TECHNICAL MANUAL

DIGITAL RECEIVERS
VHF RE9000-2G
UHF RE9010-2G

***Code:** 40500070 V1.08* ***Ref.:** NTEGB RE90x0-2G*

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VHF DIGITAL RECEIVER Overall view				44000267 Indice rév. :V1.02 Date rév. : 02/03/11
Rèf. s/ens. : RE9000A-2G	Code s/ens. : 84500146	Rèf. ens. : RE9000-2G	Code ens. : 80100067	Page : 1/1
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UHF DIGITAL TRANSMITTER Overall view				**44000316** Indice rév. :V1.00 Date rév. : 02/03/11
Rèf. s/ens. : RE9010A-2G	Code s/ens. : 84500148	Rèf. ens. : RE9010-2G	Code ens. : 80100070	Page : 1/1
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LIST OF MODIFICATIONS

No.	PAGE(S) CORRECTED	REVISION DATE	VISA
V1.00	*Created on 16/02/11*	*16/02/11*	*JPD*
V1.01	*Updates*	*17/02/11*	*JPD*
V1.02	*Updates*	*09/03/11*	*JPD*
V1.03	*Translation to English and updates*	*08/04/11*	*JPD*
V1.04	*Updates pages A to 144.*	*18/05/11*	*JPD*
V1.05	*Updates pages A to 144.*	*06/06/11*	*BP*
V1.06	*Characteristics; terminal controls; VoIP procedure*	*11/07/11*	*JPD*
V1.07	*Adding ref KITFR. Modification on the Alarm led management, Modifications of LINE level on Terminal controls, Modifications on HMI : remark ETH2, CBIT p2/2, IBIT p1/2 et 2/2. Suppressing § about software release*	*17/11/11 28/11/11*	*JPD*
V1.08	*§5.3.4 Power supply module ALSE53005, § 6.3.1.3.3 Screen PRESET menu § 6.3.1.3.7.1 Screen Setup/HW config menu. §7.1.2 Maintenance guide E1. §7.3 suppression module ENV.*	*23/01/12 14/03/12*	*BP JPD*

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CHAPTER 1. INTRODUCTION

1.1 ABOUT TELERAD

With over 40 years' experience, TELERAD offers a very high quality range of Ground to Air radiocommunication equipment in the civil (VHF) or military (UHF) frequency range, as well as associated peripheral equipment. All this equipment is in compliance with the international standards in force and provides comprehensive, reliable and upgradeable system solutions.
For any additional information, please contact the company at the following address:

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A hotline may also be made available if required. Please contact the sales department.

1.2 TARGETED USERS

This document is intended for maintenance technicians who wish to install or adjust the equipment, put it into service and monitor it in operation. It also allows authorised personnel to carry out level 3 operations on the equipment (repairing a sub-assembly, a PCB or a module).

1.3 ABOUT THIS MANUAL

This document is a technical manual. It contains all the information required to deploy and operate **the RE9000-2G VHF digital receiver and the RE9010-2G UHF digital receiver**, and to carry out preventive and corrective maintenance on them.

1.3.1 Manual structure

This manual is structured as follows:

- **Chapter 1: Introduction.** The first chapter gives a presentation of this document, the conventions used, the safety and transport instructions, the standards with which it complies, and traceability and legal information.
- **Chapter 2: Presentation.** Presentation of the RE9000-2G VHF and RE9010-2G UHF receivers**,** the available options, the compatible equipment, and the electrical, mechanical and climatic characteristics.
- **Chapter 3: Operational description.** Contains a simplified description of the operation of RE9000-2G VHF and RE9010-2G UHF receivers.
- **Chapter 4: Description of the equipment.** Complete description of the RE9000-2G VHF and RE9010-2G UHF receivers: front and rear panel and connectors.
- **Chapter 5: Installation – Configuration – Commissioning.** Allows mechanical installation and commissioning of the RE9000-2G VHF and RE9010-2G UHF receivers. It also contains a comprehensive description of the jumpers and switches of the sub-assemblies.
- **Chapter 6: Operation.** Presentation of local or remote operating principles. Details of hardware and software commands.
- **Chapter 7: Maintenance.** Preventive maintenance, corrective maintenance, locating failures, operating procedures presented in the form of maintenance, sub-assembly disassembly / reassembly, verification and adjustment sheets.
- **Chapter 8: Parts list.** List at sub-assembly level of the components of the RE9000-2G VHF and RE9010-2G UHF receivers.
- **Chapter 9: Plates.**
- List of photos, mechanical, interconnection, block diagram and layout plates provided in the appendix.
- **Appendix A1: Glossary:** List of terms, abbreviations and acronyms used in this document.
- **Appendix A2: EC certificate of conformity.**

1.3.2 Conventions used in this manual

Indicates a remark giving additional information

Cross-reference to a section in this manual or another document.

1.4 SAFETY RULES

Besides the quality criteria and high performance standards retained by TELERAD in designing its equipment, the company also gives great importance to user safety by constantly keeping its product design, manufacturing and test in compliance with the safety standards in force.

As such, the RE9000-2G VHF and RE9010-2G UHF receivers are compliant with the current EC standards. To maintain this level of safety, the user must comply with the safety guidelines described in this manual before switching on the equipment for the first time. If these rules are not followed or the equipment is used for a purpose for which it is not designed (incorrect use), TELERAD cannot be held responsible for risks related to equipment damage or physical injury.

1.4.1 Information regarding safety

The equipment is designed to operate entirely safely when it is installed and used in compliance with the instructions for use and the general safety rules.
The directives contained in this section explain the potential risks related to use of the equipment, and provide safety rules intended to reduce these risks.

Scrupulously respecting the information contained in this section and the specific instructions supplied with the equipment enables you to protect yourself from the risks, and create a safe working environment.

1.4.1.1 Installation requirements

The equipment operates in a safe manner when it is used according to the fixed electrical magnitudes, and in compliance with its instructions for use.

1.4.1.2 Servicing

The internal components of the equipment may only be serviced by trained and qualified staff.
Opening or removing covers bearing danger symbols or stickers exposes you to electric shocks.

1.4.1.3 Ventilation

The equipment's ports and openings are intended for ventilation, and must never be blocked or covered. They ensure reliable operation of the product and protect it against excessive temperatures.
Allow sufficient air circulation around the equipment, to ensure adequate cooling. Avoid direct exposure to radiant heat sources.

1.4.1.4 Water and humidity

Do not use the equipment in a humid environment.

1.4.1.5 Protection through earthing

The terminal on the rear, identified with the symbol  is the main protective earth terminal.
The minimum cross-section of the wire used must be 2.5 mm².
This connection must be made before any other connection, and must be disconnected last. It is also recommended to check the earth continuity regularly.
When the equipment has a Mains power input, it is fitted with a three-pin plug with an earth.
Earthing is a safety element. Do not nullify the protection by connecting the plug to a socket that does not have an earth connection.

1.4.2 Symbols used

The following list gives the symbols used in this manual and the equipment, along with their explanation. They are divided into two groups:

- safety symbols,
- operational symbols.

1.4.2.1 Safety symbols

Indicates dangerous voltage.

This symbol, present both on the equipment and throughout the instructions, gives an ATTENTION or ATTENTION DANGER message. When this symbol is present during operating phases, maintenance and repair phases, carefully read the corresponding paragraph of the instructions first.

If the fan does not work correctly, there is a risk of a significant increase in the temperature of certain components. The risk is indicated by an attached sticker that can be seen when the cover is removed. The operator must wait for the equipment to cool down before carrying out maintenance operations.

Indicates the risk of physical injury during equipment handling due to its heavy weight.

Indicates a risk of fire to the equipment.

Indicates danger of serious injury or death.

Indicates risk of damage to equipment by electrostatic discharge (ESD).

1.4.2.2 Operational symbols

Indicates that the equipment must be supplied with alternating current (AC) at the indicated terminal.

Indicates that the equipment must be supplied with direct current (DC) at the indicated terminal.

Indicates an input terminal when distinction between inputs and outputs is required.

Indicates an output terminal when distinction between inputs and outputs is required.

Indicates that the equipment power supply is On.

Indicates that the equipment power supply is Off.

Indicates that the equipment power supply is On/Off.

Indicates the equipment terminal connected to ground or chassis.

This symbol indicates an earthed connection. This connection is the main protective earth. It must be made before any other connection, and must be disconnected last.
The minimum cross-section of the earth wire must be 2.5mm².
It is also recommended to check the earth continuity regularly.

1.4.3 Safety instructions

1.4.3.1 General

The following general safety precautions must be respected during the equipment use, maintenance and repair phases. Failure to respect these precautions or any other warning present in the instructions constitutes a violation of the safety standards applied to the design, manufacture and use of the equipment.
TELERAD may not be held responsible for the user's failure to respect these instructions.
The purpose of reading and respecting the recommendations contained in these instructions is to reduce the risk of injury.

1.4.3.2 Electrical risks

PRESENCE OF HIGH VOLTAGE

High voltages are required when using this equipment. These are dangerous voltages, given that a voltage of 110V may cause death. Personnel must follow all of the following safety measures at all times:

- **unplug** the energy source before changing an electrical component,
- **be wary of** electrical safety devices (e.g. circuit breakers, drawer and door devices),
- **unplug** power supplies, both external and internal (batteries) to perform operations on the inside of the hardware,
- **understand** that safety devices are designed for standard openings. Dangerous circuits may be reached in the event of disassembly,
- **discharge** capacitors. Dangerous voltages may remain in the capacitors after the hardware is removed from service.

It is prohibited to enter a room alone to carry out inspections or maintenance work on high-risk equipment.

NOTA : *Do not be fooled by the term "Low Voltage" (LV). 50 volts are sufficient to cause death.*

EARTH CONNECTION

This equipment may have a significant earth leakage current. To reduce the risk of electric shock, the equipment chassis must be connected to earth, by a low impedance cord, with a minimum cross-section of 2.5mm² using the appropriate marked terminal  .
In particular, when the equipment is installed in a rack, check that its earth terminal is indeed connected to the rack chassis, which shall itself be connected to earth. This terminal must be connected first and disconnected last, and must be connected to a conductor with a cross-section suited to the default current.

POWER SUPPLY CORD SELECTION

Select a power supply cord that offers all safety guarantees according to the legislation in force in the country in which the equipment is used, and which is suited to the equipment in terms of current.
An unsuitable cord may result in either:

- damage to the device due to electrical discharges, or
- the equipment catching fire.

POWER SUPPLY VOLTAGES

Before powering on the device, check that the power supply voltages, mains and/or battery, correspond to those values recommended by TELERAD (refer to the characteristics section).
If batteries are used, they must not be exposed to extreme temperatures. Do not short-circuit the batteries, and respect their technical characteristics and their expiry date. Comply with the environmental standards in force during recycling.

PROTECTION AGAINST LIQUIDS

In order to avoid any risk of short-circuit, fire or any other internal damage, do not spill any liquids inside the device, and protect it from rain and from contact with liquids of any kind.

PROTECTION AGAINST METAL OBJETS

Do not insert any metal conductors into the equipment.

PROTECTION AGAINST DAMAGED CABLES OR PLUGS

Do not use damaged cables or plugs.

PRESENCE OF AN ON/OFF SWITCH

If the device is not fitted with a mains On/Off switch, the mains cord may be considered a circuit breaker. In this case it must be easy to access and disconnect.
If there is a mains On/Off switch but access to it is impractical, or when the device's mains plug is fitted with a locking clamp, it is essential to add a circuit breaker in the power supply circuit, which can be easily accessed by the user. If the equipment is used in a Normal / Emergency type configuration, each item of equipment must have an independent circuit breaker.

PROTECTION FROM THE ELECTRICITY NETWORK

The electricity network powering the equipment must be protected against voltage surges (network variation), including those related to weather conditions (storms, lightning, etc.)
If there is no such protection, this may result in damage to the equipment, destruction or a fire.

PROTECTION OF MAINTENANCE STAFF

Unless otherwise specified by TELERAD, the equipment must be powered off before any operations, with the power cord disconnected. Only certified, qualified and trained staff may open, adjust and replace the PCBs or equipment modules.

Under certain conditions, dangerous voltages may remain even when the power cord is disconnected. In order to avoid injury, always disconnect and discharge the circuits before touching them.

When replacing a defective part, refer to the removal/reassembly sheets of this manual, as well as the adjustment sheets and verification sheets for the smooth functioning of the equipment (refer to chapter 7 "MAINTENANCE").

Do not undertake repair or internal adjustment without the presence of another person capable of administering first aid resuscitation.
Due to the risk of creating additional dangers, do not use substitute parts and do not make any unauthorised modification to the equipment. When spare parts are required, ensure that the maintenance staff use the spare parts specified in the maintenance manual and/or in the illustrated catalogue.
In event of the equipment falling or sustaining damage, of unusual smells, smoke or overheating, immediately switch off the equipment and unplug the power cord.

Only people who are qualified and trained to maintain equipment and trained to handle products liable to produce dangerous energy levels must install accessories in safety locking zones.

PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD)

The certified staff replacing the PCB or module or performing any other operation on these sub-assemblies must be equipped with an antistatic bracelet on one wrist, connected to an earth socket via the bracelet cord.

To avoid the risk of damage linked to electrostatic discharges, it is strongly recommended to avoid any physical contact with the connector pins.

Do not remove an electronic circuit that is sensitive to static electricity from its protective packaging before being ready to install it,

To divide the static electricity between the work surface and the electronic circuit, touch the work surface with one hand and hold the electronic circuit with the other hand,

Once the electronic circuit is removed from its protective packaging, do not put it down or let go of it before it is installed in the equipment or put back in its protective packaging,

Use the electronic circuit's protective packaging as an assembly surface.

ELECTRIC SHOCK: FIRST AID

The rules for first aid are both theoretical and practical. These rules concern all staff: whether they are installing, operating or maintaining this hardware.
Everyone must be ready to give first aid to avoid any loss of human life.
You must always remain calm.
Generally, an electric shock does not kill instantly; the victim may be saved, even if they are not breathing.
First aid involves protecting, examining, alerting and rescuing.

- **1st action: PROTECT**

Analyse the environment. If the victim is at a height, anticipate their falling when the electric circuit is cut.

Switch off the current.

or

If the rescuer cannot switch off the current, they must:

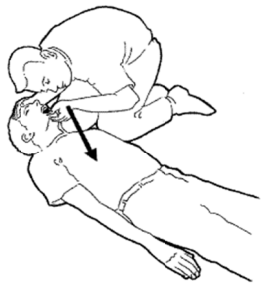
1) protect themselves: protect their hands with a dry non-conducting material (e.g. rubber gloves, cloth) and stand on an insulator (e.g. wooden or plastic stool),
2) move the victim away: use a dry non-conducting pole to remove the victim from any contact with the electric circuit. In particular, move the victim away from any metal or damp elements. Metal and water are electrical conductors,
3) mark out the area to avoid further complications of the accident.

- **2nd action: EXAMINE**

Check for consciousness and breathing before giving the alert.
Lay the victim on their back.
Ask simple questions and hold the victim's hands. Check that the victim is conscious.
e.g. "Can you hear me? If you can hear me, squeeze my hands!".
If the victim responds, they are conscious and breathing (case 1).

Or

If the victim does not respond, they are unconscious. You must check their breathing:



loosen their clothing (collar, tie, belt),
carefully tip the head back to clear the airways,
to do so, place a hand on the forehead, with the index and middle fingers of the other hand placed under the chin, pushing to tip the head backwards,
open the mouth and look inside to inspect it; with the hand that was on the forehead, remove anything that is liable to cause problems breathing,
put your ear and cheek close to the victim's nose and mouth to feel if they are breathing. Watch for the stomach and/or chest expanding,
hold this position for approximately 6 to 10 seconds.

After this examination, the rescuer knows that either:
- ✓ the victim is unconscious and breathing (case 2), or
- ✓ the victim is unconscious and not breathing (case 3).

- **3rd action: RAISE THE ALERT or HAVE SOMEONE RAISE THE ALERT**

Dial the emergency telephone number:

For France:
15 ➔ Emergency Medical Services
18 ➔ Fire brigade
15 ➔ Emergency call from a mobile phone

Give the following information:
the precise location: address, building, floor, corridor, room,
the number of victims
the condition of the victim(s) (e.g. unconscious person, not breathing, etc.).
Do not hang up first.
Facilitate the arrival of the emergency services as close as possible to the victim.
Debrief the emergency services when they arrive.

- **4th action: GIVE FIRST AID**

Case 1: the victim responds and is breathing:
wait for the emergency services.
Case 2: the victim does not respond and is breathing:
place the victim on their side in the recovery position (see below).
the recovery position is used in the event of a fall or injury,
it helps prevent the victim from choking due to obstruction of the tongue or regurgitations.

RECOVERY POSITION

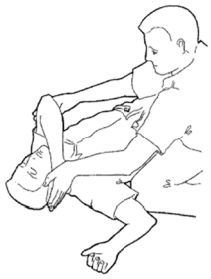
1

Place yourself on the side towards which you intend to turn the victim. Stretch the closest arm out at a right angle to the body, sliding it on the floor.

2

Kneel by their waist. Grasp the victim's opposite arm.

3



Place the back of the victim's hand against their cheek, on your side.

4

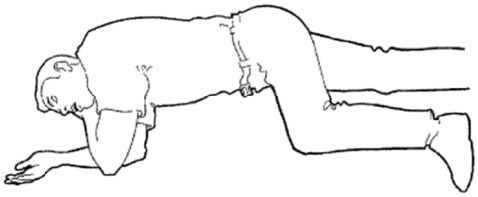
With the other hand, take the opposite leg, just behind the knee, and lift it, keeping the foot on the floor. This allows you to use it for leverage. Move far enough back, to the victim's elbow.

5

Pull on the leg, to roll the victim towards you, until the knee touches the floor.

6

Gently remove your hand from under the victim's head.



Final position:
Check that the victim is still breathing, by placing your hands on either side of the thorax.

Case 3: the victim does not respond and is not breathing.
Immediately begin cardiopulmonary resuscitation (CPR): mouth to mouth insufflation and external cardiac massage.
Place the victim on a hard surface.
Alternate 15 chest compressions (external cardiac massage) followed by two insufflations (mouth to mouth).

MOUTH TO MOUTH

1

Kneel next to the victim, near their face.
With your hand placed on the victim's forehead, block the nose by pinching it between thumb and index finger, while keeping the head tipped back.
With your hand placed under the victim's chin, slightly open their mouth, keeping the chin raised.
After breathing in, not too deeply, place your open mouth around the victim's mouth, pressing hard to avoid leakage.
Insufflate progressively over two seconds, until the victim's chest starts to rise.

2

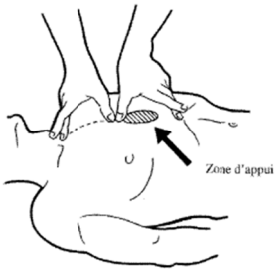
3

Straighten up slightly and catch your breath, watching the victim's chest sink; the victim's expiration is passive.

EXTERNAL CARDIAC MASSAGE

1 As far as possible, bare the victim's chest.

2

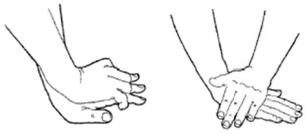


Determine the pressure area, by finding the middle of the sternum.

3

Place the heel of the hand just below the identified area.

4



Place the other hand on top of the first.

5

Perform sternal compressions, keeping the arms straight. Between each compression, the hands stay in contact with the sternum, and the thorax must return to its initial position.

6 Every eight cycles, check if the victim has started breathing again. One cycle = fifteen compressions + two insufflations

it is recommended that two rescuers perform CPR. One rescuer performs the heart massage, and the other insufflates. The rescuers are on either side of the victim. With two rescuers, they can alternate more quickly between insufflations and compressions, which is more effective.

	***Any first aid, be it the recovery position or CPR, must not be interrupted before the emergency services arrive.***

1.4.3.3 Risks related to the work environment

EXPLOSIVE ATMOSPHERE

Do not use the equipment in the presence of inflammable gases or smoke. Using electrical equipment in such environments is a significant safety risk.
In case of fire, the equipment may produce harmful products (gas, fumes) that could be a health hazard.

AMBIENT TEMPERATURE

Do not install the equipment near a heat source.
Do not leave the equipment in direct sunlight.

INSTALLATION OUTSIDE THE RACK

When using the device outside the rack, ensure that it is placed on a flat, sufficiently strong, stable and vibration-free surface at least ten centimetres away from the wall or any other equipment to facilitate air circulation with or without a ventilation system.

INSTALLATION IN A RACK

Ensure that the rack is stable before installing the equipment.
Do not move a rack by yourself. TELERAD recommends that this task be carried out by a minimum of two people.

IRRITATIONS / ALLERGIES

In case of irritation or allergy resulting from the use of the equipment, immediately consult a doctor.

PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD)

Certain equipment, such as transmitters, may increase electromagnetic radiation when being used. It is recommended that pregnant women and people with pacemakers keep away from these high-risk zones.

CONDENSATION

When there is heavy condensation resulting from the equipment being moved (e.g. from a hot to a cold area), do not use the equipment until it is fully dry.

For more information on the equipment's moisture resistance, refer to its climatic characteristics §7.4. § "CLIMATIC CHARACTERISTICS").

SERVICING

Do not use the equipment in a dusty place, as dust particles can hinder its normal functioning.

To clean the equipment, refer to the maintenance and cleaning sheets of this manual (see § 7.4 "MAINTENANCE AND CLEANING OPERATIONS").

Disconnect the equipment before cleaning. Do not use liquid or aerosol cleaners. Use a damp cleaning cloth.

TEMPERATURE

When using TELERAD transmitter-type equipment, the radiator of the RF power amplifier module may reach high temperatures under certain transmission conditions. To avoid any risks of burns, do not touch the RF power amplifier module when the equipment is transmitting and at least for 10 minutes after it switches to standby mode.

VENTILATION

Do not plug the holes or blades of the equipment. They allow free circulation of air and help cool down the system.

1.4.3.4 Risks related to transportation

HANDLING

Certain equipment designed by TELERAD may be very heavy. In this case do not transport the equipment without using appropriate lifting devices.

Refer to the mechanical characteristics of the equipment for information on its weight. (see § 2.3.2 "MECHANICAL CHARACTERISTICS").

PACKAGING

The equipment is delivered in a protective packaging. Keep this packaging for reuse when sending the equipment back to TELERAD.

1.5 TRANSPORT AND STORAGE

1.5.1 General information

Given the great diversity of structures, regulations, weather conditions and transport conditions, this chapter limits itself to recalling the general principles relating to the packaging of electronic hardware and its components, with a view to transporting or storing them.
Just a few precautions specific to the hardware are given.
Particular directives (type and quantity of desiccant, frequency of inspections, etc.), are left to users' discretion.

NOTE: *As far as possible, keep the original reusable packaging.*

1.5.2 Packing – pre-packaging

This operation consists in protecting the hardware and components to be packaged, by suitable physicochemical and/or mechanical means.
Depending on their nature, they must be supported with an appropriate system, and protected by a plastic heat-sealed envelope containing sufficient amounts of desiccant.

1.5.3 Packaging

This operation consists in protecting the previously-packed hardware and components from shocks that occur during handling, and from various damaging external factors during storage.

1.5.3.1 Hardware and mechanical elements

Each element must have a rigid box (polystyrene, wood or cardboard) suited to the transport and storage conditions.
The item shall be fixed in place with soft material that cushions against shocks, or properly fixed inside the box.

1.5.3.2 Desiccation

Condensation of humidity, in a closed container, is essentially caused by the outside temperature dropping, resulting in lowering of the pressure of the internal atmosphere, encouraging the penetration of damp air.
The relative humidity of the internal atmosphere of packaging must be lower than 30%. All packaging must therefore contain a quantity of desiccant related to the climatic conditions encountered.

Desiccant sachets must be insulated from metal objects (risk of corrosion).

1.5.3.3 Marking

All packaging must at least have identification marking specifying its content, (description, reference, quantity) independent of any other regulatory markings.

1.5.4 Transportation

All TELERAD products are supplied in specific protective packaging, and must be transported without this being modified in any manner whatsoever.
In the event of loss, damage or breakage of the equipment during transport, please inform the transport company or shipping agent by a written report.

1.5.5 Storage

Store equipment in a cool (preferably below 30°C) and ventilated place, away from humidity, heat sources, naked flames, food products or drinks. Keep equipment in its original packaging until used, and do not pile up equipment haphazardly.

1.6 CONFORMITY

The VHF RE9000-2G and UHF RE9010-2G are compliant with the standards currently in force relating to EMC, low voltage, radiocommunication, and worker safety aspects.

1.6.1 Reference directives

- **Electromagnetic compatibility (EMC):**
  Directive 89/336/EEC amended by directives 91/263/EEC, 92/31/EEC and 93/68/EEC relating to electromagnetic compatibility of electrical and electronic apparatus.

  Associated standards:
  EN 301 489-1 V1.8.1 (04/2008): Electromagnetic compatibility and radio spectrum matters (ERM). Electromagnetic compatibility (EMC) standard for radio equipment and services;
  Part 1: Basic technical requirements.

  EN 301 489-22 V1.3.1 (11/2003): Electromagnetic compatibility and radio spectrum matters (ERM). Electromagnetic compatibility (EMC) standard for radio equipment and services;
  Part 22: Specific conditions for ground-based VHF aeronautical mobile and fixed radio equipment.

- **Low voltage:**
  Directive 73/23/EEC, amended by directive 93/68/EEC relating to electrical equipment designed for use within certain voltage limits.

  Associated standards:
  EN 60950-1 (2006 + A11: 2009) : IT equipment – Safety –
  Part 1: General requirements.

- **Radiocommunication:**
  Directive R&TTE 1999/5/EC relating to radio equipment and telecommunications terminal equipment and mutual recognition of their conformity.

Associated standards:

EN 300 676-1 V1.5.1 (07/2010): Electromagnetic compatibility and radio spectrum matters (ERM). Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation – **Part 1:** Technical characteristics and methods of measurement.
It covers A3E and ACARS modes of the EM9000-2G.

EN 300 676-2 V1.4.1 (04/2010): Electromagnetic compatibility and radio spectrum matters (ERM). Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation – **Part 2:** Harmonised EN covering essential requirements under Article 3.2 of the R&TTE Directive.

EN 302 617-1 V1.1.1 (01/2009): Electromagnetic compatibility and radio spectrum matters (ERM). Ground-based UHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation – **Part 1:** Technical characteristics and methods of measurement.
It covers A3E and ACARS modes of the EM9010-2G.

EN 302 617-2 V1.5.1 (10/2010): Electromagnetic compatibility and radio spectrum matters (ERM). Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation – **Part 2:** Harmonised EN covering essential requirements under Article 3.2 of the R&TTE Directive

EN 301 841-1 V1.3.1 (06/2010): Electromagnetic compatibility and radio spectrum matters (ERM). VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground-based equipment – **Part 1:** Physical layer and MAC sub-layer.

EN 301 842-2 V1.6.1 (12/2010): Electromagnetic compatibility and radio spectrum matters (ERM). VHF air-ground Digital Link (VDL) Mode 4; Technical characteristics and methods of measurement for ground-based equipment – **Part 2:** General description and data link layer.

EN 300 086-1 V1.4.1 (06/2010): Electromagnetic compatibility and radio spectrum matters (ERM). Land mobile service. Radio equipment with an internal or external RF connector intended primarily for analog speech – **Part 1:** Technical characteristics and methods of measurement.
It covers F3E mode of the device.

EN 300 162-1 V1.4.1 (05/2006): Electromagnetic compatibility and radio spectrum matters (ERM). Radiotelephone transmitters and receivers for the maritime mobile service operating in VHF bands – **Part 1:** Technical characteristics and methods of measurement.
It covers the maritime G3E mode of the device.
EUROCAE ED-137-1 (05/2009): Interoperability Standard for VoIP ATM Components – **Part 1:** Protocol in radio equipment.

EUROCAE ED-137-4 (05/2009): Interoperability Standard for VoIP ATM Components – **Part 4:** SNMP layer.

- **Worker safety:**
  Directive 2004/40/EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields).

  Associated standards:
  EN 50371 (2002): Generic standard to demonstrate the compliance of low power electronic and electrical devices with the basic restrictions related to human exposure to electromagnetic fields (10 MHz-300 GHz) - General public.

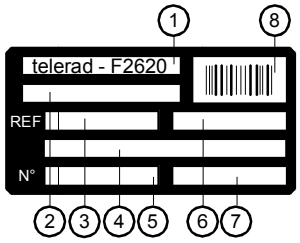
1.6.2 Ce certification

The certificate of conformity CE provided in appendix A2 attests to the conformity of the equipment with European standards in force.

1.6.3 Equipment traceability

Each equipment unit manufactured by TELERAD is fitted with a unique **brand plate** to ensure traceability throughout its service life.

Below is a description of the brand plate.



① *Telerad reference*. Always contains: telerad – F2620.
② *Contract number*. Contains the customer contract number.
③ *Equipment reference*. Contains the equipment reference as defined by Telerad.
④ *Reserved space*. Reserved for marking military equipment.
⑤ *Serial number*. Contains the equipment serial number.
⑥ *Reserved space*. Reserved for marking military equipment.
⑦ *Date*. Contains the equipment delivery date.
⑧ *Bar code*. Allows the equipment to be traced.

1.7 WARRANTY

TELERAD shall not be held liable for any damage resulting from the modification of the as-delivered configuration. This shall include damages resulting from an accident, incorrect use, deliberate damages or damages due to the environment.
Lastly, the environment for the use of TELERAD products must be compliant with the climatic specifications described in this manual.

1.8 COPYRIGHT

☞ *The information contained in this document is deemed to be reliable. However, TELERAD shall reserve the right to modify this information at any time without prior notice.*

1.9 REFERENCE DOCUMENTS

[1]	ICDFR 40600034 V1.00 Série 9000-2G MAINTENANCE	Interface Control Document relating to the local operation and configuration link from the RS232 front panel interface.
[2]	ICDFR 40600035 V1.00 Série 9000 Agent SNMP	Interface Control Document relating to the SNMP protocol supervision link.
[3]	ICDFR 40600036 V1.00 Série 9000 JBUS	Interface Control Document relating to the JBUS protocol supervision link
[4]	KITGB 40700003 V1.02 9000-2G Series	Procedure for software release through a Web server page.

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CHAPTER 2. PRESENTATION

2.1 GENERAL

The multi-mode RE9000-2G VHF and RE9010-2G UHF receivers have been developed to fulfil new civil aviation voice and data reception telecommunications requirements, firstly, in the 118-144MHz frequency range, can be optionally extended to 112-156MHz, and secondly for military aviation telecommunications, in the 225-400MHz frequency range, can be optionally extended to 225-406.1MHz with the F3E option.

They have evolved significantly from the first generation of series 9000 receivers, to respond to the obsolescence of certain components, and also to best adapt to technological change in terms of network communications. However, they remain totally compatible with them in terms of connection and operation.

Designed for communication stations on the ground, they are a multi-mode and multi-frequency unit suited to various configurations, and of course support the traditional AM modulation mode (A3E).

Thanks to their modular design, maintenance of the equipment, by replacing defective subsets, is quick and easy.

There are two versions in each family of receivers, with or without a Mains input:

- RE9000A-2G: VHF version with DC and mains inputs.
- RE9000C-2G: VHF version with DC input only.
- RE9010A-2G: UHF version with DC and mains inputs.
- RE9010C-2G: UHF version with DC input only.

In the following, terms as ***optional*** and ***pending*** are used to present some functionalities of the equipment. The common meaning for those terms is:

Optional: Functionality available with charge, not present by default on the radio.
Pending: Functionality not available, but for which the hardware of the equipment has been planned and designed.

The main characteristics of these receivers are:

Frequency range:

- For the RE9000-2G: 118-144 MHz, *optional: 112-156 MHz.*
- For the RE9010-2G: 225-400 MHz, *F3E optional: 225-406.1 MHz*.

Operating modes:

- For the 2 VHF and UHF receivers:
  - Voice in A3E mode, in channels spaced by 8.33kHz or 25 kHz in VHF, and 8.33kHz, 12.5kHz or 25kHz in UHF.
  - *Optional: Audio reception in F3E mode.*
- For the RE9000-2G VHF receiver only:
  - *Provisions for audio reception in G3E mode.*
  - *Provisions for data reception in ACARS, VDL2 or VDL4 modes.*
- For the RE9010-2G UHF receiver only:
  - *Provisions for data reception in UDL2 mode.*

Other functions:

- Local or remote operation,
- Remote configuration and supervision by PC (through SNMP or JBUS RS485 protocol),
- Local configuration with Screen/Keyboard, or by ASCII/PC RS232 terminal,
- Complete IP interface for VoIP protocol,
- Digital processing of audio signal,
- Built-in tests,
- Internal protection against voltage surges,
- Direct current $+24V_{DC}$ input from external batteries (operation ensured between 21V and 31V).
- On version A, Mains input also available (takes priority over the Battery input), automatic switching Mains ⇨ Battery in the event of mains failure.

2.2 PRESENTATION OF THE EQUIPMENT

2.2.1 Hardware and operational presentation

The multi-mode RE9000-2G VHF and RE9010-2G UHF receivers are multi-module systems designed to be installed in a standard 19" rack, taking up a height of 1U.

They both have an identical structure, made up of a mechanical chassis to which the following modules and PCBs are fixed:

- The control PCB, located at the rear. It represents the node interconnecting the other elements of the receiver.
- The Microprocessor-DSP module forming the management centre of the system, also located at the rear. It is linked to the control PCB by two ribbon cables.

The front end receiver module, VHF for the RE9000-2G, UHF for the RE9010-2G, located at the front of the equipment. It is also linked to the control PCB by a ribbon cable.

- The synthesizer module supplying the local oscillator, is also located at the front of the equipment, and is linked to the control PCB by a fourth ribbon cable.
- The front panel management PCB, which groups together the local commands and signals. It is also linked to the control PCB, by a fifth ribbon cable.
- The display PCB that manages the Front panel Screen / Keyboard. This PCB is connected directly to the front panel management PCB.

A removable cover protects these sub-assemblies from the environment.

Functionally, each receiver performs:

- Demodulation of the voice that it transmits to the controller via the radio network (VCSS), or of the data that it escalates to the upper layer of the communication system.
- Management of the various HMI allowing configuration, operation, testing and local and remote supervision.
- Self-monitoring.

2.2.2 Presentation of software

The onboard software in the multi-mode RE9000-2G VHF or RE9010-2G UHF receiver is designed around a real-time multi-process kernel used by the microcontroller of the Microprocessor/DSP module. After reading the configuration parameters, the microcontroller downloads the DSP software into its memory.

It is structured into a set of applications, which the aforementioned kernel manages and shares the resources required for them to execute correctly. These applications are themselves distributed in 2 important hardware components: a 32-bit MOTOROLA PowerQUICC I (MPC885) microcontroller, and a 16-bit ANALOG DEVICE (AD2191) DSP.
There are 4 applications, broken down as follows:

- 3 applications managed by the microcontroller:
  - Management of asynchronous serial, Ethernet and parallel links for communication with control components outside the receiver,
  - Inspection and monitoring of the receiver,
  - Management of the receiver's man-machine interface.
- 1 application managed by the DSP:
  - Management of demodulation and the CODECs.

2.2.3 Different versions

Reference	*Name*	*TLD code*	*Description*
RE9000-2G	Digital VHF receiver	80100067	Multi-mode VHF receiver operating in A3E mode, (*F3E optional)*.
RE9010-2G	Digital UHF receiver	80100070	Multi-mode UHF receiver operating in A3E mode, (*F3E optional)*.

2.2.4 Sub-assemblies

2.2.4.1 Sub-assemblies common to the two receivers

Reference	*Name*	*TLD code*	*Description*
CNUM12163	Control PCB	50001182	IF processing, AF interface, A/D conversions, control of input RF filter, electrical interfaces
PAVR42101	Front Panel	50001396	Mechanical support for screen, pushbuttons and indicator lights
CHRE43185	Chassis	50001400	Mechanical support for PCBs and modules
CLAF12164	Display PCB	51001184	Management of local display
MIPR11006	µP PCB / DSP	53500016	µP processing and DSP
ALSE53005	AC/DC power supply *(RE9000A-2G and RE9010A-2G versions only)*	58500064	Internal 24V supply

2.2.4.2 Sub-assemblies specific to the RE9000-2G

Reference	*Name*	*TLD code*	*Description*
SVHF25077	VHF synthesizer	52000620	Generation of local oscillator
VUFI23186	VHF reception module	52000619	VHF head providing the IF

2.2.4.3 Sub-assemblies specific to the RE9010-2G

Reference	*Name*	*TLD code*	*Description*
SUHF25078	UHF synthesizer	52000621	Generation of local oscillator
VUFI23191	UHF reception module	52000644	UHF head providing the IF

2.2.5 Options

2.2.5.1 RE9000-2G options

Reference	*Name*	*TLD code*	*Option type*	*Description*
Option A	RE9000A-2G	84500146	Compulsory	Multi-mode VHF receiver with mains and battery inputs.
Option B	RE9000C-2G	84500147	Compulsory	Multi-mode VHF receiver with battery input only.

2.2.5.2 RE9010-2G options

Reference	*Name*	*TLD code*	*Option type*	*Description*
Option A	RE9010A-2G	84500148	Compulsory	Multi-mode UHF receiver with mains and battery inputs.
Option B	RE9010C-2G	84500149	Compulsory	Multi-mode UHF receiver with battery input only.

2.2.6 Set of mobile plugs

Reference	*Name*	*TLD code*	*Description*
JFMRE90X0-2G	Set of EMC cables for RE90X0-2G	57001019	Set of mobile plugs and covers for connection of the equipment to its environment

2.2.7 Compatible equipment

Reference	*Name*	*TLD code*	*Description*
EM9000-2G	Digital VHF transmitter	80000086	Multi-mode VHF transmitter operating in A3E mode, *(F3E, ACARS and VDL2 optional or pending)*, in connection with the RE9000-2G
EM9010-2G	Digital UHF transmitter	80300035	Multi-mode UHF transmitter operating in A3E mode, *(F3E and UDL2 optional or pending)*, in connection with the RE9010-2G
PCR9008	Operator Console	60000011	Operator Console for remote operation in AM mode
BNS9008	Normal / Back-up Switching unit	81400040	Switching unit for 2 receivers, one of which is a back-up for the other
CPR9000	2-receiver coupling unit	84100032	Coupling unit for 2 redundant receivers set to the same frequency

2.3 EQUIPMENT CHARACTERISTICS

2.3.1 Electrical characteristics

2.3.1.1 General characteristics

Characteristics	*Value*	
Operating modes ..... :	***RE9000-2G VHF receiver:***	***RE9010-2G UHF receiver:***
	Basic: A3E.	Basic: A3E.
	Optional: F3E.	Optional: F3E.
	Pending: G3E / ACARS / VDL2 / VDL4.	*Pending:* UDL2.
Power supply..... :	Mains Input (version A only): 120/240V_{AC} ±10% at 47-63 Hz. Battery Input (versions A and C): +24 V_{DC} (21-31 V_{DC}).	
Consumption (typical).... :	On +24V_{DC} Battery input: 500 mA. On 115V_{AC} Mains input: 270 mA. On 230V_{AC} Mains input: 180 mA.	
Maximum input level ..... :	+30dBm.	
Local maintenance..... :	Various possible means of access: ▪ Front panel Screen / Keyboard. ▪ Maintenance Connector by RS232 port. 2 built-in Tests: continuous (CBIT) and initiated (IBIT), which display results on the local screen. Software update option. Configuration of operating parameters: Mode, operational frequency, squelch, squelch threshold, AF line level, call in the band, CSM, DATA and JBUS parameters, service parameters. Measurements: Power supply voltage, Internal voltages, AGC voltage, AF Output Power, internal magnitudes.	
Remote supervision ..... :	By Ethernet connection, using SNMP protocol. *Via RS485 serial link, using JBUS protocol (optional).*	

2.3.1.2 Specifications for the RE9000-2G

2.3.1.2.1 A3E specifications

Measurement conditions as per EN 300 676-1 V1.5.1 and EN 300 676-2 V1.4.1 ETSI standards.

Characteristics	*Value*
Mode ..... :	A3E.
Frequency ranges ..... :	Standard: 118-144 MHz. *Optional: Extended to 112-156 MHz.*
Frequency stability ..... :	< ±0.3 ppm (from -20°C to +55°C).
Channel spacing..... :	25 kHz and 8.33 kHz.
Modulation ..... :	Type: AM-DSB/WC.
Sensitivity ..... :	≤ -105dBm (1.2µV / 50Ω), *typical: -107dBm (1µV / 50Ω).*
Overall bandwidth at -6dB .... :	Channels at 25 kHz: ≥ ±11 kHz. Channels at 8.33 kHz: ≥ ±2.8 kHz.
Adjacent channel rejection .... :	Channels at 25kHz: ≥ 70dB. Channels at 8.33 kHz: ≥ 60dB.
Rejection of interfering signals:	≥ 70dB.
Third-order intermodulation :	≥ 80dB *(12dB SINAD, scrambling signals at 100kHz and 200kHz).*
Crossmodulation rejection .... :	≥ 85 dB.
Image frequency rejection ..... :	≥ 80dB.
Desensitization ..... :	≥ 100dB.
Dynamics ..... :	≤ 3 dB (for 100dB variation over the RF).
Interference emitted by conduction ..... :	≤ -57dBm.
AF noise ..... :	> 50dB *(Carrier at -13dBm, 90% modulated by a 1kHz AF).*
AF AGC ..... :	< 1.5 dB.
Harmonic distortion ..... :	≤ 5% *(Carrier 90% modulated by a 1kHz AF).*
AF bandwidth at -3dB..... :	Channels at 25 kHz: ≥ 300-3400Hz. Channels at 8.33 kHz: ≥ 300-2500Hz.
Output AF level ..... :	Adjustable from –11dBm to +10dBm by 0.5dB steps.
Squelch attenuation ..... :	≥ 60 dB.
Types of squelch ..... :	RF level or S/N ratio programmable between 6 and 16 dB (12dB by default).

2.3.1.2.2 F3E specifications

Measurement conditions as per EN 300 086-1 V1.4.1 ETSI standard.

Note: *Do not take the following electrical characteristics into account if the F3E option has not been installed in the RE9000-2G receiver.*

Characteristics	*Value*
Mode ..... :	F3E.
Frequency range ..... :	Standard: 118-144 MHz . *Optional: Extended to 112-156 MHz.*
Frequency stability ..... :	< ±0.3 ppm (from -20°C to +55°C).
Channel spacing..... :	25 kHz.
Sensitivity ..... :	≤ -107dBm *(1µV / 50Ω) (±2.4kHz deviation, S/N ratio = 10dB, CCITT weighting)*.
Modulation ..... :	Type: FM, Frequency deviation: ±5.6kHz.
Overall bandwidth at -6dB ..... :	≥ ±11 kHz.
Dynamics ..... :	≥ 94dB.
Adjacent channel rejection ..... :	≥ 55dB.
Co-channel rejection ..... :	≥ -8dB.
Rejection of interfering signals .. :	≥ 70dB.
Image frequency rejection ..... :	> 75dB.
Third-order intermodulation ..... :	≥ 70dB.
Desensitization ..... :	≥ 84dB.
Interference emitted by conduction	From 9kHz to 1GHz: ≤ -57dBm. From 1GHz to 4GHz: ≤ -47dBm.
AF bandwidth at -3dB..... :	> 300-3600Hz.
Types of squelch ..... :	RF level or S/N ratio programmable between 14 and 24dB (18dB by default).

2.3.1.3 Specifications for the RE9010-2G

2.3.1.3.1 A3E specifications

Measurement conditions as per EN 302 617-1 V1.1.1 and EN 302 617-2 V1.5.1 ETSI standards for the 25kHz channels.

Note: *There is no European or international standard adapted to the UHF band, for the 8.33kHz channels.*
The following characteristics are given as an extension of the EN 300 676-1 V1.5.1 standard, normally intended for the VHF band.

Characteristics	*Value*
Mode ..... :	A3E.
Frequency range ..... :	Standard: 225-400 MHz.
Frequency stability ..... :	< ±0.3 ppm (from -20°C to +55°C).
Channel spacing..... :	25 kHz, 12.5kHz and 8.33 kHz.
Modulation ..... :	Type: AM-DSB/WC.
Sensitivity ..... :	≤ -105dBm (1.2µV / 50Ω).
Overall bandwidth at -6dB ..... :	Channels at 12.5 and 25 kHz: ≥ ±11 kHz. Channels at 8.33 kHz: ≥ ±2.8 kHz.
Adjacent channel rejection ..... :	Channels at 25kHz: ≥ 60dB. Channels at 12.5kHz: ≥ 60dB *(in the 2nd adjacent channel, as no specific filter at 12.5kHz).* Channels at 8.33kHz: ≥ 50dB.
Rejection of interfering signals :	≥ 70dB.
Third-order intermodulation .. :	≥ 80dB (12dB SINAD, scrambling signals at 100kHz and 200kHz).
Crossmodulation rejection ..... :	≥ 80 dB.
Image frequency rejection ..... :	≥ 75dB.
Desensitization ..... :	≥ 95dB.
Dynamics ..... :	≤ 3 dB (for 100dB variation over the RF).
Interference emitted by conduction ..... :	≤ -57dBm.
AF noise ..... :	> 50dB *(Carrier at -13dBm, 90% modulated by a 1kHz AF).*
AF AGC ..... :	< 1.5 dB.
Harmonic distortion ..... :	≤ 5% *(Carrier 90% modulated by a 1kHz AF).*
AF bandwidth at -3dB..... :	Channels at 12.5 and 25 kHz: ≥ 300-3400Hz. Channels at 8.33 kHz: ≥ 300-2500Hz.
Output AF level ..... :	Adjustable from –11dBm to +10dBm by 0.5dB steps.
Squelch attenuation ..... :	≥ 60 dB.
Types of squelch ..... :	RF level, or S/N ratio programmable between 6 and 16 dB (12dB by default).

2.3.1.3.2 F3E specifications

Measurement conditions as per EN 300 086-1 V1.4.1 ETSI standard.

Note: *Do not take the following electrical characteristics into account if the F3E option has not been installed in the RE9010-2G receiver.*

Characteristics	*Value*
Mode ..... :	F3E.
Frequency range ..... :	Standard: 225-400 MHz. *Extended : 225-406.1MHz (optional).*
Frequency stability ..... :	< 1 ppm (from 0°C to 50°C).
Channel spacing..... :	25 kHz and 12.5 kHz.
Sensitivity ..... :	< -107dBm (1µV / 50Ω) (±2.4kHz deviation, S/N ratio = 10dB, CCITT weighting).
Modulation ..... :	Type: FM, Frequency deviation: ±5.6kHz.
Overall bandwidth at -6dB .... :	≥ ±11 kHz.
Adjacent channel rejection .... :	Channels at 25kHz: ≥ 55dB. Channels at 12.5kHz: ≥ 60dB *(in the 2nd adjacent channel, as no specific filter at 12.5kHz).*
Rejection of interfering signals:	≥ 70dB.
Image frequency rejection ..... :	> 75dB.
Co-channel rejection ..... :	≥ -8dB in a 25kHz channel. ≥ -12dB in a 12.5kHz channel.
Dynamics ..... :	≥ 94dB.
Third-order intermodulation :	≥ 70dB.
Desensitization ..... :	≥ 84dB.
Interference emitted by conduction ..... :	9kHz to 1GHz : ≤ -57dBm. 1GHz to 4GHz : ≤ -47dBm.
AF bandwidth at -3dB..... :	> 300-3600Hz.
Types of squelch ..... :	RF level or S/N ratio programmable between 14 and 24dB (18dB by default).

2.3.2 Mechanical characteristics

- *Mechanical dimensions of RE9000-2G.....: see plate 45000061.*
- *Mechanical dimensions of RE9010-2G.....: see plate 45000065.*

Weight .....: < 4 kg.

2.3.3 Climatic and environmental specifications

Operating temperature.....: between -20°C and +55°C.
Relative humidity .....: 95% at 40°C (without condensation).
Storage temperature .....: from –30°C to +80°C

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CHAPTER 3. OPERATIONAL DESCRIPTION

3.1 SIMPLIFIED OPERATION

See Plate 46000134 RE9000-2G general diagram.
See Plate 46000154 RE9010-2G general diagram.

3.1.1 Presentation

The RE9000-2G VHF receiver is a multi-mode receiver that can operate in A3E and F3E. In accordance with these modes, it performs AM and FM type demodulations.
The software and hardware resources of this equipment already allow future developments towards G3E, ACARS, VDL2 and VDL4 modes to be supported. In this case, the associated demodulations are de-emphasized FM, AM-MSK, D8PSK and GFSK type.

The RE9010-2G UHF receiver is also a multi-mode receiver, which can operate in A3E and F3E. It performs AM and FM type demodulations.
Its software and hardware resources allow it to support future developments towards UDL2 mode, if necessary. In this case, the associated demodulation is D8PSK type.

In each case, the receivers are under compete digital control (microcontroller and DSP).
They also have two independent Ethernet ports, one to connect to a network through the SNMP protocol, and the second allowing transfer of Voice over IP (VoIP).

3.1.2 Architecture

The RE9000-2G and RE9010-2G receivers are made up of 8 PCBs and modules, each with a specific function:

PCBs or Modules common to the 2 units:	***Description:***
ALSE53005	AC/DC converter power supply
CHRE43185	Chassis
CLAF12164	Display PCB
CNUM12163	Control PCB
MIPR11006	µP / DSP programmed management PCB
PAVR42101	Front Panel

PCBs or Modules specific to the RE9000-2G:	***Description:***
SVHF25077	VHF synthesizer module
VUFI23186	VHF head reception module

PCBs or Modules specific to the RE9010-2G:	***Description:***
SUHF25078	UHF synthesizer module
VUFI23191	UHF head reception module

3.1.3 Functional description

3.1.3.1 Front panel PCB (PAVR42101) combined with the display PCB (CLAF12164)

The PAVR42101 front panel PCB allows the unit's activity to be visualised through various indicator lights:

- Indication of the state of the power supplies (Presence of Mains and/or Battery inputs (version A only), device powered on),
- Indication of the state of the radio (Status, Alarm, Squelch, Call),
- Indication of the activity of the serial links (JBUS, DATA).

It also provides an "LO Test" BNC connector, and gives the option to program the receiver's operating parameters through a local screen/keyboard managed by the Display PCB, or through a Maintenance RS232 Sub-D connector.
Lastly, it allows local operation of the receiver, through the AF headphone and Loudspeaker output interfaces.

3.1.3.2 Chassis (CHRE43185)

This provides the mechanical cohesion of the equipment, and also serves as support to attach all the PCBs and modules that make up the receiver. Internal organisation is such that, apart from the Maintenance connector available from the front panel, all of the power supply, antenna, operation and supervision connectors are located on the rear panel of the chassis, which means the equipment can be connected quickly, and is easy to control remotely.

3.1.3.3 µP / DSP PCB (MIPR11006)

Fitted with a microcontroller and a DSP, this PCB is the core of the receiver. The main role of the microcontroller is to manage the different external communication ports (serial links, Ethernet port, etc.), and also the HMI, and the radio in general (programming the synthesizer, internal protection, built-in tests).
The DSP, for its part, takes charge of all demodulation (AM, AM-MSK, D8PSK, FSK, GFSK) and data or voice decoding (ACARS, VDL2, VDL4, VoIP).

3.1.3.4 Control PCB (CNUM12163)

The CNUM12163 PCB recovers the 21.4MHz IF signal coming from either the VUFI23186 PCB (RE9000-2G receiver), or the VUFI23191 PCB (RE9010-2G receiver), digitises it in a digital step-down converter box, then transmits the data obtained to the MIPR11006 PCB, where it will be analysed by the DSP.
This PCB also contains the electrical interfaces and the DATA and JBUS port connectors, as well as the AF interfaces, remote and local commands and information (600Ω AF line transformer, loudspeaker's audio amplifier, headphone output, commands for input filters of the VUFI23186 or VUFI23191 modules, measurements converter, squelch command, call information, field voltage).

3.1.3.5 VHF synthesizer module (SVHF25077) (RE9000-2G only)

Given the heterodyne structure of the RE9000-2G receiver, the SVHF25077 VHF synthesizer module supplies the local oscillator to the mixer of the VUFI23186 VHF head module.

3.1.3.6 UHF synthesizer module (SUHF25078) (RE9010-2G only)

As with the SVHF25077 module, given the heterodyne structure of the RE9010-2G receiver, the SUHF25078 UHF synthesizer module supplies the local oscillator to the mixer of the VUFI23191 UHF head module.

3.1.3.7 VHF front end module (VUFI23186) (RE9000-2G only)

The VUFI23186 module is the first module in the reception chain. Through a mixer, it performs a first step-down of the RF frequency of the signal received at the antenna to an intermediate frequency, called IF, of a value of 21.4MHz.
This IF is then sent to the digital step-down converter of the CNUM12163 control PCB, to finally allow digital processing by the MIPR11006 PCB DSP.
The RF signal received is filtered in advance with a tuneable input band pass filter by the MIPR11006 PCB, through signals shaped on the CNUM12163 PCB. The filtered and then amplified RF signal is then mixed with the local oscillator supplied by the SVHF25077 module.
The resulting IF signal is in turn amplified then filtered by one of the two quartz filters fitted, depending on the desired selectivity (25kHz or 8.33 kHz).
At the output of the selected quartz filter, the IF signal is again amplified by a variable gain amplifier, the gain of which is under the control of the MIPR11006 PCB DSP. The AGC command generated by the DSP acts directly on the gain of the IF amplifier, but also upstream of the mixer, on PIN diodes acting as RF attenuators (in the case of a strong input RF signal).
Lastly, the IF signal is sent to the CNUM12163 PCB to undergo digital processing.
Also present on this module are the voltage regulators supplying the internal voltages to the module, as well as the monitoring circuits (LO presence, antenna input test generator as part of an initiated test (IBIT)).

3.1.3.8 UHF front end module (VUFI23191) (RE9010-2G only)

With the exception of input filters, modified to be able to operate in the UHF band, as well as the head RF amplifier, the VUFI23191 UHF module is identical in every way to the VUFI23186 VHF module in the way it works, from the mixer onwards.
The IF is obtained by comparison with the Local Oscillator, this time provided by the SUHF25078 UHF synthesizer module. The signal obtained is amplified then filtered by one of the two quartz filters fitted, depending on the desired selectivity (25kHz or 12.5kHz, or 8.33 kHz). Otherwise processing is the same.

3.1.3.9 Power supply module (ALSE53005)

Present only on the RE9000A-2G and RE9010A-2G versions of the receivers, this module takes into account the Mains input, and converts the AC mains input to an internal $+24V_{DC}$ power supply.

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CHAPTER 4. PRESENTATION OF THE UNIT

4.1 GENERAL DESCRIPTION

4.1.1 Presentation of the front panel

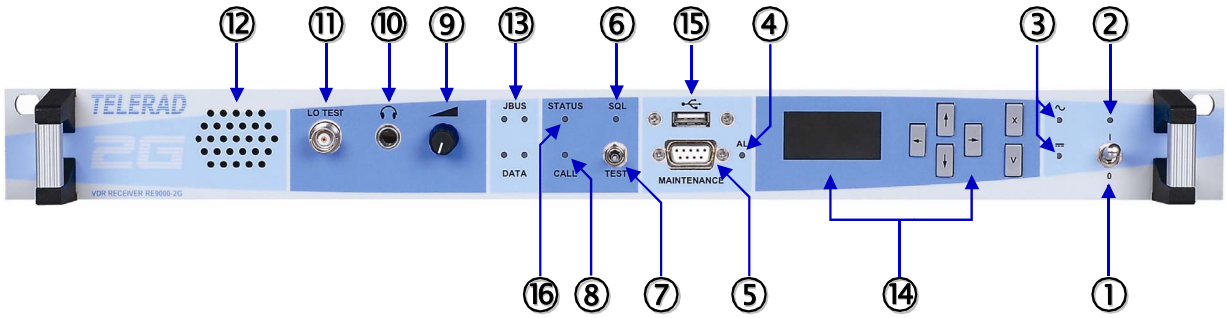


Figure 1 - Front panel

No.	*Front panel element*	*Description*
①	**On ⏽ / Off ○ Switch**	Allows the receiver to be powered on or off.
②	**Indicator light ● +V=**	Indicates that the receiver is powered on (+24V_{DC} present on the PCBs and modules)
③	**Indicator lights ● MAINS ~ and BATTERY ⎓**	These indicator lights indicate the presence of active power supply sources connected to the receiver.
④	**Indicator light ● ALARM**	This indicator light indicates an operating fault in the receiver. It is on in one of the following fault conditions: ▪ Microcontroller or DSP Alarm on Reset or triggering of the "watchdog", ▪ CODEC or A/D converter or I/O expander or internal voltages Alarm, ▪ Alarm from synthesizer on PLL unlocking or LO level too weak, ▪ High temperature of the MIDS11216 microprocessor module. ▪ Low or High voltage detection *(cf.§ 4.1.1.1),* ▪ Fault detected by the built-in test, ▪ Software updates in progress *(Test leds running during the software upload).* ▪ Frequency change (Inhibition for about **100ms).**
⑤	**RS232 MAINTENANCE connector**	9-contact female Sub-D connector for connection to an ASCII terminal or a PC emulating a terminal.

No.	*Front panel component*	*Description*
⑥	**Indicator light ● SQUELCH**	Indicates squelch status. When it is on, squelch is active, when it is off, squelch is inhibited.
⑦	**SQUELCH / TEST dual-position switch**	Switch with a stable central resting position and two working positions when pressed: ▪ The upper position allows the Squelch function to be activated or deactivated locally. ▪ The lower position triggers the built-in test.
⑧	**CALL Indicator light ●**	Lit as soon as an RF signal with an SNR superior to the programmed value, or with a level superior to the Squelch threshold, is received on the receiver's Antenna input.
⑨	**VOLUME adjustment**	Potentiometer to adjust the listening level for the audio signal sent to the Loudspeaker or to the Headphone output.
⑩	**HEADPHONE Jack connector**	Jack connector for headphone plug type ELNO JK34 (ref. TLD: 150 00163), PL55-300 (ref. TLD: 150 00146) or RR60900 (TOTEM), 6.35 mm diameter. It allows the demodulated AF signal to be listened to locally. The Loudspeaker output (12) is automatically cut off as soon as headphones are connected. Headphone impedance: 600Ω.
⑪	**LO TEST BNC connector**	This output provides a sample of the Local Oscillator of the SVHF25077 or SUHF25078 synthesizer module. By connecting an external frequency meter, it is possible to measure its frequency and precision. Output level: between -10dBm and 0dBm/50Ω).
⑫	**Loudspeaker Output**	Allows the received AF to be listened to, when headphones are not connected (10).
⑬	**Indicator lights ● TxD and ● RxD for JBUS and DATA links**	These indicator lights blink following the rhythm of the activity when the JBUS (J2) and DATA (J5) links are emitting and receiving data.

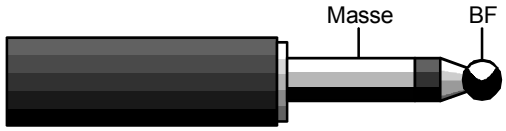


Figure 2 – Jack connector for headphones

No.	*Front panel component*	*Description:*
⑭	**Screen / Keyboard**	This local Man-Machine interface mainly allows: ▪ viewing and programming the receiver's configuration parameters, ▪ displaying measurements, ▪ launching the built-in test
⑮	**USB connector**	*Pending for an configuration USB key.*
⑯	**Indicator light ● STATUS**	Lights as soon as the remote **O**N/OFF command is at ***ON*** and no receiver alarm is active.

4.1.1.1 Management of the « Alarm » led vs the power supply voltage :

The receiver operates correctly only if the power supply voltage is between two values, a minimum and a maximum. The following flowchart displays how the alarm led is managed depending on the supply voltage changes, as well as the On/Off control :

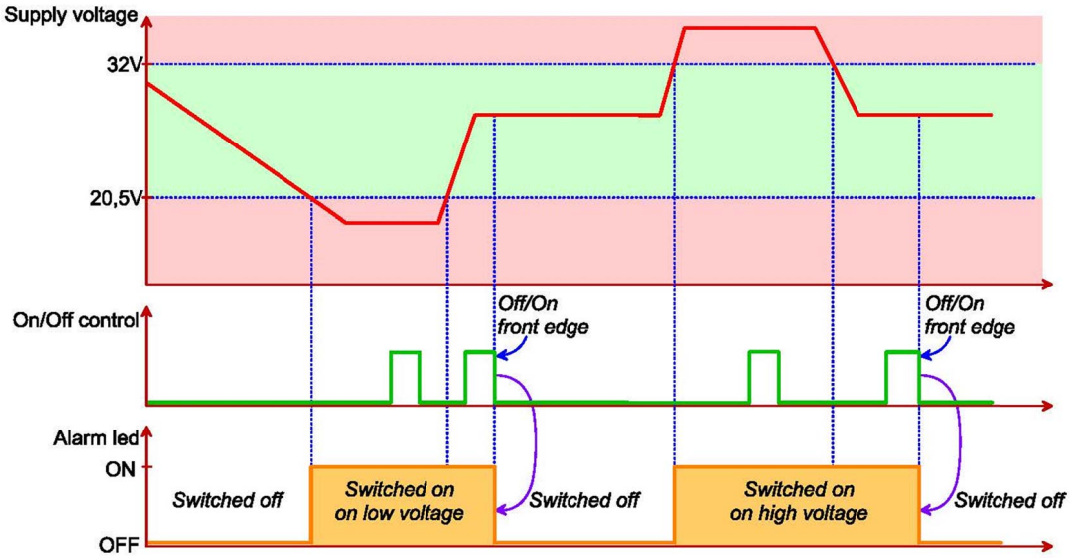


Figure 3 – Management of the « Alarm » led

4.1.2 Presentation of the rear panel

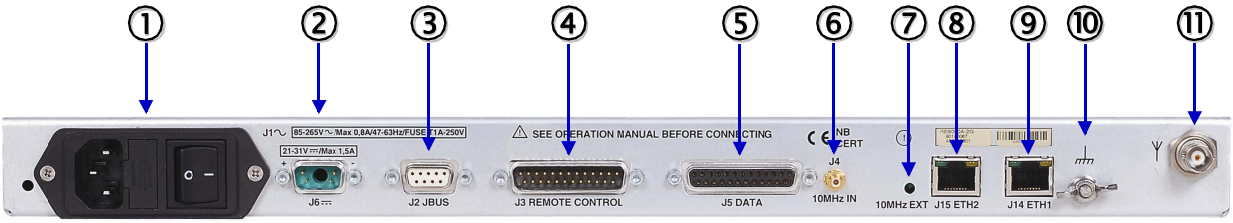


Figure 4 – Rear panel

No.	*Rear panel component:*	*Description*
①	**Connector J1: Mains power supply input**	$110V_{AC}$ / $220V_{AC}$ mains power supply input, only present on RE9000A-2G and RE9010A-2G versions. It includes: ▪ A CEI950 Phase/Neutral/Earth 3-pin connector, ▪ A mains EMC filter, ▪ An On ⏽ / Off ○ switch, ▪ Two 1A/250V slow-blow fuses, on phase and neutral, *Reference D1TD/1A (Ref. TLD: 210 00006).*
②	**Connector J6: Battery power supply input**	$+24V_{DC}$ battery input connector, present on all RE9000-2G and RE9010-2G versions. Receives the $+24V_{DC}$ power supply from a battery or external power station, required for the receiver to operate. On RE9000A-2G and RE9010A-2G versions, in the event of failure of the Mains input, the receiver automatically switches over to this input.
③	**Connector J2: JBUS link**	9-contact female Sub-D connector allowing the receiver to be connected to a remote supervision system operating using the JBUS protocol.
④	**Connector J3 : OPERATION**	25-contact male Sub-D connector inputting all the receiver's remote operating commands, and outputting all the information required to inspect its operation.
⑤	**Connector J5: DATA**	25-contact female Sub-D connector representing the data transfer DTE/DCE interface with the upper layers of a communication system. It is only used in data transmission digital modes, to send the received data to the application level.
⑥	**Connector J4: 10MHz INPUT**	SMA connector that receives an external 10MHz reference oscillator, which can be used by the SVHF25077 or SUHF25078 Synthesizer modules to generate the Local Oscillator.

No.	***Rear panel component:***	***Description***
⑦	Indicator light ● EXTERNAL 10MHz	This indicator light is lit when an external 10MHz oscillator is present and used as a reference to generate the Local Oscillator.
⑧	Connector J15: fitted with 2 indicator lights **TxD and RxD for ETHERNET 2 link**	RJ45 connector representing the data transfer DTE/DCE interface with the upper layers of a communication system. It is used within the context of data transfer using the VoIP or SNMP protocol. The associated indicator lights view activity on this port.
⑨	Connector J14: fitted with 2 indicator lights **TxD and RxD for ETHERNET 1 link**	Same as connector J15. It is used within the context of data transfer using the VoIP or SNMP protocol. The associated indicator lights view activity on this port.
⑩	**Protective earth terminal** ⏚	4mm diameter wing screw, allowing protective earthing of the equipment chassis. The minimum cross-section of the wire used must be 2.5mm². This connection must be made before any other connection, and must be disconnected last. It is also recommended to check the earth continuity regularly.
⑪	**Connector J7: ANTENNA INPUT**	Coaxial BNC connector allowing the receiver to be connected to a reception antenna.

☞ ***Note:*** *A complete description of the connectors is given in § 4.2 "DESCRIPTION OF CONNECTORS".*

4.2 DESCRIPTION OF CONNECTORS

4.2.1 Front panel connectors

4.2.1.1 Maintenance connector

9-contact female SUB-D connector .....DEP09S300……..... Ref. Telerad (150 00385)
SUB-D 9 male contact mobile plug .....DEP09P……..... Ref. Telerad (150 00023)
Protective cover .....8630-3637A ..... Ref. Telerad (150 00152)

The table below gives the list of signals available on this connector:

No.	*I/O*	*Signal*	*Signal ID*	*Characteristics*	*No. Int.*
1	/	Not used	/	/	/
2	I	RxD	J	RS232 maintenance serial link: Data reception Input level: ±12V.	127
3	O	TxD	K	RS232 maintenance serial link: Emission of data. Output level: max. ±15V.	128
4	O	DTR	L	RS232 maintenance serial link: Data terminal ready. Output level: +12V.	123
5	I	Logic ground	GND1	Linked to the ground of the receiver	/
6	I	DSR	M	RS232 maintenance serial link: Data set ready. Input level: +9V to +12V when a RS232 terminal is present.	127
7,8,9	/	Not used	/	/	/

4.2.2 Rear panel connectors

4.2.2.1 J1 mains power supply connector:

Note: *This connector is only present on the RE9000A-2G and RE9010-2G versions of the digital receivers.*

Filtered mains connector……FN 282-2-06 ..... Ref. Telerad (370 00307)
Mobile plug: see standard mains cord…3020-4360B..... Ref. Telerad (275 00011)
(Length 2.5m, fitted with IEC female connector)

No.	*I/O*	*Signal*	*Signal ID*	*Characteristics*	*No. Int.*
1	I	Neutral	/	Marked N on the mobile plug, it corresponds to the mains return circuit	/
2	I	Phase	/	Marked L on the mobile plug, it corresponds to the mains phase providing alternating current	/
3	I	Earth	/	Marked ⏚ on the mobile plug, it earths the connected device.	/

The "Phase" and "Neutral" inputs are protected by 1A/250V slow-blow fuses, dimensions 5x20mm, reference D1TD/1A (Telerad Code: 210 00006).

4.2.2.2 J6 +24V_{DC} BATTERY POWER SUPPLY connector

9-contact male SUB-D connector .....DEML5W ..... Ref. Telerad (150 01156)
9-contact female SUB-D mobile plug.....DEM 5W1S..... Ref. Telerad (150 01089)
Protective cover .....8630-3637A ..... Ref. Telerad (150 00152)

No.	*I/O*	*Signal*	*Signal ID*	*Characteristics*	*No. Int.*
1,3	I	+V = Battery	PWR3	+24V_{DC} input, current protected by 1.5A resettable fuse, and voltage protected by Tranzorb SM6T33A.	/
2,4	I	Electrical ground	GND	Input – of the power supply linked to the electrical ground of the equipment.	/

4.2.2.3 J2 SUPERVISION connector

9-contact female SUB-D connector .....DEP09S500……..... Ref. Telerad (150 00503)
SUB-D 9 male contact mobile plug .....DEP09P……..... Ref. Telerad (150 00023)
Protective cover .....8630-3637A ..... Ref. Telerad (150 00152)

No.	*I/O*	*Signal*	*Signal ID*	*Characteristics*	*No. Int.*
1-2	/	Not used	/	/	/
3	I	Ground	GND	General ground for the equipment	/
4	O	TxD2 A	AA1	JBUS link: Transmission of data+. RS485 output not inverted. Logical level: 0/5V.	114
5	O	TxD2 B	AA2	JBUS link: Transmission of data-. RS485 output inverted. Logical level: 0/5V.	114
6-7	/	Not used	/	/	/
8	I	RxD2 A	AB1	JBUS link: Reception of data+. RS485 input not inverted. Logical level: 0/5V.	115
9	I	RxD2 B	AB2	JBUS link: Reception of data-. RS485 input inverted. Logical level: 0/5V.	115

4.2.2.4 J3 OPERATION connector

25-contact male SUB-D connector…….DEP25P-500 ..... Ref. Telerad (150 00408)
25-contact female SUB-D mobile plug.….DEP25S ..... Ref. Telerad (150 00275)
Protective cover .....8630-3639A ..... Ref. Telerad (150 00153)

☞ ***Note:*** *In the following table, the greyed contacts represent the minimum pin configuration required to operate the receiver.*

No.	*I/O*	*Signal*	*Signal ID*	*Characteristics*	*No. Int.*
1	I	Ground	GND	General ground for the equipment	/
2	O	Rx AF A	CW1	Reception AF+ signal. Output to 600Ω symmetrical transformer on 2 wires (see contact no. 15). Output level programmable by the receiver: between –11 and +10 dBm/600Ω.	28
3	O	Field voltage	CU1	Direct current analog voltage whose value depends on the level of the signal received on the receiver's antenna input. Level: between 1 and 3V, corresponding to a received level between –110dBm and +10dBm (0.7µV and 0.7V / 50Ω).	129
4	O	AF Recorder	CV2	600Ω asymmetric AF output to recorder. Level: 0dBm for 30% carrier modulation.	129
5	O	Information Call A	BX	Side A of a call contact, potential-free. Contact closed on pin no. 17 for call present.	101
6	O	Receiver Alarm Information	CN2	Indicates an operating fault in the receiver. Output on saturated open collector to ground for "Alarm".	119
7	I	Power supply input +V=	PWR9	In a Transceiver configuration, $+24V_{DC}$ input protected by 1.5A resettable fuse. Level: between 21 and 31V.	122
8	I	JBUS A inhibition	DH1	In a switched-over configuration, command to inhibit the receiver that is not selected, with regard to JBUS commands. RS485 input not inverted. Logical level: 0/5V.	56
9	O	TxD4A Transceiver Link	Q1	Transceiver Link: Data transmission +. RS485 output not inverted. Logical level: 0/5V.	114
10	O	CSMA access Channel occupied	CJ1	Used in ACARS and VDL2 modes of the RE9000-2G, when they are available. Indicates to the upper level that the channel is not available. Output on saturated open drain to ground for "channel not clear". Provision for UDL2 mode of the RE9010-2G.	119
11	I	Receiver On/Off Control	CM1	Remote On/Off Control of the receiver authorising it to receive, or not authorising, in A3E mode. Connected to ground for "On"	11
12	I	RxD4A	Z1	Transceiver Link: Data reception +.	56

No.	*I/O*	*Signal*	*Signal ID*	*Characteristics*	*No. Int.*
		Transceiver Link		RS485 output not inverted. Logical level: 0/5V.	
13	I	Receiver desensitisation	DL	Desensitisation command. Acts on the receiver's AGC command, to desensitise it. Connected to ground for active command.	11
14	O	Receiver On/Off Information	CL1	Status of previous remote On/Off command, viewed by the receiver. Output on saturated open collector to ground for "On".	119
15	O	Rx AF B	CW2	Reception AF signal-. See contact no. 2.	28
16	O	Receiver Proper operation information	CN1	Indicates that the receiver is functioning normally. Output on saturated open collector to ground for "Proper Operation".	119
17	O	Information Call B	BY	Side B of a call contact, potential-free. Contact closed on pin no. 5 for call present.	101
18	I	PTT feedback/ CSMA transmission request	CI1	In A3E and F3E mode: PTT feedback. In ACARS and VDL2 mode: CSMA transmission request by the associated transmitter. *Provision for UDL2 mode.* Ground for transmission (A3E, F3E), or CSMA transmission request (ACARS, VDL2, UDL2)	11
19	O	CSMA transmission authorisation	CK1	In VDL2 mode, indication to the associated transmitter that the channel is free for transmission. Output on saturated open drain to ground for "channel free". *Provision for UDL2 mode.*	119
20	I	JBUS B inhibition	DH2	Same as pin no. 8. RS485 input inverted. Logical level: 0/5V.	56
21	O	TxD4B Transceiver Link	Q2	Transceiver Link: Data transmission -. RS485 output inverted. Logical level: 0/5V.	114
22	I	Remote squelch command	BN1	Remote squelch command. Ground for "Squelch disabled".	11
23	I	Logic ground	GND	General ground for the equipment	/
24	I	RxD4B Transceiver Link	Z2	Transceiver Link: Data reception -. RS485 output inverted. Logical level: 0/5V.	56
25	O	Receiver presence	DK	In a Transceiver configuration, used by the associated transmitter to detect the presence of the receiver.	/

4.2.2.5 J4 10MHz INPUT connector

Female SMA type coaxial connector.
Used to connect an external 10 MHz reference. Level: 4 dBm ± 3dB.

4.2.2.6 J5 DATA connector

25-contact female SUB-D connector .....DBP-25S-500..... Ref. Telerad (150 00229)
SUB-D 25 male contact mobile plug .....DBP-25P ..... Ref. Telerad (150 00149)
Protective cover .....8630-3639A…….. Ref. Telerad (150 00153)

No.	*I/O*	*Signal*	*Signal ID*	*Characteristics*	*No. Int.*
1	/	Not used	/	/	/
2	O	TXD3 A serial link	L1	DATA link: Data transmission +. RS485 output not inverted. Logical level: 0/5V.	114
3	I	RXD3 A serial link	M1	DATA link: Data reception +. RS485 input not inverted. Logical level: 0/5V.	115
4	O	Serial link RTS3 A	N1	DATA link: Request To Send+ RS485 output not inverted reversed. Logical level: 0/5V.	114
5	I	Serial link CTS3 A	O1	DATA link: Clear To Send+ RS485 output not inverted. Logical level: 0/5V.	115
6	I	1PPS A	P1	Synchronisation 1 Pulse Per Second. RS485 output not inverted. Logical level: 0/5V.	115
7	I	Ground	GND	General ground	/
8	O	+5V digital	PWR2	Digital +5V power supply output protected by 1.1A resettable fuse.	
14	O	TXD3 B serial link	L2	DATA link: Data transmission -. RS485 output inverted. Logical level: 0/5V.	114
15	I	RXD3 B serial link	M2	DATA link: Data reception -. RS485 input inverted. Logical level: 0/5V.	115
16	O	Serial link RTS3 B	N2	DATA link: Request To Send-. RS485 output inverted. Logical level: 0/5V.	114
17	I	Serial link CTS3 B	O2	DATA link: Clear To Send-. RS485 output inverted. Logical level: 0/5V.	115
18	I	1PPS B	P2	Synchronisation 1 Pulse Per Second. RS485 output inverted inverted. Logical level: 0/5V.	115
9 to 13, 19 to 25	/	Not used	/	/	/

4.2.2.7 J7 RF ANTENNA connector

Female BNC coaxial connector .....HO31..... Ref. Telerad (160 00094)
Male BNC coaxial mobile plug .....11BNC-50-3-16 ... Ref. Telerad (160.00323)

Allows the receiver to be connected to an antenna through a suitable 50Ω coaxial cable.

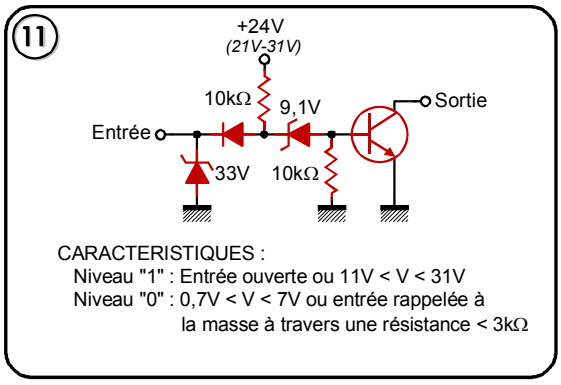
4.2.2.8 J14 and J15 ETHERNET connectors

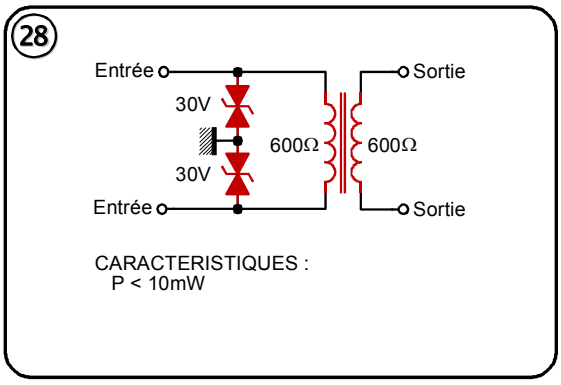
Female RJ45 connector MODS-F-8P8C-1-S4-G-Y-TH..... Ref. Telerad (150.01349)
Ethernet link connectors for data transfer using SNMP or VoIP protocol.

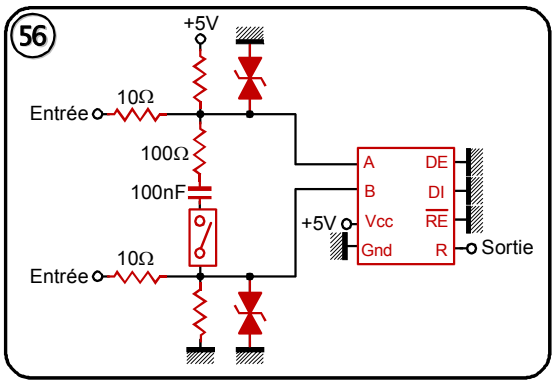
4.2.2.9 Grounding terminal

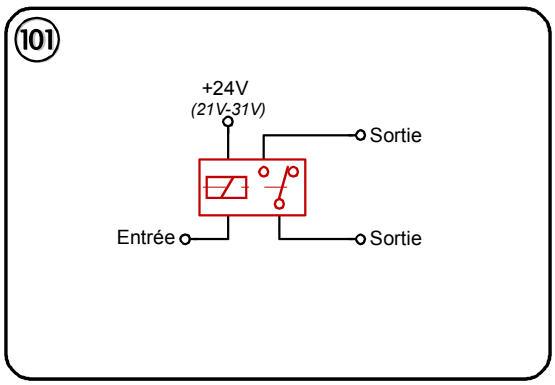
4mm diameter wing screw for grounding by attachment to fork.

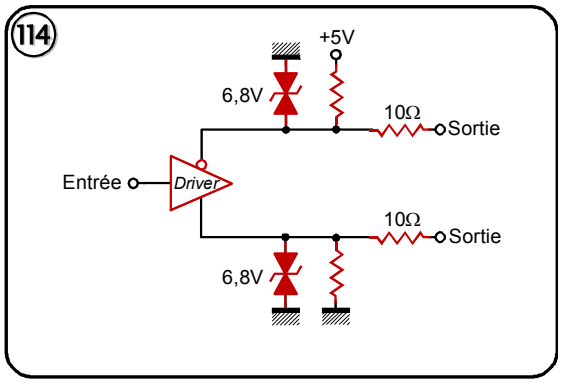
4.3 ELECTRICAL INTERFACES USED

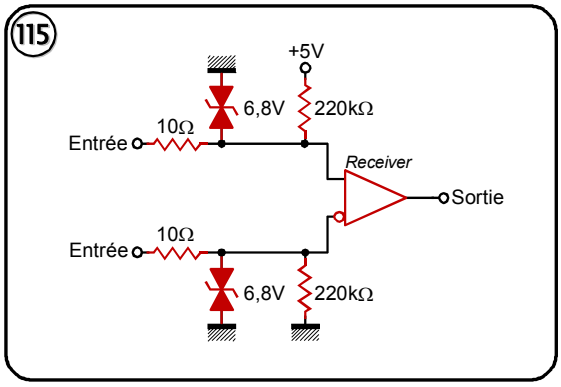


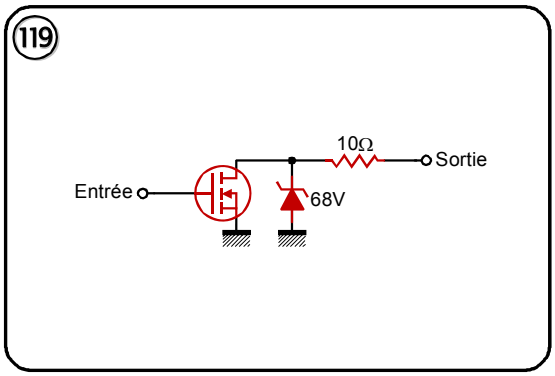


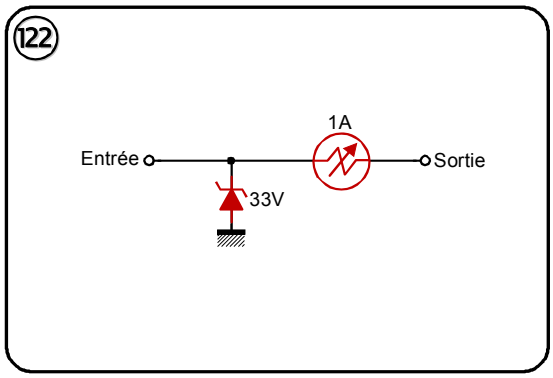


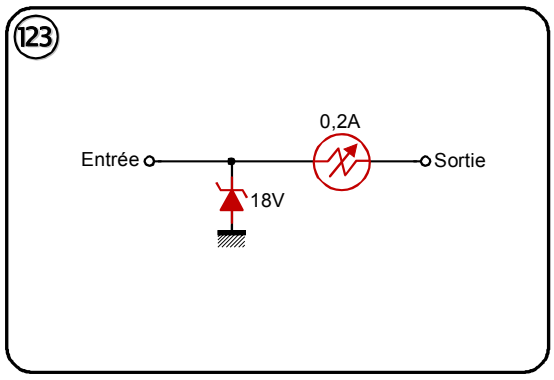


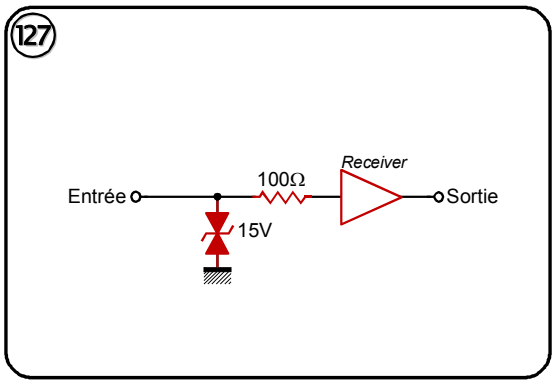

114
+5V
6,8V
10Ω
Sortie
Entrée
Driver
10Ω
Sortie
6,8V

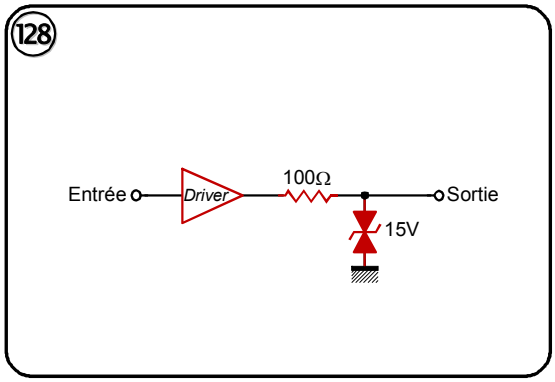

115
+5V
6,8V
220kΩ
10Ω
Entrée
Receiver
Sortie
10Ω
Entrée
6,8V
220kΩ

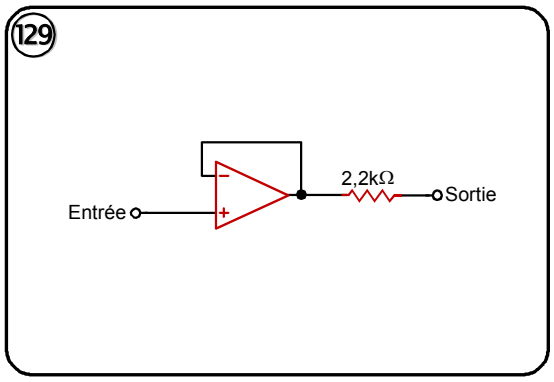

119
10Ω
Sortie
Entrée
68V


122
1A
Entrée
Sortie
33V


123
0,2A
Entrée
Sortie
18V


127
Receiver
100Ω
Entrée
Sortie
15V


128
100Ω
Entrée
Driver
Sortie
15V


129
2,2kΩ
Entrée
Sortie

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CHAPTER 5. INSTALLATION – CONFIGURATION – COMMISSIONING

5.1 CHOICE OF SITE

This equipment is to be installed in a rack in the designated service room.
Ensure that the rack is stable before installing the equipment.
Do not move a rack by yourself. TELERAD recommends that this task be carried out by a minimum of two people.
If using the device outside the rack, see § Mechanical characteristics.

5.2 INSTALLATION

The paragraphs below present the operations to be performed to correctly install the RE9000-2G or RE9010-2G receiver.

5.2.1 Unpacking

The RE9000-2G or RE9010-2G receiver is delivered in packaging intended to protect it from shocks that occur during handling, and from various damaging external factors during storage.
It is installed in a rigid box (wood or cardboard) suited to these transport and storage conditions, and is fixed in place with soft material that cushions against shocks, or properly fixed inside the box.
Keep the packaging for reuse when sending the equipment back to TELERAD.
When unpacking, avoid touching the pins of the connectors on the front or rear of the equipment, particularly if not wearing an antistatic bracelet on one wrist, connected to an earth socket using the bracelet cord.

5.2.2 Electrical protection of the equipment

5.2.2.1 Protection through earthing

The terminal on the rear of the equipment, identified with the symbol  is the main protective earth terminal.
The minimum cross-section of the wire used must be 2.5 mm².
This connection must be made before any other connection, and must be disconnected last. It is also recommended to check the earth continuity regularly.
When the equipment has a Mains power input, it is fitted with a three-pin plug with an earth.
Earthing is a safety element. Do not nullify the protection by connecting the plug to a socket that does not have an earth connection.

5.2.2.2 Protection by circuit breakers

In order to comply with the electrical safety rules, the power supply inputs of the RE9000-2G or RE9010-2G receiver must be protected by external circuit breakers. The following table indicates the recommended range and type of circuit breaker:

Type	*Name*	*Ref.*	*Range*	*Protection*
Circuit breaker	20724	18000245	1 contact + neutral $2A_{AC}$ / $220V_{AC}$	$220V_{AC}$ mains input
Circuit breaker	C32H-2A-DC-20532	18000184	1 Contact $2A_{DC}$ / $127V_{DC}$	$24V_{DC}$ battery input

5.2.3 Configuration

There is a default factory hardware configuration for the receiver.
Check that this default configuration complies with the required use, or else modify it as required (refer to § 5.3 "DESCRIPTION AND CONFIGURATION OF JUMPERS AND SWITCHES").
After installing the equipment in its location and turning it on, it is then possible to configure the receiver using software. Software configuration of the receiver applies to two categories of parameters:

- ***System parameters,*** corresponding to the general functions of the receiver: Transceiver Configuration, DATA link speed, JBUS link speed, address and Idle characters.
- ***Operating parameters,*** fixing the equipment operating conditions: Mode, frequency, squelch threshold, AF line level, AF compressor, CSMA parameters (in ACARS or VDL2), Call-in-band (in A3E mode).

The RE9000-2G or RE9010-2G receiver can be configured using software, in four different ways:

- Through the Maintenance port (refer to ICDFR 40600034 V1.00 Série 9000-2G MAINTENANCE),
- Through the SNMP port (refer to ICDFR 40600035 V1.00 Agent SNMP Série 9000-2G).
- Through the JBUS port (refer to ICDFR 40600036 V1.00 JBUS Série 9000-2G).
- Through the front panel screen / keyboard local interface (refer to § 6.3 "LOCAL OPERATION OF EQUIPMENT")

5.2.4 Mechanical installation

The RE9000-2G or RE9010-2G receiver is generally installed in a 19" rack, on two fixed support brackets.
Two crosshead screws allow the front panel of the receiver to be fixed to the frame of the rack.
When the equipment is used outside a rack, it must be placed on a flat, stable, resistant, vibration-free surface at least 10 cm or so from the wall or any other equipment to allow free circulation of air, with or without a ventilation system.
The equipment must be installed by qualified staff.

5.3 DESCRIPTION AND CONFIGURATION OF JUMPERS AND SWITCHES

5.3.1 CNUM12163 PCB

See Layout diagram – Control PCB – Plate 46500149.

Identification	*Signal*	*Characteristics*		*By default*
J4	Phantom call	***A*** (1-2) ***B*** (2-3)	The middle point of the AF transformer is linked to the call. The middle point of the AF transformer is not linked to the call.	B
J19	+3.3V power supply	***A*** (1-2) ***B*** (2-3)	The power supply is isolated. The power supply is connected to the load.	B
J20	+5V power supply	***A*** (1-2) ***B*** (2-3)	The power supply is isolated. The power supply is connected to the load.	B

5.3.2 PAVR42101 front panel PCB

See Layout diagram (1/2) – Front panel PCB – Plate 46500239.

Identification	*Signal*	*Characteristics*		*By default*
J3	Headphone connector link	Present Absent	The headphone output is linked. The headphone output is not linked.	Present
J4	Loudspeaker connector link	Present Absent	The loudspeaker output is linked. The loudspeaker output is not linked.	Present

5.3.3 MIPR11006 microcontroller / DSP PCB

See Layout diagram – Microcontroller/DSP PCB – Plates 46500155 and 46500156.

Identification	*Signal*	*Characteristics*		*By default*
S1-1	DSP "Watchdog"	ON OFF	The DSP "Watchdog" is disabled. The DSP "Watchdog" is enabled.	OFF
S1-2	Viewing "Debug" information	ON OFF	"Debug" info is not sent on the Maintenance link. "Debug" info is sent on the Maintenance link.	ON
S1-3	Not used	ON OFF	N/A. N/A.	ON
S1-4	Not used	ON OFF	N/A. N/A.	ON

5.3.4 CLAF12164 screen/ keyboard PCB, VUFI23186 VHF receiver, VUFI23191 UHF receiver, SVHF25077 VHF synthesizer, SUHF25078 UHF synthesizer and ALSE53005 power supply modules

See Layout diagram – Synthesizer PCB – Plate 46500142.
See Layout diagram – Screen/ Keyboard PCB – Plate 46500152.
See Layout diagram – Receiver/IF PCB – Plate 46500201.

No jumpers or switches present on these PCBs.

5.4 ASSEMBLY OF COAXIAL RELAYS

When the receiver is used in "Transceiver" configuration, it is possible to use an antenna coaxial relay allowing the use of a Transmission / Reception antenna.
In this case, the relay is installed directly in the transmitter, in a position provided for this purpose.
The antenna coaxial relay is controlled and powered by the transmitter itself.

5.5 MINIMUM CONNECTION FOR COMMISSIONING

In the event of simplified use of the receiver, it is possible to connect just part of the signals present on all of the rear panel connectors. This minimum connection is as follows:

- Connect the earth using the wing screw,
- Connect the mains power supply to **J1** (depending on the version), and/or battery power supply to **J6.**
- Connect the antenna to the **J7** connector,
- In analog mode, connect the operating unit to the **J3** connector, with the following minimum cabling:
  - ✓ Electrical ground *(contact no. 1),*
  - ✓ AF reception on 2 wires *(contacts no. 2 and 15),*
  - ✓ Call Information on 2 wires *(contacts no. 5 and 17),*
  - ✓ On/Off Command *(contact no. 11).*
  (refer to § 4.2.2.4 "J3 OPERATING UNIT connector")

- In digital mode, connect the operating unit to the **J5** connector *(refer to § 4.2.2.6 "J5 DATA Connector").*

Figure 5 – rear panel connectors

5.6 CONNECTION IN TRANSCEIVER CONFIGURATION

When using the receiver in Transceiver configuration, i.e. combined with a transmitter, the link to the radio network is no longer made directly, but instead through the associated transmitter. The previously-described minimum connection must therefore be modified, so as to this time connect the receiver's REMOTE CONTROL **J3** connector to the transmitter's TRANSCEIVER **J3** connector.

In this case, the transmitter's REMOTE CONTROL **J7** connector is the only connector linked to the VCSS. It contains on the one hand the transmitter's own commands and information, and on the other, the commands and information relating to the receiver, transmitted to the latter through the TRANSCEIVER **J3** connector *(see § 4.2 "Description of connectors")*.

There are three possible ways to make the connection to the antenna:

- ***Configuration 1:*** use of the antenna's coaxial relay built into the transmitter, combined with a transmission/reception antenna. In this case, the connection is as follows:

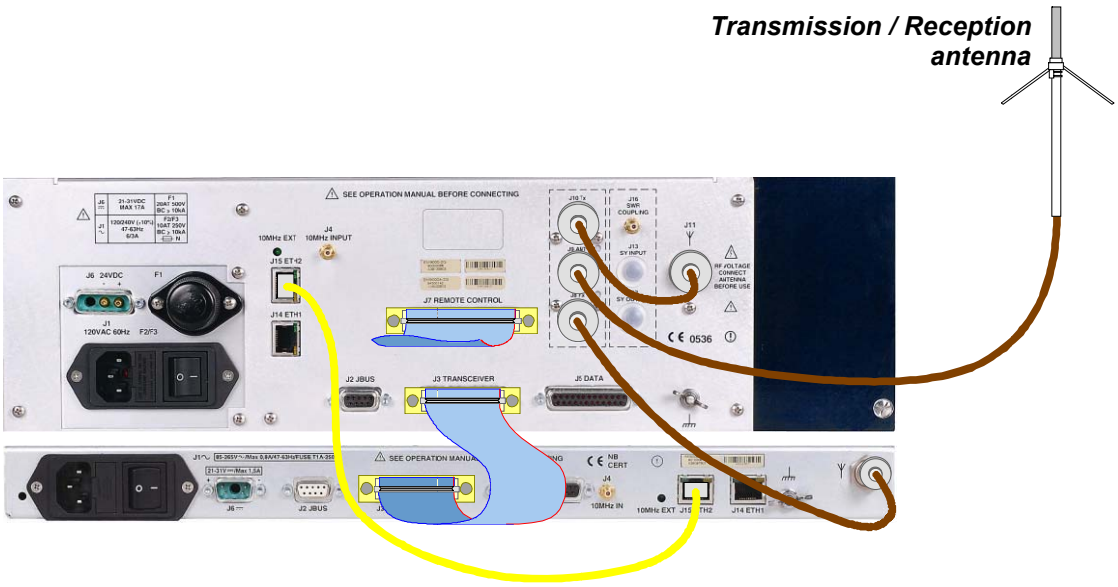

Figure 6 – Connection to the antenna – Configuration 1

- ***Configuration 2:*** use of an external antenna coaxial relay, combined with a transmission/reception antenna.

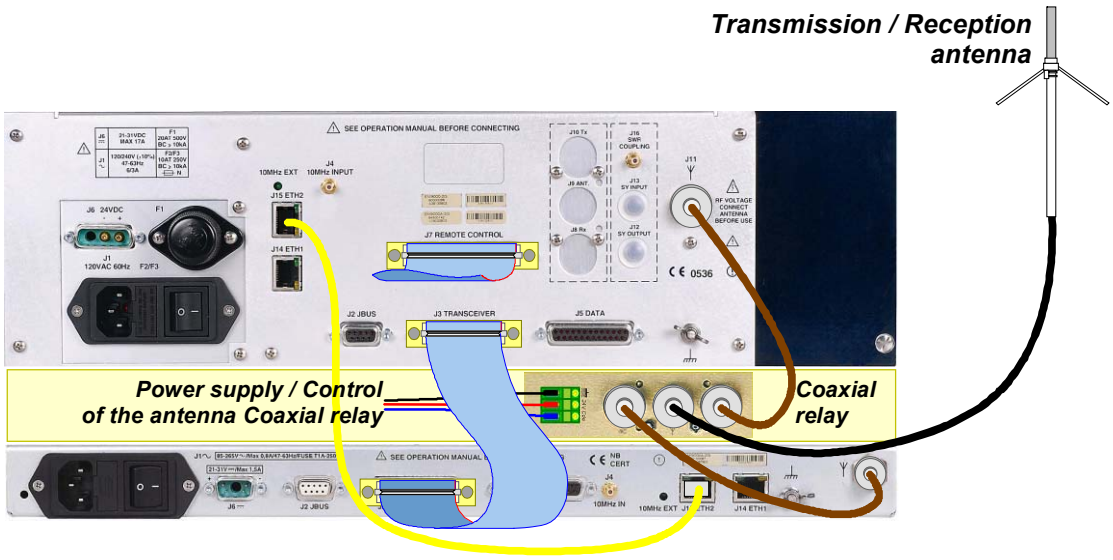

Figure 7 – Connection to the antenna – Configuration 2

- ***Configuration 3:*** use of two separate antennas,

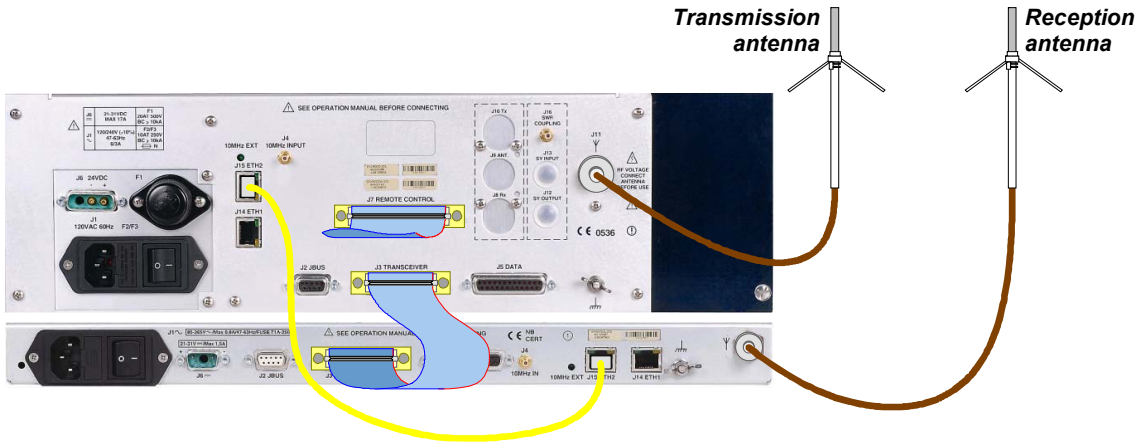

Figure 8 – Connection to the antenna – Configuration 3

5.7 BASIC COMMISSIONING

In the case of the RE9000-2G or RE9010A-2G receiver, once the rear panel connections are made, check that the yellow "Mains Presence" and/or "Battery Presence" indicator lights are on (the Mains **ON/OFF** switch of the rear **J1** connector is supposed to be in the **ON** position ⏽).

For all RE9000A-2G, RE9000C-2G, RE9010A-2G and RE9010C-2G versions, then place the front panel **ON/OFF** switch in the **ON** position ⏽ . The receiver then performs the following steps:

1) Test of all the front panel indicator lights, which stay lit for approximately 25s.
   - "+24V Presence" (○⇨●),
   - "Mains Presence" (○⇨●), "Battery Presence" (○⇨●),
   - "Alarm" (○⇨●),
   - "Squelch" (○⇨●),
   - "Status" (○⇨●),
   - "Call" (○⇨●),
   - "JBUS TxD" (○⇨●), "JBUS RxD" (○⇨●),
   - "DATA TxD" (○⇨●) and "DATA RxD" (○⇨●),
   - The screen stays black.

2) At the same time, launch of the internal “Boot Loader” authorising either downloading of new software via the network access, or loading of the application contained in the Flash memory.

3) In the standard case, loading of the embedded real-time multitasking application.

4) Launch of the initiated built-in test (noise audible in the loudspeaker), with internal analysis of the results.

5) If the results of the test are correct, the indicator lights go out and then the default operating menu is displayed on the screen.

The receiver can now be accessed by the user.

Using the front panel "Squelch / Test" switch, disable squelch and check that the "Squelch" indicator light goes out (●⇨○), and that the "Call" indicator light comes on (○⇨●).
As the remote **ON/OFF** command present on the REMOTE CONTROL connector is not connected (command set to **"OFF"),** increase the listening volume on the Loudspeaker output using the "Volume" potentiometer (◢), and check that no hiss or signal is audible.

Set the remote **ON/OFF** command to **"ON",** either by hardware *(pin J3-11 to ground)*, or by software *(refer to § 6.3.1.3.7.1.1."Setup/HW Config./ON-OFF" menu)*, and check that this time, a hiss or signal is audible.

Then enter the operating configuration in the receiver, using the local screen / keyboard (refer to following table):

Parameter	*Range*	*See §*	*Comments*
Minimum detection level	Default value –90dBm	6.3.1.3.2	Relative adjustment
Squelch Threshold SNR	0 to 5 by 2dB steps	6.3.1.3.2	0 = 6dB SNR 5 = 16dB SNR
Output AF line level (audio level)	-10 to +10dBm	6.3.1.3.4	600Ω symmetrical transformer
Mode (RE9000-2G)	A3E, F3E, *ACARS, VDL2*	6.3.1.3.5	As per ICAO standards
Mode (RE9010-2G)	A3E, F3E	6.3.1.3.5	As per ICAO standards
Frequency (RE9000-2G)	118,000-144,000 MHz	6.3.1.3.6	As per ICAO standards
Frequency (RE9010-2G)	225,000-400,000 MHz	6.3.1.3.6	As per ICAO standards
IP Parameters (Ethernet)	ETH: IP address, subnet mask	6.3.1.3.7.3	According to user

Note: *See § 6.3.1 "LOCAL OPERATION THROUGH THE FRONT PANEL SCREEN / KEYBOARD INTERFACE" for more information.*

5.8 PRELIMINARY ADJUSTMENTS

There is a preliminary adjustment to be made before putting the receiver into operation: checking the local oscillator accuracy.
This adjustment is made through software, using the front panel screen / keyboard interface
(see § 7.7.4 Adjustment sheet R1: "Adjusting the local oscillator").

5.9 EQUIPMENT COMMISSIONING IN VoIP CONFIGURATION:

The commissioning of the RE9000-2G or RE9010-2G receiver in VoIP configuration needs to follow the next steps :

- Connection to network,
- Configuration of the network parameters,
- Configuration of the operating mode,
- Configuration of the SIP parameters,
- Normal users names listing,
- Emergency users names listing,
- Commissioning.

5.9.1 Connection to a network

Receiver's operation in voice over IP is available only through the ETH1 **J14 connector** (Voice over IP on **J15** connector not yet available).
So, the very first step consists in connecting the receiver to the used Ethernet network, through a link between a hub or a switch and the **J14** connector of the receiver.

Then the equipment must be configured such a way it can operate in VoIP mode. In the following paragraphs, some parameters can be configured by using either the local HMI or an RS232 terminal connected to the « MAINTENANCE » connector on the front panel. Some others can be configured only by the terminal.
In case this terminal is used, the user must be first logged in administrator by entering the control :

- **Login admin admin.**

5.9.2 Configuration of the network parameters

By using the local HMI or the terminal, enter the receiver's IP network parameters :
Using the IHM, select the ***« SETUP/IP/ETH1 »*** menu.
Using the terminal, enter the following controls :

1. **ETH1 IP** control to define the IP address of the receiver :
   - **ETH1 IP 172.16.10.1**
2. **ETH1 MASK** control to define the subnet mask of the receiver :
   - **ETH1 MASK 255.255.0.0**
3. **ETH1 GATEWAY** control to define the IP address of the default gateway of the receiver:
   - **ETH1 GATEWAY 172.16.10.254**

5.9.3 Configuration of the operating mode

Always by using the local HMI or the terminal, enter the operating mode to be Voice over IP.
Using the HMI, select the ***« AUDIO/VOIP »*** menu.
Using the terminal, enter the control :

- **AUDIO VOIP**

5.9.4 Configuration of the SIP parameters

Establishing a communication link between the receiver and a user (for example a VCSS) through an Ethernet network is done by generating a ***SIP protocol*** *(Session Initiation Protocol)* between both equipment. This protocol is used only for establishing a network connection between the receiver and the user, and this connection is done only when initiated by the user, never by the receiver.
Data exchange on the network, that carry *the digitalized voice as well as the CALL information* will be realized by using a second real time protocol : ***the RTP protocol*** *(Real Time Protocol).*

So the **SIP** protocol parameters must be defined during the communication setting. A difference with the previous parameters is that these ones are available only by using the RS232 terminal.

1. Define the name of RE9000-2G or RE9010-2G receiver such as the SIP user :
   - **SIP USERNAME <name of the EM9000-2G or EM9010-2G>**
2. Define the SIP communication port on the receiver side :
   - **SIP PORT <port>**

Those parameters allow to *set a **SIP** connection,* whose the **SIP URI** (Uniform Resource Identifier) is of type :
sip:< name of RE9000-2G/RE9010-2G>@<IP address of RE9000-2G/RE9010-2G>:Port

5.9.5 Normal users name listing

So the SIP protocol allows establishing a communication between the transmitter and a user. In fact it is possible to define a list of several users able to use the transmitter resource, accessible through the network. These users are generally VCSS used for Air Traffic management, and are divided into two categories : the ***Normal users*** and the ***High priority users.***
This paragraph defines an users name list corresponding to the **VCSS having a Normal priority,** that can communicate with the RE9000-2G or RE9010-2G receiver, through Adding and Suppressing controls. These parameters are available only by using an RS232 terminal :

1. VCS (Voice Communication System) control for adding a Normal user :
   - **VCS NORMAL ADD <name of the VCSS>**
2. VCS (Voice Communication System) control for suppressing a Normal user :
   - **VCS NORMAL REM < name of the VCSS>**
3. VCS (Voice Communication System) control for suppressing all the Normal users :
   - **VCS NORMAL REM**

5.9.6 High priority users name list

This paragraph defines an users name list corresponding to the **VCSS having a High priority,** that can communicate with the RE9000-2G or RE9010-2G receiver, through Adding and Suppressing controls. These parameters are available only by using an RS232 terminal :

4. VCS (Voice Communication System) control for adding a High priority user :
   - **VCS EMERGENCY ADD <name of the VCSS>**
5. VCS (Voice Communication System) control for suppressing a High priority user :
   - **VCS EMERGENCY REM < name of the VCSS>**
6. VCS (Voice Communication System) control for suppressing all the High priority users :
   - **VCS EMERGENCY REM**

5.9.7 Commissioning

After the receiver has been configured to operate in VoIP mode through the previous steps, it allows the *transmission of VoIP type frames containing the digitalized received voice and CALL information,* from ***an analog signal for audio*** and ***a logical signal for CALL.***

To do that, it uses a specific *Digital-to-Analog encoder*, previously configured by using the **CODEC** control of the terminal :

- **CODEC** G711 A law control for Europe : **CODEC PCMA**
- **CODEC** G711 µ law control for United States : **CODEC PCMU**

5.10 EQUIPMENT COMMISSIONING IN SNMP CONFIGURATION

5.10.1 Presentation

The radio equipments RE9000-2G and RE9010-2G include 2 Ethernet links. These ports allow to connect them to a IP network. So it is possible to remotely control and remotely monitor the equipments through an SNMP protocol.
There are no priority between the different sources of control (Front panel, JBUS 1, SNMP), so the last command correctly received will be executed, whatever its origin.

5.10.2 SNMP protocol

The equipments are compliant with the 3 versions of SNMP Protocol (v1, v2c and v3).

The MIB used by the SNMP agent on the RE9000-2G or RE9010-2G receiver is available in the following file:

```
TELERAD-RE90X02G-MIB.TXT    For transmitters of 9000-2G series
```

5.10.3 Parameters to be monitored and controlled

Equipment characteristics supplies the main characteristics of the radio equipments
mains : presence of a Power supply module maxFrequency : Maximum RF frequency authorized minFrequency : Minimum RF frequency authorized frequencyRange : Frequency range used (VHF/UHF) softIdentMidsMicro : Software version mibVersion : MIB version description : brieve description of the radio modelName : Radio name
Equipment status : supplies the status of the radio equipments
onOffCall : RF reception in course (Call signal) inServiceTime : Time of operation since the first start eqptMgtMode : Local or Remote operation of the radio onOffControlStatus : Reception authorized operationalStatus : Proper operation of the radio
Mode of operation : used to visualize and modify the operating parameters of the equipments
squelshRfLevel : Squelch threshold on RF level squelshRf : RF squelch on RF level squelshSnrLevel : Squelch threshold on SNR squelshSnr : RF squeclh on SNR squelsh : Squelch control frequency : RF frequency communicationModes : type of modulation used
Equipments configuration : used to visualize and modify the hardware configuration parameters
compressor : Audio compressor activation voip : radio in VoIP mode lineOutputSensitivity : Output audio level in analog mode. onOffControl : Enabling or disabling the reception onOffPriorityManagement : Command to enable/disable reception controlled either by a hardware discrete signal or by a software one.

Tests : used to visualize the tests reports, and run the tests on the equipments
statusExternalCbit : External default outside the receiver detected statusPowerSupply24vCbit : Power supply default detected statusSynthesizerCbit : Synthesizer default detected statusVufiCbit VUFI module default detected statusCnumCbit CNUM board default detected statusMidsCbit MIDS module default detected statusCbit : Default detected statusIbit : Default detected after an Initiated Test triggerIbit : IBIT test initiated Testrx : CBIT test initiated
Measurements : used to make measurements on the equipments
powerSupply24v : Power supply agc : AGC reception level field : Fiel voltage reception level lineLevel : Audio level
Reset commands : used to reset the equipments
resetFactorySetup : Reset the equipment with the parameters by default resetSoftware : Restart the radio

5.10.4 Equipments configuration

The following parameters have to be configurated, before the equipments are used :

- ***The Network parameters :*** IP Address, Subnet mask,
- ***The SNMP parameters :*** SNMP Port, SNMP protocol version to be used, communities (v1 and v2c), the users and their password (v3)

Parameter	Default value
SNMP Port	161
SNMP protocol version	the 3 available versions
Read community (v1/v2c)	public
Write community (v1/v2c)	private
Read user (v3)	user1
Read password (v3)	notpassword
Write user (v3)	user2
Write password (v3)	notpassword

These parameters can be configurated by an RS232 terminal connected to the equipment front panel Maintenance connector.

☞ ***Remark about SNMPv3 :*** *The SNMP agent embedded in the radio equipments uses only the authentification mechanism, base on the MD5 algorithm. The cypher mechanism is not used.*

5.11 PROCEDURE FOR SOFTWARE UPLOAD

For more details about the procedure, please refer to the document [5] ***KITGB 40700003 V1.02 9000-2G Series :*** *Document describing the procedure for uploading and/or releasing the software embedded into the MIDS11216 board, through a Web server interface.*

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CHAPTER 6. OPERATION

6.1 PRESENTATION

This chapter provides the information required for programming and operating the RE9000-2G or RE9010-2G receiver:

1. Either locally:
   - via the front panel screen/keyboard,
   - via an RS232 terminal connected to the front panel Maintenance connector.

2. Or remotely:
   - via the JBUS link,
   - via the SNMP link.

6.2 COMMANDS ACCESSIBLE TO THE OPERATING UNIT

6.2.1 Local commands through the screen/keyboard interface

Command	*Paragraph*
Main menu	6.3.1.3.1
SQL: Choice of squelch	6.3.1.3.2
SQL RF: Threshold adjustment on carrier level criterion	6.3.1.3.2
SQL SNR: Threshold adjustment on S/N ratio criterion	6.3.1.3.2
PRESET: Operation of pre-programmed channels	6.3.1.3.3
Select: Selection of an operating pre-programmed channel	6.3.1.3.3.1
Create/Modify: Creation / modification of a pre-programmed channel	6.3.1.3.3.2
Clear: Clearing a pre-programmed channel or all channels	6.3.1.3.3.3
AUDIO: Type of audio signal	6.3.1.3.4
Analog/Line level: Selection of an analog AF signal and its line level	6.3.1.3.4.1
VoIP: Selection of a voice over IP signal	6.3.1.3.4.2
MODE: Choice of operating mode	6.3.1.3.5
A3E: AM carrier modulation	6.3.1.3.5.1
F3E: FM carrier modulation	6.3.1.3.5.2
FREQ: Selection of the operational frequency	6.3.1.3.6
SETUP: Configuration of the receiver	6.3.1.3.7
HW Config.: Hardware configuration of the unit	6.3.1.3.7.1
ON/OFF: Selection of the On Command	6.3.1.3.7.1.1
COMP: Activation/Deactivation of the audio compressor	6.3.1.3.7.1.2
Display: Selection of display parameters	6.3.1.3.7.2
Language: Selection of display language	6.3.1.3.7.2.1
Brightness: Adjustment of brightness	6.3.1.3.7.2.2
IP: IP parameters	6.3.1.3.7.3
ETH1: Ethernet channel no. 1 parameters (Address and Mask)	6.3.1.3.7.3.1
ETH2: Ethernet channel no. 2 parameters (Address and Mask)	6.3.1.3.7.3.2
JBUS: JBUS no. 1 and no. 2 parameters (Address and Speed)	6.3.1.3.7.4

Command	*Paragraph*
Remote ctl : Activation of remote control of the equipment	6.3.1.3.7.5
MAINT: Maintenance of the receiver	6.3.1.3.8
Measures : Measurements of the receiver	6.3.1.3.8.1
Test : Testing of the receiver	6.3.1.3.8.2
CBIT: Continuous testing of the receiver (CBIT)	6.3.1.3.8.2.1
IBIT: Triggered testing of the receiver (IBIT) and viewing results	6.3.1.3.8.2.2
TCXO : Adjustment of frequency master oscillator	6.3.1.3.8.3
About : Information about the model, serial no. and software version	6.3.1.3.8.4

6.2.2 Local commands through the rs232 terminal

6.2.2.1 List of user commands accessible without login

Command	*Paragraph*
AUDIO : Selection of audio source (VOIP or ANALOG)	6.3.2
AUDIO? : Reading the selected audio source	6.3.2
CBIT? : Displaying the continuous testing	6.3.2
COMP : Activation/Deactivation of the audio compressor	6.3.2
COMP? : Displaying the status of the audio compressor	6.3.2
ETH1 : Channel no. 1 manual IP parameters *(**GATEWAY:** default IP gateway, **IP:** IP address, **MASK:** IP subnet mask)*	6.3.2
ETH1? : Reading channel no. 1 manual IP parameters	6.3.2
ETH2 : Channel no. 2 manual IP parameters *(**GATEWAY:** default IP gateway, **IP:** IP address, **MASK:** IP subnet mask)*	6.3.2
ETH2? : Reading channel no. 2 manual IP parameters	6.3.2
FREQ : Programming operational frequency in MHz (xxx.xxx)	6.3.2
FREQ? : Reading the operational frequency	6.3.2
HELP? : Help menu	6.3.2
IBIT : Launching the initiated test	6.3.2
IBIT? : Results of the initiated test	6.3.2
JBUS : *No. 1 or no. 2 JBUS link parameters **(ADDR**: Address, **BAUD:** Speed, **IDLE:** Idle characters)*	6.3.2
JBUS? : Reading the no. 1 or no. 2 JBUS link parameters ()	6.3.2
LINE : Reception AF line sensitivity (-11 to +10dBm in 0.5dB steps)	6.3.2
LINE? : Reading the reception AF line sensitivity	6.3.2
LOGIN : Equipment login	6.3.2
MEAS? : Reading measurements	6.3.2
MODE : Selecting operating mode (A3E, F3E)	6.3.2
MODE? : Viewing operating mode	6.3.2
PRESET-CLR : Clearing one preset channel, or all	6.3.2
PRESET-DEF : Creation or modification of a preset channel	6.3.2
PRESET-SEL : Selection of a preset channel for operation	6.3.2
PRESET? : Channel no. to be consulted (1 to 128/ALL)	6.3.2
RADIO : Receiver On command (ON/OFF) and its priority (SOFT/HARD)	6.3.2
RADIO? : Status of receiver On command and its priority	6.3.2
RSTAT? : Radio status (status of the station, CBIT and IBIT results, number of calls received, number of startups)	6.3.2

Command	*Paragraph*
SQ : Squelch configuration (RF level and S/N ratio)	6.3.2
SQ? : Squelch status (RF level and S/N ratio)	6.3.2
STAT? : Status of the station	6.3.2
VER? : Onboard software versions and device type	6.3.2

6.2.2.2 List of user commands accessible with administrator login

Having entered the command ***Login: admin admin,*** the previous list of commands remains valid in this context, to which the following list is added:

Command	*Paragraph*
CODEC : Coder/Decoder of the digitalized audio frame (**PCMA :** G711 A law european decoder, **PCMU :** G711 µ law american decoder)	6.3.2
LEARN : Transfer from the VUFI PCB to the MIDS PCB of head RF filter tuning and field learning data	6.3.2
LEARN? : Printing learning data	6.3.2
MAINS : Mains input presence (EM9000A-2G and EM9010A-2G versions)	6.3.2
MAINS? : Reading whether the mains input is present or not	6.3.2
RST: Restarting the receiver (FACT/WARM)	6.3.2
RTP : Programming RTP (Real-time Transport Protocol) parameters for the VoIP *(**PORT** RTP Port no.)*	6.3.2
RTP? : Reading RTP port parameters for VoIP	6.3.2
SIP : Programming SIP parameters *(**CHECKVCS**: Checking VCS during the SIP connection (ON/OFF), **NBCON:** Maximum number of SIP connections for the same VCS, **PORT:** SIP Port no. for VoIP, **USERNAME:** SIP username for VoIP)*	6.3.2
SIP? : Reading SIP (Simple Internet Protocol) port parameters for VoIP.	6.3.2
SNMP : Programming SNMP (Simple Network Management Protocol) parameters ***(PORT:** SNMP Port no., **RCOM:** SNMP community being read, **SECLVL:** SNMP security level (0 to 10), **TPORT:** SNMP Trap Port no., **WCOM:** SNMP community being written)*	6.3.2
SNMP? : Reading the SNMP link parameters	6.3.2
TCXO : Adjustment of the Local Oscillator (1 to 255 by steps of ±1/AUTO)	6.3.2
TCXO? : Reading the Local Oscillator adjustment value.	6.3.2
UPLOAD : Programming the receiver	6.3.2
VCS NORMAL : Ajouter (***ADD***) / Effacer (***REM***) un Système de Communication Vocale (VCS) à priorité normale de la liste.	6.3.2
VCS EMERGENCY : Add ***(ADD) /*** Remove ***(REM)*** a High priority Voice Communication System (VCS) from the list.	6.3.2
VCS? : Views the list of VCS authorised to connect.	6.3.2

6.2.3 Remote commands through the JBUS link

6.2.3.1 Commands accessible in Read/Write

Command	*Paragraph*
AF line level programming (0 to 7 for +10 to -11dBm by 3dB step)	6.4.1
Channel spacing programming (25kHz or 8,33kHz)	6.4.1
Enable/Disable the receiver's AF compressor (With, Without)	6.4.1
Enable/Disable the Squelch (With, Without)	6.4.1
IBIT test launching	6.4.1
ON command priority (Hard/Soft)	6.4.1
ON Soft command (Off/On)	6.4.1
Operating frequency programming in MHz (xxx.xxx)	6.4.1
Shuttle	6.4.1
Squelch level programming (0 to 50)	6.4.1

6.2.3.2 Commands accessible in Read only

Command	*Paragraph*
Continuous test (OK, Alarm) (status of the Alarm led)	6.4.1
Continuous test for Synthesizer (OK, Alarm)	6.4.1
Control of the radio (Local, Remote)	6.4.1
IBIT test report availability (Available, Not available)	6.4.1
IBIT test report (OK, Alarm)	6.4.1
JBUS table read at least once	6.4.1
Measured reception AF line level (+10 to -30dBm)	6.4.1
Operating mode (0 : A3E, 1 à 7 : Futur modes)	6.4.1
Shuttle	6.4.1
Status of the active ON command (Off/On)	6.4.1
Status of the AF compressor (With/Without)	6.4.1
Status of the Call information (Call/No call)	6.4.1
Status of the Squelch (With/Without)	6.4.1
Status of the Squelch command (With/Without)	6.4.1
Type of equipment (T/R, TR, RE, other)	6.4.1
Value of channel spacing (25kHz or 8.33kHz)	6.4.1
Value of the Field Voltage (0 to 500 for a voltage from 0 to 5V)	6.4.1
Value of the Operating frequency in MHz (xxx.xxx)	6.4.1
Value of Power supply voltage +V= (0 to 511 for 0 to 51.1V)	6.4.1
Value of the programmed AF line level (0 to 7 for +10 to -11dBm by 3dB step)	6.4.1
Value of Squelch threshold (0 to 50)	6.4.1

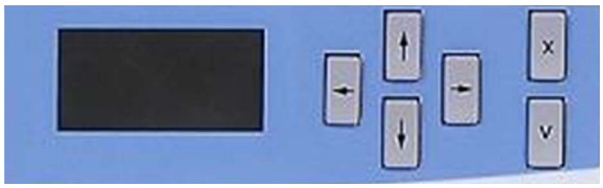
6.2.4 Remote commands through the SNMP link

See the MIB described in § 5.10 EQUIPMENT COMMISSIONING IN SNMP CONFIGURATION.

6.3 LOCAL OPERATION OF THE EQUIPMENT

6.3.1 Local commands through the front panel screen/keyboard interface

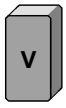
The front panel screen / keyboard interface looks like this :



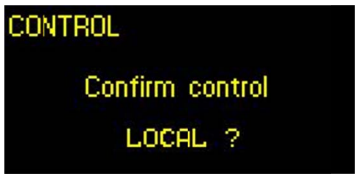
6.3.1.1 Screen operating

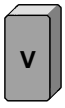
The screen of the RE9000-2G or RE9010-2G receiver is a 128x64 pixel OLED screen, 20x40mm in size, for which each pixel can be accessed and lit independently. It allows the user to :
- configure and monitor the receiver locally,
- view the mode and the various operating parameters.

By default, the equipment is systematically placed under remote control, through a JBUS or SNMP link. Pressing any key on the keyboard allows part of the operating screen to be displayed, and gives the option to take back local control of the equipment:

By pressing the validation key 

on the keyboard, the screen displays a request to confirm the change to local mode:



By pressing the validation key 

on the keyboard, the equipment changes to local mode, and the screen displays the complete operating menu:

After 5 minutes of inactivity, a standby message is displayed randomly on the screen, and control of the equipment automatically changes back to remote:

The operating screen is divided into functional zones, which are accessed using the keys on the keyboard.

When a zone can be activated, it is outlined with a rectangle.

It is divided into functional zones, which are accessed using the keys on the keyboard.
When a zone can be activated, it is outlined with a rectangle.

Example of a zone that can be activated:

When it is activated, the zone is displayed in reverse video. It will then be possible to access sub-menus and parameters or to modify a value if necessary.

Example of activated zone:

1 – Sub-menu:

2 - Parameter:

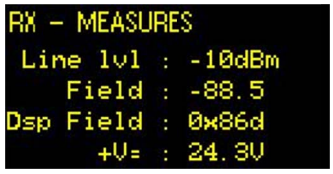
3 – Parameter value:

There are various types of screens:

Screen with zones that can be activated:
(Example: Main menu).

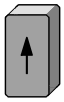
Parameter value entry screen:
(Example: Frequency value).

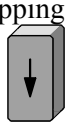
Information display screens:
(Example: Measurements).

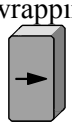


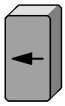
6.3.1.2 Keyboard Operation

The front panel keyboard is made up of 6 pushbuttons:

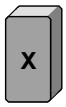

The button allows you to move from active zone to active zone towards the top of the screen, by wrapping around (moves from the first line to the last line).


The button allows you to move from active zone to active zone towards the bottom of the screen, by wrapping around (moves from the last line to the first line).


The button allows you to move from active zone to active zone towards the right then towards the bottom of the screen, by wrapping around (moves from the last zone in the bottom right to the first zone in the top left).


The button allows you to move from active zone to active zone towards the left then towards the top of the screen, by wrapping around (moves from the first zone in the top left to the last zone in the bottom right).

The button allows you to either select a zone that can be activated, or to validate a change of value of a particular parameter.



Lastly, the button allows you to cancel either the selection of a zone that can be activated, or the modification of a parameter value. In all cases, pressing this button takes you back either to the main operating screen, or to the previous menu in the tree structure.

6.3.1.3 Description of commands

6.3.1.3.1 Main Menu

When the RE9000-2G or RE9010-2G receiver is powered on, it first launches its startup sequence for a few seconds, then displays the main operating screen on the front panel display. This menu indicates the current operating parameters.

From this main screen, it will be possible, using the keys of the local keyboard, to select a zone and possibly to modify its value.

The accessible zones are the following:

SQL Zone: Displays the programmed value of the squelch threshold selected according to the carrier level and/or SNR criteria, and gives access to the menu to activate and modify these values.

PRESET Zone: Displays the no. of the selected preset channel, and gives access to the channel management menu.

AUDIO Zone: Displays the type of AF transmitted by the receiver, and gives access to the menu to modify the AF type.

CENTRAL Zone: Displays the selected modulation mode, which cannot be modified, and the operational frequency, coded as per the OACI recommendation from the 8.33kHz or 25kHz channel viewpoint.

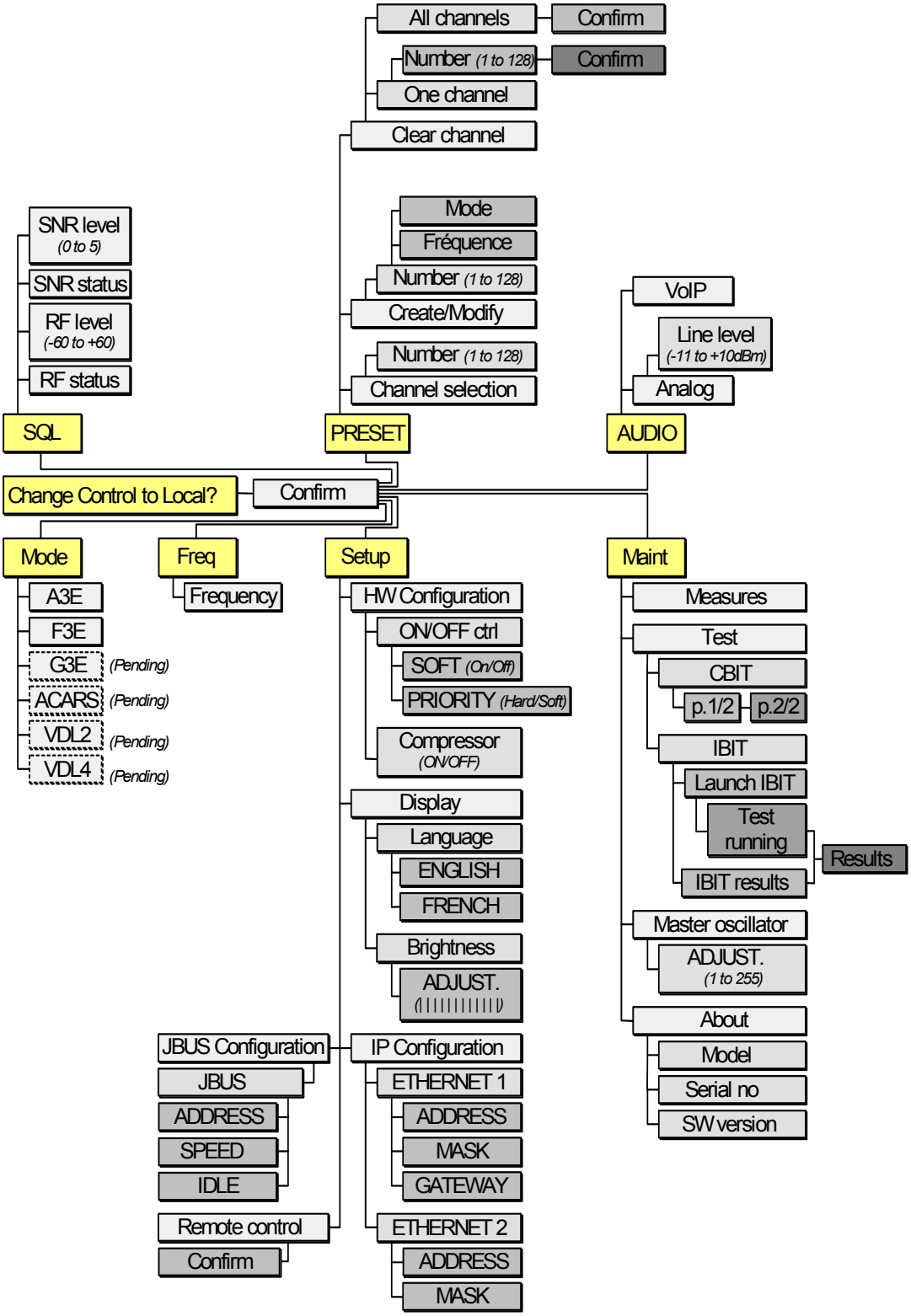
Mode Zone: Gives access to the receiver operating mode selection menu.

Freq Zone: Gives access to the operational frequency modification menu, coded as per the OACI recommendation from the 8.33kHz or 25kHz channel viewpoint.

Setup Zone: Gives access to different receiver configuration menus.

Maint Zone: Gives access to different receiver test and maintenance menus, including the measurements screen.

The menu navigation flowchart is as follows:



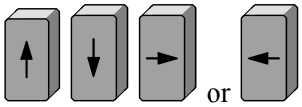
6.3.1.3.2 "SQL" Menu

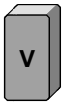
Purpose: This menu allows the squelch parameters to be accessed, selected according to the "Carrier level" and/or "SNR" criteria.

Value: There are 4 squelch parameters:

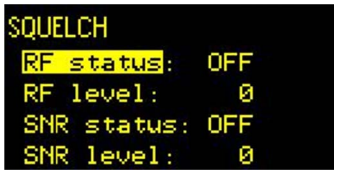
Parameter	***RF status***	***RF level***	***SNR status***	***SNR level***
Value	ON/OFF	From -60 to +60. Dimensionless number representing 120 threshold adjustment positions.	ON/OFF	From 0 to 5, representing an SNR value between 6 and 16dB, by steps of 2dB.

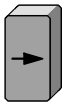
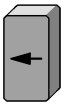
Procedure: The procedure to access the "SQL" menu is as follows:

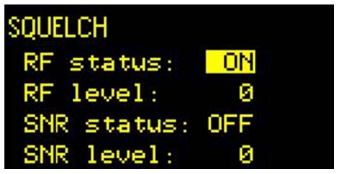
Using the  keys on the keyboard, select the **SQL** zone.

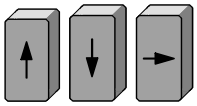
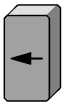
When this is displayed in reverse video, press the 

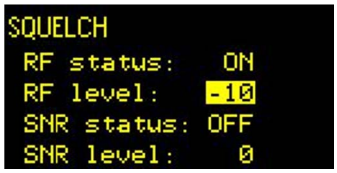
key to enter the "SQUELCH" menu.

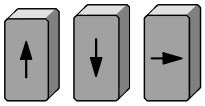
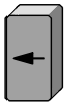


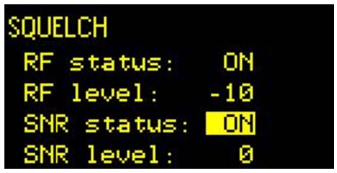
Using the  and  keys, first select the RF squelch (by carrier level), and enable (ON) or disable it (OFF).

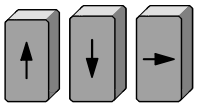
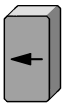


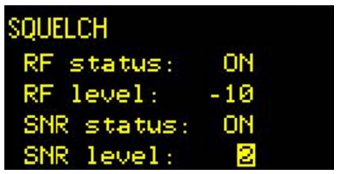
Using the  and  keys on the keyboard, select the RF level, between -60 and +60.

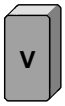


Then, using the  and  keys on the keyboard, select the squelch SNR, and enable (ON) or disable it (OFF).



Using the  and  keys on the keyboard, select the SNR level, between 0 and 5.



Press the 

key to validate the modifications relating to squelch, and return to the main operating screen, which displays its status *(in this case SQL ON)*.

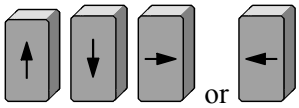
6.3.1.3.3 "PRESET" Menu (preset channels)

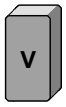
Purpose: This menu allows the user to create/modify/clear/select a number for a preset channel. These channels can then be used to establish the operating parameters of the receiver.

Value: The parameters associated with this menu are:

Parameter	***SELECT***	***CREATE/MODIFY***	***CLEAR***
Value	Selects a preset channel from among 128.	Creates or modifies a preset channel from among 128.	Removes the specified preset channel or all channels.

Procedure: The procedure to access the "PRESET" menu is as follows:

Using the  or keys on the keyboard, select the **PRESET** zone.

When this is displayed in reverse video, press the 

key to enter the "PRESET" menu.

6.3.1.3.3.1 "PRESET / Select" menu

Purpose: This sub-menu allows a preset channel number to be selected, in order to fix the operating parameters of the receiver.

Value: The parameter associated with this sub-menu is:

Parameter	***SELECT***
Value	Channel number between 001 and 128.

Procedure: The procedure to access the "Select" sub-menu is as follows:

Press the V key to enter the "Select" menu. If no channel has been preset, the screen displays the following message:

Otherwise, using the ↑ and ↓ keys, select a channel number.

Press the V key to validate the input. A confirmation screen displays the following message:

Press the V key to confirm the input. The main menu is displayed again with the selected channel number:

Press the X key to cancel the input. The screen returns to the "PRESET" menu:

6.3.1.3.3.2 "PRESET / Create/Modify" menu

Purpose: This sub-menu allows:

- a preset channel to be created, by fixing the associated parameters,
- an existing channel to be modified, by changing the value of one or more of its parameters.

Value: The parameters associated with a preset channel are:

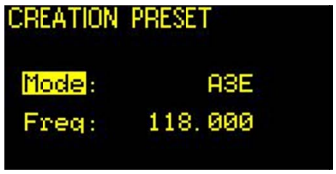
Parameter	*MODE*	*FREQUENCY*
Value	A3E or F3E	118 to 144 MHz in VHF. 225 to 400 MHz in UHF.

Procedure: The procedure to access the "Select" sub-menu is as follows:

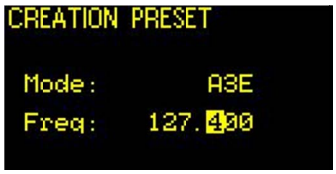
Using the ↑ and ↓ keys, select the "Create/Modify" sub-menu:

Press the V key to enter the "Create/Modify" sub-menu. **If this is a creation,** the screen displays:

Press the V key to enter the parameter entry menu:



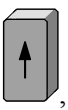
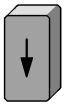
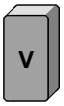
Using the ↑ ↓ → or ← keys on the keyboard, select the value of the Mode and Frequency parameters:



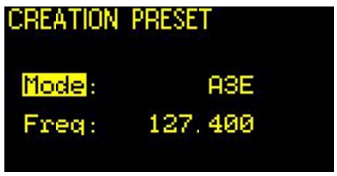
Press the V key to validate the parameter input. A confirmation screen appears:

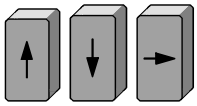
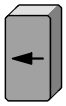
Press the V key to confirm. The "PRESET" sub-menu is displayed on the screen again:

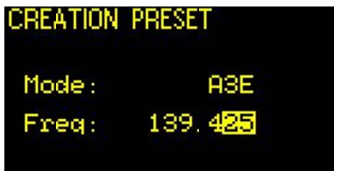
<u>If this is a modification,</u> the screen displays:

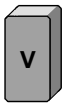
Using the  ,  and 

keys, select a channel number, then validate. The screen displays the parameters of the selected channel:

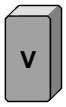


Using the  or  keys on the keyboard, modify the value of the Mode or Frequency parameters:



Press the 

key to validate the input. A confirmation screen displays the following message:

Press the 

key to confirm. The "PRESET" sub-menu is displayed on the screen:

6.3.1.3.3.3 "PRESET / Clear" menu

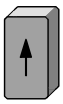
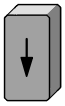
Purpose: This sub-menu allows:

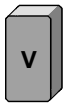
- a preset channel to be cleared by specifying its number,
- all preset channels to be cleared.

Value: The parameters associated with a preset channel are:

Parameter	*CLEAR ONE PRESET*	*CLEAR ALL PRESETS*
Value	Number of preset channel to be cleared	No specific value

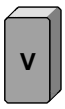
Procedure: The procedure to access the "Clear" sub-menu is as follows:

Using the  and  keys, select the "Clear" sub-menu:

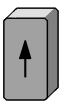
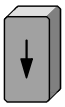
Press the 

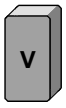
key to enter the "Clear" sub-menu. The screen displays:

6.3.1.3.3.3.1 Clearing a single channel

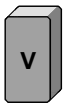
Press the 

key to enter the "Clear one preset" sub-menu. The screen displays:

Using the  and  keys, select the number of the channel to be cleared. The only numbers proposed by the transmitter are the existing channels:

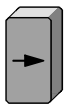
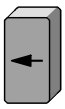
Press the 

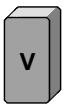
key to validate the input. A confirmation screen appears:

Press the 

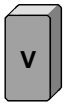
key to confirm. The "PRESET" sub-menu is displayed on the screen again:

6.3.1.3.3.3.2 Clearing all channels

Using the  and  keys, select the "Clear all Presets" sub-menu: The screen displays:

Press the 

key to enter the "Clear all presets" sub-menu. A confirmation screen appears:

Press the 

key to confirm. The "PRESET" sub-menu is displayed on the screen again:

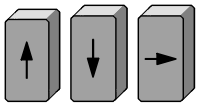
6.3.1.3.4 "AUDIO" Menu

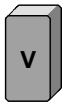
Purpose: This menu allows the type of AF supplied by the receiver.

Value: The values of the parameter associated with the AF type are:

Value	*ANALOG*	*VoIP*
Meaning	The received AF is supplied in the form of an analog voltage centred on ground. It is available on the **J3** operating connector.	The received AF is digitized by the receiver. It is supplied in the form of a data frame in the VoIP network protocol. It is available on one or other of the **J14** or **J15** Ethernet connectors.

Procedure: The procedure to access the "AUDIO" menu is as follows:

Using the  keys on the keyboard, select the **AUDIO** zone.

When this is displayed in reverse video, press the 

key to enter the "AUDIO" menu.

6.3.1.3.4.1 "AUDIO/ANALOG" menu

Purpose: This menu allows the type of analog AF to be selected, as well as its level, expected at the receiver output:

Value: The values of the parameter associated with the input AF level are:

Value	***LINE LEVEL OUT***
Meaning	From -11dBm to +10dBm, by steps of 0.5dB.

Procedure: The procedure to access the "AUDIO/ANALOG" menu is as follows:

Press the V key to enter the "AUDIO/ANALOG" sub-menu. The screen displays the entry parameter for the AF line level at the receiver output :

Using the ↑ and ↓ keys, select the desired value of the output AF:

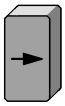
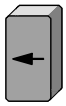
Press the V key to validate the input. The operating menu appears with the AF level displayed "-3dBm":

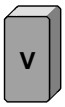
6.3.1.3.4.2 "AUDIO/VOIP" menu

Purpose: This menu allows the type of VoIP AF, supplied on one of the **E**thernet channels, to be selected.

Value: No associated parameter.

Procedure: The procedure to access the "AUDIO/VOIP" menu is as follows:

Using the  and  keys, select the "VOIP" sub-menu. The screen displays:

Press the 

key to validate the selection. The operating menu appears with the indication "Voip":

6.3.1.3.5 "MODE" Menu

Purpose: This menu allows the selected modulation mode for operation of the receiver to be adopted.

Value: The values of the parameter associated with the mode are:

Value	***A3E***	***F3E***
Meaning	AM Modulation	FM Modulation

Note: *Several analog or digital modulation modes are being developed or are reserved on the station, but are not available for the moment.*

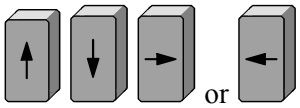
Being developed:

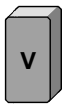
Value	***ACARS***	***VDL2***
Meaning	*AM-MSK Modulation*	*D8PSK Modulation*

Reserved:

Value	***G3E***	***VDL4***
Meaning	*Emphasized FM Modulation*	*GFSK Modulation*

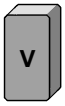
Procedure: The procedure to access the "MODE" menu is as follows:

Using the  keys on the keyboard, select the **Mode** zone.

When this is displayed in reverse video, press the 

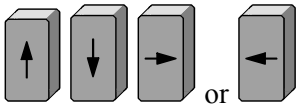
key to enter the "MODE" menu.

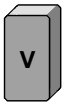
6.3.1.3.5.1 Selection of A3E mode

Press the 

key to validate the selection. The operating menu appears with the indication "A3E" in the central zone:

6.3.1.3.5.2 Selection of F3E mode

Using the  keys on the keyboard, select the "F3E" zone.

Press the  key to validate the selection. The operating menu appears with the indication "F3E" in the central zone:

6.3.1.3.5.3 Selection of ACARS or VDL2 modes

These modes are being developed. Selecting one of them results in the following screen being displayed:

6.3.1.3.5.4 Selection of G3E or VDL4 modes

These modes are reserved. It is not possible to select them for the moment.

6.3.1.3.6 "FREQ" Menu

Purpose:
This menu allows the receiver's operational frequency to be entered. This must comply with the ICAO recommendation, Appendix 10, relating to coding of frequencies as a function of the operating channel widths and the modulation mode.

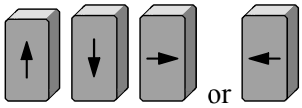
Equipment	*Frequency band*	*Modulation mode*	*Channel width*
RE9000-2G	VHF	A3E	8.33kHz and 25kHz
		F3E	25kHz
RE9010-2G	UHF	A3E	8.33kHz, 12.5kHz and 25kHz
		F3E	12.5kHz and 25kHz

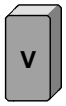
Value:
The first table below describes the possible frequency values for the 1st one hundred kHz of the VHF range, and the second for the 1st one hundred kHz of the UHF range. This rule will then be applicable for all the other frequencies of the respective bands:

VHF frequency coding for 25kHz channel	*VHF frequency coding for 8.33kHz channel*	*Operational frequency (in MHz)*
118.000	118.005	118,00000
	118.010	118,00833
	118.015	118,01666
118.025	118.030	118,02500
	118.035	118,03333
	118.040	118,04166
118.050	118.055	118,05000
	118.060	118,05833
	118.065	118,06666
118.075	118.080	118,07500
	118.085	118,08333
	118.090	118,09166

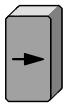
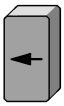
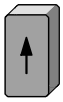
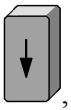
UHF frequency coding for 25kHz channel	*UHF frequency coding for 12.5kHz channel*	*UHF frequency coding for 8.33kHz channel*	*Operational frequency (in MHz)*
225.000	225.000	225.005	225,00000
		225.010	225,00833
	225.012		225,01250
		225.015	225,01666
225.025	225.025	225.030	225,02500
		225.035	225,03333
	225.037		225,03750
		225.040	225,04166
225.050	225.050	225.055	225,05000
		118.060	225,05833
	225.062		225,06250
		225.065	225,06666
225.075	225.075	225.080	225,07500
		225.085	225,08333
	225.087		225,08750
		225.090	225,09166

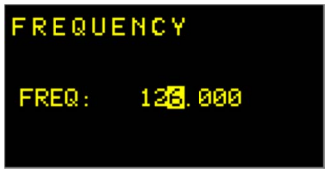
Procedure: The procedure to access the "FREQ" menu is as follows:

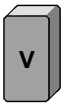
Using the  keys on the keyboard, select the **Freq** zone.

When this is displayed in reverse video, press the 

key to enter the "FREQUENCY" menu.

Using the  and  keys, then  and  , select then modify a particular digit of the frequency.



Press the 

key to validate the new frequency, and return to the main operating screen.

6.3.1.3.7 "SETUP" Menu

Purpose: This menu allows configuration of the receiver parameters not directly linked to the main operating menu. The base "SETUP" menu is itself broken down into several sub-menus, each dedicated to a particular set of parameters.

Value: The values of the sub-menus associated with the "SETUP" menu are:

Value	*HW CONFIG.*	*DISPLAY*
Meaning	Allows the receiver "On/Off Command" or the "Audio compressor" parameters to be accessed	Allows the "display language" and "screen brightness" adjustment menus to be accessed

Value	*IP*	*JBUS*	*REMOTE CTL*
Meaning	Allows the "Internet access configuration" parameters to be accessed	Allows the "JBUS 1 and 2 links configuration" parameters to be accessed	Allows the "Equipment remote control" parameter to be accessed

6.3.1.3.7.1 "Setup / Hw Config." menu

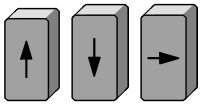
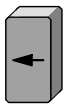
Purpose: The purpose of this menu is to specify:

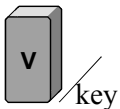
- The parameters related to the receiver "On/Off command",
- The audio compressor status.

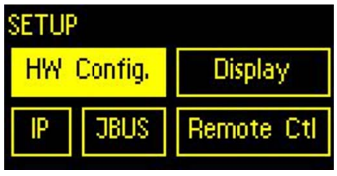
Value: The parameters associated with the "HW CONFIG." menu are:

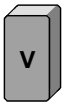
Value	*ON/OFF*	*COMP*
Meaning	Allows the receiver software "On/Off Command" to be activated or deactivated, and the priority to be selected.	Allows to enable or disable the audio compressor.

Procedure: The procedure to access the "HW CONFIG." menu is as follows:

Using the  or  keys on the keyboard, select the **Setup** zone.

When this is displayed in reverse video, press the  key to enter the "SETUP" menu.



Press the  key to enter the "HARDWARE CONFIG." menu.

6.3.1.3.7.1.1 "Setup / Hw config./ ON/OFF" menu

Objet : The purpose of this menu is to enable or disable the receiver software "On/Off Command", and to fix the priority between the software command and the hardware command.

Value: The parameters associated with the "ON/OFF" menu are:

For the status of the software command:

Value	*ON*	*OFF*
Meaning	Allows the receiver software "On/Off Command" to be enabled	Allows the receiver software "On/Off Command" to be disabled

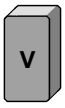
For the command priority:

Value	*SOFT*	*HARD*
Meaning	Allows priority to be given to the receiver software "On/Off Command"	Allows priority to be given to the receiver hardware "On/Off Command"

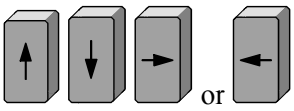
Note: *Remember that the hardware "On/Off Command" is accessible on the* ***J3-11*** *contact of the operating connector.*

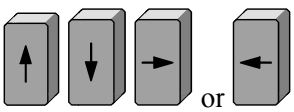
Procedure: The procedure to access the "ON/OFF" menu is as follows:

Enter the "HARDWARE CONFIG." menu as per the procedure described in § 6.3.1.3.7.1 "Setup / Hw Config." menu.

Press the 

key to enter the "ON/OFF COMMAND" menu.

Press the  or keys on the keyboard, to select the status of the software "On/Off Command" and/or to access the "Prio" parameter:

Press the  or keys on the keyboard, to select the priority of the "On/Off Command":

6.3.1.3.7.1.2 "Setup / Hw config./COMP" menu

Purpose: The purpose of this menu is to activate or deactivate the receiver's audio compressor.

Value: The parameter associated with the "COMP" menu is:

Value	*ON*	*OFF*
Meaning	Allows the receiver's audio compressor to be activated	Allows the receiver's audio compressor to be deactivated

Procedure: The procedure to access the "COMP" menu is as follows:

After entering the "HARDWARE CONFIG." menu as per the procedure described in § 6.3.1.3.7.1 "Setup / Hw Config." menu., press the keys, → or ← on the keyboard, to select the "COMP" parameter.

Press the V key to enter the "COMPRESSOR" menu:

Press the ↑ or ↓ keys on the keyboard, to modify the status of the compressor:

Press the V key to return to the "HARDWARE CONFIG." menu:

6.3.1.3.7.2 "SETUP/ Display" menu

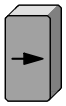
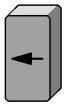
Purpose: The purpose of this menu is to:

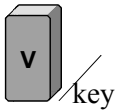
- Specify the menu display language, on the one hand,
- Adjust the display screen brightness, on the other.

Value: The parameters associated with the "DISPLAY" menu are:

Value	*Language*	*Brightness*
Meaning	Allows the menu display language to be specified as French or English	Allows the display screen brightness to be adjusted by a bar graph.

Procedure: The procedure to access the "DISPLAY" menu is as follows:

Select the "SETUP" menu, then using the  or  keys on the keyboard, select the **Display** zone:

When this is displayed in reverse video, press the 

key to enter the "DISPLAY SETTINGS" menu.

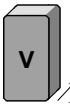
6.3.1.3.7.2.1 "Setup / Display / Language" menu

Purpose: The purpose of this menu is to select the menu display language.

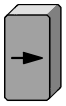
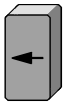
Value: The parameters associated with the "LANGUAGE" menu are:

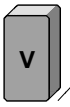
Value	***English***	***Français***
Meaning	The menus are displayed in English (default value)	The menus are displayed in French

Procedure: The procedure to access the "SELECT LANGUAGE" menu is as follows:

Enter the "DISPLAY SETTINGS" menu as per the procedure described in § 6.3.1.3.7.2 "SETUP/ Display" menu., then press the 

key to enter the "SELECT LANGUAGE" menu:

Press the  or  keys on the keyboard, to select the display language:

Press the 

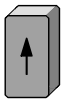
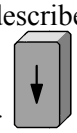
key on the keyboard to return to the "DISPLAY SETTINGS" menu:

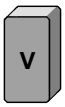
6.3.1.3.7.2.2 "Setup / Display / Brightness" menu

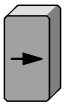
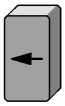
Purpose: The purpose of this menu is to allow the menu display screen brightness to be adjusted.
Value: The parameter associated with the "BRIGHTNESS" menu is displayed in the form of a bar graph the length of which is proportional to the brightness:

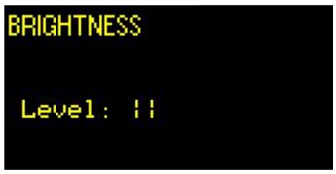
- Short : low brightness,
- Long : high brightness.

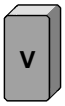
Procedure: The procedure to access the "BRIGHTNESS" menu is as follows:

After entering the "DISPLAY SETTINGS" menu as per the procedure described in § 6.3.1.3.7.2 "SETUP/ Display" menu, press the  or  keys on the keyboard, to select the "Brightness" parameter:

Press the  key to enter the "BRIGHTNESS" menu:

Press the  or  keys on the keyboard, adjust the brightness:



Press the  key to return to the "DISPLAY SETTINGS" menu:

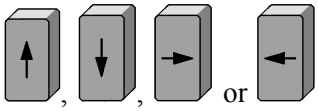
6.3.1.3.7.3 "SETUP / IP" menu

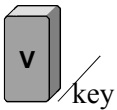
Purpose: The purpose of this menu is to configure the IP parameters, used for Ethernet links (connectors **J14** and **J15**).

Value: The parameters associated with the "IP" menu are:

Value	*ETH1*	*ETH2*
Meaning	Allows the parameters for Ethernet link no. 1 (connector **J14**) to be configured	Allows the parameters for Ethernet link no. 2 (connector **J15**) to be configured

Procedure: The procedure to access the "IP" sub-menu is as follows:

Select the "SETUP" menu, then using the  , keys on the keyboard, select the **IP** zone:

When this is displayed in reverse video, press the 

key to enter the "IP CONFIGURATION" menu.

6.3.1.3.7.3.1 "SETUP/ IP/ ETH1" menu

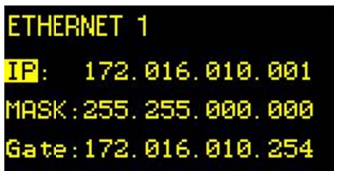
Purpose: This menu allows configuration of the parameters for Ethernet link no. 1.

Value: The parameters associated with the "ETH1" menu are:

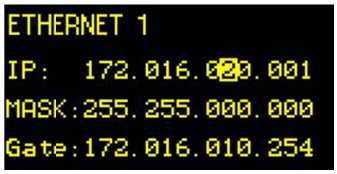
Value	*IP*	*Mask*	*Gate*
Meaning	Fixes the IP address according to the format: xxx.xxx.xxx.xxx, where each xxx field can go from 000 to 255.	Fixes the subnet mask address according to the format: xxx.xxx.xxx.xxx, where each xxx field can go from 000 to 255.	Fixes the gateway address according to the format: xxx.xxx.xxx.xxx, where each xxx field can go from 000 to 255.

Procedure: The procedure to access the "ETH1" menu is as follows:

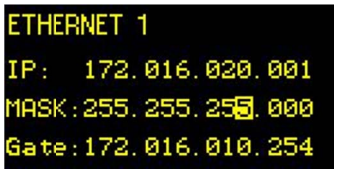
Enter the "IP CONFIGURATION" menu as per the procedure described in § 6.3.1.3.7.3 "SETUP / IP" menu, then press the V key to enter the "ETHERNET 1" menu:



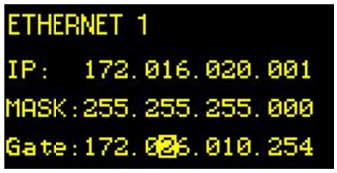
Using the ↑, ↓, → and ← keys on the keyboard, modify the IP address:



Using the ↑, ↓, → and ← keys on the keyboard, modify the subnet mask address:



Using the ↑, ↓, → and ← keys on the keyboard, modify the Gateway address:



Press the V key on the keyboard, to validate the modifications. These are stored in Flash memory, ***but are not taken into account dynamically.*** The following message is displayed:

To take the new parameters of Ethernet link no.1 into account, ***the receiver must be restarted.*** The following message is displayed to indicate this requirement:

Press the V key on the keyboard to return to the "IP CONFIGURATION" menu:

6.3.1.3.7.3.2 "SETUP/ IP/ ETH2" menu

Purpose: This menu allows configuration of the parameters for Ethernet link no. 2. It resembles the previous menu in every way.

Remark : The IP address of the ETH2 interface must obligatory indicate a sub-network different from the one of the ETH1interface. If not, it will be impossible to exchange data with the radio.

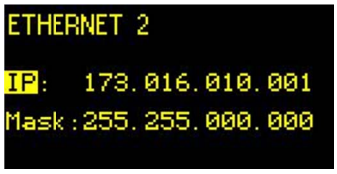
Value: The parameters associated with the "ETH2" menu are:

Value	*IP*	*Mask*
Meaning	Fixes the IP address according to the format: xxx.xxx.xxx.xxx, where each xxx field can go from 000 to 255.	Fixes the subnet mask address according to the format: xxx.xxx.xxx.xxx, where each xxx field can go from 000 to 255.

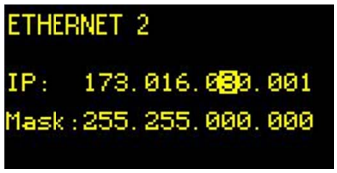
Procedure: The procedure to access the "ETH2" menu is as follows:

After entering the "IP CONFIGURATION" menu as per the procedure described in § 6.3.1.3.7.3 "SETUP / IP" menu., press the or keys on the keyboard, to select the "ETH2" parameter:

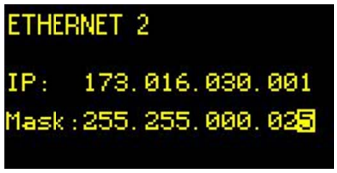
Press the key to enter the "ETHERNET 2" menu:



Using the , , and keys on the keyboard, modify the IP address:



Using the , , and keys on the keyboard, modify the subnet address:



Press the key on the keyboard, to validate the modifications. These are stored in Flash memory, ***but are not taken into account dynamically.*** The following message is displayed:

To take the new parameters of Ethernet link no.2 into account, ***the receiver must be restarted.*** The following message is displayed to indicate this requirement:

Press the key on the keyboard to return to the "IP CONFIGURATION" menu:

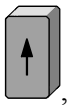
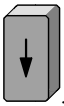
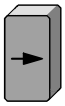
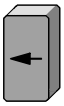
6.3.1.3.7.4 "SETUP / JBUS" menu

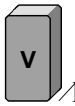
Purpose: The purpose of this menu is to configure the JBUS parameters, used for JBUS links no. 1 and no. 2 (connectors **J5** and **J2**).

Value: The parameters associated with the "JBUS" menu are the same for the JBUS links, and correspond to:

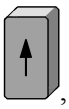
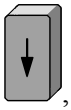
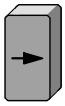
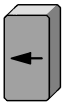
Value	*Address*	*Baud rate*	*Idle*
Meaning	Allows the address of the JBUS links 1 and 2 to be configured, from 000 to 255.	Allows the speed of the JBUS links 1 and 2 to be configured, to 1200, 2400, 9600, 19200, 38400, 57600 and 115200 Baud.	Allows the number of idle characters to be configured, from 003 to 255.

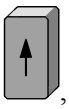
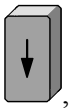
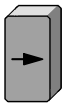
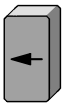
Procedure: The procedure to access the "IP" sub-menu is as follows:

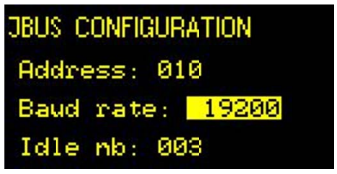
Select the "SETUP" menu, then using the  ,  ,  or  keys on the keyboard, select the **JBUS** zone:

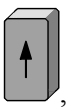
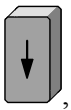
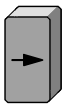
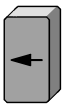
When this is displayed in reverse video, press the 

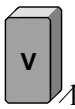
key to enter the "JBUS CONFIGURATION" menu.

Using the  ,  ,  and  keys on the keyboard, modify the JBUS address:

Using the  ,  ,  and  keys on the keyboard, modify the JBUS speed:



Using the  ,  ,  and  keys on the keyboard, modify the number of idle characters:

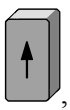
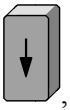
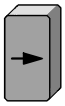
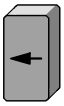
Press the 

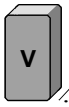
key on the keyboard to return to the "SETUP" menu:

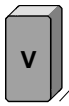
6.3.1.3.7.5 "SETUP/ Remote ctrl" menu

Purpose: The purpose of this menu is to place the radio equipment under remote control again, i.e. under the control of a supervisor.
When the receiver is under local control, note that it automatically changes back to remote control after 5 minutes of inactivity Hon the local keyboard.
Value: No parameter.

Procedure: The procedure to access the "REMOTE CTL" sub-menu is as follows:

Select the "SETUP" menu, then using the  ,  ,  or  keys on the keyboard, select the **Remote Ctrl** zone:

When this is displayed in reverse video, press the  . A screen requesting confirmation is displayed:

Press the  key on the keyboard to return to the operating menu. The operating menu displays the question: Change control to local? until the screen goes to standby.

6.3.1.3.8 "MAINT" Menu

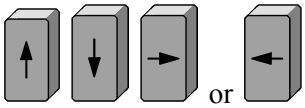
Purpose: This menu allows:

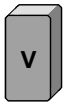
- equipment maintenance help screens to be provided in the form of measurement screens,
- different types of test to be managed: continuous or initiated,
- the frequency master oscillator accuracy to be adjusted,
- information relating to the equipment to be obtained: model, serial number, onboard software version.

Value: The values of the sub-menus associated with the "MAINT" menu are:

Value	***Measures***	***Test***	***TCXO***	***About***
Meaning	Allows the measurement screens to be accessed	Allows the test reports to be accessed	Allows the frequency master oscillator to be adjusted	Allows the general information to be accessed

Procedure: The procedure to access the "MAINT" menu is as follows:

Using the  keys on the keyboard, select the **Maint** zone.

When this is displayed in reverse video, press the 

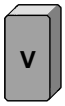
key to enter the "MAINTENANCE" menu.

6.3.1.3.8.1 "MAINT / MEASURES" menu

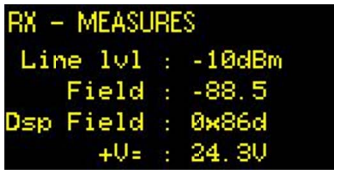
Purpose: This menu allows the measurement screens to be accessed.
Value: The receiver parameters displayed in the "MEASURES" menu are:

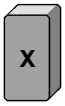
Parameter	*Name*	*Value*
AF line level	Line lvl	-11 to +10dBm
Field Voltage	Field	0 to 15V
Field value for the DSP	Dsp Field	0x000 to 0xFFF
Power supply voltage	+V=	0 to 35V

Procedure: The procedure to access the "MEASURES" menu from the "MAINTENANCE" menu is as follows:

After entering the "MAINTENANCE" menu as per the procedure described in § 6.3.1.3.8 "MAINT" Menu, press the 

key on the keyboard, to display the measurements page:



Press the 

key to return to the "MAINTENANCE" menu.

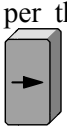
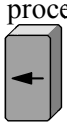
6.3.1.3.8.2 "MAINT / TEST" menu

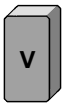
Purpose: This menu allows two types of tests built into the receiver to be accessed, and the associated test reports to be viewed.

Value: The parameters associated with the "TEST" sub-menu of the "MAINT" menu are:

Value	***IBIT*** *(Initiated Built-In Test)*	***CBIT*** *(Continuous Built-In Test)*
Meaning	Test triggered by the user on request	Continuous testing of certain resources of the receiver

Procedure: The procedure for accessing the "TEST" sub-menu of the "MAINT" menu is as follows:

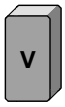
After entering the "MAINTENANCE" menu as per the procedure described in § 6.3.1.3.8 "MAINT" Menu, press the  or  keys on the keyboard, to select the **Test** zone.

Press the  key to enter the "TESTS" menu.

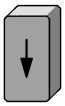
6.3.1.3.8.2.1 "MAINT / TEST / CBIT" menu

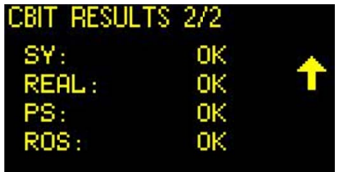
Purpose: This menu allows the result of the transmitter's continuous test to be displayed.
Value: No parameters.

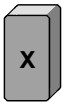
Procedure: The procedure to display the continuous test is as follows:

After entering the "TESTS" menu as per the procedure described in § 6.3.1.3.8.2 "MAINT / TEST" menu, press the 

key on the keyboard to view the first page of the initiated test report:

Press the  key to view the second page of the initiated test report:



Press the 

key to return to the "TESTS" menu.

6.3.1.3.8.2.2 "MAINT / TEST / IBIT" menu

Purpose: This menu allows the receiver's initiated test to be accessed.
Value: The parameters associated with the "IBIT" sub-menu of the "TEST" menu are:

Value	***LAUNCH IBIT***	***IBIT RESULTS***
Meaning	Launching the initiated test	Display of the results of the initiated test

6.3.1.3.8.2.2.1 "MAINT / TEST / IBIT / LAUNCH IBIT" menu

Purpose: This menu allows the receiver's initiated test to be launched.
Value: No parameters.

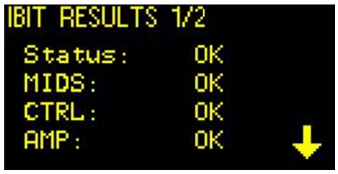
Procedure: The procedure to launch the initiated test is as follows:

After entering the "TESTS" menu as per the procedure described in § 6.3.1.3.8.2 "MAINT / TEST", press the → or ← keys on the keyboard to select the **IBIT** zone:

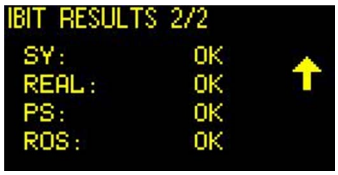
Press the V key to enter the "IBIT" page.

Press the V key to launch the "IBIT" initiated test.

At the end of the test, the result of the initiated test is displayed automatically:



Then :



6.3.1.3.8.2.2.2 "MAINT / TEST/ IBIT / IBIT RESULTS" menu

Purpose: This menu allows the result of the receiver's initiated test to be displayed.
Value: No parameters.

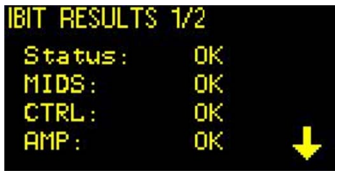
Procedure: The procedure to display the results of the initiated test is as follows:

After entering the "TESTS" menu as per the procedure described in § 6.3.1.3.8.2 "MAINT / TEST", press the → or ← keys on the keyboard to select the **IBIT** zone:

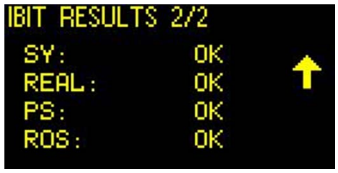
When this is in reverse video, press the V key to enter the "IBIT" page.

Press the → or ← keys on the keyboard to select the **IBIT Results** zone:

Press the V key to display the initiated test report page 1/2 :



Then page 2/2 :



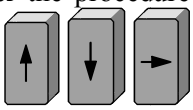
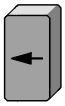
6.3.1.3.8.3 "MAINT / TCXO" menu

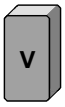
Purpose: This menu allows the accuracy of the frequency master oscillator generating the local oscillator to be adjusted.
Value: The parameter associated with the "TCXO" sub-menu of the "MAINT" menu is:

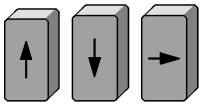
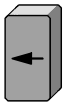
Value	***001 to 255***
Meaning	Frequency master oscillator adjustment value. Values between 001 and 127 reduce the frequency. Values between 127 and 255 increase the frequency.

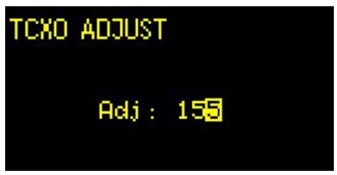
☞ *The electronic potentiometer (EEPOT) used for this adjustment is made up of 255 steps, and allows compensation of ±5ppm, i.e. an accuracy of about 0.04ppm per step (≅ 5Hz in VHF, and between 9 and 16Hz in UHF).*

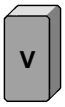
Procedure: The procedure for accessing the "TCXO" sub-menu of the "MAINT" menu is as follows:

After entering the "MAINTENANCE" menu as per the procedure described in § 6.3.1.3.8 "MAINT" Menu, press the  or  keys on the keyboard, to select the **TCXO** zone.

Press the  key to enter the TCXO adjustment page:

Using the  and  keys, modify the adjustment value:



Press the  key to return to the "MAINTENANCE" menu.

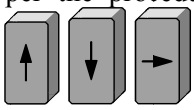
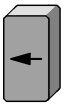
6.3.1.3.8.4 "MAINT / ABOUT" menu

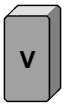
Purpose: This menu allows information relating to the receiver to be viewed, such as the model, serial number or the onboard software version. This information is *read-only,* and therefore cannot be modified.

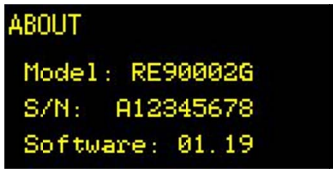
Value: The parameters associated with the "ABOUT" sub-menu of the "MAINT" menu are:

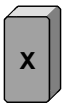
Value	***Model***	***S/N***	***Software***
Meaning	Type of receiver: RE90002G or RE90102G	Serial number of the CNUM12163 PCB	Onboard software version

Procedure: The procedure for accessing the "ABOUT" sub-menu of the "MAINT" menu is as follows:

After entering the "MAINTENANCE" menu as per the procedure described in § 6.3.1.3.8 "MAINT" Menu, press the  or  keys on the keyboard, to select the **About** zone.

Press the  key to enter the information display page:



Press the  key to return to the "MAINTENANCE" menu.

6.3.2 Local operation through the front panel RS232 interface

The front panel RS232 interface allows connection of either an RS232 terminal, or a PC emulating a terminal.

Refer to § "Front panel connectors", for the pin configuration of the 9-contact RS232 SUB-D connector.

Refer to § 6.2.2 "Local commands through the RS232 terminal", to obtain the list of local commands available from the front panel MAINTENANCE connector.

*For details of the commands, refer to the document [1] **ICDFR 40600034 V1.00 9000-2G Series MAINTENANCE:** Interface Control Document relating to the local operation link from the RS232 front panel interface.*

6.4 REMOTE OPERATION OF EQUIPMENT

6.4.1 Remote operation through the JBUS link

The JBUS interface allows the receiver to be supervised from a remote Master Supervisor, through a RS485 type electrical interface.

Refer to § 4.2.2.3 "Rear panel connectors – J2 Supervision connector", for the pin configuration of the 9-contact JBUS interface SUB-D connector.

Refer to § 6.2.3 "Remote commands through the JBUS link", to obtain the list of remote commands available from the rear panel JBUS connector.

*For the details of the JBUS tables available to read and available to write, refer to the document [3] **ICDFR 40600036 V1.00 9000-2G Series JBUS:** Interface Control Document relating to the JBUS protocol supervision link.*

6.4.2 Remote operation through the SNMP link

The SNMP interface allows the receiver to be supervised from a networked Supervisor, through an Ethernet type electrical interface.

Refer to § 4.2.2.8 "Rear panel connectors – J14 and J15 Ethernet connectors", for the pin configuration of the RJ45 interface connectors.

Refer to § 6.2.4 "Remote commands through the JBUS SNMP", to obtain the list of remote commands available from the rear panel RJ45 connectors.

*For details of the commands accessible through the SNMP protocol, refer to the document [2] **ICDFR 40600035 V1.00 9000-2G Series SNMP Agent:** Interface Control Document relating to the SNMP protocol supervision link.*

CHAPTER 7. MAINTENANCE

7.1 MAINTENANCE CONCEPT

7.1.1 Reminder of safety rules

Maintenance operations may result in handling the equipment, opening it, as well as replacing or checking certain modules or PCBs.

Before any handling, carefully read in this manual § 1.4.3 "Safety instructions".

7.1.2 Preventive maintenance

Preventive maintenance consists in performing a series of periodical checks and operations that aim at keeping the equipment operating smoothly.

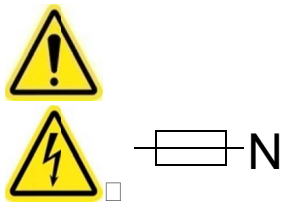
List of preventive maintenance operations:

Identification	Frequency						Type	Degree			Guide Sheet	
	M	Q	B	A	C	R		1	2	3	No.	§
1		X					Overall cleaning	X		X	E1	
2		X			X	X	Testing of overall operation			X	V1	

M: Monthly, **Q**: Quarterly, **B**: Bi-annually, **A**: Annually, **C**: Before first connection, **R**: After repair

7.1.3 Corrective maintenance

7.1.3.1 Type of protective fuses



Protective slow-blow fuses present on the filtered mains power supply input (FN282-2-06, TELERAD ref: 37000307).
Value: D1TD / 1A / 250V.
DUAL POLE / FUSE ON NEUTRAL.
If this symbol is present on the rear of the device, then there is also a fuse on Neutral. Risk of electric shock.

7.1.3.2 Corrective maintenance operations

Corrective maintenance involves the replacement of the defective PCBs (or modules) after a fault has been detected.

Faults may be detected in a number of ways:

- Equipment operation is impossible,
- Front panel alarm indicator light,
- IBIT and CBIT built-in tests,
- Detection of fault by supervision.

To access the receiver's internal PCBs or modules, be sure first of all to switch off the DC power supply with the front panel On/Off switch, then switch off the mains power supply with the rear panel On/Off switch (for RE9000A-2G and RE9010A-2G versions), then gently disconnect the various connectors from the rear panel.
Slide out the equipment on the support guides, place it on a clean flat surface, and unscrew the top cover.
The following guide sheets give the disassembly and reassembly procedures for PCBs or modules.

☞ *Generally speaking, before equipment is ever opened for operations, comply with the electrical safety rules indicated in § 1.4.3 "Electrical risks"*

7.2 ELEMENTS FOR MAINTENANCE HELP

Most of the receiver's PCBs or modules have indicator lights representing the logic state of the signals; they provide information about their validity.

7.2.1 ALSE53005 Power supply module

No indicator lights for ALSE53005 module.

7.2.2 CLAF12164 Display PCB

No indicator lights for CLAF12164 PCB.

7.2.3 CNUM12163 control and management PCB

The following table indicates the indicator lights present on the PCB and their meaning:

Indicator light	*Meaning*	*On*
DS2	Green light indicating presence of +15V internal voltage	Present
DS3	Green light indicating presence of +3.3V internal voltage	Present
DS4	Green light indicating presence of +5V internal voltage	Present
DS5	Red light indicating AD9874 Down Converter alarm.	Alarm

7.2.4 MIPR11006 microcontroller and DSP PCB

The following table indicates the indicator lights present on the PCB and their meaning:

Indicator light	*Meaning*	*On*
DS1	Red light indicating µC "Hardware Reset"	Reset
DS2	Red light indicating DSP_RESET# DSP Reset	Reset
DS3	Green light indicating operation on external 10MHz	Present
DS4	Green light indicating activity on µC data bus	Busy
DS5	Green light indicating TxD activity on the µC SCC2 link	Active
DS6	Green light indicating TxD activity on the µC SCC3 link	Active
DS7	Green light indicating TxD activity on the µC SCC1 link	Active
DS8	Green light indicating TxD activity on the µC SCC4 link	Active

7.2.5 PAVR42101 Front panel PCB

The indicator lights present on the PCB are those visible on the front panel.
See § Presentation of front panel.

7.2.6 SVHF25077 or SUHF25078 synthesizer module

The following table indicates the indicator lights present on the PCB and their meaning:

Indicator light	*Meaning*	*On*
DS1	Red light indicating MN3 PLL F_{op} alarm	Alarm
DS2	Green light indicating locked MN9 10MHz PLL	OK

7.2.7 VUFI23186 or VUFI23191 RF head PCB

No indicator lights for CVUFI23186 or VUFI23191 PCB.

7.3 FAULT LOCALISATION

The fault can be quickly located in the PCBs or modules using the test menu available on the front panel Human-Machine Interface (See § Maint/Test/CBIT).
The analysis of the results specifies the faulty PCB(s) or module(s):

- The first page gives the status of the following PCBs and modules:
  - The reception function as a whole: OK or DEF.
  - The MIPR11006 microcontroller/DSP PCB: OK or DEF.
  - The CNUM12163 control PCB: OK or DEF.
  - The SVHF25077 or SUHF25078 synthesizer module: OK or DEF.

- The second page gives the status of the following PCBs and modules:
  - The VUFI23186 or VUFI23191 IF generation module: OK or DEF.
  - The ALSE53005 power supply module: OK or DEF.

7.4 MAINTENANCE AND CLEANING OPERATIONS

7.4.1 Frequency table

Operations	*Frequency*
Cleaning the equipment	Annually

7.4.2 Maintenance operations directory

Sheet E1: Cleaning the equipment.

7.4.3 List of required tools

- Dry cloth.
- Cleaning brush.
- Computer equipment cleaner.

7.4.4 E1 guide sheet

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**E1** **Folio** 1/1
SCOPE: Cleaning the equipment	**Staff:** 1st and 2nd lines

SAFETY INSTRUCTIONS:

Power equipment off.

The person handling the equipment must be equipped with a ground bracelet.

PROCEDURE:

1) Gently disconnect the various connectors from the rear panel of the receiver.
2) If the equipment is installed in a rack, remove it from the rack, and place it on a clean flat surface.
3) Using a dry cloth, remove all traces of dust on the top cover (and possibly the bottom cover), as well as on the front and rear panels.
4) Using a brush, clean the contacts of the various front and rear panel connectors.
5) If necessary, replace the equipment in the rack, then connect all the connectors.

7.5 DISASSEMBLY / REASSEMBLY OPERATIONS

7.5.1 Frequency table

Operations	*Frequency*
Disassembly / Reassembly of RF front-end module VUFI23186 or VUFI23191	On failure detection (for disassembly), or after repair (for reassembly)
Disassembly / Reassembly of front Panel PCB PAVR42101	
Disassembly/ Reassembly of Display PCB CLAF12164	
Disassembly / Reassembly of Power supply module ALSE53005	
Disassembly / Reassembly of control PCB CNUM12163	
Disassembly / Reassembly of microcontroller PCB /DSP MIPR11006	
Disassembly / Reassembly of Synthesizer module SVHF25077 or SUHF25078	

7.5.2 Maintenance operations directory

Sheet D1: Disassembly/ Reassembly of RF front-end module VUFI23186 or VUFI23191.
Sheet D2: Disassembly / Reassembly of front Panel PCB PAVR42101.
Sheet D3: Disassembly / Reassembly of Display PCB CLAF12164.
Sheet D4: Disassembly / Reassembly of Power supply module ALSE53005.
Sheet D5: Disassembly / Reassembly of control PCB CNUM12163.
Sheet D6: Disassembly / Reassembly of microcontroller/DSP PCB MIPR11006.
Sheet D7: Disassembly / Reassembly of Synthesizer module SVHF25077 or SUHF25078.

7.5.3 List of required tools

- 1 5mm-diameter Phillips screwdriver.
- 1 small flathead screwdriver.
- 1 Spanner SN4 tip screwdriver for security screws.
- 1 8mm open-end wrench.
- 1 5mm-diameter elbow tubular wrench.
- 1 5.5mm-diameter elbow tubular wrench.

7.5.4 General note regarding disassembly of PCBs or modules

Unless otherwise indicated by TELERAD, before disassembling a PCB or module, always check that the equipment is powered off, and that its power supply cable is disconnected from the source.

7.5.5 D1 guide sheet

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**D1** **Folio** 1/1
SCOPE: Disassembly / Reassembly of RF front-end module VUFI23186 or VUFI23191	**Staff:** 1st and 2nd lines

SAFETY INSTRUCTIONS:

Refer to § 7.5.4 "General note regarding disassembly of PCBs or modules".

DISASSEMBLY PROCEDURE:

1) Gently disconnect the various connectors from the rear panel of the receiver.
2) If the equipment is installed in a rack, remove it from the rack, and place it on a clean flat surface.
3) Using the Phillips screwdriver, remove the top cover.
4) Disconnect the 3 Subclic connectors corresponding to the antenna, the local oscillator and the IF by pulling on them lightly.
5) Holding the female connector laterally between thumb and index finger, disconnect the ribbon cable linking to the CNUM12163 PCB.
6) Using the Phillips screwdriver, unscrew the 4 screws attaching the module to the chassis.
7) Remove the VUFI23186 or VUFI23191 module.

REASSEMBLY PROCEDURE:

1) Place the VUFI23186 or VUFI23191 module to be installed on the attachment spacers.
2) Using the Phillips screwdriver, screw in the 4 screws attaching the module to the chassis.
3) First, reconnect the ribbon cable linking to the CNUM12163 PCB.
4) Then reconnect the 3 Subclic connectors corresponding to the antenna, the local oscillator and the IF, being sure to keep them lined up and pushed back in straight.
5) Using the Phillips screwdriver, screw the top cover back on.

Replace the receiver in the rack if necessary, then gently reconnect the various connectors on the rear panel of the receiver.

7.5.6 Guide sheet D2

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**D2** **Folio** 1/1
SCOPE: Disassembly / Reassembly of front Panel PCB PAVR42101	**Staff:** 1st and 2nd lines

SAFETY INSTRUCTIONS:

Refer to § 7.5.4 "General note regarding disassembly of PCBs or modules".

DISASSEMBLY PROCEDURE:

1) Disassembling the PAVR42101 front panel PCB requires the VUFI23186 or VUFI23191 module to be disassembled in advance. Disassemble this module as per the procedure described in sheet D1.
2) Once the VUFI23186 or VUFI23191 module is removed, disconnect the headphone output and loudspeaker output Berg connectors, by pulling on them lightly.
3) Using the side extractors, disconnect the ribbon cable linking to the CNUM12163 PCB.
4) To allow subsequent extraction of the PAVR42101 PCB, disconnect the two coaxial cables, J4 "RxLO" and J5 "TEST", from the SVHF25077 or SUHF25078 synthesizer module.
5) Using a small flathead screwdriver, pop off the volume adjustment button cover.
6) Turn the volume adjustment button fully left, then using the Spanner tip screwdriver, unscrew the screw attaching the button to the potentiometer shaft.
7) Using the 8mm open-end wrench, unscrew the nut attaching the On/Off switch to the front panel, as well as that for the Squelch/Test switch.
8) Using the Phillips screwdriver, unscrew the 4 crosshead screws attaching the Maintenance RS232 connector to the front panel, then the 4 crosshead screws attaching the PAVR42101 PCB to the chassis.
9) Pull lightly on the PAVR42101 PCB, pulling it out straight, to gently disconnect it from the CLAF12164 Display PCB.

REASSEMBLY PROCEDURE:

1) Offer up the PAVR42101 PCB, checking that the indicator lights, switches and connector are placed correctly.
2) Using the Phillips screwdriver, tighten the 2 crosshead screws attaching the Maintenance RS232 connector to the front panel.
3) Using the 8mm open-end wrench, tighten the nut attaching the On/Off switch to the front panel, as well as the one for the Squelch/Test switch.
4) Using the Spanner tip screwdriver, tighten the screw attaching the button to the potentiometer shaft.
5) Using the Phillips screwdriver, tighten the 4 crosshead screws attaching the PAVR42101 PCB to the chassis, being careful to screw them in straight, especially for the bottom 2 screws.
6) Reconnect the SVHF25077 or SUHF25078 synthesizer module's two coaxial cables, J4 "RxLO" and J5 "TEST".
7) Reconnect the headphone output and loudspeaker output Berg connectors, then the ribbon cable linking to the CNUM12163 PCB.
8) Reassemble the VUFI23186 or VUFI23191 module as per the procedure described in sheet D1.

7.5.7 Guide sheet D3

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**D3** **Folio** 1/1
SCOPE: Disassembly / Reassembly of Display PCB CLAF12164	**Staff:** 1st and 2nd lines

SAFETY INSTRUCTIONS:

Refer to § 7.5.4 "General note regarding disassembly of PCBs or modules"

DISASSEMBLY PROCEDURE:

1) Disassembling the CLAF12164 Display PCB requires the PAVR42101 front panel PCB to be disassembled in advance. Disassemble this PCB as per the procedure described in sheet D2.
2) Once the PAVR42101 front panel PCB is disassembled, use the 5.5mm elbow tubular wrench to undo the 6 nuts attaching the CLAF12164 PCB to the chassis of the receiver.

Be careful not to undo the 4 retaining nuts of the display itself, which attach the display to the CLAF12164 PCB.

3) Remove the CLAF12164 Display PCB.

REASSEMBLY PROCEDURE:

1) Fit the CLAF12164 PCB onto its mounting supports.
2) Using the 5.5mm elbow tubular wrench, tighten the 6 nuts attaching the CLAF12164 PCB to the chassis of the receiver.
3) Reassemble the PAVR42101 front panel PCB as per the procedure described in sheet D2.

7.5.8 Guide sheet D4

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**D4** **Folio** 1/1
SCOPE: Disassembly / Reassembly of Power supply module ALSE53005	**Staff:** 1st and 2nd lines

SAFETY INSTRUCTIONS:

Refer to §7.5.4 "General note regarding disassembly of PCBs or modules".

DISASSEMBLY PROCEDURE:

1) Gently disconnect the various connectors from the rear panel of the receiver.
2) If the equipment is installed in a rack, remove it from the rack, and place it on a clean flat surface.
3) Using the Phillips screwdriver, remove the top cover.
4) Using a small flathead screwdriver, unscrew the 2 screws of the screw terminal located on the CNUM12163 PCB, holding the 2 $+24V_{DC}$ wires.
5) Disconnect the 2 fast-on connectors connecting to the mains connector.
6) Using the Phillips screwdriver, unscrew the 2 crosshead screws attaching the ALSE53005 power supply module to the chassis. These 2 screws are located on the bottom of the receiver.
7) Remove the ALSE53005 power supply module.

REASSEMBLY PROCEDURE:

1) Offer up the ALSE53005 power supply module facing the holes for attachment to the chassis. The connection cords are supposed to be previously put in place on the module's connector.
2) Using the Phillips screwdriver, tighten the 2 crosshead screws attaching the ALSE53005 power supply module to the chassis.
3) Reconnect the 2 fast-on connecting plugs to the mains connector.
4) Fit the 2 $+24V_{DC}$ power supply wires into the screw terminal located on the CNUM12163 PCB, then tighten the 2 screws of the terminal using a small flathead screwdriver.
5) Using the Phillips screwdriver, screw the top cover back on.
6) Replace the receiver in the rack if necessary, then gently reconnect the various connectors on the rear panel of the receiver.

7.5.9 Guide sheet D5

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**D5** **Folio** 1/2
SCOPE: Disassembly / Reassembly of control PCB CNUM12163	**Staff:** 1st and 2nd lines

SAFETY INSTRUCTIONS:

Refer to § 7.5.4 "General note regarding disassembly of PCBs or modules"

DISASSEMBLY PROCEDURE:

1) Gently disconnect the various connectors from the rear panel of the receiver.
2) If the equipment is installed in a rack, remove it from the rack, and place it on a clean flat surface.
3) Using the Phillips screwdriver, remove the top cover.
4) Disconnect the 3 Subclic connectors of the coaxial links with the MIPR11006 PCB (J3), the SVHF25077 or SUHF25078 synthesizer module (J2), and the VUFI23186 or VUFI23191 module (using the shielded cover).
5) Disconnect the 2 HE10 connectors of the ribbon connection with the SVHF25077 or SUHF25078 synthesizer module (J16) and the VUFI23186 or VUFI23191 module (J12).
6) Using the side extractors, disconnect the miniature connector of the ribbon connection with the PAVR42101 front panel PCB (J9), and the 2 miniature connectors of the ribbon connection with the MIPR11006 microcontroller/DSP PCB (J11 and J14).
7) Using a small flathead screwdriver, unscrew the 2 screws of the screw terminal holding the 2 +24V_{DC} wires.
8) Using a 5mm elbow tubular wrench, undo the 8 nuts attaching the 4 angled SUB-D connectors to the chassis.
9) Using the Phillips screwdriver, unscrew the 8 crosshead screws attaching the CNUM12163 PCB to the chassis.
10) Lightly pull the PCB towards the rear, checking that no cord or ribbon cable remains attached when moving it.

REASSEMBLY PROCEDURE:

1) Insert the CNUM12163 PCB, first fitting the angled SUB-D connectors into their respective locations, then putting the PCB flat, to place it on its chassis mounting supports.
2) Using the Phillips screwdriver, tighten the 8 Phillips screws attaching the CNUM12163 PCB to the chassis.
3) Using a 5mm elbow tubular wrench, tighten the 8 nuts attaching the 4 angled SUB-D connectors to the chassis.
4) Using a small flathead screwdriver, screw the 2 +24V_{DC} wires into the screw terminal.
5) Reconnect the 2 HE10 connectors of the ribbon connection with the SVHF25077 or SUHF25078 synthesizer module (J16) and the VUFI23186 or VUFI23191 module (J12).
6) Reconnect the miniature connector of the ribbon connection with the PAVR42101 front panel PCB (J9), and the 2 miniature connectors of the ribbon connection with the MIPR11006 microcontroller/DSP PCB (J11 and J14), checking that the extractors are in the locked position.
7) Reconnect the 3 Subclic connectors of the coaxial links with the MIPR11006 PCB (J3), the SVHF25077 or SUHF25078 synthesizer module (J2), and the VUFI23186 or VUFI23191 module (using the shielded cover).

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**D5** **Folio** 2/2
SCOPE: Disassembly / Reassembly of control PCB CNUM12163	**Staff:** 1st and 2nd lines

REASSEMBLY PROCEDURE: (cont.)

8) Using the Phillips screwdriver, screw the top cover back on.
9) Replace the receiver in the rack if necessary, then gently reconnect the various connectors on the rear panel of the receiver.

7.5.10 Guide sheet D6

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**D6** **Folio** 1/1
SCOPE: Disassembly / Reassembly of microcontroller/DSP PCB MIPR11006	**Staff:** 1st and 2nd lines

SAFETY INSTRUCTIONS:

Refer to § 7.5.4 "General note regarding disassembly of PCBs or modules"

DISASSEMBLY PROCEDURE:

1) Gently disconnect the various connectors from the rear panel of the receiver.
2) If the equipment is installed in a rack, remove it from the rack, and place it on a clean flat surface.
3) Using the Phillips screwdriver, remove the top cover.
4) Disconnect the Subclic connector of the coaxial link with the CNUM12163 PCB (J3).
5) Using the side extractors, disconnect the 2 miniature connectors of the ribbon connection with the CNUM12163 control PCB (J1 and J2).
6) Using the Phillips screwdriver, unscrew the 6 crosshead screws attaching the MIPR11006 PCB to the chassis.
7) Lightly pull the PCB towards the rear to gently extract the 2 RJ45 connectors.

REASSEMBLY PROCEDURE:

1) Insert the MIPR11006 PCB, first fitting the RJ45 connectors into their respective locations, then lightly pushing the PCB to the rear to click the 2 connectors onto the chassis.
2) Then put the PCB flat on its chassis mounting supports.
3) Using the Phillips screwdriver, tighten the 6 crosshead screws attaching the MIPR11006 PCB to the chassis.
4) Reconnect the 2 miniature connectors of the ribbon connection with the CNUM12163 control PCB (J1 and J2), checking that the extractors are in the locked position.
5) Reconnect the Subclic connector of the coaxial link with the CNUM12163 PCB (J3).
6) Using the Phillips screwdriver, screw the top cover back on.
7) Replace the receiver in the rack if necessary, then gently reconnect the various connectors on the rear panel of the receiver.

7.5.11 Guide sheet D7

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**D7** **Folio** 1/1
SCOPE: Disassembly / Reassembly of Synthesizer module SVHF25077 or SUHF25078	**Staff:** 1st and 2nd lines

SAFETY INSTRUCTIONS:

Refer to § 7.5.4 "General note regarding disassembly of PCBs or modules"

DISASSEMBLY PROCEDURE:

1) Gently disconnect the various connectors from the rear panel of the receiver.
2) If the equipment is installed in a rack, remove it from the rack, and place it on a clean flat surface.
3) Using the Phillips screwdriver, remove the top cover.
4) Disconnect the HE10 connector of the ribbon connection with the CNUM12163 control PCB (J1).
5) Disconnect the Subclic connectors of the coaxial links with the rear panel (J2), the CNUM12163 PCB (J6), the VUFI23186 or VUFI23191 (J4) module and the front panel (J5).
6) Using a 5.5mm elbow tubular wrench, undo the 4 nuts attaching the SVHF25077 or SUHF25078 module to the chassis.
7) Remove the module by gently pulling it upwards.

REASSEMBLY PROCEDURE:

1) Insert the SVHF25077 or SUHF25078 module in the screws attaching it to the chassis.
2) Using a 5.5mm elbow tubular wrench, tighten the 4 nuts attaching the SVHF25077 or SUHF25078 module to the chassis.
3) Reconnect the 4 Subclic connectors of the coaxial links with the rear panel (J2), the CNUM12163 PCB (J6), the VUFI23186 or VUFI23191 (J4) module and the front panel (J5).
4) Reconnect the HE10 connector of the ribbon connection with the CNUM12163 control PCB (J1).
5) Using the Phillips screwdriver, screw the top cover back on.
6) Replace the receiver in the rack if necessary, then gently reconnect the various connectors on the rear panel of the receiver.

7.6 OPERATION CHECKS

7.6.1 Frequency table

Operations	*Frequency*
Brief check that the receiver works in AM mode	Monthly
In-depth check that the receiver works in AM mode	Annually or after repair

7.6.2 Maintenance operations directory

Sheet V1: Brief check that the receiver works in A3E mode.
Sheet V2: In-depth check that the receiver works in A3E mode.

7.6.3 List of required measurement devices

- 1 $24V_{DC}$ / 1.5A laboratory power supply *(for RE9000C-2G and RE9010C-2G versions)*.
- 1 RF generator.
- 1 AF analyzer.
- 1 frequency meter.
- 1 BTRE9000 test bench.

7.6.4 Guide sheet V1

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**V1** **Folio** 1/1
SCOPE: Brief check that the receiver works in A3E mode	**Staff:** 1st and 2nd lines

PROCEDURE:

- When the receiver is powered on and in operation, check the following points:
  1. The "+24VDC power supply" indicator light is on (○⇨●),
  2. For the RE9000A-2G or RE9010A-2G version, at least one of the "Mains Presence" or "Battery Presence" indicator lights is on (○⇨●),
  3. The "Alarm" indicator light is off (●⇨○),
  4. The "Status" indicator light is on (○⇨●),
  5. The "Squelch" indicator light is on (○⇨●),
  6. The "Call" indicator light flashes in the rhythm of aircraft and controller calls (○⇨●⇨○),

- Check the listening volume on the Loudspeaker output using the "Volume" potentiometer (◢), and check that when the "Call" indicator light is lit, an AF is audible on the loudspeaker output.

- Using the screen/keyboard local interface, select the measurement screens (see § 6.3.1.3.8.1 "Maint / Measures" Menu). From the available parameters, check:
  1. The AF line output level: it must vary in line with the received AF,
  2. The field voltage: it provides an indication of the received signal level,
  3. The internal power supplies: they must all be within tolerance.

- Select the IBIT initiated test results screen (see § 6.3.1.3.8.2.2.2 "Maint / Test / IBIT / IBIT Results"), and check that all the sub-assemblies are declared "OK".

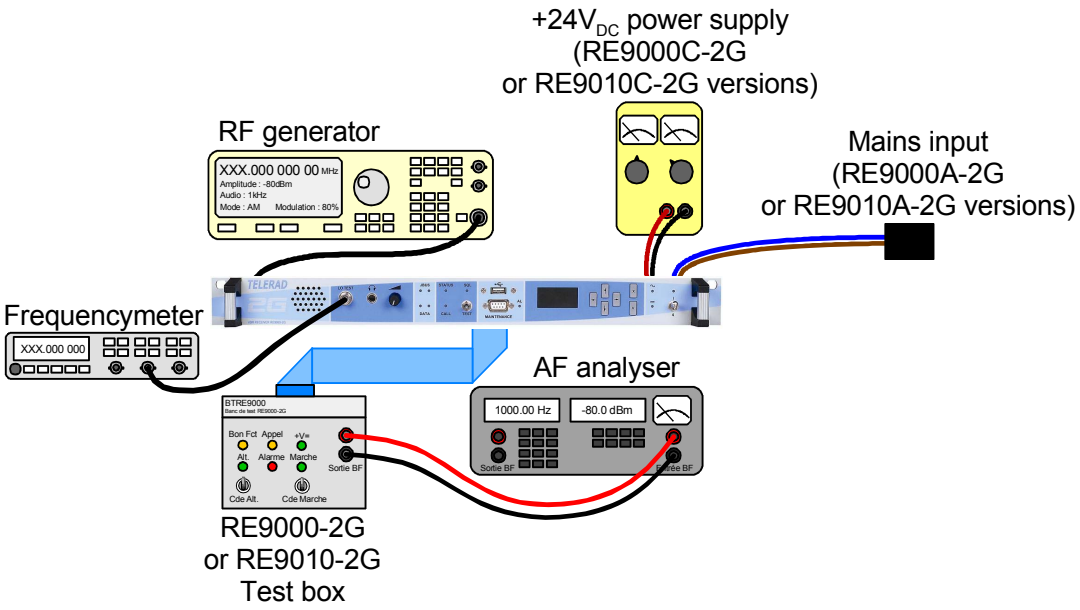
It is possible to obtain more recent information by launching an IBIT initiated test (see § 6.3.1.3.8.2.2.1 "Maint / Test / IBIT / Launch IBIT"), but this may constitute a risk of disruption to operation.

- To obtain more precise information, on each PCB or module, select the CBIT continuous test screen (see § 6.3.1.3.8.2.1 Menu "Maint / Test / CBIT"), and check that all the indications are "OK".

7.6.5 Guide sheet V2

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**V2** **Folio** 1/6
SCOPE: In-depth check that the receiver works in A3E mode	**Staff:** 2nd and 3rd lines

INSTALLATION BLOCK DIAGRAM :



PROCEDURE:

Preliminary operations:

- Gently disconnect the various connectors from the rear panel of the receiver.
- If the equipment is installed in a rack, remove it from the rack, and place it on a clean flat surface.
- Connect the measurement device as per the diagram above:
  - 1 RF generator to the antenna input,
  - 1 power supply to the battery input (and/or a cord connected to the mains for RE9000A-2G or RE9010A-2G version),
  - 1 BTRE9000 test box on the receiver's "Operation" connector,
  - 1 audio analyzer connected to the test bench,
  - 1 frequency meter on the front panel Test LO output.

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**V2** **Folio** 2/6
SCOPE: In-depth check that the receiver works in A3E mode	**Staff:** 2nd and 3rd lines

- Power on the receiver, and check the following points:
  - The "+24V_{DC} power supply" indicator light is on (○⇨●),
  - On the RE9000A-2G or RE9010A-2G version, at least one of the "Mains Presence" or "Battery Presence" indicator lights is on (○⇨●),
  - The "Alarm" indicator light is off (●⇨○),
  - The "Status" indicator light is on (○⇨●),
  - The "Squelch" indicator light is on (○⇨●). If not, activate the function using the front panel switch.

General check of proper operation:

- Put the front panel SQL/TEST switch in the "TEST" position and check that:
  1. The "Call" indicator light comes on (○⇨●),
  2. A 1000Hz AF is audible in the loudspeaker,

- Using the local screen / keyboard, select the CBIT continuous test menu *(see § 6.3.1.3.8.2.1 "Maint / Test / CBIT" Menu)*, and check that all the indications are "OK".

- Select the IBIT initiated test menu and launch the test *(see § 6.3.1.3.8.2.2.1 "Maint / Test / IBIT / Launch IBIT" Menu)*.

- At the end of the test, check that all the sub-assemblies are declared "OK" *(see § 6.3.1.3.8.2.2.2 "Maint / Test / IBIT / IBIT Results" Menu)*.

Checking operational frequency:

- Using the local screen/keyboard, set the receiver to the median frequency of 125MHz for the RE9000-2G, or 300MHz for the RE9010-2G, for a 25kHz channel (F_{op} = 125.000 or 300.000), then with the frequency meter, check the operational frequency of the receiver. If needed, adjust the frequency (see R1 adjustment procedure).

- Set the receiver to the same 125MHz or 300MHz frequency for an 8.33kHz channel (F_{op} = 125.005 or 300.005), then with the frequency meter, check that the operational frequency is the same as before.

- Set the receiver to the 125.00833MHz or 300.00833MHz frequency (F_{op} = 125.010 or 300.010), and check that the operational frequency is in fact offset by 8.33kHz.

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**V2** **Folio** 3/6
SCOPE: In-depth check that the receiver works in A3E mode	**Staff:** 2nd et 3rd lines

Checking reception:

- Return to the 125MHz or 300MHz frequency for a 25kHz channel.
- On the test bench, set the On/Off command to **"Off".**
- On the front panel of the receiver, check the Squelch status and activate it if necessary.
- Set the RF generator to the 125MHz or 300MHz frequency, level -80dBm, 80% AM-modulated by an internal 1kHz AF signal.
  Check that the "Call" indicator light stays off (○⇨○), and that no AF is audible on the Loudspeaker output.

- On the test bench, set the On/Off command to **"On".**
- Check that the "Call" indicator light turns on (○⇨●), and that an AF is audible on the Loudspeaker output. Adjust the listening volume using the "Volume" potentiometer (◢).

- On the RF generator, cut the RF output and check that the "Call" indicator light turns off (●⇨○), and that the AF disappears.
- Using the front panel switch, deactivate the Squelch function and check that the "Call" indicator light turns back on (○⇨●), and that a hiss becomes audible on the Loudspeaker output.
- Reactivate the Squelch function, and check that the "Call" indicator light turns back off (●⇨○), and that the AF disappears.

Checking the squelch threshold:

- Check that the Squelch function is active (indicator light on (●)), otherwise activate it using the front panel SQL/TEST switch.
- Using the local screen / keyboard, in the Squelch configuration menu (*see § 6.3.1.3.2 "SQL / RF status" menu or "SQL / SNR status"*), adjust the squelch threshold level to carrier level at 0 (-90dBm), and to SNR at 2 (10dB).
- On the RF generator, set the 125MHz frequency, not-modulated carrier, and adjust the signal level to -105dBm.

- Check that the receiver "Call" indicator light is off (○)

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**V2** **Folio** 4/6
SCOPE: In-depth check that the receiver works in A3E mode	**Staff:** 2nd and 3rd lines

- On the RF generator, add an internal 1000Hz AF signal, AM modulating the carrier, and change the modulation ratio from 0 to 80%, up the Call led lights on (○⇨●), then verify that, in this case, the SNR is ≥ 10dB.
- Remove modulation and check that the Call indicator light turns off (●⇨○).
- Increase the level of the pure carrier until the call signal turns on again (○⇨●).

Check on the RF generator that the carrier level is around -90dBm.

Checking sensitivity:

- Connect the AF output of the audio analyzer to the external AF input of the RF generator, with the appropriate level, at a frequency of 1000Hz.
- On the RF generator, set the 125MHz frequency, 80% AM-modulated by the external AF signal, and adjust the level to -100dBm.
- On the audio analyzer, select the S/N function.
- Reduce the level of the RF carrier until a 10dB SNR is obtained. Check that, for this ratio, the level is ≤ -105dBm (1.2µV / 50Ω).

Checking selectivity:

- With the RF generator set to the 125MHz frequency in a 25kHz channel, 80% AM-modulated by the external 1000Hz AF signal, adjust the level to -100dBm.
- In the Measures screen *(see § "Maint / Measures" Menu),* measure the field voltage value.
- Increase the VHF carrier signal by ***6dB*** *(-94dBm),* then offset the carrier higher and then lower until you *find the same field voltage level as before.*
- Check that the frequency offset is ≥ ***±8 kHz*** at -6dB.
- Increase the VHF signal level by ***+60dB*** *(-40dBm),* then offset the carrier higher and then lower until you *find the same field voltage level as before.*
- Check that the frequency offset is ≤ ***±18 kHz*** at -60dB.
- Set the RF generator to the 125MHz frequency in an 8.33kHz channel, 80% AM-modulated by the external 1000Hz AF signal, readjust the level to -100dBm.
- Restart the previous steps, this time checking that the frequency offsets obtained are ≥ ***±3,5 kHz*** *at -6dB and* ≤ ***±7 kHz*** *at -60dB.*

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**V2** **Folio** 5/6
SCOPE: In-depth check that the receiver works in A3E mode	**Staff:** 2nd and 3rd lines

Checking the audio bandwidth:

- Set the RF generator to the 125MHz frequency in a 25kHz channel, 80% AM-modulated by an internal or external 1000Hz AF signal, and adjust the level to -80dBm.
- On the audio analyzer, select the AF power measurement function, and take this value as a reference *(relative 0dB ratio function)*.
- Set the modulation AF to 300Hz, and check that the variation is < -3dB.
- Then set the modulation AF to 3400Hz, and check that the variation is also < -3dB.
- On the RF generator, set the 125MHz frequency in an 8.33kHz channel, 80% AM-modulated by the internal or external 1000Hz AF signal, and adjust the level to -80dBm.
- On the audio analyzer, check that the value is 0dB *(relative)*.
- Set the modulation AF to 300Hz, and check that the variation is < -3dB.
- Then set the modulation AF to 2500Hz, and check that the variation is also < -3dB.
- Then set the modulation AF to 3400Hz, and check that the variation is > -25dB.

Checking dynamics:

- Set the RF generator to the 125MHz frequency in a 25kHz channel, 80% AM-modulated by an internal or external 1000Hz AF signal, and adjust the level to -100dBm.
- On the audio analyzer, select the AF power measurement function, and take this value as a reference *(relative 0dB ratio function)*.
- On the RF generator, adjust the level to 0dBm, i.e. 100dB variation on the input carrier level.
- On the audio analyzer, check that the output AF level variation is < 3dB.

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**V2** **Folio** 6/6
SCOPE: In-depth check that the receiver works in A3E mode	**Staff:** 2nd and 3rd lines

Checking the AF line output level:

- Set the RF generator to the 125MHz frequency in a 25kHz channel, 80% AM-modulated by an internal 1000Hz AF signal, and adjust the level to -80dBm.
- Using the local screen / keyboard, in the Audio menu for an analog AF signal *(see § 6.3.1.3.4.1 "AUDIO / Analog / Line" menu)*, check the set line level (between -11 and +10dBm by steps of 1dB).
- On the audio analyzer, select the AF power measurement function, and check that the level of the AF connected at the input indeed corresponds to the level set in the receiver.

Checking the AF compressor:

- Set the RF generator to the 125MHz frequency in a 25kHz channel, 30% AM-modulated by an internal 1000Hz AF signal, and adjust the level to -80dBm.
- Using the local screen/keyboard, in the Configuration Hardware menu *(see § 6.3.1.3.7.1.2 "Setup / HW Config. / COMP" Menu)*, activate the AF compressor (ON).
- On the audio analyzer, select the AF power measurement function, and take this value as a reference *(relative 0dB ratio function)*.
- On the RF generator, vary the carrier modulation rate from 30 to 90% and check that the output AF level variation is < 1.5dB.
- Using the local screen/keyboard, in the Configuration Hardware menu *(see § 6.3.1.3.7.1.2 "Setup / HW Config. / COMP" Menu)*, deactivate the AF compressor (OFF).
- On the RF generator, vary the carrier modulation rate from 0 to 90% and check that the output AF varies continuously with the rate.

Checking distortion level:

- Set the RF generator to the 125MHz frequency in a 25kHz channel, 30% AM-modulated by an internal or external 1000Hz AF signal, and adjust the level to -80dBm.

  On the audio analyzer, select the Distortion function, applied to the AF connected on the input, and check that this is ≤ 3%.

7.7 ADJUSTMENT OPERATIONS

☞ *All the following adjustments may be carried out with the receiver in the rack or on a table.*

7.7.1 Frequency table

Operations	*Frequency*
Local oscillator adjustment	Annually or after repair
Squelch threshold adjustment	
Output AF line level adjustment	

7.7.2 Maintenance operations directory

Sheet R1: Local oscillator adjustment.
Sheet R2: Squelch threshold adjustment.
Sheet R3: Output AF line level adjustment.

7.7.3 List of required tools

- 1 $24V_{DC}$ / 1.5A laboratory power supply *(for RE9000C-2G and RE9010C-2G versions)*.
- 1 RF generator.
- 1 AF analyzer.
- 1 frequency meter.
- 1 BTRE9000 test bench.

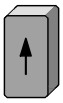
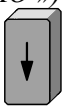
7.7.4 Guide sheet R1

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**R1** **Folio** 1/1
SCOPE: Local oscillator adjustment	**Staff:** 1st and 2nd lines

PRELIMINARY CONDITIONS

- The receiver must be powered on.

PROCEDURE

- Connect a frequency meter to the "TEST LO" BNC output located on the front panel of the receiver, and read the value of the local oscillator.
- If the accuracy is worse than 1ppm (1 part per million = 1.10^{-6}), then select the frequency adjustment menu *(see § 6.3.1.3.8.3 "Maint / TCXO" menu)* using the local screen/keyboard *Menu « Maint / TCXO »)*
- Using the  and  keys on the keyboard, adjust the accuracy of the local oscillator until better than 1ppm is obtained.

☞ *The electronic potentiometer (EEPOT) used for this adjustment is made up of 255 steps, and allows compensation of ±5ppm, i.e. a precision of about 0.04ppm per step.*

7.7.5 Guide sheet R2

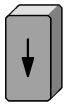
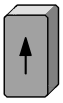
EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**R2** **Folio** 1/1
SCOPE: Squelch threshold adjustment	**Staff:** 1st and 2nd lines

PRELIMINARY CONDITIONS

- The receiver must be powered on.
- The Squelch function must be active (indicator light on (●)). If not, activate it using the front panel SQL/TEST switch.

PROCEDURE:

Adjusting the threshold by Carrier level :

- On the RF generator, set the 125MHz frequency, pure carrier, and adjust the signal level to the minimum desired detection value.
- Using the local screen / keyboard, select the carrier level threshold adjustment menu, in the SQL menu *(see § 6.3.1.3.2 "SQL" menu)*.
- Check that the receiver "Call" indicator light is off (○). Otherwise, using the  key on the keyboard, reduce the squelch threshold level until the indicator light turns off.
- Using the  key on the keyboard, adjust the squelch threshold level until the limit of where the indicator light turns on (○⇨●).
- On the RF generator, reduce the carrier level until the call indicator light turns off (●⇨○) and record the value, then increase the level until the indicator light turns on (○⇨●) and record the value. Check that the hysteresis upper threshold corresponds to the desired triggering threshold.

Adjusting the threshold by SNR :

- In the Squelch menu *(see § 6.3.1.3.2 "SQL" menu)*, adjust the squelch threshold level by SNR to the desired value, from 6 to 16 dB, in 2dB steps.
- On the RF generator, add an internal 1000Hz AF signal modulating the AM carrier by 10%, then adjust the level of the carrier signal to a level that gives an SNR 2 to 3 dB lower than the level fixed by the setting.
- Vary the modulation ratio from 10 to 80%, and check that the call indicator light turns on (○⇨●) as soon as the S/N ratio reaches the set value.

7.7.6 Guide sheet R3

EQUIPMENT:	**MAINTENANCE SHEET**
RE9000-2G VHF DIGITAL RECEIVER RE9010-2G UHF DIGITAL RECEIVER	**R3** **Folio** 1/1
SCOPE: Output AF line level adjustment.	**Staff:** 1st and 2nd lines

PRELIMINARY CONDITIONS

- The receiver must be powered on.

PROCEDURE:

- Set the RF generator to the 125MHz frequency in a 25kHz channel, 80% AM-modulated by an internal 1000Hz AF signal, and adjust the level to -80dBm.
- Using the local screen/keyboard, in the AUDIO menu *(see § 6.3.1.3.4 "AUDIO / Analog / LINE" Menu)*, adjust the line level to the desired value, from -11 to +10dBm, by steps of 1dB).
- If a BTRE9000 test bench is connected to the receiver, send the test bench AF output to the input of an audio analyzer, and select the AF power measurement function on the audio analyzer, checking that the level of the AF connected at the input indeed corresponds to the level set in the receiver.

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CHAPTER 8. PARTS LIST

8.1 1ST LEVEL PARTS LIST

VHF DIGITAL RECEIVER	**RE9000-2G**	**(80100067)**
MECHANICAL CHASSIS	CHRE43185	(50001400)
DISPLAY PCB	CLAF12164	(51001184)
CONTROL PCB	CNUM12163	(51001182)
INTERMEDIATE FREQUENCY MODULE	VUFI23186	(52000619)
SYNTHESIZER MODULE	SVHF25077	(52000620)
DIGITAL RECEIVER MAINS INPUT	**RE9000A-2G**	**(84500146)**
FRONT PANEL PCB	PAVR42101	(50001396)
MICROCONTROLLER/DSP PCB	MIPR11006	(53500016)
SPECIFIC COMPONENTS	ELSP RE9000A-2G	(58001089)
POWER SUPPLY MODULE	ALSE53005	(58500064)
DIGITAL RECEIVER BATTERY INPUT	**RE9000C-2G**	**(84500147)**
FRONT PANEL PCB	PAVR42101	(50001396)
MICROCONTROLLER/DSP PCB	MIPR11006	(53500016)
SPECIFIC COMPONENTS	ELSP RE9000C-2G	(58001109)
UHF DIGITAL RECEIVER	**RE9010-2G**	**(80100070)**
MECHANICAL CHASSIS	CHRE43185	(50001400)
DISPLAY PCB.	CLAF12164	(51001184)
CONTROL PCB	CNUM12163	(51001182)
SYNTHESIZER MODULE	SUHF25078	(52000621)
INTERMEDIATE FREQUENCY MODULE	VUFI23191	(52000644)
DIGITAL RECEIVER MAINS INPUT	**RE9010A-2G**	**(84500148)**
FRONT PANEL PCB	PAVR42101	(50001396)
MICROCONTROLLER/DSP PCB	MIPR11006	(53500016)
SPECIFIC COMPONENTS	ELSP RE9010A-2G	(58001090)
POWER SUPPLY MODULE	ALSE53005	(58500064)
DIGITAL RECEIVER BATTERY INPUT	**RE9010C-2G**	**(84500149)**
FRONT PANEL PCB	PAVR42101	(50001396)
MICROCONTROLLER/DSP PCB	MIPR11006	(53500016)
SPECIFIC COMPONENTS	ELSP RE9010C-2G	(58001127)

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CHAPTER 9. DIAGRAMS

9.1 LIST OF PHOTOS

TELERAD code	*Name*	*Assembly or Sub-assembly*
44000267	¾ view of VHF receiver RE9000A-2G	RE9000A-2G
44000268	Front and Rear views of VHF receiver RE9000A-2G	RE9000A-2G
44000269	Top View of VHF receiver RE9000A-2G	RE9000A-2G
44000316	¾ view of UHF receiver RE9010A-2G	RE9010A-2G
44000318	Front and Rear views of UHF receiver RE9010A-2G	RE9010A-2G
44000293	Top view of UHF receiver RE9010A-2G	RE9010A-2G

9.2 LIST OF MECHANICAL PLATES

TELERAD code	*Name*	*Assembly or Sub-assembly*
45000061	Mechanical dimensions / weight 1/1	RE9000-2G
45000065	Mechanical dimensions / weight 1/1	RE9010-2G

9.3 LIST OF INTERCONNECTION PLATES

TELERAD code	*Name*	*Assembly or Sub-assembly*
45500043	General interconnections 1/1	RE9000-2G
45500044	General interconnections 1/1	RE9010-2G

9.4 LIST OF BLOCK DIAGRAM PLATES

TELERAD code	*Name*	*Assembly or Sub-assembly*
46000130	µC/DSP PCB general diagram 1/1	MIPR11006
46000132	VHF synthesizer module diagram 1/1	SVHF25077
46000134	VHF receiver general diagram 1/1	RE9000-2G
46000135	Front panel PCB diagram 1/1	PAVR42101
46000136	Display PCB diagram 1/1	CLAF12164
46000137	Control PCB diagram 1/1	CNUM12163
46000138	VHF/IF module diagram 1/1	VUFI23186
46000139	Programmed µC/DSP PCB diagram 1/1	MIPR11006
46000144	UHF receiver general diagram 1/1	RE9010-2G
46000145	UHF synthesizer module diagram 1/1	SUHF25078
46000146	UHF/IF module diagram 1/1	VUFI23191

9.5 LIST OF LAYOUT VIEW SLIDES

TELERAD code	***Name***	***Assembly or Sub-assembly***
46500142	VHF or UHF synthesizer module layout diagram 1/1	SVHF25077 SUHF25078
46500149	Control PCB layout diagram 1/1	CNUM12163
46500152	Display PCB layout diagram 1/1	CLAF12164
46500153	Front panel PCB layout diagram 1/1	PAVR42101
46500155	Side A µC/DSP PCB layout diagram 1/2	MIPR11006
46500156	Side B µC/DSP PCB layout diagram 2/2	MIPR11006
46500201	VHF/IF or UHF/IF module layout diagram 1/1	VUFI23186 VUFI23191

APPENDIX A. LIST OF ABBREVIATIONS

Acronym	Description
AC	Alternating current
ACARS	Air Communication And Reporting System
A/D	Analog-to-Digital
AF	Audio Frequency
AGC	Automatic Gain Control
AM	Amplitude Modulation
AM-DSB/WC	Amplitude Modulation-Double Side Band / With Carrier
AM-MSK	Amplitude Modulation-Minimum Shift Keying
ASCII	American Standard Code for Information Interchange
ATM	Air Traffic Management
BER	Bit Error Rate
BNC	Bayonet Nut Connector
BSS	Basic Service Set
CBIT	Continuous Built-In Test
CODEC	COder - DECoder
CPLD	Complex Programmable Logic Device
CPM	Communication Processor Module
CSMA	Carrier Sense Multiple Access
D8PSK	Differential 8-Phase Shift Keying
dB	Decibel
dBm	Decibel with reference to a power of 1mW
DC	Direct Current
DCE	Data Circuit-Terminating Equipment
DHCP	Dynamic Host Configuration Protocol
DMA	Direct Memory Access
DSP	Digital Signal Processor
DTE	Data Terminal Equipment
EC	European Conformity
EEPOT	Electrically Erasable POTentiometer
EEPROM	Electrically Erasable Programmable Read Only Memory
EMC	Electromagnetic Compatibility
ERM	Electromagnetic compatibility and Radio spectrum Matters
ESD	Electro-Static Discharge
ETSI	European Telecommunications Standards Institute
FIFO	First In First Out
FSK	Frequency Shift Keying
GFSK	Gaussian Frequency Shift Keying
HDLC	High Data Link Communication
HMI	Human Machine Interface
HW	Hardware
IBIT	Initiated Built-In Test
ICAO	International Civil Aviation Organization
ICD	Interface Control Document
IF	Intermediary Frequency
IIC (I2C)	Inter Integrated Circuit
IP	Internet Protocol

Acronym	**Description**
JTAG	Joint Test Action Group
LED	Light-Emitting Diode
LO	Local Oscillator
LV	Low Voltage
MAC	Media Access Control
MMU	Management Memory Unit
OLED	Organic Light-Emitting Diode
PC	Personal Computer
PCMCIA	Personal Computer Memory Card International Association
PLL	Phase Locked Loop
ppm	Parts per million
R&TTE	Radio and Telecommunications Terminal Equipment (Directive)
RAM	Random Access Memory
RF	Radio Frequency
RISC	Reduced Instruction Set Computing
ROM	Read Only Memory
RSS	Really Simple Syndication protocol
RTP	Real-time Transport Protocol
RxD	Received Data
SCC	Serial Communication Controller
SDRAM	Synchronous Dynamic Random Access Memory
SELCALL	Selective Call
	Signal/Noise ratio
SIP	Session Initiation Protocol
SIU	System Interface Unit
SMC	Serial Management Controller
SNMP	Simple Network Management Protocol
SPI	Serial Peripheral Interface
SPORT	Serial PORT
SQL	Squelch
STDMA	Self-organized Time Division Multiple Access
SW	Software
SWR	Stationary Wave Ratio
TDM	Time-Division Multiplexed
TDMA	Time Division Multiple Access
TLD	Telerad
TQFP	Thin Quad Flat Pack
TxD	Transmitted Data
UART	Universal Asynchronous Receiver Transmitter
UHF	Ultra High Frequency
USB	Universal Serial Bus
VCSS	Voice Communication Switching System
VDL	VHF Data Link
VHF	Very High Frequency
VoIP	Voice over Internet Protocol
µP	Microprocessor

APPENDIX B. DECLARATION OF CONFORMITY BY A NOTIFIED BODY

B.1. R&TTE Declaration of conformity for the VHF receiver RE9000A-2G :

TELERAD

R&TTE DECLARATION OF CONFORMITY

Ref: DoC RE9000-2G Rev 1.0

We:

TELERAD
2 avenue de la Butte aux Cailles
64600 ANGLET, FRANCE

Represented by:

Patrice MARIOTTE
Director of Engineering & Operations

Declare under our sole responsability that the product:

VHF Receiver
TELERAD
RE9000A-2G
(Product name, Trade name, Type or model)

to which this declaration relates is in conformity with the essential requirements and other relevant requirements of the R&TTE Directive (1999/5/EC) of 9 March 1999.

The product is in conformity with the following standards and/or other normative documents.

Directives	Standards	Technical documentation
Health & Safety (Article 3.1a of the R&TTE Directive) Low Voltage Directive N° 2006/95/EC of 12 December 2006	EN 60950-1:2006 + A11:2009	Series 90x0-2G Technical File: DTC RE90X0-2G Electrical safety reports (NB 0536): RS-030-PTC-10-102538-3-A FS-030-PTC-10-102538-1
EMC (Article 3.1b of the R&TTE Directive) EMC Directive N°2004/108/EC of 15 December 2004	EN 301489-1 V1.8.1:2008 EN 301489-22 V1.2.1:2002 EN 50371:2002 EN 61000-4-3(06) EN 61000-4-2(09) EN 61000-4-4(04) EN 61000-4-5(06) EN 61000-4-11(04) EN 61000-3-3(95) + A1(01)+A2(05) EN 61000-3-2(06) EN 55022(06) + A1(07)	Series 90x0-2G Technical File: DTC RE90X0-2G EMC test reports (NB 0536): RC-030-PTC-10-102538-1-A
SPECTRUM (Article 3.2 of the R&TTE Directive)	EN 300676-2 V1.4.1:2010 EN 300676-1 V1.5.1:2010	Test report: RE9000-2G Performance Test Records

Place and date: Anglet on 4 March 2011

Patrice MARIOTTE
Director of Engineering & Operations

2 AVENUE DE LA BUTTE AUX CAILLES - BP 302 - 64603 ANGLET CEDEX - FRANCE
Tél : +33 (0)5 59 58 55 00 - Fax : +33 (0)5 59 58 55 01 - Email : courrier@telerad.fr

B.2. R&TTE Declaration of conformity for the UHF receiver RE9010A-2G

TELERAD

R&TTE DECLARATION OF CONFORMITY

Ref: DoC RE9010-2G Rev 1.0

We:

TELERAD
2 avenue de la Butte aux Cailles
64600 ANGLET, FRANCE

Represented by:

Patrice MARIOTTE
Director of Engineering & Operations

Declare under our sole responsability that the product:

UHF Receiver
TELERAD
RE9010A-2G
(Product name, Trade name, Type or model)

to which this declaration relates is in conformity with the essential requirements and other relevant requirements of the R&TTE Directive (1999/5/EC) of 9 March 1999.

The product is in conformity with the following standards and/or other normative documents.

Directives	Standards	Technical documentation
Health & Safety (Article 3.1a of the R&TTE Directive) Low Voltage Directive N° 2006/95/EC of 12 December 2006	EN 60950-1:2006 + A11:2009	Series 90x0-2G Technical File: DTC RE90X0-2G Electrical safety reports (NB 0536): RS-030-PTC-10-102538-4-A FS-030-PTC-10-102538-1
EMC (Article 3.1b of the R&TTE Directive) EMC Directive N°2004/108/EC of 15 December 2004	EN 301489-1 V1.8.1:2008 EN 301489-22 V1.2.1:2002 EN 50371:2002 EN 61000-4-3(06) EN 61000-4-2(09) EN 61000-4-4(04) EN 61000-4-5(06) EN 61000-4-11(04) EN 61000-3-3(95) + A1(01)+A2(05) EN 61000-3-2(06) EN 55022(06) + A1(07)	Series 90x0-2G Technical File: DTC RE90X0-2G EMC test reports (NB 0536): RC-030-PTC-10-102538-2-A
SPECTRUM (Article 3.2 of the R&TTE Directive)	EN 302617-2 V1.1.1:2010 EN 302617-1 V1.1.1:2009	Test report: RE9010-2G Performance Test Records

Place and date: Anglet, on 4 March 2011

Patrice MARIOTTE
Director of Engineering & Operations

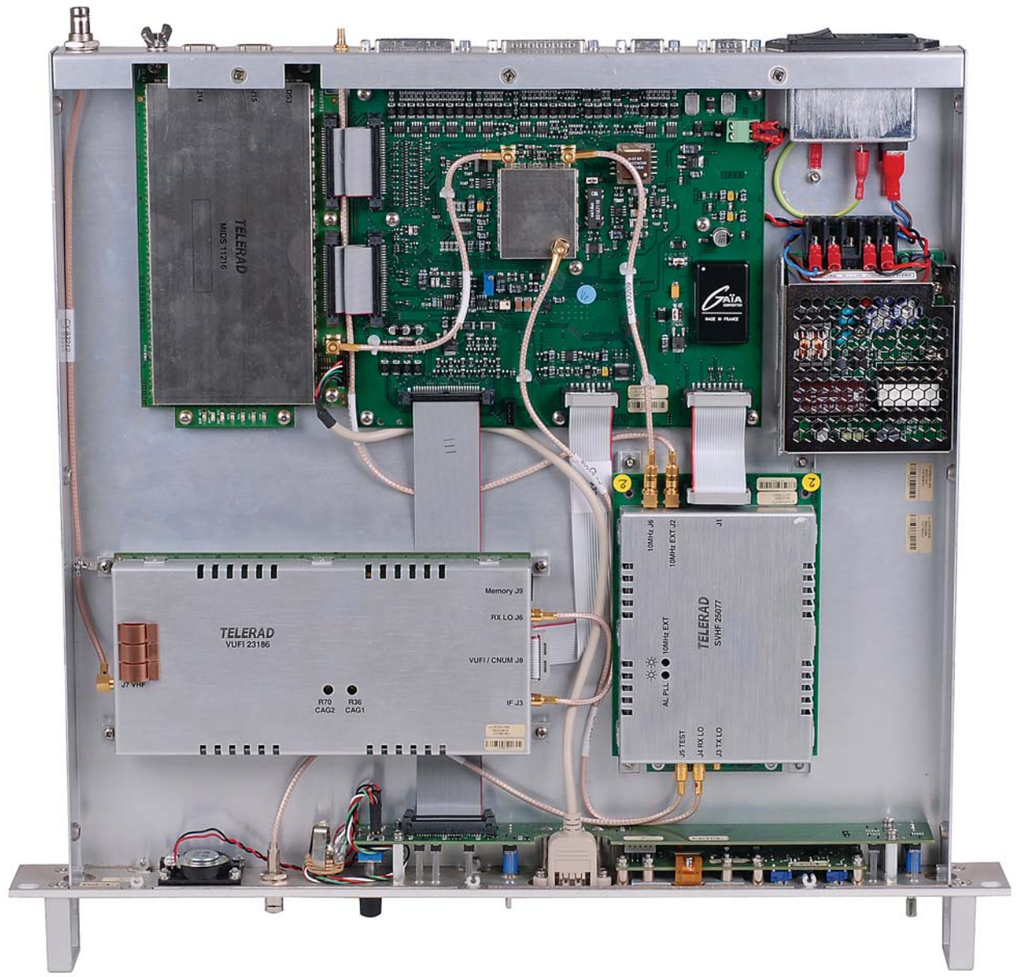
2 AVENUE DE LA BUTTE AUX CAILLES - BP 302 - 64603 ANGLET CEDEX - FRANCE
Tél : +33 (0)5 59 58 55 00 - Fax : +33 (0)5 59 58 55 01 - Email : courrier@telerad.fr

s.a. telerad au capital de 1 500 000 Euros - 341 143 915 r.c.s. bayonne - siret 341 143 915 00013 - ape 2651A - N° T.V.A/V.A.T N° FR 83 341 143 915

FRONT VIEW

REAR VIEW

VHF DIGITAL RECEIVER Front and rear views				44000268 Indice rév. :V1.02 Date rév. : 02/03/11
Rèf. s/ens. : RE9000A-2G	Code s/ens. : 84500146	Rèf. ens. : RE9000-2G	Code ens. : 80100067	Page : 1/1
TELERAD 2 Avenue de la butte aux cailles, B.P. 302 64603 ANGLET CEDEX FRANCE			email address courrier@telerad.fr	TEL : +33 5 59 58 55 00 FAX : +33 5 59 58 55 01



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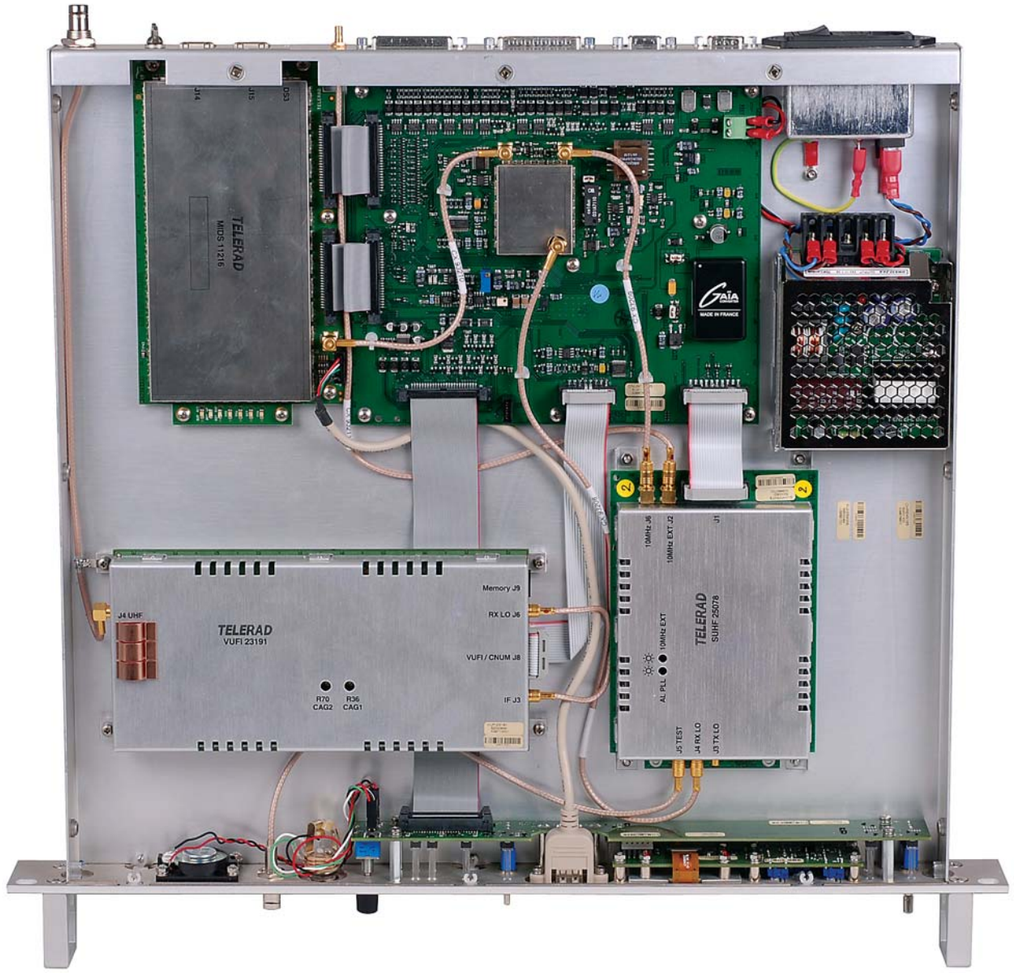
TELERAD 2 Avenue de la butte aux cailles, B.P. 302 64603 ANGLET CEDEX FRANCE			email address courrier@telerad.fr	TEL : +33 5 59 58 55 00 FAX : +33 5 59 58 55 01

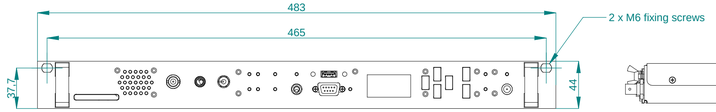
FRONT VIEW

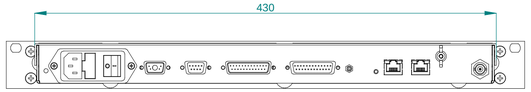
REAR VIEW

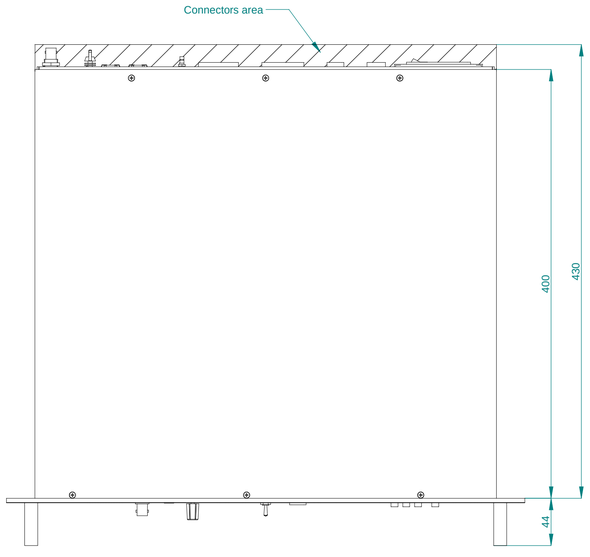
UHF DIGITAL RECEIVER Front and rear views				44000318 Indice rév. :V1.00 Date rév. : 02/03/11
Rèf. s/ens. : RE9010A-2G	Code s/ens. : 84500148	Rèf. ens. : RE9010-2G	Code ens. : 80100070	Page : 1/1
TELERAD 2 Avenue de la butte aux cailles, B.P. 302 64603 ANGLET CEDEX FRANCE			email address courrier@telerad.fr	TEL : +33 5 59 58 55 00 FAX : +33 5 59 58 55 01



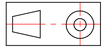
UHF DIGITAL RECEIVER Top view				44000293 Indice rév. :V1.00 Date rév. : 18/01/11
Rèf. s/ens. : RE9010A-2G	Code s/ens. : 84500148	Rèf. ens. : RE9010-2G	Code ens. : 80100070	Page : 1/1
TELERAD 2 Avenue de la butte aux cailles, B.P. 302 64603 ANGLET CEDEX FRANCE			email address courrier@telerad.fr	TEL : +33 5 59 58 55 00 FAX : +33 5 59 58 55 01

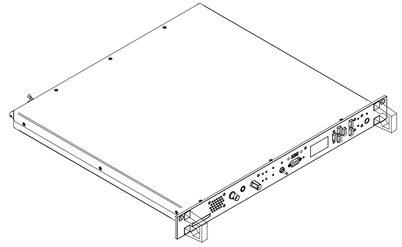


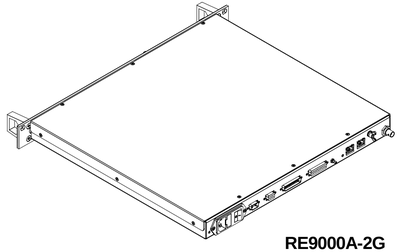




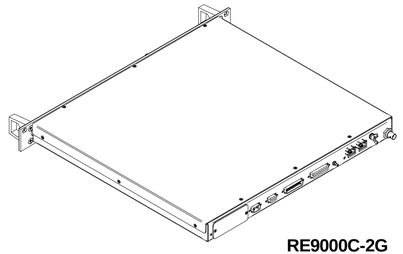
- Sides : mm
- Weight : 4Kg







RE9000A-2G



RE9000C-2G

2G VHF DIGITAL RECEIVER (VDR)

Mechanicals dimensions/weight (1/1)

45000061
Rév. doc. :V1.00
Rév. date : 08/07/2011

Réf. S/Ensemble : RE9000A-2G RE9000C-2G	Code S/Ensemble : 84500146 84500147	Réf. Ensemble : RE9000-2G	Code Ensemble : 80100067

TELERAD 2 Avenue de la Butte aux Cailles, B.P.302 64603 ANGLET CEDEX FRANCE

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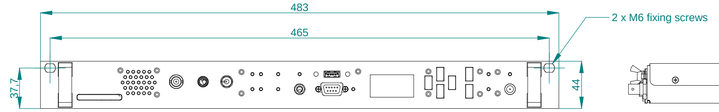
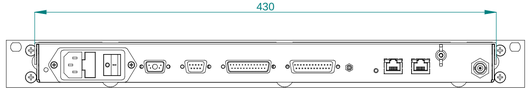
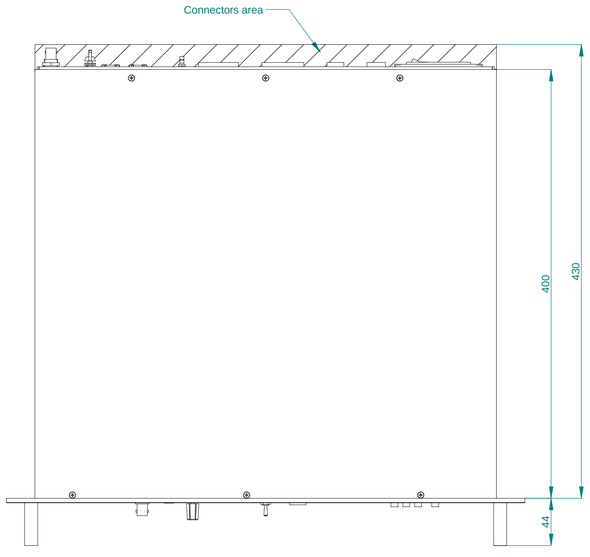
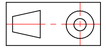
TEL: +33 5 59 58 55 00
FAX: +33 5 59 58 55 01

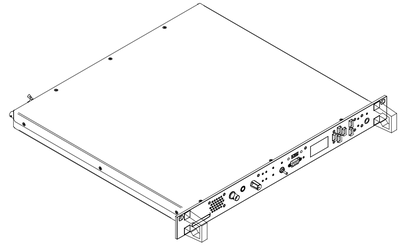


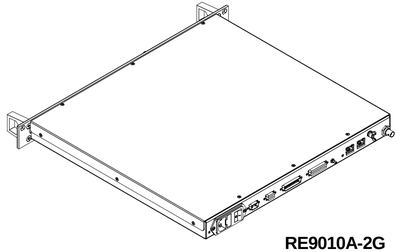




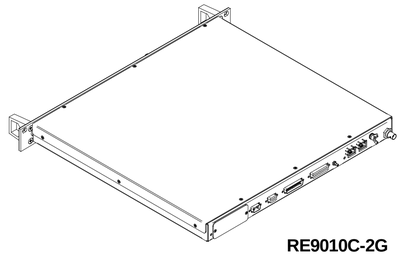
- Sides : mm
- Weight : 4Kg





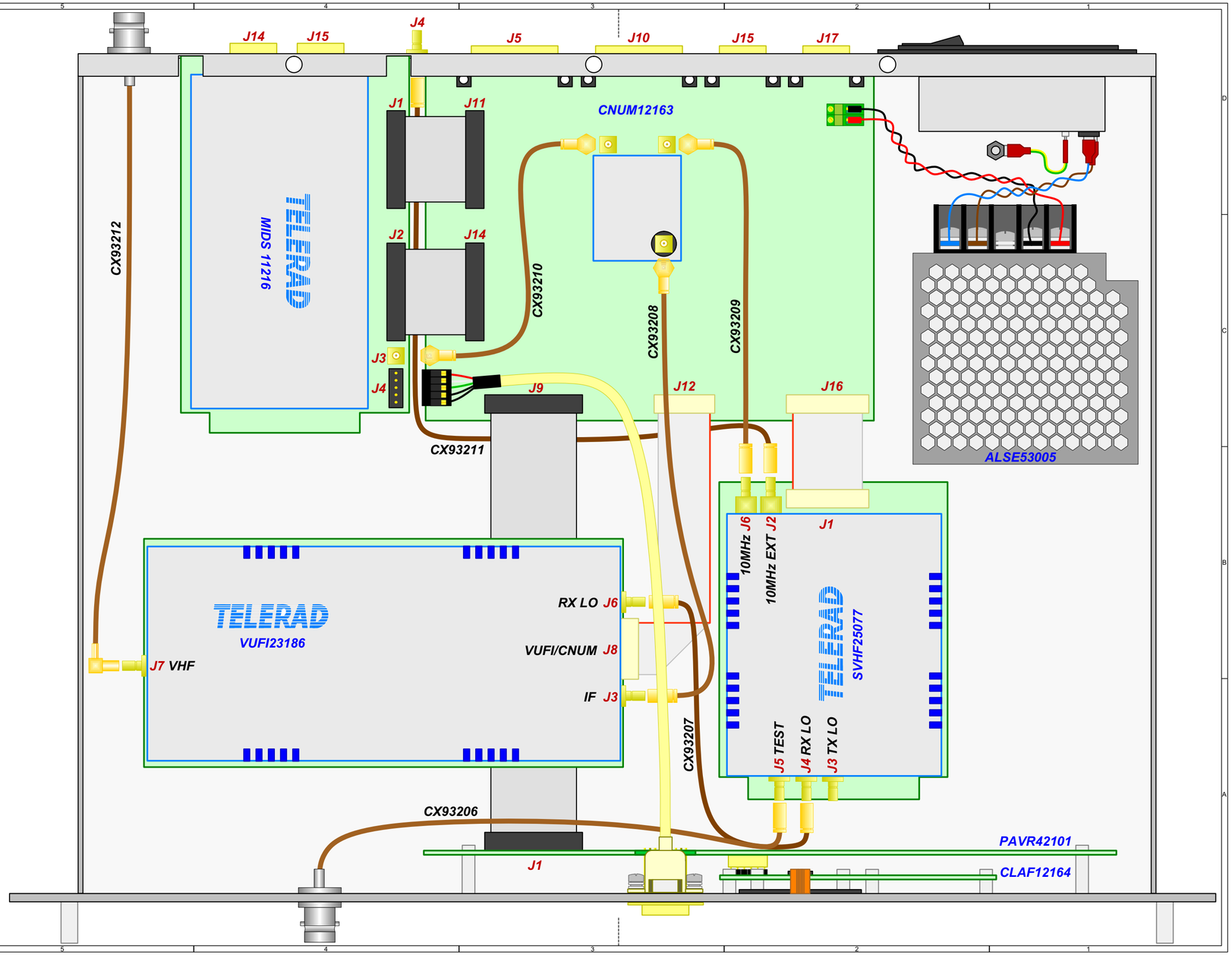


RE9010A-2G



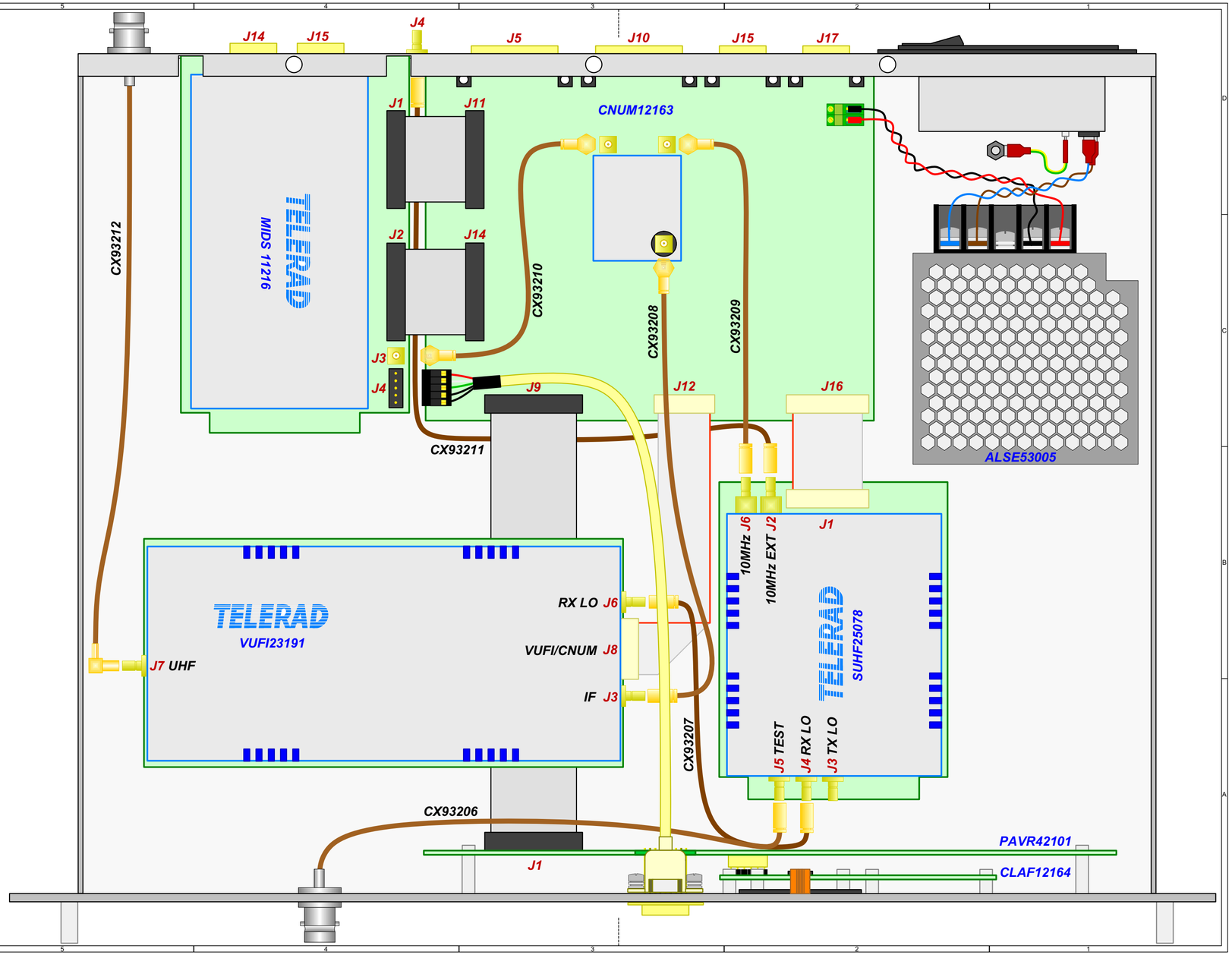
RE9010C-2G

2G UHF DIGITAL RECEIVER (UDR) Mechanicals dimensions/weight (1/1)			45000065 Rév. doc. :V1.00 Rév. date : 08/07/2011
Réf. S/Ensemble : RE9010A-2G RE9010C-2G	Code S/Ensemble : 84500148 84500149	Réf. Ensemble : RE9010-2G	Code Ensemble : 80100070
TELERAD 2 Avenue de la Butte aux Cailles, B.P.302 64603 ANGLET CEDEX FRANCE		email address courrier@telerad.fr	TEL: +33 5 59 58 55 00 FAX: +33 5 59 58 55 01



2G VHF DIGITAL RECEIVER Interconnection (1/1)			45500043 Index rev. : V1.00 Date rev. : 01/03/11
Subset ref. : /	Subset code : /	Set ref. : RE9000-2G	Set code : 80100067

TELERAD 2 Avenue de la Butte aux Cailles, B.P. 302 64603 ANGLET CEDEX FRANCE
Email address : courrier@telerad.fr
TEL : +33 5 59 58 55 00
FAX : +33 5 59 58 55 01



2G UHF DIGITAL RECEIVER Interconnection (1/1)			45500044 Index rev. : V1.00 Date rev. : 01/03/11
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TELERAD 2 Avenue de la Butte aux Cailles, B.P. 302 64603 ANGLET CEDEX FRANCE		Email address : courrier@telerad.fr	TEL : +33 5 59 58 55 00 FAX : +33 5 59 58 55 01

AF CONTROL BOARD Block diagram (1/1)			46000137 Index rev. : V1.00 Date rev. : 01/03/11
Subset ref. : CNUM12163	Subset code : 51001182	Set ref. : RE9000-2G RE9010-2G	Set code : 80100067 80100070

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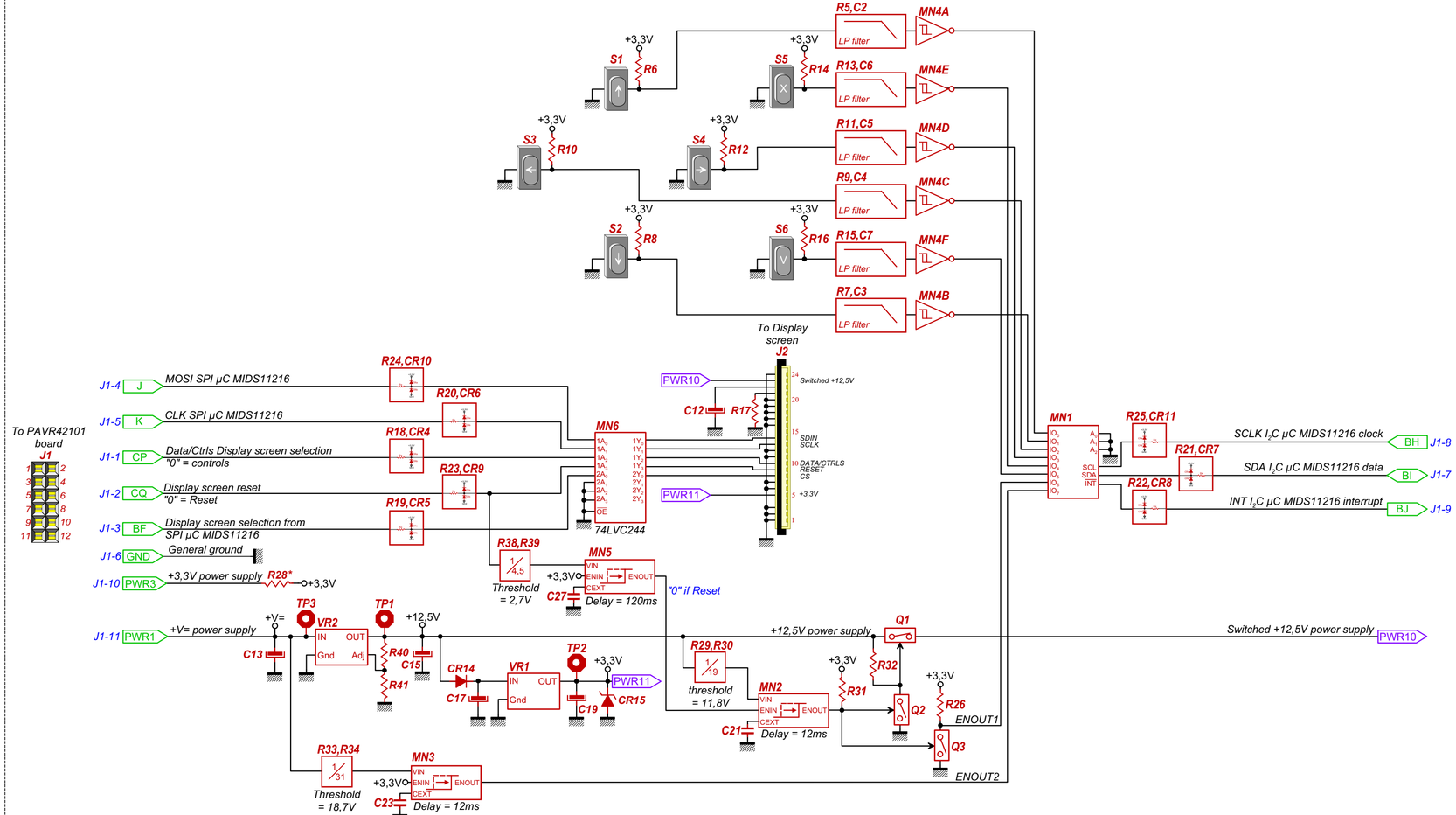
Email address : courrier@telerad.fr
TEL : +33 5 59 58 55 00
FAX : +33 5 59 58 55 01



DISPLAY SCREEN BOARD
Block diagram (1/1)

46000136
Indiex rev. : V1.00
Date rev. : 01/03/11

Subset ref. : CLAF12164	Subset code : 51001184	Set ref. : RE9000-2G RE9010-2G	Set code : 80100067 80100070

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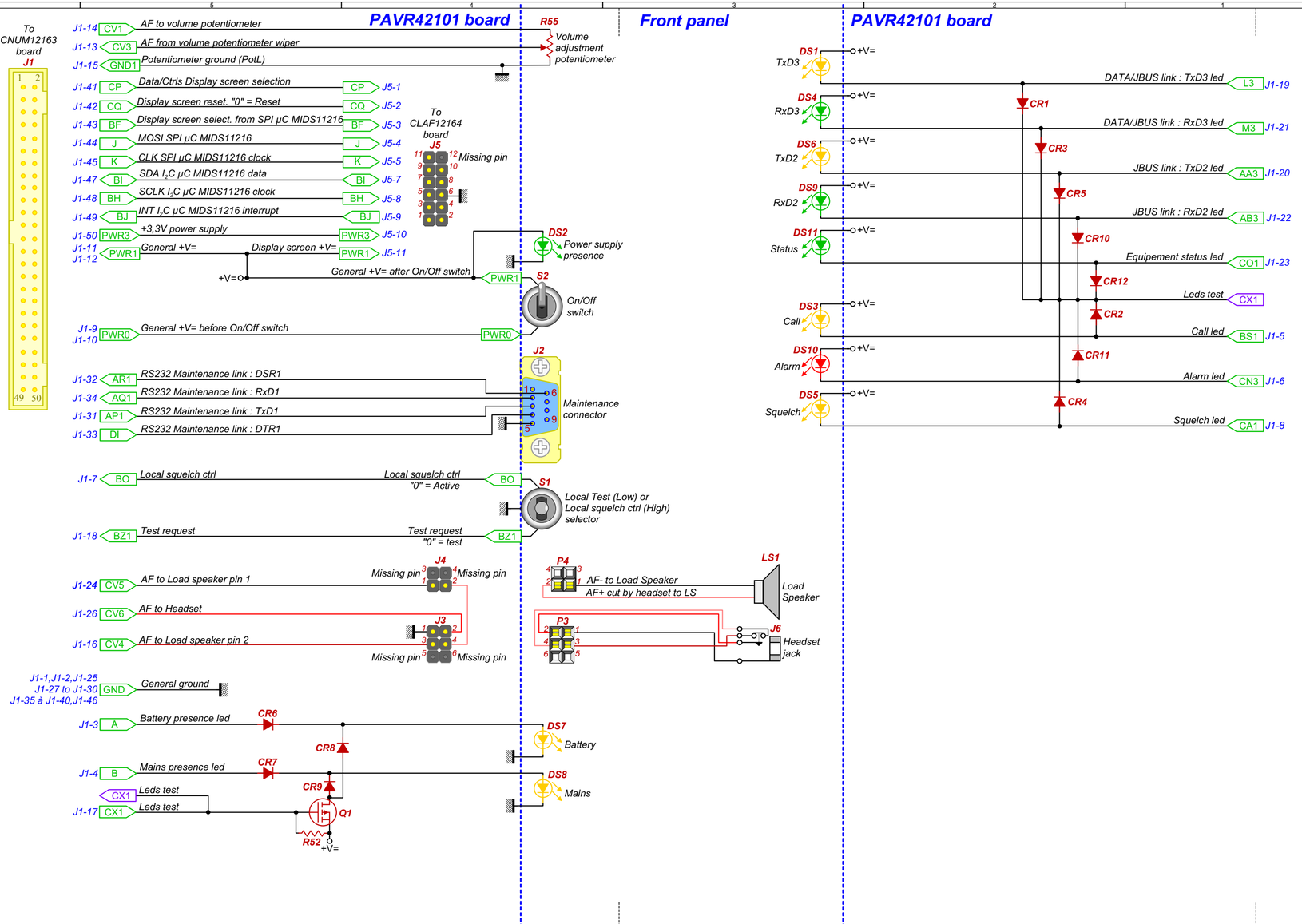
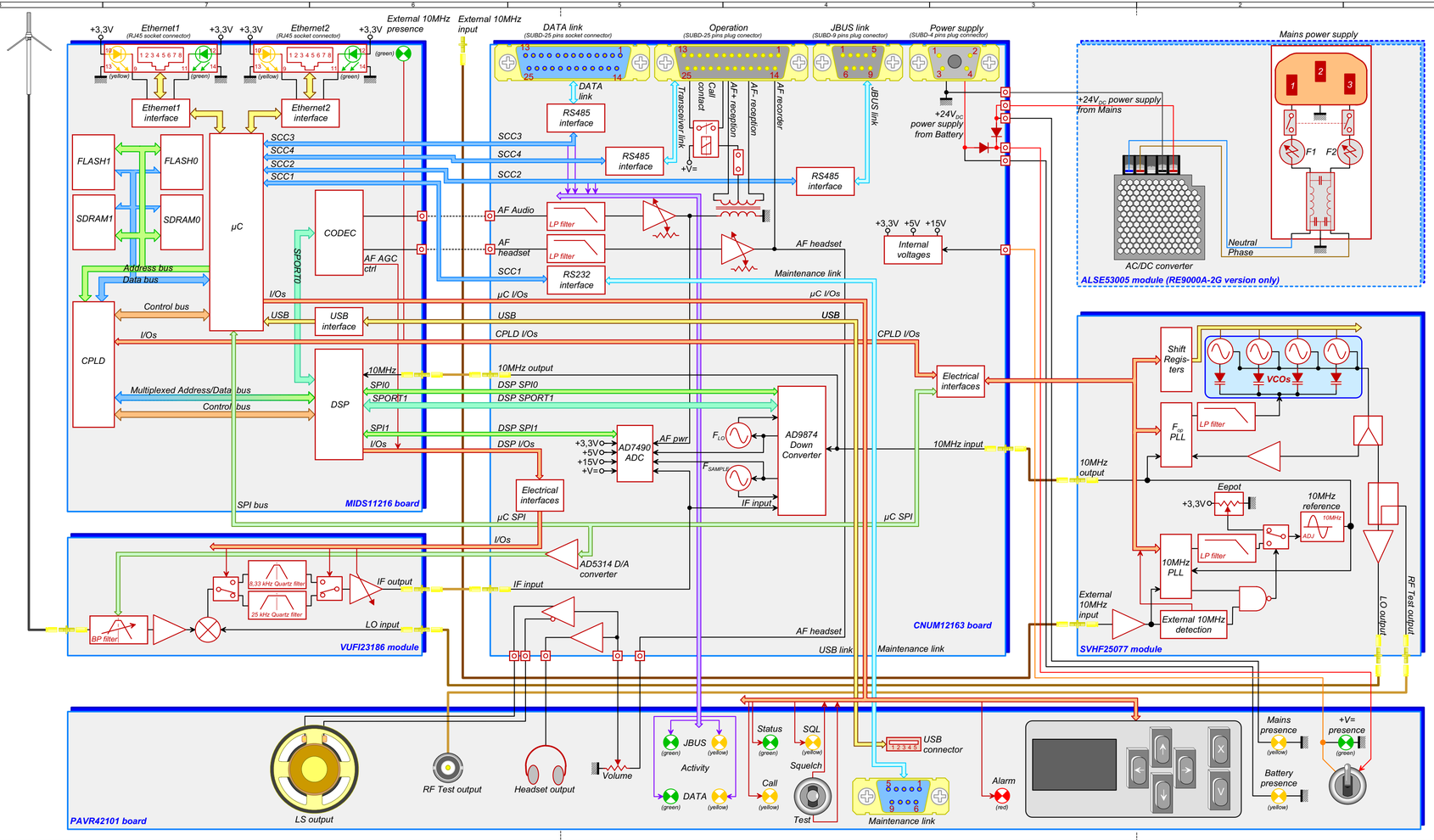
Email address : courrier@telerad.fr
TEL : +33 5 59 58 55 00
FAX : +33 5 59 58 55 01



FRONT PANEL BOARD **Block diagram (1/1)**			**46000135** Index rev. : V1.00 Date rev. : 01/03/11
Subset ref. : PAVR42101	Subset code : 50001396	Set ref. : RE9000-2G RE9010-2G	Set code : 80100067 80100070
TELERAD 2 Avenue de la Butte aux Cailles, B.P. 302 64603 ANGLET CEDEX FRANCE		Email address : courrier@telerad.fr	TEL : +33 5 59 58 55 00 FAX : +33 5 59 58 55 01



RE9000-2G VHF DIGITAL RECEIVER General block diagram(1/1)			46000134 Index rev. : V1.01 Date rev. : 11/07/11
Subset ref. : /	Subset code : /	Set ref. : RE9000-2G	Set code : 80100067
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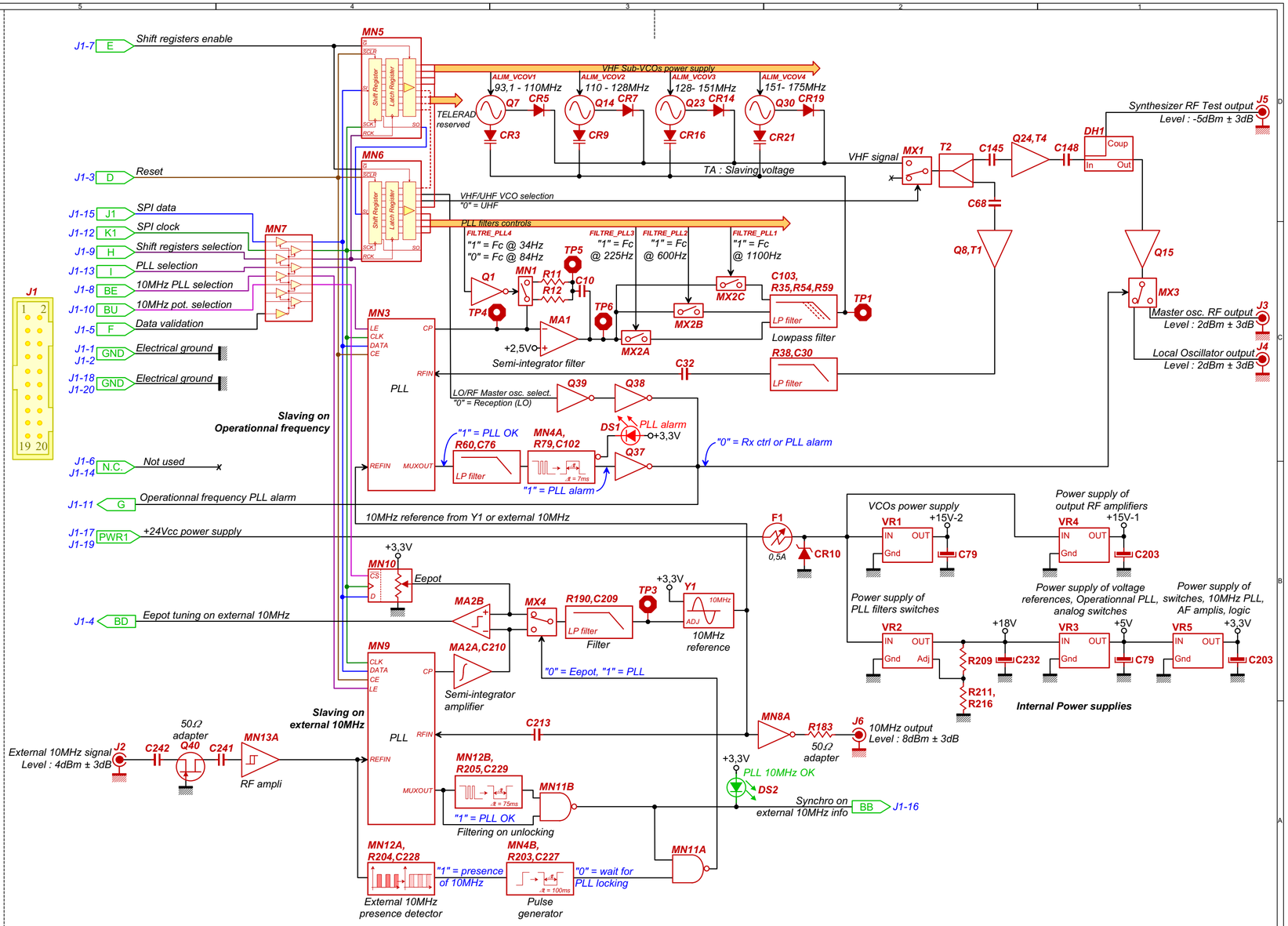

VHF SYNTHESIZER MODULE
Block diagram (1/1)

46000132
Index rev. : V1.00
Date rev. : 23/02/11

Subset ref. : SVHF25077	Subset code : 52000620	Set ref. : EM9000-2G RE9000-2G	Set code : 80000086 80100067

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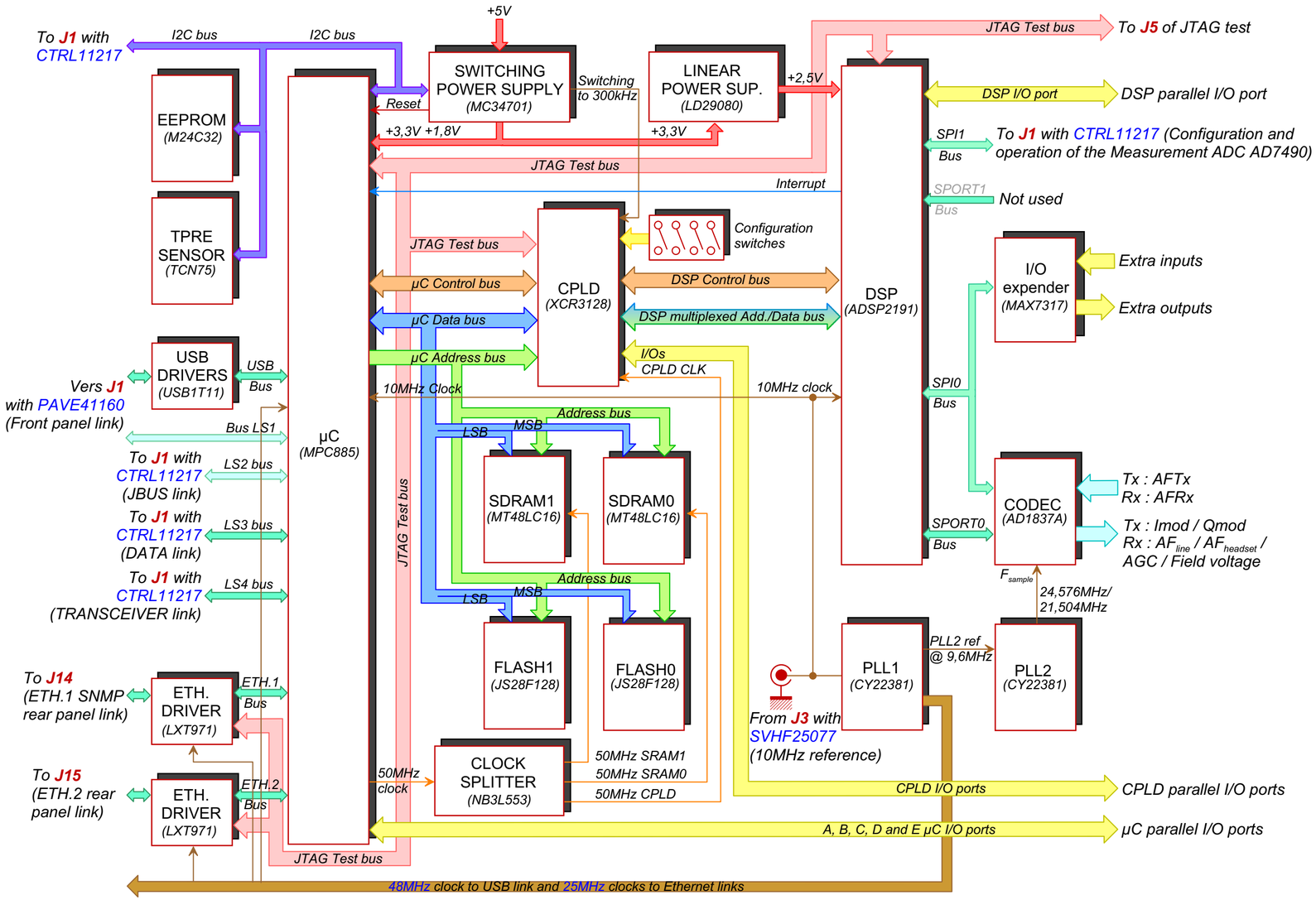

MICRO-PROCESSOR/DSP MODULE General Block diagram (1/1)			46000130 Index rev. : V1.00 Date rev. : 23/02/11
Subset ref : MIPR11005 MIPR11006	Subset code : 53500015 53500016	Set ref. : EM9000-2G EM9010-2G RE9000-2G RE9010-2G	Set code : 80000086 80300035 80100067 80100070

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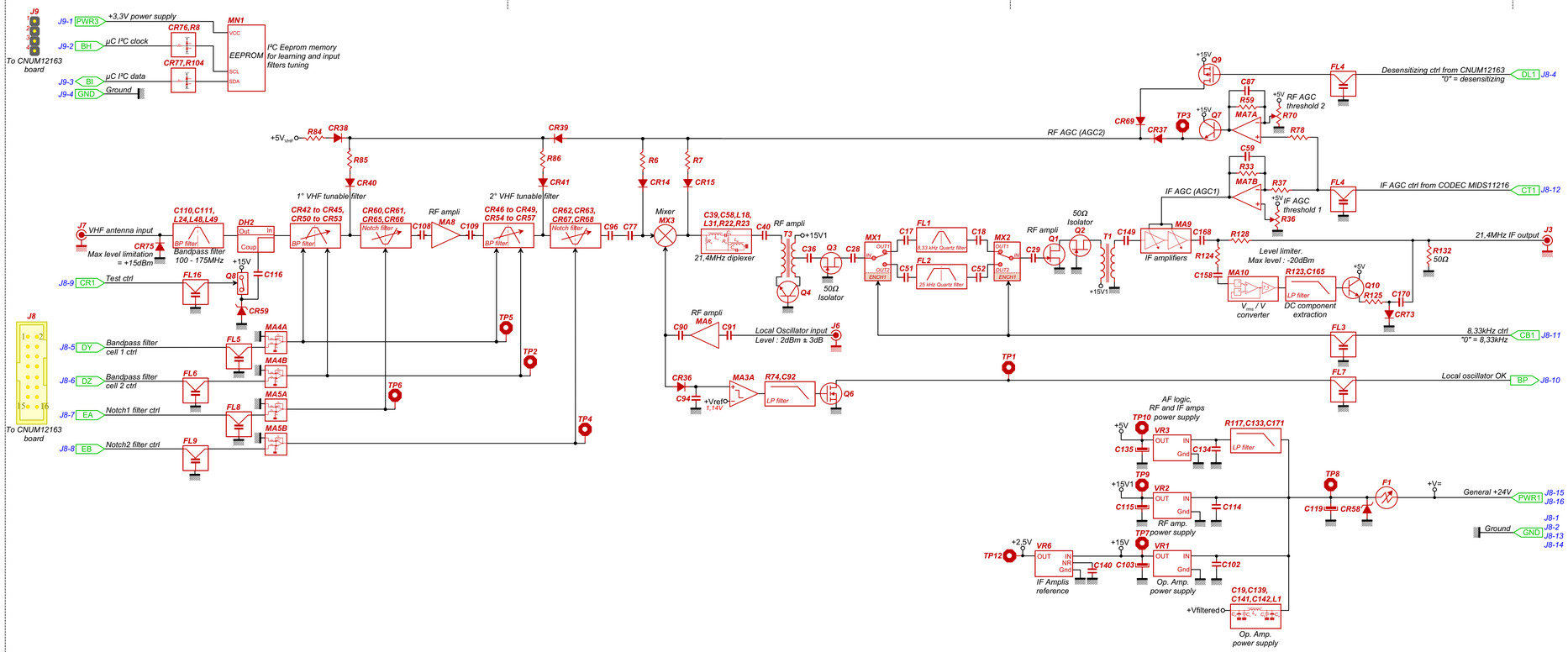
FAX : +33 5 59 58 55 01



IF MODULE Intermediate Frequency generation, Power supplies (1/1)			46000138 Index rev. : V1.00 Date rev. : 01/03/11
Subset ref. : VUFI23186	Subset code : 52000619	Set ref. : RE9000-2G	Set code : 80100067
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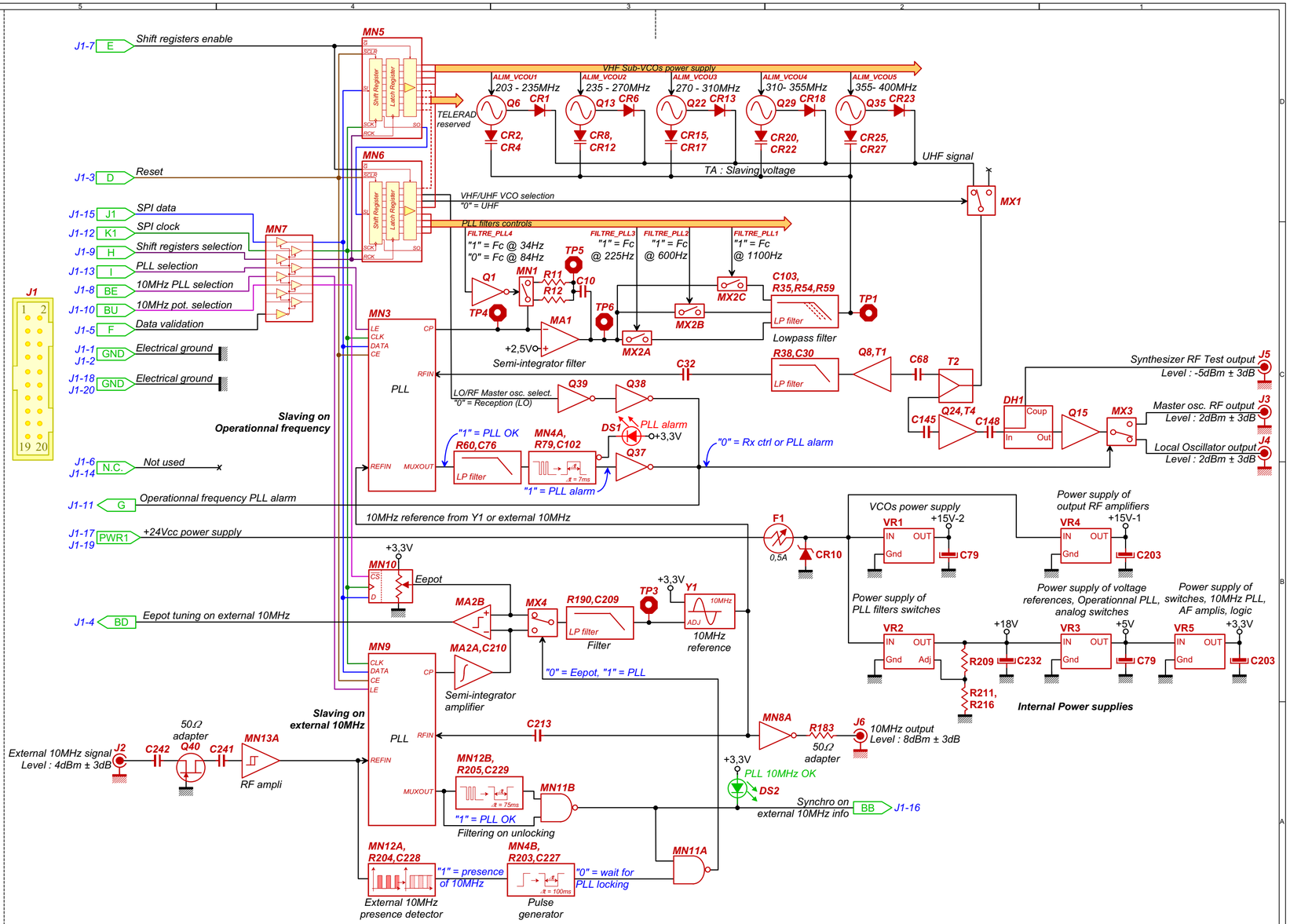
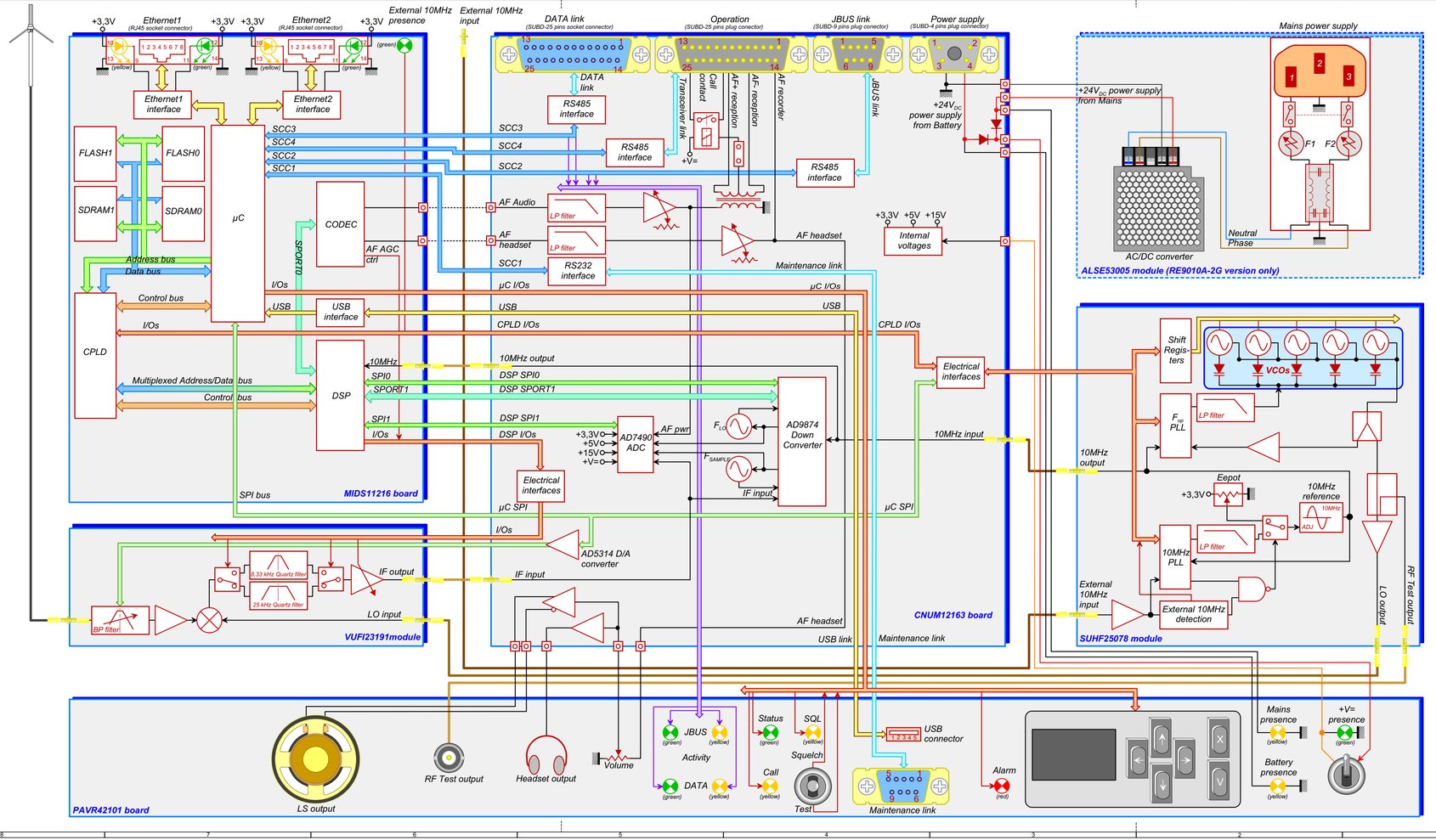


UHF SYNTHESIZER MODULE Block diagram (1/1)			46000145 Index rev. : V1.00 Date rev. : 23/02/11
Subset ref. : SUHF25078	Subset code : 52000621	Set ref. : EM9010-2G RE9010-2G	Set code : 80300035 80100070
TELERAD 2 Avenue de la Butte aux Cailles, B.P. 302 64603 ANGLET CEDEX FRANCE		Email address : courrier@telerad.fr	TEL : +33 5 59 58 55 00 FAX : +33 5 59 58 55 01



RE9010-2G UHF DIGITAL RECEIVER General block diagram(1/1)			46000144 Index rev. : V1.01 Date rev. : 11/07/11
Subset ref. : /	Subset code : /	Set ref. : RE9010-2G	Set code : 80100070

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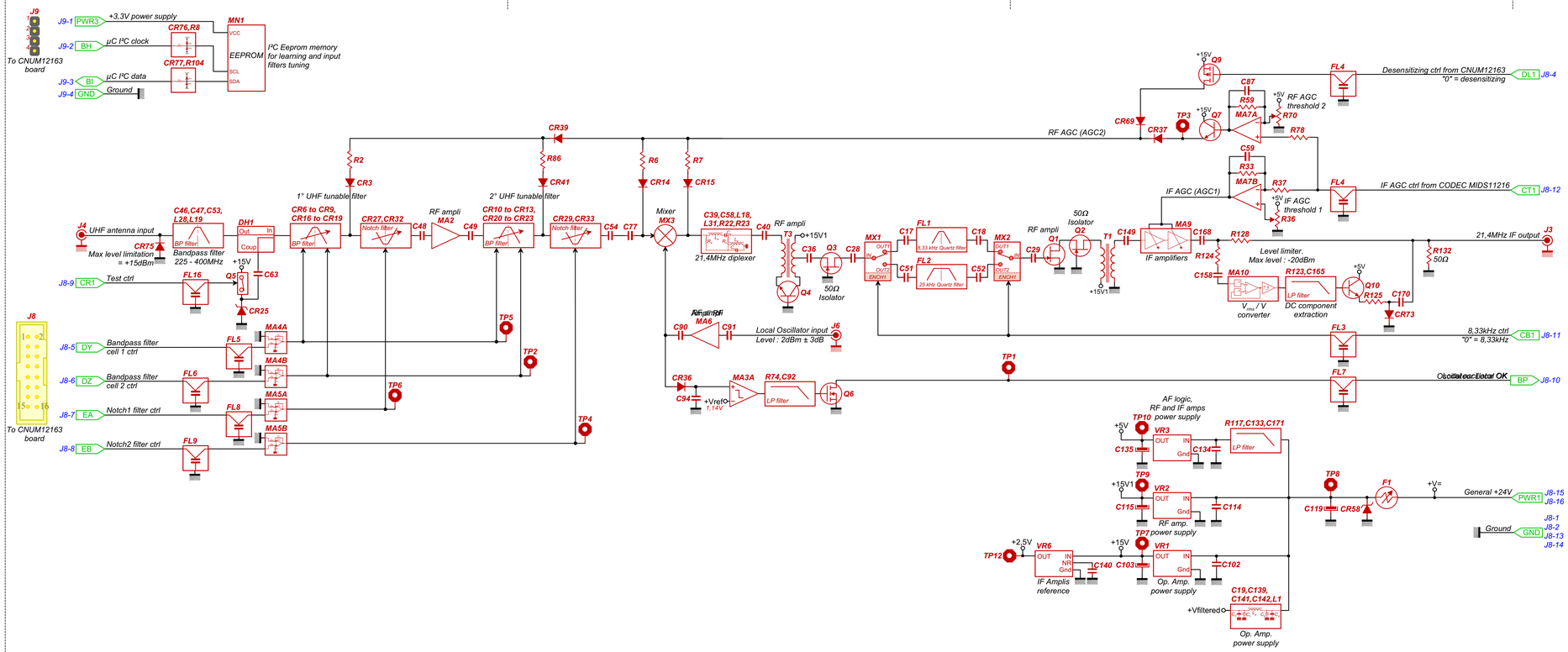
To CTRL11217 board
J1
SCC3 µC serial link
DATA/JBUS link (TxD3 L (O), RxD3 M (I), RTS3 N (O), CTS3 O (I))
1pps signal. Negative pulse to ground (I)
SMC2 µC serial link
RS485 Transceiver link (TxD4 Q (O), RxD4 Z (I))
SCC2 µC serial link
RS485 JBUS link (TxD2 AA (O), RxD2 AB (I), RTS2 AC (O))
SCC1 µC serial link
RS232 Maintenance link (TxD1 AP (O), RxD1 AQ (I), DSR1 AR (I))
Liaison SPI0 DSP
SPI0 link from DSP (MOSI0 AT (O), MISO0 AU (I), SCK0 AS (O))
AD7328 measurement ADC CS, "0" = Selected
CS Down Converter AD9874 sur SPI0 DSP (S)
Frame sycnhro on DSP SPORT1 from AD9874 (I)
Clock on DSP SPORT1 from AD9874 (I)
Frame reception on DSP SPORT1 from AD9874 (I)
µC SPI link
SPI link from µC (MISO BC (I), MOSI J (O), SCK K (O))
Fop PLL CS on µC SPI (O)
Display screen CS (O)
AD5314 DAC CS on µC SPI for Rx tuning (O)
µC I2C link
I2C link from µC (SDA BI (I/O), SCLK BH (O), INT BJ (I))
Not used (I)
Leds test ctrl, "1" = test (O)
Operation on external 10MHz info (I)
10MHz Eepot tuning (I)
10MHz PLL CS on µC SPI (O)
10MHz Eepot CS on µC SPI (O)
+5V power supply (I)
To CTRL11217 board
J2
AD9874 Down Converter Synchronisation, "0" = synchro (O)
Squelch ctrl from Front panel, "0" = active (I)
Desensitizing ctrl, "1" = desensitizing (I)
Tx/Rx info, "0" = Rx (I)
Remote Squelch ctrl, "0" = active (I)
LO presence info from VUFI23186 or VUFI23191, "0" = OL OK (I)
General reset (O)
PLL data validation (O)
Call info, "1" = Call present (O)
Shift registers activation to SVHF25077 or SUHF25078 (O)
Shift registers selection to SVHF25077 or SUHF25078 (O)
Squelch led (O)
Obstructed CSMA channel info (I)
Test request. "1" = test (I)
8,33kHz ctrl, "1" = 8,33kHz (O)
CSMA Transmission request, "0" = Request (O)
CSMA Transmission autorization, "1" = OK (O)
Rx ON/OFF info (O)
RX ON/OFF ctrl, 1" = ON (I)
Rx Alarm info, "1" = Alarm (O)
Rx status led ctrl, "1" = OK (O)
Display reset to PAVE41160 (O)
Data/Display screen ctrl selection (O)
VHF/UHF selection, "0" = VHF (O)
Rx test ctrl to VUFI23186 or VUFI23191 and CNUM12163, "1" = test (O)
IF AGC voltage to VUFI23186 or VUFI23191 board (O)
Field voltage (O)
AF reception line (O)
Headset AF after DSP processing (O)
Codec reference voltage (O)
AD9874 Down Converter alarm "1" = Alarm (O)
JBUS inhibition ctrl, "1" = Inhibition (I)
DSP SPI1 link
SPI link from DSP of MIDS11216/Rx (SCK1 EH (O), MOSI1 EF (O), MISO1 EG (I))
+5V power supply (I)
Extra I/O ports
MN20 MAX7317
MN25 CY22381FXI
DSP SPI1 bus
Bus SPI0 DSP
DSP SPI0 bus
MX1 CODEC AD1837
SPORT0 bus
MN4A,B RF ampli
MN5 CY22381FXI
48MHz clock for USB link
9,6MHz reference
25MHz clock for Ethernet links
R285 48MHz presence
R286 48MHz inhibition
MN16 DSP ADSP2191
DSP Multiplexed Address/Data bus
DSP control bus
MN21 CPLD XCR3128XL
S1 Configuration switches
JTAG test bus
MN15 MAX6747
MN17 74CBTLV3257
MN18 74CBTLV3257
MN22 74CBTLV3257
DSP SPORT1 bus
MN7 FLASH0 memory JS28F256P33T85
MN6 FLASH1 memory JS28F256P33T85
MN9 SDRAM1 memory JMT48LC16M
MN8 SDRAM0 memory JMT48LC16M
MN3 Clock Splitter NB3L553D
µC Address bus
µC Data bus
SDRAMs and FLASHs memory access bus
µC control bus
FLASH0/FLASH1 write from JTAG test
MN2 µC MPC885
VR1 DSP core power supply MC29080DT25
VR2 General power supply / µC core power supply MC34701EK/R2
C29,C30,C34,L2 LP filter
MN10 Serial EEPROM memory M24C32
MN11 Temperature sensor TCN75-3.3
µC SPI bus
MN13 ETH1 interface LXT971AL
MN14 ETH2 interface LXT971AL
T1 HX1188
T2 HX1188
J14 Ethernet1 connector
J15 Ethernet2 connector
MN6 USB interface USB1T11AMTC
J4 To USB connector
µC SCC1 link
µC SCC2 link
µC SCC3 link
µC SCC4 link
MODCK1/MODCK2 = 11 on active Reset => External clock selection.
J5 DEBUG/JTAG
J16 TRACE

MICRO-PROCESSEUR/DSP MODULE Block diagram (1/1)			46000139 Index rev. : V1.00 Date rev. : 01/03/11
Subset ref. : MIPR11006	Subset code : 53500016	Set ref. : RE9000-2G RE9010-2G	Set code : 80100067 80100070
TELERAD		Email address : courrier@telerad.fr	TEL : +33 5 59 58 55 00 FAX : +33 5 59 58 55 01



IF MODULE Intermediate Frequency generation, Power supplies (1/1)			46000146 Index rev. : V1.00 Date rev. :01/03/11
Subset ref. : VUFI23191	Subset code : 52000644	Set ref. : RE9010-2G	Set code : 80100070
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V/UHF SYNTHESIZER BOARD
Layouts side A and B (1/1)

46500142
Index rev. : V1.08
Date rev. : 06/04/11

Subset ref. : SYVU25076	Subset code : 52000614	Set ref. : /	Set code : /
SYVU25077	52000620	EM9000-2G	80000086
		CM-300 VDT V2	80000088
		CM-350 VDT V2	80000089
		RE9000-2G	80100067
		CM-300 VDR V2	80100071
SYVU25078	52000621	RE9010-2G	80100070
		EM9010-2G	80300035
		CM-300 UDT V2	80300036
		CM-300 UDR V2	80400032
SYTR25081	52000640	TRN4000	82300077
PCB ref. : SYVU5214D	PCB code : 29001760		

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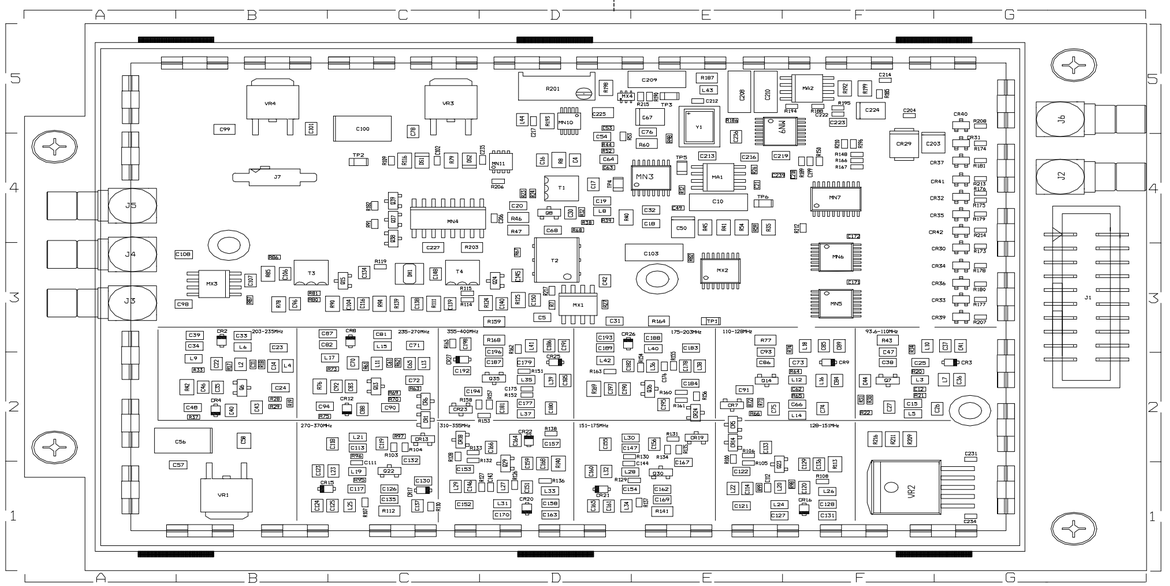
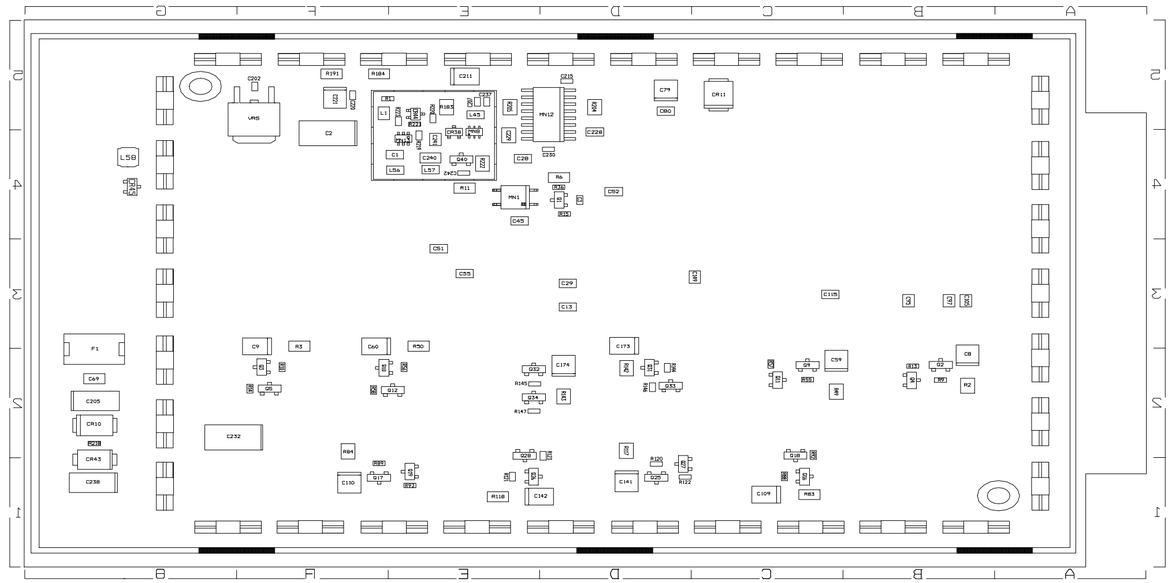
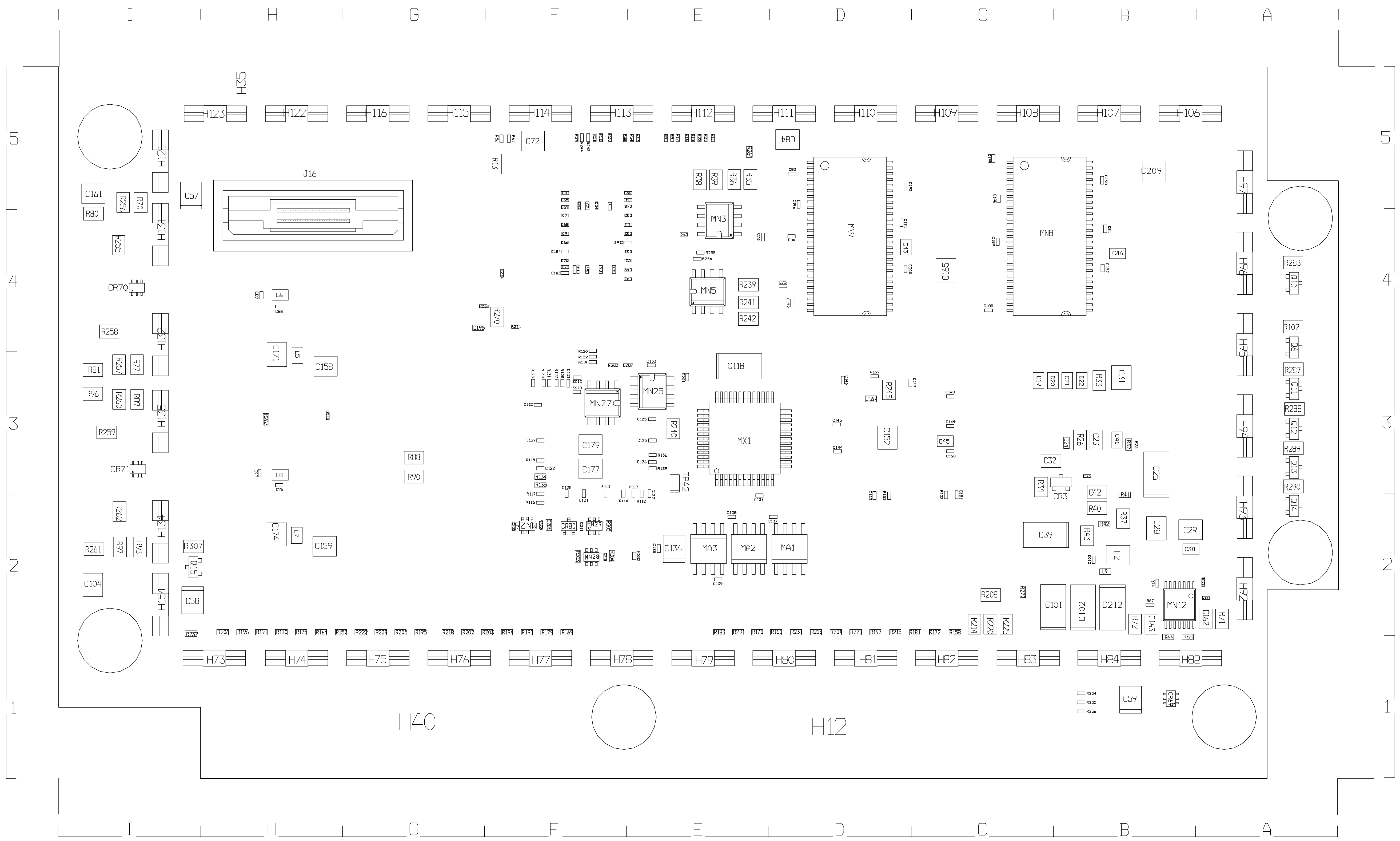




ACCORDING TO THE VERSIONS, SOME COMPONENTS FEATURED ON THE P.C.B. ARE NOT USED



ACCORDING TO THE VERSIONS, SOME COMPONENTS FEATURED ON THE P.C.B. ARE NOT USED

MICRO-PROCESSOR / DSP BOARD **Layout side B (2/2)**			**46500156** Index rev. : V1.03 Date rev. : 06/04/11
Subset ref. : MIDS11216	Subset code : 51001181	Set ref. : CM-300 VDT V2 CM-350 VDT V2 CM-300 VDR V2 CM-300 UDT V2 CM-300 UDR V2 VOAD9000 TRN4000 EM9000A-2G EM9010A-2G EM9010C-2G TRG4000T AC/DC TRG4000T DC	Set code : 80000088 80000089 80100071 80300036 80400032 82200037 82300077 84500142 84500144 84500145 84500160 84500161
PCB ref. : MIDS1345B	PCB code : 29001708		

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MICRO-PROCESSOR / DSP BOARD
Layout side A (1/2)

46500155
Index rev. : V1.03
Date rev. : 06/04/11

Subset ref. : MIDS11216	Subset code : 51001181	Set ref. :	Set code :
		CM-300 VDT V2	80000088
		CM-350 VDT V2	80000089
		CM-300 VDR V2	80100071
		CM-300 UDT V2	80300036
		CM-300 UDR V2	80400032
		VOAD9000	82200037
		TRN4000	82300077
		EM9000A-2G	84500142
		EM9010A-2G	84500144
		EM9010C-2G	84500145
		TRG4000T AC/DC	84500160
		TRG4000T DC	84500161
PCB ref. : MIDS1345B	PCB code : 29001708		

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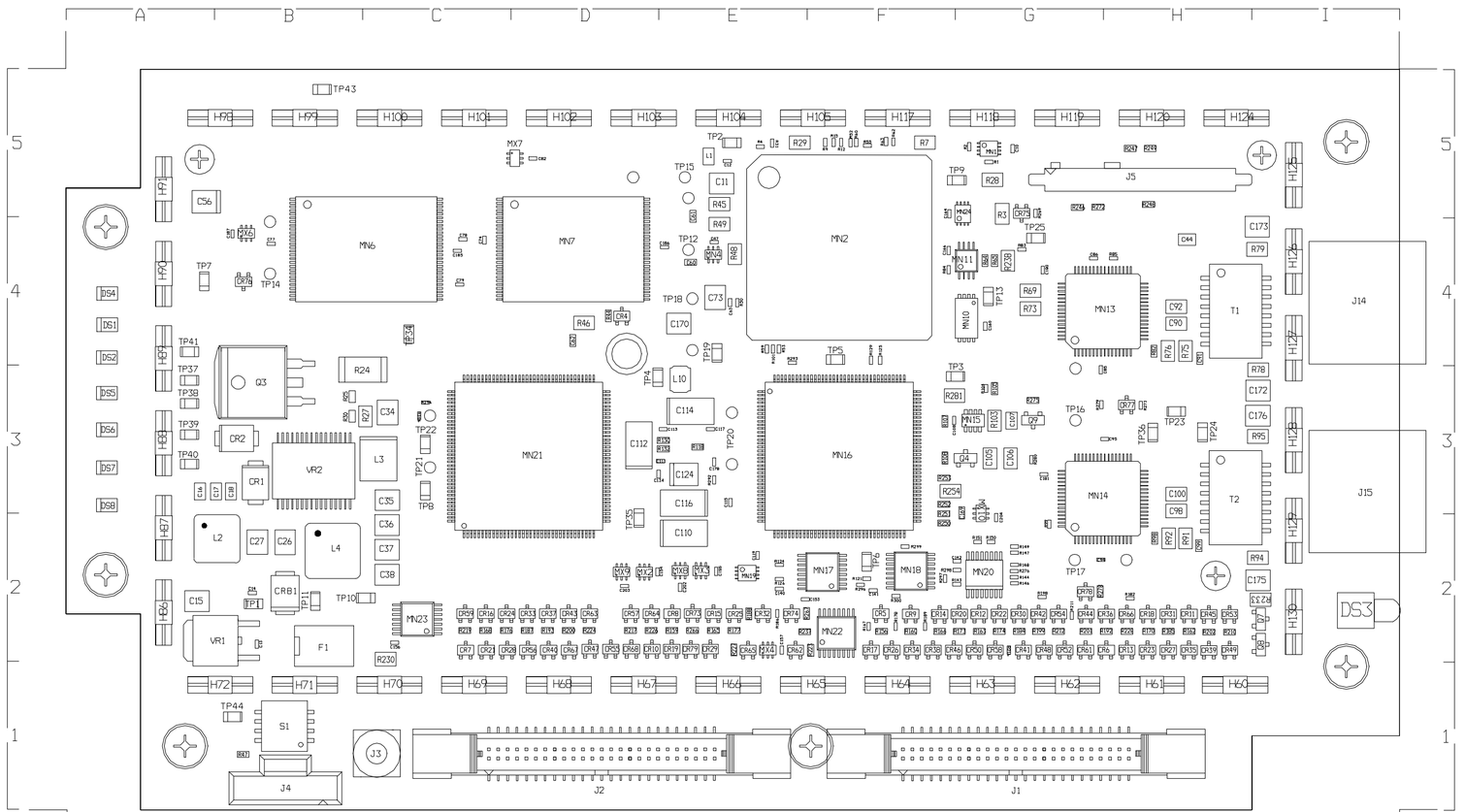
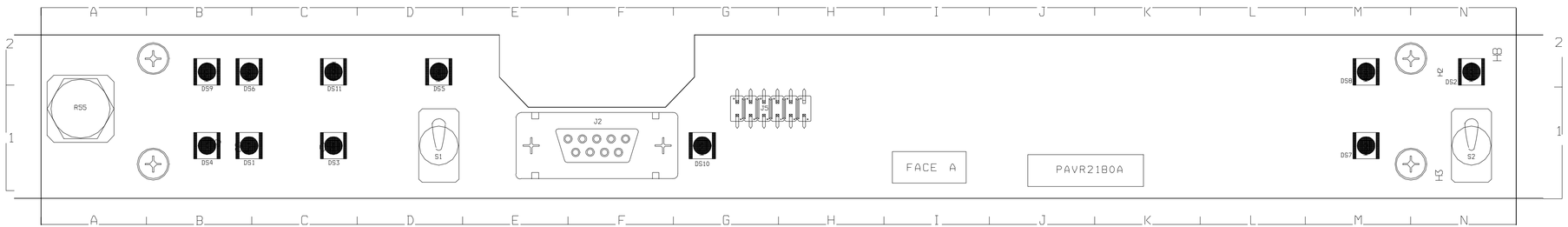
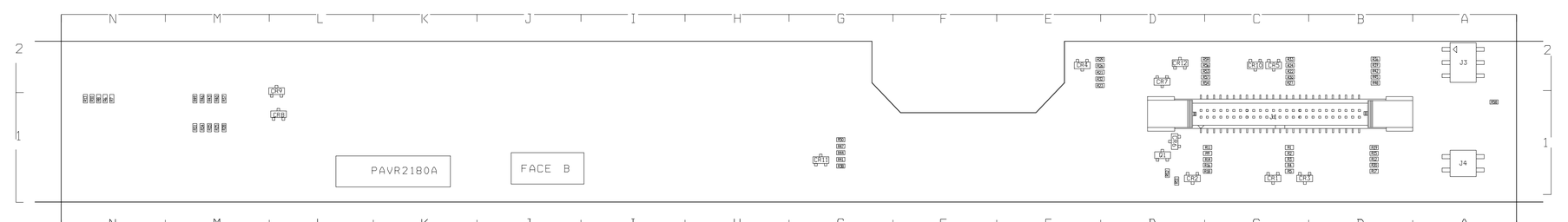


ACCORDING TO THE VERSIONS, SOME COMPONENTS FEATURED ON THE P.C.B. ARE NOT USED





ACCORDING TO THE VERSIONS, SOME COMPONENTS FEATURED ON THE P.C.B. ARE NOT USED

RECEIVER FRONT PANEL BOARD Layouts side A and B (1/1)			46500153 Index rev. : V1.03 Date rev. : 13/07/11
Subset ref. : PAVR42101	Subset code : 51001396	Set ref. : RE9000A-2G RE9000C-2G RE9010A-2G RE9010C-2G TRG4000R AC/DC TRG4000R DC	Set code : 84500146 84500147 84500148 84500149 84500155 84500156
PCB ref. : PAVR2180A	PCB code : 29001615		

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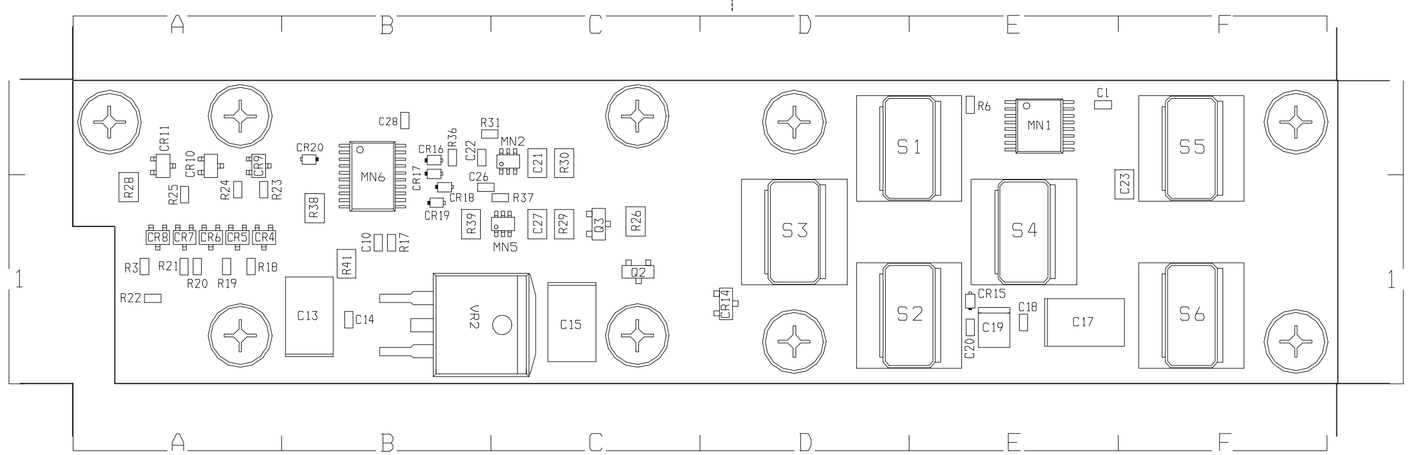
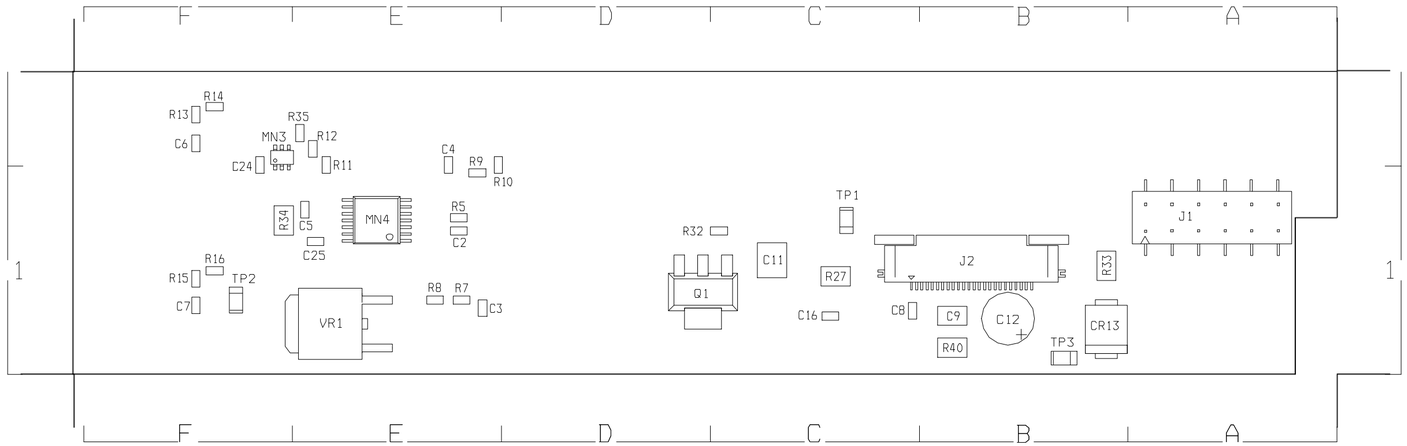


FACE A

CLAF2181C



CLAF2181C

FACE B

ACCORDING TO THE VERSIONS, SOME COMPONENTS FEATURED ON THE P.C.B. ARE NOT USED

KEYBOARD AND DISPLAY SCREEN BOARD Layouts side A and B (1/1)			46500152 Index rev. : V1.05 Date rev. : 13/07/11
Subset ref. : CLA12164	Subset code : 51001184	Set ref. : PAVR41169 PAVR42101	Set code : 50001455 50001396
PCB Ref. : CLAF2181C	PCB code : 29001610		

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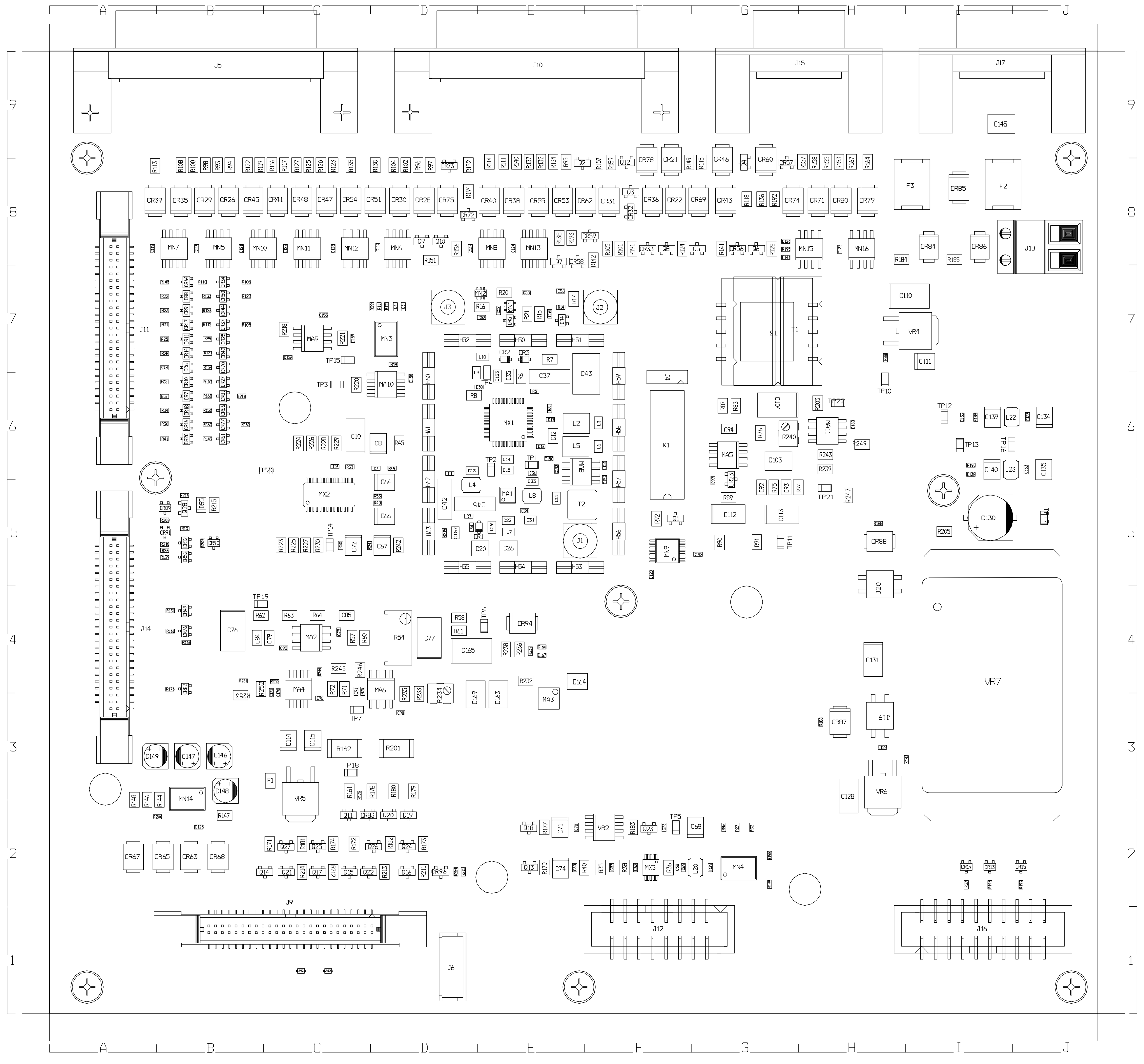
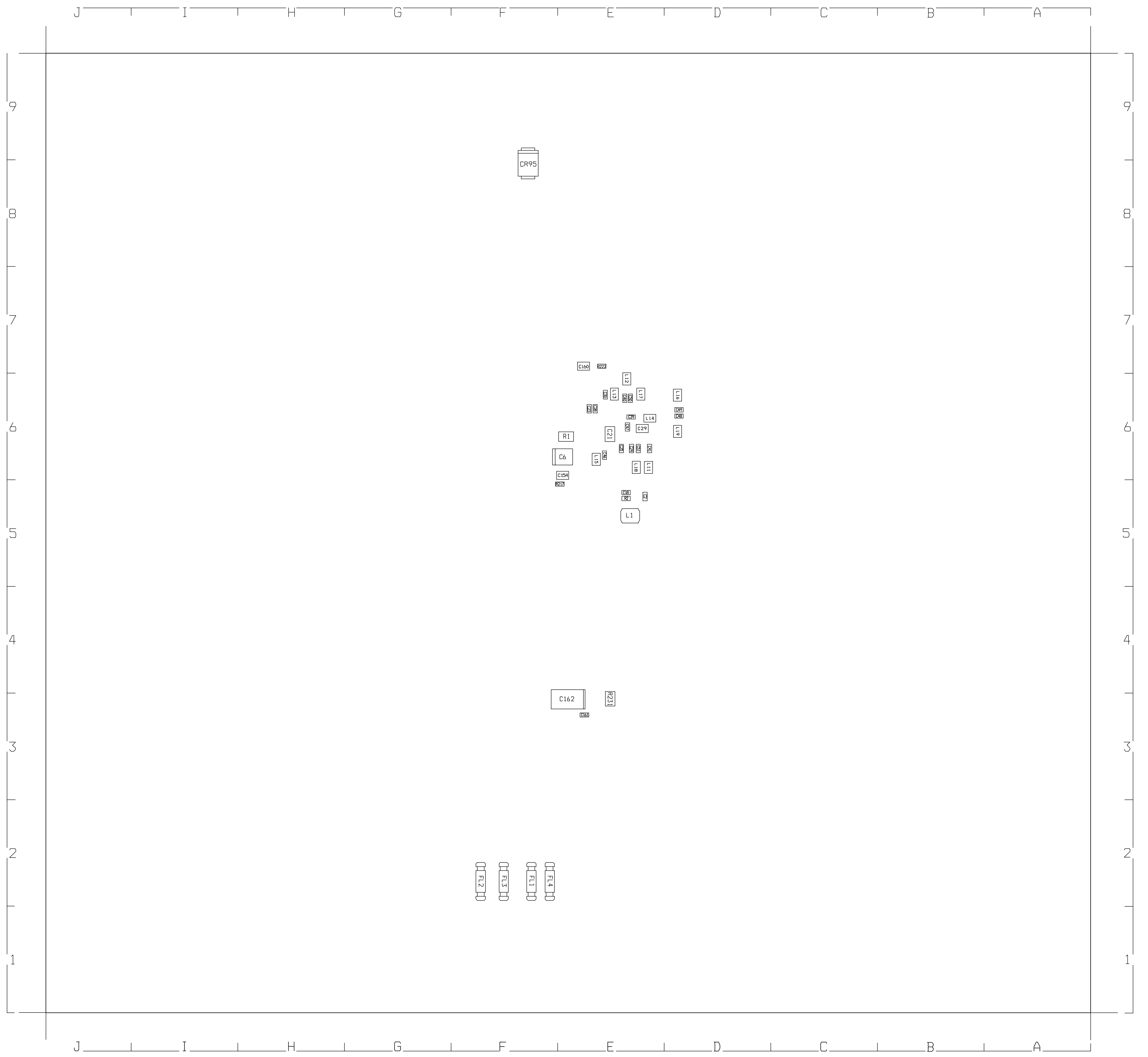
FAX : +33 5 59 58 55 01



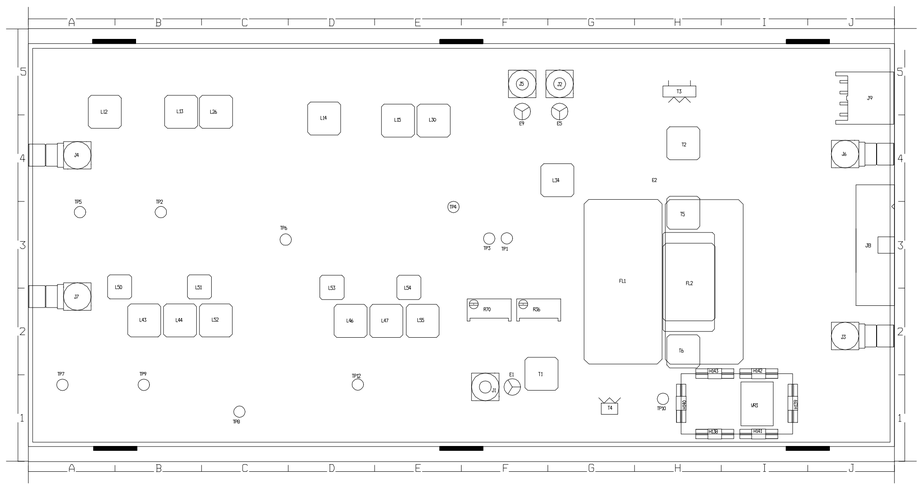
FACE A CNUM2175B



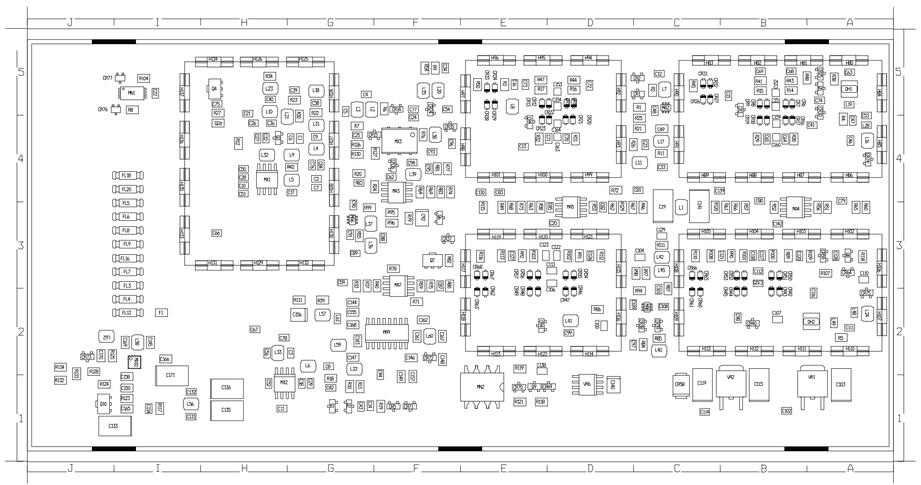
CNUM2175B FACE B

ACCORDING TO THE VERSIONS, SOME COMPONENTS FEATURED ON THE P.C.B. ARE NOT USED

DIGITAL BOARD FOR RECEPTION **Layouts side A and B (1/1)**				**46500149** Index rev. : V1.04 Date rev. : 13/07/11
Subset ref. : CNUM11228 CNUM12163	Subset code : 51001249 51001182	Set ref. : CM-300 VDR V2 CM-300 UDR V2 RE9000-2G RE9010-2G	Set code : 80100071 80400032 80100067 80100070	
PCB ref. : CNUM2175B	PCB code : 29001610			
TELERAD 2 Avenue de la Butte aux Cailles, B.P. 302 64603 ANGLET CEDEX FRANCE			Email address : courrier@telerad.fr	TEL : +33 5 59 58 55 00 FAX : +33 5 59 58 55 01



FACE A | VUFI 3333 A



VUFI 3333 A | FACE B

ACCORDING TO THE VERSIONS, SOME COMPONENTS FEATURED ON THE P.C.B. ARE NOT USED

VHF-TO-DIGITAL IF RECEIVER BOARD
Layouts side A and B (1/1)

46500201
Index rev. : V1.01
Date rev. : 13/07/11

Subset ref. : VUFI23186 VUFI23190 VUFI23191	Subset code : 52000619 52000639 52000644	Set ref. : RE9000-2G CM-300 VDR V2 / RE9010-2G CM-300 UDR V2	Set code : 80100067 80100071 / 80100070 80400032
PCB ref. : VUFI3333A	PCB code : 29001583		

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