Mier
COMUNICACIONES

USER MANUAL

FLO Repeater

Gap-fillers

CGU20-50-100 Wrms

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1. SAFETY INSTRUCTIONS

1.1. INTRODUCTION

In spite of the electric well cared used for the equipment design, the installation and maintenance personnel may be exposed to a certain inherent hazards in the electronic equipment treatment.

Since Mier Comunicaciones bets for the security of its customers, in the current chapter is pretended to offer a guide of the possible existing dangers, and a group of recommendations to avoid their development as well.

For these reasons, is extremely important to read carefully this chapter before starting any operation over the unit (chapter 1). However, someone always can get in contact with our Technical Attention Service (TAS) to solve any kind of doubt.

NOTE: the purpose of this section is not to contain a complete description of all the precautions that the operators must be bear in mind using electronic equipment. Mier Comunicaciones doesn't take responsibility for injuries suffered due to inappropriate and irresponsible procedures or to dispose of personnel without the experience and/or required qualification.

1.2. GENERAL RECOMMENDATIONS

In the next lines will be detailed some general recommendations to stick on to follow a correct security plan at the time to carry out the installation, the maintenance or any type of adjustment.

- All electrical installation and its respective maintenance must be carried out by suitable qualified personnel.
- Do not do any work in the unit unless there is another person who is able to provide first aid services.
- Do not touch overheated components without suitable precautions to avoid burns.
- If it is required to raise and to transport the unit, it must be done by more than one person. The unit weight is too high (25-30Kg depending on the unit) and it could cause injuries.
- The fuses, switches and other protection devices have the finality to guarantee security under overloads and short circuits. Pay high attention to them.
- When a security device replacement is performed, original device with the same electric specifications has to be used. When a replacement with these characteristics is done, do a security check to ensure its correct operation.
- In order to do any sort of work without operating requirement, ensure that the unit is unconnected to the supply power. In this case, not to assume

either that electric hazard doesn't exist (even in the parts that apparently show electric isolation). The capacitors might retain dangerous electric potentials for a certain period of time after switching off the unit. Wait for 5 minutes to ensure that the capacitors have been discharged. Not to discharged them by short circuits.

- Disconnect the antenna as well. Other active equipments connected to the same antenna can cause a harmful energetic feed back through the connection cable. When it is not possible to disconnect the antenna must be carried out other possible precautions to establish a voltage absence.

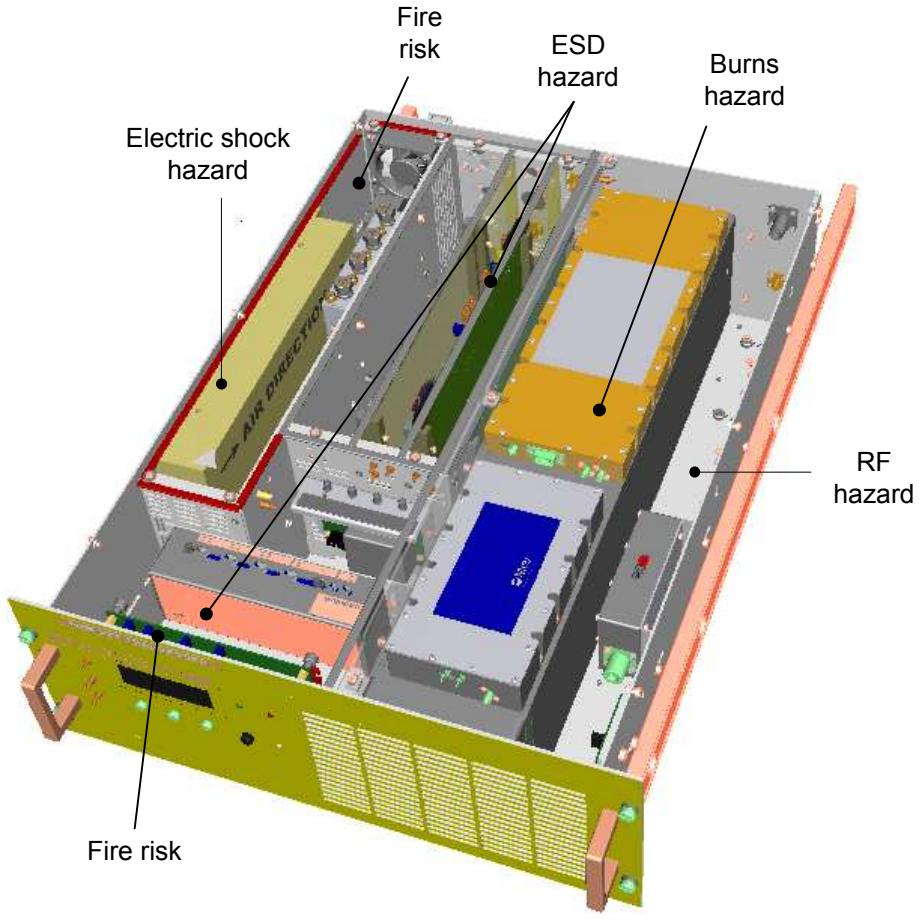


Figure 1.- Identification of the unit hazards.

1.3. ELECTRIC SHOCK HAZARD

The equipments (transmitters, transposers or gap fillers) transport a big amount of energy and hence they are a hazard supply. An electric shock happens when somebody gets in contact with an electric energy supply which causes energy propagation through his body. It may cause a shock, whose consequences might vary. It could result in nothing or by contrast it could be even lethal. For this reason, pay attention to the following recommendations:

- The current intensity is the most important magnitude to predict the kind of damage suffered. The harmful current threshold is from 80mA at a frequency of 50 Hz.
- Known the relation between the intensity and the voltage, it is considered a dangerous electric potential from 24V AC or 50V DC, which can cause serious bad consequences.
- Remember that low voltage supplies with high intensity may be as dangerous as high voltage supplies.
- Do not use connections in inappropriate conditions. If it is appreciated any deteriorated connection, replace it immediately. Otherwise, it could cause either a fire or an electric shock.
- Do not remove either the external covers or the internal lids of the equipment while it is operating, unless it is absolutely necessary to do some work. One of the main functions of them is to avoid contact with high voltages.
- Do not touch the connections with wet hands. The essential resistive element of the human body is constituted by skin, which varies according to the person. The resistance among two parts of the body is within some KΩ, even though it is reduced when it is wet.
- In front of any measurement, keep one hand in the pocket to avoid the worst path current is from hand to hand since the electric flow would pass through the chest cavity.
- Electric shocks apart from producing the shock may cause burns in the part of the body which has been in contact with the electric conductor.

1.4. ELECTROSTATIC DISCHARGE HAZARD

Electrostatic discharges (ESD) are an electric event that produces an electrostatic field discharge when bodies with different electric potential get in contact. They are extremely dangerous for electronic devices and therefore it is important to bear them in mind. Please, follow the next recommendations:

- Ensure the discharge of the static electricity of the operators and electronic devices that have been able to accumulate before touching any device or connecting devices.

- Ensure that the ESD precautions are fulfilled before extracting PCBs. Always hold up the boards with the edges. Do not touch ever the board either through the print circuit or the connection pins.
- Handle ESD sensitive devices in a free static electricity area. If it is possible, use anti-static carpets in both floor and workstation.
- In order to transport ESD sensitive device, put it in an anti-static bag.
- If it is required to touch electronic devices of the equipment during its either installation or maintenance, the operators must be equipped with ESD protection. For instance, they can use an anti-static wrist.
- Avoid contact between boards and clothes. If an anti-static wrist is used, take care: it only protects the board versus body static electricity. Thus, clothes might damage boards.

1.5. RF HAZARDS

Since RF lines may also cause certain damages, in the following lines it is described several recommendations to prevent hazards related with equipments that include this kind of lines.

- Ensure neither switch on the unit with RF lines in open circuit nor disconnect these lines when the unit is operating. Although the unit possess protection versus these events (signal is deactivated automatically), it could result in serious damages to the personnel.
- When an event as just explained happens, electric arcs may be generated, producing ultraviolet radiation. If these arcs have enough intensity, they may cause burns and temporal ocular injuries.
- When an instrument (wattmeter, spectral analyzer,…) has to be connected to a high frequency output, use suitable attenuators or dummies to avoid damages to the unit final amplifiers and to the measurement instrument.
- Do not remove either the external covers or the internal lids of the equipment while it is operating, unless it is absolutely necessary to do some work. One of their main functions is to avoid external dangerous radiation produced by the unit.

1.6. FIRE RISK

Even though it is not much common, there is a risk fire in presence of electronic equipment with these features. Moreover, flames and heat applied to the unit produce extremely dangerous gases generated by the devices materials. For this, pay attention to the next good practices:

- Ensure that the operators have basic formation of fire-fighting. Apply the most appropriate methods with specialised anti-fire material.

- Ensure the absence or the shortage of flammable materials in the room where the unit is located.
- Ensure that all the doors of the room are closed to prevent a possible expansion in case of fire.
- Do not remove either the external covers or the internal lids of the equipment while it is operating, unless it is absolutely necessary to do some work. One of their main functions is to avoid physical contact that could produce a short circuit. Then a fire could origin.
- When a fuse replacement is performed, original fuse with the same electric specifications has to be used. Otherwise, an excessive current though a fuse could cause a fire if it is not prepare for this intensity of current. The features of the fuses are shown in Table 1.

Unit Power	Size	Typical current rating (230V)	Maximum current rating (110V)	Interrupting rating
1-2-5-10Wrms 1-5-10-20Wps	5x20	0.7A	2A	4A
20-25-50Wrms 100-200Wps	5x20	2.7A	6A	8A
100Wrms	5x20	7.7A	8A	10A

Table 1.- Fuses features depending on the unit power.

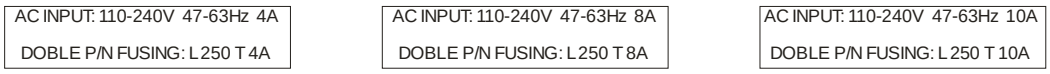


Figure 2.- Identification of the fuses in the equipment.

- When a fuse replacement is performed, caution with double pole/neutral fusing.
- Use always an original battery to replace control board battery. The features of the battery must accomplish:
  - Designation IEC: CR 2032
  - UL Recognition: MH 13645 (N)
  - Nominal Voltage: 3 V
  - Typical Capacity: 230mAh
  - Diameter: 19.7 (min), 20 (max)
  - Height: 2.9 (min), 3.2 (max)

CAUTION

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE

DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS

- Avoid placing the battery in reverse polarity, as well as do not charge and do not short circuit it.
- Battery disposal method should be in accordance with local and state regulations.

1.7. DIRECTIVE 1999/5/EC (R&TTE)

It is declared the conformity with the Directive 1999/5/EC (R&TTE) of the European parliament. This directive, which is from 9 may 1999, is related with hertzian equipment and telecommunications terminals, and it declares that the equipment fulfils with its essential requirements.

The Declaration of Conformity related to this product can be found in the following URL: www.mier.es

The following CE mark is affixed to the equipment:

CE 0341 !

The identification number of the NO (Notified Body) who certified the product might change.

The equipment is intended to be used in all EU (European Union) and EFTA (European Free Trade Association) countries.

The use of this equipment may be restricted to certain frequencies and requires a license for operation. For more details, contact with your TAS.

1.8 FCC RULE PARTS 15.21 AND 15.103

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2. INSTALLATION AND PUTTING INTO OPERATION

In the current chapter it is described the procedure that has to be taken place for a suitable both installation and start-up operation of the unit. Before doing any work in the equipment installation, please read safety instructions (chapter 0).

Note the whole electric installation and its respective maintenance have to be done by appropriated qualified personnel.

In each connection of this section appears the type (N, BNC,…) and the identification (Jx) of its connector. All these connectors can be seen in mechanical description chapter. In order to understand all the explanations of this section and to avoid any mistake it is recommended to look both chapters at the same time. Furthermore, the specifications shown in this chapter are also in technical specifications in a wider way.

2.1. ENVIRONMENTAL SPECIFICATIONS

The installation can be made in a 19" rack or over a table, using the correct accessories for each case. The rack must be perfectly ready to support the weight of all the electronic equipment that is installed in it. For security reasons, the maximum height of the rack has to be of 42U. Moreover, the unit installation must be done in a safe place avoiding weather inclemency as follows:

- Operating temperature margin: 0- 45ºC (inside the rack)
- Maximum operating altitude (optional): 2,000m (2,500m)
- Maximum relative humidity: 95% (35ºC, no condens ation)
- Flow: 237m^3/h 50-100Wrms/200Wps
  160m^3/h others

This equipment uses forced air cooling. Its installation must allow the entry of the necessary air through the front panel and the exit of it through the back panel with no obstructions. No obstacle should block the air entry and exit. Basic unit configuration does not include input air filter. The unit must be installed in a dust-free ambient.

2.2. RACK MOUNTING

When the equipment must be installed in a multi-unit rack assembly, the following precautions must be taken:

Elevated Operating Ambient

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

Reduced Air Flow

Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Mechanical Loading

Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Earthing

Reliable earthing of rackmounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

2.3. UNIT CONNECTORS

Before connecting any cable make sure that the power supply is disconnected. It will be the last cable to connect. This will prevent any body injury caused by an electric shock and any possible damage to the unit.

As the plug is considered to be the disconnect device for the equipment, the socket-outlet shall be installed near the equipment and shall be easily accessible.

2.3.1. INPUT CONNECTOR

INPUT CONNECTORS CGU

In order to carry out the input connection in gap filler units:

1. Make sure that the RF input level from the receiving antenna satisfies the nominal range established in the specifications (from -65dBm to -25dBm).
2. Connect the receiving antenna cable to the RF input situated in the back panel of the equipment (J11: 1-5-10Wrms, J10: 25-50-100Wrms) with an N male connector of 50Ω.

INPUT CONNECTORS CDU

The next connections are referred as input reference signals. They are addressed to digital transmitter units whose operation mode is based on a SFN (Single Frequency

Network). These signals allow reaching a high synchronism and frequency stability to transmit.

1. Connect an external sine wave 10 MHz reference input in the back panel of the equipment (J4: 1-5-10Wrms, J5: 25-50Wrms) with a BNC male connector of 50Ω. Its power level must be from -5dBm to +10dBm.
2. Connect a 1PPS (Pulse Per Second) signal with a pulse width of 1μs in the back panel of the equipment (J6) with a BNC male TTL/50Ω level.

Once input reference signals connections have been done, the next step is to connect an ASI input signal. Pay attention in the characteristics of the allowed ASI input signal:

- Data packets: 188 or 204 Bytes
- Frequency: 270 MHz
- ASI input level: 220-880 mV
- Max. useful bandwidth: 31.76 Mbps (for BW=8MHz)
- Impedance: 75Ω

Standard configuration of ASI inputs:

The standard configuration is two redundant ASI inputs (Seamless switched inputs).

1. Connect ASI 1 input cable in the back panel of the equipment (J9).
2. Connect ASI 2 input cable in the back panel of the equipment (J7).

Optional configuration of ASI inputs:

The optional configuration is a hierarchical modulation:

1. Connect HP (High Priority) input cable in the back panel of the equipment (J9)
2. Connect LP (Low Priority) input cable in the back panel of the equipment (J7).

INPUT CONNECTORS CMU

In order to carry out the input connection in digital transposer units do:

1. Connect an external sine wave 10 MHz reference input in the back panel of the equipment (J7) with a BNC male connector of 50Ω. Its power level must be from -5dBm to +10dBm.
2. Make sure that the RF input level from the receiving antenna satisfies the nominal range established in the specifications (from -65dBm to -25dBm).
3. Connect the receiving antenna cable to the RF input situated in the back panel of the equipment (J11: 1-5-10Wrms, J10: 25-50-100Wrms) with an N male connector of 50Ω.

INPUT CONNECTORS CTU

In order to carry out the input connection in analog transmitter units do:

1. Connect an analog video balanced input in the back panel of the equipment (J4: 1-5-10-20Wps, J6: 100-200Wps) with a BNC male connector of 75Ω. Its voltage level must be from 0.5 to 2Vpp.
2. Connect an analog audio input with a XLR 3 pins 600Ω balanced or 10kΩ un-balanced in the back panel of the equipment (J5). Its power level must be from -12 dBμ to 12dBμ.
3. Moreover, to allow a remote control connect a DB15 male in the dry contacts of the back panel (J19).

INPUT CONNECTORS CRU

In order to carry out the input connection in analog transposer units do:

1. Make sure that the RF input level from the receiving antenna satisfies the nominal range established in the specifications (from -67dBm to -27dBm).
2. Connect the receiving antenna cable to the RF input situated in the back panel of the equipment (J11: 1-5-10Wps, J10: 100-200Wps) with an N male connector of 50Ω.
3. Moreover, to allow a remote control connect a DB15 male in the dry contacts in the back panel (J13).

2.3.2. OUTPUT CONNECTOR

This connector makes reference to the RF output. Connect the transmitting antenna cable to the RF output situated in the back panel of the equipment (J1) with an N male of 50Ω. It is recommended to use a low loss cable RG214. The units with output filter accomplish return loss better than 20dB.

Note: if there is the necessity to carry out an inspection test, RF output can also be connected to a dummy load of 50Ω instead of to the transmitting antenna.

2.3.3. SAMPLE CONNECTORS

SAMPLE CONNECTORS CGU

After switching on the unit (explained in section 1.3), in case it is required, checking samples can be done to ensure a correct performance of the unit. The sample frequency is shown in the next description, whereas to know its power level it is required to see section 4.2 RF signal block diagram. The available samples are from:

- Front panel (with SMB male of 50Ω)
    - Reference oscillator (RO): 10MHz

- Local oscillator (LO2): its frequency depends on the relations (Figure 3):

Down conversion

$$f_{IF} = f_{LO2} - f_{RFin} \rightarrow f_{LO2} = f_{RFin} + f_{IF} = f_{RFin} + 36.1MHz$$
$$(f_{IF} = f_{IM} - f_{LO2} \rightarrow f_{IM} = f_{IF} + f_{LO2})$$

where f_{IM} is the image frequency, which is an undesired input frequency that is capable of producing the same intermediate frequency f_{IF} that the desired input frequency f_{RFin}. This image frequency is well attenuated in the unit so that it doesn't produce any harmful effect. On the other hand, in both down conversion and up conversion use the same local oscillator frequency.

Up conversion

$$f_{RFout} = f_{RFin} = f_{LO2} - f_{IF} \rightarrow f_{LO2} = f_{RFin} + f_{IF} = f_{RFin} + 36.1MHz$$

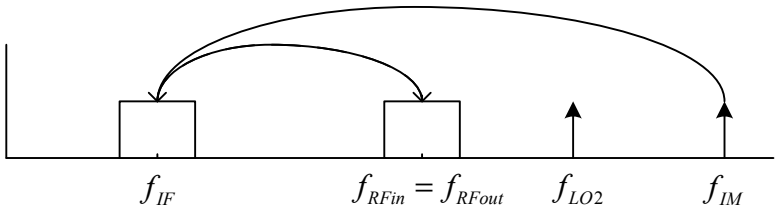


Figure 3.- Frequency conversions between local oscillator signal, RF signal and IF signal.

- Back panel (with a BNC male of 50Ω)
  - RF Output (J2)
  - RF Up converter (J3)
  - IF Down converter (J6)
- Driver amplifier (with a SMA male of 50Ω): this sample is inside the power amplification area (only in 25-50-100Wrms units).

SAMPLE CONNECTORS CDU

After switching on the unit (explained in section 1.3), in case it is required, checking samples can be done to ensure a correct performance of the unit. The sample frequency is shown in the next description, whereas to know what power level they have to present see section 4.2 RF signal block diagram. The available samples are from:

- Front panel (with SMB male of 50Ω)
  - Reference oscillator (RO): 10MHz

- Local oscillator (LO2): its frequency depends on the relation of the up conversion:

$$f_{RFout} = f_{LO2} - f_{IF} \rightarrow f_{LO2} = f_{RFout} + f_{IF} = f_{RFout} + 36.15MHz$$

where f_{RFout} is the output frequency and f_{IF} is the intermediate frequency.

- Back panel (with a BNC male of 50Ω)
  - RF Output (J2)
  - RF Up converter (J3)
- Driver amplifier (with a SMA male of 50Ω): this sample is inside the power amplification area (only in 25-50Wrms units).

SAMPLE CONNECTORS CMU

After switching on the unit (explained in section 1.3), in case it is required, checking samples can be done to ensure a correct performance of the unit. The sample frequency is shown in the next description, whereas to know what power level they have to present see section 4.2 RF signal block diagram. The available samples are from:

- Front panel (with SMB male of 50Ω)
  - Reference oscillator (RO): 10MHz
  - Local oscillators (LO1/LO2): their frequency depends on the relations (Figure 4):

Down conversion

$$f_{IF} = f_{LO1} - f_{RFin} \rightarrow f_{LO1} = f_{IF} + f_{RFin} = f_{RFin} + 36.1MHz$$
$$(f_{IF} = f_{IM} - f_{LO1} \rightarrow f_{IM} = f_{IF} + f_{LO1})$$

where f_{LO1} is the local oscillator frequency of the down conversion, whereas f_{IM} is the image frequency, which is an undesired input frequency that is capable of producing the same intermediate frequency f_{IF} that the desired input frequency f_{RFin}. This image frequency is well attenuated in the unit so that it doesn't produce any harmful effect.

Up conversion

$$f_{RFout} = f_{LO2} - f_{IF} \rightarrow f_{LO2} = f_{RFout} + f_{IF} = f_{RFout} + 36.1MHz$$

o

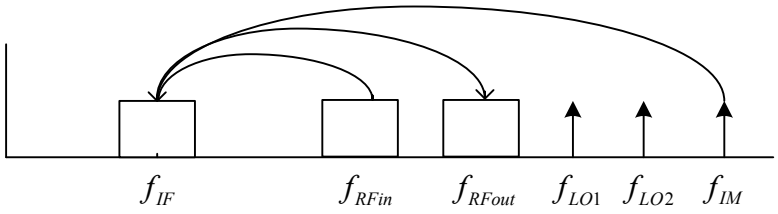


Figure 4.- Frequency conversions between local oscillators signals, RF signal and IF signal.

- Back panel (with a BNC male of 50Ω)
    - o RF Output (J2)
    - o RF Up converter (J3)
    - o IF Down converter (J6)
- Driver amplifier (with a SMA male of 50Ω): this sample is inside the power amplification area (only in 25-50Wrms units).

SAMPLE CONNECTORS CTU

After switching on the unit (explained in section 1.3), in case it is required, checking samples can be done to ensure a correct performance of the unit. The sample frequency is shown in the next description, whereas to know what power level they have to present see section 4.2 RF signal block diagram. The available samples are from:

- Front panel (with SMB male of 50Ω)
    - o Reference oscillator (RO): 10MHz
    - o Local oscillator (LO2): its frequency depends on the relation of the up conversion:

$$f_{RFout} = f_{LO2} - f_{FI} \rightarrow f_{LO2} = f_{RFout} + f_{FI} = f_{RFout} + 38.9MHz$$

where f_{RFout} is the output frequency and f_{IF} is the intermediate frequency.

- Back panel (with a BNC male of 50Ω)
    - o RF Output (J2)
    - o RF Up converter (J3)
    - o IF Down converter (J6: 1-5-10-20Wps, J4: 100-200Wps)
- Driver amplifier (with a SMA male of 50Ω): this sample is inside the power amplification area (only in 100-200Wps units).

SAMPLE CONNECTORS CRU

After switching on the unit (explained in section 1.3), in case it is required, checking samples can be done to ensure a correct performance of the unit. The sample frequency is shown in the next description, whereas to know what power level they have to present see section 4.2 RF signal block diagram. The available samples are from:

- Front panel (with SMB male of 50Ω)
    - o Reference oscillator (RO): 10MHz

- Local oscillators (LO1/LO2): their frequencies depends on the relations (Figure 4):
- Down conversion

$$f_{IF} = f_{LO1} - f_{RFin} \rightarrow f_{LO1} = f_{IF} + f_{RFin} = f_{RFin} + 38.9MHz$$
$$(f_{IF} = f_{IM} - f_{LO1} \rightarrow f_{IM} = f_{IF} + f_{LO1})$$

where f_{LO1} is the local oscillator frequency of the down conversion and f_{IM} is the image frequency, which is an undesired input frequency that is capable of producing the same intermediate frequency f_{IF} that the desired input frequency f_{RFin}. This image frequency is well attenuated in the unit so that it doesn't produce any harmful effect.

Up conversion

$$f_{RFout} = f_{LO2} - f_{IF} \rightarrow f_{LO2} = f_{RFout} + f_{IF} = f_{RFout} + 38.9MHz$$

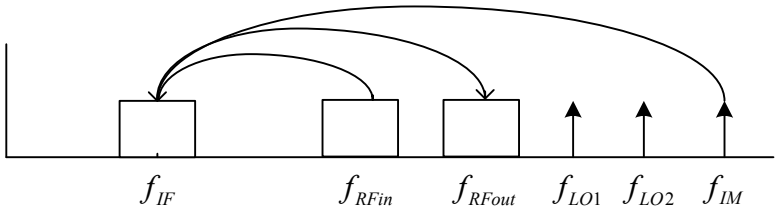


Figure 5.- Frequency conversions between local oscillators signals, RF signal and IF signal.

- Back panel (with a BNC male of 50Ω)
  - RF Output (J2)
  - RF Up converter (J3)
  - IF Down converter (J6)
- Driver amplifier (with a SMA male of 50Ω): this sample is inside the power amplification area (only in 100-200Wps units).

2.3.4. GROUND AND POWER SUPPLY CABLES

The last installation step is to connect the ground and power supply cables as follows:

4. First of all check all power cables for possible damage.
5. Provide an access for the disconnection of the power supply cable as easy as possible. The socket-outlet shall be installed near the equipment and shall be easily accessible.
6. Make sure that reliable earthing of rack-mounted equipment is maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

7. Make sure that the features of the external AC power supply are within the specified range. Consult technical specifications (chapter 6) for a more detailed information, although in general:
    - o AC supply voltage: 85-265VAC
    - o AC supply frequency: 45-65 Hz
8. Connect the ground cable to its corresponding connector in the unit (J15: 1-5-10Wrms, J14: 25-50-100Wrms). The protective conductor must be connected prior to connection to the mains supply. For the units, a 2.5mm^2 section copper cable must be provided with a terminal end which must be able to be connected to the Metric 6 ground terminal.
9. Connect the power supply cable to its corresponding connector in the unit with a female IEC950 connector (J12: 1-5-10Wrms, J15: 25-50-100Wrms).

2.4. START-UP OPERATION

Before doing these steps ensure whether all the cables explained previously have been installed properly. If they have, then do the following:

10. Switch on the unit through the back panel switch.
11. Wait for 30s for all the units except for CDU in which is required to wait for 5m due to the OCXO (Oven Controlled X-tal Oscillator) warming time. Meanwhile, the LEDs both green and red should light. If they shouldn't, see troubleshooting (chapter 10).
12. Check that the green power supply LED is still lighting. If this LED doesn't light see troubleshooting (chapter 10).
13. Check that the red alarm LED doesn't light yet. If the LED lights see troubleshooting (chapter 10).
14. Check that the unit is operating correctly: ensure that the measurements of the equipment satisfy the specifications of the protocol provided by Mier Comunicaciones. The explanation of taking these measurements is detailed in control software description (chapter 7). If any wrong measurement appears see troubleshooting (chapter 10).

Once the unit is switched on correctly, if it is required either to know any type of information related to the unit or to change any parameter, consult control software description (chapter 7).

2.5. MAINTENANCE RECOMMENDATIONS

With the purpose of ensuring a properly operation of the equipment the following maintenance rules have to be accomplished:

- At regular periods of time is convenient to check the equipment work conditions and the correct performance of the security devices. The mentioned check has not to be done if the security devices have been working under

inappropriate conditions. The security devices must be neither altered nor disconnected unless they have to be replaced.

- At regular periods of time should be carried out a revision, comparing the measurements given by the control board and by the protocol. If the result obtained is bad, see troubleshooting (chapter 10).
- In non-clean environments unit cleaning is absolutely necessary in order to avoid failures.
- If the installation incorporates air filters, they have to be replaced when its service time expires. Otherwise, the air flow in the unit will not be appropriate.
- The unit includes fan units. Service time of them is 70,000h: they have to be replaced when this time is expired.

In case the unit needs a replacement:

- The equipment is composed by several independent circuits. Revise its state before starting any work. Disconnect the neighbourhood circuits to prevent a possible accidental contact.
- When MOS devices replacement are performed, follow the standard rules to avoid injuries due to static charges and solders.
- When PCBs (Printed Circuit Board) components replacement are performed, pay attention in not to damage their traces due to a deficient protection of the board, involuntary scratches or a bad manipulation by the operator.
- Remember that FET (Field-Effect Transistor) and MOS (Metal-Oxide Semiconductor) devices can look like defective due to possible leakages in the PCB. Clean the PCB and repeat the check process before assuming that it is defected.

3. INTELLIGENT HIGH GAIN ON-CHANNEL REPEATER (HGOCR-I)

3.1. INTRODUCTION

Intelligent High Gain On-Channel Repeaters (hereinafter HGOCR-I) are the new solution for SFN repeaters designed and manufactured by MIER COMUNICACIONES.

Traditional on-channel repeaters require to know or estimate fundamental parameters such as reception level and isolation between antennas before their installation.

The advantage of HGOCR-I is that it incorporates a global gain control that allows to install the equipment without requiring this information, therefore it offers a maximum flexibility for network planning, minimizes its incertitude and simplifies the equipment installation and commissioning.

When the HGOCR-I starts up, it automatically adapts to the environment changing conditions, therefore there is no longer need to do previous “in-field” measurements, allowing a faster and easier deployment.

The new global gain control compensates slow environment variations, whereas the new generation echo canceller takes care of fast variations, both together guarantee HGOCR-I in long term stability.

HGOCR-I offers a high immunity to medium/long term variations. As the new global gain control avoids the risk of oscillation, the output power hardly ever needs to be shut down.

3.2. OCR, HGOCR & HGOCR-I

Traditionally, before installing a conventional On-Channel Repeater (OCR) or a High Gain On-Channel Repeater (HGOCR) in a site, it is required to estimate two fundamental parameters:

- Estimated reception level (Pin), and
- Available isolation between transmission and reception antennas (I).

Once this parameters are known, system stability can be warranted by limiting the OCR / HGOCR output power as shown in the following equations:

$$P_{out}(dBm) < P_{in}(dBm) + I(dB) - 10dB\,, \qquad \text{for OCR}$$

$$P_{out}(dBm) < P_{in}(dBm) + I(dB) + 10dB\,, \qquad \text{for HGOCR}$$

Having to know these two parameters before installing the On-Channel Repeater implies a difficulty in network planning based On-Channel Repeaters. Whereas the reception level is easy to estimate using specific software for network planning, the isolation between antennas is much harder to estimate, because it depends on several factors, such like physical placement of the two antennas, distance and relative angle between antennas, site environment, weather conditions, etc. As a result, some uncertainty may arise.

A possible solution is to measure on-site this two parameters once the antennas have been installed, but this is an expensive and low efficient approach. Moreover, it requires very specific instruments to measure the isolation between antennas.

Intelligent HGOCR (hereinafter HGOCR-I) allows to overcome this obstacle, offering the following advantages:

- It provides maximum flexibility during network planning phase,
- It simplifies equipment turning-gon,
- It makes the HGOCR-I independent from changing reception level and/or isolation conditions, guarantying its long term stability.

This is achieved combining the new generation active echo canceller system and a smart control system that adapts overall gain to reception level and isolation between antennas conditions.

3.3. HGOCR-I PHILOSOPHY

HGOCR-I is continuously performing a real-time monitoring of the operating gain margin (GM). Therefore HGOCR-I can increase or reduce its gain at any time that the echo power level exceeds the previously defined thresholds (these thresholds are user-programmable settings).

So, HGOCR-I provides a global gain control system, depending on the existing echo power level.

This global gain control system (that depends on the echo power level) is slow enough to let the fast Gain Margin variations be absorbed by the active echo canceller system, whereas the long-term slow variations, are compensated by the HGOCR-I itself.

When the HGOCR-I is started up, an initial minimum gain condition is loaded, so minimum output power level is obtained. The available output power level is gradually increased until it reaches on of the two following conditions:

1) Gain Margin limit specified by the user has been reached, or:
2) Maximum output power level specified by the user has been reached (usually equal to HGOCR-I nominal power)

The HGOCR-I avoids the need to do previous isolation measurement, simplifying the installation and turning-on process.

User configurable parameters, regarding the gain control system, are:

- **P max:** Maximum output power level (usually equal to nominal power)
- **P min:** Minimum output power level
- **GM min:** Minimum admissible Gain (Maximum admissible echo power level)
- **Hysth-DN:** lower hystheresis threshold
- **Hysth-UP:** upper hystheresis threshold

Intelligent gain control will start working as soon as the gain margin exceeds any of the specified limits:

- If ($GM < GM_{min} – Hysth_{DN}$) and ($P_{out} > P_{min}$) $\rightarrow$ Gain will be decreased
- If ($GM > GM_{min} + Hysth_{UP}$) and ($P_{out} < P_{max}$) $\rightarrow$ Gain will be increased

HGOCR-I advantages vs. HGOCR:

- It eases network planning and minimize its incertitude
- It simplifies the On-channel repeater start up
- It improves immunity towards the medium-term and long-term variations of Gain Margin conditions (i.e. reception level or isolation between antennas variations) → Minimizes service shutdowns, then improving system availability.

3.4. OPERATING EXAMPLES

Figure 1 shows a simulation of a 50W (47dBm) HGOCR behaviour when reception level and/or isolation between antennas conditions are changing along time.

As shown in the Gain Margin figure, the limit GM=-10dB (echo power level 10dB higher that received signal power level) is highlighted, since when GM exceeds this value the system stability is not guaranteed and shutdowns of the transmitted signal may occur. It can be seen that under these conditions, service is interrupted approximately a 10% of the time.

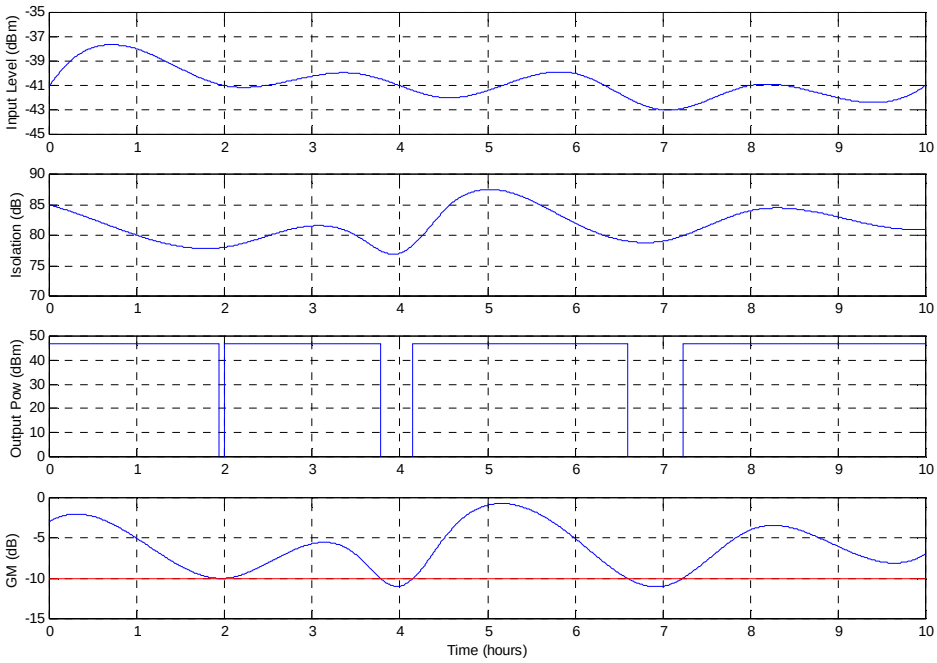


Figure 1 – HGOCR simulation

Figure 2 shows a simulation of HGOCR-I behaviour in the same changing conditions of reception level and isolation between antennas.

The parameters used in this simulation are:

P_{max} = 47dBm
P_{min} = 37dBm
GM_{min} = -8dB
Hysth-DN = 1dB
Hysth-UP = 1dB

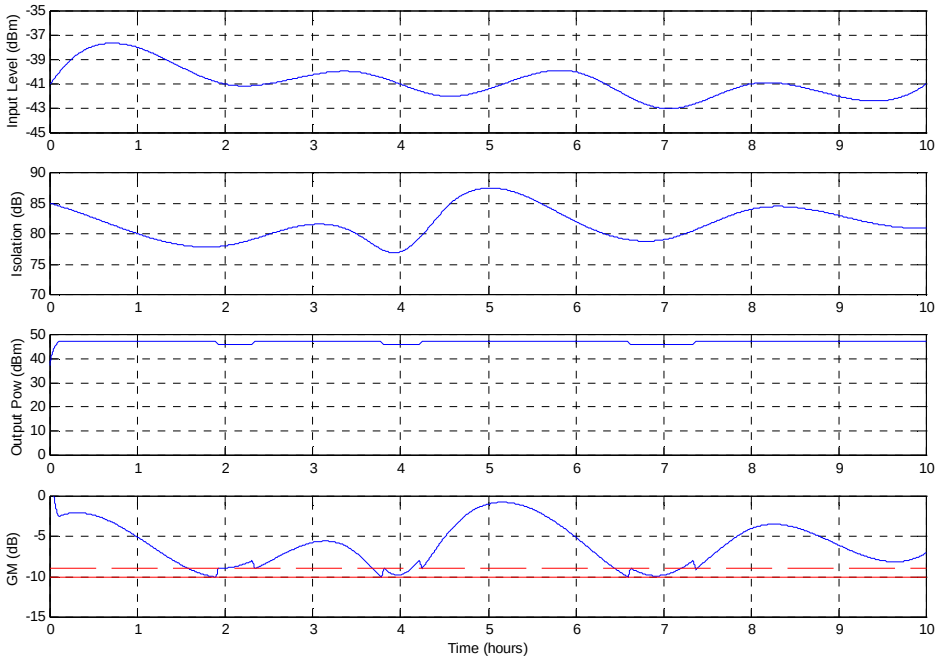


Figure 2 - HGOCR-I simulation

Notice that, in this case, HGOCR-I gain (and therefore output power level) adapts to reception level conditions and isolation between antennas conditions to keep the average value of gain margin at –8dB (specified value for the simulation). As a result, the continuity of service is guaranteed for a 100% of the time.

The following figures show the same simulation for a HGOCR (Figure 3) and a HGOCR-I (Figure 4), but in this case the isolation presents instantaneous variations added to long term variations. These instantaneous variations should appear in some specific environments (i.e. an urban environment with a multitude of vehicles circulating in the site proximity).

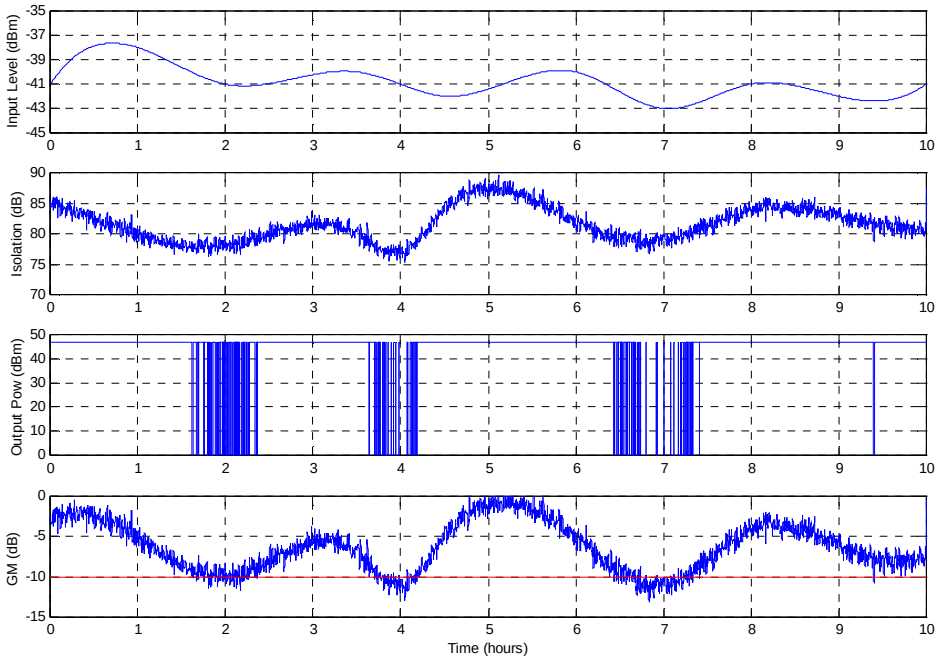


Figure 3 –HGOCR simulation, isolation presents instantaneous variations

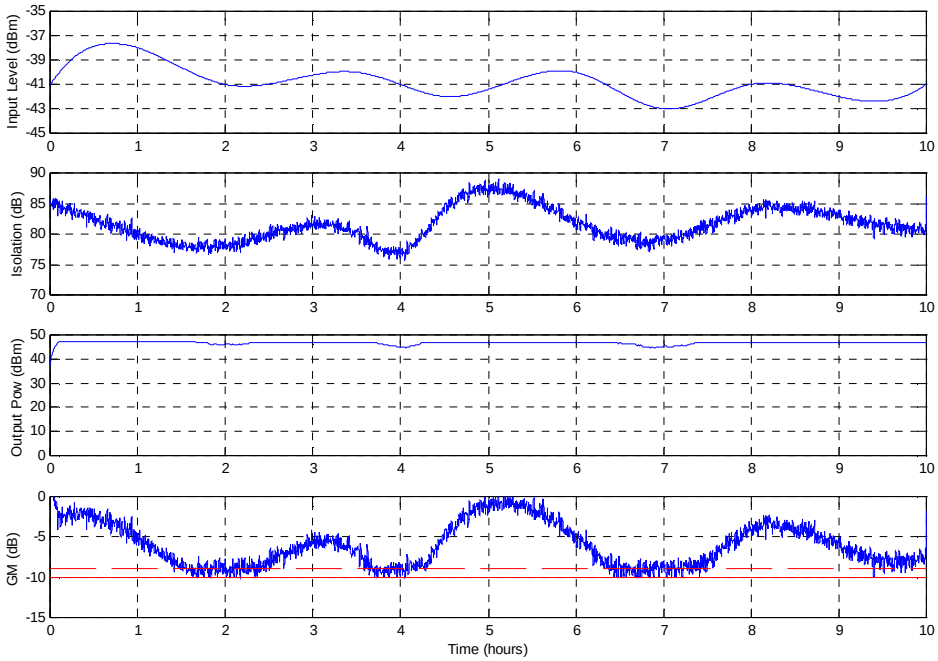


Figure 4 - HGOCR-I simulation, isolation presents instantaneous variations

HGOCR-I features fast isolation variations absorption by the echo canceller, whereas slow variations are absorbed by the HGOCR-I intelligent gain control.

3.5. HGOCR-I CONFIGURABLE PARAMETERS THROUGH THE FRONT PANEL

The following menu levels have been added inside the “Service Menu”:

Service Menu
- HGOCR Control
  - Smart AGC (Section 3.5.1)
  - IF Stages (Section 3.5.2)
  - Echo Canceller (Section 3.5.3)

3.5.1. “SMART AGC” MENU:

Parameter	Values	Default setting	Description
Active	{Off, On}	On	When the Smart AGC is activated, the HGOCR-I will continually adapt its output power in order to keep the Gain Margin within the specified working range
Pmax	[0 to –20] dB, 1dB step	0dB	Maximum output power (Offset, referred to the equipment’s nominal output power)
Pmin	[0 to –20] dB, 1dB step	-10dB	Minimum output power (Offset, referred to the equipment’s nominal output power)
GM min	[-3 to –8] dB, 1dB step	-8dB	Minimum operating Gain Margin
Hysth-UP	[1 to 3] dB, 1dB step	1 dB	Hystheresis above GM min (threshold for the HGOCR-I to increase its output power)
Hysth-DN	[1 to 3] dB, 1dB step	2 dB	Hystheresis below GM min (threshold for the HGOCR-I to decrease its output power)

Note:

- Although Pmax and Pmin are prepared to accept values as low as –20dB, the current HGOCR-I hardware might not work properly for values lower than –12dB. We do not recommend to exceed the –12dB limit with the current HGOCR-I.

3.5.2. "IF STAGES" MENU:

Parameter	Values	Default setting	Description
Bandwidth	{5, 5, 7, 8} MHz	5.55 MHz	Operating bandwidth
Coarse delay	[0 ... 511Δ] Δ steps	0 ns	Added input-output delay (coarse steps)
Fine delay	[0 ... Δ - 6.9] ns, 6.9ns steps	0 ns	Added input-output delay (fine steps)

being:

Δ = 124.5ns, 7MHz & 8MHz BW modes

Δ = 166ns, 5MHz & 6MHz BW modes

Note:

- The overall added delay will be the sum of both the coarse and fine delay values that have been set

3.5.3. "ECHO CANCELLER" MENU:

Parameter	Values	Default setting	Description
Active	{Yes, No}	Yes	Enables or disables the echo canceller
Temp. window	[MinΔ ... MaxΔ] ns	MaxΔ	Echo canceller's temporal window length
Antenna delay	[0 ... LimitΔ] Δ steps	0 ns	Input and output cable delay compensation. Compensates the delay caused by the cables, filters, etc. inserted in the path between the HGOCR and both the receiving and transmitting antennas
Tracking	{Slow, Standard, Fast, Very fast, Maximum}	Standard	Tracking speed for the Echo Canceller's algorithm.
Split pos.	{None, [MinΔ ... MaxΔ]}, Δ steps	None	Splitting position for the temporal window
Split delay	[0 ... LimitΔ] Δ steps	0 ns	Added delay at the splitting position (such delay is the temporal gap between the two cancellation window segments)

being:

Δ = 124.5ns, 7MHz & 8MHz BW modes

Δ = 166ns, 5MHz & 6MHz BW modes

4. GENERAL DESCRIPTION

The CGU20-50-100/HG FLO gap-filler unit is described in this manual. This unit is included in the COMPACT series of Mier Comunicaciones, S.A. The main characteristics of the COMPACT series are:

- Compact size.
- Valid for analogue as well as digital television. Migration through a minimal number of changes.
- Admits great number of configurations within the same electromechanical base.
- Possibility of frequency agility.
- Class AB driver and class AB output power amplifier, solid state and wide band. BIV/V output frequency range with no need of amplifiers adjustment when changing channel.
- Excellent performance qualities and long term reliability due to the technology used, SMD fitting and the control system.
- Control system based on a microprocessor which allows self-diagnosis and local, as well as remote, decision taking. It allows remote and local control and monitoring through “LCD” and RS232 interface or Ethernet.
- High modularity, easy maintenance.
- IF filtering through “SAW” technology.
- Synthesised local oscillator with very low phase noise. Easy channel switching. High stability options.
- IF “AGC” and output “ RF AGC”.
- Equipment self-protection against over temperature and reflections.
- “EMC” standards compliance.

The gap-filler units contained in the COMPACT series have also the following specific characteristics:

- 4 poles input filter inside the unit.
- Single local oscillator that allows completely coherent frequency conversion for perfect synchronisation in SFN networks.
- Adaptative echo cancellation performed by digital signal processing in the High Gain models (CGU20-50-100/HG FLO) which increases the Gain Margin in 15dB.
- IF, pre-amplification, post-amplification, LO, 10Mhz samples accessible in back and front panel.
- Possibility of external 10Mhz reference locking system that allows to lock the external frequency and have the internal oscillator phase-noise mask.

5. UNIT COMPOSITION

The Table 2 below shows the modules and the boards belonging to the CGU20-50-100/HG FLO equipment described in this manual. In grey optional elements.

ASSEMBLY ELEMENT	CGU20-50-100/HG FLO
Reference oscillator:	84A0270-11
Down converter: *Converter board*	80A0843 *80S0843*
Up converter: *Converter board* *DDS Synthesizer* *Display*	80A0780-10 *80S0662-14* *80A0554-13* *80S0668-10*
Amplifiers: Driver Amplifier Power Amplifier (100W) Power Amplifier (20W-50W)	 84A0518/D10 84A0507 84A0519
I/R detector:	84S0508
Clamp module	84S0501
Linearity corrector:	84A0393-10
Measurements and control board: *Control board* *CPU board*	80A0715-12 *80S0656-12* *80S0657-12*
Echo canceller:	80A0779/FLO
Interconnection board:	80S0783-10
Power supply:	84N0506
Mains input:	34N0118 33N0006 X 2 33N0023 17N0005 X 3
Input filter:	84A0180-10/D
Fan units:	31N0007 31N0018
Mechanics Box:	83S0109

Table 2.- Modules and boards list for the CGU20-50-100W HG FLO.

6. MECHANICAL DESCRIPTION

All the equipment are built up in the same mechanical drawer, ready to be placed in a standard 19" cabinet or also as an independent desktop equipment. The fixing of the equipment to the 19" cabinet can be made through fully removable sliding guides, fixed slides or also through a steady system by using the appropriate fixing kit.

The dimensions of the Unit are 19"x4Ux600mm (483mm x177mm x 600mm). The maximum depth of the equipment with all the options and connectors is 602mm. Notice that the front panel has two handles that stand out 40mm. The maximum weight is 35 kg with all the options.

The equipment is completely closed. This way, an excellent radio-frequency shield as well as completely user safety are achieved. The internal servicing of the equipment (to be performed by skilled personnel) can be made by removing the upper lids.

The equipment is divided in four external parts:

1. Front panel, 19" 4U. Air inlet must be left free. This front panel also includes four safety screws which allow the attachment of the equipment to the cabinet if necessary.
2. Back panel. Air cooling exits must be left free.
3. Sides. Allow the fixation of the equipment by means of sliding guides.
4. Upper lids. Allow access to the interior of the equipment.

The interior of the equipment is divided in four areas. Each one of them is made of an independent and closed metallic cavity. This way the required shielding between them is achieved:

1. Input and power supply area. Located in the back left side of the equipment by the back panel and the left panel. It is closed through an independent upper lid. It includes an extracting fan attached to the back panel which allows incoming air from the front panel through specially designed slots located in this cavity. When required the input channel filter is placed here.
2. RF area. Located by the previous described area, next to the back panel. It is formed by three metallic cavities (named slots) in which up to the three RF processing cards can be inserted. These cavities are closed through an independent lid so that they remain completely shielded. This lid has several holes, necessary to allow the adjustment of the inserted cards. When the equipment is working it is essential that the lid is on and correctly screwed. DC supply and control signal connections are performed through an interconnection card located in the bottom of the cavities. The access to this interconnection card is made by means of a peephole in the lower part of the equipment.
3. Power amplification area. Located on the right side of the equipment, from the front panel to the back panel. It is built up with a big dimensions heat sink with high heat evacuation capacity to which the power amplifiers are attached. Given that all the RF modules placed in this cavity are shielded there is no other lid

different to the general one. During the servicing tasks, the upper lid can be removed. However, it is essential that when the equipment is functioning the amplifier shield is in place. The heat sink has a fan that takes the air from the front of the equipment. Air is forced to pass through the heat sink wings and finally goes out through the back panel. In order to have access to this fan it is necessary to remove the front panel.

4. Control area. Located in the front left side. It has the control board fixed to the front and the linearity corrector module fixed to the wall by the RF zone. This area has additional space to place other modules, for instance, a reference oscillator.

This multiple cavities system separates each one of the functions of the equipment and ensures a high isolation between them. The high shielding avoids radio frequency and therefore instability phenomena. Radiation and susceptibility are very much reduced. Notice that, for maintenance, the equipment can work without having the upper and lower lids on; but that, in these conditions, there might not be possible to guarantee a fulfilment of the radiations and susceptibility established specifications. The equipment must not be switched on with the power amplifier shield nor the ones in the RF area removed.

6.1. FRONT PANEL

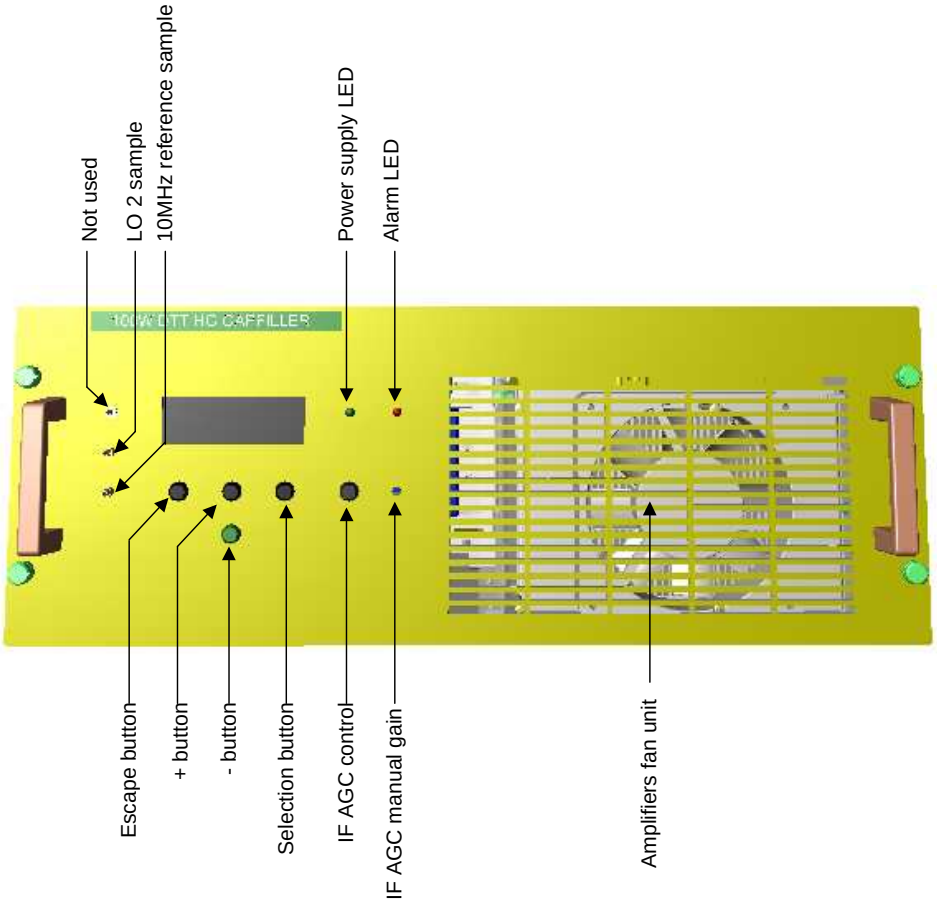


Figure 6.- Front panel elements.

Front panel description:

- Power supply LED: Green LED lighted when gap-filler unit is switched on.
- Alarm LED: Red LED lighted when an alarm is present.
- Control display: State, alarms and measurements presentation. Control of gap-filler unit behaviour (See section 9).
- Control display buttons (See section 9).:
  - SEL: Menu selection button.
  - + : Up menu button.
  - – : Down menu button.
  - ESC: Escape menu button.
- 10Mhz reference sample: +9dBm sample of reference oscillator.
- LO reference sample: -20dBm sample of Local Oscillator used in Gap-filler unit down and up-conversion.

- IF AGC control: Control of input AGC:
  AGC button pushed: Input AGC switched to automatic. Down-converter gain is automatically adjusted to obtain a constant IF level.
  AGC button un-pushed: Input AGC switched off. IF level is controlled by means of IF AGC gain potentiometer.
- IF AGC gain: Control Gain of down converter

As shown in Figure 7 access to interconnection board is situated at bottom of gap-filler unit.

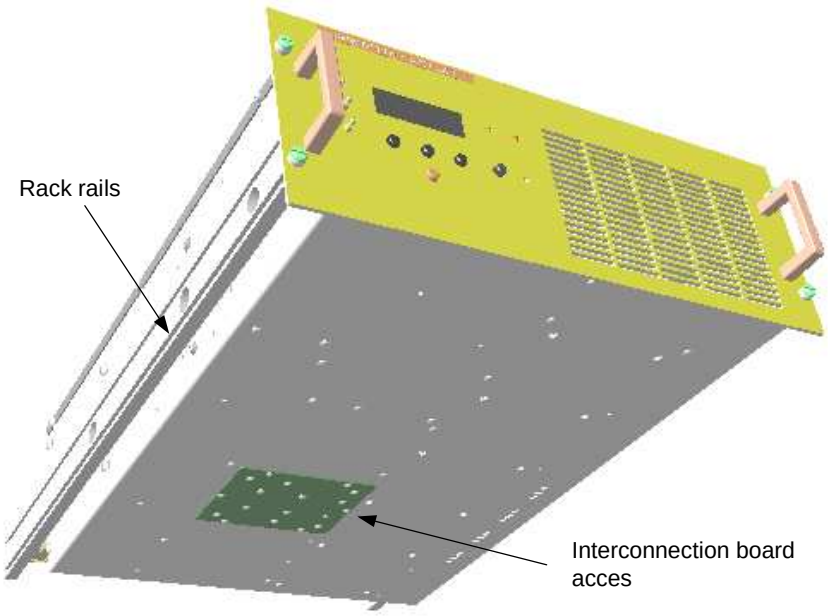


Figure 7.- Front view. Downside.

Unit rails can be unfixed from rack rails by pressing the lever situated in the central part of the rails. This action is sketched at Figure 14.

6.2. BACK PANEL

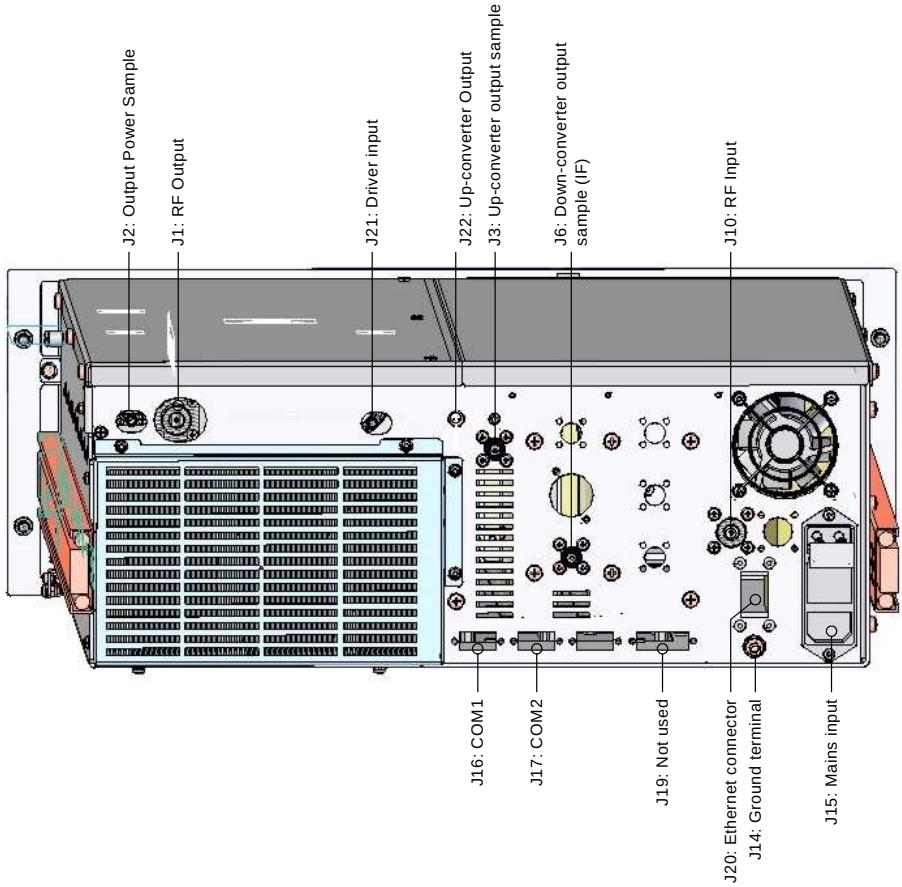


Figure 8. Back panel configuration

Back panel connectors description:

- J1. RF output. N female 50Ω.
- J2. RF output sample. BNC female 50Ω.
- J3. RF output sample, up-converter (Slot S3). BNC female 50Ω. For testing and troubleshooting purposes, signal level is labelled during production adjustment and test.
- J6. IF sample, down-converter (Slot S2). BNC female 50Ω. For testing and troubleshooting purposes, signal level is labelled during production adjustment and test.
- J10. RF input. N female 50Ω.
- J14. Ground terminal.
- J15. Mains input, IEC male, includes “on” switching button and two phase fuses.
- J16. COM1. DB9 female. NOT USED.
- J17. COM2. DB9 female. NOT USED.
- J20. Ethernet connector. RJ45 female.

6.3. INTERNAL PARTS SITUATION

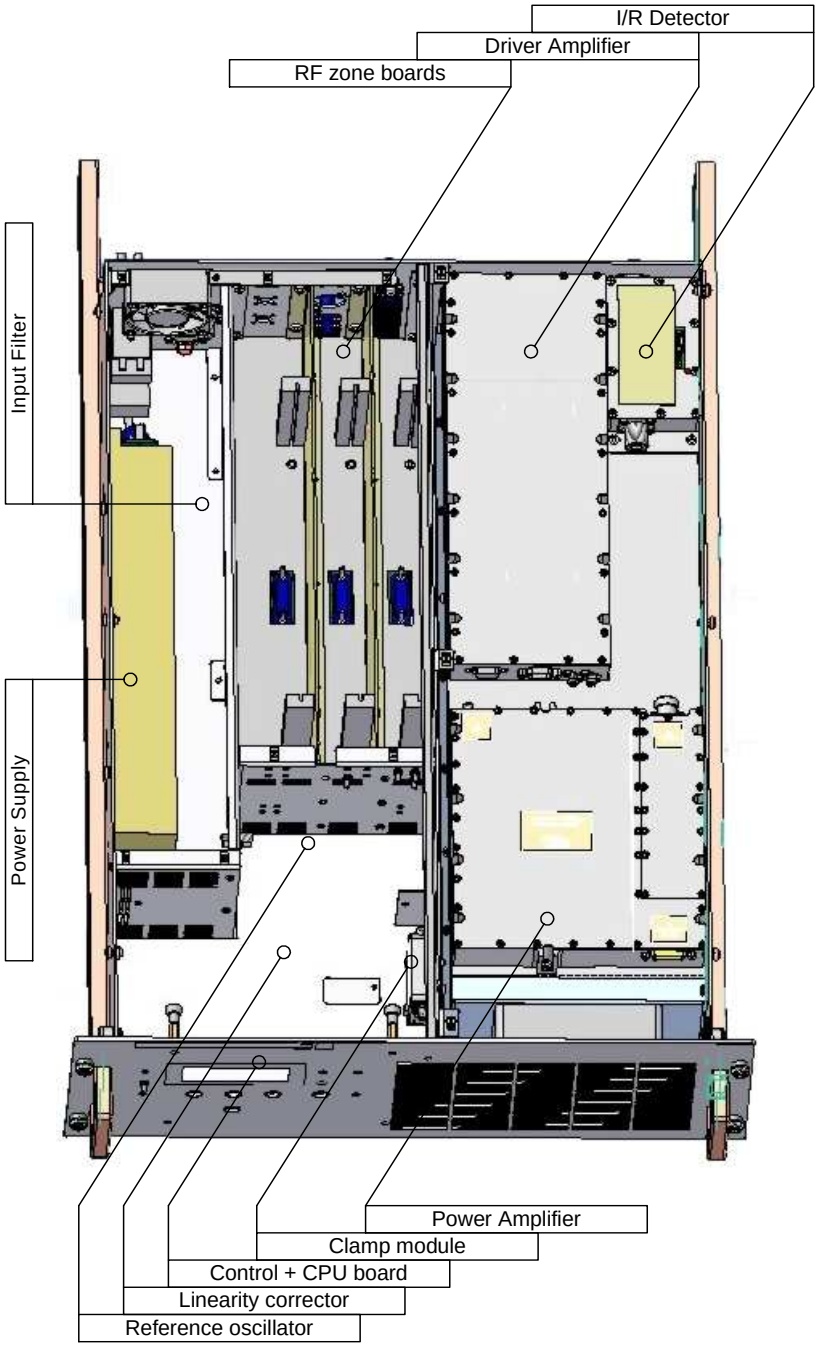


Figure 9.- Internal parts situation.

6.4. RF ZONE BOARDS SITUATION

For CGU100/HG the position of the signal processing boards inside the unit is as follows:

- SLOT 1 (S1): Echo-canceller.
- SLOT 2 (S2): Down-converter.
- SLOT 3 (S3): Up converter.

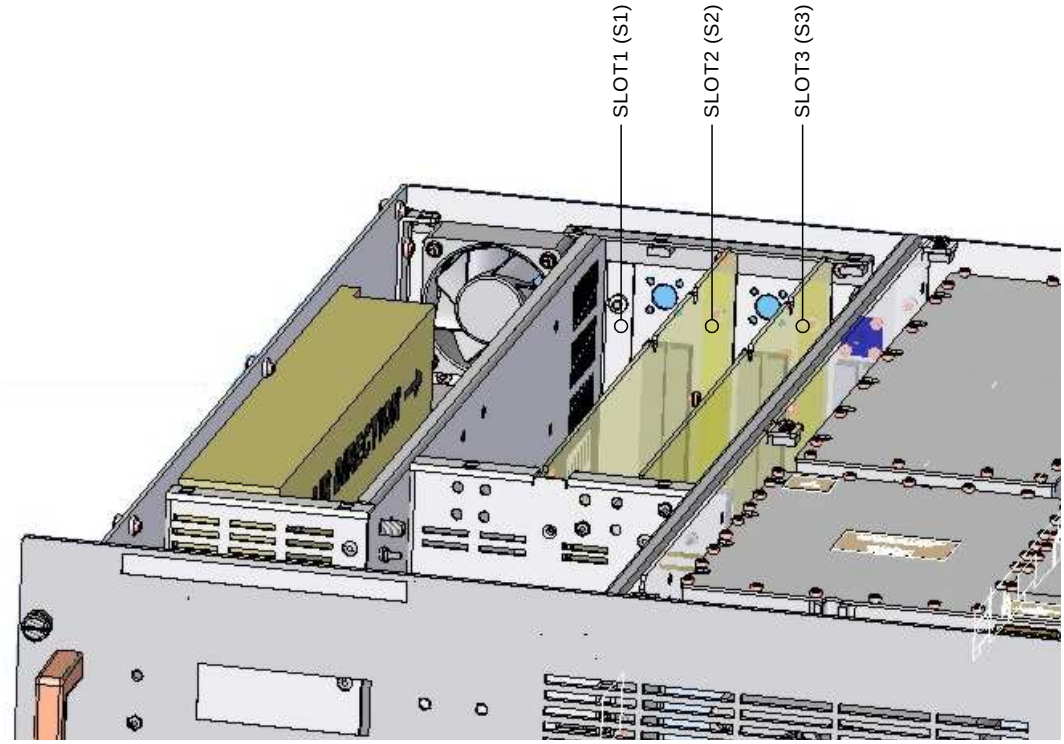


Figure 10.- RF slots nomenclature.

6.4.1. TEMPERATURE PROBES SITUATION

Four temperature measurements are shown in the control display. These measurements are obtained from the positions shown in Figure 11.

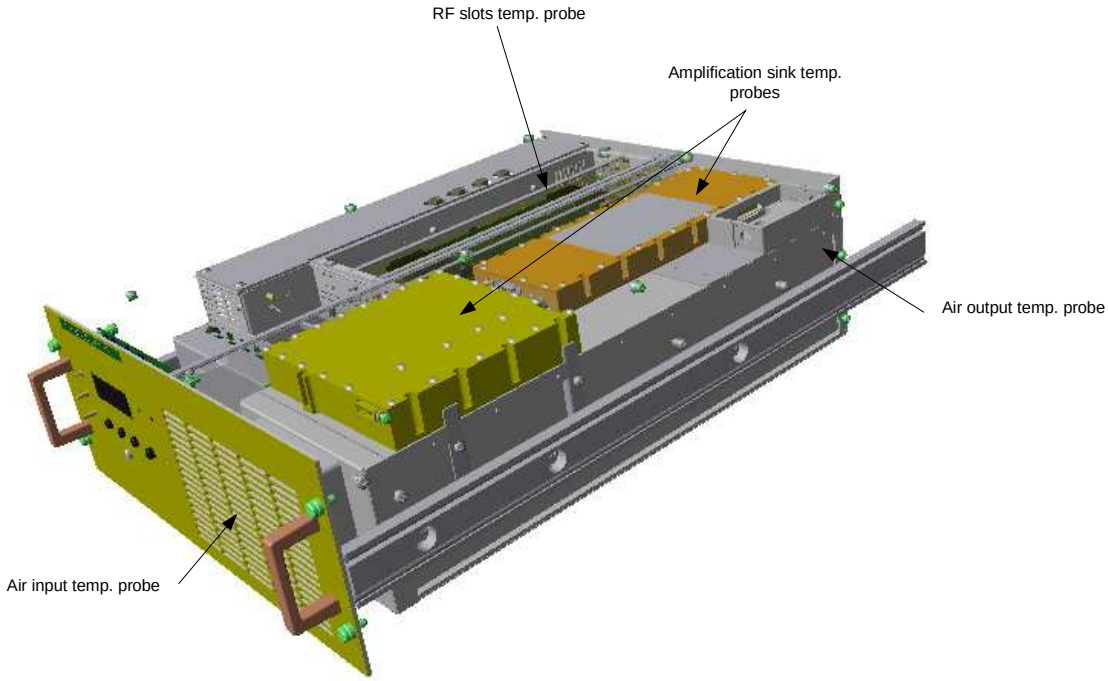


Figure 11.- Temperature probes situation.

6.5. INTERNAL LIDS

Inside the equipment there is an interconnection panel. This allows the RF and IF connection between the cards inserted into the three slots, the input channel filters, the linearity corrector, the reference oscillator and the front panel, depending on the different available versions. This panel has the connectors as shown in the last figure and two more on the side of the power supply cavity and input area. The notation input/output is made in regard of the slots. These connections are described as follow:

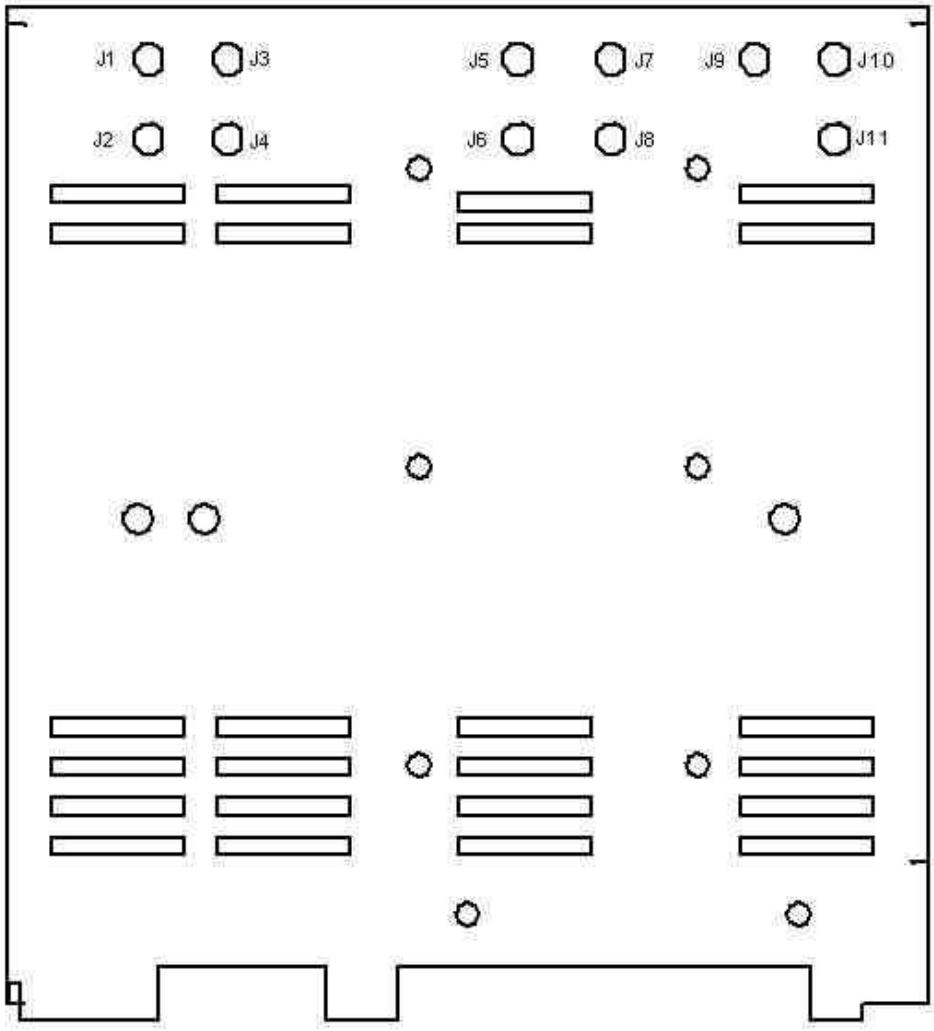


Figure 12.- RF interconnection internal panel.

- Slot S1 (Echo canceller).
    - J1. Free.
    - J2. Free.
    - J3. Free.
    - J4. Free.
- Slot S2 (Down-converter).
    - J5. RF input. From input filter.
    - J6. Free.
    - J7. IF output. To linearity corrector.
    - J8. Free.
- Slot S3 (Up-converter).
    - J9. IF input. From clamp module.
    - J10. 10Mhz input. From reference oscillator.
    - J11. Up converter local oscillator output sample. To frontal pannel.

The RF slots have a cover to ensure its shielding. Through this covers it is possible to make the required adjustments. The cover has a silkscreen print that represents each one of the three slots where the RF cards are inserted. It also has the required holes to access the adjustment points and switches that can be handled in each one of the boards. The silkscreen printed indicates the names of these adjustments and the matching type of the board, because the first and the second slots admit two types of different cards depending on the type of implemented equipment.

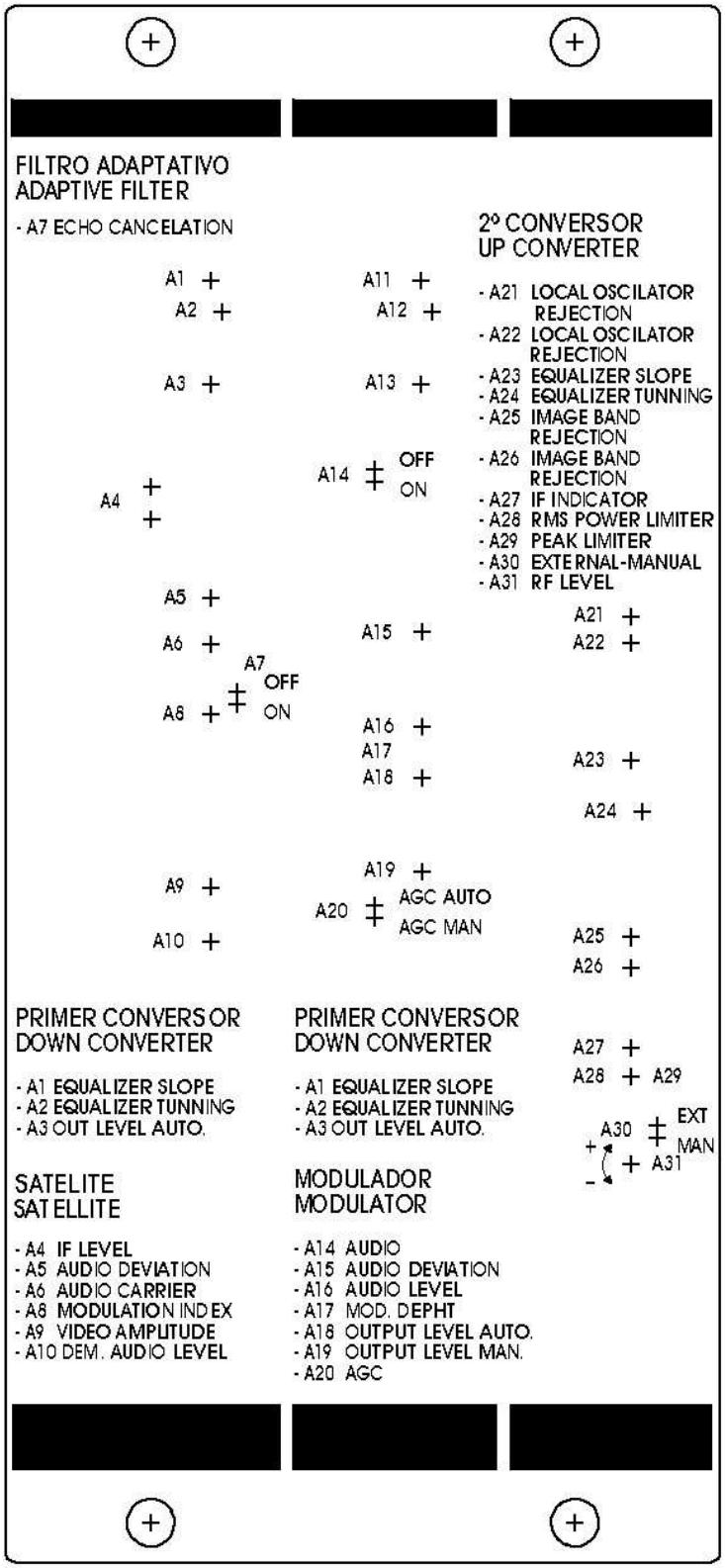


Figure 13.- RF Area lid.

6.6. UNIT RAILS

When the unit is inserted into the rack, the rails (drawer runners) fix the unit to avoid take it out by chance. To extract the Unit it must be unfixed. Next figure shows how two little levers allow to unfix the rails:

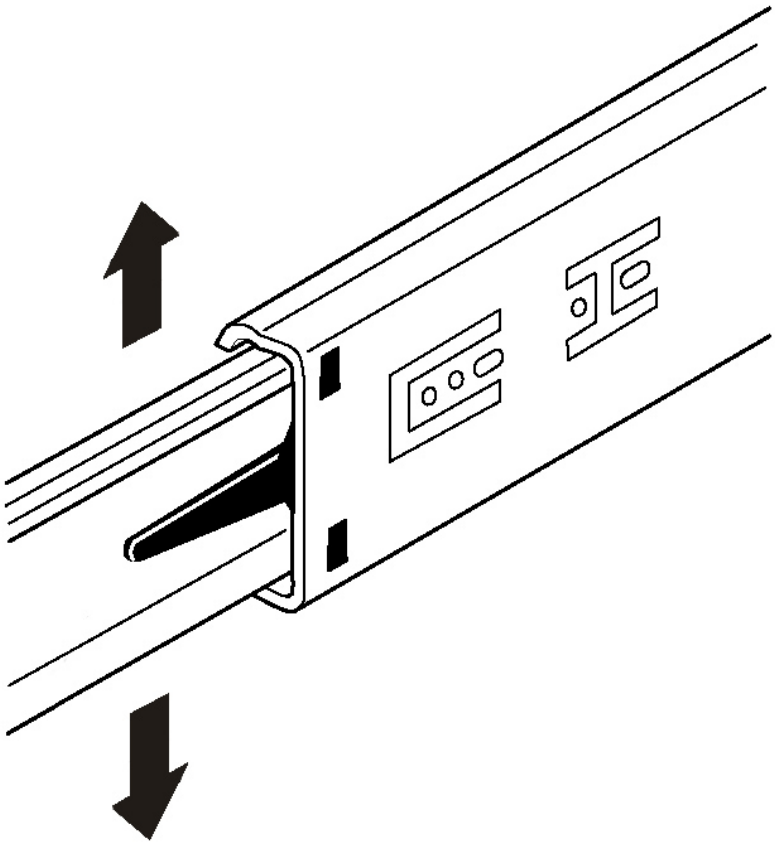


Figure 14.- Extraction of gap-filler unit from rack rails.

7. ELECTRONIC DESCRIPTION

The block diagram of the Gap-filler unit is detailed in this section.

Four block diagrams are included:

- **Complete block diagram:** The elements and connections between them of the whole system are sketched in Figure 10. This schematic does not contain information about the signals transmitted between elements (modules and boards) of the unit. This schematic contains all the input and output connectors of the unit. For clarity purposes, the information of the signals has been divided in three diagrams: RF signals, power supply signals and measurements and control signals.
- **RF Signal block diagram:** The path through the modules of the modulated signal containing the broadcasted information is shown individually in this scheme. Frequency and levels are indicated at each point. In case of sample paths, the value of coupling is also noted. The signal levels presented in this scheme are a reference value that must not be taken as an exact value since they are generic values for a Gap-filler unit. When precision adjusting for a signal level is required, the value in the diagram has a tolerance value.
- **Measurement and control block diagram:** All the connections between modules and boards containing control and indication information is shown in this block diagram. Also the output/input control Ethernet connector is shown.
- **Power supply block diagram:** In this diagram we can see the power supply distribution with the voltage values of each module and board. The voltage indication is presented as a nominal value. For exact value adjusting consult the measurements menu at the front panel control display.

These block diagrams are described in the following sections.

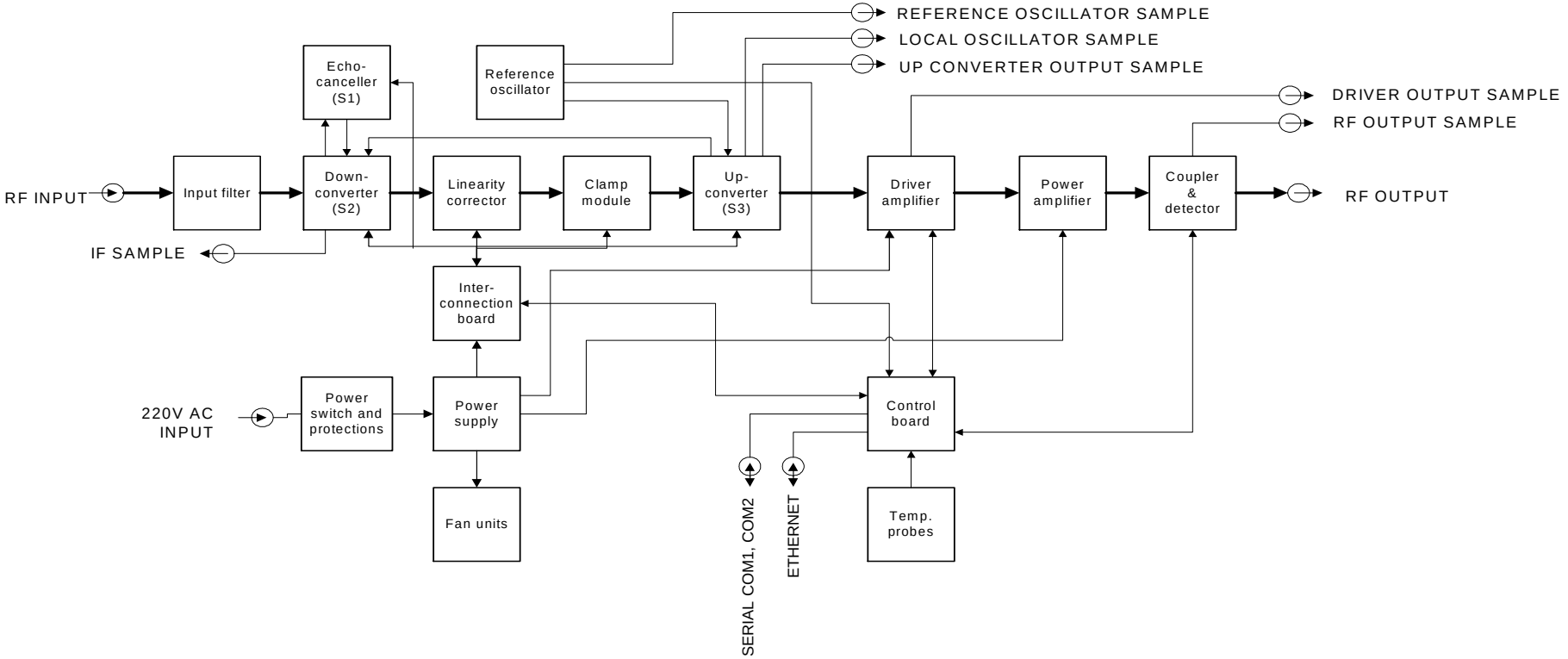


Figure 15.- Complete Gap-filler unit block diagram

7.1. SIGNAL PATH DESCRIPTION

RF input: RF input signals must be connected to the input connector. The input signal is filtered by means of a 4 pole passive filter in order to prepare the down-conversion input signal. *Down-converter* move the input signal to IF (the IF signal is inverted since it uses a LO with a higher frequency than the input signal).

IF processing: *Down-converter* also performs SAW filtering of IF signal. IF frequency equalization can be adjusted. *Echo-cancellation board* processing is situated inside the signal path of the down converter. In order to perform a good A/D conversion, the input level of *echo-canceller* board must be adjusted accurately to –15dBm. At the output of *down-converter* a coupler is used to obtain a IF signal sample at the back panel connector. The output of down-converter is connected to *linearity corrector* module that performs the pre-distortion of the IF signal to obtain a linear behavior of the whole signal path (including the amplification stages.). At the *up-converter* input, before moving to RF, IF level detection is performed. High level and low level detection is performed. IF frequency equalization can be adjusted at this point.

RF conversion: IQ modulator performs agile mixing of the IF signal. With the same LO of the *down-conversion* the signal is converted to RF frequency again. High rejection of IQ modulator spurious (LO rejection and image band rejection) can be adjusted. After conversion, an electronic attenuator is used to control the output level of the up-converter and, in consequence, the output power of the gap-filler unit. Following stages have fixed gain. This gain can be controlled internally by means a potentiometer or externally by means of I2C communication with the control board. In normal operation the gain is controlled by the control board. A sample of the *up-converter* output is connected to the back panel of the unit. Notice that this sample is still a pre-distortionated signal. Quality measurements can not be measured in this point. For CGU-50/HG, after *up-converter* module a *pre-amplification filter* is added in order to protect the power amplifier.

Amplification stages: The gain of final stages is divided in two amplifiers modules. A high gain *driver amplifier* is used first. For trouble-shooting purposes a sample is present at the output of this module. This sample is not wired to the back panel and the signal is still not linear. *Power amplifier* module obtains the desired output power.

Output power processing: After amplification stages a coupler is used in order to obtain an output sample at the back panel of the unit. At the same time have a forward and reversed power detectors obtain a voltage indication of both signals.

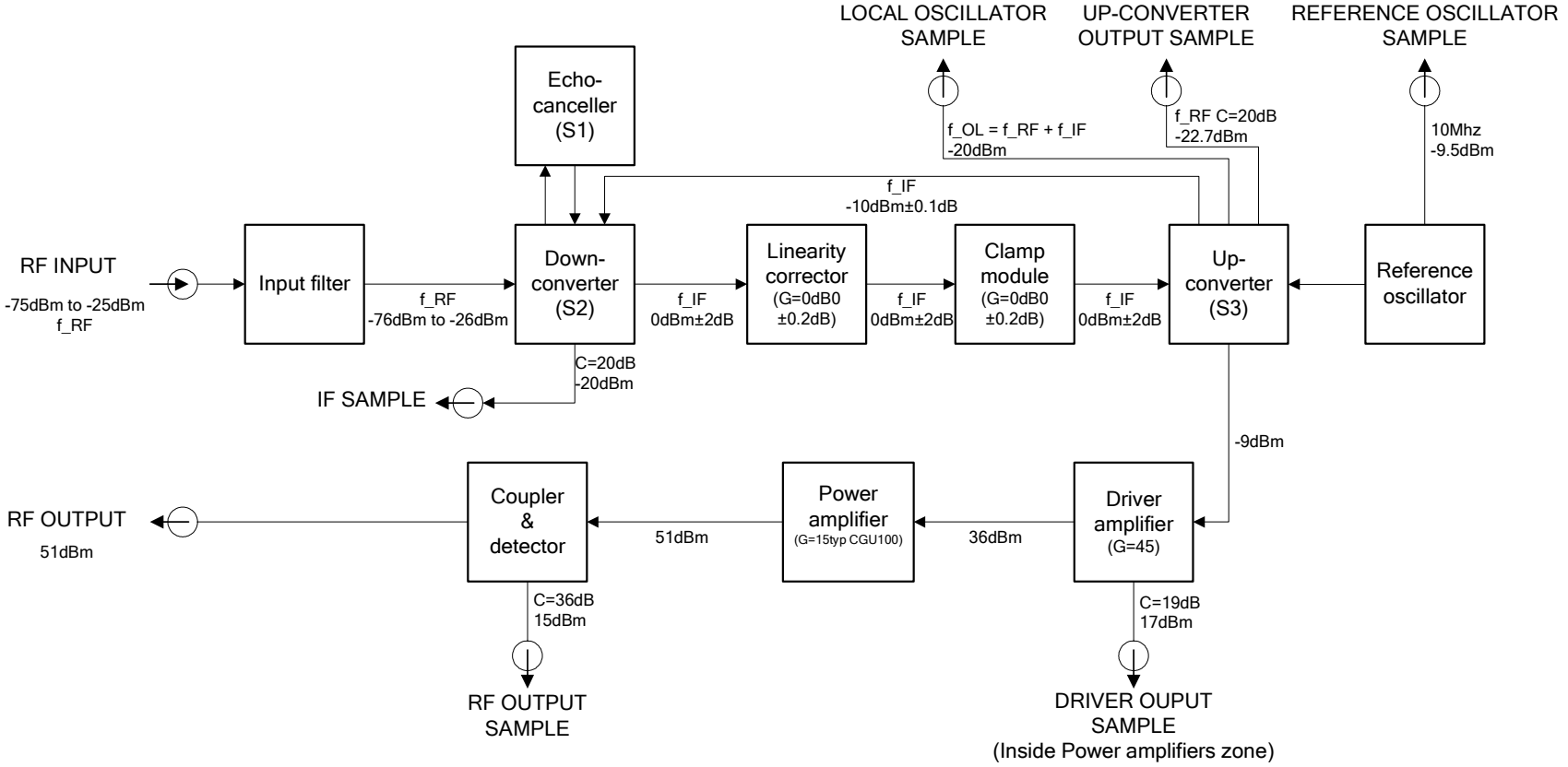


Figure 16.- RF Signal block diagram.

7.2. POWER SUPPLY DISTRIBUTION

Input AC connector provides protection in front over-currents and over-voltages. Three varistors and two fuses are used. The *power supply* module performs the AC-DC conversion. Two outputs are generated, power amplifier power supply voltage and 25.5V for the other boards and modules. *Power amplifier* supply voltage is 30V for CGU100/HG gap-filler unit. *Driver* amplifier module and fan units are supplied directly by means of 25.5V output. *Interconnection board* generates 12V for the *clamp module* and 24V from where all the remaining boards and modules (except of *coupler and detector module*) are supplied. *Coupler and detector* module uses +12V generated by *control and measurements* board. Consumption of all slot boards are sensed in *interconnection board*.

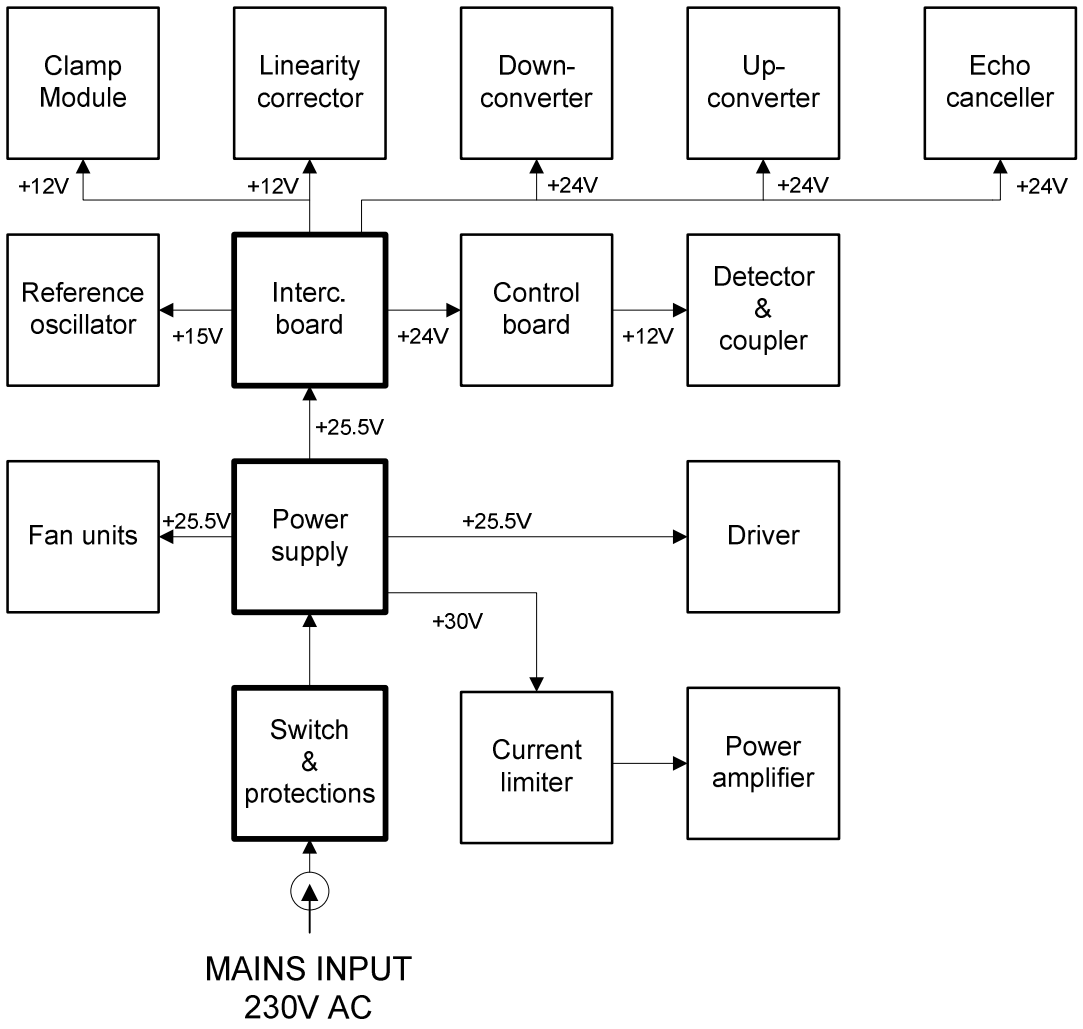


Figure 17.- Power supply distribution diagram.

7.3. CONTROL AND MEASUREMENTS

The functional behaviour of the gap-filler unit is controlled by the control and measurement boards. The functional connections between this board and the rest of modules and boards are described in Table 3.

Element	Relation description
Interconnection board	– All the control and measurement signals coming from slot boards pass through this board. – Slot boards current and voltage sensing is sent to control board.
Echo canceller	– Indication of alarms is sent to the control board. – Echo canceller switch OFF is displayed as an alarm in control menu
Down-converter	– IF AGC control voltage and MAN/AUTOMATIC selection is performed in control board. Manual gain of IF AGC is moved to control board.
Up-converter	– Local oscillator state (PLL locked or unlocked) is sent to control board. – IF presence indication is sent to control board. – I2C communication which allows up-converter gain adjustment is used between up-converter and control boards. SCL and SDA are connected.
Driver amplifier	– Driver amplifier consumption – Output forward signal detected voltage. – Reflected signal detected voltage.
Power amplifier	– No relation
Current limiter	– Voltage and current sensing of power amplifier is sent to control board
Reference oscillator	– Input signal locking state is sent to control board (Gap-filler units does not use this signal).
Temperature probes	– Temperature variable resistors terminals are connected to control board in order to calculate temperatures in different points of equipment.

Table 3.- Control and measurements signals brief.

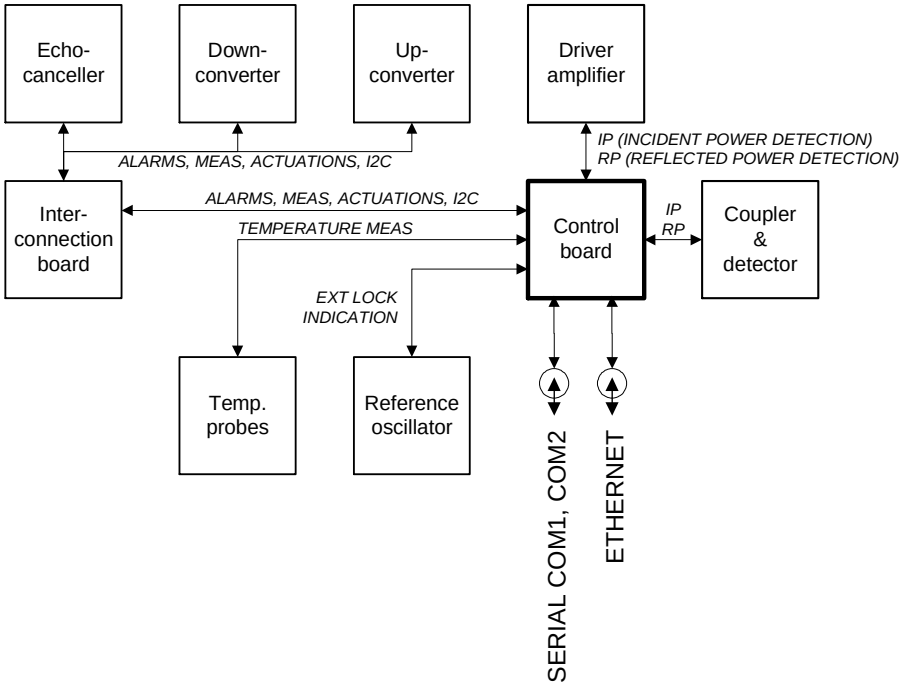


Figure 18.- Control and measurement block diagram.

The microprocessor based control system has the following characteristics:

1. Guaranteed operation of the equipment in case of microprocessor failure.
2. Local as well as remote continuous monitoring of the main equipment parameters with alarm indication.
3. Voltage measurements of the equipment.
4. Consumption measurements.
5. Temperature measurements in the most relevant points of the equipment.
6. Protection against over-temperature.
7. Forward and reflected power measurement.
8. Protection against output reflected power.
9. Output power automatic control. Protection against overdrive.
10. Detection of the input signal presence/absence.
11. Working hours indication.

8. TECHNICAL SPECIFICATIONS

Table 4.- Technical specifications CGU 20-50 HG FLO.		
PARAMETER	**VALUE**	**UNITS**
INPUT		
Frequency range	from 470 to 862 (BIV/V)	MHz
RF input signal range	from -75 to -25	dBm
RF Input impedance	50	Ω
RF input connector	N female	
OUTPUT		
Frequency range	from 470 to 862 (BIV/V)	MHz
RF output impedance	50	Ω
RF output connector	N female	
RMS power	25 o 50	Wrms
Output power variation	< 0,5	dB
SIGNAL QUALITY PARAMETERS		
Shoulders at central frequency ± 4,3 MHz (typ 25W)	-38 (typ)	dB
Shoulders at central frequency ± 4,3 MHz (typ 50W)	-36 (typ)	dB
Group delay variation	± 80	ns
Absolute delay	7.8 (BW=8MHz) 9.6 (BW=6MHz)	µs
(MER measurement performed with an input MER of 39dB)		
MER (-35dBm > Input level > -55dBm) (Gain margin = No echo)	32 (typ)	dB
MER (-35dBm > Input level > -55dBm) (Gain margin = 5dB)	31.5 (typ)	dB
MER (-35dBm > Input level > -55dBm) (Gain margin = 0dB)	31 (typ)	dB
MER (-35dBm > Input level > -55dBm) (Gain margin = -5dB)	29 (typ)	dB
MER (Input level = -25dBm) (Gain margin = No echo)	30 (typ)	dB
MER (Input level = -25dBm) (Gain margin = 5dB)	29.5 (typ)	dB
MER (Input level = -25dBm) (Gain margin = 0dB)	28 (typ)	dB
MER (Input level = -25dBm) (Gain margin = -5dB)	25 (typ)	dB
MER (Input level = -65dBm) (Gain margin = No echo)	29 (typ)	dB
MER (Input level = -65dBm) (Gain margin = 5dB)	28.5 (typ)	dB
MER (Input level = -65dBm) (Gain margin = 0dB)	28 (typ)	dB
MER (Input level = -65dBm) (Gain margin = -5dB)	26 (typ)	dB
Local oscillator phase noise at fOL ± 100Hz	<-80	dBc/Hz
Local oscillator phase noise at fOL ± 1KHz	<-94	dBc/Hz
Local oscillator phase noise at fOL ± 10KHz	<-96	dBc/Hz
Local oscillator phase noise at fOL ± 100KHz	<-102	dBc/Hz
OPERATION PARAMETERS		
Maximum gain margin	-10	dB
Operational maximum gain margin	≤ Isolation + 5	dB
Recommended gain margin	-5	dB
IF central frequency	36,15	MHz
Amplitude ripple (central frequency ± 3MHz)	± 1	dB
Frequency stability (de 0º a 45ºC)	± 5	ppm
Optional frequency stability	± 1	ppm
Ageing frequency stability (de 0º a 45ºC)	± 5	ppm / year

Table 4.- Technical specifications CGU 20-50 HG FLO.		
PARAMETER	**VALUE**	**UNITS**
Optional ageing frequency stability	± 0,1	ppm / year
Frequency selection offset	1	Hz
POWER SUPPLY		
Mains AC voltage (single phase)	85 a 265	VAC
Mains AC frequency	47 a 440	Hz
PFC	>0,95	
Mains Consumption 25W	400 @ 230V AC (typ)	W(VAC)
Mains Consumption 50W	650 @ 230V AC (typ)	W(VAC)
Varistors (55J)	S20K275	
Neutrum fuse and phase fuse	8	A
Power amplifier supply voltage	30,0 (typ)	V
Driver amplifier supply voltage	25,5 (typ)	V
+12V Voltage	12 (typ)	V
+24V Voltage	24 (typ)	V
50W power amplifier current	12 (typ)	A
25W power amplifier current	8 (typ)	A
50W driver amplifier current	4,6 (typ)	A
25W driver amplifier current	1,8 (typ)	A
+24V S1 Current (Slot1) (Echo canceller)	0,42 (typ)	A
+24V S2 Current (Slot2) (Down-converter)	0,42 (typ)	A
+24V S3 Current (Slot3) (Up-converter)	0,39 (typ)	A
MECHANICAL		
Size (WxHxL)	482,6x177x600	mm
Size (WxHxL)	19"x4Ux600mm	
Unit weight	30	kg
ENVIRONMENTAL		
Operating temperature margin	0 a 45	º C
Cooling system	Forced air	
Flow	100 (typ)	m3/h
Maximum operating altitude	2000	m
Optional high altitude operation	2500	m
Maximum relative humidity (a 35℃ without condensat ion)	95	%
SAFETY AND EMC		
Generic radio equipment ETS300489-1 and ETS 300489-14.		
Conducted and radiated CISPR22		
Radiated Field Immunity EN61000-4-3 (10V/m).		
Conducted immunity EN61000-4-6 (0.15-230MHz 10Vrms).		
Over voltage EN61000-4-5 (Surge transient 1kV, 2kV).		
Voltage gaps EN61000-4-11.		
Electrostatic discharges EN61000-4-2 (in touch 4kV, trough air 8kV).		
Fast transients EN61000-4-4 (1kV, 2kV).		
Harmonics EN61000-3-2 (optional).		
Flickers EN61000-3-3.		

Table 4.- Technical specifications CGU 20-50 HG FLO.		
PARAMETER	**VALUE**	**UNITS**
Safety: CE Mark (EN60215). UL Listed (NWGQ.E309028).		
Environmental conditions of ETS 300 019:		
Storage Class 1.2.(-25 a +55ºC) Without packing.		
Transport Class 2.3. (-40 a +70ºC).		
On service, class 3.2 (-5 a +45ºC).		
IP-20 (Vs Solids protection >12mm, no liquid protection)		

Table 5.- Technical specifications CGU100W HG FLO.		
Parameter	**Value**	**Units**
INPUT		
Frequency range	from 470 to 862 (BIV/V)	MHz
RF input signal range	from -75 to -25	dBm
RF Input impedance	50	Ohm
RF input connector	N female	
OUTPUT		
Frequency range	from 470 to 862 (BIV/V)	MHz
RF output impedance	50	Ohm
RF output connector	N female	
RMS power	100	Wrms
Output power variation	< 0,5	dB
SIGNAL QUALITY PARAMETERS		
Shoulders at central frequency ± 4,3 MHz	<-36	dB
(MER measurement performed with an input MER of 40dB)		
MER (-35dBm > Input level > -55dBm) (Gain margin = No echo)	32.5 (typ)	dB
MER (Input level = -25dBm) (Gain margin = No echo)	32 (typ)	dB
MER (Input level = -65dBm) (Gain margin = No echo)	30 (typ)	dB
MER (Input level = -45dBm) (Gain margin = 10dB)	32.7	dB
MER (Input level = -45dBm) (Gain margin = 5dB)	32.5	dB
MER (Input level = -45dBm) (Gain margin = 0dB)	31.7	dB
MER (Input level = -45dBm) (Gain margin = -5dB)	30.7	dB
MER (Input level = -45dBm) (Gain margin = -10dB)	27.5	dB
Local oscillator phase noise at fOL ± 100Hz	<-80	dBc/Hz
Local oscillator phase noise at fOL ± 1KHz	<-94	dBc/Hz
Local oscillator phase noise at fOL ± 10KHz	<-96	dBc/Hz
Local oscillator phase noise at fOL ± 100KHz	<-102	dBc/Hz
OPERATION PARAMETERS		
Maximum gain margin	-10	dB
Operational maximum gain margin	≤ Isolation + 10	dB
Recommended gain margin	-8	dB
IF central frequency	36,1	MHz
Amplitude ripple (central frequency ± 3MHz)	± 0.5	dB
Frequency stability (de 0º a 45ºC)	± 0.5	ppm
Optional frequency stability	± 0.1	ppm

Table 5.- Technical specifications CGU100W HG FLO.		
Parameter	**Value**	**Units**
Ageing frequency stability (de 0º a 45ºC)	± 0.5	ppm / year
Optional ageing frequency stability	± 0,1	ppm / year
Frequency selection offset	1	Hz
POWER SUPPLY		
Mains AC voltage (single phase)	84 a 265	VAC
Mains AC frequency	47 a 63	Hz
Mains Consumption, Pout = 100W (50dBm)	900/960 @ 230V AC	W/VA
	920/925 @ 125V AC	W/VA
Mains Consumption, Pout = 125W (51dBm)	960/1020 @ 230V AC	W/VA
	970/975 @ 125V AC	W/VA
Varistors (55J)	S20K275	
Neutrum fuse and phase fuse	8	A
100W Power amplifier supply voltage	30 (typ)	V
Driver amplifier supply voltage	25.5 (typ)	V
+12V Voltage	12 (typ)	V
+24V Voltage	24 (typ)	V
100W power amplifier current	21 (100W) (typ)	A
Driver amplifier current	3 (typ)	A
+24V S1 Current (Slot1) (Echo canceller)	0,35 (typ)	A
+24V S2 Current (Slot2) (Down-converter)	0,42 (typ)	A
+24V S3 Current (Slot3) (Up-converter)	0,39 (typ)	A
MECHANICAL		
Size (WxHxL)	482,6x177x600	mm
Size (WxHxL)	19"x4Ux600mm	
Unit weight	35	Kg
ENVIRONMENTAL		
Operating temperature margin	-5 a 45	º C
Cooling system	Forced air	
Flow	100 (typ)	m3/h
Maximum operating altitude	2000	m
Optional high altitude operation	2500	m
Maximum relative humidity (a 35℃ without condensat ion)	95	%
SAFETY AND EMC		
Generic radio equipment ETS300489-1 and ETS 300489-14.		
Conducted and radiated CISPR22		
Radiated Field Immunity EN61000-4-3 (10V/m).		
Conducted immunity EN61000-4-6 (0.15-230MHz 10Vrms).		
Over voltage EN61000-4-5 (Surge transient 1kV, 2kV).		
Voltage gaps EN61000-4-11.		
Electrostatic discharges EN61000-4-2 (in touch 4kV, trough air 8kV).		
Fast transients EN61000-4-4 (1kV, 2kV).		
Harmonics EN61000-3-2 (optional).		
Flickers EN61000-3-3.		
Safety: CE Mark (EN60215). UL Listed (NWGQ.E309028).		
Environmental conditions of ETS 300 019:		
Storage Class 1.2.(-25 a +55℃) Without packing.		

Table 5.- Technical specifications CGU100W HG FLO.		
Parameter	**Value**	**Units**
Transport Class 2.3. (-40 a +70ºC).		
On service, class 3.2 (-5 a +45ºC).		
IP-20 (Vs Solids protection >12mm, no liquid protection)		

9. CONTROL SOFTWARE DESCRIPTION

***IMPORTANT NOTE**: This chapter explains the user interface of the 100W gap fillers equipment and, therefore, is directly related to the software version which it applies to. At the moment, the 97A0577/FLO (CGU20-50-100/HG FLO embedded web) device is controlled by the 50N0136 software code. Please, ask for the corresponding interface description update whenever a software upgrade is performed on the equipment.*

9.1. DISPLAY AND KEYBOARD

The user interface has been implemented by means of a four-line retro-illuminated "LCD" display and a four-button keyboard, both placed in the left side of the front panel of the equipment. The display shows the measurements, settings, and menus, as well as any warning or alarm that might be detected on real-time. Therefore the state of the unit can always be looked up or configured, not only in a remote way, but also locally thanks to the keyboard and the LCD.

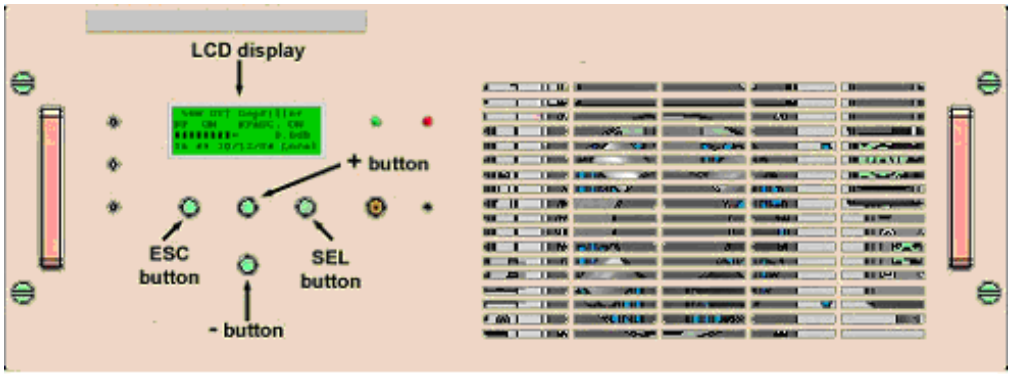


Figure 19.- User Interface: LCD display + 4-button keyboard.

9.1.1. INFORMATION IN THE DISPLAY

Depending on the selected menu or submenu, the information that is displayed on the LCD varies. However, the software has been designed in order to achieve a user-friendly interface and, in consequence, each of the four lines has a special functionality (which of course depends on each particular screen). Except for the root menu screen, which is somehow particular, the information displayed in the four lines can be summarized the following way:

1. 1st line: displays the name of the menu/submenu.
2. 2nd and 3rd line: can be used whether to display the names of the menus (as well as its scrollbars), and/or display information (parameters values, status information, process information, etc) in case of a final screen.
3. 4th line: unless it is used to display information (parameters values, status information, process information, etc) in a final screen, the 4th line shows the time, date and the state of the control (REMOTE / LOCAL). In case that

an alarm or warning is detected in the equipment, the 4th line is used to display the alarms and warnings in a rotary way.

9.1.2. KEYBOARD NAVIGATION

The 4-button keyboard can be used for navigating through the menu tree as well as to modify any device parameter when needed. As indicated in the silkscreen printing, the name of the four buttons are: “ESC”, “SEL”, “+” and “-”. These buttons can perform the following actions:

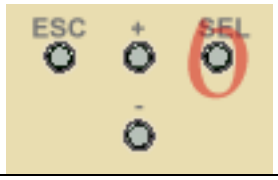
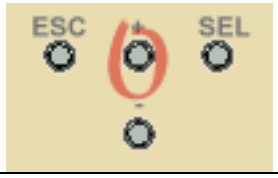
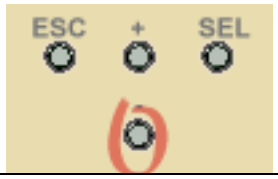
	When navigating through menus: Selects a menu, and displays its screen. In other words: descends a level of the tree menu. When editing parameters: Enables the edition of the value of a parameter, or validates and answer when the user is requested for a YES/NO question.
	When navigating through menus: Unselects a menu, and displays its parent menu screen. In other words: ascends a level of the tree menu. When editing parameters: Cancels the edition of the value of a parameter, or invalidates and answer when the user is requested for a YES/NO question.
	When navigating through menus: Sets focus to the previous submenu of the actual menu. In other words: ascends a position in the tree menu. When editing parameters: Switches between different possible options or increments a digit in case of editing a numeric value.
	When navigating through menus: Sets focus to the next submenu of the actual menu. In other words: descends a position in the tree menu. When editing parameters: Switches between different possible options or decrements a digit in case of editing a numeric value.

Table 6.- Explanation of the buttons of the keyboard.

Please, when navigating along the submenus of a menu with the “+” and “-” keys, take into account that the menus layout is not circular (e.g., the last submenu of a menu is not followed by the first submenu of the same menu). This can be clearly seen on screen thanks to the following icons:

	The focus is set on the first line of the actual menu and, therefore, there is no previous accessible line.
	The previous line is accessible.
	The next line is accessible.
	The focus is set on the last line of the actual menu and, therefore, there is no following accessible line.

Table 7.- Scrollbar icons

9.2. USER INTERFACE MENU

The software has been organized in a tree-menu format, so that its operation becomes intuitive and easy-to-use.

Once the equipment is switched on, a first boot screen appears on the display, which is shortly after replaced by the root menu screen. From this root menu screen, 3 main menus are available:

- MEASUREMENTS MENU: Here, several parameters of the equipment can be inquired:
    - Power measures
    - Voltage measures
    - Current measures
    - Temperature measures
    - General status indicators of the device
- SERVICE MENU: Can be used to look up the different control settings and parameters, or even adjust them if the equipment is set to local mode.
    - Control parameters (Remote or local mode, SW version, Language, and RF, LO state)
    - Output RF AGC parameters: State (ON/OFF), up-converter and output gains.
    - Up converter parameters: Frequency, gain adjust settings and auto-calibration option.
    - IP settings: IP and gateway addresses, as well as subnet mask.
    - Change profile
    - Time set and timer consultation.
- IP STATUS: provides easy and fast access to look up the state of the Ethernet link, as well as to the value of the IP and gateway addresses, and the subnet mask.

A more concise explanation of the different screens and settings of the software will be detailed in the next sections.

SERVICE NOTE:	The LCD screen turns into inactivity mode (i.e., it displays no intensity at all) once there have been no keyboard or remote orders for a period of time of 10 minutes. Once in the sleep mode, the LCD screen will immediately activate again in case of a remote order or a local keyboard change. After the LCD awakes, the root menu screen is shown on the LCD, despite of whichever menu was being shown just before the LCD deactivation.

10. TROUBLESHOOTING

This section describes alarm situations which could occur in the Gap-Filler unit. Some of them can be solved by operation and some of them need for a module substitution, in this last case, the information contained here will lead to found the failed module. This chapter tries to be a fast tool, helpful when solving common problems found and based on the experience record of the company.

The information is divided in several alarm situation diagrams which should be followed in order to solve the problem. To decide which diagram has to be used check the first block where the problem or/and the alarms present in the unit control display.

During in-site trouble-shooting is recommended to have a copy of the measurements performed in the “Factory Measurements Test” delivered with the documentation of the unit. This information will help finding anomalous behaviours of the unit.

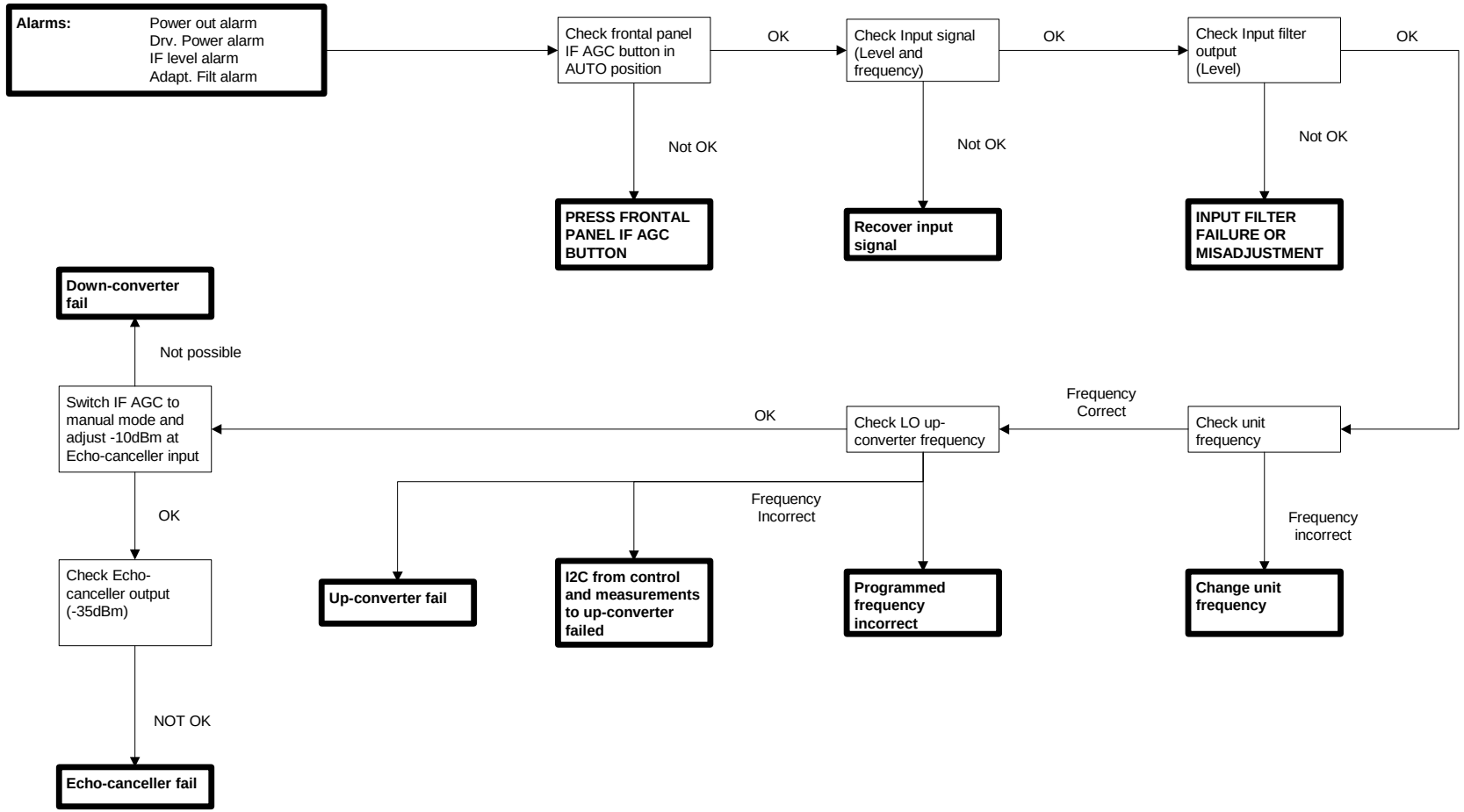


Figure 20.-Troubleshooting guide 1

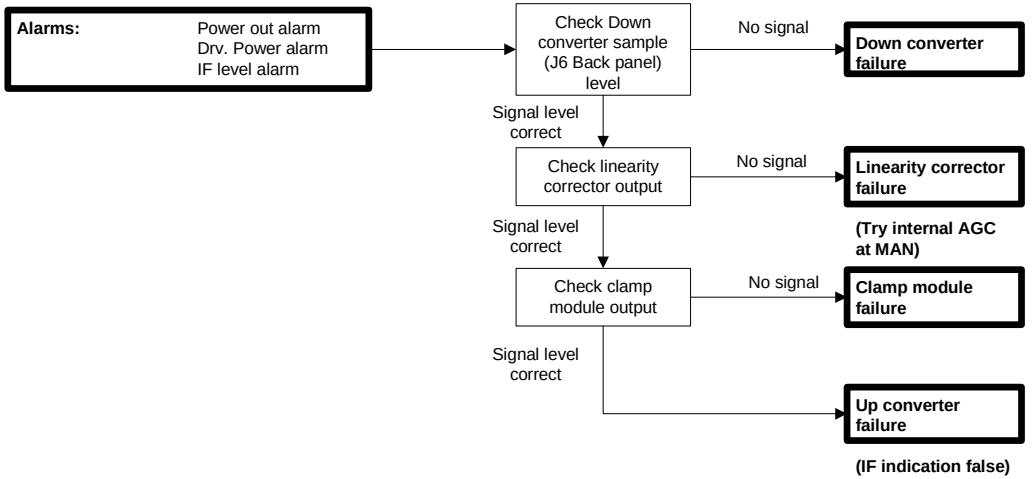


Figure 21.-Troubleshooting guide 2

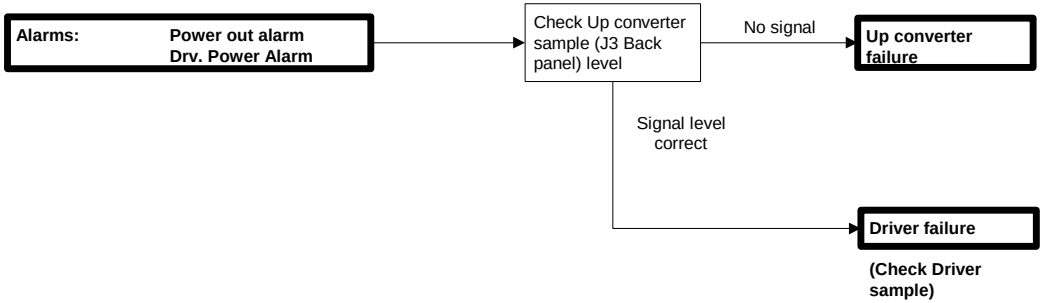


Figure 22.-Troubleshooting guide 3

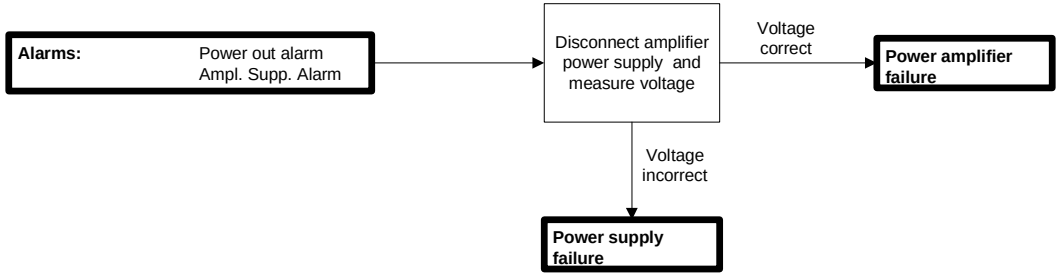


Figure 23.-Troubleshooting guide 4

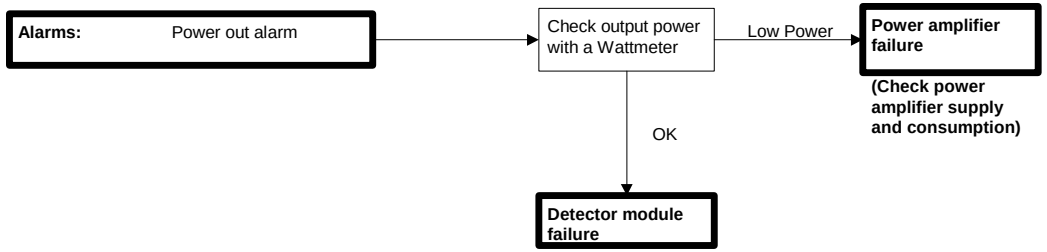


Figure 24.-Troubleshooting guide 5

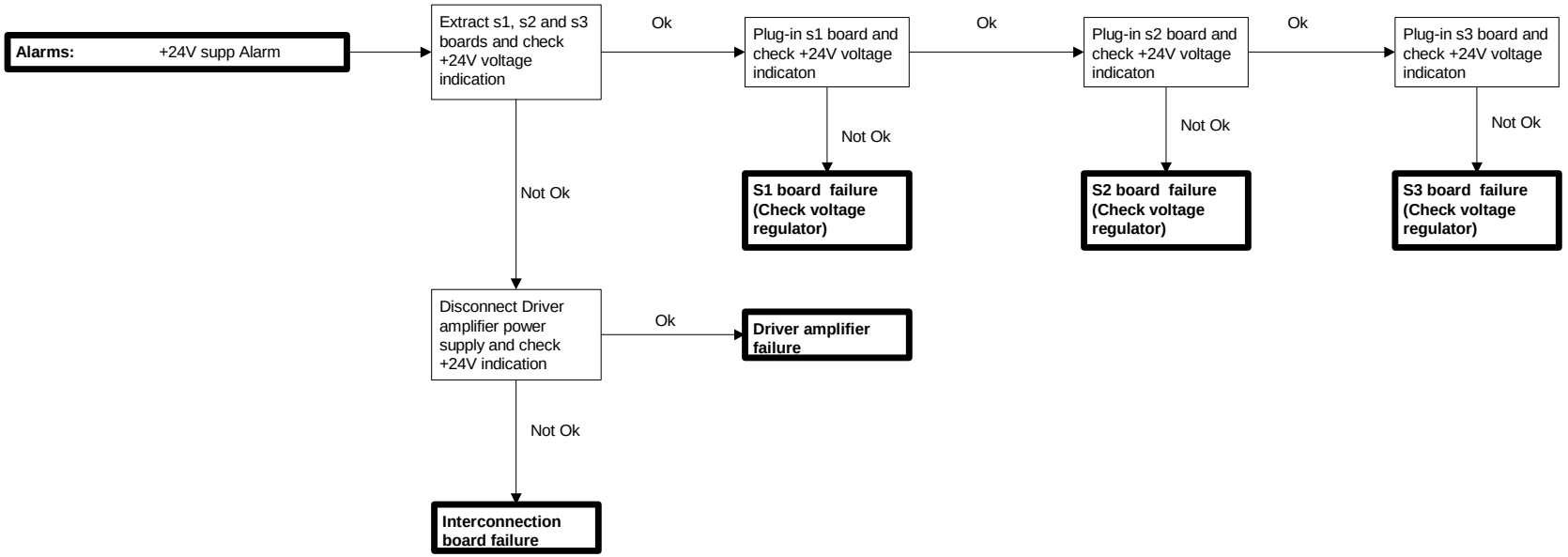


Figure 25.-Troubleshooting guide 6

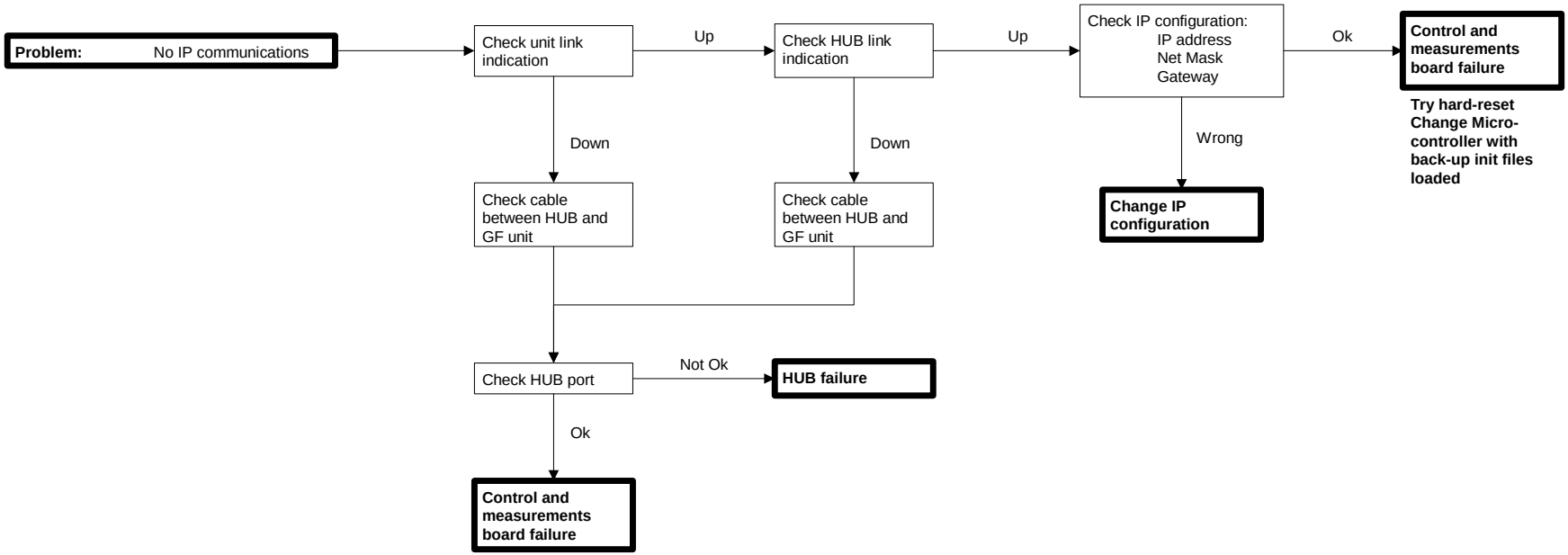


Figure 26.-Troubleshooting guide 7

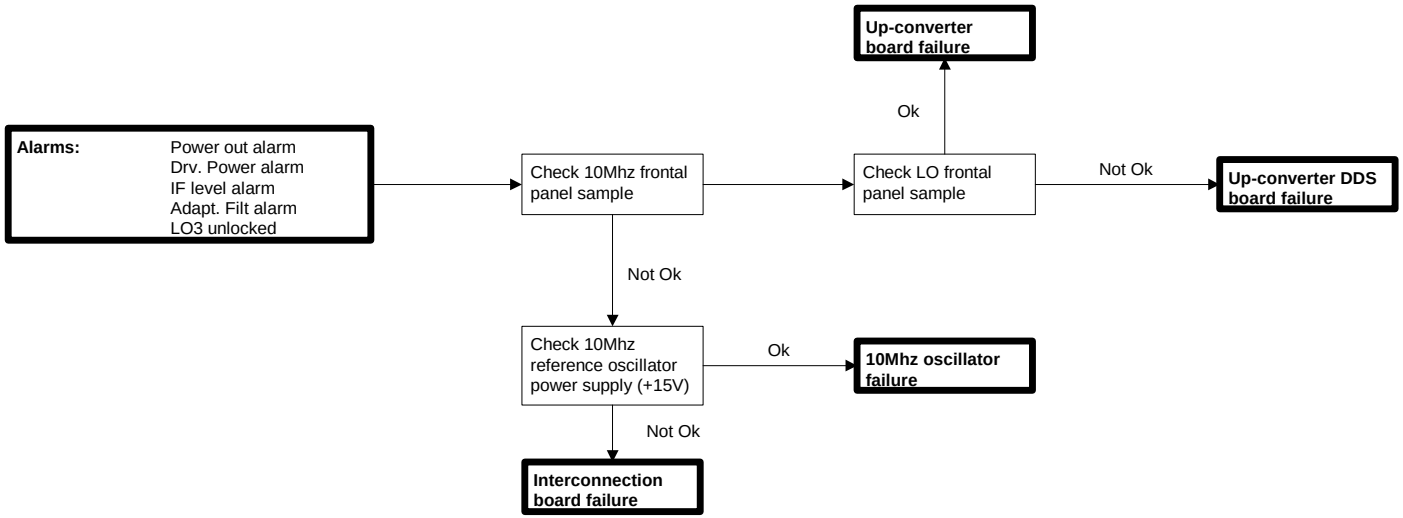


Figure 27.-Troubleshooting guide 8

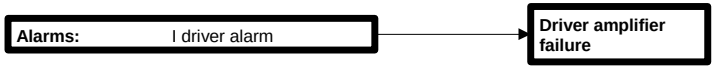


Figure 28.-Troubleshooting guide 9

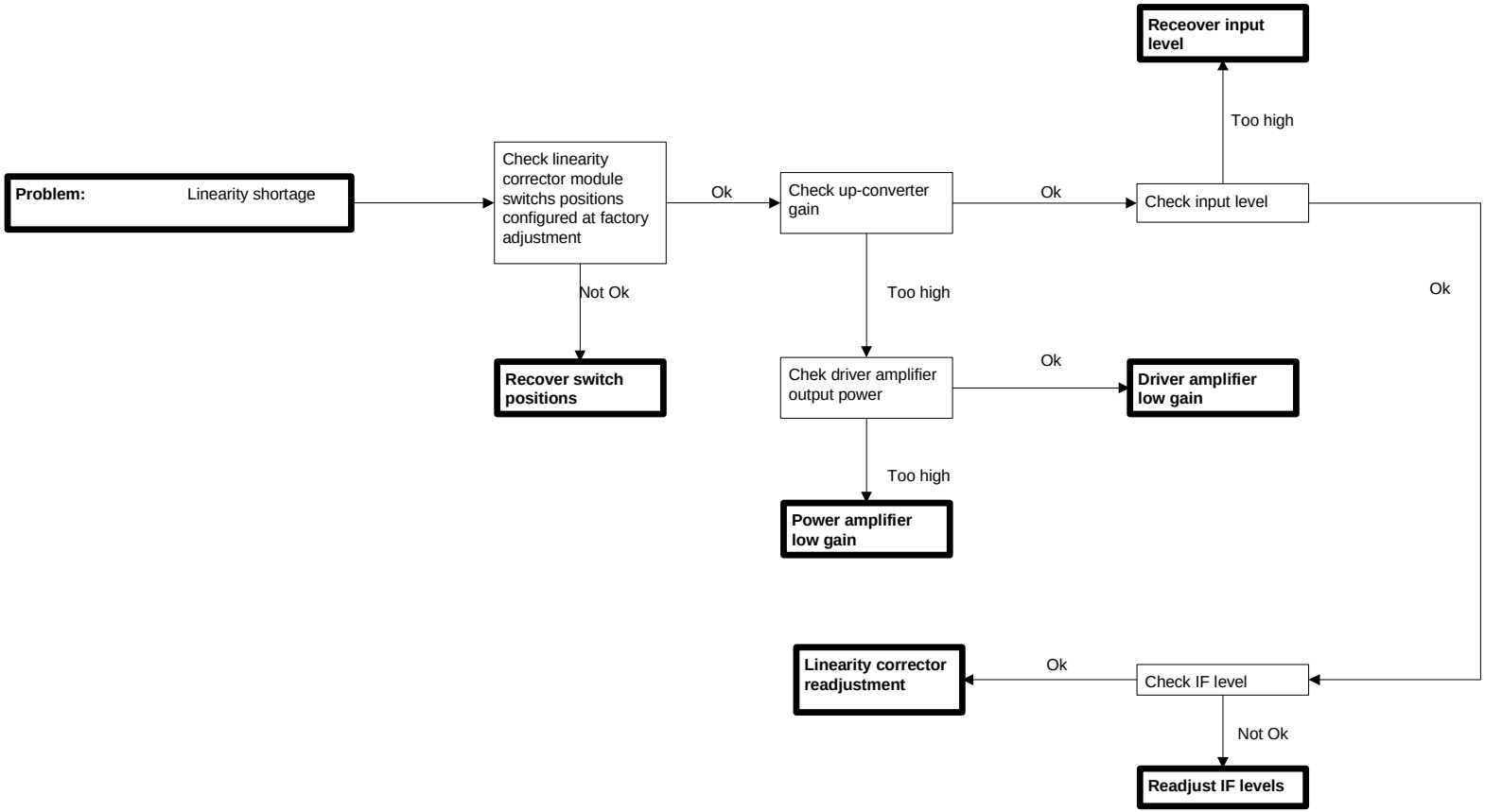


Figure 29.-Troubleshooting guide 10

11. SNMP MANAGEMENT

11.1. SNMP AGENT IN MIER COMUNICACIONES BROADCAST UNITS.

11.1.1. INTRODUCTION

Mier Comunicaciones 'broadcast' units incorporate an Ethernet 10Base-T interface for external management.

Through this interface different services and IP protocols are implemented, easing the handling and maintenance of the device. Among these, FTP protocol for a fast and efficient update of the files in the equipment, or telnet for other several services.

Some units have implemented a small Web server which allows an easy and intuitive access to the different parameters from the equipment, as well as to act on the same one. The user will only need a computer connected to the network, an explorer with qualified Java, and to know the equipment IP address to accede to the same one through the explorer. The critical options are, as it is done with other protocols, password-protected.

Another protocol, implemented optionally in the equipment is SNMP (Simple Network Management Protocol). The SNMP Agent is embedded in the unit, and, by means of SNMP protocol, provides access and control of the basic parameters of the system.

The next table gives a relationship between SW versions of the equipment, the embedded SNMP Agent version, and the MIB revision to which it makes reference.

Unit Version	SNMP Agent Version	MIB revision
< v1.42	"v2C 1.1C"	Revision 2
v1.42 to v1.47	"v2C 1.2C"	Revision 3
> v1.48	"v2C 1.3C"	Revision 4

11.1.2. MIER COMUNICACIONES BROADCAST UNITS MIB DESCRIPTION

The MIB (Management Information Base) associated to the broadcast units of MIER Comunicaciones is structured in different folders in a modular way.

This MIB is generic, and applies to all compact units (analog and digital transmitters, transposers and gap-fillers). The MIB also implements all the common objects and those that are only specific for some type of equipment.

For a specific unit only a subset of these MIB objects will apply, and the rest won't have any meaning for the given unit. Please, review the tables on next sections with the MIB entries and the kind of units they apply to.

11.1.3. READ AND WRITE COMMUNITIES

The SNMP agent has implemented read and write communities associated to the **GET** and **SET** actions of SNMP Protocol. These communities are text values. The values are '*public*' and '*private*' by default.

The assigned values to these communities are stored on **CHIP.INI** file. One way to modify them is editing directly this file and reload it in the unit by means of FTP

11.1.4. TRAPS DESCRIPTION.

The Traps have one unique OID and different variable fields incorporating additional information, such as severity degree, object OID that has caused the alarm, sequence number, etc.

NOTE: Boldface items in this table only apply to **MIB revision 4** and onwards.

Table 8.- TRAPS description

#	DESCRIPTION
1	"Bus error" (Mier Bus communication error)
2	"Bus OK" (The communication with Mier Bus is recovered)
3	"Output power error" (Output Power Alarm)
4	"Output power OK" (The Output Power Alarm is deactivated)
5	"Output return loss error" (Return loss Power Alarm)
6	"Output return loss OK" (The Return Loss Power Alarm is deactivated)
7	"2nd converter PLL unlocked" (LO3 lock Alarm)
8	"2nd converter PLL locked" (LO3 lock Alarm is deactivated)
9	"Adaptative filter error" (Adaptative filter Alarm)
10	"Adaptative filter OK" (The adaptative filter Alarm is recovered.)
11	"Cannot connect to time server" (The synchronization with the Timeserver is not possible)
12	"Restablished connection to time server."
13	"Device is in Local Control mode."
14	"Device is in Remote Control mode."
15	"External reference input error"
16	"External reference input OK"
17	"Input air temperature error"
18	"Input air temperature OK"
19	"Amplifier temperature error"
20	"Amplifier temperature OK"
21	"Input signal error"
22	"Input signal OK"
23	**"User initiated command: RFOFF"**
24	**"User initiated command: RFON"**

(In successive Agent and MIB versions, more traps can be added)

An OID to the trap variables, which describes the object that caused this alarm, has been added.

Normally, for each trap code there will be an OID field. Nevertheless, for each OID field, there can exist more than one trap code. For instance, codes 7 (LO3 lock

Alarm) and 8 (unit recovered from an OL3 lock alarm) refer to different states of the same object:

```
Mierexc2ndConverterPLLLockStatusAlarm ::={ mierExciterAlarmEntry 622 }
```

11.1.5. HISTORY OF SENT TRAPS

SNMP protocol is based on UDP, so it is not connection-oriented. It means that, in case of some transitory problem in the IP transport network or for some reason the SNMP managing was temporarily unavailable, and during this interval the SNMP agent sent some trap to this manager, this one would be lost, and the SNMP Agent would not have any way to know wether this trap has arrived to its destination or not.

For that reason, a sequence number and/or index are sent within each trap, which can help to the manager to find out if some trap has been lost between two consecutively received traps. On the other hand, the Agent keeps the last N traps (the N value can vary depending on the Agent implementation or version) in a buffer or cyclical queue so that if the manager receives 2 traps with non-consecutive sequence numbers, it can always query the SNMP Agent about the N sent traps and thus to recover those ones which probably missed.

The buffer or register of the latest sent traps is not persistent (is not saved in non-volatile memory) therefore will be reinitiated whenever the agent starts.

It is also possible to view the latest sent traps through the telnet interface. Each time key 'L' is pressed, the device sends through this interface the latest traps that have been sent.

11.1.6. PARAMETERS CONFIGURATION OF THE SNMP AGENT

Of general way, the configurable parameters of SNMP agent in the unit reside in the [SNMPD] section of CHIP.INI file. Some examples of these parameters are:

Table 9.- CHIP.INI configuration file parameters.

INPUT	OUTPUT EXAMPLE	DESCRIPTION
SYSNAME	100W-GapFiller SNMP-Agent	Value to assign to the MIB variable 'SysName'.
SYSLOCATION	Mier,S.A.	Value to assign to the MIB variable 'SysLocation'
SYSCONTACT	www.mier.es	Value to assign to the MIB variable 'SysContact'
SERVICENAME	Collserola TV3	Value to assign to the MIB variable 'miercfgServiceName'
READCOMMUNITY	Public	Read Community.
WRITECOMMUNITY	Private	Read/Write.Community
ENABLEAUTHTRAP	2	Indicate if the agent will send an special autentification error trap each time an SNMP query with the wrong community.

Table 9.- CHIP.INI configuration file parameters.		
INPUT	**OUTPUT EXAMPLE**	**DESCRIPTION**
PASSWORD	PASSWORD	(Not used for SNMP)
TRAPIP0....4	192.168.69.87	It allows to define the 'Trap Receivers', IP adresses (up to 5) of the managers where the traps are sent to. It is possible to have less than 5 entries (or any).
TIMESRV	0.0.0.0	IP address of the server which implements the TP protocol to allow the agent to recover date/time when start-up. If the entry doesn't exist (or its value is 0.0.0.0), the agent won't do any action. If the Agent synchronizes with the Time Server when it starts, it will get its time reference (plus the OFFSET) and modify its own time according to this value
OFFSET	0	Offset, in hours, from the local time to the time given by the Time Server. If this value does not exist, it will be assumed as 0.
TRAPINHIBIT	1	When value=1 the SNMP agent will keep on sending traps even if the unit is in local mode, or it will stop sending traps (value=2), but the ones which indicate change from REMOTE to LOCAL and visa-versa.
TRAPMASKDISABLE	0	Bit-Mask value which allows to individually activate or block the sending of some traps. It is described individually later.

NOTE: The assigned values to the CHIP.INI entries, even when they are text chains, are without simple nor double quotation-marks.

IMPORTANT: Please never modify other contained text chains in the CHIP.INI file, because they can be for internal use and it could cause a fatal error in the device.

Trap receivers.

In SNMP protocol, the Agent sends the answers to SNMP requests (if the communities are correct) to IP addresses where the manager who sent the requests is.

When sending traps, the Agent must have a list of adressees for this trap, because these ones have being originated by the same agent asynchronously. This list can store up to 5 different IP addresses, and it is stored in CHIP.INI file. It can also be edited and loaded through FTP.

Enabling/Disabling traps on an individual basis

By means of the *TrapMaskDisable* object, the user can assign a mask that allows enable or disable each one of the possible traps specifics of the system. The object syntax is a bit-mask, for this reason each trap could be disabled if the corresponding bit to its position (starting in the less representative bit) is on. For example, if we have

```
TRAPMASKDISABLE=12 (values in decimal format)
```

The binary representation of 12 = 00001100b

We are disqualifying the traps 3rd and 4th (counting zeros and ones from right, according to indexing by mieralmCode), that in this case will be:

```
Output Power error
Output Power OK.
```

This object has read/write permissions, and is ‘persistent’

The programmed value for this option is saved in the input `TRAPMASKDISABLE` from the [SNMPD] group, within CHIP.INI file, that is in the same Agent. It can be modified uploading the file, editing it and returning it to the device by means of FTP protocol.

11.2. MIB FIELDS AND STRUCTURE (REVISION 4)

The hierarchic structure of the MIB of Mier Comunicaciones is described below. Boldface entries are described next in form of table with all their fields and the corresponding identifiers:

Mier Comunicaciones S.A. (1.3.6.1.4.1.13531)

mierGeneric (1)

- mierConfigurationMIB (10) *1.3.6.1.4.1.13531.1.10*
- mierProxyMIB (100) *1.3.6.1.4.1.13531.1.100*
- mierAlarmMIB (1000) *1.3.6.1.4.1.13531.1.1000*

mierBroadcast (2)

- mierExciterMIB (10)
  - mierExciterTable (1)
    - **mierExciterEntry** (1) *1.3.6.1.4.1.13531.2.10.1.1*
  - mierExciterAlarmTable (10)
    - **mierExciterAlarmEntry** (1) *1.3.6.1.4.1.13531.2.10.10.1*

11.2.1. GENERIC

ALARM:

Table 10.- Generic alarm fields

FIELD	ID
mieralmTrapTable	1.3.6.1.4.1.13531.1.1000.1
mieralmTrap	1.3.6.1.4.1.13531.1.1000.1.1
mieralmTrapEntry	1.3.6.1.4.1.13531.1.1000.1.1
mieralmTrapIndex	1.3.6.1.4.1.13531.1.1000.1.1.1
mieralmSequence	1.3.6.1.4.1.13531.1.1000.1.1.2
mieralmTime	1.3.6.1.4.1.13531.1.1000.1.1.3
mieralmBusAddress	1.3.6.1.4.1.13531.1.1000.1.1.4
mieralmSeverity	1.3.6.1.4.1.13531.1.1000.1.1.5
mieralmCode	1.3.6.1.4.1.13531.1.1000.1.1.6
MieralmDescription	1.3.6.1.4.1.13531.1.1000.1.1.7
MieralmOID	1.3.6.1.4.1.13531.1.1000.1.1.8
MieralmDurationFault	1.3.6.1.4.1.13531.1.1000.1.1.9
MieralmUniqueKey	1.3.6.1.4.1.13531.1.1000.1.1.10
MieralmTableRowCount	1.3.6.1.4.1.13531.1.1000.2
MieralmLatestTrapIndex	1.3.6.1.4.1.13531.1.1000.3

MieralmLatestTrapSequence	1.3.6.1.4.1.13531.1.1000.4
MieralmGenerateTrapByCode	1.3.6.1.4.1.13531.1.1000.5
MieralmGenerateTrapByOID	1.3.6.1.4.1.13531.1.1000.6
MieralmResendTrapByIndex	1.3.6.1.4.1.13531.1.1000.7
MieralmResendTrapBySequence	1.3.6.1.4.1.13531.1.1000.8

CONFIGURATION:

Table 11.- Configuration generic fields

FIELD	ID
miercfgIPAddress	1.3.6.1.4.1.13531.1.10.1
miercfgSubnetMask	1.3.6.1.4.1.13531.1.10.2
miercfgRouter	1.3.6.1.4.1.13531.1.10.3
miercfgHWAddress	1.3.6.1.4.1.13531.1.10.4
miercfgBootP	1.3.6.1.4.1.13531.1.10.5
miercfgMIBVersion	1.3.6.1.4.1.13531.1.10.6
miercfgProductName	1.3.6.1.4.1.13531.1.10.7
miercfgResetDevice	1.3.6.1.4.1.13531.1.10.8
miercfgTrapServerTable	1.3.6.1.4.1.13531.1.10.9
miercfgTrapServerEntry	1.3.6.1.4.1.13531.1.10.9.1
miercfgTrapServerIndex	1.3.6.1.4.1.13531.1.10.9.1.1
miercfgTrapDestination	1.3.6.1.4.1.13531.1.10.9.1.2
miercfgTrapDisableWhenLocal	1.3.6.1.4.1.13531.1.10.10
miercfgTrapBitMaskDisable	1.3.6.1.4.1.13531.1.10.11
miercfgServiceName	1.3.6.1.4.1.13531.1.10.12

WARNING: The **miercfgResetDevice** is only used for development purposes in factory internal tests. It's not recommended to use it. The field which performs the unit reset is **EquipmentReset** in the EXCITER table.

PROXY:

Table 12.- Proxy Server generic fields

FIELD	ID
mierprxBusStatus	1.3.6.1.4.1.13531.1.100.1
mierprxTime	1.3.6.1.4.1.13531.1.100.10
mierprxTimeServer	1.3.6.1.4.1.13531.1.100.11
mierprxTimeOffset	1.3.6.1.4.1.13531.1.100.12
mierprxTimeSync	1.3.6.1.4.1.13531.1.100.13

11.2.2. BROADCAST

NOTE: Grey items in this table refers to a set of meaningless parameters for software versions 1S32 and above.

EXCITER

Table 13.- Measure/Adjustment fields in the 'broadcast' units (All the objects must have the prefix "mierexc")

		COMP A					COMP AB				
FIELD	**ID**	**CGU**	**CMU**	**CDU**	**CRU**	**CTU**	**CGU**	**CMU**	**CDU**	**CRU**	**CTU**
Address	1.3.6.1.4.1.13531.2.10.1.1.1										
SoftwareVersion	1.3.6.1.4.1.13531.2.10.1.1.10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
EquipmentType	1.3.6.1.4.1.13531.2.10.1.1.11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WorkFrequency	1.3.6.1.4.1.13531.2.10.1.1.12										
MasterStatus	1.3.6.1.4.1.13531.2.10.1.1.13										
1stConverterType	1.3.6.1.4.1.13531.2.10.1.1.20										
2ndConverterType	1.3.6.1.4.1.13531.2.10.1.1.21										
LinearityCorrectorType	1.3.6.1.4.1.13531.2.10.1.1.22										
SystemUpTime	1.3.6.1.4.1.13531.2.10.1.1.30	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSU12Voltage	1.3.6.1.4.1.13531.2.10.1.1.100	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSU24Voltage	1.3.6.1.4.1.13531.2.10.1.1.110	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DriverVoltage	1.3.6.1.4.1.13531.2.10.1.1.120						✓	✓	✓	✓	✓
PowerAmplifierVoltage	1.3.6.1.4.1.13531.2.10.1.1.130	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12VCavity1Consumption	1.3.6.1.4.1.13531.2.10.1.1.200	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24VCavity1Consumption	1.3.6.1.4.1.13531.2.10.1.1.210	✓					✓		.		
24VCavity2Consumption	1.3.6.1.4.1.13531.2.10.1.1.211	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24VCavity3Consumption	1.3.6.1.4.1.13531.2.10.1.1.212	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DriverAmplifierConsumption	1.3.6.1.4.1.13531.2.10.1.1.220						✓	✓	✓	✓	✓
PowerAmplifierConsumption	1.3.6.1.4.1.13531.2.10.1.1.221	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1stConverterCh1AGCVoltage	1.3.6.1.4.1.13531.2.10.1.1.300	✓	✓		✓		✓	✓		✓	
1stConverterCh2AGCVoltage	1.3.6.1.4.1.13531.2.10.1.1.301										
SatelliteReceiverAGCVoltage	1.3.6.1.4.1.13531.2.10.1.1.310										
VideoModulationIndex	1.3.6.1.4.1.13531.2.10.1.1.320										
FrequencyDeviation	1.3.6.1.4.1.13531.2.10.1.1.321										
AgileWorkFrequency	1.3.6.1.4.1.13531.2.10.1.1.330										
RedundantChannelNumber	1.3.6.1.4.1.13531.2.10.1.1.331										
UnsuccessfullSwitchTrialCount	1.3.6.1.4.1.13531.2.10.1.1.332										
OutputPower	1.3.6.1.4.1.13531.2.10.1.1.400	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DriverPower	1.3.6.1.4.1.13531.2.10.1.1.401						✓	✓	✓	✓	✓
OutputReturnLoss	1.3.6.1.4.1.13531.2.10.1.1.410	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DriverReturnLoss	1.3.6.1.4.1.13531.2.10.1.1.411						✓	✓	✓	✓	✓
VideoLevel	1.3.6.1.4.1.13531.2.10.1.1.420										
AudioLevel	1.3.6.1.4.1.13531.2.10.1.1.421										
2ndConverterIFInputLevel	1.3.6.1.4.1.13531.2.10.1.1.430										
2ndConverterRFOutputLevel	1.3.6.1.4.1.13531.2.10.1.1.431										
1stConverterCh1IFOutputLevel	1.3.6.1.4.1.13531.2.10.1.1.432										
1stConverterCh2IFOutputLevel	1.3.6.1.4.1.13531.2.10.1.1.433										
ModulatorIFOutputLevel	1.3.6.1.4.1.13531.2.10.1.1.440										
1stConverterCh1LOOutputLevel	1.3.6.1.4.1.13531.2.10.1.1.450										
1stConverterCh2LOOutputLevel	1.3.6.1.4.1.13531.2.10.1.1.451										
2ndConverterLOOutputLevel	1.3.6.1.4.1.13531.2.10.1.1.452										
VideoLOOutputLevel	1.3.6.1.4.1.13531.2.10.1.1.460										
AudioLOOutputLevel	1.3.6.1.4.1.13531.2.10.1.1.461										
AmplifierTemperature	1.3.6.1.4.1.13531.2.10.1.1.500	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
RFZoneTemperature	1.3.6.1.4.1.13531.2.10.1.1.501	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AirInputTemperature	1.3.6.1.4.1.13531.2.10.1.1.510	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AirOutputTemperature	1.3.6.1.4.1.13531.2.10.1.1.511	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DriverTemperature	1.3.6.1.4.1.13531.2.10.1.1.520						✓	✓	✓	✓	✓
2ndConverterTemperature	1.3.6.1.4.1.13531.2.10.1.1.521										
1stConverterCh1Temperature	1.3.6.1.4.1.13531.2.10.1.1.522										
1stConverterCh2Temperature	1.3.6.1.4.1.13531.2.10.1.1.523										
IFLevelPresence	1.3.6.1.4.1.13531.2.10.1.1.600	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CurrentLimiterStatus	1.3.6.1.4.1.13531.2.10.1.1.610						✓	✓	✓	✓	✓
1stConverterCh1PLLLockStatus	1.3.6.1.4.1.13531.2.10.1.1.620		✓		✓			✓		✓	
1stConverterCh2PLLLockStatus	1.3.6.1.4.1.13531.2.10.1.1.621										
2ndConverterPLLLockStatus	1.3.6.1.4.1.13531.2.10.1.1.622	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VideoCarrierPLLLockStatus	1.3.6.1.4.1.13531.2.10.1.1.623										
AudioCarrierPLLLockStatus	1.3.6.1.4.1.13531.2.10.1.1.624										
ExternalReferenceLockStatus	1.3.6.1.4.1.13531.2.10.1.1.630										
OverdriveLimiterStatus	1.3.6.1.4.1.13531.2.10.1.1.640										
ControlStatus (***TRAP***)	1.3.6.1.4.1.13531.2.10.1.1.650	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
RecentResetStatus	1.3.6.1.4.1.13531.2.10.1.1.660	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
InputChannelStatus	1.3.6.1.4.1.13531.2.10.1.1.670										
SwitchingStatus	1.3.6.1.4.1.13531.2.10.1.1.680										

Table 13.- Measure/Adjustment fields in the 'broadcast' units (All the objects must have the prefix "mierexc")											
		COMP A					COMP AB				
FIELD	ID	CGU	CMU	CDU	CRU	CTU	CGU	CMU	CDU	CRU	CTU
SwitchingError	1.3.6.1.4.1.13531.2.10.1.1.681										
AdaptativeFilterStatus	1.3.6.1.4.1.13531.2.10.1.1.750	✓					✓				
RFSwitch	1.3.6.1.4.1.13531.2.10.1.1.1000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LOSwitch	1.3.6.1.4.1.13531.2.10.1.1.1001										
RFAGCSwitch	1.3.6.1.4.1.13531.2.10.1.1.1002	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SwitchingMode	1.3.6.1.4.1.13531.2.10.1.1.1003										
InputChannelSwitch	1.3.6.1.4.1.13531.2.10.1.1.1004										
EquipmentReset	1.3.6.1.4.1.13531.2.10.1.1.1005										
EquipmentSubstitution	1.3.6.1.4.1.13531.2.10.1.1.1006										
DateTime	1.3.6.1.4.1.13531.2.10.1.1.1010	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

EXCITER ALARM

Table 14.- Generated Alarms in the 'broadcast' units (All the objects must have the prefix "mierexc")												
	DISPLAY		COMP A					COMP AB				
FIELD	ALARM	ID	CGU	CMU	CDU	CRU	CTU	CGU	CMU	CDU	CRU	CTU
AlarmAddress		1.3.6.1.4.1.13531.2.10.10.1.1										
PSU12VoltageAlarm	I. +12V A	1.3.6.1.4.1.13531.2.10.10.1.100	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSU24VoltageAlarm	I. +24V A	1.3.6.1.4.1.13531.2.10.10.1.110	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DriverVoltageAlarm	Drv. Supply A	1.3.6.1.4.1.13531.2.10.10.1.120						✓	✓	✓	✓	✓
PowerAmplifierVoltageAlarm	Amp. Supply A	1.3.6.1.4.1.13531.2.10.10.1.130	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24VCavity1ConsumptionAlarm	I. +24V s1 A	1.3.6.1.4.1.13531.2.10.10.1.210	✓					✓				
24VCavity2ConsumptionAlarm	I. +24V s2 A	1.3.6.1.4.1.13531.2.10.10.1.211	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24VCavity3ConsumptionAlarm	I. +24V s3 A	1.3.6.1.4.1.13531.2.10.10.1.212	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DriverAmplifierConsumptionAlarm	I driver A	1.3.6.1.4.1.13531.2.10.10.1.220						✓	✓	✓	✓	✓
PowerAmplifierConsumptionAlarm	I amplif. A	1.3.6.1.4.1.13531.2.10.10.1.221	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1stConverterCh1AGCVoltageAlarm (***TRAP#21-22***)	IF AGC S2 A	1.3.6.1.4.1.13531.2.10.10.1.300	✓	✓		✓		✓	✓		✓	
VideoModulationIndexAlarm		1.3.6.1.4.1.13531.2.10.10.1.320										
FrequencyDeviationAlarm		1.3.6.1.4.1.13531.2.10.10.1.321										
OutputPowerAlarm (***TRAP#3-4***)	Power Out A	1.3.6.1.4.1.13531.2.10.10.1.400	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DriverPowerAlarm	Drv. Power A	1.3.6.1.4.1.13531.2.10.10.1.401						✓	✓	✓	✓	✓
OutputReturnLossAlarm (***TRAP#5-6***)	Ret. Loss A	1.3.6.1.4.1.13531.2.10.10.1.410	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VideoLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.420										
AudioLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.421										
2ndConverterIFInputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.430										
2ndConverterRFOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.431										
1stConverterCh1IFOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.432										
1stConverterCh2IFOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.433										
ModulatorIFOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.440										
1stConverterCh1LOOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.450										
1stConverterCh2LOOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.451										
2ndConverterLOOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.452										
VideoLOOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.460										
AudioLOOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.461										
AmplifierTemperatureAlarm (***TRAP#19-20***)	Amp. Temp. A	1.3.6.1.4.1.13531.2.10.10.1.500	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
RFZoneTemperatureAlarm	RFZone Temp A	1.3.6.1.4.1.13531.2.10.10.1.501	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AirInputTemperatureAlarm (***TRAP#17-18***)	Air Input A	1.3.6.1.4.1.13531.2.10.10.1.510	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DriverTemperatureAlarm		1.3.6.1.4.1.13531.2.10.10.1.520										
2ndConverterTemperatureAlarm		1.3.6.1.4.1.13531.2.10.10.1.521										
1stConverterCh1TemperatureAlarm		1.3.6.1.4.1.13531.2.10.10.1.522										
1stConverterCh2TemperatureAlarm		1.3.6.1.4.1.13531.2.10.10.1.523										
IFLevelPresenceAlarm	IF level A	1.3.6.1.4.1.13531.2.10.10.1.600	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CurrentLimiterStatusAlarm	Limiter A	1.3.6.1.4.1.13531.2.10.10.1.610						✓	✓	✓	✓	✓
1stConverterCh1PLLLockStatusAlarm	Lock LO s2 A	1.3.6.1.4.1.13531.2.10.10.1.620		✓		✓			✓		✓	
1stConverterCh2PLLLockStatusAlarm		1.3.6.1.4.1.13531.2.10.10.1.621										
2ndConverterPLLLockStatusAlarm (***TRAP#7-8***)	Lock LO s3 A	1.3.6.1.4.1.13531.2.10.10.1.622	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VideoCarrierPLLLockStatusAlarm		1.3.6.1.4.1.13531.2.10.10.1.623										
AudioCarrierPLLLockStatusAlarm		1.3.6.1.4.1.13531.2.10.10.1.624										
ExternalReferenceLockStatusAlarm (***TRAP#15-16***)	Lock RO A	1.3.6.1.4.1.13531.2.10.10.1.630										
OverdriveLimiterStatusAlarm		1.3.6.1.4.1.13531.2.10.10.1.640										
AdaptativeFilterAlarm (***TRAP#9-10***)	Adap.Filt. A	1.3.6.1.4.1.13531.2.10.10.1.750										

11.3. RECEIVED TRAPS AND ITS INTERPRETATION WITHIN THE FRAMEWORK OF GAP-FILLER UNIT MANAGEMENT

In this section the SNMP event adquisition system will be explained. Although SNMP operates in the same way in all the 'broadcast' units of Mier Comunicaciones, this process will be described using a gapfiller unit as an example.

11.3.1. THE EVENT ACQUISITION SYSTEM

The system CPU is acquiring a set of indications which some of them can launch an alarm and in some cases, an SNMP trap. This polling is performed in an interval near to 1 second; therefore if an indication changes inside the polling interval, the CPU won't indicate the corresponding alarm.

In a similar way, the SNMP agent –which is built-in in the Control Board– performs an inner acquisition of the CPU's indications. This polling is performed in an interval of 2/3 seconds. It can be also possible that the SNMP agent not have an alarm information which has happened between the polling intervals and hence the corresponding trap won't be sent because the SNMP agent has no report about this.

Therefore it's possible to have a single trap corresponding to a problem in the equipment which has generated multiple alarms. In response to these alarms the equipment has performed some actions and, due to these actions, all the alarms have been disappeared except one. All these processes between the polling intervals have no significance and are in consequence transparent to the SNMP manager.

In the following section a list of possible alarms and traps is enclosed. Also the equipment protection routines to each situation are described.

The actions to be done further on in response to every specific alarm are described in the Troubleshooting chapter inside the Service Manual of the unit.

11.3.2. TRAPS WITH ALARM RELATIONSHIP

In the Software version described[1], there are 24 SNMP traps available. All these are grouped in pairs, normally in an ON/OFF way. All the pairs have a common OID corresponding to one field of the MIB exciter alarm tables.

The description of the alarm-related traps is divided in three cases:

a) Output power trap

b) Traps related directly to a service cut

c) Traps unrelated to a service cut

[1] Software code: 50N0097, Version: 1S51

OUTPUT POWER TRAP

3.- "Output power error"
4.- "Output power OK"

The typical situation is to receive a “cause” trap followed by an “Output Power” trap. In this case it’s easy to know what has happened to the unit.

In case only the trap "Output power error" appears, two possible causes may generate this situation:

a) A quick response of a multiple-alarmed equipment that implies the quick correction of all the alarms except the output power alarm. The errors that can generate a situation like this may be:
    a. Input signal error.
    b. Adaptative filter error (abrupt change of echo conditions).
    c. Output return loss error (output power attenuation).
    d. 2nd converter PLL unlocked.
b) An equipment failure which is not related to an SNMP trap but with an equipment alarm:
    - An IF signal cut (due to down converter, linearity corrector, clamp amplifier or up converter peak detector).
    - An amplifier failure: both power or driver amplifiers.

The basic difference between both cases is that in the first one, the equipment will recover the output power in a short interval of time, normally the time that each Gap-Filler spends on reach the nominal output power once the cut-off cause has recovered (When the IF level at the Up converter is OK, this performs a soft power start-up which can be observed directly with an Spectrum Analyzer or by means of the “Control AGC” menu in the unit display).

TRAPS RELATED DIRECTLY TO A SERVICE CUT

These situations generate as well as the own trap, an “Output Power Error” trap. Normally when the problem which has caused the service cut disappears, as has been explained in the “Output Power” case, the power is gradually recovered.

7.- "2nd converter PLL unlocked"
8.- "2nd converter PLL locked"

21.- "Input signal error"
22.- "Input signal OK"

When trap 21 is received, the unit usually sends also the trap 9 (Adaptative Filter Error), depending on the polling interval (as explained in previous section).

TRAPS UNRELATED TO A SERVICE CUT

5.- "Output return loss error"
6.- "Output return loss OK"

In this case the IF level is attenuated in order to protect the unit. The Gap-Filler gives as power as it can (on the condition that the Return Loss be greater than 6dB with regard to output power).

9.- "Adaptative filter error"
10.- "Adaptative filter OK"

This trap can be generated in case of MK-II board failure (traps 9 and 3 will be received) or in case of a failure before the Echo Canceller input, normally an Input Power Error (traps 9, 3 and 21 will be received). In case that the MK-II board works properly (with the Echo Cancellation ON) and the SNMP manager receives traps 3 and 9 (not 21), there exists a problem inside the Down Converter board, typically a cavity filter disadjustment, a bad jumper configuration, or a mixer failure. Before doing anything, please check the inputs to the Down Converter (RF input and OL input from Up Converter DDS).

15.- "External reference input error"
16.- "External reference input OK"

This trap is only received when the OR alarm is not deactivated, that is, in the Control Submenu, the OR must be ORon (when changing parameters into the Service Menu, a Local Control mode must be selected). Note, as in all other cases, that the traps are only sent in case of a State change; in this case, if the external reference are not connected when the unit is switched on, there won't be a trap #15.

17.- "Input air temperature error"
18.- "Input air temperature OK"

In this case the unit reports an alarm but not cut off the output power.

19.- "Amplifier temperature error"
20.- "Amplifier temperature OK"

Only in the 100Wrms unit, the unit attenuates 2dB/ºC that exceeds 90ºC, with a maximum attenuation of 10dB.

11.3.3. TRAPS WITH NO ALARM RELATIONSHIP

1.- "Bus error"
2.- "Bus OK"

This only applies to the equipments which has been provided with an external SNMP adaptor (only in case of control board 80A0767)

11.- "Cannot connect to time server"
12.- "Restablished connection to time server."

This is only used when synchronization with a time server is required in the moment of the start-up.

13.- "Device is in Local Control mode."
14.- "Device is in Remote Control mode."

Note if TRAPINHIBIT=2 the unit will stop sending traps in case of changing to Local mode.

23.- “User initiated command: RFOFF”
24.- “User initiated command: RFON”

Obviously when the trap 23 is received, there will be an “Output Power Error” trap.

11.3.4. MANAGEMENT RECOMMENDATIONS

When a trap is received, is very useful to get a “picture” of all parameters by means of an SNMP *get* commands. For example, in case of Output Power Error, you can get, as an example:

1.3.6.1.4.1.13531.2.10.1.1.1000	RF Switch (1) off (2) on
1.3.6.1.4.1.13531.2.10.1.1.220.1	Driver Amplifier Consumption
1.3.6.1.4.1.13531.2.10.1.1.221.1	Power Amplifier Consumption
1.3.6.1.4.1.13531.2.10.1.1.300.1	1st Converter AGC Voltage in mV
1.3.6.1.4.1.13531.2.10.1.1.400.1	Output Power
1.3.6.1.4.1.13531.2.10.1.1.401.1	Driver Power
1.3.6.1.4.1.13531.2.10.1.1.600.1	IF Level Presence (1)notPresent (2)Present
1.3.6.1.4.1.13531.2.10.1.1.750.1	Adaptative Filter Status (0)noFilter (1)noAlarm (2)alarm

...

This way it’s possible to have a better idea of what is happening inside the unit.

11.3.5. TRAP-ALARM THRESHOLDS

For the alarm management through SNMP, the EXCITER ALARM table inside the mierExciterMIB is described next.

In this table, a set of meaningless parameters for software versions 1S32 and above still appear. These fields are contained in the following table.

Table 15.- Meaningless parameters for versions 1S32 and above.

FIELD	ALARM	ID
AlarmAddress		1.3.6.1.4.1.13531.2.10.10.1.1
VideoModulationIndexAlarm		1.3.6.1.4.1.13531.2.10.10.1.320
FrequencyDeviationAlarm		1.3.6.1.4.1.13531.2.10.10.1.321
VideoLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.420
AudioLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.421
2ndConverterIFInputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.430
2ndConverterRFOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.431
1stConverterCh1IFOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.432
1stConverterCh2IFOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.433
ModulatorIFOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.440
1stConverterCh1LOOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.450
1stConverterCh2LOOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.451
2ndConverterLOOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.452
VideoLOOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.460
AudioLOOutputLevelAlarm		1.3.6.1.4.1.13531.2.10.10.1.461
DriverTemperatureAlarm		1.3.6.1.4.1.13531.2.10.10.1.520
2ndConverterTemperatureAlarm		1.3.6.1.4.1.13531.2.10.10.1.521
1stConverterCh1TemperatureAlarm		1.3.6.1.4.1.13531.2.10.10.1.522
1stConverterCh2TemperatureAlarm		1.3.6.1.4.1.13531.2.10.10.1.523
1stConverterCh2PLLLockStatusAlarm		1.3.6.1.4.1.13531.2.10.10.1.621
VideoCarrierPLLLockStatusAlarm		1.3.6.1.4.1.13531.2.10.10.1.623
AudioCarrierPLLLockStatusAlarm		1.3.6.1.4.1.13531.2.10.10.1.624
OverdriveLimiterStatusAlarm		1.3.6.1.4.1.13531.2.10.10.1.640

The other fields are significative. Next is included a set of tables including the alarm related to the field, the ID of each field and the description of the alarm.

Table 16.- MIB fields related to equipment alarms. Versions 1S32 and above.

FIELD	GAP-FILLER DISPLAY	ID	DESCRIPTION
PSU12VoltageAlarm	I. +12V A	1.3.6.1.4.1.13531.2.10.10.1.100	+12V voltage from the interconnection board
PSU24VoltageAlarm	I. +24V A	1.3.6.1.4.1.13531.2.10.10.1.110	+24V voltage from the interconnection board
DriverVoltageAlarm	Drv. Supply A	1.3.6.1.4.1.13531.2.10.10.1.120	+25.5V voltage from the driver amplifier
PowerAmplifierVoltageAlarm	Amp. Supply A	1.3.6.1.4.1.13531.2.10.10.1.130	+30V voltage from the power amplifier board
24VCavity1ConsumptionAlarm	I. +24V s1 A	1.3.6.1.4.1.13531.2.10.10.1.210	Slot 1 consumption (Echo Canceller)
24VCavity2ConsumptionAlarm	I. +24V s2 A	1.3.6.1.4.1.13531.2.10.10.1.211	Slot 2 consumption (Modulator, Down Converter)
24VCavity3ConsumptionAlarm	I. +24V s3 A	1.3.6.1.4.1.13531.2.10.10.1.212	Slot 3 consumption (Up Converter)
DriverAmplifierConsumptionAlarm	I driver A	1.3.6.1.4.1.13531.2.10.10.1.220	Driver Amplifier consumption
PowerAmplifierConsumptionAlarm	I amplif. A	1.3.6.1.4.1.13531.2.10.10.1.221	Power Amplifier consumption
1stConverterCh1AGCVoltageAlarm	IF AGC S2 A	1.3.6.1.4.1.13531.2.10.10.1.300	Input Signal Detection
OutputPowerAlarm	Power Out A	1.3.6.1.4.1.13531.2.10.10.1.400	Unit Output power
DriverPowerAlarm	Drv. Power A	1.3.6.1.4.1.13531.2.10.10.1.401	Driver Amplifier output power
OutputReturnLossAlarm	Ret. Loss A	1.3.6.1.4.1.13531.2.10.10.1.410	Output Return Loss (relative to output power)
AmplifierTemperatureAlarm	Amp. Temp. A	1.3.6.1.4.1.13531.2.10.10.1.500	Temperature measure inside the Amplifier PCB
RFZoneTemperatureAlarm	RFZone Temp A	1.3.6.1.4.1.13531.2.10.10.1.501	Temperature measure in the components silk of the interconnection board (RF zone)
AirInputTemperatureAlarm	Air Input A	1.3.6.1.4.1.13531.2.10.10.1.510	Temperature measure in the input fan
IFLevelPresenceAlarm	IF level A	1.3.6.1.4.1.13531.2.10.10.1.600	IF signal measure in the Up converter input
CurrentLimiterStatusAlarm	Limiter A	1.3.6.1.4.1.13531.2.10.10.1.610	Status from the Current Limiter module
1stConverterCh1PLLLockStatusAlarm	Lock LO s2 A	1.3.6.1.4.1.13531.2.10.10.1.620	Down Converter LO status
2ndConverterPLLLockStatusAlarm	Lock LO s3 A	1.3.6.1.4.1.13531.2.10.10.1.622	Up Converter LO status
ExternalReferenceLockStatusAlarm	Lock RO A	1.3.6.1.4.1.13531.2.10.10.1.630	10MHz external reference status
AdaptativeFilterAlarm	Adap.Filt. A	1.3.6.1.4.1.13531.2.10.10.1.750	Echo Canceller status

The next table summarizes all the alarms, with the margins of activation, the response of the alarm in the whole equipment, and the signal inside the main control board (see schematic).

ALARM	MARGIN WITHOUT ALARM (MIN/MAX)		RESPONSE WHEN ALARM	SIGNAL ON 80S0656-12
POWER				
Power Out A	CONFIG. (default: -2dB)	+1dB	Switch off RF signal	VDETIA
Ret. Loss A	+6dB	-	Attenuates RF (driver) 9dB, and 3dB in the up converter (progressive)	VDETRA
Drv. Power A	-2dB	+1dB	None. Only indication	VDETI
Drv.R.Loss A	+6dB	-	None. Only indication	VDETR
VOLTAGE				
Amp. Supply A	25.0V	32.5V	None. Only indication	V3+
Drv. Supply A	24.5V	26.5V	None. Only indication	TVCC
I. +12V A	11.0V	13.0V	None. Only indication	T+12V
I. +24V A	22.0V	26.0V	None. Only indication	T+24V
CURRENT CONSUMPTION				
I amplif. A	0.1ª	21.0A	None. Only indication	V3+, V3-
I amplif2. A	0.1ª	21.0A	None. Only indication	V3+, V3-
I driver A	0.1ª	6.2A	None. Only indication	I+VCC
I. +12V A	*Not used in this case*			
I. +24V s1 A	-	0.6A	None. Only indication	I+24VA
I. +24V s2 A	-	0.6A	None. Only indication	I+24VB
I. +24V s3 A	-	0.6A	None. Only indication	I+24VC
TEMPERATURE				
Amp. Temp. A	-	75ºC (20-50Wrms) 90ºC (100Wrms)	None. Only indication (20-50Wrms) RF attenuation (*) (100Wrms)	A3
Drv. Temp. A	-	75ºC	None. Only indication	A1+, A1-
RFZone Temp A	-	65ºC	None. Only indication	RF+, RF-
Air Input A	-	45ºC	None. Only indication	EA+, EA-
Air Output A	-	-	None.	SA+, SA-
STATE INDICATIONS				
IF AGC S2 A	0.0V	CONFIG. (0.0V to 16.0V)	Switch off RF signal	
IF level A	PK LIMITER	PK LIMITER	Only indicates that the IF is not present or is excessive and therefore the RF signal is switched off in the up converter (Peak Limiter)	I_IF (up-c.) IFI (control)
Limiter A	*Not used in this case*			
Lock LO s2 A	-	-	Switch off RF signal	LOCK2
Lock LO s3 A	-	-	Switch off RF signal	LOCK3
Lock RO A	-	-	None. Only indication when ORon	LOCKREF
Adap.Filt. A	*If the Echo Canceller is ON and the alarm is active, the echo canceller has switched off its output signal, and therefore the RF signal of the equipment.* *If the Echo Canceller is OFF, the alarm is activated, but the output power is still active*			

(*): Attenuation of 2dB for each ºC (max. 10dB) which the amplifier temperature or the input air temperature exceed 90ºC and 45ºC respectively (the maximum value of both).