

# GPS Wireless Clock System Transmitter

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This manual is created purpose to explain the function of the GPS Wireless Clock System.

This manual is not formal.

## Transmitter Display

The Transmitter has a front display that shows important information.

### Time

Displays the precise time received from the GPS Receiver. If AM or PM is on the display, then the 12-hour option is selected. If neither AM nor PM is on the display, then the 24-hour option is selected.

### Daylight Saving Time

The letters "DST+"(Daylight Saving Time) will be displayed when adjustment for Daylight Saving Time is active. If the letters "DST " will be displayed when adjustment for Daylight Saving Time is inactive.

If neither "DST+" nor "DST " is on the display, Daylight Saving time is not applied.

### GPS Communication

The GPS Communication indicator(see Figure A) will appear when the Transmitter is communicating with the GPS Receiver. The characters indicate the time signal is being received as follows.

The letters ". " is displayed, There is no communication with GPS Receiver.

The letters ".o " is displayed, There is communication with GPS Receiver. However, time is not valid.

The letters ".oO" is displayed, There is communication with GPS Receiver. Time is valid.

### **Day/Date**

Display the day and date received from the GPS satellite.

### **Channel Number**

Displays the channel number(00-09) that the Transmitter is set to.

### **Power LED**

The Power LED(Light Emitting Diode) is located on the leftmost of the front panel of the transmitter. The Power LED turns on the light when the MCU is running.

### **GPS LED**

The GPS LED is located from the leftmost the 2nd of the front panel of the transmitter. The GPS LED turns on the light when the time information from GPS satellite is valid. If the GPS LED turns off the light, the time information from GPS satellite is not valid.

## **Setup of the Transmitter**

- 1) Carefully screw the Transmitter antenna onto the Transmitter.
- 2) Plug the GPS cable into the GPS socket located in the back of the Transmitter(see Figure B)
- 3) Plug the supplied 9 Volt 2.6 Amp DC power supply(transmitter) into the Transmitter.
- 4) Plug the power supply(transmitter) into a 120 VAC outlet.
- 5) Transmitter setup is complete, See Transmitter Operation for details of operation.

## **Transmitter Operation**

When the power supply is put into the transmitter at the very first, the transmitter will be in program mode. See Program Mode and set up.

When power is first applied to the Transmitter, the front display will show important information. The POWER LED turns on the light.

The display will note software version. Then the Transmitter checks parameters of program mode. The display will initially show the time which calculated time difference to 12:00:00. The Transmitter then waits for time information from the GPS Receiver.

The GPS LED turns on the light when the time information from GPS satellite is valid.

The GPS Communication indicator will appear like this ".oO" when the Transmitter is receiving a signal from the satellite through the GPS Receiver.

The internal time on the display will increment once each second until the GPS Receiver sends the transmitter a valid time.

Note : The transmitter transmit the time data which the display shows internal time.

Once the Transmitter receives the GPS Receiver time signal, the Transmitter sets its internal clock to that time and will display the correct time and date. The transmission signal is a maximum five-watt FM signal at approximately 467MHz. The Transmitter continually monitors the GPS Receiver and the Transmitter updates its internal clock with the time data it receives. The Transmitter transmits the time signal to per minute 10 seconds, 30 seconds, and 50 seconds.

The number of the middle of the lower line of the display is the channel number to which the Transmitter will be transmitting the time signal.

## Program Mode

For entering to the program mode from the condition which shows time(Time/Day/Date), push the Mode Button 3 seconds or more.

After entering to the program mode, whenever push the Mode Button, the program mode is changed as follows.

CHANNEL -> UTC OFFSET -> FORMAT -> DST -> Time/Day/Date

### CHANNEL

There are 10 available channels as follows.

"CH00" 467212500Hz

"CH01" 467237500Hz  
"CH02" 467262500Hz  
"CH03" 467287500Hz  
"CH04" 467312500Hz  
"CH05" 467337500Hz  
"CH06" 467363500Hz  
"CH07" 467387500Hz  
"CH08" 467412500Hz  
"CH09" 467437500Hz

Display will be as follows. The channel can be changed whenever push the Set Button.

"SET MODE \*CHANNEL"  
"00 CHANNEL"

## UTC OFFSET

There are 24 available time zone as follows.

"-05 : EASTERN"  
"-06 : CENTRAL"  
"-07 : MOUNTAIN"  
"-08 : PACIFIC"  
"-09 : ANCHORAGE"  
"-10 : HONOLULU"  
"-11 : ---"  
"+12 : ANADYR"  
"+11 : ----"  
"+10 : SYDNEY"  
"+09 : TOKYO"  
"+08 : BEIJING"  
"+07 : BANGKOK"  
"+06 : COLOMBO"  
"+05 : KARACHI"  
"+04 : DUBAI"  
"+03 : MOSCOW"  
"+02 : ATHENS"  
"+01 : CENTRAL EUROPE"  
" 0 : LONDON"

"-01 : ---"  
"-02 : ---"  
"-03 : RIO DE JANEIRO"  
"-04 : CARACAS"

Display will be as follows. The time zone can be changed whenever push the Set Button.

"SET MODE \*UTC OFFSET"  
"-05 : EASTERN"

## FORMAT

Display will be as follows. The display time format can be changed whenever push the Set Button.

"SET MODE \*FORMAT"  
"12 HOUR DISPLAY"

or

"SET MODE \*FORMAT"  
"24 HOUR DISPLAY"

## DST

Transmitter is pre-programed to automatically make adjustment for Daylight Saving Time. The letters "DST+"(Daylight Saving Time) will be displayed when adjustment for Daylight Saving Time is active. If the letters "DST " will be displayed when adjustment for Daylight Saving Time is inactive. If neither "DST+" nor "DST " is on the display, Daylight Saving time is not applied.

The adjustment to Daylight Saving Time and back to Standard Time take place 12:00 AM on the day of change.

Note : The GPS signal does not encode information about Daylight Saving Time. In the spring when the Transmitter changes to Daylight Saving Time, the system clock will adjust by advancing faster then their normal speed to make the adjustment and then return to normal operation. In the fall when the Transmitter returns to Standard Time, the system clock will make the time adjustment and then return to normal operation.

Display will be as follows. The daylight saving time selection can be changed whenever push the Set Button.

"SET MODE \*DST"

"YES"

or

"SET MODE \*DST"

"NO"

## Synchronous output

The two relay output terminals located in the back of the Transmitter(see Figure B), one normally open and the other normally closed, provide a relay output connection to Synchronous Clock System.

This relay output is outputted for 1 second from 23:59:59 every day.

## Signal structure

The transmitting the time signal consists of a series 20-seconds cycles, each of 19-characters per frame.

For instance

Transmitting data = '\$07081604115410C6' + 0DH + 0AH

Baud rate : 1200bps

Start Bit: 1bit

Stop Bit : 2bit

1) '\$'(24H)

Start character

2) '0'(30H)

3) '7'(37H)

year = 2007

Last two digits of year.

This value starts in 2000 to 2099.

Range : '00' – '99'

4) '0'(30H)

5) '8'(38H)

month = August

Range : '01' – '12'

6) '1'(31H)

7) '6'(36H)

day = 16

Range : '01' – '31'

8) '0'(30H)

9) '4'(34H)

day of the week = Thursday

Range : '01' – '07'

'01' => Monday

'02' => Tuesday

'03' => Wednesday

'04' => Thursday

'05' => Friday

'06' => Saturday

'07' => Sunday

10) '1'(31H)

11) '1'(31H)

hour = 11

Range : '00' – '23'

12) '5'(35H)

13) '4'(34H)

minute = 54

Range : '00' – '59'

14) '1'(31H)

15) '0'(30H)

second = 10

Range : '00' – '59'

16) 'C'(43H)

17) '6'(36H)

The lower two digits of the check sum=  $30H + 37H + 30H + 38H + 31H + 36H + 30H + 34H + 31H + 31H + 35H + 34H + 31H + 30H = 2C6H = C6H$

18) (0DH)

19) (0AH)

Terminator

# GPS Wireless Clock System Receiver

## Setup of the Receiver

- 1) Take off the Battery cover located on the back of the Receiver and put the two alkali size D battery into the battery holder.
- 2) Attach the Battery cover to the original position. And push the Reset button.
- 3) Receiver setup is complete, See Receiver Operation for details of operation.

## Receiver Operation

When the Reset Button located on the back of the Receiver is pushed, the Receiver searches the origin(12:00:00) of the hands. After the origin of the hands is detected, the Receiver begins reception. The reception channel is started from the channel memorized in nonvolatile ROM inside MCU. When putting the battery into the Receiver at the very first, the reception channel will be channel 0.

The Receiver scans each channel automatically until reception is successful. The reception interval of one channel is for 2 minutes. When reception fails after scanning all the channels, the second hand of the Receiver will step by the earliness of two steps in every seconds from origin(12:00:00).

Once the Receiver receives the time signal from the Transmitter, the Receiver sets its internal clock to that time and will adjust the hands to correct time. And the channel information at that time is memorized to nonvolatile ROM inside MCU.

The Transmitter tries reception to get the time signal in 2:00, 6:00, 10:00, 14:00, 18:00 and 22:00 every day. When the Receiver fails in reception, the second hand of clock is stepped by the earliness of two steps in every seconds.

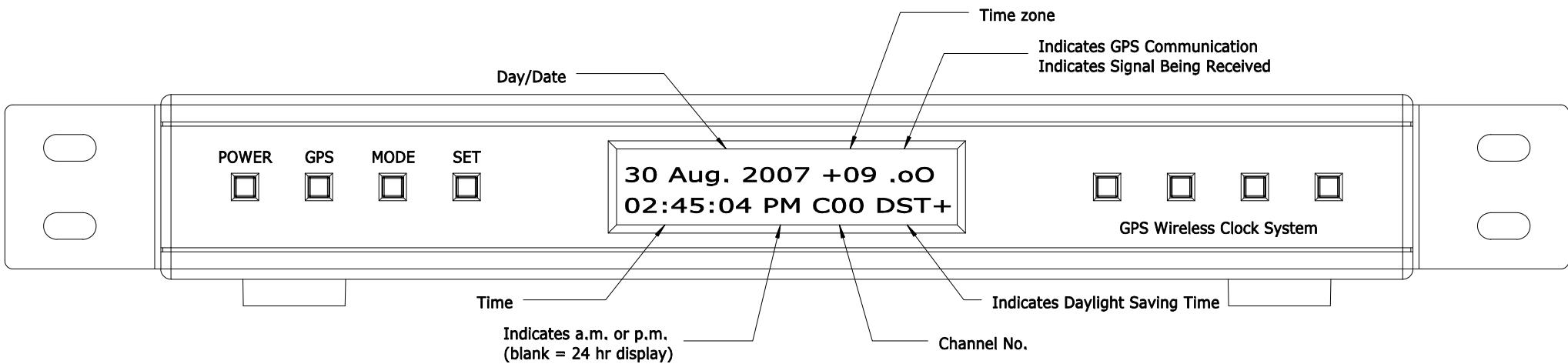


Figure A - Front of Transmitter

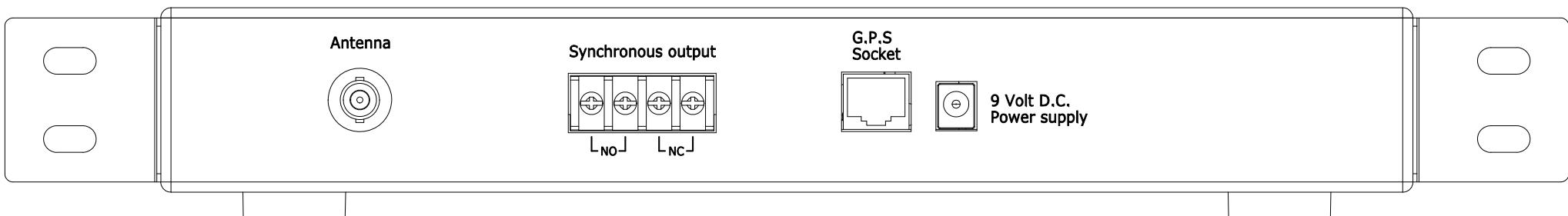


Figure B - Rear of Transmitter

