DVB QAM Modulator

DCH-3000TM-30S

User's Manual

http://www.pbi-china.com
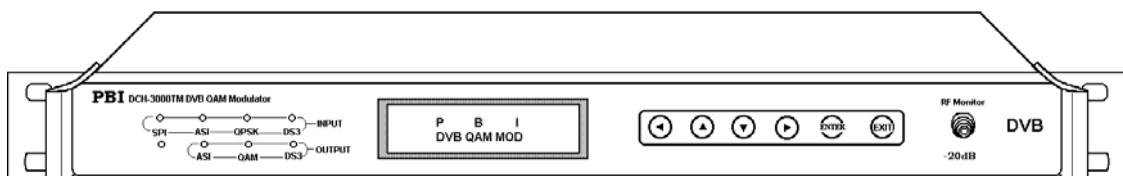
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Caution Statements:

Please observe the following safety requirements before operating the equipment.

Electrical Shock

Thoroughly check your electrical grounding and connectors prior to powering. Make sure all connectors are of the three-prong type to ensure proper grounding.

Whenever the equipment is not used for a prolong period of time, you should disconnect the power cord。

Power Disconnect

Disconnect the power cord under the following conditions：

1. damage on cord and connector
2. equipment get wet or substantial moisture enter the chassis
3. exposure to rain or water
4. equipment dropped or damaged
5. apparent irregularity appears

Do Not Open The Equipment

1. Do not try to repair by yourself
2. Do not use unauthorized part for repair
3. Do not open the covers of the equipment without proper factory authorization

Avoid Moisture

Do not use this equipment in high moisture environment.

No Heavy Stacking

Do not stack the equipment back to back to allow proper ventilation.

No Touching with Bare Hands

Do not touch the equipment during heavy lightening condition.

Caution

1. Do not place this equipment on unstable support.
2. Do not place objects on top of the equipment to block up the ventilation opening.
3. Do not place radio active instrument or object on top of adjacent to the equipment.
4. Provide proper room ventilation during operation of this equipment.
5. Verify with the repair engineer or authorized entity after repair is done to be sure the equipment can be put back to operation.
6. Read the operating manual prior to usage.

DCH-3000TM DVB QAM Modulator

1 Overview

DCH-3000TM is a professional DVB-C QAM modulator, which is based on MPEG and DVB technologies and is fully compliant with these two standards. Its remote management interface provides the flexibly remote control, monitoring and upgrading functionalities. Menu operation and PSI/SI tables can be set, monitored and edited through the Ethernet. The software could be upgraded remotely and conveniently. It supports four types of signal inputs, including：RF tuner (DVB-S, or –C, or –T, factory set optionally), DVB-ASI, DVB-SPI and DS3（option）. It could also output with three different forms simultaneously, they are DVB-ASI, QAM-RF and DS3（option）.

DCH-3000TM could re-multiplex one of the three inputs [Tuner or DVB-SPI, or DS3（option）] with its DVB-ASI input. The built-in PID filter could filter out the undesired PIDs with a service-based selection. These features make much feasible and flexible to administrate the efficiency of the spectrum resources over a CATV network.

Null package stuffing for the final symbol rate set, PCR correction, PAT remapping and PMT remapping, all these four functions are provided automatically. NIT and SDT modification could be done with the remote management interface.

Tuner option provides any one choice from three different DVB standards, they are option 30S for DVB-S, option 30C for DVB-C and option 30T for DVB-T.

Option DS3 provides the DS3 input and output capabilities.

2 Technical Specifications

Input Port

QPSK Tuner	Input frequency range	950~2150MHz
(Option 30S)	Input level	-65~-25dBm
	Input nominal impedance	75Ω
	Connector	F connector female
	Symbol Rate	2~45MBauds
	Roll Off factor	0.35
	FEC puncture rate	1/2, 2/3, 3/4, 5/6, 7/8 auto-detect
	Interleaving depth	I=12
	LNB Power Supply and Polarization signaling	0V or 13V or 18V
	Band switch signaling	0Hz or 22KHz tone

ASI Input	Connector	75Ω，BNC
	ASI mode	Byte or Burst (self adaptive)
	Packet Length	188 or 204
	Signal Level	800mVpp±10%
	Maximum data rate	160Mbps

SPI Input	Connector	25-pin sub-D, female
	Input impedance	90~132Ω
	Data Rate	1M~54Mb/s
	Packet Length	188 or 204
	Signal Level	0.1~2.0Vpp

DS3 Input (Option DS3)	Connector	75Ω，BNC
	Bit rate	44.736Mbps
	Format	DS3, Framed or Unframed (Per G804/G752)

Output Port

ASI Output	Connector	75Ω，BNC
	Maximum data rate	160Mb/s
	Packet Length	188 or 204
	Signal Level	800mVpp±10%

QAM Modulation	Modulate constellation	16, 32, 64, 128, 256 QAM
	Output symbol rate	3.5~7M Bauds
	I/Q Imbalance	<0.1%
	I/Q phase Error	<0.1°
	Jitter	<0.5°RMS
	MER（for QAM256）	>32dB (tester equalizer off)
	Output Frequency	48~862MHz
	RF Connector	75Ω, F female
	RF Level	100~113 dBμV step by 1dB
	Spurious	>55dB, 65dB typical
	Return Loss	≥14dB

DS3 Output (Option DS3)	Connector	75Ω，BNC
	Bit rate	44.736Mbps
	Format	DS3, Framed or non-framed (Per G804/G752)

Miscellaneous	Weight	5kg
	Dimension	44×431×402（mm）
	Operate Temperature	0-40℃
	Storage Temperature	-20~70℃
	Humidity	<95%, non-condensed
	Power Supply	90~260ACV, 50/60Hz
	Power Rating	30Watts MAX.

3 Block Diagram and Typical Applications

3.1 DCH-3000TM Block Diagram
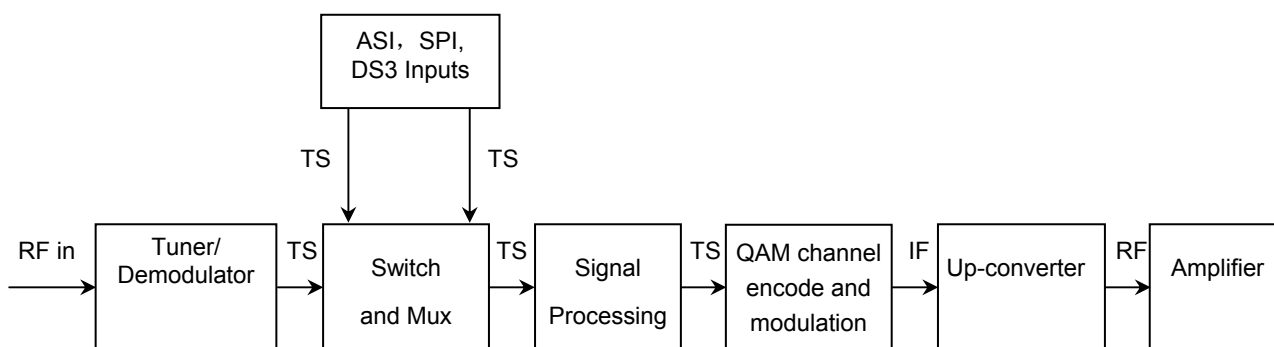
Fig 3-1 DCH-3000TM Block Diagram

3.2 DCH-3000TM Typical Applications

DCH-3000TM supports 4 types of input formats, including Tuner, DVB-ASI, DVB-SPI and DS3 (0ption) inputs. It is able to make one of the three inputs [Tuner, DVB-SPI input and DS3 input（option）]　re-multiplexed with DVB-ASI. On the other hand, DCH-3000TM can filter out the PIDs with a service-based selection. User could just select the preferred service(s) from all detected service names shown on the LCD menu on the front panel or the menu on a monitoring PC. Followed are some typical applications,

ASI

QPSK

SPI

DS3（option）

DCH-3000TM-30S/DS3

Input signal passes directly
or output

ASI

DS3

RF

CATV
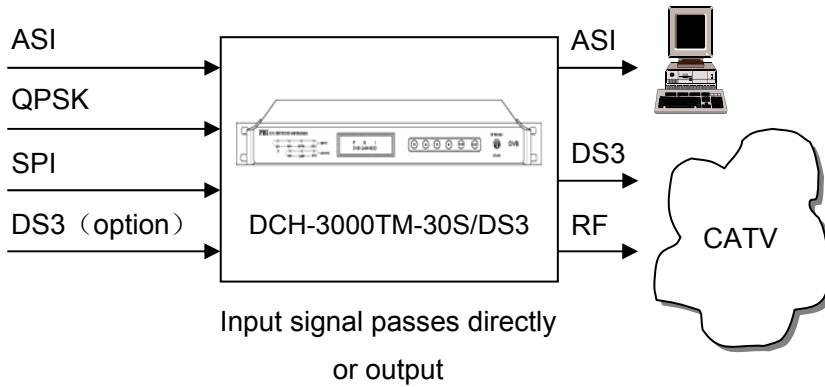
Fig. 3-2-1 One of the four inputs is selected, output as QAM RF, ASI and DS3 simultaneously after processing.

ASI

COFDM

DCH-3000TM-30T/DS3

ASI and QPSK mux output

ASI

DS3

RF

CATV
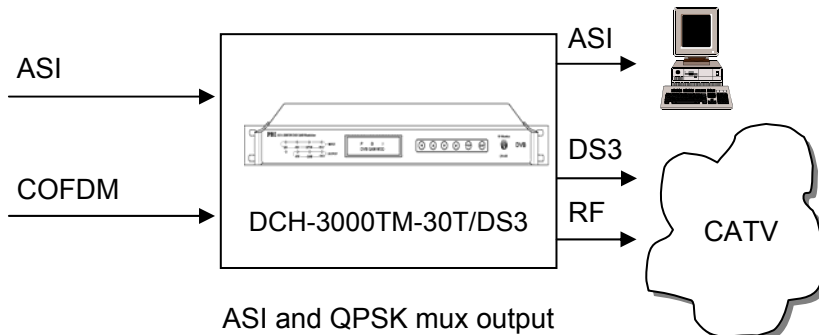
Fig. 3-2-2 The ASI and COFDM inputs are being multiplexed, and output as RF, ASI and DS3（option） formats.

ASI

SPI

DCH-3000TM

ASI and SPI mux output

ASI

DS3(

RF

CATV

Fig. 3-2-3 The ASI and the SPI inputs are being multiplexed and converted as RF, ASI and DS3 （option） forms at the sam time.

ASI

DS3(option)

DCH-3000TM-30S

ASI and DS3 mux output

ASI

DS3

RF

CATV
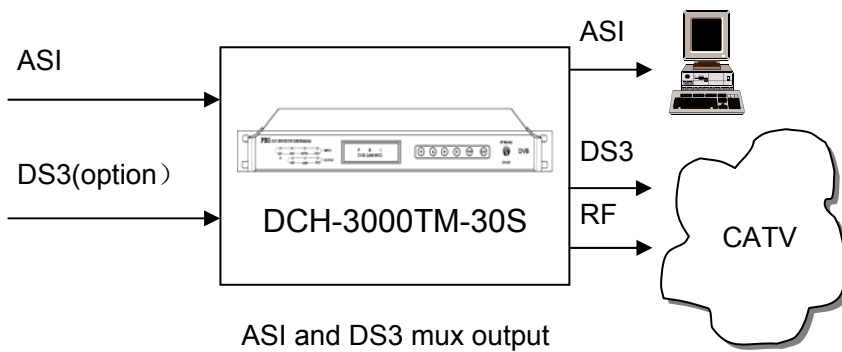
Fig. 3-2-4 A DS3 signal is converted to a DVB-QAM carrier and the DS3 and ASI signals are available, too.

4 Structure and Features

4.1 Front Panel

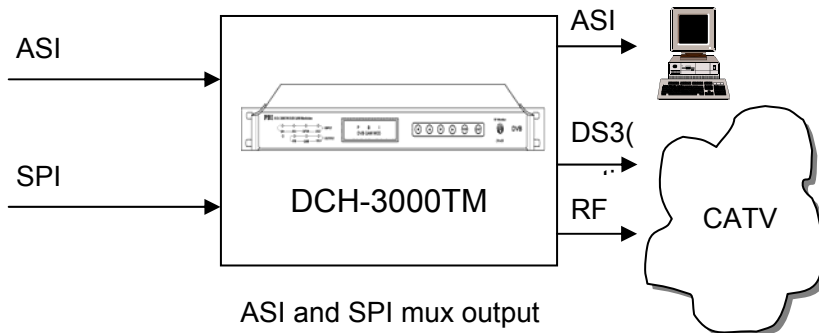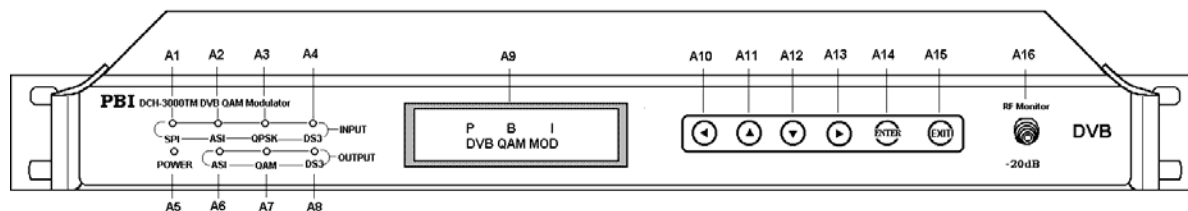|		
A1 SPI IN	SPI input status indicator. In green means 'active' and 'locked', off means 'inactive', and in red means 'under analysis'.	
A2 ASI IN	ASI input status indicator. In green means 'active' and 'locked', off means 'inactive', and in red means 'under analysis'.	
A3 Tuner IN	Tuner input status indicator. In green means 'active' and 'locked', off means 'inactive', and in red means 'under analysis'.	
A4 DS3 IN（option）	DS3 input status indicator. In green means 'active' and 'locked', off means 'inactive', and in red means 'under analysis'.	
A5 POWER	Power indicator. In green proves normal operation.	
A6 ASI OUT	ASI output indicator. In green means 'active' and 'normal'. Off reveals 'inactive'.	
A7 QAM OUT	QAM output indicator. In green means 'active' and 'normal'. Off reveals 'inactive'.	
A8 DS3 OUT（option）	DS3 output indicator. In green means 'active' and 'normal'. Off reveals 'inactive'.	
A9 LCD	2 rows × 24 characters LCD display	

A10-15 keys　　　　They are 〔◀〕〔▲〕〔▼〕〔▶〕，〔**ENTER**〕、〔**EXIT**〕

〔▲〕〔▼〕keys are used for turning page and editing numbers.

〔◀〕〔▶〕keys are used for moving the cursor left and right.

〔ENTER〕key is used for entering to the next menu or for confirming.

〔EXIT〕key is used for returning to the previous menu or for canceling the setting just be entered.

A16 RF Monitor / -20dB　Monitor port for QAM output, -20dB from the main RF OUT.

4.2 Rear Panel
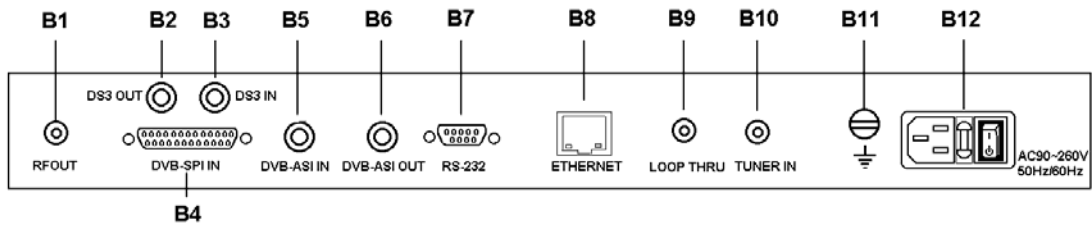
B1 RF OUT	Main QAM-RF output
B2 DS3 OUT	DS3 output (option)
B3 DS3 IN	DS3 input
B4 DVB-SPI IN	Serial Parallel Interface (SPI) input port
B5 DVB-ASI IN	Asynchronous Serial Interface (ASI) input port
B6 DVB-ASI OUT	Asynchronous Serial Interface (ASI) output port
B7 RS-232	Serial port for debug
B8 ETHERNET	RJ45 Ethernet port for network connection and software upgrade
B9 LOOP THRU	Tuner signal loop through output port
B10 TUNER IN	Tuner signal input port
B11 GND	System Ground
B12 Power Supply	AC power inlet

5 Menu Tree and Operation

TUNER Setup

TUNER IF：*1150*MHz
TUNER Symbol Rate：*6875*KBaud
TUNER Power To LNB：*0/13V/18V*
TUNER 22KHz Tone：*ON/OFF*

Source Combination

TUNER / ASI / SPI / DS3
ASI+TUNER / ASI+SPI / ASI+DS3

Input Symbol Rate

TUNER / ASI / SPI / DS3

Input Setup

TUNER Setting

Source Combination

Input Symbol Rate

QAM

QAM Constellation:*16/32/64/128/256*
I/Q Inversion: *Yes/No*
Symbol Rate: *6875*KBaud
Modulation: *ON/OFF*

RF

RF Frequency：*500000*KHz
RF Level：*110*dBuV

Package Length

188 Byte / 204 Byte

DS3 Protocol

Framer MSB / Framer LSB
Unframer MSB / Unframer LSB
DS3 LOOP

DCH-3000TM
IP10.010.070.159

Output Setup

QAM
RF
Package Length
DS3 Protocol

Input Setup
Output Setup
PID Processing
System

Program List

TUNER：*Lock/Unlock*
ASI：*Lock/Unlock*
SPI：*Lock/Unlock*
DS3：*Lock/Unlock*

Set Transportstream ID

00008

Processing Starts

Enabled / Disabled

PID Processing

Program List

Set Transportstream ID

Processing Starts

Local Setting

IP Address：*010.010.070.137*
Network mask：*255.255.255.0*
Gateway：*010.010.070.001*

Remote Setting

Upgrade FTP IP：*010.010.070.245*
Upgrade：*Disabled/Enabled*
Server IP：*010.010.070.245*

Symtem

Local Setting:
Remote Setting:
Alarm:
Unit Name: *DCH-3000TM*
S/N:
FPGA Version:
Software Version:
Factory Settings

Menu Operation

Front Panel adopts a 2 × 24 characters LCD display. The menu information will be displayed after power up the unit.

The first line is the product model name and the second line is its IP. Press "**ENTER**" to enter the main menu ：

```
┌─────────────────────────────────────┐
│           DCH-3000TM                 │
│       IP：010.010.070.159            │
└─────────────────────────────────────┘
```
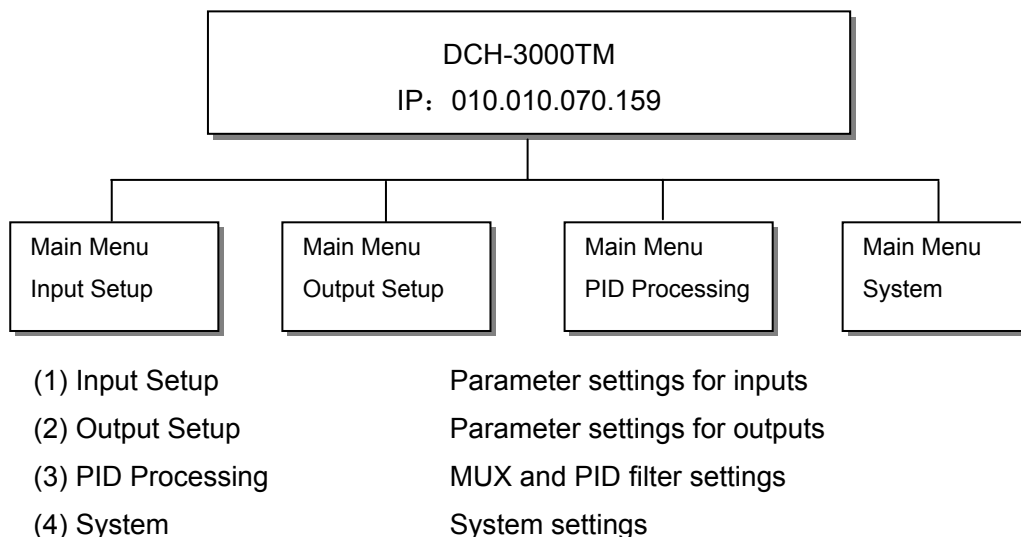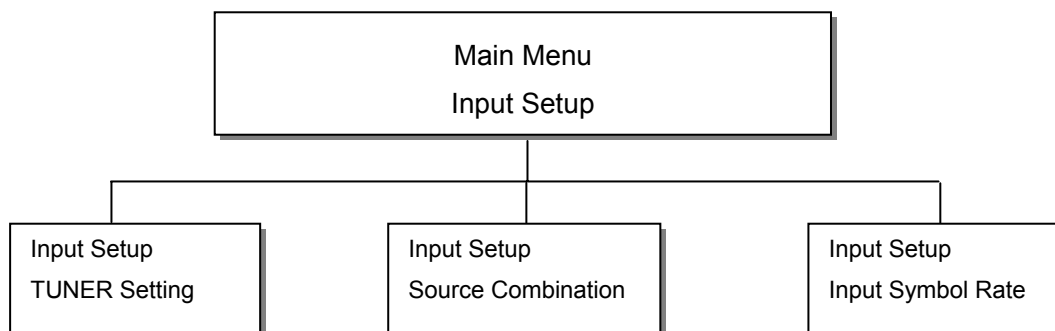
```
┌──────────────┐ ┌──────────────┐ ┌──────────────┐ ┌──────────────┐
│ Main Menu    │ │ Main Menu    │ │ Main Menu    │ │ Main Menu    │
│ Input Setup  │ │ Output Setup │ │ PID Processing│ │ System       │
└──────────────┘ └──────────────┘ └──────────────┘ └──────────────┘
```

    (1) Input Setup   Parameter settings for inputs

    (2) Output Setup   Parameter settings for outputs

    (3) PID Processing   MUX and PID filter settings

    (4) System   System settings

5.1 Input Setup Menu

There are 3 sub-menus：Tuner settings, Source combination and input symbol rate. As following：

```
┌─────────────────────────────────────┐
│           Main Menu                  │
│           Input Setup                │
└─────────────────────────────────────┘
```

```
┌──────────────────┐ ┌──────────────────┐ ┌──────────────────┐
│ Input Setup      │ │ Input Setup      │ │ Input Setup      │
│ TUNER Setting    │ │ Source Combination│ │ Input Symbol Rate│
└──────────────────┘ └──────────────────┘ └──────────────────┘
```

5.1.1 TUNER Setting Menu

Contains 4 options, setting parameters for TUNER：

TUNER IF：QPSK (option 30S) input IF frequency setting. (For example, if L.O.=*5150*MHz，Down link RF Freq=*3840*MHz, then the freq(IF) = freq(Lo) - freq(RF) = *1310*MHz.)

TUNER Symbol Rate：Input Symbol rate setting, (For example, *26850*KBauds for a QPSK tuner).

TUNER Power To LNB(option 30S only)： Power supply setting to the external LNB, also for polarization control, 13V for Vertical polarization and 18V for Horizontal. When 0V is selected, no power is supplied to the LNB.

*TUNER 22KHz Tone(option 30S only)： LNB band switch, 0Hz for low band and 22KHz tone for high band.
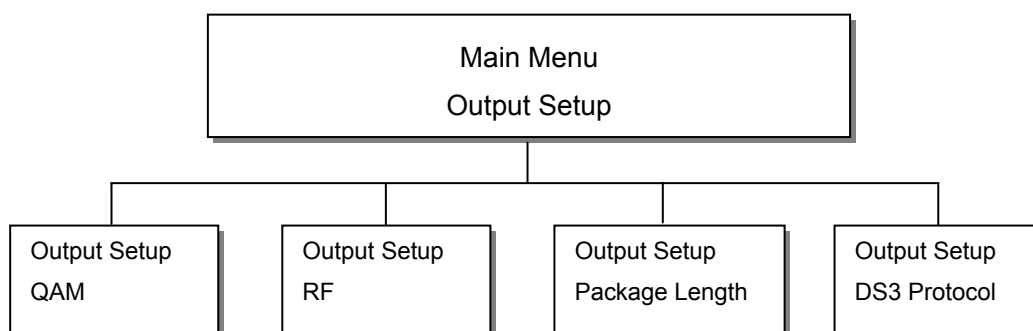
5.1.2 Source Combination Menu

DCH-3000TM supports 7 kinds of mode select , they are：*TUNER、ASI、SPI、DS3*（options）、*ASI+TUNER、ASI+SPI、ASI+DS3*（options）. User can select one combination from them per the system requirement. If signals searching and analysis are completed, the indicators corresponding to each source on front panel will turn green.

5.1.3 Input Symbol Rate Menu

Symbol rate entry for *TUNER、ASI、SPI or DS3*（options）. There will be a prompt 'LOCK' and the stream bit rate detected for corresponding input on this menu if signal input is accepted and locked.

5.2 Output Setup Menu

There are 4 sub-menu, they are QAM, RF, Package Length and DS3 Protocol, as followed：

```
            ┌─────────────────────────┐
            │        Main Menu        │
            │       Output Setup      │
            └─────────────────────────┘
       ┌──────────┬──────────┴─────────┬──────────┐
┌──────────┐ ┌──────────┐ ┌──────────┐ ┌──────────┐
│Output Setup│ │Output Setup│ │Output Setup │ │Output Setup │
│QAM       │ │RF        │ │Package Length│ │DS3 Protocol │
└──────────┘ └──────────┘ └──────────┘ └──────────┘
```

5.2.1 QAM Menu

QAM Constellation.： QAM modulation constellation and supporting *16/32/64/128/256* QAM

I/Q Inversion：Selecting "*Yes*" for Inverted I/Q, selecting "*No*" for non-inverted

Symbol Rate：Setting QAM modulation symbol rate, the default is *6875*KBaud

Modulation：Selecting QAM modulation. Selecting *ON* t0 activate QAM modulation and selecting *OFF* to output single non-modulated carrier (for example, to measure the channel power).

5.2.2 RF Menu

RF Frequency：From 48 to 862MHz, step by 250KHz

RF Level：From 100 to113dBμV, step by 1Db

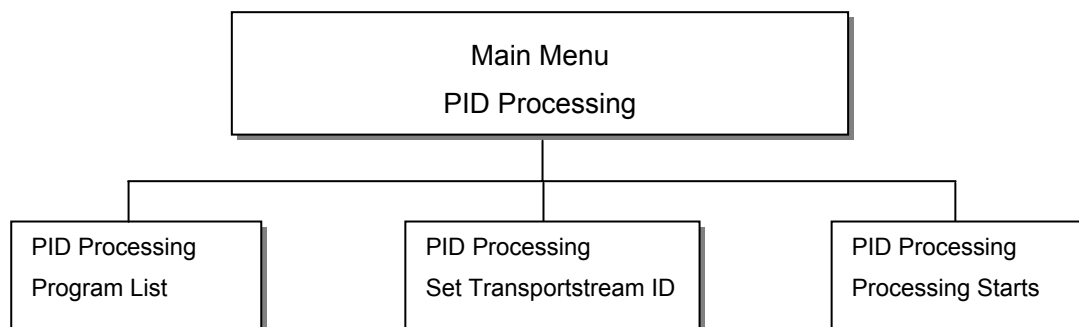### 5.2.3 Package Length Menu

It is the TS output package length and you can select *188 Byte* or *204 Byte*.

5.2.4 DS3 Protocol

DS3 output format settings: *Framed MSB*、*Framed LSB*、*Unframed MSB*、 *Unframed LSB and DS3 LOOP*

5.3 PID Processing Menu

Contains 3 options for TS MUX setting and PID filtering. The menu structure is：

```
                    ┌────────────────────────┐
                    │       Main Menu        │
                    │     PID Processing     │
                    └────────────────────────┘
          ┌──────────────────┼──────────────────┐
 ┌─────────────────┐ ┌─────────────────────┐ ┌─────────────────┐
 │ PID Processing  │ │ PID Processing      │ │ PID Processing  │
 │ Program List    │ │ Set Transportstream │ │ Processing Starts│
 │                 │ │ ID                  │ │                 │
 └─────────────────┘ └─────────────────────┘ └─────────────────┘
```

5.3.1 Program List Menu

Look-up table for the names of the programs (services) detected, which corresponds to TUNER, ASI, SPI and DS3 respectively. Pressing Up/Down key to roll the program names and press Enter key to select the program displayed; there will be a "*" mark follows the program name once it is selected; pressing Enter key again to de-select it, the '*' mark will then disappear. The selected programs are ready for multiplexing or passing the PID filter process.

If there is no signal from the input(s) selected, the display will show 'No Program List'.

There is a "**$**" mark in front of the encrypted program(s).
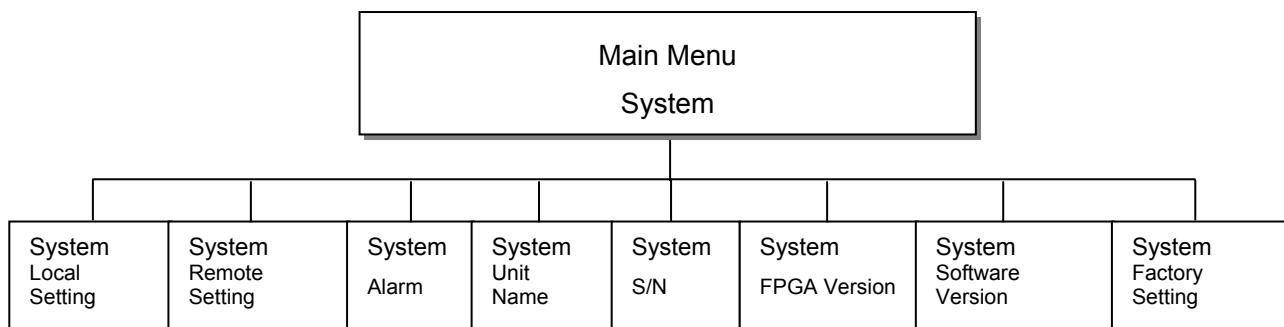
5.3.2 Set Transportstream ID Menu

It's used for setting ID of transporting stream.

5.3.3 Processing Starts Menu

Select *Enabled* for PID filter or Multiplexing, and *Disabled* for by pass mode.
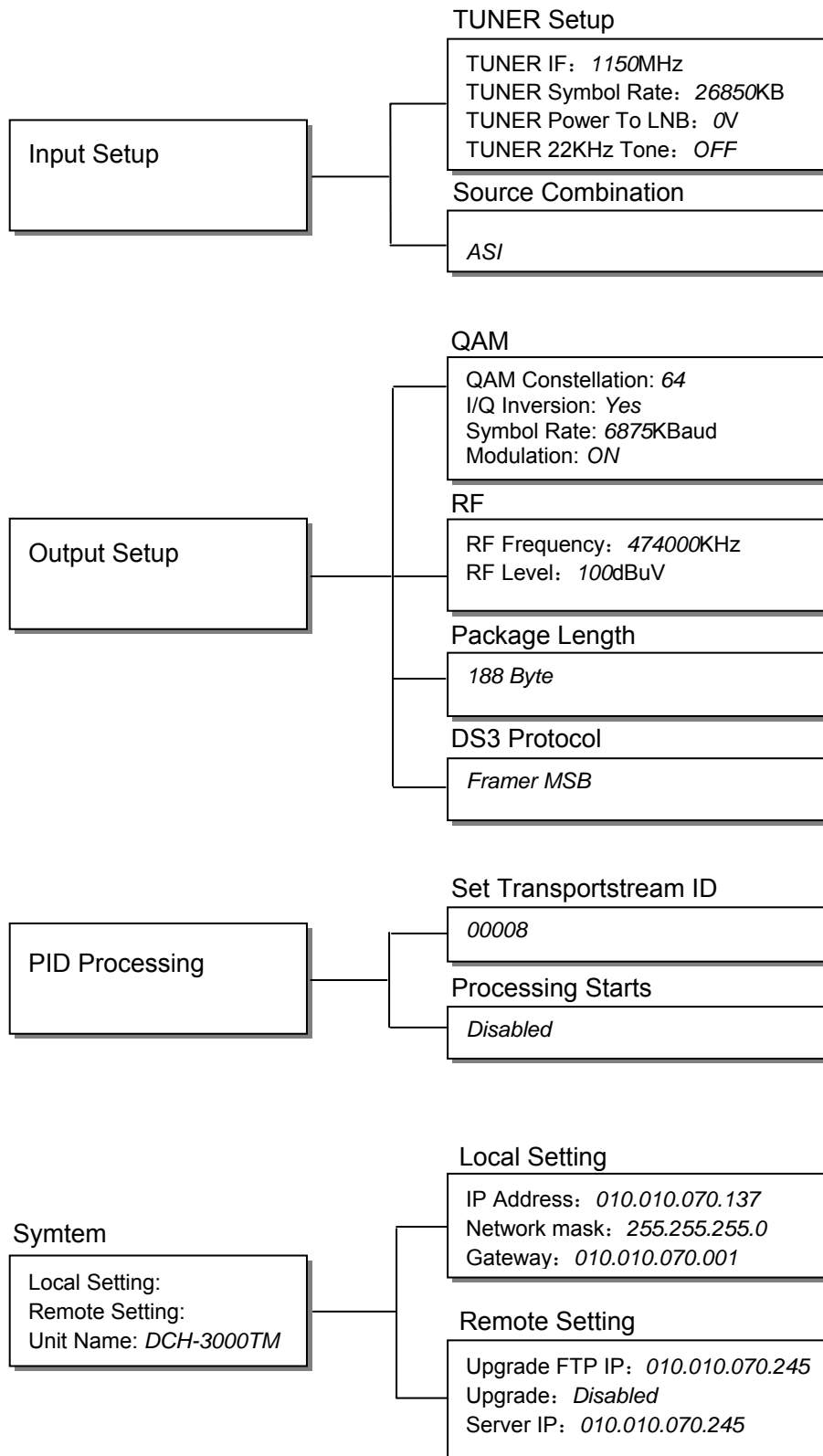
5.4 System Menu

There are 8 sub-menus and structure as below：

```
┌─────────────────────────────┐
│          Main Menu          │
│           System            │
└─────────────────────────────┘
```

System Local Setting	System Remote Setting	System Alarm	System Unit Name	System S/N	System FPGA Version	System Software Version	System Factory Setting

Local Setting	Including 4 sub-menus：
	IP Address：Local (DCH-3000TM) IP address entry menu
	Network Mask：Network Mask IP address entry menu
	Gateway：Gateway IP address entry menu
	MAC Address：Medium Accessory Control is global unique, not accessible by user.
Remote Setting	Including 3 sub-menus：
	Upgrade FTP IP：IP address entry menu for the FTP for upgrade
	Upgrade：Select Enabled to allow auto-upgrade next time the unit is power up. Select Disable to discard. This function will return to Disable every time the unit is powered up **or** auto upgraded, regardless to whether the unit has been upgraded or not.
	Server IP：IP address entry menu for the remote PC.
Alarm	Displaying alarming information
Unit Name	Nicked name entry for this unit
S/N	Serial Number of this unit
FPGA Version	FPGA version of this unit
Software Version	Main version of this unit
Factory Settings	Factory Default settings recover menu. Selection "Factory Setting" and press "ENTER" key, default setup is recalled and set, as shown below for a unit with 30S option:

Input Setup

TUNER Setup

TUNER IF：*1150*MHz
TUNER Symbol Rate：*26850*KB
TUNER Power To LNB：*0V*
TUNER 22KHz Tone：*OFF*

Source Combination

ASI

Output Setup

QAM

QAM Constellation: *64*
I/Q Inversion: *Yes*
Symbol Rate: *6875*KBaud
Modulation: *ON*

RF

RF Frequency：*474000*KHz
RF Level：*100*dBuV

Package Length

188 Byte

DS3 Protocol

Framer MSB

PID Processing

Set Transportstream ID

00008

Processing Starts

Disabled

Symtem

Local Setting:
Remote Setting:
Unit Name: *DCH-3000TM*

Local Setting

IP Address：*010.010.070.137*
Network mask：*255.255.255.0*
Gateway：*010.010.070.001*

Remote Setting

Upgrade FTP IP：*010.010.070.245*
Upgrade：*Disabled*
Server IP：*010.010.070.245*

6 Upgrade with Network

Equipment needed for upgrade：

One PC: PIII 550 or above (Installed with WIN2000 or above and FTP server software)

One HUB

One appropriated network wire (crossed or non-crossed, depends on network topology)

1. PC IP setting：First, set the IP address, sub-mask and gateway of the PC, this must be set uniquely in a network. And the IP address must be in the same network section of the target device(s) being upgraded, namely the DCH-3000TM. The sub-mask and gateway become not important if the PC is connected directly to DCH-3000TM.

2. Installing and execute the FTP server software on the same PC; Set the IP address of FTP server, it could be the same IP address of the PC; Setting user as '*anonymous*' which allows the DCH-3000TM visit the FTP without password entry; save the files for upgrade onto the root directory of the FTP.

3. DCH-3000TM setting：Setting Upgrade IP address, sub-mask and gateway (as same as those of the PC); Setting Local DCH-3000TM's IP address (within the same network section of IP of the PC); Setting 3000TM Upgrade option as '*Enabled'*. Note: this 'Upgrade enable' will be disable every time the unit is powered up, no matter the upgrade has been carried on or not. The sub-mask and gateway become not important if the PC is connected directly to DCH-3000TM.

4. Connection： Use a crossed network wire for connecting DCH-3000TM directly to a PC. User could also connect several DCH-3000TMs to a PC through a HUB and update them one by one, in the later case, use a normal network (non-crossed) wire. Note: the IPs for DCH-3000TMs must be different, and must be set within the same network section of that of PC connected, such as: *010.010.070.150* ，*010.010.070.151* ，*010.010.070.152*………

5. After make sure the 'upgrade enable' has been set, turn the DCH-3000TM's power off and wait at least 3 second for internal discharge. Then power up the unit again with the FTP is ready for visit (use must turn on and enable the FTP server first). The unit will be both connected to the FTP and upgraded automatically. After upgrade successfully, the main menu will be displayed subsequently. The upgrade process takes about 20 to 30 seconds depends on the speed of the network.

6. User could check the software version to confirming whether upgrade has been done successfully or not.

7 Using and Maintenance

7.1 Safety Notice

Please verify the following conditions to warrant safe operation：

- Must read this user manual thoroughly and carefully before installation.
- Do not operate under high temperature and high moisture conditions.
- Do not use soap or detergent to clean the equipment.
- Ground the unit properly.
  There is a 20-second warm-up time when first turned on.
  Other equipment connected to DCH-3000TM must be well-grounded.
  Please check the electricity requirements before turning it on.
- User shall not open the covers of this equipment without prior authorization from the manufacturer.
- There is no self repair component inside. Contact the manufacturer or authorized agent for repair.

7.2 Installation：

- Using screw bolts to fix the unit on a 19 inches cabinet.

- Ground the unit on the grounding bolt on the rear panel with appropriated grounding wire to the appropriated grounding terminal.

- Connect all input and output connectors to their appropriated sources or destinations.

- Verify the AC electricity source available is within the acceptant range of that of DCH-3000TM. Connect the unit to the AC source with power cord originally depatched, then turn on the power switch near the AC inlet on the rear panel. When the unit is working, the POWER indicator lights. Please unplug when the unit if not in use for a long period, e.g. 1 week. The power up booting process sometimes takes longer than 20 seconds.

- After setting all parameters correctly the QAM RF carrier will be available from the main RF output on the rear panel.

8 Accessories

1 power cord (may vary for different countries) ,1 user manual, 1 CD（Containing network management program and user manual）, 1 Quality Guarantee Card

The State Administration of Radio and Film and Television Bureau, China have qualified this unit. The Authentication number is 011050101483.

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