SV-3650D
DVB QAM modulator
User’s manual

CONTENT

1 Safety instruction

1.1 Before starting using this unit, please be sure to refer to this manual.

1.2 Do not to open the cabinet, otherwise the guarantee to repair are not available. Meanwhile touching the inside makes you in great danger of electric shock.

1.3 Please make sure to cut off the power supply if you will not use this unit in long term, and do not use any broken jack, which could result in fire or electric shock.

1.4 Wet hands are forbidden to touch the power jack, to avoid risk of electric shock.

1.5 Please pull the plug itself instead of the wire when you pull out power plug,.

1.6 Any thing flammable and metal or liquid, which will destroy the unit, must be kept out the box.

1.7 Do not place this unit in a location near a heat source such as radiator or air ducts, or in a place exposed to direct sunlight, excessive dust, moisture, rain, mechanical vibration.

1.8 Keep the device working in a good ventilative environment, if not the destruction will occur.

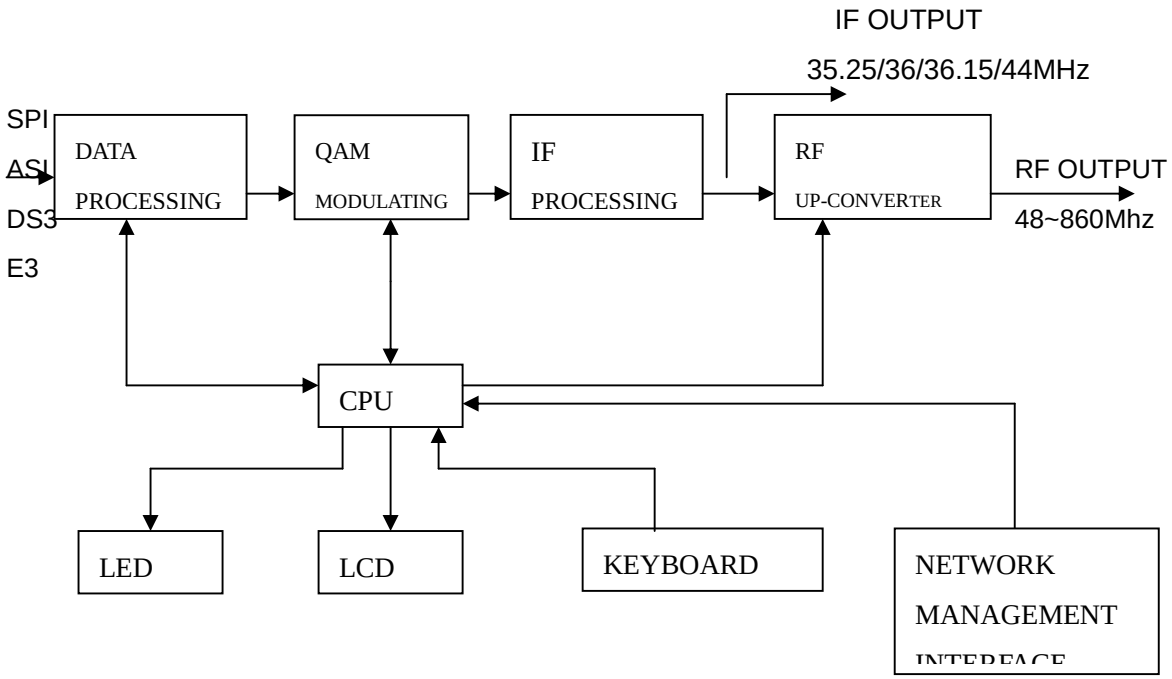
1.9 Please keep the packaging for the safety of transit.

NOTE: After all parameters are set up, please press the LOCK button. When LCD display is dark, the protection function takes effect.

2、Composition of system and operating principle

2.1 Composition of system

THE SYSTEM CONSISTS UNITS OF THE FOLLOWING CHART



QAM Digital Modulator is mainly composed of the following modules:

- Data processing unit

The unit converts signals from different interfaces into standard signal, then make data processing to carry out the preprocess of QAM modulating.

- QAM modulating unit

The unit modulates data stream into frequency spectrum signal. IF output is 35.25/36/36.15/44MHz.

- RF Up-converter unit

The unit up-converts IF signals to RF signals from 48MHz to 860MHz, divided into segments.

- CPU/LCD/LED/Keyboard unit

The unit carries out keyboard input, LED display and intelligent control, etc.

2.2 Operating principle

SV-3650 QAM Digital modulator converts input data streams into frequency signals, it meets to DVB-C standard. Signals from MPEG-II compact encoder or multiplexer was sent into QAM modulator. According to DVB standard, such as interlacing, RS error correction encoding, etc. After IF processing and up-converting into the range of TV channels, signals can be transmitted through HFC and MMDS networks. It's widely used in digital TV, data broadcasting, VOD, Internet, video conference etc.

3. Main features

Support ITU-T J.83A and B

DVB-C Standard

Constellation:16QAM、32QAM、64QAM、128QAM、256QAM

Input interface: ASI and SPI (or DS3 /E3 optional)

Input bit rate: 1.5~51.6Mbps

Output bit rate:2～56Mbps

Output bit rate：1.15～8.05MHz(Modulus 0.15)

Output symbol rate：1～7Mbaud/s

RF output：48～860MHz

Output level：105dBuV～115dBuV(step adjustable)

188/204 packet automatic identification

NIT mapping and sending function，support 44 NIT mapping

10 PID filter and re-mapping

PSI/SI information pick-up, parse and modification

SI information replacement and insert

Input data null packet filtering and output data filling.

PCR correction

Show and inspect system input bit rate and valid bit rate real time

4. Technical specification

4.1 Data interface

4.1.1 ASI interface (Asynchronous Serial interface)

A：Input:

Connector: BNC

Impedance: 75Ω

Packet format: 188/204 bits

Access data rate: 270Mbps

Max valid bit rate: 51.6Mbps

DVB standard

B: Loop output:

Connector: BNC

Impedance: 75Ω

4.1.2 SPI input interface (Synchronous Parallel interface)

Connector: DB-25 female

Packet format: 188 or 204 bits

DVB Standard: LVDS

4.2 IF interface

A: IF input

Connector: BNC

Impedance: 50Ω

IF frequency: 35.25/36/36.15/44 MHz (optional)

IF Bandwidth≤8MHz

Reflect loss ≥18dB

Input level: 100dBuV (rms)

B:IF loop output:

Connector: BNC

Impedance: 50Ω

IF frequency: 35.25/36/36.15/44 MHz (optional)

IF Bandwidth≤8MHz

Reflect loss ≥18dB

Output level: 100±2dBuV(rms)

4.3 RF interface

A. RF output:

Connector: BNC

Impedance: 75Ω

Output Frequency: 48~800MHz

Reflect loss ≥15dB

Output level:

105~115dBuV (adjustable)

Carrier rejection: > 55dB

SNR(out of band):≥50dB

B: RF output for test

Connector: BNC

Impedance: 75Ω

Output level: 85dBuV~105dBuV (adjustable)

4.4 Channel signal encoding

Constellation: 16QAM, 32QAM, 64QAM, 128QAM, 256QAM.

Channel encoding: RS encode, DVB standard

MER:≥42dB

SNR(out of band):≥50dB

4.5 Network management interface

IEEE802.3 ETHERNET, RJ45 interface

Software protocol: SNMP protocol

4.6 Power supply

Voltage: 165V～265VAC or 85V～265VAC

Frequency: 50Hz±2%

Power consumption: 50W

4.7 Operation environment

Operation temperature: +5~45°C;

Storage temperature: -25~+55°C.

Relative humidity: 10~75%

4.8Radiation and safety

Up to GB13837-92 and GB8898-88

4.9 Mechanic characteristics

Dimension: 44.5mm(1U)*483mm*(19")*400mm

Weight: 7kg

4.10 E3 /DS3 Interface (optional)

A: Input (G.703 standard)

Connector: BNC

Impedance: 75Ω

Packet format 188/204 bits

Bit rate: E3/DS3 No-frame format (34.368Mbps/44.736Mbps)

B. Output (loop)

Connector: BNC

Impedance: 75Ω

Note: The information contained herein is subject to change without notice.

5. Equipment connection

5.1 Panel display and keyboard

A. Panel display

a. LED instruction

Power

Sync

Alarm

b: LCD

B: Keyboard

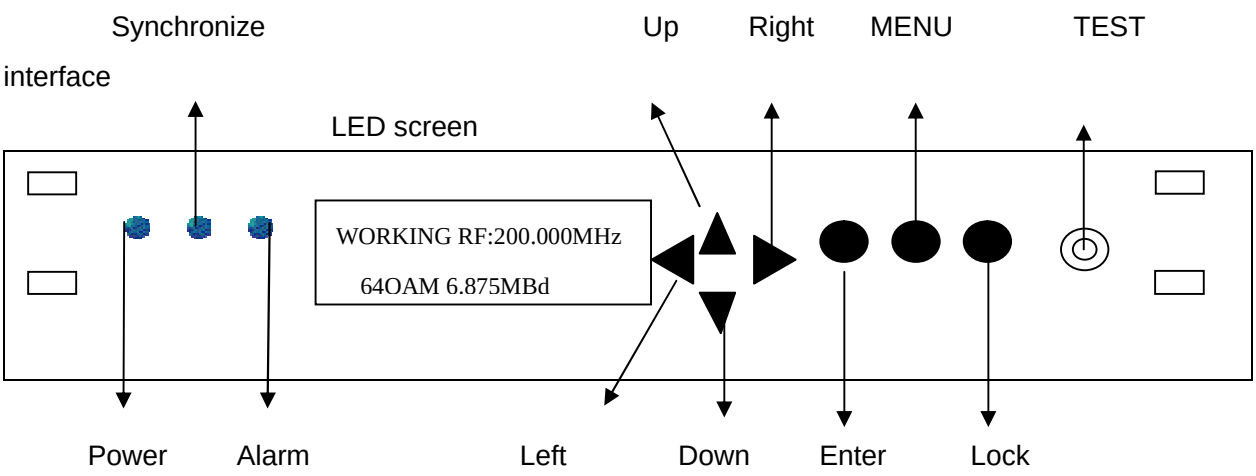
ARROW KEYS (UP/DOWN/LEFT/RIGHT)

ENTER

LOCK: press once to lock; press once again to unlock

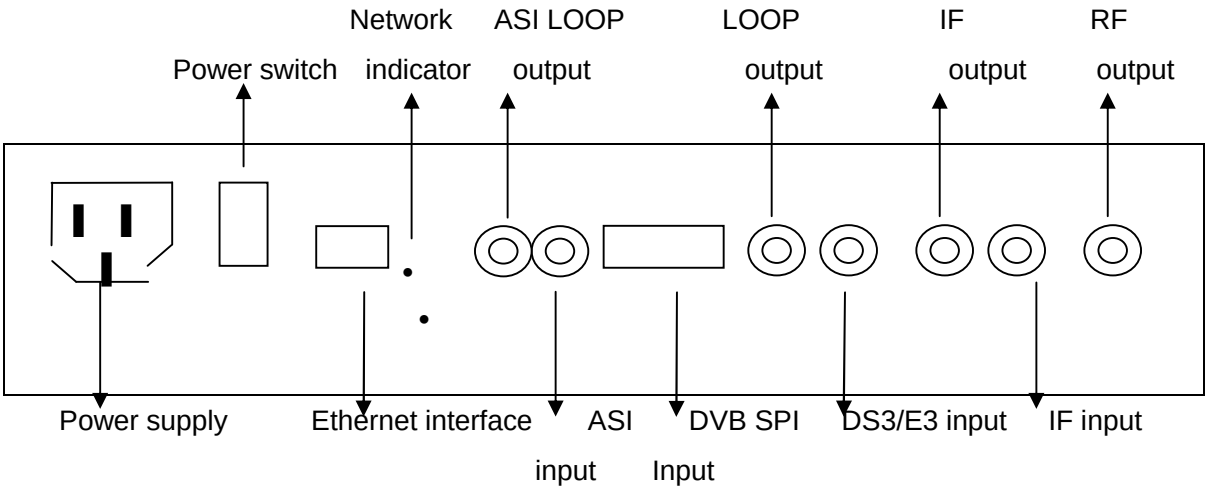
MENU

5.2 Front panel sketch



5-1: SV-3650 Front panel

5.3 Rear panel sketch



5-2:SV-3650 Rear panel

5.4 SPI input and output interface characteristics

No	Signals	Description	No	Signals	Description
1	CLK-A	Signal clock	14	CLK-B	Signal clock
2	GND	GROUND	15	GND	GROUND
3	D7-A	DATA 7	16	D7-B	DATA 7
4	D6-A	DATA 6	17	D6-B	DATA 6
5	D5-A	DATA 5	18	D5-B	DATA 5
6	D4-A	DATA 4	19	D4-B	DATA 4
7	D3-A	DATA 3	20	D3-B	DATA 3
8	D2=A	DATA 2	21	D2-B	DATA 2
9	D1-A	DATA 1	22	D1-B	DATA 1
10	D0-A	DATA 0	23	D0-B	DATA 0
11	DVALID-A	DATA AVAILABLE	24	DVALID-B	DATA AVAILABLE
12	PSYNC-A	PACK SYNCHRONOUS	25	PSYNC-B	PACK SYNCHRONOUS
13	CABLE	SHEILD CABLE			

6.Parameter check and setup

6.1 Keyboard Function

Move Right/Left key: choose sub-menu/move cursor

Move up/down key: setup cursor/change parameters

Enter: confirm operations

Lock: lock/unlock the keyboard /remote-control/exit menu

MENU: Select main menu and cancel operations

Note: 1.Be sure to press ENTER key after setup the parameters, all new parameters will take effect only without *, otherwise the old parameters will be kept.

2. Under any status of setting parameters, press LOCK key will make unit return to the status of showing operating parameters.

6.2 Operation mode select (keyboard unlocked)

Press MENU or ENTER to display main menu circularly

ONCE: 1.0 VIEW ALARMS
ALARMS LIST EMPTY

TWICE: 2.0 QAM MODE
64 QAM

THRICE 3.0 RF OUT FREQUENCY
200.0000MHz

FOUR TIMES 4.0 SIGNAL INPUT FROM
INPUT FROM ASI

FIVE TIMES 5.0 BYPASS SWISVH
OFF

SIX TIMES 6.0 NIT TABLE MODE
KEEP ORIGINAL NIT

SEVEN TIMES 7.00.0 INPUT TS
ALL HAVE: 011

EIGHT TIMES 8.00.0 OUTPUT TS
OUT PROGRAMS:011

NINE TIMES 9.0 QAM OUTPUT MODE
WORK AS INPUT TS

6.3 How to setup and change parameters

6.3.1 Setup system parameters

A: Press MENU once: display as follows

1.0 VIEW ALARMS

ALARMS LIST EMPTY or NO INPUT SIGNAL or RF UNLOCK or

BUFFER FULL or SYSTEM ERROR

B: Press UP/DOWN key to view/change parameters /select functions

▼ 1.0VIEW ALARMS

CLEAR ALL ALARMS

C: Press ENTER to store change or confirm operation

1.0 VIEW ALARMS

ALL ALARMS BE CLEARED

D: Press LEFT/RIGHT to view sub-menu

▶1 1.1 SET IP ADDR.

120.120.120.160

▶ 2 1.2 SET NET MASK

255.255.255.000

▶ 3 1.3 SET NET GATE

120.120.120.001

▶ 4 1.4 NET STATUS

NOT CONNECTED or CONNECTED

▶ 5 1.5 SERIAL No.:

XXXXXXXXXXXXXXXXX (18-digits)

▶ 6 1.6 VERSION

H: XX.XX S: XX.XX

▸ 7 1.7 GET PRESET PARAMETER

*FACTORY PRESET

Press ENTER to store exchange.

▸ 8 1.8 RELOAD IN INFO（Reload input parameters）

*RELOAD IN CHANNEL(Reload input channel parameters)

▸ 9 1.9 QAM WORK MODE

*ITU-T J.83 ANNEX A

▾ * ITU-T J.83 ANNEX B

E. In any status, press LOCK to exit

6.3.2 Setup QAM parameters

A: Press MENU twice: display as follows

2.0 QAM MODE

64 QAM

B: Press UP/DOWN to view/change parameters or select function

2.0 QAM MODE

▲*128 QAM ▲*256 QAM * QPSK * 16 QAM * 32 QAM * 64 QAM

C: Press ENTER to store exchange or confirm operation

D: Press LEFT/RIGHT to view sub-menu

▶ 1 2.1 SYMBOL RATE [36.00]-IF frequency

6.875MBd[38.014Mbps] or 6.875MBd[7.906MHz]

While setup new symbol rate, press UP/DOWN key, cursor displays at the ends, then press LEFT/RIGHT key to move cursor to the required position ,and press UP/DOWN again to setup parameters, at last press ENTER to change and store.

▶ 2 2.2 BW PREFERENCE UNIT

uc Bitrate

Press UP/DOWN to display on the second line: *Bandwidth

▶3 2.3 IF OUT FREQUENCY

36.00MHz▼*36.15MHz/36.65MHz

IF output is 36.15MHz when BW>≥7MHz under 36.15MHz/36.65MHz and IF output is 36.65MHz when BW<77MHz under 36.15MHz/36.65MHz

6.3.3 Setup RF parameters

A、Press MENU three times, display as follows

3.0 RF OUT FREQUENCY

200.0000MHz

Please refer to SETUP SYMBOL RATE to setup new frequency.

B、Press LEFT/RIGHT to view sub-menu

▸1 3.1 RF OUTPUT LEVEL：

115dBuV or 110dBuV

C、Press UP/DOWN to plus or minus 0.5dBuV(don’t need to press ENTER)

▸2 3.2 SPECTRUM INVERSION

ON▼*OFF

▸3 3.3 QAM MODULATION

ON▼*OFF

▸4 3.4 RF POWER SWISVH

ON▼*OFF

D、Press ENTER to store exchange or confirm operation

E、In any status, press LOCK will exit.

6.3.4 Select input interface

A、Press MENU four times to show following

4.0 SIGNAL INPUT FROM

INPUT FROM ASI▼* INPUT FROM SPI▼* INPUT FROM E3▼* INPUT FROM DS3

▶1 4.1 INPUT SIGNAL TYPE

188 BYTES PACKET or 204 BYTES PACKET or INPORT NOSIGNAL

▶2 4.2 IN TS ALL RATE

038.051Mbps

▶3 4.3 TS EFFECT RATE

033.160Mbps

6.3.5 PID Filter

A、Press MODE five times, display as follows

5.0 BYPASS SWISVH

ON ▼*OFF

▶1 5.1 BYPASS PID0

CH1 0032 → 0032（D）(PID By-pass)

▼2 5.2 BYPASS PID1

CH1 0032 → 0120（D）（PID Map）

▼3 5.3 BYPASS PID2

CH1 0032 → 8191（D）（PID Filter）

▼4 5.4 BYPASS PID3

CH1 8191 → 8191（D）（Empty packet filter）

▼5 5.5 BYPASS PID4

CH1 8191 → 8191（D）（Empty packet filter）

▼6 5.6 BYPASS PID5

CH1 8191 → 8191（D）（Empty packet filter）

▼7 5.7 BYPASS PID6

CH1 8191 → 8191（D）（Empty packet filter）

▼8 5.8 BYPASS PID7

CH1 8191 → 8191（D）（Empty packet filter）

B. Press UP/DOWN key to view/change parameters or select functions

C. Press ENTER to store exchange or confirm operation

D. Press LEFT/RIGHT to view sub-menu.

E. In any status, Press LOCK to exit.

6.3.6 Insert NIT

A、Press MENU six times, display as follows

6.0 NIT TABLE MODE（Exchange NIT mode）

KEEP ORIGINAL NIT ▼*EXCHANGE ORIGINAL NIT

▶1 6.1 NETWORK ID

00001（read only）

▼2 6.2 NETWORK NAME

TEST（read only）

▼3 6.3 CHANNELS IN NIT

001（read only）

B、Above is controlled by NMS.

6.3.7 View TS input data

A、Press MENU seven times or ENTER three times, display as follows

7.00.0 INTPUT TS

ALL HAVE:011（Enter number of channels）

B、Press LEFT/RIGHT to view TS ID

▶1 7.00.1 INPUT SIGNAL

INPUT 188 TS PACKET（read only）

▶2 7.00.2 IN TS TS_ID

00010（read only）

▶3 7.00.3 IN TS ON_ID

00001（read only）

▶4 7.00. 4 IN TS ALL RATE

038.051Mbps（read only）

▶5 7.00.5 TS EFFECT RATE

033.160Mbps（read only）

C、Press UP/DOWN to view all channels' source.

▲1 7.01.0 PROG01 NAME（NAME FOR CHANNEL SET 1）

CCTV 4（read only）

▲2 7.02.0 PROG02 NAME（NAME FOR CHANNEL SET 2）

CCTV 9（read only）

▲3 7.03.0 PROG03 NAME（NAME FOR CHANNEL SET 3）

CCTV OPERA（read only）

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▲11 7.11.0 PROG11 NAME（NAME FOR CHANNEL SET 11）

SHENZHEN（read only）

D、When in the following mode, press LEFT/RIGHT key to view and modified all program information.

Press ENTER to store changes; press MENU to quit from current mode.

▶ 7.01.0 P01 NAME (NAME FOR PROGRAM 1)

CCTV 4（read only）

▶1 7.01.1 PROG01(CHA01) (PROGRAM 1 OUTPUT OPTION)

REMULTIPLEXED/*NOT BE MULTIPLEXED（optional）

▶2 7.01.2 P01 CODE RATE(CHA01) (ENTER PROGRAM 1'S VALID BIT RATE)

004.075Mbps（read only）

▶3 7.01.3 P01 PMT PID (PROGRAM 1's PCR PID)

0100(HEX) 0256(DEC) （read only）

▶4 7.01.4 P01 PCR PID (PROGRAM 1's PCR PID)

0902(HEX) 2306(DEC) （read only）

▶5 7.01.5 P01 MPEG-2 V(PROGRAM 1'S VIDEO PID)

0200(HEX) 0512(DEC) （read only）

▶6 7.01.6 P01 MPEG-2 A (PROGRAM 1'S AUUDIO PID)

028A(HEX) 0650(DEC) （read only）

*****ALL SETTINGS FOR OTHER PROGRAMS ARE THE SAME AS ABOVE**

6.3.8 TS OUTPUT SETTING

A、Press MENU 8 times or ENTER 2 times to see the following:

8.00.0 OUTPUT TS

OUT PROGRAMS:011（NUMBER OF PROGRAM OUTPUTING）

B、Press LEFT/RIGHT key to view and modify TS ID.

▶1 8.00.1 OUTPUT TS_ID (OUTPUT TS ID)

00010（CHANGEABLE）

▸2 8.00.2 OUTPUT ON_ID (ORIGINAL OUTPUT ID)

00001（CHANGEABLE）

▸3 8.00.3 CAT WORK MODE

MAKE A NEW TABLE (Insert New CAT Chart)

▴ *NOT MAKE NEW TABLE(Do not Insert New CAT Chart)

▸4 8.00.4 SDT WORK MODE(SDT Control Mode)

MAKE A NEW TABLE (Insert New SDT Chart)

▴ *NOT MAKE NEW TABLE(Do not Insert SDT Chart)

C、Press UP/DOWN key to view all program source.

▴1 8.01.0 P01 FROM（PROGRAM 1 SOURCE）

PROGRAM 01 IN CHA01(ALL PROGRAMS FROM CHANNEL 1 ARE FROM SAME /ONE END)

▴2 8.02.0 P02 FROM（PROGRAM 2 SOURCE）

PROGRAM 02 IN CHA01(ALL PROGRAMS FROM CHANNEL 1 ARE FROM SAME /ONE END)

▴3 8.03.0 P03 FROM（PROGRAM 3 SOURCE）

PROGRAM 01 IN CHA01(ALL PROGRAMS FROM CHANNEL 1 ARE FROM SAME /ONE END) |

|

|

▴11 8.11.0 P11 FROM（PROGRAM 11 SOURCE）

PROGRAM 11 IN CHA01(ALL PROGRAMS FROM CHANNEL 1 ARE FROM SAME /ONE END)

D、While in the following mode, press LEFT/RIGHT key to view/modify all programs information. Press ENTER to confirm changes; press MENU to quit from current operation.

▸1 8.01.1 P01 NAME(NAME OF PROGRAM 1)

CCTV 4(CHANGEABLE)

▸2 8.01.2 P01 NUMBER(PROGRAM 1'S ID)

00001（CHANGEABLE）

▸3 8.01.3 P01 PMT PID(PROGRAMS 1'S PCR PID)

0100(HEX) 0256(DEC) (CAN BE RE-PROJECTED, SET TO 8191 AND FILTER PID CONTENT)

▸4 8.01.4 P01 PCR PID (OUTPUT PROGRAM 1'S PCR PID)

0902(HEX) 2306(DEC) (CAN BE RE-PROJECTED, SET TO 8191 AND FILTER PID CONTENT)

▸5 8.01.5 P01 MPEG-2 V(OUTPUT PROGRAM 1'S VIDEO PID)

0200(HEX) 0512(DEC) (CAN BE RE-PROJECTED, SET TO 8191 AND FILTER PID CONTENT)

▸6 8.01.6 P01 MPEG-2 A(OUTPUT PROGRAM 1'S AUDIO PID)

028A(HEX) 0650(DEC) (CAN BE RE-PROJECTED, SET TO 8191 AND FILTER PID CONTENT)

*****ALL SETTINGS FOR OTHER PROGRAMS ARE THE SAME AS ABOVE**

Press LEFT/RIGHT can view and modify all information. Press ENTER to confirm changes made; press MENU to quit current operation.

6.3.9 INTERNET DATA SETTING

A、Press MENU nine times or ENTER once to show the following:

9.0 QAM OUTPUT MODE（QAM OUTPUT SETTING）

WORK AS INPUT TS（MODULATE ACCORDING TO INPUT TS SIGNAL）

▾* WORK AS OUTPUT TS（MODULATE ACCORDING TO OUTPUT TS SIGNAL）

B、Press LEFT/RIGHT key to view and modify internet settings. Press ENTER to confirm changes; press MENU to quit current operation.

▸1 9.1 QAM OUTPUT PARA（QAM OUTPUT DATA SETTING）

WORKING AS SETTING

▾* REBUILDING PARA

Or NEED REBUILD PARA

7、QAM Messages

7.1 Relations between coding method, band width and symbol rate.

CODING METHOD	QPSK	16QAM	32QAM	64QAM	128QAM	256QAM
Min. Bit Rate（Mbps）	2	4	5	6	7	8
Max. Bit Rate（Mbps）	14	28	35	42	49	56
Min. Band Width (MHz）	1.15	1.15	1.15	1.15	1.15	1.15
Max Band Width（MHz）	8.05	8.05	8.05	8.05	8.05	8.05
Min. Symbol Rate (Mbaud）	1	1	1	1	1	1
Max. Symbol Rate（Mbaud）	7	7	7	7	7	7

Band Width=1.15×Symbol Rate

Symbol Rate=Output data rate÷m

m=2，4，5，6，7，8 Corresponding to QPSK，16QAM，32QAM，64QAM，128QAM and 256QAM

7.2 Max. transmission band width for 8MHz

CODE	C/N Limit	Max. Rate	Utilize Rate
16QAM	22dB	25.8Mbps	3.2 bit/Hz
32QAM	25dB	32.2Mbps	4.0 bit/Hz
64QAM	28dB	38.7Mbps	4.8 bit/Hz
128QAM	31dB	44.2Mbps	5.5 bit/Hz
256QAM	34dB	51.6Mbps	6.4 bit/Hz

Effective input data rate=Output rate×188÷204

8、System errors and debugging

8.1 Indicator lights

There are three LED indicator lights.

1) “POWER” lights up (Red) means power switch on and working orderly.

2) “ SYN” lights up(Green) means synchronization clock working orderly.

3) “ALARM” lights up(Green) means data processing working orderly.

8.2 Trouble Shooting

8.2.1 The ”POWER” indicator light does not illuminate.

Please check the wire to make sure the wire is connected to the socket properly and the power switch is on.

8.2.2 “STATUS”illuminates（in red）

This means lack of synchronal signals or input data abnormal or no valid data input, please check the input data cable is connected properly, and the input interface is selected correctly. If the answer is yes, it means the unit is broken, needs to be replaced.

8.2.3 “ALARM”flashes

This means the equipment is out of order for some faults. Please debug according to the instruction from LCD.

9、Network management

The unit could be controlled remotely via network management software. It needs authorization. Please refer to 《NMS user's manual》