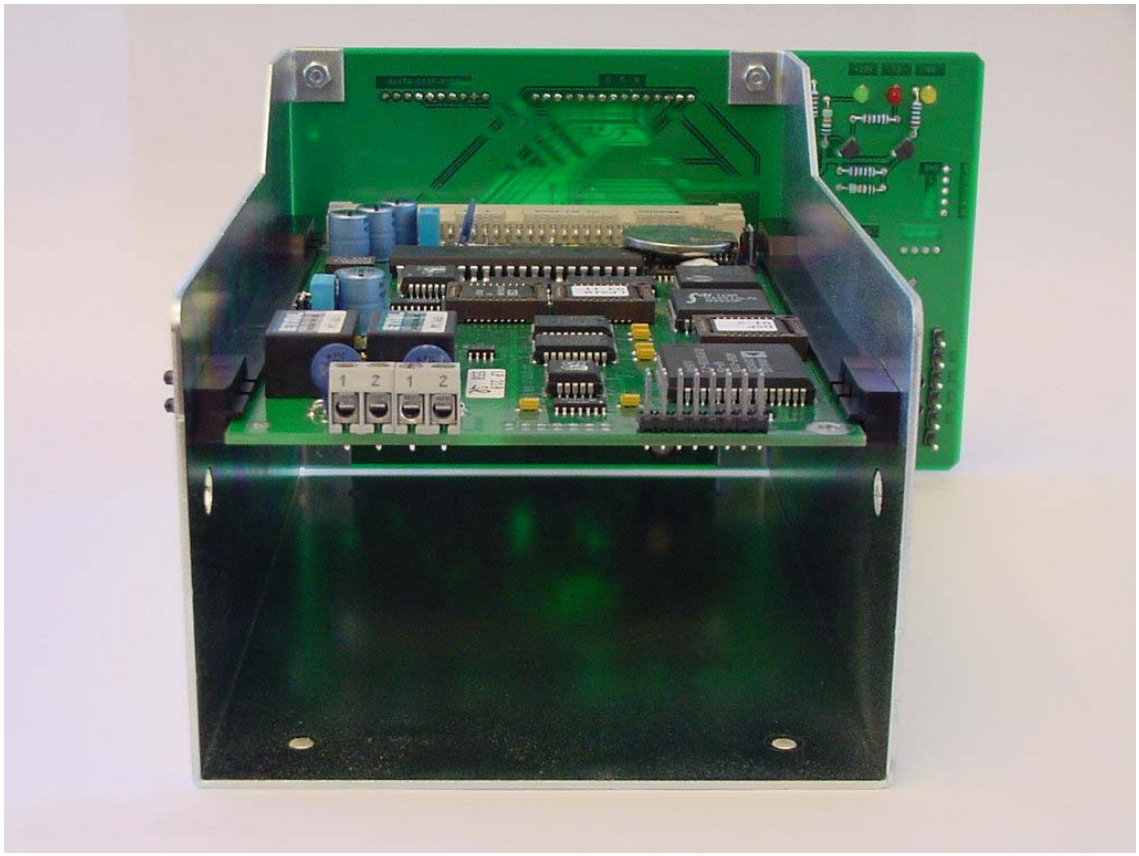


Bild1 *Picture 1* *MRS3000*

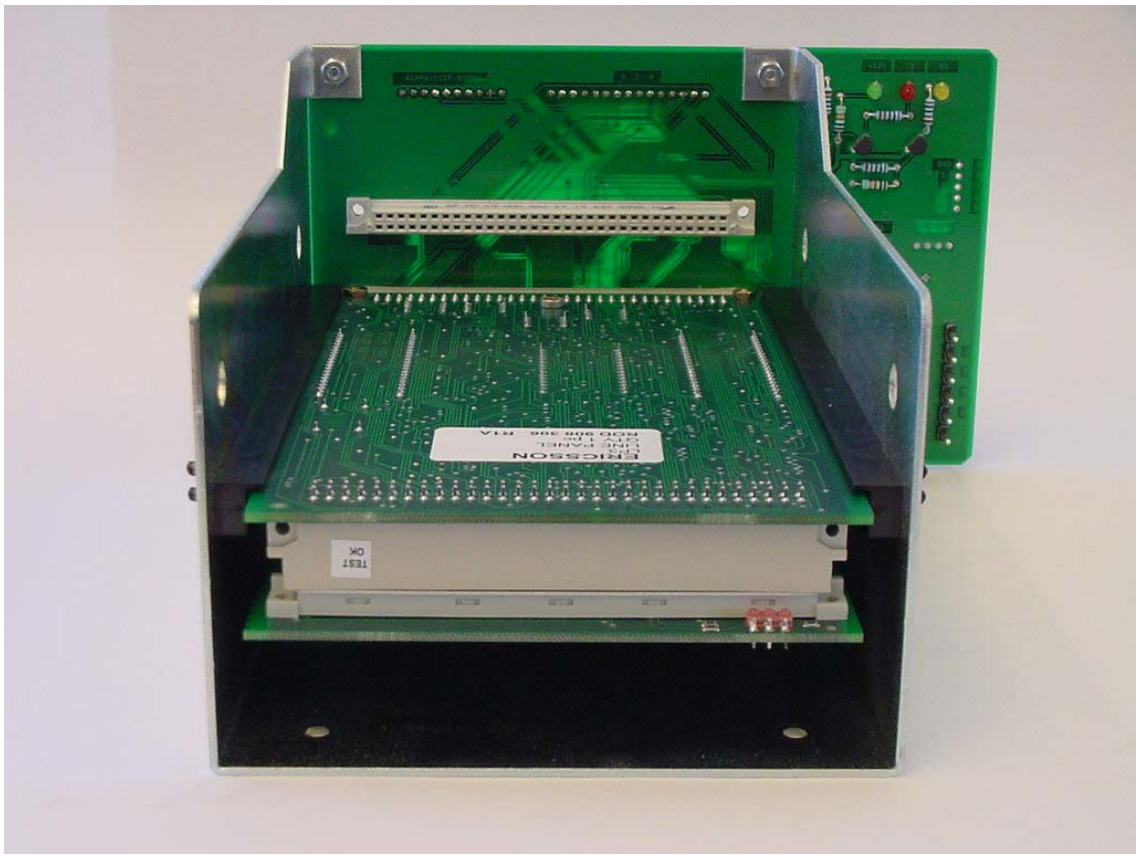


Bild 2 *Picture 2* *MRS5000*

Servicemeddelande

Ämne/Subject:
Basstationslåda F850
SXA 105 2274/5

Dok nr:
TC-1506s

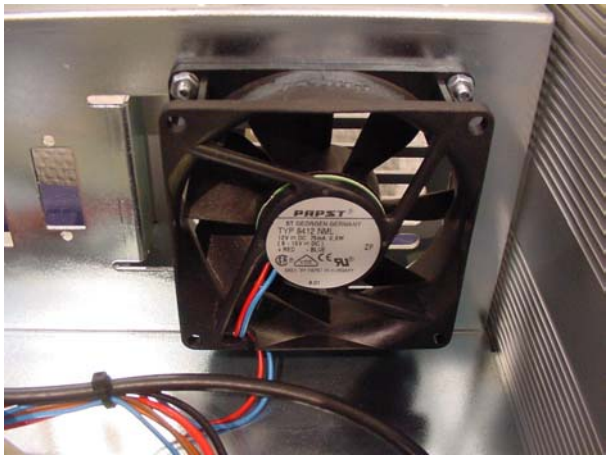
Datum/Invitation issued, date:
2002-09-17

Handläggare
Magnus Lindahl

Basstationslåda F850 SXA 105 2274/5

Fläkten som finns monterad i lådan har till funktion att kyla radion vid sändning, luftriktningen från fläkten skall vara så att den blåser på stationen. Vid vår ankomstkontroll har vi uppmärksammat en felaktigt monterad fläkt i basstationslådan, se nedan bilder för fläkten. Vid felaktig monterad fläkt, skruva bort bakstycket på lådan varpå 4 stycken skruvar för fläkten blir åtkomliga, vänd fläkten åt rätt håll.

Felaktigt monterad fläkt, produktskylten syns ej.



Rätt monterad fläkt, produktskylten syns

Fläkten har även en pil som visar luftriktningen.

Service Information

Complete Communication Care

Prepared by:	Date:	Document number:	Edition:
Rune Tapper	2005-11-01	TC-5377	A

C700 and F800 support discontinue

It is now 7 years since the C700 mobile radio and F800 base station was discontinued. The obligation from TC Connect to support this product family 7 years after products discontinue is now fulfilled.

This means that all support for those products will come to an end. From December 31, 2005 no support, central repair, documentation or training will be available. Most spare parts are no longer available.

There are three exceptions to this:

- Programming can still be ordered from Kumla.
- Some selected spare parts may still be ordered, check with us for availability before ordering.

Replacement products for most of the “C700/F800 -family” are available in our current product portfolio.

TC Connect AB
V:a Drottninggatan 33
P.O. Box 903
SE-692 29 Kumla, Sweden
Phone: +46 19 500 10 00
Fax: +46 19 500 11 00
E-mail: info@tcconnect.se

Uppgjord - *Prepared*	Faktaansvarig - *Subject Responsible*	Nr - *No*	
ECS/Y/TI MSV	Y/TF S. Lindblad	109 21 - KRD 103 10 - 1 Uen	
Dokansvarig/Godkänd - *Doc Responsible/Approved* / Kontr. - *Checked*		Datum - *Date* / Rev	från - *from* I till - *to*
ECS/Y/TF (Y/TIC)		1994-05-09 / A	R-state: R1 - R2

F800 RADIO BASE STATION CONCEPT

1. REASON FOR CHANGE:

A new "Cabinet- and Kit-concept" has been created for Base Station F800.

The new solution based upon a Cabinet with a new Back-plane board, will enable more flexible solutions both in MRS2000, MRS3000, MRS5000 and OEM applications.

2. TECHNICAL SOLUTION:

Product structure diagram: 1315 - KRD 103 10 Ux, new revision B replaces old revision A.

1. New standard Cabinet, SXK 107 2274/4, will in new production replace old versions: SXK 107 2274/1 (MRS2000 & MRS3000), SXK 107 2274/2 (MRS5000) and SXK 107 2274/3 (OEM).
2. New Kit, NTM 201 1009, KIT F800 MRS5000 is added.
3. New Kit, NTM 201 1010, KIT F800 OEM is added.
4. Old Kit, SXK 107 2277, KIT LINK F800 is removed from the concept.
5. Note that the finish on some of the steel plates has been changed from black chromated to blue chromated to reduce quality problems in production.

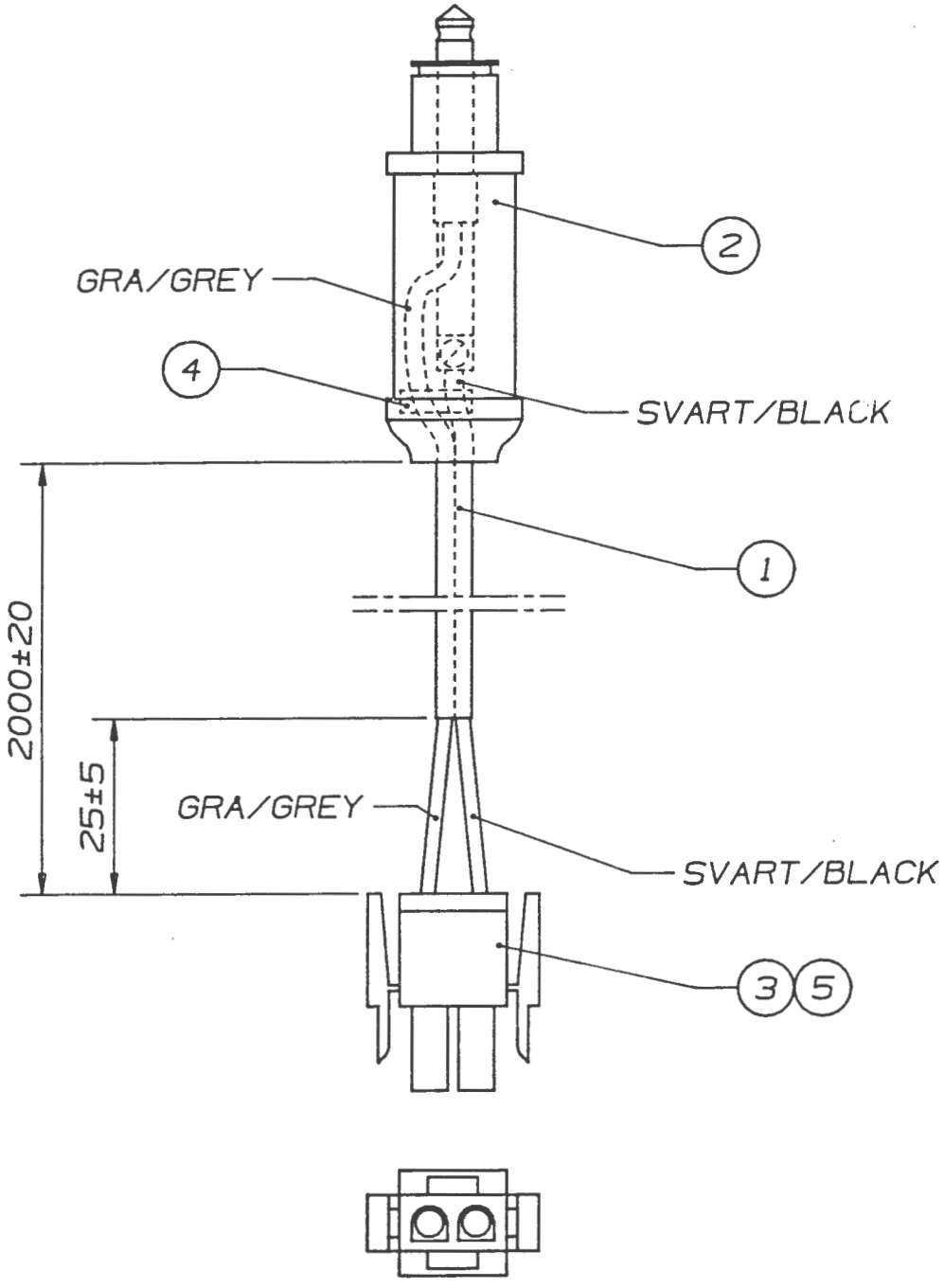
Old Kit:s and Cabinets is still valid and usable in old installations.

3. AFFECTED PRODUCTS:

None. (See above).

4. RECOMMENDED MEASURES:

None.



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Referenser - *References*
CAD: UNIGRAPHICS II

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KI/ECS/EU/TR/PM Y/TF/PT

Dokansv/Godk - *Doc respons/Approved*
Y/TF Per Thelin

Datum - *Date*
1993-02-08

Rev
B

Produktbenämning - *Product name*
KABEL/CABLE

Dokumentnr - *Document No.*

Blad - *Sheet*

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ERICSSON

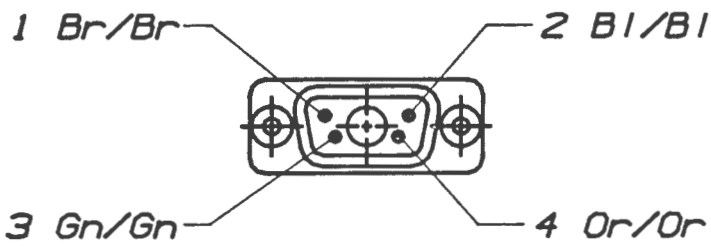
SAMMANSTÄLLNINGSRITNING
ASSEMBLY DRAWING

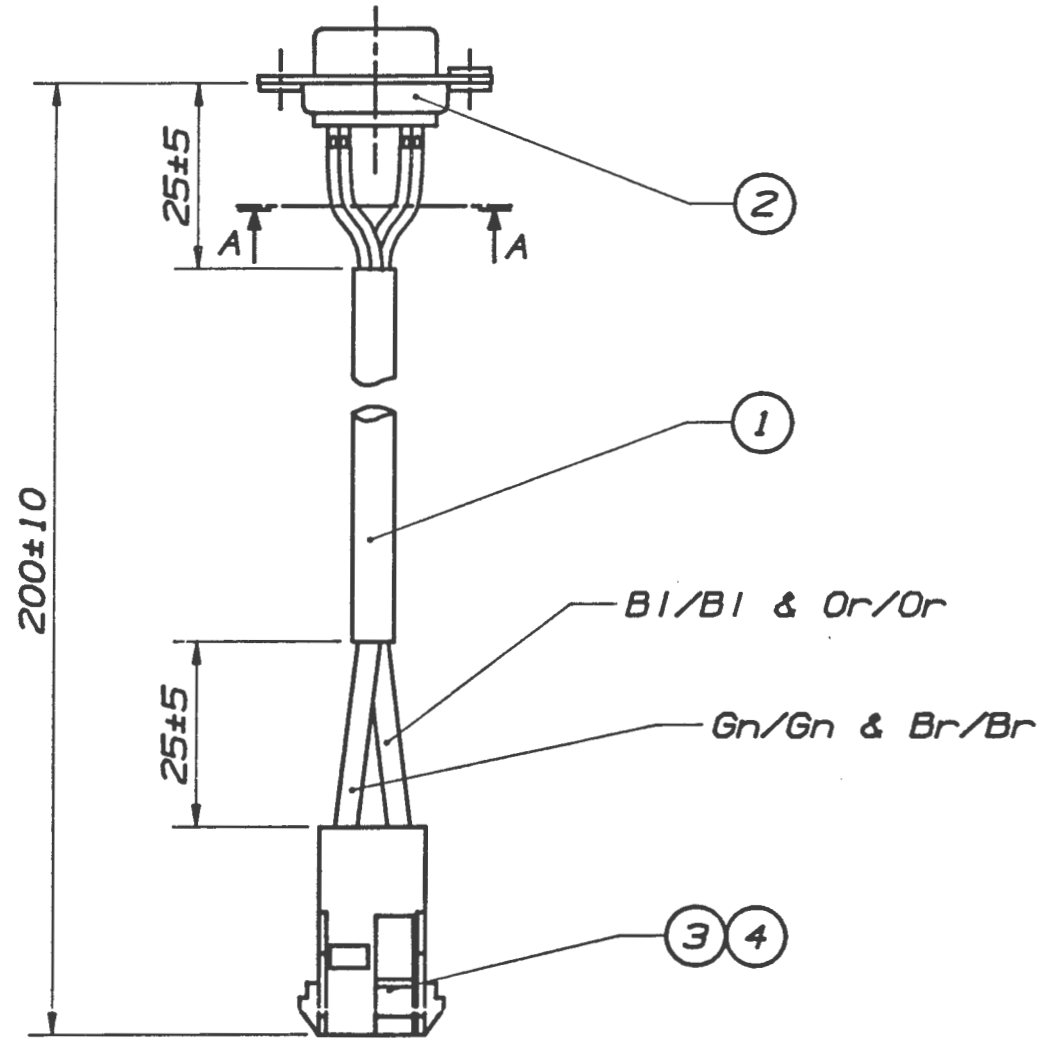
Blad - Sheet 1 (1)

Uppgjord - Prepared	Faktaansvarig - Subject responsible	Nr - No.	
KI/ECS/EU/TR/PM	CP/TMP BL	15188 - RPM 113 670	Ux
Dokansv/Godk - Doc respons/Approved		Datum - Date / Rev	File
EU/TIC		90 07 19 A	
Benämning		Title	
KABEL		CABLE	
Toleranser - Tolerances		Ritningsregler - Drawing rules	Ref

Sheet
Rev

Snitt/Section A-A





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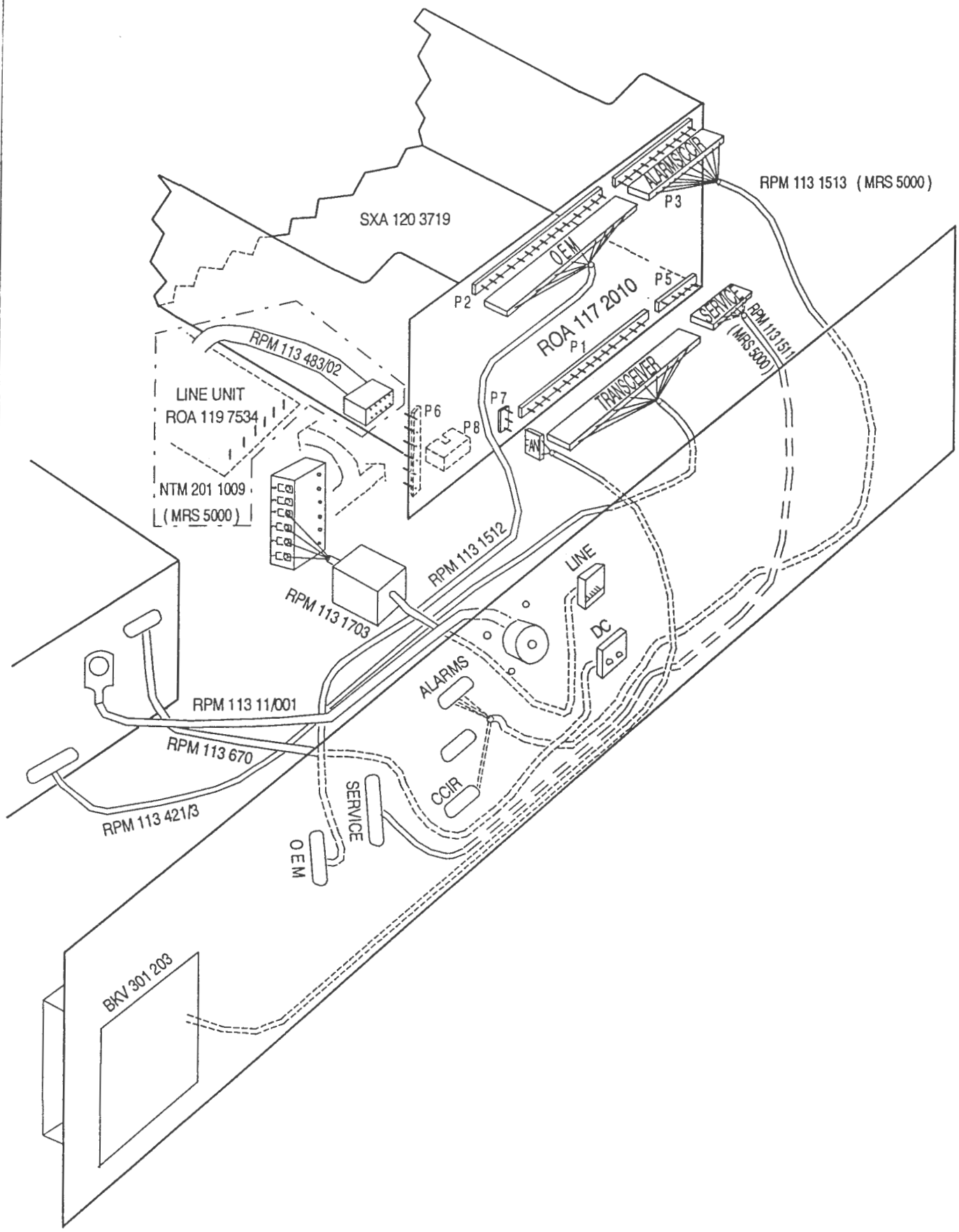

ERICSSON	Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)* KI/ECS/Y/TF S Lindblad	
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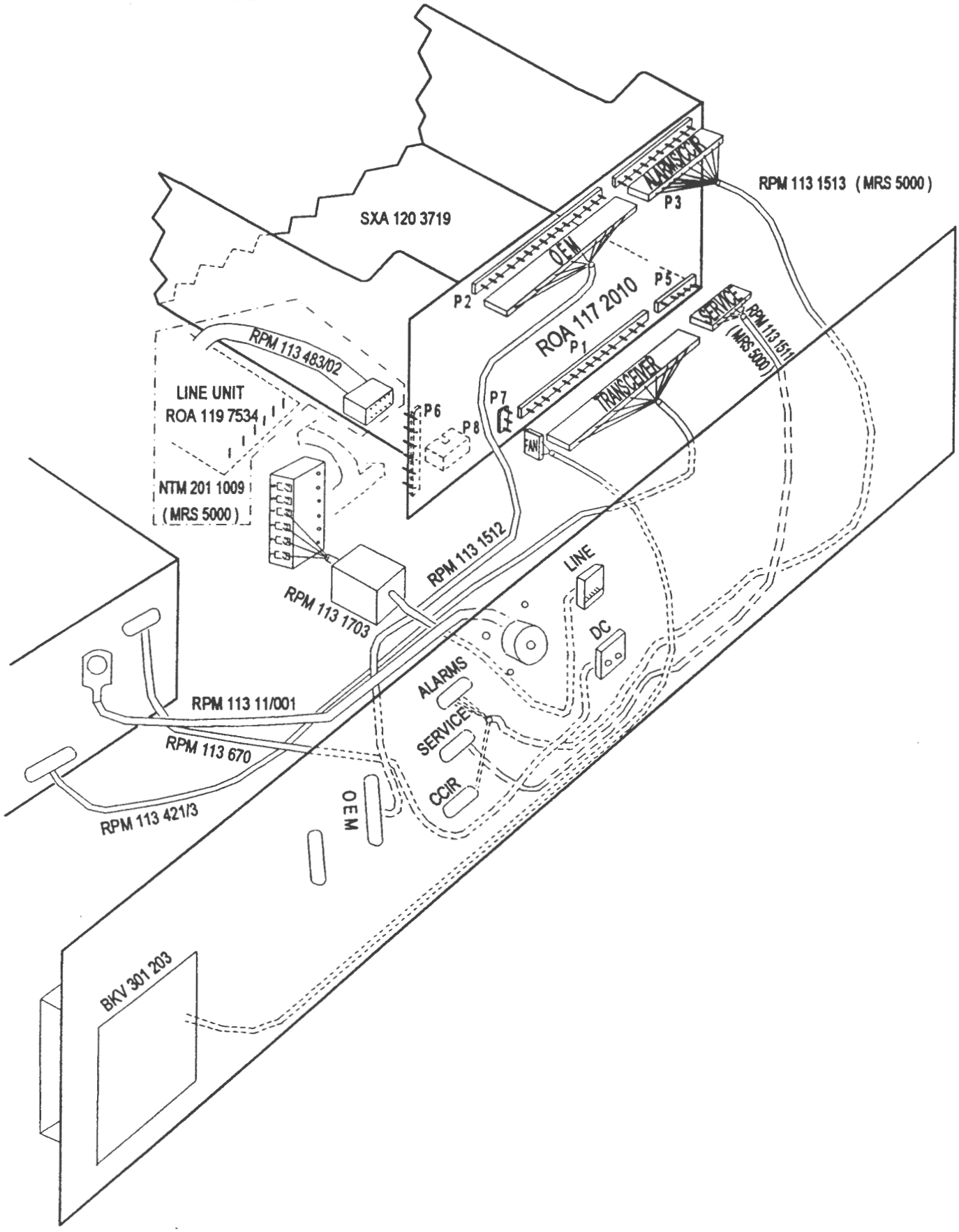
	Dokumentnr- *Document No.* 193 12-SXK 107 2274/4 Uen	Blad - *Sheet* 1 (1)



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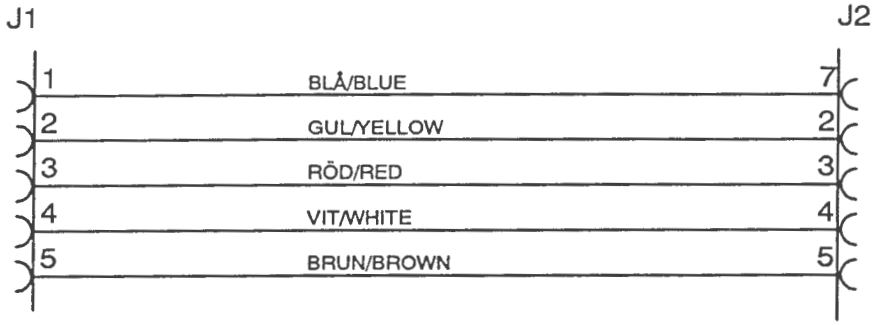
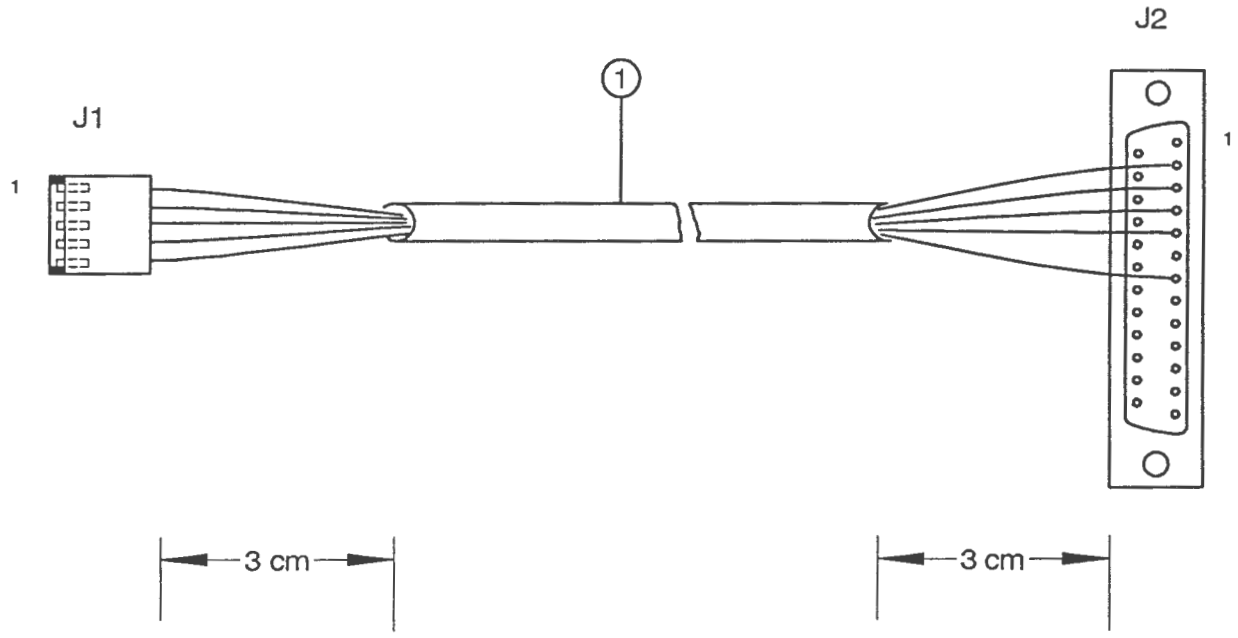
Referenser - *References*	Dokansv/Godk - *Doc respons/Approved* KI/ECS/S/XUC	Datum - *Date* 950511 / Rev B
	Produktbenämning- *Product name* CABLE TERMINAL INFO F800	
	Dokumentnr - *Document No*	Blad - *Sheet*





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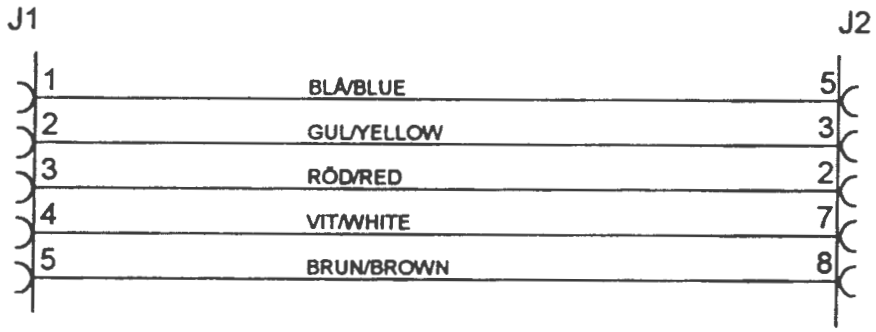
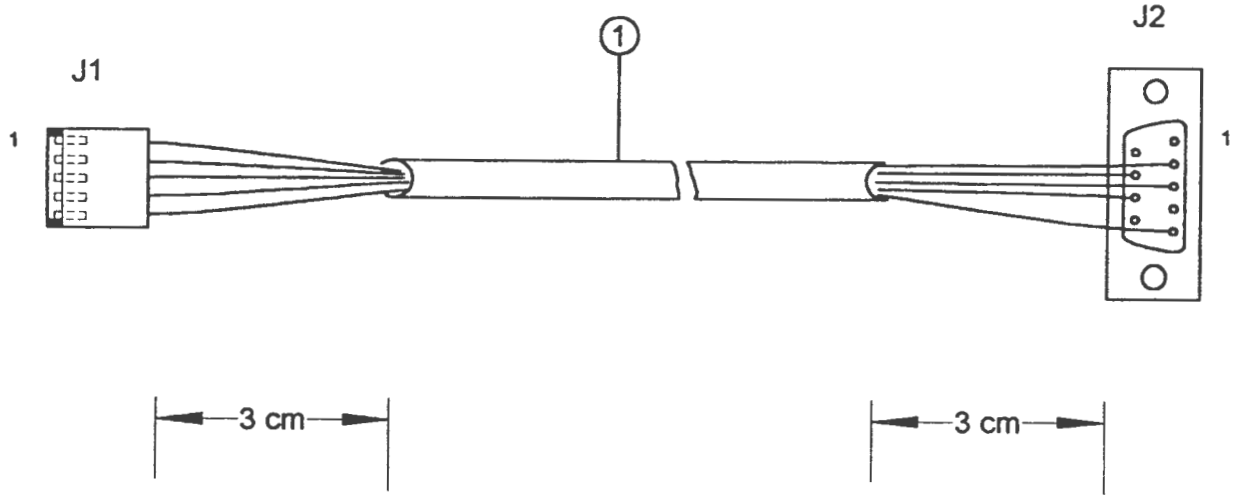
Referenser - *References*	Dokansv/Godk - *Doc respons/Approved* KI/ECS/Y/TF Lena Lelja Datum - *Date*: 940324 Rev: A
	Produktbenämning- *Product name* FÖRBINDNINGSKABEL - CONNECTION CABLE
	Dokumentnr- *Document No.* 15188 RPM 113 1511 Ux Blad - *Sheet*: 1 (1)





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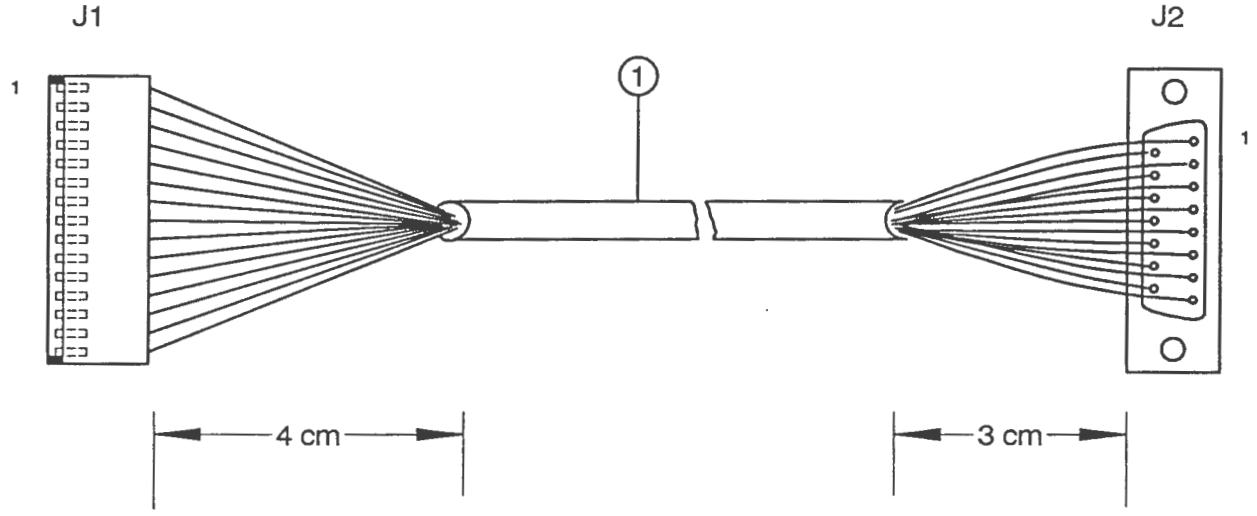
Referenser - *References*	Dokansv/Godk - *Doc respons/Approved*: KI/ECS/S/XUC
	Datum - *Date*: 950511
	Rev: B
	Produktbenämning- *Product name*: FÖRBINDNINGSKABEL - CONNECTION CABLE
	Dokumentnr - *Document No.*
	Blad - *Sheet*

J1		J2
1	GUL/YELLOW	1
2	ORANGE/ORANGE	2
3	BRUN/BROWN	3
4	BRUN-VIT/BROWN-WHITE	4
5	VIOLETT/VIOLET	5
6	BLÅ/BLUE	6
7	GUL-VIT/YELLOW-WHITE	7
8	RÖD-VIT/RED-WHITE	8
9	ORANGE-VIT/ORANGE-WHITE	9
10	SVART/BLACK	10
11	GRÖN/GREEN	11
12	SVART-VIT/BLACK-WHITE	12
13	GRÖN-VIT/GREEN-WHITE	13
14	BLÅ-VIT/BLUE-WHITE	14
15	RÖD/RED	15



ERICSSON

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*
KI/ECS/Y/TF S Lindblad

Referenser - *References*

Dokansv/Godk - *Doc respons/Approved*
KI/ECS/Y/TF

Datum - *Date*: 940324

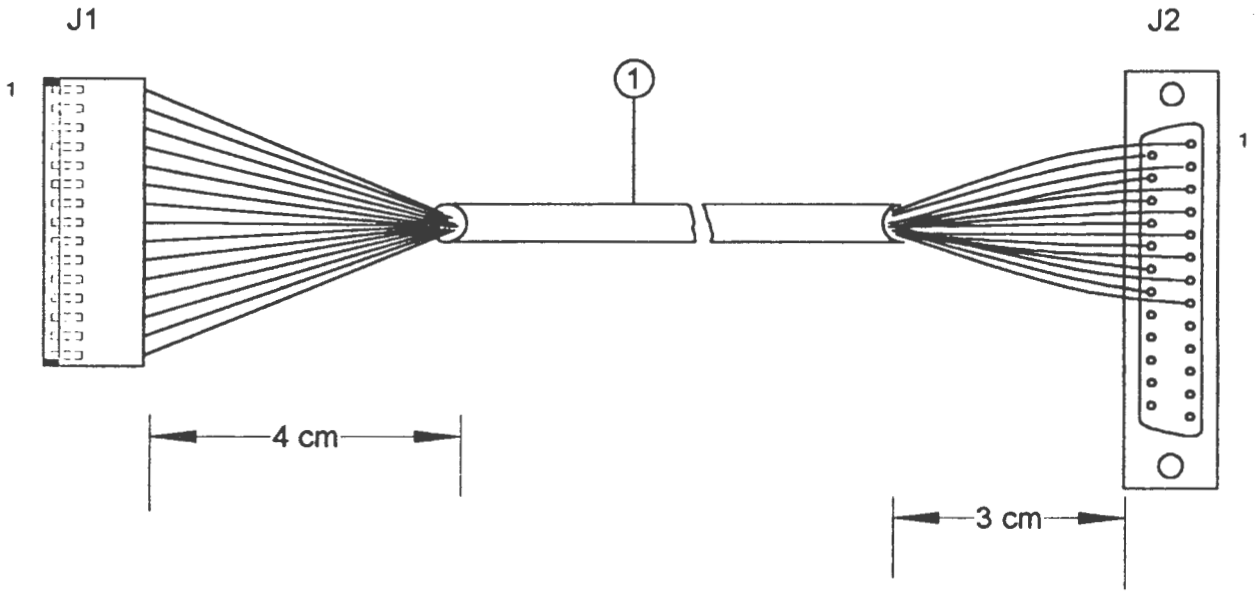
Rev: A

Produktbenämning- *Product name*
FÖRBINDNINGSKABEL - CONNECTION CABLE

Dokumentnr- *Document No.*
15188-RPM 113 1512 Ux

Blad - *Sheet*: 1 (1)

J1		J2
1	GUL/YELLOW	1
2	ORANGE/ORANGE	2
3	BRUN/BROWN	3
4	BRUN-VIT/BROWN-WHITE	4
5	VIOLETT/VIOLET	5
6	BLÅ/BLUE	6
7	GUL-VIT/YELLOW-WHITE	7
8	RÖD-VIT/RED-WHITE	8
9	ORANGE-VIT/ORANGE-WHITE	9
10	SVART/BLACK	10
11	GRÖN/GREEN	11
12	SVART-VIT/BLACK-WHITE	12
13	GRÖN-VIT/GREEN-WHITE	13
14	BLÅ-VIT/BLUE-WHITE	14
15	RÖD/RED	15



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Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*
KI/ECS/S/XU S. Lindblad

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Dokansvl/Godk - *Doc respons/Approved*
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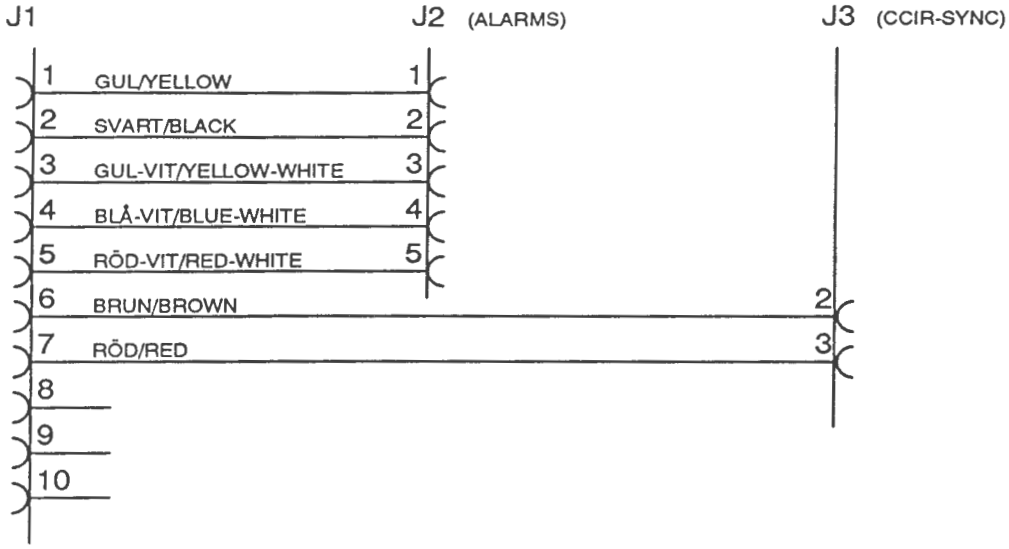
Datum - *Date*
950511

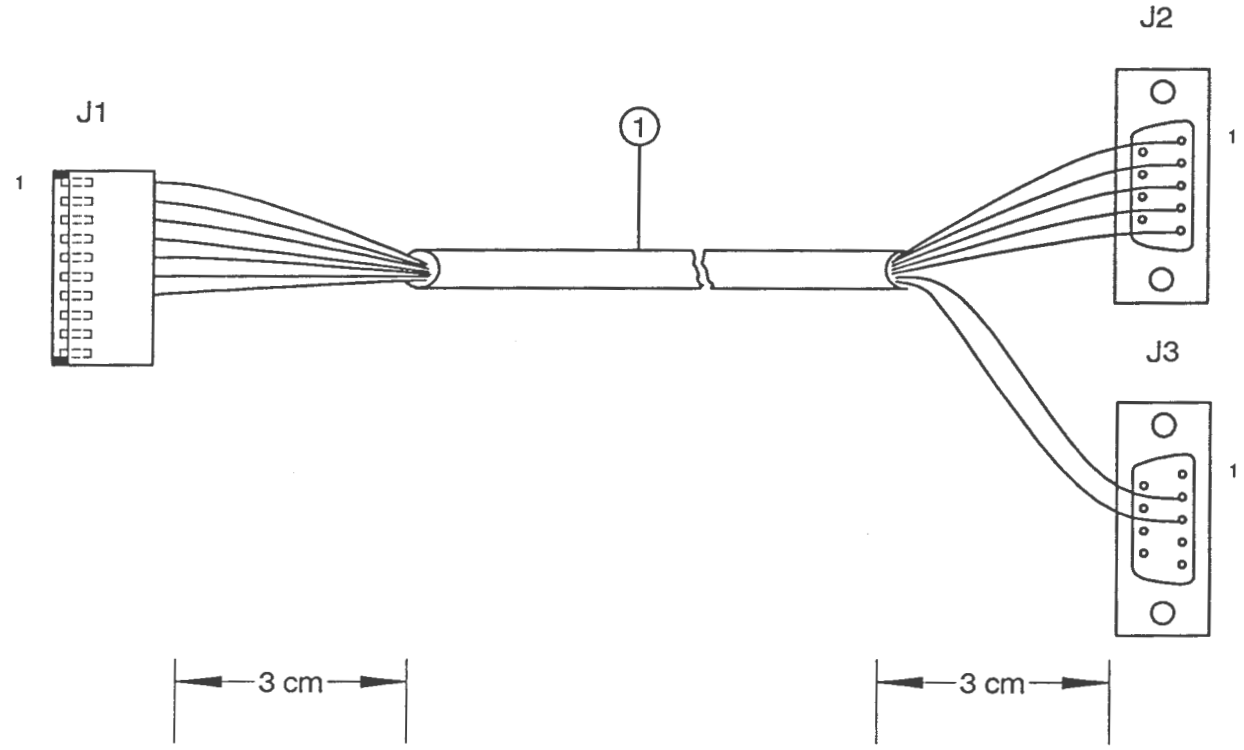
Rev
B

Produktbenämning- *Product name*
FÖRBINDNINGSKABEL - CONNECTION CABLE



KABLAR SOM INTE INKOPPLAS ISOLERAS MED KRYMPSLANG.

UNUSED WIRES TO BE INSULATED WITH SHRINK TUBING.



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		Rev A
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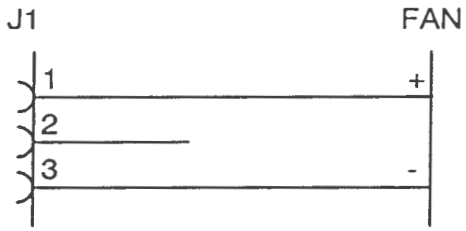

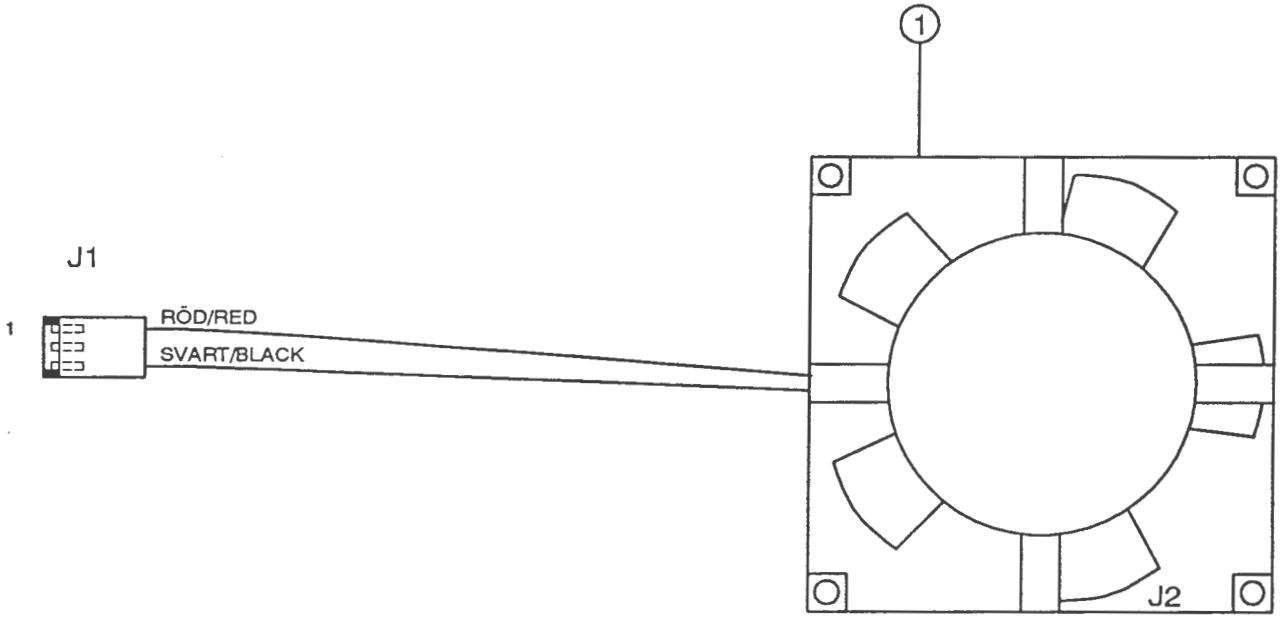

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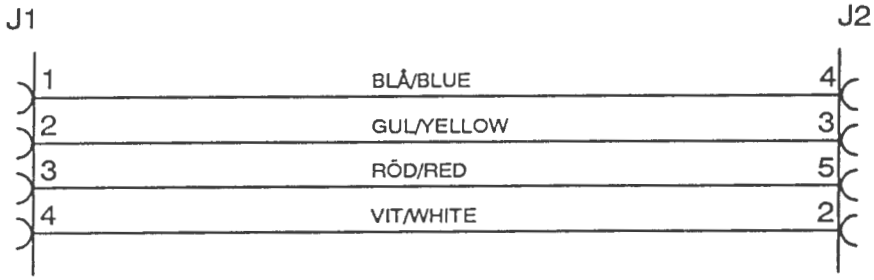

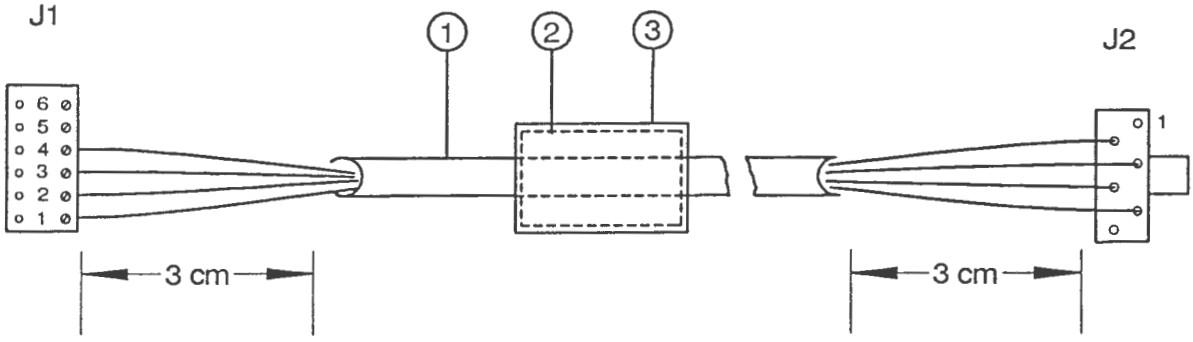

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ERICSSON

FÖRBINDNINGSSCHEMA
WIRING DIAGRAM

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Dokansv/Godk - *Doc respons/Approved*		Datum - *Date*	Rev / File
Y/TF Stefan Ulvelund		92 08 25	E / GMF2811H

Benämning	*Title*
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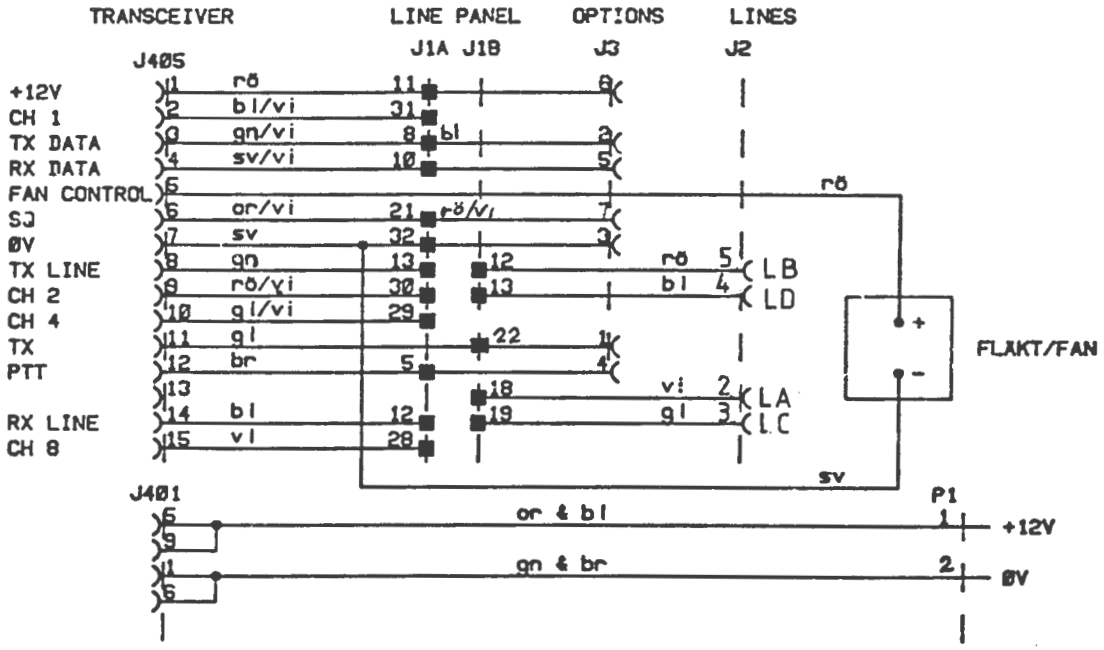
Toleranser - *Tolerances*	Ritningsregler - *Drawing rules*	Ref

Sheet
Rev



Bildkort

ERICSSON

FÖRBINDNINGSSCHEMA
WIRING DIAGRAM

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Dokansv/Godk - Doc respons/Approved	Datum - Date	Rev	File
EU/TIC	920311	D	GMF2812H

Benämning	Title
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Toleranser - Tolerances	Ritningsregler - Drawing rules	Ref

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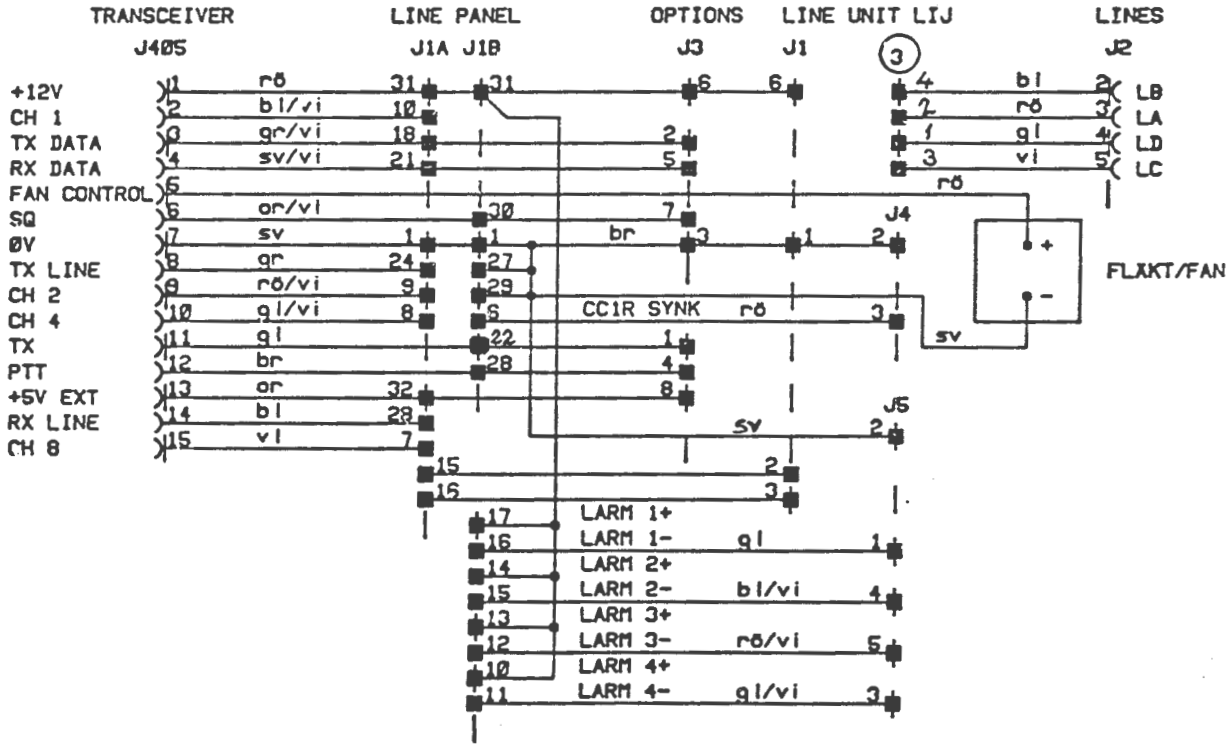
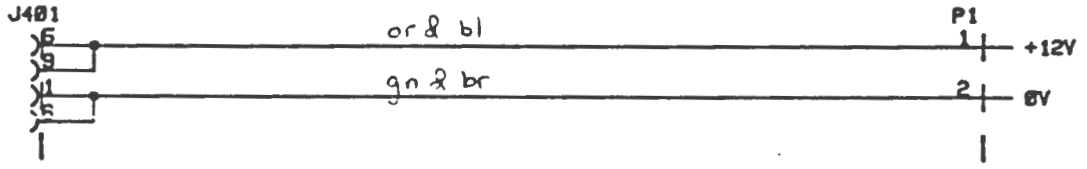
Rev





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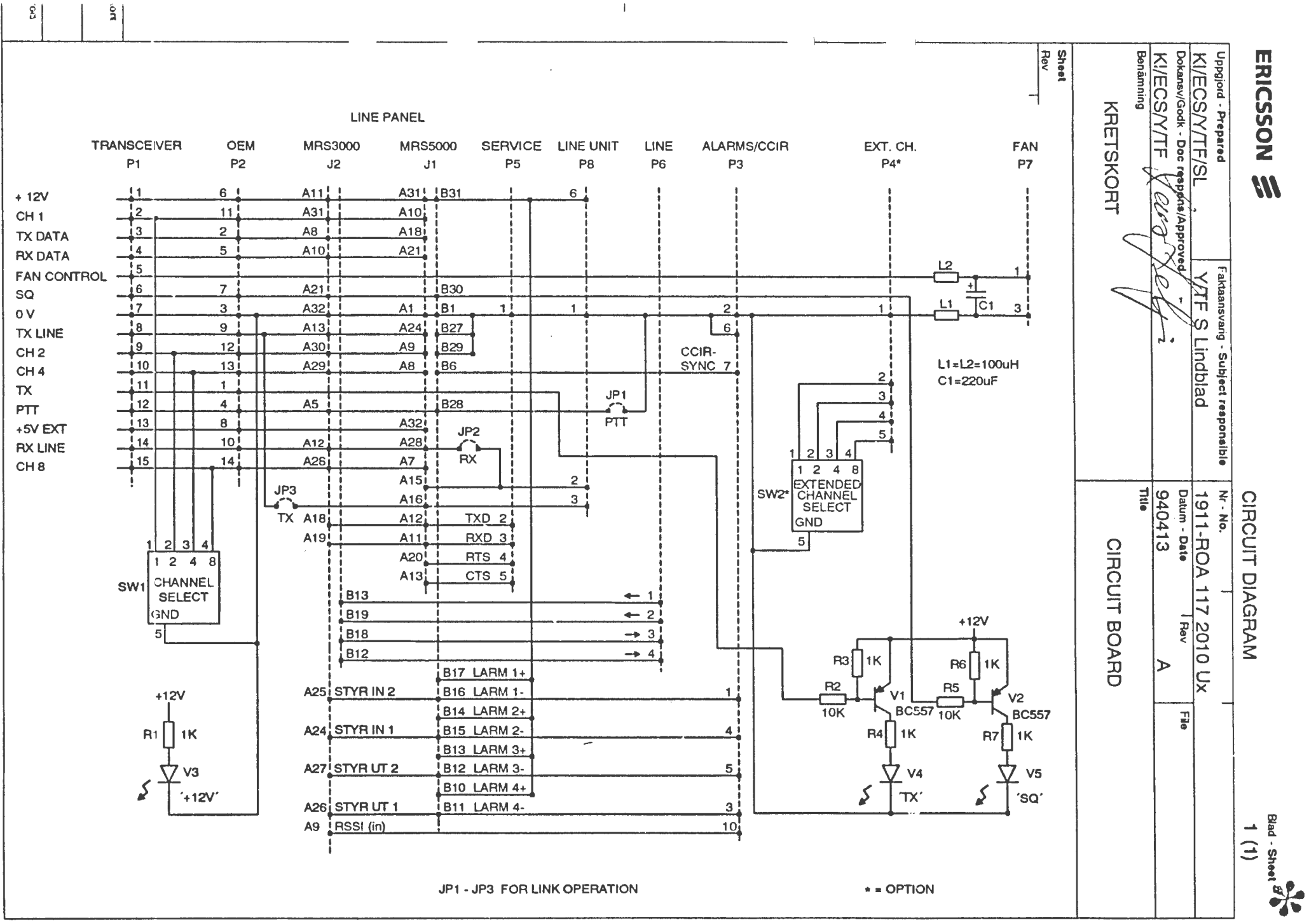

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CIRCUIT DIAGRAM

Sheet 1 (1)

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Benämning	KRETSKORT
Faktaansvarig - Subject responsible	YTF S Lindblad
Nr - No.	1911-ROA 117 2010 Ux
Datum - Date	940413
Rev	A
File	
Title	CIRCUIT BOARD

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ERICSSON

Komponentplacering

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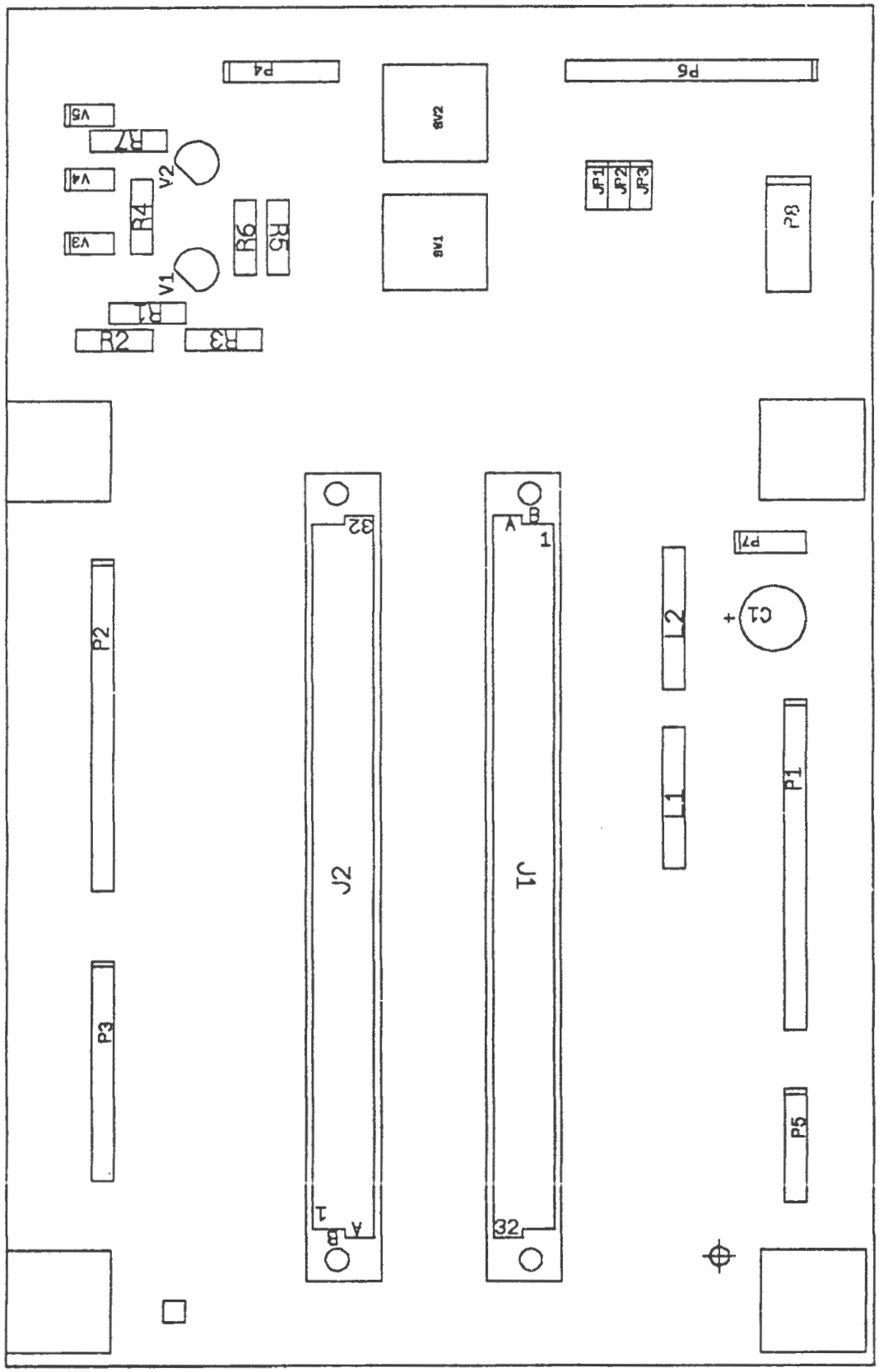
KI/ECS/Y/TF		940325 A	
Benämning		Title	
KRETSKORT		PRINTED BOARD	

Sheet
Rev

P1, P2, P3, P5 OCH P7 MONTERAS PÅ S-SIDA. ALLA ANDRA KOMP. PÅ P-SIDA.
P1, P2, P3, P5 AND P7 TO BE MOUNTED ON THE S-SIDE. ALL OTHER COMPONENTS ON THE P-SIDE.



ERICSSON Ericsson Radio Systems

SAMMANSTÄLLNINGSRITNING / ASSEMBLY DRAWING

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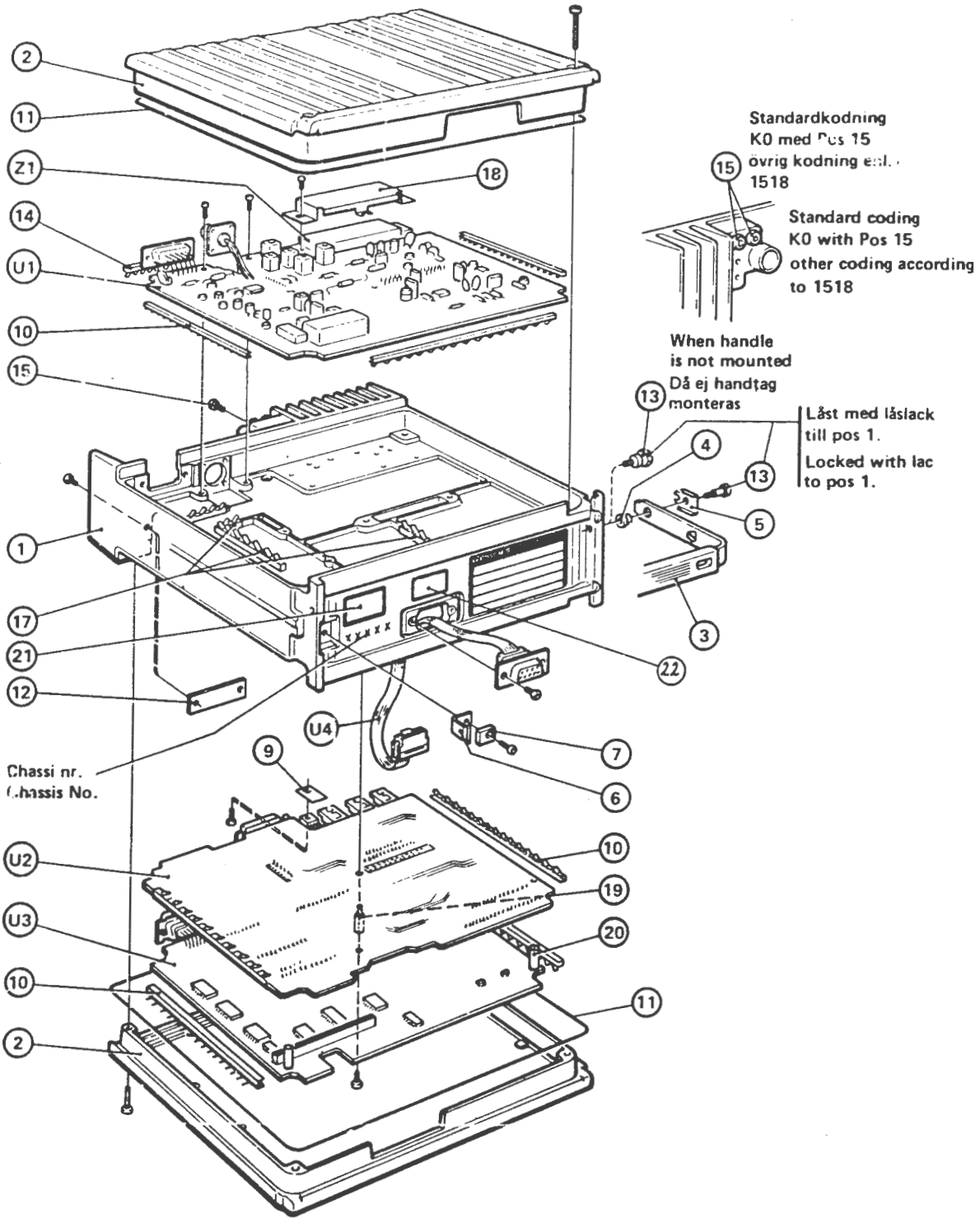
F/RBA IAn	FT/RKK	15188 - NTM 201 57 Ux

Dokansv Godk Doc respons Approved	Datum Date	Rev	File
FT/RKKC Nyxxxxxxxx	90 11 14	E	

Benämning	Title
STATIONSENHET C700	STATION UNIT C700

U1. Radiokort/Radio board
U2. CPU-kort/CPU-board
U3. Kommunikationskort/Communication board



Bildkort

Reprod

R

Bl 4201 FA4a

—A —FILTER OCH SÄKRING
—B —SPÄNNINGSREGULATOR
—C —SLUTSTEG
—D —DRIVSTEG
—E —DIODOMK. FÖR INGÅNG
—F —RIKTKOPPLARE
—G —EFFEKTINDIKATOR
—H —REGLERKRETS
—I —HF-DETEKTOR
—K —ANTENNFILTER
—L —BACKEFFEKT INDIKATOR

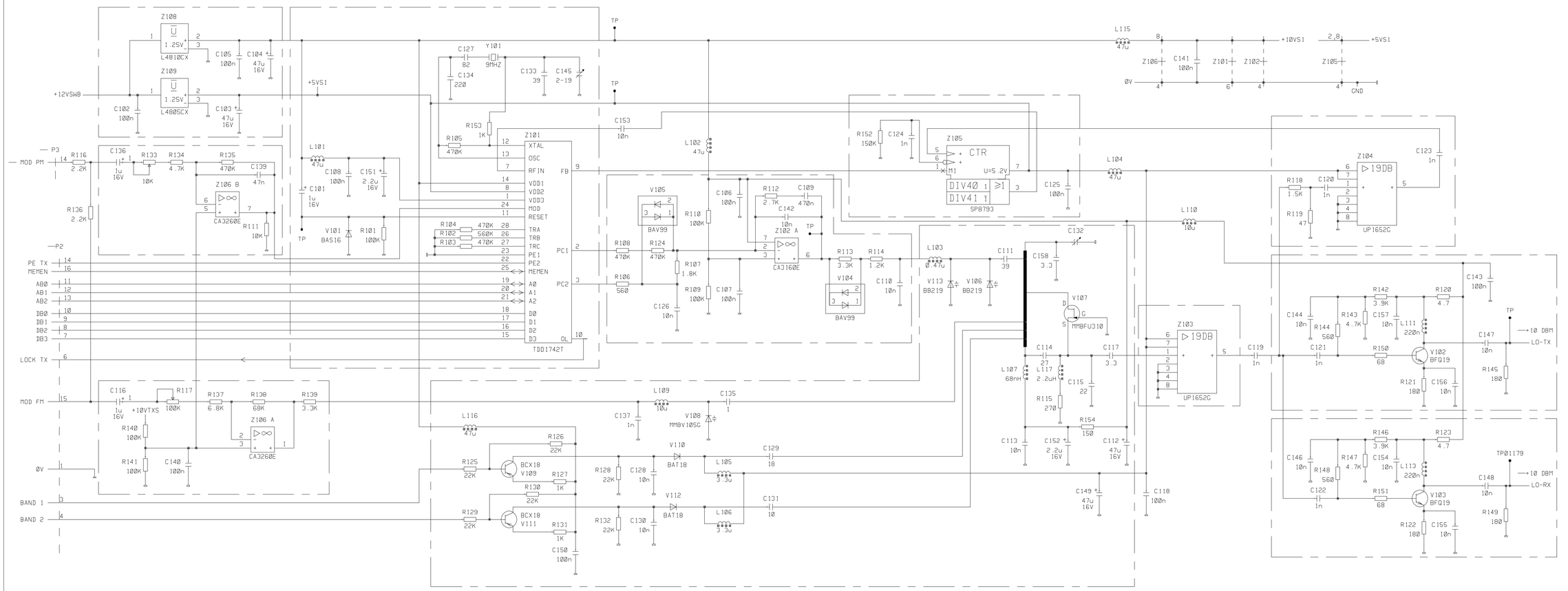
—A —FILTER AND FUSE
—B —VOLTAGE REGULATOR
—C —POWER AMPLIFIER
—D —DRIVER
—E —DIODSWITCH INPUT
—F —DIRECTIONAL COUPLER
—G —POWER DETECTOR
—H —ALC CIRCUIT
—I —RF-DETECTOR
—K —ANTENNA FILTER
—L —REVERSE POWER DETECTOR

P2 5
P3 5 ON
P1 5 9 BATT 1 6
L20 L21
Z2 EMI FILTER
F1 10A
V22 PFZ18A
C40 100n
POSS
+12V
F2 4A
SYNT RX
+12VSWB
R13 470
R12 33K
BCX 69-25 V21
C54 1n
C48 100n
Z15 L4810CV
C56 100n
C49 47u
C55 1n
TP1
Z3 11
+10VT
C52 100n
P2 2
P3 2
+12VUNSW
RX/TX 10
+10VT
R73 33K
R74 4.7K
V11 BCX18
C41 1n
R11 1K
L18 4.7uH
C5 1n
R51 150
C30 1n
L8 +12V
C12 15u
C11 100n
L9 +12V
C14 15u
C13 100n
Z1
L7 4.7uH
V7 M1308
C1 470
V4 M1308
LO TX
C35 10n
R1 470
V17 BAT18
C44 100p
R58 6.8K
R59 47
V14 BFQ19
L17 150nH
C46 27p
L16 100nH
R14 10
L3 150nH
R60 100
C9 100p
R56 1.8K
C45 1n
R57 10K
C47 1n
L5
C16 22p
C15 27p
C18 470p
0V 15
C19 1n
R15 10K
R33 68
V6 BAT17
C17 10p
R9 220
Z3 A
V20 BAT17
R23 10K
C28 1n
R10 15K
LM2902M
R26 4.7K
R7 10K
11 POWER IND
R8 22
+10VT
V13
R2 22K
R22 100K
Z3 D
R42 10K
V19 BCX19
R6 47K
C38 68n
R5 10K
R4 1K
R3 22K
BST60
TP3
V8 BAT17
R16 1K
C42 1n
R53 15K
R54 15K
V16 BAS16
L6 4.7uH
C57 10u
R52 4.7K
C26 1n
C51 1n
C23 1n
R32 1K
P2 6 6
LOCK IN IND TX
TX ON 13
V1 BAS16
R72 22K
+10VT
R71 10K
R77 33K
V12 BCX18
R28 100K
R41 3.9K
R19 100
R21 5.6K
POWER HIGH
C4 22p
C20 3.9p
C27 10n
L11 47nH
L10
L12
L13
C22 10n
P5 1 2
V10 BAT18
C33 47p
V9 M1308
R75 10K
C50 68p
C3 5.6p
C34 68p
L15
R76 10K
C36 10p
C2 x
NOT MOUNTED
+10VT
R31 18K
Z3 B
R30 1.5K
R29 10K
LM2902M
C24 1n
C25 1n
R27 10K
V5 BAS16
R40 10K
R38 2K
C29 1n
Z3 C
R39 100K
LM2902M
R34 33K
R20 10K
R18 5.6K
POWER LOW
POWER RED 12
C6 1n
IN RX

ERICSSON	Uppgjord (även fakt.ansvarig om annan) - Prepared (also subject responsible if other)	
	ECS/Y/TR L.SKOGLUND	
Referenser - References	Dokansv/Godk - Doc respons/approved	Datum - Date / Rev
gmf1431	Y/TRC (S.KARLSSON)	95-02-21 AE
	Produktbenämning - Product name	
	C702 TRANSMITTER	
	Dokumentnr - Document No	Blad - Sheet
	1911-ROA 119 7527 Ux	1 (3)

—A —SP(NNINGSREGULATORER
—B —SYNTESKRETS
—C —PRESCALER
—D —ISOLATIONSF:RST(RKARE F:R PRESCALER
—E —SLINGFILTER
—F —UTG)NGSSTEG TILL MOTTAGARE
—G —UTG)NGSSTEG TILL S(NDARERE
—H —VCO
—I —ISPLATIONSF:RST(RKARE F:R VCO
—K —F:RST(RKARE F:R FASMODULATOR
—L —F:RST(RKARE F:R FREKVENSMODULATOR

—A —VOLTAGE REGULATOR
—B —SYNT CIRCUIT
—C —PRESCALER
—D —BUFFER AMPLIFIER FOR PRESCALER
—E —LOOP FILTER
—F —OUTPUTSTAGE TO RECEIVER
—G —OUTPUTSTAGE TO TRANSMITTER
—H —VCO
—I —BUFFER AMPLIFIER FOR VCO
—K —AMPLIFIER FOR PHASEMODULATOR
—L —AMPLIFIER FOR FREQUENCYMODULATOR



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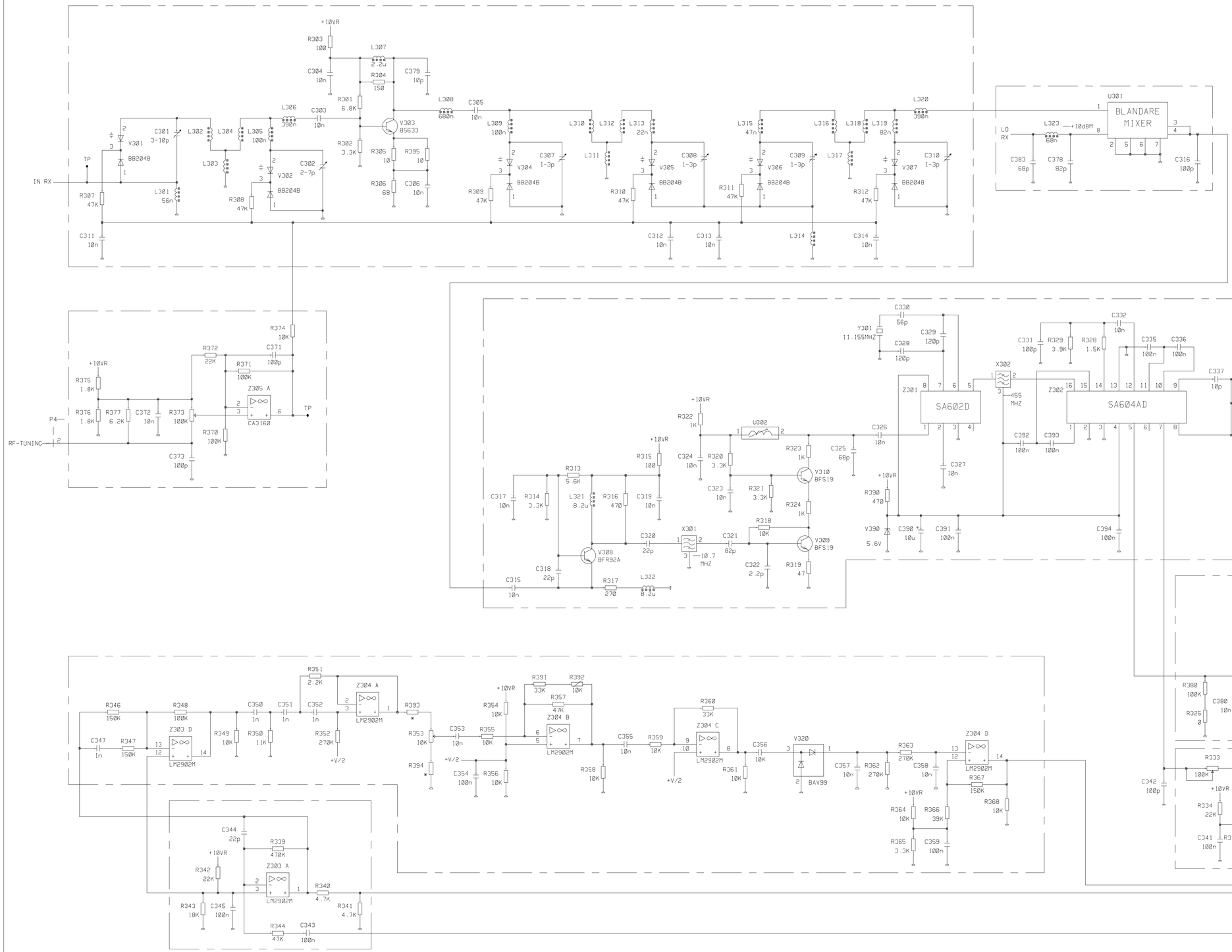

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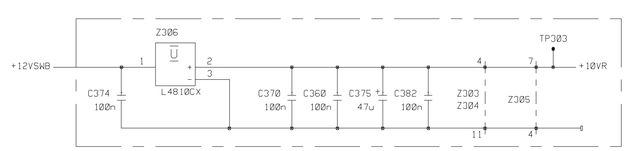
ROA 119 7527/2	100K	10K	3.9K



—A —HF-STEG
—B —AVST(MNINGSKRETS
—C —BLANDARE
—D —MF-FÖRSTÄRKARE
—E —FÖRSTÄRKARE FÖR SIGNALSTYRKEUTGÅNG
—F —FÖRSTÄRKARE DATA
—G —FÖRSTÄRKARE TAL
—H —BRUSSPÄRRDETEKTOR
—I —SPÄNNINGSREGULATOR

—A —RF-STAGE
—B —TUNING CIRCUIT
—C —MIXER
—D —IF-AMPLIFIER
—E —AMPLIFIER FOR RSSI OUTPUT
—F —AMPLIFIER DATA
—G —AMPLIFIER SPEECH
—H —SQUELCH DETECTOR
—I —VOLTAGE REGULATOR

ERICSSON

Referenser - References
gmf1433

Upprättad (även fråtsansvarig om annan) - Prepared (also subject responsible if other)
ECS/Y/TR L.SKOGLUND

Dokansv/Godk - Doc respons/approved
Y/TRC

Datum - Date
95-02-21

Rev
AE

Produktbenämning - Product name
C702 RECEIVER

Dokumentnr - Document No
1911-ROA 119 7527 Ux

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Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*
KL/ECS/S/LT Magnus Lindahl

Dokansv/Godk - *Doc respons/Approved*
KI/ECS/S/LTC

Kontr - *Checked*

Nr - *No.*
ECS/S/LT-96:5044

Datum - *Date*
1996-06-06

Rev
A

File

F800 Circuit description

CONTENTS:

INTRODUCTION

The Ericsson F800 base station can operate in simplex, semi duplex and duplex mode or as a repeater station. The unit can be configured to operate as a stand alone, tone controlled repeater station or base/repeater station in MRS3000 or MRS5000 system. It is also possible to set up F800 as a carrier controlled repeater station.

F800 is available in both simplex and duplex versions for VHF (68-88 MHz, 146-174 MHz) and UHF (378-470 MHz) bands. A link version for low UHF (370-415 MHz) is also available. Nominal output power in base and repeater versions are 20 W and in link version the output power is set to 6 W. If required the output power can be reduced to two (2) watt. In standard versions the radio has 16 channels but with an option 255 channels can be used.

The F800 base station is housed in a 19” cabinet intended for rack mounting or with installation brackets, wall mounting. The cabinet contains a radio unit, line interface and also has room for built-in filters if required. F800 is powered with external 12V DC via a 2-pole connector found on the rear of the cabinet. Line and RF connectors are also found on the rear of the cabinet. In addition to the mentioned connectors there are connectors for transmitter synchronisation and alarms located at the rear. In OEM version there is an OEM connector also found at the rear.

Application examples are described in document ECS/S/XT-95:7049, ECS/S/LT-96:1013, ECS/S/LT-96:1018.

For easy service and maintenance the radio unit is fitted in a cassette and the line interface is fitted in a slot.

Radio unit

The radio unit includes two sub-units, PCBs, a radio board and a processor board. A third board, option board, is used whenever any of the options are used. All PCBs are installed in a die-cast enclosure. All connections between the radio unit and the other facilities in the cabinet are made through connectors on the rear end of the radio unit and the corresponding connectors in the cassette.

Processor board

The processor board incorporates an 8-bit microprocessor with periphery circuits for controlling the frequency generator and transmitter on the radio board and AF paths found both on the processor board and optional boards. The required software is stored in one EPROM, Z2. All customer specific parameters are stored in an EEPROM, Z4. The processor board interfaces external units and provides DC power to external units. The processor board is used in all versions of F800.

Radio board

The radio board includes the following major blocks; a frequency generator (two in duplex version), a receiver and a transmitter. In addition to these blocks there are circuits for internal power supply.

The transmitter is frequency modulated and the receiver is of super heterodyne type. The frequency generator uses a phase locked loop (PLL) and is used to generate the local oscillator signal for the receiver as well as the carrier for the transmitter. The type of radio board used, depends on frequency band and operational mode.

Line interface

In the cabinet there are two slots for standard Euro size boards with 64-pin connectors. The upper slot is used for LP100, LP200, and LP210 (MRS3000). The lower slot is used for RC-5 and LP3 (MRS5000).

The line interfaces are described separately.

Programming

All customer specific parameter such as frequencies etc. are stored in a EEPROM in the radio unit. Programming of the prom is described in document S/LT96:1014.

Options

The number of channels can be increased to 255 by fitting an option board.

If transparent data is required, this can be obtained by fitting a 4-wire interface to the radio unit.

Note: Only one of the above mentioned options can be installed.

The option boards are described separately.

F800 can be used as a carrier controlled repeater station. This does not require any additional hardware and all the necessary functions are described in the programming manual, S/LT96:1014.

RADIO BOARD

There are a number of different radio boards for F800, both for simplex operation as well as duplex operation. Common for all versions of the radio board is that they are divided into a number of function blocks. Each block has a specific function. The number of function blocks depending on the operation mode and frequency band. The radio board is controlled by the CPU- board by a number of different signals. The following blocks and signals are found on the radio board:

– *Frequency generator.* In simplex versions one frequency generator is used and in duplex versions there are two frequency generators used. The frequency generator is controlled by the CPU- board with *channel information* and *latch* signals. From the frequency generator a *locking* signal is send to the CPU- board. To achieve a faster locking of the frequency generator the frequency band is divided into four bands. The band selection is done from the CPU- board by the *band selection* signal. In simplex mode the same frequency generator generates both *1st local oscillator* signal and *transmitter carrier*. Duplex one frequency generator is used to generate local oscillator and a second generator is used for generation of transmitter carrier. All modulation is done in the frequency generator. There are two modulation signals used, *mod FM* and *mod PM*.

– *Receiver.* Converts RF signals to AF signals. The receiver is a double super heterodyne type. The receiver *DATA* and *SPEECH* signals are connected to the CPU- board. A *SQUELCH* signal as well as a *RSSI* signal is obtained from the 2nd IF in the receiver. These two signals are used by the CPU- board. To optimise the function of the receiver, the front end is electrically tuned from the CPU- board by the *RF- tuning* signal.

– *Transmitter.* The transmitter amplifies the modulated signal from the frequency generator. The transmitter output is controlled by the *transmitter control* block on the radio board and by the CPU- board. The output power can be set in two different levels, the CPU- board selects high or low output with the *power red* signal. The transmitter is monitored by the control block and as long as the transmitter delivers output power the *power ind.* signal is active.

– *Antenna switch.* Simplex only. The antenna switch controls the RF signal path and switches the antenna to either the receiver or the transmitter. The antenna switch is controlled by the DC power supply on the radio board. In duplex mode an external duplex filter must be used.

– *Power supply.* DC power supply, 5 V, 10 V and 12 V, for the different function blocks on the radio board. The power supply also contains fuses and DC filters. The power supply also controls the transmitter on/off and the antenna switch, this is indirectly done by the CPU- board with the *TX on* signal. The DC power supply is controlled by the CPU- board with the *On/Off* signal.

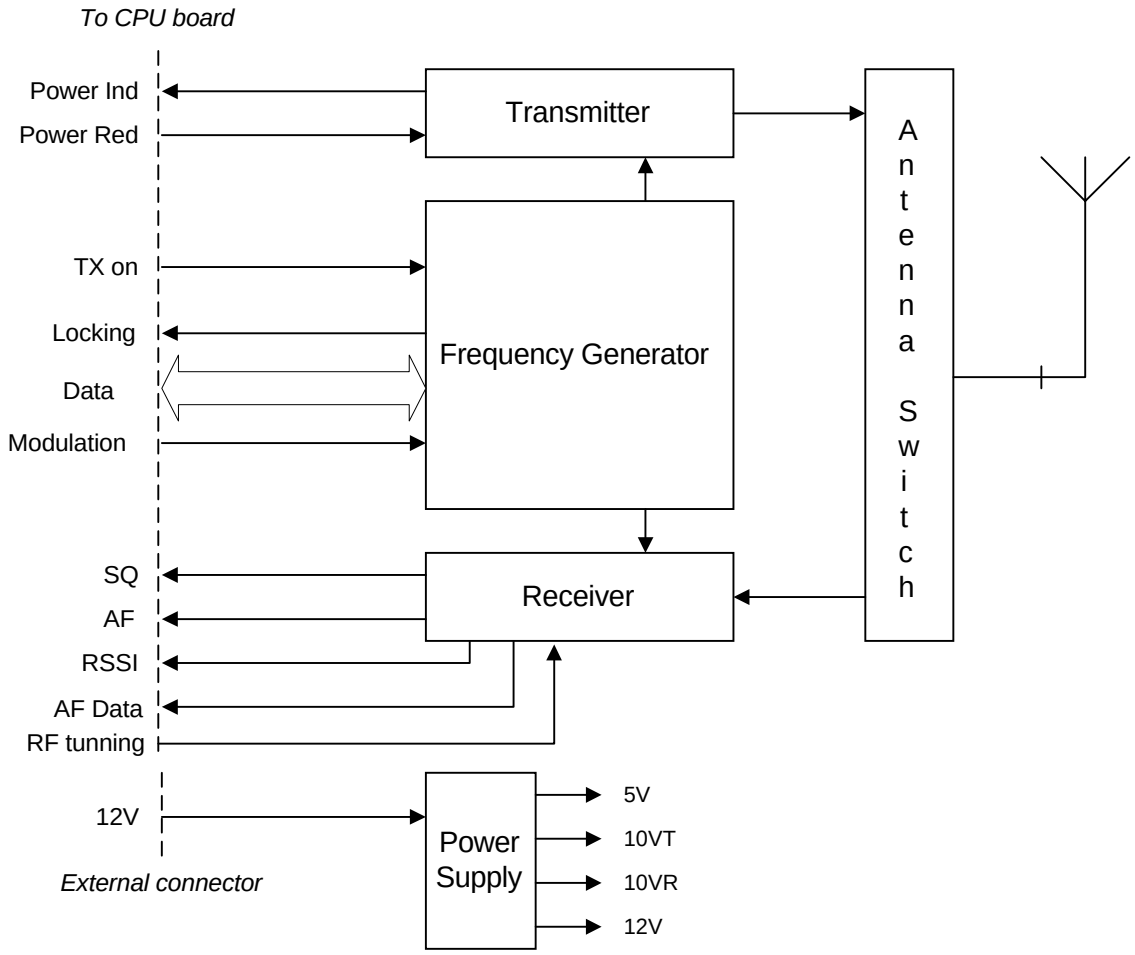

Fig A: Block diagram radio board, simplex version

The radio board is a multilayer printed circuit board and the majority of the components are surface mounted on the PCB. To obtain proper grounding and the required screening, the board is attached to the F800 chassis by nine screws. The radio board is exchanged as one unit during normal field service and requires no tuning.

There are three connectors on the radio board, one external for DC supply and two internal for signals between the CPU board and the radio board.

Frequency generator

The frequency generator is implemented as a conventional phase locked loop controlled synthesiser. In simplex versions of F800, one frequency generator produces local oscillator signal for the receiver and also the transmitter carrier. In duplex versions, one frequency generator is used for local oscillator and one frequency generator is used to produce the transmitter carrier.

The following circuits are the major parts of the frequency generator used in simplex versions:

- VCO, Voltage Controlled Oscillator.
- PLL, synthesiser circuit
- Prescaler
- Loop filter
- Crystal reference oscillator
- Buffer stage
- Output amplifiers

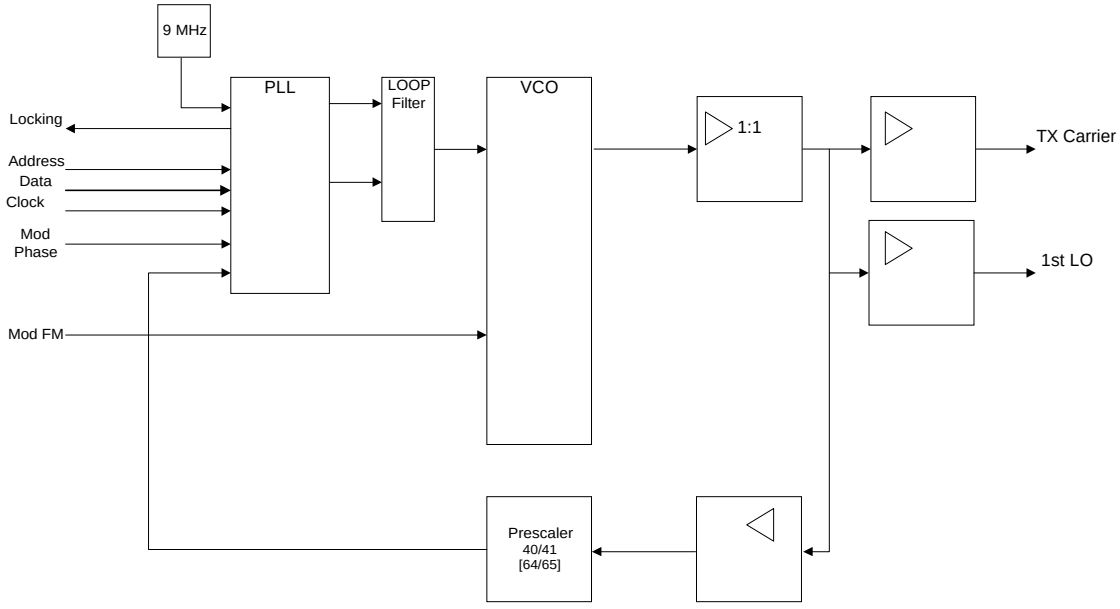

Fig B: Frequency generator, principal diagram

In duplex versions two frequency generators are used. Both generators are built with the same blocks as used in the simplex generator as indicated above.

Reference oscillator

The common reference oscillator is a crystal controlled oscillator with fixed frequency. In F800 versions made for 25 kHz channel spacing the reference frequency used is 9 MHz.

The crystal oscillator obtains bias voltage from the PLL circuit. The signal from the reference oscillator is fed to the PLL circuit where it is divided by a internal divider to create the internal PLL reference. The internal PLL reference signal is 12,5 kHz in all versions that works with 25 kHz channel spacing.

In duplex versions the same reference oscillator is used for the RCS frequency generator as well as the TX frequency generator.

PLL circuit and loop filter

The PLL circuit controls the VCO. The VCO signal is compared with the reference signal in the PLL circuit. The phases of the two signals are compared. Since the frequencies of the two signals are not at all the same, 9 MHz from the reference oscillator and the VCO signal have at least 10 times higher frequency, the signals must be divided down to a common frequency.

The PLL circuit has three internal programmable divider stages, one for the reference signal and two for the VCO signal. The denominators, i.e. the contents of the divider stages, are loaded into the PLL circuit by data from the CPU- board. According to the loaded denominators, the PLL circuit will activate a signal for control of the external prescaler.

The prescaler denominator has two fixed values, 40 or 41 for F802 and F804 and 64 or 65 for F805. Selection of one of the two denominator values is done through the PLL circuit.

The data for the PLL circuit is loaded as eight nibbles of four bits, two nibbles for each of the divider used to divide the VCO signal and one nibble for the divider used for the reference oscillator signal. In the remaining nibble there is also information used for control of the prescaler. The serial data is clocked into the registers (dividers) of the PLL circuit by a clock signal. The registers in the PLL circuit are made accessible by a strobe signal. In the case there are two PLL circuits for duplex operation each PLL circuit has it’s own strobe signal but the clock and data signals are common. The three least significant bits of the address bus from the CPU- board are used for addressing the different registers in the PLL circuit. The data is obtained through the four least significant bits of the databus from the CPU- board.

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The 12,5 kHz VCO signal is compared with the 12,5 kHz reference oscillator signal in two phase demodulators / comparators in the PLL circuit. The first phase demodulator, PC1, is made with analogue components and has a high gain. This is the main comparator. The second phase demodulator is implemented with digital components. The second comparator, PC2, has a wider range to allow faster lock times. When a small phase error is achieved the second phase demodulator is disconnected to avoid generation of noise etc. The comparison results in two signals, one from each demodulator. From the first phase demodulator, PC1, a slow ramp signal is obtained and from the output of the second phase demodulator, PC2, fast pulses are obtained. In locked mode only PC1 is active and the output of PC2 is in a high impedance state.

Both of these two signals are connected to the loop filter.

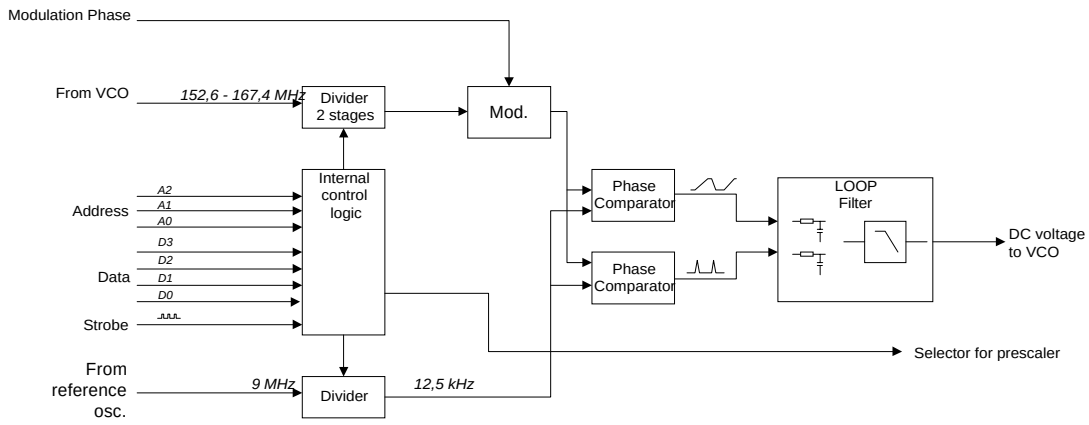

Fig C: Principal diagram for PLL circuit and loop filter

A linear phase modulator is also implemented in the PLL circuit. The modulator is implemented in the VCO signal chain between the divider and the phase comparators. The modulation is done as minor changes of the signal from the VCO.

The loop filter is an integrating network and an LP filter. The filter is used to block the remaining 12,5 kHz signals from the PLL comparators. The output from the loop filter is a DC voltage with the phase modulated AF signal as a ripple.

Due to the characteristics of the loop filter, both phase and frequency modulation are used. AF signals > 1000 Hz can be considered to be frequency modulated in the VCO and AF signals < 1000 Hz are phase modulated in the PLL.

The AF signal to be phase modulated in the PLL, is passed through a LP filter before it is connected to the modulation input to the PLL.

VCO and prescaler

The main oscillator is a voltage controlled oscillator, VCO, of LC type with a FET transistor as the active part. The tuning of the VCO is controlled by altering the capacitance in the resonance circuit, which is done by a number of capacitance diodes. The resonance circuit is implemented with stripline components as well as traditional SMD components. The total frequency range for the VCO is approximately 50 MHz. To achieve faster locking and improve scanning times, the frequency range is divided into four sub bands. The impedance of the resonance circuit is changed by two transistor switches, controlled by the CPU- board. The two transistor switches are used in combination and thus four sub bands are created.

The VCO also has a modulation input used for frequency modulation. The modulation signal is amplified and filtered before it is connected to the resonance circuit in the VCO. The modulation is done by changing the capacitance in resonance circuit by one capacitance diode.

The RF signal from the VCO is passed through a buffer amplifier stage to make the VCO less sensitive for changes in load on the output. From the buffer stage the RF signal is distributed to the prescaler as well as to two amplifiers, one for TX carrier and one for RX local oscillator. Both the TX amplifier and the RX amplifier are active as soon as the unit is switched on. The RF signals are switched by tunnel diodes in the transmitter and in the receiver.

The correct output RF frequency from the VCO is adjusted in the reference oscillator. No additional tuning is required.

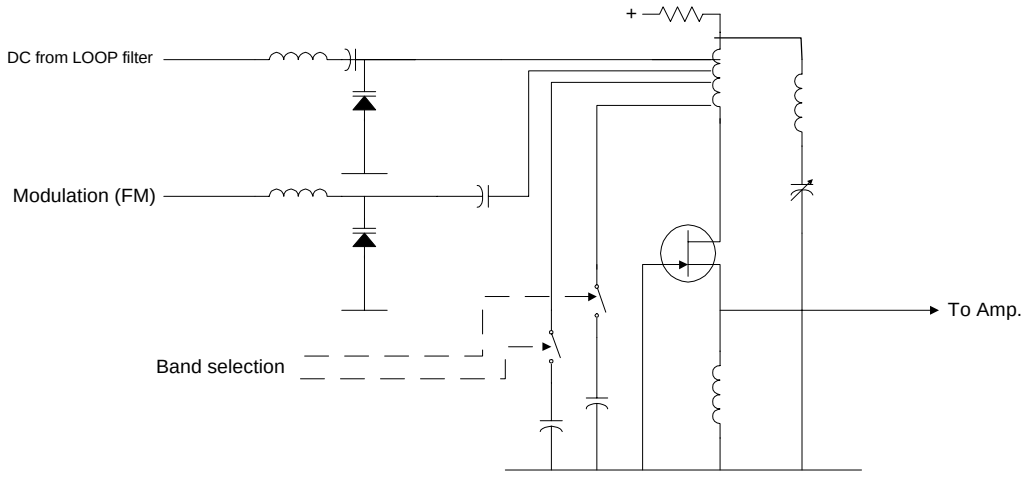

Fig D: Principal diagram for VCO

Transmitter

The simplex transmitter as well as the duplex transmitter is a number of different RF circuits and control blocks implemented on the radio board. The following RF circuits and control blocks are parts of the transmitter:

- RF switch. TX RF on/off switching.
- RF driver. Preamplification of the RF signal.
- RF power amplifier. Final RF amplifier.
- Directional coupler. Detection of SWR.
- RF detector. Detects RF power output power.
- RF power indicator. Indicates that RF output power is present.
- Power control loop. Monitoring the RF output power.

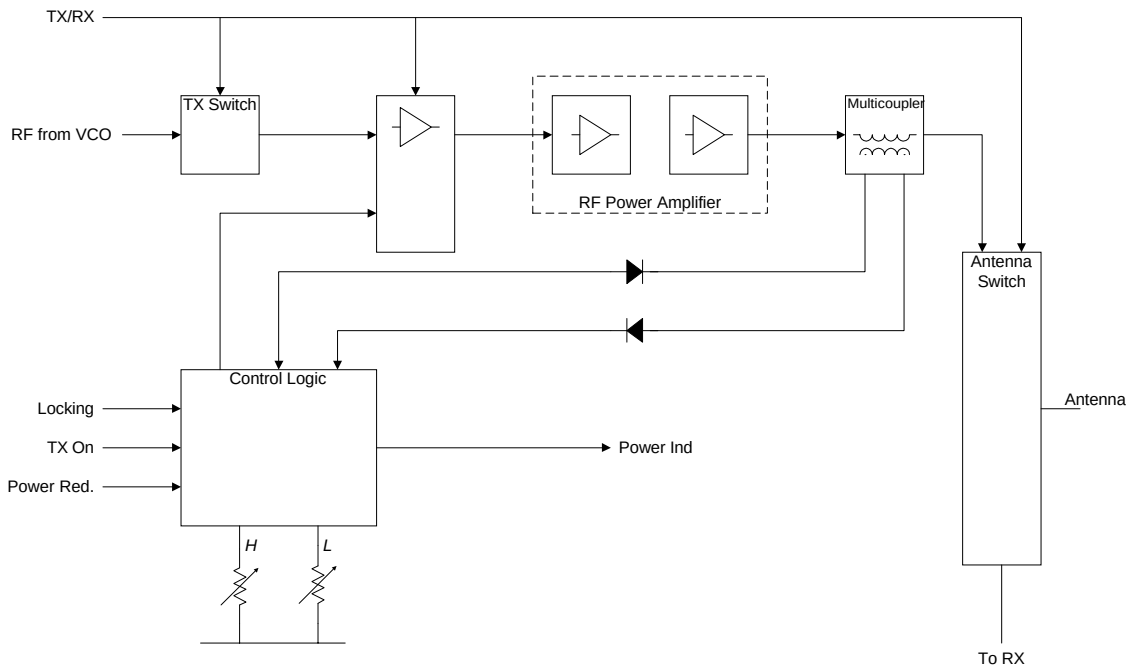

Fig E: Block diagram for F800 transmitter

RF switch and RF amplifiers

The RF signal from the frequency generator is connected to the RF driver through the RF switch. The RF switch is a diode switch that prevents leakage of RF signals from the frequency generator through the transmitter in RX mode.

The RF driver stage is a single transistor amplifier and an LP filter. The regulation of RF output power is done in the RF driver stage. The RF signal from the frequency generator is amplified to an acceptable level for the final RF stage. The RF output power is regulated by altering the amplification in the RF driver stage. The bias voltage to the transistor stage is changed by a regulator in the transmitter control block.

The final RF amplifier is an integrated module with two internal amplifier stages. The amplification in the final stages is set to fixed ratio (in dB). To obtain maximal output power both stages in the RF module are supplied with 12 V directly from the DC source. Internally in the module there are filters to avoid oscillation etc. The output from the final stage is passed through an LP filter before it is passed on to the directional coupler etc.

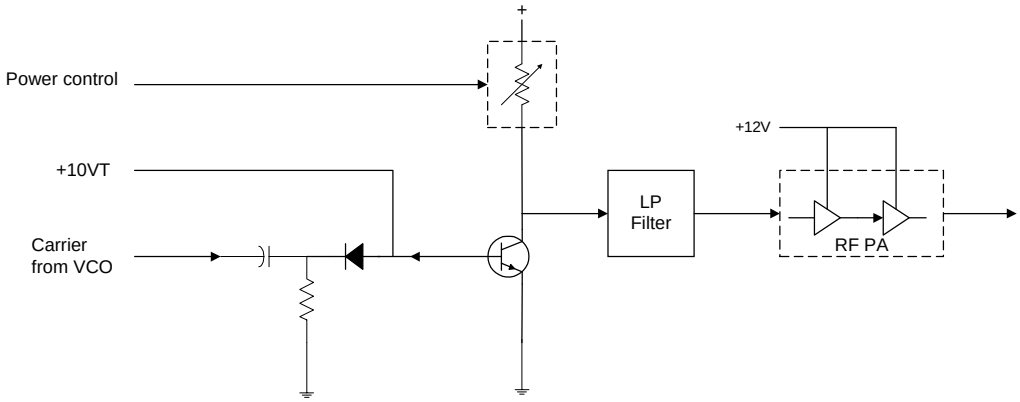

FIG F: Block diagram for RF PA

Power control loop and SWR

A directional coupler is used to measure the reverse RF power from the antenna and also to monitor the RF output power. The RF samples are rectified and filtered and used in the power control loop. The signal that represents the output power is connected to a comparator in the RF power indicator. The output from the comparator is connected to the CPU board and logical "1" indicates that the RF output power exceeds 0,2 Watts. SWR or Standing Wave Ratio is a term used to describe the relationship between the RF output power and the reversed RF power. Normally a SWR at 2:1 is acceptable, this represents a reverse power of approximately 10 % of the output power.

Even in the F800 transmitter a SWR 2:1 is acceptable before the RF power control loop starts to decrease the output power. The method used in F800 is a combination of a true SWR measurement and a maximal allowed reversed power. The same signal as used in the RF power monitor is also connected to a comparator in the RF power control loop. The signal from the directional coupler that represents the RF output power is also connected to the same input on the comparator in the RF power control loop. The two signals are added to each other and the result is a DC value that represents the RF output power plus the reversed RF power. This complex signal is then compared with a set value that represents the desired output power level. The signal that represents the desired output power is decreased when the reversed power is too high and thus the output power is also reduced. The output from the comparator in the power control loop is connected to a buffer stage. The buffer stage acts as a variable resistor and changes the DC supply voltage to the transistor in the RF driver.

The desired RF output is set in two levels, low = 2 W and high = 20 W. With a logical control signal, power red, the CPU board can select either high or low output power. As soon as the transmitter is switched on and the frequency generator is locked, the power control loop is active. With the logical signal, one of two DC values is connected to a buffer stage. From the output of the buffer stage the signal is connected to the SWR comparator as a reference value. In the "desired output power" voltage chain there is also a temperature depending resistor implemented. The output power is reduced when the temperature is higher then approximately 60° centigrade. At 90° the output is reduced by 10 dB to approximately 2 Watts.

The transmitter is supplied with DC as soon as the radio unit is switched on. The transmitter is set in transmission mode by the TX ON signal from the CPU board. The TX ON signal activates the RF power control loop.

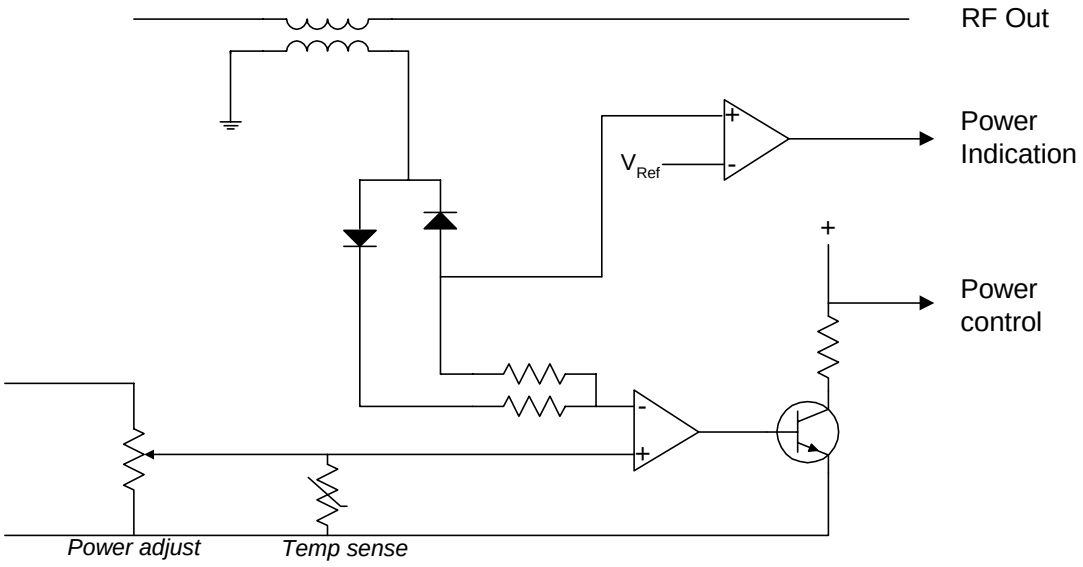

FIG G: Power control and SWR circuits, principal diagram

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Antenna switch

The antenna switch is only implemented in simplex versions of the F800 radio board. The antenna switch is an electrical switch implemented with diodes and one transistor. The switch is followed by a LP filter at the antenna output. At the RX input there is a matched LC filter with one capacitance diode and one pin diode. In the TX path there is a pin diode acting as a switch. As soon as the transmitter is activated the transistor starts feeding a current through the diodes and thus the TX RF path is opened and the impedance of the filter on the RX input is changed. To protect the RX front end the tunnel diode is also connected to the front end input to ground when the transmitter is active. To insure that the antenna switch has changed from receive mode to transmit mode before the TX signal is connected to the antenna there is a short delay, 1 mS, in the power control loop. The antenna switch is controlled by the RX/TX signal from the CPU board.

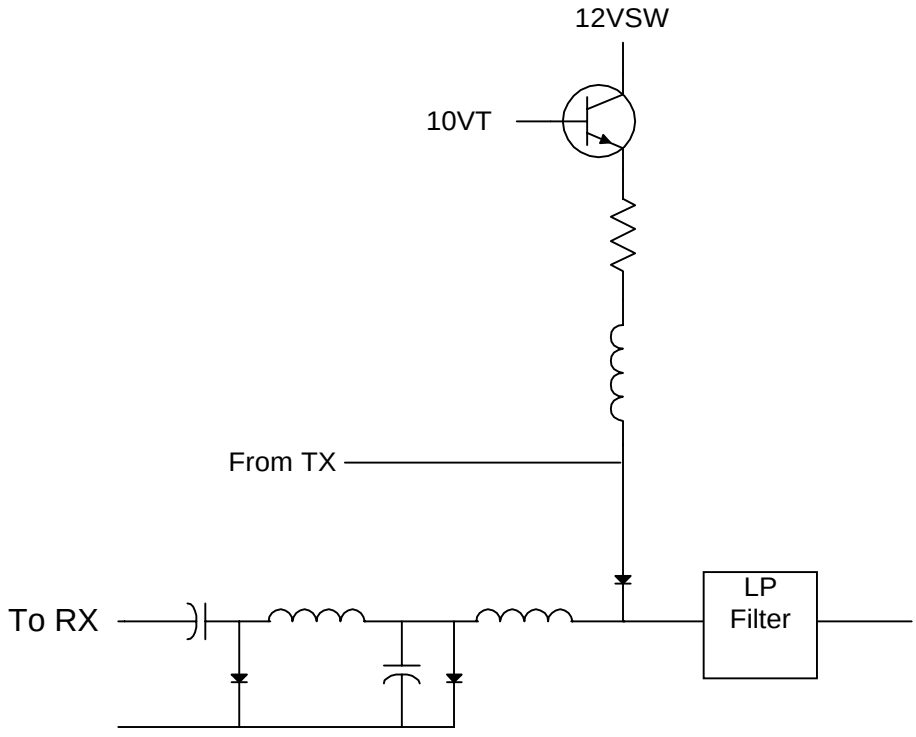

Fig H: Antenna switch

Receiver

The receiver is a double super heterodyne with 1st IF at 21,4 MHz (F804 and F805) or 10,7 MHz (F802) and the 2nd IF at 455 kHz. The 1st local oscillator signal is obtained from the frequency generator. The 2nd local oscillator signal is generated by a crystal oscillator in the IF circuits. The front end is varactor tuned.

Front End and 1st IF

The signal from the antenna switch is connected to the front end of the receiver. The front end consists of one amplifier stage and four or five band pass filters. The number of filters depends on the frequency band. The BP filter chain is tuned by capacitance diodes in each filter. The tuning voltage is obtained from the CPU board via a buffer stage on the radio board. The tuning is done in 16 steps, each step with a specific DC level connected to the capacitance diodes. Each tuning step will give the front end filters a band width of 3,2 MHz. In fact the 16 different tuning steps are not equal in size, the most narrow is approximately 1,7 MHz and the step with the highest band width is approximately 3,7 MHz. The gain in the front end is approximately 10 - 15 dB and the output is also limited.

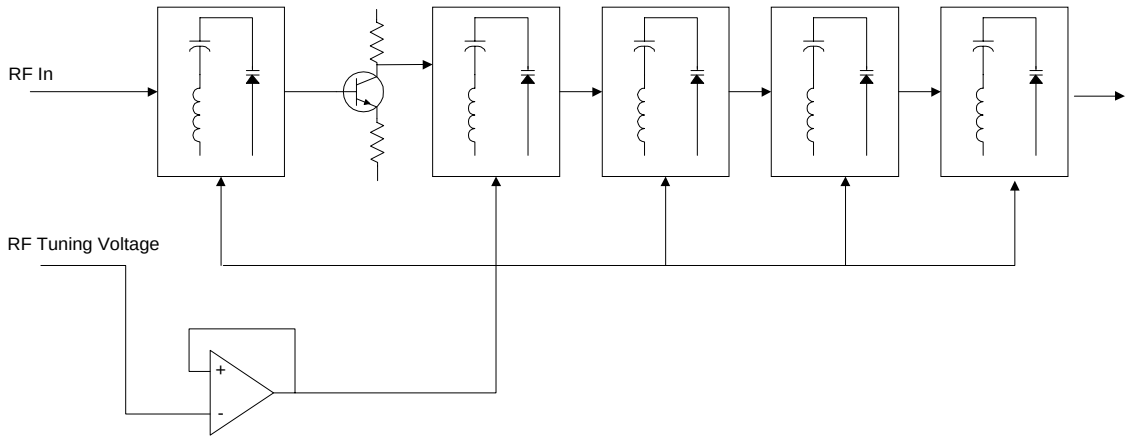

Fig I: RF front end F802/4

After the front end the RF signal is connected to the 1st mixer. In the mixer the RF signal is mixed with the 1st local oscillator signal from the VCO. To achieve faster locking of the frequency generator, the frequency range (50 MHz) of the VCO is divided into four sub bands, each sub band approximately 10 - 15 MHz. To further speed up the scanning procedure only two VCO sub band are used as a local oscillator in the receiver. The local oscillator signal is below a certain frequency which is lower then the RF signal. For RF signals higher then a certain frequency the local oscillator signal is higher then the RF signal. The following example is valid for F804:

RF signal > 154,6 MHz the local oscillator is RF signal - 21,4 MHz

RF signal < 154,6 MHz the local oscillator is RF signal + 21,4 MHz

The same principal also applies to the other frequency bands but with different break frequencies and also for F802 different 1st IF frequency.

After the 1st mixer the signal, 1st IF, is connected to impedance matching amplifier stage before the signal is passed through a crystal filter tuned for the 1st IF. After the crystal filter, a pure 1st IF is obtained that is connected to an impedance matching buffer stage. The buffer stage is followed by an amplifier stage with a tuned filter in the collector path. The filter is then tuned for the 1st IF. The 1st IF signal, 21,4 MHz, is then connected to the 2nd IF circuit.

2nd IF and demodulator

The 2nd IF is implemented in two integrated circuits with the following functions:

- 2nd local oscillator
- 2nd mixer
- 2nd IF amplifier
- RX limiter
- Demodulator
- Signal strength indicator

There are a small number of external components in the 2nd IF. The major external components are the detector coil, the 2nd LO crystal and a 455 kHz crystal filter. All major IF functions are found in two integrated circuits, containing the 2nd oscillator and 2nd mixer. The other IC contains an amplifier for the 2nd IF, limiter and the demodulator. The second IF circuit also contains an RSSI output. The signal corresponds to the signal strength received in the 2nd IF. The IF circuits have internal temperature compensation. The 2nd IF circuit has two audio outputs, one muted and one unmuted. The unmuted output is not used in F800. The sensitivity of the 2nd IF circuit is high. Typical sensitivity is > -110 dBm !

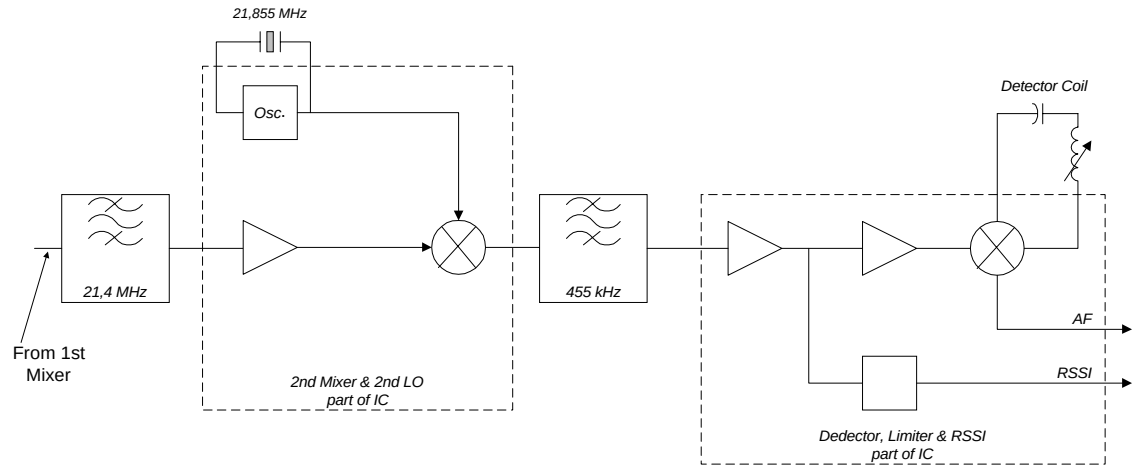

Fig J: Blockdiagram IF circuits

Squelch and AF circuits

The AF data signal from the 2:nd IF is connected to the CPU board and the option board as well as to the squelch and AF filter circuits on the radio board. The AF data signal has a straight frequency response from 0 - 3000 Hz. The AF data signal is also passed through an amplifier stage acting as a band pass filter. The filtered signal is called AUDIO and has a straight frequency response from 300 Hz to 3000 Hz.

To the input of the squelch circuit the AF data signal is connected. The actual squelch function consists of one active high pass filter, a noise amplifier, a limiter and finally a comparator. The high pass filter designed to allow frequencies higher then 8 kHz to pass. After the HP filter there is a noise amplifier followed by a limiter. The limited AF signal is rectified and then connected to one of the inputs of the comparator. The other comparator input is connected to a reference value. The comparator output as in high state when there is noise present at the input (no carrier). The squelch threshold level is set by altering the amplification in the noise amplifier. The threshold level must be set to 20 dB SINAD.

The SQ hysteresis is in some way dynamic, depending on the input noise level etc. The hysteresis is set by a fixed resistor in the limiting amplifier stage. Normally the hysteresis is 0,5 - 4 dB. The lower hysteresis level is present when the received carrier is high (= low noise level in the squelch circuit when carrier is present). When the received carrier has a lower level, close to the squelch threshold level, the hysteresis is larger.

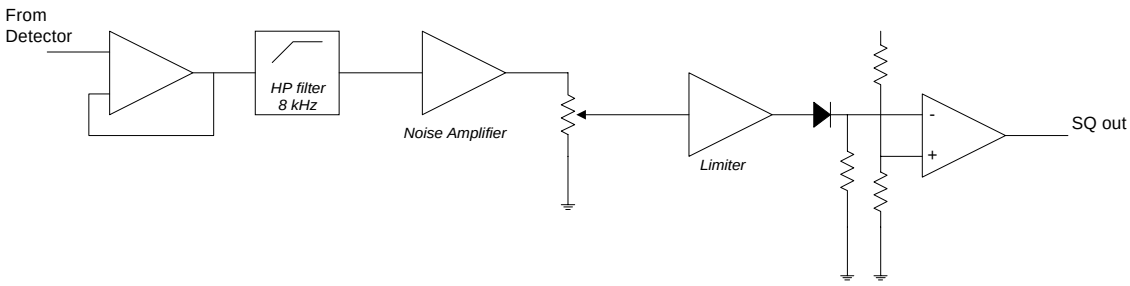

Fig K: IF circuits, block diagram.

DC power supply

All external DC power is connected through the DC circuits on the radio board. The CPU board controls the DC power distribution on the radio board. The incoming DC is filtered and fused. There is also a transient protection on the DC input.

On the radio board the following voltages are used:

12V Supplied to the CPU board and to the TX power amplifier. 12V is present as long as the radio unit is connected to the DC power source.

12VSW Switched 12V from a transistor switch controlled by the on signal from the CPU board. The voltage is fused by a 4 A fuse.

10V Switched 10V delivered from a regulator on the radio board. The voltage is used in the frequency generator. The regulator is supplied with 12VSW.

10VR Switched 10V delivered from a regulator on the radio board. The voltage is used in the receiver. The regulator is supplied with 12VSW.

10VT Switched 10V delivered from a regulator on the radio board. The voltage is used in the transmitter. The regulator is supplied with 12VSW.

5V Switched 5 V delivered from a regulator on the radio board. The voltage is used as DC supply for the PLL circuit in the frequency generator. The regulator is supplied with 12VSW.

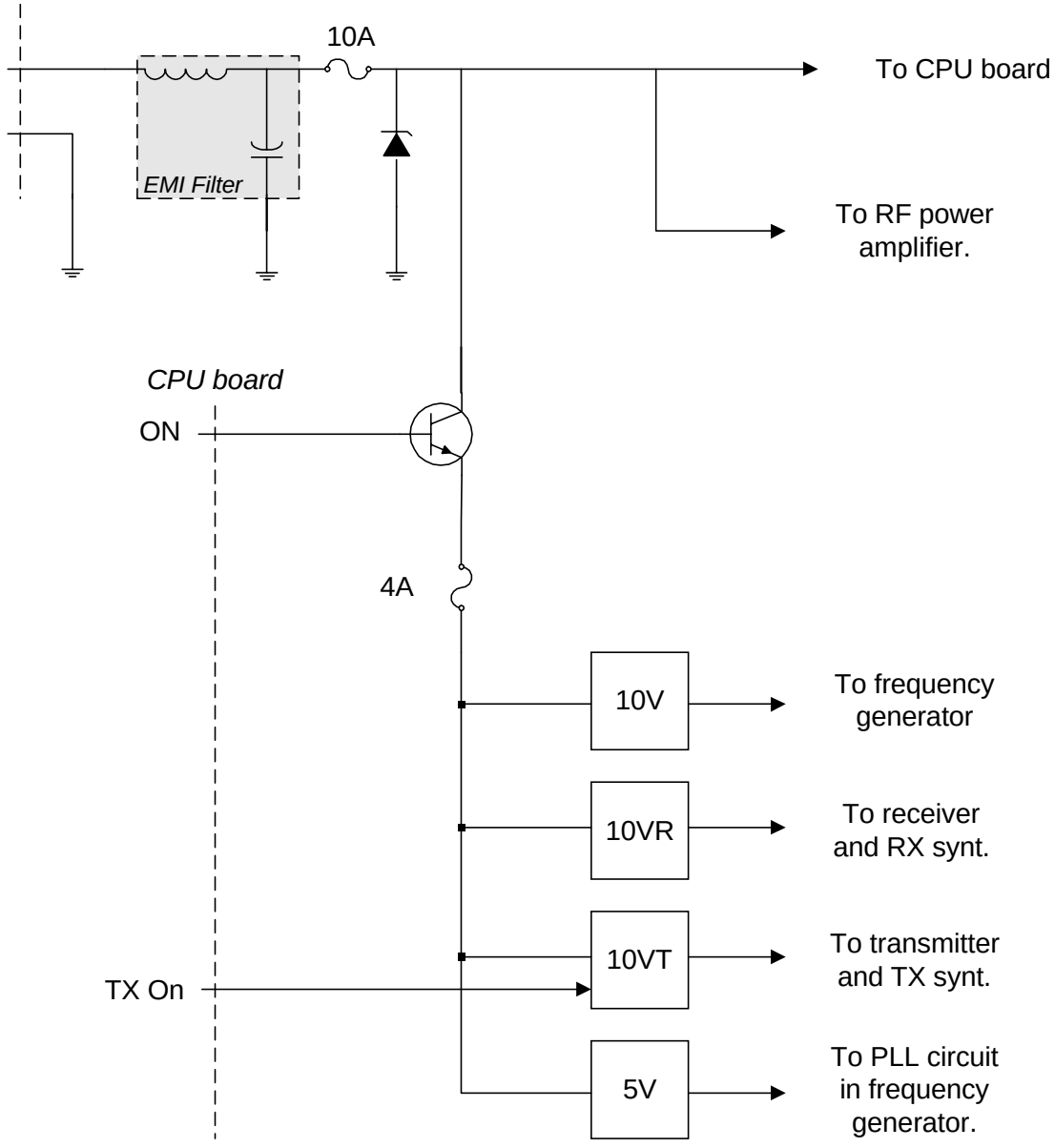

Fig L: DC power supply, radio board

PROCESSOR BOARD

The same kind of CPU boards are used in all versions of F800. The CPU board contains a number of hardware functions. The majority of the hardware functions are controlled by the software. A few logic functions and features of the F800 are implemented as pure hardware functions. In general a function consists of a combination of hardware and software. The function blocks described here will be described as a mixture of hardware and software.

The CPU board can be used together with an option board.

The CPU board is divided into the following major function blocks :

- An 8- bit processor with peripheral circuits.
- AF circuits for speech
- AF circuits for tone signalling
- I/O circuits for communication with external units
- I/O circuits for internal communication
- Interface for the radio board
- Interface for option board
- DC power supply and distribution

The CPU board is fitted with two external, D- type, and five internal, strip, connectors. The majority of the components are surface mounted to the multi-layer PCB. The processor and the memory circuits are all mounted in IC holders. The CPU board is mounted in the F800 chassis with 8 screws to obtain proper grounding. To further improve the grounding and to avoid interference etc. the CPU board is fitted with ground strips on the edges of the board. The CPU board is replaced as one unit during normal field service. The CPU board requires no tuning.

Processor and peripheral circuits

The CPU board is equipped with a V20 microprocessor, equal to 80C88, and peripheral circuits from the same family. The microprocessor, Z1, uses an external crystal controlled oscillator as clock, Y1, Z16A. The clock frequency is 4,6080 MHz. The clock is also made available for the option board via P406:3.

The V20 is a CMOS 16- bit microprocessor with internal 16- bit architecture and an 8-bit external data-bus. The processor can address 1 Mbytes of memory. The address-bus is 16 + 4 bits, where the lower 8- bits are multiplexed on the data-bus. There are 4- bits that can be used as the most significant bits of the address-buss or as status indicators. The 4- bits are used in this application as part of the address-bus, for memory mapping and for addressing of peripheral circuits. The 4- bits are clocked into a memory mapping circuit formed by, Z5-Z8, by a control signal from the processor. The control signal, IO/M, decides if the present information on the address-bus is a memory or I/O address. Simultaneously as the 8 lower address-bits are present on the data-buss, the processor generates a strobe signal, QS0. An external address decoder, latch, Z5; is clocked with the strobe signal and the contents on the data-bus are stored in the latch. The information from the 8 higher bits of the address-bus, A15 - A8, and the information on the output of the latch, A7 - A0, together form the 16- bit address-bus. The information on the latch output will remain until a new strobe signal has been generated by the processor.

The memory, < 1 Mbytes, is located on the processor board. Three different kinds of memory circuits are used. The software for the F800 is stored in an EPROM, Z2,, the customer-specific information is stored in an EEPROM, Z4, and temporary information is stored in a RAM, Z3. Each physical memory position has it's own address area and a specific memory enable signal. The memory enable signal is generated by the memory mapping circuits described earlier.

The processor also has two interrupt inputs, one software maskable and one none maskable. The interrupt inputs are not used in this application.

On the CPU board there are a number of outports for control of audio switches and other internal switches. In the same manner there are also a number of inputs for monitoring of internal events such as squelch on/off etc. External outputs such as fan control via a buffer transistor to one of the internal outports, Z11, Z12. Signals from external units such as PTT(TX) are connected via buffer to an internal input, Z9. The ports are addressed by the processor in the same way as memory circuits but with one difference, which is the status of the IO/M signal.

Incoming speech

Incoming speech denotes the internal handling, on the processor board of speech signals from the receiver to the line interface.

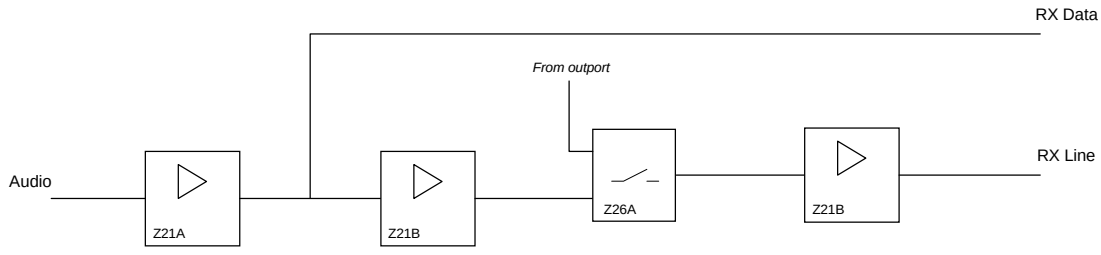

FIG M: Block diagram for RX AF

Incoming AF from the radio section on J404:5 is filtered in an HP- filter formed by Z21A, Z21B and peripheral components. After the filters the signal is connected to a AF switch, Z26A which is followed by an amplifier stage, Z21C. The amplifier has approx. 5 times amplification and the output signal is -10dBu. The amplified signal is connected through a de-emphasis network, R56 and C60 to P405:14.

RX data signals are withdrawn before the LP filter and made available on P405:4, level approx. -10dBu. RX data signals are used for reception of tones in some line interfaces.

Outgoing speech

Outgoing speech denotes the internal handling on the CPU board of audio signals generated by the line interface.

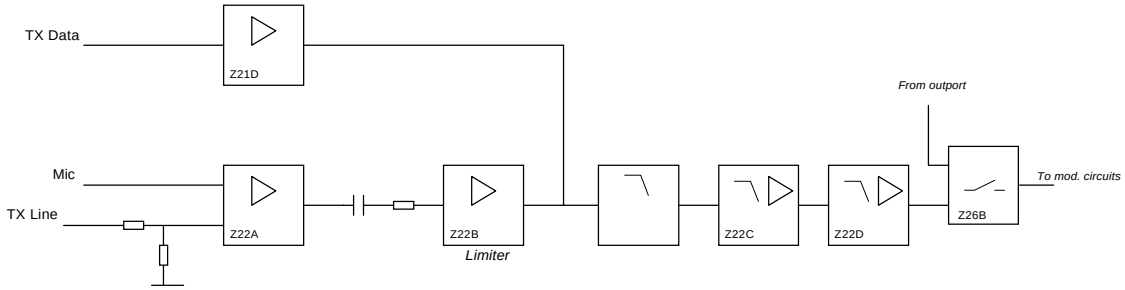

Fig N: Block diagram TX AF

An audio signal from the line interface is connected to an amplifier stage, Z22A via P405:8. The amplifier is followed by a pre-emphasis net , C8, R67. The pre-emphasis net is followed by a limiter, Z22B. The Z22B limits the amplitude to $3{,}5V_{PP}$. The limiter is followed by an LP filter, R77-R80 and C12. The filtered signal is then connected to an active LP filter formed by Z22C and Z22D with associated components.

The signal is then passed on to the modulation circuits.

TX data is introduced in the audio path after the limiter, Z22B. TX data is used by some line interfaces for transmission of tones. The TX data signals are connected to P405:3 and then passed on to a limiter formed by Z21D.

AF signals from the service handset, P401:4 are connected to the first amplifier, Z22A.

Modulation circuits

In the modulation circuits the incoming signal comes from the line ,TX line, or from the line interface, TX data,. After the speech circuits the modulation signal is connected through an audio switch to the modulation sensitivity block.

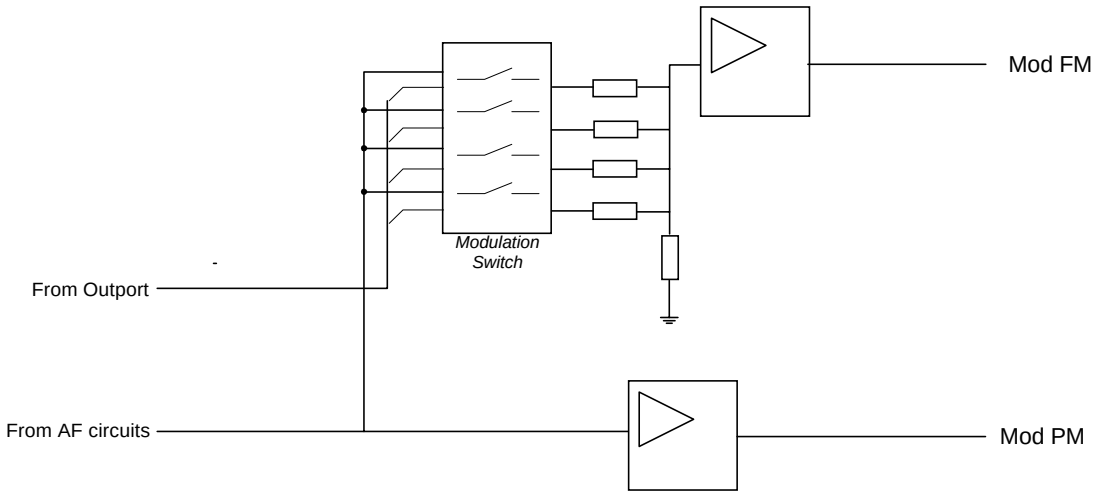

FIG O: Block diagram modulation switch

The modulation sensitivity block is used to split the modulation signal into two different signals. Due to different modulation sensitivity in the transmitter a mixture of FM and PHASE modulation has to be used. The proportions between FM and PHASE modulation depends on which frequency the transmitter is active on. The proportions are controlled by the processor via outports Z13 and Z14. The processor sets the switches in Z25 according to the operational frequency.

From the modulation sensitivity block there are two out signals, MOD FM for frequency modulation and MOD PM for phase modulation. Both signals are connected to the radio board. Max. deviation is set in the modulation sensitivity block. A fixed proportion between FM and PHASE modulation is set, on the radio board

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Tuning of RX front end

The tuning of the RF front end depends on which frequency the receiver is active on. The tuning is controlled by a voltage that is connected to capacitance-diodes in the front end. The voltage is generated on the radio board and connected to a variable resistance on the processor board. The resistance is controlled in 16 steps from the processor via an outport. The voltage divider is formed by the switches in Z24 and R57-R61.

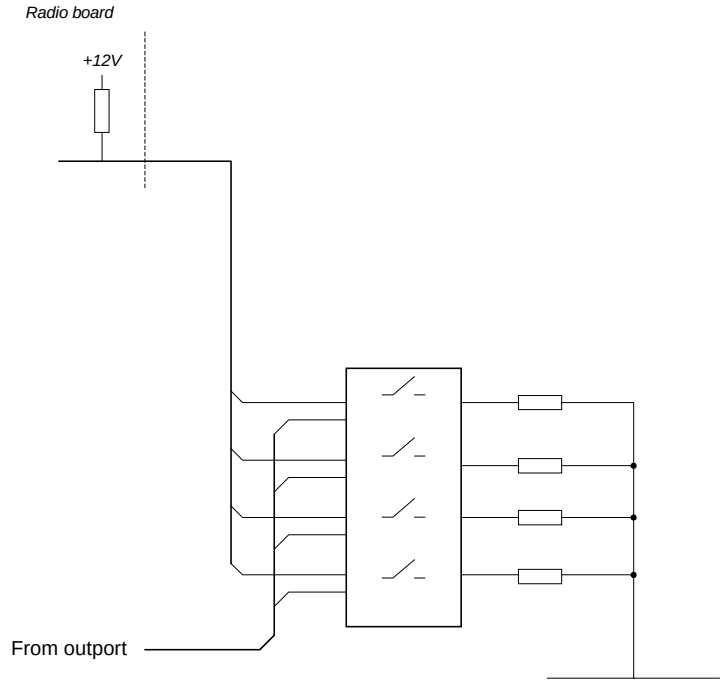

FIG P: Block diagram tuning of RF front end

Channel selection

A channel is chosen by loading channel information into the PLL circuit in the synthesiser on the radio board.

The channel information consists of a PLL address, a divider and band selection. The PLL address is used for selection of RX-synthesiser or TX-synthesiser in a duplex station. The divider is loaded into the PLL circuit as a 4-bit word. The choice of which band the VCO shall use is made by the band selection.

The channel information is generated by the program and fed to the processor controlled outports, Z13/V6-V9 and Z15.

Power supply

DC power is connected to the processor board from the radio board. The voltage is filtered and fused on the radio board. This voltage is always present as long as the F800 is connected to external DC. The voltage is used as DC source for the 5 VB regulator, Z27. The 5VB provides voltage to the line interface via P405:13.

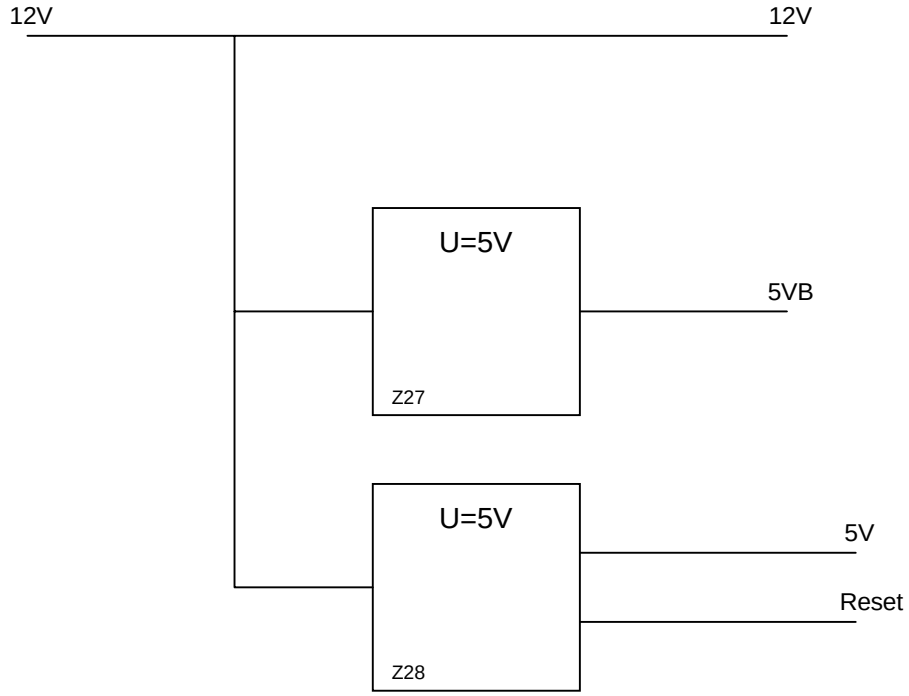

FIG Q: Internal DC circuits

The 12V is also connected to regulator Z28 which provides 5V to internal circuits. The regulator includes a power on reset. The reset line of the processor is kept low until the output voltage exceeds 4,8V.

Bias voltages, 1,8VT and 1,8VR, for the AF circuits are derived from 5V.

Both 5 V, 5 VA and 12 VSW are connected to the option board.

Connectors

The CPU board has two external connectors and five internal connectors.

P401:9 PIN, D- type on the front of the F800

J402:16 PIN strip connector, frequency generator

J403:16 PIN strip connector, transmitter

J404:8 PIN strip connector, receiver

P405:15 PIN, D- type on the back of the F800 radio unit

J406: 25 PIN strip for option board

J407: 15 PIN strip for option board

J408: 15 PIN strip for option board

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KI/ECS/S/LTC		**Error!**	**Error!**	

F800 as Radio Link

Contents

Overview

F800 can be used as an analogue one channel radio link. The whole link path consists of two F800, normally for the 450 MHz band, F805. Each F800 is equipped with a four-wire line interface, named LIJ. The transmitters run continuously, which means that the link path is always open.

Configuration

The F800 is configurated as a link station by mounting three jumpers on the back plane in the F800 cabinet. See separate description of the back plane. The output power is adjusted to 6W. See separate description for the radio board. The slots for line panels are left empty.

Electrical interface

The AF (Audio Frequency) interface, the LIJ board, have a 600 ohms balanced AF input and a 600 ohms balanced AF output. Nominal AF levels are -10 dBm. The output level is fixed to -10 dBm, and the input gain can be adjusted to handle between -10 dBm and -30 dBm line level. If required the board could be reconfigured by jumpers to act as a hybrid to make a two-wire interface. The part number for the LIJ board is ROA 119 7534.

Physical interface

The four-wire line is connected to a modular connector on the rear of F800 marked ”LINE IN/OUT”. As a standard the F800 is delivered with a line cable with a modular connector in one end and a Swedish telephone plug in the other end. To use this cable in other countries than Sweden a corresponding telephone jack should be ordered. Part number: HE 500011-0001.

Applications

A common application is to use the F800 link to substitute the four-wire line between TC549 and base stations in MRS5000 systems. See figure 1! The four-wire line between RC85 and TC549 can also be replaced by a F800 link path.

Other ranges of use could be any application that requires AF signals to be transferred wireless between two sites.

Examples

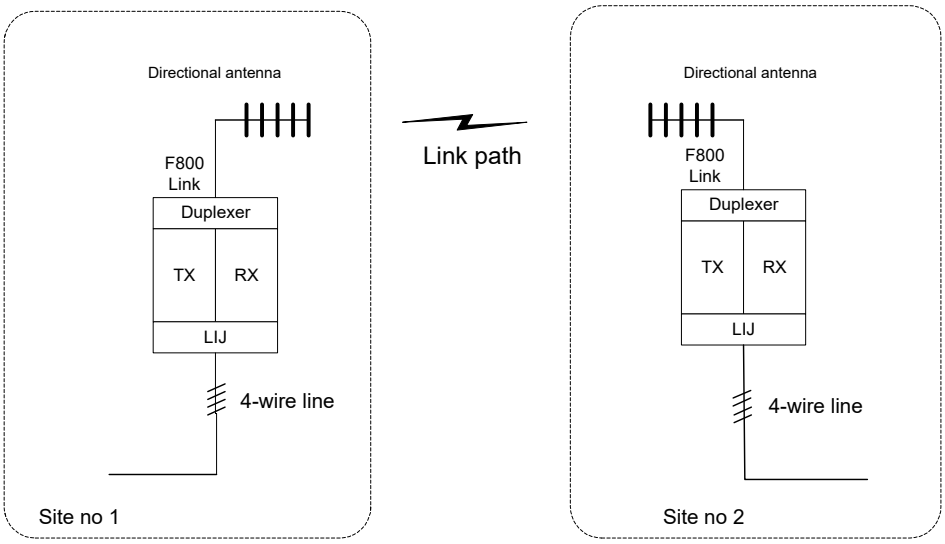

Figure 1. F800 link path. Basic structure.

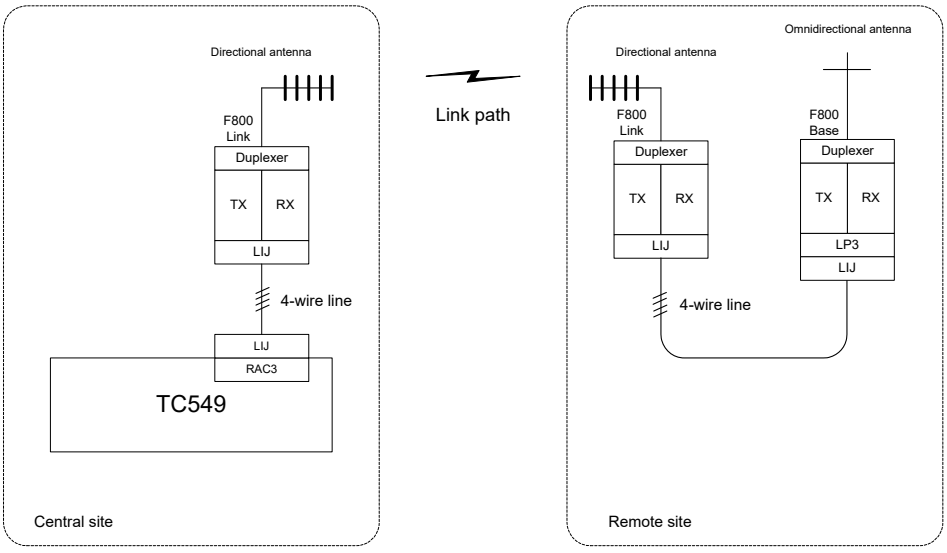

Figure 2. F800 link path for Ericsson MRS5000

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F800 as Repeater

Contents

About repeaters

A repeater is a fixed radio station which receives signals on one frequency and transmits the same signals on another frequency. It works in duplex mode. The basic use for a repeater is to enhance the covering range for mobile radio stations working in two-frequency simplex mode. The traffic mode for such system is referred to as "Semi duplex".

The F800 can be used as a stand alone repeater or a repeater connected to a control system. Repeaters connected to control systems such as MRS3000 or MRS5000 are used to work as combined bas and repeater stations. A stand alone repeater is a repeater that has no wire or link connection to a radio exchange or a control unit. However, it could exist as a component in such a network.

Technical specifications

The F800 repeater has 20 W output on all frequency bands. It contains a duplex filter to be able to receive and transmit simultaneously. See the technical data sheet for details! The repeater will retransmit everything it receives with flat frequency response between 300 and 3000 Hz. A deviation of 3 kHz in the receiving signal should result in a 3 kHz deviation in the transmitted signal. The maximum deviation is limited to 5 kHz.

For detailed technical information, see

Stand alone repeaters

Carrier controlled repeater

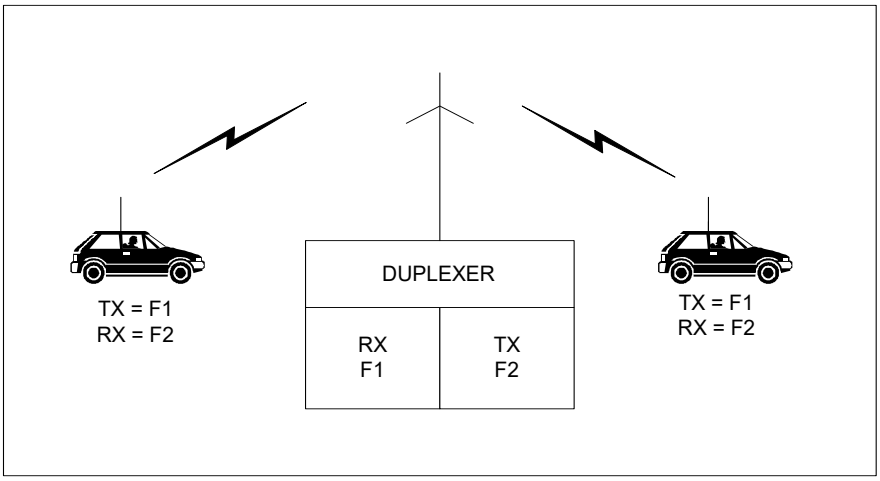

Fig 1. Carrier controlled repeater

This is the most basic repeater application. It will start the retransmision of the received signal as soon as the receiver detects a carrier on the receiving frequency. The transmitter will continue to transmit as long as the carrier is present. After the carrier has gone, the transmitter will continue to transmit a predifined "hang time", usally 10 seconds. This parameter could be set in the F800 personality programming. The F800 needs no line panel for this application. Warning! Carrier controlled repeaters are not legal in all countries. Check with the regulations in your country.

Back-to-back repeater

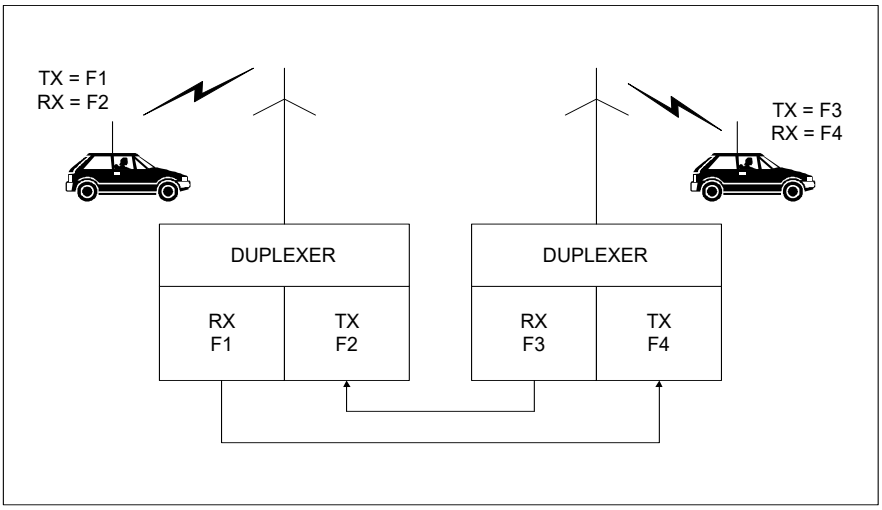

Fig 2. Back-to-back repeater

This is basically two carrier controlled repeaters connected together with a special "back-to-back" cable. The back-to-back repeater makes it possible to carry out full duplex conversation. It can be used for different purposes: converting from one frequency band to another, to extend repeater coverage to remote areas or just as a full duplex repeater between mobile duplex stations. Note that this configuration involves no tone equipment and is only controlled by carrier wave.

Tone regenerating repeater

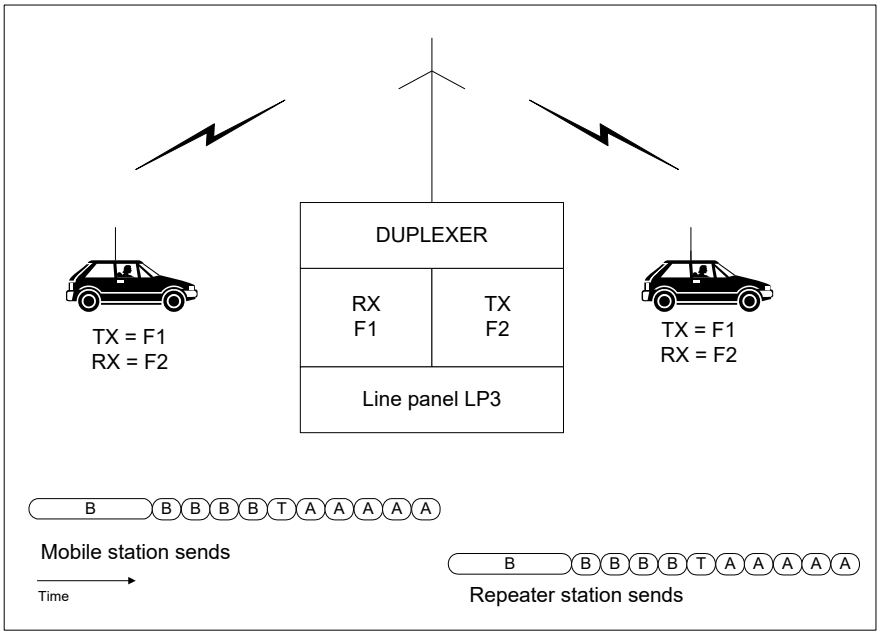

Fig 3. Tone regenerating repeater

This repeater contains the LP3 line panel. It is used as a repeater in semi duplex systems where the repeaters must be tone controlled and only one repeater exists on each frequency. The function of the LP3 is to analyse the incoming tone calls to determine if it is a call to another mobile station. The repeater will start the transmitter when a complete tone call is received and regenerate the tone call.

The LP3 will also control the maximum talk time, absence of carrier and also receive disconnection tone from mobile subscribers. Standard time limits are 6 minutes maximum talk time and tolerate 25 seconds absence of carrier. The repeater will also send warning tones before disconnection due to time limitation. A disconnection tone is sent out before disconnection. All parameters are programmable.

Tone transparent repeater

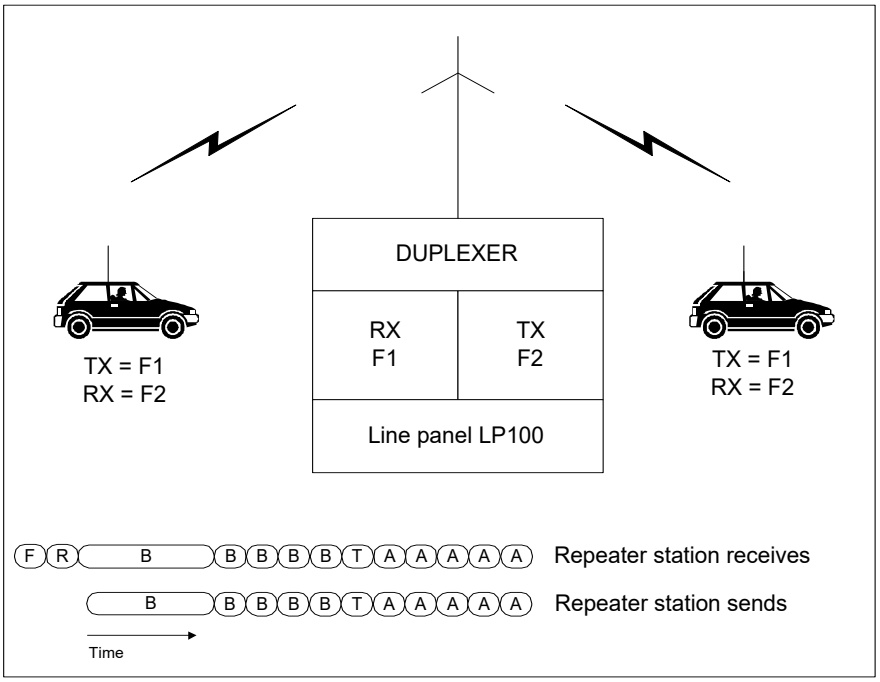

Fig 4. Tone transparent repeater

This is used in systems where more than one repeater can work on the same channel. The mobile subscriber can choose which repeater to use by sending a ”repeater start code” which consists of two extra tones preceding the normal tone call. After receiving the ”repeater start code” the repeater will be transparent to all succeeding tones. Because this repeater does not regenerate tones it will be transparent for all system functions in MRS5000. This repeater controls absence of carrier wave but has no maximum talk time and sends no warning tones. A special disconnection tone is used for this repeater, it corresponds to the start code and the repeater will translate it to the normal R-tone to disconnect the mobile subscribers.

Connected repeaters:

MRS3000

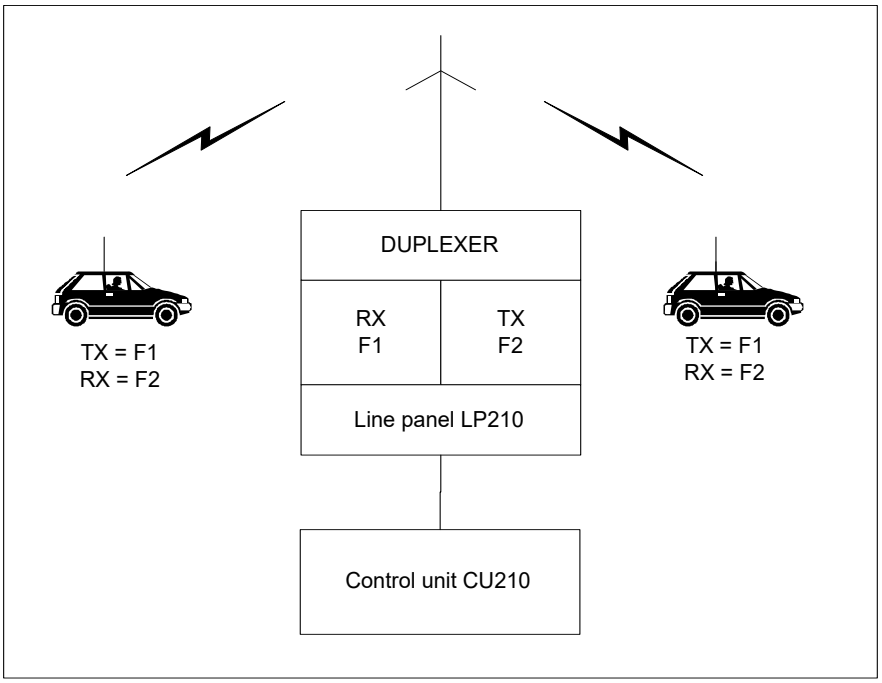

Fig 5. Base/repeater in MRS3000 system.

This tone regenerating repeater works as a combined base and repeater station in a MRS3000 semi duplex network. It is connected with 4-wire cable to a control unit CU210. See separate system description!

MRS5000

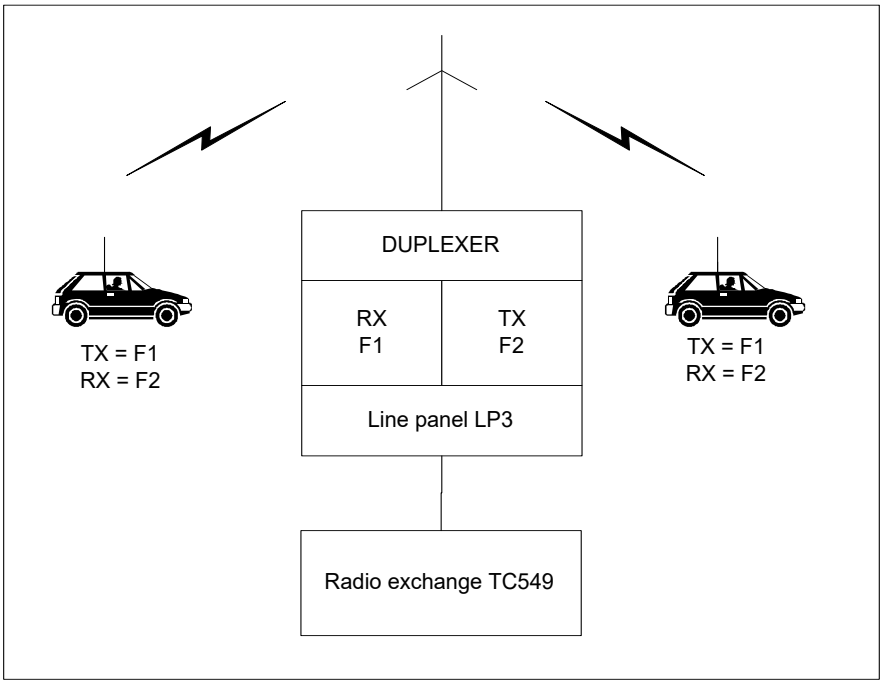

Fig 5. Base/repeater in MRS5000 system.

This tone regenerating repeater works as a combined base and repeater station in a MRS5000 semi duplex and full duplex networks. It is connected with 4-wire cable or radio link to a radio exchange TC549. See separate system description!

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F800 as OEM base station

Contents

Overview

The F800 base station is suitable for any general base- or repeater application outside the Ericsson system product range. To simplify connecting the F800 to other applications than Ericsson applications, a special ”OEM-connector” is mounted on the rear side of the F800. This connector together with the normal control line connector forms the OEM interface and holds any signals that will be needed for external control equipment.

Configuration

Besides the standard F800 simplex or duplex, the OEM model should be equipped with the ”OEM cable kit” which includes the OEM connector.

Options

To extend the functions of F800 OEM the following options can be added:

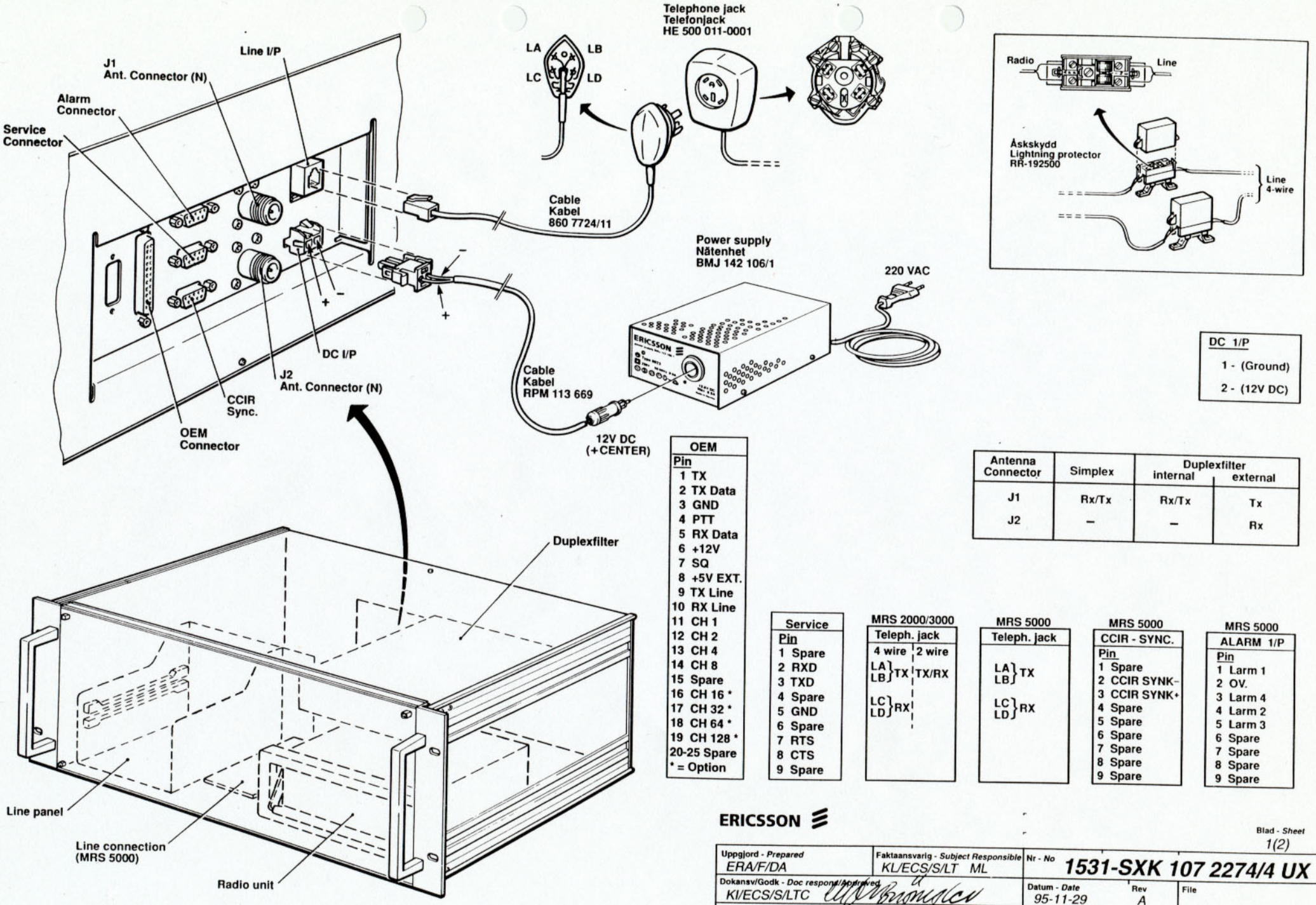
- ”MRS5000 cable kit” which will give the F800 a 600 ohms floating input and output, 4-wire line interface. The ordinary modular RJ 6/4 connector is used for this.

- ”255 channel kit” which will give the F800 the possibility of extending its normal 15 channels to 255 different channels or frequency pairs. The channel setting is controlled by the external control equipment via the OEM connector. If the external control equipment does not include any signals to control the channel settings this can be done by two internal channel switches on the back plane board inside the F800.

Connector disposition

The OEM connector is a 25-pole D-sub female connector, mounted on the rear of the F800. The connector disposition is as follows:

Pin	***Signal name***	***Electrical level***	***Comments***
1	TX	+12V	Outputs 12V at transmit
2	TX Data	-10dBm	Data input to transmitter
3	0V	0V	Common ground
4	PTT	+12V	Connect to 0V for transmit
5	RX Data	-10dBm	Data output from receiver
6	+12V	+12V	12 VDC output max 1000mA
7	SQ	+12V	Squelsh open collector
8	+5V ext	+5V	5V DC output max 1000 mA
9	TX line	-10dBm	AF input to transmitter
10	RX line	-10dBm	AF output from receiver
11	CH 1	+12V 0=active	Binary channel select bit 1
12	CH 2	+12V 0=active	Binary channel select bit 2
13	CH 4	+12V 0=active	Binary channel select bit 4
14	CH 8	+12V 0=active	Binary channel select bit 8
15	Spare		Not used
16	CH 16	+12V 0=active	optional
17	CH 32	+12V 0=active	optional
18	CH 64	+12V 0=active	optional
19	CH 128	+12V 0=active	optional
20	Spare		Not used
21	Spare		Not used
22	Spare		Not used
23	Spare		Not used
24	Spare		Not used
25	Spare		Not used



DC 1/P
1 - (Ground)
2 - (12V DC)

Antenna Connector	Simplex	Duplexfilter internal	Duplexfilter external
J1	Rx/Tx	Rx/Tx	Tx
J2	–	–	Rx

OEM	
Pin	
1	TX
2	TX Data
3	GND
4	PTT
5	RX Data
6	+12V
7	SQ
8	+5V EXT.
9	TX Line
10	RX Line
11	CH 1
12	CH 2
13	CH 4
14	CH 8
15	Spare
16	CH 16 *
17	CH 32 *
18	CH 64 *
19	CH 128 *
20-25	Spare
* = Option	

Service	
Pin	
1	Spare
2	RXD
3	TXD
4	Spare
5	GND
6	Spare
7	RTS
8	CTS
9	Spare

MRS 2000/3000 Teleph. jack	
4 wire	2 wire
LA, LB } TX	TX/RX
LC, LD } RX	

MRS 5000 Teleph. jack
LA, LB } TX
LC, LD } RX

MRS 5000 CCIR - SYNC.	
Pin	
1	Spare
2	CCIR SYNK-
3	CCIR SYNK+
4	Spare
5	Spare
6	Spare
7	Spare
8	Spare
9	Spare

MRS 5000 ALARM 1/P	
Pin	
1	Larm 1
2	OV.
3	Larm 4
4	Larm 2
5	Larm 3
6	Spare
7	Spare
8	Spare
9	Spare

ERICSSON

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Benämning	Title	
INSTALLATIONSFÖRESKRIFT F800	INSTALLATION INSTRUKTION F800	

ERICSSON

SAMMANSTÄLLNINGSRITNING
ASSEMBLY DRAWING

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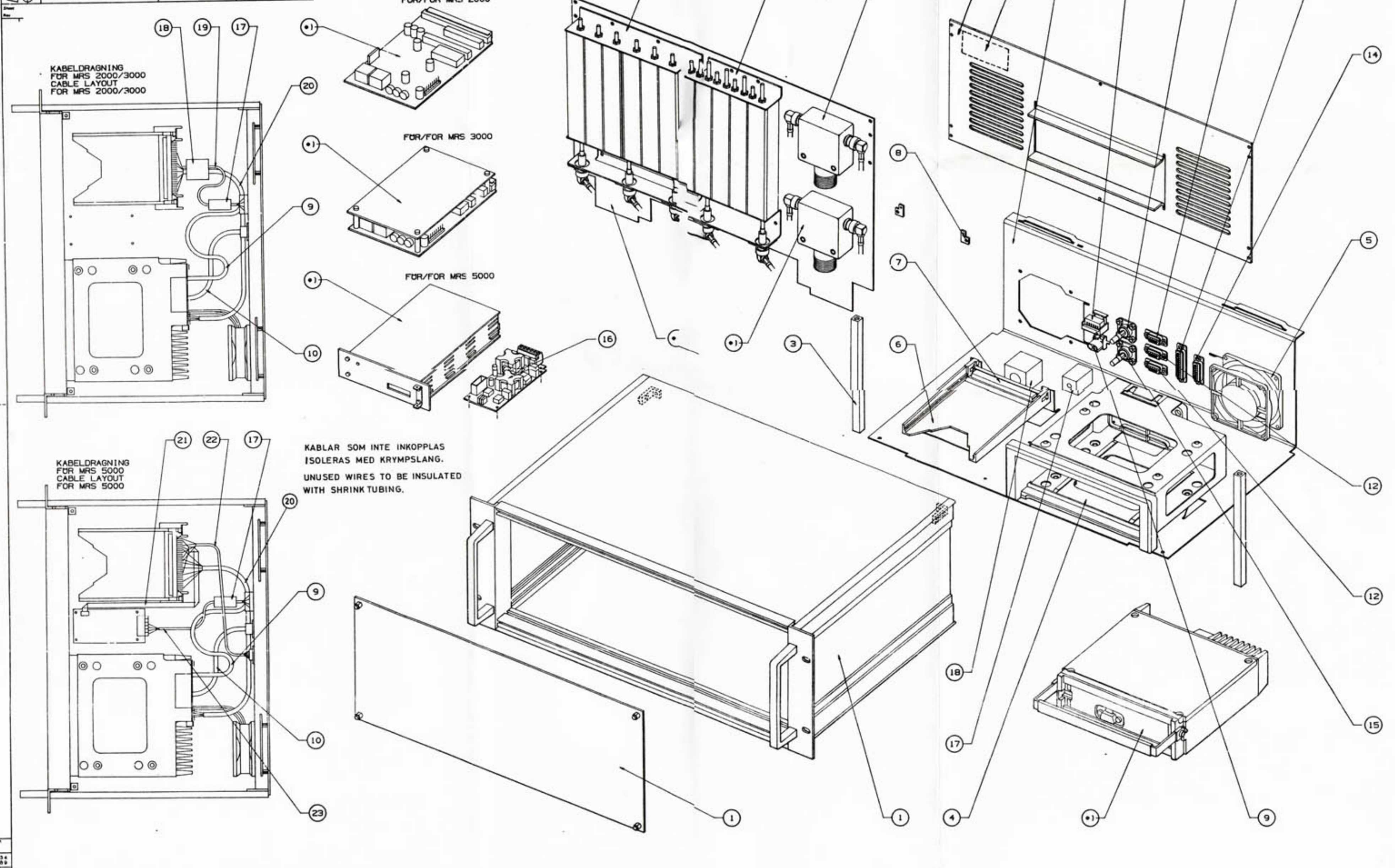
R/FTC	
F800	

15188 - SXK 107 2274/1 Ux

920331 C

F800



•1 ENL. KUNDORDER/ACC. TO ORDER

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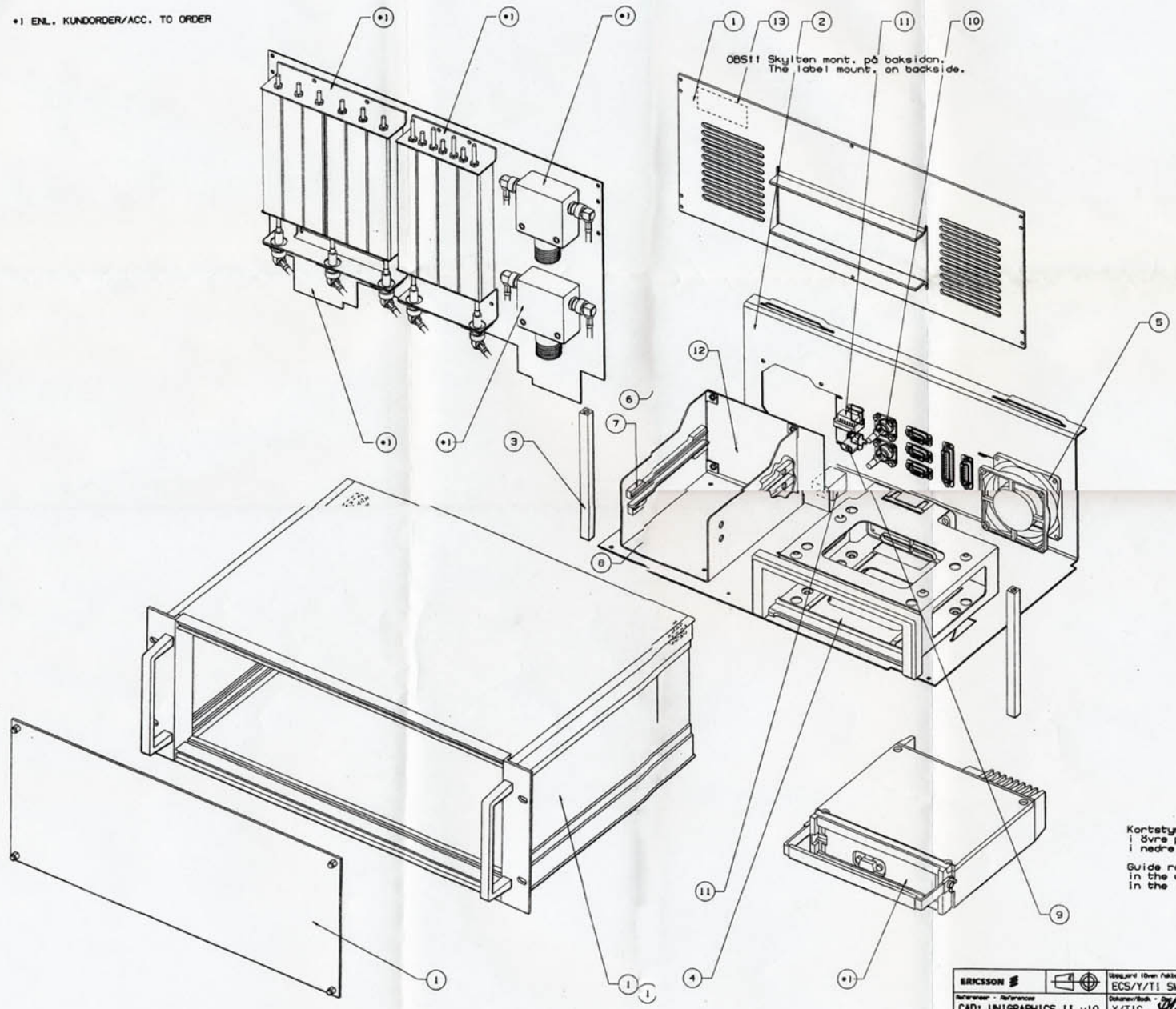
The label mount. on backside.



Kortstyrskenorna, pos 7 monteras
i övre position för MRS 2000/3000,
i nedre position för MRS 5000.

Guide rails, pos 7 to be mounted
in the upper position for MRS 2000/3000,
in the lower position for MRS 50000.

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Referenser - References CAD: UNIGRAPHICS II v10	Datum/Sign - Date/Sign Y/TIC	Datum - Date 1994-10-13 Rev A
Ritn.regler - Drawing rules	Produktområde - Product area F800	
Toleranser - Tolerances		
Skala - Scale	Dokumentnr - Document No. 151 88-SXK 107 2274/4 Ux	Blad - Sheet 1111

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KI/ECS/S/MPC (Johan Gentz)		1998-11-13	A	

FUNCTIONAL DESCRIPTION

Radio Base Station

F800

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KI/ECS/S/MPC (Johan Gentz)		1998-11-13	A	

Contents **Page**

1 INTRODUCTION

F800 is a reliable radio base station for private radio networks. F800 is based on Ericsson´s mobile radio station C700.

2 OVERVIEW

2.1 CONFIGURATION

The Ericsson F800 base station are available in different versions to work in simplex, semi-duplex, duplex or as a stand alone repeater station working in duplex mode. It can be used either in the Ericsson well-known mobile-radio system MRS3000 or MRS5000 as well with systems from other manufacturers.
In addition to this, the F800 can be used as a single channel radio link. The F800 can also be used as a carrier controlled repeater without any line interface or other external logic.

The base/repeater station, F800, contains a radio unit and a radio interface. The base station is controlled by the radio interface, which carries all system dependent parameters and handles all communication with the radio exchange. The actual operating frequencies are stored in the radio unit.

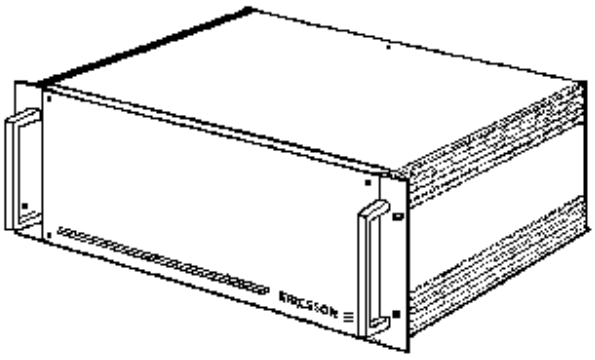


Figure: 1 F800 Base station

2.2 OPERATIONAL FREQUENCY

The F800 are available in the following frequency bands;
68 - 88 MHz, 146 - 174 MHz and 370 - 470 MHz both for simplex and duplex-versions. Nominal output power is 20 Watts and 6 Watts for link stations. A total of 16 channels can be stored in the F800.
As an option, 255 channels can be offered.

3 RADIO UNIT

3.1 GENERAL

The radio unit contains two sub units, a radio board and a processor board housed in a die cast housing. In addition a third sub unit can be fitted for the addition of another option, i.e. 255 channel.
The connections between the radio unit and the cabinet are made through connectors at the rear of the radio unit and corresponding connectors in the cassette.

3.2 RADIO BOARD

The radio board contains the frequency generator, transmitter and receiver. In addition to this, there are circuits for internal power supply. The transmitter is frequency modulated and the receiver is of double super heterodyne type. The frequency generator uses a phase locked loop circuit (PLL). In a duplex station, two loop circuits are fitted. The frequency generator produces local oscillator signals for the receiver as well as the carrier for the transmitter. The type of radio board used, depends on the operational mode of the base station and the frequency range.

3.3 PROCESSOR BOARD

The processor board has an 8-bit processor with peripheral circuits for controlling the frequency generator and the AF-switches. All necessary software is stored in a EEPROM. The processor board also provides DC power for the line interface.

3.4 255-CHANNEL BOARD

The 255-channel board has the necessary circuit to enable the controlling of 255 channels. It is installed inside the radiounit and the backplane is equipped with an optional channel-selector.

4 PROGRAMMING

The radio unit is fully microprocessor controlled, Parameters such as operational frequencies and mode of operation are stored in EEPROM. The content of the EEPROM is easily changed with a special software. All signaling are controlled by the microprocessor based linepanels. The data in the linepanel can also easily be changed.

5 RADIO CABINET

The base station is housed in a 19” cabinet intended for rack or wall mounting with special brackets. The cabinet houses the radio unit, a duplex filter and the line interface. Each base/repeater station is fitted with a fan that starts when the transmitter is keyed. To enable easy removal for servicing, the radio unit is mounted in a cassette inside the cabinet housing.

All internal interconnections between the radio unit and the line interface slot are made via a back plane board. On the back plane, switches for channel selection and different AF straps are found.
All connections are made with connectors on the rear end of the cabinet. The line is connected to the base station through an external line connection. The antenna is connected to the cabinet with a N-type connector.
The base stations is powered by an 13,2 VDC external power supply.

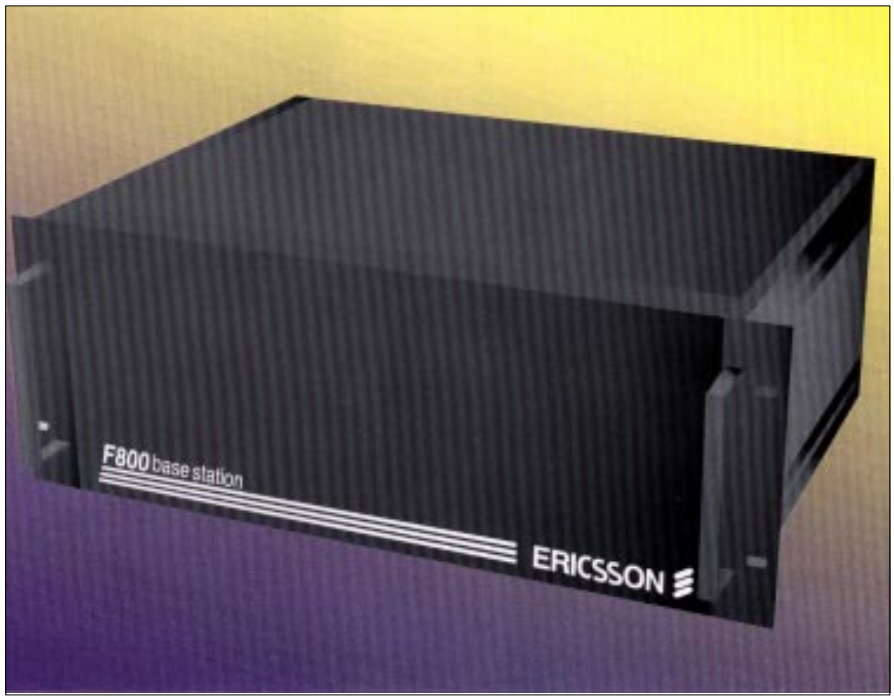
6 BASE STATION INTERFACE

The radio station normally includes a line interface for handling the functions of the radio and the communication with for example a centralized radio exchange. The line interface is installed inside the cabinet in a slot for a standard Euro board with a 64 pin connector. The type of line-interface used varies depending in which application the unit should be used.

Basradiostation F800

MRS 3000/5000 och OEM-SYSTEM

F800 kan placeras fristående eller tillsammans med andra utrustningar i en 19"-rack. Basstationen är i första hand utvecklad för Ericssons radiosystem MRS 3000/5000, men kan med fördel också integreras i radionät av andra fabrikat.



F800 är en pålitlig basradiostation för såväl tal- som datakommunikation i privata mobilradionät med stor trafikintensitet. Stationen är baserad på Ericssons mobila radiostation C700 och är i första hand utvecklad för Ericssons radiosystem MRS 3000/5000. Den kan emellertid lätt även integreras i radionät av andra fabrikat.

Utmärkande för F800 är den flexibla uppbyggnaden - varje enskild station utgörs av en specifik kombination av moduler baserad på användarens önskemål. Modulerna är monterade i en apparatlåda med gott om utrymme för OEM-produkter, t ex enheter för tonsignalering, kryptering eller telemetri (överföring av mätdata).

F800 kan användas för både simplex- och duplextrafik på frekvensbanden 80, 160 och 450 MHz.

Stabila frekvenser, 255 kanaler

Den radiofrekventa signalen genereras i F800 av en digital frekvensgenerator. Det innebär hög frekvensstabilitet och att stationen kan arbeta på ett stort antal radiokanaler. I sitt grundutförande erbjuder den 15 radiokanaler men vid behov kan antalet ökas till 255.

Speciell OEM-kontakt

På baksidan av F800 finns en 25-polig anslutningskontakt, speciellt avsedd för funktionskontroll och anslutning av externa utrustningar då stationen är integrerad i ett OEM-system. Signalerna på respektive stift i kontakten redovisas i bilden på omstående sida.

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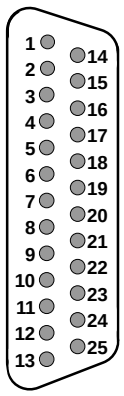
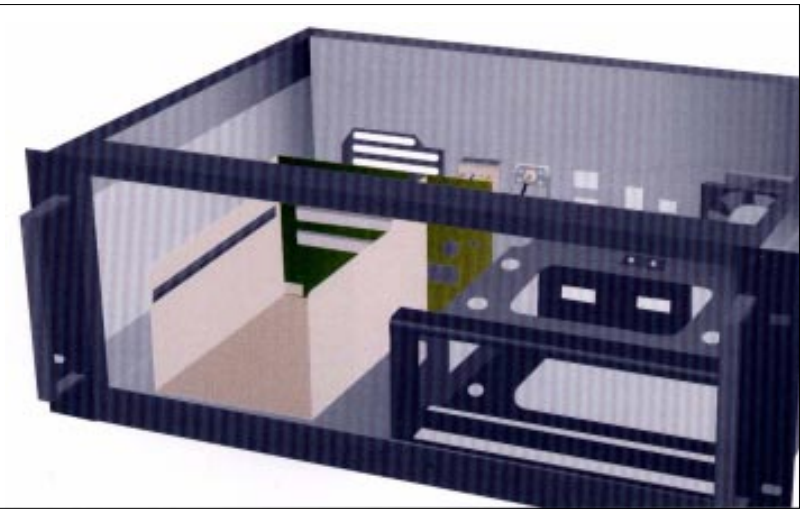


1	TX	**14**	CH 8
2	TX DATA	**15**	RESERV
3	0 V	**16**	CH 16
4	PTT	**17**	CH 32
5	RX DATA	**18**	CH 64
6	+ 12 V	**19**	CH 128
7	SQ	**20**	RESERV
8	+ 5 V EXT	**21**	RESERV
9	TX LINE	**22**	RESERV
10	RX LINE	**23**	RESERV
11	CH 1	**24**	RESERV
12	CH 2	**25**	RESERV
13	CH 4		



Basstation F800 är modulärt uppbyggd, vilket medger en individuell anpassning till varje kunds specifika önskemål.

På baksidan finns en 25-polig anslutningskontakt, speciellt avsedd för funktionskontroll och anslutning av externa utrustningar då stationen är integrerad i ett OEM-system.

Bilden ovan visar F800 utan radiomodul.

Servicevänlig

Den modulära uppbyggnaden gör F800 till en mycket servicevänlig basstation förutom att det är lätt att anpassa den till önskad funktion. Vid fel eller då nya funktionskrav föreligger kan en modul lätt bytas ut. Samtliga moduler blir åtkomliga när stationens hölje avlägsnats.

Fristående relästation

Integrerad i ett MRS 3000/5000-system och kompletterad med en s k linjepanel kan F800 fjärrmanövreras över en 2- eller 4-trådslinje eller radiolänk. Ansluten till en radioväxel typ Ericsson TC549 kan den tillsammans med växeln automatiskt också genomföra nummeranalys av inkommande anropsnummer. Analysen kan bl a resultera i att stationen automatiskt kopplas upp för relä- eller överföringstrafik.

Linjepanelen kan också ombesörja att stationen kopplas upp som fristående relästation vid ett eventuellt avbrott på linjen mellan växeln och basstationen.

Enkanalig radiolänkterminal

F800 kan mycket väl användas som radiolänkutrustning. Två F800-stationer i vardera änden av en radiolänkförbindelse ersätter då en 4-trådig abonnentlinje.

Automatisk kanalscanning

F800 kan arbeta med automatisk kanalscanning på upp till 8 kanaler. Det innebär att den kontinuerligt söker efter inkommande anrop genom att ett kort ögonblick lyssna på var och en av kanalerna i tur och ordning. När ett anrop kommer låser stationen både sändare och mottagare på den aktuella kanalen.

Viktiga data

Mått:	439 x 177 x 325 mm (B x H x D)
Vikt:	12 kg
Strömförbrukning:	0,5 / 6 A (mott./sänd.) vid 13,8 V DC
Ansl.manöverapp. och radioväxel:	4-trådslinje eller radiolänk, 600 ohm
Frekvensband:	68-88 / 146-174 / 378-470 MHz
Antal radiokanaler:	Standard 15, max 255
Trafiksätt:	Simplex eller duplex

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SV/LZT 123 841 R2

Informatören B Byfors.