QUESTTEL

Broadcast Systems

1 HDMI & YPbPr, CVBS Digital RF Encoder Modulator

User Manual

B-QAM-HDMI-1CH

Thank you for buying this encoder modulator.

Please read this manual carefully to install, use and maintain the encoder modulator in the best conditions of performance. Keep this manual for future reference.

Directory

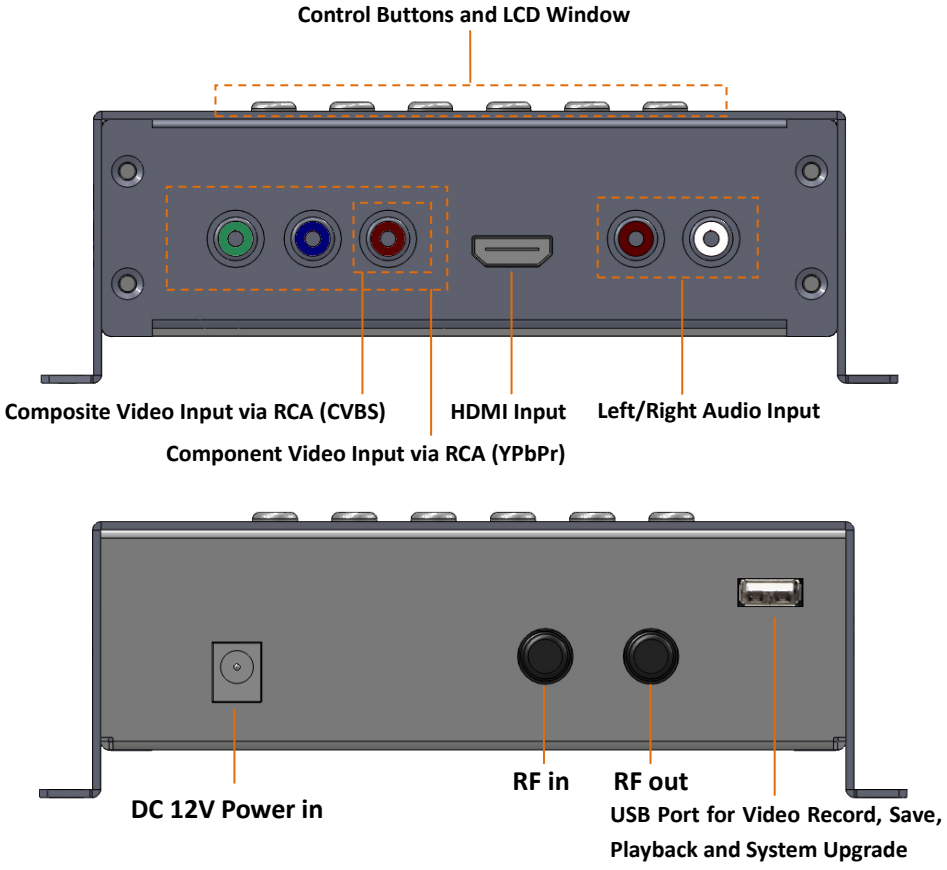
CHAPTER 1 Product Introductions

General Description

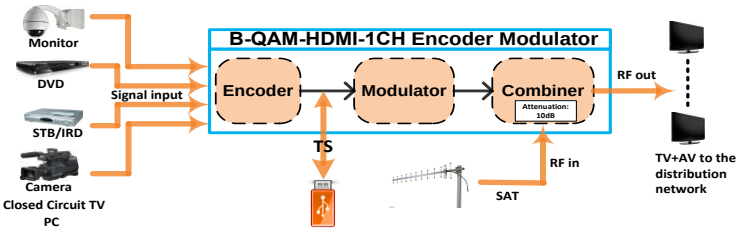
B-QAM-HDMI-1CH series encoder & modulator is QuestTel's consumer electronics which allow audio/video signal input in TV distributions and video recorded and playback through a USB port with applications in home entertainment, hotel Digital Signage, shops etc.

It is an all-in-one device integrating MPEG2 HD/SD & MPEG4 AVC/H.264 HD/SD encoding and modulating to convert video/audio signals to ATSC RF out.

The signals source could be from satellite receivers, closed-circuit television cameras, Blue-ray players, and *.ts files created on PC with our TS Creator.exe. Its output signal is to be received by ATSC TVs or ATSC STBs etc.



Working Principle



Technical Specifications

Encoding Section

HDMI	Video	Encoding	MPEG-2, MPEG-4 AVC/H.264
		Interface	HDMI*1
		Resolution	1920*1080_60P, 1920*1080_50P → (for MPEG-4 AVC/H.264 only) 1920*1080_60i, 1920*1080_50i; 1280*720_60p, 1280*720_50P
		Bit rate	1.000~19.000 Mbps
	Audio	Encoding	MPEG1 Layer II, MPEG2-AAC, MPEG4-AAC,AC3(2.0)
		Interface	HDMI
		Sample rate	48KHz
		Bit rate	64, 96,128, 192, 256, 320, 384kbps
YPbPr/ CVBS	Video	Encoding	MPEG-2, MPEG-4 AVC/H.264
		Interface	CVBS *1, YPbPr*1
		Resolution	**CVBS:** 720x576_50i (PAL); 720x480_60i (NTSC) **YPbPr:** 1920*1080_60i, 1920*1080_50i; 1280*720_60p, 1280*720_50P
		Bit rate	1.000~19.000 Mbps
	Audio	Encoding	MPEG1 Layer II, MPEG2-AAC, MPEG4-AAC,AC3(2.0)
		Interface	1*Stereo /2 mono
		Sample rate	48KHz
		Bit rate	64, 96,128, 192, 256, 320, 384kbps

ATSC Modulator Section

Standard	ATSC A/53
MER	≥42dB
RF frequency	30~960MHz, 1KHz step
RF output level	-16~ -36 dBm (71~91 dbμV), 0.1db step
Constellation	8VSB

System

Management	Local control: LCD + control buttons

Language	English
LCN Insertion	yes

General

Power supply	DC 12V
Dimensions	144*238*52mm
Weight	Approx 1kg
Operation temperature	0~45℃

CHAPTER 2 Safety Instruction and Installations

Safety Instructions

WARNING: Hot plug is not allowed since it may cause system halted.

To prevent fire or electrical shock, do not expose the device to rain or moisture.

The encoder modulator is powered with a voltage of 12V DC. The power supply voltage must not exceed the recommended voltage, which otherwise may cause irreparable damage to the device and the invalidation of the warranty. Therefore:

- Do not replace power supply with a voltage greater than 12V DC.
- Do not connect the device to the power if the power cord is damaged.
- Do not plug the device into mains supply until all cables have been connected correctly.
- Do not cut the cord.

Avoid placing the device next to central heating components and in areas of high humidity.

Do not cover the device with elements that obstruct the ventilation slots.

If the encoder modulator has been kept in cold conditions for a long time, keep it in a warm room minimum 2 hours before plugging into the mains.

Mount the device in vertical position with the connectors located on the top side.

When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutes may result in fire, electric shock or other hazards.

Safety check- Upon completion of any service or repairs to this device, ask the service technician to perform safety checks to determine that the device is in proper condition.

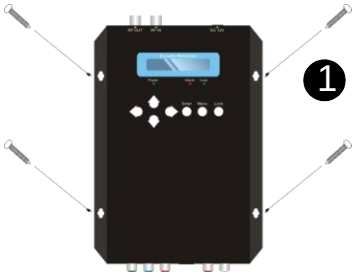
Installations

RISK of damage to the unit

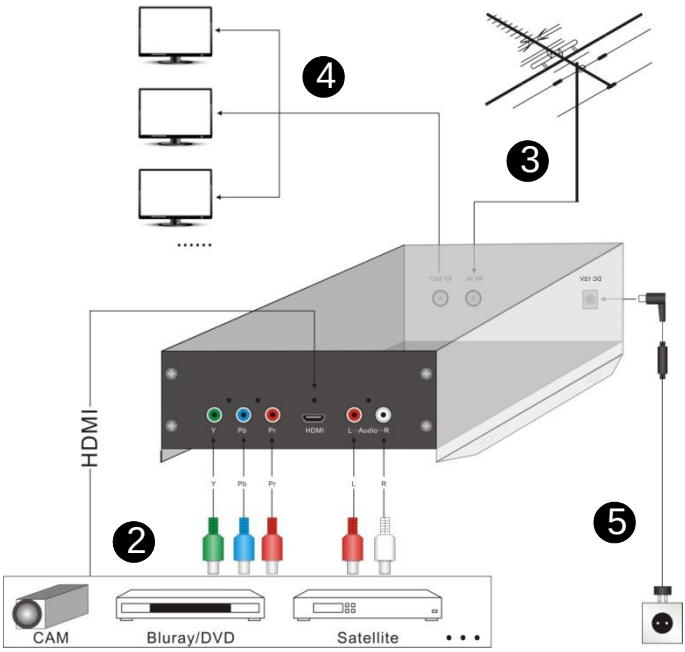
Mechanically handling the unit may result in damage. Do not connect the unit to the power supply before or during assembly. Connect the unit as below instructed.

NO HOT PLUG AND CONNECT THE CABLE AS FOLLOWING STEPS.

1. Mount and tighten the screws and plugs to secure the unit to the wall. Left 10 cm of free space around from each unit.



2. Connect the signal input in the respective connectors. The signal source can be from a surveillance monitor, DVD, set-top box, CCTV and etc.
3. Optionally, connect the loop-through RF input coaxial cable.
4. Connect cable to RF output to STB/TV.
5. Power supply connection: a) Connect the earth cable; b) Connect the power plug to the unit mains connector; c) Connect the power plug to the mains socket.

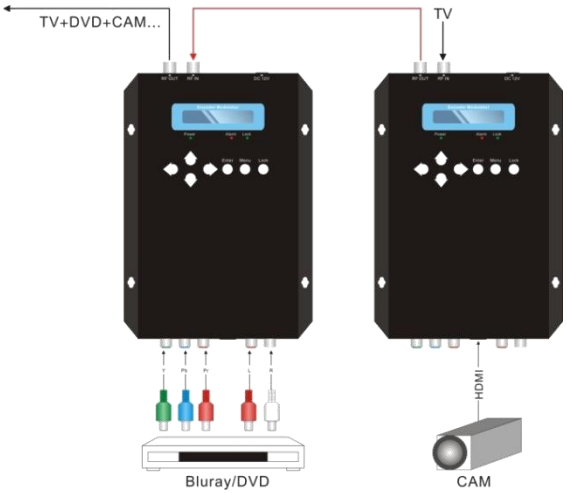


Cascade Installation

B-QAM-HDMI-1CH unit has 1 TV signal to RF output encoded as ATSC Digital TV signal.

Several B-QAM-HDMI-1CH units can be cascaded in order to increase the capacity. The maximum capacity of a series of N units is 1xN incorporated TV signals.

To cascade 2 or more units, connect the RF output of the preceding unit to the TV input (loop-through) of the next unit (see right illustration).



USB Recoder & Player

TS Recorder and Save:

Unit can encode the source video to *.ts files and save them through the USB flash drive.

- Connect the signal source to **Unit** and start encoding process.
- Start the record process and save the TS generated to the USB flash drive.

*.ts Video Creation Software:

Users can also create *.ts videos containing pictures, videos and music with our creator software on a PC and save them into the USB flash drive.

- Drag the files to "Creator" application.
  Formats supported include:
  Image: JPG, PNG, BMP, GIF
  Audio: MP3, WAV
  Video: WMV, MPG, MP4, TS, AVI…
- Start the conversion process to generate *.ts videos

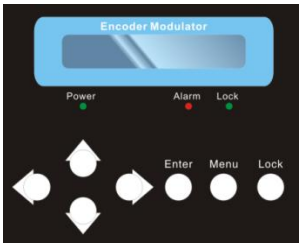
TS Playback:

- Insert the USB flash drive with *.ts videos in **Unit** and play back the content in an easy way.
- A single video can be up to 2G in size and multi videos can be played on a loop.

USB Flash Drive Specifications Required:
- **Standard**: High Speed 2.0
- **File System**: FAT 32
- **Memory**: 32G is suggested

CHAPTER 4 Operations and Management

B-QAM-HDMI-1CH is controlled and managed through the key board and LCD display.



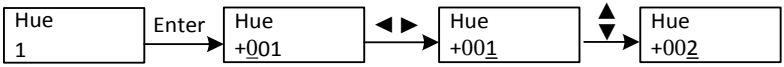
LCD Display – It presents the selected menu and the parameter settings. The backlight in the display is on when the power is applied.

LED – These lights indicate the working status

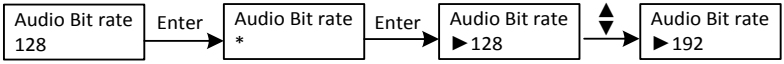
- Power: It lights on when the power supply is connected.
- Alarm: It lights on when the there is error, such as the signal source loss.
- Lock: It lights on when the signal source connected and goes off when the signal lose.

Left/Right/Up/Down buttons – Use these buttons to turn the screen pages, shift the target items by moving the triangle, or change the parameter settings in the program mode.

Enter – Use this button to enter a submenu or save a new setting after adjustment; press it to start adjusting the value of certain items with Up/Down buttons when the corresponding underline flash;



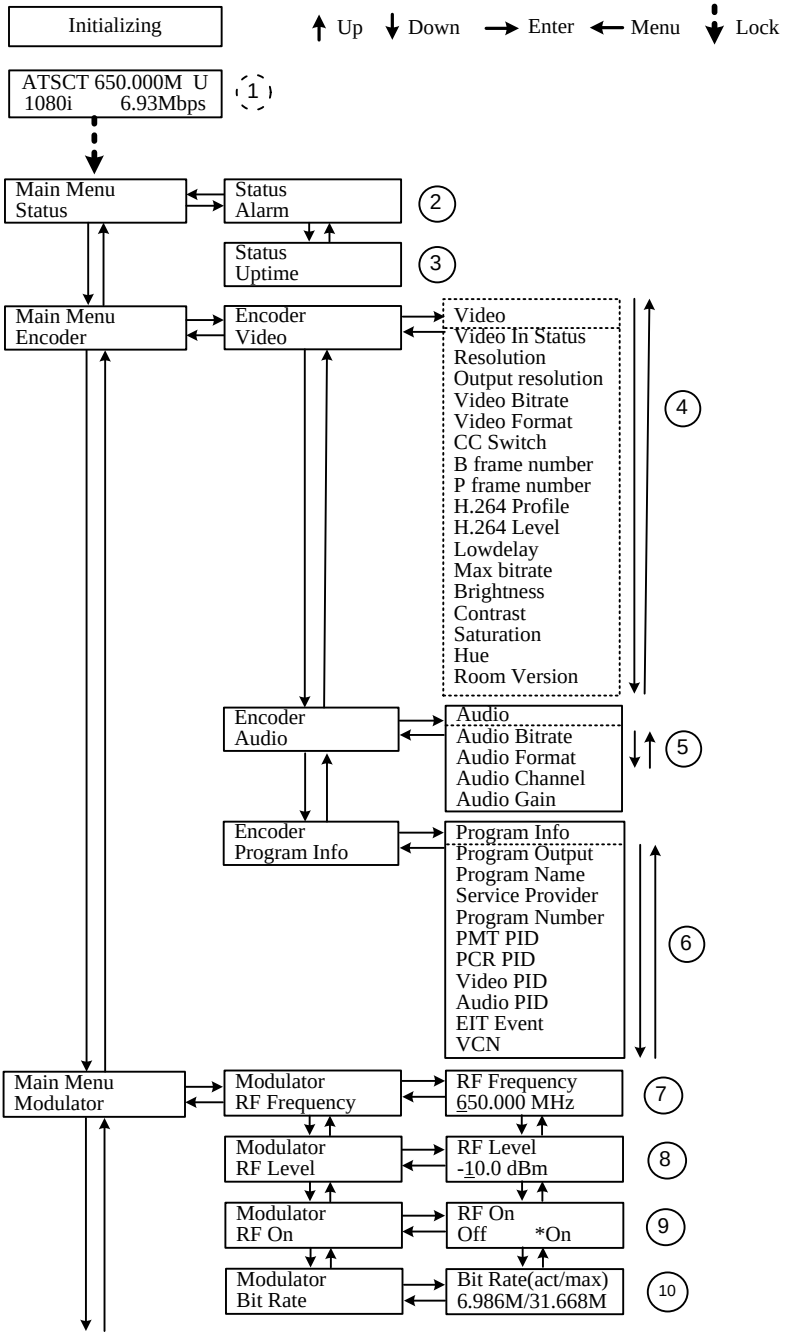
Press it to activate the hidden selections and change the setting with Up/Down (or Left/ Right) buttons.

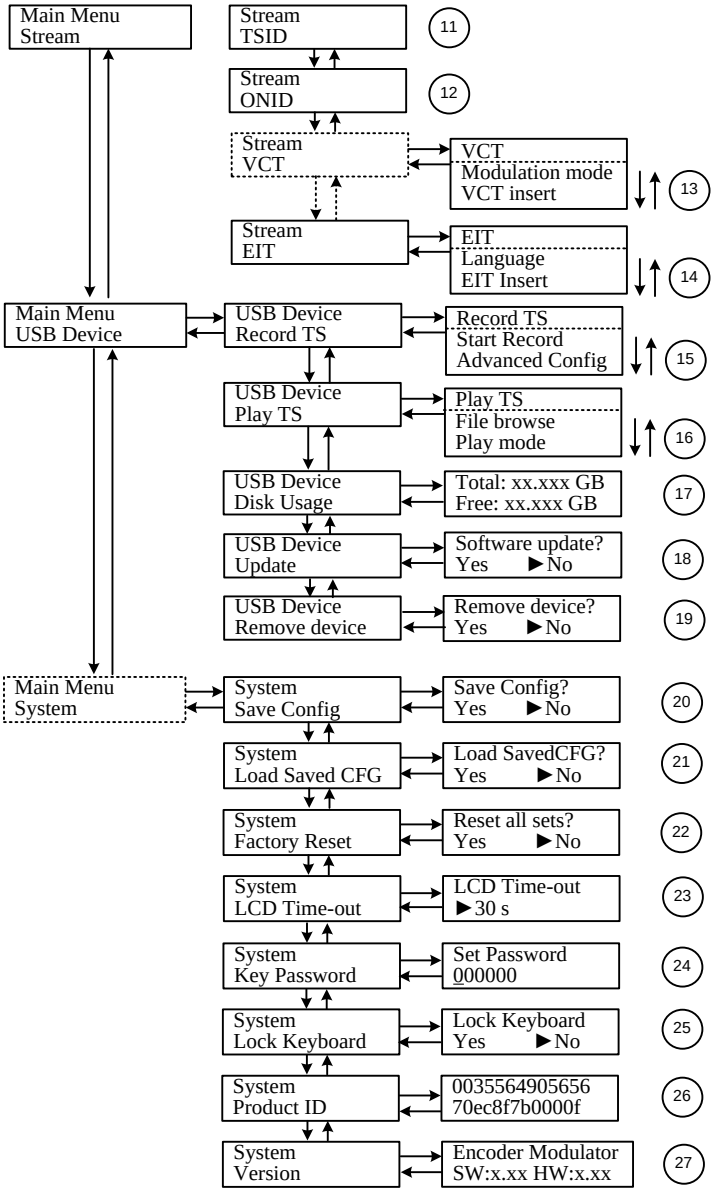


Menu – Press this button to step back

Lock – Locking the screen / cancelling the lock state, and entering the main menu after the initialization of the device. After pressing lock key, the system will question the users to save present setting or not. If not, the LCD will display the current configuration state.

When the power is connected, the LCD will start to initialize the program. The LCD menu goes as below chart.


Initializing
Up
Down
Enter
Menu
Lock
ATSCT 650.000M U
1080i 6.93Mbps
1
Main Menu
Status
Status
Alarm
2
Status
Uptime
3
Main Menu
Encoder
Encoder
Video
Video
Video In Status
Resolution
Output resolution
Video Bitrate
Video Format
CC Switch
B frame number
P frame number
H.264 Profile
H.264 Level
Lowdelay
Max bitrate
Brightness
Contrast
Saturation
Hue
Room Version
4
Encoder
Audio
Audio
Audio Bitrate
Audio Format
Audio Channel
Audio Gain
5
Encoder
Program Info
Program Info
Program Output
Program Name
Service Provider
Program Number
PMT PID
PCR PID
Video PID
Audio PID
EIT Event
VCN
6
Main Menu
Modulator
Modulator
RF Frequency
RF Frequency
650.000 MHz
7
Modulator
RF Level
RF Level
-10.0 dBm
8
Modulator
RF On
RF On
Off *On
9
Modulator
Bit Rate
Bit Rate(act/max)
6.986M/31.668M
10



1) ATSC: modulating standard; XX.XXX MHz: the current output frequency; U: symbol of the USB disk insertion; 1080i: video resolution of signal source; X.XX Mbps: the current encoding bit rate.

2) Alarm Status: For example, if the signals lose, it will give alarm and display error type

under this menu. For example: *Video 1 Not Lock*

3) Uptime: It displays the working time duration of the device. It times upon power on.

4) Video Parameters: User can enter the items respectively to set video parameters. ***Resolution***: signal source resolution, read-only. ***Output resolution:*** To set the output resolution for 1080***. Video Bit rate***: adjust in range of 1.000~19.000 Mbps. ***Video Format***: this unit supports mpeg2 and h.264 video encoding format in CBR/VBR bitrate control mode. ***CC switch:*** User can choose enable CC in or not. ***Low delay***: User can enter this menu to choose Normal, Mode 1, and Mode 2. The different combination of Video Format, Video Bit-rate, Low Delay Mode and the Resolution of signal source will have an impact on the delay. User can also enter the other items to set B frame number, P frame number, H.264 profile, H.264 level and Max bitrate. User can also adjust values of rest items (Brightness & Contrast & Saturation: 0-255; Hue: -128 - +127)

5) Audio Parameters: User can enter the items respectively to set Aduio parameters. ***Audio Bit rate:*** Select audio bit rate among 64, 96, 128, 192, 256, 320, 384 kbps. ***Audio Format:*** User can select audio format among MPEG2, MPEG2-AAC, MPEG4-AAC, AC3 passthrough, Dolby Digital. ***Audio Mode：*** Choose Audio Mode among Stereo, Stereo left, Stereo right. ***Audio Channel:*** Analog and HDMI optional. ***Audio Gain:*** User can also adjust values of Audio Gain from 0 to 401.

6) Program Information: User can enable or disable the program output under menu *Program Output*. User can also enter the other items to edit the *Service Name, Program Name, Program Number*, and PIDs of *PMT, PCR*, *Video* and *Audio*. *EIT Event* – User can enter this menu to setup EIT (Event Information Table) for the current and next program event. The EIT contains Start Year, Start Time, Duration, and Event Name of the event. All the EIT information can be displayed on the TV screen on condition that the EIT is chosen to insert (see explanation 14.). *VCN* – User can enter its submenus to setup the VCN (Virtual Channel Number) information.

7) RF Frequency: Adjust it at range of 30 to 999 MHz. Set it according your regional situation or inquire your local services.

8) RF Level: Adjust it at range of -16~ -36dBm.

9) RF On: User can choose to turn on or turn off the RF under this menu.

10) Bit Rate: User can read the current modulating bit rate and the maximum bit rate

11) TSID: (Transport Stream ID) User can view or adjust after enter this menu.

12) ONID: (Original Network ID)-User can view or adjust after enter this menu.

13) VCT: Virtual Channel Table. This menu contains two sub-menus, Modulation Mode and VCT Insert. User can edit modulation mode at the range of 0-255. Choose to insert the VCT when J.83B is applied as the modulation standard.

14) EIT: EIT Insert - As mentioned above (6), the event information table can be chosen whether to insert into the TS or not under this menu. If yes, the EIT information set above (6) will be displayed on the TV screen. Language Code – to set the EIT language For example, code of the English language is *eng*. If you set the code as *eng*, the EIT displayed will be in English language.

15)-19) Please refer to *Chapter 5* for details.

20) Save Config: *Yes/No*-to save/give up the adjustment of setting.

21) Load Saved CFG: *Yes/No*-to load/ not to load the saved configuration.

22) Factory Reset: *Yes/No*-choose/not choose the factory's default configuration.

23) LCD Time out: A time limit that LCD will light off. Choose among 5s, 10s, 45s, 60s, 90s and 120s (seconds).

24) Key Password: to set a 6-digit password for unlocking the keyboard.

25) Lock Keyboard: Choose *Yes* to lock the keyboard, then the keyboard will be locked and cannot be applicable. It is required to input the password to unlock the key board. This operation is one-off. (Password forgotten, please use the universal code "*005599*".)

26) Product ID: User can view the serial number of this device. It is read-only and unique

27) Version: It displays the version information of this device. *Encoder Modulator*: the name of the device; *SW*: software version number; *HW*: hardware version number. User can also press ENTER again to view the published time of this device.

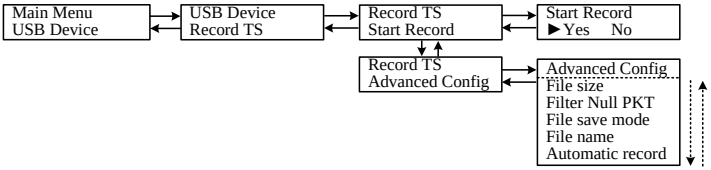
Chapter 5 Operations of Record TS and Play TS through USB Disk

The B-QAM-HDMI-1CH encoder modulator has new functions of:

1. *.ts Video Creation

See Chapter 3.

2. TS Record and Save



1) Connect the signal source, enter “Start Record” and choose “Yes” to start recording the encoded TS.

2) Advanced Config:

File size: users can set the file size for the *.ts to be recorded. A single file can be maximum 2000M in size.

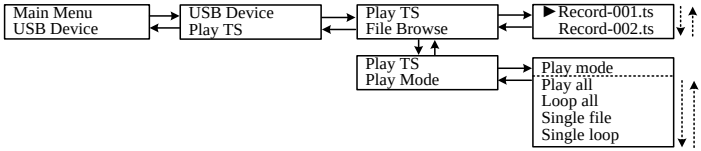
Filter null PKT: Users can decide whether to filter the null packet for the *.ts files to be recorded.

File save mode: there are 3 modes provided: “single file” (For example, when the file size is set as 1000M and the *.ts is recorded up to 1000M, it automatically stops recording TS.). “Segmented file” (For example, when the file size is set as 1000M and the *.ts is recorded up to 1000M, it automatically saves the files and continues to record TS and save it to next file until the USB memory is full.) . “Loop record”: (it automatically saves the files and continues to record TS and save it to next file. When the USB memory is full, it replaces the previous files.)

File name: Users can enter this menu to edit name for the *.ts files to be recorded. For example, if users name it “Record-”, it will give name to the saved *.ts files “Record-001.ts”, “Record-002.ts”… “Record-00N.ts”.

Automatic Record: Users can choose whether to set B-QAM-HDMI-1CH record the TS automatically or manually.

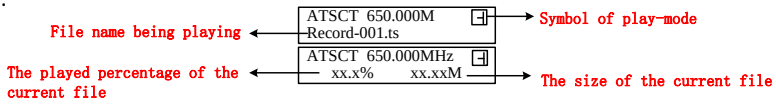
3. TS Playback



1) File browse: There is a video list under this menu, choose one file and press "Enter" button to start play.

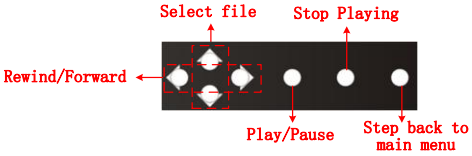
2) Play mode: User can select a play mode for the saved *.ts files as needed before playing the *.ts file.

When the *.ts is being playing, B-QAM-HDMI-1CH LCD will present a playing interface as shown below.



single loop; play all; loop all; single file

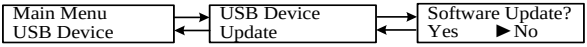
At this time, the key board also plays a different rule



4. Disk Usage

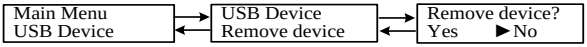
Users can enter this menu to view the USB disk's capacity left.

5. Update



Choose "Yes" to update the B-QAM-HDMI-1CH with the update file stored in the USB disk.

6. Remove Device



Choose "Yes" to safely remove the USB disk. B-QAM-HDMI-1CH will then automatically resume encoding and playing the program input from the encoder module.

Appendix

Air Channels			
Ch.	Frequency		
	Start	Center	End
VHF			
C00	45	48.5	52
C01	56	59.5	63
C02	63	66.5	70
C03	85	88.5	92
C04	94	97.5	101
C05	101	104.5	108
C5A	137	140.5	144
C06	174	177.5	181
C07	181	184.5	188
C08	188	191.5	195
C09	195	198.5	202
C9A	202	205.5	209
C10	209	212.5	216
C11	216	219.5	223
C12	223	226.5	230
UHF			
C20	470	473.5	477
C21	477	480.5	484
C22	484	487.5	491
C23	491	494.5	498
C24	498	501.5	505
C25	505	508.5	512
C26	512	515.5	519
C27	519	522.5	526
C28	526	529.5	533
C29	533	536.5	540
C30	540	543.5	547
C31	547	550.5	554
C32	554	557.5	561
C33	561	564.5	568
C34	568	571.5	575
C35	575	578.5	582
C36	582	585.5	589
C37	589	592.5	596

Air Channels			
Ch.	Frequency		
	Start	Center	End
C38	596	599.5	603
C39	603	606.5	610
C40	610	613.5	617
C41	617	620.5	624
C42	624	627.5	631
C43	631	634.5	638
C44	638	641.5	645
C45	645	648.5	652
C46	652	655.5	659
C47	659	662.5	666
C48	666	669.5	673
C49	673	676.5	680
C50	680	683.5	687
C51	687	690.5	694
C52	694	697.5	701
C53	701	704.5	708
C54	708	711.5	715
C55	715	718.5	722
C56	722	725.5	729
C57	729	732.5	736
C58	736	739.5	743
C59	743	746.5	750
C60	750	753.5	757
C61	757	760.5	764
C62	764	767.5	771
C63	771	774.5	778
C64	778	781.5	785
C65	785	788.5	792
C66	792	795.5	799
C67	799	802.5	806
C68	806	809.5	813
C69	813	816.5	820
C70	820	823.5	827
C71	827	830.5	834
C72	834	837.5	841
C73	841	844.5	848
C74	848	851.5	855
C75	855	858.5	862

Modulation Constellation	FEC	6MHz Bandwidth				7MHz Bandwidth				8MHz Bandwidth			
		Guard Interval				Guard Interval				Guard Interval			
		1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32
QPSK	1/2	The weak ability of error-correcting and anti-interference in this area											6.03
	2/3				6.03	5.80	6.45	6.83	7.03	6.64	7.37	7.81	8.04
	3/4		6.22	6.58	6.78	6.53	7.25	7.68	7.91	7.46	8.29	8.78	9.05
	5/6	6.22	6.91	7.31	7.54	7.25	8.06	8.53	8.79	8.29	9.22	9.76	10.05
	7/8	6.53	7.25	7.68	7.91	7.62	8.46	8.96	9.23	8.71	9.68	10.25	10.56
16QAM	1/2	7.46	8.29	8.78	9.04	8.70	9.67	10.24	10.55	9.95	11.06	11.71	12.06
	2/3	9.95	11.05	11.70	12.06	11.61	12.90	13.66	14.07	13.27	14.75	15.61	16.09
	3/4	11.19	12.44	13.17	13.57	13.06	14.51	15.36	15.83	14.93	16.59	17.56	18.10
	5/6	12.44	13.82	14.63	15.08	14.51	16.12	17.07	17.59	16.59	18.43	19.52	20.11
	7/8	13.06	14.51	15.36	15.83	15.24	16.93	17.93	18.47	17.42	19.35	20.49	21.11
64QAM	1/2	11.19	12.44	13.17	13.57	13.06	14.51	15.36	15.83	14.93	16.59	17.56	18.10
	2/3	14.92	16.58	17.56	18.09	17.41	19.35	20.49	21.11	19.91	22.12	23.42	24.13
	3/4	16.79	18.66	19.76	20.35	19.59	21.77	23.05	23.75	22.39	24.88	26.35	27.14
	5/6	18.66	20.73	21.95	22.62	21.77	24.19	25.61	26.39	24.88	27.65	29.27	30.16
	7/8	19.59	21.77	23.05	23.75	22.86	25.40	26.89	27.71	26.13	29.03	30.74	31.67

Safety Instructions

Read before operating equipment.

1. Cleaning - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
2. Power Sources - Use supplied or equivalent UL/CSA approved low voltage DC plug-in transformer.
3. Outdoor Antenna Grounding - If you connect an outside antenna or cable system to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.
4. Lightning - Avoid installation or reconfiguration of wiring during lightning activity.
5. Power Lines - Do not locate an outside antenna system near overhead power lines or other electric light or power circuits or where it can fall into such power lines or circuits. When installing an outside antenna system, refrain from touching such power lines or circuits, as contact with them might be fatal.
6. Overloading - Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.
7. Object and Liquid Entry - Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short out parts, resulting in a fire or electric shock. Never spill liquid of any kind on the product.
8. Servicing - Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
9. Damage Requiring Service - Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    - When the power supply cord or plug is damaged.
    - If liquid spills or objects fall into the product.
    - If the product is exposed to rain or water.
    - If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions. An improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
    - If the video product is dropped or the cabinet is damaged.
    - When the video product exhibits a distinct change in performance, this indicates a need for service.