H-DVB-S2X-MOD

DVBS2X Satellite Modulator

Revision 2018

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A Note from Thor Broadcast about this Manual

Intended Audience

This user manual has been written to help people who have to use, integrate and to install the product. Some chapters require some prerequisite knowledge in electronics and especially in broadcast technologies and standards.

Disclaimer

The contents of this document are subject to revision without notice due to continued progress in methodology, design and manufacturing. Thor shall have no liability for any error or damage of any kind resulting from the use of this document.

Copy Warning

Chapter 1

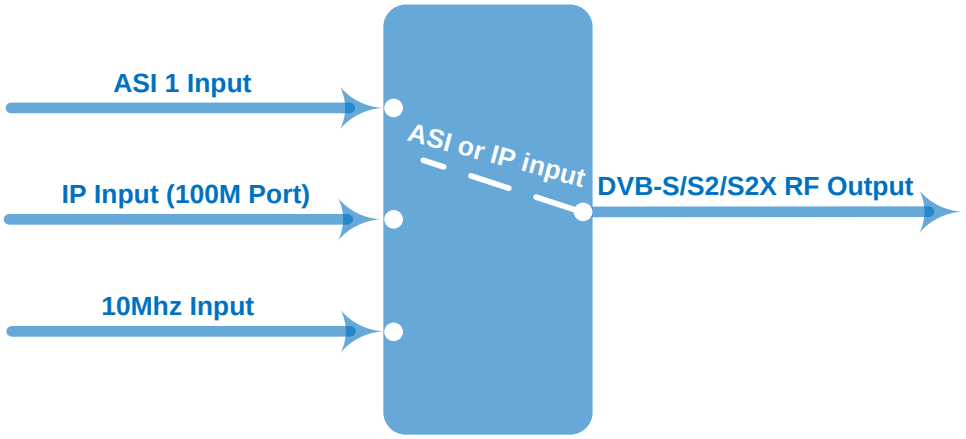
1.1 Overview

Thor Broadcast's standalone modulator that has been made to abide by DVB-S2X standards (EN302 307-2) which is a third generation broadband satellite telecommunication standard that integrates ASI and IP inputs and modulate them into a DVB-S/S2/S2X IF output.
This 1-U IP input Chassis supports BISS scrambling for easy signal distribution. It also comes standard with 4 ASI inputs (3 ASI are backups) and a 100mb. The S2X modulator can come with CID, this is optional, and must be ordered as such.
This Modulator is the newest S2X standard used in a wide variety of application like broadcasting, news services, broadband satellite applications. Fully compliant with DVB-S (EN300 421), DVB-S2 (EN302 307-1) and DVB-S2X (EN 302307-2) standards.

1.2 Features

- Fully compliant with DVB-S (EN300 421), DVB-S2 (EN302 307) and DVB-S2X (EN 302 307-2) standards
- 4 ASI inputs supporting backups (3 for backup)
- IP (100M) signal input
- QPSK, 8PSK, 8APSK, 16APSK, 32APSK Constellations
- RF CID setting (Optional Setting, must be ordered)
- Constant temperature crystal oscillator, as high as 0.1ppm stability
- Support coupling 10Mhz clock output through RF output port
- Support BISS scrambling
- Support local and remote control with Web-server NMS
- Output frequency range: 50~960MHz, 1KHz step

1.3 Principle Chart



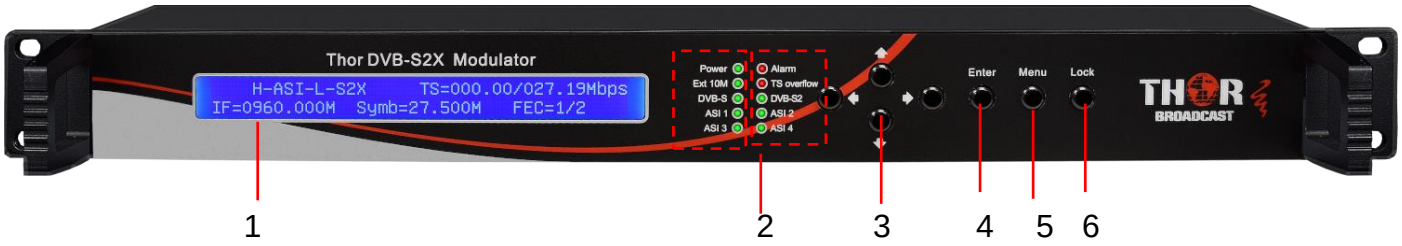
1.4 Specifications

ASI Input	Supporting both188 Byte Packet TS Input			
	4 ASI Inputs (3 ASI for backup)			
	Connector: BNC, Impedance 75Ω			
IP Input	1*IP Input (RJ45, 100M TS Over UDP)			
10MHz Input	1*10MHz Input (BNC Interface)			
IF Output	Range:50 ~ 960 MHz, 1KHz step			
	Output Level Attenuation: -28.5dBm~+3 dBm, 0.5dB Step			
	MER≥40dB			
	Connector: N type, impedance 50Ω			
Channel Coding and Modulation	Standard	**DVB-S**	**DVB-S2**	**DVB-S2X**
	Outer coding	RS Coding	BCH Coding	BCH Coding
	Inner coding	Convolution	LDPC Coding	LDPC Coding
	Constellation	QPSK	QPSK,8PSK, 16APSK,32APSK	QPSK,8PSK, 8APSK, 16APSK, 32APSK
	FEC/ Convolution Rate	1/2, 2/3, 3/4, 5/6, 7/8	**QPSK:** 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 **8PSK:** 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 **16APSK:** 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 **32APSK:** 3/4, 4/5, 5/6, 8/9, 9/10	**QPSK:** 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10, 13/45, 9/20, 11/20 **8PSK:** 3/5, 2/3, 3/4, 5/6, 8/9, 9/10, 23/36, 25/36, 13/18 **8APSK:** 5/9-L, 26/45-L **16APSK:** 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,1/2-L,8/15-L, 5/9-L, 26/45, 3/5, 3/5-L, 28/45, 23/36 , 2/3-L, 25/36, 13/18, 7/9, 77/90 **32APSK:** 3/4, 4/5, 5/6, 8/9, 9/10, 2/3-L, 32/45, 11/15, 7/9
	Roll-off Factor	0.2,0.25,0.35	0.2, 0.25, 0.35	0.05, 0.10, 0.15, 0.2, 0.25, 0.35
	Symbol Rate	0.05~45Msps	0.05~40Msps (32APSK); 0.05~45Msps (16APSK/8PSK/QPSK)	0.05~40Msps(32APSK,32APSK-L); 0.05~45 Mbps (16APSK/8PSK/QPSK/16APSK-L/8APSK-L)
	BISS Scramble	Mode 0, Mode 1, Mode E		
System	Web-server NMS			

	Language: English	
	Ethernet software upgrade	
Miscellaneous	Dimension	482mm×410mm×44mm
	Temperature	0~45℃(operation), -20~80℃ (storage)
	Power	100-240VAC±10%,50Hz-60Hz

1.5 Appearance and Description

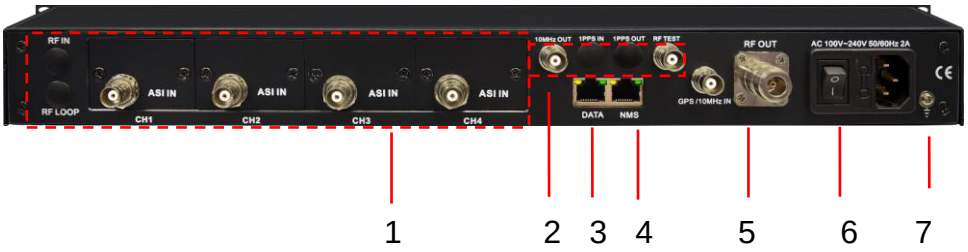
Front Panel Illustration



1 2 3 4 5 6

1.	LCD Screen	
2.	Indicators	Power: indicates power connection
		Alarm: indicates errors
		Ext 10M: indicates 10MHz outer reference clock is applied
		TS Overflow: indicates the input TS bit rate is over the bandwidth of transmission limit
		DVB-S: Current Modulation is DVB-S
		DVB-S2: Current Modulation is DVB-S2
		ASI1-4: indicates the corresponding ASI input is chosen to modulate
3.	Up/Down/Left /Right key	
4.	Enter: Confirmation key	
5.	Menu key: Step-back key	
6.	Locking key	

Rear Panel Illustration



1.	ASI Input ports (3 ports for backup)
2.	External 10Mhz Reference Clock Input and loop through
3.	Data Port
4.	Network Interface (NMS Management Port)
5.	IF Output
6.	Power Socket
7.	Grounding screw

Chapter 2 Installation Guide

2.1 What's in the Box

- Thor DVB-S2X Satellite Modulator
- User's Manual
- ASI Cable
- Power Cord

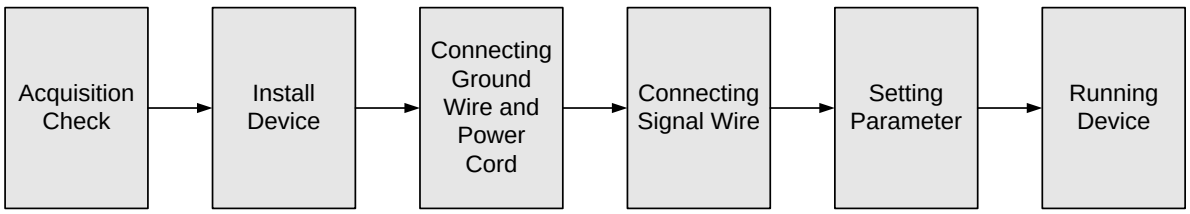
If any item is missing or mismatching with the list above, please contact Thor 1-800-521-8467.

2.2 Installation Prep

When you install the DVB-S2X Modulator, please follow the steps below. Check the device for missing or damage during transport

- Preparing relevant environment for installation (rack room or Headend)
- Install Modulator
- Connect signal cables
- Connecting communication port (if it is necessary)

2.2.1 Device's Installation Flow Chart Illustrated as following：



2.2.2 RackRoom & Headend Install

Item	Requirement
Machine Hall Space	When installing unit on rack, the distance between 2 rows of machine frames should be 1.2~1.5m and the distance against wall should be no less than 0.8m.
Machine Hall Floor	Electric Isolation, Dust Free, HVAC anti-static material:$1X10^{7}$~$1X10^{10}\Omega$, Grounding current limiting resistance: 1MΩ (Floor bearing should be greater

	than 450Kg/㎡)
Environment Temperature	5~40℃(sustainable)，0~45℃(short time) installing air-conditioning is recommended
Relative Humidity	20%~80% sustainable 10%~90% short time
Pressure	86~105KPa
Door & Window	Installing rubber strip for sealing door-gaps and dual level glasses for window
Fire Protection	Fire alarm system and extinguisher
Power	Device power, HVAC and lighting should be independent to each other. Device power requires AC 110V±10%, 50/60Hz or AC 220V±10%, 50/60Hz. Please carefully check before running.

2.2.3 Grounding Requirement

- Must be operated and maintained in an area free of dust and debris.
- The cover should be securely fastened, do not open the cover of the chassis when the power is on. This will also void Thor's manufacturer's warranty.
- After installation, securely stow away all loose cables, external antenna, and others.
- Be careful when connecting a power source to the device.
- Do not operate in wet or damp areas. Make sure the extension cable is in good condition
- Make sure the power switch is off before you start to install the device
- It is important to keep this device grounded to ensure all of the modules function correctly. Correctly grounding the device will also help prevent any electrical interference, lightening. Etc. Also it helps reject minor interference that may disrupt the devices ability to function smoothly. General rule of them, make sure the device is grounded when installing anywhere.
- Always use copper wire. When applied correctly the ground must be wrapped well to ensure maximum conduction so it can reduce any high frequencies. The copper ground wire should also be as short and thick as possible
- Installer must make sure that the two ends of the ground are well conducted and have appropriate anti-rust properties.

- It is prohibited to use any other device as part of the grounding electric circuit.
- The area of the conduction between the ground wire and device's frame should be no less than 25 ㎡.

2.3 Power and Ground

- Connect Power Cord
- Insert one end into power supply socket, while inserting the other end to AC power.
- Connect Grounding Wire
- When the device solely connects to protective ground, it should not share the same ground with any other devices. If the device shares grounding, the resistance should be smaller than 1Ω.

☞Caution:

Before connecting power cord to the DVB-S2X Mod, you should set the power switch to "OFF".

2.4 Signal Cable Connection

The signal connections include the connection of input signal cable and the connection of output signal cable.

2.4.1 ASI input and loop-out cable

2.4.2 RF output interface connection

Chapter 3 Operation

The front panel of the DVB-S2X Mod has any easy to use interface where the equipment can also be conveniently operated and managed the LCD:

Keyboard Function Description:

MENU: Cancel current entered value, resume previous setting; Return to previous menu.

ENTER: Activate the parameters which need modifications, or confirm the change after modification.

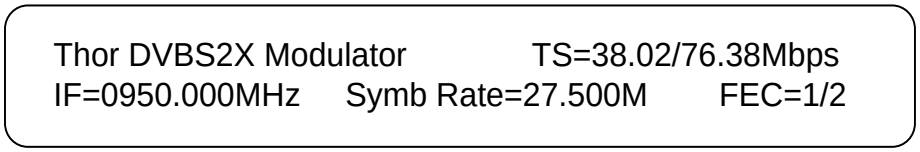
LEFT/RIGHT: Choose and set the parameters.

UP/DOWN: Modify activated parameter or paging up/down when parameter is inactivated.

LOCK: Lock the screen/cancel the lock state. After pressing the lock key, the LCD will display the current configuring state.

3.1 Main Interface

After switching on the modulator, the LCD screen will display the device name, real-time input total bit-rate and the maximal bit-rate the modulator can support in the first row, while the output IF frequency, Symbol rate and FEC (Forward Error Correction) rate are displayed in the second row.



3.2 Menu Tree

By pressing the “LOCK” key to enter the main menu, the LCD will display the following pages:

By pressing UP or DOWN keys in the specified menu, highlight and then press ENTER, you can enter the

submenu's as shown:

3.2.1 Alarm Status

Whenever an abnormal event happens, the alarm indicator will light up and it will display error content in the submenu. For example, when there is no TS input, it shows the following:

3.2.2 System Settings

By pressing UP/DOWN or LEFT/RIGHT to choose this item, ENTER and LEFT/RIGHT to set the parameters. The system displays following pages:

3.2.2.1 Modulation Mode

After entering the submenu by pressing ENTER key, choose the "modulation mode" you require.

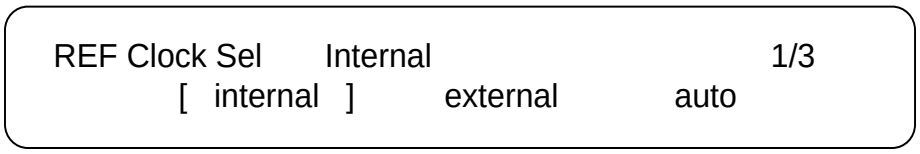
DVB-S: This modulator works under the DVB-S standard and the constellation is QPSK.

8PSK/16APSK/32APSK/8APSK: these options are the constellations under DVB-S2 and DVB-S2X. If any one of the 4 options is selected as the modulation mode, the device works under DVB-S2 and DVB-S2X with the corresponding constellation.

3.2.2.2 Reference Clock Set

After entering the submenu by pressing ENTER key, set the reference clock source.

Clock Select:



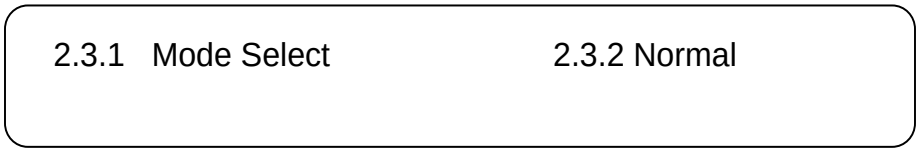
Internal: This modulator uses internal 10MHz crystal oscillator as a reference clock.

External: This modulator uses external 10 MHz input as reference clock.

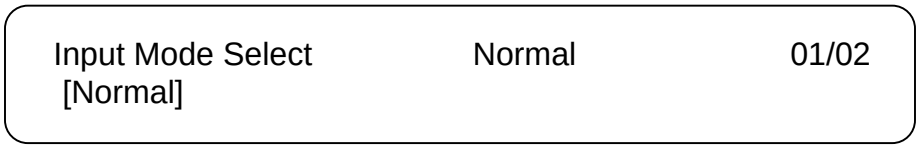
Auto: The modulator will preferably select the external 10MHz input if it exists. Otherwise the modulator will select the internal 10MHz crystal oscillator's output as reference clock.

Internal Adjust:

3.2.2.3 Input Mode



This modulator can receive TS in normal format. Enter 2.3.1 to set the input mode:



Select 'Normal' in 2.3.1 and enter 2.3.2 to select the input channel you want and press apply. At this time, the modulator can process one channel TS from any ASI input or the IP port.

Input Normal Mode [IP]	IP	05/05

ASI1/2/3/4: The input TS comes from port ASI 1 or 2 or 3 or 4.

IP IN: The input signal comes from data port.

After entering the submenu by pressing ENTER key, choose the channel the input TS comes from.

3.2.2.4 IP Input Set

When you use an IP stream as the signal source to modulate and output (Choose 'Normal' as the input mode under 2.3.1 and 'IP' as the source port under 2.3.2), it needs to configured in the IP parameters under '2.4 IP Input Set' according to the actual IP source to receive IP signal. Submenus are as follows:

▶2.4.1 IP Address	2.4.2 Port Set
2.4.3 MAC	

2.4.1 IP Address
224.002.002.002

2.4.2 Port Set
21002

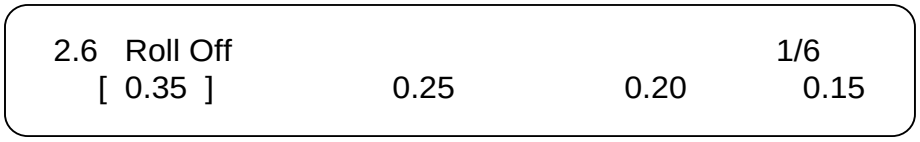
2.4.3 Data MAC Address
XX:XX:XX:XX:XX:XX

3.2.2.5 Symbol rate

2.5 Symbol Rate
27.500Msps

Adjustable Range: DVB-S: 0.05-45Msps; DVB-S2: 0.05~40Msps (32APSK), 0.05~45 Msps (for 16APSK/8PSK/QPSK) ; DVB-S2X : 0.05~40Msps (for 32APSK, 32APSK-L), 0.05~45 Msps (for 16APSK/8PSK/QPSK/16APSK-L/8PSK-L)

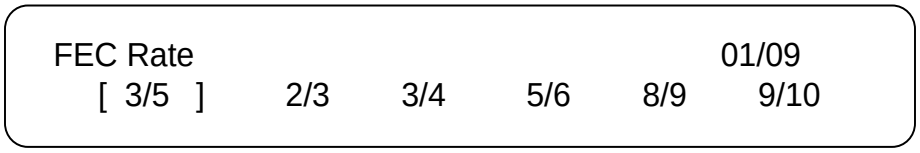
3.2.2.6 Roll-off Factor



Set the roll-off factor of the DVB-S, DVB-S2 and DVB-S2X

There are 6 possible options, including 0.35, 0.25, 0.20, 0.15, 0.10, 0.05.

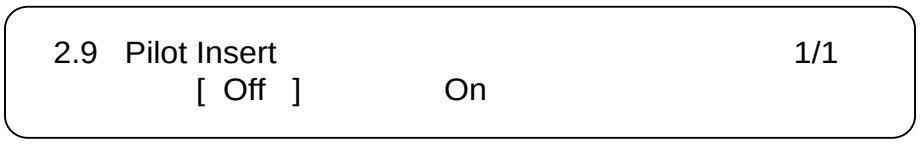
3.2.2.7 FEC Rate



Set FEC rate at this submenu. Different modulate modes (DVB-S/DVB-S2/DVB-S2X) and constellations have different FEC rate options. (Refer to specifications table in Chapter 1 for details.)

3.2.2.8 Pilot Insert

This menu item is applicable to DVB-S2 modulation mode.



Choose whether to insert the Pilot block.

Off: without pilots

On: with pilots

3.2.2.9 Parse Program

Select 2.9 and press Enter key, wait for a while and it displays the program number from the input channel set under menu 2.3.2. Only after this procedure, you can view the programs when you proceed to BISS scrambling under 2.10.2.

Please Wait.....

Complete ! Total: 3

3.2.2.10 BISS Setting

▶2.10.1 Biss Mode 2.10.2 Program
2.10.3 Select ID 2.10.4 SW Data

▶2.10.5 Input ID 2.10.6 ESW Data

There are three BISS modes to select: Mode 0, Mode 1, Mode E.

2.10.1 Biss Mode
[Mode 0] Mode 1 Mode E

Mode 0: to not enable the BISS scrambling function.

Mode 1: When the modulator works under Mode 1, select and scramble the input programs manually by entering submenu 2.10.2 and set SW data at submenu 2.10.4 (input 12 characters from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F).

▶Program
01 GXTV √

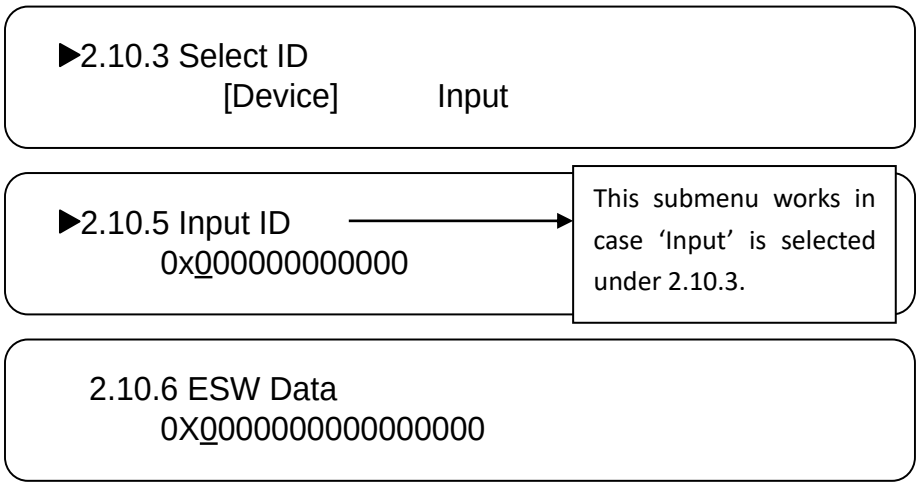
2.10.4 SW Data
0X000000000000

√: to scramble the corresponding program; X: to not scramble the corresponding program.

Shift '√' and 'X' symbols with Enter and navigation buttons.

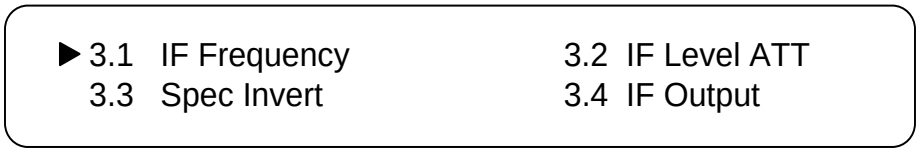
Mode E: When the modulator works under Mode E, select and scramble the input programs manually by entering submenu 2.10.2 in the same way as Mode 1.

Instead setting SW data under Mode 1, you will set the 2.10.3 Select ID, 2.10.5 Input ID and 2.10.6 ESW Data under Mode E.



3.2.3 Output Settings

Pressing UP/DOWN or LEFT/RIGHT to choose this item, ENTER and LEFT/RIGHT to set the parameters. The system displays following page:

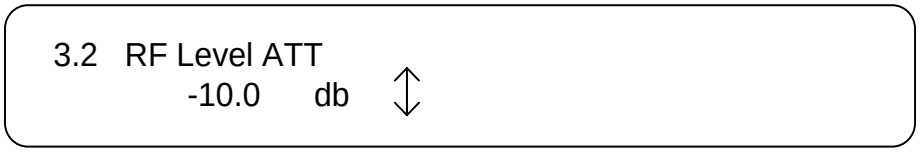


3.2.3.1 IF Frequency Setting

After entering the submenu by pressing ENTER key, set IF output frequency. The IF output frequency range is from 50 to 960MHz.

3.2.3.2 RF Level ATT Setting

User can set the attenuation of the RF output at this submenu. The RF attenuation range is from -28.5dB~+3 dB in 0.5db step.



3.2.3.3 Spectrum Invert

User can set the Spectrum of RF output invert or not.

```
3.3  Spec Invert
          normal
```

```
3.3  Spec Invert                                        1/2
          [ normal  ]          invert
```

3.2.3.4 IF Output

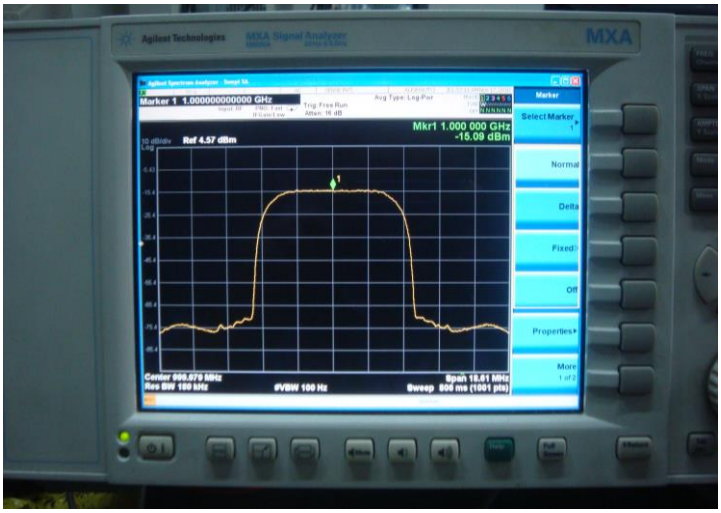
```
3.4  IF Output
          SINGLE
```

```
3.4  IF Output                                          [01/03]
     [ SINGLE  ]          MODU          OFF
```

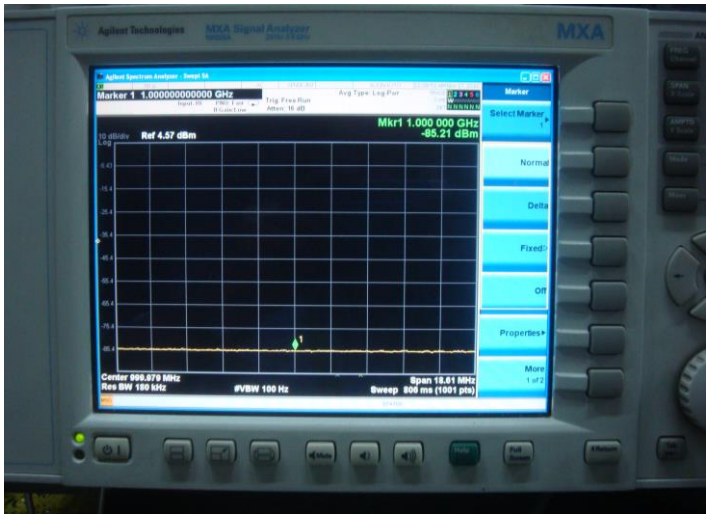
You can set the IF output mode for different applications.

SINGLE (Single Tone): the IF output is only carrier without modulation.

MODU (Modulation): The IF output carrier with modulation.



Off: **Turn off the IF output.**



3.2.4 Network Setting

Press “Up/Down” to choose this item. “Enter” and “Left/Right” to set the parameters. The system displays following pages.

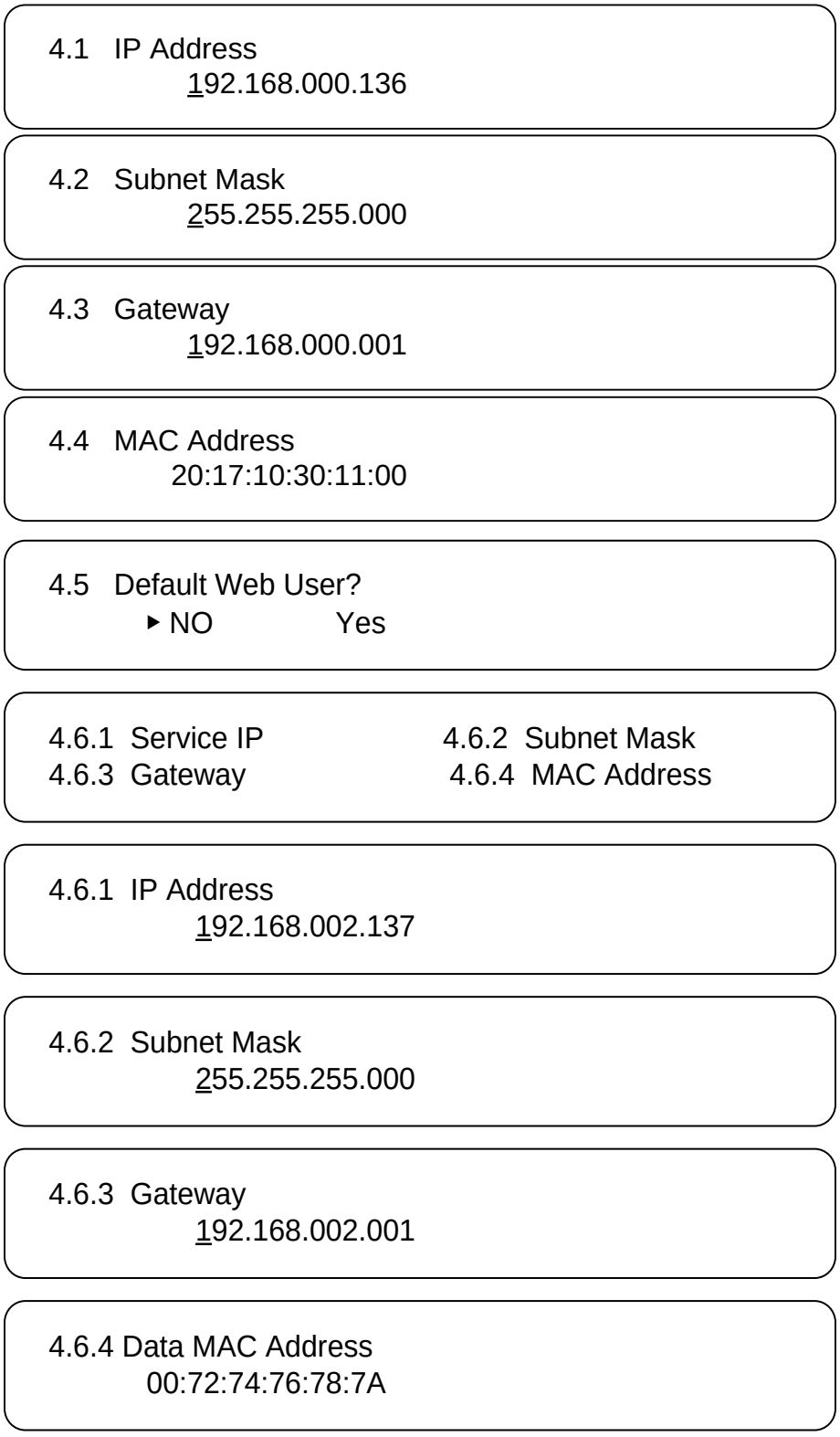
- 4.1 IP Address
- 4.2 Subnet Mask
- 4.3 Gateway
- 4.4 MAC Address

- 4.5 Default Web
- 4.6 Data Port

Note: The MAC address is according to the factory setting, and it’s unique.

Under the following submenus, there are parameters which can be set manually; user can press “Up/Down”

to choose this item. “Enter” and “Left/Right” to set the parameters. The system displays following pages.



3.2.5 Saving Configuration

Save the current configured parameters by pressing ENTER key. The system displays following page:

Saving, please wait:
erasing...

3.2.6 Load Configuration

At this menu, press UP/DOWN key and ENTER to confirm.

▸ 6.1 Saved Config 6.2 Default Config

Load Config
▸ NO YES

Load Default
▸ NO YES

Restore the device into the last saved configuration by choosing **"6.1"** and restore the device into factory configuration by choosing **"6.2"**.

3.2.7 Factory Debug

After entering the submenu by pressing ENTER key, set the debug password and disable or enable the debug for engineer.

▸ 7.1 Permission KEY 7.2 Modu Mode

▸ 7.1 Debug Password
0000

▸ Debug for Engineer
Permission disabled!

3.2.8 Version

Check the hardware version and software version of the equipment.

SW:x.xx HW:x.x

Chapter 4 Web-based NMS Management

The Thor Broadcast Modulator supports front D-pad buttons with an LCD screen for control and management, but you can also control and set the configuration by connecting the IRD to a PC via the web NMS Port. Make sure that the computer's IP address is different from the Encoder's IP address otherwise it would cause an IP conflict and you will not be able to login.

4.1 Login

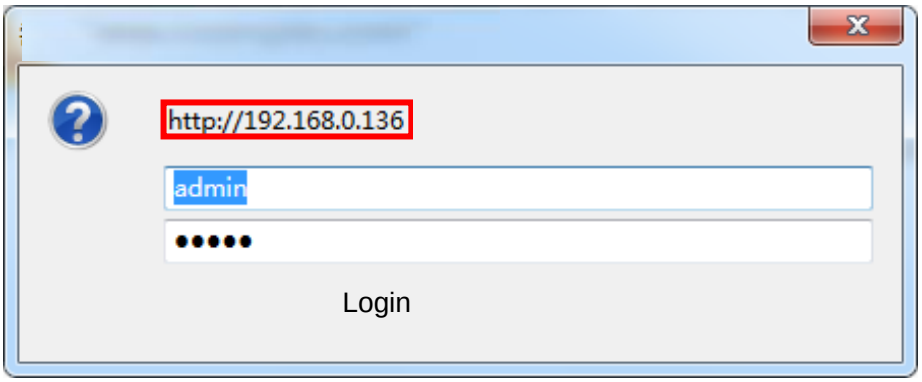
The default IP address of this device is 192.168.0.136. (We can modify the IP through the front panel.)

Connect the PC (Personal Computer) and the device with included net cable, and use ping command to confirm they are on the same network segment (subnet).

E.G. the PC IP address is 192.168.99.252, we then change the device IP to 192.168.99.xxx (xxx can be 0 to 255 except 252 to avoid IP conflict).

Use any web browser to connect the device with the PC by inputting the Encoder's IP address in the browser's address bar and press Enter. (our units usually work better on Mozilla and IE, not Chrome)

It will display the Login interface as Figure-1. Input the Username and Password (Both the default Username and Password are "admin".) and then click "LOGIN" to start the device setting.



4.2 Operation

Summary:

After the login, it displays the WELCOME screen, this is the interface where you have an overview of the IRD's system information and working status.

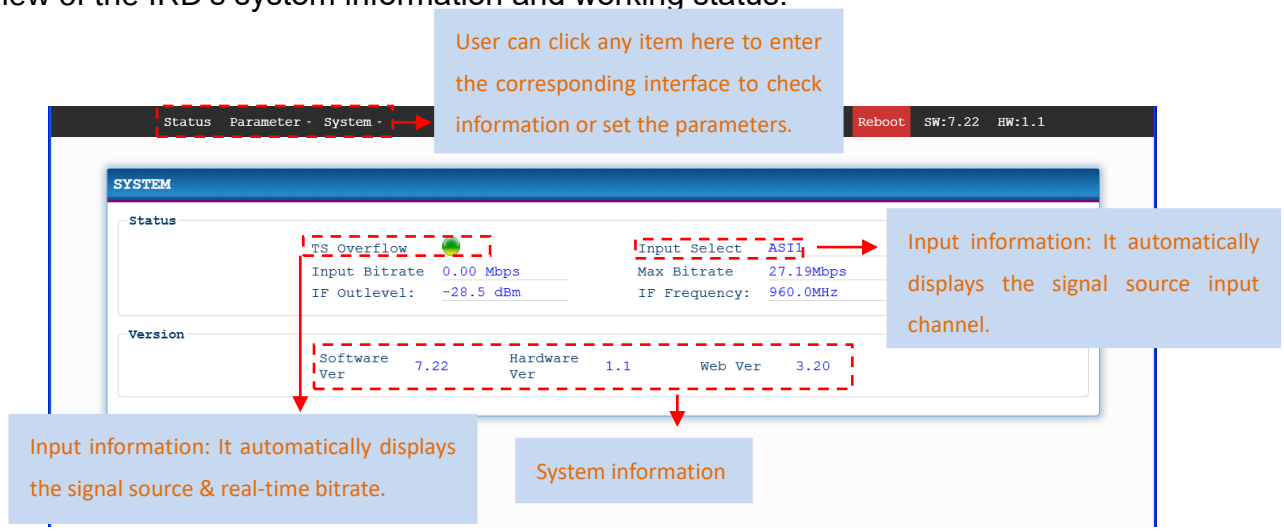


Figure-2

Parameters →Modulator:

From the menu on left side of the webpage, click "Modulator", it displays the interface where you can configure the IF output parameters and IP input parameters if needed. (Figure-3)

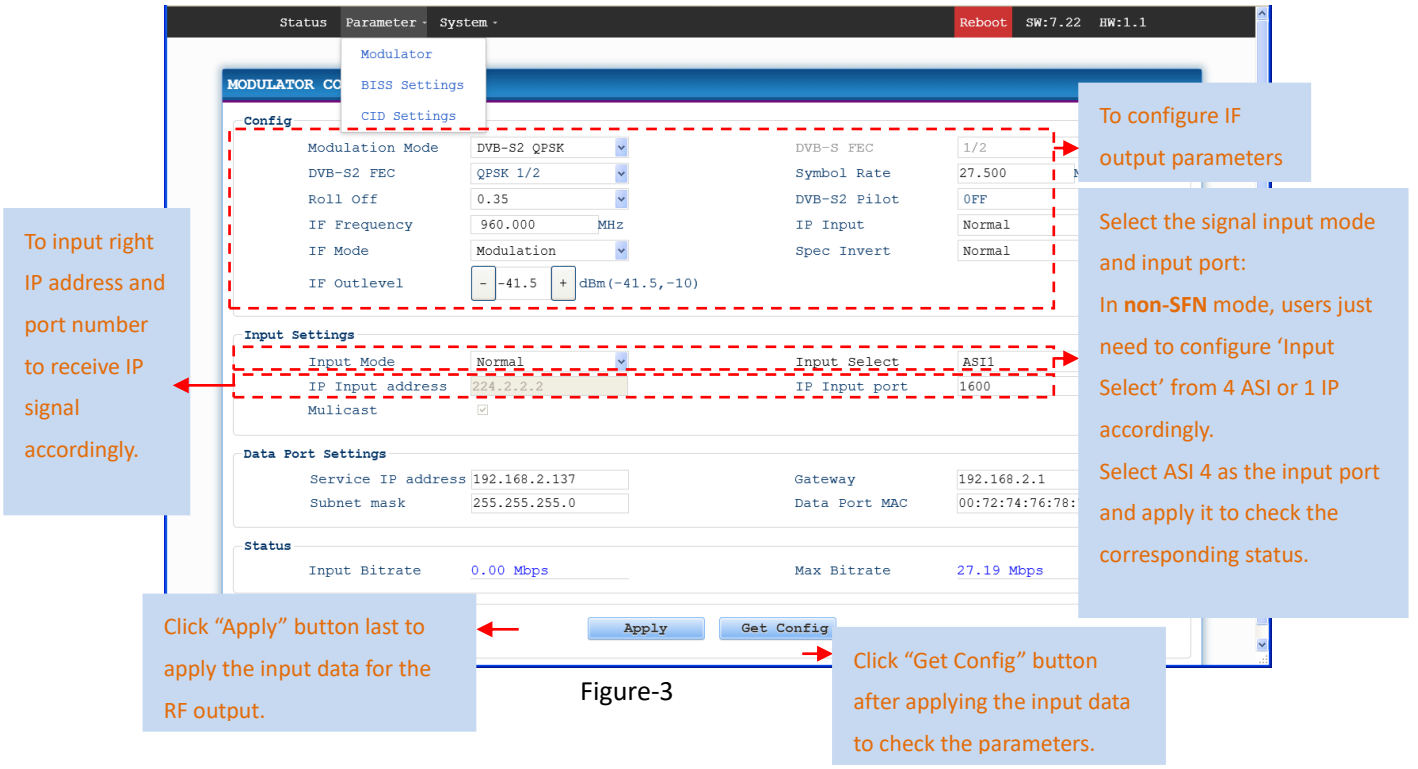


Figure-3

Parameters →BISS Settings:

From the menu on up side of the webpage, click "BISS Config", it displays the interface where users can

parse and scramble the input program(s). (Figure-4)

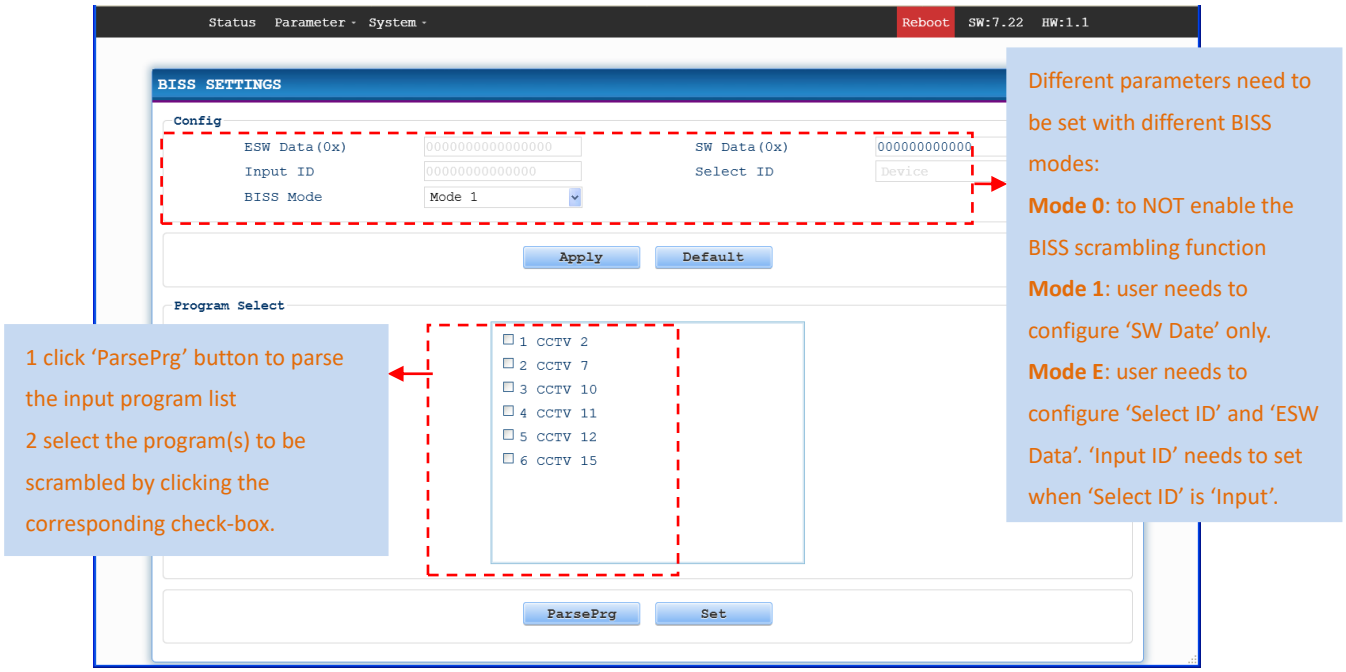


Figure-4

Parameters → CID Settings:

- **RF CID**

From the menu on up side of the webpage, click "CID Settings", it displays the "RF CID" where the distributor can check the location of device and contact information of the users, which is convenient for distributors to maintain and manage the device. (Figure-5)

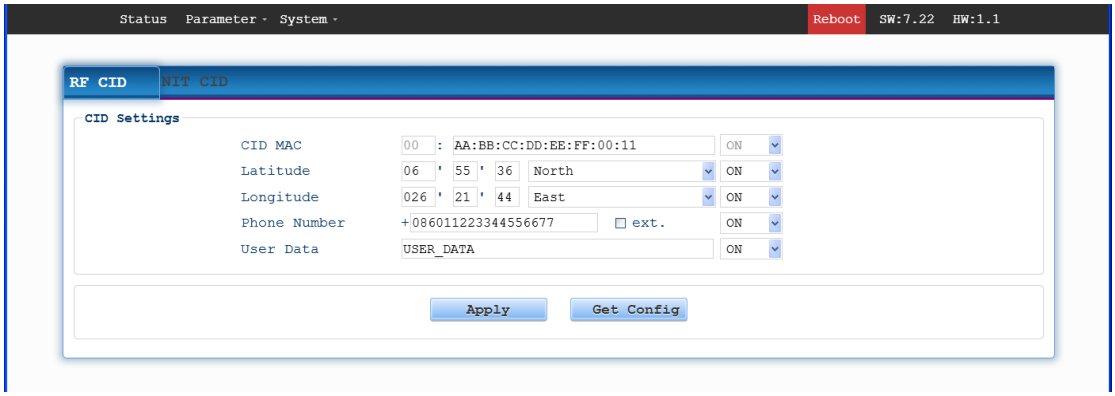


Figure-5

- **NIT CID**

From the menu on up side of the webpage, click "CID Settings", it displays the NIT table which is a very important table for describing the network and TS. Set the parameters of the output NIT table and check the NIT-CID information. It displays the interface as Figure-6.

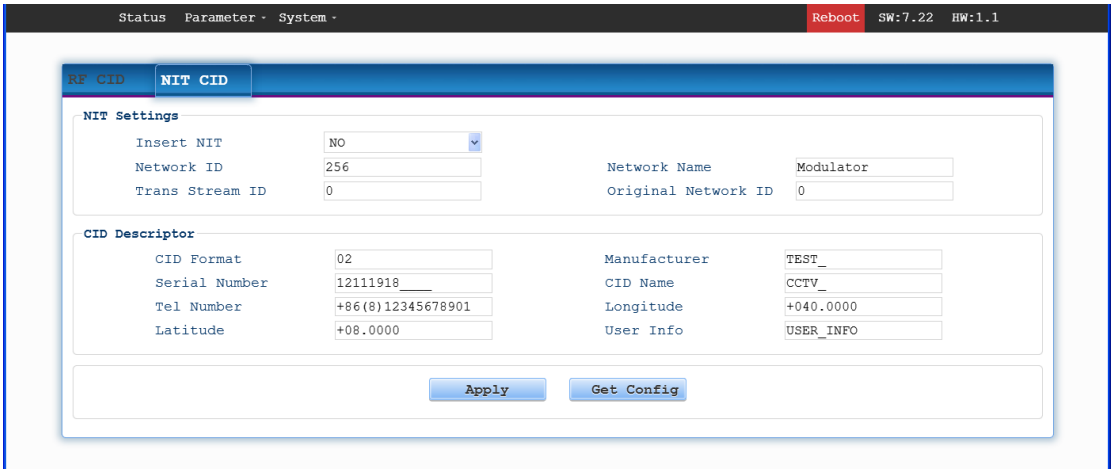


Figure-6

System → Saveload:

From the menu on left side of the webpage, click “Saveload”, it displays the screen as shown in Figure-7 where to save or restore your configurations.

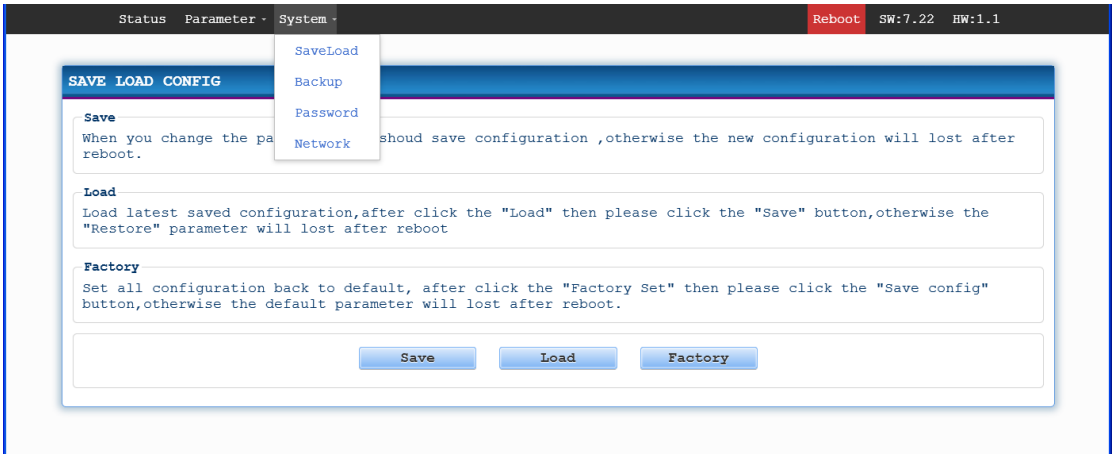


Figure-7

System → Backup:

From the menu on left side of the webpage, click “Backup/Load”, it displays the screen as shown in Figure-8 where to backup or load your configurations.

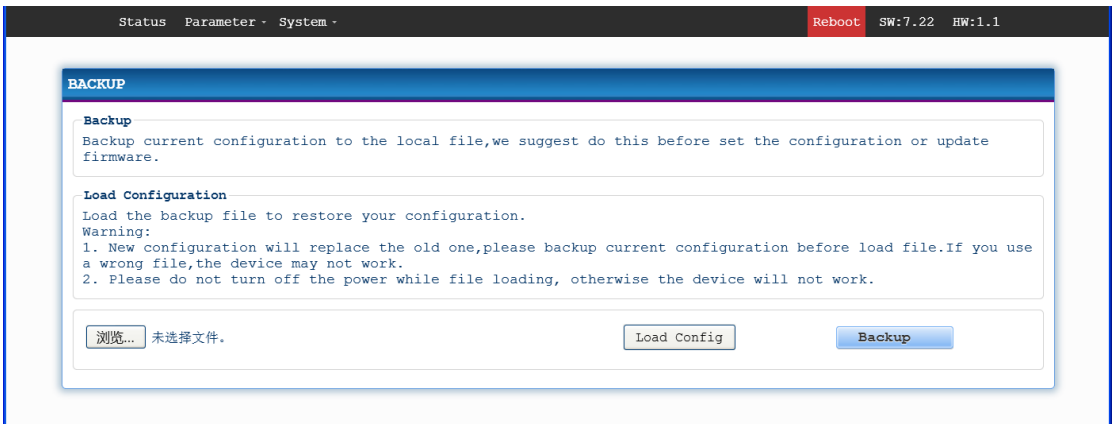


Figure-8

System → Password:

From the menu on left side of the webpage, click “Password”, it displays the screen as shown in Figure-9 where to reset the login info for the device.

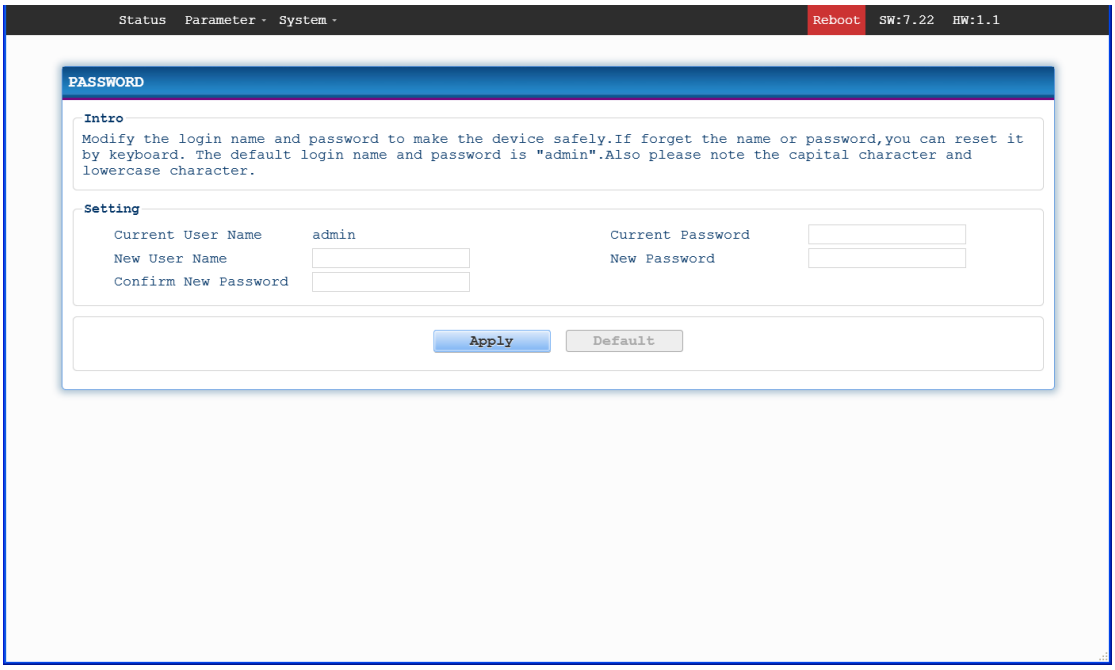


Figure-9

System → Network:

From the menu on left side of the webpage, click “Network”, it displays the screen as shown Figure-10 where to configure the network parameters for the device.

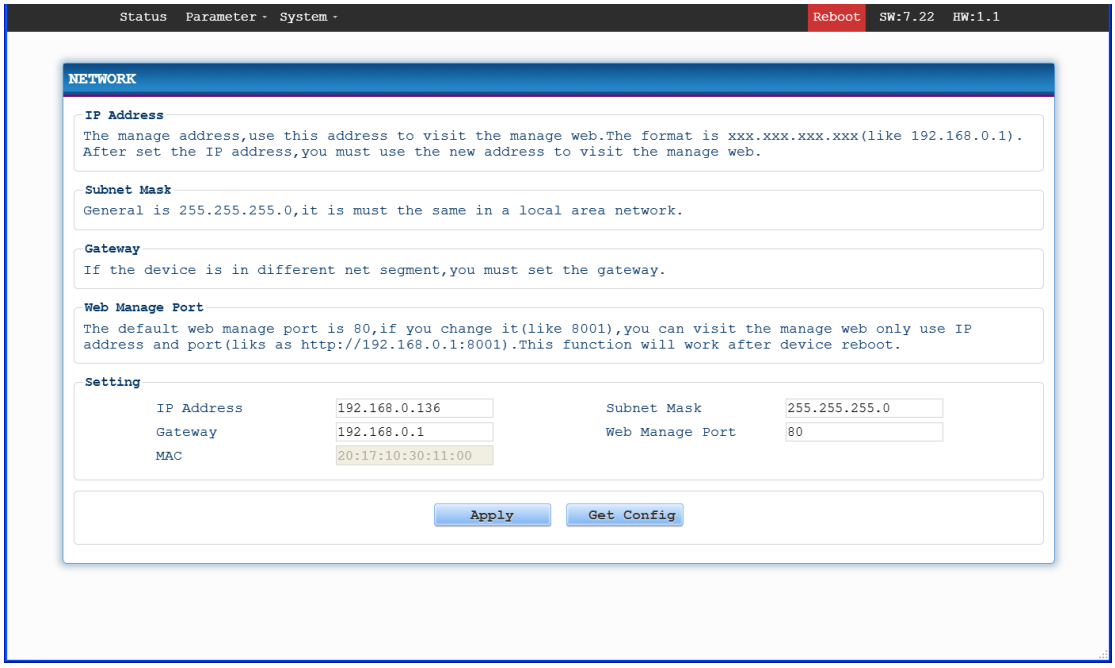


Figure-10

Chapter 5 Troubleshooting

THOR's ISO9001 quality assurance system has been approved by the CQC organization. We guarantee the products' quality, reliability and stability. All THOR products haven passed all testing and manual inspections before they are shipped out. The testing and inspection scheme already covers all the Optical, Electronic and Mechanical criteria which have been published by THOR. To prevent a potential hazard, please strictly follow the operation conditions.

Prevention Measures

- Installing the device in a place where the environmental temperature is between 0 to 45 °C
- Making sure the unit has plenty of ventilation for the heat-sink on the rear panel; and other heat-sink bores if necessary
- Checking the AC input within the power supply and ensure it is working, the connection is correctly installed before switching on device
- Checking the RF output levels to stay within a tolerable range, if it is necessary
- Checking all signal cables have been properly connected
- Frequently switching on/off device is prohibited; the interval between every switching on/off must be greater than 10 seconds.

Conditions needed to unplug power cord

- Power cord or socket damage.
- Any liquid that got into the device.
- Any stuff that could cause a circuit short
- Device in damp environment
- Device has suffered from physical damage; i.e. it fell off a rack.
- Longtime idle.
- After switching on and restoring to factory setting, device still won't work properly.
  Maintenance needed on device

Warranty

H-DVB-S2X-MOD is covered by a **THREE YEAR LIMITED WARRANTY**, which starts from the initial date of your purchase. We provide the owner technical support for the life of the product. If the warranty is expired, repair service charges & parts(if required) can be applied. In the event that a unit must be returned for service, before returning the unit, please be advised that:

1. Warranty mark pasted on the housing of unit must be in good condition.
2. A clear and readable model number, serial number and issues must be identifiable.
3. RMA # and PDF RMA form must be enclosed in the package
4. Please pack the unit in its original container. If the original container is no longer available, please pack the unit in at least 3 inches of shock absorbing material.
5. Returned unit(s) must be prepaid and insured. COD and freight collect are not accepted.

NOTE: We **do not** assume responsibility for damage caused by improper packing of returned unit(s).

The following situations are not covered by warranty:

1. The unit fails to perform because of operators' faults.
2. Warranty mark is modified, damaged and/or removed.
3. Damage caused by force/ user error.
4. The unit has been altered and/or repaired by an unauthorized person(s).

For Further Tech Support

1-800-521-Thor (8467) ext 2

support@thorfiber.com