**Operating and Installation Instructions****Issue 5.0**

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6010 & 6100 Frequency control clock systems

Operating and Installation Instructions

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Customer Support

For assistance with installation, configuration or operation of your 6010 or 6100 frequency control clock system, please contact your vendor's representative.

For further technical information and support for your 6010, 6100 or any other Wharton product, please visit the Wharton Electronics's web site:

<https://www.wharton.co.uk>

Statutory Notices

Warning - To prevent fire or shock hazard, do not expose the unit to rain or moisture.

This equipment has a built-in Lithium battery which in normal operation should have a service life greater than 10 years.

CAUTION

Danger of explosion if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

You can return your unwanted Lithium batteries to the manufacturer or their agent.

Note: In some areas disposal of Lithium batteries in household or business trash may be prohibited.

Caution: Do not handle damaged or leaking Lithium batteries.

To remove battery at end of product's life, unscrew case lid from case body to remove, locate Lithium 'coin cell' battery in holder on main driver board and unclip from holder. Battery should be disposed of as per local legislations.

For Customers in Europe

Electromagnetic Compatibility & Safety

The 6010 and 6100 frequency control clock systems, when used in accordance with our recommendations, complies with the European Community Electromagnetic Compatibility Directive 89/336/EEC (as amended by 91/263/EEC, 92/31/EEC and 93/68/EEC) and the European Community Low Voltage Directive 73/23/EEC (as amended by 93/68/EEC) and conforms to the following standards:

- EN IEC 61000-6-1
- EN IEC 61000-6-2
- EN IEC 61000-6-3
- EN IEC 55032
- EN IEC 55033
- EN IEC 62368-1

For Customers in the USA

The equipment has been tested and certified to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorientate or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

Warranty

The 6010 & 6100 frequency control clock systems are fully guaranteed, on a return to works basis, against failure due to faulty parts or workmanship for two years from date of purchase. In the event of failure, either within or outside the warranty period, please pack the unit with care and return to the manufacturer, or their agent, for examination and repair.

In no event shall the manufacturer, or their agent, be liable for any direct, incidental or consequential damages of any nature, or losses or expenses resulting from any defective product or the use of any product, irrespective of whether the manufacturer, or their agent, has advance notice of the possibility of such damages.

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1 - Introduction

The 6010 & 6100 frequency control clock systems are designed to provide an integrated display of time and frequency information for power generation control rooms and facilities. Each display unit uses bright red, green, yellow or blue LED characters to provide an accurate read-out of the supply Frequency, the Standard Time derived from the internal or external time reference, the Frequency Time derived from the 50 or 60Hz supply frequency and the Time Difference between the Standard Time and the Frequency Time.

Features

Operational

High visibility red, green, yellow or blue LED display showing supply Frequency, Standard Time, Time difference and Frequency Time.

'Set Once' local time zone setup, automatically calculating future daylight saving time changes for local time zone. 256 Year Calendar, 4 digit year setting. (Range 2000-2255)
Easy to install, 'setup and forget' operation.

RC-100 remote to provide remote manual setup via hand held infrared remote control.

Timing accuracy

The display of Frequency and the Frequency Time count are derived from a dedicated, isolated voltage input. The frequency display has an accuracy of +/-0.001% +/-1 digit from 20-80Hz.

Optional high precision OCXO upgrade available.

Unsynchronised: 1/sec/week @ 20-25°C

Locked to optional GPS synchronisation system: within 1mS of UTC

Synchronisation options

An optional 488HS4 GPS satellite time synchronisation subsystem may be fitted to maintain the time keeping within 1mS of UTC.

May be synchronised to the 48x0 time code output of a 5200 series master clock.

May be synchronised to NTP server.

RS232 and RS485 interface

A serial RS232 & RS485 data port is provided which allows the display of information derived to a remote computer with an appropriate serial data input.

3 x Relay Outputs

30V DC @ 200mA rated contacts.

Programmable for under frequency / over frequency alarm conditions.

High visibility front panel LEDs showing relay status.

(6100 units only)

Environment

Unit Power supply: Internal PSU 100-250V AC. 50/60Hz
24V or 48V DC power supply extra cost option.

Frequency Detection input: 100-250V AC. 50/60Hz

Battery Backup: >1 Year. (The battery backup maintains the internal time count during periods of mains failure)

6010.057 Enclosure:

1450mm wide x 135mm high x 66mm deep (57.1" x 5.3" x 2.6")

6010.100 Enclosure :

2600mm wide x 230mm high x 66mm deep (102.4" x 9.1" x 2.7")

6100.02 Enclosure:

330mm wide x 135mm high x 66mm deep (13.0" x 5.3" x 2.6")

Operating temperature: 0-50°C

Relative Humidity: 0% to 90% (non-condensing.)

Altitude: 0 to 3,000m

MTBF: > 50,000 hours

2 - Installation



Warning - dangerous voltages - the 6010/6100 frequency control clock system must be disconnected from both the mains supply, and mains detection supply prior to removing the rear cover.

Power Supply Connection

The 6010/6100 frequency control clock system is fitted with a universal 100-250V 50/60Hz power supply. The system may be supplied with a 24V or 48V DC power supply as an extra cost option.

The 6010/6100 frequency control clock systems mains detection input is designed for connection to a 100-250V 50/60Hz mains supply.

Both the power supply input and mains detection input are on rear mounted IEC mains connections.

The 6010/6100 frequency control system must be connected to the appropriate supply sources after first verifying the correct voltage by reference to the voltage labels fixed to the rear of the system.

A connection to the earth line must be made to ensure safe operation and ensure compliance with EMC regulations.

To ensure conformance with EN60950:

- (A) For installations where the 6010/6100 frequency control clock system is to be permanently connected into the mains power circuit, a readily accessible disconnect device should be incorporated in the fixed wiring.
- (B) For installations where the 6010/6100 frequency control clock system is to be plugged into the mains power circuit, a socketed outlet should be installed near the equipment and should be easily accessible.

All installation work should be performed in accordance with the Seventeenth Edition of the IEE Wiring Regulations.

The 6010/6100 frequency control clock system is fitted with a Lithium battery which will maintain the internal time count for a period normally in excess of 1 year if the mains supply is interrupted.

External Connections

The external connections located on the rear of the 6010/6100 frequency control clock system provide the following inputs and outputs:

Connection Section	
GPS / Synchronisation Connection	6
48x0 Synchronisation Connection	6
RS232 and RS485 Connections	9
Relay Connections	8
Frequency Time remote reset connection	7

Please see the relevant sections of the 6010/6100 frequency control clock system manual for further information.

3 - Programming

The 6010/6100 frequency control clock system has a user friendly interface based on the use of four buttons.

The buttons are located on the right hand rear of the unit. Each button is mirrored on the remote control supplied, labelled ▲, +, - and ▼.

The ▲ button is used to enter the setting mode and step to the next stage saving any changes, whereas the + and - buttons are used to alter the values of settings. The bottom button resets the Frequency Time back to the current Standard Time display and thus zeros the Time Difference offset. This can also be done remotely by pressing the ▼ button on the remote control.

Function Programming

On pressing the ▲ button the function mode is entered. By pressing the + and - buttons the user can scroll through all the available modes for set up of the 6010/6100 frequency control clock system.

The modes will be displayed in the following order:

ti

Time Setting Mode

Lo

Location Setting Mode

Sy

Synchronisation Setting Mode

rL

Relay Setting Mode

nE

DHCP Setting Mode

St

System Setting Mode

To select any of the modes whilst they are displayed in the function mode press the ▲ button. This allows the user to enter a specific mode and make any necessary changes to the related settings.

To progress through the options use the ▲ button and to alter the values for these options use the + and - buttons. On completion of any changes the ▲ button can be used to save the settings and to step forward through any other options before returning to the normal time display.

Please refer to the following table for more details on function programming.

Unit Status Indication

The operational status of the 6010/6100 Frequency control clock system is indicated by the colon LEDs on the Standard Time display. When the system is unsynchronised, the Standard Time display colon LEDs will flash on and off. If the unit is synchronised the Standard Time display colon LEDs will be continuously illuminated. A unit error state is indicated by the Standard Time display colons being extinguished.

Display Brightness

Automatic or manual brightness - The display may be programmed to one of seven preset display brightness levels. Alternatively, the unit may be programmed for automatic display brightness where the display illumination level is reduced as the ambient light level decreases

Programming menus



12:47:36
 Standard Time

Normal time display



Fu t,
 Standard Time

Function 'Time Setting Mode'. 'Up' to select, '+' or '-' to change.



12:47:37
 Standard Time

Time Setting Mode selected, with seconds flashing. See chapter 4.



Fu L 0
 Standard Time

Function 'Location Setting Mode'. 'Up' to select, '+' or '-' to change.



L 00
 Standard Time

Location Setting Mode selected, with zone flashing. See chapter 5.



Fu 54
 Standard Time

Function 'Synchronisation Mode'. 'Up' to select, '+' or '-' to change.



54 0 PS
 Standard Time

Synchronisation Mode selected. See chapter 6.



Fu nE
 Standard Time

Function 'Network Setting Mode'. 'Up' to select, '+' or '-' to change.



dh Fu LL
 Standard Time

Network Setting Mode selected. See chapter 7.



Fu rL
 Standard Time

Function 'Relay Setting Mode'. 'Up' to select, '+' or '-' to change.



r 1 1
 Standard Time

Relay Setting Mode selected, with code 1 flashing. See chapter 8.



Fu St
 Standard Time

Function 'System Setup'. 'Up' to select, '+' or '-' to change.



br A
 Standard Time

System Setting Mode selected, with brightness flashing.

4 - Time Setting

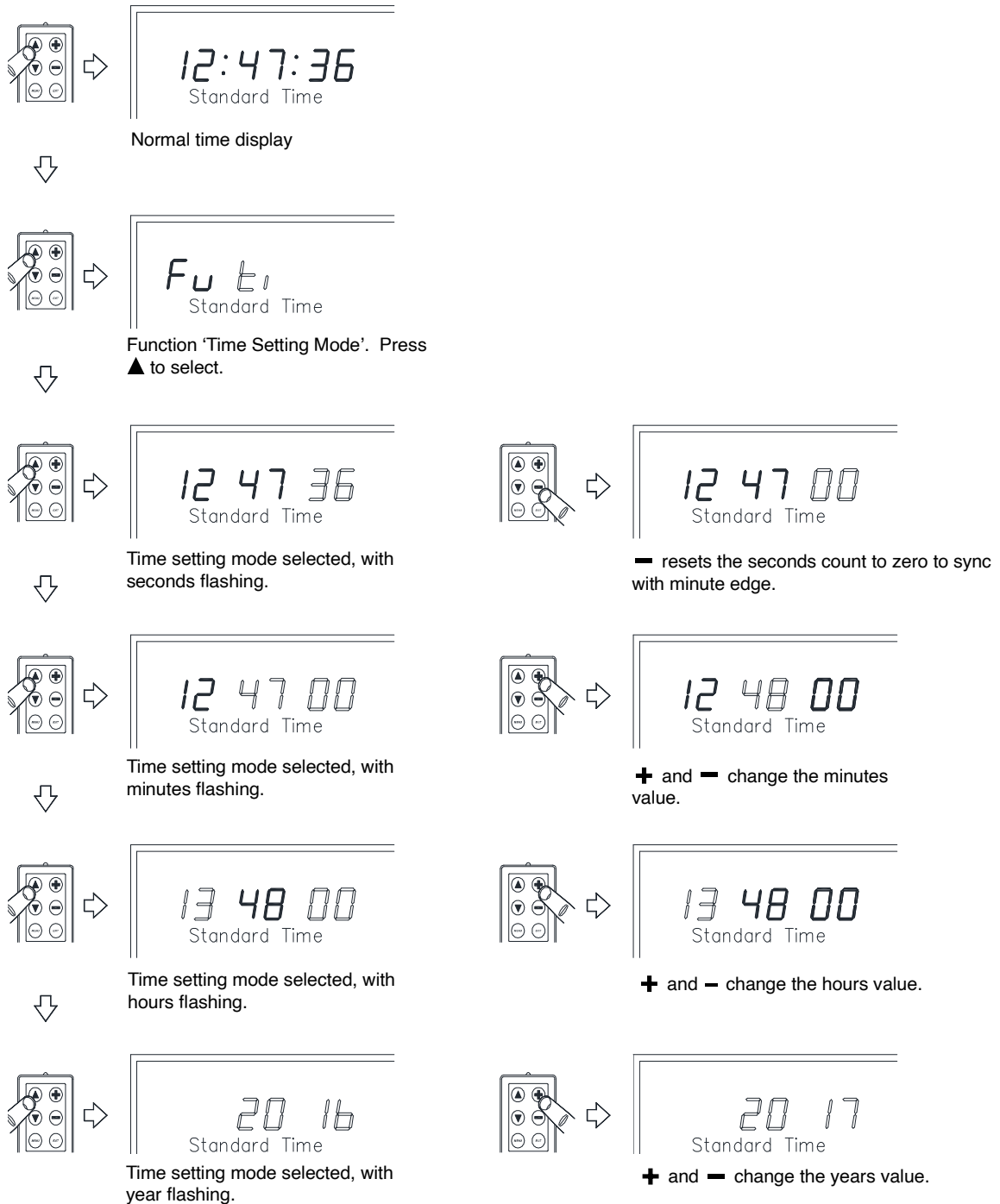
The 6010/6100 frequency control clock system is designed to be synchronised from a 488HS4 GPS receiver system or in larger installations, a Master Clock. In this instance, once the location and synchronisation settings have been entered (please refer to the chapters 5 and 6 for more details), the Standard Time display will automatically synchronise.

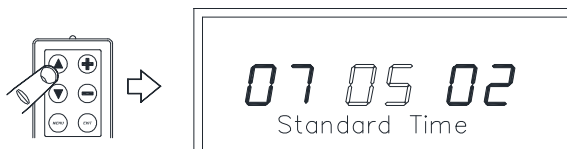
However, for stand alone operation, the 6010/6100 may be programmed to obtain the Standard Time reference from the internal Temperature Compensated Crystal Oscillator.

Manually setting the time

The synchronisation setting should be set to 'none' and the location setting to your required time-zone (please refer to chapters 5 and 6).

The table below details the time setting procedure.





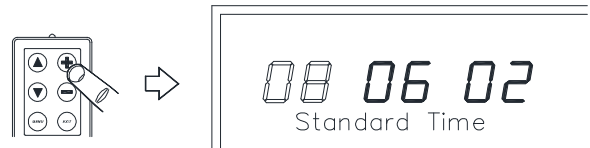
Time setting mode selected, with month flashing.



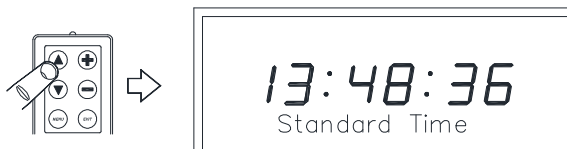
+ and **-** changes the month value.



Time setting mode selected, with day flashing.



+ and **-** changes the day value.



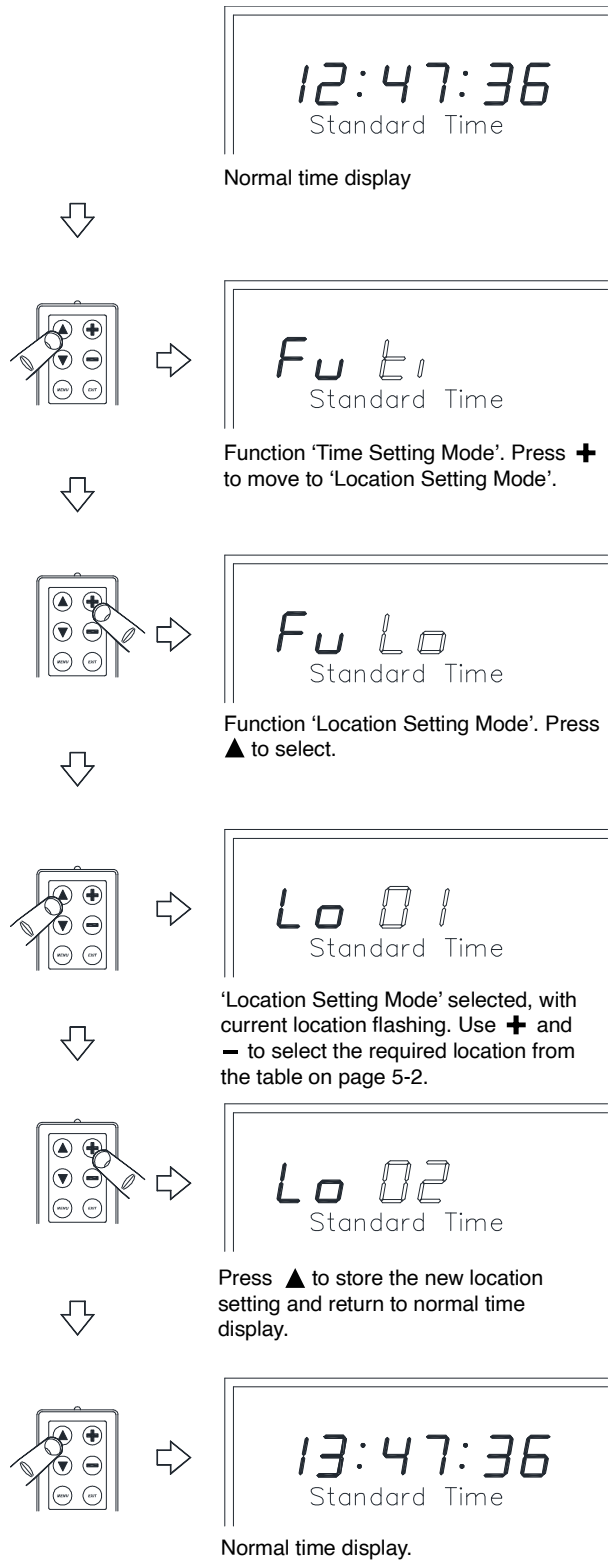
Normal time display

5 - Location Setup

The 6010 & 6100 frequency control clock systems provide advanced time zone functionality. Regardless of time synchronisation source, the 6010 & 6100 frequency control clock systems can display time and date information referenced to UTC, user 'local' time or other custom time zone. Incorporating 'Set Once' technology, the unit will automatically calculate future seasonal time changes for all 83 of the preset time location code settings.

Setting the location

For installations where the 6010 or 6100 is to display UTC / GMT the location code should be set to 00. For installations where the 6010 or 6100 is to display the 'local' time zone, select the appropriate location code from the table opposite. (eg. For a unit installed in Birmingham, England, where 'local' time output is required, location code 01 should be used.)



Time Zone Locations			Time Zone Locations				
Code	Time Zone / City / Location	UTC Offset	Seasonal Time Changes?	Code	Time Zone / City / Location	UTC Offset	Seasonal Time Changes?
0	UTC+0 (ZULU) UTC, GMT	0	No	51	EST/CST Mexico - Mexico City	-6	Yes
1	WET/WEST GMT/BST London, Lisbon	0	Yes	52	CDT/CST US - Central, Chicago	-6	Yes
2	UTC+1 (ALPHA) WAT Luanda, Angola	1	No	53	UTC-5 (ROMEO) PET Peru - Lima	-5	No
3	CET/CEST MEZ/MESZ Brussels, Frankfurt	1	Yes	54	EST/EDT US - Eastern, New York	-5	Yes
4	UTC+2 (BRAVO) SAST Joburg, Pretoria, S Africa, Kaliningrad	2	No	55	VET Venezuela - Caracas	-4 1/2	No
5	EET/FEEST Greece - Athens, Ukraine - Kiev	2	Yes	56	UTC-4 (QUEBEC) BOT Bolivia - La Paz	-4	No
6	IST/IDT Israel - Tel Aviv	2	Yes	57	CLT/CLEST Chile - Santiago	-4	Yes
7	MSK Russia - Moscow	3	No	58	ADT/AST US - Atlantic	-4	Yes
8	UTC+3 (CHARLIE) AST Iraq - Baghdad, S Arabia - Riyadh	3	No	59	PYT/PYST Paraguay - Asuncion	-4	Yes
9	MSK+1 Russia - N/A	4	No	60	UTC-3.5	-3 1/2	No
10	IRST/IRDT Iran - Tehran	3	Yes	61	INST/NDT US - Newfoundland	-3 1/2	Yes
11	UTC+4 (DELTA) GST UAE - Dubai, Abu Dhabi	4	No	62	MIL-PAPA ART Argentina - Buenos Aires	-3	No
12	AZT/AZST Azerbaijan - Baku +4 hours offset	4	Yes	63	BRT/BRST Brazil - Brasilia, Sao Paulo	-3	Yes
13	AFT Afghanistan - Kabul	4 1/2	No	64	WGT/WGST Greenland (West) - Nuuk	-3	Yes
14	UTC+5 (ECHO) TMT Turkmenistan - Ashgabat, Yekaterinburg	5	No	65	PMST/PMST US - Pierre & Miquelon	-3	Yes
15	PKT Pakistan - Islamabad	5	No	66	UYT/UYST Uruguay - Montevideo	-3	Yes
16	OMST, MSK+3 Russia - Omsk	6	No	67	UTC-2.5	-2 1/2	No
17	IST India - New Delhi, Mumbai	5 1/2	No	68	UTC-2 (OSCAR)	-2	No
18	UTC+6 (FOXTROT) BST Bangladesh - Dhaka	6	No	69	UTC-1 (NOVEMBER) CVT Cape Verde - Praia	-1	No
19	KRAT, MSK+4 Russia - Krasnoyarsk	7	No	70	AZOT/AZOST Portugal - Azores	-1	Yes
20	MMT Myanmar - Naypyidaw	6 1/2	No	71	EGT/EGST Greenland (East) - Ittoqqortoormiit	-1	Yes
21	UTC+7 (GOLF) WIB Indonesia - Jakarta	7	No	72	Morocco - Rabat, Casablanca	0	Yes
22	IRKT, MSK+5 Russia - Irkutsk	8	No	73	WT/WST Western Sahara - El Aaiún	0	Yes
23	UTC+7.5	7 1/2	No	74	Namibia - Windhoek	1	Yes
24	UTC+8 (HOTEL) CST - Beijing, WITA, WST Australia - Perth	8	No	75	Egypt - Cairo	2	No
25	YAKT, MSK+6 Russia - Yakutsk	9	No	76	Gaza - Gaza	2	Yes
26	UTC+9 (INDIA) JST Japan - Tokyo, WIT - Eastern Indonesia	9	No	77	Jordan - Amman	2	Yes
27	VLAT, MSK+7 Russia - Vladivostok	10	No	78	Lebanon - Beirut	2	Yes
28	CST Australia - Darwin	9 1/2	No	79	Syria - Damascus	2	Yes
29	CST/CDT Australia - Adelaide	9 1/2	Yes	80	West Bank - Bethlehem	2	Yes
30	UTC+10 (KILO) EST Australia - Brisbane, CHST Guam	10	No	81	NPT Nepal - Kathmandu	5 3/4	No
31	EST/EDT Australia - Sydney, Taerania - Hobart	10	Yes	82	FJT/JUST Fiji - Suva	12	Yes
32	MAGT, MSK+8 Russia - Magadan	11	No	83	SST Samoa - Apia	13	Yes
33	UTC+10.5	10 1/2	No	94	Temperature Display A (47xx world time zone display only)		
34	UTC+11 (LIMA) SBT Solomon Is. - Honiara	11	No	96	Stopwatch display (47xx world time zone display only)		
35	MSK+9 - N/A	12	No				
36	UTC+12 (MIKE) MHT Marshall Is. - Majuro, Kwajalein	12	No				
37	NZST/NZDT New Zealand - Wellington, Auckland	12	Yes				
38	TKT Tokelau - Fakaofu	13	No				
39	LINT Line Is. - Kiritimati	14	No				
40	UTC-13	-13	No				
41	UTC-12 (YANKEE)	-12	No				
42	UTC-11 (X-RAY) Midway Is.	-11	No				
43	UTC-10 (WHISKEY) HAST Hawaii - Honolulu	-10	No				
44	UTC-9 (VICTOR)	-9	No				
45	AKST/AKDT US - Alaska, Anchorage	-9	Yes				
46	UTC-8 (UNIFORM) PST US - Pictain Is.	-8	No				
47	PST/PDT US - Pacific, L.A.	-8	Yes				
48	UTC-7 (TANGO) US - Arizona, Phoenix	-7	No				
49	MST/MDT US - Mountain, Denver	-7	Yes				
50	UTC-6 (SIERRA) Costa Rica - San Jose	-6	No				

6 - Synchronisation Setup

The 6010/6100 frequency control clock system is supplied as standard with a quartz crystal oscillator that provides the Standard Time display with a typical accuracy of better than 1 seconds per week, with an optional high precision OCXO upgrade available. However, for ultimate accuracy, we would recommend synchronising the frequency control clock system to an external time reference.

Synchronisation Setup		
Code	Synchronisation source	Notes
None	Standalone operation using internal TCXO	No external reference, timekeeping accuracy better than 0.1 sec/day. 20°C-25°C.
GPS	488HS4 GPS Receiver System - Synchronisation from GPS satellites.	Very accurate time synchronisation. Can be used anywhere in the world.
48x0	Synchronisation via 48x0 time code from a 5200 series master clock.	Used in large installations with multiple clock units.

GPS Synchronisation

The 488HS4 GPS receiver systems are designed to be automatically synchronised to time signals transmitted from the Global Positioning System (GPS) navigation network. The GPS constellation consists of 28 operational satellites, operating in 12 hour orbits at an altitude of 20,200km.

The 488HS4 GPS receiver has been designed for simple installation and operation by the end-user, requiring only a 4 wire interconnection to the 6010/6100 frequency control clock system. When synchronised to a 488HS4 GPS receiver system the standard time base of the 6010/6100 frequency control clock system is maintain within 1mS of UTC.

The reception gain pattern of the GPS system is designed for full, upper hemispherical coverage with the gain diminishing at low elevations. This cross-section is consistent through 360 degrees and so the 3 dimensional gain pattern is a symmetrical spheroid surface.

Advantages of GPS time synchronisation:

- Very accurate synchronisation
- Can be used anywhere in the world
- Not subject to EM interference

Disadvantages of GPS time synchronisation:

- Antenna needs to be mounted externally with a clear view of 75% of the sky.

The 488HS4 GPS Synchronisation System

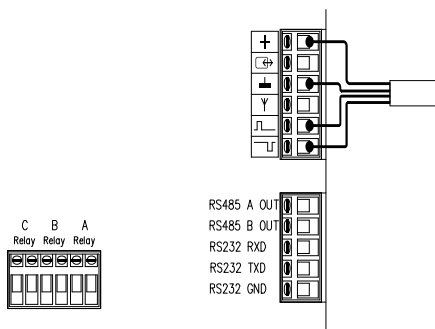
The 488HS4 GPS synchronisation system is housed in a single IP66 rated case containing an advanced combined Sony active antenna and 12 channel parallel GPS receiver module and a microprocessor based communications interface. The system is supplied complete with a post mounting clamp to enable the unit to be fixed to a suitable horizontal or vertical post of up to 2cm diameter. The antenna should be mounted on the roof of a building or under a suitable skylight.

Installation

- 1 Install the 488HS4 unit horizontally using the post mounting kit provided. Ensure that the unit has a clear view of at least 75% of the sky. If the sky view is reduced the interval between 'switch-on' and system time synchronisation will be considerably increased.

Ensure that the 6010/6100 frequency control clock system is disconnected from the mains power supply when making connections to the GPS receiver module.

- 2 A connection between the 488HS4 and the 6010/6100 should be made using the 25 metres of four core cable supplied. If a longer cable distance is required Appendix A should be consulted for suitable cable specifications. The maximum distance between the GPS receiver and the 6010/6100 is 200m.
If a screened cable is used, the cable screen should be connected to the EMC ground connection on the terminal block, located on the rear of the 6010/6100.
- 3 The 4 GPS input connections located on the terminal block on the rear of the 6010/6100, should be wired as shown in the diagram.
- 4 Connect the power supply to the 6010/6100 frequency control clock system



GPS connection

Top right hand 6-way terminal block

- -ve Power for 488HS4 GPS.
- + +ve Power for 488HS4 GPS.
- A Signal A from 488HS4 GPS.
- B Signal B from 488HS4 GPS.
- ⏚ EMC grounding point

Note:

A Screened cable should be used to connect the 488HS4 GPS receiver to the 6010/6100. The screen should be connected to the EMC grounding points on both the 6010/6100 and the 488HS4 GPS receiver.

488HS4 GPS Receiver
 Should be mounted with a view
 of at least 75% of the sky.

Supplied with 25 metres of 4 core cable. Cable distance can be extended up to a maximum distance of 200 metres using the cable specifications detailed in appendix A.

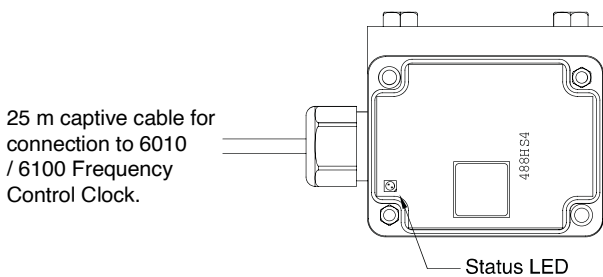


- 5 Once the power has been applied the receiver will automatically begin to search the sky for all available satellites, during this process the LED will flash orange. After three satellites have been acquired the LED will flash green, indicating that a precise date and time has been calculated from the satellite data transmissions. From a 'cold' start this process will typically take less than 5 minutes
- 6 Ensure that the 6010/6100 is configured to synchronise from the GPS signal by following the GPS Synchronisation procedure.

Once the green LED has illuminated the synchronising time signals are transmitted from the receiver/decoder module to the 6010/6100. The standard Time display on the 6010/6100 frequency control clock system should lock in and display the correct time within 5 minutes.

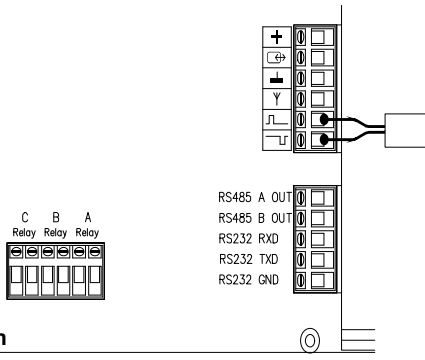
Connections from 6010/6100 to 488HS4		
488HS4 GPS Connection	6010/6100 Connection	Connection Colour (using supplied 25m cable)
+	+	Red
-	-	Blue
A	A	Yellow
B	B	Green

488HS4 GPS Receiver System



6010 & 6100 Frequency control clock systems

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48x0 connection

6-way terminal block

- A Signal A.
- B Signal B.

5200 Master Clock synchronisation

In larger installations, the 6010/6100 frequency control clock system may be synchronised via 48x0 time code from a 5200 series Master Clock.

The 48x0 time code output from the 5200 series Master Clock should be connected to the GPS A & B terminals on the rear of the 6010/6100 unit as shown in the diagram above. Please refer to the 5200 series Master Clock user manual for details of recommended cable specifications.

The 6010/6100 frequency control clock system should be set to synchronise from the 48x0 signal by following the procedure shown to the right. In standard installations, the zone option (accessed after selecting 48x0) should be set to zone 1.

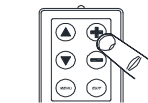
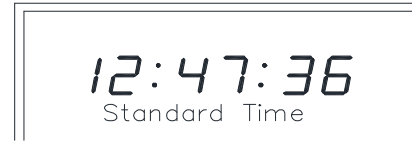
For installation into systems where the 5200 Master Clock is transmitting local time on zone 1, the 6010/6100 frequency control clock system should be set to synchronise from zone 2. Zone 2 on the master clock should then be set to location '00'. The location on the 6010/6100 frequency control clock should be programmed as normal (please refer to chapter 5 for information on how to perform this operation).

Synchronisation Status

Regardless of synchronisation source, the synchronisation status of the 6010/6100 can be confirmed by the operation of the colons. When the unit is unsynchronised, the colons will flash. Once the unit is synchronised, the colons will be illuminated continuously.



Normal time display



Function 'Time Setting Mode'. Press + twice to move to synchronisation mode.



Function 'Synchronisation Mode'. Press ▲ to select.



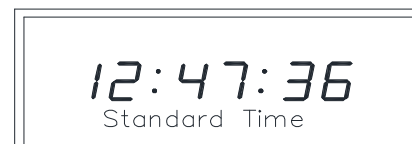
Synchronisation mode selected with current mode flashing. Use + and - to select required setting.



Press ▲ to save synchronisation mode and return to normal time display.



Normal time display.



7 - Network Setup

The 6010N and 6100N series digital frequency control clocks are fitted with a 10/100Base-T Ethernet network interface and designed to synchronise to a remote NTP (Network Time Protocol) time server across a TCP/IP computer network.

Upon initial installation, the unit's IP address, subnet mask, gateway and NTP time server IP address shall be automatically assigned by a DHCP server (if available). Alternatively, the unit's IP address, subnet mask, gateway and NTP time server IP address can be statically assigned.

The table below details the available network parameters. Please contact your network administrator for details of network configuration & addresses that will allow the clocks to be used on your network.

Fu Nt	Network Settings		'Up' button function
Function	Display	Description	
DHCP Setting	dh Full	Full DHCP mode. Automatic assignment of IP, Subnet and Gateway by customer's DHCP server. Automatic assignment of NTP servers via DHCP option 42.	Exit to Time display
	dh Yes	DHCP mode. Automatic assignment of unit's IP, Subnet and Gateway by customer's DHCP server. User setting of NTP server addresses.	Exit to Time display
	dh No	Static assignment of IP, Subnet and Gateway addresses by user. User setting of NTP server addresses.	Select IP Byte 1
IP Byte 1	I 010	IP Address setting 1st Byte / Octet Range 0 - 254	Select IP Byte 2
IP Byte 2	I 001	IP Address setting 2nd Byte / Octet Range 0 - 255	Select IP Byte 3
IP Byte 3	I 000	IP Address setting 3rd Byte / Octet Range 0 - 255	Select IP Byte 4
IP Byte 4	I 100	IP Address setting 4th Byte / Octet Range 0 - 255	Select Subnet Byte 1
Subnet Byte 1	S 255	Subnet Address setting 1st Byte / Octet Range 0 - 255	Select Subnet Byte 2
Subnet Byte 2	S 255	Subnet Address setting 2nd Byte / Octet Range 0 - 255	Select Subnet Byte 3
Subnet Byte 3	S 000	Subnet Address setting 3rd Byte / Octet Range 0 - 255	Select Subnet Byte 4
Subnet Byte 4	S 000	Subnet Address setting 4th Byte / Octet Range 0 - 255	Select Gateway Byte 1
Gateway Byte 1	G 010	Gateway Address setting 1st Byte / Octet Range 0 - 254	Select Gateway Byte 2
Gateway Byte 2	G 001	Gateway Address setting 2nd Byte / Octet Range 0 - 255	Select Gateway Byte 3
Gateway Byte 3	G 000	Gateway Address setting 3rd Byte / Octet Range 0 - 255	Select Gateway Byte 4
Gateway Byte 4	G 001	Gateway Address setting 4th Byte / Octet Range 0 - 255	Exit to Time display

8 - Frequency Setup

The 6010/6100 frequency control clock system monitors the Standard Time and Frequency Time and displays any discrepancy between the two as the Time Difference. The Frequency Time base and the Frequency display are derived from a dedicated mains input on the rear of the unit.

Setting the Mains Frequency

The time base for the Frequency Time and Time Difference displays may be set for either 50Hz or 60Hz operation.

Please refer to the table to the right for details of how to set this function.

Frequency Time daylight saving time changes

The Frequency Time display automatically self adjusts for any daylight saving time changes relevant to the selected location setting. Please refer to chapter 5 for information on the location setting.

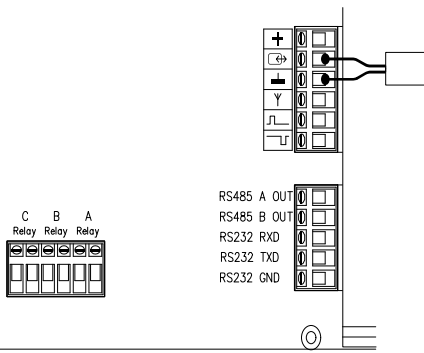
Time Difference Out Of Range Indication

If the difference between the Standard Time and the Frequency Time exceeds 59 minutes and 59 seconds, the Time Difference display will indicate this by showing '-RANGE'.

Resetting the Frequency Time and Time Difference

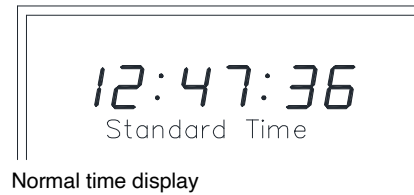
If required, the Frequency Time may be reset to the current Standard Time by pressing the bottom switch on the rear of the unit, (or ▼ on the optional infrared remote control unit). This will also zero the Time Difference display.

The above operation may be performed remotely by shorting the two opto-coupled switch inputs on the top 6-way connector on the rear of the unit as shown below.

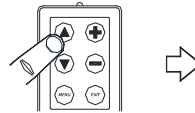


Remote 'Switch' connections

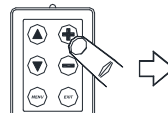
Top 6-way terminal block



Normal time display



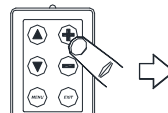
Function 'Time Setting Mode'. Press + three times to move to system settings



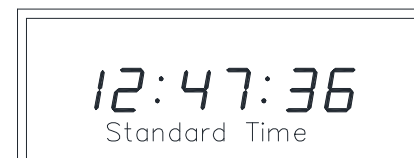
Function 'System Setting Mode'. Press ▲ twice to move to frequency setting mode.



Frequency Setting Mode selected with frequency flashing. Use + and - to select required setting.

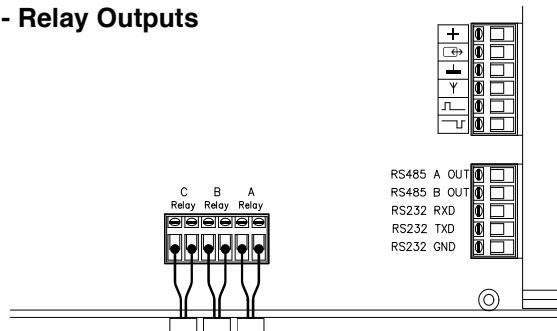


Press ▲ to save frequency and return to normal time display.



Normal time display.

9 - Relay Outputs



6010/6100 Relay Connections

Bottom 6-way terminal block

Relay Operation

The 6010/6100 frequency control clock system has three independently programmable voltage-free relay contact closures. The relays, A, B and C may be programmed to close at a preset time or upon detection of various status and alarm conditions.

The operation of each relay contact pair is mirrored by an LED indicator on the front of the 6100 unit.

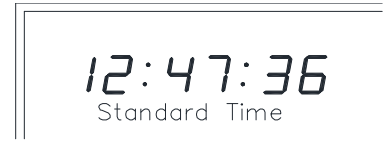
The table below shows the relay program options available for each relay.

Relay Modes Table

Code	Mode
OFF	Relay operation is disabled.
5 SE	5 Seconds - Contact closure every five seconds.
1 M	1 Minute - Contact closure every minute.
30 M	30 Minutes - Contact closure every 30 minutes.
1 Hr	1 Hour - Contact closure every hour.
24 Hr	1 Hour - Contact closure every 24 hours.
3 AM	3 AM - Contact closure every day at 03:00 AM.
4 AM	4 AM - Contact closure every day at 04:00 AM.
Loc	Lock - Contacts closed while the 601 / 610 is synchronised to an external source. Contacts open while unit is unsynchronised.
Pwr	Power - Contacts closed while power is present. Contacts open when power is removed.
41 AM	4:01 AM - Contact closure every day at 04:01 AM.
Fr	Frequency above limit - Contacts closed when Mains Frequency is above preset limit.
-Fr	Frequency below limit - Contacts closed when Mains Frequency is below preset limit.
ti	Time Difference above limit - Contacts closed when Time Difference is above preset limit.
-ti	Time Difference below limit - Contacts closed when Time Difference is below preset limit.

Programming the Relays

Each relay may be programmed by following the procedure detailed below. If any relay is set for Frequency above or below limit or Time Difference above or below limit, the procedure on the next page should then be followed to set the required over-limit or under-limit threshold.



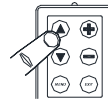
Normal time display.



Function 'Time Setting Mode'. Press **+** four times to move to relay selection menu.



Function 'Relay selection'. Press **▲** to select.



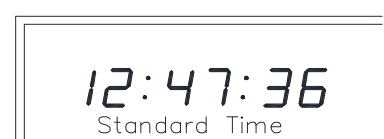
Current relay selection flashing. Use **+** and **-** to select relay. Press **▲** to select.



Current relay A mode flashing. Use **+** and **-** to select relay mode.




Press **▲** to save relay A mode and return to the normal time display.




Normal time display

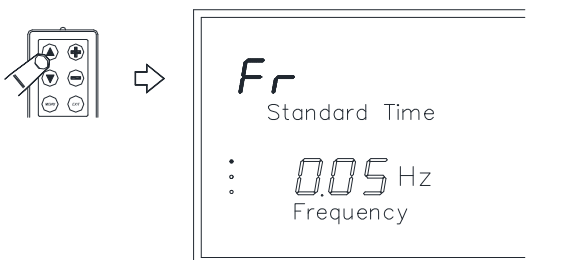
Programming the Relays - Time and Frequency limit setting



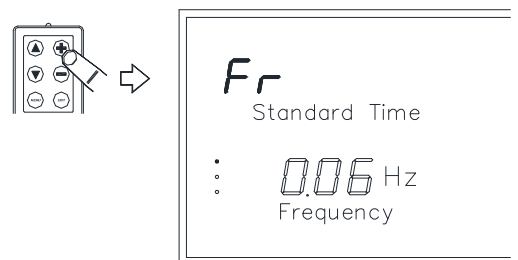
Current relay selection flashing. Use **+** and **-** to select relay mode.



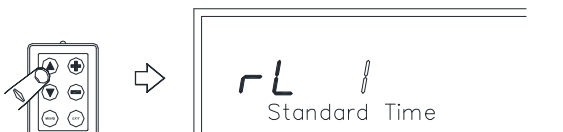
Relay mode frequency over-limit flashing. Press **▲** to select and enter frequency setup mode.




Frequency over-limit setup with frequency difference flashing. Use **+** and **-** to set frequency over-limit.



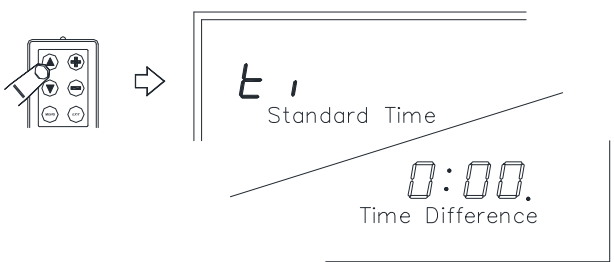
Frequency over-limit setup with frequency difference flashing. Press **▲** to save frequency over-limit and return to the normal time display.



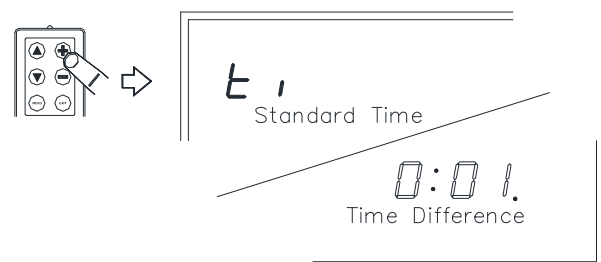
Current relay selection flashing. Use **+** and **-** to select relay mode.



Relay mode time difference over-limit flashing. Press **▲** to select and enter time difference setup mode.

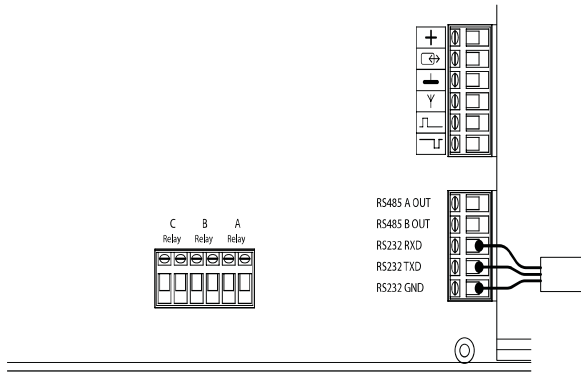


Time difference over-limit setup with time difference flashing. Use **+** and **-** to set time difference over-limit.



Time difference over-limit setup with time difference flashing. Press **▲** to save time difference over-limit and return to the normal time display.

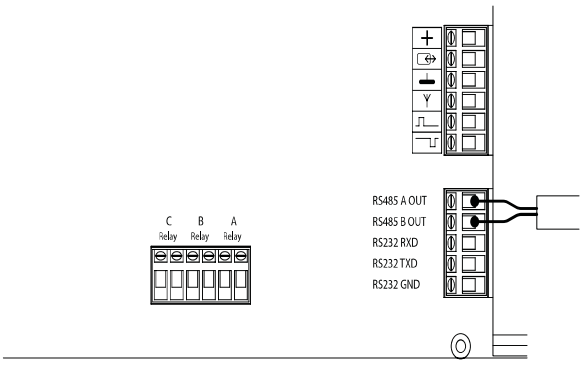
10 - RS232 & RS485 Serial Interface



RS232 Interface

5-way terminal block

RS232 TXD RS232 Transmitted data
 RS232 GND RS232 Ground
 RS232 RXD RS232 Received data



RS485 Interface

5-way terminal block

RS485 A Transmitted data 'A'
 RS485 B Transmitted data 'B'

Message Format

The 6010/6100 frequency control clock system uses the following message format for all serial communications. (The message is shown below in four sections. This is for simplicity. The message will be transmitted as one continuous string).

(Frequency component)

* Frt Fru . Frth Frh

(Standard time component)

T Yt Yu : Mtt Mtu : Dyt DyU : Ht Hu : Mit Miu : St Su

(Frequency time component)

M Ht Hu : Mit Miu : St Su

(Time difference component)

D + Ht Hu : Mit Miu : St Su : Sth CR LF

Byte	Description	ASCII value
Fr	frequency	30h-39h
Y	year	30h-39h
Mt	month	30h-39h
Dy	day-of-month	30h-39h
H	hours	30h-39h
Mi	minutes	30h-39h
S	seconds	30h-39h
*	ASCII star	2ah
F	ASCII F	46h
.	ASCII .	2eh
T	ASCII T	54h
M	ASCII M	4dh
D	ASCII D	44h
+	difference polarity	2bh/2dh
:	ASCII colon	3ah
CR	carriage return	0dh
LF	line feed	0ah
t	tens	
u	units	
th	tenths of units	
h	hundredths of units	

For example, to represent the data shown on the 6100 display on the front of this manual, the 6100 would transmit the following string:

*F59.76T97:06:26:12:47:36M12:44:52D-00:02:44:6CrLf

Transmission Format

All serial communications to and from the 6010/6100 frequency control clock system are transmitted at 9600 baud, 7 data bits, even parity and 1 stop bit. The message repetition rate is once per second.

Appendix A - Cable Specifications

6010/6100 -> 488HS4 GPS interconnection

The 6010/6100 frequency control clock system may be referenced to an external time base by use of the optional 488HS4 GPS synchronisation subsystem.

The 488HS4 GPS Receiver system is supplied with 25 metres of four core 7/0.2 (0.22mm²) screened cable. The cable screen should be grounded at the 6010/6100 end by means of the EMC rear grounding terminal.

For distances of up to 50 metres the length can be extended by adding an additional length of 7/0.2 cable.

For greater distances, up to a maximum of 200m, 16/0.2 (0.5mm²) cable should be used.

6010/6100 -> 5200 interconnection

For larger installations, the 6010/6100 frequency control clock system may be synchronised from a 5200 series Master Clock. The 6010/6100 48x0 time code input should be connected to the 48x0 time code output from the 5200 Master Clock using a non-critical cable pair.

The 48x0 time code system is designed to have considerable immunity to external electrical interference and screened cable is only required in areas of high electrical noise.

All installation work should be performed in accordance with the Seventeenth Edition of the IEE Wiring Regulations, or equivalent local regulations.

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