

manual

HD ENCODULATOR



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Environmental Issues

Thank you for buying a product which contributes to a reduction in pollution and thereby helps save the environment.

Our products reduce the need for travel and transport and thereby reduce pollution. Our products have either no or few consumable parts (chemicals, toner, gas, paper). Our products are low energy consuming products.

Waste handling:

There is need to send material back to LUMANTEK. Please contact your local dealer for information on recycling the product by sending the main parts of the product for disassembly at local electronic waste stations.

Production of products:

Our factories employ the most efficient environmental methods for reducing waste and pollution by ensuring that the products are recyclable.

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 plug 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 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 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.

Your 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.

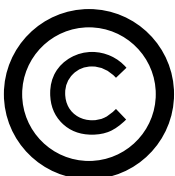
The product was not used in accordance with Lumantek specifications and instructions.

The product was not used for its intended function.

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Additional Limitations on Warranty

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



HD ENCODULATOR

All-in-One HD Encoder + DTV Modulator



1. HD Encodulator / Introduction

1.1 / Description

HD EncodulatorTM is professional Video / Audio Encoder which has DTV broadcasting modulator using AV compression and digital modulation technologies. MPEG-2 / H.264 technologies were supported for Video compression and MP1L2 / 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

- Device information

Video Encoder	<ul style="list-style-type: none"> • Input : HD-SDI, HDMI, Y/Pb/Pr • HD Resolutions and frame(progressive) or field(interlaced) rates: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 720x480: 59.94i - 720x576: 50i • MPEG2 HD/SD Encoder <ul style="list-style-type: none"> - 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. • H.264 HD/SD Encoder <ul style="list-style-type: none"> - Baseline, Main and High Profiles support - HD video bit rate: 25~0.25 Mbps. - SD video bit rate: 25~0.25 Mbps. • Maximum TS bit rate: 30 Mbps. • Advanced Settings(option) <ul style="list-style-type: none"> - 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.
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Audio Encoder	<ul style="list-style-type: none"> • Input : SDI embedded, HDMI embedded, S/PDIF(Optic/Coax), AES-EBU(BNC), Analog Stereo • Sample rate converter <ul style="list-style-type: none"> - 32KHz ~ 96KHz to 48KHz • Dolby Digital CE Stereo Encoder (for ATSC, DTMB) <ul style="list-style-type: none"> - Output bit rates: 128/192/256/384 Kbps - Encoding sample rates: 48 KHz • MPEG-1 Layer II Stereo Encoder (for DVB-T, DTMB) <ul style="list-style-type: none"> - 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) <ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> • PSI/SI: PAT, PMT generation enable/disable • PSIP: MGT, TVCT/CVCT generation enable/disable, <ul style="list-style-type: none"> - Short name, major and minor channel number setting • External PSI/PSIP generator input via "ASI IN" port 	
RF Output	<ul style="list-style-type: none"> • Main Output: F-Type 75Ω 1ea @ rear • -20dB Output: F-Type 75Ω 1ea @ front • 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	<ul style="list-style-type: none"> • Ethernet 10/100Base-T • UDP/IP, RTP/UDP/IP 	<ul style="list-style-type: none"> • Connector: RJ-45 • Unicast, Multicast

Modulator (Option)	<ul style="list-style-type: none"> • ATSC(8VSB) Modulator <ul style="list-style-type: none"> - Modulation Mode: 8VSB - Symbol Rate 10.762 MSps - SNR(MER): >35 dB - Maximum Output Level: +10dBm • Open Cable Modulator <ul style="list-style-type: none"> - Standard: ITU-T J.83 Annex B - Constellation types & Symbol Rates: <ul style="list-style-type: none"> - 64QAM: 5.057MSps - 256QAM: 5.361MSps - Channel Bandwidth: 6MHz - SNR(MER): >40dB - Maximum Output Level: +7dBm • DVB-T Modulator <ul style="list-style-type: none"> - 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 - Maximum Output Level: +7dBm • DVB-C Modulator <ul style="list-style-type: none"> - 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 - Maximum Output Level: +7dBm • DTMB Modulator <ul style="list-style-type: none"> - Single Carrier & TDS-OFDM modulation support - Modulation Mode: QPSK, 16QAM, 32QAM, 64QAM - Standards <ul style="list-style-type: none"> - GB20600-2006, ISO/IEC 13838-1, EN 50083-9. - OGY/T 229.1-2008 (SIP) - SNR(MER): >40 dB - Maximum Output Level: +7dBm • ISDB-T/Tb Modulator <ul style="list-style-type: none"> - Modulation Mode: ISDB-T Layered OFDM - Standard: ARIB STD-B31 - TMCC Encoding: Fully supported - SNR(MER): >40dB - Maximum Output Level: +7dBm
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Management	<ul style="list-style-type: none"> • Front panel: 4-line text LCD, 6 buttons • RS-232 local console • Web GUI • SNMP(Optional)
Physical	<ul style="list-style-type: none"> • Dimension: 44(H) X 483(W) X 402(D, excluding connectors) • Temperature: 0~45℃ • Weight: • Power Consumption: 45W max.

1.3 / Model Numbers

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

2. HD Encodulator / Product Description

2.1 / Indicators and key-buttons Details

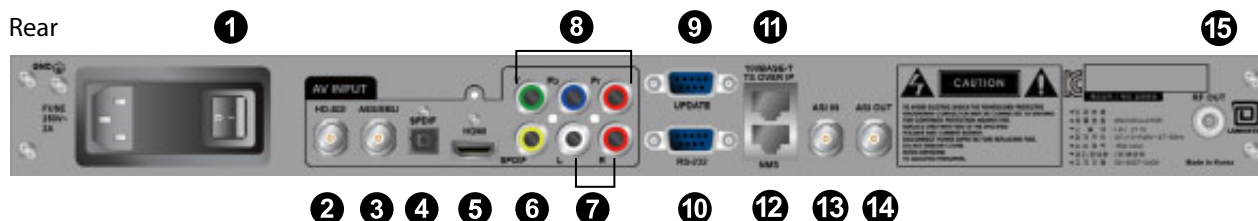
Front



- ❶ POWER LED: Power supply status
- ❷ LAN LED: NMS port link(turn on) and activity(blink) status
- ❸ ALARM LED: Input absent, booting or error status
- ❹ LCD window : LCD display that indicates status reports
- ❺ UP button: Press to move up
- ❻ LEFT button: Press to move left
- ❼ Down button : Press to move down
- ❽ RIGHT button : Press to move right
- ❾ SET button: Press to set present status
- ❿ ESC button: Press to exit this menu
- ⓫ RF-TP: RF T.P output

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Rear



- ❶ Power SW : Power On/Off switch
- ❷ HD-SDI : HD-SDI input port
- ❸ AES/EBU : AES/EBU Audio input port
- ❹ SPDIF(Optical) : SPDIF Audio input port
- ❺ HDMI : HDMI input port
- ❻ SPDIF(RCA): COAXIAL Audio input port
- ❼ Composite Audio IN: Composite Audio input port
- ❽ Component Video IN: Component Video input port
- ❾ UART(UPDATE) : UART port for Update
- ❿ UART(Console) : UART port for Console control
- ⓫ 100BASE-T(TSoverIP): 100 BASE-T for TS over IP output
- ⓬ 100BASE-T(NMS): 100 BASE-T for WebGUI/SNMP
- ⓭ ASI-IN: ASI input port input port
- ⓮ ASI-OUT: ASI output port
- ⓯ RF-TP/-20dB: RF output test port, 20dB lower than "RF OUT" port(rear)

2.2 / Installation precautions

This section is explaining about the cautions the users must know in some cases that the product might injure users physically when it's used or installed. For that reason, please keep all details here in mind before installing or using the product.

Before using our product, you're recommended to carefully read,

● General Precautions

- Must be operated and maintained free of dust or dirt.
- The cover should be securely fastened.
- After use, securely stow away all loose cables.
- Avoid wearing any loose-fitting clothing or loosely hanging accessories when using the product.
- Do not open the product case, doing so will void the warranty and LUMANTEK takes no responsibility for damage to the unit. Should you be experiencing performance issues, please contact your dealer for assistance.

● Power Precautions

- Make sure if it may cause overload in wiring when you connect the power source.
- When connecting to a power source, avoid wearing necklaces or watches. These can cause shock to the product.
- Avoid operating on a wet floor out in the open (e.g., raining). Make sure the power extension cable is in satisfactory condition (e.g., not worn out).



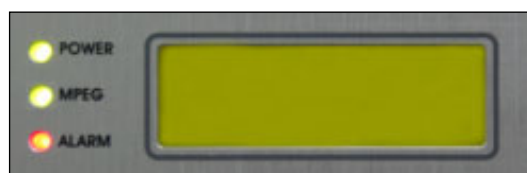
- Before starting hardware installation, turn off a power source and contact the same surface as the iron surface of power supply to discharge electricity out of your body.
- Notice no responsible for manufacturer damages caused by using inappropriate components or wrong services.
- In case of supplying a power while installing, it may cause some damage for system and a user's body.

● AC Power

- This unit uses the AC power cord, please be sure the power cord has a grounding function.
- In the event of a fire emergency, please disconnect the power cord from the unit.

3. HD Encodulator / Hardware Operation

3.1 / Button introduction

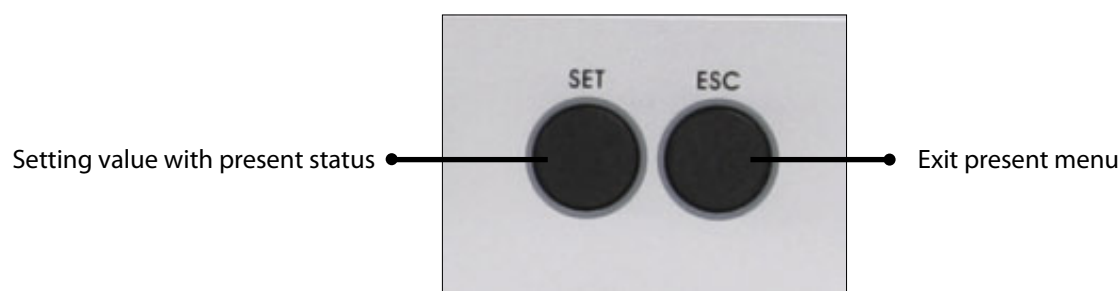
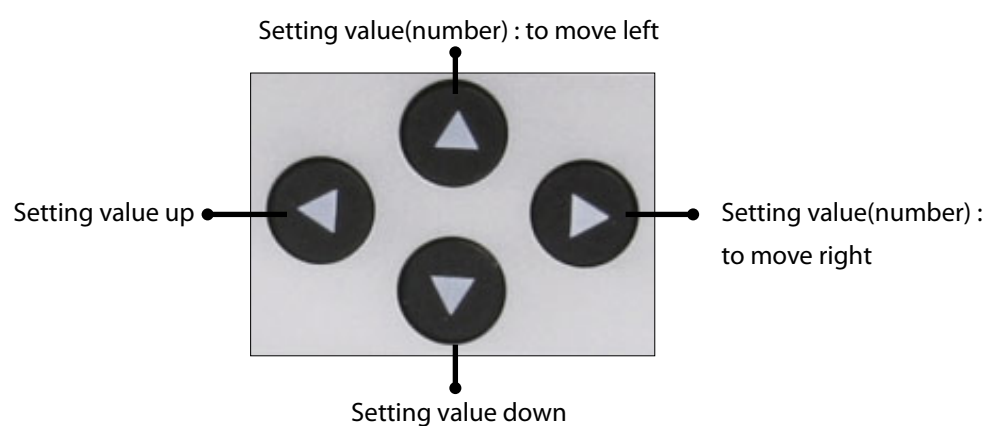


LCD Display Window

-> Display window for Setting menu

-> Status Display when Power ON

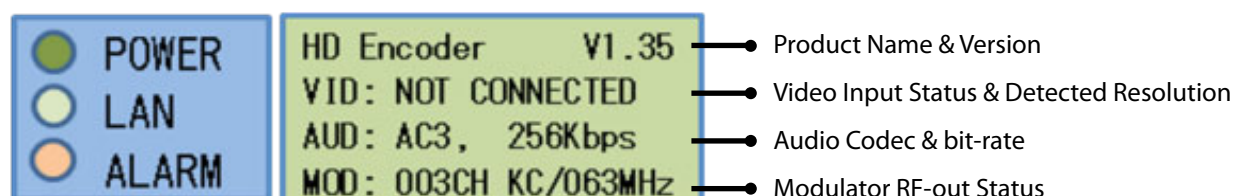
For cursor move and change setting value



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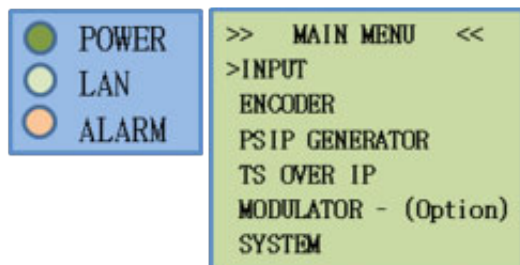
3.2 / Initial Status

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



3.3 / Main Menu

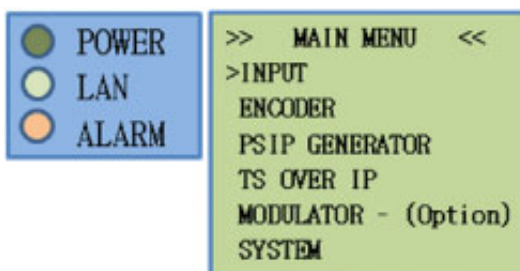
Main menu selection windows will be displayed when press set button.



To select menu, user use up button and down button to move and set button.

3.4 / INPUT Menu

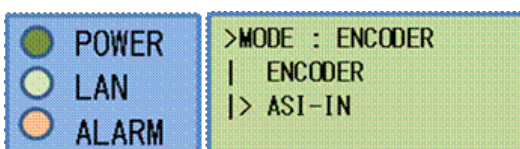
Input detail menu will be displayed when press set button on the ">" indicates "INPUT".



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

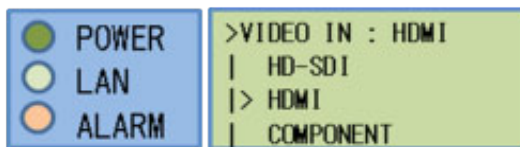
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● Mode Menu



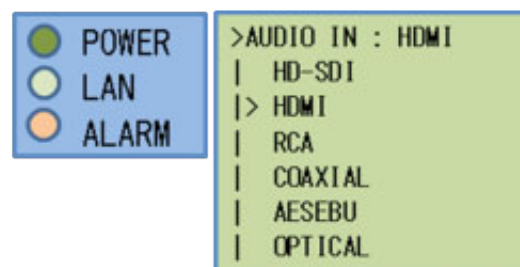
- Select Mode using up/down button (▲▼) and press Set button.
- If you press ESC, present value is not applied and the cursor move to upper menu.
- You may chose one among ENCODER or ASI-IN.

● Video Input Menu



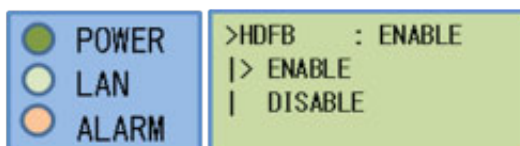
- Select Video Input using up/down button (▲▼) and press Set button.
- If you press ESC not SET then present value is not applied and the cursor move to upper menu.
- You may chose one among HD-SDI, HDMI and COMPONENT.

● Audio Input Menu



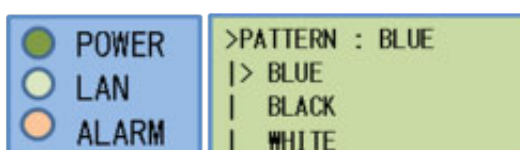
- Select Audio Input using up/down button (▲▼) and press Set button.
- If you press ESC not SET then present value is not applied and the cursor move to upper menu.
- You may chose one among HD-SDI, HDMI, RCA, COAXIAL, AESEBU, and OPTICAL.

• HDFB Menu



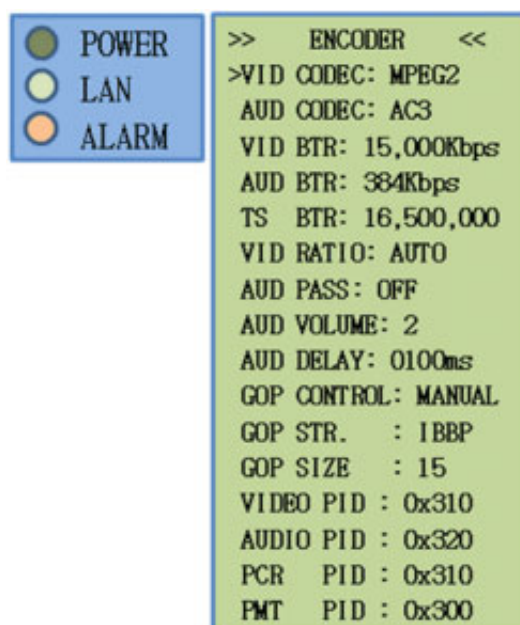
- User may select ENABLE or DISABLE for internal HDFB module.
- Select ENABLE or DISABLE using up/down button (▲▼) and press Set button.
- If you press ESC not SET then present value is not applied and the cursor move to upper menu.
- You may chose one between ENABLE and DISABLE.
- (*HDFB-Enable is recommended.)

• PATTERN Menu



- Select color pattern that used when input is not detected.
- Select color 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 BLUE, BLACK and WHITE.
- (*It only works with HDFB-Enable)

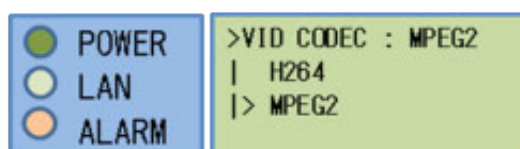
3.5 / ENCODER Menu



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

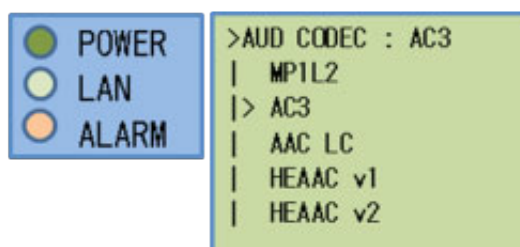
- Encoder details will be selected using UP button(▲) and DOWN button(▼) and press SET button.
- If you press ESC not SET then present value is not applied and the cursor move to upper menu.

• VID CODEC Menu



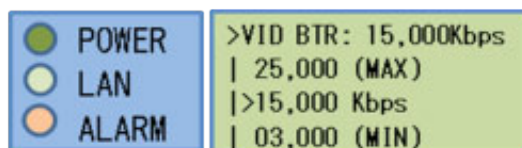
- To go video codec, select VIDEO CODEC using UP button(▲) and DOWN button(▼) and press SET button.
- If you press ESC not SET then present value is not applied and the cursor move to upper menu.
- You may select H.264 or MPEG2.

• AUD CODEC Menu



- 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.

● VID BTR Menu



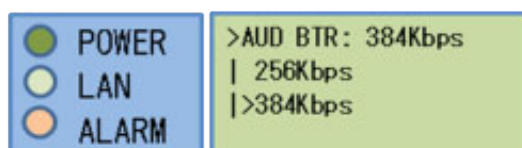
- To select video Bit-rate menu, move to VID BTR using UP button(▲) and DOWN button(▼) and press SET button.

- 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.

- (*TS bit-rate will be automatically adjusted, if it needs).

● AUD BTR Menu

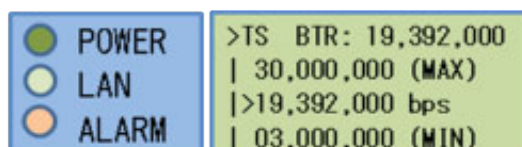


- To select audio Bit-rate menu, move to VID BTR using UP button(▲) and DOWN button(▼) and press SET button.

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

- The audio bit rate range to be set will be different for selected audio codec.

● TS BTR Menu



- 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.

- (*Video bit-rate will be automatically adjusted, if it needs).

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● VID RATIO Menu

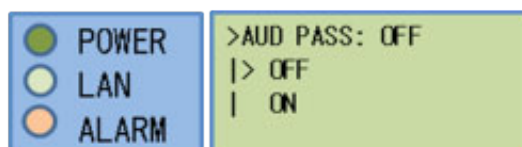


- To select video ratio menu, move to VID RATIO using UP button(▲) and DOWN button(▼) and press SET button.

- 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.

● AUD PASS Menu

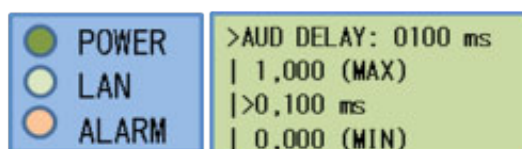


- To select audio pass-through, move to AUD PASS using UP button(▲) and DOWN button(▼) and press SET button.

- 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.

● AUD DELAY Menu

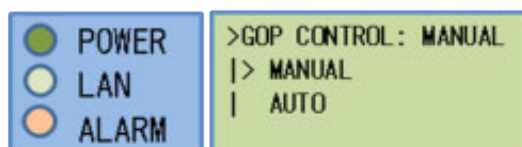


- To select audio delay menu, move to AUD DELAY using UP button(▲) and DOWN button(▼) and press SET button.

- 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.

● GOP CONTROL Menu



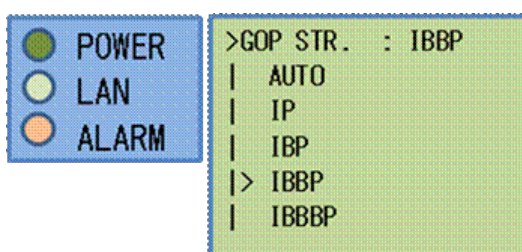
- To select video GOP control menu, move to GOP CONTROL using UP button(▲) and DOWN button(▼) and press SET button.

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

- You may set GOP control with MANUAL or AUTO.

- (* When GOP CONTROL is set to MANUAL, GOP STRUCTURE and GOP SIZE are work with selected value.)

● GOP STRUCTURE Menu

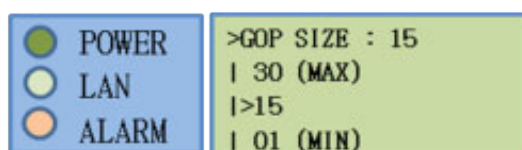


- To select video GOP structure menu, move to GOP STRUCTURE using UP button(▲) and DOWN button(▼) and press SET button.

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

- You may set one of AUTO, IP, IBP, IPBB, IPBBB.

● GOP SIZE Menu



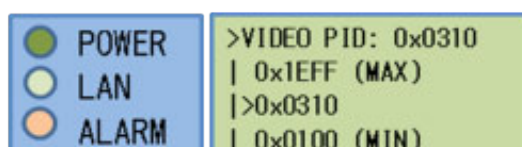
- To select video GOP size menu, move to GOP SIZE using UP button(▲) and DOWN button(▼) and press SET button.

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

- You may set GOP size between 1 ~ 30.

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● VIDEO PID Menu

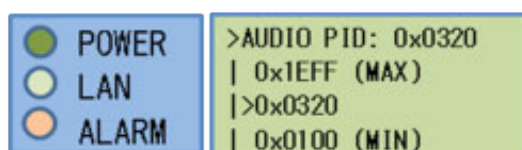


- To select Video TS PID menu, move to VIDEO PID using UP button(▲) and DOWN button(▼) and press SET button.

- 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

● AUDIO PID Menu

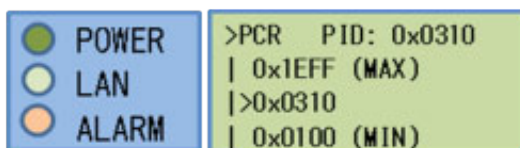


- To select Audio TS PID menu, move to AUDIO PID using UP button(▲) and DOWN button(▼) and press SET button.

- 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

● PCR PID Menu

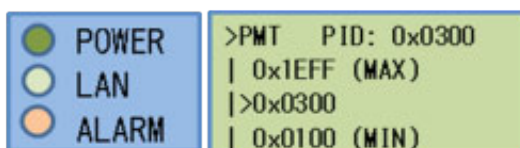


- To select PCR PID menu, move to PCR PID using UP button(▲) and DOWN button(▼) and press SET button.

- 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.

● PMT PID Menu



- To select PMT PID, move to PMT PID using UP button(▲) and DOWN button(▼) and press SET button.

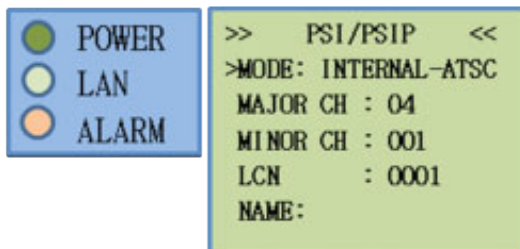
- Move cursor to right column using left right button (◀▶) and set the values using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.

- You may set PID between 0x0100 and 0x1EFF.

3.6 / PSIP GENERATOR Menu

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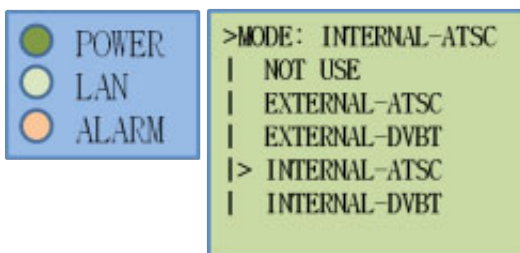
PSIP details are displayed when press SET on PSIP mode in Main menu.



- 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.

● Mode Menu



- Set PSI/PSIP mode

- Select NOT USE, EXTERNAL-ATSC, EXTERNAL-DVBT, INTERNAL-ATSC, INTERNAL-DVBT

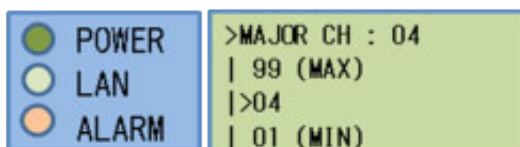
- If you press ESC not SET then present value is not applied and the cursor move to upper menu.

- In case EXTERNAL, PSIP data comes through ASI-In

- In case INTERNAL, PSIP data will be generated in internal.

- Major CH, Minor CH, LCN, NAME are the case of INTERNAL setting.

● MAJOR CH Menu



- Set first number in virtual channel number(for ATSC).

- 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.

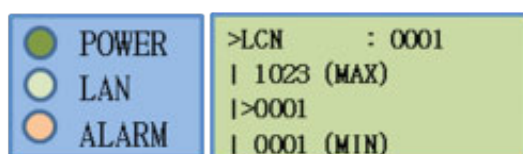
- You may set the value between 1 and 99.

● MINOR CH Menu



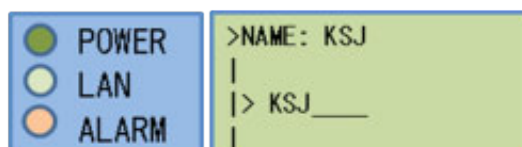
- Set second number in virtual channel number(for ATSC).
- Move cursor to right column using left right button (◀▶) and set the values using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.
- You may set the value between 1 and 999

● LCN(Logical Channel Number) Menu



- Set logical channel number for DVBT.
- Move cursor to right 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 value between 1 and 1023

● NAME Menu

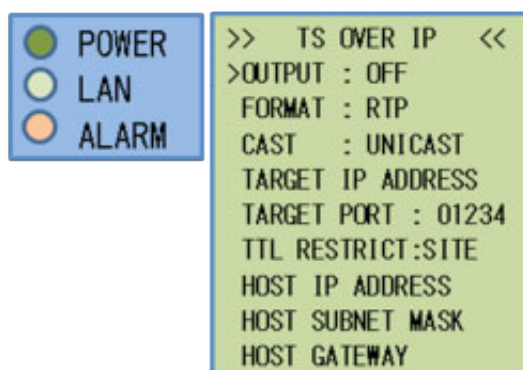


- You may set virtual channel name.
- Move cursor to right column using left right button (◀▶) and set the character using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.
- You may set the character maximum 7 characters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

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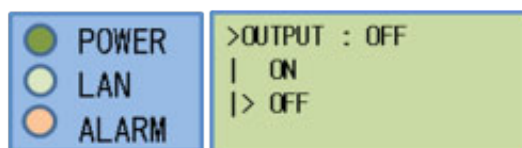
3.7 / TS OVER IP

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



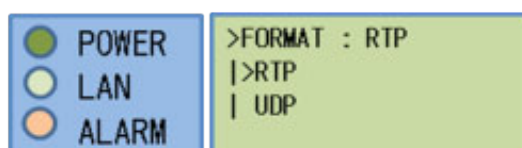
- TS OVER IP details will be selected using UP button(▲) and DOWN button(▼) and press SET button.
- If you press ESC not SET then present value is not applied and the cursor move to upper menu.

● OUTPUT Menu



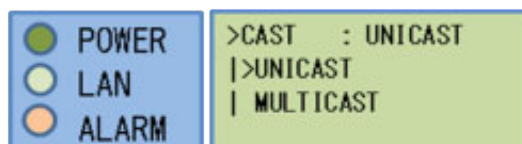
- Set TS OVER IP output.
- TS data will be out through 100BASE-T(TSoverIP) port.
- You may choose ON or Off using up and down button (▲▼) and press SET.
- If you press ESC not SET then present value is not applied and the cursor move to upper menu.

● FORMAT Menu



- Setting TS OVER IP output.
- You may select TS OVER IP with RTP or UDP.

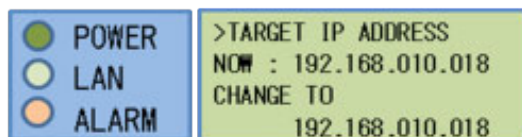
● CAST Menu



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

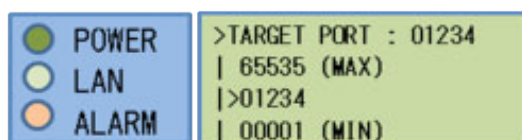
20

● TARGET IP ADDRESS Menu



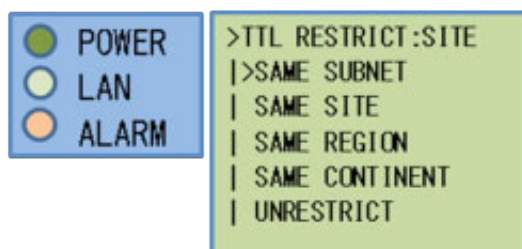
- Setting TS OVER IP address.
- Move cursor to right column using left right button (◀▶) and set the address using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.

● TARGET PORT Menu



- Setting TS OVER IP output port.
- Move cursor to right 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

● TTL RESTRICT Menu



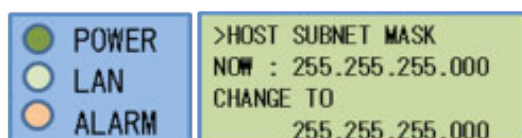
- Setting TTL restrict range.
- Select right item using up and down button(▲▼) and press SET.
- If you press ESC not SET then present value is not applied and the cursor move to upper menu.
- You may select one of SAME SUBNET, SAME SITE, SAME REGION, SAME CONTINENT, UNRESTRICT.

- HOST IP ADDRESS Menu



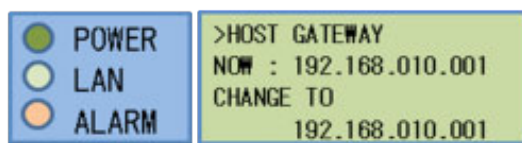
- Setting IP address of TS OVER IP port(100BASE-T(TSoverIP)).
- Move cursor to right column using left right button (◀▶) and set the IP address using UP and DOWN button(▲▼) and press SET button. If you press ESC not SET then present value is not applied and the cursor move to upper menu.

- HOST SUBNET MASK Menu



- Setting Subnet Mask of TS OVER IP output port(100BASE-T(TSoverIP)).
- Move cursor to right 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

- HOST GATEWAY Menu

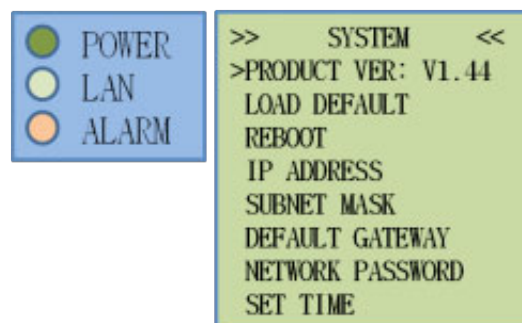


- Setting HOST GATEWAY of TS OVER IP output port(100BASE-T(TSoverIP)).

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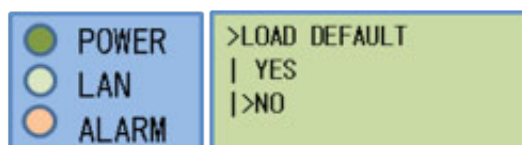
3.8 / SYSTEM Menu

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



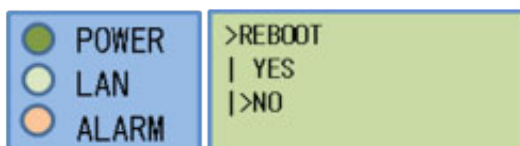
- You may move to above item using UP button(▲) and DOWN button(▼).

- LOAD DEFAULT Menu



- Setting with default value.
- If you select YES and press SET then setting value will be set with default value.

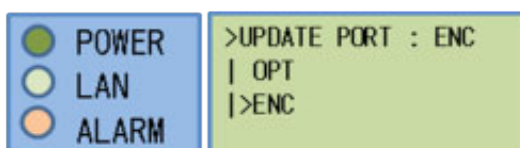
- REBOOT Menu



- Setting REBOOT.

- If you select ON and press SET then this product will be rebooted.

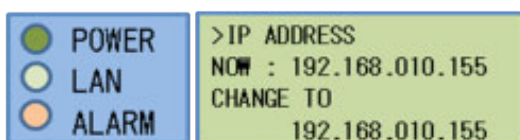
- UPDATE PORT Menu



- To update, select system to be connected with UART(UPDATE) port of rear panel.

- You may select OPT or ENC.

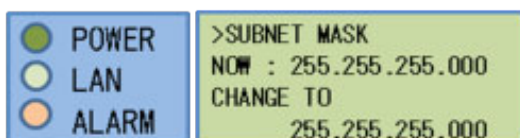
- IP ADDRESS Menu



- Setting IP address of IP output port(100BASE-T(NMS)).

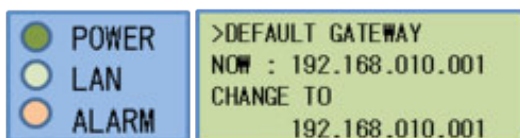
22

- SUBNET MASK Menu



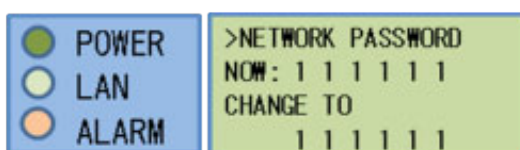
- Setting SUBNET MASK of IP output port(100BASE-T(NMS)).

- DEFAULT GATEWAY Menu



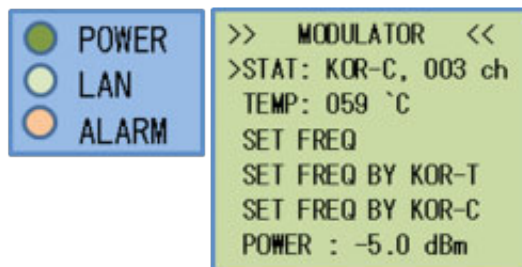
- Setting DEFAULT GATEWAY of IP output port(100BASE-T(NMS)).

- NETWORK PASSWORD Menu



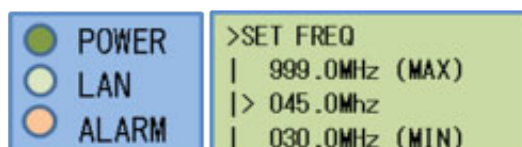
- Setting password to access Web-GUI.

3.9 / MODULATOR – ATSC1 (HAT-2110)



MODULATOR –ATSC1 details are displayed when press SET on MODULATOR mode in Main menu.

- SET FREQ Menu



- Setting RF output Frequency.

- You may set frequency between 30MHz ~ 999MHz

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- SET FREQ BY KOR-T Menu



- Setting RF output frequency of Korean Terrestrial broadcasting channel number.

- You may set the channel number between 2 and 69.

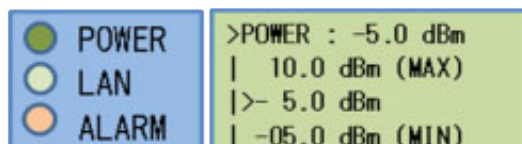
- SET FREQ BY KOR-C Menu



- Setting RF output frequency of Korean Cable channel number.

- You may set the channel number between 2 and 153.

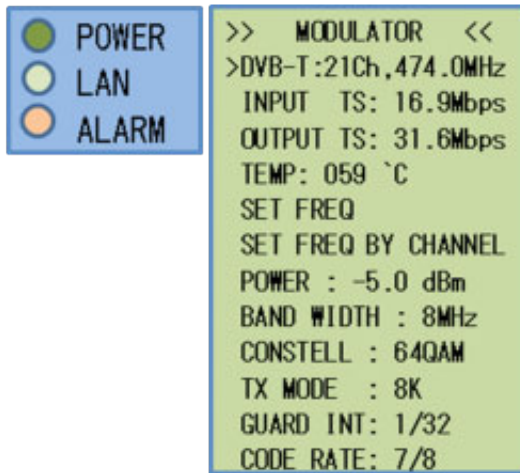
- POWER Menu



- Setting RF Output level.

- You may set the RF Power from -5.0dBm to 10dBm with 0.5dB step.

3.10 / MODULATOR – DVBT1 (HDT-2110)



MODULATOR –ATSC1 details are displayed when press SET on MODULATOR mode in Main menu.

- Status Menus

DVB-T : Frequency or RF-channel status

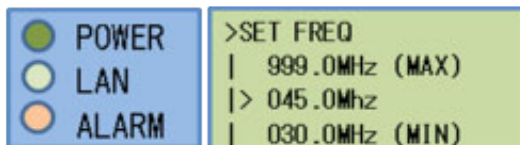
INPUT TS : Current input TS bit-rate from encoder

OUTPUT TS : RF-out TS bit-rate

TEMP : Temperature in modulator module.

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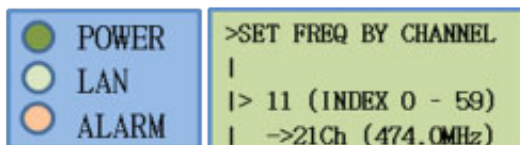
- SET FREQ Menu



- Setting RF output Frequency.

- You may set frequency between 30MHz ~ 999MHz .

- SET FREQ BY CHANNEL Menu

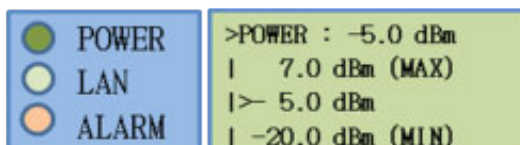


- Setting RF output frequency of DVB-T broadcasting channel number .

- You may set the channel index number between 0 and 59.

- (DVB-T channel 2~12,21~69).

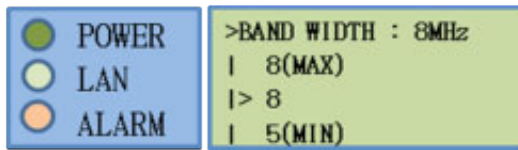
- POWER Menu



- Setting RF Output level.

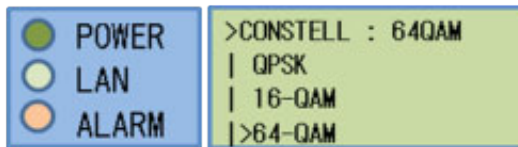
- You may set the RF Power from -20.0dBm to 7dBm with 0.5dB step.

- BAND WIDTH Menu



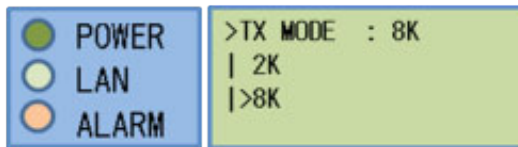
- Setting band width of DVB-T mode
- You may set the band width between 5 and 8 MHz

- CONSTELLATION Menu



- Setting constellation of DVB-T mode
- You may set one of QPSK, 16-QAM and 64-QAM

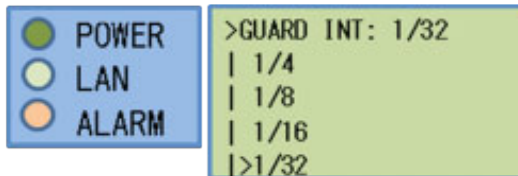
- TX MODE Menu



- Setting TX mode of DVB-T mode
- You may set one of 2K and 8K

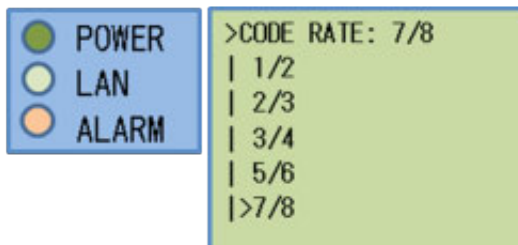
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- GUARD INTERVAL Menu



- Setting guard interval of DVB-T mode.
- You may set one of 1/4, 1/8, 1/16 and 1/32.

- CODE RATE Menu



- Setting code rate of DVB-T mode.
- You may set one of 1/2, 2/3, 3/4, 5/6 and 7/8.

Appendix. A QUICK Operation Guide

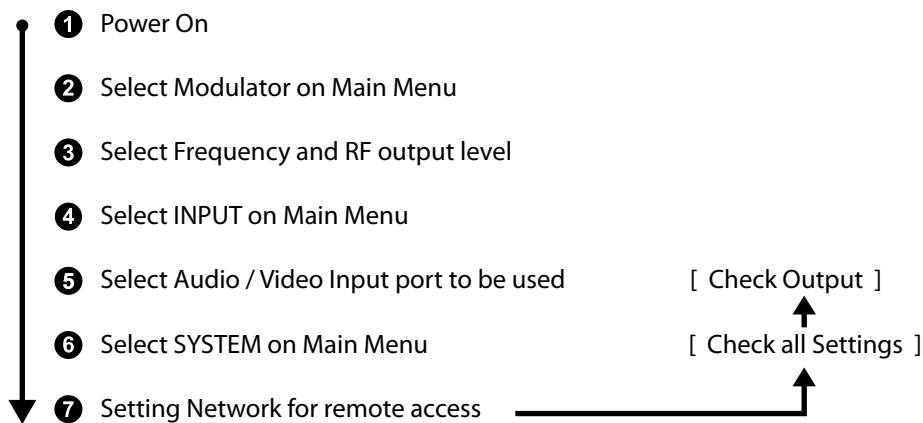
A.1 / ENCODING Bit-rate Setting

- ☒ VIDEO BITRATE: Set with DEFAULT
- ☒ AUDIO BITRATE: You may change the value

A.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

A.3 / Operation Procedure



Appendix. B Setting item briefs

B.1 / ENCODING Bit-rate Setting

Categories	Detail categories	Detail items	Description
INPUT	MODE	ENCODER	Setting Active Mode
		ASI-IN	
	VIDEO INPUT	HD-SDI	Setting Video input port
		HDMI	
		COMPONENT	
	AUDIO INPUT	HD-SDI	Setting Audio input port Audio
		HDMI	
		RCA	
		COAXIAL	
		AESEBU	
		OPTICAL	
	HDFB	ENABLE	Setting HDFB mode
		DISABLE	(*HDFB-Enable is recommended.)
	PATTERN	BLUE	Select color pattern that used when input is not detected
		BLACK	(*It only works with HDFB-Enable)
		WHITE	
ENCODER	VID CODEC	H264	Setting Video CODEC
		MPEG-2	
	AUD CODEC	MP1L2	Setting Audio CODEC
		AC3	
		AAC LC	
		HEAAC v1	
		HEAAC v2	
	VID BTR	2~ 25 Mbps (1Kbps step)	Setting Video bit-rate. (*TS bit-rate will be automatically adjusted, if it needs).
	AUD BTR	(Variable)	Setting Audio bit-rate. (*The audio bit rate range to be set will be different for selected audio codec.)
	TS BTR	3~30 Mbps (1Kbps step)	Setting TS bit-rate. (*Video bit-rate will be automatically adjusted, if it needs.)
	VID RATIO	AUTO	Setting Video display ratio(in case Auto, the ratio will be set automatically)
		4:3	
		16:9	
	AUD PASS	OFF	Setting Audio pass-through mode
		ON	
	AUD VOLUME	0~8	Setting Audio Volume. (*0-0%, 2-100%, 4-200%, 8-400%)
	AUD DELAY	0~1,000ms (1ms step)	Setting Audio delay
	GOP CONTROL	MANUAL / AUTO	Setting GOP control method
	GOP STR	AUTO / IP / IBP	Setting GOP structure
		IBBP / IBBBP	
	GOP SIZE	1~30	Setting GOP size (It means I-frame interval)

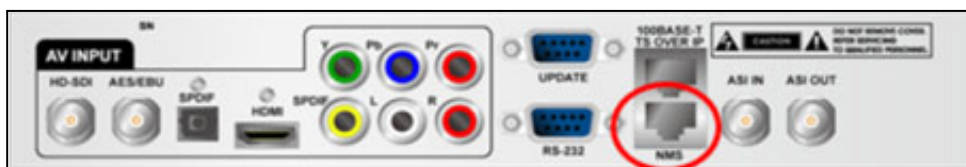
Categories	Detail categories	Detail items	Description
	VIDEO PID	0x0100~ 0x1EFF	Setting Video TS PID. (Video PID can not be set with Audio or PMT value.)
	AUDIO PID	0x0100~ 0x1EFF	Setting Audio TS PID (Audio PID can not be set with Video or PMT value.)
	PCR PID	0x0100~ 0x1EFF	Setting PCR TS PID
	PMT PID	0x0100~ 0x1EFF	Setting PMT TS PID(PMT PID can not be set with Video or Audio value.)
PSIP	PSIP	NOT USE EXTERNAL-ATSC EXTERNAL-DVBT INTERNAL-ATSC INTERNAL-DVBT	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)
	LCN	1~1023	Setting DVBT logical channel number
	NAME	(Variable)	Setting virtual channel name
TS over IP	OUTPUT	ON	Setting TS OVER IP or not
		OFF	
	FORMAT	RTP / UDP	Setting TS OVER IP format
	CAST	UNICAST	Setting TS OVER IP Cast Type
		MULTICAST	
	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	Setting TTL restriction range of TS OVER IP output
		SAME SITE	
		SAME REGION	
		SAME CONTINENT	
		UNRESTRICT	
	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))
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
Modulator - ATSC1	STAT	(None)	Display present setting Ex) KOR-C, 003 ch, (Cable Channel 3)
	TEMP	(None)	Display internal temperature

Categories	Detail categories	Detail items	Description
(HAT-2110)	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
Modulator - DVBT1 (HDT-2110)	STAT	(None)	Display RF output frequency or channel
	INPUT TS	(None)	Display input TS bit-rate from encoder
	OUTPUT TS	(None)	Display TS bit-rate of RF-output
	TEMP	(None)	Display internal temperature
	SET FREQ	30 ~ 999 MHz (0.1MHz step)	Setting modulator output frequency
	SET FREQ BY CHANNEL	0 ~ 59	Setting Modulator output with DVB-T broadcasting channel
	POWER	-20.0 ~ 7.0 dBm (0.5 dBm step)	Setting RF Output power
	BANDWIDTH	5~8 MHz	Setting band width of DVB-T mode
	CONSTELLATION	QPSK 16-QAM 64-QAM	Setting constellation of DVB-T mode
	TX MODE	2K 8K	Setting TX mode of DVB-T mode
	GUARD INTERVAL	1/4 1/8 1/16 1/32	Setting guard interval of DVB-T mode
	CODE RATE	1/2 2/3 3/4 5/6 7/8	Setting code rate of DVB-T mode

Appendix. C Remote Control – Web GUI

Web GUI can be controlled by 100BASE-T(NMS) port.

- ☒ Change SYSTEM - IP, Subnet mask, gateway address if need.
- ☒ Change SYSTEM – NET PASSWORD if need.



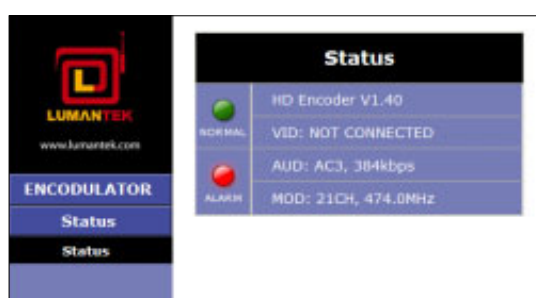
- ☒ Access the machine with web-browser
(example : <http://192.168.10.155>)

WEBGUI consists of the following items:

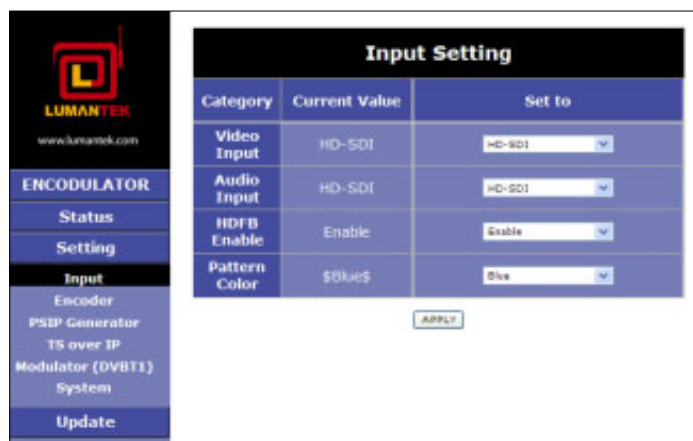
- ☒ Initial page : product image
- ☒ Status page: for status monitoring
- ☒ Setting page: for configuration changing
(divide to Input, Encoder, PSIP, TSoverIP, Modulator, System configuration part.)
- ☒ Update page: for firmware update.

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[Status page]



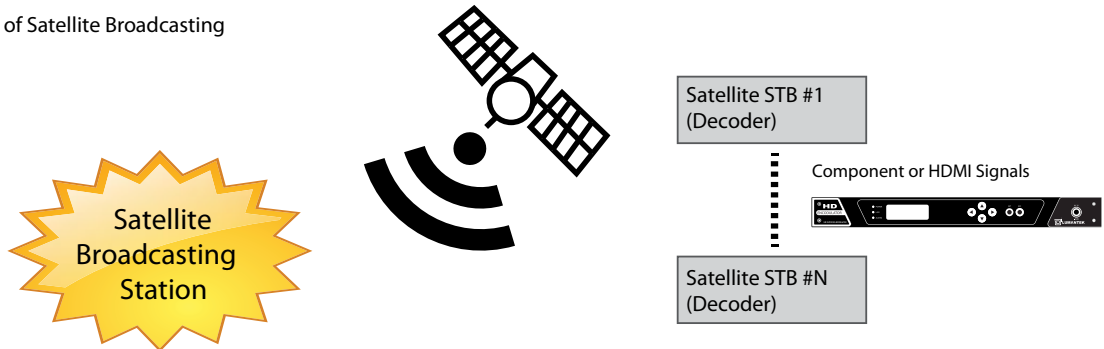
[Setting page]



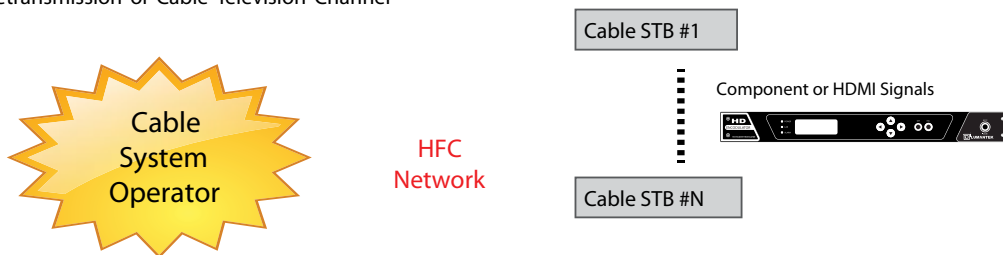
Appendix. D Overview

D.1 / System Overview

Retransmission of Satellite Broadcasting



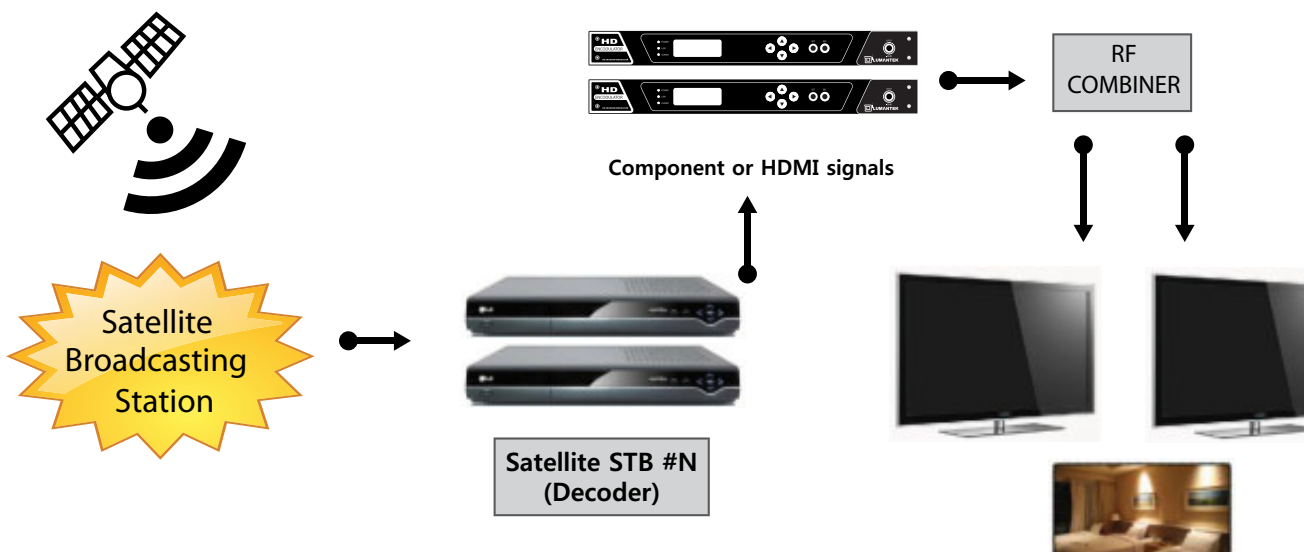
Retransmission of Cable Television Channel

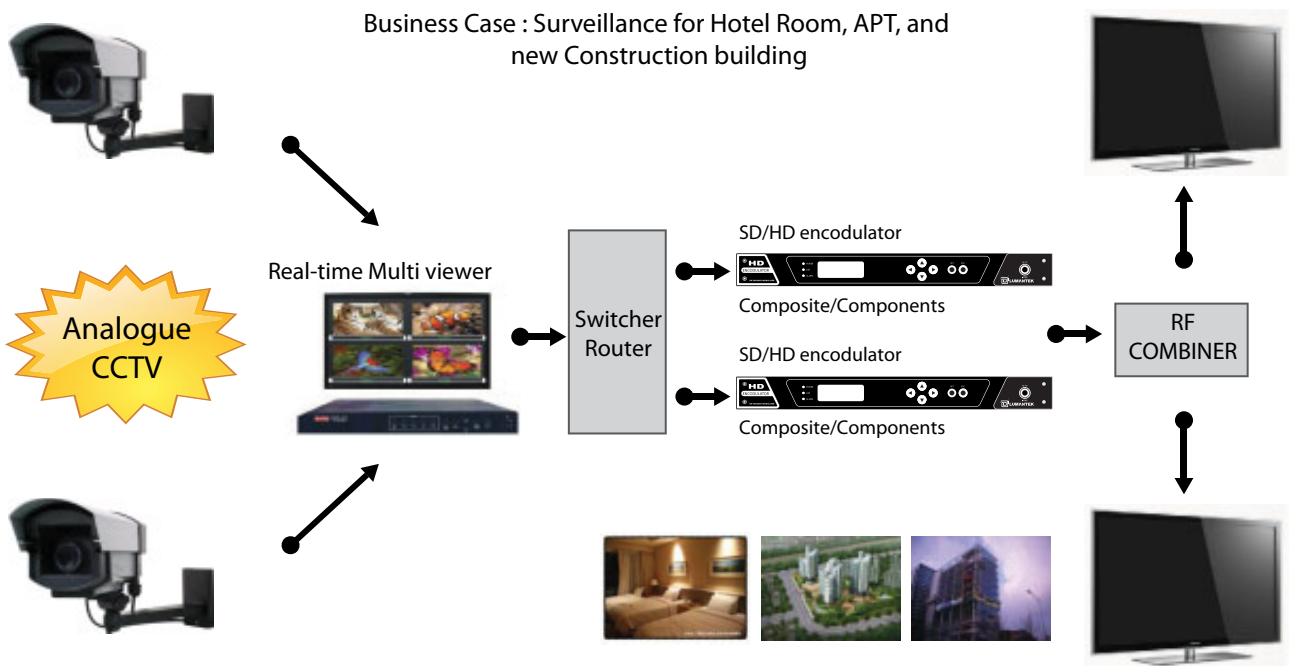


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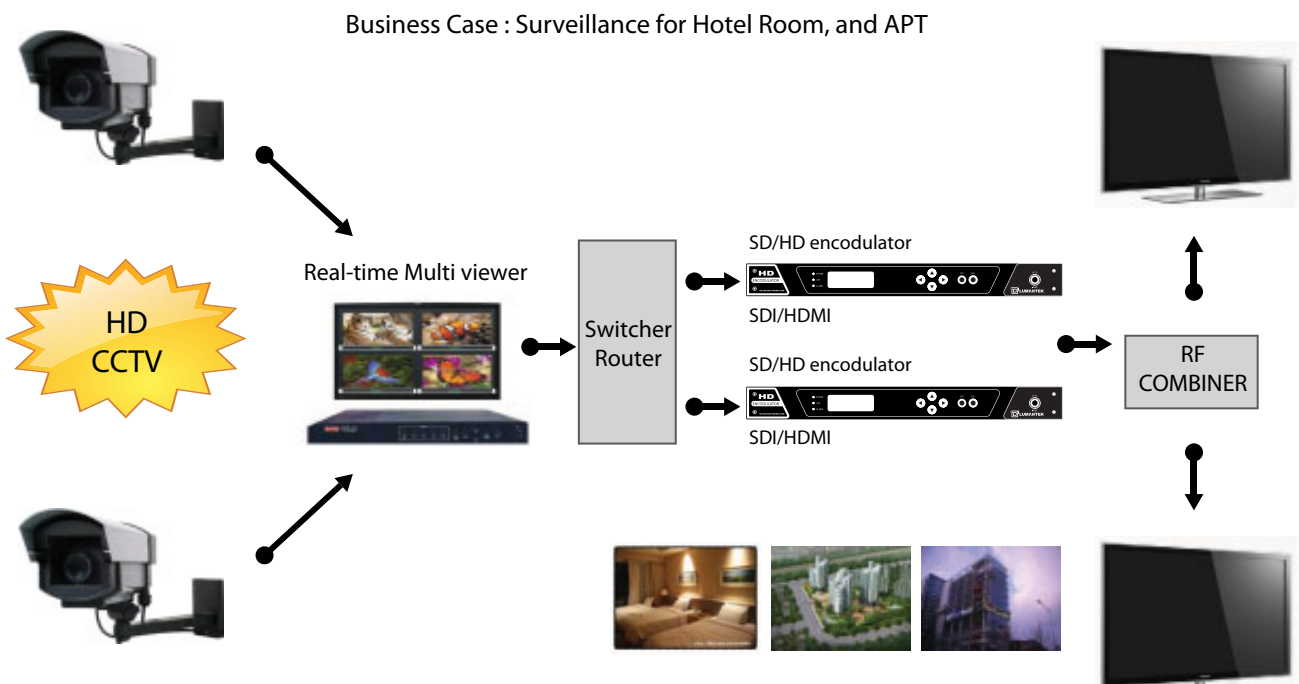
D.2 / Business Application

Case Study: Hotel, and Resort for HD Satellite Content

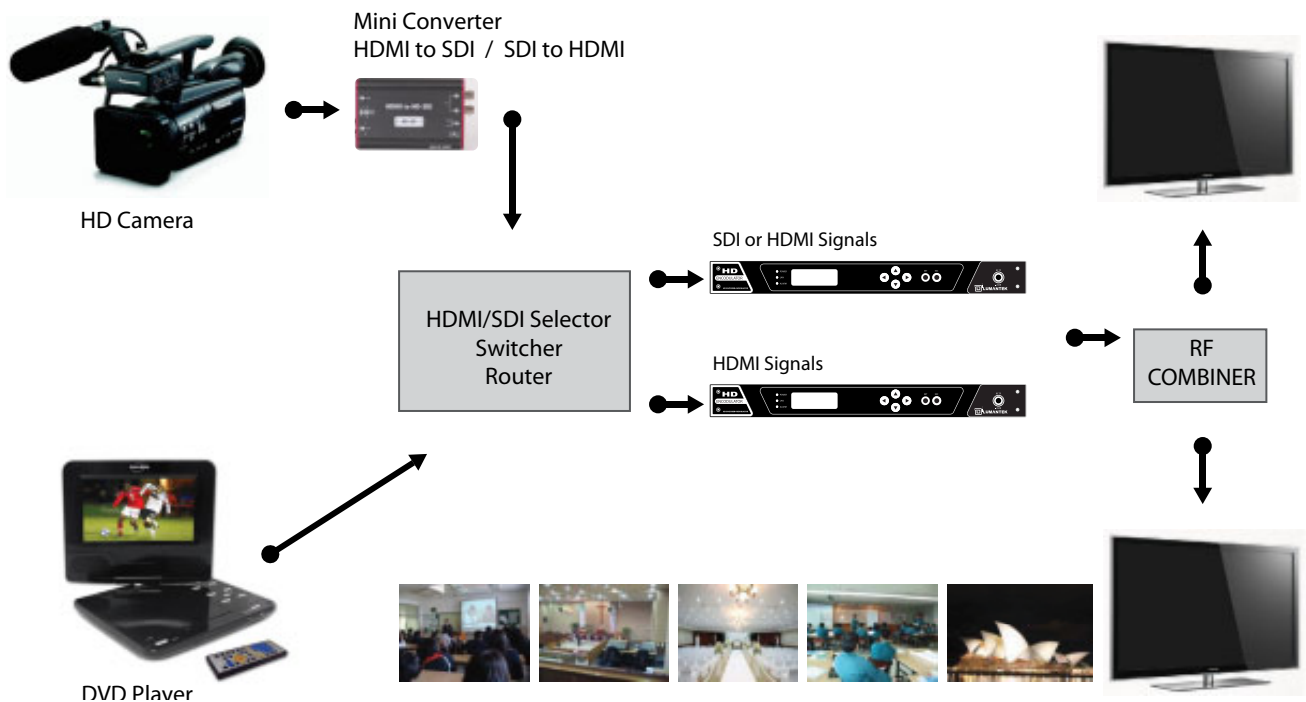




32

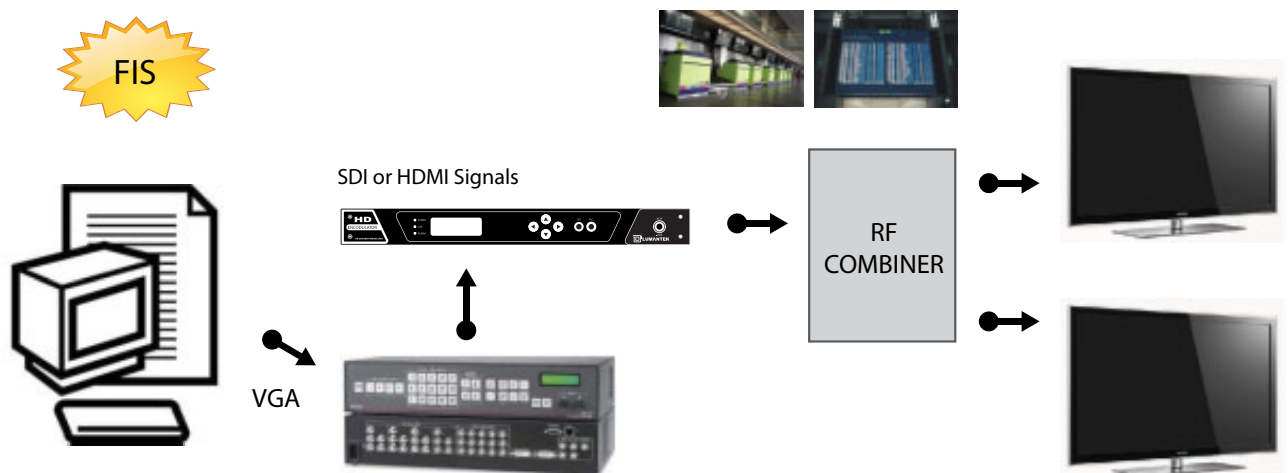


Business Application : School, Church, Convention, and Opera house



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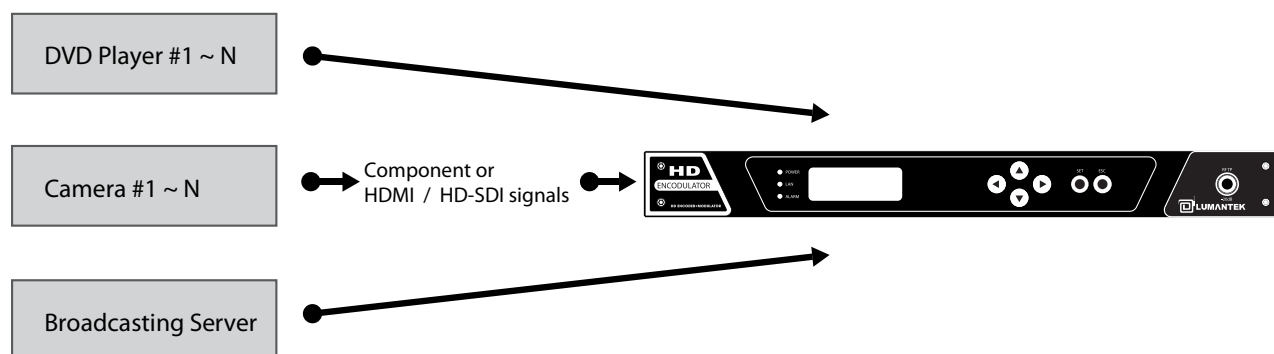
Case Study: Airport, Terminal



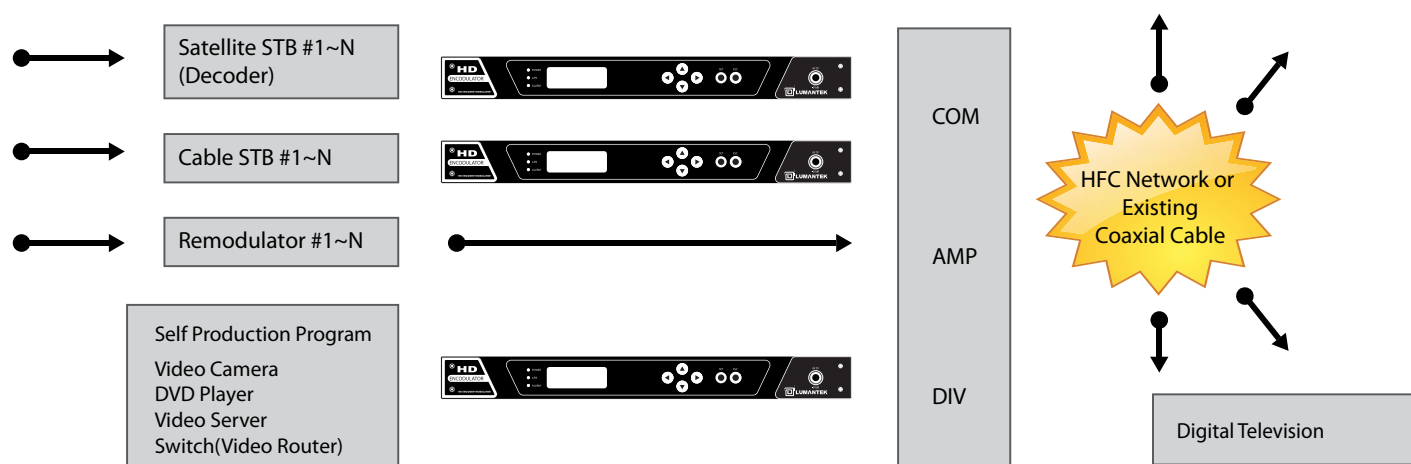
D.2 / System Specification

Independent Production Programs

(Hotel / Resort / Hospital introduction p contents, advertising contents, Educational Contents, and Events Live Broadcasting Contents)



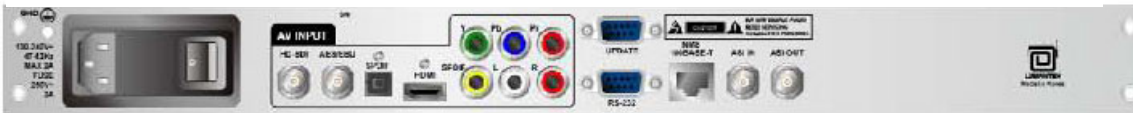
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The HD Encodulator is professional HD encoder including digital broadcasting modulator as like ATSC, DVB-T, ISDB-T, and DTMB. This product has variable interfaces with HDMI, HD-SDI, Y/Pb/Pr, ASI, LR, SPDIF (optical/coaxial), and AES/EBU. So it's variable interfaces make this product ideal for broadcasting systems as like MATV systems, education broadcasting systems, and guarding systems in company building, church, government building, and dense apartment area.



[Basic Model : One HD encoder plus one channel DTV modulation]



[HD Encoder only]



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