**OTE**

air traffic control
**Radio Communication Solutions**

# OTE DTR100 Setting-up Guide 4bs-tz000009-e
## Rev. 01

## DTR100 VHF Transceiver for ATC applications

Information for the guide user:

**Before using the equipment, read all of the instructions contained in the manual and read those relative to safety with special care.**

**Lue käyttöohjeet ja erityisesti turvallisuuteen liittyvat ohjeet ennen laitteen käyttöä.**

**Alvorens over te gaan tot het gebruik van het apparaat lees met aandacht al de instructies van het handboek en let vooral op die die de veiligheid betreffen.**

**Alvorens het apparaat in gebruik te nemen lees alle instructies van het handboek en vooral de voorschriften betreffende de veiligheid.**

**Avant toute utilisation de l'appareil, lire toutes les indications contenues dans le Manuel et avec une attention particulière celles relatives à la sécurité.**

**Läs alla instruktioner i denna manual innan ni använder apparaten och då särskilt noggrannt de anvisningar som gäller säkerheten.**

**Læs alle de vejledninger, der er indeholdt i manualen med særlig opmærksomhed på de vejledninger, der vedrører sikkerheden, før apparatet tages i brug.**

**Vor Gebrauch des Geräts alle in dieser Bedienungsanleitung enthaltenen Anweisungen und Vorschriften lesen.**

**Den Sicherheitsbestimmungen ist dabei besondere Aufmerksamkeit zu widmen.**

**Πριν χρησιμοποιήσετε τη συσκευή διαβάστε όλες τις οδηγίες που περιέχονται στο εγχειρίδιο και δώστε ιδιαίτερη προσοχή στης οδηγίες ασφαλείας.**

**Prima di utilizzare l'apparecchiatura leggere tutte le indicazioni contenute nel manuale e con particolare attenzione quelle relative alla sicurezza.**

**Antes de utilizar el equipo leer todas las instrucciones contenidas en el manual, poniendo particular atención a las de seguridad.**

AVISO

**Antes de utilizar o aparelho, leia todas as instruções que constam no manual e com muita atenção as instruções relativas à segurança.**

AVISO

Перед эксплуатацией оборудования внимательно прочитайте инструкции данного руководства, в частности, относящиеся к правилам безопасности

ПРЕДУПРЕЖДЕНИЕ

تحذير

قبل إستخدام الأجهزة إنتبه لقراءة جميع الارشادات المحتوية في الكتيب وخاصةً بالمعلوماتالأمنية.

警告 在使用之前，请你一定要阅读说明手册全文，并请特别注意阅读" 有关安全之重要说明 "。

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# Document history

| Title: | OTE DTR100 – Setting-up Guide | |
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# 1 - GENERAL

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# 1. GENERAL

This section introduces the DTR100 equipment and the guide itself, by describing their tasks, operating modes and scenarios.

The following figure shows the DTR100 layout.



**Figure 1.1 - DTR100 equipment**

## 1.1 PURPOSE OF THIS GUIDE

The purpose of this guide is to provide to operators and technical staff the necessary knowledge of the equipment operating, in order to make possible setting-up activity.

Guide user is supposed to have a good skill in telecommunications and RF basics, to understand the given terms and parameters.

Only trained and qualified personnel may operate the equipment. Non-observance of these conditions and the safety instructions can result in personnel injury or in property damage.

## 1.2 INTRODUCTION

The **DTR100 multimode VHF transceiver** is a state-of the-art communication unit, specifically designed to operate as radio core part of Air Traffic Control ground stations. It may be regarded as an integrated transmitter and receiver device, since the internal transmit and receive sections operate independently.

Thanks to its DSP-based architecture, software-radio approach, and modular design, it allows for easy update and re-configuration.

The equipment has been designed to fulfil operating requirements in any possible system layout.

In the transmitter section, the equipment has outstanding performances in terms of noise radiation and unwanted emissions. These features, together with the high grade of immunity to external interference of the receiver section, allow for meeting considerable co-siting requirements under EMC-critical equipment arrangement.

DTR100 belongs to the latest OTE's ATC third-generation communication systems family, together with the DR100 (VHF receiver), and DT100 (VHF transmitter).

## 1.3 DECLARATION OF CE MARK CONFORMANCE

The equipment described in this guide has been designed according the following international standards:


Safety:

- CEI EN 60950 (4th edition - 2000) - Safety of information technology equipment.
- CEI EN 60215 (1997-10) - Safety requirements for radio transmitting equipment.


EMC:

- ETSI 301 489-1 (version 1.4.1 - 2002) - Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements.
- ETSI 301 489-22 (version 1.2.1 - 2002) - Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 22: Specific conditions for ground based VHF aeronautical mobile and fixed radio equipment.

$$C \hspace{-0.3em} \epsilon$$

Any connected device has to comply with the applicable safety standards.

In addition, all installation activities must be performed in such a way to not compromise or lower the equipment degree safety; this must also be taken in account whenever designing system architecture and choosing installation arrangement.


## 1.4 ECO-COMPATIBILITY

The equipment described in this guide has been designed and realized by following criteria of eco-compatibility, which are also applied to the manufacturing process.


## 1.5 GUIDE ORGANISATION

This guide is organized into following sections:

- *Section 1 – General*. Introduces the equipment.
- *Section 2 – Safety*. This section gives to operator all necessary information for a correct and safe use of the equipment.
- *Section 3 – Operation*. This section describes all the aspects related to the normal use of equipment, e.g. showing function of each of the front panels controls and indicators.
- *Section 4 – Setting-up*. This section gives an overview of the DTR100 interfaces and describes step-by-step the procedures for the configuration and adjustments of the equipment.

## 1.6 GLOSSARY OF ACRONYMS

| ACRONYM | MEANING |
|---|---|
| AC | Alternate Current |
| AF | Audio Frequency |
| ALB-M | Analogue Line Barrier Minimal |
| AM-DSB | Amplitude Modulation _ Double Side Band |
| ATC | Air Traffic Control |
| AWG | American Wire Gauge |
| BB | Baseband |
| BNC | Bayonet Navy Connector (type of RF connector) |
| CE | Conformité Européene / Certified Europe |
| CEI | Comitato Elettrotecnico Internazionale |
| CEI-EN | CEI-European Norm |
| CP | Control Panel |
| CW | Continuous Wave |
| DC | Direct Current |
| DIN | Deutsches Institut für Normung |
| DR100 | Digital Receiver, OTE 100 series |
| DSP | Digital Signal Processing/Processor |
| DT100 | Digital Transmitter, OTE 100 series |
| DTR100 | Digital Transceiver, OTE 100 series |
| EMC | ElectroMagnetic Compliance |
| EMI | ElectroMagnetic Interference |
| EN | European Norm |
| ERM | Electromagnetic compatibility and Radio spectrum Matters |
| ESD | ElectroStatic Discharge |
| ETS | European Telecommunications Standard |
| ETSI | European Telecommunications Standards Institute |
| GND | Ground |
| GNSS | Global Navigation Satellite System |
| GPS | Global Positioning System/Satellite |
| HMI | Human-Machine Interface |
| IEC | International Electrotechnical Committee/Commission |
| IMC | Interface and Management Card |
| LCD | Liquid Crystal Display |

| ACRONYM | MEANING |
|---------|---------|
| LED | Light Emitting Diode |
| N | Navy (type of RF connector) |
| NC | Normally Close |
| NO | Normally Open |
| O&M | Operation and Maintenance |
| OTE | Officine Toscane Elettromeccaniche |
| PA | Power Amplifier |
| ppm | Part Per Million |
| PS | Power Supply (module) |
| PTT | Push to Talk |
| RCB | Radio Control Bus |
| RF | Radio Frequency |
| RSSI | Received Signal Strength Indicator |
| RX | Receiver or Reception |
| SMA | Sub-Miniature A (type of RF connector) |
| SQL | Squelch (signaling) |
| TCXO | Temperature-Compensated Crystal Oscillator |
| TRX | Transceiver |
| TTL | Transistor - Transistor Logic |
| TX | Transmitter or Transmission |
| UTC | Universal Time Coordinated |
| VCSS | Voice Communication Switching System |
| VHF | Very High Frequency |
| VOLMET | Aviation Weather Broadcasts |
| VSWR | Voltage Standing Wave Ratio |
| wrt | with respect to |

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# 2 – SAFETY

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# 2. SAFETY

This section of the guide gives all the instructions and warning for a correct and safe use of the equipment. Operators are strongly recommended to respect given indications; non-observance of these instructions can result in personnel injury or in property damage.

## 2.1    SAFETY RECOMMENDATIONS

Carefully read all the following cautions and warnings before using the equipment.



WARNING

Do not use the equipment for uses different than those indicated in the guide.



WARNING

For correct use of equipment, refer to the relevant section within this guide.



WARNING

Protect the equipment from rainfalls, sprinkling of water and/or other liquids, and from dust.



WARNING

Do not set any object on equipment.



WARNING

Connect the equipment to the equipment room ground bar through dedicated connection, and not through physical contact with other frames.



WARNING

Do not use the equipment if it is not appropriately grounded or if ground is absent.

**WARNING**

The electric shock can cause the interruption of the natural breathing. An immediate action is necessary in order to restore breathing. It is therefore necessary that the staff be familiarized with the various methods of artificial breathing and cardiac massage. In case of incidents, caused from high tension, an urgent medical aid is necessary to deal the possible effects of the body poisoning caused from burns. In all the cases, proper medical assistance must be requested. It is necessary to make sure that any person who uses or takes care itself of the maintenance of the equipment having parts under dangerous voltages is able of performing artificial breathing, and it is necessary to instruct the staff on first aid measures in case the need arises.

**WARNING**

Do not use the equipment if the power cable and/or the power supply outlet are damaged.

**WARNING**

Do not use the equipment if antenna, and/or antenna cable is damaged.

**WARNING**

Install the equipment following the instructions given in this guide. The equipment must be installed in such a way complies with the national regulations in effect.

**WARNING**

Wear protection gloves when handling the equipment.

**WARNING**

When handling the equipment be sure that all internal modules and cards are safely screwed in their position into the chassis.

**WARNING**

The equipment weight can cause problems during its handling. Take the necessary precautions, e.g. be assisted by another person if necessary.

**WARNING**

Position the equipment in such a way as to guarantee its correct aeration as well as safe accessibility to the front side controls, and rear side power supply outlets, RF, signal and data connections.

**WARNING**

WARNING

Do not position the equipment standing on its rear side, since this can damage rear panel parts.

WARNING

Carry out the maintenance interventions on the equipment following the instructions given in this guide.

WARNING

Follow all accident prevention standards when carrying out maintenance interventions on the equipment.

WARNING

The equipment includes components containing beryllium oxide (beryllia), substance that can be highly toxic if no precautionary measures are undertaken. Pay attention to the beryllium oxide warning label placed on the relevant module(s), and to beryllium oxide warning within this guide. Relevant module(s) cover must not be removed.

WARNING

Disconnect the power supply before carrying out maintenance interventions on the equipment.

WARNING

The PS module does not fully disconnect the equipment from both AC and DC sources, even when front side switches are in OFF position. Part replacement must take place only once that the external AC breaker has been switched OFF, and/or external DC supply has been disconnected.

WARNING

Use only accessories or replacement parts approved by the manufacturer for the equipment.

WARNING

⚠️

**WARNING**

Only authorized technical personnel may carry out maintenance interventions on the equipment.

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| | |
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The equipment complies with all product specification and the greatest care is taken by the manufacturer so that user safety, as far as the effects of electromagnetic waves on health are concerned, is guaranteed within the limits established by the international specifications.

## 2.2 ESD

No ESD precautions have to be taken by the operator in the daily use of the equipment. The equipment is designed and manufactured in such a way to not be sensible to electrostatic discharges.

### 2.2.1 ESD precautions

The equipment includes many electrostatic-sensitive parts that must be handled at a static-safeguarded working area. Furthermore, they must be arranged in static-safeguarded packages, either in the case of storing, or in the case of shipment.

These recommendations should be followed with the maximum care, especially in the case of modules or board extraction and handling.

A static safeguard area may be intended as:

- Grounded static dissipating wrist-strap that drains static charge from the operator wearing it.
- A work surface covered with or composed of a grounded, static-dissipating material that drains electrical charges from devices placed on the surface.

Work surface should provide a standard-size ESD-safeguard snap suitable for snap-stacking wrist-strap connection. It should be used as a convenient ESD caution, whenever handling modules and boards. These recommendations are to be extended also to activity not strictly performed in close equipment surrounding. If removed, replaced, or located inside workshop, any board should be handled by means of convenient ESD cautions.

**WARNING** **Please note that OTE disclaims any responsibility for problems due to poor ESD protection during activity.**

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# 3 – OPERATION

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# 3. OPERATION

The purpose of this section is to describe the operational management of the DTR100, specifically control and indicator devices and operating through the control panel facilities

## 3.1  OPERATING STATES AND EQUIPMENT ACCESS POINTS

The equipment can be set in two different operating states:

- *ON Line state* if the AF line port, located onto the ALB-M rear panel, is used to manage the AF+signaling connection, e.g. carrying PTT input and the TX and RX balanced audio lines.

- *OFF Line state* if the Headset/Microphone connector, located onto the Control Panel front side, is used to manage the AF+signaling connection, e.g. carrying PTT input and the TX and RX audio.  In this operating state, the AF line port located onto the ALB-M rear panel is not enabled, this meaning that the equipment can not provide service to an operator located at a remote position.  Although full management of equipment audio facility is possible in OFF Line state (e.g. by Headset), this is the typical operating state to be used for activities performed locally.

Concerning O&M functions, the equipment can be managed from the Control Panel (CP) by using the keyboard.  It is intended as an easy and immediate access point.

When performing O&M tasks, it is important to note that all equipment functional parameters can be accessed only in OFF Line state.  See next chapters for further details about editable parameters.

## 3.2    DTR100 CONTROL, INDICATORS AND CONNECTORS

Control and indicator devices are located on the front panel of the equipment. The rear panel is devoted to external signal and power connections, with the exception of indication of signaling from remote.

Here below the figure shows the DTR100 front and rear view and the table gives a description of all DTR100 indicators, switches and connectors.



**Figure 3.1 - DTR100 devices**
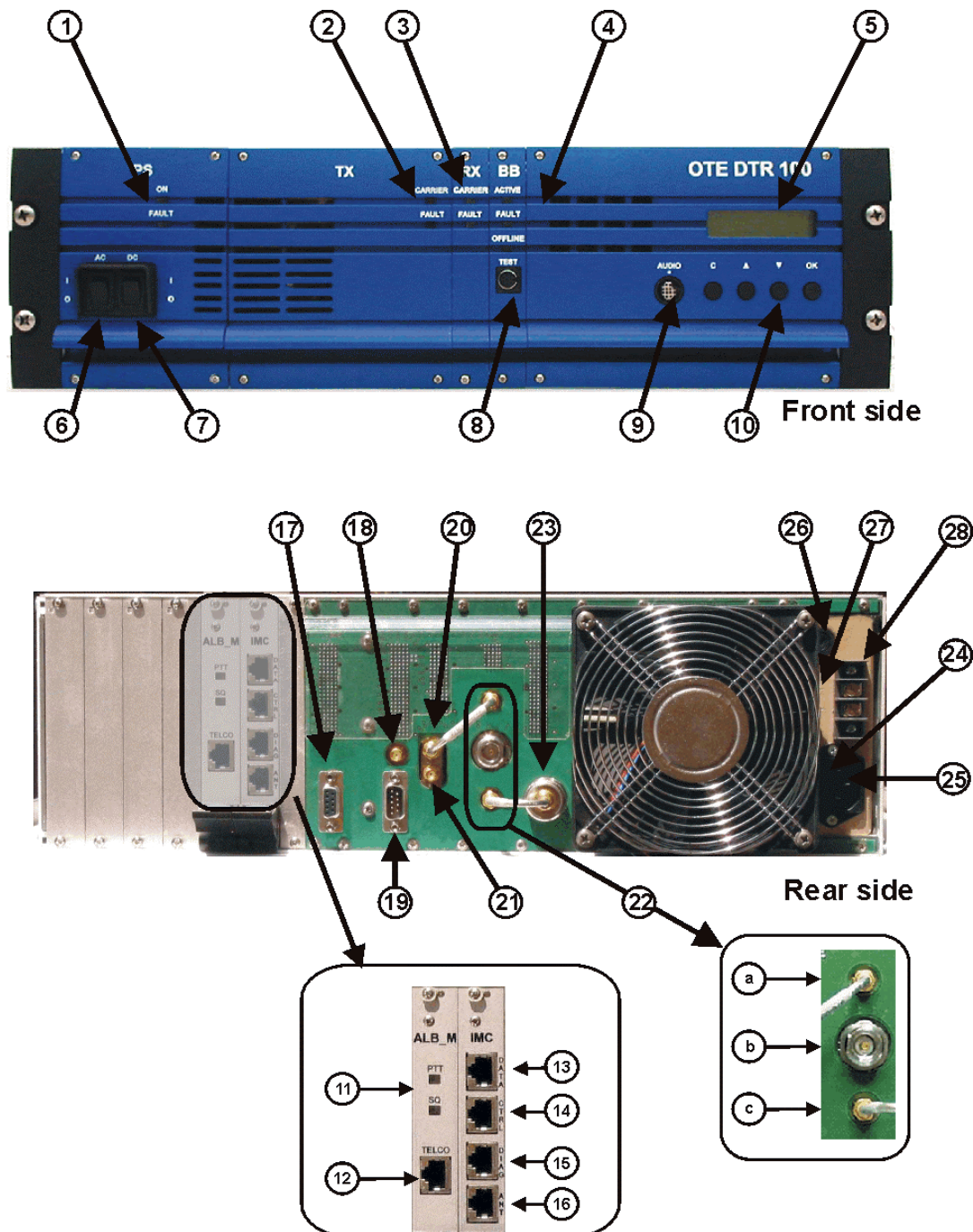
**Table 3.1 - DTR100 front side devices description**

| Ref | Description | Function |
|---|---|---|
| 1 | LEDs (green, red) | PS module status |
| 2 | LEDs (green, red) | TX/PA module status |
| 3 | LEDs (green, red) | RX module status |
| 4 | LEDs (green, red, yellow) | BB module status |
| 5 | LCD Display 2x10 digits | Display on Control Panel |
| 6 | Switch | ON/OFF AC switch |
| 7 | Switch | ON/OFF DC switch |
| 8 | Mini-DIN 8-pin connector | Test connector. |
| 9 | RP17 | Headset/Microphone connector. |
| 10 | Four control keys | Keyboard on Control Panel |

**Table 3.2 - DTR100 rear side devices description**

| Ref | Description | Function |
|---|---|---|
| 11 | LEDs (green) | PTT and Squelch status indication |
| 12 | RJ45 connector (keyed) | AF line and signaling |
| 13 | RJ45 connector (DATA) | Data interface (RS232) connector |
| 14 | RJ45 connector (CTRL) | Auxiliary control signals I/O connector |
| 15 | RJ45 connector (DIAG) | Remote diagnostic interface connector |
| 16 | RJ45 connector (ANT) | Ext. antenna switch interface connector |
| 17 | 9-pin D-type female | Service port |
| 18 | SMA-type female connector | External frequency reference input |
| 19 | 9-pin D-type male | GPS/GNSS input |
| 20 | SMA-type female connector | RX module RF input Low sensitivity |
| 21 | SMA-type female connector | RX module RF input High sensitivity |
| 22 | a: SMA-type female connector<br>b: N-type female connector<br>c: SMA-type female connector | Connections of internal RF switch |
| 23 | N-type female connector | RF output |
| 24 | 6.3 A fuse (slow blow). | VAC protection |
| 25 | Standard IEC 320 connector | AC powering |
| 26 | 20 A fuse (fast acting). | VDC protection |
| 27 | GND connection point | Equipment grounding |

| Ref | Description | Function |
|---|---|---|
| 28 | Plug-in connector | DC powering |

### 3.2.1   DTR100 front panel connectors

*Headset/Microphone connector.* It is a RP17 12-pin socket; it is located on the front side of Control Panel module and it is used to connect the headset by AF input/output lines and command signal (PTT and EAR_ON).

**Table 3.3 - DTR100 Headset/Microphone connector pin function**

| Pin | Signal | Function |
|---|---|---|
| 1 | MIC AF - VDC | Microphone input[1] |
| 2 | GND | Ground |
| 3 | PTT | PTT command (active with low level) |
| 4 | GND | Ground |
| 5 | GND | Ground |
| 6 | N.C. | |
| 7 | N.C. | |
| 8 | Earphone left | Earphone output (stereo earphone, 32 Ohm impedance) |
| 9 | GND | Ground |
| 10 | Earphone right | Earphone output (stereo earphone, 32 Ohm impedance) |
| 11 | Earphone ON | Speaker muting, when the headset is connected |
| 12 | N.C. | |

---

[1] Electrete microphone with 2 KOhm nominal impedance, also brings +2.5 VDC.

Test connector. It is a Mini-DIN 8-pin socket; it is located on the Baseband module front panel and it is used for Global Test Interface.

**Table 3.4 - DTR100 Test Interface connector pin function**

| Pin | Signal | Function |
|-----|--------|----------|
| 1 | GND | Ground |
| 2 | TEST_SER_RX | RS232 RX line, used for test purpose |
| 3 | 10 MHz_monitor | Reference clock accuracy monitoring[2] |
| 4 | GND | Ground |
| 5 | TEST_SER_TX | RS232 TX line, used for test purpose |
| 6 | GND | Ground |
| 7 | N.C. | |
| 8 | N.C. | |

### 3.2.2 DTR100 controls and indicators description

The PS module front panel hosts the following controls and indicators:

**Table 3.5 - PS module front panel LEDs layout and meaning**

| LED | Status | Function |
|-----|--------|----------|
| Green | ON | TRX ON, operating correctly |
| | OFF | TRX OFF |
| Red | ON | PS alarm |
| | OFF | Operating correctly |
| **Switch** | **Status** | **Function** |
| DC Power | ON | Switches the TRX unit ON |
| | OFF | Switches the TRX unit OFF |
| AC Power | ON | Switches the TRX unit ON |
| | OFF | Switches the TRX unit OFF |

**WARNING** **The PS module does not fully disconnect the equipment from both AC and DC sources, even when front side switches are in OFF position. PS module should be removed from the equipment only once that the external breaker has been switched OFF, or external DC supply has been disconnected.**

The TX/PA module front panel hosts the following controls and indicators:

**Table 3.6 - TX/PA module front panel LEDs layout and meaning**

| LED | Status | Function |
|-----|--------|----------|
| Green | ON | TX/PA carrier ON |
| | OFF | TX/PA OFF |
| Red | ON | TX/PA Fault |
| | OFF | Operating correctly |

---

[2] This is a 500 KHz signal obtained by dividing the internal 10 MHz reference source.

The RX module front panel hosts the following controls and indicators:

**Table 3.7 - RX module front panel LEDs layout and meaning**

| LED | Status | Function |
|---|---|---|
| Green | ON | RX carrier over squelch threshold |
| | OFF | RX in squelch state |
| Red | ON | RX fault |
| | OFF | Operating correctly |

The BB module front panel hosts the following controls and indicators:

**Table 3.8 - BB module front panel LEDs layout and meaning**

| LED | Status | Function |
|---|---|---|
| Green | ON | Connected to AF line [3] |
| | OFF | Not connected to AF line |
| Red | ON | BB fault |
| | OFF | Operating correctly |
| Yellow | ON | Equipment OFF-LINE |
| | OFF | Equipment ON-LINE |

The CP module front panel hosts the following controls and indicators:

**Table 3.9 - CP module front panel layout and keyboard meaning**

| Key | Function |
|---|---|
| **C** | cancel |
| ▲ | move up |
| ▼ | move down |
| **OK** | confirm |

---

[3] The BB ACTIVE LED ON indicates whether the equipment is connected and managed by the AF line (e.g it becomes OFF if the unit is set OFF-Line).

### 3.2.3    DTR100 Control Panel operating

The display allows monitoring and management of DTR100 configuration parameters (e.g. frequency, power output level etc.) through keyboard use.   Moreover, it shows the alarms (intended as messages indicating a detected failure) coming from DTR100 modules.   Following figure shows an example of messages that can be visualized on the display, and the keys use to browse windows.
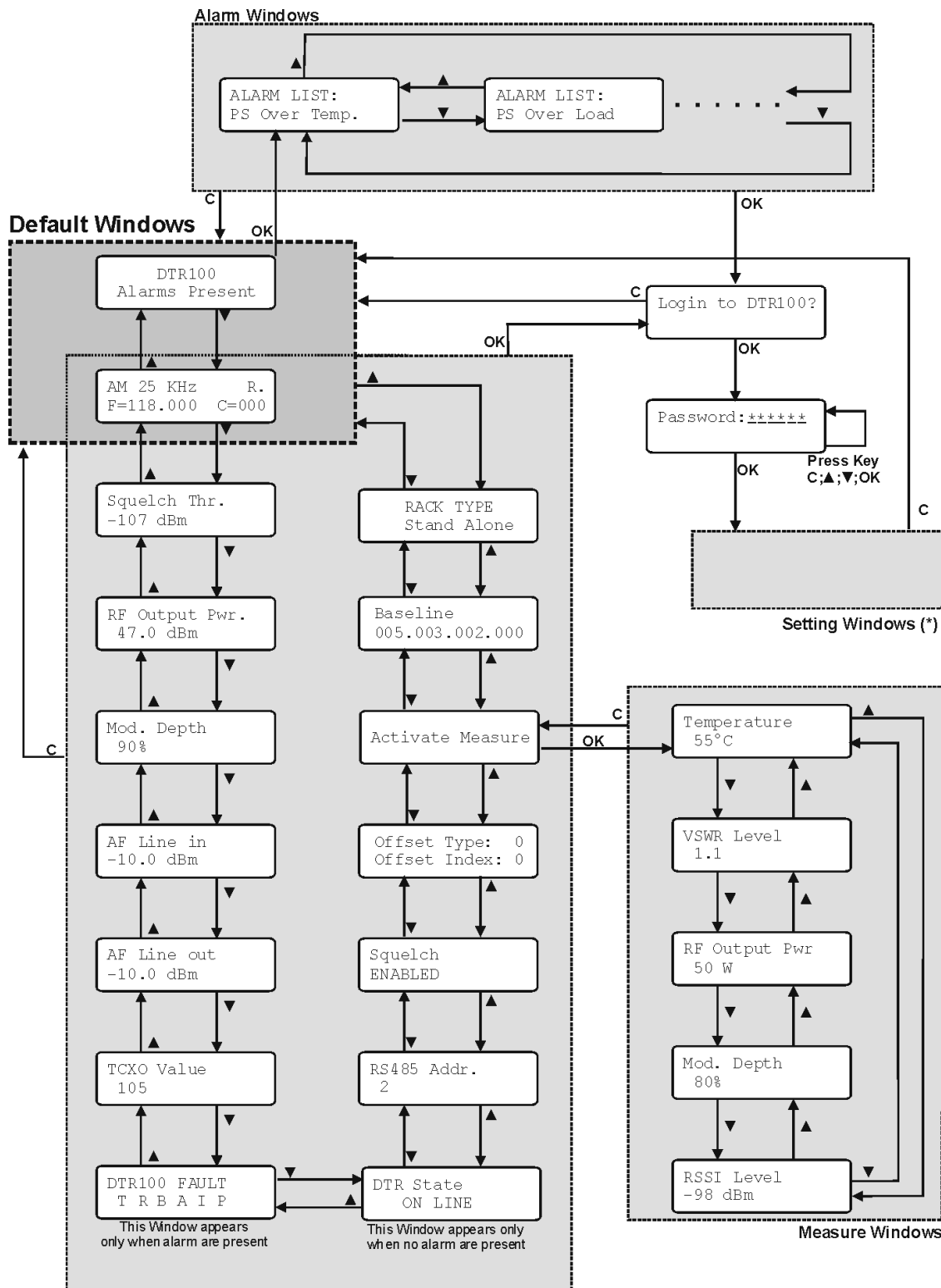
**Figure 3.2 - DTR100 keyboard menu functional block diagram**

**From login**
OK

**To Default window**
C



New DTR100 State
  OFF  LINE

Set State?:
  ON LINE

Set TCXO value?
 105

New TCXO value:
 105

New Loudsp. Vol:
 8

Set Loudsp. Vol?:
 8

Set AF Line Out?
-10.0 dBm

New AF Line Out:
-10.0 dBm

New Headph. Vol:
 8

Set Headph. Vol?:
 8

Set AF Line In?
-10.0 dBm

New AF Line In:
-10.0 dBm

New Loudsp:
 OFF

Set Loudsp?:
 OFF

Set Mod. Depth?:
 90%

New Mod.Depth:
 90%

New PTT Timeout:
 Disabled

Set PTT Timeout?:
 Disabled

Set RF Out Pwr?
 47.0 dBm

New RF Out Pwr:
 47.0 dBm

New Sq. On/Off:
 Enabled

Set Squelch?
 Enabled

Set Squelch Thr?
-107 dBm

New Squelch Thr:
-107 dBm

New RS485 Addr.:
 2

Set RS485 Addr.?
 2

Set Frequency?
F=118.000  C=000

New Freq. MHz:
F=118.000  C=000

New Diag485:
 48

Set Diag485:
 48

New Freq. KHz:
F=118.000  C=000

New Channel:
F=127.505  C=000

Set Channel?
F=127.505  C=---

Set Oper. Mode?
 AM   25KHz

New Oper. Mode:
 AM   25KH

Select Ch-Frq?
F=127.505  C=000

New Ch-Frq?
F=127.505  C=000

Set Ch-Frq MHz?
F=127.505  C=000

Set Ch-Frq kHz?
F=127.505  C=00

**Note:** All windows are present when DTR100 is in **OFF Line** mode of operation.
Only the lighted windows are present when DTR100 is in **ON Line** mode of operation.

Setting Windows

**Figure 3.3 - DTR100 setting environment functional block diagram**

The following table shows information that can be monitored on display. Press ▲ or ▼ key to browse the windows.

**Table 3.10 - DTR100 display messages**

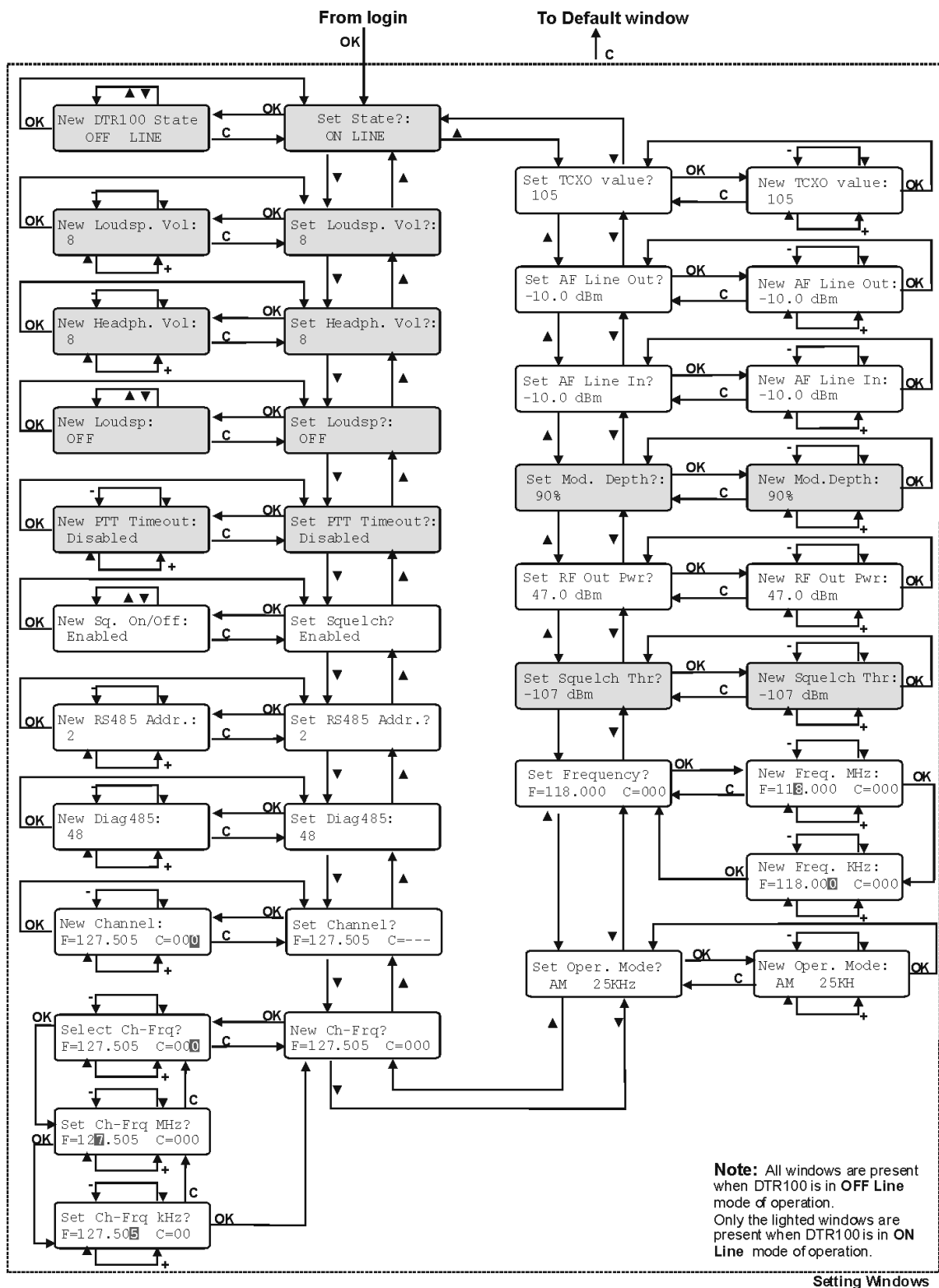| Display message | Description |
|---|---|
| DTR100<br>Alarms Present | This is the default window when alarms are present. |
| AM 25 KHz      R.<br>F=118.000  C=000 | Default window when no alarms are present. It gives information on current frequency, channel and the indication of OFF Line (L) or ON Line (R) state. |
| Squelch Thr.<br>-107 dBm | Indication of squelch threshold level, set by operator. |
| RF Output Pwr.<br> 47.0 dBm | Power output level expressed in dBm |
| Mod. Depth<br> 90% | Modulation index expressed in percentage. |
| AF Line IN<br>-10.0 dBm | AF input level to get rated modulation index |
| AF Line OUT<br>-10.0 dBm | AF output level |
| TCXO Value<br> 105 | Indication of the fine-tuning of 10 MHz local frequency reference expressed in steps. |
| DTR100 FAULT:<br> T R B A I P | This window appears only when alarms are present. Letters are referred to modules (or cards) that produce an alarm. |
| DTR100 State:<br>    ON  LINE | This window appears only when no alarms are present. |
| RS485 Addr<br>2 | This is the address ID on the RS485 connection routed towards an external controller for remote O&M management |
| Squelch<br>ENABLED | Indication of squelch state (enabled/disabled) |
| Offset Type:   0<br>Offset Index:  0 | Indication of carrier offset scheme |
| Activate Measure | This windows allows activating the measurement environment |
| Baseline<br>005.003.002.000 | Indication of the Baseline (global software release) of the equipment |
| RACK TYPE<br>...Stand Alone | Indication of the equipment assigned type; this may be Main or Standby (2 equipment in redundancy scheme) or Stand Alone (single equipment) |

Keyboard use allows handling DTR100 configuration parameters.  Instructions for handling are given in following table where an example for setting operating mode is shown.

**Table 3.11 - DTR100 parameters editing**

| | Action | | Display message |
|---|---|---|---|
| | Default display<br>(browse ▲ or ▼ key to get it) | | `AM 25 KHz      R.`<br>`F=132.000  C=000` |
| 1 | Press **OK** key | ⇨ | `Login to DTR100?` |
| 2 | Press **OK** key | ⇨ | `Password: _____` |
| 3 | Select password, pressing keys | ⇨ | `Password: ******`<br>`          _____` |
| 4 | Press ▲ or ▼ key<br>to get the desired function<br>(see editable parameter table) | ⇨ | `Set Oper. Mode?`<br>`  AM   25KHz` |
| 5 | Press **OK** key | ⇨ | `New Oper. Mode:`<br>`  AM   25KHz` |
| 6 | Press ▲ or ▼ key until that it is set the desired operating mode (e.g. AM 8.33) | ⇨ | `New Oper. Mode:`<br>`AM   8.33KHz` |
| 7 | Press **OK** key | ⇨ | `  Setting….` |
| 8 | Waiting for setting | ⇨ | `Set Oper. Mode?`<br>`AM   8.33KHz` |
| 9 | To exit, press **C** key.<br><br>To modify others parameters<br>repeat from action 4. | | |

The following table lists all control parameters, detailing the possible values, the default and the step values. In addition, table specified whether the relevant parameter can be accessed in following operating states and equipment access points:

**CP-OFF Line** indicates the operating by Control Panel in OFF Line conditions.

**CP-ON Line** indicates the operating by Control Panel in ON Line conditions.

**Table 3.12 - DTR100 editable parameters**

| Parameter | Values | Default | Step | CP-OFF Line | CP-ON Line |
|---|---|---|---|:---:|:---:|
| Operating mode[4] | AM-DSB 25 KHz<br>AM-DSB 8.33 KHz<br>AM Data | AM-DSB 25 KHz | | ● | |
| Frequency | 118 to 136.975 MHz | 118 MHz | See note [5] | ● | |
| Frequency to Channel association | Any frequency onto any channel | | | ● | |
| Channel Number | 0 to 119 | 0 | 1 | ● | |
| Squelch Thr. | -107 to -44 dBm | -107 dBm | 1 dB | ● | ● |
| Squelch Enabled/Disabled | Enabled/Disabled | Enabled | | ● | |
| Output Power | +40 to +47 dBm | +47dBm | 0.5 dB | ● | |
| Modulation Depth | 0 to 100% | 90% | 1 | ● | ● |
| TCXO value | 0 to 255 | 105 | 1 | ● | |
| DTR100 State | ON LINE/OFF LINE | ON LINE | | ● | ● |
| Loudsp. Vol. | 0 to 15 | 8 | 1 | ● | ● |
| Headph. Vol. | 0 to 15 | 8 | 1 | ● | ● |
| Loudsp. OnOff | ON/OFF | OFF | | ● | ● |
| RS485 Address[6] | UNASSIGNED to 14[7] | 2 | 1 | ● | |
| Diag 485[8] | 0 to 255 | 48 | 1 | ● | |
| AF Line IN | -30 to +10 dBm | -10 dBm | 0.5 dB | ● | |
| AF Line OUT | -30 to +10 dBm | -10 dBm | 0.5 dB | ● | |

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[4] When operating in AM-DSB 8.33 KHz mode, it is necessary to select a frequency that is compatible with 25 KHz spacing before selecting any other operating mode. Otherwise, message "setting failed" is displayed. See also relevant table and example.
[5] The step is according to the operating mode; if AM-DSB 8.33 mode is selected, step is 8.33 KHz. If any other operating mode is selected, step is 25 KHz.
[6] Physical ID address on the RS485 multi-drop connection for remote O&M management via DIAG port.
[7] RS485 address 1 and 15 are reserved and can not be used.
[8] Logical ID address on the RS485 multi-drop connection for remote O&M management via DIAG port.

### 3.2.3.1   About Baseline

**Baseline** is an identification 4-fields number indicating the equipment global release. Although this parameter is factory-configured on the proper value, it may be necessary to edit it during the equipment lifetime, e.g. upon software upgrade of any of the internal module or cards.

**Baseline format** as following example for **Baseline 5.3.2.0**.

**Table 3.13 - Baseline format**

| Index | Ref. | Definition | Note |
|-------|------|-----------|------|
| **Index 1** | 5 | Main baseline index | This number identifies the overall equipment hardware, firmware and software configuration |
| **Index 2** | 3 | Major baseline index | This number identifies the functions of the equipment. Changes to this number imply major changes to the functions of the equipment. |
| **Index 3** | 2 | Minor baseline index | This number identifies the functions of the equipment. Changes to this number imply minor changes to the functions of the equipment. |
| **Index 4** | 0 | Fix baseline index | This number identifies the fixes implemented in the equipment. |

## 3.2.4   DTR100 measurements environment

The ▲ and ▼ keys allow to access to the measurements environment. The following list details the measurements that can be shown on the display. . To exit from measurements environment press **C** key, and the default window appears on the display.

| Parameter | Unit | Description |
|-----------|------|-------------|
| Temperature | °C | Current temperature measured within the TX/PA module |
| VSWR | - | Current VSWR at the RF output[9] |
| RF power output | Watts | Current RF power at the RF output[10] |
| Modulation depth | % | Current modulation depth applied on the radiated carrier[11] |
| RSSI | dBm | Current receive signal strenght indication[12] |

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[9] Not active when not in transmission.

[10] Not active when not in transmission.

[11] Not active when not in transmission.

[12] Not active in transmission.

## 3.3 FREQUENCY INPUT AND DISPLAY FORMATS

DTR100 can operate both 8.33 and 25 KHz frequency spacing.

According to Eurocontrol specification, the following table describes the association between the frequency to be inserted (and displayed by the system), and the effective operating frequency that is set on the equipment.

**Table 3.14 - Frequency input and display formats**

| Spacing (KHz) | Frequency (MHz) | 25 KHz mode format | 8.33 KHz mode format |
|---|---|---|---|
| **25** | **132.0000** | **132.000** | 132.005 |
| 8.33 | 132.0083 | - | 132.010 |
| 8.33 | 132.0167 | - | 132.015 |
| **25** | **132.0250** | **132.025** | 132.030 |
| 8.33 | 132.0333 | - | 132.035 |
| 8.33 | 132.0417 | - | 132.040 |
| **25** | **132.0500** | **132.050** | 132.055 |
| 8.33 | 132.0583 | - | 132.060 |
| 8.33 | 132.0667 | - | 132.065 |
| **25** | **132.0750** | **132.075** | 132.080 |
| 8.33 | 132.0833 | - | 132.085 |
| 8.33 | 132.0917 | - | 132.090 |
| **25** | **132.1000** | **132.100** | 132.105 |

## 3.4    START-UP PROCEDURE

If the equipment is powered only by AC, please refer to the following steps.

- Set ON the external AC breaker or AC power source.
- Set ON the AC switch on PS module.
- Wait until the equipment booting is completed, and the display shows the default window, with operating mode, frequency, etc. If no alarm is present, operate the equipment.

If the equipment is powered by both AC and backup DC, please refer to the following steps.

- Set ON the external AC breaker or AC power source.
- Set ON the external DC breaker or DC power source.
- Set ON the AC switch on PS module.
- Set ON the DC switch on PS module.
- Wait until the equipment booting is completed, and the display shows the default window, with operating mode, frequency, etc. If no alarm is present, operate the equipment.

Please note that the equipment is not serviceable until the start-up phase is completed.

**WARNING**    **Do not turn OFF the AC switch when the equipment is operating with both AC and backup DC.**

The equipment is designed to be powered with DC only for backup purposes. In case of AC source lack, the PS module is automatically supplied by the backup DC power source, and equipment reduces the RF power output to + 46 dBm (approx. 40 W CW) max.

To power-down the equipment (if powered by both AC and backup DC), operator must before set OFF the DC and AC switch, and then set OFF the DC and AC breakers or power sources.

It is important to note that any maintenance action on the equipment must be done only after switching OFF the external AC and DC breakers.

**WARNING**    **The PS module does not fully disconnect the equipment from both AC and DC sources, even when front side switches are in OFF position. Internal modules and/or parts should be removed from the equipment only once that the external AC and DC breakers have been switched OFF, and/or external supply sources have been disconnected.**

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# 4 – SETTING-UP

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# 4. SETTING-UP

The purpose of this section is to provide to technical staff information and references required for the setting-up of the equipment.

The procedure to set-up and align the equipment is given.

**WARNING**   **Setting-up are intended to be carried out by qualified technical personnel only.**

## 4.1    INTERFACE CONNECTORS

The interface connectors are located on the equipment rear side.  Following chapters details pin function of each connector.

### 4.1.1    Signal and data

Signal and data connections are located on the rear left side of the equipment as shown in the following figure.
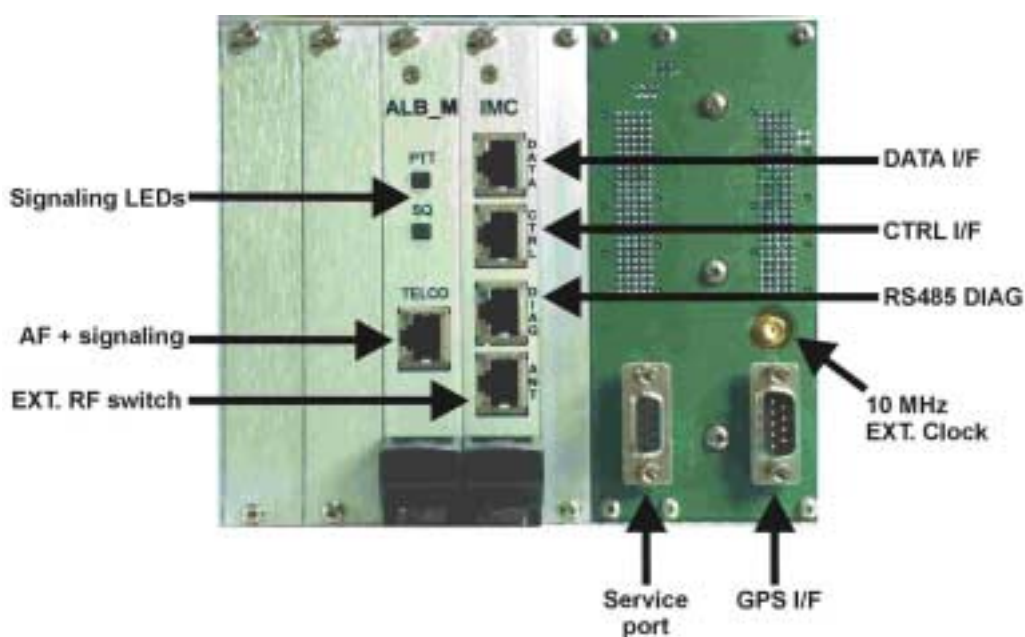


**Figure 4.1 - Signal and data connections**

*TELCO connector*. This is a 8-pin RJ45 keyed socket, used to connect the AF input/output lines together with PTT and squelch signaling. AF input and output circuits are designed to interface balanced lines, with 600 ohm nominal impedance. The LED indicators may be used as monitoring of E&M signaling activity.

**Table 4.1 - TELCO connector pin function for DTR100**

| Pin | Signal | Function (AM-DSB) | Function (AM-DATA) |
|-----|--------|-------------------|--------------------|
| 1 | M- | Squelch signaling to external | Squelch signaling to ACARS modem |
| 2 | M+ | Squelch signaling to external | Squelch signaling to ACARS modem |
| 3 | AF RX + | RX AF balanced audio output | FSK output to ACARS modem |
| 4 | AF RX - | RX AF balanced audio output | FSK output to ACARS modem |
| 5 | AF TX + | TX AF balanced audio input | FSK input from ACARS modem |
| 6 | AF TX - | TX AF balanced audio input | FSK input from ACARS modem |
| 7 | E+ | PTT signaling from external | PTT command from ACARS modem |
| 8 | E- | PTT signaling from external | PTT command from ACARS modem |

*DIAG connector*. This is a 8-pin RJ45 socket, used to connect the RS485 serial data line towards local controller devices.

**Table 4.2 - DIAG connector pin function**

| Pin | Signal | Function |
|-----|--------|----------|
| 1 | N.C. | |
| 2 | N.C. | |
| 3 | GND | Ground |
| 4 | RS485 + | RS485 O&M data to/from external controller |
| 5 | RS485 - | RS485 O&M data to/from external controller |
| 6 | GND | Ground |
| 7 | N.C. | |
| 8 | N.C. | |

*DATA connector*. This 8-pin RJ45 socket allows data link between main and standby unit to support changeover features.

**Table 4.3 - DATA connector pin function**

| Pin | Signal | Function (AM-DSB) | Function (AM-DATA) |
|-----|--------|-------------------|--------------------|
| 1 | GND | Ground | Ground |
| 2 | RS232 TX | RS232 TX data to other DTR | RS232 TX data to controller |
| 3 | GND | Ground | Ground |
| 4 | RS232 RX | RS232 RX data from other DTR | RS232 RX data from controller |
| 5 | GND | Ground | Ground |
| 6 | RTS | RTS signal to other DTR | RTS signal to controller |
| 7 | GND | Ground | Ground |
| 8 | CTS | CTS signal from other DTR | CTS signal from controller |

*CTRL connector.*  This is a 8-pin RJ45 socket, used for additional input and output controls and for the summary alarm output.  All the input/output signals are handled by optocouplers.

**Table 4.4 - CTRL connector pin function**

| Pin | Signal | Function |
|---|---|---|
| 1 | N.C. | |
| 2 | PTT_resp | PTT activation response output (command wire) |
| 3 | PTT_resp_ref | PTT activation response output (return wire) |
| 4 | Mute_IN | Receiver muting command input (command wire) |
| 5 | Mute_IN_ref | Receiver muting command input (return wire) |
| 6 | Alarm | Summary alarm status output (command wire) |
| 7 | Alarm_ref | Summary alarm status output (return wire) |
| 8 | N.C. | |

*ANT connector.*  This is a 8-pin RJ45 socket, used to drive an external device for RF coaxial switch handling.  Output signal is handled by optocoupler.

**Table 4.5 - ANT connector pin function**

| Pin | Signal | Function |
|---|---|---|
| 1 | N.C. | |
| 2 | N.C. | |
| 3 | N.C. | |
| 4 | SW_ANT | External RF switch drive (command wire) |
| 5 | SW_ANT_ref | External RF switch drive (return wire) |
| 6 | N.C. | |
| 7 | N.C. | |
| 8 | N.C. | |

*GPS I/F connector.*  This is a D-type 9-pin male, used for interfacing an external GPS/GNSS device to get UTC absolute time reference in VDL modes[13].

**Table 4.6 - GPS I/F connector pin function**

| Pin | Signal | Function |
|---|---|---|
| 1 | 1 pps | 1 pps reference pulse from external GPS/GNSS (TTL) |
| 2 | GND | Ground |
| 3 | N.C. | |
| 4 | RS232 TX | RS232 TX data to external GPS/GNSS |
| 5 | RS232 RX | RS232 RX data from external GPS/GNSS |
| 6 | GND | Ground |
| 7 | N.C. | |
| 8 | N.C. | |
| 9 | GND | Ground |

[13] Not available in current release.

*EXT CLOCK input.* This is a SMA-type coaxial female, used to get TTL square-wave 10 MHz high-precision clock signal from an external reference, such as high-stability TCXO, or GPS-slaved reference, etc. It allows for increasing the rated frequency accuracy of the equipment up to the reference one.

**Table 4.7 - EXT CLOCK connector pin function**

| Pin | Signal | Function |
|--------|--------|---------------------------|
| Center | Clock | 10 MHz reference (TTL) |
| Shield | GND | Shield |

*Service port.* This is a D-type 9-pin female, used for service tasks and audio recording[14].

**Table 4.8 - Service port pin function**

| Pin | Signal | Function |
|-----|-----------|-----------------------------------------------|
| 1 | +13.5 VDC | +13.5 VDC from PS module[15] |
| 2 | RS485 - | Extension of RCB bus (service purposes only) |
| 3 | RS485 + | Extension of RCB bus (service purposes only) |
| 4 | REC OUT - | Recording balanced audio output |
| 5 | REC OUT + | Recording balanced audio output |
| 6 | N.C. | |
| 7 | N.C. | |
| 8 | LDSPK + | For connection of external loudspeaker[16] |
| 9 | LDSPK - | For connection of external loudspeaker[17] |

---

[14] 600 ohm balanced line carrying both TX and RX audio, having an output of -10 dBm ± 3 dB.
[15] Max. current output 500 mA. This output must be used only to power external accessories recommended by OTE, not suitable to power third-part external devices.
[16] Option not available in current release.
[17] Option not available in current release.

## 4.1.2    Power and grounding

Power and grounding connections are located on the rear right side of the equipment as shown in the following figure.
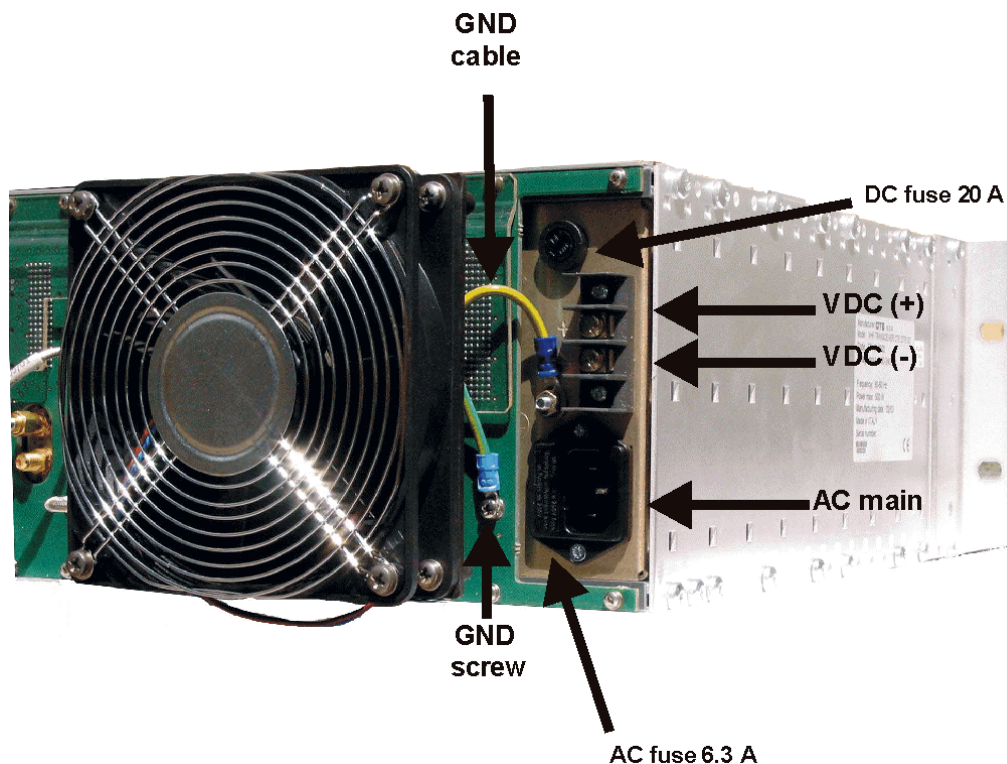


**Figure 4.2 - Power and grounding connections**

*VDC plug-in.*  This is the DC supply input connection point, to be used with crimped-plug wires.

*AC main.*  This is an IEC 320 standard socket for AC powering, provided with fuse receptacle. Use only CE-approved power cord.

*GND (screw).*  This is a M3 screw terminal point for connection of grounding cable, located on the rear side of the equipment motherboard.

**WARNING**    **The use of a CE-approved power cord is mandatory.**

### 4.1.3    Radio frequency

Radio frequency connections are located on the middle rear side of the equipment as shown in the following figure.
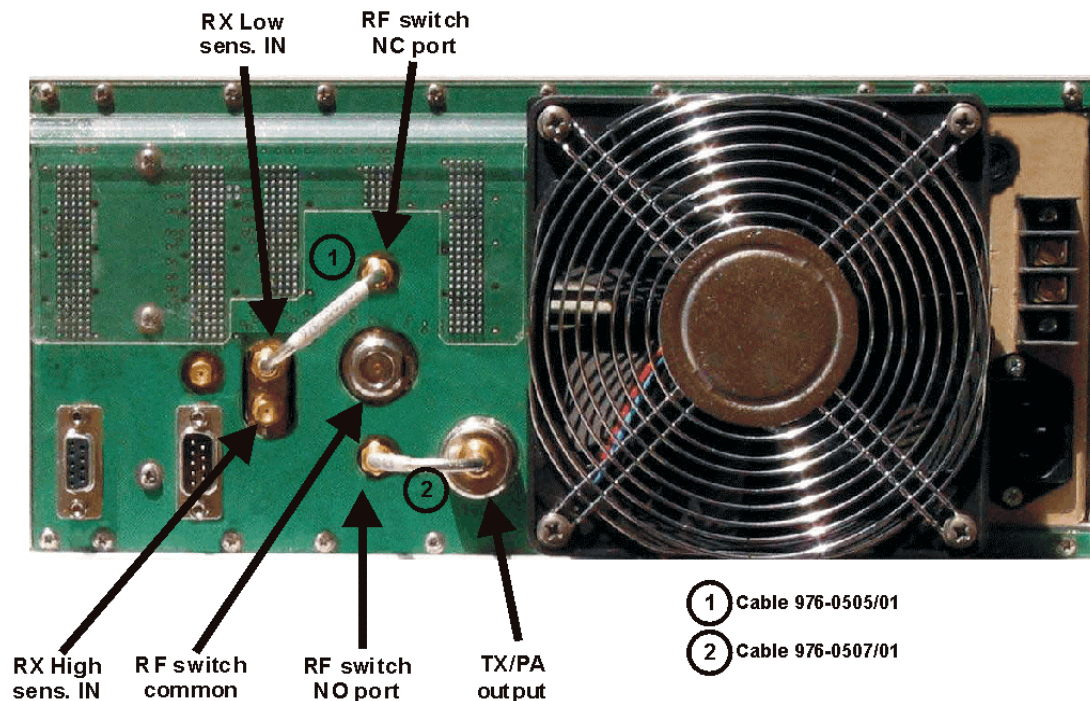


**Figure 4.3 - DTR100 radio frequency connections**

*RX Low sensitivity input (SMA-female).*  By this port, the receiver is fed by the normal input, having equipment rated sensitivity features.

*RX High sensitivity input (SMA-female).*  By this port, the receiver is fed by the high-sensitivity input, but it is important to note that this connection bypasses the first RX front-end cell, thus having less protection wrt interfering signals, e.g. radiated carrier from co-located transmitters. This input must be used only when the receiver is connected to an external band-pass filter (e.g. cavity filter).

*TX/PA output (N-female).*  This port is the TX/PA direct radio frequency output.

*RF switch connectors.*  The internal RF switch has a normally-closed SMA port (to be used for the receiver section, by fitting the external coaxial SMA-SMA jumper), and a normally-open SMA port (to be used for the transmitter section, by fitting the external coaxial SMA-N jumper). The switch common port is then available on an N-female port, to be connected to the radiating system (or the filtering device, etc).

By using this layout the equipment fully operates as "transceiver", device, in which the transmitter and receive sections share the same radiating system.  As factory-default (see the above figure), the equipment is provided with common TX/RX coaxial port (jumpers present), the normally-closed port is routed to the receiver low-sensitivity input.

## 4.2   SETTINGS AND ADJUSTMENTS

Following chapters detail necessary information for proper setting-up of the equipment, by defining a step-by-step procedure.

Setting-up is intended as the sequence of alignment and configuration actions that must be performed by operator in order to put the equipment in service.

### 4.2.1   E&M line interface settings

ALB-M card feature dip-switch banks to match AF line interfacing requirements. Line interfacing adjustments concern E line and M line settings.

To perform the setting, the card must be previously removed from the equipment rear side. Following figure shoes dip-switch bank position onto the card (screening cover removed).
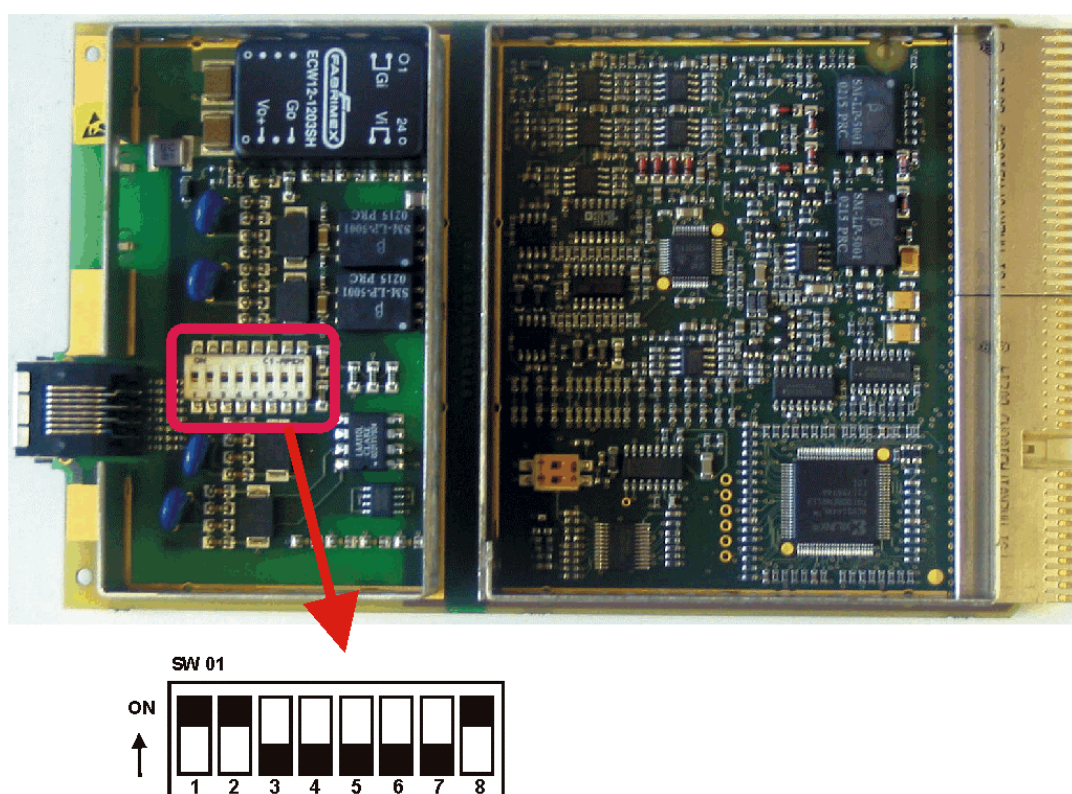


**Figure 4.4 - ALB-M dip-switch bank position**

**WARNING**   **Please follow given indications about ESD prevention cares when handling the card.**

*E line* is used to acquire PTT signaling from TELCO line. The circuit design is based on a current detector; the line polarization can be either due to external or internal voltage, as shown in the figure.
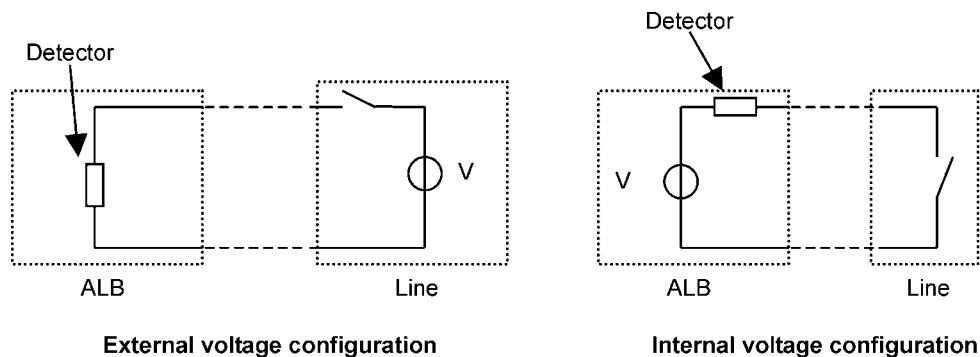


| External voltage configuration | Internal voltage configuration |

**Figure 4.5 - E line circuit layout**

In the first case, the presence of an external voltage makes the current flow in the loop; in the second configuration ALB-M powers the line and external equipment closes the loop. The proper configuration can be selected setting contacts 1 to 3 of SW01 according to the table.

**Table 4.9 - E line settings #1**

| Line feed | Dip-Switch | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| Internal voltage | ON | ON | OFF | X | X | X | X | X |
| External voltage | OFF | OFF | ON | X | X | X | X | X |

When external voltage configuration is used, a voltage from 12 to 48 VDC can be applied to E leads. The applied polarity can be positive or negative. Contacts 5 to 8 of SW01 must be set according to external applied voltage value as from configuration given in table below.

**Table 4.10 - E line settings #2**

| Line feed | Dip-Switch | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| 12V (9V to 18V) | X | X | X | X | ON | X | OFF | OFF |
| 12V (220 Ohm) | X | X | X | X | ON | X | ON | OFF |
| 12V (0 Ohm) | X | X | X | X | ON | X | ON | ON |
| 24V (18V to 36V) | X | X | X | X | OFF | ON | OFF | OFF |
| 48V (36V to 60V) | X | X | X | X | OFF | OFF | OFF | OFF |

When internal voltage configuration is used, the voltage applied is +12V. Dip-switches 5 and 6 of SW01 are not relevant; only 7 and 8 can be set. Setting on contact 7 reduces the series resistance of about 70% (from 800 Ohm to 220 Ohm). Setting on contact 8 reduces to zero the series resistance. This setting can be useful when using long cables that have a series resistance not negligible[18].

*M line* is used to send squelch signaling towards remote device through the TELCO line. The circuit design is based on an electronic switch. The line can be interfaced in either "floating" or "common ground" layout
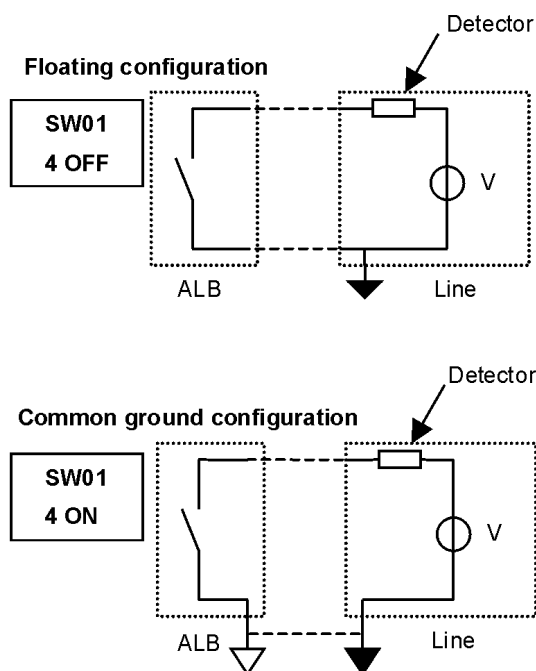
**Figure 4.6 - M line circuit layout**

In the first case both leads of M line are related to voltage potentials of the external equipment, and are not referred to ALB-M potentials. In the second case, a dedicated wire for return path is not present, but the current loop is anyway closed through isolated ALB-M ground. In this configuration, isolated ALB-M ground and external equipment ground reference must be at the same potential.

When activated, M line interface makes a short circuit on the loop, making current flow[19].

---

[18] This setting can be useful when using long cabling having a series resistance not negligible (e.g. a connection of 5 Km with AWG24 wire, 0.205 mm$^2$ section, has (84Ohm/Km x 5Km) x 2 = 840 Ohm series resistance).
[19] The current flow takes place independently from the line polarity. The residual voltage is 2.5 V @ 20 mA.

### 4.2.2   Equipment adjustments

The following procedure lists the operating parameters (e.g. frequency, modulation depth, etc) that must be adjusted according to system layout requirements.  In any case, further non-mandatory adjustments (e.g. loudspeaker volume, earphone volume, etc) may be done according to user criteria, referring to section § 3 - Operation.

Any setting-up activity must be done only after than installation has been completed, thus also including the connection to any external device and the alignment of ancillary devices (filters, radiating system, etc).  Setting-up is listed in following procedure.

**Table 4.11 - Setting-up procedure for DTR100**

| Step | Action | Expected result |
|------|--------|-----------------|
| 1 | Switch ON and wait for the end of boot. | After correct booting, control panel displays shows the default windows. |
| 2 | Login[20]. | Setting environment menu is active. |
| 3 | Set the equipment OFF Line[21]. | Once setting is done, control panel display shows OFF Line indication. |
| 4 | Set the operating frequency[22]. | Once setting is done, control panel display shows new operating frequency. |
| 5 | Set the operating mode (e.g. AM-25 kHz or AM-8.33 kHz). | Once setting is done, control panel display shows new operating mode. |
| 6 | Set the equipment RS485 address[23]. | Once setting is done, control panel display shows new RS485 address. |
| 7 | Set the equipment DIAG485 address[24]. | Once setting is done, control panel display shows new DIAG485 address. |
| 8 | Set the RF power output. | Once setting is done, control panel display new RF power level. |
| 9 | Set the transmission timeout[25]. | Once setting is done, control panel display new transmission timeout figure. |
| 10 | Set the maximum modulation depth[26]. | Once setting is done, control panel display new modulation depth figure. |
| 11 | Set the TX audio input level[27]. | Once setting is done, control panel display new TX audio input level. |

---

[20] The control panel display browsing is detailed into § 3 - Operation.  Please refer to the relevant chapter about how getting the desired editable parameters.
[21] OFF Line condition is necessary, since many parameters can not be edited when in ON Line.
[22] The adjustment of the operating frequency and operating mode must be done in conjunction, refer also to § 3 - Operation for details.
[23] This parameter is used to assign a specific physical ID address on the DIAG port, within the RS485 multi-drop connection to an external controller.  If no controller for remote O&M activity is present, this setting is not necessary.
[24] This parameter is used to assign a specific logical ID address on the DIAG port, within the RS485 multi-drop connection to an external controller.  If no controller for remote O&M activity is present, this setting is not necessary.
[25] Transmission timeout sets the maximum elapse of time allowed for transmission.  At timeout counter expiring, transmission is shut-down.  Short timeout values can affect the equipment service by truncate radiated speech.  It is also possible to set the PTT Timeout OFF by setting the relevant parameter to 0, thus allowing for continuous transmission operating.  Although this setting is not recommended, it can be required for special application (e.g. VOLMET, etc).
[26] Setting of maximum modulation depth is anyway referred to a nominal AF input of -10 dBm.  Baseband module internal process operates as compressor/limiter device, avoiding modulation rate to override 95% and causing over-modulation phenomena.
[27] It operates a gain or attenuation on the TX AF line coming from the VCSS.  It must be set according to the expected nominal AF level of the line.

| Step | Action | Expected result |
|------|--------|-----------------|
| 12 | Set the RX audio output level[28]. | Once setting is done, control panel display new RX audio output level. |
| 13 | Set the squelch threshold[29]. | Once setting is done, control panel display shows new squelch threshold. |
| 14 | Set the equipment ON Line[30]. | Once setting is done, control panel display shows ON Line indication. |
| 15 | Logout[31]. | Quit the setting environment menu. |

It is important to note that many of the above parameters do not need to be changed from the default settings for a correct operating, and therefore some of the above steps may be ignored.

In example, default value of squelch threshold is -107 dBm. This value allows for correct operating in standard operating condition, and it is not necessary to change it.

### 4.2.2.1 Reference oscillator monitoring

This adjustment must be done with the equipment ON. The front side test port has a monitoring facility for the internal 10 MHz reference oscillator that has a rated 1 ppm accuracy. When operating in in 25 kHz channel spacing mode 5 ppm accuracy is required; when operating in 8.33 kHz channel spacing mode 1 ppm accuracy is required.

On the TEST port, a TTL-level 500 KHz square-wave signal is available, obtained by dividing the internal reference[32]. As specified, the counter used for the test must have an internal time base stability better than 0.1 ppm ($1 \times 10^{-7}$); it is recommended to use a counter provided with internal high-stability oven, or slaved to external reference (e.g GPS).

It is necessary to wire a cabling having on the equipment side a Mini-DIN 8-pin male, and having on the frequency counter side the relevant termination (e.g. BNC coaxial). Cabling should be realized preferably with RF-coaxial cable. The pin 3 of the TEST port must be connected to the central conductor of coaxial, while pins 1, 4 or 6 (corresponding to GND) must be connected to the shield. Once realized the cable, the procedure for monitoring and adjustment is given in the following table.

**Table 4.12 - Reference oscillator monitoring procedure**

| Step | Action | Expected result |
|------|--------|-----------------|
| 1 | Connect the cabling to the TEST port and to the counter input port. | Frequency counter displays the 500 KHz signal current frequency. |
| 2 | Set the equipment OFF Line. | The equipment is OFF Line. |
| 3 | Enter in the display menu the setting environment, and scroll the menu until the window <Set Osc. value> is shown. | Current <Set Osc. value> setting figure is displayed. |

---

[28] It operates a gain or attenuation on the RX AF line routed to the VCSS. It must be set according to the nominal AF level expected by the line, or connected device.
[29] Wrong setting of the squelch threshold may result in no receiving of weak signals.
[30] ON Line is the normal operating condition.
[31] Logout is mandatory for permanently storing of the edited parameters.
[32] The frequency accuracy can be monitored and adjusted even by checking the effective frequency precision of the radiated carrier, e.g. by connecting a radio test set on the transmitter RF output.

| 4 | If the equipment is operating in 25 kHz channel spacing mode, and the frequency reference is less accurate than 5 ppm wrt the 500 KHz signal, proceed adjusting the <Set Osc. value> until the desired accuracy is achieved. | Frequency counter displays the 500 KHz signal adjusted frequency. |
|---|---|---|
| 5 | Alternatively to previous step, if the equipment is operating in 8.33 kHz channel spacing mode, and the frequency reference is less accurate than 1 ppm wrt the 500 KHz signal, proceed adjusting the <Set Osc. value> until the desired accuracy is achieved. | Frequency counter displays the 500 KHz signal adjusted frequency. |
| 6 | Set the equipment ON Line and disconnect the counter. | The equipment is ON Line. |