



Screen Service

SDT ARK 1 ECHO

Software Defined Transposer / Re-Transmitter Gap Filler / Echo canceller



OPERATION MANUAL

Jan 2012 - Version 1.ATSC_FCC_

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Screen Service Broadcasting Technologies S.p.A.
Via Giuseppe Di Vittorio, 17
25125 Brescia, Italy

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All specifications, characteristics and circuit descriptions set forth in this manual are subject to change without notice.



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LIST OF CONTENTS

- CHAPTER 1: GENERAL INFORMATION**
Gives information on safety procedures and good practices to follow using the equipment.
- CHAPTER 2: PURPOSE AND PLANNING**
Introduction to the manual, technical specifications, brief functional description with block diagram.
- CHAPTER 3: OPERATIONS**
Installation and unpacking instructions, mounting specifications, controls and connections, first time operating procedures and channel changing procedures.
- CHAPTER 4: TECHNICAL INFORMATION**
Provides technical information on all modules including schematic diagrams and components layouts.
- CHAPTER 5: MANUAL CHANGE INFORMATION**

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OPERATION MANUAL

1 GENERAL INFORMATION

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1.1 SAFETY SUGGESTIONS

Regardless of how well electrical equipment is designed, personnel can be exposed to **dangerous electrical shock** when protective covers are removed for maintenance or other activities. Therefore, it is incumbent on the user to see that all safety regulations are consistently observed and that each individual assigned to the equipment has a clear understanding of the first aid related to electrical shocks. (see next pages)

In addition these safety practices must be followed:

- Do not attempt to adjust unprotected circuit controls or to dress leads with power on.
- Always avoid placing parts of the body in series between ground and circuit points.
- To avoid burns, do not touch heavily loaded or overheated components without precautions.
- Remember that some semiconductor cases and solid-state circuits carry high voltages.
- Do not assume that all danger of electrical shock is removed when the power is off. Charged capacitors can retain dangerous voltages for a long time after power is turned off. These capacitors should be discharged through a suitable resistor before any circuit points are touched.
- Don't take chances. Be fully trained. Screen Service Italia equipment should be operated and maintained by fully qualified personnel.
- Do not service alone and do not perform internal adjustments of this unit unless another person capable of rendering first aid and resuscitation is present.
- Some components used in the construction of this equipment contain Beryllium Oxide (BeO). This substance is harmless as it is, but becomes highly dangerous if it is ground to powder. Special procedures of disposal must be observed in case of failure of these devices.

NOTE: This section is not intended to contain a complete statement of all safety precautions which should be observed by personnel in using this electronic equipment or others. Screen Service shall not be responsible for injury or damage resulted from improper procedures or from using it by improperly trained or inexperienced personnel.

1.2 GENERAL SAFETY RECOMMENDATIONS

When connecting the equipment to the power, please follow these important recommendations:

- This product is intended to operate from a power source that will not apply more than 10% of the voltage specified on the rear panel between the supply conductors or between either supply conductor and ground. A protective-ground connection by way of the grounding conductor in the power cord is essential for safe operation.
- This equipment is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired socket before connecting to the product input or output terminals.
- Upon loss of the protective-ground connection, all accessible conductive parts (including parts that may appear to be insulating) can render an electric shock.
- To avoid fire hazard, use only the fuse of correct type, voltage rating, and current rating. Refer fuse replacement to qualified service personnel.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

1.3 GOOD PRACTICES

In maintaining the equipment covered in this manual, please keep in mind the following, standard good practices:

- At regular intervals, the condition of the equipment and the correct functioning of protective and safety devices shall be checked by a skilled person approved by the appropriate authority for this duty. Functional checks shall be carried out on interlocking systems of doors, mechanical interlocks, isolating switches, earthing switches, parallel resistances and protective devices against over-voltages and over-currents. The above checks shall not be carried out after the protective and safety devices have operated under fault conditions. The safety devices shall not be altered or disconnected except for replacement, nor shall the safety circuit be modified without specific approval of the appropriate authority in each case.
- When connecting any instrument (wattmeter, spectrum analyzer, etc.) to a high frequency output, use the appropriate attenuator or dummy load to protect the final amplifiers and the instrument input.
- When inserting or removing printed circuit boards (PCBs), cable connectors, or fuses, always turn off power to the affected portion of the equipment. After power is removed, allow sufficient time for the power supplies to bleed down before reinserting PCBs.
- When troubleshooting, remember that FETs and other metal-oxide semiconductor (MOS) devices may appear defective because of leakage between traces or component leads on the printed circuit board. Clean the printed circuit board and recheck the MOS device before assuming it is defective.
- When replacing MOS devices, follow standard practices to avoid damage caused by static charges and soldering.
- When removing components from PCBs (particularly ICs), use care to avoid damaging PCB traces.

1.4 PROCEDURE FOR ESTABLISH THE ABSENCE OF VOLTAGE

Follow these simple steps for establish the absence of voltage:

- Before starting work on the equipment, it shall be isolated from the mains supply. This disconnection shall always be checked by visual inspection. Further precautions shall be taken to ensure that the mains supply cannot be restored whilst work is being carried out. After the mains supply has been disconnected, all other lines such as control, interlocking and modulation lines shall be disconnected if they carry dangerous voltages. Moreover, the antenna or the antenna transmission line shall be disconnected from the antenna terminal device to prevent the introduction of dangerous voltages due to antenna pick-up. When disconnection of the antenna or antenna transmission line is not possible, other suitable precautions shall be taken, for example, earthing, when necessary at several places, to establish absence of voltage. These earthing connections shall be very short compared with the wave-length.
- Capacitors which are connected to a circuit isolated from its supply shall be discharged and have their terminals permanently short-circuited and the casing earthed during the whole period of the work.
- The electrical charge retained by electrical machinery when stopped may, in certain cases, be sufficient to cause a severe shock. This shall be taken into account when making connections to an apparently "dead" machine. Therefore all machinery shall be discharged and earthed using an adequately insulated lead for this purpose. The discharge operation shall be repeated several times.
- Before any maintenance work is carried out on automatic or remote controlled equipment, the remote switching circuits shall be made inoperative.

1.4.1 PROCEDURE FOR DETERMINATION OF THE ABSENCE OF VOLTAGE

After the equipment has been isolated according to the standard EN60215, the absence of voltage shall be determined at the work place. This may be done by the use of voltage indicators, measuring instruments, glow discharge lamps for indicating radio-frequency voltage or other suitable means.

1.5 FIRST AID IN CASE OF ELECTRICAL SHOCK

If someone seems unable to free himself while receiving an electric shock, **turn power off** before rendering aid. A muscular spasm or unconsciousness can make a victim unable to free himself from the electrical power.

**DO NOT TOUCH VICTIM OR HIS CLOTHING BEFORE
POWER IS DISCONNECTED OR YOU CAN ALSO
BECOME A SHOCK VICTIM**

If power cannot be turned off immediately, **very carefully** loop a length of dry non-conducting material (such as a rope, insulating material, or clothing) around the victim and pull him free of the power. Carefully avoid touching him or his clothing until free of power.

1.5.1 EMERGENCY RESUSCITATION TECHNIQUE



Step 1

Check the victim for unresponsiveness. If there is no response, **immediately call for medical assistance**, and then return to the person.



Step 2

Position the person flat on their back. Kneel by their side and place one hand on the forehead and the other under the chin. Tilt the head back and lift the chin until teeth almost touch. Look and listen for breathing.



Step 3

If not breathing normally, pinch the nose and cover the mouth with yours. Give two full breaths. The person's chest will rise if you are giving enough air.



Step 4

Put the fingertips of your hand on the Adam's apple, slide them into the groove next to the windpipe. Feel for a pulse. If you can not feel a pulse or are unsure, move on to the next step.

**Step 5**

Position your hands in the center of the chest between the nipples. Place one hand on top of the other.

**Step 6**

Push down firmly two inches. Push on chest 15 times.

CONTINUE WITH TWO BREATHS AND 15 PUMPS UNTIL HELP ARRIVES.

1.5.2 TREATMENT FOR BURNS

- Continue treat victim for electrical shock.
- Check for points of entry and exit of current.
- Cover burned surface with a clean dressing.
- Remove all clothing from the injured area, but cut around any clothing that adheres to the skin and leave it in place. Keep the patient covered, except the injured part, since there is a tendency to chill.
- Splint all fractures. (Violent muscle contractions caused by the electricity may result in fractures.)
- Never permit burned surfaces to be in contact with each other, such as: areas between the fingers or toes, the ears and the side of the head, the undersurface of the arm and the chest wall, the folds of the groin, and similar places..
- Transport to a medical facility

1.5.3 ELECTRIC SAFETY PRECAUTIONS

All the parts making up the equipment have got danger identification tags (with a yellow background) to highlight the parts dangerous for the operator that has access to the system.



Presence of hazardous energy levels

A hazardous energy level is defined as a stored energy level of 20 J or more, or an available continuous power level of 240 VA or more, at a potential of 2 V or more.

1.5.4 COMPONENTS CONTAINING TOXIC MATERIAL HANDLING PRECAUTION

Beryllium (BERILLIUM OXIDE) is used in the construction of the some of the components in this equipment.

This material, when in the form of fine dust or vapor and inhaled into the lungs, can cause a respiratory disease. In its solid form, as used here, it can be handled quite safely although it is prudent to avoid handling conditions which promote dust formation by surface abrasion.

Because of this hazard, you are advise to be very careful in removing and disposing of these components. Do not put them in the general industrial or domestic waste or dispatch them by post. They should be separately and securely packed and clearly identified to show the nature of the hazard and then disposed of in a safe manner by an authorized toxic waste contractor.

Before removing or replacing any RF COMPONENTS, make sure that all precautions comply with SAFETY recommendations.



This WARNING tag is used for the RF COMPONENTS.

1.5.5 ELECTROSTATIC PRECAUTIONS

Before removing or replacing any PCB assembly within the equipment, make sure that all precautions comply with ESD protections (ESD = Electro Static Discharge). Make sure that electrostatic discharge protections are reset after maintenance and/or measurement operations.



This ATTENTION tag is used for the majority of electronic devices that are sensitive to electrostatic discharges.

If electronic parts have to be touched during installation or repair, please observe the following precautions.

Operators must be equipped with anti-static protection devices such as:



Elastic wrist band. To be fixed on the operator's wrist.



Flexible cord. To be connected to the elastic wrist band and the special plug on the shelf highlighted with the ESD warning label.

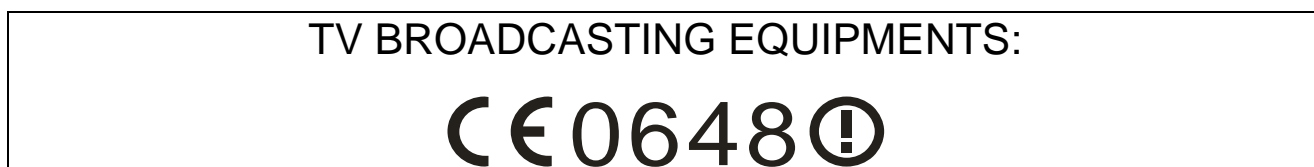
1.6 R&TTE DIRECTIVE 1999/5/EC

Declaration of Conformity with regards to the R&TTE Directive 1999/5/EC

English:	This equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC
Deutsch:	Dieses Gerät entspricht den grundlegenden Anforderungen und den weiteren entsprechenden Vorgaben der Richtlinie 1999/5/EU.
Dansk:	Dette udstyr er i overensstemmelse med de væsentlige krav og andre relevante bestemmelser i Direktiv 1999/5/EF.
Español:	Este equipo cumple con los requisitos esenciales así como con otras disposiciones de la Directiva 1999/5/EC.
Ελληνας	Αυτός ο εξοπλισμός συμμορφώνεται με τις ουσιώδεις απαιτήσεις και τις λοιπές διατάξεις της Οδηγίας 1999/5/EK
Français:	Cet appareil est conforme aux exigences essentielles et aux autres dispositions pertinentes de la Directive 1999/5/EC.
Íslenska:	Þessi búnaður samrýmist lögboðnum kröfum og öðrum ákvæðum tilskipunar 1999/5/ESB.
Italiano:	Questo apparato é conforme ai requisiti essenziali ed agli altri principi sanciti dalla Direttiva 1999/5/EC.
Nederlands:	Deze apparatuur voldoet aan de belangrijkste eisen en andere voorzieningen van richtlijn 1999/5/EC.
Norsk:	Dette utstyret er i samsvar med de grunnleggende krav og andre relevante bestemmelser i EU-direktiv 1999/5/EC.
Português:	Este equipamento satisfaz os requisitos essenciais e outras provisões da Directiva 1999/5/EC.
Suomalainen:	Tämä laite täyttää direktiivin 1999/5/EY oleelliset vaatimukset ja on siinä asetettujen muidenkin ehtojen mukainen.
Svenska:	Denna utrustning är i överensstämmelse med de väsentliga kraven och andra relevanta bestämmelser i Direktiv 1999/5/EC.

The Declaration of Conformity related to this product can be found at the following URL: www.screen.it/rtte

The following CE mark is affixed to the equipment:



The identification number of the Notified Body who certified the product might change.

This equipment is intended to be used in all EU and EFTA countries.

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

1.7 WASTE ELECTRICAL AND ELECTONIC EQUIPMENT (WEEE)



The purpose of the DIRECTIVE 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on waste electrical and electronic equipment (WEEE) is, as first priority, the prevention of waste electrical and electronic equipment and, in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste.

To do this, remember to collect separately all the electronic material.

1.8 RADIO LINK SYSTEM SPECIAL ADVISE: EN 50385 STANDARD

The responsible of the installation and (or) the use of the RADIOLINK SYSTEM composed of:

- EQUIPMENT(s)
- CONNECTION(s)
- ANTENNA(s)

Shall certify under its own responsibility the conformity as per EN 50385 standard:

EN 50385:2002 - Product standard to demonstrate the compliance of radio base stations and fixed terminal stations for wireless telecommunication systems with the basic restrictions or the reference levels related to human exposure to radio frequency electromagnetic fields (110 MHz - 40 GHz) - General public.

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2.1 GENERALITY

Propagation is a critical issue in ATSC / Mobile TV broadcasting.

In this contest, the use of repeaters for digital TV broadcasting becomes a key issue for commercial terrestrial distribution of digital TV.

In addition, 8VSB signal characteristics avert well known adjacent channel interference problems of analogue TV broadcasting. This leads to the SFN network planning: a single frequency is used all over the coverage territory, increasing spectrum efficiency.

Therefore, in digital TV SFN networks iso-frequency repeaters are needed. An On-channel repeater is, basically, a radiofrequency repeater that receiver and transmits using the same frequency.

Traditional On-channel repeater use is limited by a hard design constraint: coupling between transmitter and receiver antenna limits the allowed maximum gain for the on-channel repeater, leading to a reduction of the coverage area: a traditional on-channel repeater installation is only possible if hard isolation conditions are complied.

A on-channel repeater, with coupling echo cancellation system, allows operations at higher power levels under normal tower isolation conditions.

2.2 INTRODUCTION

SDT ARK-1 ECHO is a Multi-standard Television Transposer. Based on Software Defined technology, SDTX ECHO allows the definition of different operative modes on the same hardware platform.

At the state of the art SDT ARK-1 ECHO has the following possible working modes:

- Analog Television Heterodyne Transposer;
- Digital Television Heterodyne Transposer;
- Digital Television Heterodyne Transposer with echo canceller;
- Re-broadcasting ATSC Modulator.

Analog and Digital Television Heterodyne Transposers receive and re-transmit Analog or Digital TV signals allowing the software setting of input and output channels.

Re-broadcasting ATSC Modulator receives and de-modulates ATSC signals and re-modulates them. Auxiliary inputs and outputs allow to import and export TS contents on ASI and GBE interfaces.

The single software controller allows the switching between working modes and different settings for each operative mode using the same platform.

A brief description of the main features and potentialities of each operative mode follows.

2.2.1 ANALOG/DIGITAL TELEVISION HETERODYNE TRANSPOSER

Heterodyne Transposer with Digital Filtering at Intermediate Frequency for Analog and Digital Television standards.

Capable of:

- Agile UHF input Down-converter (from 470 MHz up to 862 MHz)
- Agile UHF output Up-converter (from 470 MHz up to 862 MHz)
- Input Analog/Digital signal level monitoring with quality measurement for ATSC
- Digital Filtering at Intermediate Frequency
- Echo canceller for Digital signal
- AM/PM Software Pre-correction power and frequency calibrated for Digital and Analog signal

2.2.2 DIGITAL TELEVISION HETERODYNE TRANSPOSER WITH ECHO CANCELLER

Heterodyne Transposer with Digital Filtering at Intermediate Frequency for Analog and Digital Television standards.

Capable of:

- Agile UHF input Down-converter (from 470 MHz up to 862 MHz).
- Agile UHF output Up-converter (from 470 MHz up to 862 MHz).
- Input Analog/Digital signal level monitoring with quality measurement for ATSC
- Digital Filtering at Intermediate Frequency.
- **Echo canceller for Digital signal.**
- AM/PM pre-correction calibrated on channel and power ranges for Digital and Analog signal with manual modeling of the curves on Java GUI.

2.2.3 RE-BROADCASTING ATSC MODULATOR

ATSC Modulator with de-modulator for Digital Television standard.

Capable of:

- Agile UHF input Down-converter (channels 21 to 69)
- Agile UHF output Up-converter (channels 21 to 69)
- Input RF signal level monitoring with quality measurement
- Auxiliary Transport Stream inputs on ASI or Gigabit Ethernet
- Modulus/Group Delay Software Pre-correction
- AM/PM Software Pre-correction

2.2.4 FUNCTIONAL BLOCK DIAGRAMS

Figure 1 Echo board block diagram

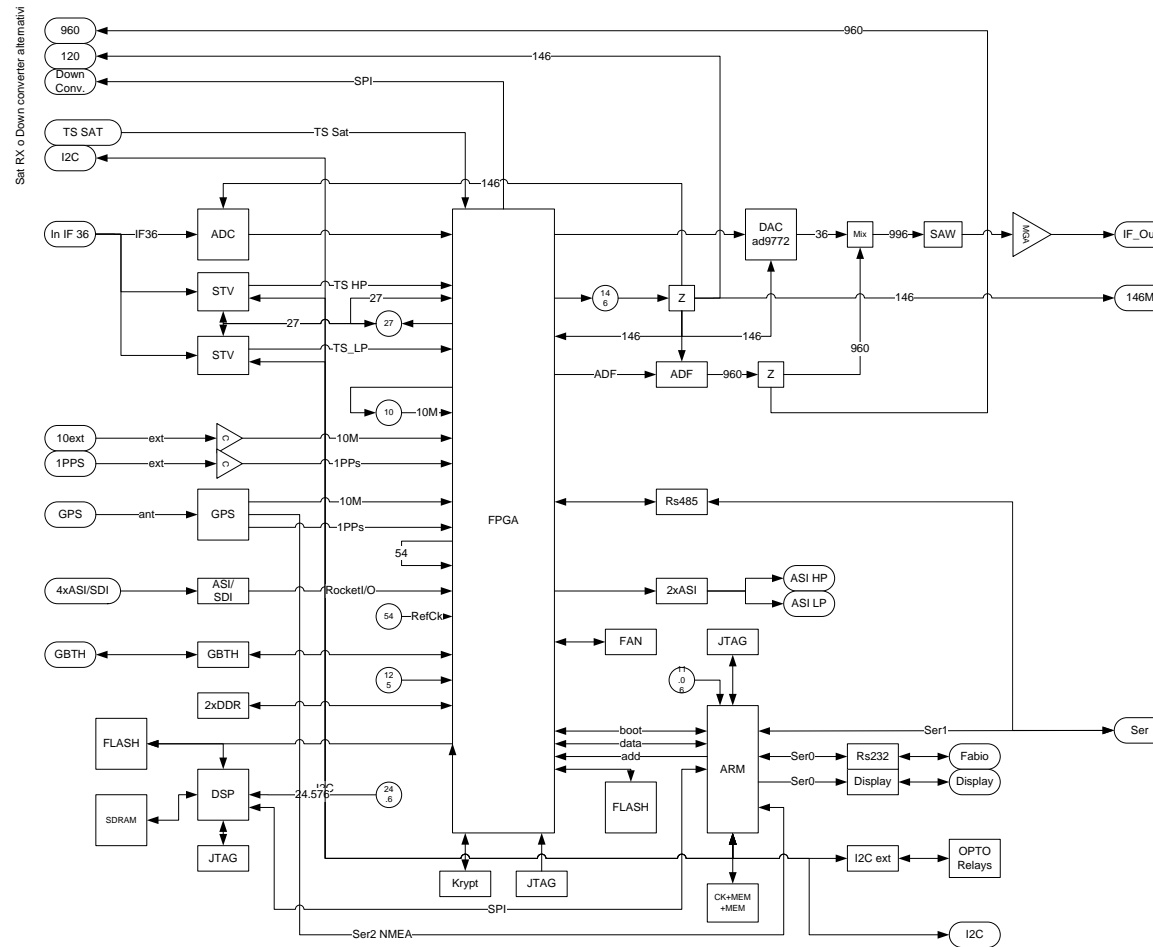


Figure 2 Echo down-converter block diagram

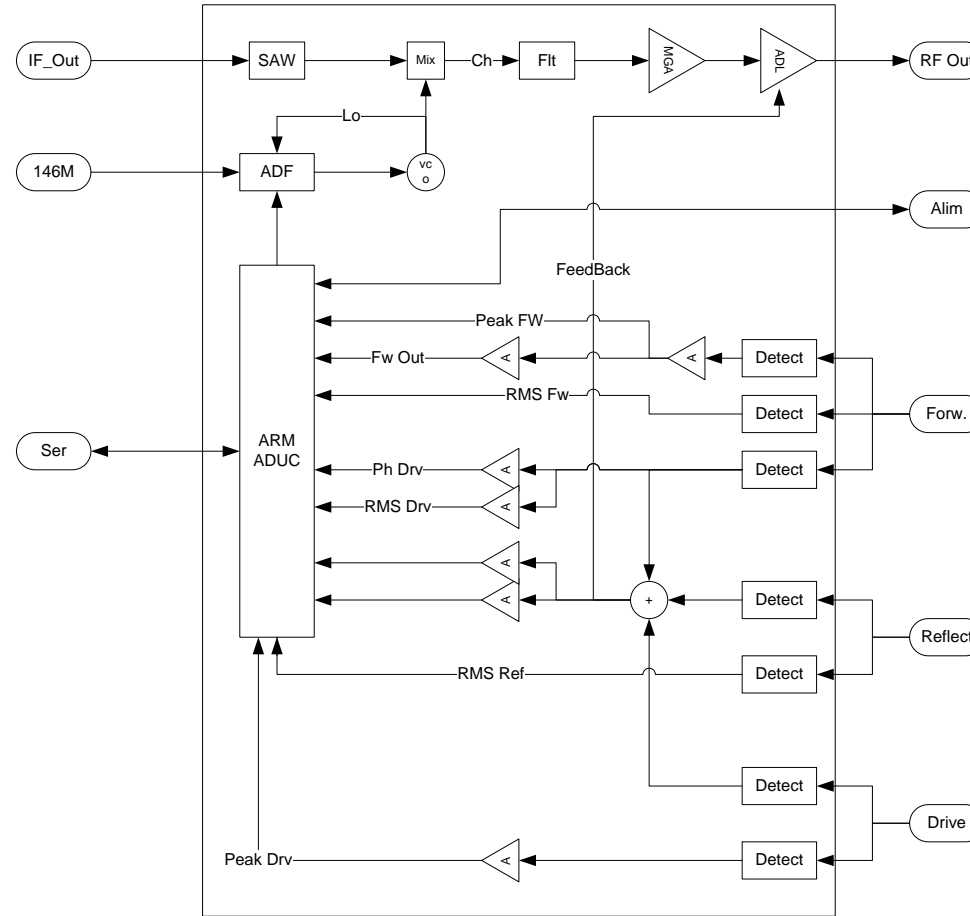
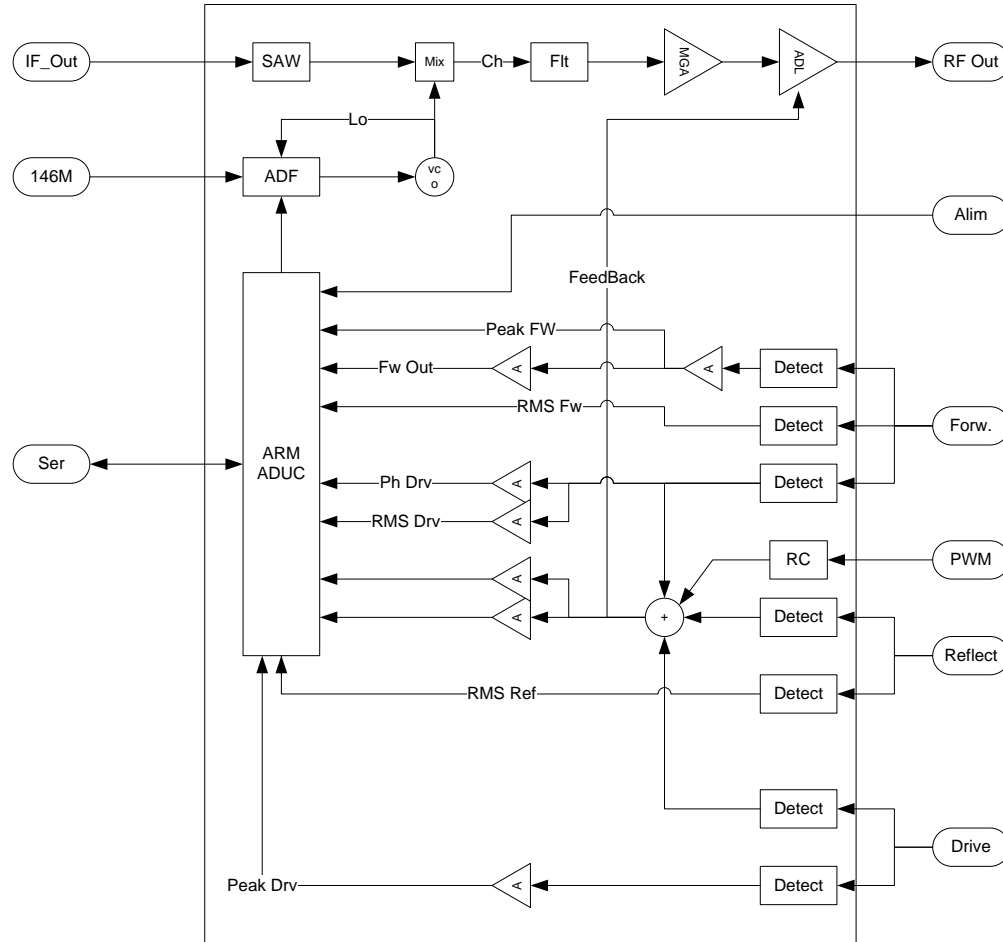


Figure 3 Echo 2 up-converter block diagram



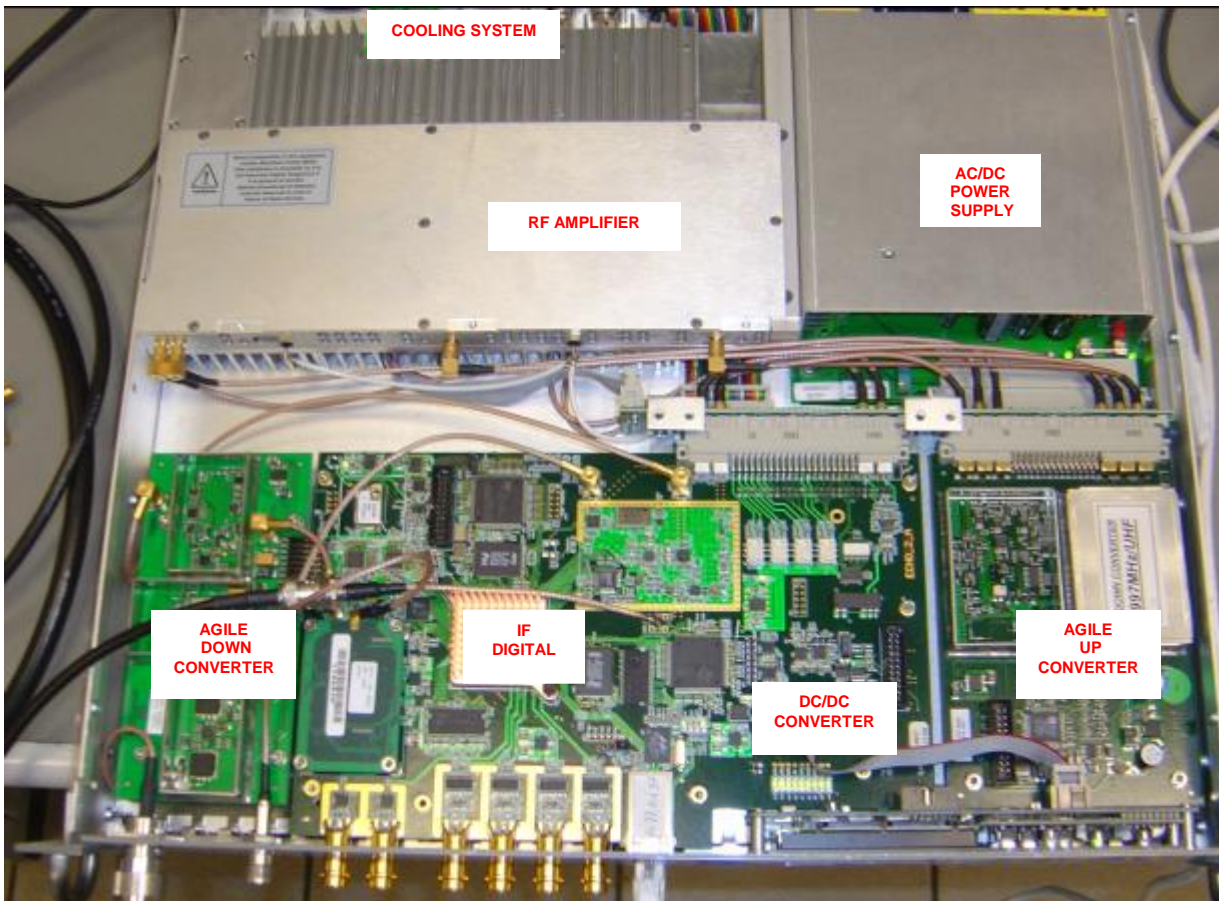
2.3 PURPOSE

This manual contains information and reference documentation on installation, operation and maintenance of the SDT ARK 1 equipment.

2.4 COMPOSITION

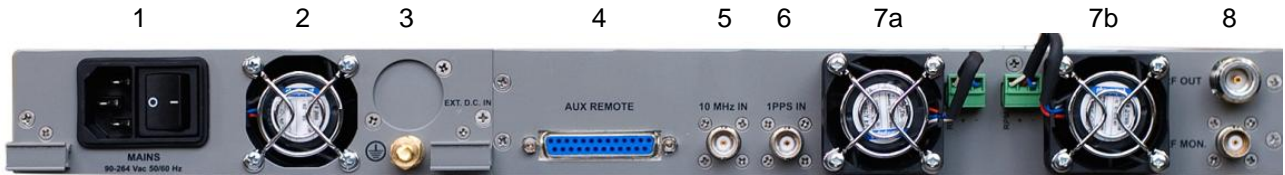
The equipment is composed of the following functional blocks:

- 1st AC/DC POWER SUPPLY
- 2nd IF DIGITAL
- 3rd RF AMPLIFIER
- 4th COOLING SYSTEM
- 5TH AGILE DOWN CONVERTER
- 6TH AGILE UP CONVERTER
- 7TH DC/DC CONVERTER



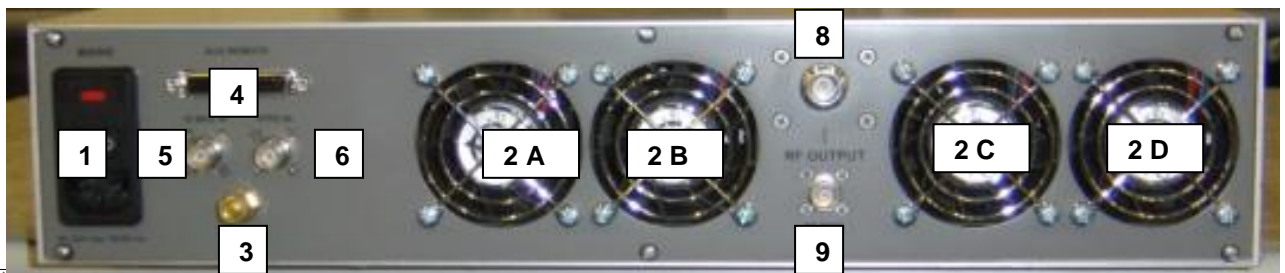
On the **rear panel** are located the following functions/connectors (from left to right)

- 1. AC MAIN INPUT & ON/OFF SWITCH
- 2. AC/DC FAN
- 3. GROUND REFERENCE
- 4. AUX REMOTE
- 5. 10 MHz INPUT
- 6. 1 PPS INPUT
- 7. FANs EQUIPMENT COOLING (a & b)
- 8. RF OUTPUT
- 9. RF MONITOR



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- 10. AC MAIN INPUT & ON/OFF SWITCH
- 11. FANs
- 12. GROUND REFERENCE
- 13. AUX REMOTE
- 14. 10 MHz INPUT
- 15. 1 PPS INPUT
- 16. RF OUTPUT
- 17. RF MONITOR



2.5 TECHNICAL PERFORMANCE

2.5.1 GENERAL

Available standards	ATSC	
Operating frequency range	VHF Band I: 45 - 90 MHz VHF Band III: 174 - 260 MHz UHF Band IV & V: 470 - 860 MHz	
IF Frequency	36 MHz +/- 4	
IF Bandwidth	6 -7- 8 MHz (TBS)	
Time delay	7 us typ.	
ECHO Delay correction capability (Equipment time delay NOT included)	20 us max	
Correction speed	40 mSec	(echoes from +10 to -20 dB)
	2 Sec	(echoes less than -20 dB)
Cooling	Forced Air	
Main supply	230 V AC	
MAX Power consumption	750 VA	(SDT 201 UB - ARK 1)
	250 VA	(SDT 500 UB - ARK 1)
	200 VA	(SDT 200 UB - ARK 1)
	150 VA	(SDT 100 UB - ARK 1)

2.5.2 MECHANICAL AND ENVIRONMENTAL

Dimensions	483 mm (W) x 400 mm (D) x 45/90 mm (H)
Weight	10/18 kg approx.
Operating temperature	from 0° C to + 45° C
Storage temperature	from -10° C to +60° C
Maximum relative humidity	90%, non condensing

2.5.3 INPUT PARAMETERS

2.5.3.1 RF

Input connector	N female
Input Signal	8VSB_ATSC_RF
Input Level	-45 dBm ± 20 dB
Impedance	50 Ω

2.5.3.2 ASI 1, 2, 3, 4

Input Signal	MPEG-2 Transport Stream, ASI format
Input Level	800 mV (±10%)
Data rate	270 MB/s
Data rate error	±3 ppm
Input connector	BNC
Input impedance	75 Ω

2.5.3.3 GPS

Input connector	TNC female
Antenna power supply	from transmitter, 5V DC
Sensitivity	-185dBW

2.5.3.4 10 MHz

Input connector	BNC female
Input Impedance	50 Ohm
Level	2 Vpp

2.5.3.5 1 PPS

Input connector	BNC female
Input Impedance	50 Ohm
Level	TTL
Pulse width	100us

2.5.3.6 OPTOCOUPPLERS (4)

Input connector	SUB-D 25p Female
Max current	-5 mA

2.5.4 OUTPUT PARAMETERS

2.5.4.1 RF GENERAL

RF OUTPUT Connector	N Female
Impedance	50 Ω
RF monitor connector	BNC
Impedance	50 Ω

2.5.4.2 RF ATSC MODE

Nominal output power SDT 500 UB - ARK 1	20	W RMS
Nominal output power SDT 200 UB - ARK 1	8	W RMS
In-Band Flatness	± 0.5	dB
Shoulders at $F_0 \pm 4.3$ MHz	≤ -36	dB
	With digital pre-correction inserted	
Spurious emission (with output filter)	< -60	dBc
Harmonic emission (with output filter)	< -60	dBc

2.5.4.3 ASI OUT HP

Output Signal	MPEG-2 Transport Stream, ASI format	
Output Level	800	mV ($\pm 10\%$)
Data rate	270	MB/s
Data rate error	± 3	ppm
Input connector	BNC	
Input impedance	75 Ω	

2.5.4.4 ASI OUT LP

Output Signal	MPEG-2 Transport Stream, ASI format	
Output Level	800	mV ($\pm 10\%$)
Data rate	270	MB/s
Data rate error	± 3	ppm
Input connector	BNC	
Input impedance	75 Ω	

2.5.4.5 RELAYS

N° outputs	<ul style="list-style-type: none"> • 4
Connectors	<ul style="list-style-type: none"> • SUB-D 25p Female
Max voltage	<ul style="list-style-type: none"> • 125VAC / 60VDC @ 0,3A • 30VDC @ 1A
Modes (TBD)	<ul style="list-style-type: none"> • Relay 0: <ul style="list-style-type: none"> ○ Alarm mask: <ul style="list-style-type: none"> ▪ Off: no alarms; ▪ On: one or more alarm conditions. ○ Mode: <ul style="list-style-type: none"> ▪ Off: Mode A; ▪ On: Mode B. • Relay 1: <ul style="list-style-type: none"> ○ Alarm mask: <ul style="list-style-type: none"> ▪ Off: no alarms; ▪ On: one or more alarm conditions. ○ Mode: <ul style="list-style-type: none"> ▪ Off: Mode A; ▪ On: Mode B. • Relay 2: <ul style="list-style-type: none"> ○ Alarm mask: <ul style="list-style-type: none"> ▪ Off: no alarms; ▪ On: one or more alarm conditions. • Relay 3: <ul style="list-style-type: none"> ○ Alarm mask: <ul style="list-style-type: none"> ▪ Off: no alarms; ▪ On: one or more alarm conditions.

2.5.5 DIGITAL MODULATION

Modulation Modes	8VSB
Inputs	2 ASI + 2 SSI
Input Data Rate	up to 19.39 Mbps
Channel Bandwidth	6 MHz
Symbol Rate	10.762 MSymbol/sec
Bandwidth Efficiency	3 Bits/symbol
PCR Restamping and Del. Null Packet	Included
Frequency Step	1 Hz
Test Signal	PRBS, CW
GPS Receiver	Integrated
Adaptive Digital Precorrector	Integrated

2.5.6 MANAGEMENT

2.5.6.1 GIGABIT ETHERNET

Connector	RJ45
Standard supported	IEEE 802.3

2.5.6.2 REAR SUB-D 25P CONNECTOR

N° connectors	• 1	
Connector	• SUB-D 25p Female	
Pinout	1	N.C.
	2	IN_OPTO_1
	3	IN_OPTO_2
	4	IN_OPTO_3
	5	OPTO_GND
	6	N.C.
	7	N.C.
	8	N.C.
	9	RS232 Tx
	10	RS232 Rx
	11	N.C.
	12	IN_OPTO_0
	13	N.C.
	14	N.C.
	15	N.C.
	16	FWD_OUT
	17	RL_COM0
	18	RL0
	19	RL_COM1
	20	RL1
	21	RL_COM2
	22	RL2
	23	RL_COM3
	24	RL3
	25	RS232 GND

2.6 FUNCTIONAL DESCRIPTION

2.6.1 GENERAL

The ARK 1 receives on its inputs An RF signal or four MPEG-2 Transport Stream in serial ASI format. The RF input signal is converted into a standard 36 MHz IF frequency by a fully agile down converter. This signal is digitally filtered, elaborated, precorrected and then presented at 997 MHz to the channel converter.

The channel converter provides to generate the final frequency in a fully agile mode.

The LO with a very low phase noise is locked to the 146 MHz high stability reference.

Reference signal coming from GPS board allow precision offset

The switching power supply module generates the following voltages to feed the different circuits: +32 V, + 24V.

2.6.2 RF AMPLIFICATION

The signal coming from the agile up converter goes to the RF amplifier section. The RF amplification is done by class A and AB stages.

Out of the final stage, the RF signal passes through a directional coupler. The directional coupler detects samples of direct and reflected power and passes this information to the check function

SDT ARK 1 ECHO

Software Defined Transposer / Re-Transmitter Gap Filler / Echo canceller

OPERATION MANUAL

3 OPERATIONS

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3.1 INSTALLATION

3.1.1 INSTALLATION PROCEDURE CHECK OFF

Some procedures in this section contain steps preceded by a check box. Fill out or initial each step as it is completed.

3.1.2 SITE SELECTION

Use the following specifications to establish criteria for site selection and equipment installation.

3.1.2.1 MOUNTING SPECIFICATIONS

- **Mount.**
 - A floor-standing, open rack or permanent structure with vertical mounting members conforming to EIA Standard 310 is recommended.
- **Environment.**
 - Ambient temperature: 0°C to +45°C (room temperature or below is ideal)
 - Relative humidity: 10% to 90%, non condensing
- **Clearance.**
 - No clearance is required for sides.
 - At least 1 U free space above and below the equipment is recommended to obtain adequate cooling.
 - Access to the front requires approximately 20 centimeters clearance for making connections.
 - Access to the rear requires approximately 20 centimeters clearance for making connections.

3.1.3 UNPACKING

The containers used to ship a SDT ARK 1 transposer / re-transmitter will vary with the number of options ordered. If there is any external damage to the containers, inform the shipping company and request that an agent be present during unpacking. Carefully unpack the boxes (no special instructions are required) and note any damage making pictures if possible.

After all items are unpacked, check the equipment received. If there are any damages or shortages, notify the carrier and Screen Service BT immediately.

3.1.4 EQUIPMENT MOUNTING

Install the transmitter in an EIA (Standard 310) 19 inch rack as follows:

- ❑ Place the equipment into the rack (2 units), align the mounting holes, and secure in place with four rack screws.
- ❑ If configured to operate, make sure the "LINE" switch on the front panel of the POWER SUPPLY & METERING module is OFF.
- ❑ Connect the power cord to an operating power source.

Note: We warmly suggest the installation of spike suppressors, line conditioners, isolation transformers or other devices useful to protect the equipment.

- ❑ Connect the transmitting antenna cable to the "RF OUTPUT" connector in the rear panel.
- ❑ Connect the, RF, GPS, ASI, SNMP PORT, AUX REMOTE, 10 MHz, 1PPS and the IF monitor to the relevant input / output connectors on the front and rear panel.
- ❑ REMEMBER TO CONNECT the equipment to the GROUND using the relevant screw located on the rear panel.

3.1.5 FRONT PANEL

1 2 3 4 5 6 7 8 9 10



ARK 1 Front Panel

n.	Label	Description
1	RF INPUT	
2	GPS IN	
3	ASI OUTPUT HP	
4	ASI OUTPUT LP	
5	ASI in 1	
6	ASI in 2	
7	ASI in 3	
8	ASI in 4	
9	GBE 1	
10	LCD Display	

3.1.5.1 REAR PANEL

1 2 3 4 5 6 7a 7b 8

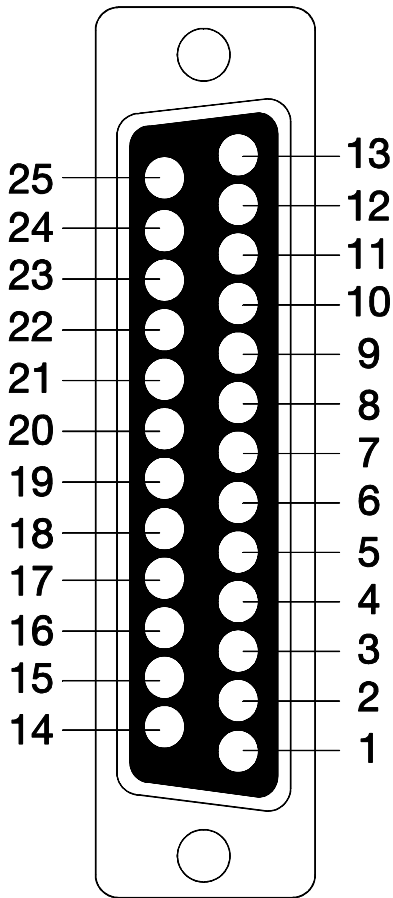


ARK 1 Rear Panel

n.	Label	Description
1	AC INPUT	
2	AC/ DC FAN	
3	GND	
4	AUX REMOTE	
5	10 MHz INPUT	
6	1 PPS INPUT	
7,a,b	FANs EQUIPMENT	
8	RF OUTPUT	N Type (50W) female connector, 50 Ω
9	RF MONITOR	BNC Type female connector, 50 Ω

3.1.5.2 REAR PANEL CONNECTORS

AUX REMOTE CONNECTOR
Sub-D 25 Male.



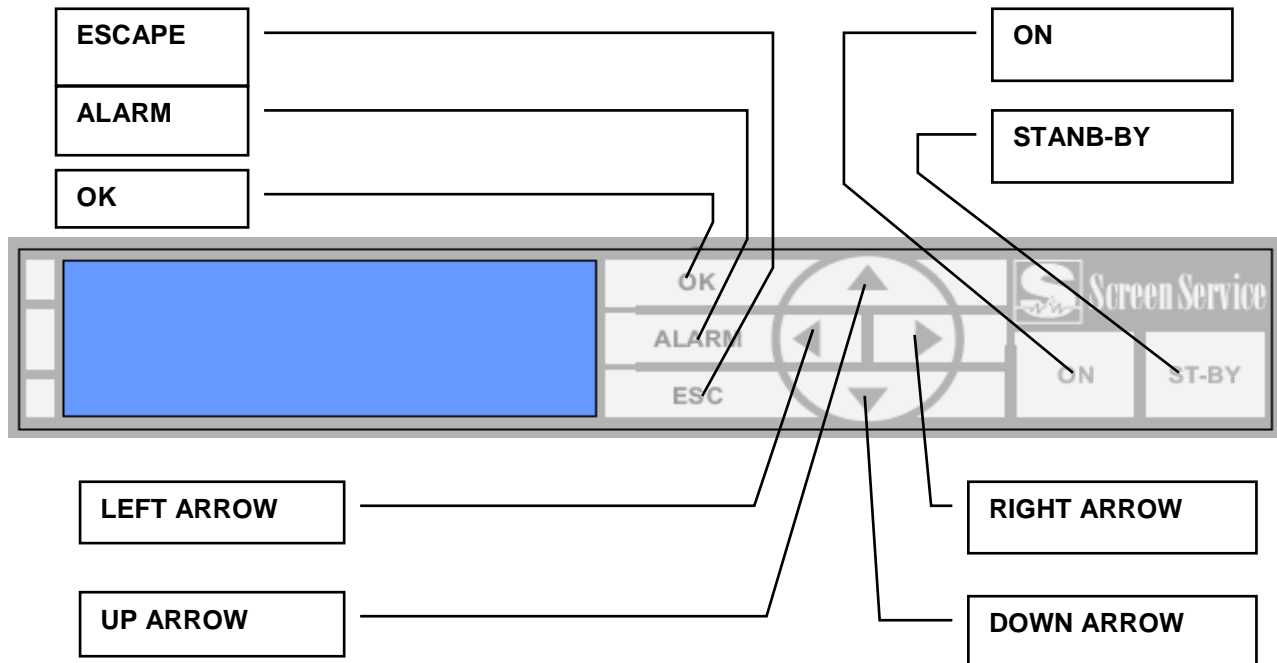
PIN	ASSIGNMENT	REMARKS
1		
2	Not used	
3	Alarm reset	in opto active to gnd
4	Remote STBY	in opto active to gnd
5	GND OPTO	
6		
7		
8		
9	SERIAL 485/232	
10	SERIAL 485/232	
11		
12	RF OFF	in opto active to gnd
13		
14		
15		
16		
17	COM RL 0	NOR. CLOSED
18	RL 0	
19	COM RL 1	NOR. CLOSED
20	RL 1	
21	COM RL2	NOR. CLOSED
22	RL 2	
23	COM RL 3	NOR. CLOSED
24	RL 3	
25		

Figure 3.1-1: AUX REMOTE CONNECTOR

3.1.6 MULTIMETER

The following paragraphs describe the local user interface for **ARK1**.

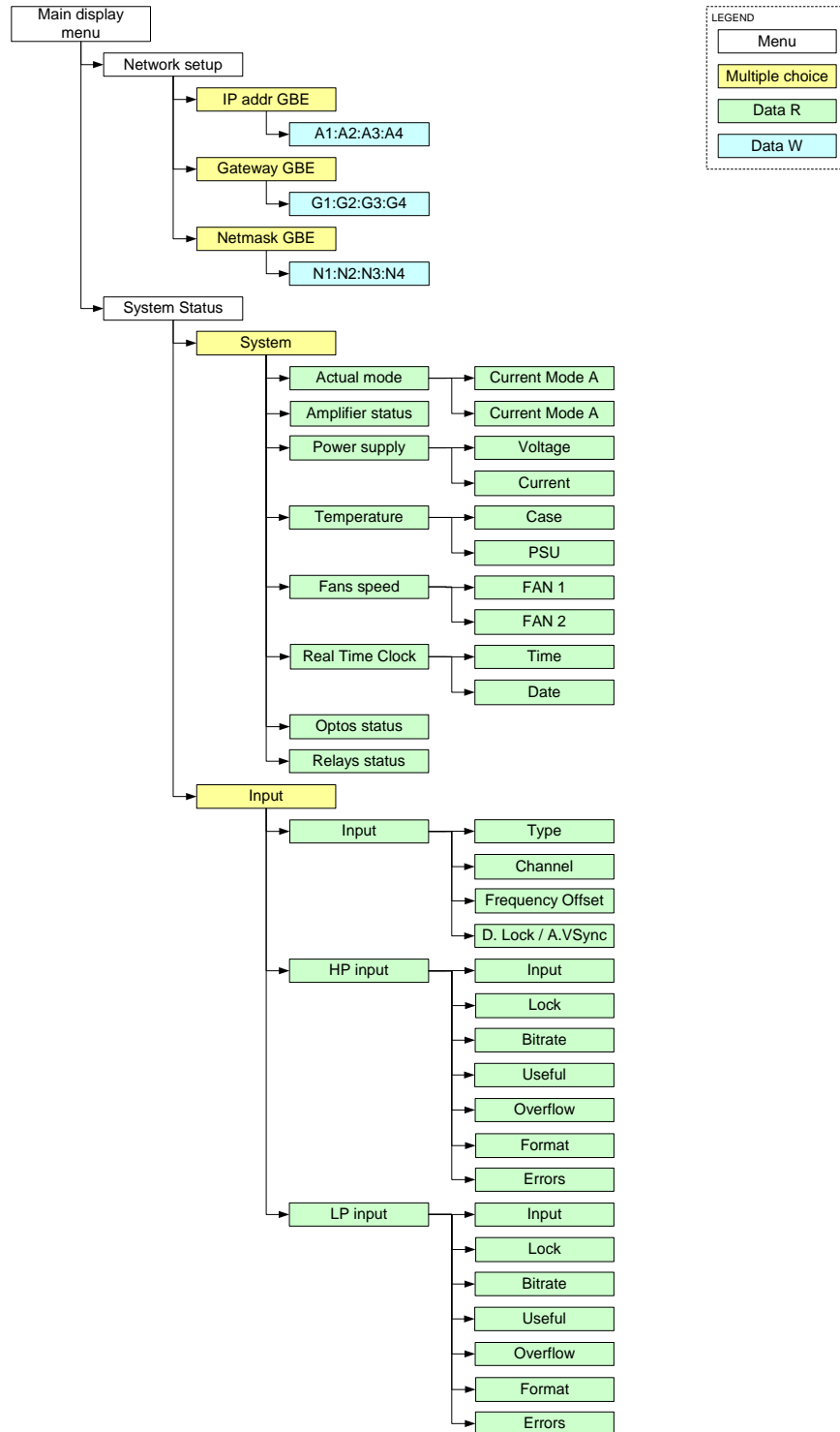
This user interface is composed of LCD Display, seven buttons and two status leds. Here below is depicted the ARK1 Front Panel.

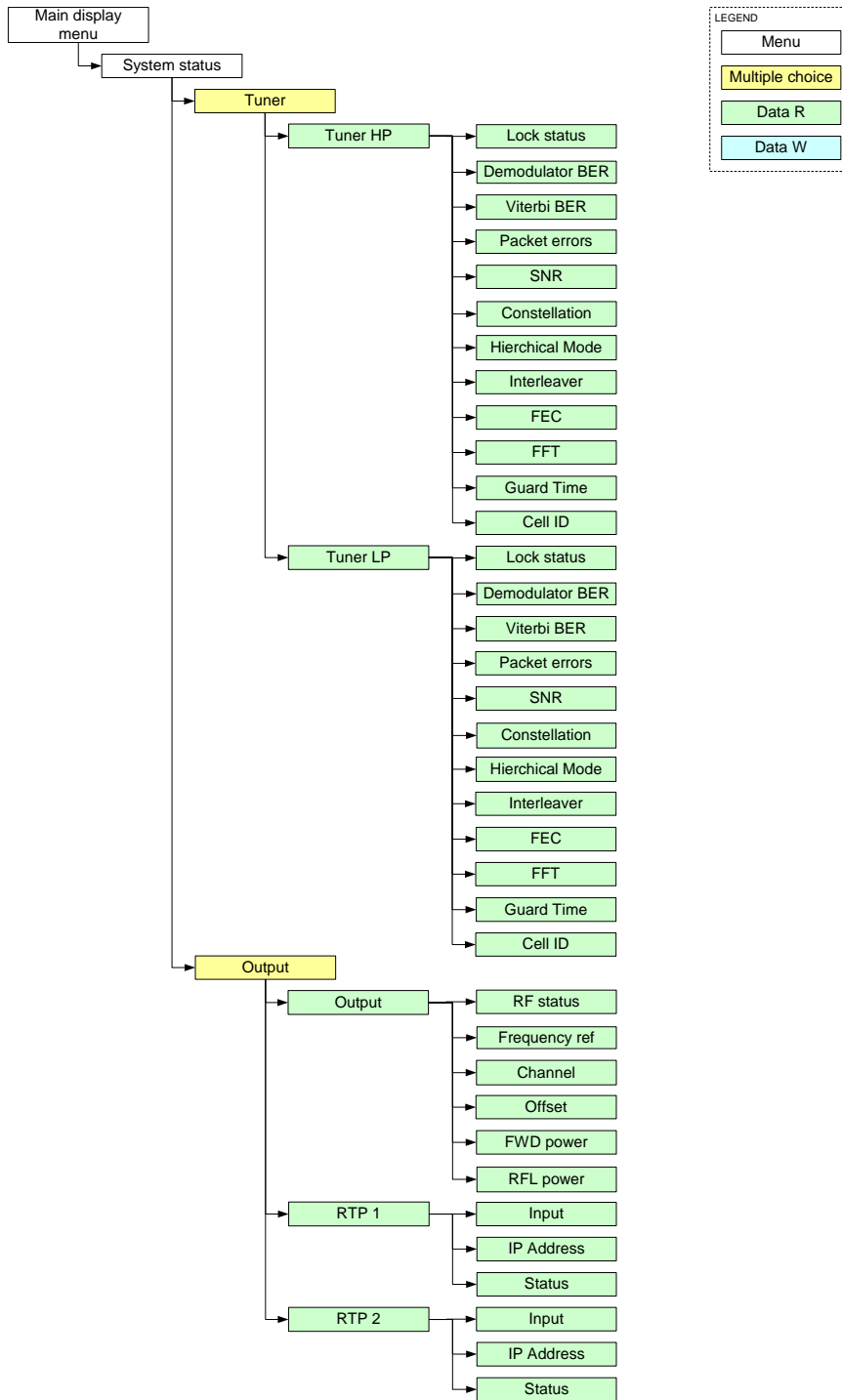


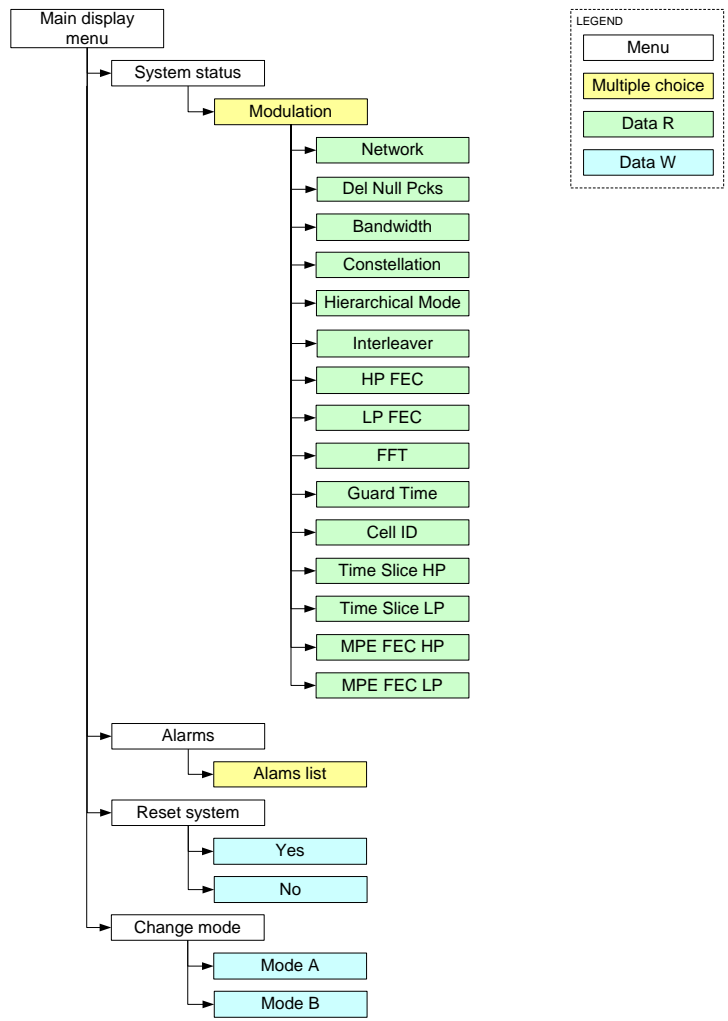
- **STAND-BY**: push this button (lie in wait for two seconds) to put the equipment on STAND-BY mode. The orange led lights up and the written **STAND-BY MODE** appears on the display. The remote Stand-by mode is enforceable only if on JAVA interface this feature is enabled.
- **ON**: push this button (lie in wait for two seconds) to turn on the equipment. The green led lights up and the **MAIN MENU** is displayed.
- **OK**: push this button to select or to confirm the subwindow or the value respectively. Touching the screen with a finger the green led lights up.
- **ESC**: push this button to quit a submenu and to return to the previous one. Touching the screen with a finger the green led lights up.
- **ALARM**: when an alarm occurs the RED LED lights up.
- **UP ARROW**: push this botton to scroll up menus or to increase a value. Touching the screen with a finger the green led lights up.
- **DOWN ARROW**: push this botton to scroll down menus or to decrease a value. Touching the screen with a finger the green led lights up.
- **LEFT ARROW**: push this botton to move within a string. Touching the screen with a finger the green led lights up.
- **RIGHT ARROW**: push this botton to move within a string. Touching the screen with a finger the green led lights up.

3.1.7 LOCAL INTERFACE MENU TREE

Figure 1. Local Interface Menu Tree







3.1.8 BOOT AND WELCOME MESSAGE

Turning on the equipment, the display shows the progress bar as follow:

```
Screen Service
ARK - ATSC/DIG-IF
System Init
Init : [          ] Wait
```

```
Screen Service
ARK - ATSC/DIG-IF
Boot FPGA
Init : [□□□      ] Wait
```

```
Screen Service
ARK - ATSC/DIG-IF
Up Converter check
Init : [□□□□     ] Wait
```

```
Screen Service
ARK - ATSC/DIG-IF
Start system
Init : [          ] Wait
```

When the boot is over, the board is ready.

```
Screen Service
ARK - ATSC/DIG-IF
Start system
Init : [□□□□□□□□ ] Ready
```

```
Screen Service
ARK - ATSC/DIG-IF
10.77.98.44
Ready
```

Press ESC to enter the main menu, otherwise after one minute waiting the idle status message appears.

3.2 IDLE MENU

ARK -DIGITAL-IF (DIG)
 DIn 23.1dBm CH:22
 Dout 23.1dBm CH:22
 UTC: 14:11 08/11/06

ARK - ATSC
 InHP: ASI1
 Out 17.1dBm CH:22
 UTC: 14:11 08/11/06

ARK -DIGITAL-IF (ANA)
 AIn 23.1dBm CH:22
 Aout 23.1dBm CH:22
 UTC: 14:11 08/11/06

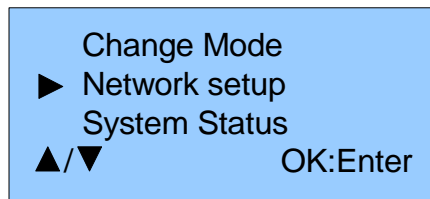
This menu appears after one minute waiting from the last touch. Information contained in the Idle Menu are described in next table.

Table 1. Local User Interface: Idle Menu

Information	Description
Operating mode	<ul style="list-style-type: none"> DIGITAL IF: Heterodyne Transposer ATSC: Re-broadcasting ATSC Modulator
AGC Mode (only in DIGITAL-IF mode)	<ul style="list-style-type: none"> ANA: Analog DIG: Digital
Input Power and Channel (only in DIGITAL-IF mode)	<ul style="list-style-type: none"> Din: digital input power and channel Ain: analog input power and channel
Output Power and Channel	Dout: digital output power and channel Aout: analog output power and channel Out: output power and channel
UTC	Time and date coming from GPS receiver

Press ESC to enter the MAIN MENU.

3.2.1 MAIN MENU



This menu shows five SUBMENUS. It is possible to view them sliding the menu up and down, with the UP or DOWN ARROWS, and to select one of them by pushing on the OK button. Submenus contained in the Main Menu are described in next table.

Submenu	Description
Network setup	Enter this submenu to change: <ul style="list-style-type: none"> • Board IP address • Gateway address • Netmask
System Status	Enter this submenu to monitor: <ul style="list-style-type: none"> • System status • Auxiliary and RF input statistics • Tuner status • Output status and settings • Actual modulation parameters All information are refreshed every 5 seconds.
Alarms	Enter this submenu to view the alarm list
Reset system	Enter this submenu to reset the device.
Change mode	Enter this submenu to change operating mode (A or B).

3.3 LCD alarms

Through the LCD Alarms mask it is possible to select which alarm has to be notified on LCD display. The alarm button is lighted and when an alarm condition occurs, alarms status is displayed in the Alarms submenu.

The following table lists the alarms messages displayed on LCD, associated to the corresponding alarm (refer to [Alarms](#) paragraph for further information about alarms and their masks).

Alarms descriptions list

Table 2

Alarm	Alarm Message
Up converter Osc. Unlock	UPCV not locked
PS Voltage out of range	PS V out of range
PS Current out of range	PS I out of range
Absolute Power Limiter	Abs. pwr high
Communication error	UPCV dialog error
Temperature High Alarm	Temperature high
Temperature Level-3dB	Temp alarm (-3dB)
Temperature High Warning	Temp warning
Forward Power High	FWD power high
Forward Power Low Warning	FWD low warning
Forward Power Low Alarm	FWD low alarm
Reflex Power High	RFL power high
Fan Speed	Fans warning
S/N level	RF in S/N low
GPS Lock	GPS not locked
GPS Communication Error	GPS dialog error
Signal 10 MHz Lock	10MHz not detected
Signal 146 MHz Lock	120MHz not detected
Signal 960 MHz Lock	960MHz not detected
Down Converter Osc. Unlock	DWCV not locked
No RF Input	In. not detected
RF Input Squelch	RF in Squelch
RF Digital Ber Alarm	RF BER high
File System Error	FS wrong
Bad File in File system	File error
ATSC 1PPS Lock	PPS not detected
ATSC PPS Phase	PPS phase wrong
ATSC System Delay	Sys delay wrong
ATSC No MIP	MIP not detected

<i>Alarm</i>	<i>Alarm Message</i>
ATSC No Input	In. not detected
FPGA Boot alarm	FPGA boot err
Warm up alarm	Sys. warm up

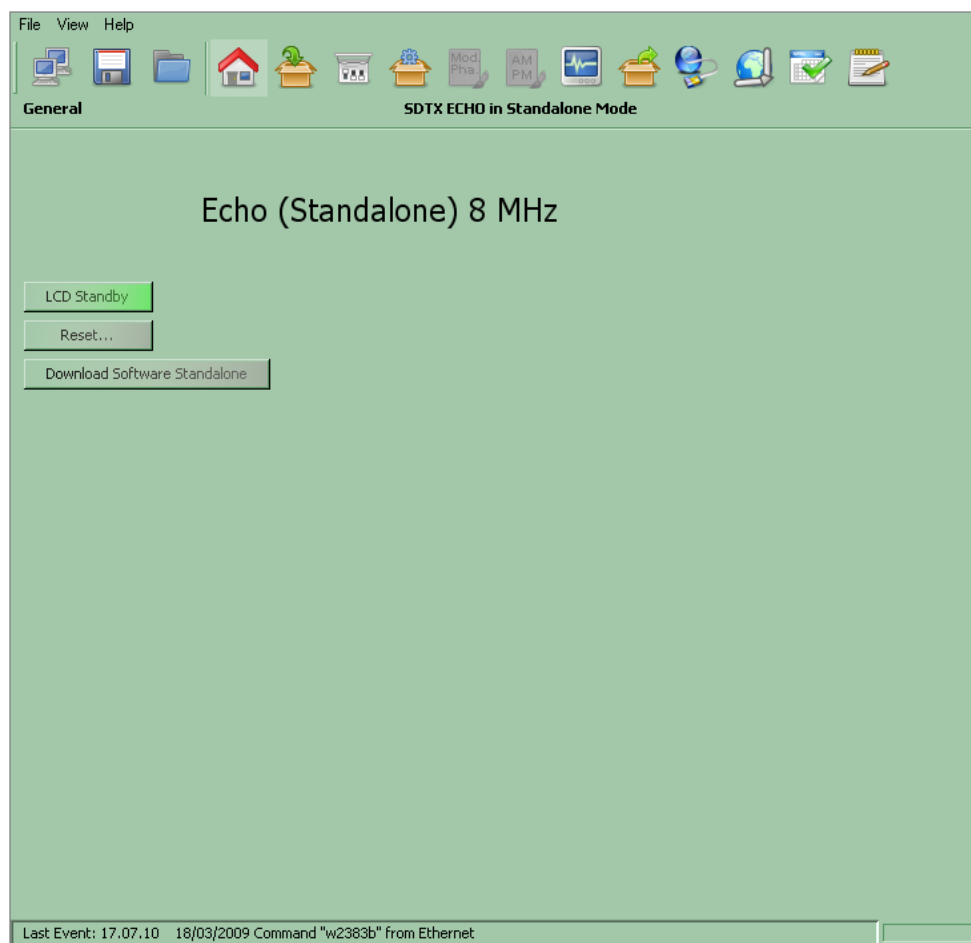
3.4 JAVA REMOTE GRAPHIC USER INTERFACE

The Java Graphic User Interface, stored in the board File System, is downloaded to the local PC every time the user connects to the board with a Web Browser. A proper Java Virtual Machine is needed; refer to the Appendix B for a description of supported Java and Internet Browsers.

3.4.1 JAVA INTERFACE OVERVIEW

The following figure shows the main control switch of the Java User Interface. It allows the switching between control pages for settings and monitoring the device.

Figure 2. Java main control switch



The following controls are provided:

System commands bar allows the enabling of the following commands:

- **Connect:** connects/disconnects the local machine to Ark1 system
- **Save:** allows to save the device configuration.
- **Load:** allows to load the last saved device configuration.

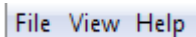
Figure 3. System commands bar

Operation pages bar allows to switch between the following operative sections:

- **General:** allows the enable the Stand-by mode through the LCD Button, to reset the device and to locally download the *.jar file.
- **Input:** shows ASI and GBE input statistics (Re-broadcasting Hierarchical ATSC Modulator).
- **Tuner:** allows to monitor the RF input and to configure operative modes (Analog/Digital Television Heterodyne Transposer and Re-broadcasting Hierarchical ATSC Modulator).
- **Modulation:** allows to monitor and to set the ATSC modulation parameters (Re-broadcasting Hierarchical ATSC Modulator).
- **Mod. Pha.:** allows to manage linear pre-correction curves.
- **AM/PM:** allows to manage AM/PM pre-correction curves.
- **Outputs:** allows to set output parameters, specific for each operative mode, and to monitor the hardware status (Analog/Digital Television Heterodyne Transposer and Re-broadcasting Hierarchical ATSC Modulator).
- **Network:** allows the Network management and the RTP in/out parameters setting.
- **GPS:** shows received GPS statistics.
- **Alarms:** provides a grid where to set alarms masks for LCD, Graphic User Interface, Events, Relays, Traps and RF Off.
- **Events:** shows the board events.

Figure 4. Operation pages bar

System menu allows the access to the same commands and pages as System commands and Operation pages bars plus management options, help and version windows (refer to [Option sub-menu](#) paragraph).

Figure 5. System menu

A brief description of all the provided indicators and controls follows in the next paragraphs. The column named **R/H** specifies if the indicator/command belongs to the Re-broadcasting ATSC modulator mode rather than belonging to the Analog/Digital Television Heterodyne Transposer mode.

3.4.1.1 General

Click on General button icon, highlighted in the next figure, to access the general window.



Figure 6. General window

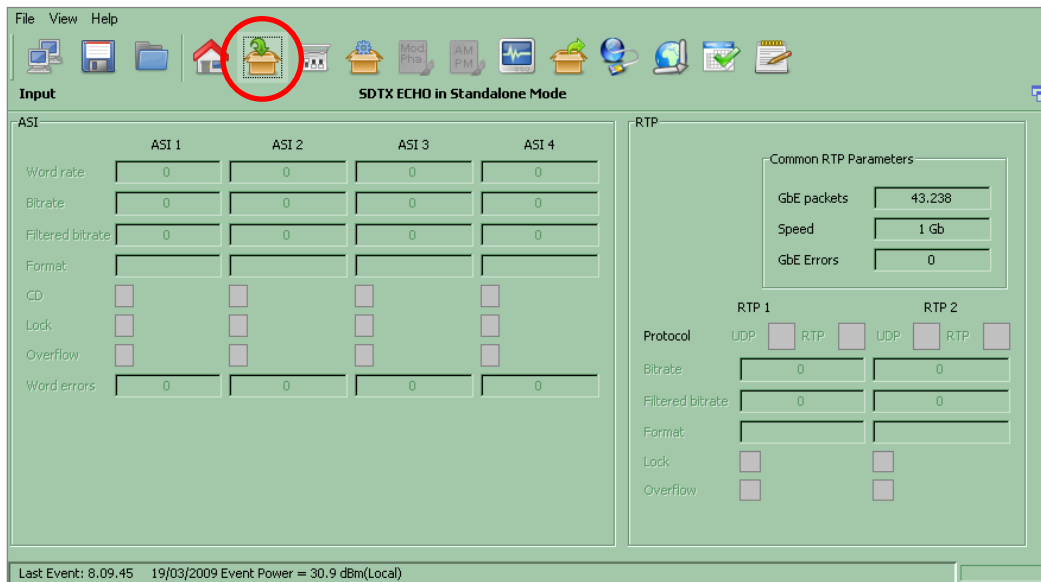
The General window provides a general description of the device and allows the access to a subset of commands through the following button icons:

- **Reset:** resets the device.
- **LCD Standby:** enables the LCD Stand-by button.
- **Download Software Standalone:** performs a local download of the *.jar file (refer to [Download Software Standalone](#) paragraph).

3.4.1.2 Input

Click on Input button icon, highlighted in the next figure, to access the input statistics window.

Figure 7. Input window



The Input window allows the monitoring of auxiliary inputs of Re-broadcasting ATSC Modulator. Input Transport Stream monitoring of four ASI and two RTP channels on GBE port are provided.

Table 3. Input window

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
ASI	Word rate	ASI input word rate. 10 bit word rate of ASI input (Ref. to CEI EN 50083-9).	Approximately 27 Mword/s	R
ASI	Bitrate [bit/s]	ASI input bitrate.		R
ASI	Filtered bitrate[bit/s]	Bitrate actually used by the modulator.	<ul style="list-style-type: none"> • Zero when the input is not selected • Equal to the total bitrate, when Delete Null Packets disabled • Less than total bitrate, when Delete Null Packets enabled 	R
ASI	Format	Format of received TS Packets (Ref. to CEI EN 50083-9).	<ul style="list-style-type: none"> • 188 Bytes • 240 Bytes 	R
ASI	CD	ASI Carrier detect.	<ul style="list-style-type: none"> • Green: Detected • Grey: Not detected 	R
ASI	Lock	ASI lock status. The input Transport Stream is unlocked when more than two consecutive Sync Byte are missed then five consecutive Sync Bytes must occur to regain the lock (Ref. to ETSI ETR-291)	<ul style="list-style-type: none"> • Green: Locked • Grey: Not locked 	R
ASI	Overflow	ASI input overflow indicator. This alarm condition occurs when the input bitrate exceeds the capability of the modulation (Ref. to ETSI EN 300 744).	<ul style="list-style-type: none"> • Red: Alarm • Grey: No alarms 	R

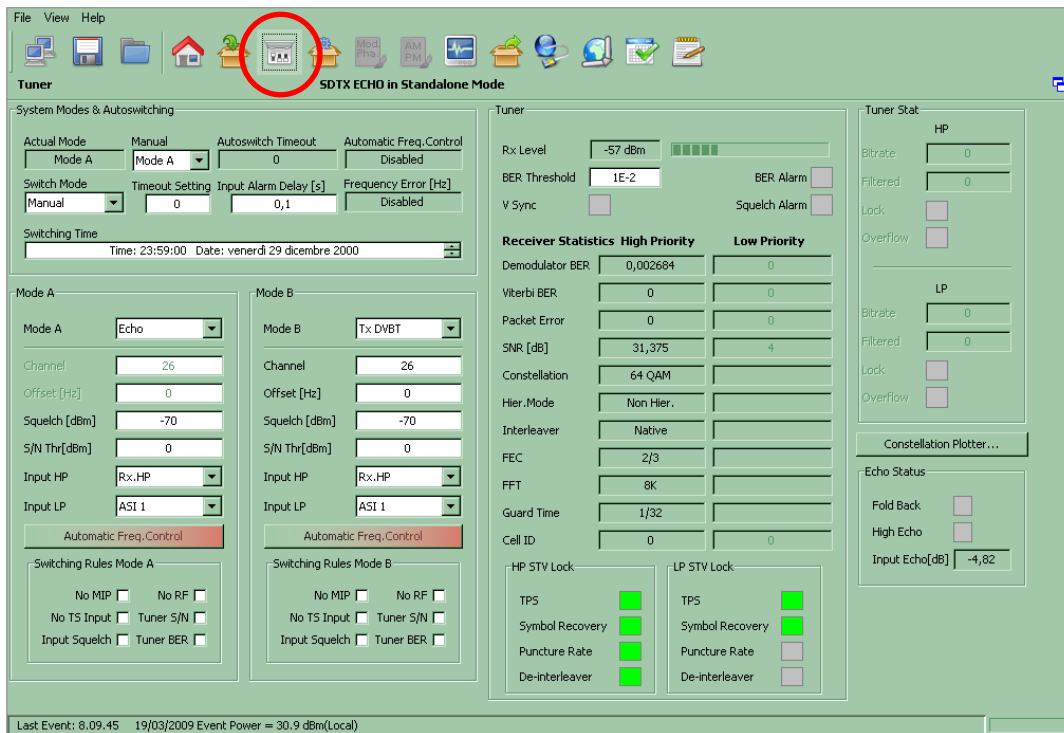
Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
ASI	Word Errors	Total amount of ASI wrong words received.		R
RTP	Protocol	Ethernet input packets protocol.	<ul style="list-style-type: none"> • UDP • RTP 	R
RTP	Bitrate [bit/s]	Bitrate of TS from Ethernet input.		R
RTP	Filtered bitrate[bit/s]	Bitrate actually used by the modulator.	<ul style="list-style-type: none"> • Zero when the input is not selected • Equal to the total bitrate, when Delete Null Packets disabled • Less than total bitrate, when Delete Null Packets enabled 	R
RTP	Format	Format of received TS Packets (Ref. to CEI EN 50083-9).	<ul style="list-style-type: none"> • 188 Bytes • 240 Bytes 	R
RTP	Lock	TS lock status. The input Transport Stream is unlocked when more than two consecutive Sync Byte are missed then five consecutive Sync Bytes must occur to regain the lock (Ref. to ETSI ETR-291)	<ul style="list-style-type: none"> • Green: Locked • Grey: Not locked 	R
RTP	Sequence error	Ethernet input Sequence error alarm status. This alarm condition occurs when an error in the sequence of input packets at IP level occurs.	<ul style="list-style-type: none"> • Red: Alarm • Grey: No alarms 	R

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
RTP	Overflow	GbE input overflow alarm status. This alarm condition occurs when the input bitrate exceeds the capability of the modulation (Ref. to ETSI EN 300 744).	<ul style="list-style-type: none"> • Red: Alarm on • Grey: Alarm off 	R
RTP	GBE packets	Total amount of good Ethernet frames received.		R
RTP	Speed	Ethernet connection speed. No duplex information is provided.	<ul style="list-style-type: none"> • 10 Mbit/s • 100 Mbit/s • 1 Gbit/s 	R
RTP	GBE errors	Total amount of bad Ethernet frames received.		R

3.4.1.3 TUNER

Click on Tuner button icon, highlighted in the next figure, to access the tuner window.

Figure 8. Tuner window



This window provides commands that allow the selection of working modes, the management and selection of inputs, and the monitoring of quality and level of input RF signals.

The **Tuner** window is divided in the following boxes:

- **System Mode & Autoswitching;**
- **Mode A;**
- **Switching Rules Mode A;**
- **Mode B;**
- **Switching Rules Mode B;**
- **Tuner;**
- **Tuner Stat.**

3.4.2 Modes management

These commands allow the setting of working modes and switch selection rules.

The following table shows the commands and indicators available for modes management.

Table 4. Modes management

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
System Mode & Autoswitching	Actual mode	Current operating mode.	<ul style="list-style-type: none"> Mode A Mode B 	R/H
System Mode & Autoswitching	Manual	Selector of mode used when Manual Switch mode is selected.	<ul style="list-style-type: none"> Mode A Mode B 	R/H
System Mode & Autoswitching	Switch mode	<p>Selector of the switch mode rules.</p> <p>Switching modes rules</p> <p>Refer to _____ paragraph for a detailed description of the switching rules and conditions.</p>	<ul style="list-style-type: none"> Manual Auto Opto Time 	R/H
System Mode & Autoswitching	Autoswitch Timeout	When Auto Switch Mode is enabled shows the time to wait for switching. If the used input regains lock before the countdown reaches 0 the switch is blocked and device keeps the same mode.	Countdown from 255 to 0	R/H
System Mode & Autoswitching	Timeout setting	<p>Time to wait for switching.</p> <p>Switching modes rules</p> <p>Refer to _____ paragraph for a detailed description of the switching rules.</p>	Countdown from 255 to 0 second	R/H
System Mode & Autoswitching	Switching Time	Time and date of modes switching when Time Switch mode is enabled.		R/H

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
System Mode & Autoswitching	Frequency Error [Hz]	Frequency error automatically corrected. Note: When the frequency error exceeds the dynamics, STV might loose the lock.	<ul style="list-style-type: none"> Out of range: input frequency error exceeds 166 KHz dynamics. Set a +/- 166 KHz input freq. offset in order to true up the dynamics. Min: -83 KHz Max: +83KHz 	R/H
System Mode & Autoswitching	Automatic Freq. Control	Shows Automatic Freq. Control status.	<ul style="list-style-type: none"> Enabled Disabled 	R/H
Mode A / Mode B	S/N Thr [dBm]	Signal to Noise alarm threshold	<ul style="list-style-type: none"> Min: -10 dBm Max: -50 dBm 	R/H
Mode A / Mode B	Automatic Freq. Control	Enabling button of the AFC (refer to Appendix A for further information)	<ul style="list-style-type: none"> Enabled Disabled 	R/H
Mode A / Mode B	Mode A / B	Selector of working mode. Three different working modes are provided: <ul style="list-style-type: none"> Analog Television Heterodyne Transposer; Digital Television Heterodyne Transposer; Re-broadcasting ATSC Modulator. 	<ul style="list-style-type: none"> Rep. Analog Rep. Digital Tx ATSC 	R/H

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
Mode A / Mode B	Channel	Selector of the UHF input channel used as RF input.	<ul style="list-style-type: none"> Min: 21 Max: 69 	R/H
Mode A / Mode B	Offset [Hz]	Frequency offset from the channel center frequency of the RF input. 1 Hz step variation.	<ul style="list-style-type: none"> Min: -4 MHz Max: 4 MHz 	R/H
Mode A / Mode B	Squelch [dBm]	Squelch alarm threshold expressed in dBm. Input is squelched when the RF level is under this treshold.	<ul style="list-style-type: none"> Min: -70 Max: -20 	R/H
Mode A / Mode B	Input HP	Selector of TS input for re-modulator used for Not Hierarchical or High Priority.	<ul style="list-style-type: none"> ASI 0 	R
Mode A / Mode B	Input LP	Selector of TS input for re-modulator used for Low Priority in a Hierarchical Modulation.	<ul style="list-style-type: none"> ASI 1 ASI 2 ASI 3 RX.HP RX.LP GbE1 GbE2 	R

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
Switching Rules Mode A / B	No RF, No TS Input, Tuner S/N, Input Squelch, Tuner BER	Autoswitch alarms mask. Refer to Switching modes rules paragraph for a detailed description of the switching rules and conditions.		R/H

3.4.3 Modes switching rules

Four switching rules are provided in order to cover different requirements:

- **Manual:** switch between mode A and mode B by selecting one mode using the Manual Selector. The selected mode is always enabled until the user selects the other one.
 - **Auto:** switch between mode A and mode B using the rules shown in the following table. One mode is enabled until at least one of the alarms associated to the enabled autoswitch rules is risen, then a countdown starts and, if the parameter doesn't regain a normal status during the timeout, the device switches to the other mode.

Table 5. Autoswitch rules

Mode	Autoswitch rules
Heterodyne Analog repeater	<p>No RF: No good Analog RF input. Video Carrier not locked. It is associated to the <i>No RF Input</i> alarm.</p> <p>Input Squelch: Received signal level under the squelch threshold. It is associated to the <i>RF Input Squelch</i> alarm.</p>
Heterodyne Digital repeater	<p>No RF: video carrier not locked by the ATSC receiver. It is associated to the <i>No RF Input</i> alarm.</p> <p>Input Squelch: Received signal level under the squelch threshold. It is associated to the <i>RF Input Squelch</i> alarm.</p> <p>Tuner BER: Bit Error Rate after demodulator over the BER threshold. It is associated to the <i>RF Digital BER Alarm</i> alarm.</p> <p>Tuner S/N: Signal to Noise ratio under the S/N threshold. It is associated to the <i>S/N Level</i> alarm.</p>
TX ATSC	<p>No RF: video carrier not locked by the ATSC receiver. It is associated to the <i>No RF Input</i> alarm.</p> <p>Input Squelch: Received signal level under the squelch threshold. It is associated to the <i>RF Input Squelch</i> alarm.</p> <p>Tuner BER: Bit Error Rate after demodulator over the BER threshold. It is associated to the <i>RF Digital BER Alarm</i> alarm.</p> <p>Tuner S/N: Signal to Noise ratio under the S/N threshold. It is associated to the <i>S/N Level</i> alarm.</p> <p>No TS Input: selected TS input not locked. TS input Alarm should be enabled in the RF Off alarms mask. It is associated to the <i>ATSC No Input</i> alarm.</p>

- **Opto:** switch between mode A and mode B by selecting one mode using the Opto 1 input with the following rules:
 - **1 – Open:** Mode A.
 - **0 – Closed:** Mode B.
- **Time:** switch between mode A and mode B at the specified Date and Time. Switching will happen only one time from A to B. In order to set the Switching Time, select hours, minutes, seconds, days, months and years, and click on up/down arrows to increase/decrease them.

3.4.4 Tuner management

These commands allow the setting of BER alarm threshold and monitoring of RF input status. The following table shows all the commands and indicators available.

Table 6. Tuner management

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
Tuner Stat	Bitrate [bit/s]	Bitrate of TS from RF input (HP and LP).		R/H
Tuner Stat	Filtered [bit/s]	Bitrate actually used by the modulator.	<ul style="list-style-type: none"> • Zero when the input is not selected • Equal to the total bitrate, when Delete Null Packets disabled • Less than total bitrate, when Delete Null Packets enabled 	R/H
Tuner Stat	Lock	HP/LP input lock status. The input Transport Stream is locked when no more than two consecutive Sync Byte are missed.	<ul style="list-style-type: none"> • Green: Locked • Grey: Not locked 	R/H
Tuner Stat	Overflow	HP/LP input overflow alarm status. This alarm condition occurs when the input bitrate exceeds the capability of the modulation (Ref. to ETSI EN 300 744).	<ul style="list-style-type: none"> • Red: Alarm • Grey: No alarms 	R/H
Turner Main	Rx level	RF input rx level.		R/H
Turner Main	BER Threshold	Demodulator Bit Error Rate alarm threshold.	<ul style="list-style-type: none"> • Min: 0.000001 • Max: 0.06 	R/H
Turner Main	BER Threshold	Demodulator Bit Error Rate alarm threshold.	<ul style="list-style-type: none"> • Min: 0.000001 • Max: 0.06 	R/H

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
Turner Main	Squelch alarm	Squelch alarm status.	<ul style="list-style-type: none"> Red: Alarm Grey: No alarms 	R/H
Turner Main	V Sync	Analog signal lock status. The PAL detector has been implemented through the detection of the video carrier synchronization at 15,625 Hz.	<ul style="list-style-type: none"> Green: Good Analog Grey: Bad Analog 	R/H
HP/LP Receiver Statistics	Demodulator BER	Demodulator bit error rate.		R/H
HP/LP Receiver Statistics	Viterbi BER	Viterbi byte error rate.		R/H
HP/LP Receiver Statistics	Packet Error	Packet error counter.		R/H
HP/LP Receiver Statistics	SNR [dB]	Signal to Noise Ratio.		R/H
HP/LP Receiver Statistics	Constellation	Constellation for current modulation scheme..	<ul style="list-style-type: none"> QPSK 16-QAM 64-QAM 	R/H

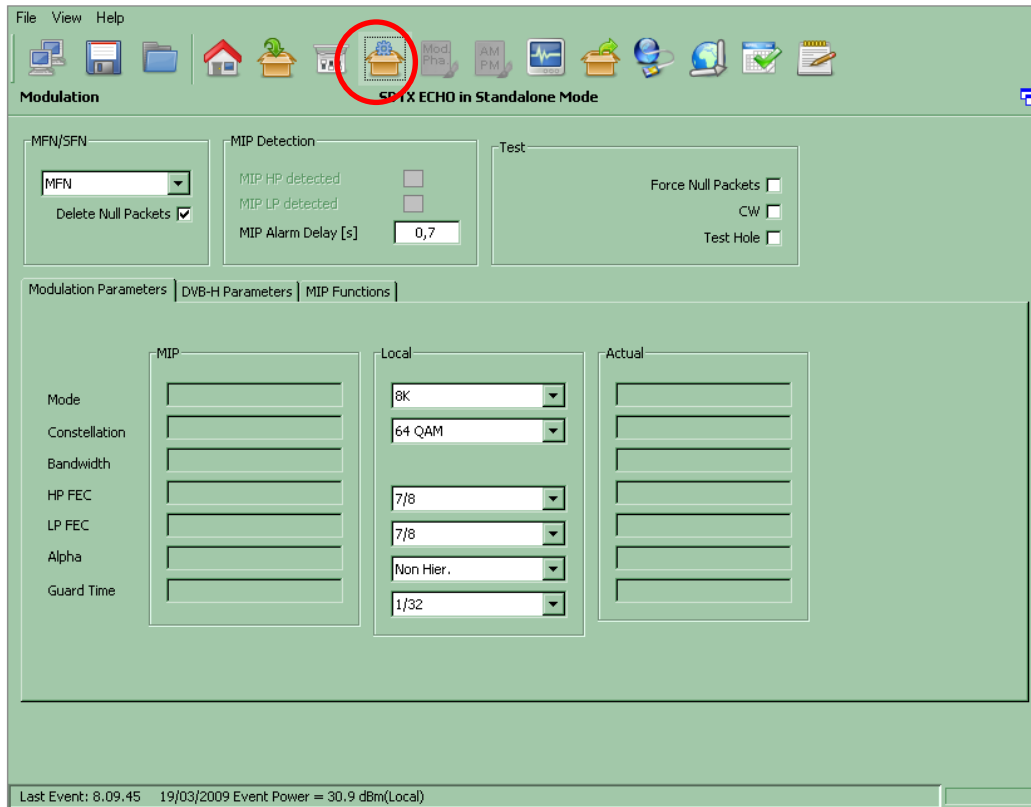
Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
HP/LP Receiver Statistics	Hier. Mode	Hierarchy information for current scheme.	<ul style="list-style-type: none"> • NH • a=1 • a=2 • a=4 	R/H
HP/LP Receiver Statistics	Interleaver	Interleaver type.	<ul style="list-style-type: none"> • Native • In-depth 	R/H
HP/LP Receiver Statistics	FEC	HP/LP stream code rate.	<ul style="list-style-type: none"> • 1/2; • 2/3; • 1/4; • 5/6; • 7/8. 	R/H
HP/LP Receiver Statistics	FFT	Transmission mode.	<ul style="list-style-type: none"> • 2K; • 4K; • 8K. 	R/H

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
HP/LP Receiver Statistics	Guard Time	Guard interval.	<ul style="list-style-type: none"> • 1/32; • 1/16; • 1/8; • 1/4. 	R/H
HP/LP Receiver Statistics	Cell ID	Cell ID		R/H
HP/LP STV Lock	TPS	TPS were confirmed decoded.	<ul style="list-style-type: none"> • Green: Locked; • Grey: Not locked. 	R/H
HP/LP STV Lock	Symbol Recovery	Symbol recovery loop locked.		R/H
HP/LP STV Lock	Puncture Rate	Puncture rate found.		R/H
HP/LP STV Lock	De-Interleaver	De-interleaver locked.		R/H
General	Constellation plotter	Plotter of HP and LP constellations		R/H

3.4.5 MODULATION

Click on Modulation button icon, highlighted in the next figure, to access the modulation window.

Figure 9. Modulation window: modulation parameters



The Modulation window allows actual modulation parameters monitoring and modulator setting/monitoring. These settings are always editable but are applied **only when the re-modulator working mode is enabled**.

3.4.6 Modulator management

These commands and indicators allow the setting and monitoring of modulator's synchronization options, MIP detector and the enabling of Test options.

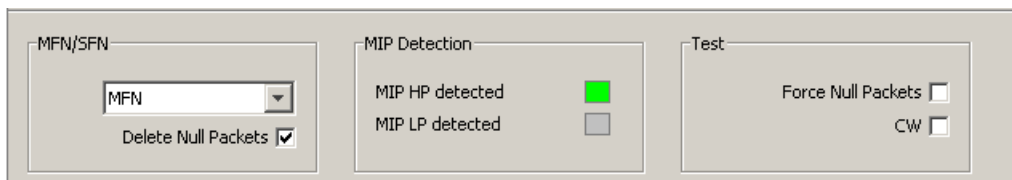


Figure 10. Modulator management

Table 7. Modulation management

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
MFN / SFN	MFN/SFN	Selector of Network's Transmitters Synchronization. Network Synchronization parameter setting Refer to paragraph.	<ul style="list-style-type: none"> • MFN • MFN MIP • SFN • SFN Local 	R
MFN / SFN	Delete Null Packets	Delete null packets enabling check box. In SFN and SFN Local transmission modes, this option is enabled by default. In MFN and MFN MIP transmission modes, this option is disabled by default.	<ul style="list-style-type: none"> • Checked: Enabled • Not checked: Disabled 	R
Mip Detection	MIP HP/LP detected	Detection of MIP packets in HP/LP streams.	<ul style="list-style-type: none"> • Green: Detected • Grey: Not detected 	R

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
Mip Detection	MIP Alarm Delay [s]	<p>Time to wait for No MIP alarm rising expressed in seconds (refer to Alarms paragraph).</p> <p>Note: It is highly recommended to set a MIP Alarm Delay value different from zero as to allow the input signal locking.</p>	<ul style="list-style-type: none"> • Min: 1 s • Max: 25.5 s 	R
Test	Force Null Packets	Null data packets transmission enabling check box.	<ul style="list-style-type: none"> • Checked: Enabled • Not checked: Disabled 	R
Test	CW	CW test enabling check box.	<ul style="list-style-type: none"> • Checked: Enabled • Not checked: Disabled 	R/H
Test	Test Hole	Test Hole enabling check box.	<ul style="list-style-type: none"> • Checked: Enabled • Not checked: Disabled 	R/H

3.4.7 Network Synchronization parameters setting

Four Network Synchronization modes are available:

- **Multi Frequency Network mode using local parameters (MFN):**
The transmitter is not synchronized with any network. No input MIP is needed and Clock Reference can be internal.
- **Multi Frequency Network mode using MIP parameters (MFN MIP):**
The transmitter is not synchronized with any network but MIP sets the modulation parameters. Input MIP is needed and Clock Reference can be internal.
- **Single Frequency Network mode (SFN):** The transmitter is synchronized with a Network of transmitters on the same frequency. MIP is needed and Clock Reference must be external or GPS.
- **Single Frequency Network mode using local parameters (SFN Local):** The transmitter is synchronized with a Network of transmitters but for testing purposes the modulation parameters are set locally. Input MIP is needed for 1PPS synchronization and Clock Reference must be external or GPS.

The following table provides a description of the available parameters setting for the network modes.

Table 8. Network Synchronization parameters setting

Parameters	MFN	SFN	MFN + MIP	SFN Local
Mode	Local	MIP	MIP	Local
Constellation	Local	MIP	MIP	Local
FEC HP	Local	MIP	MIP	Local
FEC LP	Local	MIP	MIP	Local
Transmission	Local	MIP	MIP	Local
Time Slicing HP	Local	MIP	MIP	Local
Time Slicing LP	Local	MIP	MIP	Local
Guard Time	Local	MIP	MIP	Local
BW	Local	MIP	MIP	Local
Alpha	Local	MIP	MIP	Local
Input HP	Local	Local	Local	Local
Input LP	Local	Local	Local	Local
Interleaver	Local (for 8k mode only native)	MIP	MIP	Local (for 8k mode only native)
MPE FEC HP	Local	MIP	MIP	Local
MPE FEC LP	Local	MIP	MIP	Local
Cell Id enable	Local	Local	Local	Local
Cell Id	Local (only if enabled)	MIP or Local (only if enabled) Function from MIP can be enabled or disabled	MIP or Local (only if enabled) Function from MIP can be enabled or disabled	Local (only if enabled)
Frequency Offset	Local	MIP or Local (only if enabled) Function from MIP can be enabled or disabled	MIP or Local (only if enabled) Function from MIP can be enabled or disabled	Local

Parameters	MFN	SFN	MFN + MIP	SFN Local
Time Offset	Local	MIP or Local (only if enabled) Function from MIP can be enabled or disabled	MIP or Local (only if enabled) Function from MIP can be enabled or disabled	Local
Del Null Packet	Can be enabled or disabled	Must be disabled	Can be enabled or disabled	Must be disabled
Frequency Reference	Can be internal or external	Must be external	Can be internal or external	Must be external

3.4.8 Modulation parameters

These commands and indicators allow the setting of modulation parameters, the monitoring of parameters carried by MIP in SFN configuration and of actual modulation parameters.

The screenshot shows a software interface with three tabs: "Modulation Parameters", "DVB-H Parameters", and "MIP Functions". The "Modulation Parameters" tab is active. It displays a table of parameters for three different configurations: MIP, Local, and Actual. The parameters are listed on the left, and their values are shown in input fields or dropdown menus for each configuration.

Parameter	MIP	Local	Actual
Mode	2K	8K	8K
Constellation	64 QAM	64 QAM	64 QAM
Bandwidth	8 MHz	8 MHz	8 MHz
HP FEC	7/8	1/2	1/2
LP FEC	1/2	1/2	1/2
Alpha	Non Hier.	Non Hier.	Non Hier.
Guard Time	1/32	1/32	1/32

Figure 11. Modulation parameters

Table 9. Modulation parameters

Box	Parameter/ Control	Description	Admitted Ranges / Values	R/H
MIP	Mode	Transmission mode: set by MIP.	<ul style="list-style-type: none"> • 2K • 4K • 8K 	R
Local		Transmission mode: locally set.		R
Actual		Current transmission mode		R
MIP	Bandwidth	Bandwidth: set by MIP.	<ul style="list-style-type: none"> • 7MHz • 8MHz • 6MHz • 5MHz 	R
Actual		Current bandwidth.		
MIP	Constellation	Constellation for current modulation scheme: set by MIP.	<ul style="list-style-type: none"> • QPSK • 16-QAM • 64-QAM 	R
Local		Constellation for current modulation scheme: locally set.		R
Actual		Current constellation for modulation scheme.		R
MIP	Bandwidth	Bandwidth: set by MIP.	<ul style="list-style-type: none"> • 7MHz 	R
Local		Bandwidth: locally set.		R

Box	Parameter/ Control	Description	Admitted Ranges / Values	R/H
Actual		Current bandwidth.	<ul style="list-style-type: none"> • 8MHz • 6MHz • 5MHz 	R
MIP	HP/LP FEC	HP/LP stream code rate: set by MIP.	<ul style="list-style-type: none"> • 1/2 • 2/3 • 3/4 • 5/6 • 7/8 	R
Local		HP/LP stream code rate: locally set.		R
Actual		Current HP/LP stream code rate.		R
MIP	Alpha	Hierarchy information for current scheme: set by MIP.	<ul style="list-style-type: none"> • NH; • a=1; • a=2; • a=4. 	R
Local		Hierarchy information for current scheme: locally set.		R
Actual		Current Hierarchy information for current scheme.		R
MIP	Guard Time	Guard interval: set by MIP.	<ul style="list-style-type: none"> • 1/32 	R
Local		Guard interval: locally set.		R

Box	Parameter/ Control	Description	Admitted Ranges / Values	R/H
Actual		Current guard interval.	<ul style="list-style-type: none">• 1/16• 1/8• 1/4	R

3.4.9 ATSC parameters

These commands and indicators allow the setting of options for ATSC transmission, the monitoring of parameters carried by MIP in SFN configuration and of actual ATSC options.

Figure 12. ATSC parameters

	MIP	Local	Actual
Time Slicing HP	Not Used	Not Used	Not Used
Time Slicing LP	Not Used	Not Used	Not Used
MPE FEC HP	Not Used	Not Used	Not Used
MPE FEC LP	Not Used	Not Used	Not Used
Interleaver	Native	Native	Native

*ATSC parameters.**Table 10.*

Box	Parameter/ Control	Description	Admitted Ranges / Values	R/H
MIP	Time Slicing HP/LP	Enabling of time slice transmission of the HP/LP stream: set by MIP.	<ul style="list-style-type: none"> • Used • Not used 	R
Local		Enabling of time slice transmission of the HP/LP stream: locally set.		R
Actual		Current enabling status of time slice transmission.		R
MIP	MPE FEC HP/LP	HP/LP MPE-FEC enabling: set by MIP.	<ul style="list-style-type: none"> • Used • Not used 	R
Local		HP/LP MPE-FEC enabling: locally set.		R
Actual		Current HP/LP MPE-FEC enabling status.		R
MIP	Interleaver	Interleaver type selector: set by MIP.	<ul style="list-style-type: none"> • Used • Not used 	R
Local		Interleaver type selector: locally set.		R
Actual		Interleaver type selector status.		R

3.4.10 MIP functions

These commands and indicators allow the enabling and monitoring of MIP functions in SFN configuration, the setting of local functions and the monitoring of the actual functions used by modulator.

Modulation Parameters	DVB-H Parameters	MIP Functions						
<table border="1"> <thead> <tr> <th>MIP</th> <th>Local</th> <th>Actual</th> </tr> </thead> <tbody> <tr> <td> <input type="checkbox"/> Cell ID <input type="text" value="0"/> Max Delay [100ns] <input type="text" value="0"/> <input type="checkbox"/> Freq. Offset [Hz] <input type="text" value="0"/> <input type="checkbox"/> Time Offset [100 ns] <input type="text" value="0"/> <input type="checkbox"/> Tx Power [0.1 dB] <input type="text" value="Error"/> <input type="checkbox"/> Func. Bw <input type="text" value="7 MHz"/> Function Cell ID enabled <input type="checkbox"/> Function Tag Cell ID <input type="checkbox"/> Function Ch. Bw enabled <input type="checkbox"/> Function Tag Ch. Bw <input type="checkbox"/> </td> <td> <input type="checkbox"/> Cell ID <input type="text" value="0"/> User Delay <input type="text" value="0"/> Frequency Offset [100ns] <input type="text" value="0"/> Time Offset [100ns] <input type="text" value="0"/> Tx.ID Broadcast Enable <input type="checkbox"/> Tx ID <input type="text" value="0"/> Standard <input checked="" type="radio"/> DVB-T <input type="radio"/> DVB-H </td> <td> Cell ID <input type="text" value="0"/> Delay [100ns] <input type="text" value="0"/> Freq. Offset [Hz] <input type="text" value="0"/> Time Offset [100 ns] <input type="text" value="0"/> Center Freq. [Hz] <input type="text" value="510,000,000"/> Network Delay [100ns] <input type="text" value="0"/> </td> </tr> </tbody> </table>			MIP	Local	Actual	<input type="checkbox"/> Cell ID <input type="text" value="0"/> Max Delay [100ns] <input type="text" value="0"/> <input type="checkbox"/> Freq. Offset [Hz] <input type="text" value="0"/> <input type="checkbox"/> Time Offset [100 ns] <input type="text" value="0"/> <input type="checkbox"/> Tx Power [0.1 dB] <input type="text" value="Error"/> <input type="checkbox"/> Func. Bw <input type="text" value="7 MHz"/> Function Cell ID enabled <input type="checkbox"/> Function Tag Cell ID <input type="checkbox"/> Function Ch. Bw enabled <input type="checkbox"/> Function Tag Ch. Bw <input type="checkbox"/>	<input type="checkbox"/> Cell ID <input type="text" value="0"/> User Delay <input type="text" value="0"/> Frequency Offset [100ns] <input type="text" value="0"/> Time Offset [100ns] <input type="text" value="0"/> Tx.ID Broadcast Enable <input type="checkbox"/> Tx ID <input type="text" value="0"/> Standard <input checked="" type="radio"/> DVB-T <input type="radio"/> DVB-H	Cell ID <input type="text" value="0"/> Delay [100ns] <input type="text" value="0"/> Freq. Offset [Hz] <input type="text" value="0"/> Time Offset [100 ns] <input type="text" value="0"/> Center Freq. [Hz] <input type="text" value="510,000,000"/> Network Delay [100ns] <input type="text" value="0"/>
MIP	Local	Actual						
<input type="checkbox"/> Cell ID <input type="text" value="0"/> Max Delay [100ns] <input type="text" value="0"/> <input type="checkbox"/> Freq. Offset [Hz] <input type="text" value="0"/> <input type="checkbox"/> Time Offset [100 ns] <input type="text" value="0"/> <input type="checkbox"/> Tx Power [0.1 dB] <input type="text" value="Error"/> <input type="checkbox"/> Func. Bw <input type="text" value="7 MHz"/> Function Cell ID enabled <input type="checkbox"/> Function Tag Cell ID <input type="checkbox"/> Function Ch. Bw enabled <input type="checkbox"/> Function Tag Ch. Bw <input type="checkbox"/>	<input type="checkbox"/> Cell ID <input type="text" value="0"/> User Delay <input type="text" value="0"/> Frequency Offset [100ns] <input type="text" value="0"/> Time Offset [100ns] <input type="text" value="0"/> Tx.ID Broadcast Enable <input type="checkbox"/> Tx ID <input type="text" value="0"/> Standard <input checked="" type="radio"/> DVB-T <input type="radio"/> DVB-H	Cell ID <input type="text" value="0"/> Delay [100ns] <input type="text" value="0"/> Freq. Offset [Hz] <input type="text" value="0"/> Time Offset [100 ns] <input type="text" value="0"/> Center Freq. [Hz] <input type="text" value="510,000,000"/> Network Delay [100ns] <input type="text" value="0"/>						

Figure 13. MIP functions

MIP function Modulation window: MIP functions**Table 11.**

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
MIP	Cell Id enable	MIP cell ID function enabling	<ul style="list-style-type: none"> Checked: Enabled Not checked: Disabled 	R
Local		General Cell Id enabling. Must be enabled to insert Cell Id into output TPS.		R
MIP	Cell ID	MIP cell ID monitoring.	<ul style="list-style-type: none"> Min: 0 Max: 65,535 	R
Local		Local Cell ID setting.		R
Actual		Used Cell ID monitoring.		R
MIP	Max Delay [100ns]	MIP max delay function monitoring	<ul style="list-style-type: none"> Min: 0 Max: 9,999,999 	R
Local		User delay setting.		R
Actual		Used delay monitoring.		R
MIP	Freq. Offset [Hz]	MIP frequency offset function enabling and monitoring	<ul style="list-style-type: none"> Checked: Enabled Not checked: Disabled 	R

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
Local		User frequency offset setting.	<ul style="list-style-type: none"> Min: -500,000 Hz Max: 500,000 Hz 	R
Actual		Used frequency offset monitoring.		R
MIP		MIP time offset function enabling and monitoring	<ul style="list-style-type: none"> Checked: Enabled Not checked: Disabled 	R
Local	Time Offset [100ns]	User time offset setting.	<ul style="list-style-type: none"> Min: -32,768 Max: 32,767 	R
Actual		Used time offset monitoring.		R
MIP	Tx Power [0.1dB]	NOT IMPLEMENTED (MIP Tx power function enabling and monitoring).	<ul style="list-style-type: none"> Checked: Enabled Not checked: Disabled 	R

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
MIP	Func.Bw	NOT IMPLEMENTED (Function Bw enabling and monitoring).	<ul style="list-style-type: none"> • Checked: Enabled • Not checked: Disabled 	R
MIP	Function Cell ID enabled	MIP Cell ID function enabling status.	<ul style="list-style-type: none"> • Green: enabled • Grey: disabled 	R
MIP	Function Tag Cell ID.	Cell ID Tag detection.	<ul style="list-style-type: none"> • Green: present • Grey: not present 	R
MIP	Function Ch.Bw enabled	MIP channel bandwidth function enabling status.	<ul style="list-style-type: none"> • Green: enabled • Grey: disabled 	R
MIP	Function Tag Ch.Bw	Channel bandwidth Tag detection.	<ul style="list-style-type: none"> • Green: present • Grey: not present 	R

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
Local	Tx ID Broadcast Enable	Tx ID 0 enabling.	<ul style="list-style-type: none"> • Checked: Enabled • Not checked: Disabled 	R
Local	Tx ID	User Tx ID setting.	<ul style="list-style-type: none"> • Min: 0 • Max: 65,535 	R
Local	Standard	User transmission standard setting.	<ul style="list-style-type: none"> • ATSC <ul style="list-style-type: none"> ○ Checked: Enabled ○ Not checked: Disabled • ATSC <ul style="list-style-type: none"> ○ Checked: Enabled ○ Not checked: Disabled 	R
Actual	Center Freq. [Hz]	Used center frequency indicator.		R

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
Actual	Network Delay [100ns]	Used network delay indicator.		R

s

Table 12.

3.5 PRE-CORRECTION TOOL

The ARK1 system provides a pre-correction tool for both **Module&Phase** and **AM/PM** output signal pre-correction.

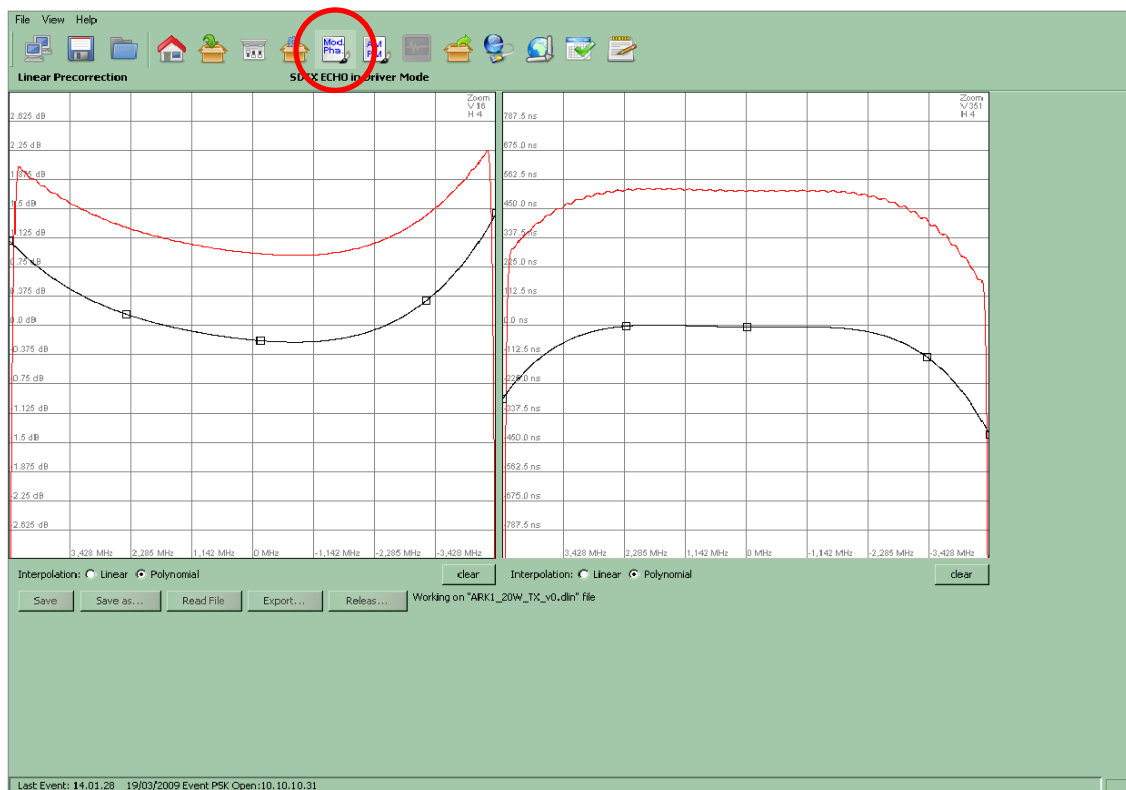
Remember to save curves changing before closing the connection to port 5000. At every working session open

Note: the operation of uploading and downloading pre-correction curves moves a large amount of data from and to the device. The use of these tools over low badwidth, not stable or high distances networks could cause frequently time-out disconnections and it is **not recommended**.

3.5.1 Module&Phase

Click on MOD. PHA. button icon, highlighted in the nex figure, to modify the complex filter curves for linear pre-correction.

Figure 14. Phase and module window



This tool provides two grids for the drawing of:

- Module of the filter's curve.
- Group Delay of the filter's curve.

The two curves are used to calculate the linear pre-correction coefficients. The curves are drawn by the interpolation of 1024 points referring to the points inserted and using a linear or polynomial interpolation algorithm.

Knob points can be added with a left-click of the mouse on the grid and deleted with a right-click, drag and move a point to change the curve.

Each coefficient variation, due to curves change, is saved in the FPGA "runtime" memory registers and dynamically changes the device's output.

The tool is prevented to send an "overflowing" amount of data to the device: curve changes will be applied only when the mouse button is released.

In the module grid, the red curve is used to monitor the current module curve calculating and saving. The last saved coefficients are locally downloaded from the FPGA runtime memory registers in order to redraw the curve.

Click two times the right mouse button on the grid to open the zoom menu. The "H" options are used to horizontally zoom (x01,x02,x04,x08,x16). The "V" options are used to vertically zoom (x01,x02,x04).

During the saving actions are created two nonlinear pre-correction files:

- *.dlin files: files containing digital coefficients values for Digital-IF linear pre-correction curves.
- *.alin files: files containing analog coefficients values for ATSC Re-modulator linear pre-correction curves.

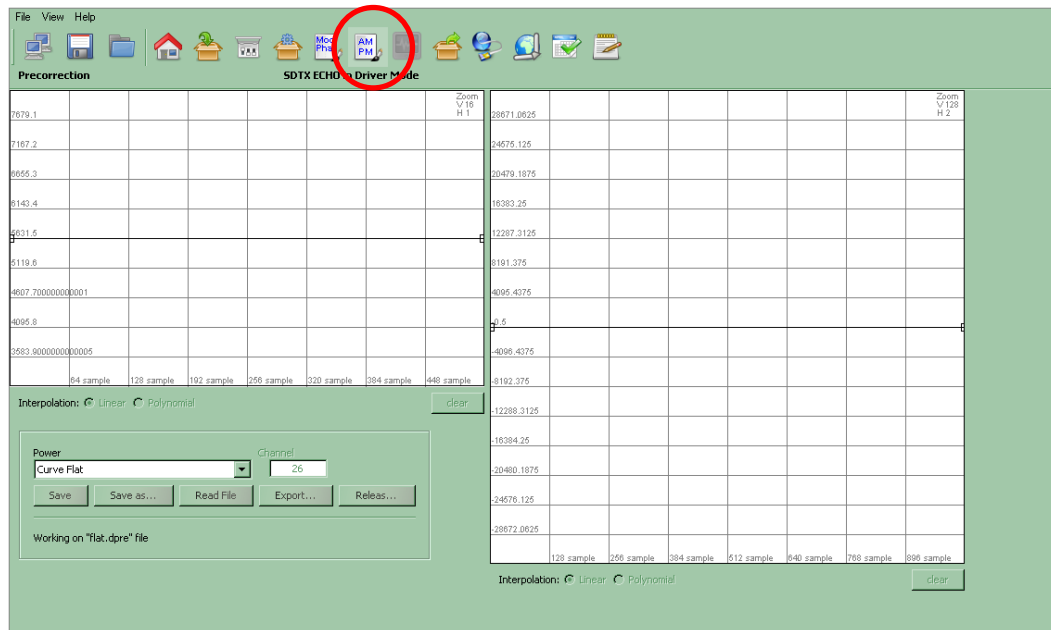
The following buttons allow the management of linear pre-correction files and the management of the connection to port 5000:

- **Save:** used to save in the device memory the current curves setting. The previously saved file will be overwritten except in the event that no files have been saved before; in this case a dedicated window appears in order to let the user name the new file.
- **Save as:** used to save in the device memory the current curves setting. The previously saved file will be overwritten with a new name. in the event that no files have been saved before, a new file will be created.
- **Read file:** used to reload the last saved file.
- **Export:** used to download pre-correction files on the user PC. A browser window allows the selection of the saving path.
- **Release:** release the connection in order to allow others remote machines to connect to port 5000 (refer to [Connection to port 5000](#) paragraph).

Files are separately managed in analog and in digital AGC mode.

3.5.2 AM/PM

Click on AM/PM button icon, highlighted in the next figure, to access the pre-correction window.

Figure 15. AM/PM window

Two main actions are possible in this section:

- AM/AM and AM/PM curve drawing: used to change the AM/PM pre-correction coefficient.
- AM/PM pre-correction files management: used to open or save AM/PM pre-correction setting file.

AM/AM and AM/PM curves are specific for each power range of each output channel.

The two curves are used to calculate the AM/PM pre-correction coefficients. The curves are drawn by the interpolation of 1024 points referring to the points inserted and using a linear or polynomial interpolation algorithm.

Knob points can be added with a left-click of the mouse on the grid and deleted with a right-click, drag and move a point to change the curve.

Each coefficient variation, due to curves change, is saved in the FPGA “runtime” memory registers and dynamically changes the device’s output.

The tool is prevented to send an “overflowing” amount of data to the device: curve changes will be applied only when the mouse button is released.

In the module grid, the red curve is used to monitor the current module curve calculating and saving. The last saved coefficients are locally downloaded from the FPGA runtime memory registers in order to redraw the curve.

Click two times the right mouse button on the grid to open the zoom menu. The “H” options are used to horizontally zoom (x01,x02,x04,x08,x16). The “V” options are used to vertically zoom (x01,x02,x04).

During saving actions are created two nonlinear pre-correction files:

- *.dpre files: files containing digital coefficients values.
- *.apre files: files containing analog coefficients values.

The following buttons allow the management of linear pre-correction files and the management of the connection to port 5000:

- **Save:** used to save in the device memory the current curves setting. The previously saved file will be overwritten except in the event that no files have been saved before; in this case a dedicated window appears in order to let the user name the new file.
- **Save as:** used to save in the device memory the current curves setting. The previously saved file will be overwritten with a new name. in the event that no files have been saved before, a new file will be created.
- **Read file:** used to reload the last saved file.
- **Export:** used to download pre-correction files on the user PC. A browser window allows the selection of the saving path.
- **Release:** release the connection in order to allow others remote machines to connect to port 5000 (refer to [Connection to port 5000](#) paragraph).

Files are separately managed in analog and in digital AGC mode.

3.5.3 Connection to port 5000

The connection to port 5000 is performed every time a pre-correction tool is opened through Mod.Pha. button and AM/PM button, from Java interface,. The pre-correction tool opens and keeps busy the connection to port 5000 till the connection releasing

The connection to this port precludes the possibility of:

- programming the device;
- allowing more than one user, the very same one that is keeping busy the connection, to open the pre-correction tools.

The Release button comes through these limits. It closes the connection to port 5000, close the Mod.Pha. / AM/PM window and opens the General window. Once clicked the Release buttons and before quitting the pre-correction tool, three options are provided:

- Continue: continue without saving;
- Save and Release: save and continue;
- Cancel: cancel the request of releasing the connection.

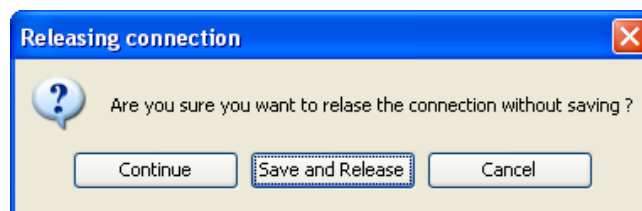


Figure 16. Realising connection

3.6 Channel filter & complex filter

Click on Filter button icon, highlighted in the next figure, to access the channel and complex filters window.

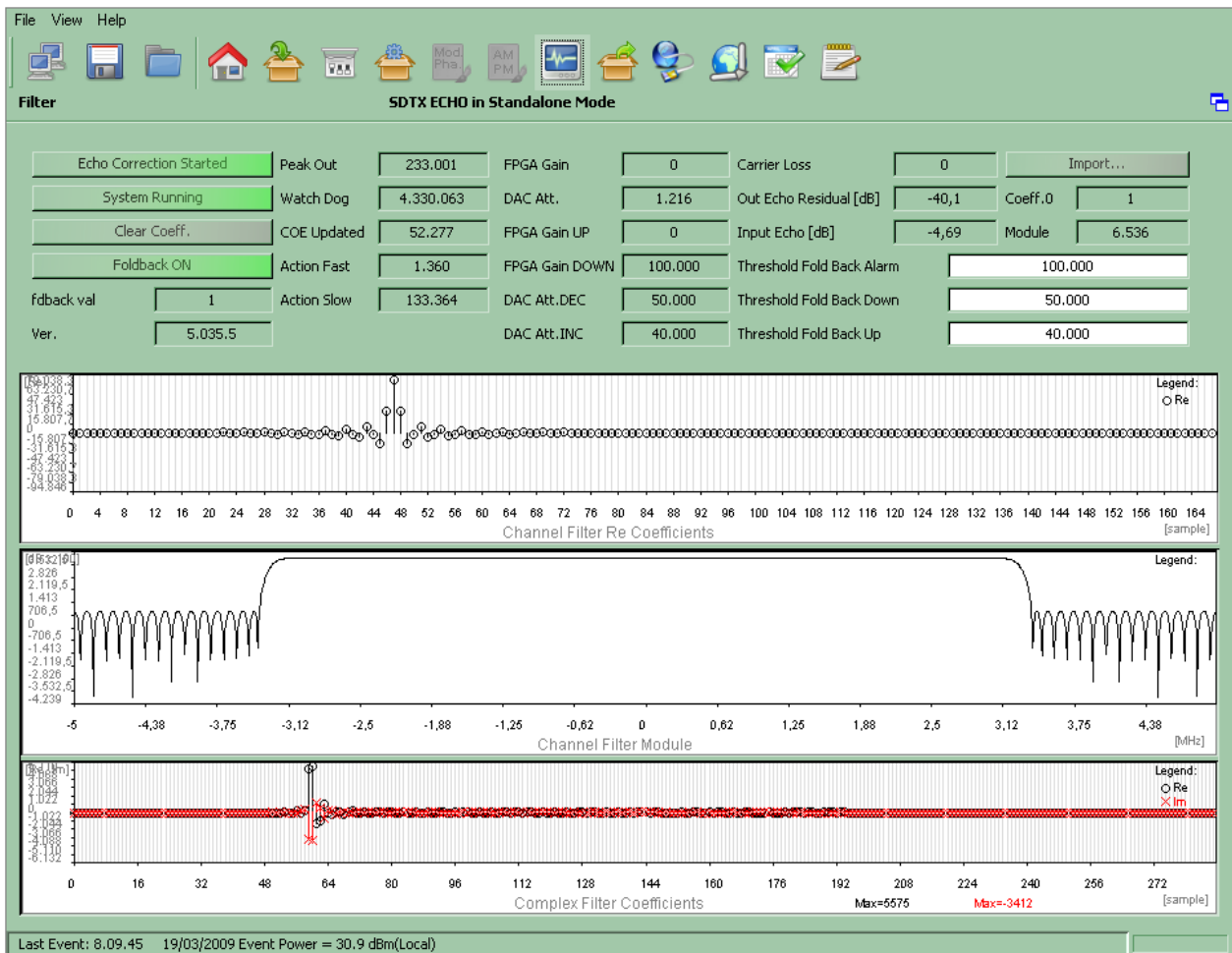


Figure 17. Channel filter & complex filter window

Use the Filter window to manage and monitor channel and complex filters.

To understand the behavior of the Echo's Channel Filter, a brief explanation is needed. The Fold-back mode is an algorithm that makes use of 3 thresholds, determined by the characteristics of the system (receiver and transmitter's antenna front and back gains), to calculate the optimal range of the transmitter's output RF power that results in controlled echo level on the receiver side antenna. The so introduced thresholds are:

- **Threshold Fold Back Alarm:** individuates the level of the transmitter's output RF power that determines an uncontrollable echo level on the receiver side antenna.
- **Threshold Fold Back Down:** individuates the upper limit of the optimal range of the transmitter's output RF power. When the "Module" value is higher than this threshold, the controller decreases the output RF power.
- **Threshold Fold Back Up:** individuates the lower limit of the optimal range of the transmitter's output RF power. When the "Module" value is lower than this threshold, the controller increases the output RF power.

It follows that:

Thr. FB Alarm > Thr. FB Down > Thr. FB Up.

The "FPGA Gain" value results from the comparison of the "Module" value with the thresholds:

- **0:** when "Module" is lower than FB Up.
- **1:** when "Module" is higher than FB Down.
- **2:** when "Module" is comprised between FB Up and FB Down.

<input type="button" value="Echo Correction Started"/>	Peak Out	<input type="text" value="3.506"/>	FPGA Gain	<input type="text" value="0"/>	Carrier Loss	<input type="text" value="0"/>	<input type="button" value="Import..."/>
<input type="button" value="System Running"/>	Watch Dog	<input type="text" value="16.112"/>	DAC Att.	<input type="text" value="0"/>	Out Echo Residual [dB]	<input type="text" value="0"/>	Coeff.0 <input type="text" value="0"/>
<input type="button" value="Clear Coeff."/>	COE Updated	<input type="text" value="0"/>	FPGA Gain UP	<input type="text" value="0"/>	Input Echo [dB]	<input type="text" value="0"/>	Module <input type="text" value="0"/>
<input type="button" value="Foldback OFF"/>	Action Fast	<input type="text" value="0"/>	FPGA Gain DOWN	<input type="text" value="100.000"/>	Threshold Fold Back Alarm	<input type="text" value="100.000"/>	
fdback val	<input type="text" value="0"/>	Action Slow	<input type="text" value="0"/>	DAC Att.DEC	<input type="text" value="55.000"/>	Threshold Fold Back Down <input type="text" value="55.000"/>	
Ver.	<input type="text" value="5.035.5"/>			DAC Att.INC	<input type="text" value="50.000"/>	Threshold Fold Back Up <input type="text" value="50.000"/>	

Figure 18. Filters commands and monitors

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H/E
General	Echo Correction Started/Stopped	Enables or disables the updating of the coefficients. When in "Echo Correction Started" mode, the system continues calculating the coefficients, but those are not updated.	<ul style="list-style-type: none"> Red: Echo Correction Stopped Green: Echo Correction Started. 	R
General	System Running/Locked	Indicates the running status of the echo canceling process.		
General	Clear Coeff.	Resets the complex filter coefficients		
General	Foldback ON/OFF	Enables or disables the Foldback mode.	<ul style="list-style-type: none"> Fold Back ON Fold Back OFF 	
General	Fdback val	Indicates whether the Foldback mode is active ('1' is shown) or not ('0' is shown).	<ul style="list-style-type: none"> 0: Fold-back not active. 1: Fold-back active 	
General	Ver.	Indicates an error code associated with the cause that determined the correction action that was taken. Introduced for debug purposes.		
General	Peak Out	Indicates the peak of the module of the signal at the output of the Channel Filter.		
General	Watch Dog	Indicates the value of the counter, incremented at each Echo control loop iteration. Introduced for debug purposes.		
General	COE Updated	Indicates the value of the counter, incremented each time the coefficients are updated. Introduced for debug purposes.		

General	Action Fast	Indicates the value of the counter, incremented each time an Action Fast was performed. Introduced for debug purposes.		
General	Action Slow	Indicates the value of the counter, incremented each time an Action Slow was performed. Introduced for debug purposes.		
General	FPGA Gain	Indicates the actual value of the Foldback status. Introduced for debug purposes.	<ul style="list-style-type: none"> • 0: when “Module” is lower than Thr. FB Up. • 1: when “Module” is higher than Thr. FB Down. • 2: when “Module” is comprised between Thr. FB Up and Thr. FB Down (Optimal range). 	
General	DAC Att.	Indicates the value of the PWM control. Introduced for debug purposes.		
General	FPGA Gain UP	It is an internal counter introduced for debug purposes.		
General	FPGA Gain DOWN	Shows the same value as “Threshold Fold Back Alarm”. Introduced for debug purposes.		
General	DAC Att. DEC	Shows the same value as “Threshold Fold Back Down”. Introduced for debug purposes.		
General	DAC Att. INC	Shows the same value as “Threshold Fold Back Up”. Introduced for debug purposes.		
General	Carrier Loss	It is an internal counter introduced for debug purposes.		

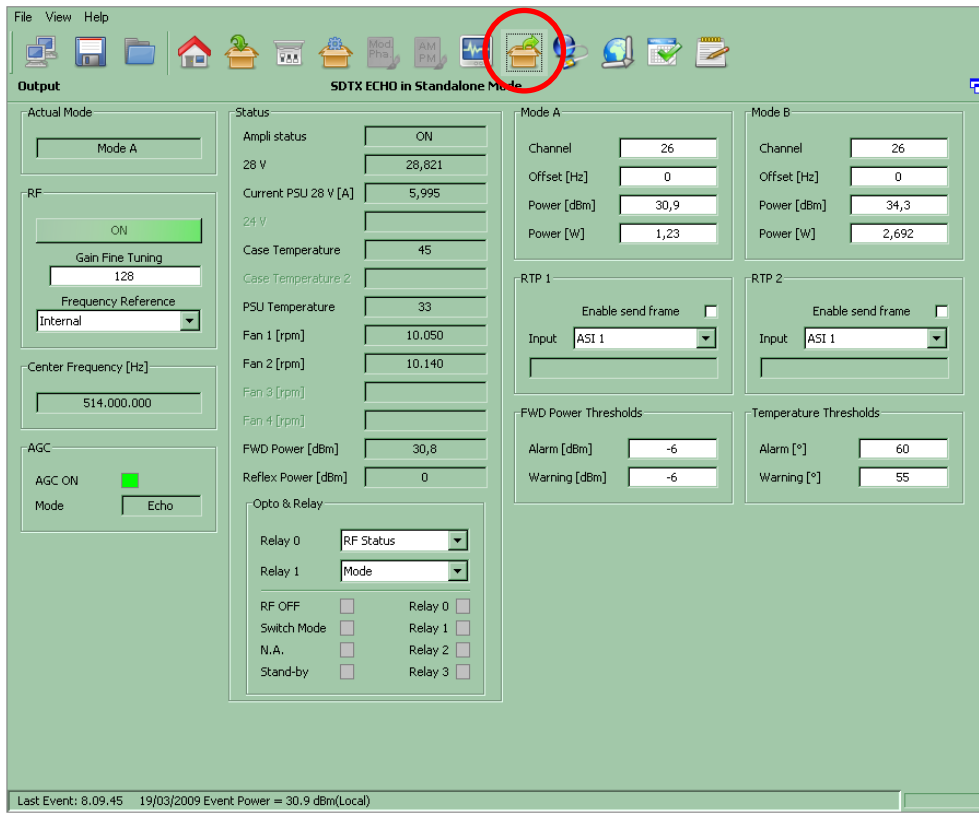
General	Out Echo Residual [dB]	Indicates the value of the Echo amplitude that was not compensated.		
General	Input Echo [dB]	Indicates the value of the Echo amplitude that was compensated.		
General	Import...	Imports the ".echf" file that contains the channel filter coefficients.		R
General	Coeff.0	Shows the same value as "fdback val" indicator. Introduced for debug purposes.		R
General	Module	Shows the peak value of the module of the current filter's coefficients.	<ul style="list-style-type: none"> • Min: - 214748364 8 • Max: 214748364 7 	
General	Threshold Fold Back Alarm	Specifies the peak value of the module of the current filter's coefficients. to be considered as alarm level. The output RF power shall always be lower than this threshold.	<ul style="list-style-type: none"> • Min: - 214748364 8 • Max: 214748364 7 	R
General	Threshold Fold Back Down	Specifies the peak value of the module of the current filter's coefficients. to be considered as higher level of the optimal range. The optimal range is determined by the "Threshold Fold Back Down" and "Threshold Fold Back Up" values.	<ul style="list-style-type: none"> • Min: - 214748364 8 • Max: 214748364 7 	R

General	Threshold Fold Back Up	Specifies the peak value of the module of the current filter's coefficients. to be considered as lower level of the optimal range. The optimal range is determined by the "Threshold Fold Back Down" and "Threshold Fold Back Up" values.	<ul style="list-style-type: none"> • Min: - 214748364 8 • Max: 214748364 7 	
General	Channel Filter Re Coefficients	Shows, in a graph, the actual impulse response of the Channel Filter (the inverse Fourier Transform of the transfer function).		
General	Channel Filter Module	Shows, in a graph, the actual frequency transfer function of the Channel Filter.		
General	Complex Filter Coefficients	Shows, in a graph, the actual complex coefficients, plotting separately the real (black dots) and imaginary (red crosses) parts.		

3.6.1 OUTPUT

Click on Output button icon, highlighted in the nex figure, to access the output window.

Figure 19. Output window



Use the Output window to change and monitor both Ethernet and RF output settings, and to monitor all accessible hardware indicators.

Output window

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
RF	ON / OFF	Output RF signal enabling. The possible output RF signal status are the following: <ul style="list-style-type: none"> • ON; • RF not On: automatic switch off of the output signal (refer to Ampli status); • OFF: manual switch off of the output signal. 	<ul style="list-style-type: none"> • Green: ON • Green: RF not ON • Red: OFF 	R/H
RF	Frequency reference	Frequency reference source selector.	<ul style="list-style-type: none"> • External • Internal • GPS 	R/H
RF	Internal Freq. Ref. Tune	Internal frequency reference fine tuning setting. Allows the fine tuning of VCO, internal clock oscillator, with 60 Hz steps.	<ul style="list-style-type: none"> • Min: 0 • Max: 255 	R/H
AGC	AGC ON	AGC status.	<ul style="list-style-type: none"> • Green: ON • Grey: OFF 	R/H

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
AGC	Mode	Current AGC mode indicator.	<ul style="list-style-type: none"> • Analog/Digital: <ul style="list-style-type: none"> ○ Green: ON ○ Grey: OFF 	R/H
Frequency Out [Hz]	Frequency Out [Hz]	Output center frequency expressed in Hz.		
Status	Ampli status	Current amplifier status indicator.	<ul style="list-style-type: none"> • On • Off • Restart • Stand-by off • Init • Alarm off • Rf off • Opto off 	R/H
Status	28V	PSU 28V indicator (values are expressed in V).		R/H
Status	Current PSU 28V [A]	PSU 28V current indicator (values are expressed in A).		R/H

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
Status	28V / 42V	<p>PSU voltage indicator (values are expressed in V). It depends on the hardware type of the device:</p> <ul style="list-style-type: none"> • 28V for SDTx_Echo 20W and 50W; • 42V for SDTx_Echo 200W. 		R/H
Status	Case Temperature	Case temperature indicator (values are expressed in °C).		R/H
Status	Case Temperature 2	<p>2nd Case temperature indicator (values are expressed in °C).</p> <p>Only in SDTX 200 version.</p>		
Status	PSU Temperature	PSU temperature indicator (values are expressed in °C).		R/H
Status	Fan 1	Fan 1 speed indicator (values are expressed in rpm).		R/H
Status	Fan 2	Fan 2 speed indicator (values are expressed in rpm).		R/H
Status	Fan 3	<p>Fan 3 speed indicator (values are expressed in rpm).</p> <p>Only in SDTX 200 version.</p>		R/H
Status	Fan 4	<p>Fan 4 speed indicator (values are expressed in rpm).</p> <p>Only in SDTX 200 version.</p>		R/H
Status	FWD Power [dBm]	Output forward power indicator (values are expressed in dBm).		R/H
Status	Reflex Power [dBm]	Output reflex power indicator (values are expressed in dBm).		R/H
Opto & Relay	Relay 0	Selector of Relay 0 mode.	<ul style="list-style-type: none"> • Alarm: indicator of an alarm condition • Mode: indicator of operating mode 	R/H

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
Opto & Relay	Relay 0...3	Relays status indicators.	<ul style="list-style-type: none"> Green: Alarm on/Mode A Grey: Alarm off/Mode B 	R/H
Opto&Relay	Opto 0...3	<p>Opto status indicators. Optos are normally opened:</p> <ul style="list-style-type: none"> Opto 0: RF Off, manual switching off of output RF; Opto 1: Mode A/B switch; Opto 2: Retry of amplifier alarms (only in SDTX 200 version); Opto 3: Stand-by enabling; it puts the device on stand-by. 	<ul style="list-style-type: none"> Green: Closed (0) Grey: Opened (1) 	R/H
Mode A / Mode B	Channel	Output channel.	<ul style="list-style-type: none"> Min: 21 Max: 69 	R/H
Mode A / Mode B	Power [dBm]	Output power (expressed in dBm).	<ul style="list-style-type: none"> Analog min: 23 dBm Analog max: 43 dBm Digital min: 17 dBm Digital max: 37 dBm 	R/H
Mode A / Mode B	Power [W]	Output power (expressed in W).		R/H

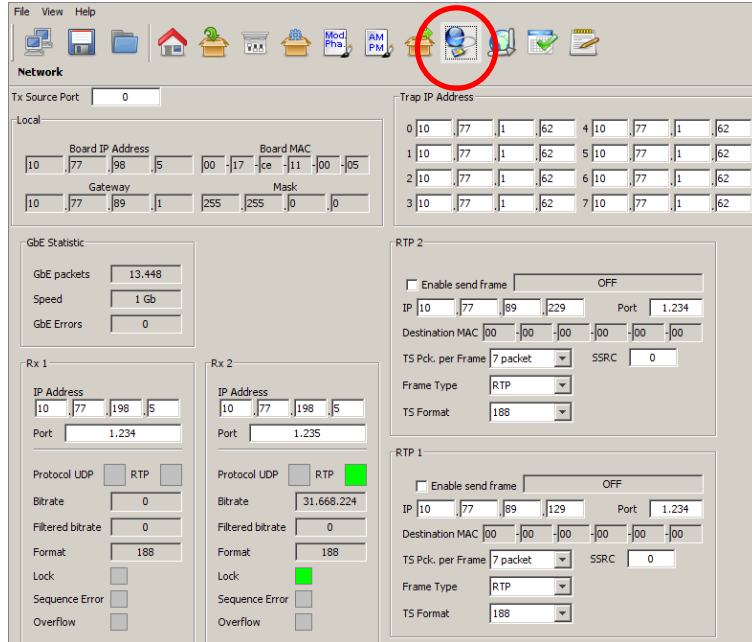
Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
Mode A / Mode B	Offset [Hz]	Output frequency offset (expressed in Hz).	<ul style="list-style-type: none"> Min: -4 MHz Max: 4 MHz 	R/H
FWD Power Thresholds	Warning [dB]	Forward power warning threshold expressed in dBm.	<ul style="list-style-type: none"> Min: -16 dBm Max: 0 dBm 	R/H
FWD Power Thresholds	Alarm [dB]	Forward power alarm threshold expressed in dBm.		R/H
Temperature Thresholds	Warning	Case temperature warning threshold expressed in °C.	<ul style="list-style-type: none"> Min: 0 °C Max: 100 °C 	R/H
Temperature Thresholds	Alarm	Case temperature alarm threshold expressed in °C.		R/H
RTP 1 / RTP 2	Enable send frame	Channel 1/2 Ethernet transmission enabling.	<ul style="list-style-type: none"> Enabled Disabled 	R/H

Box	Parameter / Control	Description	Admitted Ranges / Values	R/H
RTP 1 / RTP 2	Input	Input to output Ethernet channel 1/2 selector.	<ul style="list-style-type: none"> • ASI 0 • ASI 1 • ASI 2 • ASI 3 • RX.HP • RX.LP • GbE1 • GbE2 	R/H
RTP 1 / RTP 2	ON/OFF	Ethernet transmission on channel 1/2 status indicator.	<ul style="list-style-type: none"> • ON • OFF 	R/H

3.7 NETWORK

Click on Network button icon, highlighted in the next figure, to access the Network management window.

Figure 20. Network window



This window allows the Network management on both PRO-MPEG COP 3 RX and TX sides. It also allows the monitoring of the board IP and MAC addresses.

Note: The Clock Recovery Function, used in MFN transmissions of received streams on Ethernet channels 1 and/or 2, is based on the timestamps of incoming packets. UDP packets do not contain STS information therefore it is not allowed using GbE inputs with UDP protocol in MFN transmission mode.

Table 13. Network window

Box	Parameter/ Control	Description	Admitted Ranges / Values	R/H
Local	Board IP address	Board IP address.		R/H
Local	Board MAC address	Board MAC address.		R/H
Local	Gateway	Gateway address.		R/H
Local	Mask	Net Mask.		R/H
Local	Tx Source Port	Board receiving port.	<ul style="list-style-type: none"> • Min: 0 • Max: 65,535 	R/H
Trap IP address	0...7	Trap 0...7 destination IP address.		R/H
Rx 1 / Rx 2	IP Address	Channel 1/2 receiving IP address.		R
Rx 1 / Rx 2	Port	Channel 1/2 receiving port.	<ul style="list-style-type: none"> • Min: 0 • Max: 65,535 	R
Rx 1 / Rx 2	Protocol	Ethernet input packets protocol.	<ul style="list-style-type: none"> • UDP • RTP 	R
Rx 1 / Rx 2	Bitrate [bit/s]	Bitrate of TS from Ethernet input.		R

Box	Parameter/ Control	Description	Admitted Ranges / Values	R/H
Rx 1 / Rx 2	Filtered bitrate[bit/s]	Bitrate actually used by the modulator.	<ul style="list-style-type: none"> • Zero when the input is not selected • Equal to the total bitrate, when Delete Null Packets disabled • Less than total bitrate, when Delete Null Packets enabled 	R
Rx 1 / Rx 2	Format	Received transmission format.	<ul style="list-style-type: none"> • 188 Bytes • 240 Bytes 	R
Rx 1 / Rx 2	Lock	Ethernet input lock status indicator. The input Transport Stream is locked when no more than two consecutive Sync Byte are missed.	<ul style="list-style-type: none"> • Green: Lock • Grey: Not locked 	R
Rx 1 / Rx 2	Sequence error	Ethernet input Sequence error alarm status indicator. This alarm condition occurs when a sequence error occurs	<ul style="list-style-type: none"> • Red: Error • Grey: No errors 	R
Rx 1 / Rx 2	Overflow	Input GbE overflow alarm status. This alarm condition occurs when the input bitrate exceeds the capability of the modulation (Ref. to ETSI EN 300 744).	<ul style="list-style-type: none"> • Red: Alarm on • Grey: Alarm off 	R
Gbe statistic	GBE Packets	Total amount of good frames received.		R/H

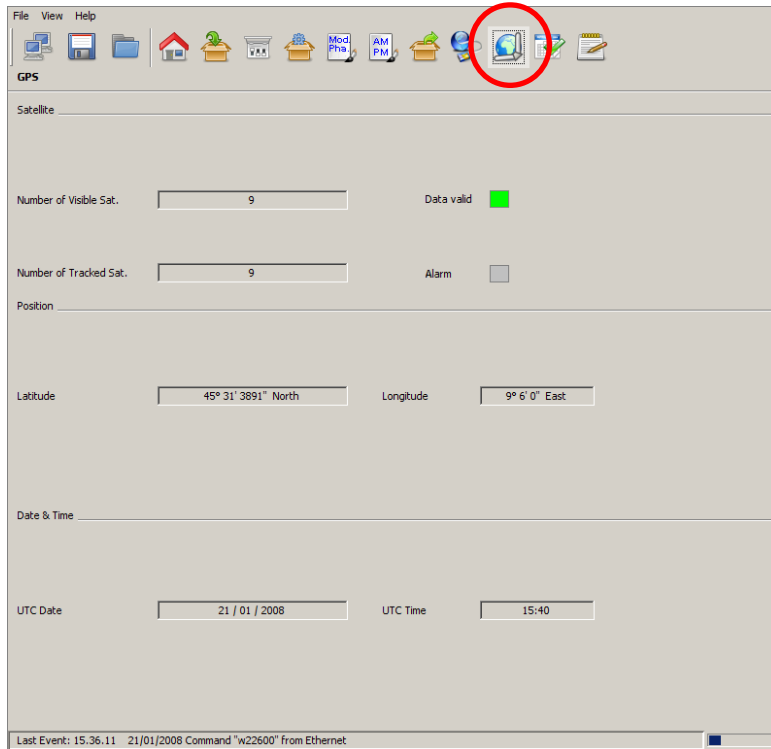
Box	Parameter/ Control	Description	Admitted Ranges / Values	R/H
Gbe statistic	Speed	Ethernet speed.	<ul style="list-style-type: none"> 10 Mbit/s 100 Mbit/s 1 Gbit/s 	R/H
Gbe statistic	GBE Errors	Total amount of bad frames received.		R/H
Community	Get	Read community setting.		R/H
Community	Set	Set community setting.		R/H
Community	Trap	Trap community setting.		R/H
RTP 1/ RTP 2	Enable send frame	Channel 1/2 Ethernet transmission enabling.	<ul style="list-style-type: none"> Enabled Disabled 	R
RTP 1/ RTP 2	IP	Channel 1/2 Ethernet transmission IP address.		R
RTP 1/ RTP 2	Port	Port used for RTP/UDP data transmission	<ul style="list-style-type: none"> Min: 0 Max: 65,535 	R
RTP 1/ RTP 2	ON/OFF	Ethernet transmission on channel 1/2 status indicator.	<ul style="list-style-type: none"> ON OFF 	R
RTP 1/ RTP 2	Destination MAC	Destination MAC address.		R
RTP 1/ RTP 2	SSRC	SSRC identifier of the RTP transmission on channel ½.		R

Box	Parameter/ Control	Description	Admitted Ranges / Values	R/H
RTP 1/ RTP 2	TS Pck per Frame	Number of packets per frame.	<ul style="list-style-type: none"> • Min: 1 • Max: 7 	R
RTP 1/ RTP 2	Frame type	Transmission protocol selector.	<ul style="list-style-type: none"> • RTP • UDP 	R
RTP 1/ RTP 2	TS Format	Transmission format.	<ul style="list-style-type: none"> • 188 Bytes • 240 Bytes 	R

3.8 GPS

Click on GPS button icon, highlighted in the next figure, to access the GPS received statistics window.

Figure 21. GPS window



GPS window

Table 14.

Box	Parameter/ Control	Description	Admitted Ranges / Values	R/H
Satellite	#Number of Visible sat	Number of visible GPS satellites indicator.		R/H
Satellite	#Number of Tracked sat	Number of tracked GPS satellites indicator.		R/H
Satellite	Alarm	GPS alarm status indicator. This alarm is a logic OR of the GPS alarms (refer to Alarms paragraph).	<ul style="list-style-type: none"> Red: Alarm on Grey: Alarm off 	R/H
Satellite	Data valid	Valid satellite signal receiving status indicator.	<ul style="list-style-type: none"> Green: Valid Grey: Not valid 	R/H
Position	Latitude(°)	Site latitude expressed in degrees.		R/H
Position	Longitude (°)	Site longitude expressed in degrees.		R/H
Date & Time	UTC Time	Current time indicator. Each GPS satellite has an atomic clock and continually transmits messages containing the current time and date at the start of the message sent by the GPS itself.		R/H
Date & Time	UTC Date	Current date indicator. Each GPS satellite has an atomic clock and continually transmits messages containing the current time and date at the start of the message sent by the GPS itself.		R/H

3.9 ALARMS

Click on Alarms button icon, highlighted in the next figure, to access the alarms management window.

Figure 22. Alarms window

Alarm	GUI	LCD	Event	R0	R1	R2	R3	T0	T1	T2	T3	T4	T5	T6	T7	RF
Up Converter Osc. Unlock	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PS Voltage out of range	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PS Current out of range	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Absolute Power Limiter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Communication Error	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Temperature High Alarm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Temperature Level -3dB	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Temperature High Warning	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Forward Power High	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Forward Power Low Warning	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Forward Power Low Alarm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Reflex Power High	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Fan speed	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
S/N Level	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
GPS Lock	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
GPS Communication Error	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Signal 10 MHz Lock	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Signal 120 MHz Lock	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Signal 960 MHz Lock	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Down Converter Osc. Unlock	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
No RF Input	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
RF Input Squelch	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
RF Digital BER Alarm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
File System Error	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Bad File in File System	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
DVB-T 1PPS Lock	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
DVB-T PPS Phase	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
DVB-T System Delay	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
DVB-T No MIP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
DVB-T No Input	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
FPGA Boot Alarm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Warm UP Alarm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The Alarm window allows the setting of alarm masks and the monitoring of alarms status.

Use alarm masks to select how and which alarm have to be notified.

Masks are organized in columns. The sixteen columns represent sixteen destinations of each alarm condition:

- **GUI:** the selected alarms status is notified on the Java alarm page icon.
- **LCD:** the selected alarms status is notified on LCD display lighting the alarm button and listing the alarms in the Alarms menu (refer to [Alarms Menu](#) paragraph).
- **Event:** the selected alarms status generate an alarm event that will be logged in the event memory (refer to [Events](#) paragraph).
- **R0...R3:** the selected alarms switch on the corresponding relay.
- **T0...T7:** the selected alarms generate the corresponding trap messages (refer to [Network](#) paragraph to set destination IP addresses).
- **RF:** the selected alarms switch off the RF output. The RF mask is almost entirely fixed in order to avoid board damages or malfunctioning.

In the Alarms window, when an alarm condition occurs, the relative alarm is red highlighted.

The Total check box enables all alarms-to-masks associations.

Remember to enable the RF Off alarms mask of ATSC alarms while working in Tx ATSC mode.

Table 15. Alarms window

Alarm	Description	H/R (1)	Troubleshooting	RF mask
Up converter Osc. Unlock	PLL of the Upconveter board not locked to 120 MHz clock.	H/R	• Hardware fault	1
PS 28V out range	Voltage out of range. The range is 20V up to 30V.	H/R	• Hardware fault	1
PS Current out of range	The current exceeds the 22 Ampere upper limit.	H/R	• Hardware fault	1
Absolute Power Limiter	The output power exceeds the maximum endurable limit.	H/R	• Hardware fault	1
Up converter communication error	Communication errors between ARK1 main board and Up-converter board.	H/R	• Hardware fault	1
Temperature High Alarm	Case temperature over 70°C, the maximum endurable limit.	H/R	• Check alarm and warning throesholds	0
Temperature Level-3dB	Temperature level goes over the alarm threshold. The output power is consequently lowered of 3 dBm.	H/R	• Lower the output power to decrease internal temperature	0
Temperature High Warning	Temperature level goes over the warning threshold.	H/R	• Check the device airflow • Check fans	0
Forward Power High	FWD power goes over the maximum endurable limit.	H/R	• Hardware fault	1
Forward Power Low Alarm	FWD power level goes over the alarm threshold.	H/R	• Check alarm and warning thresholds	0
Forward Power Low Warning	FWD power level goes over the warning threshold.	H/R	• At every amplifier initialization the FWD power alarm and warning are temporary on • Amplifier is not properly working, hardware fault	0

Reflex Power High	RFL power goes over the maximum endurable limit.	H/R	<ul style="list-style-type: none"> Check the RF output for disconnection or wrong impedance adaptation 	0
Fan Speed	Fans speed is under the minimum speed (1,000 rpm).	H/R	<ul style="list-style-type: none"> Check fans connections Verify that fans are not damaged; in this case substitute them. The substitution can be performed during device normal operations 	0
S/N level	<p>Signal to noise ratio under the S/N threshold:</p> <ul style="list-style-type: none"> Heterodyne Digital repeater: Signal to Noise ratio, detected by the ATSC receiver, under the S/N threshold TX ATSC: Signal to Noise ratio, detected by the ATSC receiver, under the S/N threshold. only when RX HP and/or RX LP inputs are selected as input HP and/or LP. 	H/R	<ul style="list-style-type: none"> Check alarm threshold Check input signal and input channel 	0
GPS Lock	GPS signal is not lock.	H/R	<ul style="list-style-type: none"> Check cable and GPS antenna connections Hardware fault 	X
GPS Communication Error	Communication errors between ARK1 main board and GPS board.	H/R	<ul style="list-style-type: none"> Hardware fault 	1

Signal 10 MHz Lock	10 MHz is not locked.	H/R	<ul style="list-style-type: none"> • If the frequency reference is Internal: internal PLL fault • If the frequency reference is External: <ul style="list-style-type: none"> ○ Internal PLL fault ○ Lack of external 10 MHz ○ Hardware fault • If the frequency reference is Internal: <ul style="list-style-type: none"> ○ Check GPS alarms ○ Internal PLL fault ○ Hardware fault 	1
Signal 120 MHz Lock	120 MHz is not locked.	H/R	<ul style="list-style-type: none"> • In SFN configuration, when selected TS input or MIP are not detected, 120 MHz oscillator can loose the lock • Hardware fault 	1
Signal 960 MHz Lock	960 MHz is not locked.	H/R	<ul style="list-style-type: none"> • Hardware fault 	1
Down Converter Osc. Unlock	PLL of the Downconveter board not locked to 120 MHz clock.	H/R	<ul style="list-style-type: none"> • Hardware fault 	1
No RF Input	Input RF missing.	H/R	<ul style="list-style-type: none"> • Check input channel • Check RF input signal type, source and connector 	X

RF Input Squelch	Rx level under the Squelch threshold.	H/R	<ul style="list-style-type: none"> • Check Squelch alarm threshold • Check input channel • Check RF input source and signal 	X
RF Digital Ber. Alarm	Demodulator BER over the alarm threshold.	H/R	<ul style="list-style-type: none"> • Check BER alarm threshold • Check RF input source and signal 	X
File System Error	File System loading error.	H/R	<ul style="list-style-type: none"> • File system partition damage 	0
Bad File in File system	One more files missing in the File System.	H/R	<ul style="list-style-type: none"> • Check files list • Reload the file system 	0
1PPS Lock	1PPS is not lock to the selected frequency reference.		<ul style="list-style-type: none"> • If the frequency reference is Internal: internal PLL fault • If the frequency reference is External: <ul style="list-style-type: none"> ○ Internal PLL fault ○ Lack of external 1PPS ○ Hardware faul • If the frequency reference is Internal: <ul style="list-style-type: none"> ○ Check GPS alarms ○ Internal PLL fault ○ Hardware fault 	X

PPS Phase	1PPS is not lock to a common reference of the network.	R	<ul style="list-style-type: none"> • Check 1PPS • Hardware fault 	X
System Delay	System delay is too high.	R		X
No MIP	MIP packets missing.	R	<ul style="list-style-type: none"> • Check input signal 	X
No Input	Input Transport Stream missing.	R	<ul style="list-style-type: none"> • Check input statistics 	X
FPGA Boot alarm	FPGA boot has not been successfully completed.	R	<ul style="list-style-type: none"> • Restart the machine • Reload the file system 	X
Warm up alarm	Temperature level under 5°C or temperature sensor fault.	H/R	<ul style="list-style-type: none"> • Restart the machine • Temperature sensor fault 	X

Notes to the table:

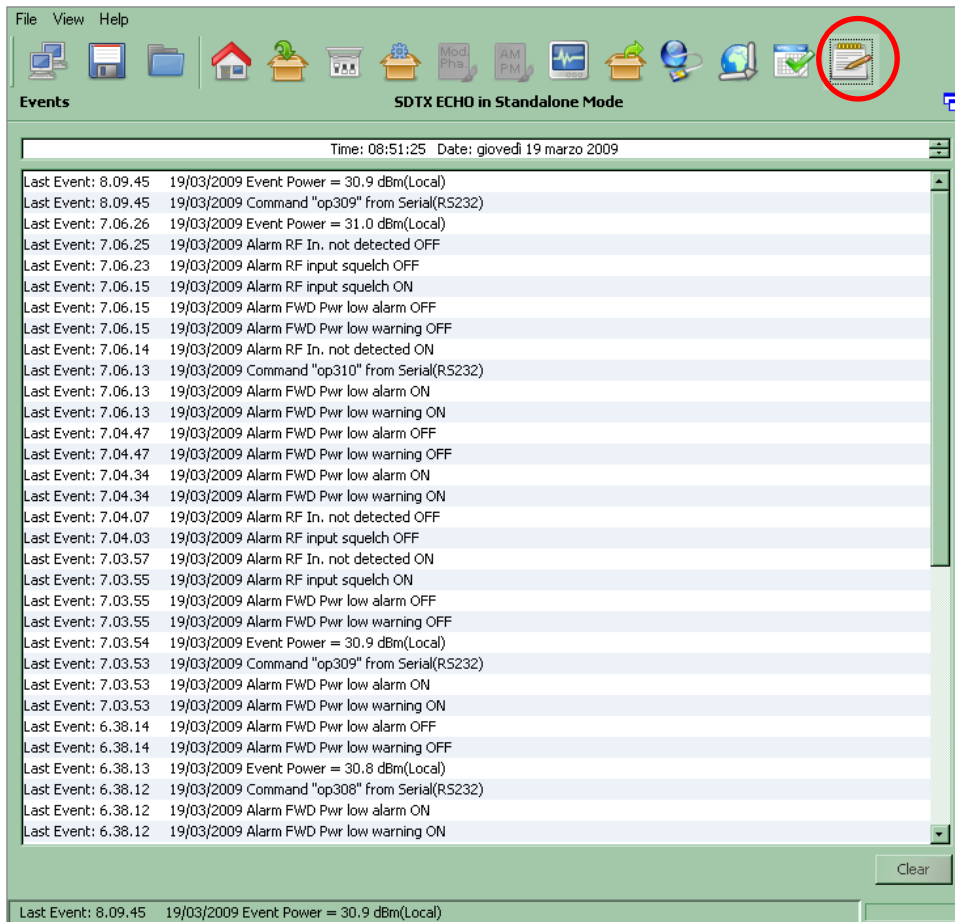
(1) H stands for Heterodyne Repeater and R stands for Re-broadcasting modulator.

(2) 0/1 stands for disabled/enabled and is fixed, X stands for not fixed.

3.10 EVENTS

Click on Events button icon, highlighted in the nex figure, to access the events windos.

Figure 23. Events window



Open the Events window to slide the events list.

Events are reported with the following information:

- **Time:** event detection time.
- **Date:** event detection date.
- **Type:** event type:
 - **Alarm** (refer to alarms list in [Alarms](#) paragraph);
 - **Command** (See *ARK1_SW_Reference_manual_v1_6.doc* for further information);
 - **Event** (refer to *Events list* table);
 - **System init** (refer to [Init System Event](#) paragraph);
 - **TASK_ERR** (refer to [Task Error Event](#) paragraph).
- **Description:** event description:
 - Alarm: which alarm generated the event;
 - Command: the low level code and command source;
 - Event: event description;
 - System Init: system initialization perhaps followed by the alarm

Use the following buttons, sited on the right side of the window, to manage the Events list:

- **Clear:** resets the events list.
- **Get History:** gets all the stored events from the last board reset (max 512 events).

Events list

Table 16.

Event	Description
RF OFF enabled from OPTO	RF output switched off through OPTO 0.
RF OFF disabled from OPTO	RF output switched on through OPTO 0.
Stand-by ON from OPTO	Stand-by mode enabled through OPTO 3.
Stand-by OFF from OPTO	Stand-by mode disabled through OPTO 3.
Stand-by ON from LCD	Stand-by mode enabled through LCD button.
Stand-by OFF	Stand-by mode disabled through LCD button.
Power = <i>xx.x</i> dBm (<i>source</i>)	New output power setting. <i>xx.x</i> : output power expressed in dBm. <i>Source</i> : Local or MIP
Update file *. <i>xxxx</i>	New file loading. <i>Xxxx</i> : file extension.
P5K open: <i>xx.xx.xx.xx</i>	Connection to port 5000 open. <i>xx.xx.xx.xx</i> : host IP address.
P5K closed	Connection to port 5000 closed.
Mode <i>X</i> = (<i>mode</i>)	Manual change mode. <i>X</i> : new mode (A/B) <i>mode</i> : TX ATSC / Rep. Analog / Rep. Digital.
<i>Switch mode</i> switch <i>X</i> => <i>Y</i>	Switch mode change. <i>Switch mode</i> : Manual / Auto / Opto / Time. <i>X</i> => <i>Y</i> : A/B => B/A.
UPCV not configured	The Upconverter has been found not configured during the Task Error Event UPCV_TASK (refer to paragraph).
UPCV configured	Automatic reconfiguring of the Upconverter. It automatically starts at every UPCV not configured event or UPCV communication error.
File system busy	File system already in use while trying to employ it (e.g. change mode during a file loading).
UTC Time set from GPS	Time and date set by GPS. As soon as the GPS lock is regained, once lost, and if the current time and date are different from the GPS ones, the UTC time is set by GPS.
Warm UP Restart	When Warm up alarm is risen this event is reported and the device is restarted.

<i>Event</i>	<i>Description</i>
PS Restart	<p>When one of the following alarms is risen, this event is reported, amplifier is restarted and the list of events shows the number of attempts (from 1 up to 4):</p> <ul style="list-style-type: none"> • ALARM_UPCV_OSC_LOCK • ALARM_UPC_VOLTAGE • ALARM_UPC_CURRENT • ALARM_UPC_ABS_POWER <p>Only in SDTX 200 version.</p>
PS OFF	<p>After the fourth time the amplifier has been restarted, if an alarm condition causing a PS Restart event occurs, PS OFF event is reported and the amplifier is turned off</p> <p>When this event is reported amplifier can be turned on only by OPTO 2 (only in SDTX 200 version).</p>
Restart Amp from OPTO	<p>This event is reported when the retry command is given by the Retry Alarm OPTO (OPTO 2).</p> <p>Only in SDTX 200 version.</p>
PS ON	<p>This event is reported when the amplifier is restarted through the Retry Alarm OPTO (OPTO 2).</p>
FPGA Re-config	<p>When Signal 120 MHz Lock alarm is risen the FPGA is re-configured and this event is reported.</p>
Events List cleared	<p>This event is reported when the events list is cleared.</p>

3.10.1 Task Error Event

The watchdog performs a periodic (every 20 seconds) polling of tasks and triggers a system reset if one or more tasks do not answer, restarting the Codeloader (See *Codeloader_Operations_Note_v1.1.doc* for further information) and generating a TSK ERR event as follows:

TSK ERR 0000028, 000003c

The blue underlined 8 bits word is the enabling status of the alarms mask. The red underlined 8 bits word indicates the status of tasks (1 if the task has been successfully performed, otherwise 0) as specified in the following table:

Table 17. Task error event specific data

TASK	Description	Bit
WD_FAN_TASK	This task controls fans speed on the base of the board temperature.	0
WD_UPCV_TASK	This task controls the Upconverter status.	1
WD_GPS_TASK	This task controls the GPS status.	2
WD_STATUS_TASK	This task gathers quite all the board information in order to perform the following operations: <ul style="list-style-type: none"> • It updates all variables of the system; • It manages alarms; • It manages the RF status (e.g. on, off...); • It manages the mode switch; • It manages the ARP resolution in ATSC mode. 	3
WD_TCP_IP_TASK	This task implements the TCP-IP protocol stack.	4
WD_TIMER_TICK_TASK	This task generates the clock for the TCP-IP task.	5
WD_STV0362_TASK	This task gathers information from both the HP and LP tuners and configures them.	6

The default tasks mask at the board startup is set to 0x0000007D (i.g. the UPCV task is excepted). Once the presence of the upconverter is assured, the upconverter task bit is automatically enabled and the mask is set to 0x0000007F. Tasks execution is stopped during de-fragmentation operations and FPGA boots.

3.10.2 Init System Event

This event occurs at every system initialization. The following table shows the event specific data:

Table 18. Init system event specific data

Event	Description	Errors code
FS_ERR	File System error.	<ul style="list-style-type: none"> • 0x00: File System ok. • 0x01: FS partition error (invalid FS).
INFO_ERR	*.cfg file error.	<ul style="list-style-type: none"> • 0x00: File ok. • 0x01: File not found. • 0x02...0x03: Invalid file (syntax errors).
DEF_ERR	*.def file error.	<ul style="list-style-type: none"> • 0x00: File ok. • 0x01: File not found.
LCD_ERR	LCD error.	<ul style="list-style-type: none"> • 0x00: LCD ok. • 0x01: LCD not found.
PLL_120M_ERR	120 MHz PLL error.	<ul style="list-style-type: none"> • 0x00: PLL locked. • 0x01: PLL not locked
BOOT_ERR	FPGA boot error.	<ul style="list-style-type: none"> • 0x00: FPGA boot ok. • 0x01: FPGA configuration erasing process error. • 0x02: Invalid configuration (the configuration has been correctly loaded, but the FPGA doesn't boot). • 0x10: FPGA file not found. • 0x11 and 0x20: Invalid FPGA file (syntax error).
LOAD_CFG_ERR	*.sav file error.	<ul style="list-style-type: none"> • 0x00: File ok. • 0x01: File not found. • 0x02...0x05: Invalid file (syntax errors).

<i>Event</i>	<i>Description</i>	<i>Errors code</i>
SNMP_ERR	SNMP file error.	<ul style="list-style-type: none"> • 0x00: SNMP file ok. • 0x01: SNMP file not found. • 0x02: File open error. • 0x03: UDP socket initialization error. • 0x04: Port 161 open error.
CALIB_ERR	*.apwr and *.dpwr files error.	<ul style="list-style-type: none"> • 0x00: File ok. • 0x01: Analog (Digital) mode (current mode) file not found. • 0x02: Analog (Digital) file open error. • 0x03...0x12: Invalid Analog (Digital) file (syntax error). • 0x20: Digital (Analog) mode file not found • 0x21: Digital (Analog) file open error. • 0x22...0x26: Invalid Digital (Analog) file (syntax error).
PREC_ERR	*.apre and *.dpre files error.	<ul style="list-style-type: none"> • 0x00: File ok. • 0x01: File not found. • 0x02: File open error. • 0x03...0x0a: Invalid file (syntax errors).
LINEAR_ERR	*.alin and *.dlin files error.	<ul style="list-style-type: none"> • 0x00: File ok. • 0x01: File not found. • 0x02: File open error. • 0x03...0x06: Invalid file (syntax errors).
DOWNCV_ERR	Downconverter PLL not locked error.	<ul style="list-style-type: none"> • 0x00: PLL locked. • 0x01: PLL not locked

<i>Event</i>	<i>Description</i>	<i>Errors code</i>
UPCV_ERR	Upconverter error.	<ul style="list-style-type: none"> • 0x00: Upconverter ready. • 0x01: Upconverter not found. • 0x10: Upconverter disabled.
SYS_ERR	For critical errors, the system calls the system error function.	<ul style="list-style-type: none"> • 0x00: Out of memory. Memory pool size is too small. • 0x01: Invalid memory block release. Buffer data has been written out of boundaries of the allocated memory block. • 0x02: Link pointer corrupted. Buffer data has been written out of boundaries of the allocated memory block. • 0x03: No free UDP Sockets. The system has run out of UDP Sockets. • 0x04: No free TCP Sockets. The system has run out of TCP Sockets. • 0x05: TCP socket is in an undefined state. System memory has been accidentally overwritten.

3.11 System menu

Figure 24. Menu bar



The menu bar allows the access to three menus:

- **File:** allows the enabling of load and save commands
- **View:** allows to manage sections windows showing, java update time and events alert messages
- **Help:** informs about board name, GbE1 IP address, file system and operator managing system characteristics.

3.11.1 File menu



Figure 25. File menu

The File menu allows the enabling of the following commands:

- **Save:** allows device configuration saving creating a new *.sav file in the file system.
- **Load:** allows last *.sav file loading from file system.

3.11.2 View menu

Figure 26. View menu

The View menu allows the enabling of the following commands:

- **General:** allows to access the general window.
- **Input:** allows to access the input window.
- **Tuner:** allows to access the Tuner window.
- **Output:** allows to access the Output window.
- **Network:** allows to access the Network window.
- **CAM:** allows to access the PID manager window.
- **Input GPS:** allows to access the Input GPS window.
- **Alarms:** allows to access the Alarms window.
- **Events:** allows to access the Events window.
- **Options:** allows to access the Options sub-menu.

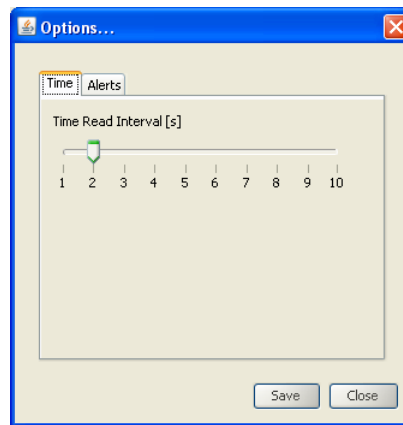
3.11.2.1 Option sub-menu

The Option sub-menu allows two controls type:

- **Time:** Time Read Interval [s];
- **Alerts:** the selection of events to display.

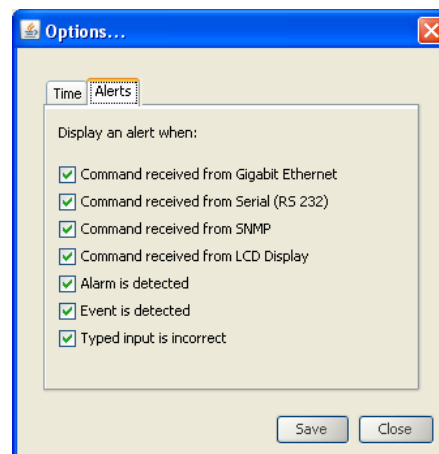
Click on the *Save* button to save Java options; a *.properties file will be created. The device is not loaded with a factory default *.properties file, but it is created and then stored in System File once the properties have been saved.

3.11.2.2 Time

Figure 27. Time window

This control allows changing the device-to-management PC java update time. The default value is 2 seconds. Click on Close button quit this sub-window.

3.11.2.3 Alerts

**Figure 28. Alerts window**

The Alert sub-window allows selecting which types of events will be notified through an Alert box.

Alert boxes appear on the right side of the monitor. The selection is performed among the following types of event:

- **Commands (blue boxes):**
 - Gigabit Ethernet commands;

- RS232 commands;
- SNMP commands;
- LCD Display commands.
- **Alarms (red boxes);**
- **Events (green messages):**
 - Board events.
- **Typing error (yellow messages):**
 - Typed setting is incorrect.

Click on *hide* button to close these alert popup windows.

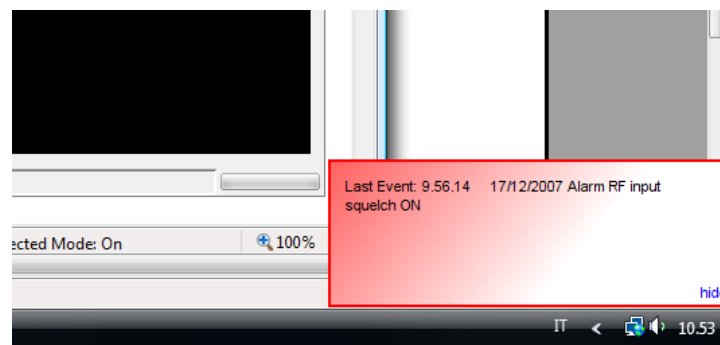
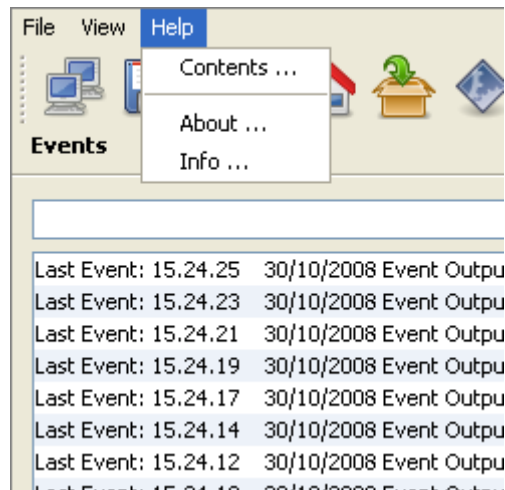


Figure 29. Alert message

Alert boxes can be disabled through the hide button located on the right side of the box. The hide button, once clicked, disables all boxes belonging to the same class.

3.11.3 Help menu

Figure 30. Help menu



The Help menu allows enabling the following controls type:

- **Contents:** actually not implemented.
- **About:** shows the board name and the GbE1 IP address. It also informs about the board uC, fpga and java software versions.
- **Info:** shows the board system files list and the operator managing system characteristics.

3.11.3.1 About

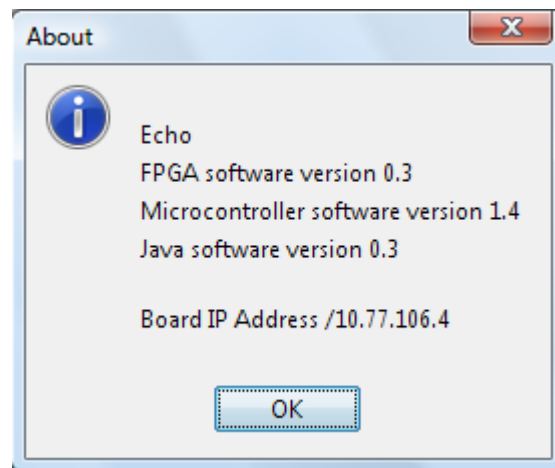
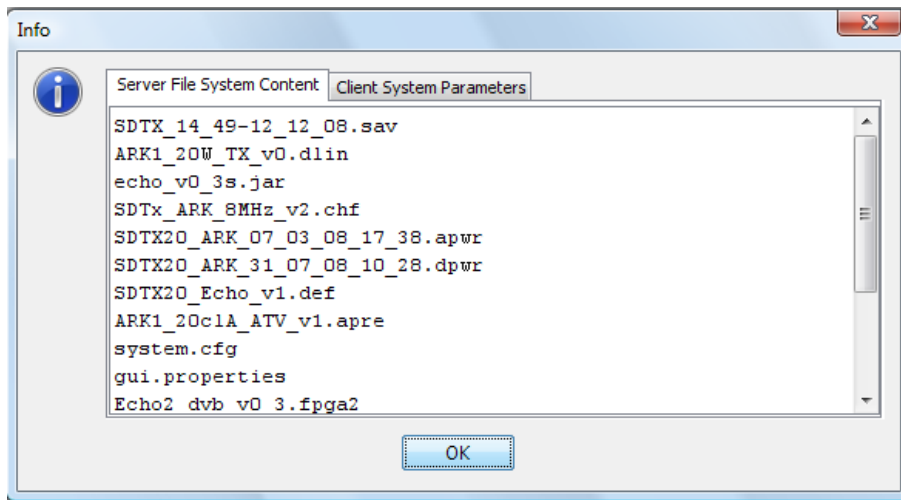


Figure 31. About window

The “About” window shows the board name and the GbE1 IP address. It also informs about the board uC, FPGA and Java software versions. Click on OK button to close the window.

3.11.3.2 Info

Figure 32. Info window: file system content



The server file system content section of info window shows the entire board system files list. Use scroll bars to view all the items.

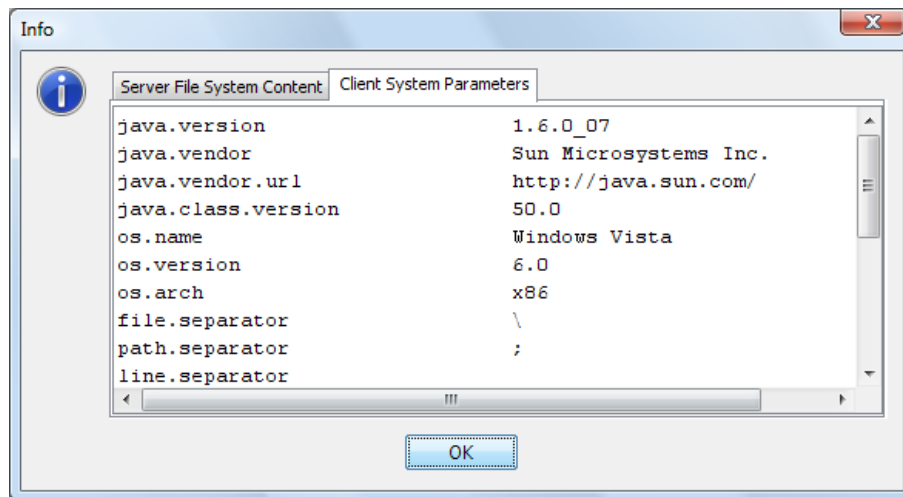


Figure 33. Info window: client system parameters

The client system parameters section of info window shows the operator managing system characteristics list. Use scroll bars to view all the items. Click on OK button to close the window.

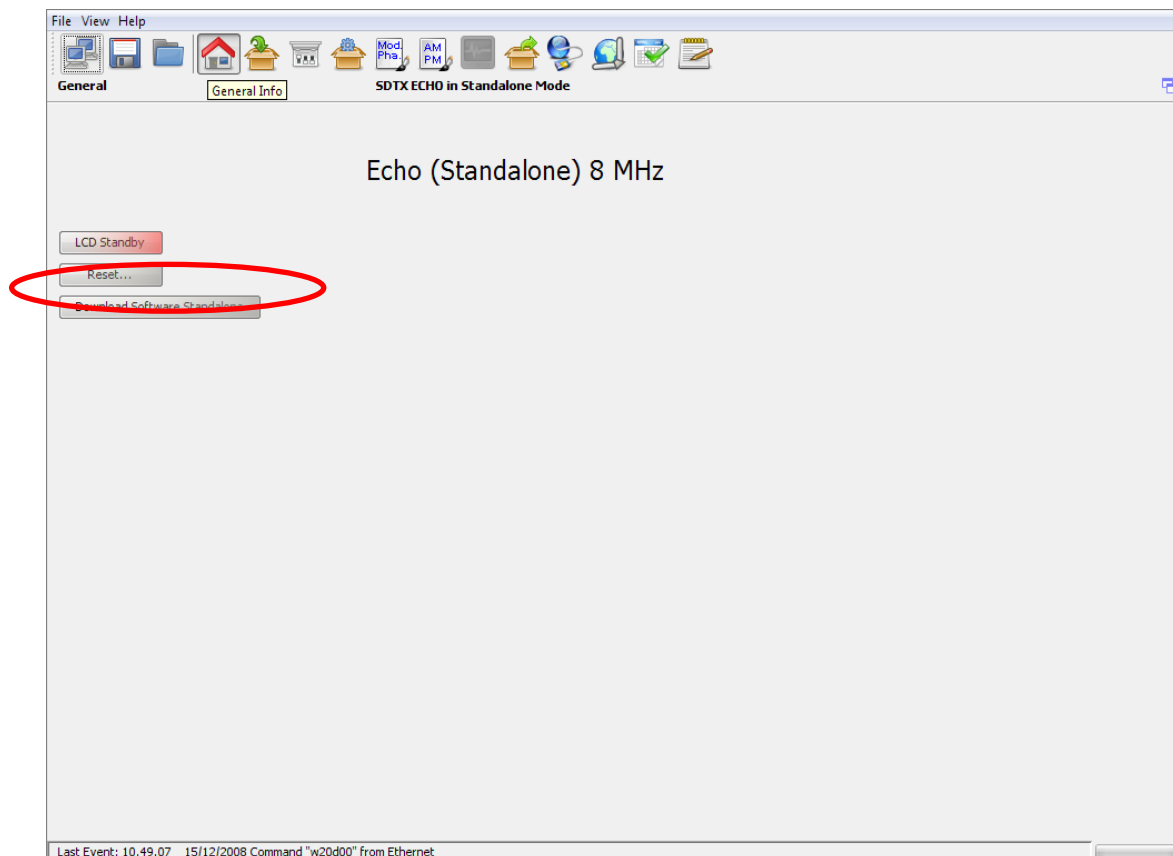
3.12 Download Software Standalone

The Download Software Standalone button allows the downloading of standalone java application (executable jar file) based on java applet.

If your browser is Internet Explorer, it may blocks the site from downloading files to your computer. If you want to enable the file downloading, follow the instructions listed below:

- Open Internet Explorer;
- Click on the Tools button and then click on Internet Options;
- Click on the Security tab and then click on Custom level button;
- To turn off the Information bar for file downloads, scroll to the Downloads section of the list, and then, under Automatic prompting for file downloads, click on Enable;
- Click on OK, click Yes in order to confirm that you want to make the change, and then click OK again.

Figure 34. Download Software Standalone



3.13 SNMP – Simple Network Management Protocol

The SNMP model assumes the existence of managers and agents. A manager is a software module in a management system responsible for managing the device. An agent is a software module in a managed device responsible for maintaining local management information and delivering that information to a manager via SNMP. A management information exchange can be initiated by the manager (via polling) or by the agent (via trap).

Interaction between a user of board management and the board management software takes place across a user interface. Such an interface is needed to provide users with a monitoring and controlling tool in order to allow some parameters to be viewed or set locally.

The operations that are supported in SNMP network management are the alteration and inspection of variables. Specifically, three general-purpose operations may be performed on scalar objects:

- Get: a management station retrieves a scalar object value from a managed station.
- Set: a management station updates a scalar object value in a managed station.
- Trap: a managed station sends an unsolicited scalar object value to a management station.

Management information accessible via SNMP is maintained in a management information base (MIB) at each manager and agent node.

On manager side, SDTX ECHO management system has been tested with MG-SOFT as MIB Browser; besides compatibility with any other MIB browser is assured.

The following MIB libraries are required for the SNMP management of the equipment:

- SCREENSERVICE-SCB-BROADCASTING-MIB.my;
- echo_0_1.MY.

Compatibility tested and assured with SNMP version 1 and 2.

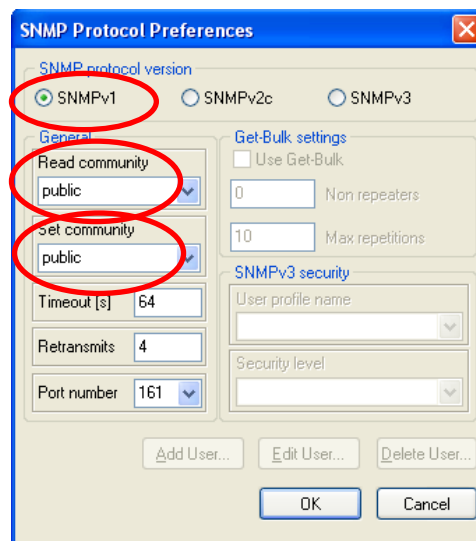
3.14 SNMP Protocol Preferences

Go to SNMP Protocol Preferences. The following parameters should be set in order to correctly configure the SNMP Manager:

- SNMP protocol version: **SNMPv1**;
- Read Community: the same of the one set in the **Get** field of Java interface, community section;
- Set Community: the same of the one set in the **Set** field of Java interface, community section;
- Timeout [s]: user defined;
- Retransmits: user defined;
- Port number: **161**.

Next figure illustrates how to configure SNMP Protocol Preferences using MG_SOFT MIB Browser as an example.

Figure 3.13-1: SNMP Protocol Preferences



3.15 Communities

The following community strings are used by default.

- Read Community: **public.**
- Set Community: **private.**

Change in **public** the Set Community on the SNMP Protocol Preferences.

3.16 Monitoring

All status and setup information can be queried via SNMP. To get the setup and status information you need a management system (or a special MIB browser).

Next figure, referring to iReasoning MIB Browser as an example, is a broad view of the SDTX ECHO tree structure.

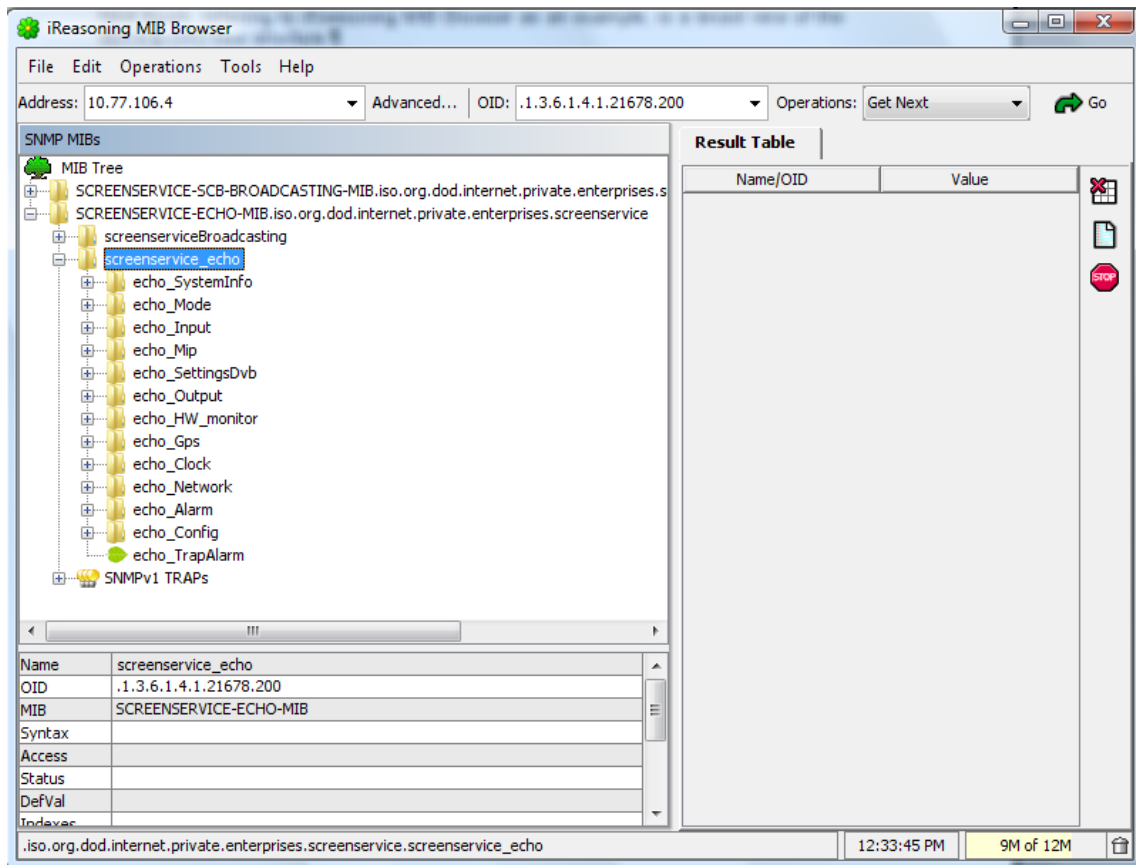


Figure 35. SDTX ECHO MIB Browser

3.17 OID

Any status and setup information has an OID (Object Identifier). The OID of the SDTX ECHO system is:

- *screenservice_SDtx Echoc: 1.3.6.1.4.1.21678.200*
iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).screenservice(21678).screenservice_echo(200)

3.17.1 SNMP tree structure

The SNMP tree structure is shown in the previous figure, after the node *screenserviceBroadcasting* there is the node that specifies the device typology.

The *screenservice_SDtx Echo* tree has 12 nodes and 1 leaf.

The nodes are:

- **echo_SystemInfo:** global description of the system.
- **echo_Mode:** shows and manages board modes.
- **echo_Input:** shows and manages inputs.
Note: In *Echo_STV0* and *Echo_STV1* nodes are housed the statistics of the digital RF signal. *STV0* and *STV1* are the two IF demodulators for the HP and LP streams respectively.
- **echo_Mip:** shows MIP modulation parameters.
- **echo_SettingsATSC:** shows and sets local modulation parameters.
- **echo_Output:** shows and manages the output.
- **echo_HW_monitor:** shows the amplifier status.
- **echo_Gps:** shows the collection of live data from GPS receiver.
- **echo_Clock:** shows and sets 10MHz and 1PPS source.
- **echo_Network:** shows and sets network parameters.
- **echo_Alarm:** shows and manages system alarms.
- **echo_Config:** allows the management of the machine configuration.
- **echo_TrapAlarm:** is the OID used in the trap message.

Table 19. SDTX ECHO SNMP Tree Structure

OID	Name	R/W	Description
1	iso		OBJ ID
1.3	org		OBJ ID
1.3.6	dod		OBJ ID
1.3.6.1	internet		OBJ ID
1.3.6.1.2	mgmt		OBJ ID
1.3.6.1.2.1	mib-2		OBJ ID
1.3.6.1.2.1.1	system		OBJ ID
1.3.6.1.2.1.1.1	sysDescr	R	
1.3.6.1.2.1.1.2	sysObjectID	R	
1.3.6.1.2.1.1.3	sysUpTimeInstance	R	
1.3.6.1.2.1.1.4	sysContact	R	
1.3.6.1.2.1.1.5	sysName	R	
1.3.6.1.2.1.1.6	sysLocation	R	
1.3.6.1.2.1.1.7	sysServices	R	
1.3.6.1.4	private		OBJ ID
1.3.6.1.4.1	enterprise		OBJ ID
1.3.6.1.4.1.21678	screenservice		OBJ ID
1.3.6.1.4.1.21678.183	screenservice_echo		OBJ ID
1.3.6.1.4.1.21678.183.1	echo_SystemInfo		OBJ ID
1.3.6.1.4.1.21678.183.1.1	echo_SystemInfoIdentifier	R	Identification name of the equipment managed
1.3.6.1.4.1.21678.183.1.2	echo_SystemInfoName	R	Manufacturer name

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.1.3	echo_SystemInfoDescription	R	Description of the equipment managed
1.3.6.1.4.1.21678.183.1.4	echo_SystemInfoLocation	R	Geographical implantation
1.3.6.1.4.1.21678.183.1.5	echo_SystemInfoContact	R	The person to contact in case of problems with the managed element
1.3.6.1.4.1.21678.183.1.6	echo_SystemInfoFamilyNumber	R	Device family number
1.3.6.1.4.1.21678.183.1.7	echo_SystemInfoId	R	System info ID
1.3.6.1.4.1.21678.183.1.8	echo_SystemInfoSerialNumber	R	Device serial number
1.3.6.1.4.1.21678.183.1.9	echo_SystemInfoVersion		OBJ ID
1.3.6.1.4.1.21678.183.1.9.1	echo_VersionUc	R	UC file version
1.3.6.1.4.1.21678.183.1.9.2	echo_VersionFpga	R	Fpga file version
1.3.6.1.4.1.21678.183.1.9.3	echo_VersionSnmp	R	Snmp file version
1.3.6.1.4.1.21678.183.1.9.4	echo_VersionPsu		OBJ ID
1.3.6.1.4.1.21678.183.1.9.4.1	echo_PsuFamily	R	PSU family number
1.3.6.1.4.1.21678.183.1.9.4.2	echo_PsuSerial	R	PSU serial number
1.3.6.1.4.1.21678.183.1.9.5	echo_VersionUpconverter		OBJ ID
1.3.6.1.4.1.21678.183.1.9.5.1	echo_UpconverterFamily	R	Upconverter family number
1.3.6.1.4.1.21678.183.1.9.5.2	echo_UpconverterSerial	R	Upconverter serial number
1.3.6.1.4.1.21678.183.1.9.5.3	echo_UpconverterLib	R	Upconverter software library number
1.3.6.1.4.1.21678.183.1.9.5.4	echo_UpconverterVer	R	Upconverter version
1.3.6.1.4.1.21678.183.2	echo_Mode		OBJ ID
1.3.6.1.4.1.21678.183.2.1	echo_ModeSwitch	RW	Switch mode selector 0:manual 1:auto 2:opto 3:time
1.3.6.1.4.1.21678.183.2.2	echo_ModeManualSelector	RW	Manual mode 0: modeA 1: modeB
1.3.6.1.4.1.21678.183.2.3	echo_ModeActual	R	Actual mode 0: modeA 1: modeB
1.3.6.1.4.1.21678.183.2.4	echo_ModeSelectorA	RW	Mode A selector 0: Rep Analog 1: Rep Digital 2: Tx ATSC

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.2.5	echo_ModeSelectorB	RW	Mode B selector 0: Rep Analog 1: Rep Digital 2: Tx ATSC
1.3.6.1.4.1.21678.183.2.7	echo_ModeErrorFrequency	R	Frequency error correction expressed in Hz
1.3.6.1.4.1.21678.183.2.8	echo_ModeAFC_A	RW	Automatic Frequency Control mode A 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.2.9	echo_ModeAFC_B	RW	Automatic Frequency Control mode B 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.2.10	echo_ModeAFC_actual	R	Automatic Frequency Control status 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.2.11	echo_ModeAutoSwitchTmo	RW	Auto-switch timeout (s)
1.3.6.1.4.1.21678.183.2.12	echo_ModeActualTmo	R	Actual auto-switch timeout (s)
1.3.6.1.4.1.21678.183.2.13	echo_ModeAutoSwitchRuleA	RW	Auto-switch rules mode A (bit to alarm association) bit 0: no RF input alarm bit1: input squelch alarm bit2: no ts input alarm bit3: ber alarm bit4: S/N alarm bit5: no MIP alarm
1.3.6.1.4.1.21678.183.2.14	echo_ModeAutoSwitchRuleB	RW	Auto-switch rules mode B (bit to alarm association) bit 0: no RF input alarm bit1: input squelch alarm bit2: no ts input alarm bit3: ber alarm bit4: S/N alarm bit5: no MIP alarm
1.3.6.1.4.1.21678.183.2.15	echo_ModeSwitchingTime		OBJ ID
1.3.6.1.4.1.21678.183.2.15.1	echo_SwitchingTimeYear	RW	Switching time: year setting (starting from 2000)
1.3.6.1.4.1.21678.183.2.15.2	echo_SwitchingTimeMonth	RW	Switching time: month setting
1.3.6.1.4.1.21678.183.2.15.3	echo_SwitchingTimeDay	RW	Switching time: day setting
1.3.6.1.4.1.21678.183.2.15.4	echo_SwitchingTimeHour	RW	Switching time: hour setting
1.3.6.1.4.1.21678.183.2.15.5	echo_SwitchingTimeMinutes	RW	Switching time: minutes setting
1.3.6.1.4.1.21678.183.2.15.6	echo_SwitchingTimeSeconds	RW	Switching time: seconds setting
1.3.6.1.4.1.21678.183.3	echo_Input		OBJ ID
1.3.6.1.4.1.21678.183.3.1	echo_InputSettings		OBJ ID
1.3.6.1.4.1.21678.183.3.1.1	echo_InputSettingsA		OBJ ID

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.3.1.1.1	echo_InputSettingsA_Rf		OBJ ID
1.3.6.1.4.1.21678.183.3.1.1.1.1	echo_SettingsA_Rf_Channel	RW	Mode A: input channel
1.3.6.1.4.1.21678.183.3.1.1.1.2	echo_SettingsA_Rf_FrequencyOffset	RW	Mode A: input frequency offset expressed in Hz (from -4,000,000 up to 4,000,000)
1.3.6.1.4.1.21678.183.3.1.1.2	echo_InputSettingsA_Remod		OBJ ID
1.3.6.1.4.1.21678.183.3.1.1.2.1	echo_SettingsA_Remod_Hp	RW	Mode A: High Priority steam selector 0: asi 1 1: asi 2 2: asi 3 3: asi 4 4: RX HP 5: RX LP 6: Gbe Port1 7: Gbe Port2
1.3.6.1.4.1.21678.183.3.1.1.2.2	echo_SettingsA_Remod_Lp	RW	Mode A: Low Priority steam selector 0: asi 1 1: asi 2 2: asi 3 3: asi 4 4: RX HP 5: RX LP 6: Gbe Port1 7: Gbe Port2
1.3.6.1.4.1.21678.183.3.1.2	echo_InputSettingsB		OBJ ID
1.3.6.1.4.1.21678.183.3.1.2.1	echo_InputSettingsB_Rf		OBJ ID
1.3.6.1.4.1.21678.183.3.1.2.1.1	echo_SettingsB_Rf_Channel	RW	Mode B: input channel
1.3.6.1.4.1.21678.183.3.1.2.1.2	echo_SettingsB_Rf_FrequencyOffset	RW	Mode B: input frequency offset expressed in Hz (from -4,000,000 up to 4,000,000)
1.3.6.1.4.1.21678.183.3.1.2.2	echo_InputSettingsB_Remod		OBJ ID
1.3.6.1.4.1.21678.183.3.1.2.2.1	echo_SettingsB_Remod_Hp	RW	Mode B: High Priority steam selector 0: asi 1 1: asi 2 2: asi 3 3: asi 4 4: RX HP 5: RX LP 6: Gbe Port1 7: Gbe Port2
1.3.6.1.4.1.21678.183.3.1.2.2.2	echo_SettingsB_Remod_Lp	RW	Mode B: Low Priority steam selector 0: asi 1 1: asi 2 2: asi 3 3: asi 4 4: RX HP 5: RX LP 6: Gbe Port1 7: Gbe Port2
1.3.6.1.4.1.21678.183.3.2	echo_InputStatistics		OBJ ID
1.3.6.1.4.1.21678.183.3.2.1	echo_StatisticsRf		OBJ ID
1.3.6.1.4.1.21678.183.3.2.1.1	echo_RfRxLevel	R	Input RX level 0: over input 255: low power 1...254: power (absolute value expressed in dBm)

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.3.2.1.2	echo_RfAnalog		OBJ ID
1.3.6.1.4.1.21678.183.3.2.1.2.1	echo_VSync	R	PAL detector 0: No 1: Yes
1.3.6.1.4.1.21678.183.3.2.1.3	echo_RfDigital		OBJ ID
1.3.6.1.4.1.21678.183.3.2.1.3.1	echo_RxATSClp		OBJ ID
1.3.6.1.4.1.21678.183.3.2.1.3.1.1	echo_RxATSClp_PckRate	R	Input Rx HP: packet rate
1.3.6.1.4.1.21678.183.3.2.1.3.1.2	echo_RxATSClp_UsedPckrate	R	Input Rx HP: filtered packet rate
1.3.6.1.4.1.21678.183.3.2.1.3.1.3	echo_RxATSClp_Lock	R	Input Rx HP: lock alarm 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.1.3.1.4	echo_RxATSClp_OverFlowAlarm	R	Input Rx HP: overflow alarm 0: off 1: on
1.3.6.1.4.1.21678.183.3.2.1.3.2	echo_RxATSClp		OBJ ID
1.3.6.1.4.1.21678.183.3.2.1.3.2.1	echo_RxATSClp_Pckrate	R	Input Rx LP: packet rate
1.3.6.1.4.1.21678.183.3.2.1.3.2.2	echo_RxATSClp_UsedPckrate	R	Input Rx LP: filtered packet rate
1.3.6.1.4.1.21678.183.3.2.1.3.2.3	echo_RxATSClp_Lock	R	Input Rx LP: lock alarm 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.1.3.2.4	echo_RxATSClp_OverFlowAlarm	R	Input Rx LP: overflow alarm 0: off 1: on
1.3.6.1.4.1.21678.183.3.2.1.3.3	echo_STV0		OBJ ID
1.3.6.1.4.1.21678.183.3.2.1.3.3.1	echo_STV0LockTps	R	STV 0: TPS lock status 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.1.3.3.2	echo_STV0LockSyr	R	STV 0: symbol recovery loop lock status 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.1.3.3.3	echo_STV0LockPunctureRate	R	STV 0: puncture rate found 0: not found 1: found
1.3.6.1.4.1.21678.183.3.2.1.3.3.4	echo_STV0LockDeinterleaver	R	STV 0: de-interleaver lock status 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.1.3.3.5	echo_STV0DemodBerRate	R	STV 0: demodulator Bit Error Rate
1.3.6.1.4.1.21678.183.3.2.1.3.3.6	echo_STV0ViterbiBerRate	R	STV 0: Viterbi Bit Error Rate
1.3.6.1.4.1.21678.183.3.2.1.3.3.7	echo_STV0PckErr	R	STV 0: packet error count
1.3.6.1.4.1.21678.183.3.2.1.3.3.8	echo_STV0Snr	R	STV 0: estimated Signal-to-Noise Ratio expressed in dB
1.3.6.1.4.1.21678.183.3.2.1.3.3.9	echo_STV0Constallation	R	STV 0: constellation for current modulation scheme 0: QPSK 1: 16-QAM 2:

OID	Name	RW	Description
			64-QAM
1.3.6.1.4.1.21678.183.3.2.1.3.3.10	echo_STV0HierMode	R	STV 0: hierarchy information for current scheme 0: non hierarchical 1: alpha=1 2: alpha=2 3: alpha=4
1.3.6.1.4.1.21678.183.3.2.1.3.3.11	echo_STV0Interleaver	R	STV 0: native/in-depth symbol interleaver for current scheme 0: native 1: in-depth
1.3.6.1.4.1.21678.183.3.2.1.3.3.12	echo_STV0Fec	R	STV 0: High Priority FEC 0: 1/2 1: 2/3 2: 3/4 3: 5/6 4: 7/8
1.3.6.1.4.1.21678.183.3.2.1.3.3.13	echo_STV0Fft	R	STV 0: transmission mode information 0: 2K 1: 8K 2: 4K
1.3.6.1.4.1.21678.183.3.2.1.3.3.14	echo_STV0GuardTime	R	STV 0: guard interval 0: 1/32 1: 1/16 2: 1/8 3: 1/4
1.3.6.1.4.1.21678.183.3.2.1.3.3.15	echo_STV0CellId	R	STV 0: cell identifier
1.3.6.1.4.1.21678.183.3.2.1.3.4	echo_STV1		OBJ ID
1.3.6.1.4.1.21678.183.3.2.1.3.4.1	echo_STV1LockTps	R	STV 1: TPS lock status 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.1.3.4.2	echo_STV1LockSyr	R	STV 1: symbol recovery loop lock status 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.1.3.4.3	echo_STV1LockPunctureRate	R	STV 1: puncture rate found 0: not found 1: found
1.3.6.1.4.1.21678.183.3.2.1.3.4.4	echo_STV1LockDeinterleaver	R	STV 1: de-interleaver lock status 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.1.3.4.5	echo_STV1DemodBerRate	R	STV 1: demodulator Bit Error Rate
1.3.6.1.4.1.21678.183.3.2.1.3.4.6	echo_STV1ViterbiBer	R	STV 1: Viterbi Bit Error Rate
1.3.6.1.4.1.21678.183.3.2.1.3.4.7	echo_STV1PckErr	R	STV 1: packet error count
1.3.6.1.4.1.21678.183.3.2.1.3.4.8	echo_STV1Snr	R	STV 1: estimated Signal-to-Noise Ratio expressed in dB
1.3.6.1.4.1.21678.183.3.2.1.3.4.9	echo_STV1Constellation	R	STV 1: constellation for current modulation scheme 0: QPSK 1: 16-QAM 2: 64-QAM
1.3.6.1.4.1.21678.183.3.2.1.3.4.10	echo_STV1HierMode	R	STV1: hierarchy information for current scheme 0: non hierarchical 1: alpha=1 2: alpha=2 3: alpha=4
1.3.6.1.4.1.21678.183.3.2.1.3.4.11	echo_STV1Interleaver	R	STV 1: native/in-depth symbol interleaver for current scheme 0: native 1: in-

OID	Name	RW	Description
			depth
1.3.6.1.4.1.21678.183.3.2.1.3.4.12	echo_STV1Fec	R	STV1: Low Priority FEC 0: 1/2 1: 2/3 2: 3/4 3: 5/6 4: 7/8
1.3.6.1.4.1.21678.183.3.2.1.3.4.13	echo_STV1Fft	R	STV 1: transmission mode information 0: 2K 1: 8K 2: 4K
1.3.6.1.4.1.21678.183.3.2.1.3.4.14	echo_STV1GuardTime	R	STV 1: guard interval 0: 1/32 1: 1/16 2: 1/8 3: 1/4
1.3.6.1.4.1.21678.183.3.2.1.3.4.15	echo_STV1CellId		STV 1: cell identifier
1.3.6.1.4.1.21678.183.3.2.2	echo_StatisticsRemod		OBJ ID
1.3.6.1.4.1.21678.183.3.2.2.1	echo_RemodAsi		OBJ ID
1.3.6.1.4.1.21678.183.3.2.2.1.1	echo_Asi1		OBJ ID
1.3.6.1.4.1.21678.183.3.2.2.1.1.1	echo_Asi1WordRate	R	Asi 1 input word rate
1.3.6.1.4.1.21678.183.3.2.2.1.1.2	echo_Asi1ByteRate	R	Asi 1 input byte rate
1.3.6.1.4.1.21678.183.3.2.2.1.1.3	echo_Asi1Filtered	R	Asi 1 filtered byte rate
1.3.6.1.4.1.21678.183.3.2.2.1.1.4	echo_Asi1OverFlowAlarm	R	Asi 1 overflow alarm 0: off 1: on
1.3.6.1.4.1.21678.183.3.2.2.1.1.5	echo_Asi1Lock	R	Asi 1 lock status 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.2.1.1.6	echo_Asi1PacketFormat	R	Asi 1 packet format 0: 204 1: 188
1.3.6.1.4.1.21678.183.3.2.2.1.1.7	echo_Asi1Cd	R	Asi 1 carrier detect alarm 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.2.1.1.8	echo_Asi1Errors	R	Asi 1 wrong bytes received (pay attention: when the input is not connected it is different from zero)
1.3.6.1.4.1.21678.183.3.2.2.1.2	echo_Asi2		OBJ ID
1.3.6.1.4.1.21678.183.3.2.2.1.2.1	echo_Asi2WordRate	R	Asi 2 input word rate
1.3.6.1.4.1.21678.183.3.2.2.1.2.2	echo_Asi2ByteRate	R	Asi 2 input byte rate
1.3.6.1.4.1.21678.183.3.2.2.1.2.3	echo_Asi2Filtered	R	Asi 2 filtered byte rate
1.3.6.1.4.1.21678.183.3.2.2.1.2.4	echo_Asi2OverFlowAlarm	R	Asi 2 overflow alarm 0: off 1: on
1.3.6.1.4.1.21678.183.3.2.2.1.2.5	echo_Asi2Lock	R	Asi 2 lock status 0: unlock 1: lock

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.3.2.2.1.2.6	echo_Asi2PacketFormat	R	Asi 2 packet format 0: 204 1: 188
1.3.6.1.4.1.21678.183.3.2.2.1.2.7	echo_Asi2Cd	R	Asi 2 carrier detect alarm 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.2.1.2.8	echo_Asi2Errors	R	Asi 2 wrong bytes received (pay attention: when the input is not connected it is different from zero)
1.3.6.1.4.1.21678.183.3.2.2.1.3	echo_Asi3		OBJ ID
1.3.6.1.4.1.21678.183.3.2.2.1.3.1	echo_Asi3WordRate	R	Asi 3 input word rate
1.3.6.1.4.1.21678.183.3.2.2.1.3.2	echo_Asi3ByteRate	R	Asi 3 input byte rate
1.3.6.1.4.1.21678.183.3.2.2.1.3.3	echo_Asi3Filtered	R	Asi 3 filtered byte rate
1.3.6.1.4.1.21678.183.3.2.2.1.3.4	echo_Asi3OverFlowAlarm	R	Asi 3 overflow alarm 0: off 1: on
1.3.6.1.4.1.21678.183.3.2.2.1.3.5	echo_Asi3Lock	R	Asi 3 lock status 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.2.1.3.6	echo_Asi3PacketFormat	R	Asi 3 packet format 0: 204 1: 188
1.3.6.1.4.1.21678.183.3.2.2.1.3.7	echo_Asi3Cd	R	Asi 3 carrier detect alarm 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.2.1.3.8	echo_Asi3Errors	R	Asi 3 wrong bytes received (pay attention: when the input is not connected it is different from zero)
1.3.6.1.4.1.21678.183.3.2.2.1.4	echo_Asi4		OBJ ID
1.3.6.1.4.1.21678.183.3.2.2.1.4.1	echo_Asi4WordRate	R	Asi 4 input word rate
1.3.6.1.4.1.21678.183.3.2.2.1.4.2	echo_Asi4ByteRate	R	Asi 4 input byte rate
1.3.6.1.4.1.21678.183.3.2.2.1.4.3	echo_Asi4Filtered	R	Asi 4 filtered byte rate
1.3.6.1.4.1.21678.183.3.2.2.1.4.4	echo_Asi4OverFlowAlarm	R	Asi 4 overflow alarm 0: off 1: on
1.3.6.1.4.1.21678.183.3.2.2.1.4.5	echo_Asi4Lock	R	Asi 4 lock status 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.2.1.4.6	echo_Asi4PacketFormat	R	Asi 4 packet format 0: 204 1: 188
1.3.6.1.4.1.21678.183.3.2.2.1.4.7	echo_Asi4Cd	R	Asi 4 carrier detect alarm 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.2.1.4.8	echo_Asi4Errors	R	Asi 4 wrong bytes received (pay attention: when the input is not connected it is

OID	Name	RW	Description
			different from zero)
1.3.6.1.4.1.21678.183.3.2.2.2	echo_RemodGbe		OBJ ID
1.3.6.1.4.1.21678.183.3.2.2.2.1	echo_GbePckCounter	R	Good frame count
1.3.6.1.4.1.21678.183.3.2.2.2.2	echo_GbeErrors	R	Bad frame count
1.3.6.1.4.1.21678.183.3.2.2.2.3	echo_GbePort1		OBJ ID
1.3.6.1.4.1.21678.183.3.2.2.2.3.1	echo_GbePort1PckRate	R	Gigabit Ethernet 1 input packet rate
1.3.6.1.4.1.21678.183.3.2.2.2.3.2	echo_GbePort1Filtered	R	Gigabit Ethernet 1 filtered packet rate
1.3.6.1.4.1.21678.183.3.2.2.2.3.3	echo_GbePort1PacketFormat	R	Gigabit Ethernet 1 packet format 0: 204 01: 188 3: not valid
1.3.6.1.4.1.21678.183.3.2.2.2.3.4	echo_GbePort1Lock	R	Gigabit Ethernet 1 lock lock status 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.2.2.3.5	echo_GbePort1OverFlowAlarm	R	Gigabit Ethernet 1 overflow alarm 0: off 1: on
1.3.6.1.4.1.21678.183.3.2.2.2.3.6	echo_GbePort1SequenceError	R	NOT IMPLEMENTED (Gigabit Ethernet 1 sequence error 0: off 1: on)
1.3.6.1.4.1.21678.183.3.2.2.2.3.7	echo_GbePort1Protocol	R	Gigabit Ethernet 1 transmission protocol 0: udp 1: rtp
1.3.6.1.4.1.21678.183.3.2.2.2.4	echo_GbePort2		OBJ ID
1.3.6.1.4.1.21678.183.3.2.2.2.4.1	echo_GbePort2PcktRate	R	Gigabit Ethernet 2 input packet rate
1.3.6.1.4.1.21678.183.3.2.2.2.4.2	echo_GbePort2Filtered	R	Gigabit Ethernet 2 filtered packet rate
1.3.6.1.4.1.21678.183.3.2.2.2.4.3	echo_GbePort2PacketFormat	R	Gigabit Ethernet 2 packet format 0: 204 01: 188 3: not valid
1.3.6.1.4.1.21678.183.3.2.2.2.4.4	echo_GbePort2Lock	R	Gigabit Ethernet 2 lock lock status 0: unlock 1: lock
1.3.6.1.4.1.21678.183.3.2.2.2.4.5	echo_GbePort2OverFlowAlarm	R	Gigabit Ethernet 2 overflow alarm 0: off 1: on
1.3.6.1.4.1.21678.183.3.2.2.2.4.6	echo_GbePort2SequenceError	R	NOT IMPLEMENTED (Gigabit Ethernet 2 sequence error 0: off 1: on)
1.3.6.1.4.1.21678.183.3.2.2.2.4.7	echo_GbePort2Protocol	R	Gigabit Ethernet 2 transmission protocol 0: udp 1: rtp
1.3.6.1.4.1.21678.183.4	echo_Mip		OBJ ID
1.3.6.1.4.1.21678.183.4.1	echo_MipDetect		OBJ ID
1.3.6.1.4.1.21678.183.4.1.1	echo_DetectHp	R	High priority MIP detect 0: not detected 1: detected

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.4.1.2	echo_DetectLp	R	Low priority MIP detect 0: not detected 1: detected
1.3.6.1.4.1.21678.183.4.2	echo_MipTxId		OBJ ID
1.3.6.1.4.1.21678.183.4.2.1	echo_TxId	RW	Transmitter identifier
1.3.6.1.4.1.21678.183.4.2.2	echo_TxId0Enable	RW	TX ID 0 enable 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.4.3	echo_MipConstellation	R	MIP Constellation 0: QPSK 1: 16-QAM 2: 64-QAM
1.3.6.1.4.1.21678.183.4.4	echo_MipInterleaver	R	MIP native/in-depth symbol interleaver selector 0: native 1: in-depth
1.3.6.1.4.1.21678.183.4.5	echo_MipAlpha	R	MIP alpha 0: not hierarchical 1: alpha=1 2: alpha=2 3: alpha=4
1.3.6.1.4.1.21678.183.4.6	echo_MipGuardTime	R	MIP guard interval 0:1/32 1:1/16 2:1/8 3:1/4
1.3.6.1.4.1.21678.183.4.7	echo_MipFft	R	MIP transmission mode 0:2K 1:8K 2:4K
1.3.6.1.4.1.21678.183.4.8	echo_MipBandwidth	R	MIP bandwidth 0: 7MHz 1: 8MHz 2: 6MHz 3: 5MHz
1.3.6.1.4.1.21678.183.4.9	echo_MipFec		OBJ ID
1.3.6.1.4.1.21678.183.4.9.1	echo_MipFecHp	R	MIP High priority FEC 0: 1/2 1: 2/3 2: 3/4 3: 5/6 4: 7/8
1.3.6.1.4.1.21678.183.4.9.2	echo_MipFecLp	R	MIP Low priority FEC 0: 1/2 1: 2/3 2: 3/4 3: 5/6 4: 7/8
1.3.6.1.4.1.21678.183.4.10	echo_MipTimeSlicing		OBJ ID
1.3.6.1.4.1.21678.183.4.10.1	echo_MipTimeSlicingHp	R	MIP High priority time slicing 0: not used 1: used
1.3.6.1.4.1.21678.183.4.10.2	echo_MipTimeSlicingLp	R	MIP Low priority time slicing 0: not used 1: used
1.3.6.1.4.1.21678.183.4.11	echo_MipMpeFec		OBJ ID
1.3.6.1.4.1.21678.183.4.11.1	echo_MipMpeFecHp	R	High priority MPE-FEC 0: not used 1: used
1.3.6.1.4.1.21678.183.4.11.2	echo_MipMpeFecLp	R	Low priority MPE-FEC 0: not used 1: used
1.3.6.1.4.1.21678.183.4.12	echo_MipDelayTx	R	MIP transmission delay
1.3.6.1.4.1.21678.183.4.13	echo_MipMaxDelay	R	MIP maximum delay [100ns]
1.3.6.1.4.1.21678.183.4.14	echo_MipTimeOffset		OBJ ID
1.3.6.1.4.1.21678.183.4.14.1	echo_TimeOffsetEnable	RW	MIP time offset enable

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.4.14.2	echo_TimeOffsetStatus	R	MIP time offset [100ns]
1.3.6.1.4.1.21678.183.4.15	echo_MipFrequencyOffset		OBJ ID
1.3.6.1.4.1.21678.183.4.15.1	echo_FrequencyOffsetEnable	RW	MIP frequency offset enable 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.4.15.2	echo_FrequencyOffsetStatus	R	MIP frequency offset [Hz]
1.3.6.1.4.1.21678.183.4.16	echo_MipTxPower		OBJ ID
1.3.6.1.4.1.21678.183.4.16.1	echo_TxPoweEnable	R	NOT IMPLEMENTED (MIP transmission power enable 0: disabled 1: enabled)
1.3.6.1.4.1.21678.183.4.16.2	echo_TxPowerStatus	R	MIP transmission power [0.1 dB]
1.3.6.1.4.1.21678.183.4.17	echo_MipCellId		OBJ ID
1.3.6.1.4.1.21678.183.4.17.1	echo_CellIdEnable	RW	Cell id function enable 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.4.17.2	echo_CellIdFunctionEnable	R	Enable function status 0: not received 1: received
1.3.6.1.4.1.21678.183.4.17.3	echo_CellIdFunctionTag	R	Cell id function tag 0: not detected 1: detected
1.3.6.1.4.1.21678.183.4.17.4	echo_CellIdStatus	R	Cell id function
1.3.6.1.4.1.21678.183.4.17.5	echo_CellIdWaitForEnable	R	Cell id function wait for enable 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.4.18	echo_MipFunctionBw		OBJ ID
1.3.6.1.4.1.21678.183.4.18.1	echo_FunctionBwEnable	R	NOT IMPLEMENTED (Bandwidth function enable 0: disabled 1: enabled)
1.3.6.1.4.1.21678.183.4.18.2	echo_FunctionBwStatus	R	Bandwidth function 0: 5MHz 1: reserved for future use
1.3.6.1.4.1.21678.183.4.18.3	echo_FunctionBwEnableRx	R	Enable function status 0: not received 1: received
1.3.6.1.4.1.21678.183.4.18.4	echo_FunctionChBwTag	R	Bandwidth function tag 0: not detected 1: detected
1.3.6.1.4.1.21678.183.4.18.5	echo_FunctionChBwWaitForEnable	R	Channel bandwith function wait for enabled 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.5	echo_SettingsATSC		OBJ ID
1.3.6.1.4.1.21678.183.5.1	echo_SettingsCellIdEnable	RW	Cell Id enable 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.5.3	echo_SettingsTxModeSel		OBJ ID

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.5.3.1	echo_TxModeSelATSC_T_H	RW	Transmitter mode selection 0 : ATSC 1: ATSC
1.3.6.1.4.1.21678.183.5.3.2	echo_TxModeSel_Mfn_Sfn	RW	Transmitter mode selection 0 : MFN 1: SFN
1.3.6.1.4.1.21678.183.5.3.3	echo_TxModeSel_Mip	RW	Transmitter mode selection 0 : Local 1: MIP
1.3.6.1.4.1.21678.183.5.4	echo_SettingsLocal		OBJ ID
1.3.6.1.4.1.21678.183.5.4.2	echo_LocalFft	RW	Transmission mode selector 0: 2K 1: 8K 2: 4K
1.3.6.1.4.1.21678.183.5.4.3	echo_LocalGuardTime	RW	Guard time selector 0: 1/32 1: 1/16 2: 1/8 3: 1/4
1.3.6.1.4.1.21678.183.5.4.4	echo_LocalAlpha	RW	Alpha selector 0: NH 1: alpha=1 2: alpha=2 3: alpha=4
1.3.6.1.4.1.21678.183.5.4.5	echo_LocalConstellation	RW	Constellation selector 0: QPSK 1: 16-QAM 2: 64-QAM
1.3.6.1.4.1.21678.183.5.4.6	echo_LocalSettingsFec		OBJ ID
1.3.6.1.4.1.21678.183.5.4.6.1	echo_SettingsFecHp	RW	High priority FEC 0: 1/2 1: 2/3 2: 3/4 3: 5/6 4: 7/8
1.3.6.1.4.1.21678.183.5.4.6.2	echo_SettingsFecLp	RW	Low priority FEC 0: 1/2 1: 2/3 2: 3/4 3: 5/6 4: 7/8
1.3.6.1.4.1.21678.183.5.4.7	echo_LocalCellId	RW	Local cell id setting
1.3.6.1.4.1.21678.183.5.4.8	echo_LocalInterleaver	RW	Symbol interleaver selector 0: native 1: in-depth
1.3.6.1.4.1.21678.183.5.4.9	echo_LocalTimeSlicing		OBJ ID
1.3.6.1.4.1.21678.183.5.4.9.1	echo_TimeSlicingHp	RW	High priority time slicing 0: not used 1: used
1.3.6.1.4.1.21678.183.5.4.9.2	echo_TimeSlicingLp	RW	Low priority time slicing 0: not used 1: used
1.3.6.1.4.1.21678.183.5.4.10	echo_LocalMpeFecUsed		OBJ ID
1.3.6.1.4.1.21678.183.5.4.10.1	echo_MpeFecHp	RW	High priority MPE-FEC 0: not used 1: used
1.3.6.1.4.1.21678.183.5.4.10.2	echo_MpeFecLp	RW	Low priority MPE-FEC 0: not used 1: used
1.3.6.1.4.1.21678.183.5.4.11	echo_LocalTimeOffset	RW	Time offset setting (-32768..32767)
1.3.6.1.4.1.21678.183.5.4.12	echo_LocalFrequencyOffset	RW	Frequency offset setting (from -8388608 up to 8388607)
1.3.6.1.4.1.21678.183.5.4.13	echo_LocalDelay	RW	User delay setting (-8388608..8388607)
1.3.6.1.4.1.21678.183.6	echo_Output		OBJ ID

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.6.1	echo_OutputSettings		OBJ ID
1.3.6.1.4.1.21678.183.6.1.1	echo_OutputSettingsA		OBJ ID
1.3.6.1.4.1.21678.183.6.1.1.1	echo_SettingsAChannel	RW	Mode A: output channel
1.3.6.1.4.1.21678.183.6.1.1.2	echo_SettingsAFrequencyOffset	RW	Mode A: output frequency offset expressed in Hz (from -4,000,000 up to 4,000,000)
1.3.6.1.4.1.21678.183.6.1.1.3	echo_SettingsAPower	RW	Mode A: output power
1.3.6.1.4.1.21678.183.6.1.2	echo_OutputSettingsB		OBJ ID
1.3.6.1.4.1.21678.183.6.1.2.1	echo_SettingsBChannel	RW	Mode B: output channel
1.3.6.1.4.1.21678.183.6.1.2.2	echo_SettingsBFrequencyOffset	RW	Mode B: output frequency offset expressed in Hz (from -4,000,000 up to 4,000,000)
1.3.6.1.4.1.21678.183.6.1.2.3	echo_SettingsBPower	RW	Mode B: output power
1.3.6.1.4.1.21678.183.6.1.3	echo_OutputSettingsGbe		OBJ ID
1.3.6.1.4.1.21678.183.6.1.3.1	echo_SettingsGbe0		OBJ ID
1.3.6.1.4.1.21678.183.6.1.3.1.1	echo_Gbe0Selector	RW	Input to Gigabit Ethernet 0 selector 0: asi 1 1: asi 2 2: asi 3 3: asi 4 4: RX HP 5: RX LP 6: Gbe Port1 7: Gbe Port2
1.3.6.1.4.1.21678.183.6.1.3.1.2	echo_Gbe0Status	R	Tx channel 1: transmission status 0: off 1: Resolving IP 2: No entry error 3: TX data 4: IP address not found 5: TX multicast data
1.3.6.1.4.1.21678.183.6.1.3.1.3	echo_Gbe0Enable	RW	Tx channel 1: transmission enable 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.6.1.3.2	echo_SettingsGbe1		OBJ ID
1.3.6.1.4.1.21678.183.6.1.3.2.1	echo_Gbe1Selector	RW	Input to Gigabit Ethernet 1 selector 0: asi 1 1: asi 2 2: asi 3 3: asi 4 4: RX HP 5: RX LP 6: Gbe Port1 7: Gbe Port2
1.3.6.1.4.1.21678.183.6.1.3.2.2	echo_Gbe1Status	R	Tx channel 2: transmission status 0: off 1: Resolving IP 2: No entry error 3: TX data 4: IP address not found 5: TX multicast data

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.6.1.3.2.3	echo_Gbe1Enable	RW	Tx channel 2: transmission enable 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.6.2	echo_OutputRf		OBJ ID
1.3.6.1.4.1.21678.183.6.2.1	echo_RfOn	RW	RF output enable 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.6.2.2	echo_RfStatus	R	RF output status 0: off 1: on
1.3.6.1.4.1.21678.183.6.2.3	echo_RfPrecCurveMode	R	Pre-correction curve editing status 0: auto 1: manual
1.3.6.1.4.1.21678.183.6.2.4	echo_RfPrecCurve	R	Pre-correction curve editing status 0: closed 1: opened
1.3.6.1.4.1.21678.183.6.2.5	echo_RfPrecCurveActualNumber	R	Current pre-correction curve number
1.3.6.1.4.1.21678.183.6.3	echo_OutputTest		OBJ ID
1.3.6.1.4.1.21678.183.6.3.1	echo_TestForceNullPck	RW	Force null packets 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.6.3.2	echo_TestCw	RW	Test CW 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.6.3.3	echo_TestHole	RW	Test Hole 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.6.4	echo_OutputTsProcessing		OBJ ID
1.3.6.1.4.1.21678.183.6.4.1	echo_TsProcessingDeleteNullPck	RW	Delete null packets enable 0: disabled 1: enable
1.3.6.1.4.1.21678.183.6.4.2	echo_TsProcessingPcrRestamping	RW	PCR restamping enable 0: disabled 1: enable
1.3.6.1.4.1.21678.183.6.5	echo_OutputModulator_monitor		OBJ ID
1.3.6.1.4.1.21678.183.6.5.1	echo_modulator_monitor_time_offset	R	Used time offset [100ns] indicator
1.3.6.1.4.1.21678.183.6.5.2	echo_modulator_monitor_constallation	R	Used constellation indicator 0: QPSK 1: 16-QAM 2: 64-QAM
1.3.6.1.4.1.21678.183.6.5.3	echo_modulator_monitor_alpha	R	Used apha indicator 0: not hierarchical 1: alpha=1 2: alpha=2 3: alpha=4
1.3.6.1.4.1.21678.183.6.5.4	echo_modulator_monitor_guard_time	R	Used guard time indicator 0: 1/32 1: 1/16 2: 1/8 3: 1/4
1.3.6.1.4.1.21678.183.6.5.5	echo_modulator_monitor_fft	R	Used transmission mode indicator 0:2K 1:8K 2:4K
1.3.6.1.4.1.21678.183.6.5.6	echo_modulator_monitor_bandwidth	R	Used bandwidth indicator 0: 7MHz 1: 8MHz 2: 6MHz 3: 5MHz
1.3.6.1.4.1.21678.183.6.5.7	echo_modulator_monitor_frequency_center	R	Center Frequency indicator (expressed in Hz)
1.3.6.1.4.1.21678.183.6.5.8	echo_modulator_monitor_frequency_offset	R	Used frequency offset indicator

OID	Name	R/W	Description
1.3.6.1.4.1.21678.183.6.5.9	echo_modulator_monitor_cell_id	R	Used Cell id indicator
1.3.6.1.4.1.21678.183.6.5.10	echo_modulator_monitor_cell_id_en	R	Cell id enable status indicator 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.6.5.11	echo_modulator_monitor_interleaver	R	Used symbol interleaver indicator 0: native 1: in-depth
1.3.6.1.4.1.21678.183.6.5.12	echo_modulator_monitor_system_delay	R	System delay indicator [100ns]
1.3.6.1.4.1.21678.183.6.5.13	echo_modulator_monitor_network_delay	R	Network delay [100ns] indicator
1.3.6.1.4.1.21678.183.6.5.14	echo_modulator_monitor_Fec		OBJ ID
1.3.6.1.4.1.21678.183.6.5.14.1	echo_FecHp	R	FEC high priority used 0: 1/2 1: 2/3 2: 3/4 3: 5/6 4: 7/8
1.3.6.1.4.1.21678.183.6.5.14.2	echo_FecLp	R	FEC low priority used 0: 1/2 1: 2/3 2: 3/4 3: 5/6 4: 7/8
1.3.6.1.4.1.21678.183.6.5.15	echo_modulator_monitor_MpeFec		OBJ ID
1.3.6.1.4.1.21678.183.6.5.15.1	echo_modulator_monitor_MpeFecHp	R	High priority MPE-FEC 0: not used 1: used
1.3.6.1.4.1.21678.183.6.5.15.2	echo_modulator_monitor_MpeFecLp	R	Low priority MPE-FEC 0: not used 1: used
1.3.6.1.4.1.21678.183.6.5.16	echo_modulator_monitor_TimeSlicing		OBJ ID
1.3.6.1.4.1.21678.183.6.5.16.1	echo_modulator_monitor_TimeSlicingHp	R	Modulator High priority time slicing 0: not used 1: used
1.3.6.1.4.1.21678.183.6.5.16.2	echo_modulator_monitor_TimeSlicingLp	R	Modulator Low priority time slicing 0: not used 1: used
1.3.6.1.4.1.21678.183.6.6	echo_OutputMonitor		OBJ ID
1.3.6.1.4.1.21678.183.6.6.1	echo_Monitor_FwdPowerDbm	R	Forward power [dBm x 10] indicator
1.3.6.1.4.1.21678.183.6.6.2	echo_Monitor_AgcMode	R	AGC mode status 0: analog 1: digital
1.3.6.1.4.1.21678.183.6.6.3	echo_Monitor_AgcOn	R	Auto AGC status 0: off 1: on
1.3.6.1.4.1.21678.183.6.7	echo_OutputPower		OBJ ID
1.3.6.1.4.1.21678.183.6.7.1	echo_PowerMode	R	NOT IMPLEMENTED (Output power mode indicator 0: local 1: MIP)
1.3.6.1.4.1.21678.183.6.7.2	echo_FromMip		OBJ ID
1.3.6.1.4.1.21678.183.6.7.2.1	echo_mipActual	R	NOT IMPLEMENTED (Actual Mip power [dBm x 10])
1.3.6.1.4.1.21678.183.6.7.2.2	echo_mipAntennaGain		NOT IMPLEMENTED (Mip antenna gain)

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.7	echo_HW_monitor		OBJ ID
1.3.6.1.4.1.21678.183.7.1	echo_HW_monitor_RflPowerDbm	R	Reflex power [dBm x 10]
1.3.6.1.4.1.21678.183.7.2	echo_HW_monitor_Amplifier	R	Amplifier status 0: on 1: off 2: restart 3: stand by off 4: GPS off 5: init 6: alarm off 7: rf off 8: opto off 9: change mode
1.3.6.1.4.1.21678.183.7.3	echo_HW_monitor_CurrentOut	R	Current indicator (mA)
1.3.6.1.4.1.21678.183.7.4	echo_HW_monitor_PowerSupply	R	Voltage indicator (mV): 28V for 20W and 50W versions, and 42V for 200W version"
1.3.6.1.4.1.21678.183.7.5	echo_HW_monitor_FanPulse		OBJ ID
1.3.6.1.4.1.21678.183.7.5.1	echo_FanSpeed1	R	FAN 1 speed (rpm)
1.3.6.1.4.1.21678.183.7.5.2	echo_FanSpeed2	R	FAN 2 speed (rpm)
1.3.6.1.4.1.21678.183.7.5.3	echo_FanSpeed3	R	FAN 3 speed (rpm) - only for 200W version
1.3.6.1.4.1.21678.183.7.5.4	echo_FanSpeed4	R	FAN 4 speed (rpm) - only for 200W version
1.3.6.1.4.1.21678.183.7.6	echo_HW_monitor_Temperature		OBJ ID
1.3.6.1.4.1.21678.183.7.6.1	echo_TemperatureCase	R	Case temperature
1.3.6.1.4.1.21678.183.7.6.2	echo_TemperaturePsu	R	PSU temperature
1.3.6.1.4.1.21678.183.7.6.3	echo_TemperatureCase2	R	Case temperature 2 (only in SDTX 200 version)
1.3.6.1.4.1.21678.183.7.7	echo_HW_monitor_Relays		OBJ ID
1.3.6.1.4.1.21678.183.7.7.1	echo_Relay0Status	R	Relay 0 status 0: on 1: off
1.3.6.1.4.1.21678.183.7.7.2	echo_Relay1Status	R	Relay 1 status 0: on 1: off
1.3.6.1.4.1.21678.183.7.7.3	echo_Relay2Status	R	Relay 2 status 0: on 1: off
1.3.6.1.4.1.21678.183.7.7.4	echo_Relay3Status	R	Relay 3 status 0: on 1: off
1.3.6.1.4.1.21678.183.7.8	echo_HW_monitor_Opto		OBJ ID
1.3.6.1.4.1.21678.183.7.8.1	echo_Opto0Status	R	Opto 0 status (RF Off): if closed the output RF is switch off 0: closed 1:

OID	Name	RW	Description
			opened
1.3.6.1.4.1.21678.183.7.8.2	echo_Opto1Status	R	Opto 1 status (Mode Switch): if closed Mode B, otherwise Mode A 0: closed 1: opened
1.3.6.1.4.1.21678.183.7.8.3	echo_Opto2Status	R	Opto 2 status (Retry, only in 200 watt version) 0: closed 1: opened
1.3.6.1.4.1.21678.183.7.8.4	echo_Opto3Status	R	Opto 3 status (Stand-by): if closed the device is put on stand-by 0: closed 1: opened
1.3.6.1.4.1.21678.183.7.9	echo_HW_monitor_PowerSupply24V	R	24V voltage indicator (mV), only in 200 watt version
1.3.6.1.4.1.21678.183.8	echo_Gps		OBJ ID
1.3.6.1.4.1.21678.183.8.1	echo_GpsSat		OBJ ID
1.3.6.1.4.1.21678.183.8.1.1	echo_SatVisible	R	Number of visible satellite
1.3.6.1.4.1.21678.183.8.1.2	echo_SatTracked	R	Number of satellite locked
1.3.6.1.4.1.21678.183.8.2	echo_GpsStatus		OBJ ID
1.3.6.1.4.1.21678.183.8.2.1	echo_StatusDataValid	R	Signal precision status 0: Not valid 1: Valid
1.3.6.1.4.1.21678.183.8.3	echo_GpsPosition		OBJ ID
1.3.6.1.4.1.21678.183.8.3.1	echo_PositionLatitude	R	Latitude position [°]
1.3.6.1.4.1.21678.183.8.3.2	echo_PositionLongitude	R	Longitude position [°]
1.3.6.1.4.1.21678.183.8.4	echo_GpsTime		OBJ ID
1.3.6.1.4.1.21678.183.8.4.1	echo_TimeActual	R	UTC time
1.3.6.1.4.1.21678.183.8.4.2	echo_TimeDate	R	UTC date
1.3.6.1.4.1.21678.183.9	echo_Clock		OBJ ID
1.3.6.1.4.1.21678.183.9.1	echo_ClockSel10MhzReference	RW	10 MHz frequency reference 0: ext 1: int 2: gps
1.3.6.1.4.1.21678.183.9.2	echo_ClockSel1Pps	RW	1PPS frequency reference 0: int 1: ext
1.3.6.1.4.1.21678.183.9.3	echo_GainFineTuning	RW	Gain fine tuning (from 0 up to 255)

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.10	echo_Network		OBJ ID
1.3.6.1.4.1.21678.183.10.1	echo_NetworkManagement		OBJ ID
1.3.6.1.4.1.21678.183.10.1.1	echo_ManagementMacAddress	R	Board MAC address
1.3.6.1.4.1.21678.183.10.1.2	echo_ManagementIpAddress	R	Board IP address
1.3.6.1.4.1.21678.183.10.1.3	echo_ManagementNetmask	R	Subnet mask
1.3.6.1.4.1.21678.183.10.1.4	echo_ManagementGateway	R	Gateway address
1.3.6.1.4.1.21678.183.10.1.5	echo_ManagementUdpPort	RW	UDP port
1.3.6.1.4.1.21678.183.10.1.6	echo_ManagementSpeed	R	GBE Speed 0: 10 Mbit 1: 100 Mbit 2: 1 Gbit
1.3.6.1.4.1.21678.183.10.2	echo_NetworkIcmp		OBJ ID
1.3.6.1.4.1.21678.183.10.2.1	echo_IcmpEnable	RW	IGMP enable 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.10.3	echo_NetworkTxChannel1		OBJ ID
1.3.6.1.4.1.21678.183.10.3.1	echo_TxChannel1Type	RW	Tx channel 1: transmission protocol selector 0: RTP 1: UDP
1.3.6.1.4.1.21678.183.10.3.2	echo_TxChannel1TsFormat	RW	Tx channel 1: packet format 0: 204 1: 188
1.3.6.1.4.1.21678.183.10.3.3	echo_TxChannel1TsNum	RW	Tx channel 1: number of TS packet per frame
1.3.6.1.4.1.21678.183.10.3.4	echo_TxChannel1IpAddr	RW	Tx channel 1: destination IP address
1.3.6.1.4.1.21678.183.10.3.5	echo_TxChannel1Port	RW	Tx channel 1: destination port
1.3.6.1.4.1.21678.183.10.3.6	echo_TxChannel1Ssrc	RW	Tx channel 1: SSRC identifier
1.3.6.1.4.1.21678.183.10.3.7	echo_TxChannel1MacAddr	R	Tx channel 1: destination MAC address
1.3.6.1.4.1.21678.183.10.4	echo_NetworkTxChannel2		OBJ ID
1.3.6.1.4.1.21678.183.10.4.1	echo_TxChannel2Type	RW	Tx channel 2: transmission protocol selector 0: RTP 1: UDP
1.3.6.1.4.1.21678.183.10.4.2	echo_TxChannel2TsFormat	RW	Tx channel 2: packet format 0: 204 1: 188
1.3.6.1.4.1.21678.183.10.4.3	echo_TxChannel2TsNum	RW	Tx channel 2: number of TS packet per frame
1.3.6.1.4.1.21678.183.10.4.4	echo_TxChannel2IpAddr	RW	Tx channel 2: destination IP address

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.10.4.5	echo_TxChannel2Port	RW	Tx channel 2: destination port
1.3.6.1.4.1.21678.183.10.4.6	echo_TxChannel2Src	RW	Tx channel 2: SSRC identifier
1.3.6.1.4.1.21678.183.10.4.7	echo_TxChannel2MacAddr	R	Tx channel 2: destination MAC address
1.3.6.1.4.1.21678.183.10.5	echo_NetworkRxChannel1		OBJ ID
1.3.6.1.4.1.21678.183.10.5.1	echo_RxChannel1IpAddr	RW	Rx channel 1: IP address
1.3.6.1.4.1.21678.183.10.5.2	echo_RxChannel1Port	RW	Rx channel 1: port
1.3.6.1.4.1.21678.183.10.5.3	echo_RxChannel1ClkRecoveryEnable	RW	Rx channel 1: clock recovery enable 0: enabled 1: disabled
1.3.6.1.4.1.21678.183.10.5.4	echo_RxChannel1SourceClkReference	RW	Rx channel 1: source clock reference selector 0: 90 kHz 1: 27 MHz
1.3.6.1.4.1.21678.183.10.6	echo_NetworkRxChannel2		OBJ ID
1.3.6.1.4.1.21678.183.10.6.1	echo_RxChannel2IpAddr	RW	Rx channel 2: IP address
1.3.6.1.4.1.21678.183.10.6.2	echo_RxChannel2Port	RW	Rx channel 2: port
1.3.6.1.4.1.21678.183.10.6.3	echo_RxChannel2ClkRecoveryEnable	RW	Rx channel 2: clock recovery enable 0: enabled 1: disabled
1.3.6.1.4.1.21678.183.10.6.4	echo_RxChannel2SourceClkReference	RW	Rx channel 2: source clock reference selector 0: 90 kHz 1: 27 MHz
1.3.6.1.4.1.21678.183.10.7	echo_SnmpTrap		OBJ ID
1.3.6.1.4.1.21678.183.10.7.1	echo_Trap0IpAddress	RW	Trap 0: destination IP address
1.3.6.1.4.1.21678.183.10.7.2	echo_Trap1IpAddress	RW	Trap 1: destination IP address
1.3.6.1.4.1.21678.183.10.7.3	echo_Trap2IpAddress	RW	Trap 2: destination IP address
1.3.6.1.4.1.21678.183.10.7.4	echo_Trap3IpAddress	RW	Trap 3: destination IP address
1.3.6.1.4.1.21678.183.10.7.5	echo_Trap4IpAddress	RW	Trap 4: destination IP address
1.3.6.1.4.1.21678.183.10.7.6	echo_Trap5IpAddress	RW	Trap 5: destination IP address
1.3.6.1.4.1.21678.183.10.7.7	echo_Trap6IpAddress	RW	Trap 6: destination IP address
1.3.6.1.4.1.21678.183.10.7.8	echo_Trap7IpAddress	RW	Trap 7: destination IP address
1.3.6.1.4.1.21678.183.11	echo_Alarm		OBJ ID

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.11.1	echo_AlarmThr		OBJ ID
1.3.6.1.4.1.21678.183.11.1.1	echo_ThrDemodBer	RW	Demodulator BER alarm threshold (val * 10^-6)
1.3.6.1.4.1.21678.183.11.1.2	echo_ThrRfSquelchA	RW	Mode A: Squelch threshold (absolute value)
1.3.6.1.4.1.21678.183.11.1.3	echo_ThrRfSquelchB	RW	Mode B: Squelch threshold (absolute value)
1.3.6.1.4.1.21678.183.11.1.4	echo_ThrFwdPowerWarning	RW	Forward power warning threshold (absolute value [dBm x 10])
1.3.6.1.4.1.21678.183.11.1.5	echo_ThrFwdPowerAlarm	RW	Forward power alarm threshold (absolute value [dBm x 10])
1.3.6.1.4.1.21678.183.11.1.6	echo_ThrTemperatureWarning	RW	Case temperature warning threshold
1.3.6.1.4.1.21678.183.11.1.7	echo_ThrTemperatureAlarm	RW	Case temperature alarm threshold
1.3.6.1.4.1.21678.183.11.1.8	echo_ThrSNmodeA	RW	Mode A: S/N threshold (dBm 10-50)
1.3.6.1.4.1.21678.183.11.1.9	echo_ThrSNmodeB	RW	Mode B: S/N threshold (dBm 10-50)
1.3.6.1.4.1.21678.183.11.1.10	echo_MipAlarmDelay	RW	MIP missing alarm delay [val * 100 ms]
1.3.6.1.4.1.21678.183.11.2	echo_AlarmStatus	R	32 bits word indicating alarms status (each bit is associated to an alarm)
1.3.6.1.4.1.21678.183.11.3	echo_AlarmTrap		OBJ ID
1.3.6.1.4.1.21678.183.11.3.1	echo_Trap0Enable	RW	Trap 0: alarm mask
1.3.6.1.4.1.21678.183.11.3.2	echo_Trap1Enable	RW	Trap 1: alarm mask
1.3.6.1.4.1.21678.183.11.3.3	echo_Trap2Enable	RW	Trap 2: alarm mask
1.3.6.1.4.1.21678.183.11.3.4	echo_Trap3Enable	RW	Trap 3: alarm mask
1.3.6.1.4.1.21678.183.11.3.5	echo_Trap4Enable	RW	Trap 4: alarm mask
1.3.6.1.4.1.21678.183.11.3.6	echo_Trap5Enable	RW	Trap 5: alarm mask
1.3.6.1.4.1.21678.183.11.3.7	echo_Trap6Enable	RW	Trap 6: alarm mask
1.3.6.1.4.1.21678.183.11.3.8	echo_Trap7Enable	RW	Trap 7: alarm mask
1.3.6.1.4.1.21678.183.11.4	echo_AlarmRelay		OBJ ID
1.3.6.1.4.1.21678.183.11.4.1	echo_Relay0Mode	RW	Relay 0: mode selector 0: alarm mask 1: mode indicator 2: RF status

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.11.4.2	echo_Relay0Enable	RW	Relay 0: alarm mask
1.3.6.1.4.1.21678.183.11.4.3	echo_Relay1Mode	RW	Relay 1: mode selector 0: alarm mask 1: mode indicator
1.3.6.1.4.1.21678.183.11.4.4	echo_Relay1Enable	RW	Relay 1: alarm mask
1.3.6.1.4.1.21678.183.11.4.6	echo_Relay2Enable	RW	Relay 2: alarm mask
1.3.6.1.4.1.21678.183.11.4.8	echo_Relay3Enable	RW	Relay 3: alarm mask
1.3.6.1.4.1.21678.183.11.5	echo_AlarmFrontPanelEnable	RW	Front panel: alarm mask
1.3.6.1.4.1.21678.183.11.6	echo_AlarmJavaEnable	RW	Java: alarm mask
1.3.6.1.4.1.21678.183.11.7	echo_AlarmEventEnable	RW	Events: alarm mask
1.3.6.1.4.1.21678.183.11.8	echo_AlarmRfOffEnable	RW	RF Off: alarm mask
1.3.6.1.4.1.21678.183.11.9	echo_AlarmSingleStatus		OBJ ID
1.3.6.1.4.1.21678.183.11.9.1	echo_UpconvUnlockStatus	R	Upconverter Oscillator Unlock alarm status
1.3.6.1.4.1.21678.183.11.9.2	echo_PsVoltageStatus	R	PS Voltage out of range alarm status
1.3.6.1.4.1.21678.183.11.9.3	echo_PsCurrentStatus	R	PS Current out of range alarm status
1.3.6.1.4.1.21678.183.11.9.4	echo_AbsPowerLimiterStatus	R	Absolute Power Limiter alarm status
1.3.6.1.4.1.21678.183.11.9.5	echo_CommErrorStatus	R	Upconverter Communication error alarm status
1.3.6.1.4.1.21678.183.11.9.6	echo_TempHighStatus	R	Temperature High Alarm status
1.3.6.1.4.1.21678.183.11.9.7	echo_TempAlarmStatus	R	Temperature Level -3dB alarm status
1.3.6.1.4.1.21678.183.11.9.8	echo_TempWarningStatus	R	Temperature High Warning status
1.3.6.1.4.1.21678.183.11.9.9	echo_FwdPowerHighStatus	R	Forward Power High alarm status
1.3.6.1.4.1.21678.183.11.9.10	echo_FwdPowerWarningStatus	R	Forward Power Low Warning status
1.3.6.1.4.1.21678.183.11.9.11	echo_FwdPowerAlarmStatus	R	Forward Power Low Alarm status
1.3.6.1.4.1.21678.183.11.9.12	echo_ReflexPowerStatus	R	Reflex Power High alarm status
1.3.6.1.4.1.21678.183.11.9.13	echo_FansSpeedStatus	R	Fans Speed alarm status

OID	Name	RW	Description
1.3.6.1.4.1.21678.183.11.9.14	echo_SnLevelStatus	R	S/N Level alarm status
1.3.6.1.4.1.21678.183.11.9.15	echo_GpsLockStatus	R	GPS Lock alarm status
1.3.6.1.4.1.21678.183.11.9.16	echo_GpsCommErrorStatus	R	GPS Communication Error alarm status
1.3.6.1.4.1.21678.183.11.9.17	echo_10MhzLockStatus	R	Signal 10 MHz Lock alarm status
1.3.6.1.4.1.21678.183.11.9.18	echo_146MhzLockStatus	R	Signal 146 MHz Lock alarm status
1.3.6.1.4.1.21678.183.11.9.19	echo_960MhzLockStatus	R	Signal 960 MHz Lock alarm status
1.3.6.1.4.1.21678.183.11.9.20	echo_DownconvUnlockStatus	R	Downconverter Oscillator Unlock alarm status
1.3.6.1.4.1.21678.183.11.9.21	echo_NoRfInputStatus	R	No RF Input alarm status
1.3.6.1.4.1.21678.183.11.9.22	echo_RfInputSquelchStatus	R	RF Input Squelch alarm status
1.3.6.1.4.1.21678.183.11.9.23	echo_BerAlarmStatus	R	RF Digital BER Alarm status
1.3.6.1.4.1.21678.183.11.9.24	echo_FileSysErrorStatus	R	File System Error alarm status
1.3.6.1.4.1.21678.183.11.9.25	echo_BadFileStatus	R	Bad File in File System alarm status
1.3.6.1.4.1.21678.183.11.9.26	echo_1PpsLockStatus	R	ATSC 1PPS Lock alarm status
1.3.6.1.4.1.21678.183.11.9.27	echo_PpsPhaseStatus	R	ATSC PPS Phase alarm status
1.3.6.1.4.1.21678.183.11.9.28	echo_SysDelayStatus	R	ATSC System Delay alarm status
1.3.6.1.4.1.21678.183.11.9.29	echo_NoMipStatus	R	ATSC No MIP alarm status
1.3.6.1.4.1.21678.183.11.9.30	echo_NoInputStatus	R	ATSC No Input alarm status
1.3.6.1.4.1.21678.183.11.9.31	echo_FpgaBootStatus	R	FPGA Boot alarm status
1.3.6.1.4.1.21678.183.11.9.32	echo_WarmUpStatus	R	Warm up alarm status
1.3.6.1.4.1.21678.183.12	echo_Config		OBJ ID
1.3.6.1.4.1.21678.183.12.1	echo_ConfigLoad	W	Load configuration
1.3.6.1.4.1.21678.183.12.2	echo_ConfigSave	W	Save configuration
1.3.6.1.4.1.21678.183.12.3	echo_ConfigReset	W	Reset board

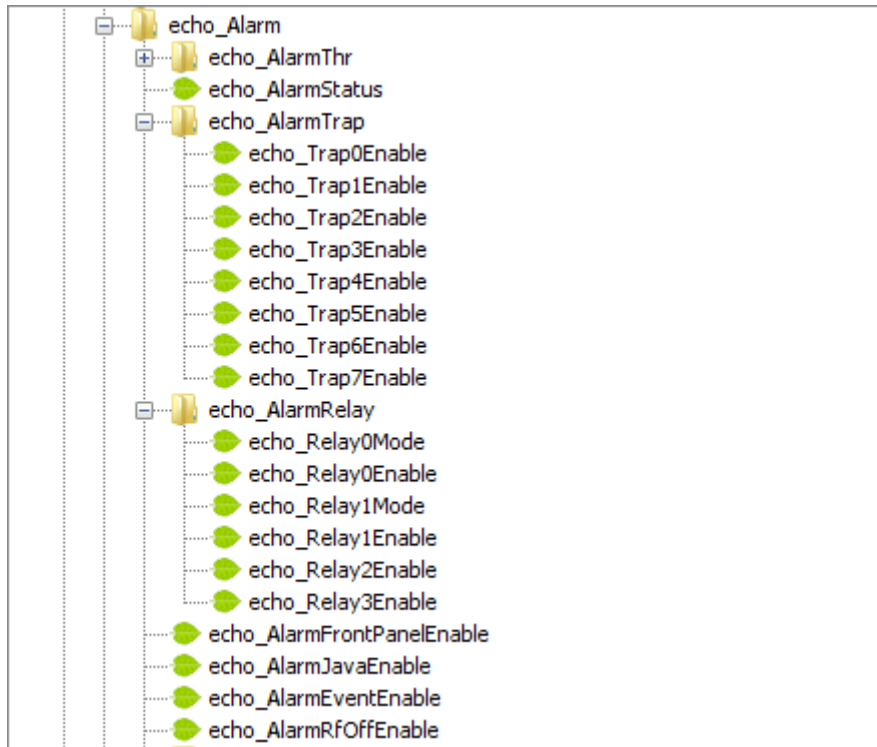
OID	Name	RW	Description
1.3.6.1.4.1.21678.183.12.4	echo_ConfigStandByEnable	RW	LCD stand-by button enable 0: disabled 1: enabled
1.3.6.1.4.1.21678.183.12.5	echo_ConfigStandByStatus	R	Current device mode 0: normal 1: standby
1.3.6.1.4.1.21678.183.12.6	echo_ConfigTime		OBJ ID
1.3.6.1.4.1.21678.183.12.6.1	echo_Year	RW	Year setting (starting from 2000)
1.3.6.1.4.1.21678.183.12.6.2	echo_Month	RW	Month setting
1.3.6.1.4.1.21678.183.12.6.3	echo_Day	RW	Day setting
1.3.6.1.4.1.21678.183.12.6.4	echo_Hour	RW	Hour setting
1.3.6.1.4.1.21678.183.12.6.5	echo_Minutes	RW	Minutes setting
1.3.6.1.4.1.21678.183.12.6.6	echo_Seconds	RW	Seconds setting
1.3.6.1.4.1.21678.183.13	echo_TrapAlarm		Alarm

3.18 Configuring alarms masks

The *echo_Alarm* leaf allows the monitoring of alarms status, the setting of alarm masks and thresholds.

Use alarm masks to select how and which alarm have to be notified.

Figure 36. Configuring alarms



There are six families of alarm masks:

- ***echo_AlarmJavaEnable***: the selected alarms status is notified on the Java alarm page icon.
- ***echo_AlarmFrontPanelEnable***: the selected alarms status is notified on LCD display lighting the alarm button and listing the alarms in the Alarms menu (refer to [Alarms Menu](#) paragraph).
- ***echo_AlarmEventsEnable***: the selected alarms status generate an alarm event that will be logged in the event memory (refer to [Events](#) paragraph).
- ***echo_AlarmRelay***: the selected alarms switch-on the corresponding relay.
- ***echo_AlarmTrap***: the selected alarms generate the corresponding trap message.
- ***echo_AlarmRfEnable***: the selected alarms switch off the RF output. The RF mask is almost entirely fixed in order to avoid board damages or malfunctioning.

Each alarm mask is a 32 bits word and each alarm represents one bit (0: Off, 1: On). Set the decimal value corresponding to the mask you want to activate in the relative leaf. The following table shows the bit-to-alarm association.

Bit-to-alarm association map**Table 20**

Alarm	Bit	Alarm	Bit
Up converter Osc. Unlock	0	Signal 10 MHz Lock	16
PS Voltage out range	1	Signal 146 MHz Lock	17
PS Current out of range	2	Signal 960 MHz Lock	18
Absolute Power Limiter	3	Down Converter Osc. Unlock	19
Up converter communication error	4	No RF Input	20
Temperature High Alarm	5	RF Input Squelch	21
Temperature Level-3dB	6	RF Digital Ber. Alarm	22
Temperature High Warning	7	File System Error	23
Forward Power High	8	Bad File in File system	24
Forward Power Low Warning	9	1PPS Lock	25
Forward Power Low Alarm	10	PPS Phase	26
Reflex Power High	11	System Delay	27
Fan Speed	12	No MIP	28
S/N Level	13	No Input	29
GPS Lock	14	FPGA Boot alarm	30
GPS Communication Error	15	Warm Up	31

E.g. if you want to enable the No MIP and No Input alarms of a generic alarm mask, set the decimal value of 805,306,368 that corresponds to a binary value of 0011 0000 0000 0000 0000 0000 0000.

3.19 Traps

While a management station can poll, at fixed time interval, all the agents it knows for some key information, each agent is responsible for notifying the management station of any alarm condition. These events are communicated in SNMP messages known as *traps*.

The following parameters should be set in order to correctly configure traps:

- SNMP Agent Port: 162.
- SNMP Agent Transport protocol: IP/UDP.
- Variable
 - OID: 1.3.6.1.4.1.21678.200.13.
 - Value(gauge): 32 Bit

3.19.1 Configuring traps

Use Java (refer to [Network](#) and [Alarms](#) paragraphs for further information) or SNMP user interfaces to configure traps.

The configuration of traps is performed through the setting of a trap alarm mask, by means of leaves housed in the *echo_AlarmTrap* node (refer to [Configuring alarms](#) paragraph), and through the setting of the destination IP Address of the receiving management stations, by means of leaves housed in the *echo_Network* node as shown in next figure.

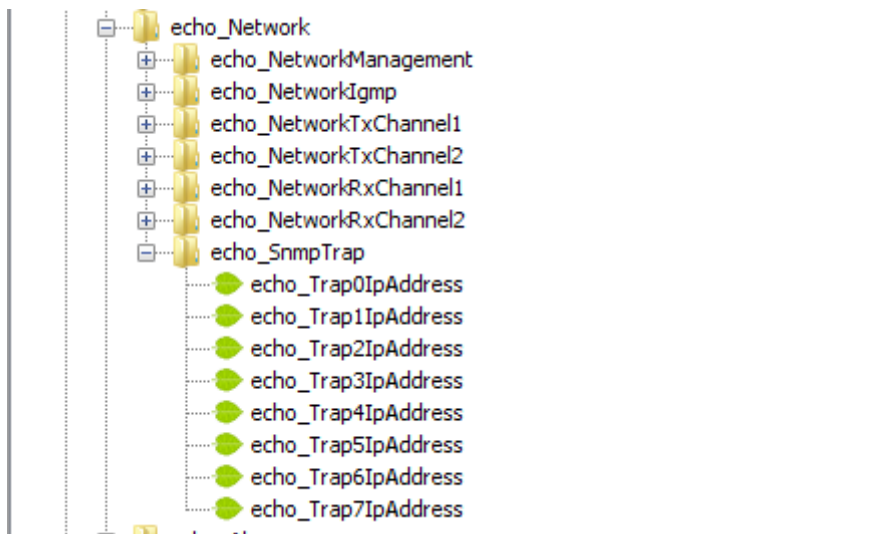
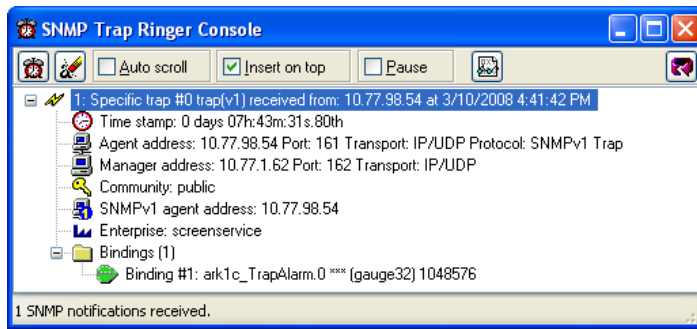


Figure 37. Configuring traps

Figure 38. SNMP Trap Message



Each trap carries a 32 bits word in which each alarm represents one bit (0: Off, 1: On). The following table shows the bit-to-alarm association.

Bit-to-trap association map

Table 21

Alarm	Bit	Alarm	Bit
Up converter Osc. Unlock	0	Signal 10 MHz Lock	16
PS Voltage out range	1	Signal 146 MHz Lock	17
PS Current out of range	2	Signal 960 MHz Lock	18
Absolute Power Limiter	3	Down Converter Osc. Unlock	19
Up converter communication error	4	No RF Input	20
Temperature High Alarm	5	RF Input Squelch	21
Temperature Level-3dB	6	RF Digital Ber. Alarm	22
Temperature High Warning	7	File System Error	23
Forward Power High	8	Bad File in File system	24
Forward Power Low Warning	9	1PPS Lock	25
Forward Power Low Alarm	10	PPS Phase	26
Reflex Power High	11	System Delay	27
Fan Speed	12	No MIP	28
S/N Level	13	No Input	29
GPS Lock	14	FPGA Boot alarm	30
GPS Communication Error	15	Warm Up	31

E.g. A trap carrying the decimal value 805,306,368 ,corresponding to a binary value of 0011 0000 0000 0000 0000 0000 0000 0000, means No MIP (bit 28) and No Input (bit 29) alarms raised.

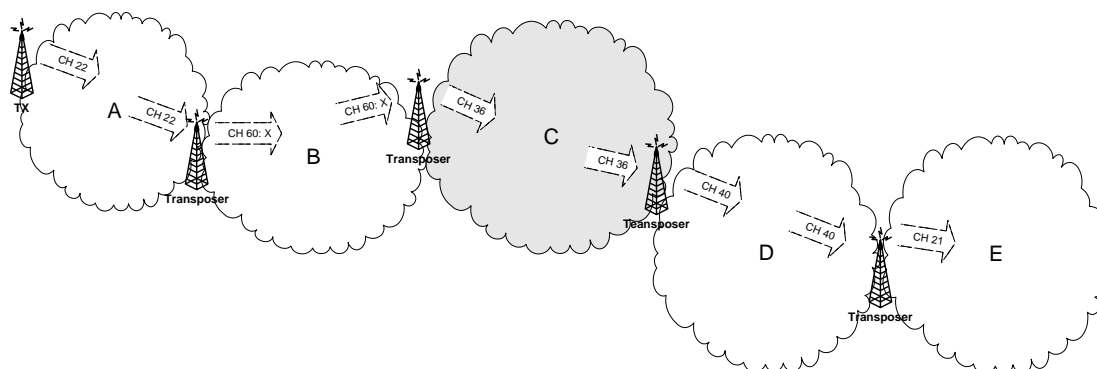
The Community shown in trap messages can be set from Java interface in the *Community* box within the Network window (refer to [Network](#) paragraph).

3.20 AUTOMATIC FREQUENCY CONTROL

The Television Broadcasting through countrywide transposers networks requires special care to avoid too high frequency drift errors.

The Automatic Frequency Control is highly recommended for transposers chains. The following figure illustrates an example of when the AFC might be used to stop the overwhelming increase of such errors.

Figure 39. TROVA NOME



The Automatic Frequency Control in ARK1 devices is software defined.

Most of the frequency drift errors could be avoided by means of a stable frequency reference, such as GPS, but since it is not always available, the ARK1 AFC makes it possible to compensate frequency jitters owing to each previous transposer.

Frequency compensation of analog input signals is performed through a proprietary algorithm that, filtering the input video carrier, allows the control loop to extract frequency jitter information from the input RF phase deviation.

The frequency error adjustment slows down within 3 Hz; it takes about 2 minutes to fulfil the correction.

- Frequency resolution: $\pm 1\text{Hz}$.

Maximum frequency compensation: $\pm 4,000,000\text{ Hz}$.

Frequency compensation of digital input signals is carried out through frequency jitter information coming from STV0362 receiving the HP Transport Stream.

- Frequency resolution: $\pm 1\text{kHz}$.
- Maximum frequency compensation: $\pm 83\text{kHz}$.

Due to the Symbol Rate error compensation of the frequency measure algorithm of STV, digital AFC can work properly only with 0ppm Symbol Rate errors in the input signal.

Appendix A. Standalone/Driver working modes

Two different working modes are provided:

- **Stand-alone:** the device works in stand-alone mode. The system configuration can be totally set through user interfaces. Pre-correction curves are automatically selected according to channel and power range.
- **Driver:** the device works in a driven system. The system configuration cannot be totally set through user interfaces. Some settings are disabled on the user interfaces in order to be driven by serial interface commands. Pre-correction curves are not automatically selected according to channel and power range, but the selection is manually performed through serial interface commands.

The following table lists the commands, specific to each system interface, which must be enabled or disabled while working in Driver mode.

N.B. Diver mode is a specific working mode available and used only in N+1 configuration systems.

Issue	Ethernet Interface – Port 10001	Java	SNMP	Ethernet interface – Port 5000	Char interface	Local Interface (Display)	MIP	OPTO
Block output channel setting	Commands: “oo” and “w” uC registers 0x02 and 0x12 uC ignores the commands	Java control is disabled	SNMP commands are ignored	Not present	Commands: “O” or “o” and “W” or “w” uC registers 0x02 and 0x12 The control is enabled	Not present	Not present	Not present
Block frequency offset setting	Commands: “w” FPGA registers 0x07 up to 0x0A and 0x17 up to 0x1A uC ignores the command	Java control is disabled	SNMP commands are ignored	Not present	Commands: “W” or “w” FPGA registers 0x07 up to 0x0A and 0x17 up to 0x1A The control is enabled	Not present	Frequency offset function is disabled from uC	Not present
Block MIP frequency offset setting	Command: “w” FPGA register 0x0020 bit 1 uC ignores the command	Java control is disabled	SNMP commands are ignored	Not present	Command: “w” or “w” FPGA register 0x0020 bit 1 The control is enabled	Not present	Command: “W” FPGA register 0x0020 bit 1=0	Not present
Block power setting	Commands: “op” and “w” uC registers 0x0C and 0x0B, and 0x1C and 0x1B uC ignores the command	Java control is disabled	SNMP commands are ignored	Not present	Command: “OP” or “op” and “W” or “w” uC registers 0x0C and 0x0B, and 0x1C and 0x1B The control is enabled	Not present	Tx power function is disabled from uC	Not present
Block MIP TX power setting	Command: “W” FPGA register 0x0020 bit 2 uC ignores the command	Java control is disabled	SNMP commands are ignored	Not present	Command: “W” or “w” FPGA register 0x003B bit 2 The control is enabled	Not present	“W” FPGA register 0x0020 bit 2=0	Not present

Issue	Ethernet Interface – Port 10001	Java	SNMP	Ethernet interface – Port 5000	Char interface	Local Interface (Display)	MIP	OPTO
Block manual RF ON/OFF command	Command: “W” uC register 0x26 uC ignores the command	Java control is disabled	SNMP commands are ignored	Not present	Command: “W” or “w” uC register 0x26 The control is enabled	Not present	Not present	OPTO 0= Closed Enabled
Block mode switch	Commands: “w” uC registers 0x00/0x01/0x10/0x11/0x33/0x32 Java control is disabled uC ignores the command	Java controls are disabled	SNMP commands are ignored	Not present	Commands: “W” or “w” uC registers 0x00/0x01/0x10/0x11/0x33/0x32 The control is enabled	Command mode switch The command is disabled	Tag 33 Function – Remote Mode Switch Disabled by uC Command: “W” FPGA register 0x003B bit 7=0	OPTO 1= Closed Disabled

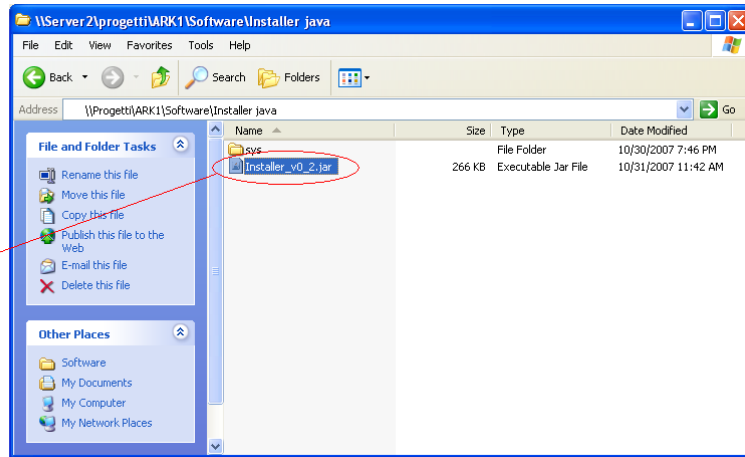
3.21 APPLICATION NOTE 1

3.21.1 How to update

1. Launch the Java installer.

Figure 40. Java Installer

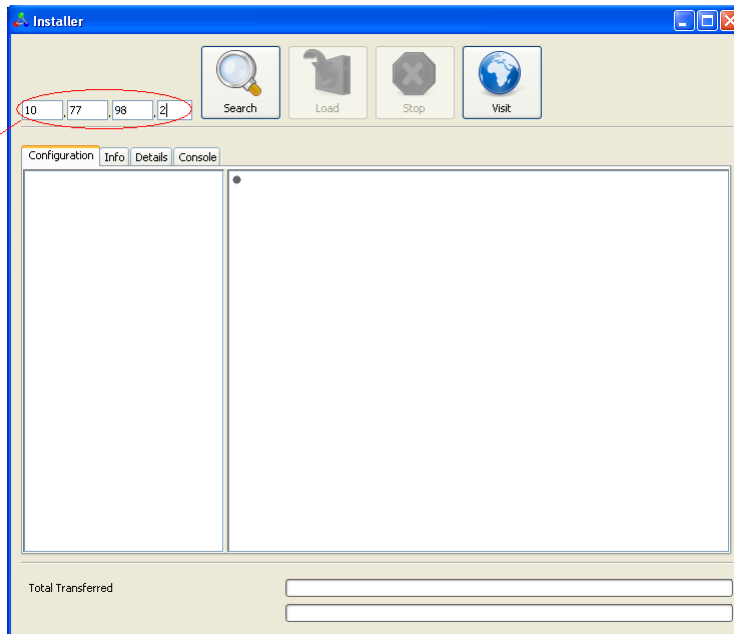
Launch the Java Installer



2. Insert the board IP address into the numeric field.

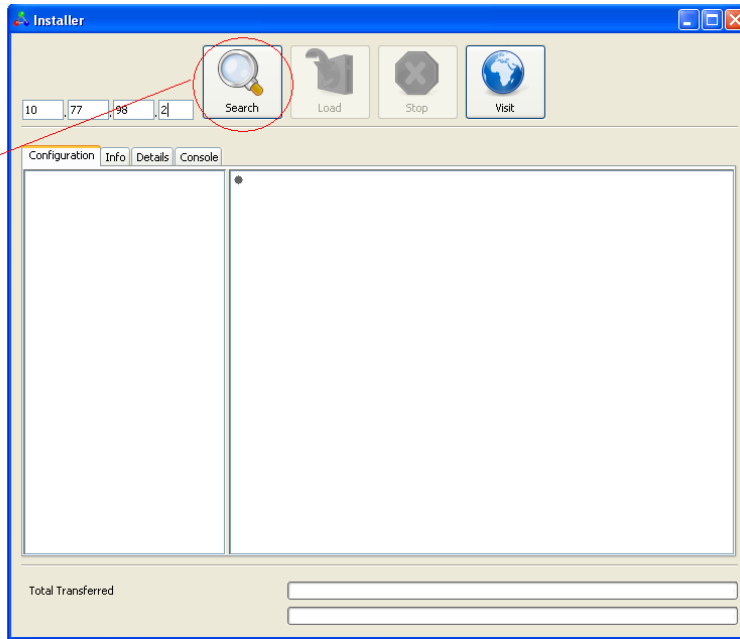
Figure 41. Java Installer - IP Address insertion

Insert the board IP Address



3. Click on the "Search" button.

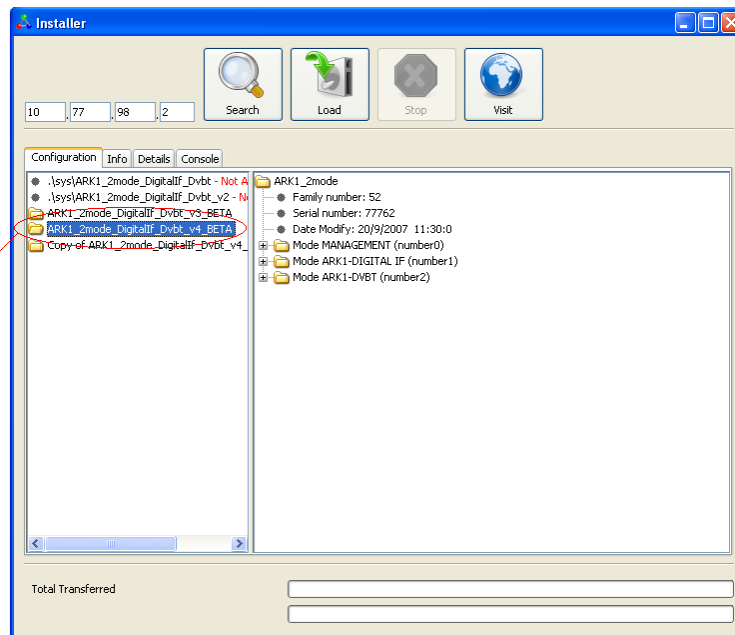
Figure 42. Java Installer - Search button



Click on the "Search" button

4. Select the device version you want to load.

Figure 43. Java Installer - Device Version Selection



Select the version

5. Click on the "Load" button.

Click on the "Load" button

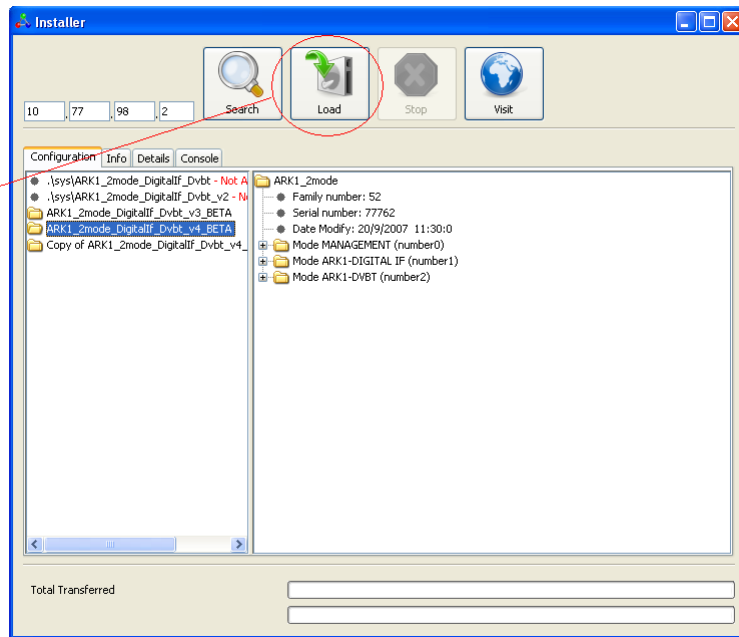
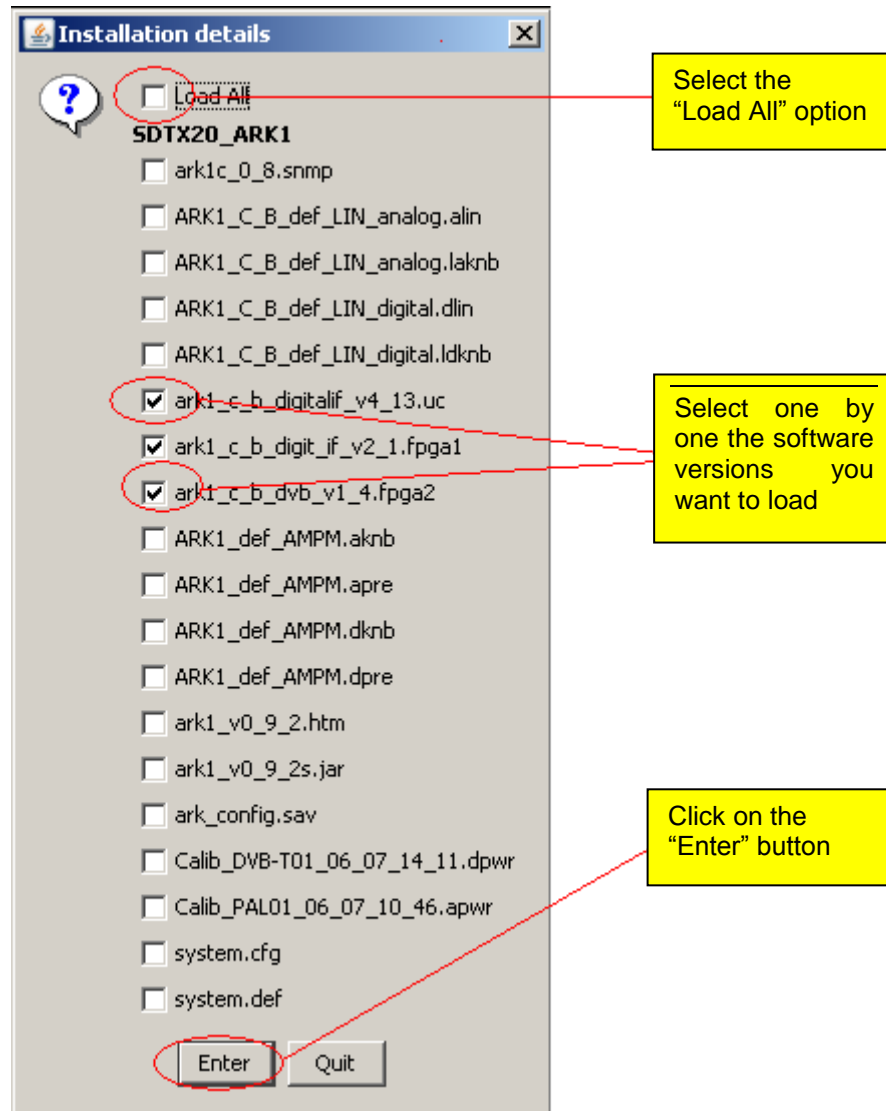


Figure 44. Java Installer - Load button

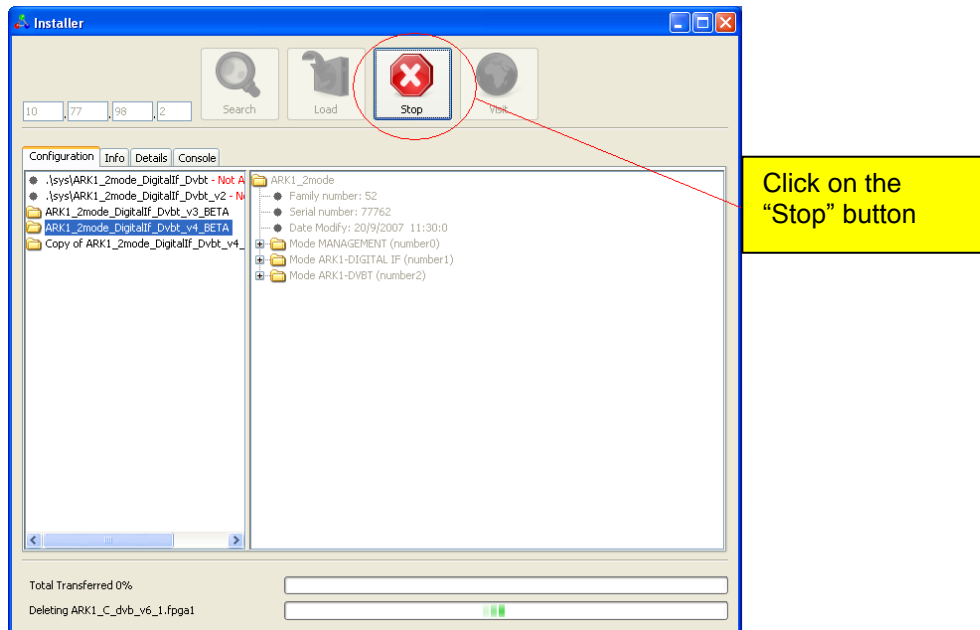
6. If you want to update only some software versions, click on the check boxes corresponding to the software version you want to load, otherwise click on the check box corresponding to the Load All option. Click on the "Enter" button to start the loading.

Figure 45. Java Installer - Software versions selection



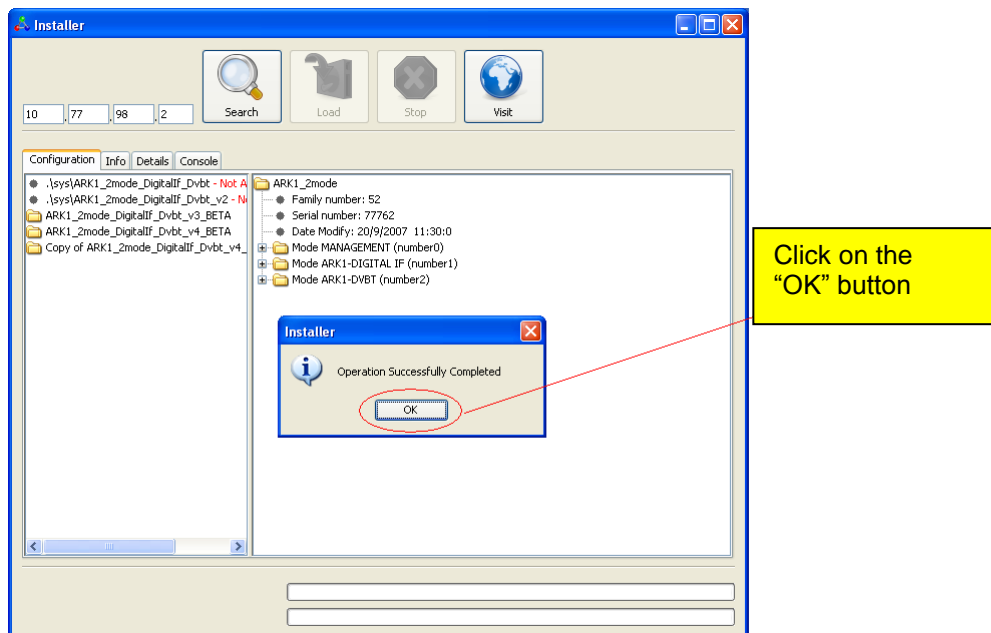
7. Once started the loading, the “Stop” button lights up. Click on this button to end the programming.

Figure 46. Java Installer - Stop button



8. When the loading is complete, the pop-up window “Operation Successfully Completed” appears. Click on the “OK” button.

Figure 47. Java Installer - Operation Successfully Completed



3.22 Java Virtual Machine

The Java interface requires a host computer connected via Ethernet to the board with the proper Java Machine version installed.

3.23 ETHERNET CONNECTION

The host computer has to be connected via Ethernet to the board.
Direct or crossed UTP **category 6 cable is recommended**.

3.23.1 Configuration

In order to connect to the board through a LAN, all the devices have to be on the same network.
The default IP address settings of the X-port are:

- IP address: 10.77.xx.xx , where xx is the host address unique for each board.
- Subnet mask: 255.255.0.0 .

Remember to change these settings if they are not compatible with the LAN where the computer and the board are connected.

IP address and network parameters can be changed only using the local interface. Please refer to chapter 6 for the network setting commands.

3.23.2 Java(TM) Platform

3.23.3 Download

The Java Interface works with any Sun Java Virtual Machine after the 1.4.1 version.

If the computer has no Java Virtual Machine installed, the recommended 1.5.0 version can be downloaded from the Sun Server through this link:

<http://www.java.com/>.

3.23.4 Java Control Panel

Java caching must be disabled; to do that follow the following steps:

1. Open Internet Explorer, click on Tool button and select the Sun Java Console option.

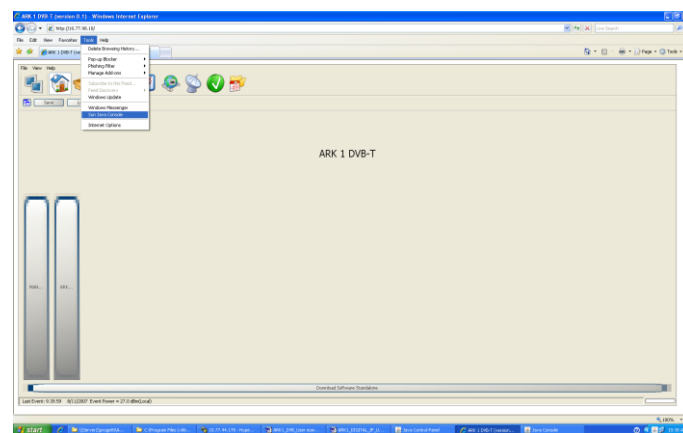
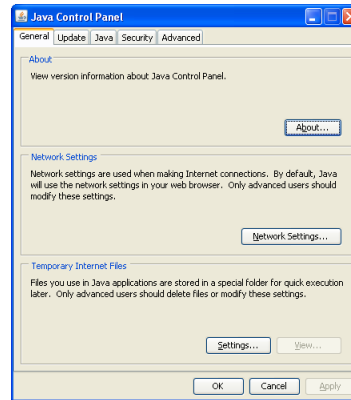


Figure 48. Sun Java Console

2. Perform a right button mouse click on the Java(TM) Platform icon sited on the right corner of the Taskbar and select "Open Control Panel". The following window will suddenly appear.

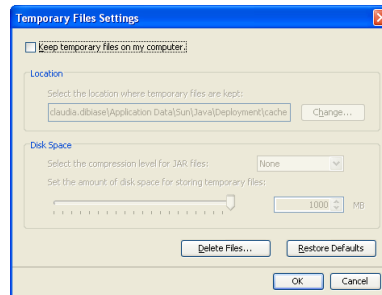
Figure 49. Java Control Panel



3. Select "Settings..." in the "Temporary Internet Files" section of the "General" tab.

4. Deselect the check box of the “Keep temporary files on my computer” (disable cache).

Figure 50. Temporary Files Settings



5. Push “OK” button and close the window.

3.24 SUPPORTED WEB BROWSERS

The Java GUI is designed to support every Web Browser that uses Sun Java Virtual Machine from 1.4.1 and newer.

Here’s a list of Web Browsers where Java GUI has been tested and troubleshot:

- Microsoft Internet Explorer, version 5 and newer.
- Mozilla Firefox, version 1.5 and newer.