



**UDT-04 Transmitter Manual
Version V1.4
SW: UDT_V1_119131190921-07**



Accessories included in this manual



AVS
Airborne Antenna



RTC-04

Remote Control



CELLULAR DATALINK ANTENNA

Contents

Chapter 1: Introduction

This first chapter provides a general description of the UDT-04 high power transmitter.

Chapter 2: Technical features

This second part offers the transmitter's physical and environmental characteristics.

Chapter 3: How to order

The third part provides the user with information on ordering and different configurations available for these Transmitters.

Chapter 4: Transmitter operation and Menus

This fourth part provides the user all the necessary information to control and operate the equipment properly. It is detailed the function of each button on the keyboard and the information shown on the display, menus, etc.

Chapter 5: GPS Application

In this chapter, the use of the GPS incorporated system and some of its applications are shown.

Chapter 6: Web Server

This chapter provides a detailed description of the Web Server tool. This feature allows controlling the UDT-04 transmitter through a website.

Chapter 7: Equipment Installation

This seventh chapter indicates the available connections of the transmitter and their characteristics.

Chapter 8: Remote Control

The use of the RTC-04 device or RS-485 operation provides a remote connection to the UDT-04 transmitter.

Chapter 9: Mechanical Dimensions

In this chapter, the mechanical drawing of the units described in this manual are included.

Chapter 10: Preventive maintenance

This chapter explain the procedure that should be followed during the transmitter's life.

Chapter 11: Warranty

This chapter contains warranty considerations and conditions.

Annex A: AVS Airborne Antenna User's Guide

Annex B: Modulation Standards

Dear customer,

We would like to thank you for selecting this equipment and welcome you to the SVP's growing family of products.

We are sure that the addition of this equipment will cause you a complete satisfaction in your existing installation.

Please read these instructions carefully and keep them in hand in case you have to refer to them.

About this manual

This user's guide provides indications and explanations about how to set up the UDT-04 transmitter easily for the most common use cases.

This document is intended to help first time users:

- To find their way around the GUI.
- To understand the different possibilities of the UDT-04 transmitter.
- To set the UDT-04 for their specific configurations.

Symbols

The symbols that appear in this manual are:



An information message which indicates explanations for the proper operation of the equipment.



This symbol advises users that if they do not take, avoid or make specific actions, several damages could appear in the device.



In the places where this symbol appears it means that by pressing the Down button of the equipment the user can access to the next screen.



This symbol means that pressing the OK button in the options where this symbol appears, the user can access to the submenu related to that option or can change the value of the parameter.



These symbols mean that the parameter can be modified in the same screen with the right and left keys.

Important Notes

1. The UDT-04 transmitter is completely compatible with the DVB-T/T2 Standards, included in the European Standard ETSI EN300744 (DVB-T), ETSI EN300755 (DVB-T2).
2. It is important that when the transmitter is switched on, the selected RF output connection must have the suitable antenna or must be loaded.
3. The UDT-04 transmitter is available in different frequency bands from 2 to 7 GHz, for the DVB-T2 and DVB-T RF stage. The frequency band is defined on the product P/N.
4. Special care should be taken with SDI cables, quality and length, these are very important, especially when 12G-SDI or 3G SDI signals are transmitted.
5. If any audio or data channel are not used in a transmission, they should be disabled, in order to assign that bitrate to the video and achieve a higher quality transmitted video signal.
6. Only authorized personnel should open the product and any repair or warranty will be invalidated if the seals are broken.

Safe Operating Procedures

In this section the safety requirements are shown in order to ensure awareness of potential hazard to the personnel who is operating and maintaining the equipment.

FCC

This chapter has been made taking into account the OET bulletin 65, from August 1997, recommended by the FCC (Federal Communications Commission).

The HDT-04 Transmitter designed to provide services for broadcasting, will not create RF energy exceeding 1.0 mW/cm², the FCC limit for exposure. This is known as the Maximum Permissible Exposure (MPE) limit. This transmitter follows this law (with the AVS flexible antenna 4.5 dBi) as long as the distance between the antenna and the person is at least 58 cm for higher power transmitter of 15 Watts. SVP Broadcast Microwave, in accordance with the requirements set forth by the FCC, provides this information as a guide to the user. Next are shown the calculations made to obtain those values:

$S = \text{MPE in mW/cm}^2$ (milliwatts per square centimetres)

To follow the law, S maximum must be 1.0 mW/cm²

$$S = \frac{EIRP}{4\pi \cdot R^2}$$

$$R_{min} = \sqrt{\frac{EIRP}{4\pi}}$$

$$EIRP = P \cdot G$$

$$G = 10^{\frac{G(dBi)}{10}}$$

Where:

EIRP: Equivalent isotropically radiated power

G : Antenna gain in numeric value

P: Output power of the transmitter (mW)

R: Distance from the antenna to the transmitter (cm)

1. UDT-04 15 Watts Transmitter with AVS antenna (4.5 dBi)

$$G = 4.5\text{dBi} = 2.818$$

$$P_{\text{max}} = 15000 \text{ mW}$$

$$\text{EIRP} = 42,270 \text{ mW/cm}^2$$

$$\mathbf{R_{\text{min}} = 58 \text{ cm}}$$

2. UDT-04 10 Watts Transmitter with AVS antenna (4.5 dBi)

$$G = 4.5\text{dBi} = 2.818$$

$$P_{\text{max}} = 10000 \text{ mW}$$

$$\text{EIRP} = 28,180 \text{ mW/cm}^2$$

$$\mathbf{R_{\text{min}} = 47.35 \text{ cm}}$$

3. UDT-04 5 Watts Transmitter with AVS antenna (4.5 dBi)

$$G = 4.5\text{dBi} = 2.818$$

$$P_{\text{max}} = 5000 \text{ mW}$$

$$\text{EIRP} = 14090 \text{ mW/cm}^2$$

$$\mathbf{R_{\text{min}} = 33.48 \text{ cm}}$$

First Aid in Case of Electric Shock

DO NOT TOUCH THE VICTIM WITH YOUR BARE HANDS until the circuit is broken. SWITCH OFF. If this is not possible, PROTECT YOURSELF with DRY insulating material and pull the victim clear of the conductor.

If breathing has stopped, indicated by unconsciousness, lack of respiratory movements and a 'blue' look to cheeks, lips, ears and nails, START RESUSCITATION AT ONCE.

EMERGENCY RESUSCITATION – THE EXPIRED AIR METHOD

(Approved by the Royal Life Saving Society)

Chapter 1: If possible, lie the victim on his back with his head slightly higher than his feet. Clear the mouth and throat of any obvious obstruction.

Chapter 2: Kneel on one side of the victim, level with his head. LIFT THE JAW AND TILT THE HEAD BACK AS FAR AS POSSIBLE (Figs. 1a and 1b)

Chapter 3: One of the following may happen:

- Breathing may begin and consciousness returns.
- Breathing may begin but consciousness NOT returns. Turn the victim on his side and ensure that the airway is kept clear.
- Breathing may return but be NOISY which means that the airway is not fully clear. Try to clear the airway.

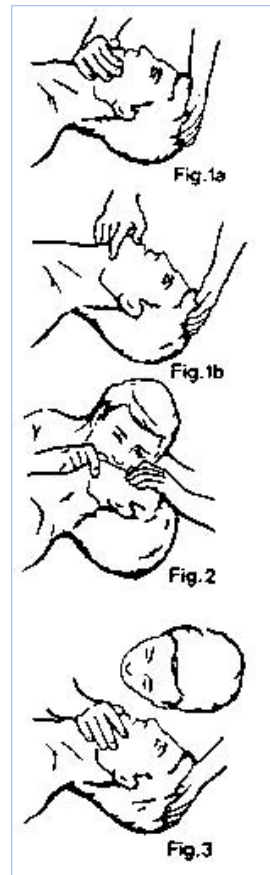
Chapter 4: IF THERE NO SIGN OF BREATHING:

- Check that the head is still tilted back.
- Take a deep breath.
- Pinch the victim's nose and blow firmly into his mouth (Fig. 2). As you do, the chest will RISE.
- Turn your head away and take another breath, watching for the chest to FALL (Fig. 3).

Chapter 5: Start with four quick breaths and then continue with one breath every five seconds (i.e. 12 times a minute). This should be continued until the victim revives or a doctor certifies death.

Chapter 6: As consciousness returns the victim will start to breathe on his own, and a 'pink' colour replaces the 'blue' look: this is the time to stop resuscitation. Continue to hold his chin up and so keep the airway clear.

Chapter 7: In the case of injuries to the mouth, it may be necessary to use mouth-to-nose resuscitation. Seal the victim's mouth with your cheek and blow firmly into his nose, proceeding as above.



Chapter 8: In the case of severe facial injuries, it may be necessary to do a manual method of artificial respiration (Silvester-Brosch or Holger Nielsen). Briefly, these methods apply compression to ribcage with the victim lying on his back (S-B) or face down (H.N.) with associated movement of his arms up and out. The cycle of movement should take about five seconds, i.e. the normal breathing phase.

Chapter 9: Whatever the method, it is **ESSENTIAL** to commence resuscitation **WITHOUT DELAY** and to send for medical assistance immediately.

TREATMENT FOR BURNS

If the victim is also suffering from burns, then, without hindrance to resuscitation, observe the following:

- a) DO NOT ATTEMPT TO REMOVE CLOTHING ADHERING TO THE BURN.
- b) If possible, alleviate the pain from the burnt part by immersing in cold water.
- c) If help is available or as soon as resuscitation is no longer required, the wound should be covered with a DRY clean dressing.
- d) Oil or grease in any form should not be applied.
- e) If severely burnt, get the victim to hospital immediately.

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Chapter 1: Introduction

The UDT-04 is the new high-power transmitter developed by SVP Broadcast Microwave which provides an output power of 15 W in the frequency range of 1,900 to 2,500 MHz and 2,300 to 2,700 MHz, 10 W in the frequency range of 1,250 to 1,600 MHz, 1,700 to 2,200 MHz 3,300 to 3,600 MHz, 4,400 to 5,000 MHz and 6,400 MHz to 7,000MHz and output power of 5 W in the range of 5,000 to 5,300 MHz.

Its feature HEVC encodes for 12G video quality signals with ultra-low latency. HEVC transmission is possible using 50% lower bitrate.

This new generation transmitter accepts one 12G signal or four 3G/HD/SD-SDI video input signals.

The ASI output enables the user to use the transmitter as a standalone encoder.

The UDT-04 transmitter performs DVB-T2 and DVB-T modulations.

Moreover, it expands the possibilities of COFDM digital links on the market using linearization technology to minimize distortion and to provide superior signal quality for complex multicarrier modulations.

Control, operation and monitoring of the UDT-04 transmitter are very friendly. All the parameters can be configured in field. A wide range of accessories allow using this equipment in many different applications.

An excellent design, mechanical and electronic assembly make the UDT-04 a robust and reliable solution.

For applications of high security, the UDT-04 transmitter has the option of AES-128 and AES-256 encryption.

Features

This transmitter features HEVC, H.264 and Mpeg-2 encoding for 12G, high definition (HD) and standard definition (SD) signals with ultra-low latency. HEVC allows the same video quality, reducing file sizes by up to 50% compared to its predecessor, the H.264.

Among the improvements of this new transmitter is the ability to transmit one 4K UHD signal with HDR at 10-bit 4:2:2 quality or 4 simultaneous 1080p50/59HD signals.

Encoded signals can be encrypted using BISS-1, BISS-E, AES-128 and AES-256 (optionally) scrambling system. The encrypted signal will only be received by the receivers that have a valid descrambling key.

The transmitter system operation is very easy. It has a display and a keyboard which make possible the configuration and monitoring of every parameter of the equipment.

The equipment is fed with DC power supply from 9 to 36V. It has good harmonic rejection and isolator for protection against high VSWR.

It also has a waterproof radiator that dissipates heat through a fan. The fan is activated when the temperature exceeds 40°C.

DVB-T2 features

This transmitter uses COFDM (Coded Orthogonal Frequency Division Multiplexing) modulation system (1K, 2K) which provides superior signal robustness and a higher link performance. This technology provides the operators efficient means to overcome the challenges of NLOS propagation and mobile channel propagation.

COFDM spread spectrum modulation system distributes the data over a large number of closely-spaced carriers, for example, 1705 carriers in 2K mode. The data is divided into several parallel data streams, one for each carrier, so that each carrier transports a lower data rate and the symbol duration is longer. Each carrier is then modulated with a QPSK, 16QAM, 64QAM or 256QAM scheme with a constellation rotation.

COFDM modulated signal, since it uses a low symbol rate modulation scheme (*i.e.* the symbols are relatively long compared to the channel time characteristics), suffers less from inter symbol interference caused by multipath propagation. As the duration of each symbol is long, it is feasible to insert a guard interval between the COFDM symbols, thus eliminating the inter symbol and co-channel interference. So, if one carrier's information is lost, only a small part of the whole information will be lost.

Besides, in COFDM the sub-carrier frequencies are chosen so that the sub-carriers are orthogonal to each other, thus cross-talk, the interference between the sub-channels, is eliminated. Furthermore, the orthogonality allows high spectral efficiency.

On the other hand, COFDM system is invariably used in conjunction with channel coding (forward error correction). The error correction code used in this equipment is Reed-Solomon coding, which is concatenated with LDPC, and there is an additional interleaving between the two layers of coding. Error correcting codes build redundancy into the transmitted data stream. This redundancy allows bits that are in error or even missing to be corrected at the receiver.

The European ETSI EN 300755 standard defines the following LDPC coding rates: $1/2$, $3/5$, $2/3$, $3/4$, $4/5$, $5/6$. There is a compromise between the coding rate (signal robustness) and the transmitted bit rate. If the coding rate is higher the signal transmission is more robust ($1/2$ is the most robust) but the bit rate that the system is able to transmit is lower.

The modulation scheme used on each COFDM sub-carrier (QPSK, 16QAM, 64QAM and 256 QAM) is also thus related to the signal robustness and the transmitted bit rate. QPSK is the most robust and 256QAM is able to transport the highest bit rate.

Besides, the system can define 3 guard intervals: $1/8$, $1/16$ and $1/32$. The guard interval is used to reduce inter symbol interferences due to the multipath propagation.

In addition, it also provides several bandwidths: 1.7, 5, 6, 7 and 8 MHz, for different applications.

The maximum bit rate achieved is 46 Mbps.

DVB-T features

The RF stage of the UDT-04 transmitter for DVB-T is the same as the one described for DVB-T2. The only differences are found in the modulation part, as it is commented below.

The UDT-04 transmitter uses COFDM (Coded Orthogonal Frequency Division Multiplexing) modulation system (2K mode).

The available modulations are: QPSK, 16QAM or 64QAM. Of them, the most robust one is QPSK and the one with the maximum bit rate is 64 QAM.

The European ETSI EN 300744 standard defines the following convolutional coding rates: 1/2, 2/3, 3/4, 5/6, 7/8.

The modulation scheme used on each OFDM sub-carrier (QPSK, 16QAM and 64QAM) is also thus related to the signal robustness and the transmitted bit rate. QPSK is the most robust and 64QAM is able to transport the highest bit rate.

Besides, the system can define 3 guard intervals: 1/8, 1/16 and 1/32.

Finally, the maximum bit rate achieved is 31.67 Mbps.

Datalink

SVP AEROSPACE, world leader in line-of-sight microwave transmission, has developed the ideal complement to expand the coverage of its transmissions: NLOS system based on cellular bonding.

Now the best of both worlds can be used at the same time: Microwave link for line-of-sight coverage with all sales of SVP Aerospace's leading technology, and transmission from anywhere with cellular technology.

Linked cellular technology aggregates bandwidth from multiple connections. For critical communications, carrier diversity is essential.

Microwave solution- Allows excellent video and data transmission with highest robustness and low latency but requires line of sight between the transmitter and receiver site. It is essential for big demonstrations or sport concentrations in big cities.

Satellite solution – These on-board solutions are usually bulky and heavy, and the cost of operation is much higher. Though they do not require direct line of sight, they do require open skies above them and have low redundancy.

Single cellular solution – Bandwidth is too low and there is no redundancy between links and therefore is not reliable enough.

Multicellular SIMs – Gives a level of redundancy but with drops of signal in big cities and high concentration of people due the saturation of the public networks

Cellular Datalink + Microwave solution – Offers full redundancy with Microwave and 4x cellular, high bandwidth, low latency, data security, to a bonded link. Global coverage and security in local events with high concentration of people.

When completion of your mission relies on sturdy, secure, & continuous connectivity.

Combine multiple LTE & 5G cellular communications and Microwave technologies to one secure pipeline in a bonded link for a continuous, robust connectivity for optimal transmission of your unmanned systems. Take full control of prioritizing the quality-of-service (QOS) of your video stream, telemetry or command & control data.

Chapter 2: Technical Features

RF Stage DVB-T2and DVB-T

Frequency ranges:

- 1,300 – 1,600 MHz
- 1,700 – 2,200 MHz
- 1,900 – 2,500 MHz
- 2,300 – 2,700 MHz
- 3,300 – 3,600 MHz
- 4,400 – 5,000 MHz
- 5,000 – 5,300 MHz
- 6,400 – 7,000 MHz

Output Power:

	Low	Mid	High
1,300 – 1,600 MHz	30 dBm	37 dBm	40dBm
1,700 – 2,200 MHz	30 dBm	37 dBm	40dBm
1,900 – 2,500 MHz	30 dBm	37 dBm	41.5 dBm
2,300 – 2,700 MHz	30 dBm	37 dBm	41.5dBm
3,300 – 3,600 MHz	30 dBm	37 dBm	40 dBm
4,400 – 5,000 MHz	30 dBm	37 dBm	40 dBm
5,000 – 5,300 MHz	30 dBm	35 dBm	37 dBm
6,400 – 7,000 MHz	30 dBm	37 dBm	40 dBm

Protection capabilities:

- Reverse power
- Short Circuit
- Overvoltage

Video:

Inputs:

- 1 x 12G-SDI
- 4 x 3G, HD, SD-SDI (optional)

Formats:

- 2160p-23.98/24/25/29.97/30/50/59.94/60 Hz
- 1080p-23.98/24/25/29.97/30/50/59.94/60 Hz
- 1080i-50/59.94/60 Hz
- 720p-23.98/24/25/29.97/30/50/59.94/60 Hz
- 576i-50 Hz
- 480i-59.94 Hz

Audio

Quantity:	16 channels (8 pairs)
Formats:	Embedded or Analogue
Analogue Input:	2 pair Line / Mic level
Analogue Max. Level:	24dBu (Balanced)
Phantom Power:	48V Phantom Power

User Data

Data channel:	RS 232
Data rate:	1,200 to 57,600 bps

Internal GPS Data

GPS Data channel:	Internal GPS Receiver
Antenna DC output:	5 VDC

ASI

Input and Output:	ASI Transport Stream (EN50083-9)
Extra Feature:	Remux (Optional)
TS over IP:	Output (Optional)

Test Signals

Video:	Bars
Audio:	16 Audio tones

Encoder

Video compression:	HEVC, H.264 and MPEG2
Latency:	UHD 59p = 66ms
Encoder+Decoder	UHD 50p = 75ms
	FHD 59p = 55ms
	FHD 50p = 70ms
	FHD 59i = 83ms
	FHD 50i = 98ms

Profile:	4:2:2/4:2:0, 8/10-bit
Output Bitrate:	1 Mbps – 90 Mbps
Audio Encoder:	MPEG-1 Layer1, MPEG-1 Layer2 and AAC-LC

Encryption

BISS:	BISS-1 and BISS-E
AES:	AES-128 and AES-256 (Optional)

Modulation

DVB-T2:	COFDM 1K, 2K, 4K QPSK, 16 QAM, 64 QAM, 256 QAM Constellation rotation LDPC FEC: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6 IG: 1/8, 1/16, 1/32 Bandwidth: 1.7, 5, 6, 7, 8 MHz Max. bitrate: 46.4 Mbps
DVB-T:	COFDM 2K mode QPSK, 16 QAM, 64 QAM FEC: 1/2, 2/3, 3/4, 5/6, 7/8 IG: 1/8, 1/16, 1/32 Bandwidth: 5, 6, 7, 8 MHz Max. bitrate: 31.67 Mbps

Control & Monitorization

Control Interfaces:	Front panel & display Web browser interface RTC-04 ARINC-429 (Optional)
Pre-sets:	7 user defined pre-sets
Monitoring:	Encoding, modulation, frequency and output power and alarms.

Power Supply

DC input:	9 – 36 VDC
Power Consumption:	100 W (2 GHz) 160 W (4-5 GHz)

Recovery time: 10.5 seconds
(It is the time the equipment needs to recover an image in case of a cut in the power supply)

Weight on Wheel System (WoW)

Mechanical

Size: 123.5 x 124.22 x 224.57 mm (WxHxD)

Weight: 3.3 kg

Environmental

Temperature range: -20° to 50°C

BLOS-04 (Optional as accessory)

Power supply range: 9 to 36V Powered by PoE (active and passive)

Ethernet: 10/100Mb

Environmental Characteristics: Waterproof
Gore Pressure valve

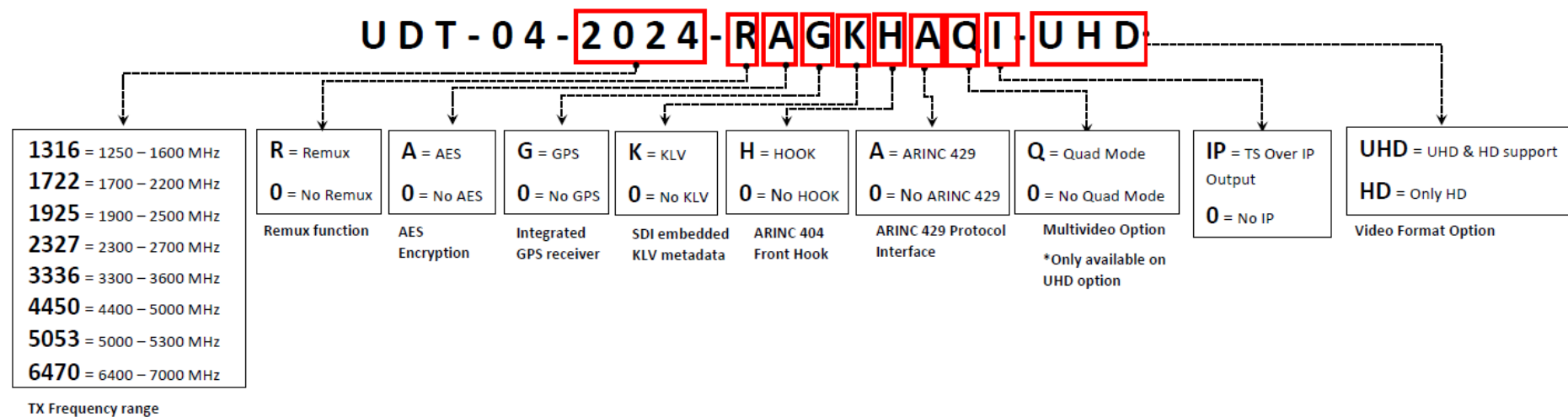
Installation: Compatible with Airfilm Camera Systems
DT-1-1

Functionalities: Integration of cellular communications
(3G/LTE/5G) with Microwave Link
Real-time network prediction
3D reception coverage mapping for route planning

Cybersecurity enclosed: Data security package splitting mechanism.
Encryption up to AES-256-CBC

Certification: DO-160G

Chapter 3: How to Order



Chapter 4: Transmitter Operation and Menus

This fourth chapter provides the user all the necessary information to control, configure and operate the equipment properly.

4.1 Display

To turn the equipment on and off, press ON/OFF button.

When a video, audio or data input has been selected, a character connected to this input is displayed in the main screen.

Below, the main screen of the UDT-04 transmitter is shown.

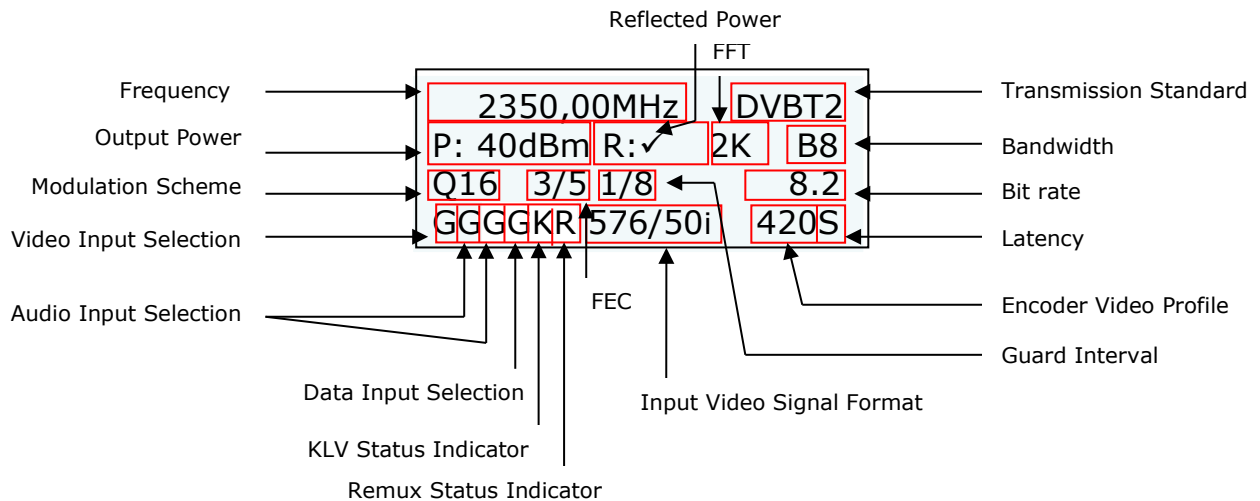


Figure 4.1: UDT-04 front panel / Main screen explanation

When an option is selected, the main screen displays these parameters:

- Frequency (MHz)
- Transmission Standard (DVB-T2, DVB-T)
- Output power (dBm)
- Reflected power
- FFT number of points
- Bandwidth (MHz)
- Modulation Scheme
- FEC

- Guard Interval
- Transmitted bit rate (Mbps)
- Video Input selection

Possibilities: SDI, DVB-ASI Transport Stream or Generator.

Behaviour of the corresponding character: If the character is static then it means presence of that signal. If the character blinks, then it means absence of that signal.

- Audio status indication: If audio 1 or 2 are not darkened then they are enabled. On the other hand, if audio 1 or 2 are darkened then they are disabled.
- Data status indication: If this field is not darkened then it means that data is enabled. On the other hand, if this value is darkened it means that data is disabled. Moreover, in case this field is static, its meaning is presence of the data whereas if this field is blinking, it means absence of the data.
- KLV status indicator: If this field is not darkened then it means that KLV metadata is enabled. On the other hand, if this value is darkened it means that metadata is disabled. Moreover, in case this field is static, its meaning is presence of the data whereas if this field is blinking, it means absence of the KLV metadata.
- Remux status indicator: This field indicates if Remux function is enabled or disabled.
- Input video signal format.
- Encoder Video Profile (4.2.0 or 4.2.2).
- Latency (Normal delay, Low delay or Ultra Low Delay)

4.2 LEDs

The UDT-04 transmitter has 5 Leds on its front panel that show the information detailed below.

The **ON/OFF** provides the following information:

- If the Led blinks in red, there is power into the unit, but it is turned off.
- The Led lights up in green when the equipment is turned on.

The **RF LED** provides the following information:

- The Led lights up in green when the equipment transmits RF signal, RF stage is active.

The **ALARM LED** provides the following information:

- The different alarms that can appear in the transmitter are:
 - Voltage High.
 - Voltage Low.
 - Temperature High.
 - Direct Power.
 - Reverse Power.
 - PA Not Forward
 - ASI Overflow.
 - No SDI Input.
 - No ASI Input.
 - No KLV.

The **REMOTE LED** provides the following information:

- The LED lights up when the remote control via Webserver has been established.

The **STATUS LED** provides the following information:

- The LED lights up when the transmitter is working properly.

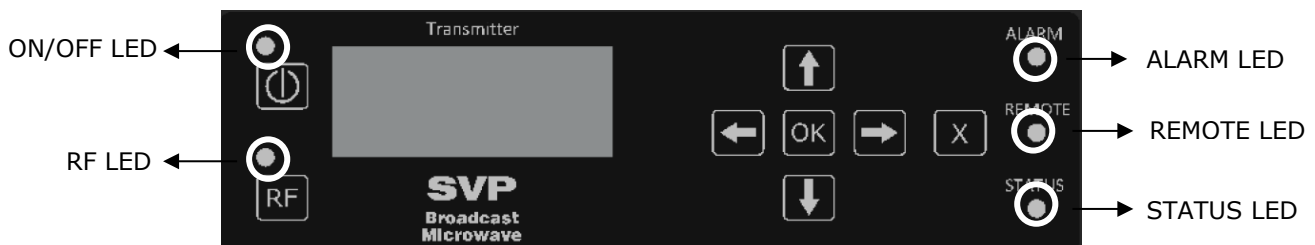


Figure 4.2: front panel LED indication

4.3 Keyboard

4.3.1 ON/OFF Button

To switch the equipment on and off, press this button. When the equipment is turned on, the display will show the start-up message (model and version of the equipment), and then it will display the main screen.

If the power fails while the equipment is operating, it will restart automatically when the power returns, not being necessary to press the on/off button again.



Figure 4.3: ON/OFF button

4.3.2 OK Button

This button is used to:

- Enter to submenus and change parameters. So as to access to a submenu, OK button must be pressed. Moreover, in the fields where the enter symbol  appears, by pressing the OK button the user can change the value of the selected parameter. Besides, so as to save the introduced value, the OK button must be pressed.
- In case of being in the main screen, pressing the OK button the user can access to the alarms screen where there are the different alarms that are taking place. So as to return to the main screen, the cross button must be pressed.



Figure 4.4: OK Button

4.3.3 Cross Button

This button is used to:

- Enter from the equipment main screen to the setup menu and vice versa.
- Exit equipment's submenus.
- This button allows the user to access to the main screen from the alarms screen.



Figure 4.5 Cross Button

4.3.4 Left and Right Button

These buttons are used to:

- Once the parameter to change has been selected, they are used to move the cursor towards the digit immediately on the left or right and to select a parameter from different options.



Figure 4.6: Left and Right buttons

4.3.5 Up and Down Button

- The up and down arrow buttons allow the navigation in the main menu and the rest of submenus. Using these buttons, the user can enter to the submenu or change a parameter. Once selected, the OK button must be pressed.
- These buttons are also used to change, for example, the frequency and PID parameter's values. Pressing up and down arrows the value of those parameters can be changed, increased or decreased respectively.



Figure 4.7: Up and Down buttons

By pressing the RF button, RF output is enabled or disabled. The RF LED indicates the status of the RF output. To enable or disable the RF output, just press the RF button. It is important that before pressing this button, the selected RF output must be conveniently loaded and there is no reflected signal.

In case the device is switched off with the RF output enabled then, when it is switched on again it is necessary to push again this button so as to enable this feature.

However, if power supply fails when RF output is enabled then, once power supply returns it is not necessary to push this button because RF output will continue being enabled.



Figure 4.8: RF On/Off button

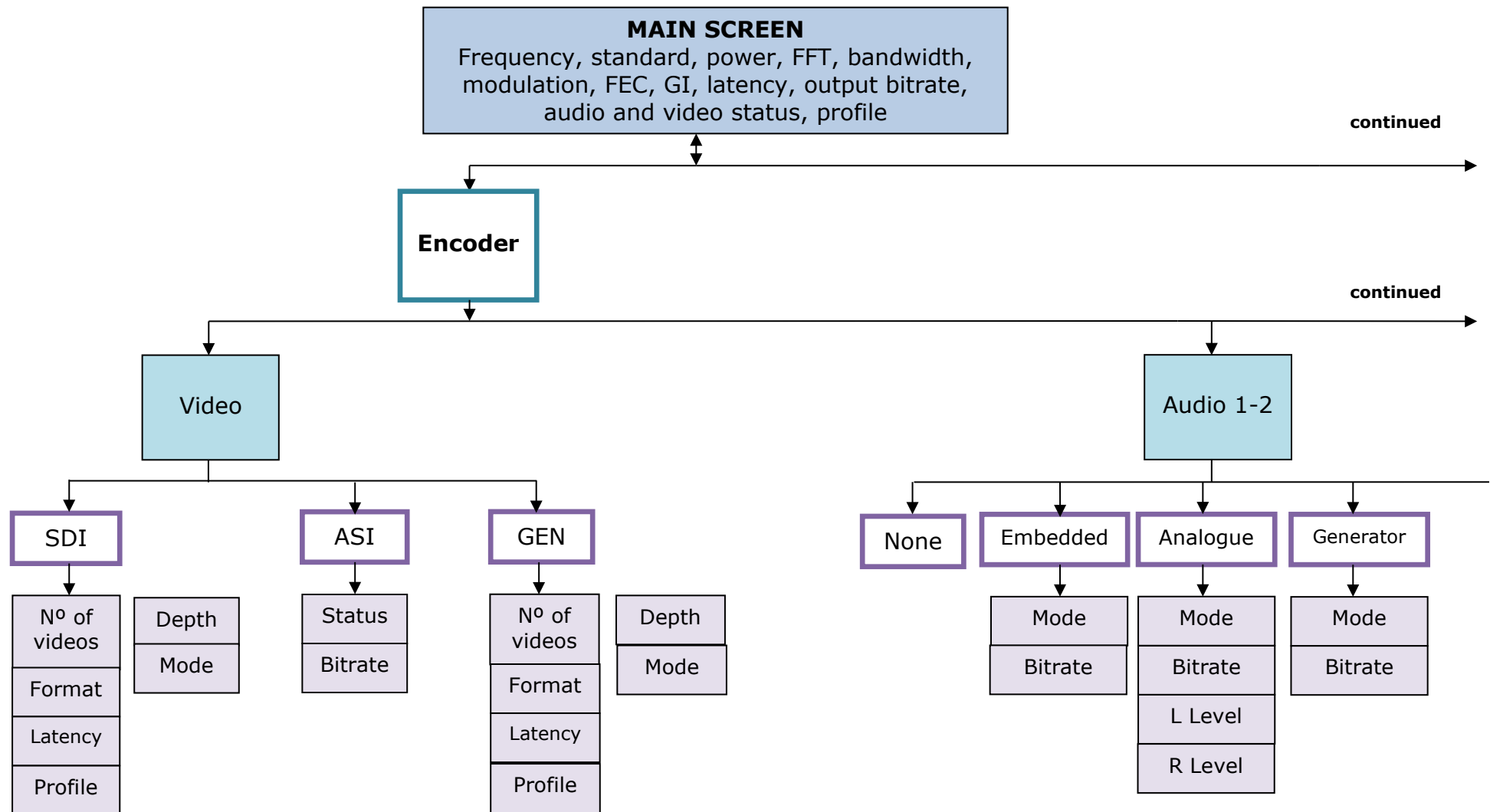
4.4 Menus Scheme

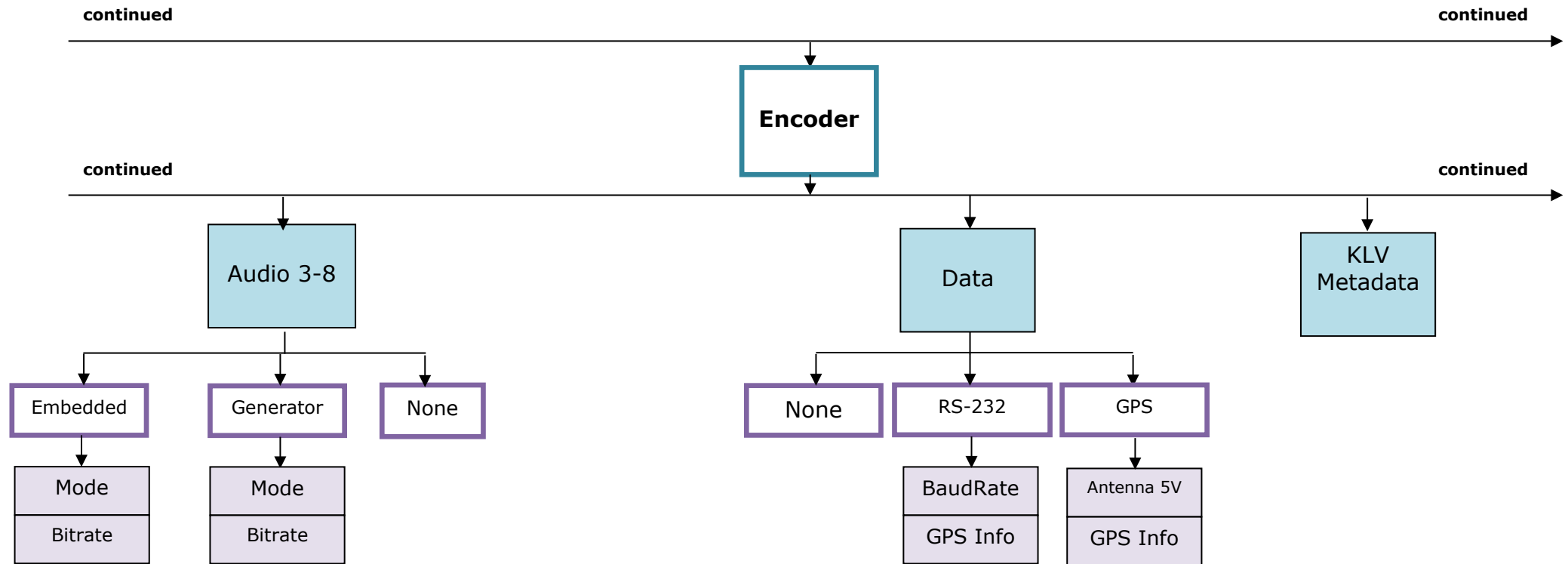
There is one menu in this transmitter that allows the user to change the transmitter's parameters and configure them.

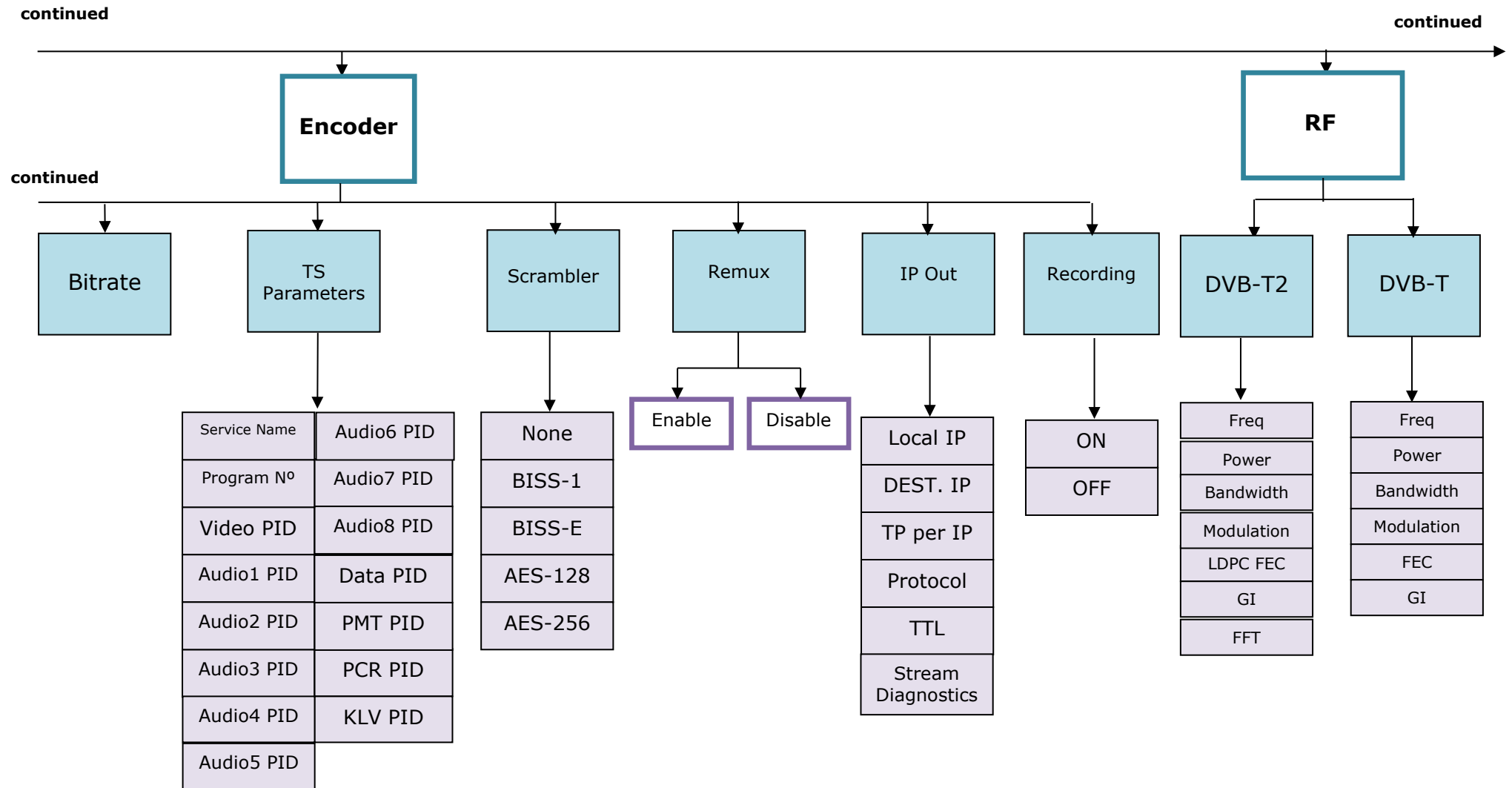
To enter the menu of this equipment the cross button must be pressed. In case it is wanted to return to the main screen from the menu, the cross button must be pressed. Furthermore, in case of being in the submenus area, returning to the mainly screens are achieved by pressing the cross button as much times as it is needed.

In the next page it is shown a scheme that specifies the different menu options available.

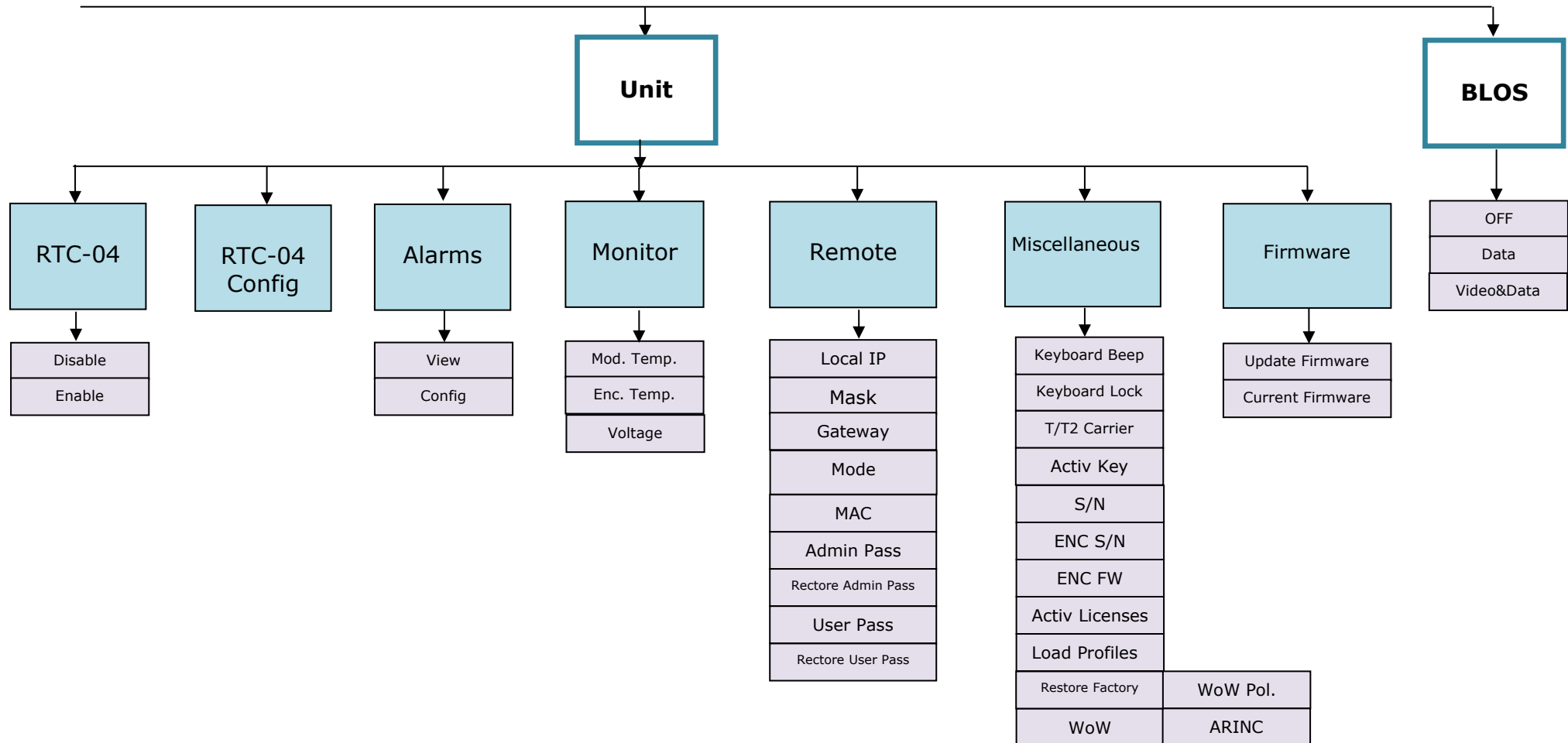
UDT-04 MENU STRUCTURE







continued



4.5 Menu Navigation

This section contains a detailed description of each parameter that can be configured in the UDT-04 transmitter's MENU.

To enter the MENU, press the cross button in case of being in the main screen or in any submenu.

To select a parameter or a submenu, use the Up and Down arrows. Once selected it, press the OK button to access to a submenu or to edit a parameter. To exit from a submenu or a parameter, press the cross button.





Figure  means that to have access to the right image that button must be pushed.

Symbols <> mean that the parameter can be modified in the same screen with the right and left keys.

Symbol  means that pushing the OK button allows entering to the options of the submenu.

There are different types of parameters available:

- **Eligible:** When the user can choose between predetermined states. (They usually have the symbol <> near to them)
- **Editable:** When the user must enter a value in that option. (They usually have the symbol  near them). So as to save the introduced value, the OK button must be pressed.
- **Reading:** When the value of that parameter is a monitored parameter that can't be changed.

To change a parameter, for example, the transmitted frequency, press the OK button in the desired option and then with the Up, Down buttons choose the value. Once the parameter is set, press the OK button to save the value.

Next, the different menus and submenus with the options and the different parameters are shown. Also, in each figure, example parameters are displayed.

4.6 Menu Structure

The following menu screen can be accessed by pressing the cross key from the monitoring menu.

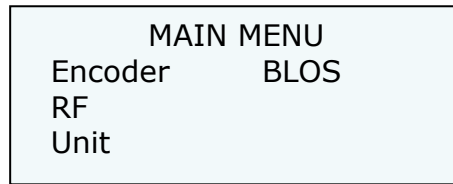


Figure 4.9: Menu

Encoder – All the parameters related to the video, audio and data inputs are configured here. Besides, all video, audio, multiplexing and data encoding parameters are accessed here.

RF – DVB-T2/T transmission parameters are set in this section.

Unit – Parameters related to the Web Server and other internal options of the transmitter are configured here, as well as other characteristics of the device.

BLOS – Configuration of 5G system.

4.6.1 Encoder Menu

By using the Up, Down arrow keys, select the **Encoder** option and press the OK key.

ENCODER

Video: Generator

< ⏪

Audio:

⏪

Data: RS232

< > ⏪

ENCODER

KL V Metadata: Off

>

BitRate: Auto

>

TS Parameters

⏪

ENCODER

Scrambler: None

>

Remux: Disable

>

IP OUT: Disable

>

ENCODER

REC: Off

>

Figure 4.10: Encoder Menu

Line nº	Function
	Video (eligible parameter):
	In this field, the video input must be chosen with the Right and Left buttons. Once the video input has been selected, press the OK button to configure the parameters related to it.
1	The available options are: • SDI • ASI • Generator

Audio 1 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 1 input can be chosen with the right and left buttons. Once the Audio 1 input has been selected, press the OK button to configure the parameters related to it.

2 The available options are:

- None
- Embedded
- Analogue 1
- Generator

Audio 2 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 2 input can be chosen with the right and left buttons. Once the Audio 2 input has been selected, press the OK button to configure the parameters related to it.

3 The available options are:

- None
- Embedded
- Analogue 2
- Generator

Audio 3 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 1 input can be chosen with the right and left buttons. Once the Audio 1 input has been selected, press the OK button to configure the parameters related to it.

4 The available options are:

- None
- Embedded
- Generator

Audio 4 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 2 input can be chosen with the right and left buttons. Once the Audio 2 input has been selected, press the OK button to configure the parameters related to it.

5 The available options are:

- None
 - Embedded
 - Generator
-

Audio 5 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 1 input can be chosen with the right and left buttons. Once the Audio 1 input has been selected, press the OK button to configure the parameters related to it.

6

The available options are:

- None
- Embedded
- Generator

Audio 6 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 2 input can be chosen with the right and left buttons. Once the Audio 2 input has been selected, press the OK button to configure the parameters related to it.

7

The available options are:

- None
- Embedded
- Generator

Audio 7 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 1 input can be chosen with the right and left buttons. Once the Audio 1 input has been selected, press the OK button to configure the parameters related to it.

8

The available options are:

- None
- Embedded
- Generator

Audio 8 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 2 input can be chosen with the right and left buttons. Once the Audio 2 input has been selected, press the OK button to configure the parameters related to it.

9

The available options are:

- None
- Embedded
- Generator

Data (eligible parameter):

In this field, the sort of data input can be selected.

10

The available options are:

- None
 - RS232
 - GPS
-

11	KLV Metadata (eligible parameter) (Optional): In this field, the KLV metadata can be enabled. This feature is optional.
12	BitRate (eligible parameter): In this field, the encoder output bitrate mode can be selected. The available options are: • Auto • Manual Bitrate (editable parameter)
13	TS Parameters (editable parameters): This field consists of the configuration of the parameters of the Transport Stream. In this option, the different program identifiers are configured.
14	Scrambler (eligible parameter): In this field, the encryption system can be chosen with right and left buttons. The available options are: • None • BISS-1 • BISS-E • AES-128 (Optional) • AES-256 (Optional)
15	Remux (eligible parameter) (Optional): In this field, remux option can be activated. This feature is optional.
16	IP Out (eligible parameter) (Optional): In this field, IP Out option can be activated. This feature is optional.
17	REC (eligible parameter) (Optional): In this field, Recording Out option can be activated. This feature is optional.

Table 4.1: Encoder Menu

4.6.1.1 SDI Video Input

When SDI input is selected, press OK button to access the video configuration menu. The video format is automatically detected. The parameters which are configured in this section are explained below.

SDI		
Nº Videos: 1 Video		>
Frmt: 1080i50	<>	
Latency: Normal		<
SDI		
Profile: 4.2.0		>
Depth: 8 bits		>
Mode: H.265		>

Figure 4.11: SDI Input Menu

Line nº	Function
	Nº Videos:
	In this field, the number of videos is selected.
1	The available options are: • 1 Video. Standard mode for single HD/UHD operation. • 4xHD. Flexible video input format and 4x HD operation.

Format:

In this field, the video format is selected.

The available options are:

- 480i59
- 576i50
- 480p59
- 576p50
- 720p50
- 720p59
- 720p60
- 1080i50
- 1080i59
- 1080i60
- 1080p23
- 1080p24
- 1080p25
- 1080p29
- 1080p30
- 1080psf23
- 1080psf24
- 1080psf25
- 1080psf29
- 1080psf30
- 1080p50
- 1080p59
- 1080p60
- 2160p23
- 2160p24
- 2160p25
- 2160p29
- 2160p30
- 2160p50S12
- 2160p59S12
- 2160p60S12
- 4KDCIp23
- 4KDCIp24
- 4KDCIp25
- 4KDCIp29
- 4KDCIp30
- 4KDCIp50

	• 4KDCIp59 • 4KDCIp60 • 2160p50DL6 • 2160p59DL6 • 2160p60DL6
	Latency Mode: In this field, the latency mode is selected. The available options are:
3	• Normal. Highest video quality per bitrate with typical end to end latency of 800-2000ms. • Low. Compromise between video quality, bitrate and latency with typical end to end latency of 200-1000ms. • Ultra Low. Requires the most bitrate but with typical end to end latency of a few frames, HEVC mode only.
	Profile (eligible parameter): In this field, the chroma format is selected. The available options are:
4	• 4:2:0 Lowest bitrate required. • 4:2:2 Recommended for interlaced applications, and highest picture quality.
	Bit Depth: In this field, the bit depth is selected. The available options are:
5	• 8-bit. Lowest bitrate required. • 10-bit. Recommended for HDR applications, and highest picture quality.
	Encoding Mode: In this field, the Encoding mode is selected. The available options are:
6	• H.265 HEVC. Highest video quality per bitrate, and lowest latency options. • H.264 AVC. Greater compatibility with legacy systems, and low latency option. • MPEG-2. Not recommended unless specifically required, limited to 8-bit 4:2:0 1080p30

Table 4.2: SDI Input menu options

4.6.1.2 ASI Video Input

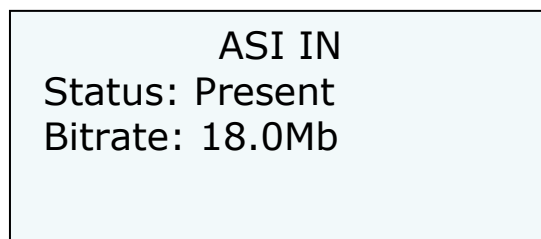


Figure 4.12: ASI Input Menu

Line n°	Function
Status:	
1	This field indicates if there is any ASI signal in the ASI input. In case there is an ASI signal, this field will display the word present. If there is no ASI signal then, no present will be displayed. (reading parameter) The available options are: ▪ Present ▪ No Present
Bitrate:	
2	In this option, the bitrate of the ASI input signal is shown. (reading parameter)

Table 4.3: ASI Input menu options

4.6.1.3 Generator Video Input

In this section the video generator can be configured, this option is used for tests when there is no video source.

GENERATOR	
Nº Videos: 1 Video	>
Frmt: Auto HD	<>
Latency: Normal	<

GENERATOR	
Profile: 4.2.0	>
Depth: 8 bits	>
Mode: H.265	>

Figure 4.13: ASI Main Screen

Line nº	Function
	Nº Videos:
	In this field, the number of videos is selected.
1	The available options are: • 1 Video. Standard mode for single HD/UHD operation. • 4xHD. Flexible video input format and 4x HD operation.

Format:

In this field, the video format is selected.

The available options are:

- 480i59
- 576i50
- 480p59
- 576p50
- 720p50
- 720p59
- 720p60
- 1080i50
- 1080i59
- 1080i60
- 1080p23
- 1080p24
- 1080p25
- 1080p29
- 1080p30
- 1080psf23
- 1080psf24
- 1080psf25
- 1080psf29
- 1080psf30
- 1080p50
- 1080p59
- 1080p60
- 2160p23
- 2160p24
- 2160p25
- 2160p29
- 2160p30
- 2160p50S12
- 2160p59S12
- 2160p60S12
- 4KDCIp23
- 4KDCIp24
- 4KDCIp25
- 4KDCIp29
- 4KDCIp30
- 4KDCIp50

	• 4KDCIp59 • 4KDCIp60 • 2160p50DL6 • 2160p59DL6 • 2160p60DL6
	Latency Mode: In this field, the latency mode is selected. The available options are:
3	• Normal. Highest video quality per bitrate with typical end to end latency of 800-2000ms. • Low. Compromise between video quality, bitrate and latency with typical end to end latency of 200-1000ms. • Ultra Low. Requires the most bitrate but with typical end to end latency of a few frames, HEVC mode only.
	Profile (eligible parameter): In this field, the chroma format is selected. The available options are:
4	• 4:2:0 Lowest bitrate required. • 4:2:2 Recommended for interlaced applications, and highest picture quality.
	Bit Depth: In this field, the bit depth is selected. The available options are:
5	• 8-bit. Lowest bitrate required. • 10-bit. Recommended for HDR applications, and highest picture quality.
	Encoding Mode: In this field, the Encoding mode is selected. The available options are:
6	• H.265 HEVC. Highest video quality per bitrate, and lowest latency options. • H.264 AVC. Greater compatibility with legacy systems, and low latency option. • MPEG-2. Not recommended unless specifically required, limited to 8-bit 4:2:0 1080p30

Table 4.4: Generator Input menu options

4.6.1.4 Audio Embedded 1 to 8

When Embedded Audio is selected, it means that the transmitted Audio is catch from the video input selected, where the Audio is embedded. There are up to 8 pairs of embedded audio.

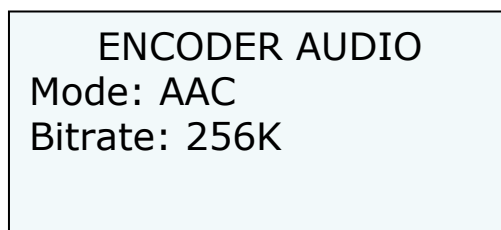


Figure 4.14 : Audio Embedded Input Menu

Line n°	Function
Audio Stream Encoding Mode:	
In this field, the audio stream encoding mode 1 to 8 is selected.	
The available options are:	
1	• MPEG-1 L1. Ultra Low latency compressed audio. • MPEG-1 L2. Low Latency compressed audio, Low/Normal latency modes use a higher quality codec on streams 1-4. • AAC. Highest audio quality per bitrate, using with Ultra Low latency mode will increase video latency. Only audios 1 to 4.
Audio Stream Bitrate (Kb/s):	
2	In this field, the audio stream bitrate, currently information only which depends on the encoding mode.

Table 4.5: Audio Embedded Input menu options

4.6.1.5 Audio Analogue 1 or 2

When Analogue Audio is selected, the Audio is catch from the external Audio input. The cable from Lemo 5 to XLR-4 is needed, this cable is provided together with the transmitter. There are 2 pairs of analogue audio.

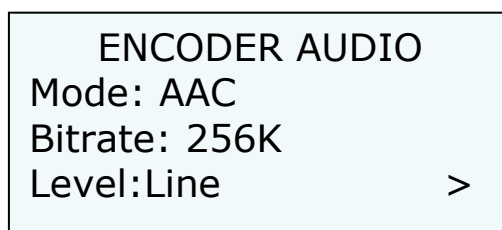


Figure 4.15 : Audio Embedded Input Menu

Line n°	Function
	Audio Stream Encoding Mode:
	In this field, the audio stream encoding mode 1 and 2 is selected. The available options are:
1	• MPEG-1 L1. Ultra Low latency compressed audio. • MPEG-1 L2. Low Latency compressed audio, Low/Normal latency modes use a higher quality codec on streams 1-4. • AAC. Highest audio quality per bitrate, using with Ultra Low latency mode will increase video latency.
	Audio Stream Bitrate (Kb/s):
2	In this field, the audio stream bitrate, currently information only which depends on the encoding mode.
	Level:
	In this field, the type of analogue audio input can be selected. The available options are:
3	• Line. • Micro Dynamic. • Micro Phantom. • Variable.

Table 4.6: Audio Embedded Input menu options

4.6.1.6 Audio Generator 1 to 8

This Audio tone can be used for tests when an Audio source is not available.

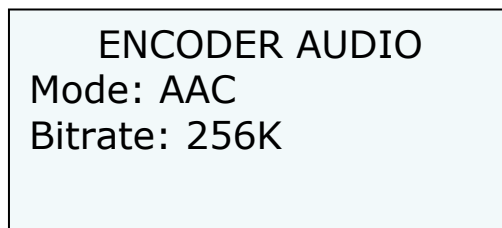


Figure 4.16 : Audio Embedded Input Menu

Line n°	Function
	Audio Stream Encoding Mode:
	In this field, the audio stream encoding mode 1 to 8 is selected.
	The available options are:
1	• MPEG-1 L1. Ultra Low latency compressed audio. • MPEG-1 L2. Low Latency compressed audio, Low/Normal latency modes use a higher quality codec on streams 1-4. • AAC. Highest audio quality per bitrate, using with Ultra Low latency mode will increase video latency. Only audios 1 to 4.
	Audio Stream Bitrate (Kb/s):
2	In this field, the audio stream bitrate, currently information only which depends on the encoding mode.

Table 4.7: Audio Embedded Input menu options

4.6.1.7 Data

To select the desired sort of data, press Right, Left buttons (eligible parameter).

The available options are:

- None
- RS232
- GPS

None

This option is selected when no data is sent to the transmitter.

RS232 Screen

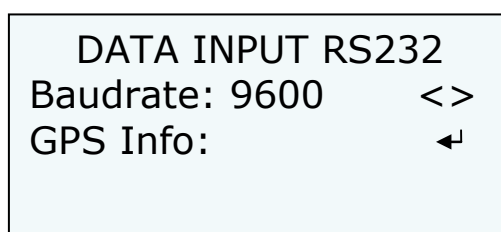


Figure 4.17 : RS 232 data Input Menu

Data option	Parameters
1	Baudrate (eligible parameter): Select the baudrate at which data user is received (Baudrate options are: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200).
2	GPS Info: (eligible parameter): When GPS data is transmitted, GPS position is shown in this menu.

Table 4.8: RS232 Parameters

GPS Screen

If this option is selected, you can receive the GPS information from the internal GPS receiver using an external GPS antenna (which must be connected to the GPS Antenna Input). The antenna is fed directly from the transmitter at 5 V.

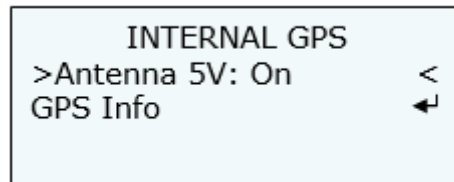


Figure 4.18: Internal GPS screen

The GPS info option screen shows the following information:

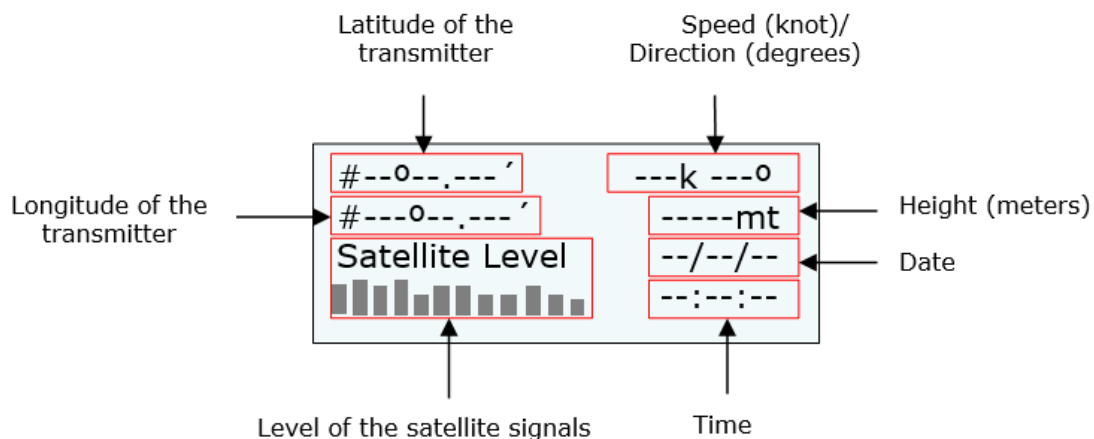


Figure 4.19: GPS Transmitter screen

- **Latitude of the transmitter:** The latitude position of the transmitter is specified.
- **Speed of the transmitter:** It shows the speed of the transmitter in knots.
- **Direction of the transmitter:** The direction of the transmitter is shown in this field.
- **Longitude of the transmitter:** The longitude position of the transmitter is specified.
- **Height of the transmitter:** The height of the transmitter from ground is specified in this value.
- **Satellite Level:** The level of each satellite signal received is shown in this field.
- **Date:** The updated date is shown.

4.6.1.8 KLV Metadata

When this option is ON, the KLV Metadata embedded on the SDI signal is sent through the radio link.

If KLV metadata is not embedded on SDI input, the UDT-04 Transmitter will show an alarm indicating that the KLV is not present.

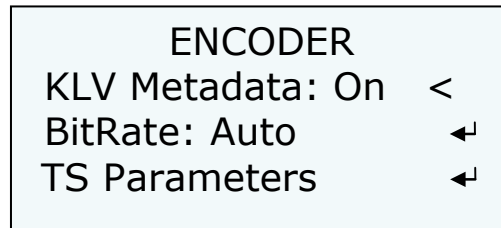


Figure 4.20: KLV Metadata option

Once that KLV is received at ground, using the TS over IP output of the receiver, KLV metadata can be monitored by a Mission Monitor program.

4.6.1.9 BitRate

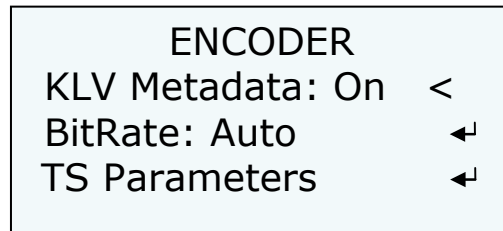


Figure 4.21: Encoder Output Menu

Line n°	Function
BitRate:	
1	In this field, the output bitrate is shown. In case it is wanted to select between an automatic bitrate or configure manually the bitrate, press Right, Left buttons. If manual configuration is selected then, press OK button so as to select the desired bitrate with the UP, Down keys. Press the OK button so as to save the introduced value. (eligible parameter) The available options are: ▪ Auto (The output bitrate is given by the modulation parameters) ▪ Manual (ASI out bitrate selectable when the transmitter is used only as encoder or while using Remux option)

Table 4.9: Encoder Output menu options



If the user selects the manual option, the first and second lines disappear on the main screen.



When the encoder output is in Manual, if you activate the RF, the encoder output changes to AUTO mode automatically.

4.6.1.10 TS Parameters

ENCODER		
Service Name		⬅
Program N°:	2	⬅
Video PID:	200	⬅

ENCODER		
Audio1 PID:	201	⬅
Audio2 PID:	202	⬅
Audio3 PID:	203	⬅

ENCODER		
Audio4 PID:	204	⬅
Audio5 PID:	205	⬅
Audio6 PID:	206	⬅

ENCODER		
Audio7 PID:	207	⬅
Audio8 PID:	208	⬅
Data PID:	209	⬅

ENCODER		
PMT PID:	204	⬅
PCR PID:	204	⬅
KLV Metadata:	212	⬅

Figure 4.22: TS Parameters Menu

Line n°	Function
	Service Name (editable parameter):
1	Here the Service name must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired letter. With the Right, Left keys, the user can select the character of the word. Press the OK button to save the introduced value.
	Program N° (editable parameter):
2	Here the Program number must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.

Video PID (editable parameter):	
3	Here the Video packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 1 PID (editable parameter):	
4	Here the Audio1 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 2 PID (editable parameter):	
5	Here the Audio2 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 3 PID (editable parameter):	
6	Here the Audio1 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 4 PID (editable parameter):	
7	Here the Audio2 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 5 PID (editable parameter):	
8	Here the Audio1 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 6 PID (editable parameter):	
9	Here the Audio2 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 7 PID (editable parameter):	
10	Here the Audio1 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 8 PID (editable parameter):	
11	Here the Audio2 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Data PID (editable parameter):	
12	Here the Data packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.

PMT PID (editable parameter):	
13	Here the Program Map Tables packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
PCR PID (editable parameter):	
14	Here the Program Clock Reference packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
KLV PID (editable parameter):	
15	Here the KLV Metadata packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.

Table 4.10: Encoder TS menu options

4.6.1.11 Scrambler

In this section the signal can be encrypted with different encryption methods.

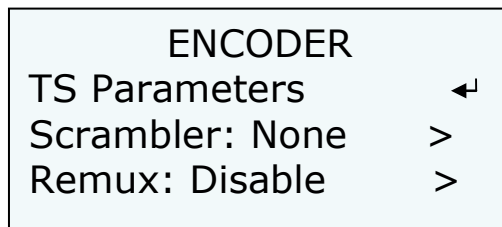


Figure 4.23: Scrambler menu

Line nº	Function
Mode (eligible parameter):	
To choose the desired encryption, press the Right, Left keys.	
The available options are:	
1	• None • BISS-1 • BISS-E • AES-128 (Optional) • AES-256 (Optional)

Table 4.11: Scrambler menu options

To introduce the key of the encryption, follow these steps:

1. Choose the correct encryption.
2. Press the OK button to introduce the key.
3. With Left and Right buttons select one field and with UP, Down buttons choose one value from 0 to 9 or A to F.
4. Press the OK button to set the key.

.

4.6.1.12 Remux (optional)

Remux option allows the transmitter to send up to 8 services multiplexed in one TS. The TS must be introduced in the ASI input.

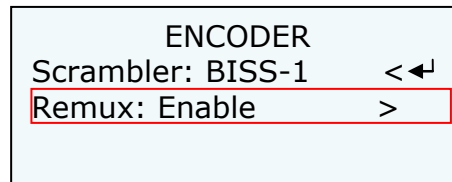


Figure 4.24: Remux menu screen

Please, make sure that the TS parameters are different for each services. Then, the Encoder Output changes to manual bitrate when you enable Remux option. The modulator bitrate must be set to support the total bitrate; Manual bitrate + ASI input bitrate must be lower than the bitrate configured in the modulator.

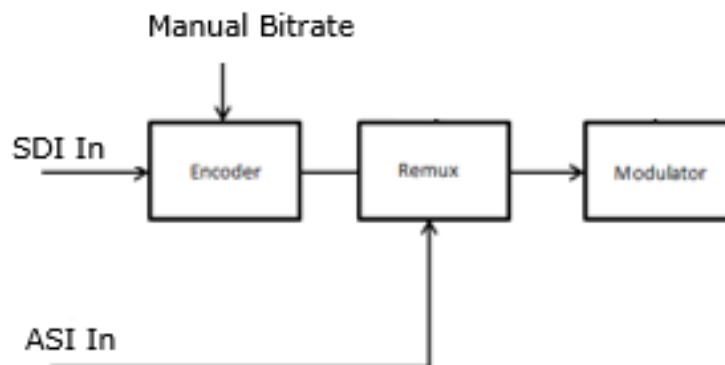


Figure 4.25: Remux work diagram



ASI input bitrate must be known.



You must configure the Modulator bitrate to be greater than the sum of the Manual Encoder bitrate plus ASI Input bitrate.

4.6.1.13 IP Output (optional)

ENCODER IP OUT

Local IP Config ⬅

Dest IP&Port ⬅

TPperIP : 7(1..7) <

ENCODER IP OUT

Protocol : UDP <>

TTL :64 (1..255) ⬅

Stream Diagnostics ⬅

Figure 4.26: Encoder IP Out menu screen

Line n°	Function
	Local IP Config: In this field, different parameters related to the configuration of the local network can be set. The available parameters are: - Local: IP address of the device which is going to send the information. To change the IP address first press the OK button and then, with the Up, Down keys select the desired number. To change from one character to another, press Right, Left keys. To save the value, press the OK button. (editable parameters) - Mask: Subnet address of the device which is going to send the information. To change the Subnet Mask address first press the OK button and then, with the Up, Down keys select the desired number. To change from one character to another, press Right, Left keys. To save the value, press the OK button. (editable parameters) - Gateway: Gateway address of the device which is going to send the information. To change the Gateway address first press the OK button and then, with the Up, Down keys select the desired number. To change from one character to another, press Right, Left keys. To save the value, press the OK button. (editable parameters) - Mode: In this field, speed negotiation can be configured. The options are:10 Mbps Full, 10 Mbps Half, 100 Mbps Full and 100 Mbps Half. - Video over IP MAC: In this field the MAC address of the Video over IP card is displayed (reading parameter)
1	

2	Dest IP & Port: In this option, the IP address and the number of the port of the device to which data is sent must be configured. In case you want to send data to a multicast address just enter the desired multicast address. To change the IP address and the number of the port, first press the OK button and then, with the Up, Down keys select the desired number. To change from one character to another, press Right, Left keys. To save the value, press the OK button. (editable parameter)
3	TP per IP: In this field the number of Transport Stream packets per IP (from 1 to 7) can be configured. To select the desired value, press the Right and Left buttons. (eligible parameter)
4	Protocol: The type of protocol used for the communication can be RTP, UDP or SRT. To select the desired protocol for the communication, use Right and Left buttons. (eligible parameter)
5	Time To Live (TTL): This field limits the lifetime of the data. The Time To Live value (from 1 to 255) means the number of routers that a packet can reach until it is discarded. To configure this value, first press the OK button and then, with the Up, Down, Right and Left buttons select the desired value. To save the value, press OK button. (editable parameter)
6	Stream Diagnostics: In this field the estimated bitrate and IP packet size is shown.

Table 4.12: IP Out menu options

4.6.1.14 Recording (optional)

In this field, the user can enable or disable the video recording on the USB drive placed on the RTC-04 remote control. This is a licensable option.

4.6.2 RF Menu

By using the Up, Down arrow keys, select the **RF** option and press the OK key.

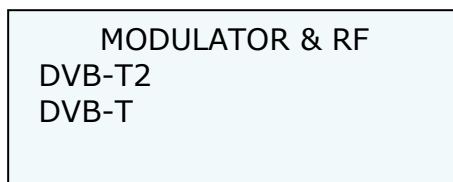


Figure 4.27: RF Menu

4.6.2.1 DVB-T2

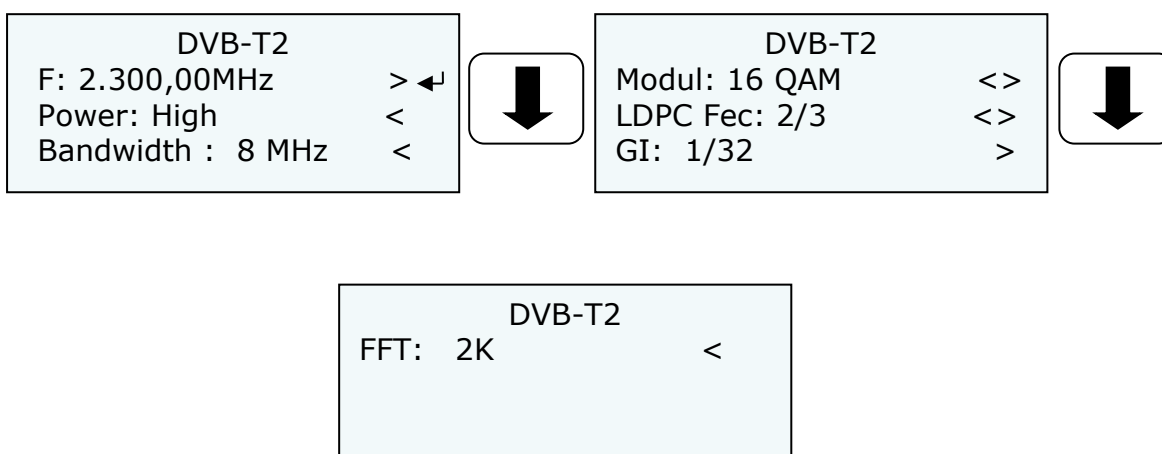


Figure 4.28: DVB-T2 Menu

Line n°	Function
	Frequency (editable parameter):
1	Select the frequency at which the signal is going to be transmitted. To establish the frequency value first, press the OK button and then, with the Up, Down arrow buttons select the desired value. To save the introduced value, press the OK button.
	Power (eligible parameter):
	The output power can be selected with the Right and Left buttons.
2	The available options are: • Low • Mid • High
	Bandwidth (eligible parameter):
	Here the bandwidth of the transmitted signal can be chosen. Use Right, Left buttons to select the desired value.
3	The available options are: • 1.7 MHz • 5 MHz • 6 MHz • 7 MHz • 8 MHz
	Modulation (eligible parameter):
	Here the constellation can be chosen. Use the Right, Left buttons to select the desired constellation.
4	The available options are: • QPSK • 16QAM • 64QAM • 256QAM
	LDPC FEC (eligible parameter):
	Here the value of the Forward Error Correction can be chosen. Use the Right, Left buttons to select the desired value.
5	The available options are: • 1/2 • 3/5 • 2/3 • 3/4 • 4/5 • 5/6

	Guar Interval (eligible parameter):
	Here the operation mode can be chosen. Use Right, Left buttons to select the desired value.
	The available options are:
6	• 1/8 • 1/32 • 1/16
	FFT Mode (eligible parameter):
	Here the number of FFT points can be chosen. Use Right, Left buttons to select the desired buttons.
	The available options are:
7	• 2K • 4K

Table 4.13: DVB-T2 menu options

4.6.2.2 DVB-T2 Maximum Bitrates

These maximum values are reached under the following conditions: 8 MHz channel, 8K mode, G.I.=1/128.

Modulation Scheme	Code Rate	Bit Rate (Mbps)
QPSK	1/2	7.0
	3/5	8.4
	2/3	9.4
	3/4	10.5
	4/5	11.3
	5/6	11.7
16 QAM	1/2	14.5
	3/5	17.5
	2/3	19.4
	3/4	21.8
	4/5	23.3
	5/6	24.3
64 QAM	1/2	21.5
	3/5	25.9
	2/3	28.8
	3/4	32.4
	4/5	34.6
	5/6	36.0
256 QAM	1/2	29.0
	3/5	34.9
	2/3	38.8
	3/4	43.7
	4/5	46.6
	5/6	48.6

Table 4.14: DVB-T2 bitrate table

4.6.2.3 DVB-T

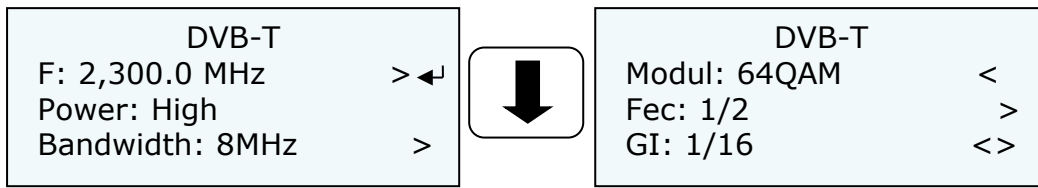


Figure 4.29: DVB-T Menu

Line n°	Function
1	Frequency: Select the frequency at which the signal is going to be transmitted.
2	Power: The output power is selectable here, the possible values are: ▪ Low ▪ Mid ▪ High * The power level of these values depends on the frequency band of the UDT-04. The information about the output power is given on page 16 of this manual.
3	Bandwidth: Here the bandwidth of the transmitted signal can be chosen. Use Right, Left buttons so as to select the desired value. (eligible parameter) The available options are: ▪ 5 MHz ▪ 6 MHz ▪ 7 MHz ▪ 8 MHz
4	Modulation: Here the constellation of the modulation can be chosen. Use Right, Left buttons so as to select the desired constellation. (eligible parameter) The available options are: ▪ QPSK ▪ 16QAM ▪ 64QAM

Fec:

Here the value of the Forward Error Correction can be chosen. Use Right, Left buttons so as to select the desired value. (eligible parameter)

5

The available parameters are:

- 1/2
- 2/3
- 3/4
- 5/6
- 7/8

GI:

Here the Guard Interval value can be chosen. Use Right, Left buttons so as to select the desired value. (eligible parameter)

6

The available options are:

- 1/8
- 1/16
- 1/32

Table 4.15: DVB-T menu options

4.6.3 Unit Menu

By using the Up, Down arrow keys, select the **Unit** option and press the OK key.

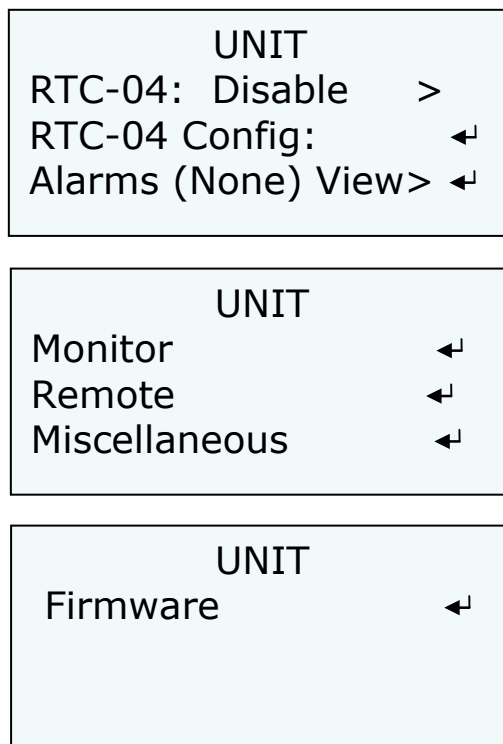


Figure 4.30: Unit Menu

4.6.3.1 RTC Selection

In the Profile option, use the Right and Left buttons to select RTC-04 when the Remote Control is going to be connected, or disable it. Once you have selected, press OK button to access to the profiles mode.

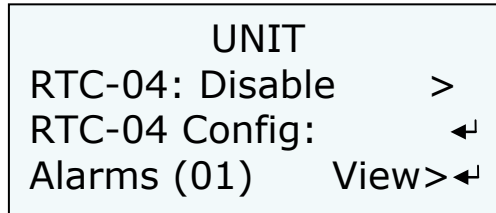


Figure 4.31: Unit Profile Menu

- Disable:
The UDT-02 Transmitter works without the Profile option.
- RTC-04:
Select this option when the NVIS RTC-04 is used.

4.6.3.1.1 RTC-04 Remote Control Screen

When we enter in the RTC-04 profile, the channel selection screen will appear:



Figure 4.32: Profile Selection

This screen enables the user to choose one channel from the channel group that has been previously configured.

If one of the channels is selected, a line under the channel number will appear and the device will be ready to work in that configuration. To access to the channel and see its configuration, the down button must be pressed for a short time.

It is also possible to access to the main screen of a channel by pressing up button for a short time.

Alarms and warnings are displayed if you press OK button for a short time. The output power configured on the RTC-04 is shown on the main screen of the channel selection.

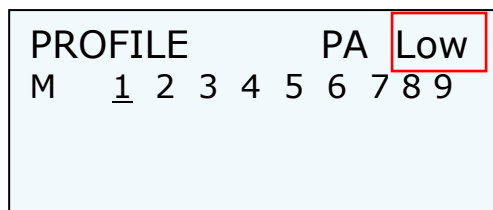


Figure 4.33: Profile selected

To return to the Main menu and change the UDT-02 configuration, press MAIN MENU. You will get out of remote control operation.



While the user is controlling the Transmitter via a Remote control, Web Server is not accessible.

4.6.3.2 RTC-04 Config

In this option, a profile can be configured. Select RTC-04 Config option and then by pressing the OK button, the available profiles will be displayed. There are seven profiles available and can be enabled or disabled.

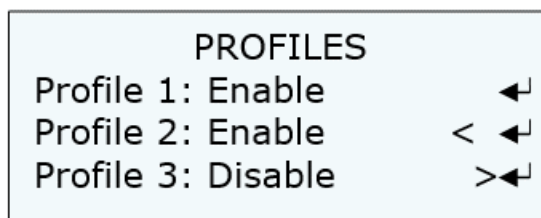
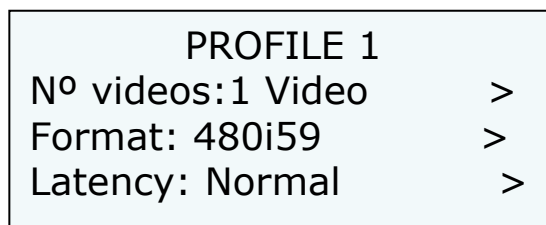
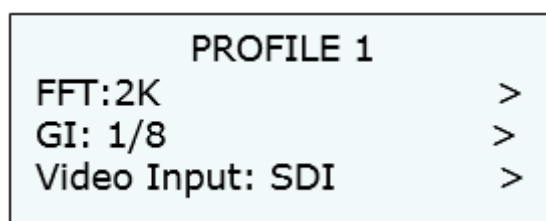
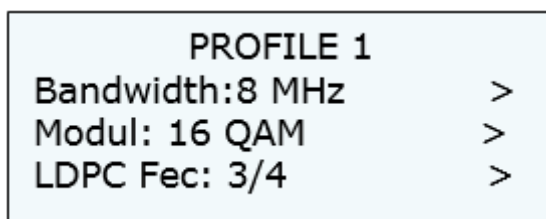
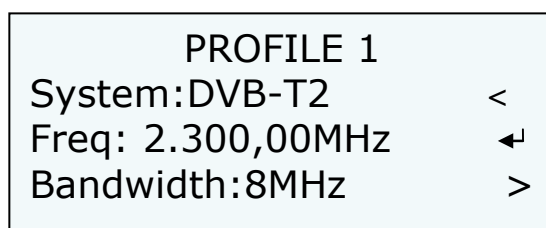


Figure 4.34: Profile Config Menu

Select a profile and then press the OK button to configure the parameters related to it.



PROFILE 1	
Profile:4.2.0	>
Depth: 8 bits	>
Mode:H265	>

PROFILE 1	
Audio1:Embedded	<>↵
Audio2:Embedded	<>↵
Audio3:Embedded	<>↵

PROFILE 1	
Audio4:Embedded	<>↵
Audio5:Embedded	<>↵
Audio6:Embedded	<>↵

PROFILE 1	
Audio7:Embedded	<>↵
Audio8:Embedded	<>↵
Data Input: None	>

PROFILE 1	
KLV Metadata:_Off	>
Scrambler:None	>
Service Name	↵

PROFILE 1	
Program N°: 1	↵
Video PID: 200	↵
Audio1 PID: 201	↵

PROFILE 1	
Audio2 PID: 202	←
Audio3 PID: 203	←
Audio4 PID: 204	←

PROFILE 1	
Audio5 PID: 205	←
Audio6 PID: 206	←
Audio7 PID: 207	←

PROFILE 1	
Audio8 PID: 208	←
Data PID: 209	←
PMT PID: 210	←

PROFILE 1	
PCR PID: 211	←
KLV Metadata: 40	←
Remux: Disable	>

Figure 4.35: Profile 1 Menu

Line n°	Function
1	System (eligible parameter):
	Select the type of the transmission system with the Right and Left buttons.
2	There are two options available:
	• DVB-T2 • DVB-T
3	Frequency (editable parameter):
	Select the frequency at which the signal is going to be transmitted. Press the OK button and with Up, Down keys configure the desired value.
4	Bandwidth (eligible parameter):
	Select the desired bandwidth with the Right and Left buttons.
5	There are five options available:
	• 1.7 MHz (Only DVB-T2) • 5 MHz • 6 MHz • 7 MHz • 8 MHz
6	Modulation (eligible parameter):
	In this field, the modulation must be chosen with the Right and Left buttons.
7	The available options are:
	• QPSK • 16QAM • 64QAM • 256QAM (Only DVB-T2)
8	LDPC Fec (eligible parameter):
	Select the desired FEC value with the Right and Left buttons.
9	The available options are:
	• 1/2 • 3/5 • 2/3 • 3/4 • 4/5 • 5/6 • 7/8

FFT (eligible parameter):

Select the desired FFT value with the Right and Left buttons.

The available options are:

- | | |
|---|--|
| 6 | <ul style="list-style-type: none"> • 1K • 2K • 4K |
|---|--|

All options are not available with all modulation parameters.

Guard Interval (eligible parameter):

Select the desired GI value with the Right and Left buttons.

The available options are:

- | | |
|---|--|
| 7 | <ul style="list-style-type: none"> • 1/4 • 1/8 • 1/16 • 1/32 |
|---|--|

Video Input (eligible parameter):

In this field, the video input must be chosen with the Right and Left buttons.

- | | |
|---|---|
| 8 | <p>The available options are:</p> <ul style="list-style-type: none"> • SDI • ASI • Generator |
|---|---|

Number of Videos (eligible parameter):

In this field, the number of video inputs must be chosen with the Right and Left buttons.

- | | |
|---|---|
| 9 | <p>The available options are:</p> <ul style="list-style-type: none"> • 1 video • 4 x HD |
|---|---|
-

Format:

In this field, the video format is selected.

The available options are:

- 480i59
- 576i50
- 480p59
- 576p50
- 720p50
- 720p59
- 720p60
- 1080i50
- 1080i59
- 1080i60
- 1080p23
- 1080p24
- 1080S25
- 1080p29
- 1080p30
- 1080psf23
- 1080psf24
- 1080psf25
- 1080psf29
- 1080psf30
- 1080p50
- 1080p59
- 1080p60
- 2160p23
- 2160p24
- 2160p25
- 2160p29
- 2160p30
- 2160p50S12
- 2160p59S12
- 2160p60S12
- 4KDCIp23
- 4KDCIp24
- 4KDCIp25
- 4KDCIp29
- 4KDCIp30
- 4KDCIp50

10

	Latency (eligible parameter): In this field, the delay of the coding process is configured. To select the desired delay, press Right, Left arrows buttons. The available options are:
11	• Normal • Low • Ultra Low
	Video Profile (eligible parameter): In this field, the codification profile can be configured. To select the desired profile, press Right, Left arrows buttons. The available options are:
12	• 4.2.0 • 4.2.2
	Bit Depth: In this field, the bit depth is selected. The available options are:
13	• 8-bit. Lowest bitrate required. 10-bit. Recommended for HDR applications, and highest picture quality.
	Encoding Mode: In this field, the Encoding mode is selected. The available options are:
14	• H.265 HEVC. Highest video quality per bitrate, and lowest latency options. • H.264 AVC. Greater compatibility with legacy systems, and low latency option. • MPEG-2. Not recommended unless specifically required, limited to 8-bit 4:2:0 1080p30
	Audio1-2 Input (eligible parameter): In this field, the sort of Audio signal introduced in the Audio 1 or audio 2 input can be chosen with right and left buttons. The available options are:
15	• Embedded • Analogue • Tone.Gen • None

16	Audio3-8 Input (eligible parameter): In this field, the sort of Audio signal introduced in the Audio 3-8 input can be chosen with right and left buttons. The available options are: • Embedded • Tone.Gen • None
17	Data Input (eligible parameter): In this field, the data input must be chosen with the Right and Left buttons. The available options are: • RS-232 • GPS • None
18	KLV Metadata (eligible parameter): In this field, the KLV metadata can be enabled or disabled.
19	Scrambler (eligible parameter): Select the desired encryption with the Right and Left buttons. There are five options available: • None • Biss-1 • Biss-E • AES-128 (optional) • AES-256 (optional)
20	Service Name (editable parameter): Set the name of the service.
21	Program Number (editable parameter): Here the program number must be entered.
22	Video PID (editable parameter): Here the video packet identifier must be entered.
23	Audio 1-8 PID (editable parameter): Here the Audio 1 packet identifier must be entered.
24	Data PID (editable parameter): Here the data packet identifier must be entered.
25	PMT PID (editable parameter): Here the program map tables packet identifier must be entered.
26	PCR PID (editable parameter): Here the program clock reference packet identifier must be entered.

Valid values:

- NONE
- BISS1
- BISSE
- AES128
- AES256

Example: 1,SCRAMBLER:AES256

Encryption Key Tags (used based on selected SCRAMBLER)

SCRAMBLER Type Required Key Tag

AES128 AES128:<hexadecimal_key>

AES256 AES256:<hexadecimal_key>

BISS1 BISS1:<key>

BISSE Use both BISSESW:<key> and/or BISSEU:<key> as needed

Additional Notes

Each profile is identified by a number (e.g., 1, 2, 3...).

You can define multiple profiles in a single file.

Each line must:

- Start with the profile number
- Use a comma , between profile and parameter
- Use a colon : between parameter and value
- Contain no extra spaces

The RTC-04 will ignore invalid lines or unsupported parameters.

4.6.3.3 Alarms

In this section, you can View and Configure the Alarms shown by the Transmitter. You can select view or configure an alarms by pressing Left and Right arrows.

The alarm screen can be accessed by pressing the OK button from the main screen as well. To return to the main screen from the alarm screen, the Cross button must be pressed.

The different alarms that configured in the transmitter are:

- High Voltage
- Low Voltage
- High Temperature
- ASI Overflow: this alarm means that the input bit rate is higher than the one that can be modulated due to the parameters configured (constellation, FEC, GI...).
- No SDI Input: Video source is not connected.

- No ASI Input: ASI source is not connected.
- No GPS: GPS source is not connected.
- No KLV
- Encoder fault
- PA No Forward
- PA Rev High
- PA Volt Low
- PA Temp High
- WeightOnWheels

4.6.3.4 Monitor

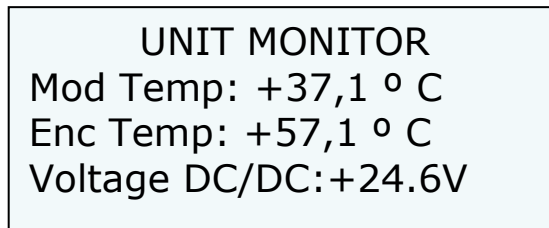


Figure 4.36: Unit Monitor Menu

- **Temperature:**

In this field, the internal temperature of the device is displayed. With the Right, Left keys, the user can select if the temperature is shown in °C or in °F. Also, the value which is between square brackets means the speed of the fans (values from 1 to 4) where 1 means that the fans are stopped and value 4 is the maximum speed. (reading parameter)

- **Voltage:**

In this field, the voltage of the transmitter is shown. (reading parameter)

4.6.3.5 Remote

```

UNIT ETHERNET
LOC 192.168.001.010  ←
MSK 255.255.000.000  ←
GAT 192.168.001.001  ←
  
```

```

UNIT ETHERNET
Mode :10MbpsFull  <>
MAC:70B3D51AC000
Admin Pass: *****  ←
.
  
```

```

UNIT ETHERNET
Restore Admin Pas  ←
User Pass: *****  ←
Restore User Pas  ←
  
```

Figure 4.37: Unit Remote Menu

Line nº	Function
Local IP:	
1	In this option it can be set the IP address of the device in case it is wanted to control the device remotely. So as to change the IP address first press OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)
Subnet Mask:	
2	Here it can be written the Subnet Mask address of the device. So as to change the Subnet Mask address first press the OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)
Gateway:	
3	In this option, the address of the Gateway must be written. So as to change the Gateway address first press OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)
Mode:	
4	In this option, Ethernet port negotiation can be configured. The options are: • 100Mbps Half • 100Mbps Full • 10Mbps Half • 10Mbps Full
MAC ADDRESS	
5	The MAC address of the device is shown. (reading parameter)

Admin Pass:

- 6** The administrator's password is introduced. It can be set an own password which is a list of 8 digits.
- To set the password, press the OK button and the use the Up and Down button to establish the desired value, the press Right and Left buttons to change other digits. Finally press the OK button to save the introduced values.

Restore Admin Pass:

- 7** This option enables to restore the default administrator password (00000000).

User Pass:

- 8** The user's password is introduced. It can be set an own password which is a list of 8 digits.
- To set the password, press the OK button and then use the Up and Down button to establish the desired value, the press Right and Left buttons to change other digits. Finally press the OK button to save the introduced values.

Restore User Pass:

- 9** This option enables to restore the default user password (00000000).

Table 17: Unit Remote menu options

4.6.3.6 Miscellaneous

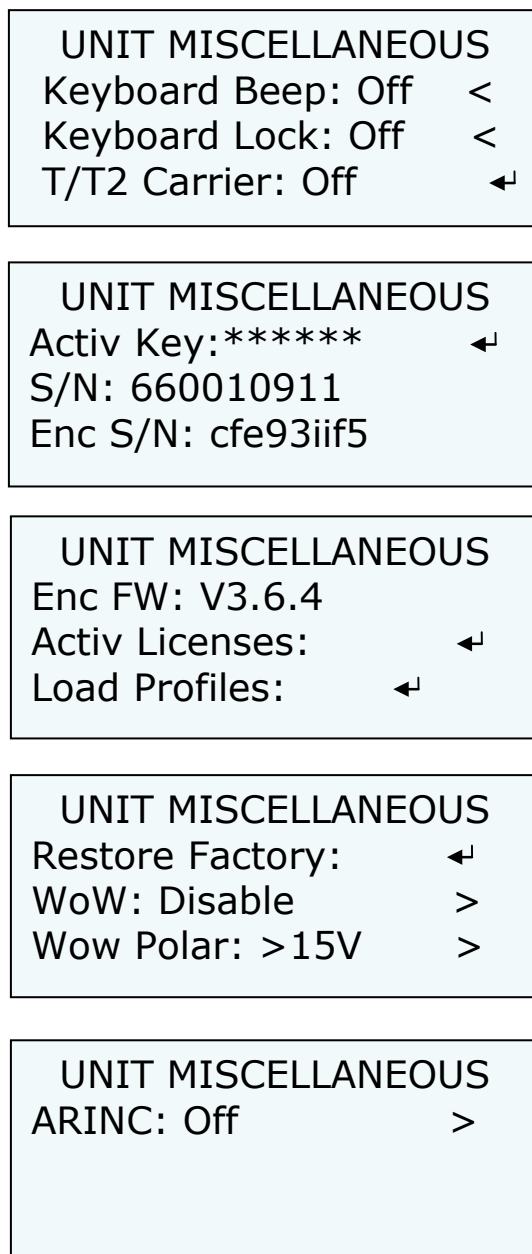


Figure 4.38: Miscellaneous Menu

Line n°	Function
	Keyboard Beep (eligible parameter): If the On option is selected, each time a key is pressed a beep sound will appear. If the Off option is selected, there will be no sound when a key is pressed.
1	The available options are: • On • Off
	Keyboard Lock (eligible parameter): If the On option is selected and the buttons of the equipment remain for 5 minutes without being pressed, a message will appear on the screen saying that the keyboard is locked. By pressing the cross button, the keyboard can be unlocked. If the Off option is selected there will be no messages on the screen.
2	The available options are: • On • Off
	T/T2 Carrier (eligible parameter): The available options are:
3	• On: The carrier (without modulation) is shown for 1 minute. • Off: The option is disabled.
	Activation Key (editable parameter):
4	In this field, you can activate your license. You can set the activation key by pressing the up and down buttons. It must have 8 alphanumeric characters.
	S/N (reading parameter):
5	In this field the serial number of the device is shown.
	Encoder S/N (reading parameter):
6	In this field the serial number of the Encoder device is shown.
	Encoder FW (reading parameter):
7	In this field the FW of the Encoder device is shown.

Activ Licenses:

In this field you can enter the license code for the following optional features:

- AES
- KLV
- Remux
- Internal GPS
- 3-4 GHz band
- 4-8 GHz band
- 8 • Cam control
- 4 x HD
- ARINC
- IP
- UHD

Once the code has been introduced, the licence is enabled on the unit.

You can use this menu to check which licenses are enabled on this unit.

For a new license code, please contact us.

Load profiles:

- 9 In this field you can load profiles from a USB.

Restore Factory:

- 10 In this field you can restore to factory configuration.

WoW Weight on Wheels (eligible parameter):

The available options are:

- 11
- On: Wow is enabled. When the aircraft lands the RF is automatically disconnected.
 - Off: The option is disabled.

WoW Weight on Wheels Polarity (eligible parameter):

The available options are:

- 12
- >15 VDC
 - <15 VDC

ARINC (Optional):

The available options are:

- 13
- On: ARINC data reception is enabled. If you press OK you can enable or disable GPS labels.
 - Off: The option is disabled.

Table 4.18: Unit Miscellaneous menu options

4.6.3.6.1 ARINC (Optional)

The UDT-04 can be remotely configured via ARINC-429 commands. It features can also be used to transmit GPS frames through the ARINC 429 interface.

There are 4 labels that can be sent to the transmitter; Latitude, Longitude, Height and RF.

Three of these labels are for GPS management and are sent to the receiver through the transmitter's GPS channel.

For these labels the data format is defined by the ARINC standard:

Label Code (Octal)	Name	Units	Range	Sig Bits	Resolution
310	Latitude	Deg/180	0-180N/0-180S	20	0.000172
311	Longitude	Deg/180	0-180E/0-180W	20	0.000172
204	Altitude	Feet	131072	17	31.3

Table 19: ARINC 429 GPS labels

The label code can be modified in the transmitter setup menu. The user can also read the value received or enable/disable the reception of this data.

RF label for controlling some parameters of the transmitter is also available. The parameters that can be controlled are:

- Profile Selection.
- RF On/Off.
- Standby.
- PA power.

The format designed for the RF label is:

Bit 32: Parity bit (odd parity).
 Bits 31-29: Profile select (0 to 7)
 Bit 28: RF On/Off (1 On, 0 Off)
 Bit 27: Standby (1 standby, 0 On)
 Bits 26-25: PA power (0 Low, 1 Mid, 2 High)
 Bits 24-8: Reserved.
 Bits 7-0: Label (371 octal)

4.6.3.7 Firmware



Transmitter PCB Version

Figure 4.39:Firmware Menu

Line n°	Function
1	Update Firmware: This field is the one for updating the version of the device. So as to update the equipment properly, follow the instructions below.
2	Current Firmware: In this field, the number of the version installed in the device is shown. The characters which describe the number of the version are the one inside the red box shown in the figure above. The rest of the characters are important for the manufacturer but are not important for the user.

Table 20: Firmware menu options

Next, the necessary steps to make a successful update are explained.

- 1) The latest firmware is allocated in the website of SVP Broadcast Microwave. So as to access to the firmware file, first enter www.svpbm.com in your web browser.
- 2) Click on the Support tab.

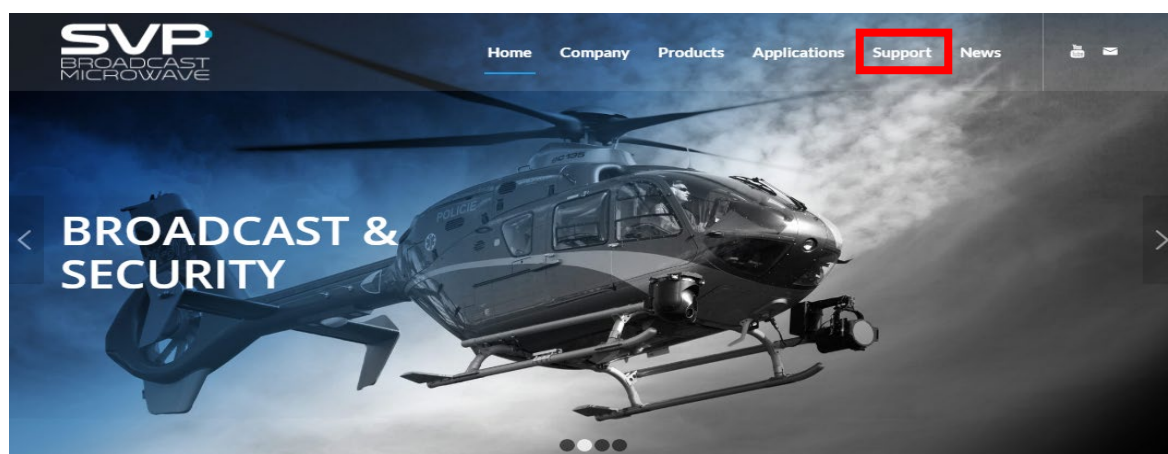


Figure 4.40: Updating firmware step 2

- 3) Click on Firmware.



Figure 4.41: Updating firmware step 3

4) Go to TX_Firmware.

TRANSMITTERS



Figure 4.42: Updating firmware step 4

5) Press the version of the transmitter model needed (version of the equipment) so as to download the file.

To verify the version of the transmitter, go to firmware field and then look at the current firmware to check the number of the version installed in the device (the first two digits).

6) Once the firmware file has been downloaded, save it in a USB device.



In the USB device, the only file that can be allocated inside it is the firmware file of the device to be updated.

7) With the equipment completely powered off (**with no power supply**), insert the USB device in the USB connector, situated in the rear panel.



Before introducing the USB device, remove the power supply of the equipment.

8) Now, switch on the device.

9) Go to Unit menu. In case of being in the main screen, press cross button so as to access to the menu. There, with the Up, Down buttons, select the Unit option.

10) Select Firmware by pressing the OK button.

11) Select Check USB Memory with the OK button.

12) Now, automatically the device updates the firmware. The screens which are shown below display the different steps that the device makes while the updating process is taking place.



Don't power off the device during the updating process.

4.6.4 BLOS Menu

In this field, the user can configure the operation of the BLOS Datalink system. The options are:

- Off: The datalink is in standby mode.
- Data: The datalink is used only for bidirectional data transmission.
- Video&Data: The datalink is used for bidirectional video and data transmission.

DATA Menu Configuration

For BLOS-04 data configuration, we just need to configure IP address, mask and gateway.

BLOS-04 IP

LOC 192.168.001.220 ⬅️

MSK 255.255.000.000 ⬅️

GAT 192.168.001.001 ⬅️

Figure 4.43: BLOS-04 IP Menu

Line nº	Function
Local IP:	
1	In this option it can be set the IP address of the device. So as to change the IP address first press OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)
Subnet Mask:	
2	Here it can be written the Subnet Mask address of the device. So as to change the Subnet Mask address first press the OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)
Gateway:	
3	In this option, the address of the Gateway must be written. So as to change the Gateway address first press OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)

Table 4.21: BLOS-04 DATA IP menu options

VIDEO&DATA Menu Configuration

For BLOS-04 video and data configuration, we need to configure video output bitrate first, which can be:

- **AUTO:** That means that the bitrate used for video is the same configured in the modulator.
- **MANUAL BITRATE:** That means that we can limit the bitrate used for video manually. The bandwidth available will be shared between data and video.

After this, we need to configure BLOS IP address:

BLOS-04 IP	
LOC 192.168.001.220	↩
MSK 255.255.000.000	↩
GAT 192.168.001.001	↩

Figure 4.44: BLOS-04 IP Menu

Line n°	Function
Local IP:	
1	In this option it can be set the IP address of the device. So as to change the IP address first press OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)
Subnet Mask:	
2	Here it can be written the Subnet Mask address of the device. So as to change the Subnet Mask address first press the OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)
Gateway:	
3	In this option, the address of the Gateway must be written. So as to change the Gateway address first press OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)

Table 4.22: BLOS-04 VIDE&DATA IP menu options

Chapter 5: GPS Application

5.1 Introduction

The UDT-04 transmitter has an integrated GPS receiver, it is needed to connect an external GPS antenna to the SMA connector, this antenna can be active or passive.

Once the information is kept inside the device, it can be sent to the HDR receiver. If the signal arrives correctly to the receiver system, then the HDR will have all the GPS data available and this receiver device will be able to calculate the direction, distance and positioning of the transmitter.

The HDR receiver also includes another feature that consists of an output RS232 connection which allows watching through Google Maps application the position of the transmitter in real time.



Figure 5.1: UDT-04 transmitter with the GPS antenna

5.2 Main Screen

Next it is explained the value of the data field which appears in the main screen of the UDT-04 transmitter.

F: 2250.00MHz	DVBT
P:40dBm R:✓	8K B8
QPSK 3/4 1/16	8.7
HAuG 625/50i	422L

Figure 5.2: Main Screen

The data status field indicates with a darkened X that it is disabled. When this parameter is enabled and blinkers, this means that there is nothing connected to the data input. When this field alternates the value between 'g' and 'G', it means that it is trying to get the GPS satellites. If the 'G' does not vary, then it is connected to the satellites.

5.3 GPS Transmitter Screen

When an external GPS receiver is connected, to access the GPS screen, go to the encoder option in the menu. Once inside this option, go to the Data field and choose GPS External. Press the OK button and then the GPS screen appears.

When the internal GPS receiver is being used, to access the GPS screen, go to the encoder option in the menu. Once inside this option, go to the Data field and choose GPS Internal. Go to GPS info and press the OK button.

The format of the GPS coordinates used is decimal minutes as shown in the next example:

N43°02.032'
W023°03.023'

Next there the different field meanings are shown.

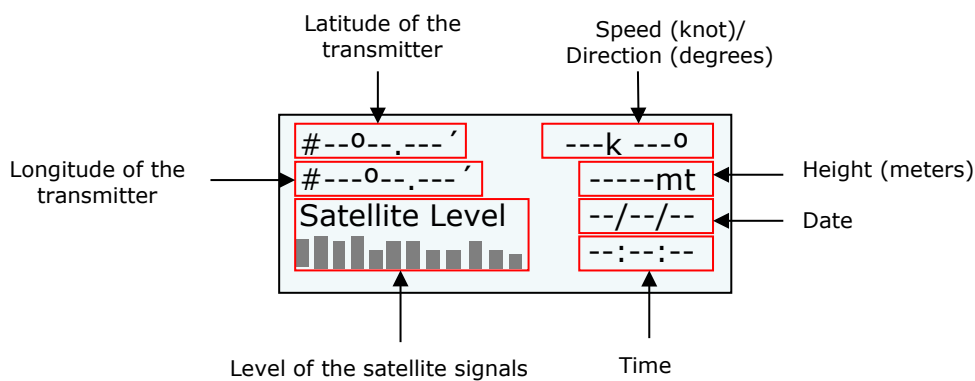


Figure 5.3: GPS transmitter screen

- **Latitude of the transmitter:** It specifies the latitude position of the transmitter.
- **Speed of the transmitter:** It shows the speed of the transmitter in knot.
- **Direction of the transmitter:** The direction of the transmitter is shown in this field.
- **Longitude of the transmitter:** It specifies the longitude position of the transmitter.
- **Height of the transmitter:** The height of the transmitter from ground is specified in this value.

- **Satellite Level:** The level of each satellite signal received is shown in this field.
- **Date:** The updated date is shown.

5.4 Application Example 1 – Constant Positioning

Suppose the transmitter device is on an aeroplane and the constant positioning of the vehicle is wanted to be known. This is achievable with the next items:

- UDT-04 transmitter
- GPS antenna
- HDR-108 receiver

With the GPS antenna connected to the UDT-04 transmitter, positioning of the aeroplane is achieved once the GPS system is connected to the necessary satellites. Data obtained in the transmitter is the positioning of the aeroplane. Next, this GPS data is sent to the HDR-108 receiver. When this signal arrives to the receiver, the HDR-109 shows in its screen some GPS values like:

- Transmitter positioning
- Transmitter direction
- Distance from receiver to transmitter

Above this paragraph a picture of this system is shown:

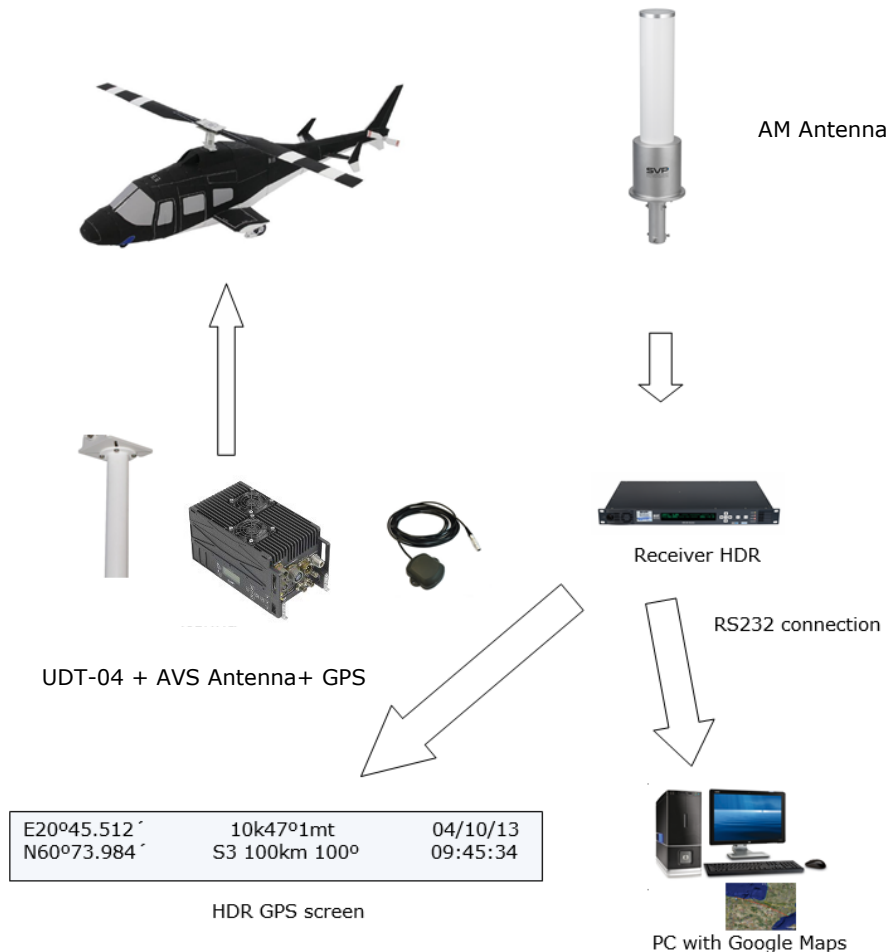


Figure 5.4: PS system example 1 picture

Chapter 6: Web Server

6.1 Introduction

This equipment can be controlled by the use of a PC connected at the rear panel Ethernet connector.

To enable the browser interface correctly, the IP address, Subnet Mask, Gateway, User Password and Administrator Password need to be set correctly on this unit. Next, the steps so as to setup network parameters are shown:

1. Go to Unit -> Remote.

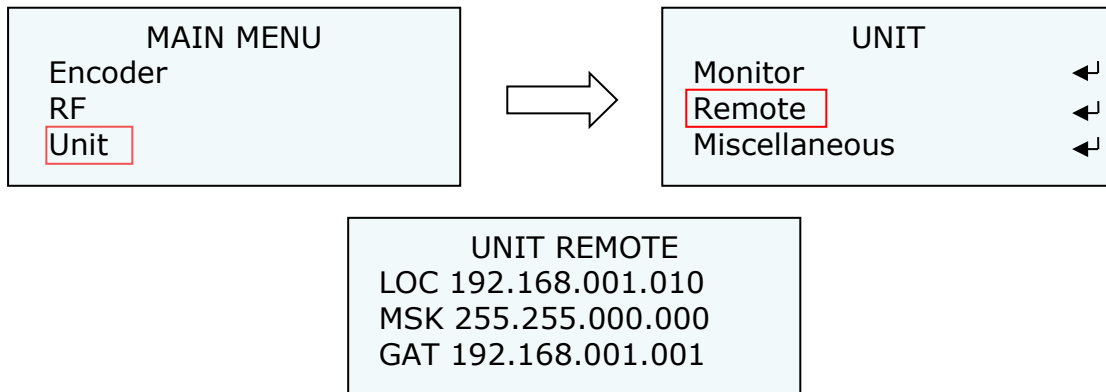


Figure 7.1: Web Server screen

2. Select LOC option and set an IP address. So as to change the IP address first press the OK button and then, with the Up, Down keys select the desired number. So as to change from one character to another, press Right, Left keys. Press the OK button so as to save the introduced value.

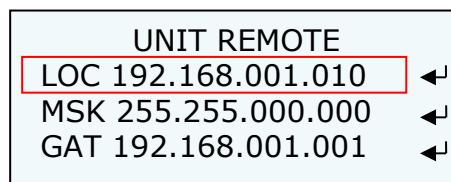


Figure 7.2: Local IP

3. Select MSK option and set the Subnet Mask address. So as to change the Subnet Mask address first press OK button and then, with the Up, Down keys select the desired number. So as to change from one character to another, press Right, Left keys. Press the OK button so as to save the introduced value.

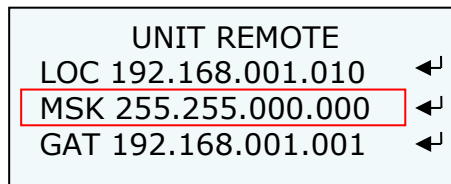


Figure 7.3: Subnet Mask

4. Select GAT option and set the Gateway address. So as to change the Gateway address first press the OK button and then, with the Up, Down keys select the desired number. So as to change from one character to another, press Right, Left keys. Press the OK button so as to save the introduced value.

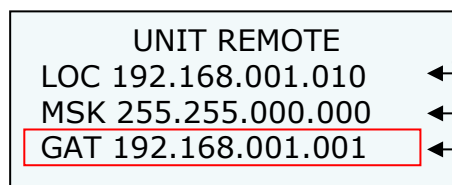


Figure 7.4: Gateway

5. Select Admin Pass option and set the administrator's password. If it is wanted to access to the Webserver directly without setting any password, the Admin Pass must be set to 0 (00000000). However, if it is wanted to set an administrator's password, it is necessary to introduce 8 digits. In this way, with this password, the administrator can access to the Webserver and make any configuration, modification or monitoring.

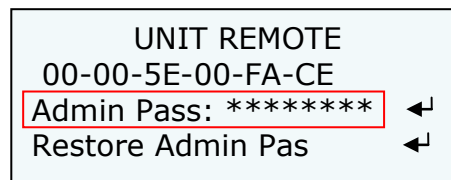


Figure 7.5: Admin Pass

6. Select Restore Admin Pass option to restore de default value of the administrator's password.

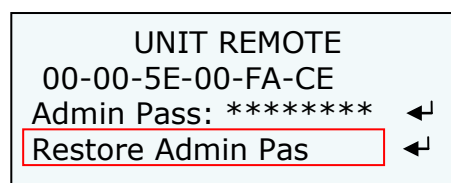
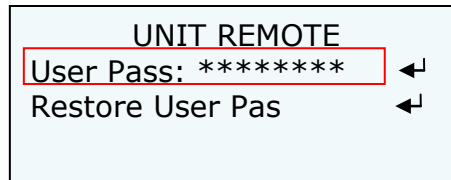


Figure 7.6: Restore Admin Pass

7. Select User Pass option and set the user's password. If it is wanted to access to the Webserver directly without setting any password, the User Pass must be set to 0 (00000000). However, if it is wanted to set a user's password, it is necessary to introduce 8 digits. In this way, with this password, the user can access to the Webserver and make any monitoring.



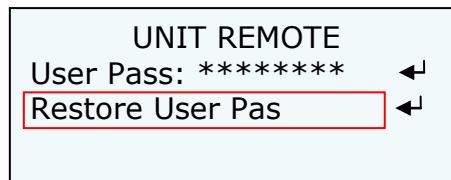
UNIT REMOTE

User Pass: ****'*' ←↵

Restore User Pas ←↵

Figure 7.7: Restore Admin Pass

8. Select Restore User Pass option to restore de default value of the administrator's password.



UNIT REMOTE

User Pass: ****'*' ←↵

Restore User Pas ←↵

Figure 7.8: 8 Restore User Pass

Once the IP, Subnet Mask, Gateway, Admin Pass, Restore Admin Pass, User Pass and Restore User Pass are set and the laptop or PC is connected to the UDT-04, open the web browser and tip the IP given to the transmitter.

Press the enter button in your computer and then the main screen will appear.

6.2 Web Page Overview

The main menu is set in the upper position of the screen. Once an option is chosen, it is possible to change any parameter allowed or to see the values of some options.

In order to modify an editable parameter, introduce the new one and press enter button. Then the change will be set in the transmitter device. Moreover, to modify an eligible parameter, select the new one and the change will appear in the transmitter.

Next several screens of the web server and their features are shown.

6.2.1 ENCODER

Encoder
RF
BLOS
TSoIP
Unit

Video

Input:

Num Videos:

Format:

Latency: Profile:

Depth: Mode:

Audio

[A1] Input:

[A1] Mode: [A1] Bitrate:

[A2] Input:

[A2] Mode: [A2] Bitrate:

[A3] Input:

[A3] Mode: [A3] Bitrate:

[A4] Input:

[A5] Input:

[A5] Mode: [A5] Bitrate:

[A6] Input:

[A7] Input:

[A8] Input:

Data

Mode: Bitrate:

KLK Metadata

KLK Metadata:

Encoder Output

Bitrate: Mbps

TS Parameters

Program Number: Service Name:

Video PID:

Audio1 PID: Audio2 PID: Audio3 PID: Audio4 PID:

Audio5 PID: Audio6 PID: Audio7 PID: Audio8 PID:

Data PID: PMT PID: PCR PID: KLK Metadata:

Scrambler

Mode:

Remux

Mode:

Figure 6.9: Web Server Encoder screen

Video

- **Input:**

Select the type of the video input. The video input options available are SDI, ASI and Generator. (eligible parameter)

- **Number of Videos:**

Here the number of videos is selected between 1 or 4x HD videos. (eligible parameter)

- **Format:**

Here the format of the video input signal is selected. (eligible parameter)

- **Latency:**

In this field, the delay of the coding process is configured. The available options are Normal, Low , or Ultra Low. (eligible parameter)

- **Profile:**

In this field, the codification profile can be configured. The available options are 4:2:0 and 4:2:2. (eligible parameter)

- **Depth:**

In this field, the colour depth bit can be configured between 8 bits or 10 bits. (eligible parameter)

- **Mode:**

In this field, encoding mode can be configured between the following options: H.265, H.264 and Mpeg-2. (eligible parameter)

Audio

- **[A1/A2] Input:**

Select the type of signal introduced in the audio 1 input. The audio input options available are Embedded, Analogue 1, Generator or None. (eligible parameter)

- **[A1/A2] Mode:**

In this field, the audio stream encoding mode is selected.

The available options are:

- MPEG-1 L1. Ultra Low latency compressed audio.
- MPEG-1 L2. Low Latency compressed audio, Low/Normal latency modes use a higher quality codec on streams.
- AAC. Highest audio quality per bitrate, using with Ultra Low latency mode will increase video latency.

- **[A1/A2] Level:**

In this field, the sort of signal of the analogue audio channel introduced in the transmitter is selected. (eligible parameters)

The available options are:

- Line
- MIC Dynamic
- MIC Phantom

- **[A3/A4/A5/A6/A7/A8] Input:**

Select the type of signal introduced in the audio input. The audio input options available are Embedded, Generator or None. (eligible parameter)

Data

- **Input:**

Select the type of data introduced to the device. The available options are None, GPS and RS232. (eligible parameter)

-RS-232

If the RS-232 connection is selected, it is needed to configure the next parameters so as to achieve a successful communication:

○ **Baudrate:**

Choose the baudrate of the RS-232 connection. The available options are 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600. (eligible parameter)

- **Parity:**

Select the parity for the RS-232 connection. The available options are None, ODD and Even. (eligible parameter)

- **Stop Bits:**

Establish the number of stop bits for the RS-232 connection. The available options are 1 and 2. (eligible parameter)

-GPS

If GPS data is selected and the GPS antenna is connected to the device, then different parameters as shown in chapter 4 appear:

Data

Input:	GPS	Status:	GPS not detected		
Latitude:	#--0--.--'	Longitude:	#---0--.--'		
Altitude:	-----mt	Direction:	---	Speed:	---k

Figure 6.10: Web Server GPS screen

If the GPS is connected the status field will show "GPS data verified" message and if it is not connected, the status field will be "GPS not detected".

The format of the GPS coordinates used is decimal minutes as shown in the next example:

N43°02.032'

W023°03.023'

- **Status:**

The status of the GPS input is displayed in this field. (reading parameter)

- **Latitude:**

It specifies the latitude position of the transmitter. (reading parameter)

- **Longitude:**

It specifies the longitude position of the transmitter. (reading parameter)

- **Altitude:**

The height of the transmitter from ground in meters is specified in this value. (reading parameter)

- **Direction:**

The direction in degrees of the transmitter is shown in this field. (reading parameter)

- **Speed:**

The speed of the transmitter in km/h is shown in this field. (reading parameter)

KLK Metadata

In this field, KLM metadata transmission can be configured.

Encoder Output

- **TS Bitrate Mode:**

The bitrate mode can be automatic or manual. In case automatic mode is selected, the device configures automatically the video bitrate depending on the modulation, FEC, IG, BW used, so as to the video bitrate can be always the maximum allowed. SVP advises to use the automatic mode when the signal is transmitted through RF. Manual mode is useful when the device is used as an encoder so as to configure the desired output bitrate in the ASI output. (eligible parameter)

- **TS Bitrate:**

If the bitrate mode is manual, select the bitrate. (editable parameter)



When editable parameters are being set in the Web Server and new values are being introduced, the text remains in red colour until the enter button is pressed. When the enter button is pressed, the new values are saved, and the text will appear in black colour. It is necessary to press the enter button to keep and save the new values on the screen.

TS Parameters

- **Program Number:**

Here the program number must be entered. (editable parameter)

- **Service Name:**

Set the name of the service. (editable parameter)

- **Video PID:**

Here the video packet identifier must be entered. (editable parameter)

- **Audio 1 PID:**

Here the audio 1 packet identifier must be entered. (editable parameter)

- **Audio 2 PID:**

Here the audio 2 packet identifier must be entered. (editable parameter)

- **Audio 3 PID:**

Here the audio 3 packet identifier must be entered. (editable parameter)

- **Audio 4 PID:**

Here the audio 4 packet identifier must be entered. (editable parameter)

- **Audio 5 PID:**

Here the audio 5 packet identifier must be entered. (editable parameter)

- **Audio 6 PID:**

Here the audio 6 packet identifier must be entered. (editable parameter)

- **Audio 7 PID:**

Here the audio 7 packet identifier must be entered. (editable parameter)

- **Audio 8 PID:**

Here the audio 8 packet identifier must be entered. (editable parameter)

- **Data PID:**

Here the data packet identifier must be entered. (editable parameter)

- **PMT PID:**

Here the program map tables packet identifier must be entered. (editable parameter)

- **PCR PID:**

Here the program clock reference packet identifier must be entered. (editable parameter)

- **KLV Metadata PID:**

Here the KLV metadata identifier must be entered.

Scrambler

If you want an encryption system, it can be chosen here.

- **None:**

None encryption

- **BISS-1:**

Uses an unencrypted key for the BISS key

- **BISS-E:**

Uses an encrypted key

- **AES-128:**

Uses an encrypted key of 128 bits

- **AES-256:**

Uses an encrypted key of 256 bits

Remux (Optional)

- **Mode:**

Here you can enable or disable Remux mode, when de enable mode is selected, Transport Stream Bitrate mode is always manual.

6.2.2 RF

Encoder	RF	BLOS	TSoIP	Unit
System:	DVB-T2 ▼			
RF Status:	Off ▼			
Frequency:	2300,00	MHz		
Power:	High ▼			
Bandwidth:	8MHz ▼			
Modulation:	16QAM ▼			
LDPC FEC:	3/5 ▼			
GI:	1/8 (INSIDE) ▼			
FFT:	2K ▼			
TS Bitrate:	14,49	Mbps		

Figure 6.11: Web Server MOD_RF screen

- **System:**

In this field the transmission standard can be chosen. The available options are DVB-T2 and DVB-T. (eligible parameter)

- **RF Status:**

Select ON in case of wanting to activate the RF transmission or press OFF button so as to deactivate it. (eligible parameter)

6.2.2.1 DVB-T

Encoder	RF	BLOS	TSoIP	Unit
System:	DVB-T ▼			
RF Status:	Off ▼			
Frequency:	2300,00	MHz		
Power:	High ▼			
Bandwidth:	8MHz ▼			
Modulation:	16QAM ▼			
FEC:	1/2 ▼			
GI:	1/8 (INSIDE) ▼			
TS Bitrate:	11,05 Mbps			

Figure 6.12: Web Server MOD_RF screen (DVB-T)

- **Frequency:**

Introduce the frequency at which the signal is being transmitted. (editable parameter)

- **Power:**

Select the Output Power of the transmitted signal. The available options are Low, Mid and High. (eligible parameter)

- **Bandwidth:**

Enter the transmitted signal bandwidth. The available options are 5, 6, 7, 8 MHz. (eligible parameter)

- **Modulation:**

Select the constellation of the transmitted signal. The available options are QPSK, 16QAM, 64QAM. (eligible parameter)

- **FEC:**

Select the FEC value for the transmitted signal. The available options are 1/2, 2/3, 3/4, 5/6, 7/8. (eligible parameter)

- **GI:**

Select the guard interval of the transmitted signal. The available options are 1/4, 1/8, 1/16, 1/32. (eligible parameter)

- **Spectrum:**

Here the type of the spectrum is configured. Inverted spectrum is just another method to help prevent signal theft. (eligible parameter)

The available options are normal or invert.

- **Bitrate:**

The bitrate of the transmitted signal is displayed in this field. (reading parameter)



When editable parameters are being set in the Web Server and new values are being introduced, the text remains in red colour until the enter button is pressed. When the enter button is pressed, the new values are saved, and the text will appear in black colour. It is necessary to press the enter button to keep and save the new values on the screen.

6.2.2.2 DVB-T2

Encoder	RF	BLOS	TSoIP	Unit
System: DVB-T2 ▼				
RF Status: Off ▼				
Frequency: 2300,00 MHz				
Power: High ▼				
Bandwidth: 8MHz ▼				
Modulation: 16QAM ▼				
LDPC FEC: 3/5 ▼				
GI: 1/8 (INSIDE) ▼				
FFT: 2K ▼				
TS Bitrate: 14,49 Mbps				

Figure 6.13: Web Server RF screen (DVB-T2)

- **Frequency:**

Introduce the frequency at which the signal is being transmitted. (editable parameter)

- **Power:**

Select the Output Power of the transmitted signal. The available options are Low, Mid and High. (eligible parameter)

- **Mode:**

Select the guard interval of the transmitted signal. The available options are 1/8, 1/16, 1/32. (eligible parameter)

- **Bandwidth:**

Enter the transmitted signal bandwidth. The available options are 1.7, 5, 6, 7, 8 MHz. (eligible parameter)

- **Modulation:**

Select the constellation of the transmitted signal. The available options are QPSK, 16 QAM, 64 QAM, 256 QAM. (eligible parameter)

- **LDPC FEC:**

Select the FEC value for the transmitted signal. The available options are 1/2, 3/5, 2/3, 3/4, 4/5, 5/6. (eligible parameter)

- **FFT:**

Specify the FFT mode. The available options are 1K, 2K (eligible parameter)

- **Pilot Pattern:**

This field indicates the scattered pilot pattern used for the data OFDM symbols. The available options are between PP1 and PP8. (reading parameter)

- **Time Interleaving:**

This option indicates the number of time interleaver blocks per interleaving frame. (editable parameter)

The user must select, in how many time interleaver blocks (TI_blocks) an interleaving frame is split.

Only the time interleaver mode 0 (TIME_IL_TYPE=0) is supported, so one interleaving frame always equates to exactly one OFDM frame. To deactivate the time interleaver, this parameter must be set to 0.

To configure this option, press the OK button and then select with the Up and Down buttons the desired value.

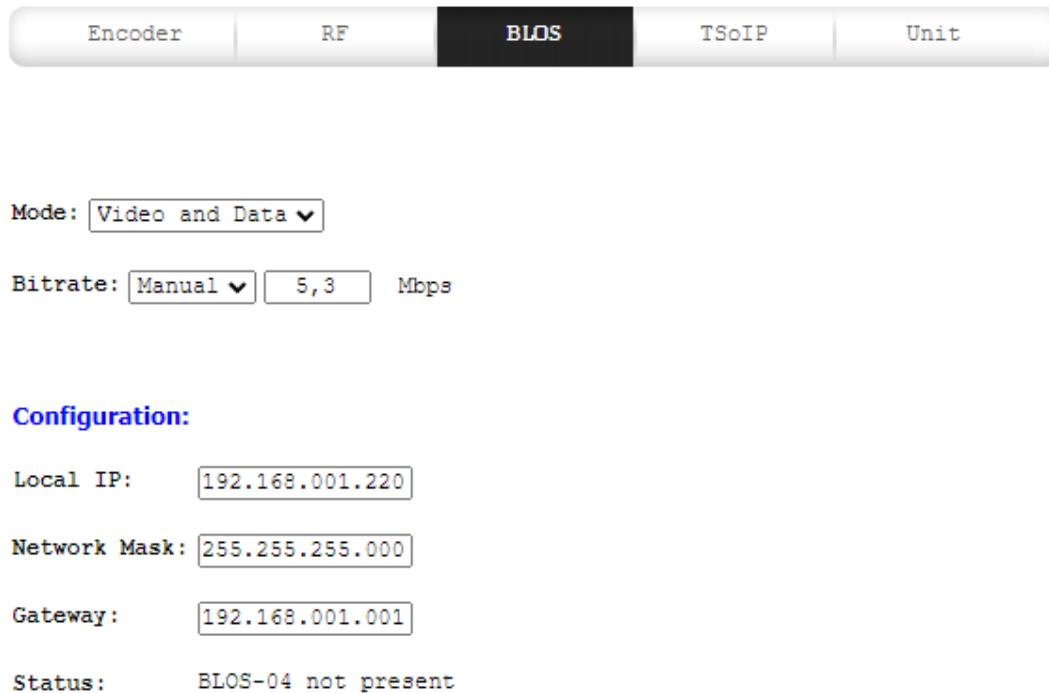
- **TS Bitrate:**

The bitrate of the transmitted signal is displayed in this field. (reading parameter)



When editable parameters are being set in the Web Server and new values are being introduced, the text remains in red colour until the enter button is pressed. When the enter button is pressed, the new values are saved, and the text will appear in black colour. It is necessary to press the enter button to keep and save the new values on the screen.

6.2.3 BLOS



The screenshot shows the BLOS configuration interface. At the top, there is a navigation bar with five tabs: 'Encoder', 'RF', 'BLOS' (which is highlighted in black), 'TSolP', and 'Unit'. Below the navigation bar, the 'Mode' is set to 'Video and Data' with a dropdown arrow. The 'Bitrate' is set to 'Manual' with a dropdown arrow, followed by a text input field containing '5,3' and the unit 'Mbps'. Under the 'Configuration:' heading, there are three fields: 'Local IP' with the value '192.168.001.220', 'Network Mask' with the value '255.255.255.000', and 'Gateway' with the value '192.168.001.001'. At the bottom, the 'Status' is displayed as 'BLOS-04 not present'.

Figure 6.14: Web Server BLOS screen

- **Mode:**

In this field, the user can configure the operation of the BLOS Datalink system. The options are:

- Off: The datalink is in standby mode.
- Data: The datalink is used only for bidirectional data transmission.
- Video and Data: The datalink is used for bidirectional video and data transmission.

For BLOS-04 video and data configuration, we need to configure video output bitrate first, which can be:

- AUTO: That means that the bitrate used for video is the same configured in the modulator.
- MANUAL BITRATE: That means that we can limit the bitrate used for video manually. The bandwidth available will be shared between data and video.

- **Configuration:**

▪ **Local IP:**

In this option, the IP address of the device is shown.

▪ **Network Mask:**

Subnet address of the device which is going to send the information.

▪ **Gateway:**

Gateway address of the device which is going to send the information.

6.2.1 TSoIP

Encoder	RF	BLOS	TSoIP	Unit
---------	----	------	--------------	------

IP Output:

Configuration:

Local IP:

Network Mask:

Gateway:

MAC: 74:1A:E0:8F:F5:AF

Dest IP:

Port:

TP per IP:

Protocol:

Time to live:

Diagnostics:

Estimated Bitrate: 5,412 Mbps

IP Packet Size: 1344 bytes

Figure 6.15: Web Server TSoIP screen

- **Local IP:**

In this option, the IP address of the device is shown.

- **Network Mask:**

Subnet address of the device which is going to send the information.

- **Gateway:**

Gateway address of the device which is going to send the information.

- **Destination IP:**

In this option, the IP address of the device to which data is sent must be configured. In case you want to send data to a multicast address just enter the desired multicast address. (editable parameter)

- **Port:**

In this option, the port number of the device to which data is sent must be configured. (editable parameter)

- **TP per IP:**

In this field the number of Transport Stream packets per IP (from 1 to 7) can be configured. (editable parameter)

- **Protocol:**

In this field the type of protocol used for the communication is selected. The type of protocol used for the communication can be RTP, UDP or SRT. (eligible parameter)

- **Time to live:**

This field limits the lifetime of the data. The Time To Live value (from 1 to 255) means the number of routers that a packet can reach until it is discarded.

Diagnostics:

In this field, the estimated output bitrate and IP packet size is shown.



The destination IP address, the Webserver IP address and the TSoIP Local IP address must be different.



When editable parameters are being set in the Web Server and new values are being introduced, the text remains in RED until the enter button is pressed. When the enter button is pressed, the new values are saved, and the text will appear in BLACK. It is necessary to press the enter button to keep and save the new values on the screen.

6.2.2 UNIT

Encoder	RF	BLOS	TSoIP	Unit
---------	----	------	-------	-------------

LEDs Status

ON/OFF: ☒

RF: ☐

ALARM: ☒

STATUS: ☐

Alarms

No ASI Input
No GPS

Alarms configuration

- ☒ High Voltage
- ☒ Low Voltage
- ☒ High Temperature
- ☒ ASI Overflow
- ☒ No SDI Input
- ☒ No ASI Input
- ☒ No GPS
- ☒ No KLV
- ☒ Encoder Fault
- ☒ PA No Forward
- ☒ PA Rev High
- ☒ PA Volt Low
- ☒ PA Temp High
- ☒ Weight on Wheels

Monitor

Voltage: 24,1 V

Mod Temperature: +45 ,3

Enc Temperature: +60,4 °C

Configuration

Webserver Address:

Webserver Subnet:

Webserver Gateway:

Webserver MAC: 70-B3-D5-1A-C0-00

Admin Password: Mandatory: 8 characters

User Password: Mandatory: 8 characters

Miscellaneous

S/N: 660010911
Encoder S/N: 6180aa5a
Firmware: V1_8808880811-06

Activ Licenses

AES: Enable
KLV: Enable
Remux: Enable
Internal GPS: Enable
3-4GHz Band: Enable
4-8GHz Band: Enable
Camera Control: Disable
4xHD: Disable
ARINC: Disable

Firmware Update

Ningún archivo seleccionado
Select a file to upload

Figure 6.16: Web Server UNIT screen

LEDs Status (reading parameters)

- ON/OFF:
 - If the Led is off the equipment is not being fed.
 - The Led lights up in green when the equipment is turned on.
 - If the Led is orange, the equipment is in standby mode.
- RF:
 - If the Led is off the equipment does not transmit RF signal.
 - The Led lights up in green when the equipment transmits RF signal, that is, RF stage is active.
- ALARM:
 - The Led lights up in red when any alarm occurs.
- STATUS:

The Led lights up when a change in the configuration of the device is being processed.

Alarms (reading parameter)

In this option, different alarms which are present in the device are shown.

Alarms Configuration (eligible parameter)

In this option, the alarms to be shown can be selected.

The different alarms that can be configured to be shown are:

- High Voltage
- Low Voltage
- High Temperature
- ASI Overflow: this alarm means that the bit rate at the ASI input is higher than the one that can be modulated due to the parameters configured (constellation, FEC, GI...).
- No SDI Input: SDI source is not connected.
- No ASI Input: ASI source is not connected.
- No GPS: GPS source is not connected.
- No KLV
- Encoder Fault
- PA No Forward
- PA Rev High
- PA Volt Low
- PA Temp High
- WeightOnWheels

Monitor

- Voltage:

In this field, the voltage of the transmitter is shown. (reading parameter)

- Temperature:

In this field, the internal temperature of the device is displayed. (reading parameter)

Configuration

- **Webserver Address**

In this option it can be set the IP address of the device in case it is wanted to control the device remotely. So as to change the IP address, introduce the desired number and then press enter button to save the introduced value. (editable parameter)

- **Webserver Subnet**

Here it the Subnet Mask address of the device can be written. So as to change the Subnet Mask address, introduce the desired value and then press enter button to save it. (editable parameter)

- **Webserver Gateway**

In this option, the address of the Gateway must be written. So as to change the Gateway address, introduce the desired value and then press enter button to save it. (editable parameter)

- **Webserver MAC**

In this field, the MAC address of the device is shown

- **Admin Password**

In this field, the administrator's password is introduced. It can be set an own password which is a list of 8 digits. Then, to save the introduced value, press Enter button. Moreover, there is the option to restore the default administrator password (00000000).

- **User Password**

In this field, the user's password is introduced. It can be set an own password which is a list of 8 digits. Then, to save the introduced value, press Enter button. Moreover, there is the option to restore the default user password (00000000).

Miscellaneous

- **S/N:**

In this field, the serial number of the device is displayed. (reading parameter)

- **Encoder S/N:**

In this field, the encoder serial number of the device is displayed. (reading parameter)

- **Firmware:**

In this field, the number of the version installed in the device is displayed. (reading parameter)



When editable parameters are being set in the Web Server and new values are being introduced, the text remains in red colour until the enter button is pressed. When the enter button is pressed, the new values are saved, and the text will appear in black colour. It is necessary to press the enter button to keep and save the new values on the screen.

Active Licenses

In this field, the user can check which licenses are activated on the unit.

Firmware Update

In this field, the user can upload the firmware .SVP file and upgrade the firmware remotely.

Chapter 7: Equipment Installation

7.1 Introduction

This chapter provides important information for the transmitter system installation such as connections available in the rear and front panel of the UDT-04 transmitter and their pinout, connectors needed and the accessories which are available with the transmitter device.

7.2 Connections

All the input/output connections of the transmitter are shown in the figure below:



All the Lemo part numbers and pinout refer to the connector that is fixed to the cable. The pinout of the cable connector is shown as if it is watched from the soldering side.

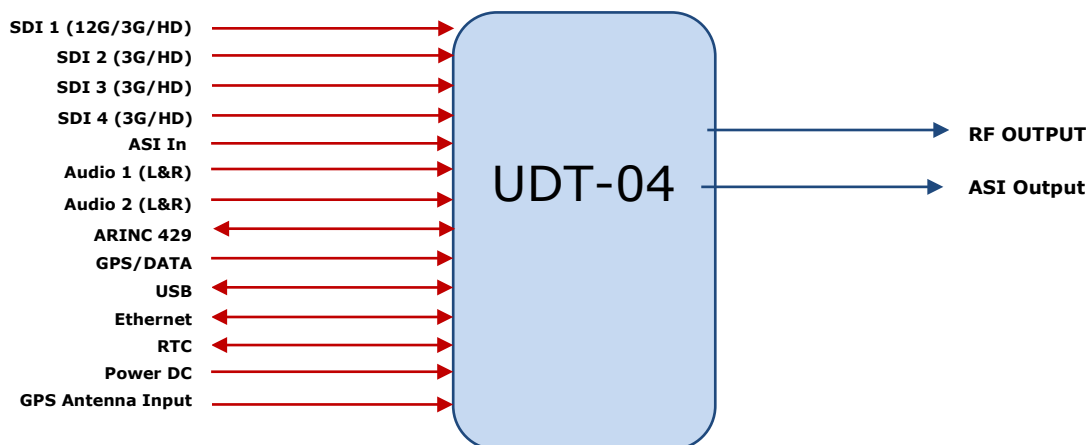


Figure 9.1: UDT-04 Connections

The following figures show the UDT-04 front and rear panel. Connections mentioned in the upper figure are shown below.

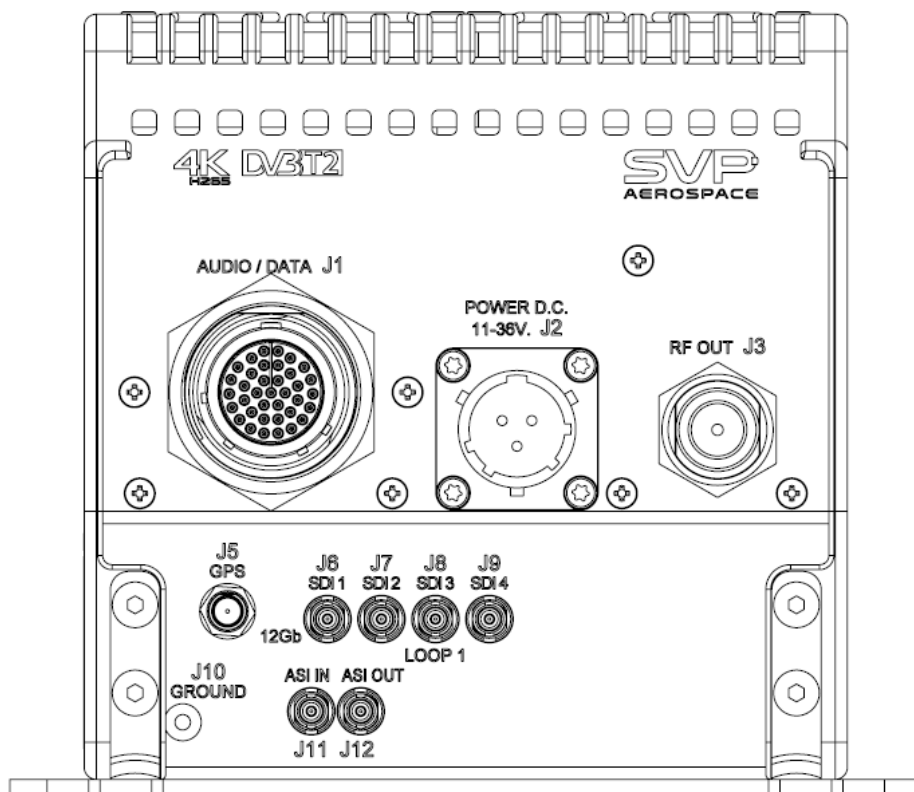
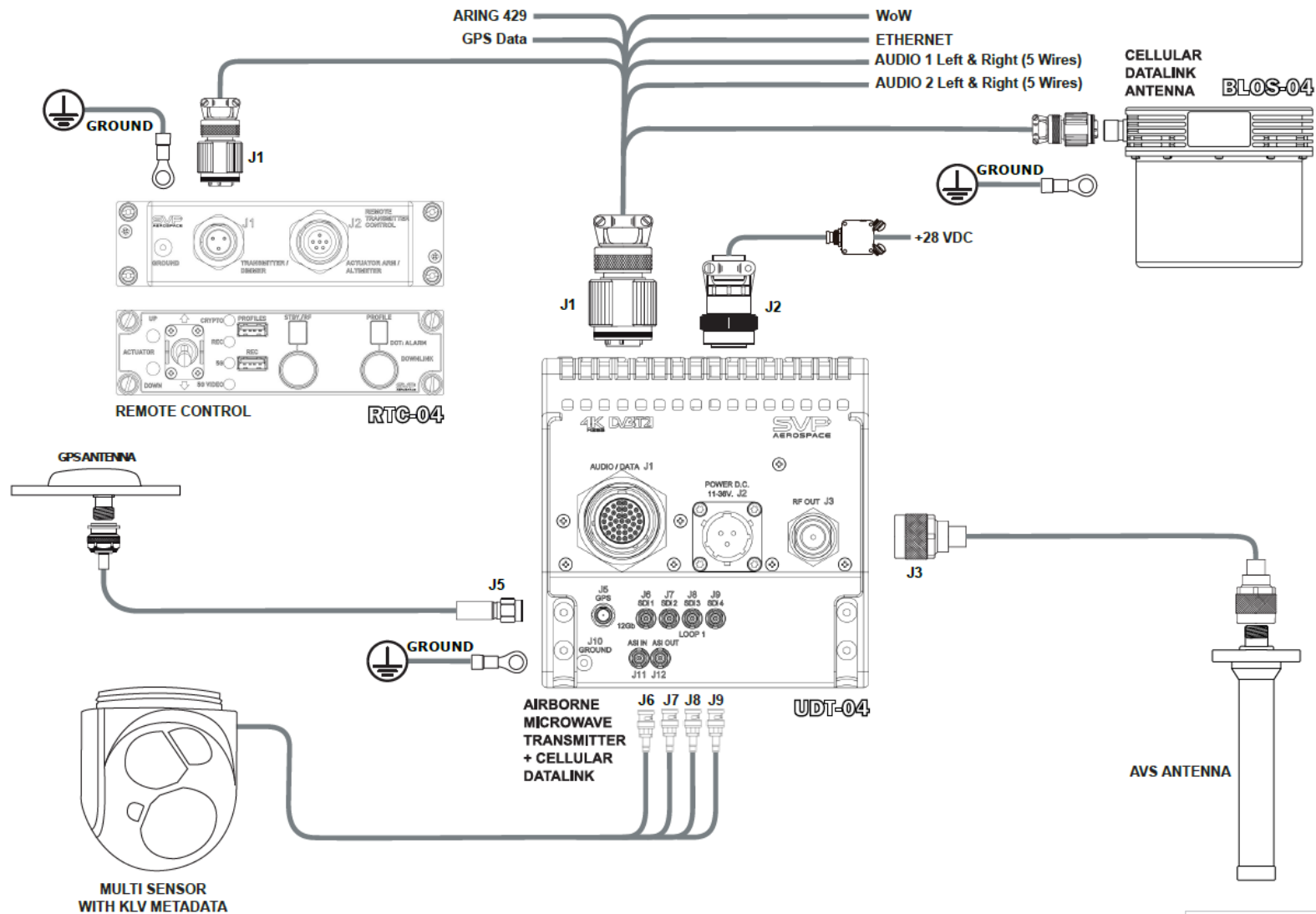


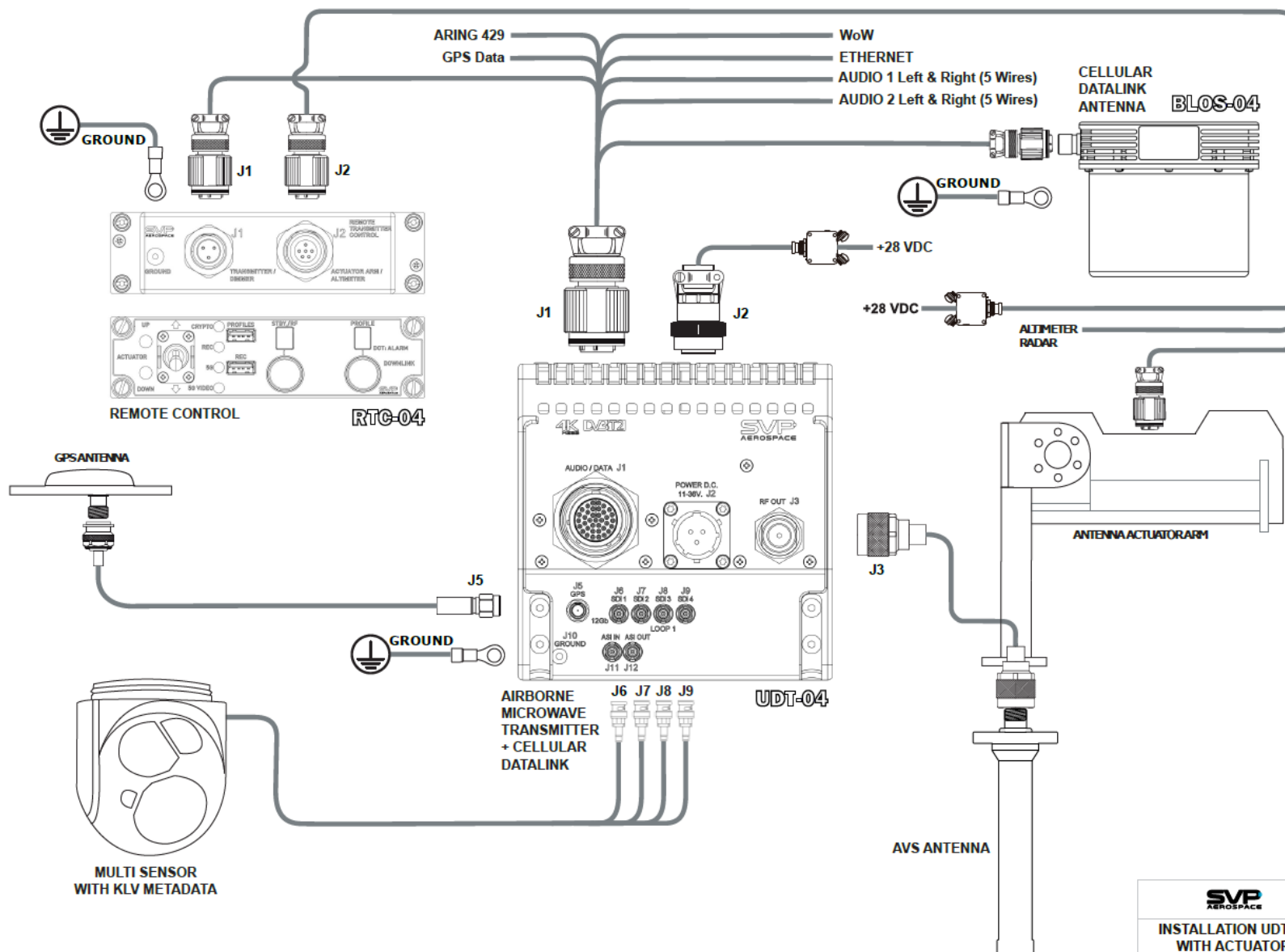
Figure 7.2: UDT-04 front panel

Jack number	Features
J1	AUDIO/DATA
J2	POWER DC 9-36 V
J3	RF OUT
J4	RF OUT AUX (in rear panel)
J5	GPS
J6	SDI 1
J7	SDI 2
J8	SDI 3
J9	SDI 4
J10	Ground
J11	ASI IN
J12	ASI OUT

Table 23: Connectors Jack number

Note: The ground connection is grounded in the equipment, size is M3.







7.2.1 AUDIO DATA [J1]

The UDT-04 transmitter has an Auxiliary connector by using MIL-DTL-38999 Series 3 connector on equipment's front panel.

AUDIP/DATA input technical features

Item	Features
Connector Label	AUDIO/DATA
Connector type	MIL-DTL-38999 Series 3
Part number (equipment)	TV07RW-15-35PN-W32
Part number (cable)	D38999/26WD35SN

Table 24:AUDIO/DATA input connection technical features

AUDIO/DATA connector pinout

Pin	Description
1	5G_ANTENNA_A_P
2	5G_ANTENNA_A_N
3	5G_ANTENNA_B_P
4	5G_ANTENNA_B_N
5	PoE+
6	PoE-
7	ETHERNET_AUX_A_P
8	ETHERNET_AUX_A_N
9	ETHERNET_AUX_B_P
10	ETHERNET_AUX_B_N
11	AUDIO 1_L_R
12	AUDIO 1_L_N
13	AUDIO 1_R_P
14	AUDIO 1_R_N
15	GND
16	AUDIO 2_L_R
17	AUDIO 2_L_N
18	AUDIO 2_R_P
19	AUDIO 2_R_N
20	GND
21	GPS RS-232 OUT
22	GND
23	WoW
24	GND
25	RTC+
26	RTC-
27	+V RTC POWER SUPPLY
28	GND
29	ARINC TX-A

30	ARINC TX-B
31	GND
32	ARINC RX-A
33	ARINC RX-B
34	USB+ REC
35	USB- REC
36	+12V. OUT AUX
37	GND

Table 25: AUDIO/DATA Connection pinout

7.2.2 9-36V. DC Power Supply [J2]

In this section, technical features about the power supply connections available and the connectors needed are described.

The equipment is powered by a DC source from 9 to 36 V extended range. If the input voltage of the equipment is out of that range, the LED of the equipment blinks green and red showing an alarm.

The DC power supply is connected to the equipment via a 3 pin Amphenol connector.

Power supply connection technical features	
Item	Features
Connector label	POWER D.C.
Part number E.g. (UDT-04 connector)	851-02E123P50 (Souriau)
Part number E.g. (cable connector)	851-06EC123S50 (Souriau)
Input voltage range	9-36 V. DC

Table 26: Power supply connection technical features

Table Power supply connector pinout	
Pin	Description
A	+28V. DC IN
B	28V DC RETURN
C	Not used

Table 27: Power supply connection pinout

7.2.3 RF output [J3]

The antenna is directly connected to the female N-type connector on the front panel of the UDT-04 transmitter.

RF connection technical features

Item	Features
Connector label	RF OUT
Connector type	N female
Impedance	50 Ω
Output power	Maximum: 10 W or 15 W

Table 28: RF Output connector characteristics

7.2.1 RF Auxiliary output [J4]

The antenna is directly connected to the female N-type connector on the front panel of the UDT-04 transmitter.

RF connection technical features

Item	Features
Connector label	RF OUT AUX
Connector type	N female
Impedance	50 Ω
Output power	Maximum: 10 W or 15 W

Table 29: RF Output connector characteristics

7.2.2 GPS Antenna Input [J5]

When the internal GPS is used, the GPS antenna must be connected to this input. The equipment feed the antenna at 5 V.

Item	Features
Connector label	GPS
Connector type	SMA female
Impedance	50 Ω
Output voltage	5V

Table 30: GPS antenna connector characteristics

7.2.3 SDI Input [J6/J7/J8/J9]

When the internal GPS is used, the GPS antenna must be connected to this input. The equipment feed the antenna at 5 V.

Item	Features
Connector label	SDI 1/SDI 2/SDI 3/ SDI 4
Connector type	HD-BNC
Impedance	75 Ω

Table 31: SDI Input connector characteristics

7.2.4 ASI Input [J11]

The UDT-04 transmitter has a DVB-ASI input and output compatible with the EN50083 standard, available on an insulated 75 Ω HD-BNC connector.

ASI IN connection technical features

Item	Features
Connector label	ASI IN
Connector type	HD-BNC
Impedance	75 Ω
Standard	EN50083-9

Table 32: DVB-ASI Transport Stream input connection features

7.2.5 ASI Output [J12]

ASI output signal type uses 75 Ω BNC connector. This connector is placed on transmitter's front panel.

It is important that 75 Ω connectors are used. This is because the female output connector of the UDT-04 unit may be damaged and because of an impedance mismatch.

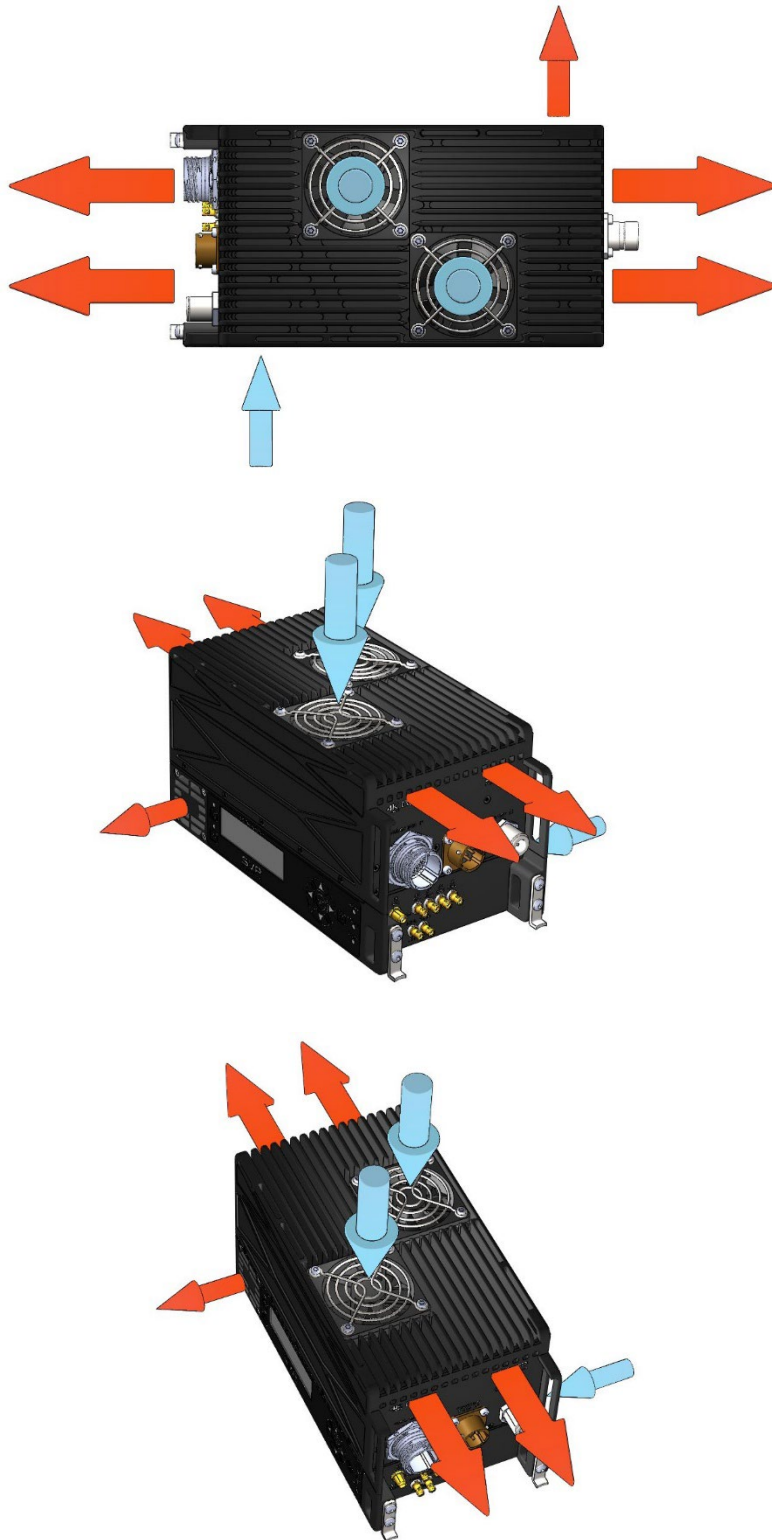
ASI connection technical features

Item	Features
Connector label	ASI OUT
Connector type	HD-BNC
Impedance	75 Ω
Standard	EN50083-9

Table 33: DVB-ASI Transport Stream output connection features

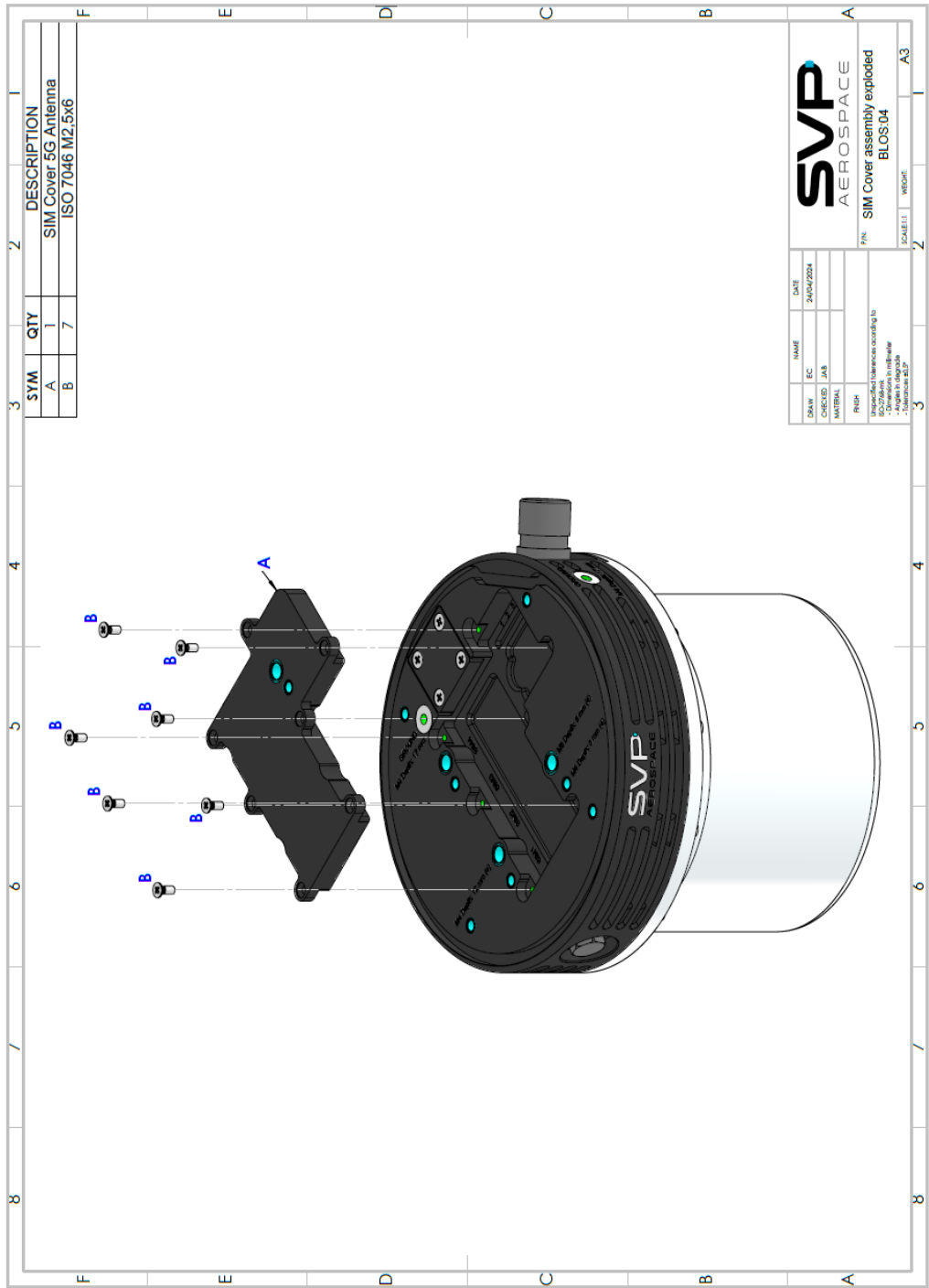
7.3 UDT-04 AIRFLOW

During installation, the following considerations must be taken into account for correct cooling of the equipment:

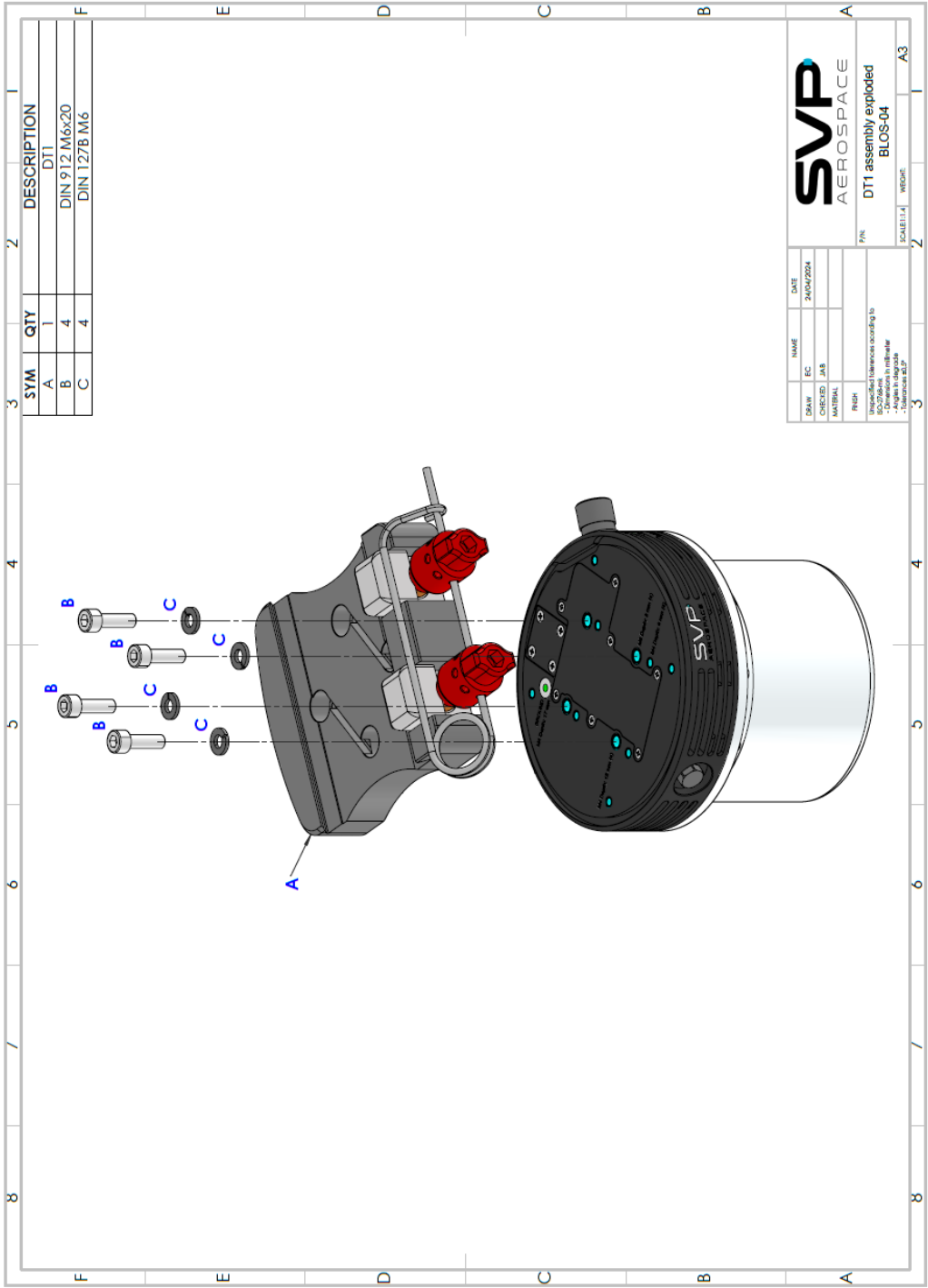


7.4 5G Antenna

7.4.1 CELLULAR DATALINK Antenna SIM cover



7.4.2 CELLULAR DATALINK Antenna: AIRFILM
CAMERA SYSTEMS DT-1-1 Assembly



Chapter 8: Remote Control

8.1 Introduction

The RTC-04 equipment is compact lightweight Remote Controller for SVP Broadcast Microwave transmitters. They can control the UDT-04 and the UDT-02 Transmitters.

Thanks to this equipment, the user can control the transmitter remotely in an easy and comfortable way. The RTC-04 front panel consists of several switch which allow the user to configure and modify different features such as the actuator arm state (up/down), the level of the RF, the profile selected and enable or disable encryption.

From the RTC-04 the user can record video on an USB drive or can charge profiles automatically on an USB port.

This equipment is especially useful in applications where the UDT-02 or UDT-04 Transmitter is mounted away from the operator and the parameters can't be modified directly from the front panel.

Additionally, when used with a 5G Antenna, we can select between 5G DATA transmission (5G antenna is only used for DATA) or 5G VIDEO (5G antenna is used for video transmission backup).

8.2 RTC-04

8.2.1 Remote Control Operation

This chapter provides the user with all the necessary information to control and operate the equipment properly.



Figure 8.1: RTC-04 front view

There are several buttons in the front panel of the device that allows the control of the UDT-02 and UDT-04 Transmitter remotely.

- Actuator

This Up/Down switch is used to control the antenna actuator in different systems. With this switch, it is possible to move the antenna up and down remotely. It has also two LEDs to indicate the status of the actuator (Up or Down).

In order to disable the actuator function, please you hold down the PROFILE button and press the Actuator DOWN button for 3 seconds.

- Standby/RF

To select the amplifier output power level or leave it in standby mode please move this selector. The options available are:

- Standby "."
- RF Off "o"
- Low power "L"
- Medium power "M"
- High power "H"

- Profiles

With this button, the user can choose between different profiles which have been configured previously. There are seven profiles available. Each profile has different features related to the type of transmission system, the frequency at which the signal is going to be transmitted, the bitrate, the type of video input, the type of Audio 1 and Audio 2 inputs, the video delay and the codification profile.

- LEDS

There are 4 LEDS that can be used for different purposes; Crypto, REC, 5G and 5G Video.

In order to access the configuration mode, first press PROFILE button for about 2 seconds.

One of the LEDs will start blinking, move UP or Down using PROFILE button and select the option that you want to configure.

Press PROFILE button to change the configuration.

Press PROFILE button for 2s to get out of configuration mode.

Configuration options are:

- Encyption:
 - ON
 - OFF
- REC (Video recording on USB drive):
 - ON
 - OFF
- 5G:
 - ON (Only data is transmitter over bidirectional 5G antenna)
 - OFF
- 5G video:
 - ON (Video is sent over the 5G antenna as video backup)
 - OFF

8.2.2 Connections

This chapter provides important information such as connections available in the remote control and the connectors needed.



Figure 8.2: RTC-04 rear view

8.2.2.1 Transmitter Dimmer Connector [J1]

This connector is used for the communication between [J1] UDT-04 Transmitter and the RTC-04 Remote Control.

Transmitter Dimmer connection technical features	
Item	Features
Connector label	TRANSMITTER DIMMER
Connector type	MIL-DTL-38999 Series 3 D38999/24
Part number E.g. (RTC-03 connector)	D38999/24WA35PN
Part number E.g. (cable connector)	D38999/26WA35SN

Table 34: Transmitter Dimmer connector technical features

Transmitter Dimmer connector pinout	
Pin	Description
1	GND
2	RTC RS485 (+) Half Duplex
3	RTC RS485 (-) Half Duplex
4	+V Power Supply
5	NVG Dimmer
6	Dimmer Enable
7	Not Used
8	USB+ REC
9	USB- REC

Table 35: Transmitter Dimmer connector pinout

Pin 6 of Dimmer Enable has the function of enabling the external Dimmer. For this purpose, you have to connect Pin 6 from J1 to GND. Please note that NVIS Dimmer signal is 0 to 5 Volts. When pin 6 is not connected to GND, the brightness is controlled manually. That means the brightness is controlled by pushing STBY/RF button while rotating it, it has 9 levels of brightness. To set a level, keep pushed the button until the level number is steady.

8.2.2.2 Actuator Arm Altimeter Connector [J2]

This connector is used for the communication between [J2] UDT-04 Transmitter and the actuator arm. This connector has different pinouts depending on the internal selection of the actuator type; type A or Type B as described below.

Actuator Arm Altimeter connection technical features	
Item	Features
Connector label	ACTUATOR ARM ALTIMETER
Connector type	MIL-DTL-38999 Series 3 D38999/24
Part number E.g. (RTC-04 connector)	D38999/24WB35SN
Part number E.g. (cable connector)	D38999/26WB35PN

Table 36: Actuator Arm Altimeter connection technical features

RTC-04 connection to Type A actuator

PIN	Description
1	Switch common
2	Retract
3	Extend
4	Actuator power Out GND
5	Actuator power Out +28V
6	Limit Switch common
7	Altimeter
8	GND
9	Not Used
10	+ 28V. DC
11	28V DC Return
12	NC
13	NC

Table 37: Connector pinout for Type A actuator

RTC-04 connection to Type B actuator

Pin	Description
1	Not Used
2	Down indicator
3	Up command
4	GND Chassis
5	Up indicator
6	Down command
7	Altimeter
8	GND
9	Not Used
10	+28V. DC
11	28V. DC Return
12	NC
13	NC

Table 38: Connector pinout for Type B actuator

The equipment supports two polarity options to automatically retract the arm, this is made based on the altimeter radar signal. There are two optionsm this should be defined in the P/N when ordering the remote control. Low level (bring pin 7 to GND), or high level (bring pin 7 to + 28V DC).

8.2.3 Alarms

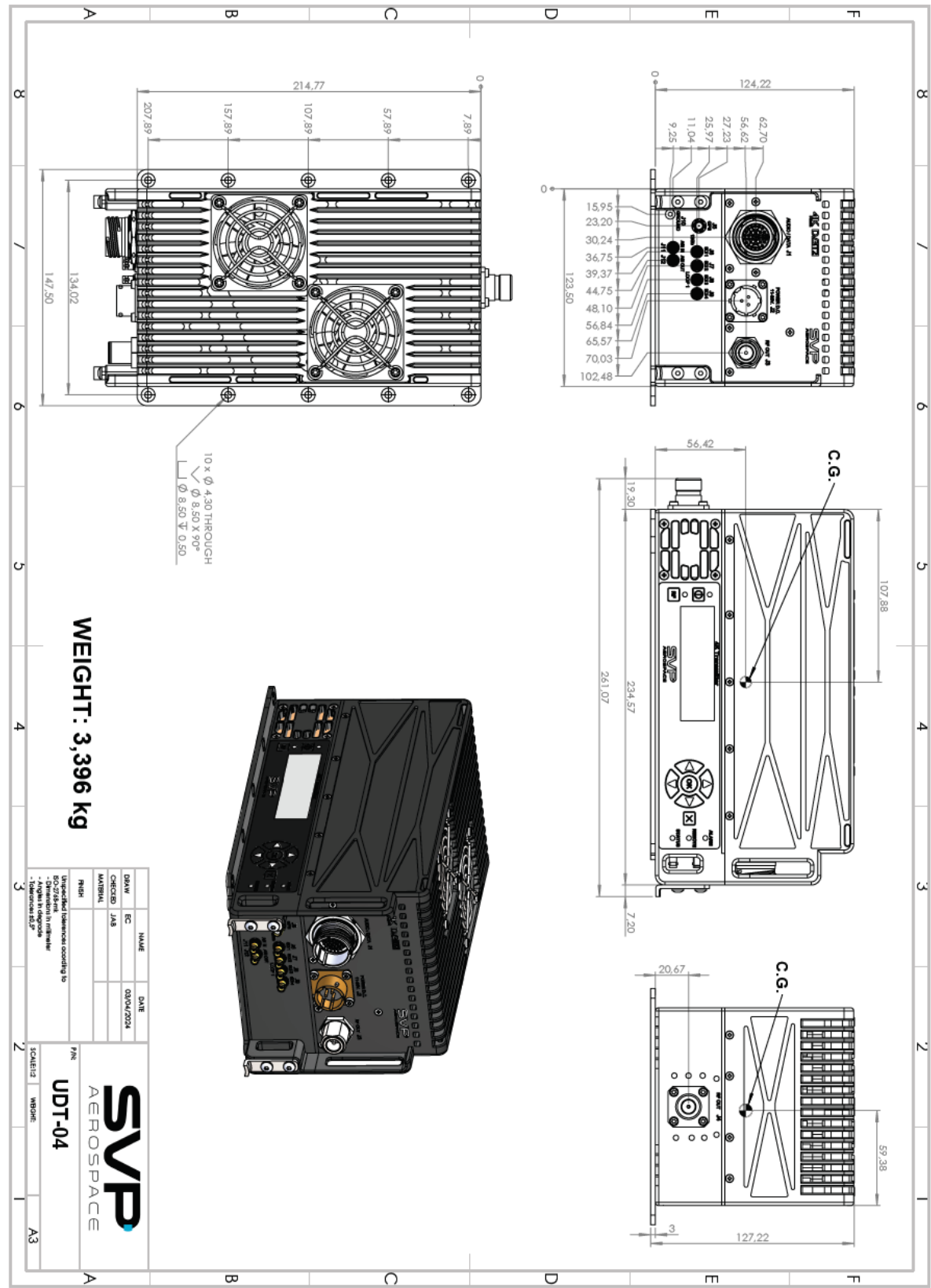
The RTC-04 Remote Control shows transmitter alarms. When there is an alarm there will be a point in the profile screen.

Chapter 9: Mechanical Dimensions

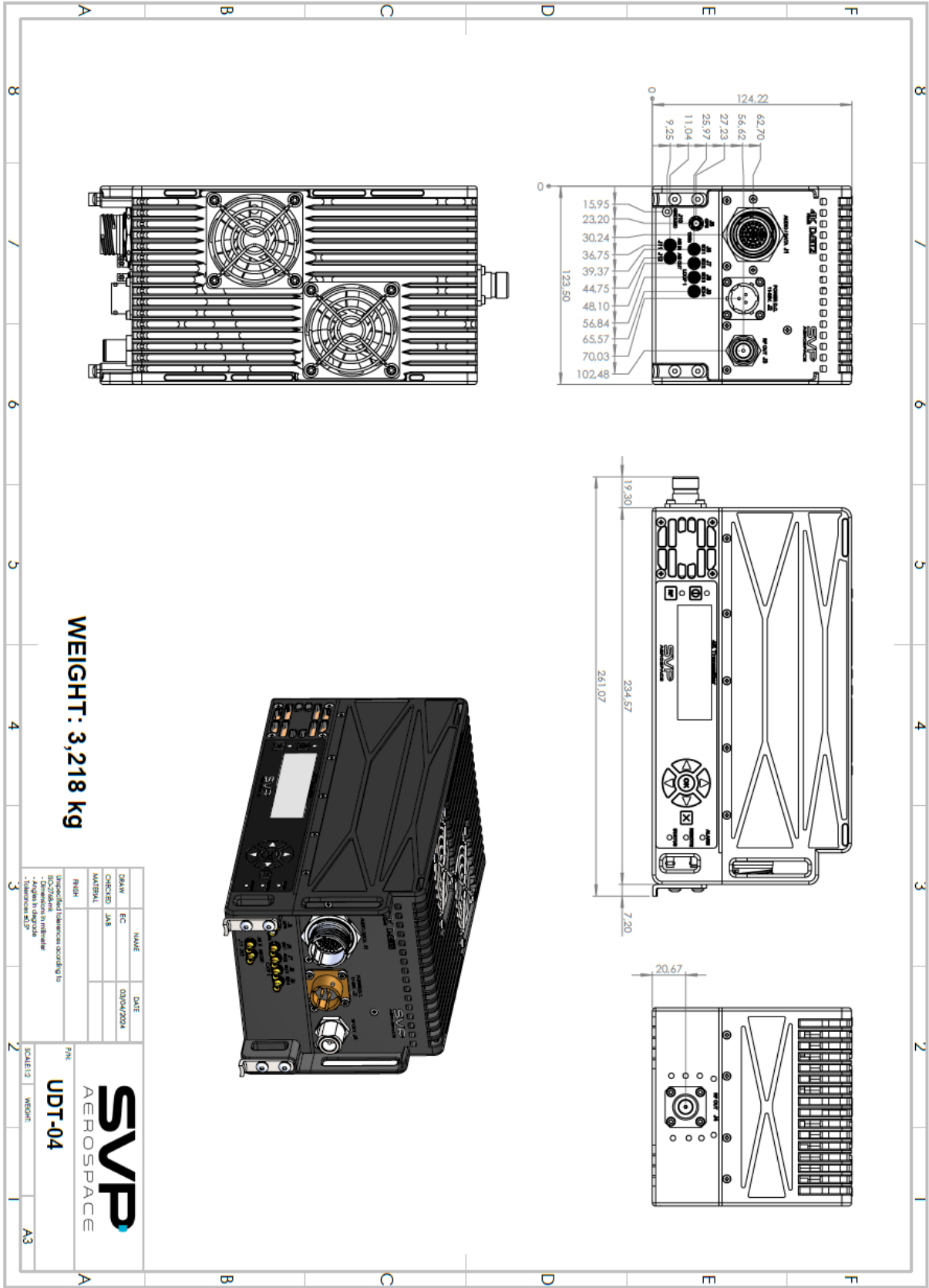
In this chapter, the mechanical drawing of the units described in this manual are included.

9.1 UDT-04

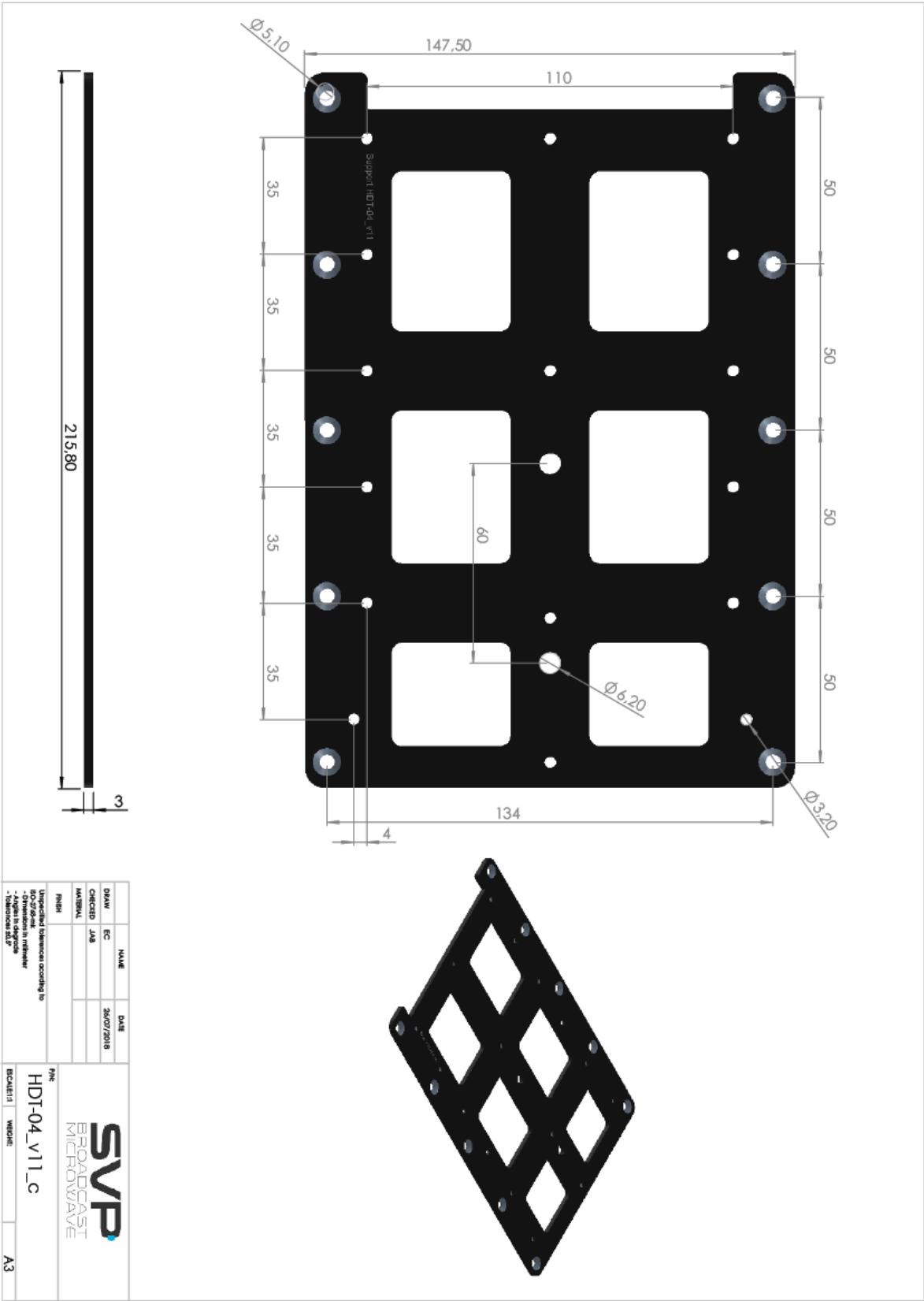
9.1.1 UDT-04 with CLTX



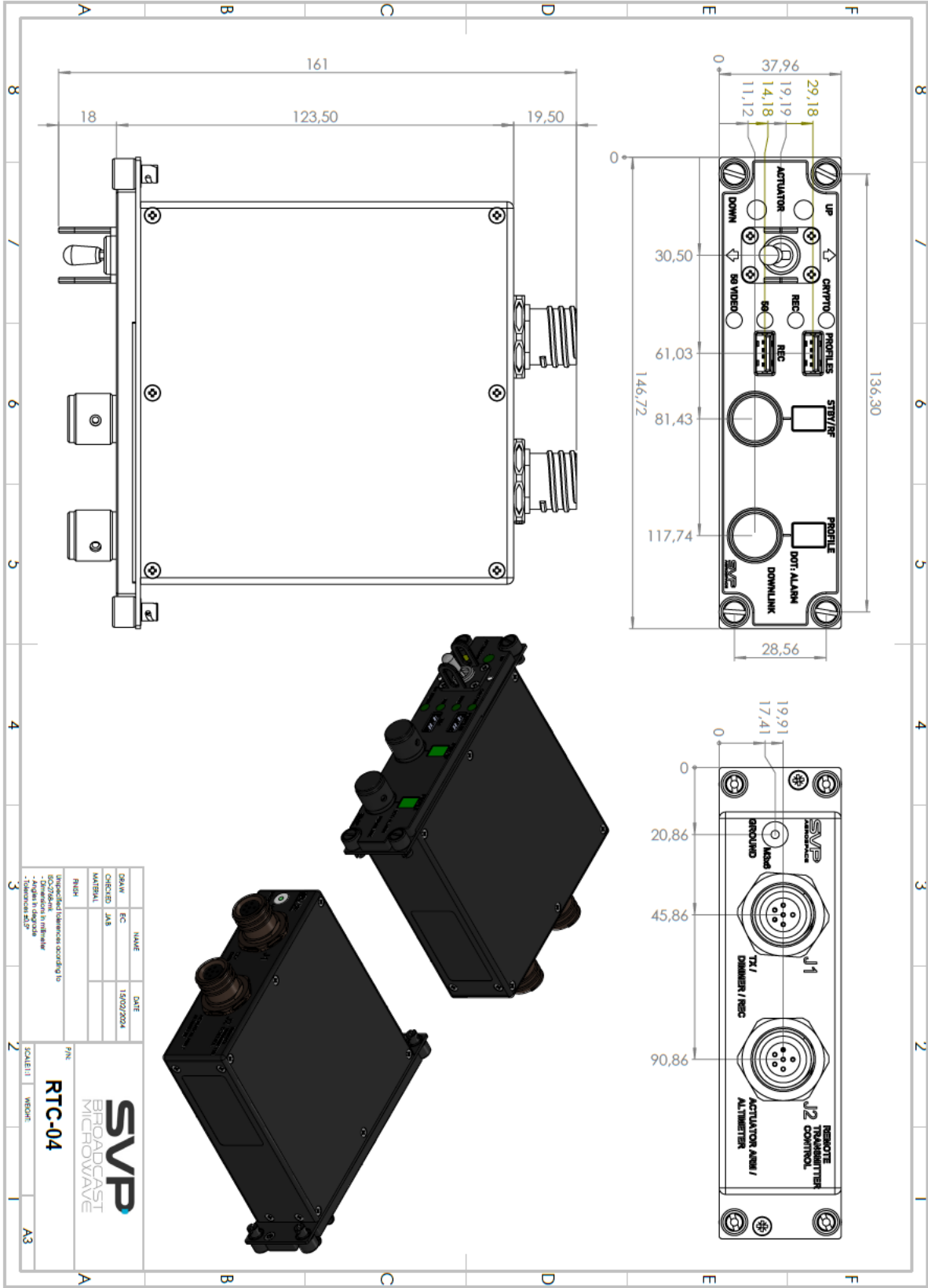
9.1.1 UDT-04 without base



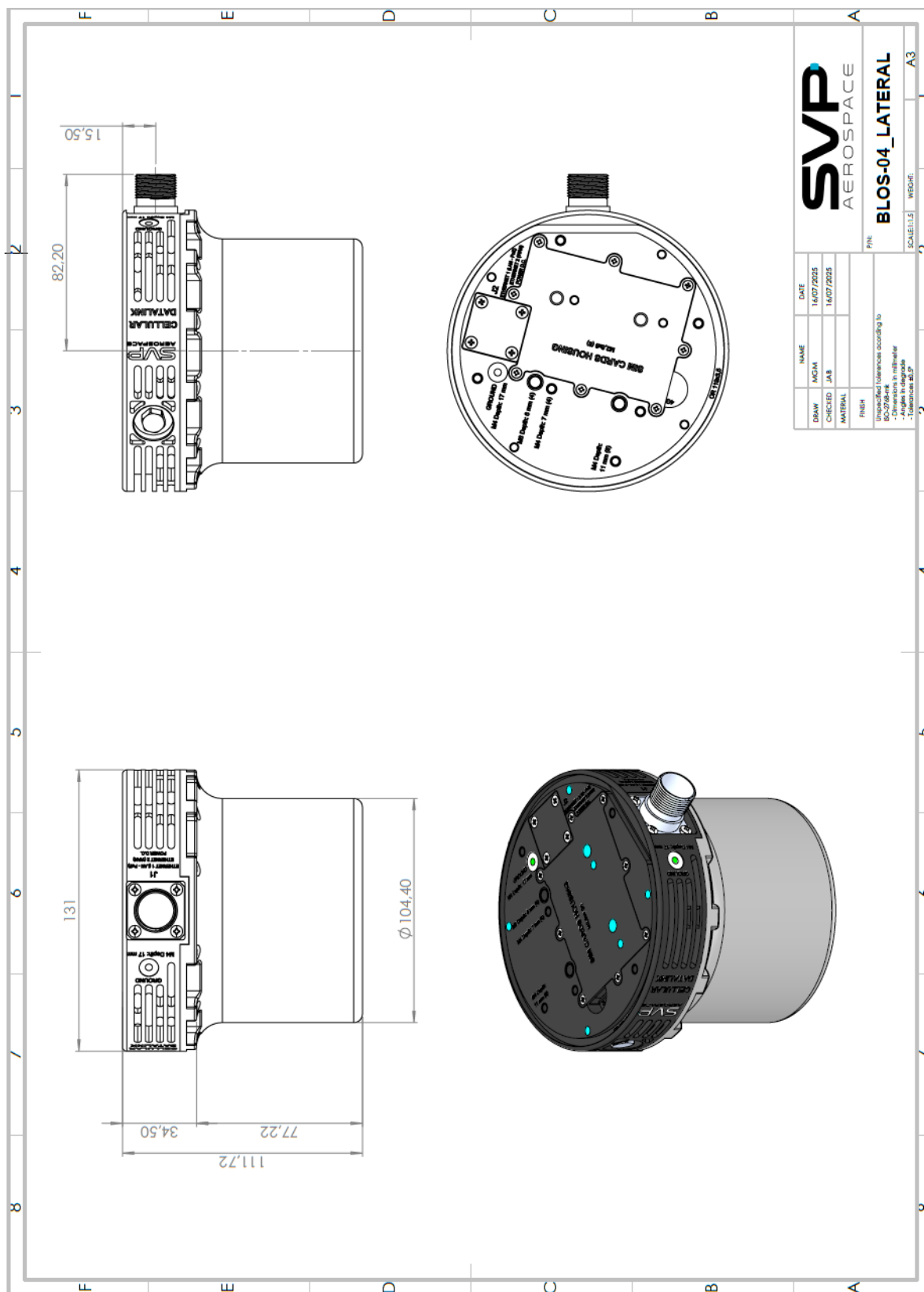
9.2 CLTX-04



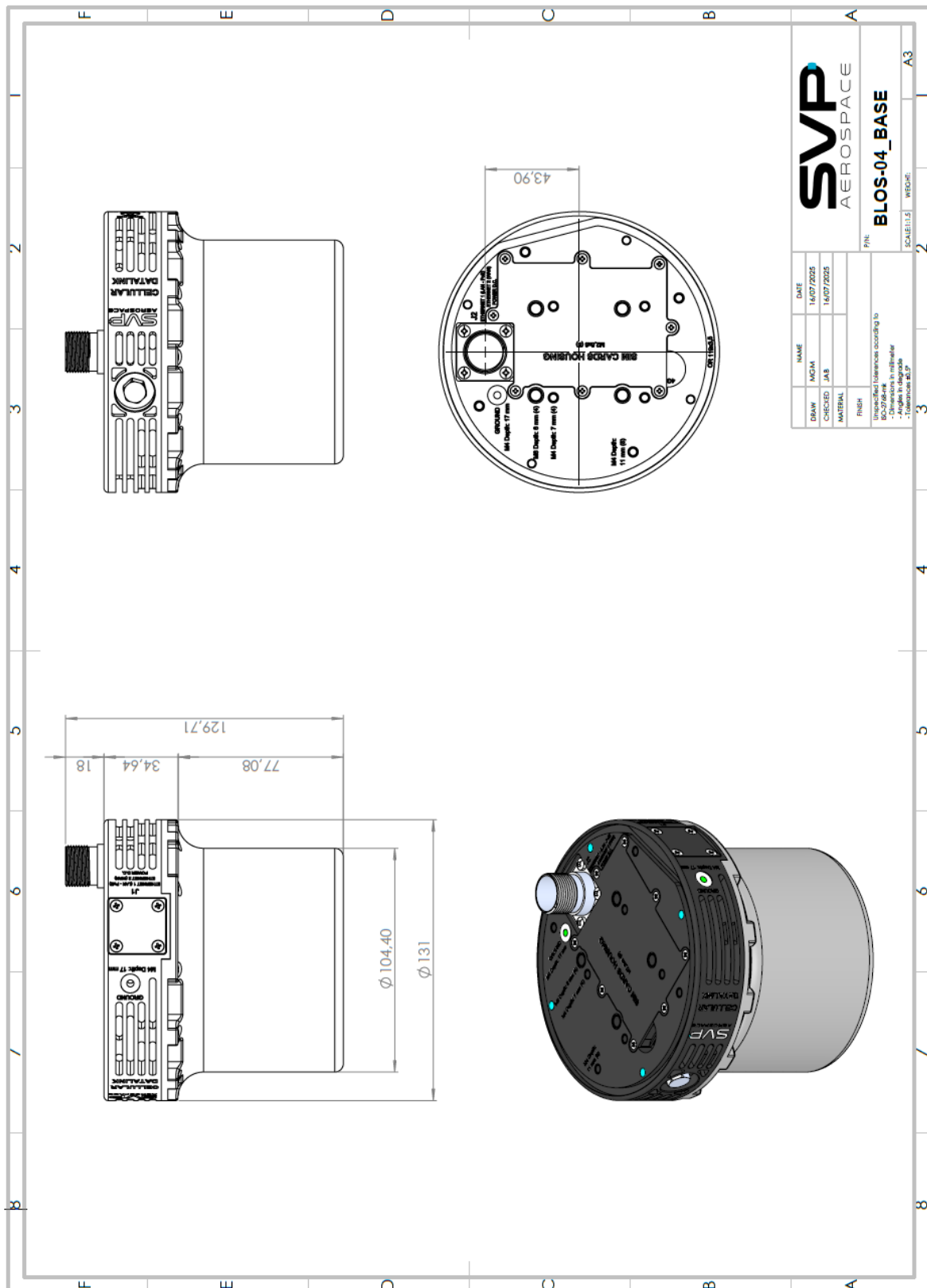
9.3 RTC-04



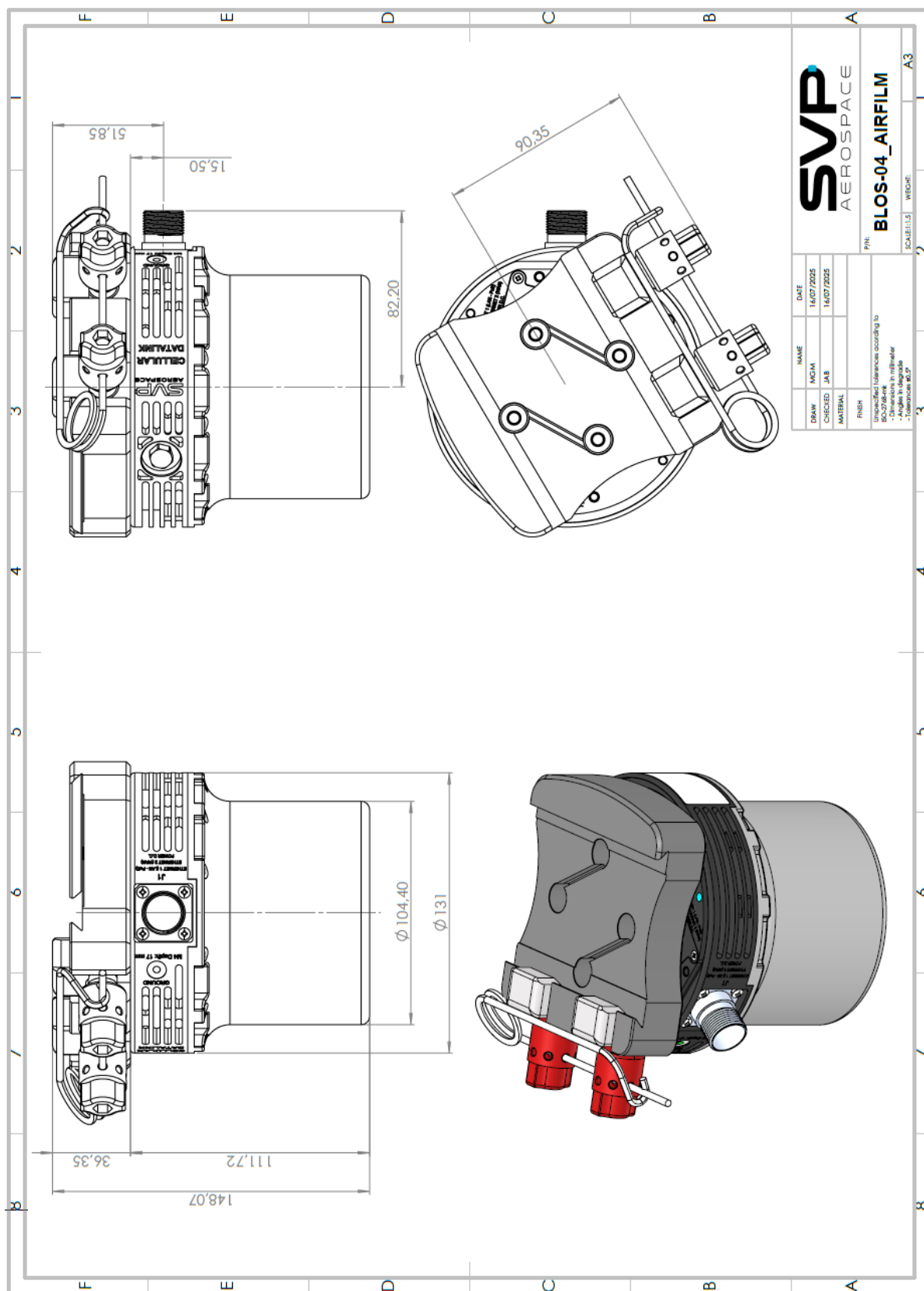
9.4 CELLULAR DATALINK Antenna Lateral



9.5 5G CELLULAR DATALINK Antenna Base



9.6 5G CELLULAR DATALINK Antenna with AIRFILM



Chapter 10: Preventive Maintenance

In order to ensure system longevity, it is highly recommended that the following preventive maintenance procedures be done at the appropriate time.

10.1 Maintenance Schedule

Procedure	Yearly	Each 6 months	Prior each use
Inspect Mounting Hardware (UDT-04)	✓		
Inspect Wiring (helicopter installation)	✓		
Inspect control (RTC-01) and RF (Antenna) cables		✓	
Inspect the screws of antenna mount			✓
Please check fans life	✓		

Hours of life of the fans are 70,000 hours in conditions of 40 degrees and 65% humidity. The durability is 8 years with continuous operation.

10.2 Maintenance Procedures

As a pre-flight inspection:

- Inspect mounting hardware to ensure all components are secure.
- Inspect cables and connections.

10.3 Spare Parts

The UDT-04 downlink system has no user replaceable parts. Contact SVP Broadcast Microwave for all service and repair inquiries.

Contact email: info@svpbm.com

Note: Any attempts to service individual components may void the warranty.

Chapter 11: Warranty

11.1 Warranty information

Under recommended use and service, all SVP Broadcast Microwave products are warranted against defects in material and workmanship to twenty-four (24) months from the date of original shipment.

SVP Broadcast Microwave's obligation is limited to repairing or replacing, at our plant, products, which prove to be defective during the warranty period. Under no circumstances shall the warranty be transferred or assigned to any third party unless consent in writing has first been obtained from SVP Broadcast Microwave. SVP Broadcast Microwave shall not be under any liability for warranty in respect to any equipment, which shall be sold by the Customer to any third party unless otherwise agreed in writing.

SVP Broadcast Microwave is not liable for consequential damage resulting from the use of SVP Broadcast Microwave equipment.

11.2 Claim for damage in shipment

Your unit should be inspected and tested as soon as it is received. Claims for damage should be filed with carrier.

11.3 Return procedures

All claims under warranty must be made promptly after occurrence of circumstances giving rise to the claim and must be received within the applicable warranty period by SVP Broadcast Microwave or its authorized representative. SVP Broadcast Microwave reserves the right to reject any warranty claim not promptly reported. After expiration of the applicable warranty period, products are not subject to adjustment.

Before any Product is returned for repair and / or adjustment, authorization from SVP Broadcast Microwave for the return and instructions as to how and where the Product should be shipped must be obtained. The Product type, serial numbers, and a full description of the circumstances giving rise to the warranty claim should be included. Such information will help establish the cause of failure and expedite adjustment or repair.

Important

Any Product returned without complete information will be considered not to have met all contractual requirements. Information required includes (as a minimum): Model Number, Serial Number, Description, Hours of Use, Type of Failure, and Operating Conditions during failure.

Annex A: AVS Airborne Antenna User's Guide

A.1 Description

The **AVS** vertically polarized omni linear antennas are designed for applications requiring extra strength, particularly for vehicle roof applications (to withstand tree branch impacts) and for fixed-wing aircraft installations (to withstand higher wind speeds than a helicopter operation).

These collinear antennas compliment SVP slimline omni antenna range, similarly featuring highly efficient, wideband groundplane independent 2 tier arrays of balanced centre-fed collinear dipoles.

High performance with consistent gain and radiation pattern across their wide operating bands results from a unique conical dipole and double isolating choke design preventing stray currents on the feed system.



Figure A.1: AVS Airborne Omni Linear Antenna

A.2 Technical Specifications

• AVS-206

Item	Features
Frequency band	2 GHz
Bandwidth	200 MHz
Gain	6 dBi
Polarization	Vertical
Elevation B/W	27°
Azimuth B/W	360°
Return Loss	14 dB Typical (1.7 to 1 VSWR)
Connector	N female
Length	311 mm (approx.)
Colour	White
Radom	Fibreglass

Table 39: AVS-206L antenna technical features

• AVS-406

Item	Features
Frequency range	4 – 6 GHz
Bandwidth	300 MHz
Gain	6 dBi
Polarization	Vertical
Elevation B/W	27°
Azimuth B/W	360°
Return Loss	14 dB Typical
Connector	N female
Diameter	177.8 mm (approx.)
Colour	White
Radom	Fibreglass

Table 40: AVS-406L antenna technical specifications



Figure A.2: AVS Airborne Omni Linear Antenna

Annex B: Modulation Standards

This chapter describes the DVB-T/T2 standards, as well as their features and the differences between them.

B.2 DVB-T



DVB-T is a technical standard that specifies the framing structure, channel coding and modulation for digital terrestrial television (DTT) broadcasting. It is a flexible system that allows networks to be designed for the delivery of a wide range of services, from HDTV to multichannel SDTV, fixed, portable, mobile, and even handheld reception.

B.2.1 How Does It Work

DVB-T, in common with almost all modern terrestrial transmission systems, uses OFDM (orthogonal frequency division multiplex) modulation. This type of modulation, which uses a large number of sub-carriers, delivers a robust signal that has the ability to deal with very severe channel conditions.

DVB-T has technical characteristics that make it a very flexible system:

- 3 modulation options (QPSK, 16QAM, 64QAM).
- 5 different FEC (forward error correction) rates.
- 4 Guard Intervals.
- Choice of 2k or 8k carriers.
- Can operate in 6, 7 or 8MHz channel bandwidths.

Using different combinations of the above parameters a DVB-T network can be designed to match the requirements of the network operator, finding the right balance between robustness and capacity.

B.3 DVB-T2



DVB-T2 is the world's most advanced digital terrestrial television (DTT) system, offering more robustness, flexibility and at least 50% more efficiency than any other DTT system. It supports SD, HD, UHD, mobile TV, or any combination thereof.

B.3.1.1 How Does It Work

Like its predecessor, DVB-T2 uses OFDM (orthogonal frequency division multiplex) modulation with a large number of subcarriers delivering a robust signal, and offers a range of different modes, making it a very flexible standard. DVB-T2 uses the same error correction coding as used in DVB-S2 and DVB-C2: LDPC (Low Density Parity Check) coding combined with BCH (Bose-Chaudhuri-Hocquengham) coding, offering a very robust signal. The number of carriers, guard interval sizes and pilot signals can be adjusted, so that the overheads can be optimised for any target transmission channel.

B.3.1.2 DVB-T2 New Features

The DVB-T2 standard has several improvements in comparison with the DVB-T standard.

FEC coding

In the error correction stage, the DVB-T2 standard implements a combination of LDPC codes with BCH codes. LDPC codes allow a close performance to Shannon limit and the BCH codes are used so as to eliminate the floor error of the LDPC codes.

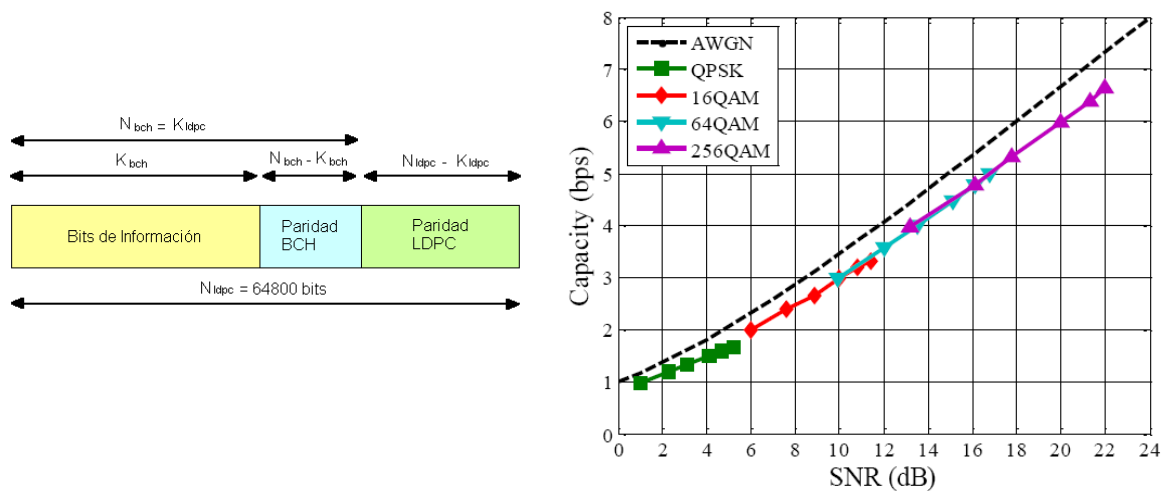


Figure B.1: LDPC and BCH codes

Constellation Rotation

This new feature consists on a rotation of some degrees of the constellation. With this rotation, dependence between the I and Q components of the signal is achieved. This means that with only one component (the I or the Q one) it is possible to know exactly the symbol to which it belongs to. This new feature provides additional robustness for low order constellations.

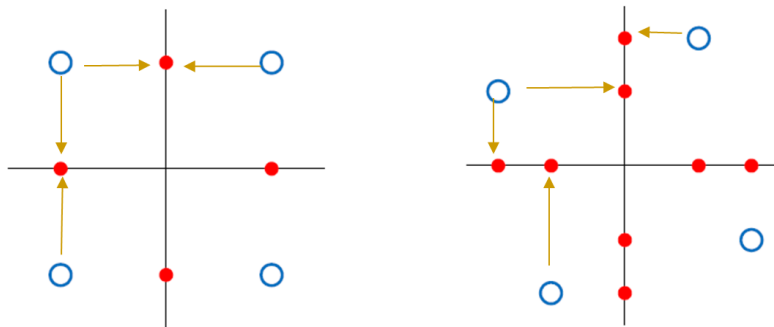


Figure B.2: Constellation Rotation

B.3.2 DVB-T vs DVB-T2

Next, it is shown a comparison table between the two existing DVB terrestrial standards. The new features of the DVB-T2 standards respect to the DVB-T are in bold.

	DVB-T	DVB-T2 (new/improved options in bold)
FEC	Convolutional Coding + Reed Solomon 1/2, 2/3, 3/4, 5/6, 7/8	LDPC + BCH 1/2, 3/5 , 2/3, 3/4, 4/5 , 5/6
Modes	QPSK, 16QAM, 64QAM	QPSK, 16QAM, 64 QAM, 256 QAM
Guard Interval	1/4, 1/8, 1/16, 1/32	1/4, 19/128 , 1/8, 19/256 , 1/16, 1/32, 1/128
FFT Size	2k, 8k	1k , 2k, 4k , 8k, 16k , 32k
Scattered Pilots	8% of total	1%, 2%, 4% , 8% of total
Continual Pilots	2.0% of total	0.4% - 2.4% (0.4% - 0.8% in 8k-32k)
Bandwidth	6, 7, 8 MHz	1.7, 5 , 6, 7, 8, 10 MHz
Typical data rate (UK)	24 Mbit/s	40 Mbit/s
Max. Data rate (@20 dB C/N)	31.7 Mbit/s (using 8 MHz)	45.5 Mbit/s (using 8 MHz)
Required C/N ratio (@24 Mbit/s)	16.7 dB	10.8 dB

Table 41 DVB-T vs DVB-T2

Glossary

AES/EBU	Audio Engineering Society/European Broadcasting Union
ACPR	Adjacent Channel Power Ratio
APSK	Amplitude and phase-shift keying or asymmetric phase-shift keying (APSK)
ASI	Asynchronous Serial Interface
BNC	Bayonet Neill-Concelman
BR	BitRate
CA-BISS	Conditional Access-BISS
COFDM	Coded Orthogonal Frequency Division Multiplexing
DC	Direct current
DVB-T	Digital Video Broadcasting – Terrestrial
DVB-T2	Digital Video Broadcasting – Terrestrial Second Generation
ETSI	European Telecommunications Standards Institute
EVM	Error Vector Magnitude

FEC	Forward Error Correction
FFT	Fast Fourier transform
GPS	Global Positioning System
HD	High Definition
HDMI	High-Definition Multimedia Interface
HDR	High Definition Receiver
HDT	High Definition Transmitter
IF	Intermediate Frequency
IG	Interval Guard
IP	Internet Protocol
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
LD	Low Delay
MPEG	Moving Picture Experts Group
NLOS	Non-Line of Sight
PAL	Phase Alternating Line
PID	Packet Identification

QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase-Shift Keying
RF	Radio Frequency
RTC	Remote Control
SD	Standard Delay
SDI	Serial Digital Interface
TFT	Thin-Film Transistor
TS	Transport Stream
UDP	User Datagram Protocol
USB	Universal Serial Bus

Notes

EU DECLARATION OF CONFORMITY

Certificate No.: 5 2012001

Description: UDT-04 H.265 Multiband Transmitter

Model: UDT-04

This declaration of conformity is issued under the exclusive responsibility of the manufacturer.

The equipment has been designed and tested in conformity with the relevant union harmonisation legislation:

2014/53/UE	Harmonization of the laws of the Member States on marketing of radio equipment directive.
2011/65/EU	RoHS Directive. Restriction of the use of certain hazardous substances.
1999/519/EC	Council Recommendation.

Above described product have been evaluated based on the requirement of the standard(s):

EN 62368-1:2024	Audio/video, information and communication technology equipment (Safety requirements).
EN 300 113:2020	Radio equipment intended for the transmission of data (and/or speech) using constant or non-constant envelope modulation and having an antenna connector harmonised Standard.
EN 301 489-1:2020	Electromagnetic Compatibility (EMC) standard for radio equipment and services; clause 8.2: Radiated emission clause 8.3&8.4: Conducted emission clause 8.5: Harmonic current emissions clause 8.6: Voltage fluctuations and flicker clause 8.7: Conducted emission

Manufacturer / Fabricante
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Certified by / Certificado por

Juan Antonio Burgos

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Durango, October 11th, 2024

Certificate of Conformance

Certificate No.: S 2012013
Description: RTC-04 remote control
Model: RTC-04 Remote control

This declaration of conformity is issued under the exclusive responsibility of the manufacturer.
The equipment has been designed and tested to meet the following standards applicable to the 2014/53/UE directive:

EN 50566 Product standard to demonstrate the compliance of wireless communication devices with the basic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 30 MHz to 6 GHz.

RoHS Directive 2011/65/EU Restriction of the use of certain hazardous substances

EN 62368-1:2024 Audio/video, information and communication technology equipment (Safety requirements).

EN 301 489-1:2020 Electromagnetic Compatibility (EMC) standard for radio equipment and services;
clause 8.2: Radiated emission
clause 8.3&8.4: Conducted emission
clause 8.5: Harmonic current emissions
clause 8.6: Voltage fluctuations and flicker
clause 8.7: Conducted emission

Manufacturer / Fabricante
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Certified by / Certificado por

Juan Antonio Burgos

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Final note

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