Televes®

T.OX SERIES

EN HDTV TRANSMODULATOR - Dual 8PSK to QAM

Ref. 563701

User manual

Televes

Contents

Televes

1 - Safety instructions

Caution statements

Product inspection - Inspect the equipment for shipping damage. Should any damage be discovered, immediately file a claim with the carrier.

Important Safety Instructions - To ensure proper installation and operation, take a moment to read this guide before proceeding with the installation. If you have any questions or comments about the T.0X Series - HDTV TRANSMODULATOR - Dual 8PSK to QAM, please contact your dealer.

WARNING: TO PREVENT FIRE OR ELECTRICAL SHOCK DO NOT EXPOSE TO RAIN OR MOISTURE.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.

	A product and cart combination should be moved with care. Quick stops, excessive force and uneven surfaces may cause the product and cart combination to overturn.
	The lightning flash with arrow head symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE. DO NOT OPEN THE CABINET, REFER SERVICING TO QUALIFIED PERSONAL ONLY.

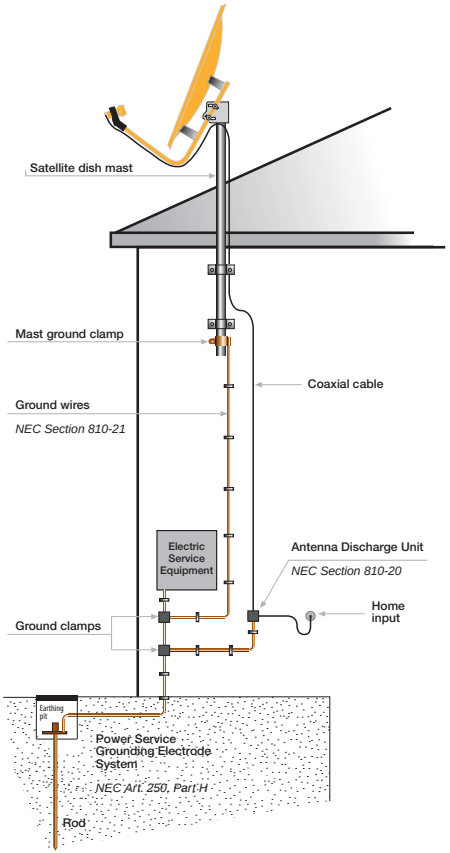
CAUTION: TO PREVENT ELECTRIC SHOCK, DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

Important Safety Instructions

1. **Read and Follow All Instructions** - All the safety and operating instructions should be read prior to and followed while operating this product.
2. **Retain Instructions** - The safety and operating instructions should be retained for future reference.
3. **Heed Warnings -** All warnings on the product and in the operating instructions should be adhered to.
4. **Cleaning** - Disconnect this product from any electrical source before cleaning. Use a damp cloth; do not use liquid or aerosol cleaners.
5. **Attachments** - Do not use attachments that are not recommended by the product manufacturer as they may cause hazards.
6. **Water and Moisture** - Do not use this product near any source of water.
7. **Mounting –** Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to persons or nearby objects, and serious damage to this product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.
8. **Ventilation** – Slots and openings in the cabinet are provided for ventilation and to

ensure reliable operation of the product. These openings should never be blocked or covered in any way. This product should not be placed in any case, cabinet, or rack unless proper ventilation is provided and the manufacturer's instructions have been adhered to.

9. **Power Sources** - This product should be operated only from the type of power source indicated on the marking label.
10. **Grounding or Polarization** - Do not bypass or defeat electrical plug polarization or grounding. Doing so will violate the warranty and may pose a risk of fire or electrocution.
11. **Wire Protection** – Ensure all connected wiring is routed correctly to avoid damage including pinching, excessive bends, or compression.
12. **Electrical Supply, Grounding, and Surge Protection –** Ensure that all local or national electrical codes are followed. Seek the advice of a licensed electrician, professional engineer, or other licensed expert. See example wiring figure.
13. **Power Lines** - Always use caution and avoid operating this or any connected equipment near uninsulated power line or any other hazards.
14. **Object and Liquid Entry** - Never allow objects or liquid of any kind into this product through openings. Doing so could result in fire or electric shock.
15. **Servicing** - There are no user serviceable parts. Do not attempt to service this product or remove covers. Doing so may expose you to



dangerous voltage or other hazards. Refer all servicing to qualified service personnel. Examples of damage requiring service include but are not limited to:

- Damage to power-supply wiring.
- If liquid has been spilled, or objects have fallen into the product.
- If the product has been exposed to rain or water.
- If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
- If the product has been dropped or physically damaged.
- When the product exhibits a distinct change in performance.

16. **Replacement Parts** - Ensure that repairs are performed by qualified technicians and that only manufacturer supplied or authorized parts are used.
17. **Safety Check -** Upon completion of any service or repairs to this product, ensure safety checks to determine that the product is functioning per manufacturer specifications are performed.
18. **Heat** - The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat. Ensure that

ambient temperature is maintained in the manufacturer specified operating range.

2 - Description

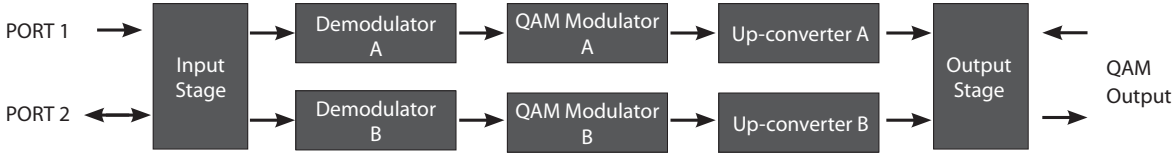
- The T.0X Series is a complete family of digital cable headend products. These products include satellite QPSK and 8PSK to QAM transmodulators, universal modulators and fiber optic transmitters/receivers, amplifiers, and splitters. The T.0X family of products all fit in a standard 19" rack chassis that contains a power supply and room for 7 modules.
- Each of the T.0X Q/8PSK modules contain 2 completely independent transmodulators that are capable of being fed from either the same or different sources with output frequencies able to be set independently across the entire range in order to provide maximum flexibility.
- The entire transponder's multiplex is converted to a single QAM channel so all content regardless of whether it is video or music, MPEG2 or MPEG4, SD or HD, encrypted or not, will be output unaltered eliminating the need for additional costly encoding or encryption equipment in the headend.
- Additionally, both inputs and outputs can be daisy-chained with the input/output of a module being added to the input/output of all the preceding modules thus eliminating the need for RF splitters and combiners.
- Configuration and Control of the modules can either be done through the handheld controller or from any Internet connection with the use of the CDC headend controller module. The remote control of the system provides two easy to use options with the TSuite computer application or through any internet browser for maximum customer choice.

3 - Main features

- TWIN modules (two independent tuners per module) allowing up to 14 transcoded transponders/channels per chassis.
- User friendly interface allowing simple selection of which satellite transponder is output on which QAM channel including a decoded view of the satellite tables, output channel mode, and DISH Network™ installation mode.
- Two completely independent and fully agile outputs from 57 to 999 MHz (EIA Ch. 2-158) for easier organization of wider-than-6MHz QAM carriers.
- Input switching matrix allows for either of the two inputs to be routed to either demodulator including either one of the two inputs routed to both of the demodulators simultaneously.
- Up to 1024QAM output capability.
- Remotely upgradeable firmware allows for future updates without having to visit the headend.
- Carrier wave and null packets output mode for easy system balancing without an input signal or without a digital meter.
- Extensive monitoring information for easy troubleshooting (current and lowest input SNR, current and highest temperature reached, number of lock loss conditions over a period of time, etc.) with LED indicators on the front of the unit.
- Back-lit LCD display handheld programmer or TSuite PC application options for both on-site and remote configuration and troubleshooting.
- Copy configurations from one module to another with the handheld programmer for fast and easy module swaps (copy/paste).
- Web page configuration and remote management using the CDC system, including "DISH mode" for easy set-up.
- Input/Output daisy-chain architecture to avoid external splitters/ combiners.
- High performance, MER>40dB over the full frequency range of 57-999MHz.
- High output level, greater than 38 dBmV with over 20dB of attenuation margin for easy balance and integration.

4. Technical Specifications

4.0 Block diagram



4.1 8PSK to QAM transmodulator

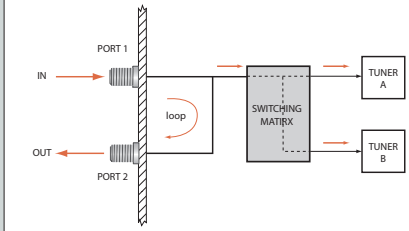
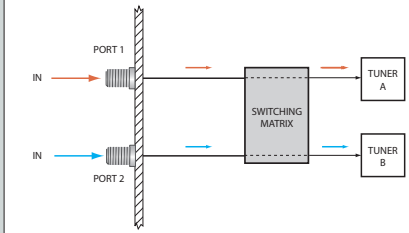
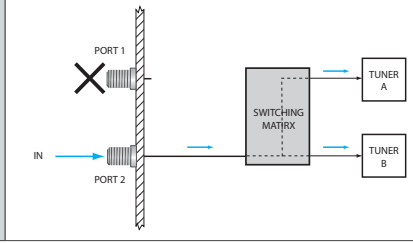
Table 1 . Technical specifications

Satellite input	Input selection options		SEE TABLE 2	Symbol rate		Mbaud	10-30
	Input frequency (agile)	MHz	950 - 2150	FEC	QPSK Legacy		Viterbi 1/2, 2/3, 3/4, 5/6, 7/8 Reed Solomon (204, 188)
	Frequency steps	MHz	1		8PSK		Interactive Turbo Error Correction Reed Solomon (204, 188)
	Input modulation		QPSK Legacy (EN300421) Turbo 8PSK - Turbo QPSK	Transmission filter			Square Root Raised Cosine
	Input level	dBm	-70 to -20	Roll-off Factor		%	*QPSK legacy* 35
	PORT1-PORT2 isolation	dB	> 25 (1)				*8PSK-TC QPSK-TC* 20
	Loop-through losses	dB	< 1.5	In/Out connectors		type	"F" female
				Input impedance		ohm	75
QAM Modulator	Modulation format	QAM	16, 32, 64, 128, 256, 512, 1024	Symbol rate (max)		Mbaud	6.9
				Roll-off factor		%	15 (12 for 1024 QAM)
RF Output	Frequency range (agile)	MHz	57 ··· 999 (EIA Ch 2 to 158)	Loop-through losses		dB	< 1.5
	Frequency steps	MHz	1	MER		dB	> 40
	Output level	dBmV	38 ± 2	In/Out connectors		type	"F" female.
	Adjustable level (min.)	dB	20	Out Impedance		ohm	75
General	Powering voltage	Vdc	24	Consumption 24V		mA	600
	Protection index	IP	20	Working temperat.		ºF	<113 (use forced ventilation at higher temp)

(1) When using dual inputs, input signals should be correctly balanced to avoid undesired results.

4.2 Satellite input options

Table 2 . Satellite input options

Option no.	PORT 1	PORT 2	TUNER A	TUNER B	Simplified diagram	Comments
	Port function		Signal from			
1	**IN**	**OUT**	**PORT 1**	**PORT 1**		Normal input mode. The input signal loop-through allows to daisy-chain the whole subrack avoiding the use of an external splitter. In this configuration the input signal connected to PORT1 feeds both tuners.
2	**IN**	**IN**	**PORT 1**	**PORT 2**		Independent inputs.
3	**DISABLED**	**IN**	**PORT 2**	**PORT 2**		PORT 1 is disabled. In this configuration the input signal connected to PORT2 feeds both tuners.

4.3 Broadband Amplifier

Table 3 . Technical Specifications						
Amplifier ref 5575	Frequency range	MHz	54 to 862	Connector	type	"F"
	Gain	dB	44 ± 2.5	Powering voltage	Vdc	24
	Regulation margin	dB	20	Consumption at 24 Vdc	mA	450
	Output level	dBmV	45	Test socket	dB	-30

4.4 Power Supply Unit

Table 4 .- Technical Specifications						
Power Supply Unit ref 563901	Mains voltage	V~	108 to 132	Output voltage	V=	24±1 (1)
	Mains frequency	Hz	50/60	Output current (max.)	A=	5(2)
	Current consumption (max.)	A~	1.5	Output power	W	120
	Working temperature (max.)	ºF	113	Protection level		IP20

(1) Provides protection voltage variation from 21 to 27 V=

(2) Maximum current limited to 4A=

4.5 Power consumption

Table.- Power consumption vs number of units&CDC		
Chassis load	Power consumption (W)	I_{AC} (mA)
1 555902 + 1 × 563701	21.1	203
1 555902 + 2 × 563701	32.5	291
1 555902 + 3 × 563701	44.4	390
1 555902 + 4 × 563701	56.2	484
1 555902 + 5 × 563701	68.2	584
1 555902 + 6 × 563701	80.3	685

Table.- Power consumption vs number of units		
Chassis load	Power consumption (W)	I_{AC} (mA)
1 x 563701	20.5	197
2 x 563701	32	287
3 x 563701	43.7	381
4 x 563701	55.8	479
5 x 563701	67.6	579
6 x 563701	80	682
7 x 563701	93.3	813

5. Ordering information

When ordering, please, specify reference number as per table below.

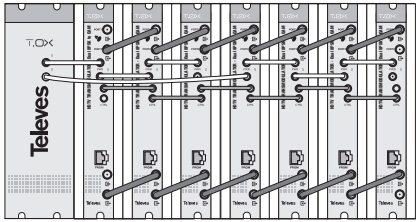
Ref #	Description
SMATV	
563901	T.0X Power Supply Unit (110 Vac/UL)
563701	T.0X 8PSK/QAM TWIN Transmodulator
555902	T.0X CDC IP Headend Manager
5806	T.0X Universal TWIN Modulator
5575	Broadband amplifier
FIBER OPTICS	
233311	T.0X Optical Transmitter (1310nm / 10dBm)
233411	T.0X Optical Transmitter (1310nm / 10dBm) / Return Path Receiver
234305	T.0X Optical Transmitter (1550nm / 4dBm)
234311	T.0X Optical Transmitter (1550nm / 10dBm)
234220	T.0X EDFA Optical Amplifier (20dBm)
2337	T.0X Optical Splitter, 2 ways
2339	T.0X Optical Splitter, 4 ways
234401	T.0X Optical Splitter, 8 ways

Ref #	Description
234501	T.0X Optical Splitter, 16 ways
234601	T.0X Optical Splitter, 32 ways
233501	T.0X Optical Receiver
233601	T.0X Optical Receiver / Return Path Transmitter (1310nm / 6dBm)
2310	Outdoor Optical Receiver/Amplifer w/ Return Path Transmitter (1310nm / 3dBm)
2311	FTTU Mini Optical Receiver
ACCESSORIES	
7234	Handheld Programming Unit
5301	19in Chassis, 7 modules+1PSU
422603	Control Bus Jumper (40 inches)
140057	Power Bus Jumper (15 inches)

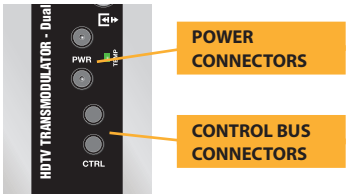
6. Quick start guide

WARNING:
Do not apply power to the headend until all the connections have been completed and double checked. Failure to do so may result in irreparable damage to the equipment.

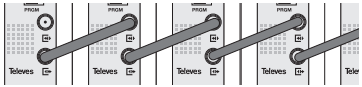
1. The headend must be installed in a well ventilated room, free of humidity and with the necessary facilities. Forced ventilation or an HVAC system will need to be installed when ambient temperature is over 113ºF at the headend location.
2. Before installing the units, take into account the 19" subrack is 5RU height, so size rack appropriately. A 1RU spacing plate is recommended between every 2 subracks for easier wiring access.
3. Unpack the units and the PSU. Check that all accessories such as jumpers, coax bridge bars, power cords, etc., have been provided. If not, contact your distributor immediately.
4. Arrange the PSU and units of each subrack from left to right, starting by the PSU, followed by the CDC. Remote Headend Controller (if used) and the transmodulators.
5. Interconnect the units with the power and control bus jumpers supplied ***before applying power to the system***. Use the long control bus jumpers to connect different subracks together.
   - Each PSU output provides up to 4A and both must be used in order to balance the consumption of the 7 transmodulators in a subrack (for example: 4+3 or 3+4).



WARNING:
Never connect control bus jumpers to power connectors or vice versa. Doing so will cause irreparable damage to the units when power is applied.



6. Connect the supplied RF input and output coax bridge bars as needed.



7. Be sure that all connections are secured, properly terminated and tightened ***before applying power to the system***.

WARNING:
Unterminated input and output ports are a common source of ingress noise.
Be sure to terminate all unused input and output ports with 75 ohm loads (ref. 4061) for optimum performance.

8. Each subrack should be treated as a standalone module in terms of power and RF output.
   - Each daisy-chained output does incur some loss.
   - Balance the final output of the subrack appropriately.
   - Use an external combiner to combine the outputs of all subracks together.
9. Proceed with the configuration of each unit as detailed in this User Manual.
   - Start by configuring the inputs of each unit to the desired satellites/transponders.
   - Set the output level accounting for the losses due to the unit's loop-through.
   - If remote control is used, follow the instructions in the corresponding User Manual of the CDC Remote Headend Controller.

7. Product description

7.1. Introduction

The HDTV TRANSMODULATOR - Dual 8PSK to QAM allocates the information contained in two independent satellite transponders (QPSK legacy, Turbo QPSK or Turbo 8PSK modulations) in two completely independent cable channels in the 57 to 999MHz range (Ch. 2 to 158).

The digital transmodulation process starts with the demodulation of the input satellite transponders, to obtain the MPEG2 transport streams which are then remodulated into QAM format.

The output channel bandwidth will depend on the useful bitrate of the satellite transponder and the modulation selected for the QAM output.

The **HDTV TRANSMODULATOR - Dual 8PSK to QAM** features two F-type satellite input connectors labelled PORT1 and PORT2, allowing 3 input configuration options (table 2):

- PORT1 routed to both tuners A and B (A loop-through output is available in PORT2).
- PORT1 routed to tuners A and PORT2 to tuner B (Two independent inputs).
- PORT2 routed to both tuners A and B (PORT1 is not used).

The HDTV TRANSMODULATOR - Dual 8PSK to QAM unit also features two output RF connectors, the bottom one is the QAM output and the top one is the QAM input (loop-through) that allows to mix the output signal of previous modules installed in the same subrack.

The universal Programming Unit (ref. 7234) is used to program the operating parameters of the HDTV TRANSMODULATOR - Dual 8PSK to QAM unit.

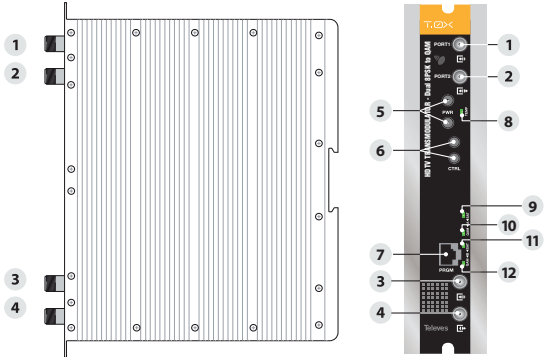
7.2. Front panel elements description

The next figure shows the location of all the ports, status and alarm indicators, existing in the front on the unit.

PORT1 and PORT2 are the satellite input F-connectors (see table 2 for configuration options). The input signal can be daisy-chained to all the modules in a subrack, thus minimizing the use of external splitters.

Connector 3 is the daisy chain QAM input from a previous QAM output.

Connector 4 outputs the combined QAM output. Loop-through losses are very low allowing to combine the output of all the units in a subrack.



Side view Front view

1. PORT1 – Satellite L-Band input
2. PORT2 – Satellite L-Band input/output
3. RF QAM input (loop-through input)
4. RF QAM output (loop-through output)
5. Power bus connectors
6. Control bus connectors
7. Computer/Programmer connector
8. Temperature status LED
9. SAT A input status LED
10. QAM A output status LED
11. SAT B input status LED
12. QAM B output status LED

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The unit also features 2 sets of daisy-chain connectors for the power and control buses.

Special care must be taken so as to never connect control bus jumpers to power connectors or vice versa. ***Doing so will cause irreparable damage to the units***.

Connector 7 is the handheld programmer unit (ref. 7234) connection.

Front light indicators 8 to 12 are alarm/status LEDs that give monitoring information about the unit status, as follows:

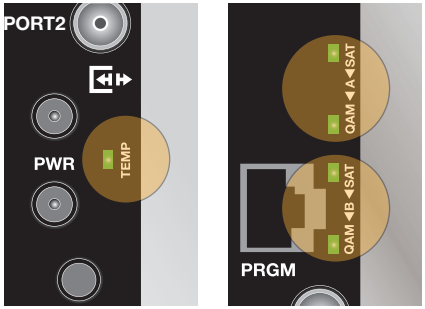

Table 5.- FRONT UNIT LED ALARMS

TEMPERATURE (LED no. 8)		
LED Colour	Unit internal temperature (ºF)	Comments
Solid green	under 149	SAFE
Slow blink orange	between 149 ···185	WARNING
Fast blink red	over 185	OVER TEMP
SATELLITE INPUT STATUS - for A and B tuners (LEDs no. 9 &11)		
LED Color	Tuner status	Comments
Solid green	LOCKED	Good input SNR
Solid orange	LOCKED	Low input SNR
Solid red	UNLOCKED	MANUAL mode
Fast blink red	UNLOCKED & SCANNING INPUT SIGNAL	AUTO mode
QAM OUTPUT SIGNALS (LEDs no. 10 &12)		
LED Color	QAM channel status	Comments
Solid green	LOCKED	NORMAL mode
Fast blink green	SPECIAL MODE	CW, MUTED, & NULL modes
Solid orange	OVERFLOW	MANUAL mode
Fast blink orange	OVERLAP	between QAM output carriers
Solid red	UNLOCKED	-
Fast blink red	DEACTIVATED	RAINFADE CONDITION

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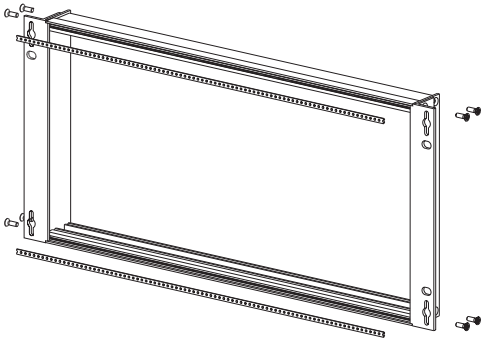
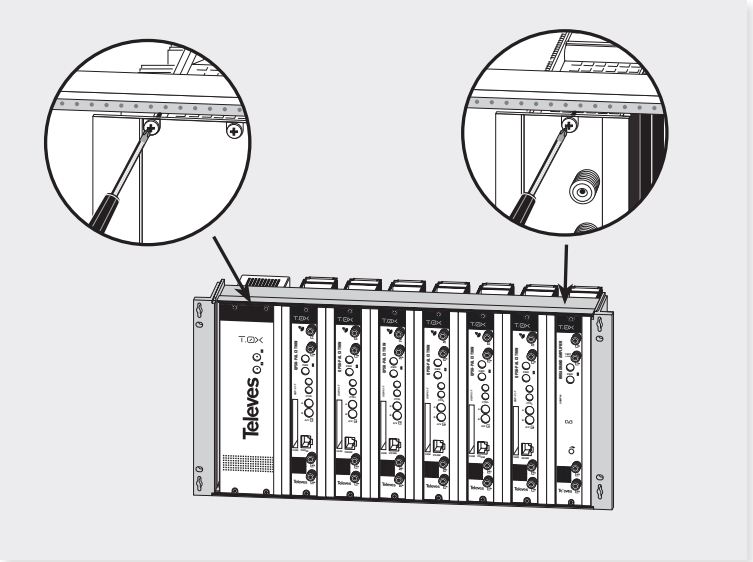
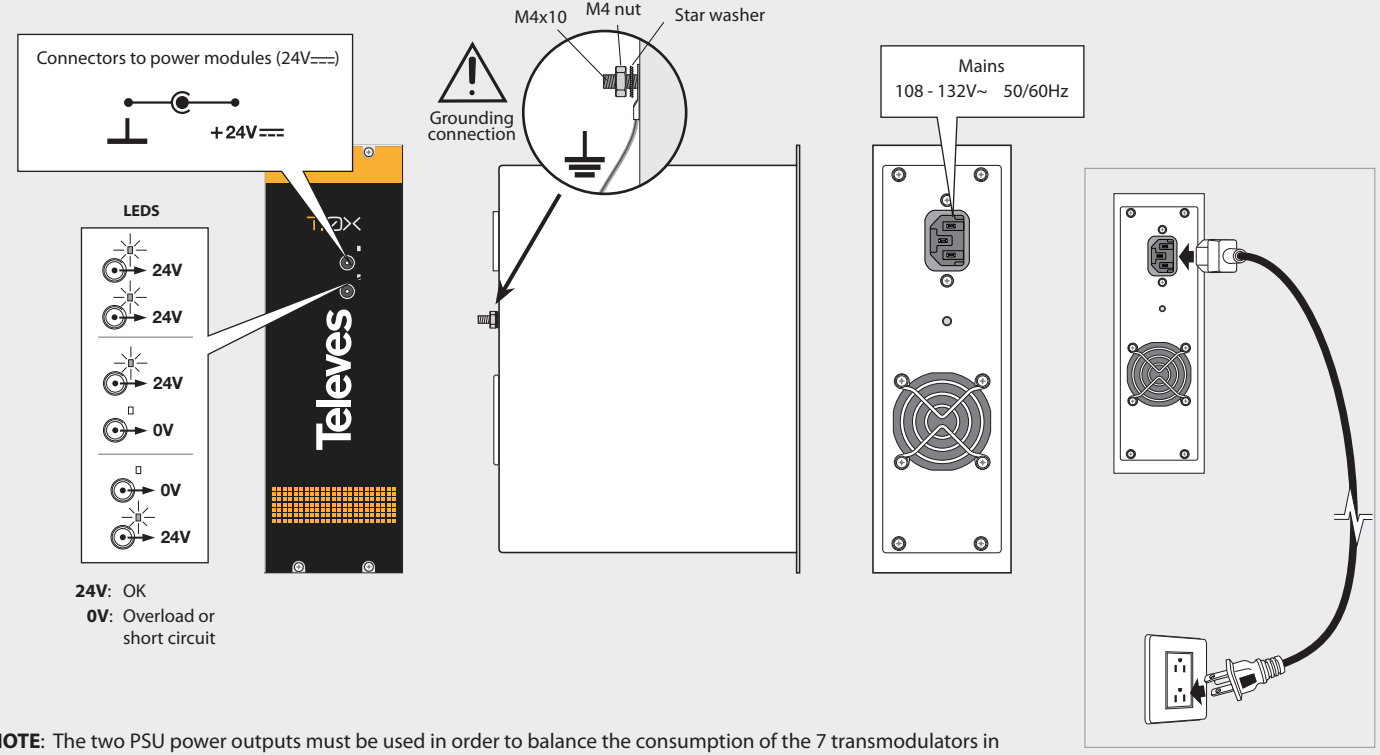
8. Installation

8.1 - 19" subrack mounting





8.2 Power Supply Unit

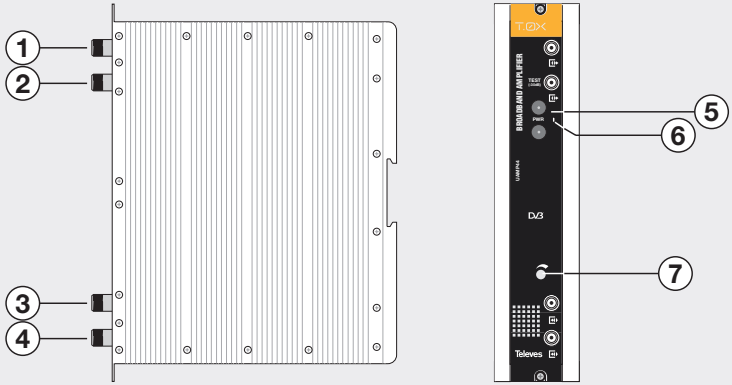


24V: OK
0V: Overload or short circuit

NOTE: The two PSU power outputs must be used in order to balance the consumption of the 7 transmodulators in a subrack (for example: 4+3 or 3+4)

8.3 Broadband Amplifier

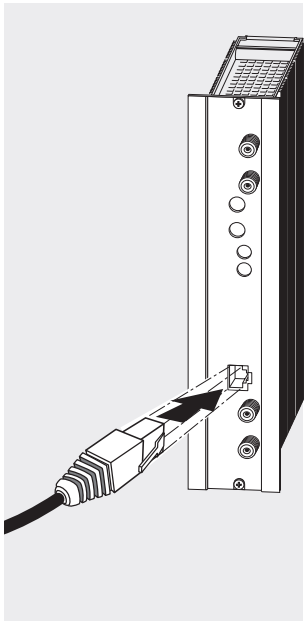
Ref. 5575



1. RF output
2. Test output
3. RF input 1
4. RF input 2
5. Power input
6. Status LED
7. Attenuator adjustment

This unit features two RF input connectors (3 & 4), to allow mixing signals coming from two different systems or subracks. When only one of the two inputs is used it is advisable to terminate the unused input port with a 75 ohm load (ref 4061). As with all T.0X units, this amplifier is powered via the 24 Vdc power bus. The unit combines and amplifies input signals in the 54-862 MHz frequency band.

8.4. Programming Unit



The handheld programmer has an LCD display, three LED indicators and four buttons:

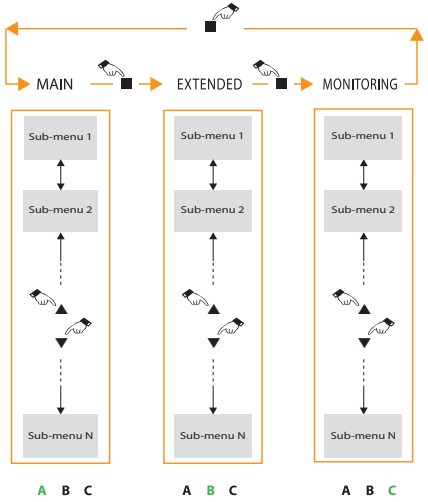
Table 8 .- Programmer key functions

Key	Keystroke	Function description
●	short	Enable / Disable "Edit mode" Move Cursor in "Edit mode"
●	long	Default configuration Reset unlock counters Reset minimum SNR Reset maximum temperature
▲ ▼	short	Change parameter value (when in "Edit mode"). Change menu (when not in "Edit mode").
■	short	Change menu type A, B or C
■	long	Save changes to memory
■ + ● + ▲	long	Increase screen contrast
■ + ● + ▼	long	Decrease screen contrast
● + ▼	long	Copy configuration (see page 25)
● + ▲	long	Paste configuration (see page 25)

9. Instructions for use

The first item displayed after connecting the Programming Unit to the front of the transmodulator is the Programming Unit's firmware version:

```
PCT firmware
   version
------------
V:5.03.00001
```



The configuration screens are organized in three main sections as shown in the figure (refer to Appendix 4 for a detailed diagram):

- Section A: MAIN MENUS
- Section B: CONFIGURATION MENUS
- Section C: MONITORING MENUS

LEDs A, B and C will light up indicating the currently selected section.

The ■ button toggles between sections.

To move up and down a section press the ▲ and ▼ buttons .

To save data, press and hold the ■ button.

In each individual screen, pressing the ● button enables the "Edit mode" and the selected parameter can then be modified by using the ▲ or ▼ buttons.

In those cases where the cursor may be placed in more than one position (for example an input frequency with several digits) press the ● button as many times as needed to position the cursor over the desired field.

To move to a different screen, press the ● button until the cursor stops blinking (cursor is OFF, leaving "Edit mode").

Each screen displays and allows the modification of a single operating parameter, which is described by a short message on the display.

9.1 - MAIN menu (LED A is ON)

Transcoder selection

The first menu allows the selection of one of the unit's tuners, A or B. Once selected, the remaining submenus in this section will refer to the parameters of the selected tuner.

```
SELECT
TRANSCODER

TUNER A
```

```
SELECT
TRANSCODER

>TUNER A<
```

Press the ● button to enter "Edit mode" so the last line of the display starts to blink (cursor ON). You can now select one of the tuners (A or B) using the ▲ and ▼ buttons. To exit "Edit Mode" press the ● button until the cursor stops blinking (cursor OFF)

Satellite selection

This menu only appears when transponder mode has been selected in the corresponding CONFIGURATION menu (see pag 20) and allows the selection of one of the predefined satellites.

```
- TUNER  A -
SELECT INPUT
  SATELLITE
 61.5° EAST
```

The current list of pre-defined DISH NetworkTM satellites is detailed in Appendix 3:

EN

Slot	E/W	Sat ID
61.5º	EAST	DBS
72.7º	EAST	DBS
77º	EAST	DBS
110º	WEST	DBS
119º	WEST	DBS
129º	WEST	DBS
118.7º	WEST	Anik F3
121º	WEST	FSS 121
105º	WEST	FSS 105

Input frequency/transponder selection

Use this menu to select the input frequency, either by entering the frequency value in MHz or the transponder number, depending on the selected mode (MANUAL, XPNDR STACK or XPNDR LEGACY).

The display will show the following information in each case:

```
- TUNER  A -
SELECT INPUT
  FREQUENCY
   1500 MHz
```

```
- TUNER  A -
SELECT INPUT
 TRANSPONDER
 1R= 974MHz
```

Press circle to enter the "Edit mode" and the last line of the display will start to blink (cursor ON).

In manual mode (setting by frequency), you can move the cursor to any of the 4 frequency digits by pressing the ● button.

In transponder mode, the transponder's number will blink displaying the corresponding L-Band input frequency .

Input modulation selection

This menu only appears when the user has selected the manual modulation mode in the corresponding CONFIGURATION menu.

```
- TUNER  A -
SELECT INPUT
  MODULATION
   TQPSK 7/8
```

In this case the user has to manually select the input modulation, the available choices are:

QPSK Scan
8PSK 2/3
8PSK 3/4
8PSK 4/5
8PSK 5/6
8PSK 8/9
TQPSK 1/2
TQPSK 2/3
TQPSK 3/4
TQPSK 5/6
TQPSK 7/8

Input baud rate selection

This menu only appears when the user has selected the manual modulation mode in the corresponding CONFIGURATION menu. In this case the user has to manually enter the baudrate of the input signal (between 10,000 and 30,000 Kbaud).

```
- TUNER  A -
SELECT INPUT
 SYMBOL RATE
22.000 Kbaud
```

Output frequency/ channel selection

This menu allows the user to select the output frequency/channel according to the mode selected in the corresponding CONFIGURATION menu.

```
- TUNER  A -
SELECT OUT
  CHANNEL
 2 = 57MHz
```

```
- TUNER  A -
SELECT OUT
 FREQUENCY
 57MHz (2)
```

In channel mode, the CATV QAM channel is selected (see Appendix 1). The last line of the display will show both the output channel number and its center frequency (Channel # = center frequency).

In frequency mode, the user can select any frequency value between 57 and 999 MHz and the corresponding channel number is displayed between brackets.

The two outputs in an HDTV TRANSMODULATOR - Dual 8PSK to QAM are completely agile, so the two QAM channels can be positioned anywhere in the spectrum allowing for maximum flexibility.

Output modulation selection

This menu only appears when the user has selected the manual modulation mode in the corresponding CONFIGURATION menu, in this case the user has to manually select the constellation of the QAM output signal (between 16, 32, 64, 128, 256, 512 and1024 QAM):

```
- TUNER  A -
SELECT OUT
MODULATION
256 QAM
```

If the QAM order selected is not able to accommodate the data rate of the input signal, it will cause an overflow condition. This will be indicated on the display with the **OVF!** alert text after the selected QAM modulation and an orange LED in the front of the unit.

```
- TUNER  A -
SELECT OUT
MODULATION
16QAM OVF!
```

Output level selection

This menu lets you select the QAM channel output level, between 00 and 99. A setting of "99" means no attenuation is applied to the output and thus the output level is the maximum (38 ± 2dBmV). A setting of "00" means the output level is attenuated by 20 dB (approx.) below its maximum output level. By changing this value the user can select the amount of attenuation applied and therefore balance the system as needed.

```
- TUNER  A -
SELECT OUT
LEVEL
69
```

Output mode selection

Use this menu to select the desired output mode:

```
- TUNER  A -
SELECT OUT
MODE
NORMAL
```

- NORMAL: The output signal is a QAM transmodulated version of the input satellite signal. This is the normal functioning mode.
- NULL: Null packets are modulated. This mode generates a well-formed QAM output carrier even when the demodulator is not locked and can be used to balance the system in absence of input signal (off-site).
- MUTED: There is no output signal. This mode can be used to turn off the output of certain channels or to leave hot spares prepared in the headend.
- CARRIER WAVE: The unit generates an unmodulated carrier wave on the output frequency that has the same level as the power of the corresponding QAM carrier. This mode can be used to balance the RF output levels with a simple SLM when a QAM digital meter is not available.

9.2 - Configuration menus (LED B is ON)

This section includes a number of less frequently used configuration options and is indicated by LED B on the Programming Unit.

Input routing mode

Use this menu to select the routing of the input signals (details on Table 2 on page 41):

```
SELECT TUNER
INPUT CONFIG
A = PORT 1
B = PORT 2
```

A = PORT 1

B = PORT 1

(PORT 2 is a loop-through output of the signal connected to PORT 1)

A = PORT 1

B = PORT 2

(Dual inputs)

A = PORT 2

B = PORT 2

(PORT 1 is disabled and cannot be used)

Modulation mode

This menu allows the selection of the input modulation mode.

In "Auto Detect" mode, the input/output modulation parameters are set automatically according to the priority look-up table in Appendix 2.

```
SELECT
MODULATION
MODE
AUTO DETECT
```

In "Manual" mode, the user has to manually configure all the modulation parameters.

Input frequency mode

Using this menu the user can select one of the modes available to program the input frequency:

```
SELECT
INPUT FREQ
MODE
XPNDR STACK
```

- MANUAL: The user has to manually enter the input L-Band frequency in MHz.
- XPNDR LEGACY: The user selects the satellite and transponder and the unit automatically calculates the input frequency for a DISH legacy LNB (non stacking).
- XPNDR STACK: The user selects the satellite and transponder and the unit automatically calculates the input frequency for a DISH PRO stacking LNB.

Output frequency mode

Using this menu, the user can select one of the two modes available to program the output frequency:

```
SELECT
OUT FREQ
MODE
CHANNEL
```

- CHANNEL: The user selects an output channel between 2 and 158 according to the CATV QAM channel frequencies in Table 1 (Appendix 1).
- MANUAL: The user has to manually enter the output CATV frequency in MHz.

Remote control address

Use this menu to change the remote control address when the unit is connected to a CDC Remote Headend Controller (ref. 555902) via its control bus. It is the user's responsibility to ensure that each unit in the bus has been assigned a different and unique address in the bus.

```
SELECT
REMOTE CTRL
ADDRESS
001
```

The valid address range goes from 1 to 254 (maximum number of devices controllable from a single headend controller module).

WARNING:
Duplicated addresses will cause data collision on the bus and the transmodulators will not be able to communicate with the Remote Headend Controller.

Restore default settings

To return the unit to its default factory configuration enter this menu and then press and hold down the ● button for a few seconds.

```
SELECT
DEFAULT
SETTINGS
HOLD ● key
```

The Programming Unit will display the following message:

```
Restoring
default
values
...
```

Once finished it will go back to the first MAIN menu (transcoder selection).

WARNING:
The remote control address parameter will default to 1 after restoring the unit to factory settings.

9.3 - MONITORING menus (LED C is ON)

This set of menus displays firmware versions and monitoring information, and is indicated by LED C on the Programming Unit.

Versions menu

This menu displays the unit's reference number, Firmware and FPGA (QAM Modulator) versions and the auto look-up table version for modulation "Auto Detect" mode.

```
Ref: 563701
FW: 1.00.0009
FPGA:1.00.04
  AUTO:1.03
```

Input status

This menu displays the status of the input signal, indicating its lock status. When locked, the detected input modulation and symbol rate are displayed.

```
- INPUT A -
STAT: LOCKED
MOD:QPSK-2/3
SR: 27.500Kb
```

```
- INPUT A -
STAT:
  UNLOCKED
```

If "Auto Detect" modulation mode is selected, the word SEARCHING will blink on the display as the unit tries to acquire an input signal when the demodulator is not locked.

```
- INPUT A -
STAT:
  UNLOCKED
 SEARCHING
```

Output status

This menu displays the status of the output signal, indicating the output QAM constellation, the QAM symbol rate and the bandwidth occupied by the output carrier.

```
- OUTPUT A -
MOD: 1024QAM
SR:  3.667Mb
BW: 4.107MHz
```

```
- OUTPUT A -
MOD: 1024QAM
 QAM Unlock
```

```
- OUTPUT A -

 QAM Unlock
```

If "Auto Detect" modulation mode is selected, and if the tuner is not locked, the QAM modulation will not be displayed, because it will depend on the input signal acquired.

If the QAM constellation manually selected is not enough to accommodate the data rate of the input signal, it will cause an overflow condition, and **OVF** will be displayed.

```
- OUTPUT A -
MOD: 64 OVF
SR:  6.111Mb
BW: 7.028MHz
```

When the bandwidth of the two output signals generated by the QAM transmodulator and their frequencies are such that overlap each other, it is indicated by the message **OVERLAP!**.

```
- OUTPUT A -
MOD: 256QAM
SR:  4.583Mb
 OVERLAP!
```

When the input SNR falls below a certain modulation dependent threshold (rain fade), the output QAM signal is muted to avoid artifacts in the reception and the message "**RAIN FADE!**" is displayed.

Input measurements

This menu displays the current input SNR, the minimum input SNR recorded, and the number of tuner unlock conditions.

```
SNR TUNER A
NOW:  11.5dB
MIN:   3.5dB
#Unlock:  03
```

The minimum SNR and unlock counters can be reset by pressing and holding the ● button for approximately 2 seconds. These values are stored in nonvolatile memory so they are not erased otherwise, even when the unit loses power or is turned off.

Any change to the input parameters (frequency, baud rate, satellite, etc.) automatically resets these counters.

Temperature menu

This menu shows the current internal temperature and the maximum internal temperature recorded (F).

The maximum value is stored in nonvolatile memory for monitoring purposes.

```
 -  TEMP  -
NOW:  103°F
MAX:  125°F
```

```
 -  TEMP  -
NOW:  193°F
MAX:  195°F
WARNING TEMP
```

If the current internal temperature exceeds 149ºF (65ºC) the screen will display the message "**WARNING TEMP**".

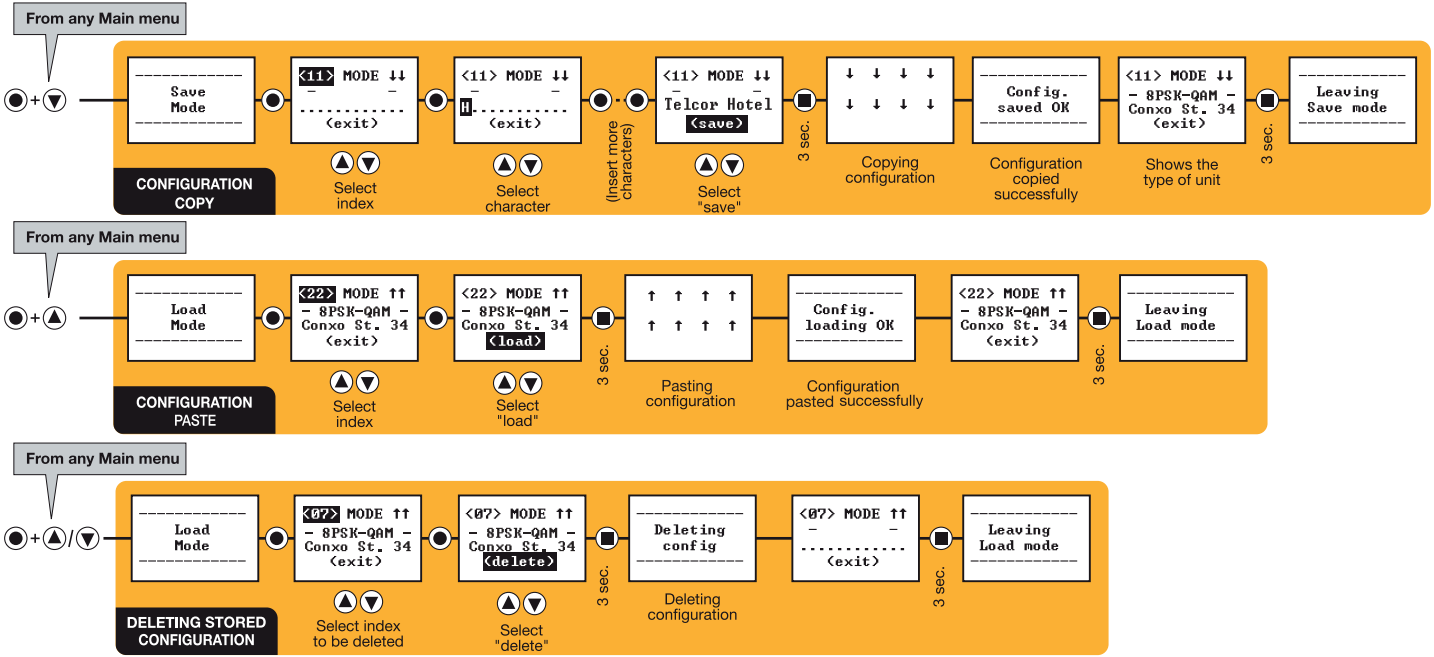
If the current internal temperature exceeds 185ºF (85ºC) the screen will display the message "**OVER TEMP**"

The maximum registered temperature may be reset by pressing and holding the circle button for a few seconds.

EN

9.4 - Configuration Copy/Paste using the Programming Unit

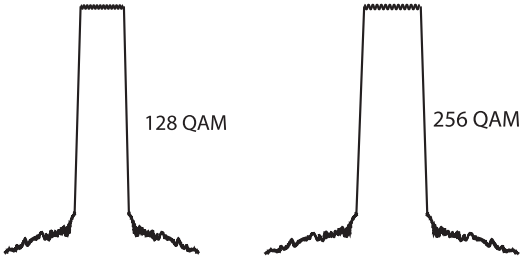
To enter copy/paste mode, press and hold the ● and ▼ buttons at the same time from any MAIN menu. Then follow the flowchart below to copy/paste configurations to/from the handheld Programming Unit.



10. Distribution Bandwidth considerations

The bandwidth of a transmodulated QAM signal depends on the parameters of the incoming satellite signal (baud rate, modulation and FEC) and on the QAM constellation selected for the output carrier. For the same parameters of the satellite signal, the higher the QAM order, the narrower the QAM signal is.

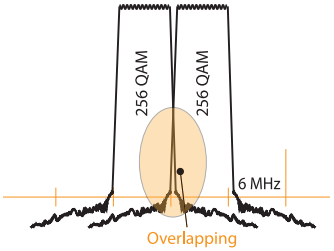
As an example, in automatic mode, an input baud rate and satellite modulation signal (8PSK 2/3 21.5MBaud) is transmodulated to 256QAM carriers occupying bandwidths up to 6.43MHz. Lower input baud rate signals are transmodulated to 64QAM or 128QAM carriers with narrower bandwidths up to 5.75MHz.



64 / 128 QAM output
Bandwidth up to 5.75 MHz

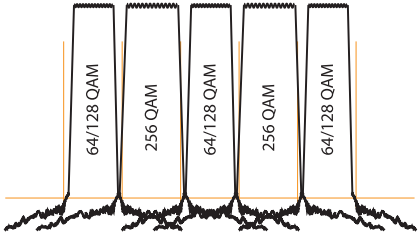
256 QAM output
Bandwidth up to 6.43 MHz

Standard American CATV channels have 6 MHz of bandwidth, therefore, 256 QAM modulated signals with a bandwidth wider than 6 MHz can cause interference to the adjacent channels. Two 256 QAM carriers on adjacent channels can cause a 3 dB MER degradation.



Whenever channel bandwidth is wider than 6 MHz, there is an overlap of the 2 adjacent channels

In order to avoid this overlapping it advisable to alternate narrow 64/128 QAM carriers with wider 256 QAM carriers in the distribution, as in the example below:



While some satellite input signals may be transmodulated to 1024QAM carriers that are less than 6 MHz, it is still recommended to alternate narrow 64/128 QAM carriers in the same fashion. It is also recommended to set the output level of the 1024 QAM carrier to be 2-3 dB greater than the adjacent carriers. These steps are recommended due to the increased sensitivity to interference in 1024QAM signals.

The fully agile and fully independent QAM outputs of the HDTV TRANSMODULATOR - Dual 8PSK to QAM greatly help to overcome this issue.

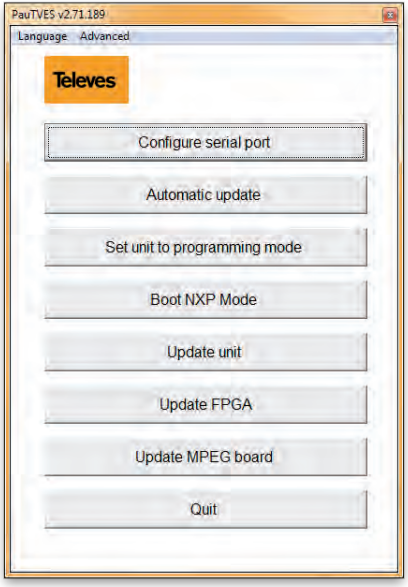
11. Firmware Updates

Introduction

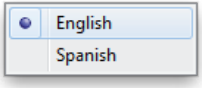
To update the Firmware of the unit you will need additional hardware and a software package:

- **USB - Serial Port adapter**.
- Cable **DB-9 to RJ45.**
- **PauTves** software package.

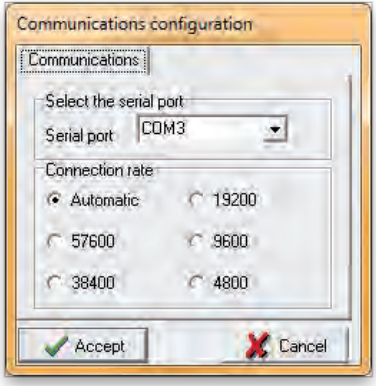
Unzip the PauTves tool to a known location and run the program:



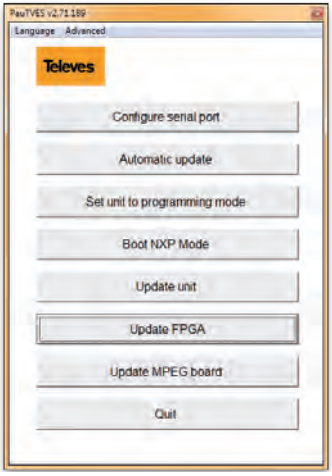
Select English as preferred language if needed:



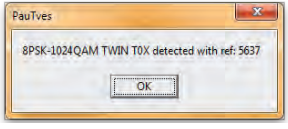
Verify the port configured in the program ("Configure Serial Port") is the one you have your COM/SERIAL adaptor connected to:



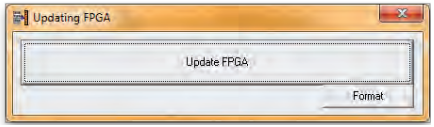
Then click on "Update FPGA":



The program will detect the connected unit as a 563701:



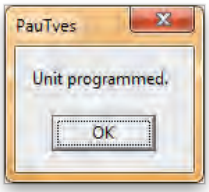
Press OK and the following window will appear:



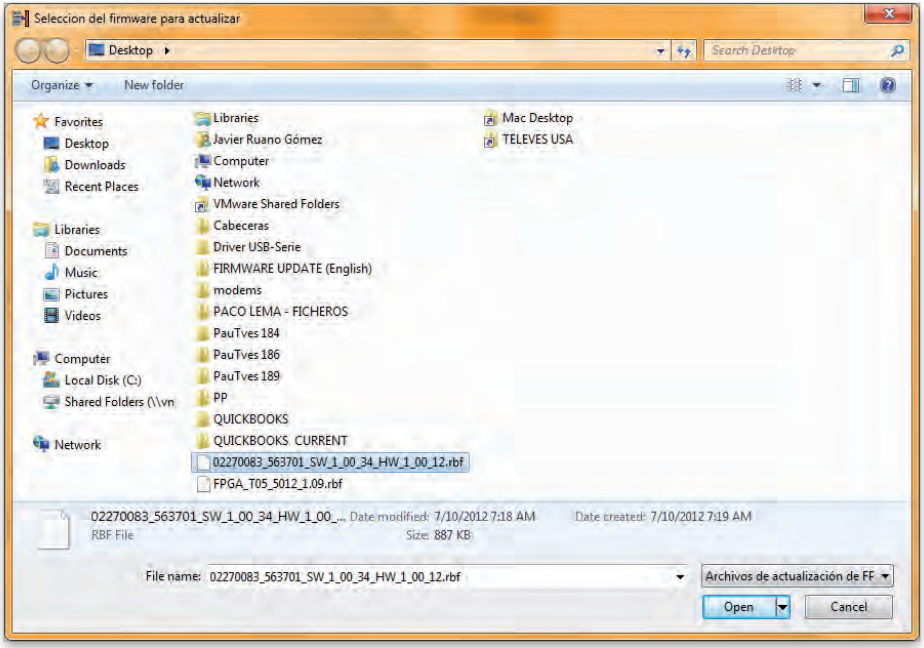
Select "Update FPGA" and browse for the .rbf file stored in your computer (see the example screenshot on the right).

Click Open and the update will begin:

When it is finished the following message will appear on the screen:



If an unexpected failure occurs during programming, a default version of the firmware that is stored in the boot sector will get reloaded automatically, thus preventing a permanent failure.



Repeat going back to the "Update FPGA" step to update more units.

12. TSuite - CDC SOFTWARE

This software allows remote or local control of a T.0X headend, via a control module either ref. 5559 (CDC IP) or ref. 555901 CDC IP/GSM).

Main features

- Compatible with T05 headends.
- Adjustment, maintenance, control, management and monitoring of new T.0X headends from anywhere in the world via the internet.
- Designed to support new services.
- Plug and play.
- Allows the use of a PC as local programming unit.

TSuite offers, through Televés Services, a private portal for each user enabling centralized management of all headends.

- Allows monitoring headend communication status.
- Provides connection alerts and record of user sessions.

Remote monitoring of a headend and connection to Televés Services

An alternative to the TSuite software is the web based Televés Services. This web interface will allow you to check the status of and configure a headend.

Steps to follow

1 Register a user account on Televés Services.

2 Once an account is created, login to Televés Services to register a T.0X CDC. The data required are the MAC and Serial Number of the module.

The control of a headend using the TSuite program can be done in three different ways:

- In local mode, programming modules one by one performing the function with the Programming Unit.
- In local mode, programming the headend via the CDC module.
- In remote mode, programming the headend by using a CDC module connected to the Internet.

Whatever the method, it is necessary that each module has been assigned with different CDC addresses. Refer to section 8 for detailed instructions.

EN

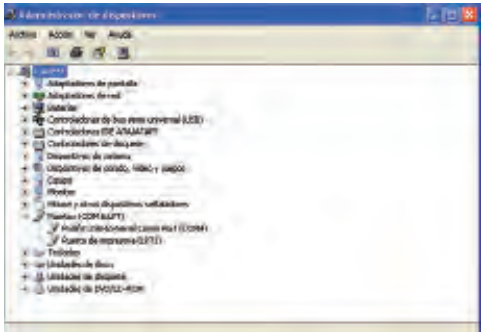
Using TSuite software in local mode, programming modules one at a time.

Preliminary considerations

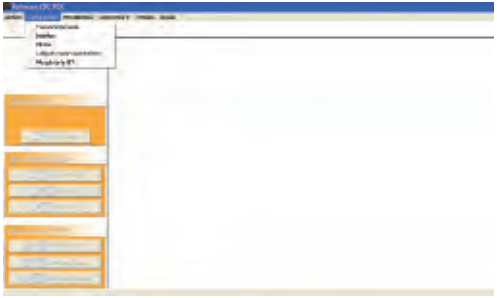
1. The connection between the PC and the module to be configured is made via the serial port and a cable RS232 - RJ45.
2. If you do not have a serial port, you can use a USB-RS232 adapter ref. 5838.

Steps to follow

1 When using a USB 2.0 RS-232 adapter (ref. 5838), check availability of the serial port, and make note of the active COM port.



2 To set the port used, select Configuration, Serial communications.



3 Specify the port used in the drop down window and click Accept.

4 Activate the Identify Device function by selecting the icon in the menu bar.

5 The program will identify the device connected, then select Add to a new headend.

6 The program will place a graphic of the module within a headend frame.

7 Double clicking on the module opens its management window. You can now perform all the functions you would with the programmer. To do this, activate the Enable / Disable direct communication.

8 There are 3 tabs, Status, Setup, and Advanced. A sample Status screen is shown.

9 Setup function: You can modify all the input and output parameters here.

10 Advanced functions allow you to change the address of the module.

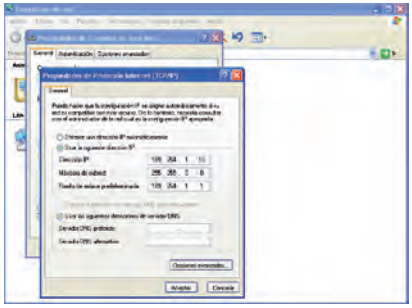
Using TSuite software in local mode, programming modules through the CDC.

Preliminary considerations

1. Direct connection between the PC and the CDC module with a data cable RJ45-RJ45.
2. The transmission of information is done through a network interface. To do this, configure the computer's IP to be on the network of IP CDC module. The CDC IP module can be configured by the programmer, but by default is 169.254.1.253.

Steps to follow

1 Assign the computer an IP address on the network of the CDC.



2 Select New File with the icon or the menu File, New IP Connections, IP Connections management, **select Create new connection and** select **the direct option (LAN) in the Connection Type. Then enter a name and the IP address of the CDC module.**

3 In Session Control box, select IP Connection, then Start session. **Then select the name of the connection made in step 2.**

4 Enter Password for the headend and select Apply.

5 You will see the status screen as the session is started.

6 Once connected, you will see a graphic representation of the headend.

7 Double clicking on the CDC module displays the CDC management window. Selecting "Load modules connected to the CDC," will load all modules connected to and recorded in the CDC.

8 Status will be displayed as the program is loading information for the modules.

9 Once all modules are loaded, a pop up "Headend loaded!" will be displayed.

10 After exiting the CDC screen, all the recognized modules will be displayed. You can double click on a module to monitor or configure it in the same was as described in section "Using TSuite software in local mode, programming modules one at a time".

Using TSuite software in remote mode, programming modules through the CDC connected to the internet.

Preliminary considerations

1. The connection between the CDC module and Internet can be accomplished in two ways: through a LAN; or using the GPRS modem built into a module ref. 555901. In the latter case, we need an active SIM card with a data plan.
2. If using a LAN, an internet connection is needed that does not block outbound ports. The CDC will connect to a Televés server and this connection
3. will provide a link back to the CDC.

Steps to follow

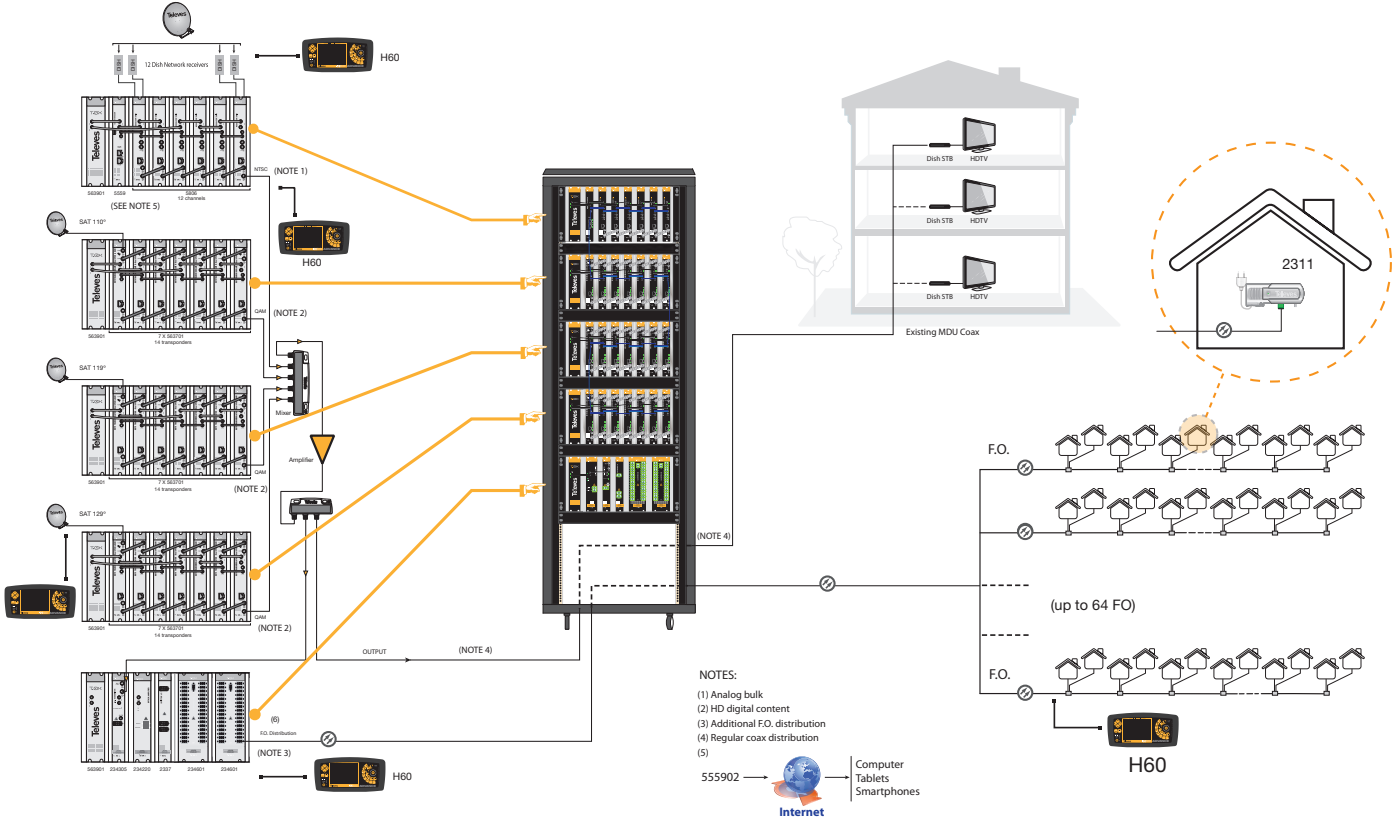
1 In IP Connections, IP Connections management, select create new connection, and select the Server option in the Connection Type. Then enter the Name and the MAC Address of the module (found on the label).

2 In Session Control box, select IP Connection, then Start session. Then select the name of the connection created in the previous step and enter the headend password.

3 The rest of the steps are identical to the previous section.

EN

13. Example installation



14. Rackmount Standards (max. 49 - 7 subracks with 5RU height - 8'7")

14.1. Installation of the rack with ventilation facilities

To aid in cooling for proper operation, especially in warm locations (>113ºF ambient), installation of 2 25W or greater fans is recommended at the top of the rack. See fig 1 and 2.

Be sure to leave approximately 3-5 cm of ventilation slots at the top for proper air flow. See fig 2 and 3.

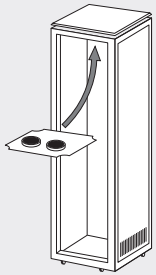


fig. 1

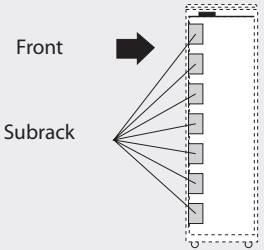


fig. 2

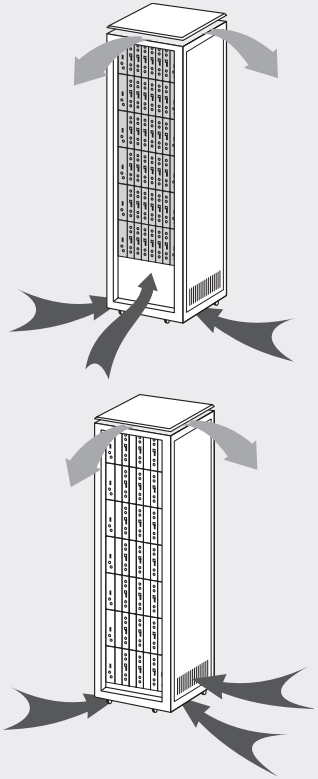


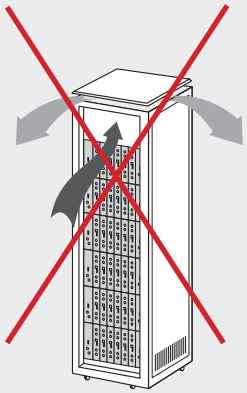
fig. 3

In order to provide adequate cooling, proper airflow must be established. As such, the following items must be observed:

- Do not open the side doors. This could cause fans to move air from outside rather than through the rack.

- Do not place objects near the rack that could clog the ventilation inlets and outlets.

- If the rack is not complete, the subracks must be placed from the top downwards without leaving large gaps in between, fig. 4.



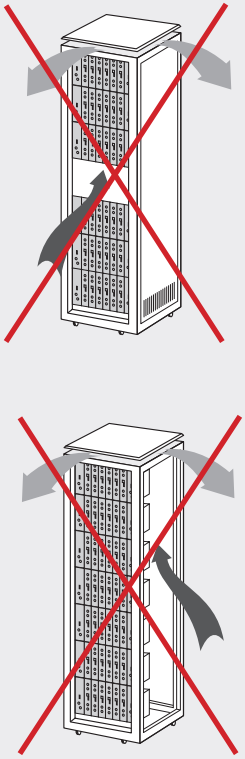


fig. 4

14.2. Installation of the rack without fans

If fans are not available and the rack is installed in ambient temperatures near 113ºF, it is advisable to leave the rack sides completely open. See fig 5.

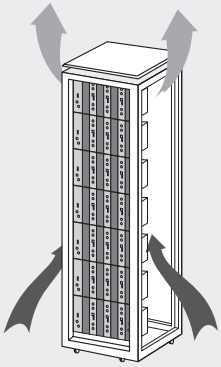


fig. 5

Appendix 1.- CATV QAM channel frequencies

CH#	QAM center frequency (MHz)
2	57.00
3	63.00
4	69.00
5	79.00
6	85.00
95	93.00
96	99.00
97	105.00
98	111.00
99	117.00
14	123.00
15	129.00
16	135.00
17	141.00
18	147.00
19	153.00
20	159.00
21	165.00
22	171.00
7	177.00
8	183.00
9	189.00
10	195.00
11	201.00
12	207.00
13	213.00
23	219.00

CH#	QAM center frequency (MHz)
24	225.00
25	231.00
26	237.00
27	243.00
28	249.00
29	255.00
30	261.00
31	267.00
32	273.00
33	279.00
34	285.00
35	291.00
36	297.00
37	303.00
38	309.00
39	315.00
40	321.00
41	327.00
42	333.00
43	339.00
44	345.00
45	351.00
46	357.00
47	363.00
48	369.00
49	375.00
50	381.00

CH#	QAM center frequency (MHz)
51	387.00
52	393.00
53	399.00
54	405.00
55	411.00
56	417.00
57	423.00
58	429.00
59	435.00
60	441.00
61	447.00
62	453.00
63	459.00
64	465.00
65	471.00
66	477.00
67	483.00
68	489.00
69	495.00
70	501.00
71	507.00
72	513.00
73	519.00
74	525.00
75	531.00
76	537.00
77	543.00

CH#	QAM center frequency (MHz)
78	549.00
79	555.00
80	561.00
81	567.00
82	573.00
83	579.00
84	585.00
85	591.00
86	597.00
87	603.00
88	609.00
89	615.00
90	621.00
91	627.00
92	633.00
93	639.00
94	645.00
100	651.00
101	657.00
102	663.00
103	669.00
104	675.00
105	681.00
106	687.00
107	693.00
108	699.00
109	705.00

CH#	QAM center frequency (MHz)
110	711.00
111	717.00
112	723.00
113	729.00
114	735.00
115	741.00
116	747.00
117	753.00
118	759.00
119	765.00
120	771.00
121	777.00
122	783.00
123	789.00
124	795.00
125	801.00
126	807.00
127	813.00
128	819.00
129	825.00
130	831.00
131	837.00
132	843.00
133	849.00
134	855.00
135	861.00
135	861.00

CH#	QAM center frequency (MHz)
136	867.00
137	873.00
138	879.00
139	885.00
140	891.00
141	897.00
142	903.00
143	909.00
144	915.00
145	921.00
146	927.00
147	933.00
148	939.00
149	945.00
150	951.00
151	957.00
152	963.00
153	969.00
154	975.00
155	981.00
156	987.00
157	993.00
158	999.00

Appendix 2.- DISH Network™ Transmodulator Auto-Detect Code/Symbol Rates - ver. 1.00

Symbol rate	Madulation	QAM size	Priority
21500	T_8PSK_23	QAM_256	1
20000	QPSK_78	QAM_128	2
22500	T_QPSK_56	QAM_256	3
20000	QPSK_56	QAM_128	4
20000	QPSK_34	QAM_64	5
21500	T_QPSK_23	QAM_64	6
21500	T_8PSK_56	QAM_1024	7
20000	QPSK_12	QAM_64	8
25000	T_8PSK_23	QAM_256	9
20000	QPSK_23	QAM_64	10
21500	T_8PSK_34	QAM_1024	11
21500	T_8PSK_45	QAM_1024	12
21500	T_QPSK_12	QAM_64	13
21500	T_QPSK_34	QAM_128	14
21500	T_QPSK_56	QAM_256	15

Symbol rate	Madulation	QAM size	Priority
21500	T_QPSK_78	QAM_256	16
22500	T_QPSK_78	QAM_256	17
26000	QPSK_12	QAM_64	18
26000	QPSK_23	QAM_128	19
26000	QPSK_34	QAM_256	20
26000	QPSK_56	QAM_1024	21
26000	T_QPSK_12	QAM_64	22
26000	T_QPSK_23	QAM_128	23
26000	T_QPSK_34	QAM_256	24
26000	T_QPSK_56	QAM_1024	25
30000	QPSK_12	QAM_64	26
30000	QPSK_23	QAM_256	27
30000	T_QPSK_12	QAM_64	28
30000	T_QPSK_23	QAM_256	29
Rev 1.00			

Appendix 3.- DISH Network™ DBS - Anik F3 - FSS 121 _ FSS 105 Tables

DBS (61.5º, 72.7º, 77º, 110º, 119º & 129º		
Name	Legacy	Stacking
1R	974	974
2L	989	2111
3R	1003	1003
4L	1018	2082
5R	1032	1032
6L	1047	2053
7R	1061	1061
8L	1076	2024
9R	1091	1091
10L	1105	1995
11R	1120	1120
12L	1134	1966
13R	1149	1149
14L	1164	1936
15R	1178	1178
16L	1193	1907
17R	1207	1207
18L	1222	1878
19R	1236	1236
20L	1251	1849
21R	1266	1266
22L	1280	1820
23R	1295	1295
24L	1309	1791
25R	1324	1324
26L	1338	1762
27R	1353	1353
28L	1368	1732
29R	1382	1382
30L	1397	1703
31R	1411	1411
32L	1426	1674

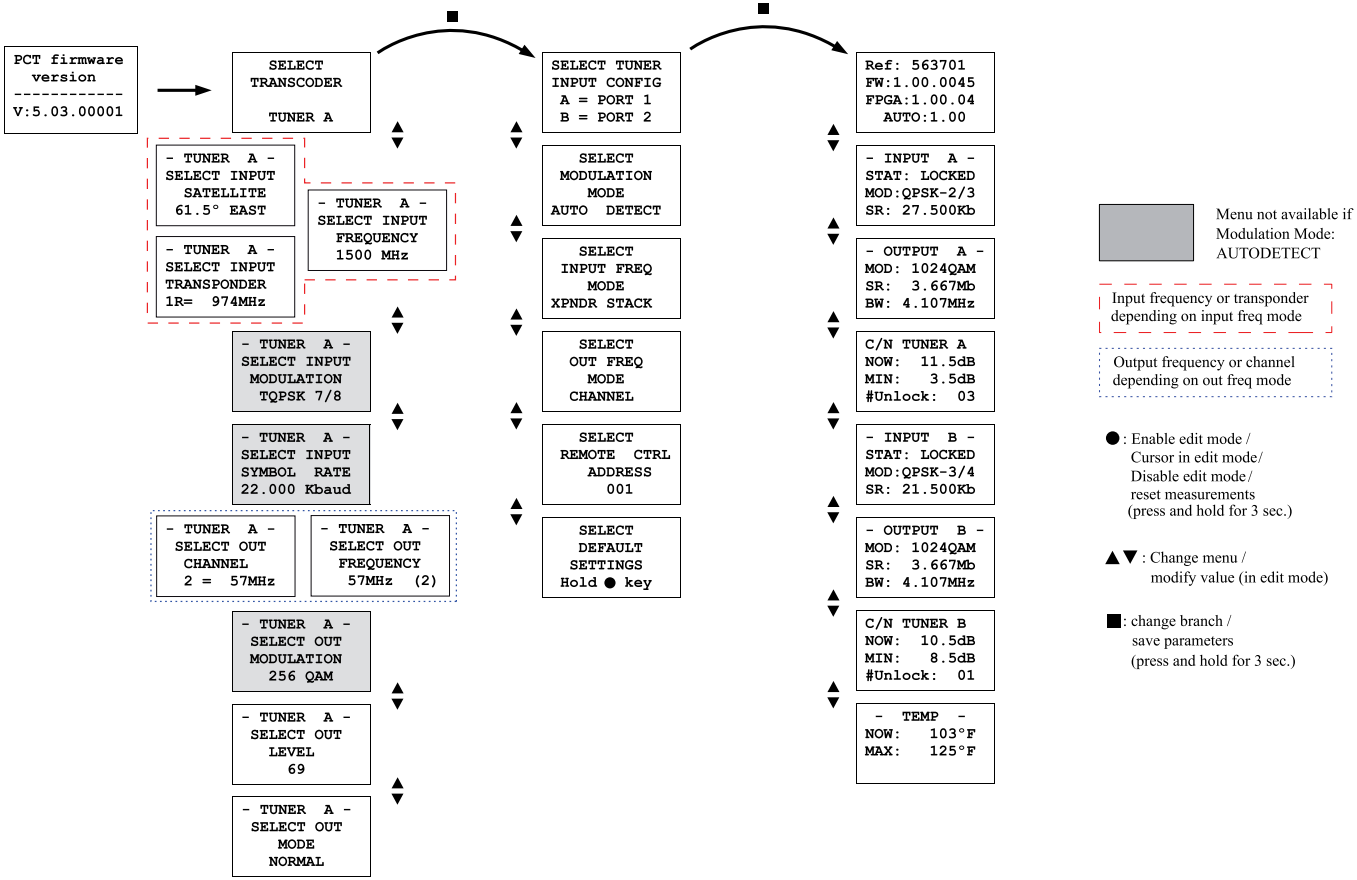
118.7 º		
Name	Legacy	Stacking
1R	965	965
2L	978	2122
3R	995	995
4L	1008	2092
5R	1026	1026
6L	1039	2061
7R	1056	1056
8L	1069	2031
9R	1087	1087
10L	1100	2000
11R	1117	1117
12L	1130	1970
13R	1148	1148
14L	1161	1939
15R	1178	1178
16L	1191	1909
17R	1209	1209
18L	1222	1878
19R	1239	1239
20L	1252	1848
21R	1270	1270
22L	1283	1817
23R	1300	1300
24L	1313	1787
25R	1331	1331
26L	1344	1757
27R	1361	1361
28L	1374	1726
29R	1392	1392
30L	1405	1695
31R	1422	1422
32L	1435	1665

FSS 121º		
Name	Legacy	Stacking
1V	974	974
2H	989	2111
3V	1003	1003
4H	1018	2082
5V	1032	1032
6H	1047	2053
7V	1061	1061
8H	1076	2024
9V	1091	1091
10H	1105	1995
11V	1120	1120
12H	1134	1966
13V	1149	1149
14H	1164	1936
15V	1178	1178
16H	1193	1907
17V	1207	1207
18H	1222	1878
19V	1236	1236
20H	1251	1849
21V	1266	1266
22H	1280	1820
23V	1295	1295
24H	1309	1791
25V	1324	1324
26H	1339	1762
27V	1353	1353
28H	1368	1732
29V	1382	1382
30H	1397	1703
31V	1411	1411
32H	1426	1674

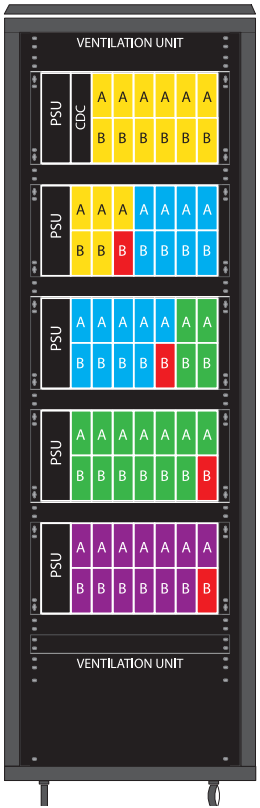
FSS 105º		
Name	Legacy	Stacking
1V	970	970
2H	990	2110
3V	010	1010
4H	1030	2070
5V	1050	1050
6H	1070	2030
7V	1090	1090
8H	1110	1990
9V	1130	1130
10H	1150	1950
11V	1170	1170
12H	1190	1910
13V	1210	1210
14H	1230	1870
15V	1250	1250
16H	1270	1830
17V	1290	1290
18H	1310	1790
19V	1330	1330
20H	1350	1750
21V	1370	1370
22H	1390	1710
23V	1410	1410
24H	1430	1670

Appendix 4.- Programming unit Menus and Sub-menus

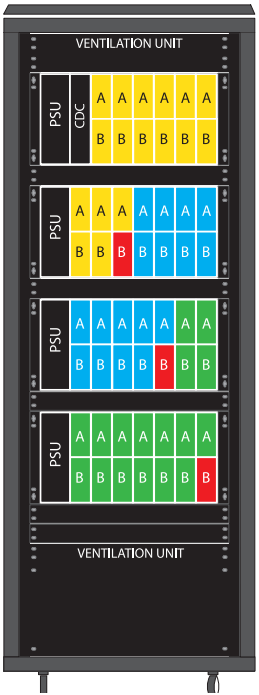
MENUS AND SUBMENUS					
→	MAIN MENU	→	CONFIGURATION MENU	→	MONITORING MENU
Sub-menus	Transcoder selection Satellite selection Input frequency/transponder selection Input modulation selection Input baud rate selection Output frequency/ channel selection Output modulation selection Output level selection Output mode selection	Sub-menus	Input routing mode Modulation mode Input frequency mode Output frequency mode Remote control address Restore default settings	Sub-menus	Versions menu Input status Input measurements Temperature menu


PCT firmware version
V:5.03.00001
SELECT TRANSCODER
TUNER A
SELECT TUNER INPUT CONFIG
A = PORT 1
B = PORT 2
Ref: 563701
FW:1.00.0045
FPGA:1.00.04
AUTO:1.00
- TUNER A - SELECT INPUT SATELLITE 61.5° EAST
- TUNER A - SELECT INPUT FREQUENCY 1500 MHz
- TUNER A - SELECT INPUT TRANSPONDER 1R= 974MHz
SELECT MODULATION MODE AUTO DETECT
SELECT INPUT FREQ MODE XPNDR STACK
- INPUT A - STAT: LOCKED MOD:QPSK-2/3 SR: 27.500Kb
- OUTPUT A - MOD: 1024QAM SR: 3.667Mb BW: 4.107MHz
- TUNER A - SELECT INPUT MODULATION TQPSK 7/8
- TUNER A - SELECT INPUT SYMBOL RATE 22.000 Kbaud
SELECT OUT FREQ MODE CHANNEL
SELECT REMOTE CTRL ADDRESS 001
C/N TUNER A NOW: 11.5dB MIN: 3.5dB #Unlock: 03
- INPUT B - STAT: LOCKED MOD:QPSK-3/4 SR: 21.500Kb
- OUTPUT B - MOD: 1024QAM SR: 3.667Mb BW: 4.107MHz
- TUNER A - SELECT OUT CHANNEL 2 = 57MHz
- TUNER A - SELECT OUT FREQUENCY 57MHz (2)
SELECT DEFAULT SETTINGS Hold ● key
C/N TUNER B NOW: 10.5dB MIN: 8.5dB #Unlock: 01
- TUNER A - SELECT OUT MODULATION 256 QAM
- TUNER A - SELECT OUT LEVEL 69
- TUNER A - SELECT OUT MODE NORMAL
- TEMP - NOW: 103°F MAX: 125°F
Menu not available if Modulation Mode: AUTODETECT
Input frequency or transponder depending on input freq mode
Output frequency or channel depending on out freq mode
●: Enable edit mode / Cursor in edit mode/ Disable edit mode / reset measurements (press and hold for 3 sec.)
▲▼: Change menu / modify value (in edit mode)
■: change branch / save parameters (press and hold for 3 sec.)

Appendix 5.- Typical DISH NetworkTM Western Arc System



68 transponder system (DISH core programming and international channels



54 transponder system (DISH core programming)

Legend:

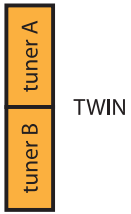
110º → 17 + 1 tuners

119º → 17 + 1 tuners

129º → 17 + 1 tuners

118º → 13 + 1 tuners

Spare tuner



TWIN

8PSK-QAM

Televes Limited Warranty

A. Televés warrants, only to the original Purchaser, all Products be free from any defect in materials or workmanship for a period of two (2) years from the date of original purchase, unless otherwise specified.

B. Televés shall, free of charge and in its sole discretion, either repair, replace with a new or factory reconditioned equivalent, or refund the purchase price of the Product(s), that has been determined by Televés to be defective in material or workmanship, subject to the limits of this warranty.

C. This warranty excludes any damage or inoperability resulting from:

I. Use or installation that is not in strict compliance with the written instructions and specifications;

II. Any modification or alteration performed by any third party not authorized in writing by Televés;

III. Service or repair performed by any third party not authorized in writing by Televés;

IV. Misuse, abuse, intentional harm, or lack of reasonable care;

V. Fire, ice, snow, rain, wind, water, volcano, excessive heat or cold, lightning, flood, power surge, earthquake, or any other acts of God;

VI. War, crime, strike, riot, electro-magnetic pulse, or any other acts beyond the control of Televés;

VII. Shipping.

D. All claims under the terms of this warranty must be made in writing, by the original Purchaser, within fourteen (14) days of the defect being known to the Purchaser. Such claims shall be accompanied by a description of any material facts related to the claimed defect and the invoice or other proof of original purchase date and price. If Televés so requests, the Purchaser shall, at Purchaser's expense, deliver the claimed Product(s) to Televés, within 14 days of the date of the return authorization. Under no circumstances shall the Product(s) be returned to Televés without a return authorization.

E. Any refund to the Purchaser, shall be limited to the purchase price of the Product(s), excluding any applicable taxes, duties, freight costs, removal costs, installation costs, or any other charges incident to the purchase of the product.

F. Any damage caused by shipper shall be claimed with the shipper in accordance with the shipper's policies and procedures.

G. Televés shall in no event and under no circumstances be liable or responsible for any consequential, indirect, incidental, punitive, direct or special damages based upon breach of warranty, breach of contract, negligence, strict tort liability or otherwise or any other legal theory, arising directly or indirectly from the sale, use, installation or failure of any product acquired by Purchaser from Televés.

H. This limited warranty extends to the original Purchaser and cannot be assigned or transferred to any other party without the prior express written permission of Televés, which permission Televés may withhold for any reason or for no reason at all.

I. Televés will not assume any liabilities for any other warranties, whether statutory, express or implied, made by any other person.

J. Televés reserves the right to modify or discontinue this warranty at Televés' sole discretion without notification. No other warrantees are expressed or implied.

Televés Extended Five (5) Year Warranty

K. Any product in the T.0X family is subject to a five (5) year warranty from the date of original purchase. This three (3) year extension applies only to new Product(s) in its initial installation and only extends the duration of the warranty beyond the original duration subject to the addition of the following terms:

I. The Product(s) shall have been installed in one and only one location and its use shall be in strict compliance with the written instructions and specifications;

II. An approved forced air ventilation system, designed to extend the life of the product, shall be in use during the entire installed life of the Product(s);

III. The Product(s) shall be registered with Televés, at the time of installation;

IV. Photographic evidence of the proper installation of the Product(s) shall be provided at the time of registration;

V. Televés reserves the right to physically inspect the installation of any claimed Product(s);

VI. The registration number, provided by Televés, at the time of registration, shall be provided by the Purchaser at the time of claim;

VII. Photographic evidence of the installation of the claimed Product(s) shall provided at the time of claim documenting the status of the installation at the time the defect is made known to the Purchaser;

VIII. Any cost incurred by Televés, related to a claim under the terms of this extended warranty, for a product that is found to not be defective under the terms of this warranty, may be charged to the Purchaser.

DECLARATION OF CONFORMITY

Per FCC Part 2 Section 2.1077(a)

Responsible Party Name: **TELEVES, S.A.**

Address: Rúa B. de Conxo, 17
15706 Santiago de Compostela
A Coruña-Spain

Phone / Fax Nº: +34 981522200 / + 34 981522262

Hereby declares that the product

Product Name: TWIN 8PSK 1024QAM T0X
Model Number: 563701

Conforms to the following specifications:

FCC Part 15, Subpart B, Section 15.107(e) and section 15.109(g)

Supplementary Information:

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Representative Person's Name: **José Luis Fernández Carnero**

Signature:

Date: 03/01/2013

televes.com

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