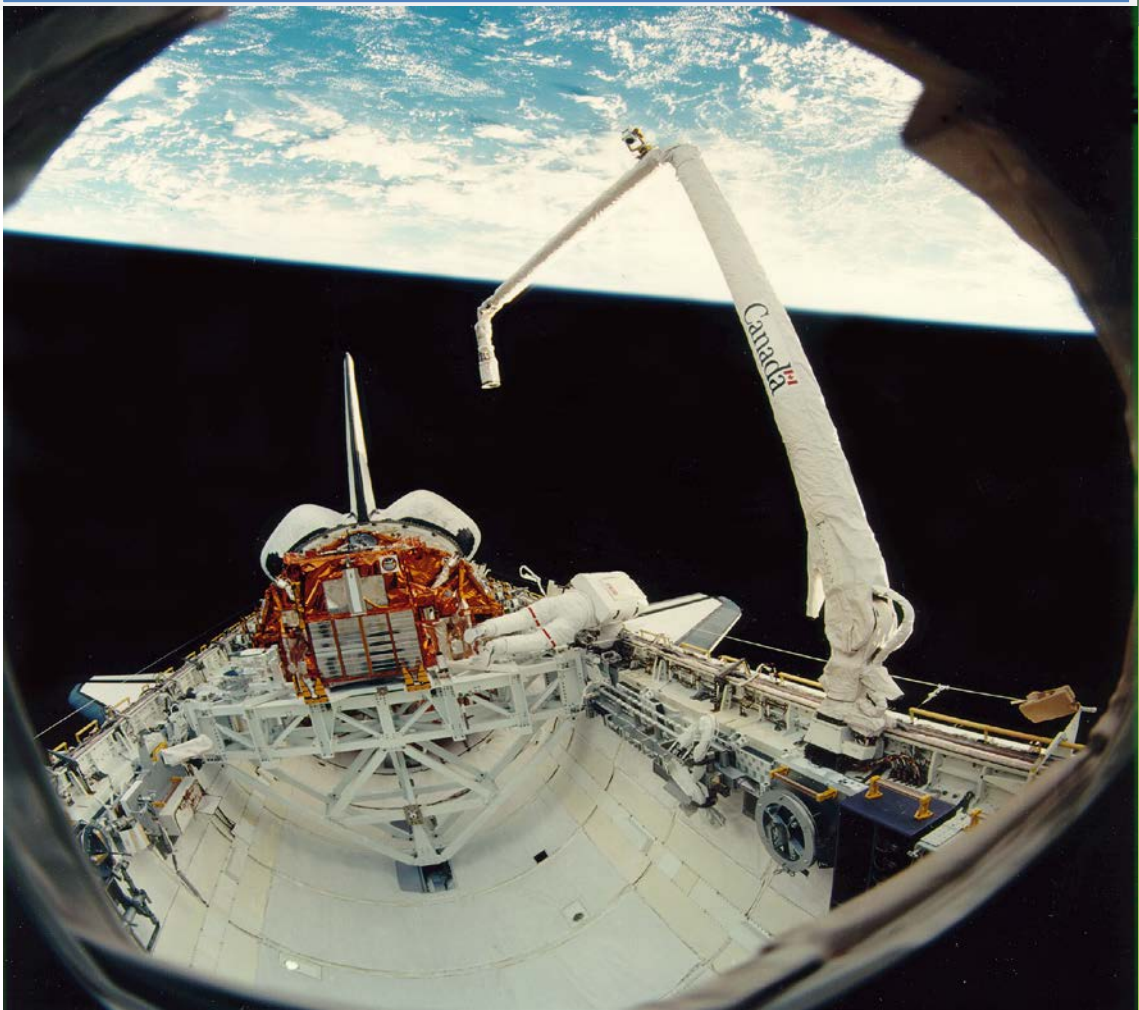


PTS-10A Time Server Operation Manual



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Version Copyright

R7



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1.

Basic Features

1.1. Introduction



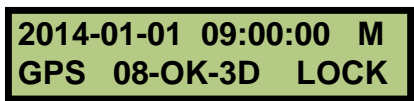
[Figure 1-1] PTS-10A Time Server

The PTS-10A Time Server is a standard time server. It supports high precision reference clock, which can be synchronized to absolute time such as GPS, BDS, and GLONASS etc. Built-in TCXO, OCXO, Rubidium clock helps to provide stable reference frequency source. System supports multiple sources time sync auto selection algorithm which can perform stable switch between GPS, BDS, GLONASS, IRIG-B, PTP and local clock, and sky/ground and master/slave clock backup. PTS-10A time server provides flexible time output channels and signals. The output timing signals include PPS, PPM, PPH, IRIG-B (Demodulated), IRIG-B (Modulated), Serial Time Signal (TOD etc.) etc. Plus, PTS-10A supports network sync time protocols NTP/SNTP and PTP (IEEE1588 v2). IEEE1588 can works in several modes by the software configuration including grandmaster clock, slave clock and boundary clock. PTS-10A has LCD to show any status and do configuration by keyboard. Meanwhile, PTS-10A is designed to send timing source status and clock status to control center by IEC61850 MMS, IEC60870-T104, DNP3.0, Modbus etc. PTS-10A also supports WEB and SNMP to manage system.

2. LCD

2.1. Main Screen

The default main screen is shown as below:

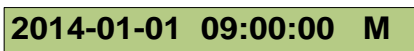


[Figure 2-1] PTS-10A Main Screen

The screen has two line characters. The top line always shows the time information and PTP clock information. The bottom line shows time server status including time source status, clock status, position information and version information.

2.1.1. Time Infomation

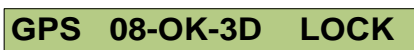
It lies in the top line of screen. Time information includes time as the following format yyyy-mm-dd hh:mm:ss and PTP clock information as M (Master), S (Slave) and B (Boundary).



[Figure 2-2] PTS-10A Time Information

2.1.2. Status Infomation

Time server shows the current time source status, clock status, position information and version information. The detail information please refers to section 2.3.



[Figure 2-3] PTS-10A Status Information

2.2. Indicator Light and Keys

Press any key of front panel to view information and change parameters.

Name	Description
LEFT	Show Information as left direction.
RIGHT	Show information as right direction.
Enter	Confirm operation.
ESC	Cancel operation or Back to high level

Indicator light of front panel shows time server status.

Name	Description
PSW	On: Power On; Off: Power Off
SAT	On: Satellite Number >=4; Off: Satellite Number <4
ANT	On: Antenna is normal; Off: Antenna is abnormal
LOCK	Flash(1 second): Clock is locked; Flash(3 seconds):Clock is holded; Off: Clock is unlocked

NOTE: When screen backlight is off, press any key will ative screen again.

2.3. Status Indication

Time server will be shown as the following information.

All information screens can be shown by LEFT or RIGHT key at the main screen.

2.3.1. Time Information

The system time is shown at the first part of top line. This line is fixed.

The time format is YYYY-MM-DD HH:MM:SS.mmm.

```
2014-01-01 09:00:00 M
GPS 08-OK-3D LOCK
```

[Figure 2-4] System Time (LOCAL)

This is a local time display with local time zone.

The daylight saving time (DST) will show ‘*’ at the end of system reference time.

```
2014-01-01 09:00:00 * M
GPS 08-OK-3D LOCK
```

[Figure 2-5] System Time (DST)

2.3.2. PTP Information

The PTP clock status is shown at last part of top line. This line is fixed.

The PTS-10A might work in one of the following modes:

- Master PTP Grandmaster Clock
- Slave PTP Slave Clock
- Boundary PTP Boundary Clock

```
2014-01-01 09:00:00 M
PTP 000-000-P2P LOCK
```

```
2014-01-01 09:00:00 S
PTP 000-000-P2P LOCK
```

2014-01-01 09:00:00 B
PTP 000-000-P2P LOCK

[Figure 2-6] PTP Information

2.3.3. Source Information

The time source status is shown at bottom line.

The display contents will be changed by LEFT or RIGHT key.

Use GPS as sync source, the display format is shown below:

GPS xx-xx-xx

xx (1st) The amount of locked GPS satellites at present.

xx (2nd) GPS antenna status. Following is the status introduction:

OK: antenna normal

UV: low antenna power supply voltage

NV: no antenna power supply voltage

OC: antenna over current

xx (3rd) GPS fix mode. Following is the mode introduction:

3D: The best fix mode.

2D: 2D fix mode. Not enough tracked satellites

HD: Hold over. Just lost the tracking to satellites, but time accuracy should be OK.

No: No fix. No satellites are tracked.

2014-01-01 09:00:00 M
GPS 08-OK-3D LOCK

[Figure 2-7] Sync Source: GPS

Use BDS as sync source, the display format is shown below:

BDS xx-xx-xx

xx (1st) The amount of locked BDS satellites at present.

xx (2nd) BDS antenna status. Following is the status introduction:

OK: antenna normal

UV: low antenna power supply voltage

NV: no antenna power supply voltage

OC: antenna over current

xx (3rd) BDS fix mode. Following is the mode introduction:

3D: The best fix mode.

2D: 2D fix mode. Not enough tracked satellites

HD: Hold over. Just lost the tracking to satellites, but time accuracy should be OK.

No: No fix. No satellites are tracked.

2014-01-01 09:00:00 M
BDS 08-OK-3D LOCK

[Figure 2-8] Sync Source: BDS

Use GLONASS as sync source, the display format is shown below:

GLN xx-xx-xx

xx (1st) The amount of locked GLONASS satellites at present.

xx (2nd) GLONASS antenna status. Following is the status introduction:

OK: antenna normal

UV: low antenna power supply voltage

NV: no antenna power supply voltage

OC: antenna over current

xx (3rd) GLONASS fix mode. Following is the mode introduction:

3D: The best fix mode.

2D: 2D fix mode. Not enough tracked satellites

HD: Hold over. Just lost the tracking to satellites, but time accuracy should be OK.

No: No fix. No satellites are tracked.

2014-01-01 09:00:00 M
GLN 08-OK-3D LOCK

[Figure 2-9] Sync Source: GLONASS

Use IRIG-B as sync source, the display format is shown below:

IRIG-B xx-xx-xxx

xx (1st) IRIG-B input format. Following is the format introduction:

DC: IRIG-B Demodulated

AC: IRIG-B Modulated

xx (2nd) IRIG-B input interface. Following is the interface introduction:

FI1: IRIG-B input interface named FI1 on the rear panel.

FI2: IRIG-B input interface named FI2 on the rear panel.

xxx (3rd) The number of IRIG-B input frame from 0 to 999. It means when count number over 999, it will start from 0 again.

2014-01-01 09:00:00 M
IRIG DC-FI1-255 LOCK

[Figure 2-10] Sync Source: IRIG-B-DC

Use PTP as sync source (i.e., the PTS-10A can work as PTP Slave Clock or Boundary Clock), the display format is shown below:

PTP xxxx xxxxx xxx
 xxxx(1st) PTP Offset value, the unit is ns.
 The value range is between -999 to +999.
 If out of this range, it will use '*' instead.
 xxxxx(2nd) PTP Delay Measurement value, the unit is ns.
 The value range is between -9999 to +9999.
 If out of this range, it will use '*' instead.
 xxx(3rd) PTP Mode, E2E or P2P

2014-01-01 09:00:00 S
PTP 000-000-P2P LOCK

[Figure 2-11] Sync Source (PTP-P2P-Slave)

2014-01-01 09:00:00 B
PTP 000-000-E2E LOCK

[Figure 2-12] Sync Source (PTP-E2E-Boundary)

2.3.4. Clock Information

For any kind of time reference source, the lastpart of line always shows clock status. For seeking status, 'SEEK' is displayed; for initial status, 'INIT' is displayed; for sync status, 'SYNC' is displayed; for lock status, 'LOCK' is displayed; for time adjust status, 'RCRV' is displayed; for hold status, 'HOLD' is displayed.

2014-01-01 09:00:00 M
LOCAL No Source SEEK

[Figure 2-13] Sync Lock Mode (SEEK)

2014-01-01 09:00:00 M
LOCAL No Source INIT

[Figure 2-14] Sync Lock Mode (INIT)

2014-01-01 09:00:00 M
GPS 08-OK-3D SYNC

[Figure 2-15] Sync Lock Mode (SYNC)

2014-01-01 09:00:00 M
GPS 08-OK-3D LOCK

[Figure 2-16] Sync Lock Mode (LOCK)

2014-01-01 09:00:00 M
GPS 08-OK-3D RCVR

[Figure 2-17] Time Setting Mode (RCVR)

2014-01-01 09:00:00 M
LOCAL No Source HOLD

[Figure 2-18] Hold Mode (HOLD)

2.3.5. Position Information

When get the satellite information from satellite source, system will show the position information including longitude, latitude and height.

2014-01-01 09:00:00 M
Longitude: 0.000000 E

[Figure 2-19] Longitude

2014-01-01 09:00:00 M
Latitude: 0.000000 N

[Figure 2-20] Latitude

2014-01-01 09:00:00 M
Height: 0.000 M

[Figure 2-21] Height

2.3.6. Version Information

View the version information of software from screen. The version will show detailed version information and compile date and time of software.

2014-01-01 09:00:00 M
VER: R7.40

[Figure 2-22] Version

2014-01-01 09:00:00 M
VER:Feb 22 2016 16:42:02

[Figure 2-23] Compile Date & Time

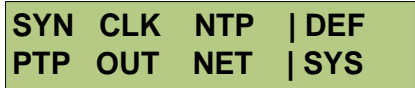
3. Operations

3.1. Settings

LCD screen might show data by 'LEFT/RIGHT' key. Press 'Enter' key on any screen might enter setting screen to change setting. When change any options in the setting screen, user can use the navigation button 'LEFT' and 'RIGHT' key to switch the settings page. Press 'Enter' key to set parameters. According to screen tips, select or type the correct settings.

3.1.1. Setting Options

On main screen, select 'Enter' key to enter to setting configuration screen.



[Figure 3-1] Configuration Screen

Name	Description	Note
SYN	Source settings	Set the external clock source including GPS, BDS, GLONASS, IRIG-B, and PTP. Here we can set the priority of source, IRIG-B time service and antenna time delay compensation, etc.
CLK	Clock settings	Set reference time as UTC or TAI time tag, time zone offset, output modes and Daylight Saving Time(DST) etc.
NTP	NTP settings	Set NTP time service and offset between UTC and NTP.
PTP	PTP settings	Set PTP time service including work modes, sync time interval, delay time interval, priority and vLAN etc.
OUT	Output settings	Set programmable output channel SO, O1~O5 including output signal, time format, signal delay compensation, polarity, etc.
NET	Network settings	Set network IP address, subnet mask and operating modes.
DEF	Default setting	Load default parameter when need it.
SYS	System setting	System management including change password etc.

3.1.2. Setting Confirmation

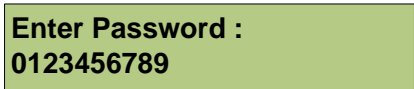
Any modified settings should be accepted password confirm. If wrong password, the new configuration will not work.

As the following steps to finish password confirm:

Password Check Screen

Use 'LEFT/RIGHT' key to select password, then press 'Enter'key to confirm.

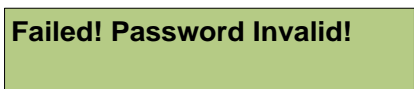
NOTE: The default password is 8.



[Figure 3-2] Enter Password Screen

Password Invalid Screen

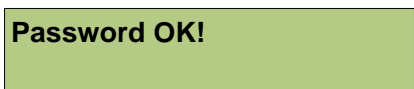
Input wrong password, the following tips will be shown:



[Figure 3-3] Invalid Password Screen

Password Valid Screen

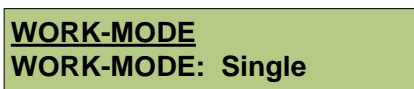
Input correct password, the following tips will be shown:



[Figure 3-4] Valid Password Screen

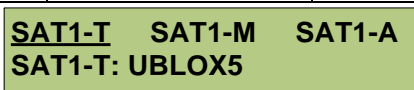
3.2. Source Settings

In main screen, press 'SYNC' button to modify sync source settings. Various sync source settings are provided by the page switch buttons. There are totally 3 pages available.



[Figure 3-5] Source Setting: Page 1

Name	Description	Parameter	Note
WORK MODE	Working Mode	Single /Multiple	Single source enabled(only one good external source can make clock work)/multi-source enabled(compare with multiple good time sources in order to select best one as the reference source)



SAT2-T SAT2-M SAT2-A
SAT2-T: UBLOX5

[Figure 3-6] Source Setting: Page 2, 3

Name	Description	Parameter	Note
SAT1-T SAT2-T	SatelliteType	UBLOX5/UBLOX8/AT 3340/HWA210B/HW A210L	Set satellite receiver model.
SAT1-M SAT2-M	SatelliteMode	Auto/A-BDS/A- GPS/A-GLN/F- BDS/F-GPS/F-GLN	Set satellite receiver working mode.
SAT1-A SAT2-A	SatelliteAntenna Compensation	Ons	According to different antenna types and lengths, system implements time delay compensation.

SAT1-P SAT1-P
SAT1-P: 1

B01-P B02-P PTP-P
B01-P : 1

[Figure 3-7] Source Setting: Page 4, 5

Name	Description	Parameter	Note
SAT1-P	SAT1 Priority	1~10	Set the priority for external signal source. 1 is highest source and 10 is lowest source.
SAT2-P	SAT2 Priority		
B01-P	IRIG-B1 Priority		
B02-P	IRIG-B2 Priority		
PTP-P	PTP Priority		

SAT1-W SAT2-W
SAT1-W: SYNC

B01-W B02-W PTP-W
B01-W : SYNC

[Figure 3-8] Source Setting: Page 6, 7

Name	Description	Parameter	Note
SAT1-W	SAT1 Mode	SYNC/PEER/NONE	To set source working mode. SYNC is individual sync source, PEER is redundancy sync source and NONE is anything to do.
SAT2-W	SAT2 Mode		
B01-W	IRIG-B1 Mode		
B02-W	IRIG-B2 Mode		
PTP-W	PTP Mode		

B1CHA B1FOR B1OFF
B1CHA: FI1

B2CHA B2FOR B2OFF
B2CHA: FI2

[Figure 3-9] Source Setting: Page 8, 9

Name	Description	Parameter	Note
B1CHA B2CHA	IRIG-B1/2 Input	FI1/FI2	To set IRIG-B1/B2 input time signal.
B1FOR B2FOR	IRIG-B1/2 Format	DC+/DC-/MC/AC	To set IRIG-B1/B2 input format, including DC+ (positive polarity demodulated), DC-(negative polarity demodulated), MC (Manchester) and AC (modulated) IRIG-B signal.
B1OFF B2OFF	IRIG-B1/B2 UTC	0.00H	Set time offset between IRIG-B and UTC.

3.3. Clock Settings

USE OUT ZONE TAI OFF
USE: UTC

[Figure 3-10] Clock Setting: Page 1

Name	Description	Parameter	Note
USE	Use UTC	UTC / TAI	Set UTC time or TAI time as required.
OUT	Output Mode	Always/Lock	Always means time server always has output signals in any time. Lock means time server only has output signals after timer server is locked by external time source.
ZONE	Time Zone	0.00H	Set time zone offset to ensure required time zone display.
TAI OFF	TAI and UTC Offset	35s	Set time zone offset between TAI and UTC.

DST OFF DSTMODE
DST OFF: 0.00H

[Figure 3-11] Clock Setting: Page 2

Name	Description	Parameter	Note
DST OFF	DST Offset	0.00H	Set how many hours need to adjust at DST period.
DSTMODE	DST Mode	UTC/LOCAL	Set use which reference time to convert DST time.

Start : 1st MON MAR 02:00
Start Index: 1st

Stop : 1st MON MAR 02:00
Stop Index: 1st

[Figure 3-12] Clock Setting: Page 3

Name	Description	Parameter	Note
Start DST	Index	1 st /2 nd /3 rd /4 th /5 th /L ast	Set start date of DST.
	Weekday	MON/TUE/WEN/ THU /FRI/SAT/SUN	
	Month	JAN/FEB/MAR/AP R/MAY/JUN/JUL/A UG/SEP/OCT/NOV /DEC	
	Time	00:00~24:00	
Stop DST	Index	1 st /2 nd /3 rd /4 th /5 th /L ast	Set start date of DST.
	Weekday	MON/TUE/WEN/ THU /FRI/SAT/SUN	
	Month	JAN/FEB/MAR/AP R/MAY/JUN/JUL/A UG/SEP/OCT/NOV /DEC	
	Time	00:00~24:00	

3.4. NTP Settings

NTP-S NTPOFF
NTP-S: Enable

[Figure 3-13] NTP Setting: Page 1

Name	Description	Parameter	Note
NTP-S	NTP Server	Enable/Disable	Set NTP to enable time service.
NTPOFF	NTP and UTC Offset	0.00H	Set time offset between NTP and UTC.

3.5. PTP Settings

MODE DELAY LOG-S LOG-D
MODE: Master

[Figure 3-14] PTP Setting: Page 1

Name	Description	Parameter	Note
MODE	PTP Mode	Master/Slave /Boundary	Set PTP working mode.
PATH	Delay Measurement Mode	E2E / P2P / Disable	Set clock delay measurement mode or disable this function.
LOG-S	Sync Interval	-8~4 / Stop	Set the PTP sync message rate of PTP master clock. Setting value is n, actual interval is 2 ⁿ seconds. Valid range is from -8 to 4 and Stop. Default value is Stop.
LOG-D	Delay Measurement Interval	-8~4 / Stop	Set delay measurement rate. Setting value is n, actual interval is 2 ⁿ seconds. Valid range is from -8 to 4 and Stop. Default value is Stop.

DOM1 DOM2 PRI1 PRI2
DOM1: 0

[Figure 3-15] PTP Setting: Page 2

Name	Description	Parameter	Note
DOM1/2	Domain1/2	0~3	Set the working domain name for PTP message.
PRI1/2	Priority1/2	0~255	Set working priority for PTP message.

MEDIA INDELAY OUTDELAY
MEDIA: 802.3

[Figure 3-16] PTP Setting: Page 3

Name	Description	Parameter	Note
MEDIA	Over Media	802.3 / IPv4	Set the transmission protocol for PTP.IEEE802.3 and IPv4 are supported.
INDELAY	Receive Delay	Ons	Set the time delay for receiving PTP message.
OUTDELAY	Send Delay	Ons	Set the time delay for sending PTP message.

VLAN VLAN-P VLAN-CFI
VLAN: No

[Figure 3-17] PTP Setting: Page 4

Name	Description	Parameter	Note
VLAN	Enable Vlan	Yes / No	Set whether to send vLan information.
VLAN-P	vLan Priority	0~7	Set vLan priority.
VLAN-CFI	vLan CFI	0~1	Set vLan CFI information.

VLAN-ID MasterCoord
VLAN_ID: 0

[Figure 3-18] PTP Setting: Page 5

Name	Description	Parameter	Note
VLAN-ID	vLan ID	0~4095	Set vLan ID information.
MasterCoord	Master Coordination	Yes,No	Set PTP to enable master coordination.

3.6. Output Settings

SO O1 O2 O3 O4 O5 AC

[Figure 3-19] Output Setting

Name	Description
SO	Config serial output time signals.
O1	Config channel 1 output time signals.
O2	Config channel 2 output time signals.
O3	Config channel 3 output time signals.
O4	Config channel 4 output time signals.
O5	Config channel 5 output time signals.
AC	Config IRIG-B modulated time signals.

3.6.1. SO Output

PPS TXD TIME TYPE BAUD
PPS: PPS

[Figure 3-20] SO Output Setting: Page 1

Name	Description	Parameter	Note
PPS	SO-PPS signal	PPS/IRIG/PPM/PPH	Set the signal type for the SO-PPS.
TXD	SO-TxD Signal	TOD	Set the signal type for SO-TxD.
TIME	SO Time Format	UTC / TAI / Local	Set SO output time format which can be

			set to UTC/TAI/Localtime.
TYPE	SO Message	RMC,ZDA,DL/T1100, CM-TOD,CMBB	Set the coding format for serial port message.
BAUD	SOBaudRate	300~115200	Set the working baud rate for serial port, ranging from 300 to 115200.

S-OFF PPS-OFF
S-OFF: 0s

[Figure 3-21] SO Output Setting: Page 2

Name	Description	Parameter	Note
S-OFF	SO Offset	0s	Set SO second offset.
PPS-OFF	SO-PPS Offset	0ns	Set SO-PPS offset.

3.6.2. O1-O5 Output

O1 S-OFF PPS-OFF
O1: PPS

[Figure 3-22] O1~O5 Output Setting: Page 1

Name	Description	Parameter	Note
O1~O5	O1~O5 time signals	PPS/IRIG/PPM/PPH	Set the signal type for the O1~O5. The BDC means IRIG-B-DC signal.
S-OFF	IRIG-B Offset	0s	Set second offset for IRIG-B.
PPS-OFF	IRIG-B PPS Offset	0ns	Set PPS offset for PPS1~5.

IRIG-C IRIG-P IRIG-T
IRIG-C : Even

[Figure 3-23] O1~O5 Output Setting: Page 2

Name	Description	Parameter	Note
IRIG-C	IRIG-B Check Bit	Even /Odd	Set IRIG-B check code: even check, odd check.
IRIG-P	IRIG-B Polarity	+/-	Set IRIG-B output signal polarity.
IRIG-T	IRIG-B Time	UTC/TAI/Local	Set IRIG-B output time format which can be set to UTC/TAI/Localtime.

3.6.3. IRIG-B-AC Output

AC-PEAK AC-RATIO
AC-PEAK : 3.0V

[Figure 3-24] AC Output Setting: Page 1

Name	Description	Parameter	Note
------	-------------	-----------	------

AC-PEAK	IRIG-AC Output P-P	3.0V~12.0V	Set the peak-to-peak value for IRIG-B-AC, ranging from 3.0V to 12.0V, adjusting step length is 0.5V, default value is 12.0V.
AC-Ratio	IRIG –AC Output Ratio	3.0:1~6.0:1	Set the modulation ratio for IRIG-B-AC, ranging from 3.0:1~6.0:1, adjusting step length is 0.5:1; default value is 3.0:1.

3.7. Network Settings

IP0 MS0 MO0
IP0 :192.168.0.111

[Figure 3-25] Network Setting: Page 1

Name	Description	Parameter	Note
IP0	IP Address	192.168.0.111	Set ETH0 IP address, the default is 192.168.0.111.
MS0	Mask Address	255.255.255.0	Set ETH0 Subnet mask address, the default is 255.255.255.0.
MO0	Network Mode	Auto, 100M-FX FDX, 100M-FX-HDX, 1000M-X FDX, 1000M-X HDX	Set ETH0 mode.It can be set to fiber mode with 100M and 1000M.

IP1 MS1 MO1
IP1 :192.168.1.111

[Figure 3-26] Network Setting: Page 2

Name	Description	Parameter	Note
IP1	IP Address	192.168.1.111	Set ETH1 IP address, the default is 192.168.1.111.
MS1	Mask Address	255.255.255.0	Set ETH1 Subnet mask address, the default is 255.255.255.0.
MO1	Network Mode	Auto, 100M-FX FDX, 100M-FX-HDX, 1000M-X FDX, 1000M-X HDX	Set ETH1 mode.It can be set to fiber mode with 100M and 1000M.

IP2 MS2
IP1 :192.168.2.111

[Figure 3-27] Network Setting: Page 3

Name	Description	Parameter	Note
IP2	IP Address	192.168.2.111	Set ETH2 IP address, the default is 192.168.2.111.
MS2	Mask Address	255.255.255.0	Set ETH2 Subnet mask address, the default is 255.255.255.0.

```

IP3      MS3
IP1 :192.168.3.111
    
```

[Figure 3-28] Network Setting: Page 4

Name	Description	Parameter	Note
IP3	IP Address	192.168.3.111	Set ETH3 IP address, the default is 192.168.3.111.
MS3	Mask Address	255.255.255.0	Set ETH3 Subnet mask address, the default is 255.255.255.0.

3.8. Default Settings

Load default parameter via 'DEF' entrance.

```

SYN CLK NTP | DEF
PTP OUT NET | SYS

Load default parameters?
    
```

[Figure 3-29] Default Setting: Page 1

Press 'ENTER' key to confirm this operation and make system load default parameters.

3.9. System Settings

Change password via 'SYS' entrance.

```

SYN CLK NTP | DEF
PTP OUT NET | SYS

New Password: 0000
    
```

[Figure 3-30] System Setting: Page 1

Press 'ENTER' key to set new password and confirm password. If want to cancel this operation, please press 'ESC' key to cancel this operation.

Notes: The password is made up of four digital.

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