HD Encodulator^{TM} (HAT-2110) User Operational Manual

HD Encodulator^{TM} User Operational Manual

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products are low energy consuming products.

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1 Introduction

Introduction

1-1. Description

HD Encodulator^TM is professional Video / Audio Encoder which has DTV broadcasting modulator using A/V compression and digital modulation technologies. MPEG-2 / H.264 technologies were supported for Video compression and MPEG-1 L2 / AC3 / AAC / HE-AAC technologies were supported for Audio compression. For the video input, this product has HDMI, HD-SDI, Component ports and HDMI, HD-SDI, Analog Stereo Audio (L/R), SPDIF (optical/coaxial) and AES/EBU for audio input. And for the encoder and modulation output, this product has ASI and Ethernet ports and RF output port.

1-2. Specifications

Video Encoder	- Input : HD-SDI, HDMI, Y/Pb/Pr - HD Resolutions and frame(progressive) or field(interlaced) rates: 1920x1080 at 60p, 50p via internal interlacer(convert to 60i, 50i, respectively) 1920x1080 at 60i, 59.94i, 50i, 30p, 29.97p, 25p, 24p, 23.97p 1280x720 at 60p, 59.94p, 50p. - SD Resolutions and frame/field rates: 720x480: 59.94i 720x576: 50i - MPEG2 HD/SD Encoder - ISO/IEC 13818-2 (MPEG2 HP@HL, MP@HL, MP@ML) - HD video bit rate: 25~0.5 Mbps. - SD video bit rate: 25~0.5 Mbps. - Sub 1.5 seconds encoder latency, configurable. - H.264 HD/SD Encoder - Baseline, Main and High Profiles support - HD video bit rate: 25~0.25 Mbps. - SD video bit rate: 25~0.25 Mbps. - Sub 0.8 seconds encoder latency, configurable. - Maximum TS bit rate: 30 Mbps. - Advanced Settings(option) - GOP structure: Automatic/IP/IPB/IPBB/IPBBB, open/closed, size 1 to 300. - Adaptive I-frame insertion: enable/disable. - Bit rate control: CBR, VBR and capped-VBR - MCTF strength: 0(off) to 7(maximum). - Inverse Telecine enable/disable. - Scene change detection and fade detection enable/disable.

Audio Encoder	• Input : SDI embedded, HDMI embedded, S/PDIF(Optic/Coax), AES-EBU(BNC), Analog Stereo
	• Sample rate converter
	    ■ 32KHz ~ 96KHz to 48KHz
	• Dolby Digital CE Stereo Encoder (for ATSC, DTMB)
	    ■ Output bit rates: 128/192/256/384 Kbps
	    ■ Encoding sample rates: 48 KHz
	• MPEG-1 Layer II Stereo Encoder (for DVB-T, DTMB)
	    ■ Output bit rate: 192/224/256/320/384 Kbps
	    ■ Encoding sample rates: 32/44.1/48KHz
	• AAC-LC, HE-AAC v1, HE-AAC v2 Stereo Encoder (for ISDB-T)
	    ■ Output bit rate(LC): 32/48/56/64/80/96/112/128/160/192/224/256/320/384 Kbps
	    ■ Output bit rate(HE-AAC v1): 32/48/56/64/80/96/112/128/160/192 Kbps
	    ■ Output bit rate(HE-AAC v1): 32/48/56/64/80/96 Kbps
	    ■ Audio sample rate: 32/44.1/48KHz
	• Pass-through of Dolby Digital Stereo/5.1ch, MPEG-1 Layer II and AAC-LC audio support.

PSI/SI/PSIP	• PSI/SI: PAT, PMT generation enable/disable • PSIP: MGT, TVCT/CVCT generation enable/disable, ■ Short name, major and minor channel number setting • External PSI/PSIP generator input via "ASI IN" port
RF Output	• Main Output: F-Type 75Ω 1ea @ rear • -20dB Output: F-Type 75Ω 1ea @ front • Maximum Output Level for 1ch: +10dBm • Maximum Output Level for 2ch: +5dBm • Maximum Output Level for 3ch: +2.5dBm • Maximum Output Level for 4ch: +1dBm • Level Adjustment: 0~-27dB in 0.5dB steps • Center Frequency Range: 30~999 MHz • Spurious: <-60dBc relative to output level • Harmonics: <-50dBc • Return Loss: >15dB • Phase Noise: <-98dBc/Hz @20kHz offset
TS over IP Output	• Ethernet 10/100Base-T • Connector: RJ-45 • UDP/IP, RTP/UDP/IP • Unicast, Multicast

Modulator (Option)	• ATSC(8VSB) Modulator
	  ■ Modulation Mode: 8VSB
	  ■ Symbol Rate 10.762 MSps
	  ■ SNR(MER): >35 dB
	• ATSC(8VSB) 4ch. Modulator
	  ■ 1~4 adjacent RF channel configurable
	  ■ 1 channel from internal encoder.
	  ■ Other 3 channels are from extra DVB-ASI inputs
	  ■ Reduces total cost of ownership via superior RF performance, installed density and power consumption.
	• Open Cable Modulator
	  ■ Standard: ITU-T J.83 Annex B
	  ■ Constellation types & Symbol Rates:
	    64QAM: 5.057MSps
	    256QAM: 5.361MSps
	  ■ Channel Bandwidth: 6MHz
	  ■ SNR(MER): >40dB
	• DVB-T Modulator
	  ■ Modulation Mode: QPSK, 16QAM, 64QAM
	  ■ Transmission Mode: 2K, 4K, 8K
	  ■ Channel Bandwidth: 5, 6, 7, 8 MHz
	  ■ Code Rate: 1/2, 2/3, 3/4, 5/6, 7/8
	  ■ Guard Interval: 1/4, 1/8, 1/16, 1/32
	  ■ SNR(MER): >40dB
	• DVB-C Modulator
	  ■ Standard: ITU-T J.83 Annex A/C
	  ■ Constellation types: 16QAM, 32QAM, 64QAM, 128QAM, 256QAM
	  ■ Symbol Rate: 0.87~7.2MSps
	  ■ Channel Bandwidth: 1~8.280MHz
	  ■ SNR(MER): >40dB
	• DTMB Modulator
	  ■ Single Carrier & TDS-OFDM modulation support
	  ■ Modulation Mode: QPSK, 16QAM, 32QAM, 64QAM
	  ■ Standards
	    • GB20600-2006, ISO/IEC 13838-1, EN 50083-9.
	    • OGY/T 229.1-2008 (SIP)
	  ■ SNR(MER): >40 dB
	• ISDB-T/Tb Modulator
	  ■ Modulation Mode: ISDB-T Layered OFDM
	  ■ Standard: ARIB STD-B31

	■ TMCC Encoding: Fully supported ■ SNR(MER): >40dB
Management	• Front panel: 4-line text LCD, 6buttons • RS-232 local console • Web GUI • SNMP(Option)
Physical	• Dimension: 44(H) X 483(W) X 402(D),(excluding connectors) • Temperature: 0~45℃ • Weight: 3.5Kg(at One Modulator) • Power Consumption: 45W(max.)

1-3. Model Numbers

Model No.	Encoder Channel	Modulator
HEN-2100	1 HD(MPEG2, H.264)	None
HAT-2110/2140	1 HD(MPEG2, H.264)	1/4 ch. ATSC
HOC-2110/2140	1 HD(MPEG2, H.264)	1/4 ch. OpenCable
HDT-2110	1 HD(MPEG2, H.264)	1 ch. DVB-T
HDC-2110/2140	1 HD(MPEG2, H.264)	1/4 ch. DVB-C
HDM-2110	1 HD(MPEG2, H.264)	1 ch. DTMB
HIT-2110	1 HD(MPEG2, H.264)	1 ch. ISDB-T

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2 Product Description

2-1. Indicators and key-buttons

2-1-1. Front
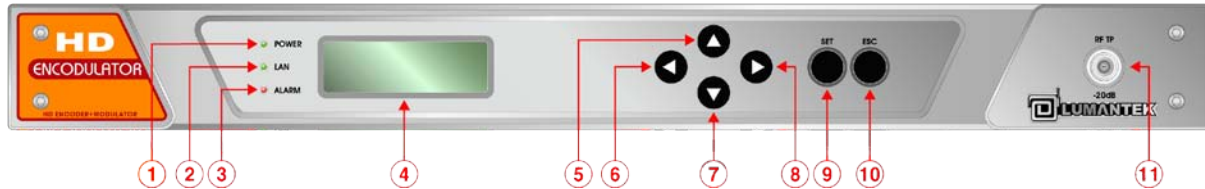
① POWER LED   ② LAN LED   ③ ERROR LED
④ Control LCD   ⑤ UP BUTTON   ⑥ LEFT BUTTON
⑦ DOWN BUTTON   ⑧ RIGHT BUTTON   ⑨ SET BUTTON
⑩ ESC BUTTON   ⑪ RF-OUT(T.P)

2-1-2. Rear
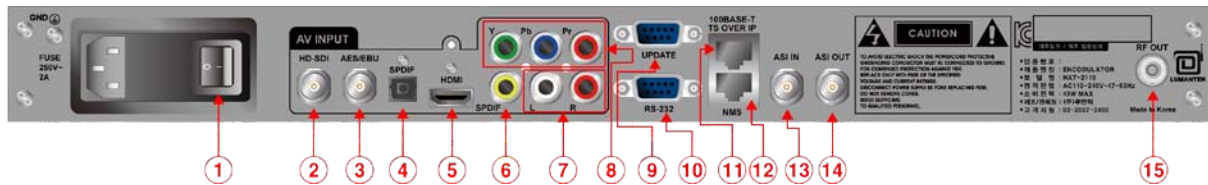
① Power switch   ② HD-SDI-IN   ③ AES/EBU-IN
④ SPDIF-IN   ⑤ HDMI-IN   ⑥ COAXIAL-IN
⑦ Composite Audio IN ⑧ Component Video IN   ⑨ UART(UPDATE)
⑩ UART(Console)   ⑪ 100BASE-T(TSoverIP) ⑫ 100BASE-T(WebServer)
⑬ ASI-IN   ⑭ ASI-OUT   ⑮ RF-OUT

2-2. Indicators and key-buttons Details

2-2-1. Front

① POWER LED: Indicates the power supply is producing
② LAN LED: Indicates the LAN port is connected
③ ERROR LED: Indicates something is not working correctly
④ LCD window : LCD display that indicates status reports
⑤ UP button: Press Up button to move up
⑥ LEFT button: Press Up button to move left
⑦ Down button : Press Down button to move down
⑧ RIGHT button : Press Up button to move right
⑨ SET button: Press Set button to set present stutus
⑩ ESC button: Press to exit this menu
⑪ RF-OUT (T.P): RF T.P(test Point) output

2-2-2. Rear

① Power SW : Power On/Off switch
② HD-SDI-IN: HD-SDI input port
③ AES/EBU-IN: AES/EBU Audio input port
④ S/PDIF-IN: SPDIF Audio input port
⑤ HDMI: HDMI input port
⑥ COAXIAL-IN: COAXIAL Audio input port
⑦ Composite Audio IN: Composite Audio input port
⑧ Component Video IN: Component Video input port
⑨ UART(UPDATE) : UART port   for Update
⑩ UART(Console) : UART port for Console control
⑪ 100BASE-T(TSoverIP): 100 BASE-T for TS over IP output
⑫ 100BASE-T(WebServer): 100 BASE-T for WebGUI/SNMP
⑬ ASI-IN: ASI input port input port
⑭ ASI-OUT: ASI output port
⑮ RF-OUT: DTV RF Signal output port

2-3. Product

① HD Encodulaotr^{TM} Main Equipment
② AC Power Cord: 220VAC Power Cord

HD Encodulaotr^{TM} Main equpment
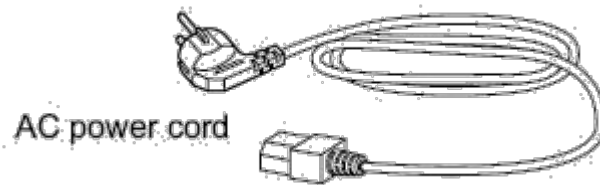
2-4. Operator Safety Summary

For your protection, please read these safety instructions completely before operating the equipment and keep this manual for future reference. The information in this summary is intended for operators. Carefully observe all warnings, precautions and instructions both on the apparatus and in the operating instructions.

Equipment Markings

The lighting flash symbol within an equilateral triangle is intended to alert the user to the presence of un insulated "dangerous voltages" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electrical shock.

The exclamation mark within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions within literature accompanying the equipment.

Warnings

Water and Moisture - Do not operate the equipment under or near water - for example near a bathtub, kitchen sink, or laundry tub, in a wet basement, near a swimming pool or in areas with high humidity.

Cleaning - Unplug the apparatus from the wall outlet before cleaning or polishing. Do not use liquid cleaners or aerosol cleaners. Use a lint-free cloth lightly moistened with water for cleaning the exterior of the apparatus.

Ventilation - Do not block any of the ventilation openings of the apparatus. Install in accordance with the installation instructions. Never cover the slots and openings with a cloth or other material. Never install the apparatus near heat sources such as radiator, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Grounding or Polarization - Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plus has two blades and a third grounding prong.

The wide blade or third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician.

Power-Cord Protection - Route the power cord so as to avoid it being walked on or pinched by items placed upon or against it, paying particular attention to the plugs, receptacles, at the point where the cord exits from the apparatus.

Attachments - Only use attachments as recommended by the manufacture.

Accessories - Use only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

Lighting - Unplug this apparatus during lightning storms or when unused for long periods of time.

ISDN cables - CAUTION - to reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.

Servicing - Do not attempt to service the apparatus yourself as opening or removing covers may expose you to dangerous voltages or other hazards, and will void the warranty. Refer all servicing to qualified service personnel.

Damaged Equipment - Unplug the apparatus from the outlet and refer servicing to qualified personnel under the following conditions:

> When the power cord or plug is damaged or frayed
> If liquid has been spilled or objects have fallen into the apparatus
> If the apparatus has been exposed to rain or moisture

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If the apparatus has been subjected to excessive shock by being dropped, or the cabinet has been damaged

If the apparatus fails to operate in accordance with the operating instruction

Warranty Period

Lumantek Test & Measurement and Broadcasting products normally carry a 1-year limited warranty (including labor and parts)

Unless noted, Lumantek Digital Media products normally carry a 1-year limited warranty (including labor and parts).

Return Material Authorization Policy

No product may be returned directly to Lumantek without first contacting Lumantek for a Return Material Authorization ("RMA") Code. If it is determined that the product is defective, you will be given an RMA Code and instructions for product return for servicing or replacement. An unauthorized return such as where an RMA Code has not been issued, the product will be returned to you at your expense. Authorized returns are to be shipped prepaid and insured to the address on the RMA in an approved shipping container (original box and packaging materials or similar). To request an RMA Code, please visit on *http://www.lumantek.com/support/rma_services_instruction.html*

Warranty Limitations

Lumantek's limited warranty provides that, subject to the following limitations, each product will be free from defects in material and workmanship and will conform to Lumantek's specification for the particular product.

Limitation of Remedies

Your exclusive remedy for any defective product is limited to the repair or replacement of the defective product.

Lumantek may elect which remedy or combination of remedies to provide in its sole discretion. Lumantek shall have a reasonable time after determining that a defective product exists to repair or replace a defective product. Lumantek's replacement product under its limited warranty will be manufactured from new and serviceable used parts. Lumantek's warranty applies to repaired or replaced products for the balance of the applicable period of the original warranty or ninety days from the date of shipment of a repaired or replaced product, whichever is longer.

Limitation of Damages

Lumantek's entire liability for any defective product shall in no event exceed the purchase price for the defective product. This limitation applies even if Lumantek cannot or does not repair or replace any defective product and your exclusive remedy fails of its essential

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purpose.

No Consequential or Other Damages

Notwithstanding anything else in this policy or otherwise, Lumantek will not be liable with respect to the products under any contract, negligence, strict liability or other legal or equitable theory (i) for any amount in excess of the purchase price for the defective product or (ii) for any general, consequential, punitive, incidental or special damages. These include loss of recorded data, interruption of use, the cost of recovery of lost data, lost profits and the cost of the installation or removal of any products, the installation of replacement products, and any inspection, testing, or redesign caused by any defect or by the repair or replacement of products arising from a defect in any product. This section does not limit liability for bodily injury of a person.

You're Use of the Product

Lumantek will have no liability for any product returned if Lumantek determines that:

The product was stolen from Lumantek.

The asserted defect:
- Is not present,
- Cannot reasonably be fixed because of damage occurring when the product is in the possession of someone other than Lumantek, or
- Is attributable to misuse, improper installation, alteration (including removing or obliterating labels and opening or removing external covers (unless authorized to do so by Lumantek), accident or mishandling while in the possession of someone other than Lumantek.

The product was not sold to you as new.

The product was not used in accordance with Lumantek specifications and instructions.

The product was not used for its intended function.

Additional Limitations on Warranty

Lumantek's warranty does not cover products which have been received improperly packaged, altered, or physically damaged.

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3 Hardware Operation

Hardware Operation

3. Product Operation

3-1. Button introduction

	▪ LCD Display Window → Display window for Setting menu → Status Display when Power ON
	▪ For cursor move and change setting value Setting value(number) : to move left Setting value up Setting value(number) : to move right Setting value down
	Setting value with present status Exit present menu
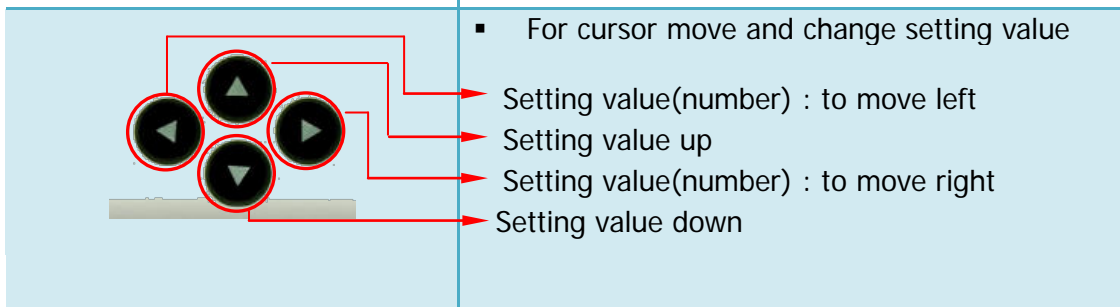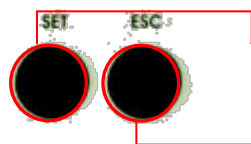
3-2. Initial Status

Press power on then below status will be displayed after initialization.

POWER
LAN
ALARM

HD Encoder   V1.35
VID: NOT CONNECTED
AUD: AC3, 256Kbps
MOD: 003CH_KC/063MHz

Status details.

POWER
LAN
ALARM

HD Encoder   V1.12
VID: NOT CONNECTED
AUD: AC3   256Kbps
MOD: 003CH_KC/063MHz

Version

Video Input & Resolution

Audio Codec & Bit-rate

Modulator Setting
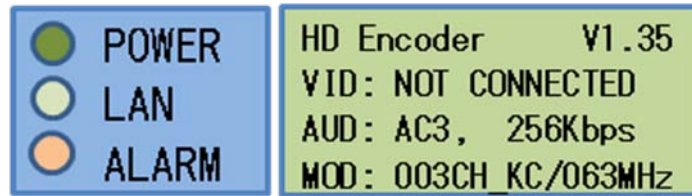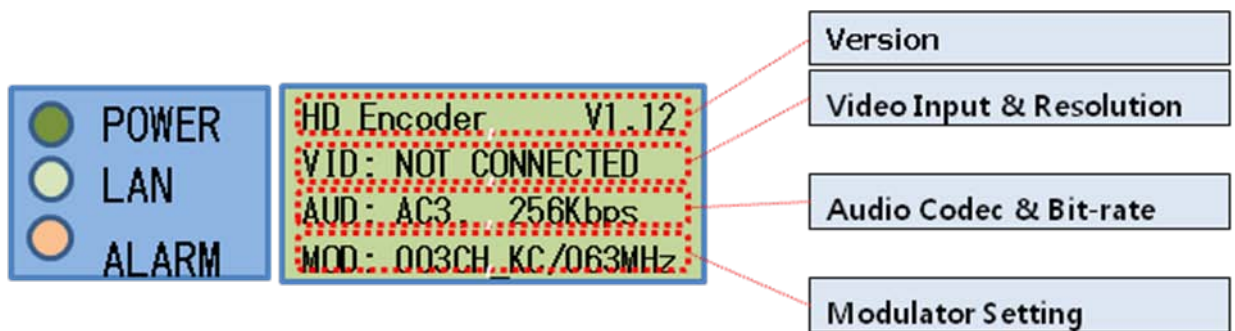
3-3. Main Menu

Main menu selection windows will be displayed when press set button.

POWER
LAN
ALARM

>>   MAIN MENU   <<
>INPUT
 ENCODER
 PSIP GENERATOR
 TS OVER IP
 MODULATOR - ATSC1
 SYSTEM
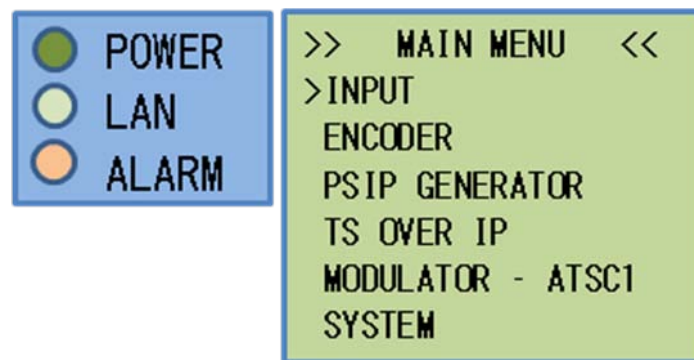
To select menu, user use up button and down button to move and set button.

3-4. INPUT Menu

Input detail menu will be displayed when press set button on the "ꞏ" indicates "INPUT".

```
  ○ POWER        >>      INPUT      <<
  ○ LAN          >VIDEO IN : HDMI
  ○ ALARM         AUDIO IN : HDMI
                  HDFB     : ENABLE
```

Wanted menu will be selected using UP button(▲) and DOWN button(▼) and set with SET button.
To move upper menu, press ESC button.

3-4-1. Video Input Menu

```
  ○ POWER        >VIDEO IN : HDMI
  ○ LAN          |  HD-SDI
  ○ ALARM        |> HDMI
                 |  COMPONENT
```
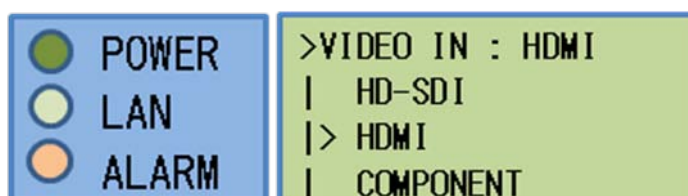
➢ Select Video Input using up/down button (▲▼) and press Set button
➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➢ You may chose one among HD-SDI, HDMI and COMPONENT

3-4-2. Audio Input Menu

```
  ○ POWER        >AUDIO IN : HDMI
  ○ LAN          |  HD-SDI
  ○ ALARM        |> HDMI
                 |  RCA
                 |  COAXIAL
                 |  AESEBU
                 |  OPTICAL
```
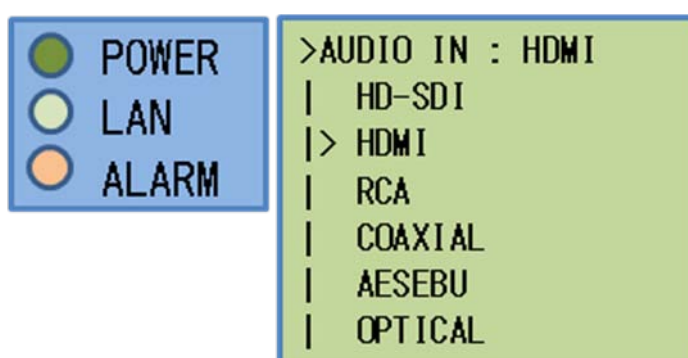
➢ Select Audio Input using up/down button (▲▼) and press Set button
➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➢ You may chose one among HD-SDI, HDMI, RCA, COAXIAL, AESEBU, and OPTICAL

3-4-3. HDFB Menu

```
○ POWER        >HDFB     : ENABLE
○ LAN          |> ENABLE
○ ALARM        |  DISABLE
```

➢ User may select ENABLE or DISABLE for internal HDFB module
➢ Select ENABLE or DISABLE using up/down button (▲▼) and press Set button
➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➢ You may chose one between ENABLE and DISABLE

3-5. ENCODER Menu

Encoder details are displayed when press SET on ENCODER mode in Main menu.

```
┌─────────────┐ ┌──────────────────────────┐
│ ● POWER     │ │ >>    ENCODER    <<      │
│ ○ LAN       │ │ >VID CODEC: MPEG2        │
│ ● ALARM     │ │  AUD CODEC: AC3          │
│             │ │  VID BTR: 15,000Kbps     │
└─────────────┘ │  AUD BTR: 384Kbps        │
                │  TS  BTR: 19,392,000     │
                │  VID RATIO: AUTO         │
                │  AUD PASS: OFF           │
                │  AUD VOLUME: 4           │
                │  AUD DELAY: 0500ms       │
                │  VIDEO PID : 0x310       │
                │  AUDIO PID : 0x320       │
                │  PCR   PID : 0x310       │
                │  PMT   PID : 0x300       │
                └──────────────────────────┘
```
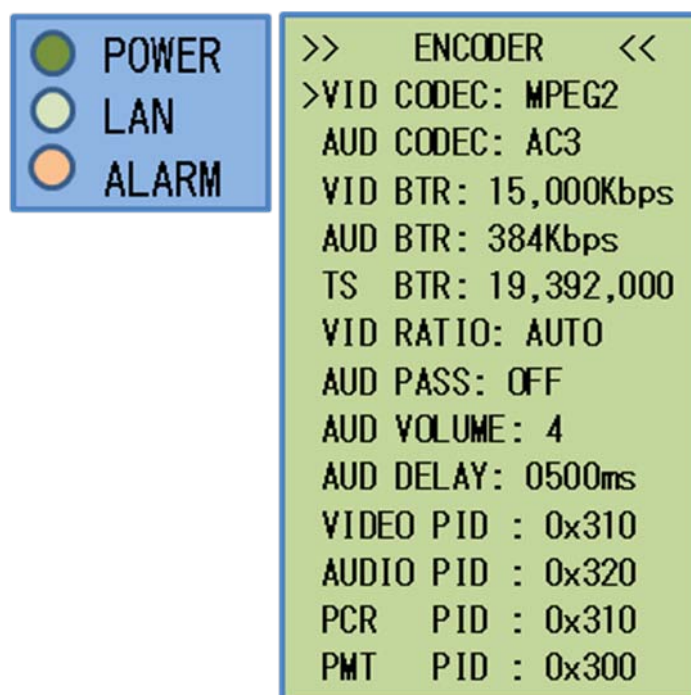
➢ Encoder details will be selected using UP button(▲) and DOWN button(▼) and press SET button.

➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.

3-5-1. VID CODEC Menu

```
┌─────────────┐ ┌──────────────────────────┐
│ ● POWER     │ │ >VID CODEC : MPEG2       │
│ ○ LAN       │ │ |  H264                  │
│ ● ALARM     │ │ |> MPEG2                 │
└─────────────┘ └──────────────────────────┘
```

➢ To go video codec, select VIDEO CODEC using UP button(▲) and DOWN button(▼) and press SET button.

➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.

➢ You may select H.264 or MPEG2.

3-5-2. AUD CODEC Menu


```
>AUD CODEC : AC3
|   MP1L2
|>  AC3
|   AAC LC
|   HEAAC v1
|   HEAAC v2
```

- ➢ To select Audio Codec, move to AUD CODEC using UP button(▲) and DOWN button(▼) and press SET button.
- ➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
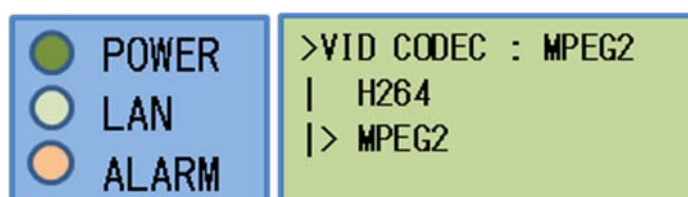- ➢ You may select one of MP1L2, AC3, AAC LC, HEAAC v1, HEAAC v2

3-5-3. VID BTR Menu


```
>VID BTR: 15,000Kbps
| 25,000 (MAX)
|>15,000 Kbps
| 03,000 (MIN)
```

- ➢ To select video Bit-rate menu, move to VID BTR using UP button(▲) and DOWN button(▼) and press SET button.
- ➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
- ➢ You may set video bit rate between 3,000 ~ 25,000 Kbps

3-5-4. AUD BTR Menu


```
>AUD BTR: 384Kbps
| 256Kbps
|>384Kbps
```

- ➢ To select audio Bit-rate menu, move to AUD BTR using UP button(▲) and DOWN button(▼) and press SET button.
- ➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
- ➢ The audio bit rate range to be set will be different for selected audio codec.

3-5-5. TS BTR Menu


```
>TS  BTR: 19,392,000
| 30,000,000 (MAX)
|>19,392,000 bps
| 03,000,000 (MIN)
```

➢ To select transport stream bit rate menu, move to TS BTR using UP button(▲) and DOWN button(▼) and press SET button.
➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➢ You may set TS bit rate between 3,000 ~ 25,000 Kbps

3-5-6. VID RATIO Menu
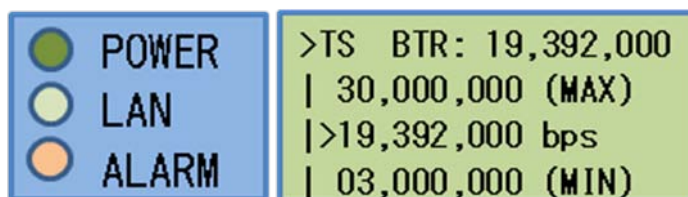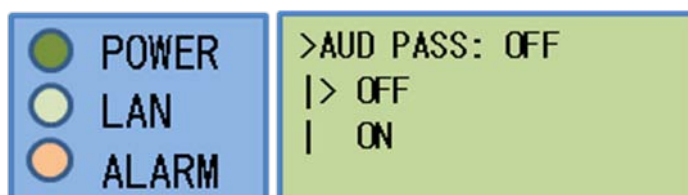


```
>VID RATIO: AUTO
|> AUTO
|   4:3
|   16:9
```

➢ To select video ratio menu, move to VID RATIO using UP button(▲) and DOWN button(▼) and press SET button.
➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➢ You may set one of ATUO, 4:3, and 16:9.

3-5-7. AUD PASS Menu


```
>AUD PASS: OFF
|> OFF
|   ON
```

➢ To select audio pass-through, move to AUD PASS using UP button(▲) and DOWN button(▼) and press SET button.
➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➢ You may set audio pass-through with OFF or ON.

3-5-8. AUD VOLUME Menu

>AUD VOLUME: 4
| 8 (MAX)
|>4
| 0 (MIN)

➢ To select audio volume, move to AUD VOLUME using UP button(▲) and DOWN button(▼) and press SET button.
➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➢ You may set audio volume with one of 0, 4, and 8.

3-5-9. AUD DELAY Menu

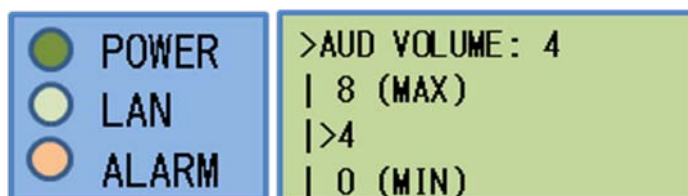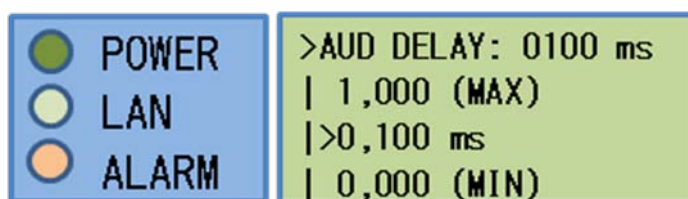>AUD DELAY: 0100 ms
| 1,000 (MAX)
|>0,100 ms
| 0,000 (MIN)

➢ To select audio delay menu, move to AUD DELAY using UP button(▲) and DOWN button(▼) and press SET button.
➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➢ You may set audio delay between 0 ~ 1,000ms

3-5-10. VIDEO PID Menu

>VIDEO PID: 0x0310
| 0x1EFF (MAX)
|>0x0310
| 0x0100 (MIN)

➢ To select Video TS PID menu, move to VIDEO PID using UP button(▲) and DOWN button(▼) and press SET button.
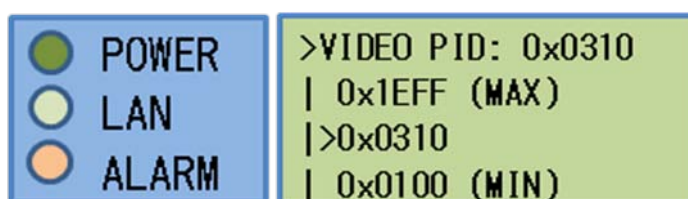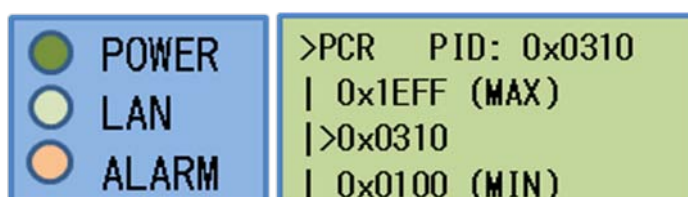➢ Move cursor to right column using left right button (◀▶) and set the values using UP button(▲) and DOWN button(▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➢ You may set PID between 0x0100 and 0x1EFF

3-5-11. AUDIO PID Menu

> To select Audio TS PID menu, move to AUDIO PID using UP button(▲) and DOWN button(▼) and press SET button.
> Move cursor to right column using left right button (◄►) and set the values using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.
> You may set PID between 0x0100 and 0x1EFF

3-5-12. PCR PID Menu

> To select PCR PID menu, move to PCR PID using UP button(▲) and DOWN button(▼) and press SET button.
> Move cursor to right column using left right button (◄►) and set the values using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.
> You may set PID between 0x0100 and 0x1EFF

3-5-13. PMT PID Menu

> To select PMT PID, move to PMT PID using UP button(▲) and DOWN button(▼) and press SET button.
> Move cursor to right column using left right button (◄►) and set the values using UP and DOWN button(▲▼) and press SET button.

If you press ESC not SET then present value is not applied and the cursor move to upper menu.

➢ You may set PID between 0x0100 and 0x1EFF

3-6. PSIP GENERATOR Menu
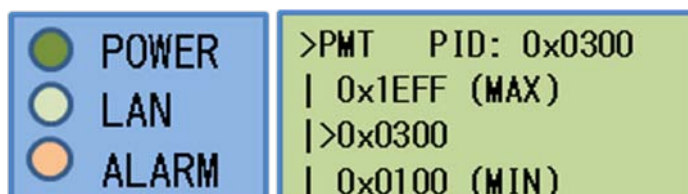
PSIP details are displayed when press SET on PSIP mode in Main menu.

```
○ POWER      >>      PSIP      <<
○ LAN        >PSIP     : INTERNAL
○ ALARM       MAJOR CH : 04
              MINOR CH : 01
              NAME:
```

➤ PSIP details will be selected using UP button(▲) and DOWN button(▼) and press SET button.
➤ If you press ESC not SET then present value is not applied and the cursor move to upper menu.

3-6-1. PSIP Menu

```
○ POWER      >PSIP    : INTERNAL
○ LAN        |  EXTERNAL
○ ALARM      |> INTERNAL
```
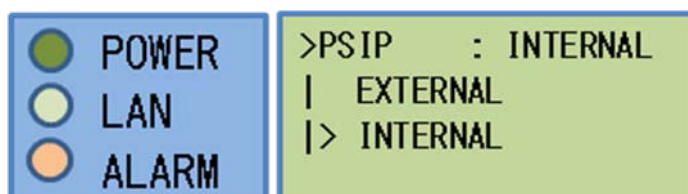
➤ Set PSIP source
➤ Select EXTERNAL or INTERNAL using up down button(▲▼) and press SET button.
➤ If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➤ In case EXTERNAL, PSIP data comes through ASI-In
➤ In case INTERNAL, PSIP data will be generated in internal.
➤ Major CH, Minor CH, NAME are the case of INTERNAL setting.

3-6-2. MAJOR CH Menu

```
○ POWER      >MAJOR CH : 04
○ LAN        | 99 (MAX)
○ ALARM      |>04
             | 01 (MIN)
```
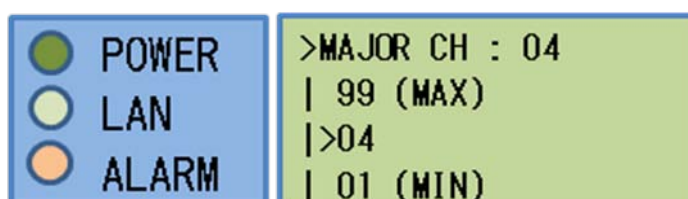
➤ Set first part of number in virtual channel number.
➤ Move cursor to appointed column using left right button (◄►) and

set the values using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.
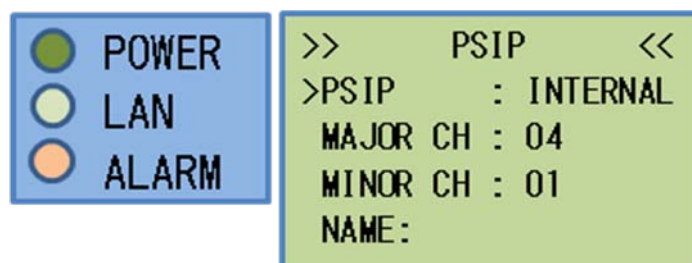
➢ You may set the value between 1 and 99

3-6-3. MINOR CH Menu

```
  ○ POWER    >MINOR CH : 001
  ○ LAN      | 999 (MAX)
  ○ ALARM    |>001
             | 001 (MIN)
```
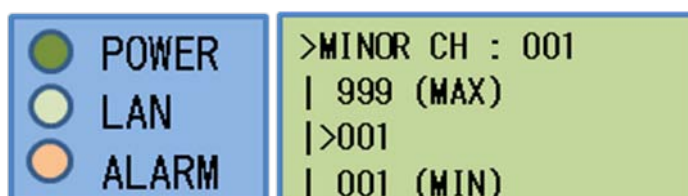
➢ Set second part of number in virtual channel number.
➢ Move cursor to appointed column using left right button (◄►) and set the values using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➢ You may set the value between 1 and 999

3-6-4. NAME Menu

```
  ○ POWER    >NAME: KSJ
  ○ LAN      |
  ○ ALARM    |> KSJ____
             |
```

➢ You may set virtual channel name.
➢ Move cursor to appointed column using left right button (◄►) and set the character using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.
➢ You may set the character maximum 7 characters (among alphabet, number, special character)

3-7. TS OVER IP

TS OVER IP details are displayed when press SET on TS OVER IP mode in Main menu.

```
○ POWER        >>   TS OVER IP   <<
○ LAN          >OUTPUT : OFF
○ ALARM         FORMAT : RTP
                CAST   : UNICAST
                TARGET IP ADDRESS
                TARGET PORT : 01234
                TTL RESTRICT:SITE
                HOST IP ADDRESS
                HOST SUBNET MASK
                HOST GATEWAY
```
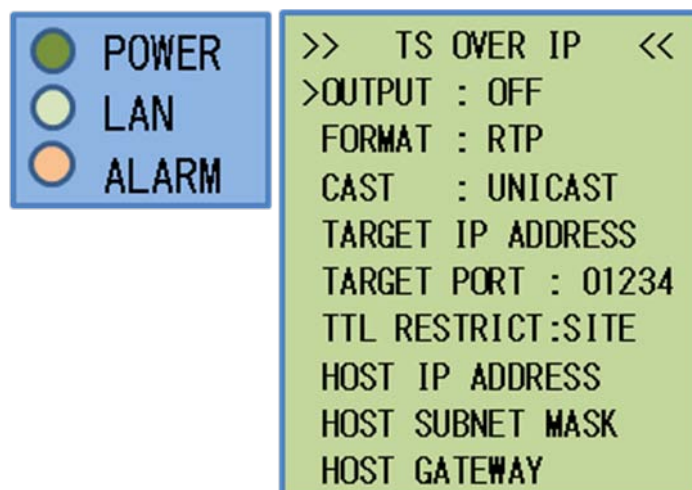
➢ TS OVER IP details will be selected using UP button(▲) and DOWN button(▼) and press SET button.
➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.

3-7-1. OUTPUT Menu

```
○ POWER        >OUTPUT : OFF
○ LAN          |  ON
○ ALARM        |> OFF
```

➢ Set TS OVER IP OUTPUT.
➢ TS data will be out through 100BASE-T(TSoverIP) port
➢ You may choose ON or Off using up and down button (▲▼) and press SET.
➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu.

3-7-2. FORMAT Menu

```
○ POWER        >FORMAT : RTP
○ LAN          |>RTP
○ ALARM        | UDP
```
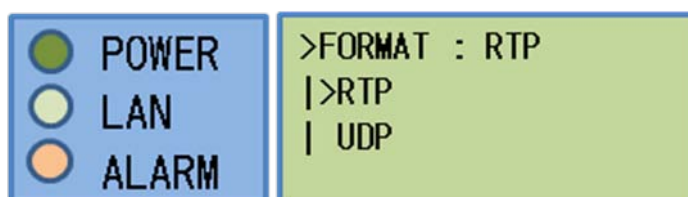
- ➢ Setting TS OVER IP output
- ➢ You may select TS OVER IP with RTP or UDP

3-7-3. CAST Menu

```
┌──────────────┐  ┌──────────────────┐
│  ● POWER     │  │ >CAST   : UNICAST│
│  ○ LAN       │  │ |>UNICAST        │
│  ○ ALARM     │  │ | MULTICAST      │
└──────────────┘  └──────────────────┘
```

- ➢ Setting TS OVER IP CAST Menu.
- ➢ You may select UNICAST or MULTICAST

3-7-4. TARGET IP ADDRESS Menu

```
┌──────────────┐  ┌──────────────────────┐
│  ● POWER     │  │ >TARGET IP ADDRESS   │
│  ○ LAN       │  │ NOW : 192.168.010.018│
│  ○ ALARM     │  │ CHANGE TO            │
│              │  │       192.168.010.018│
└──────────────┘  └──────────────────────┘
```

- ➢ Setting TS OVER IP address
- ➢ Move cursor to appointed column using left right button (◄►) and set the address using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.

3-7-5. TARGET PORT Menu

```
┌──────────────┐  ┌──────────────────────┐
│  ● POWER     │  │ >TARGET PORT : 01234 │
│  ○ LAN       │  │ | 65535 (MAX)        │
│  ○ ALARM     │  │ |>01234              │
│              │  │ | 00001 (MIN)        │
└──────────────┘  └──────────────────────┘
```
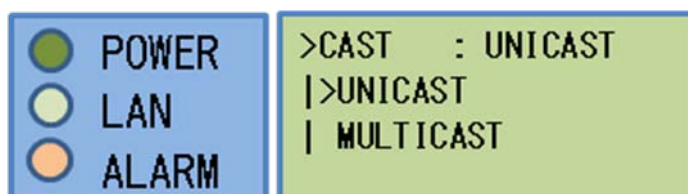
- ➢ Setting TS OVER IP output port.
- ➢ Move cursor to appointed column using left right button (◄►) and set the right port using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu

3-7-6. TTL RESTRICT Menu

- ➢ Setting TTL restrict range.
- ➢ Select appointed item using up and down button(▲▼) and press SET.
- ➢ If you press ESC not SET then present value is not applied and the cursor move to upper menu
- ➢ You may select one of SAME SUBNET, SAME SITE, SAME REGION, SAME CONTINENT, UNRESTRICT

3-7-7. HOST IP ADDRESS Menu

- ➢ Setting IP address of TS OVER IP port(100BASE-T(TSoverIP))
- ➢ Move cursor to appointed column using left right button (◄►) and set the IP address using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu
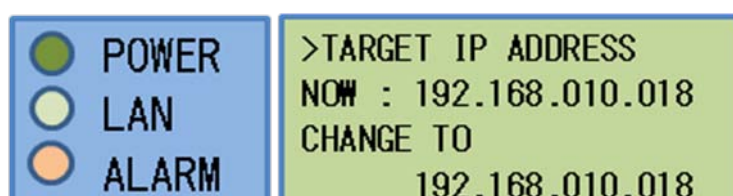
3-7-8. HOST SUBNET MASK Menu

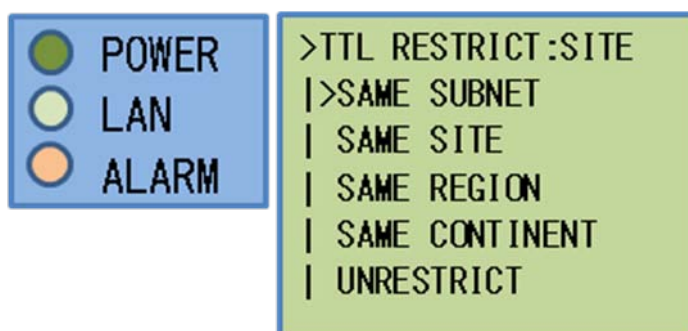- ➢ Setting Subnet Mask of TS OVER IP output port(100BASE-T(TSoverIP)).
- ➢ Move cursor to appointed column using left right button (◄►) and

set the subnet mask address using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu
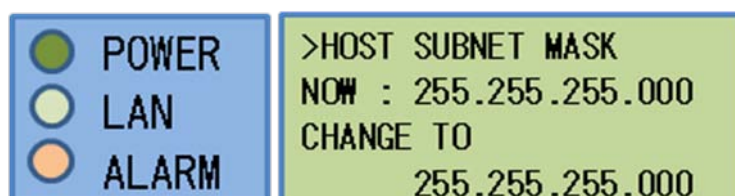
3-7-9. HOST GATEWAY Menu

> Setting HOST GATEWAY of TS OVER IP output port(100BASE-T(TS over IP))

3-8. ATSC MODULATOR

MODULATOR details are displayed when press SET on MODULATOR mode in Main menu.

```
>>    MODULATOR   <<
>STAT: KOR-C, 003 ch
 TEMP: 059 `C
 SET FREQ
 SET FREQ BY KOR-T
 SET FREQ BY KOR-C
 POWER : -5.0 dBm
```

3-8-1. SET FREQ Menu

```
>SET FREQ
|  999.0MHz (MAX)
|> 045.0Mhz
|  030.0MHz (MIN)
```
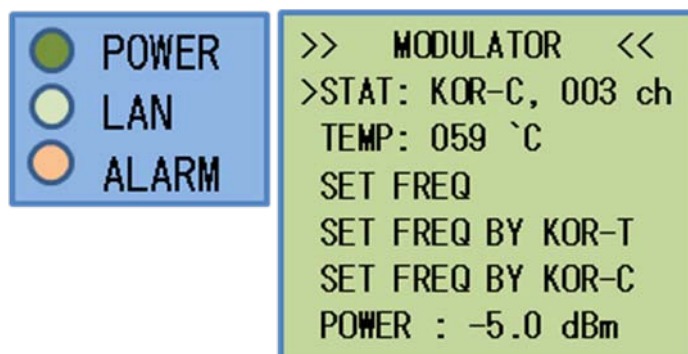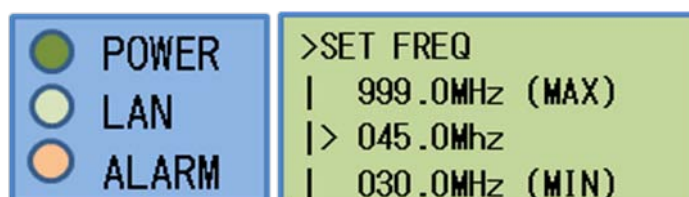
➢ Setting RF output Frequency.
➢ You may set frequency between 30MHz ~ 999MHz

3-8-2. SET FREQ BY KOR-T Menu

```
>SET FREQ BY KOR-T
|  69 (MAX)
|> 02
|  02 (MIN)
```
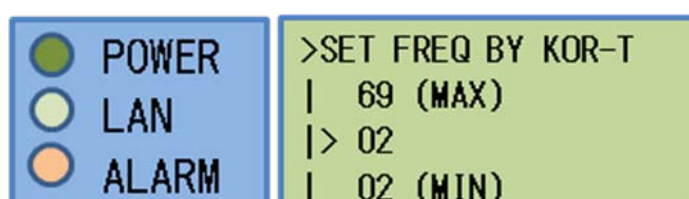
➢ Setting RF output frequency of Korean Terrestrial broadcasting channel number
➢ You may set the channel number between 2 and 69

3-8-3. SET FREQ BY KOR-C Menu

```
 ○ POWER      >SET FREQ BY KOR-C
 ○ LAN        |   153 (MAX)
 ○ ALARM      |> 003
              |   002 (MIN)
```

- ➢ Setting RF output frequency of Korean Cable channel number
- ➢ You may set the channel number between 2 and 153

3-8-4. POWER Menu

```
 ○ POWER      >POWER : -5.0 dBm
 ○ LAN        |   10.0 dBm (MAX)
 ○ ALARM      |>- 5.0 dBm
              |  -05.0 dBm (MIN)
```
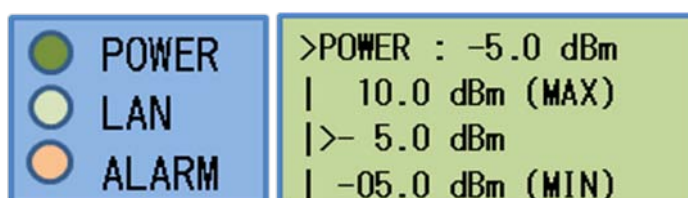
- ➢ Setting RF Output level.
- ➢ You may set the RF Power from -5.0dBm to 10dBm with 0.5dB step

3-9. SYSTEM Menu

SYSTEM Menu details are displayed when press SET on SYSTEM mode in Main menu.
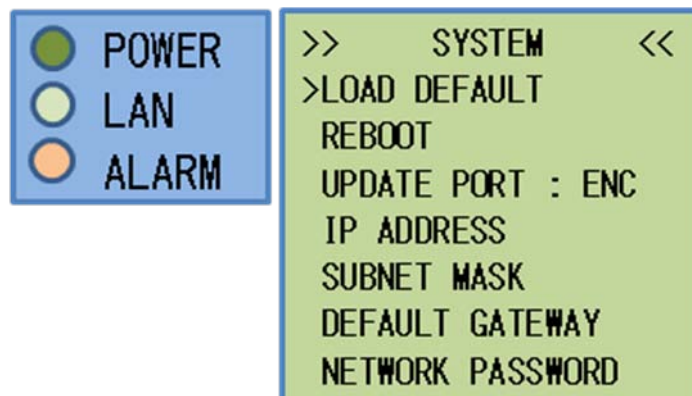
You may move to above item using UP button과(▲) DOWN button(▼).

3-9-1. LOAD DEFAULT Menu
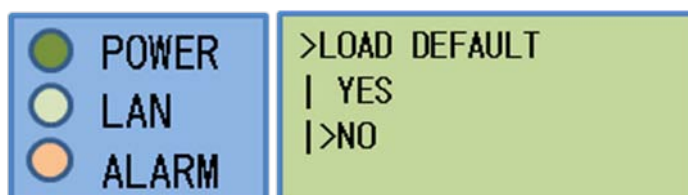
➢ Setting with default value
➢ If you select YES and press SET then setting value will be set with default value

3-9-2. REBOOT Menu
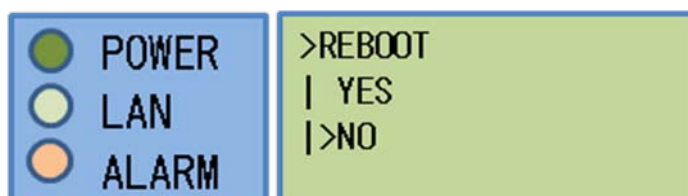
➢ Setting REBOOT
➢ If you select ON and press SET then this product will be rebooted.

3-9-3. UPDATE PORT Menu

```
○ POWER       >UPDATE PORT : ENC
○ LAN         | OPT
○ ALARM       |>ENC
```
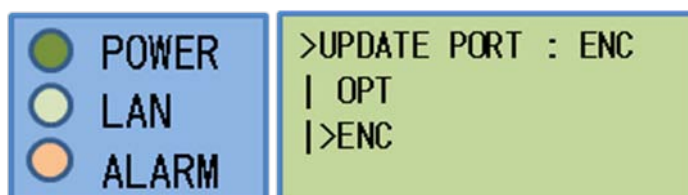
➢ To update, select system to be connected with UART(UPDATE) port of rear panel.
➢ You may select OPT or ENC

3-9-4. IP ADDRESS Menu

```
○ POWER       >IP ADDRESS
○ LAN         NOW : 192.168.010.155
○ ALARM       CHANGE TO
                    192.168.010.155
```
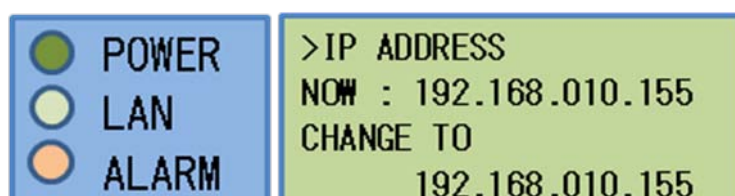
➢ Setting IP address of IP output port

3-9-5. SUBNET MASK Menu

```
○ POWER       >SUBNET MASK
○ LAN         NOW : 255.255.255.000
○ ALARM       CHANGE TO
                    255.255.255.000
```
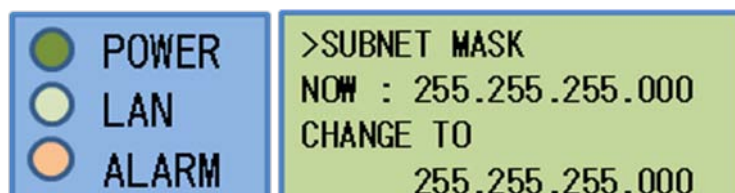
➢ Setting SUBNET MASK of IP output port

3-9-6. DEFAULT GATEWAY Menu

```
○ POWER       >DEFAULT GATEWAY
○ LAN         NOW : 192.168.010.001
○ ALARM       CHANGE TO
                    192.168.010.001
```
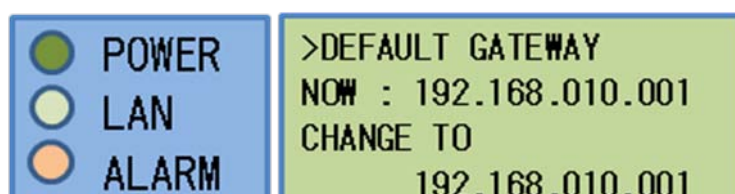
➢ Setting DEFAULT GATEWAY of IP output port

3-9-7. NETWORK PASSWORD Menu
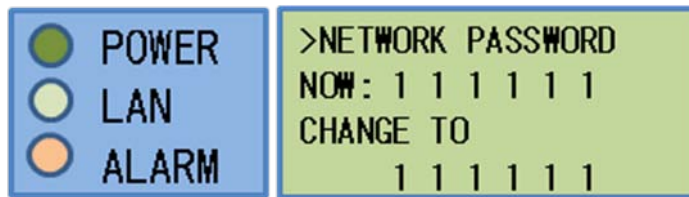
➤ Setting password to access Web-GUI

APPENDIX

QUICK Operation Guide

1. ENCODING Bit-rate Setting
- ☑ VIDEO BITRATE: Set with DEFAULT
- ☑ AUDIO BITRATE: You may change the value

2. KEY PAD operation
- ☑ You may move cursor using left right key button
- ☑ You may change setting value using up down button and SET button
- ☑ You may move upper menu using ESC button

3. Operation Procedure

❶ Power on

⬇

❷ Select Modulator on Main Menu

⬇

❸ Select Frequency and RF output level

⬇

❹ Select PSIP on Main Menu

⬇

❺ Set Virtual channel No and name

⬇

❻ Select INPUT on Main Menu

⬇

❼ Select Audio / Video Input port to be used | Check Output

⬇

❽ Select SYSTEM on Main Menu | Check all settings

⬇

❾ Setting Network for remote access
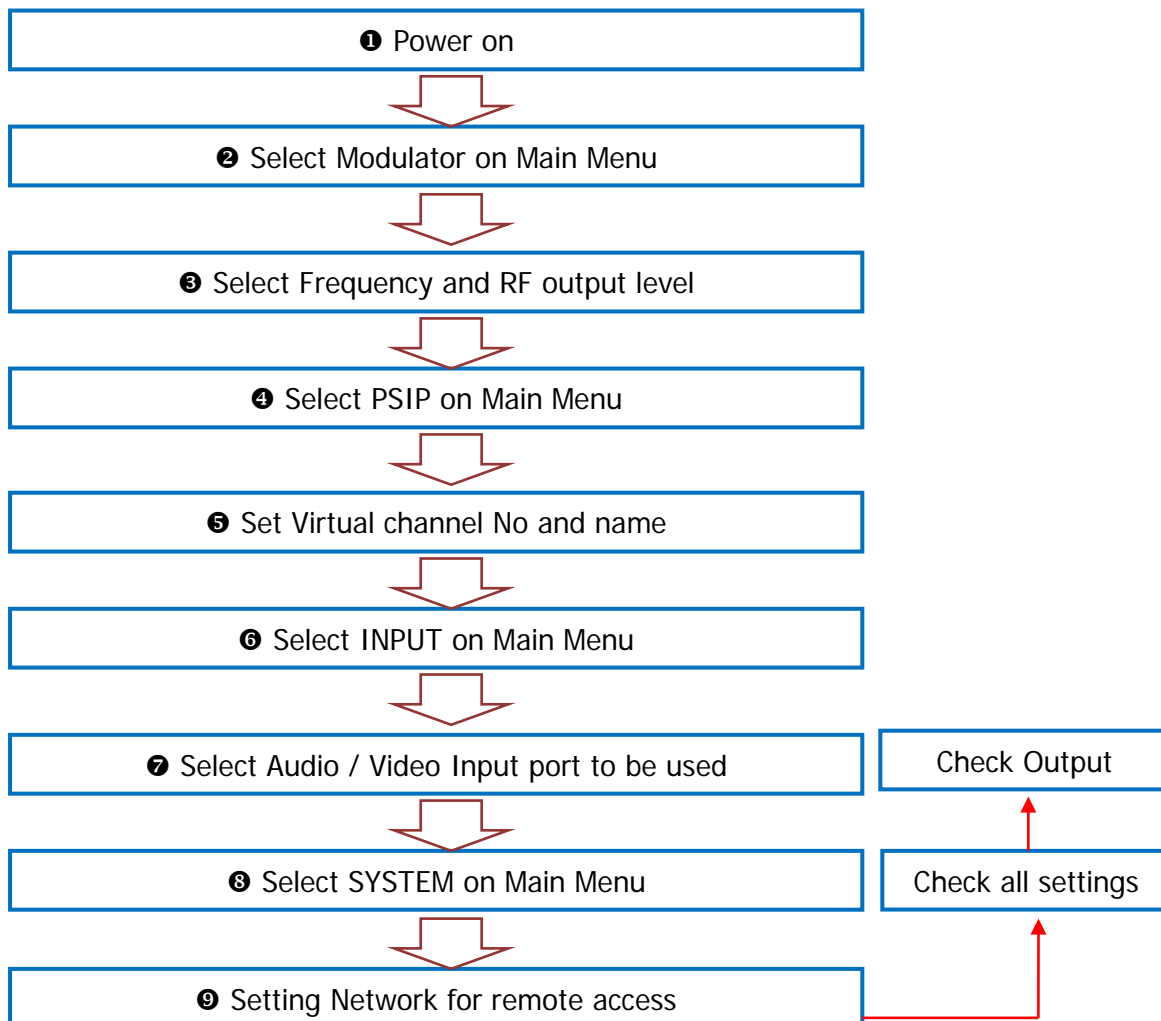
Setting Item Briefs

Item	Detail categories	Detail items	Description
INPUT	VIDEO INPUT	HD-SDI HDMI COMPONENT	Setting Video input port
	AUDIO INPUT	HD-SDI HDMI RCA COAXIAL AESEBU OPTICAL	Setting Audio input port Audio
	HDFB	ENABLE DISABLE	Setting HDFB mode
ENCODER	VID CODEC	H264 MPEG-2	Setting Video CODEC
	AUD CODEC	MP1L2 AC3 AAC LC HEAAC v1 HEAAC v2	Setting Audio CODEC
	VID BTR	2~ 25 Mbps (1Kbps step)	Setting Video bit-rate
	AUD BTR	(Variable)	Setting Audio bit-rate
	TS BTR	3~30 Mbps (1Kbps step)	Setting TS bit-rate
	VID RATIO	AUTO 4:3 16:9	Setting Video display ratio (in case Auto, the ratio will be set automatically)
	AUD PASS	OFF ON	Setting Audio pass-through mode
	AUD VOLUME	0~8	Setting Audio Volume
	AUD DELAY	0~1000ms (1ms step)	Setting Audio delay
	VIDEO PID	0x0100~ 0x1EFF	Setting Video TS PID. (Video PID can not be set with Audio or PMT value.)
	AUDIO PID	0x0100~ 0x1EFF	Setting Audio TS PID (Audio PID can not be set with Video or PMT value.)
	PCR PID	0x0100~ 0x1EFF	Setting PCR TS PID
	PMT PID	0x0100~ 0x1EFF	Setting PMT TS PID (PMT PID can not be set with Video or Audio value.)
PSIP	PSIP	EXTERNAL INTERNAL	Setting PSIP generation type EXTERNAL : Input PSIP data through ASI-IN INTERNAL : PSIP generation internally
	MAJOR CH	1~99	Setting virtual MAJOR channel number (number of front part)

	MINOR CH	1~999	Setting virtual MINOR channel number (number of front part)
	NAME	(Variable)	Setting virtual channel name
TS over IP	OUTPUT	ON OFF	Setting TS OVER IP or not
	FORMAT	RTP UDP	Setting TS OVER IP format
	CAST	UNICAST MULTICAST	Setting TS OVER IP Cast Type
	TARGET IP ADDRESS	xxx.xxx.xxx.xxx	Setting TS OVER IP target address
	TARGET PORT	1 ~ 65535	Setting TS OVER IP target Port
	TTL RESTRICT	SAME SUBNET SAME SITE SAME REGION SAME CONTINENT UNRESTRICT	Setting TTL restriction range of TS OVER IP output
	HOST IP ADDRESS	xxx.xxx.xxx.xxx	Setting IP address of TS OVER IP output port (100BASE-T (TSoverIP))
	HOST SUBNET MASK	xxx.xxx.xxx.xxx	Setting Subnet Mask of TS OVER IP output port
	HOST GATEWAY	xxx.xxx.xxx.xxx	Setting Gateway address of TS OVER IP output port(100BASE-T (TSoverIP))
ATSC Modulator	STAT	(None)	Display present setting Ex) KOR-C, 003 ch, (Cable Channel 3)
	TEMP	(None)	Display internal temperature
	SET FREQ	30 ~ 999 MHz (0.1MHz step)	Setting modulator output frequency
	SET FREQ BY KOR-T	2 ~ 69	Setting Modulator output with Korean terrestrial broadcasting channel
	SET FREQ BY KOR-C	2 ~ 153	Setting Modulator output with Korean Cable channel
	POWER	-5.0 ~ 10.0 dBm (0.5 dBm step)	Setting RF Output power
System	LOAD DEFAULT	YES NO	If you select YES then set with factory setting
	REBOOT		If you select YES then it will be rebooted
	UPDATE PORT	OPT ENC	Select OPT or ENC to be connected to UART (UPDATE) port. OPT : Modulator part ENC : Encoder core part
	IP ADDRESS	xxx.xxx.xxx.xxx	Setting IP address for Network
	SUBNET MASK	xxx.xxx.xxx.xxx	Setting Subnet mask for Network
	DEFAULT GATEWAY	xxx.xxx.xxx.xxx	Setting Gateway for Network
	NETWORK PASSWORD	xxxxxx	Setting password for Web GUI access

Frequency Table

	CH NO.	ATSC Center Frequency	Frequency Range	CH NO.	CATV Center Frequency	Frequency Range
VHF LOW BAND	2	57	54-60	2	57	54-60
	3	63	60-66	3	63	60-66
	4	69	66-72	4	69	66-72
	5	79	76-82	5	79	76-82
	6	85	82-88	6	85	82-88
FM BAND				FM	88-108	88-108
				95	93	90-96
				96	99	96-102
				97	105	102-108
MID BAND				98	111	108-114
				99	117	114-120
				14	123	120-126
				15	129	126-132
				16	135	132-138
				17	141	138-144
				18	147	144-150
				19	153	150-156
				20	159	156-162
				21	165	162-168
				22	171	168-174
VHF HIGH BAND	7	177	174-180	7	177	174-180
	8	183	180-186	8	183	180-186
	9	189	186-192	9	189	186-192
	10	195	192-198	10	195	192-198
	11	201	198-204	11	201	198-204
	12	207	204-210	12	207	204-210
	13	213	210-216	13	213	210-216
SUPER BAND				23	219	216-222
				24	225	222-228
				25	231	228-234
				26	237	234-240
				27	243	240-246
				28	249	246-252
				29	255	252-258
				30	261	258-264
				31	267	264-270
				32	273	270-276
				33	279	276-282
				34	285	282-288
				35	291	288-294
				36	297	294-300
HYPER BAND				37	303	300-306
				38	309	306-312
				39	315	312-318
				40	321	318-324
				41	327	324-330
				42	333	330-336
				43	339	336-342
				44	345	342-348
				45	351	348-354
				46	357	354-360
				47	363	360-366
				48	369	366-372
				49	375	372-378
				50	381	378-384
				51	387	384-390
				52	393	390-396
				53	399	396-402
				54	405	402-408
				55	411	408-414
				56	417	414-420
				57	423	420-426
				58	429	426-432
				59	435	432-438
				60	441	438-444
				61	447	444-450
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				63	459	456-462
				64	465	462-468
				65	471	468-474
UHF BAND	14	473	470-476	66	477	474-480
	15	479	476-482	67	483	480-486
for	16	485	482-488	68	489	486-492
	17	491	488-494	69	495	492-498
ATSC	18	497	494-500	70	501	498-504
CATV	19	503	500-506	71	507	504-510
	20	509	506-512	72	513	510-516
	21	515	512-518	73	519	516-522
	22	521	518-524	74	525	522-528
	23	527	524-530	75	531	528-534
	24	533	530-536	76	537	534-540
	25	539	536-542	77	543	540-546
	26	545	542-548	78	549	546-552
	27	551	548-554	79	555	552-558
	28	557	554-560	80	561	558-564
	29	563	560-566	81	567	564-570
	30	569	566-572	82	573	570-576
	31	575	572-578	83	579	576-582
	32	581	578-584	84	585	582-88
	33	587	584-590	85	591	588-594
	34	593	590-596	86	597	594-600
	35	599	596-603	87	603	600-606
	36	605	602-608	88	609	606-612
	37	611	608-614	89	615	612-618
	38	617	614-620	90	621	618-624
	39	623	620-626	91	627	624-630
	40	629	626-632	92	633	630-636
	41	635	632-638	93	639	636-642
	42	641	638-644	94	645	642-648
	43	647	644-650	100	651	648-654
	44	653	650-656	101	657	654-660
	45	659	656-662	102	663	660-666
	46	665	662-668	103	669	666-672
	47	671	668-674	104	675	672-678
	48	677	674-680	105	681	678-684
	49	683	680-686	106	687	684-690
	50	689	686-692	107	693	690-696
	51	695	692-698	108	699	696-702
	52	701	698-704	109	705	702-708
	53	707	704-710	110	711	708-714
	54	713	710-716	111	717	714-720
	55	719	716-722	112	723	720-726
	56	725	722-728	113	729	726-732
	57	731	728-734	114	735	732-738
	58	737	734-740	115	741	738-744
	59	743	740-746	116	747	744-750
	60	749	746-752	117	753	750-756
	61	755	752-758	118	759	756-762
	62	761	758-764	119	765	762-768
	63	767	764-770	120	771	768-774
	64	773	770-776	121	777	774-780
	65	779	776-782	122	783	780-786
	66	785	782-788	123	789	786-792
	67	791	788-794	124	795	792-798
	68	797	794-800	125	801	798-804
	69	803	800-806	126	807	804-810
	70	809	806-812	127	813	810-816
	71	815	812-818	128	819	816-822
	72	821	818-824	129	825	822-828
	73	827	824-830	130	831	828-834
	74	833	830-836	131	837	834-840
	75	839	836-842	132	843	840-846
	76	845	842-848	133	849	846-852
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