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VORTEX

THU 26 JUN		
NEW YORK	**LONDON**	**BRUSSELS**
07:47	12:47	13:47

V-470A/V-474A, AIL, N & NIL v2 series
Time Zone Displays

Operating and Installation

Issue 1.1h

V-470A/V-474A v2 Series Time Zone Displays
Operating and Installation Instructions

Trademarks

Vortex Communications and Timelord are trademarks of Vortex Communications Ltd. All other trademarks and registered trademarks are property of their respective owners.

Statutory Notices

Warning - To prevent fire or shock hazard, do not expose the internals of 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. The Lithium battery should only be changed by a suitably qualified engineer.

CAUTION - Danger of explosion if battery is incorrectly replaced.

Replace only with the same type or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. You can return unwanted Lithium batteries to the manufacturer or their agent. Note: In some areas disposal of Lithium batteries in household or business refuse may be prohibited.

Caution: Do not handle damaged or leaking Lithium batteries.

Electromagnetic Compatibility & Safety

The V-470A/V-474A v2 Series Time Zone Displays, when used in accordance with our recommendations, comply with both the European Community Electromagnetic Compatibility Directive, 89/336/EEC (as amended by 91/263/EEC, 92/31/EEC and 93/68/EEC) and European Community Low Voltage Directive 73/23/EEC (as amended by 93/68/EEC) and conform to the following standards:

- **EN 61000-6-1**

- **EN 61000-6-3**

- **EN 60950**

Warranty

The V-470A/V-474A v2 Series Time Zone Displays are fully guaranteed, on a return to works basis, against failure due to faulty parts or workmanship for one year 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.

Product Development

Our products are subject to continuous development and the technical specifications and sizes detailed are subject to change without notice.

Contents

1 - Introduction

The V-470A v2 series time zone displays are designed to show the local time in a number of different national and international locations. The V-470A v2 series comprises a number of different models offering a choice of zones, horizontal or vertical display format, character height and calendar display options.

The v2 range of V-470A series time zone displays provides advanced time zone functionality originally introduced in the Timelord series master clock ranges. Regardless of time synchronisation source, the V-470A/V-474A v2 series time zone displays can display time and date information referenced to UTC, user 'local' time or other custom time zone.

Incorporating 'Set-Once' technology, the V-470A/V-474A v2 series time zone displays automatically calculate future seasonal time changes for all 78 preset time location code settings.

Units are supplied either with the customers choice of factory fitted location legends (*A* versions), or with illuminated LED location legends that may be reprogrammed in the field using the supplied '*ZoneControl*' software (*AIL* versions) or via the time zone display's web interface (*NIL* versions).

Operating Modes

The V-470A/V-474A v2 series time zone displays are user programmable to provide a wide range of operating features.

*   V-470A/V-474A v2 series time zone displays can be used as stand-alone units, deriving their timekeeping from a highly accurate internal quartz crystal oscillator, or to operate as slave displays controlled by time signals from many different sources.

*   Each time zone can be programmed to automatically display the 'local' time and adjust for individual seasonal time changes in one of 78 preset locations.

*   V-470/V-474AIL units with illuminated location legends may be reprogrammed in the field to display any LED location legend consisting of a maximum of 10 alphanumeric characters using the supplied '*ZoneControl*' software - *please refer to chapter 7*.

*   V-470A/V-474A v2 series time zone displays can be synchronised from:

    ~ Radio time code signals when connected to a V-484 series DCF or MSF radio receiver - *please refer to chapter 6*.

    ~ GPS satellite time signals when connected to a V-488GPS receiver system - please *refer to chapter 6*.

    ~ w482® multi-zone code signals from a Timelord series master clock - please refer *to chapter 6.*

    ~ NTP (Network Time Protocol) across a computer network *(N / NIL versions only)* - *please refer to chapter 8.*

    ~ MOBA*Line*® time code signals from a MOBA*Line*® master clock - *please refer to chapter 6.*

*   The display brightness may be adjusted through a range of 7 settings - *please refer to chapter 3*.

*   Units fitted with a calendar display show the abbreviated day of week, day of month and abbreviated month - *please refer to chapter 4 for further information.*

2 - Installation

The V-470A/V-474A v2 series time zone displays are available with cases suitable for surface wall mounting, flush mounting in a panel with rear access, flush mounting in a wall box and single or double sided ceiling suspension. The surface wall mounting case is supplied with wall mounting brackets. Please refer to appendix C for further mounting information.

Power Supply Connection

V-470/V-474A v2 series time zone displays are manufactured with universal mains power supplies enabling operation at voltages from 100 to 240V ac 50/60Hz without adjustment.

Units for surface or flush mounting applications have an IEC mains socket located in the external interface connector module and are supplied with a 2m mains cable preterminated with either a UK, European, US or Australian style mains plug. The external interface connector module may be found recessed into the rear of the clock as shown in appendix A.

Units for single or double sided ceiling suspension mounting applications are supplied with a 3m unterminated captive mains cable (units for supply to the USA or Canada are supplied with a 3m captive mains cable preterminated with a US style moulded plug).

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

To ensure conformance with EN60950:

(A)   For installations where the V-470/V-474A v2 clock 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 V-470/V-474A v2 clock 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 current Building Regulations and the Sixteenth Edition of the IEE Wiring Regulations, or equivalent local standard.

When time zone displays are used as stand-alone units, an internal Lithium battery will maintain the internal time count if the mains supply is interrupted. In normal operation, this battery should have a service life of greater than 10 years.

The power supply is fitted with an internal fuse. In case of fault the fuse should only be replaced with a fuse of the same rating, by a suitably qualified engineer **after disconnection from the mains power supply** and correction of the fault condition.

Synchronisation Signal Connection

A six way terminal block is located on the rear panel of the clock to enable the connection of synchronisation signals, a GPS receiver system or a radio time code receiver. Details of the connections for various signal configurations are detailed in appendix A. Please refer to chapter 6 for information on synchronisation setup.

The mains power supply must be disconnected when making connections to external signals.

Clocks supplied for ceiling suspension are supplied with a 6 way cable to enable connection of external synchronisation signals.

PC Update Port

The PC update port may be found located in the External Interface Connector Module recessed into the rear of the clock, as shown in appendix A. This port enables remote programming of the time zone location settings and additionally on AIL type units with programmable illuminated locations, remote programming of the alphanumeric location characters.

If you wish to remotely alter the time zone location settings or alphanumeric location characters, the *'ZoneControl'* software should be installed on a Windows PC (as detailed in the *ZoneControl* software instructions provided) and a connection made between the PC update port and a spare COM port on the Windows PC using the 9 way serial cable supplied.

A connection between the PC update port and a Windows PC is only required temporarily when you wish to remotely update the time zone location settings or alphanumeric location characters.

Please refer to chapter 7 and appendix A for further details relating to this interface. Please note that a PC Update Port connection is not required on N or NIL units with a network connection - please refer to chapter 8 for further details.

Multiple Unit Expansion Port

V-470/V-474A v2 series time zone displays in larger case sizes may be supplied in two or more sections due to shipping or installation issues. Multiple sections should be joined using the supplied cable as shown in figure 1 below.

The multiple unit expansion port allows all sections of the clock to be controlled from the master section in a fully transparent manner as if they were in one complete unit. All sections will require both a local mains power supply connection and a connection via the multiple unit expansion port. All other connections (e.g. synchronisation connections) should be made only to the master unit.

The Master Part A section should be installed on the right hand side when viewed from the front. The secondary units should be installed in sequence to the left of the Master.
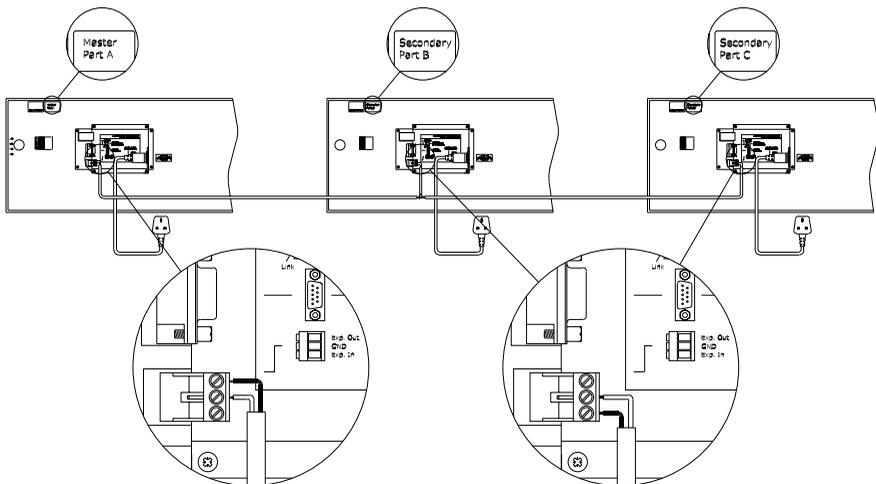

figure 1 - Rear view detailing Multiple Unit Expansion Port connection

Local Link Output

In small / medium sized installations, the local link output from a V-470/V-474A v2 series time zone display may be used to synchronise a maximum of ten further V-470A series displays as secondary clocks. This output enables the timebase of all connected clocks to be controlled from the master V-470/V-474A v2 series timezone display .

V-470A series displays to be synchronised from a local link output should be programmed for 48x0 synchronisation. Please note that the location setting should be programmed for each time zone (please refer to chapter 4 for further details).

The local link output connection is located on the 6 way synchronisation signal terminal block on the rear of the unit, as detailed in appendix A. Units to be synchronised from a local link output should be connected using the w482 time code input as shown in figure 2 below.

The system should be connected in a single daisy chain configuration, using a minimum 24AWG (0.22mm^2 or 7/0.2) cable pair. The total cable length should not exceed 200m.

Local Link Master Unit Generates Local Link output to synchronise a further ten V-474A v2 units

Local Link synchronisation cable connection. Polarity not critical

Local Link Slave Unit Timebase synchronised from Local Link Master unit

Local Link Slave Unit Timebase synchronised from Local Link Master unit
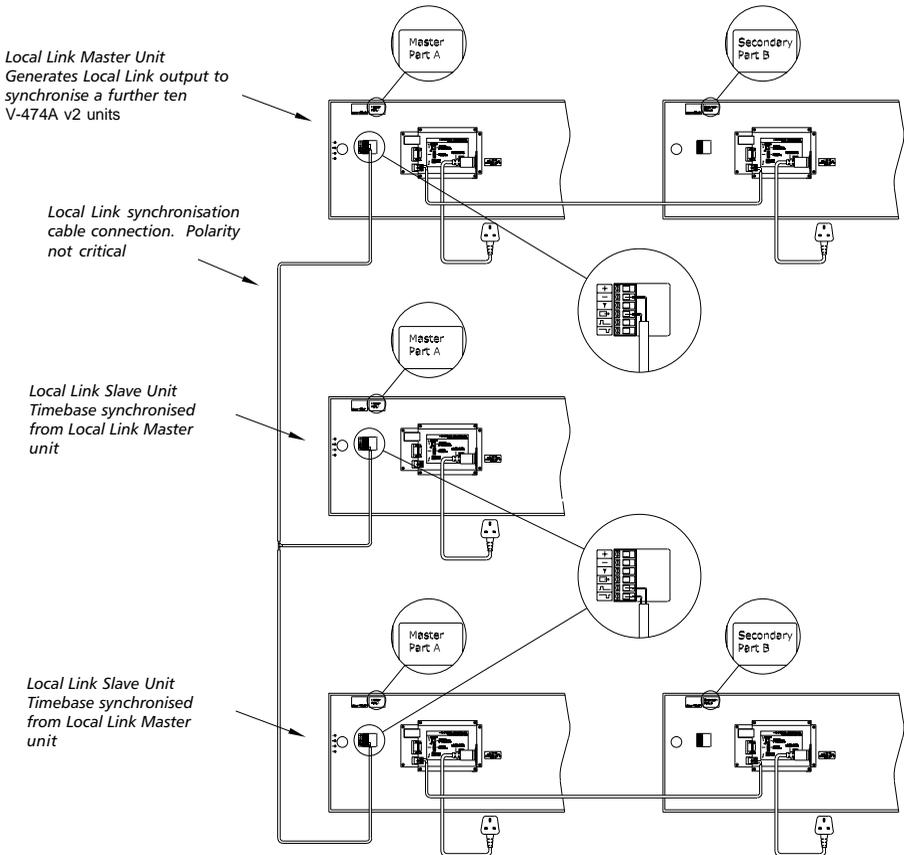
figure 2 - Local Link system connection

3 - Function Programming

The V-470A/V-474A v2 Series Time Zone Displays have a user friendly interface based on the use of four switches. Surface mounting units have switches located on the right hand rear of the display. On other case mounting types, the switches may be accessed remotely via the supplied V-408 type remote control handset .

Please refer to the table below for further details of function programming procedures.

NEW YORK	LONDON	HONG KONG
07:47	12:47	19:47

Normal time display

| NEW YORK	LONDON	HONG KONG
Fu ti		
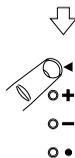
Function 'Time Setting Mode'. See page 5-1. Press '+' once to move to location setting mode. *Please note that this option is not present on w482 synchronised units.*

NEW YORK	LONDON	HONG KONG
Fu Lo		
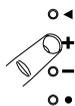
Function 'Location Setting Mode'. See page 4-1. Press '+' once to move to synchronisation setting mode. *Please note that this option is not present on w482 synchronised units.*

NEW YORK	LONDON	HONG KONG
Fu SY		
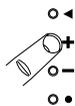
Function 'Synchronisation Setting Mode'. See page 6-1. Press '+' once to move to system setting mode. *This option is followed by a Zone option (Zo) on w482 synchronised units and an NTP option (Nt) on NTP synchronised units.*

NEW YORK	LONDON	HONG KONG
Fu St		
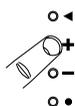
Function 'System Setting Mode'. See page 3-2. Press 'o' once to move to normal time display.

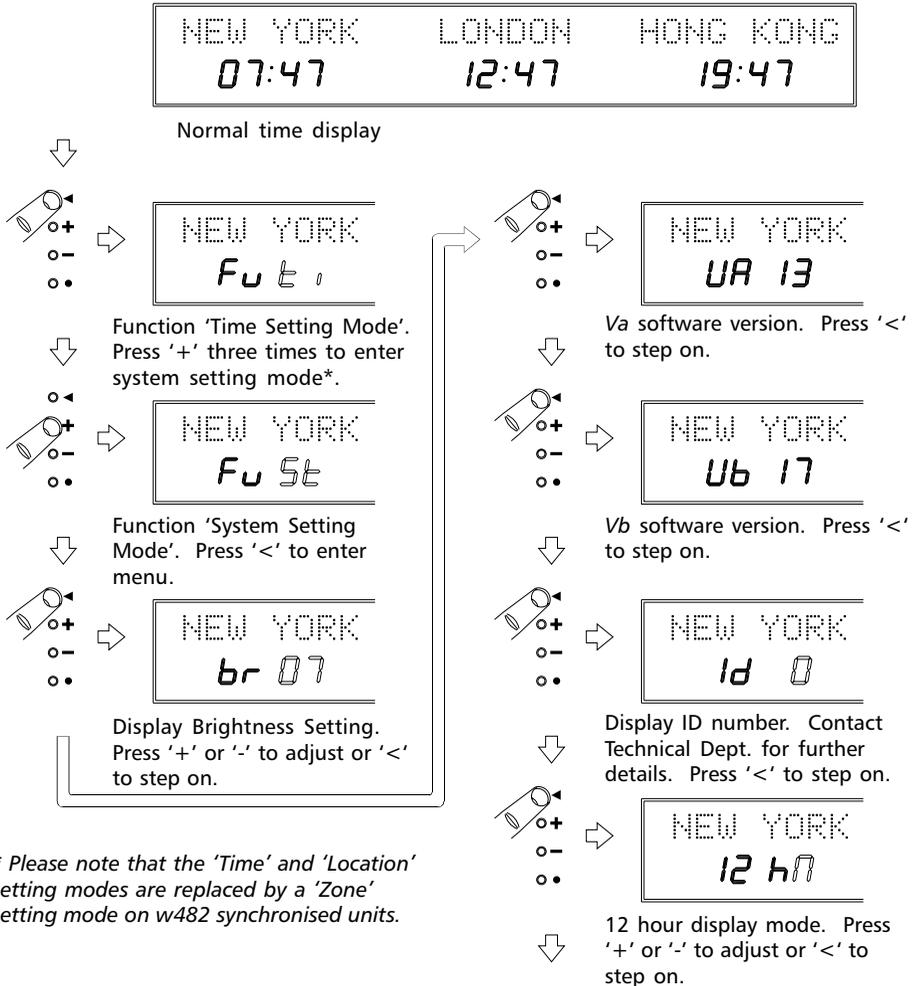| NEW YORK	LONDON	HONG KONG
07:47	12:47	19:47

Normal time display

System setup

The system setup menu contains general setup options for the V-470A/V-474A v2 Series Time Zone Displays.

Please refer to the diagram below for further information regarding this function.
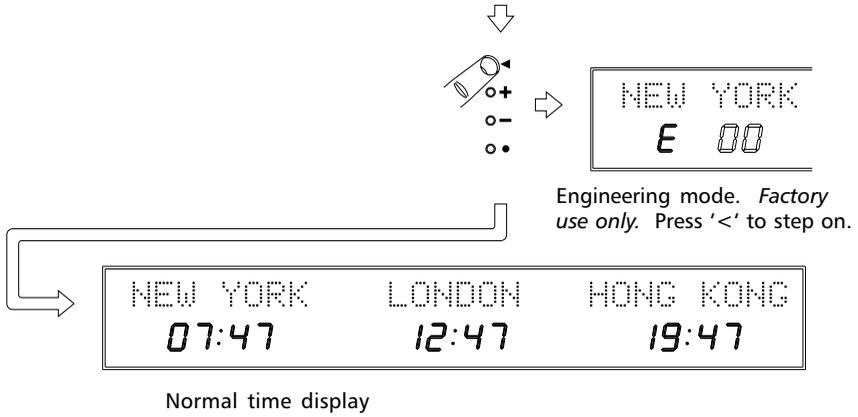
```
NEW YORK      LONDON      HONG KONG
 07:47        12:47        19:47
```

Normal time display

```
NEW YORK
Fu t i
```

Function 'Time Setting Mode'. Press '+' three times to enter system setting mode*.

```
NEW YORK
Fu 5t
```

Function 'System Setting Mode'. Press '<' to enter menu.

```
NEW YORK
br 07
```

Display Brightness Setting. Press '+' or '-' to adjust or '<' to step on.

* Please note that the 'Time' and 'Location' setting modes are replaced by a 'Zone' setting mode on w482 synchronised units.

```
NEW YORK
UA 13
```

Va software version. Press '<' to step on.

```
NEW YORK
Ub 17
```

Vb software version. Press '<' to step on.

```
NEW YORK
Id 0
```

Display ID number. Contact Technical Dept. for further details. Press '<' to step on.

```
NEW YORK
12 hA
```

12 hour display mode. Press '+' or '-' to adjust or '<' to step on.

New 12 Hour Display Mode

When 12 hour display is enabled, location times between 00:00 and 11:59 (AM time) will have the colons turned off while location times between 12:00 and 23:59 (PM time) will have the colons turned on. When unit is unsynchronised, first set of colons will flash.

System Setup (cont..)

NEW YORK
E 00

Engineering mode. *Factory use only.* Press '<' to step on.

NEW YORK   LONDON   HONG KONG
07:47   12:47   19:47

Normal time display

4 - Location and Calendar Setup

The V-470A/V-474A v2 Series Time Zone Displays provide advanced time zone functionality. Regardless of time synchronisation source*, each time display can be programmed to indicate the time in one of 78 preset locations. Incorporating 'Set Once' technology, the V-470A/V-474A v2 Series Time Zone Display will automatically calculate future seasonal time changes for all preset time location code settings.

* Please note that the location setting is not present on units synchronised from a Timelord *master clock using w482 time code. Please refer to chapter 6 for further information.*

User Programmable Time Zone

To allow for custom time zones and future changes in legislation, setting any time zone to location code 52 enables users to program a 6 byte code representing the local time offset and seasonal time change-over dates for that zone. Please contact our technical department for further details of this function.
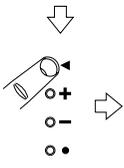
Setting the Location

All V-470A/V-474A v2 Series Time Zone Displays are supplied with time zone location codes preprogrammed to customers specification.

However, if for example your unit has been supplied with programmable location displays, you may wish to alter the displayed time zones. Rather than manually adjusting the time on a time zone you wish to alter, the time zone location code should be reprogrammed. This will automatically adjust the time displayed on that location without altering all the other displayed time zones.
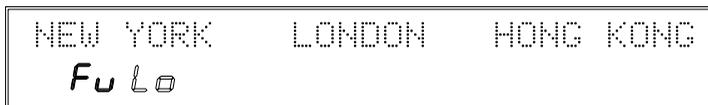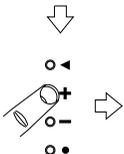
The table on page 4-3 details the time displayed for each location code. Please refer to the diagram below for further details of this setting procedure.
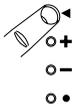

Normal time display

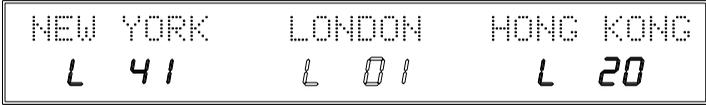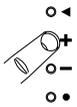Function 'Time Setting Mode'. Press '+' once to move to location setting mode.

Function 'Location Setting Mode'. Press '<' to select.

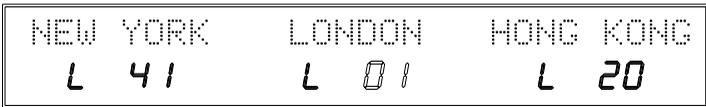NEW YORK   LONDON   HONG KONG
L 41   L 01   L 20

Preset locations displayed with current selected zone flashing. If required, press '+' or '-' to select zone for adjustment.
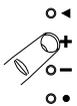
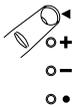NEW YORK   LONDON   HONG KONG
L 41   L 01   L 20

Current selected zone flashing. Press '<' to enter location adjustment mode.

NEW YORK   LONDON   HONG KONG
L 41   L 01   L 20
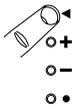
Location code for current selected zone flashing. Press '+' or '-' to adjust. Please refer to table on page 4-2 for details of location codes.

NEW YORK   LONDON   HONG KONG
L 41   L 02   L 20

Revised location code for current selected zone flashing. Press '<' to save and return to normal time display.

NEW YORK   LONDON   HONG KONG
07:47   13:47   19:47

Normal time display

Time Zone Locations

Code	City / Location	GMT offset	Daylight Savings?
00	GMT, UTC, Monrovia, Casablanca	0	No
01	Dublin, Edinburgh, London, Lisbon	0	Yes
02	Amsterdam, Berlin, Brussels, Paris	+1	Yes
03	Belgrade, Budapest, Prague, Zagreb	+1	Yes
04	Athens, Istanbul, Minsk	+2	Yes
05	Bucharest	+2	Yes
06	Cairo - pre 2008	+2	Yes
07	Harare, Pretoria	+2	No
08	Helsinki, Riga, Tallinn	+2	Yes
09	Israel (Standard Time)	+2	No
10	Kuwait, Riyadh, Nairobi, Israel (daylight savings time)	+3	No
11	Moscow, St. Petersberg, Volgograd	+3	Yes
12	Tehran (non leap-year)	+3$\frac{1}{2}$	Yes
13	Abu Dhabi, Muscat, Tbilisi	+4	No
14	Kabul	+4$\frac{1}{2}$	No
15	Ekaterinburg	+5	Yes
16	Tashkent	+5	No
17	Chennai, Colombo, Mumbai, New Delhi	+5$\frac{1}{2}$	No
18	Almaty	+6	No
19	Bangkok, Hanoi, Jakarta	+7	No
20	Beijing, Chongqing, Hong Kong, Urumqi	+8	No
21	Singapore, Taipei	+8	No
22	Osaka, Sapporo, Seoul, Toyko	+9	No
23	Yakutsk	+9	Yes
24	Adelaide - pre 2008	+9$\frac{1}{2}$	Yes
25	Darwin	+9$\frac{1}{2}$	No
26	Brisbane, Guam, Port Moresby - pre 2008	+10	No
27	Canberra, Melbourne, Sydney - pre 2008	+10	Yes
28	Hobart - pre 2008	+10	Yes
29	Vladivostok	+10	Yes
30	Magadan, Solomon Is., New Caledonia	+11	No
31	Auckland, Wellington - pre 2008	+12	Yes
32	Fiji, Kamchatka, Marshall Is.	+12	No
33	Azores	-1	Yes
34	Mid-Atlantic	-2	Yes
35	Brasilia - pre 2007	-3	Yes
36	Buenos Aires - pre 2008	-3	No
37	Newfoundland - pre 2007	-3$\frac{1}{2}$	Yes
38	Atlantic Time (Canada) - pre 2007	-4	Yes
39	Caracas, La Paz - pre 2008	-4	No

Time Zone Locations cont

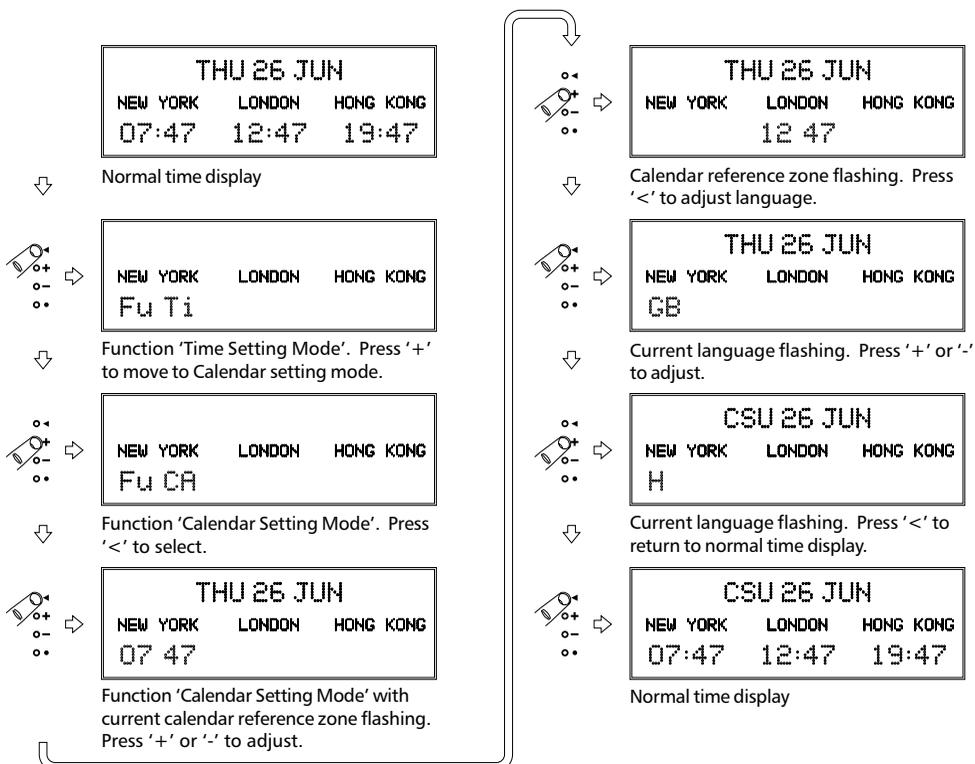| Code	City / Location	GMT offset	Daylight Savings?
40	Bogota, Lima, Quito	-5	No
41	Eastern Time (US & Canada) - pre 2007	-5	Yes
42	Indiana (East)	-5	No
43	Central Time (US & Canada), Mexico City - pre 2007	-6	Yes
44	Tegucigalpa	-6	No
45	Arizona	-7	No
46	Mountain Time (US & Canada) - pre 2007	-7	Yes
47	Pacific Time (US & Canada) - pre 2007	-8	Yes
48	Alaska - pre 2007	-9	Yes
49	Hawaii	-10	No
50	Midway Island, Samoa	-11	No
51	Eniwetok, Kwajalein	-12	No
52	User programmable time zone	-	-
53	Amman	+2	Yes
54	Baghdad	+3	Yes
55	Tehran (leap-year only)	+3$\frac{1}{2}$	Yes
56	Kathmandu	+5$\frac{3}{4}$	No
57	Santiago, Chile	-4	Yes
58	Newfoundland - 2007+ (US Energy Policy Act 2005)	-3$\frac{1}{2}$	Yes
59	Atlantic Time - 2007+ (US Energy Policy Act 2005)	-4	Yes
60	Eastern Time - 2007+ (US Energy Policy Act 2005)	-5	Yes
61	Central Time - 2007+ (US Energy Policy Act 2005)	-6	Yes
62	Mountain Time - 2007+ (US Energy Policy Act 2005)	-7	Yes
63	Pacific Time - 2007+ (US Energy Policy Act 2005)	-8	Yes
64	Alaska - 2007+ (US Energy Policy Act 2005)	-9	Yes
65	Luanda	+1	No
66	Baku	+4	Yes
67	Perth - 2007+	+8	Yes
68	Adelaide - (2007 - 2008)	+9.5	Yes
69	Adelaide - 2008+	+9.5	Yes
70	Sydney & Melbourne - (2007 - 2008)	+10	Yes
71	Sydney, Melbourne & Tasmania - 2008+	+10	Yes
72	New Zealand - 2008+	+12	Yes
73	Cape Verde	-1	No
74	Greenland	-2	No
75	Nuuk (Greenland)	-3	Yes
76	Brasilia - (2007 - 2009)	-3	Yes
77	Falkland Islands	-4	Yes
78	Venezuela - 2008+	-4.5	No
99	Display blanking option	-	-

Programming the Calendar display

V-470A & V-475A type units have an integral calendar display showing the day-of-week, the day-of-month and an abbreviated month. The calendar display may be programmed to be referenced to any of the displayed time zones and to indicate the day-of-week and month in one of 20 different languages as shown in the language table below:

Language Table					
Code	**Language**	**Code**	**Language**	**Code**	**Language**
CA	Catalan	GB	English	PL	Polish
CR	Czech	H	Hungarian	RU	Russian
D	German	HR	Croat	S	Swedish
DK	Danish	I	Italian	SF	Finnish
E	Spanish	N	Norwegian	SK	Slovakian
F	French	NL	Dutch	W	Welsh
GA	Gallician	P	Portuguese		

Please refer to the diagram below for further programming and setup information.

Normal time display

Function 'Time Setting Mode'. Press '+' to move to Calendar setting mode.

Function 'Calendar Setting Mode'. Press '<' to select.

Function 'Calendar Setting Mode' with current calendar reference zone flashing. Press '+' or '-' to adjust.

Calendar reference zone flashing. Press '<' to adjust language.

Current language flashing. Press '+' or '-' to adjust.

Current language flashing. Press '<' to return to normal time display.
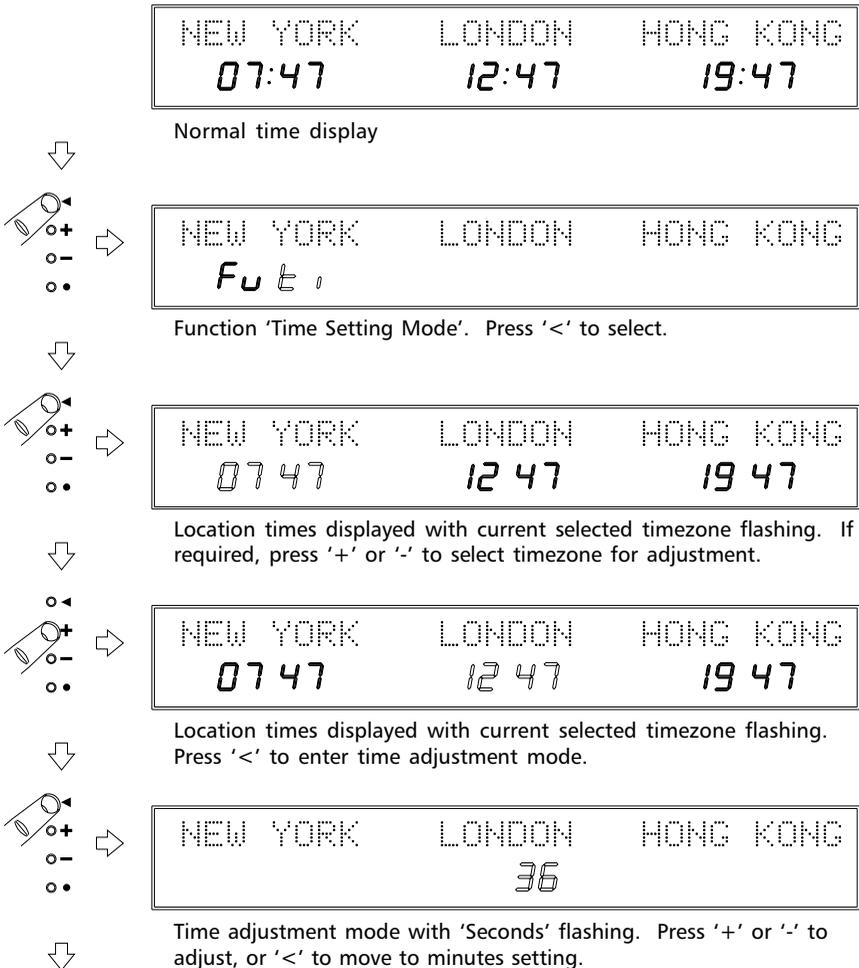
Normal time display
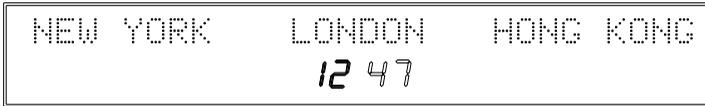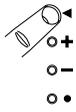
5 - Time and Date Setting

The V-470A/V-474A v2 Series Time Zone Displays may be synchronised from a number of different time sources. When coupled with the advanced time zone functionality provided by the 'Set Once' technology, the time on a V-470A/V-474A v2 Series Time Zone Display should never need to be manually set.

However, if your V-470A/V-474A v2 Series Time Zone Display is running standalone, you may occasionally need to manually adjust the time. Please note, only the time on one zone (usually the local zone) will need to be adjusted.

Please refer to the diagram below for further information.

NEW YORK   LONDON   HONG KONG
   07:47   12:47   19:47

Normal time display

NEW YORK   LONDON   HONG KONG
   Fu t ı

Function 'Time Setting Mode'. Press '<' to select.

NEW YORK   LONDON   HONG KONG
   07 47   12 47   19 47

Location times displayed with current selected timezone flashing. If required, press '+' or '-' to select timezone for adjustment.

NEW YORK   LONDON   HONG KONG
   07 47   12 47   19 47

Location times displayed with current selected timezone flashing. Press '<' to enter time adjustment mode.

NEW YORK   LONDON   HONG KONG
               36

Time adjustment mode with 'Seconds' flashing. Press '+' or '-' to adjust, or '<' to move to minutes setting.

NEW YORK   LONDON   HONG KONG
                12 47

Time adjustment mode with 'Minutes' flashing. Press '+' or '-' to adjust, or '<' to move to hours setting.

NEW YORK   LONDON   HONG KONG
                12 47
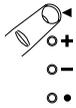
Time adjustment mode with 'Hours' flashing. Press '+' or '-' to adjust, or '<' to move to years setting.

NEW YORK   LONDON   HONG KONG
                20 04
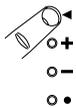
Time adjustment mode with 'Year' flashing. Press '+' or '-' to adjust, or '<' to move to month setting.

NEW YORK   LONDON   HONG KONG
                26 06
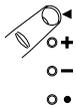
Time adjustment mode with 'Month' flashing. Press '+' or '-' to adjust, or '<' to move to day-of-month setting.

NEW YORK   LONDON   HONG KONG
                26 06
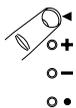
Time adjustment mode with 'Day-of-Month' flashing. Press '+' or '-' to adjust, or '<' to save and exit time setting mode.

NEW YORK   LONDON   HONG KONG
 07:47   12:47   19:47
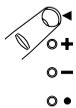
Normal time display

6 - Synchronisation Setup

The V-470A/V-474A v2 series time zone displays are supplied as standard with no external time reference using their internal quartz crystal oscillator to provide a timekeeping accuracy of better than 0.1 sec/day @ 20-25°C.

However, for applications where an increased level of accuracy is required, units may be externally synchronised via the GPS navigation network, MSF or DCF radio time codes, NTP across an ethernet network (N/NIL versions only - please refer to chapter 8), or in larger installations, w482 time code generated from a Timelord series master clock.

The table below details the available options. Please refer to the diagram at the bottom of this page for further programming and setup information.

Synchronisation Setup

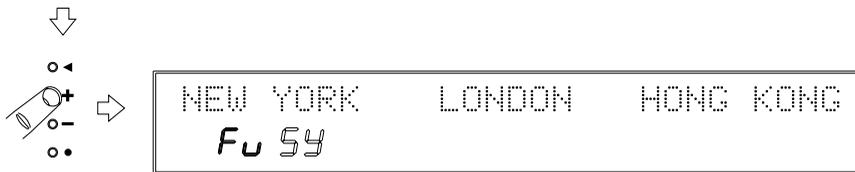| Code	Synchronisation source	Notes
None	Standalone operation using internal quartz ctystal oscillator.	No external reference, timekeeping accuracy better than 0.1 sec/day @ 20-25°C.
GPS	V-488GPS Receiver System - Synchronisation from GPS satellites.	Very accurate time synchronisation. Can be used anywhere in the world.
DCF	V-484 DCF Receiver - Synchronisation from the DCF time signal.	
MSF	V-484 MSF Receiver - Synchronisation from the MSF time signal.	
w482	Timelord Master Clock - Synchronisation ony from w482 time code.	Used for the control of mutliple clock displays in large installations.
48x0	Special 'Local Link' UTC synchronisation from w482 time code zo e 0.	Used for mutliple clock installations connected via 'Local Link'.
CUST	Custom setting	Special order only.
MOBA	MOBA*Line* - Synchronisation from a MOBA*Line* Master Clock.	Synchronisation of minutes and seconds count only to the nearest hour.
NtP	NTP (Network Time Protocol) from a remote NTP time server across a computer network.	N/NIL versions only. Please refer to chapter 8 for further details.

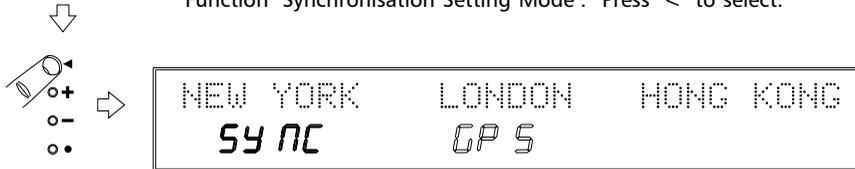**Synchronisation setting mode**

Normal time display
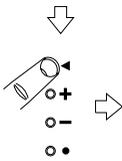
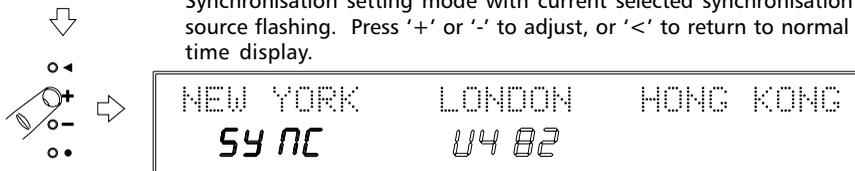Function 'Time Setting Mode'. Press '+' twice to move to synchronisation setting mode.

NEW YORK   LONDON   HONG KONG
　　　Fu SY

Function 'Synchronisation Setting Mode'. Press '<' to select.

NEW YORK   LONDON   HONG KONG
SY NC   **GP S**

Synchronisation setting mode with current selected synchronisation source flashing. Press '+' or '-' to adjust, or '<' to return to normal time display.

NEW YORK   LONDON   HONG KONG
SY NC   **U4 82**

Synchronisation setting mode with current selected synchronisation source flashing. Press '<' to save and return to normal time display.

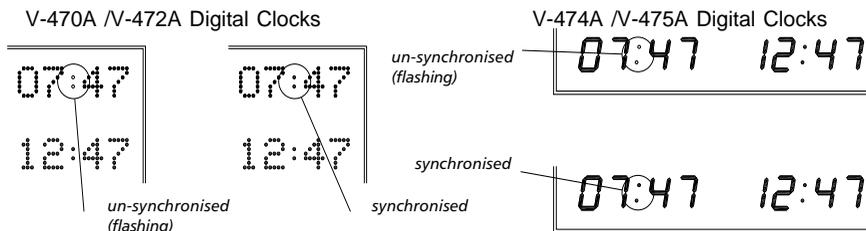NEW YORK   LONDON   HONG KONG
　　　:　　　　　　:　　　　　　:
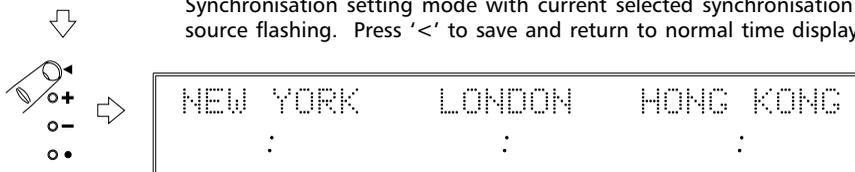
Normal time display. *Please note that when programmed for w482 time code synchronisation, location times will not be displayed until* time code is received from the Timelord master clock.

Synchronisation status indication

Synchronisation status is indicated visually by the 'synchronisation status LEDs' as shown below. When the unit is unsynchronised, the synchronisation status LEDs will flash. When the unit is synchronised (or programmed for stand-alone operation), the synchronisation status LEDs will be illuminated.

On units synchronised via w482 timecode (from a Timelord Master Clock), the time displays will be blank when the unit is unsynchronised and illuminated when synchronised.

V-470A /V-472A Digital Clocks   V-474A /V-475A Digital Clocks

*un-synchronised
(flashing)*

07:47   12:47

07:47   07:47

12:47   12:47

synchronised

07:47   12:47

*un-synchronised
(flashing)*   *synchronised*

GPS Synchronisation

The V-488GPS receiver system is 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 V-488GPS receiver has been designed for simple installation and operation by the end-user, requiring only a 4 wire interconnection to the V-470A/V-474A v2 series time zone display. When synchronised to a V-488GPS receiver system the V-470A/V-474A v2 series time zone display timebase is maintained within 50uS of UTC.

Advantages of V-488GPS time synchronisation:

*   Very accurate synchronisation

*   Can be used anywhere in the world

*   Better resistance to EM interference

Disadvantages of GPS time synchronisation:

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

The V-488GPS Antenna/receiver module

The V-488GPS 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.

The reception gain pattern 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.

Installation

To ensure ease of operation and to remove the possibility of operator error, the V-488GPS system is designed to self initialise.

> ***Ensure that the V-470A/V-474A v2 series time zone display is disconnected from the mains power supply when making connections to the V-488GPS receiver system.***

1   Install the V-488GPS 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.

2   The V-488GPS should be connected to the V-470A/V-474A v2 series time zone display using the captive 25 metre four core cable supplied. 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 (0.5mm^2) cable should be used. The cable should be connected to the 6 way terminal block on the rear of the V-470A/V-474A v2 series time zone display as shown in figure 3. The cable screen should be connected to the EMC ground connection on the 6 way terminal block.

3   Connect the power supply to the V-470A/V-474A v2 series time zone display.

Connection to V-474Av2 digital
*clock (please refer to appendix
A & B for further details)*

V-488GPS antenna /
receiver module

*25m four core
screened cable*

Red
Blue

Yellow
Green

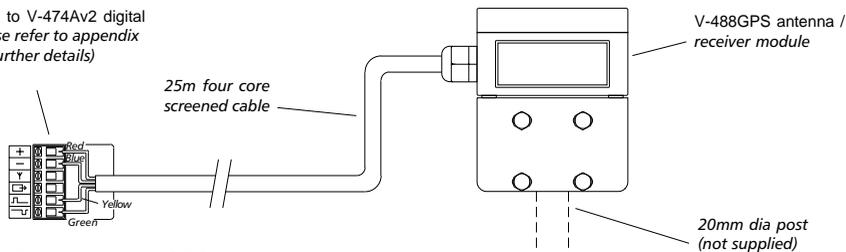*20mm dia post
(not supplied)*

figure 3 - V-488GPS receiver system connections

4   Once the power has been applied the receiver will automatically begin to search the sky for all available satellites. During this process the green LED inside the V-488GPS unit will flash. After three satellites have been acquired the green LED will stop flashing and become constantly illuminated, 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 10 minutes.

5   Ensure that the V-470A/V-474A v2 series time zone display is configured to synchronise from the GPS signal by following the procedure on page 6-1.

Once the green LED has illuminated the synchronising time signals are transmitted from the receiver/decoder module to the V-470A/V-474A v2 series time zone display. The V-470A/V-474A v2 series time zone display should lock in and display the correct time within 5 minutes.

MSF and DCF synchronisation

MSF and DCF are the two most widely used radio time code signals. The DCF signal is derived from the atomic clocks at the Physics Institute of Brunswick and transmitted at a frequency of 77.5KHz from Manflingen, near Frankfurt in Germany. The MSF signal is referenced to the Caesium Beam Oscillators at the National Physical Laboratory and transmitted on a frequency of 60KHz from Anthorn in the United Kingdom.

Under normal circumstances the DCF signal provides reliable operation at distances of up to 1500km, MSF signals are normally usable up to 1000km from the transmitter. Greater operating ranges are possible at night.

When synchronised to MSF or DCF using a 484 radio receiver the V-470A/V-474A v2 series time zone display timebase is maintained within 30mS of UTC.

Advantages of MSF and DCF time synchronisation:

•   Lower purchase cost than GPS

•   Can sometimes be installed internally.

Disadvantages of MSF and DCF time synchronisation:

•   Can be difficult to find good location for signal reception.

•   Suffers greatly from EM interference - Avoid locating near computers, electronic equipment, fluorescent lighting, lift equipment, metal girders, reinforced concrete walls and all other sources of electrical noise.

•   MSF is off-air for maintenance on the second Thursday of every March, June, September and December. MSF status can be checked by telephoning 020 8943 6493.

Installation

The V-484 series time code receiver should be mounted:

- At least 2.5 metres from the V-470A/V-474A v2 series time zone display.

- At greatest practical distance from:
  Other electronic equipment including computers, fluorescent lights and signs, metal girders, reinforced concrete walls and any other sources of electrical noise.

- On the side of the building nearest Anthorn (MSF) or Frankfurt (DCF).

- Preferably on the outside of the building (V-484.02 and V-484.03 only) as high as possible. The case is weatherproof to IP65 (V-484.02 and V-484.03 only) but it is preferable to provide some protection from direct rain.

- With the cable entry on the lower face of the case. (V-484.02 and V-484.03 only)

The antenna is supplied with 3 metres of two core cable, if a longer cable distance is required Appendix B should be consulted for suitable cable specifications. The maximum distance between the 484 radio receiver and the V-470A/V-474A v2 series time zone display is 200m.

If a screened cable is used, the cable screen should be connected to the EMC grounding terminal on the rear of the V-470A/V-474A v2 series time zone display.

Alignment

The V-484.02 (MSF) and V-484.03 (DCF) radio receivers have dual ferrite antennas, which normally permit location regardless of orientation to the transmitter. The receiver is mounted by means of four fixing holes in the rear surface which are accessed after removing the front cover. The four mounting holes are located outside of the central sealed compartment.

The V-484.06 (MSF) and V-484.07 (DCF) receivers have a single antenna element and are supplied with an adjustable mounting bracket so that the installer can ensure that the orientation of the longest face of the receiver is at 90° to the direction of the transmitter.

The front cover of the V-484.02 and V-484.03 receivers may be removed to enable the indicator LED to be viewed. The indicator LED on the V-484.06 and V-484.07 receiver is located on the front face of the unit.

The alignment of the receiver is correct when the LED flashes on/off once per second.

Signal reception

In good conditions the V-470A/V-474A v2 series time zone display will take three minutes to synchronise with the transmitted time code from either DCF or MSF. When the V-470A/V-474A v2 series time zone display is 'locked' to the transmitted signal, the colon LEDs located between the hours and minutes displays on each time zone are illuminated continuously.

During periods of signal failure or signal corruption the clock will maintain timekeeping using its internal quartz crystal oscillator.

w482 Time Code Synchronisation

In large installations, multiple V-470A/V-474A v2 series time zone displays may be controlled via a Timelord master clock. The master clock provides centralised control for a maximum of 50 displays using the w482 time code system.

The w482 Time Code Signal

The w482 signal was developed for controlling electronic clocks, using a single cable pair data interconnection, in electrically noisy environments. A principle advantage of w482 is the ability to provide time information in any one of fifteen different synchronised time zones. All fifteen time zones can be individually configured on the master clock to provide automatic seasonal time change correction.

The w482 signal is transmitted at 4-24v amplitude at a rate of 50 bits per second. The signal is virtually immune to electromagnetic interference. One Timelord master clock can control up to fifty V-470A/V-474A v2 series time zone displays located up to 1km from the master clock using a simple, non-critical cable pair.

Installation

If your V-470A/V-474A v2 series time zone display has been supplied with a master clock, it will already be programmed so that the individual time zones are set to display the correct w482 zones, (i.e. - if the master clock is setup so the Zone 1 is New York time, then the zone labelled 'New York' on the V-470/V-474A time zone display should be set to zone 1 or Z1).

If the V-470A/V-474A v2 series time zone display is to be used with an existing system, the zones should be set to correspond with the zone settings in the master clock. Please refer to the diagram below for further details of this setting procedure.
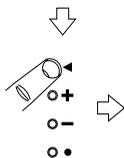
Please refer to Appendix A for connection information and Appendix B for recommended cable specifications.

Please note that the 'time setting' & 'location' options normally found in the function programming menu are not present when the unit is programmed for w482 time code synchronisation.
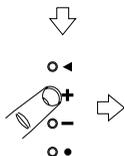
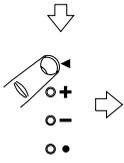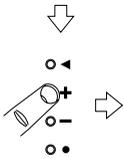### w482 Zone setting mode
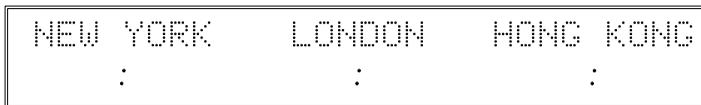
Normal time display

Function 'Synchronisation Setting Mode'. Press '+' once to move to zone setting mode.

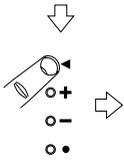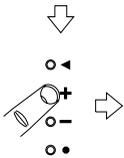Function 'Zone Setting Mode'. Press '<' to select.

NEW YORK   LONDON   HONG KONG
  Zo 1   Zo 2   Zo 3

Zone setting mode with current selected timezone flashing. If required, press '+' or '-' to select alternate timezone for adjustment.

NEW YORK   LONDON   HONG KONG
  Zo 1   Zo 2   Zo 3

Zone setting mode with current selected timezone flashing. Press '<' to enter zone adjustment mode.

NEW YORK   LONDON   HONG KONG
  Zo 1   Zo 2   Zo 3

Zone adjustment mode with current selected zone setting flashing. Press '+' or '-' to adjust, or '<' to exit Zone setting mode.

NEW YORK   LONDON   HONG KONG
  Zo 1   Zo 4   Zo 3

Zone adjustment mode with current selected zone setting flashing. Press '<' to save and exit Zone setting mode.

NEW YORK   LONDON   HONG KONG
    :   :   :
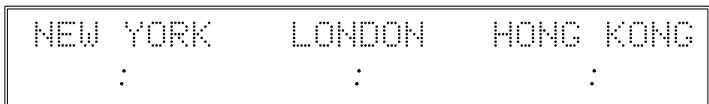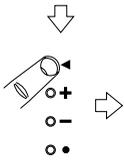
Normal time display. *Note that location times will not be displayed until time code is received from the master clock.*

NEW YORK   LONDON   HONG KONG
  07:47   12:47   19:47

Normal time display after time code has been received from the master clock. Time code should be received within 2 minutes of connection and setup.

w482 Time Code System Interconnection

A maximum of 50 V-400A series digital clocks or V-470A/V-474A v2 series time zone displays may be controlled via w482 time code from a Timelord master clock. The digital clocks may be connected in a 'daisy-chain' or 'star-wire' configuration as shown in the diagram below.

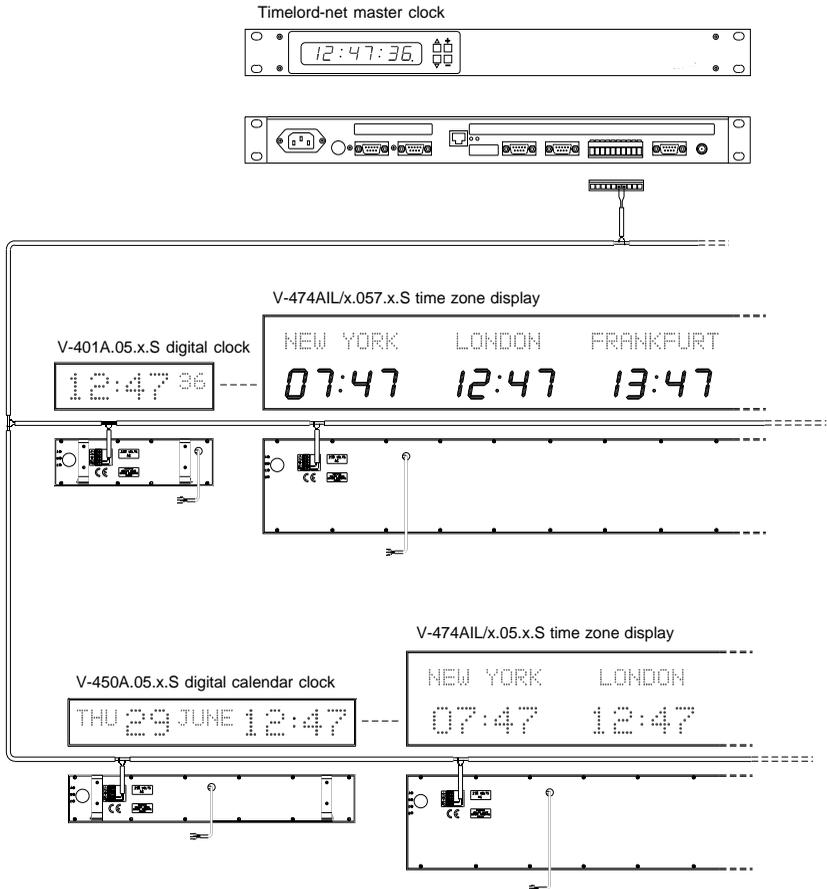Please refer to Appendix A for recommended cable specifications.

Timelord-net master clock

NEW YORK LONDON FRANKFURT
07:47 12:47 13:47

V-474AIL/x.057.x.S time zone display

V-401A.05.x.S digital clock

12:47 36

V-474AIL/x.05.x.S time zone display

NEW YORK LONDON
07:47 12:47

V-450A.05.x.S digital calendar clock

THU 29 JUNE 12:47

figure 4 - w482 time code system interconnection

Local Link Synchronisation

In small / medium sized installations, the local link output from a V-470/V-474A v2 series time zone display may be used to synchronise a maximum of ten further V-470A series displays. Please refer to page 2.3 for further details.

NTP Synchronisation (N/NIL versions only)

V-470N /V-470NIL type units may be synchronised via NTP (Network Time Protocol) across an Ethernet network. Please refer to chapter 8 for further details.

7 - Programmable Location Displays

V-470/V-474AIL v2 series time zone displays are fitted with illuminated LED location legends. If required, the displayed location text may be reprogrammed in the field to display a maximum of 10 alphanumeric characters.

V-470AIL versions may be reprogrammed via the 'PC update port' using the supplied 'ZoneControl' software. V-470NIL versions may be reprogrammed via the Ethernet network connection (please refer to section 8 for details of the network connection).

If you wish to alter the displayed locations using the PC update port, the supplied 'ZoneControl' software should be installed on a Windows 2000 / XP PC. This software may be used to remotely adjust the zone identifier and location time displayed on each zone.

The supplied serial cable should be connected between the PC update port on the rear of the V-470AIL/V-474AIL v2 Series Time Zone Display and the serial port on your PC. Please refer to Appendix A for cable connection details.

Please follow the instructions below to install and operate the '*ZoneControl*' software.

Installation and Setup

Administrative privileges may be required for the installation of this software.

1.   Insert the ZoneControl CD-ROM supplied with the V-470/V-474AIL series time zone display into a computer running Windows 2000 or Windows XP.

2.   Run the 'setup.exe' program.

3.   Follow the instructions on screen.

4.   When the software is installed, click 'Finish'. If the check-box is ticked, this will launch the ZoneControl software.

5.   If the program is not already running, run the 'zc2' program from the Start menu or double-click the 'zc2' icon on your Desktop.

6.   Open the File menu and click 'Config'. Select a free COM port and click 'OK'.

7.   Connect the supplied RS232 serial cable between the selected COM port and the 'PC Update Port' on the V-470/V-474AIL series time zone display.

Adding a Clock

1.   Click 'Add Clock'. The 'Add Time Zone Clock' window will appear, as shown in figure 5.

2.   Select the 'Unit Type' of your V-470 /V-474AIL series time zone display. For example, if you have a time zone display with 4 time zones, select the V-474AIL/4 option.

3.   Select the 'Unit ID' of your V-470/ V-474AIL series time zone display. The Unit ID may be found on the rear of the unit.
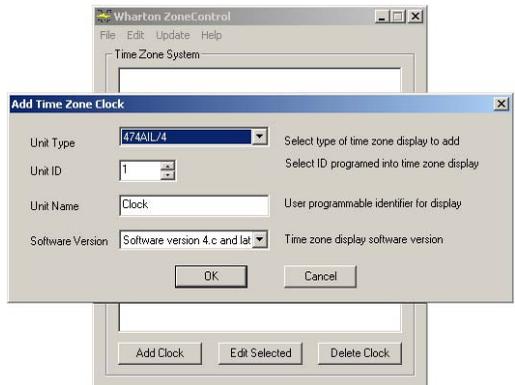

figure 5 - Adding a timezone clock

Note: The Unit ID may be configured in the V-470/V-474AIL digital clock system setup *menu. Please refer to page 3.2 for further details.*

4.   If required, the clock may be given a unique name which should be entered in the 'Unit Name' field. This optional name may be used to ease the management and setup of installations with multiple clock displays. *Note: This name is only used within the software program to enable users to easily identify a specific clock unit and does not effect the information displayed on the clock display.*

5.   Select the 'Software Version' of your V-470/V-474AIL series time zone display. If you are configuring a unit using '*ZoneControl*' installed from the CD-ROM supplied with the xtime zone display, the pre-selected software version will be correct. If you are using the '*ZoneControl*' software to configure a previously supplied unit, please check the software version of your V-470/V-474AIL series time zone display and select the appropriate sofware version from the drop-down menu. *Note: Please refer to page* 3.2 for instructions for viewing your V-470/V-474AIL series time zone display software *version.*

6.   Click 'OK' to save and exit the Add Time Zone Clock window.

7.   Repeat steps 2 - 5 until all connected time zone displays are added.

Editing a Location

1.   Select the clock and then the zone location you wish to edit. *Note: Clocks entered in the 'Adding a Clock' section will now be shown graphically in the Wharton ZoneControl window, with each unedited location represented by the text 'Zone'.*

2.   Click 'Edit Selected'. The 'Edit Location Display' window will appear, as shown in figure 6.

3.   Enter the location text you wish to display into the 'Location Display' field.

figure 6 - Editing a location display

4.   Select the 'Zone Time' location code from the list displayed. *Note: Please refer to page 4.3 for a full list of locations. If your required location is not covered by the standard location codes, please contact your technical support representative for details of how to input a user programmable location code.*

5.   Click 'OK' to save and exit the Edit Location Display window.

6.   Repeat steps 1 - 5 until all locations are edited.

Updating the display

1.   Open the 'Update' drop-down menu.

2.   Click on 'Update Selected' to update the selected zone only. If you wish to update all connected clocks, click on 'Update All'. *Note: This function will update all connected clocks (including unedited locations).*

Deleting a Clock

1.   Select the clock you wish to delete.

2.   Click 'Delete Clock'.

3.   A confirmation window will appear. Click 'OK'.

8 - Ethernet Network Connection (N/NIL units only)

V-470/V-474N/NIL series time zone displays are designed to synchronise to a remote NTP (Network Time Protocol) time server across a TCP/IP computer network. The units are fitted with a dual speed 10/100Base-T RJ45 Ethernet interface and may be connected either to a dedicated 10Base-T or 100Base-T port or to a switchable 10/100Base-T port on your network.

Upon initial installation, the unit IP address, subnet mask, gateway and NTP time server IP address should be programmed as detailed in the setup procedure below. Alternatively, the DHCP setting may be selected to enable the unit to obtain it's IP address, subnet mask and gateway settings automatically.

With the unit connected to your computer network, settings may be remotely monitored and adjusted via the web interface. Additionally, if your unit has illuminated locations (NIL versions only), the displayed location text may be remotely adjusted using the web interface.

Initial Setup Procedure

Before connecting the V-470/V-474N/NIL unit to your computer network, the following procedure should be performed using the setting switches located on the right hand rear of the display.

> *Attention: If you are unsure about any of the following settings, please contact your network administrator. Incorrect settings may have adverse affects on the performance of your network.*

1) Ensure the unit is programmed for NTP synchronisation. *Please refer to chapter 6.*

2) Configure the DHCP setting for correct operation on your network. If you wish to manually program the unit IP address, subnet mask and gateway, the DHCP setting should be set to 'NO'. If you wish the unit to obtain it's network settings automatically and your network is configured for DHCP, the DHCP setting should be set to 'YES'.

If you have selected DHCP operation, please omit steps 3, 4 and 5 below. These options will not be visible in the setting menu.

3) Program the unit IP address in dotted-decimal notation (e.g. 192.168.0.44). Use the plus and minus switches to increment and decrement each value. The arrow switch will move on to the next value, the circle switch will return to the previous value.

Network Settings Table

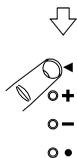| Display Code	Setting	
dhCP	DHCP (Dynamic Host Control Protocol) setting.	Enables automatic allocation of unit IP address, Subnet and Gateway settings when connected to a network configured for DHCP.
IP	Unit a	This is the Internet Protocol address that the 470N/NIL digital clock on the computer network. *Not visible in NTP setting menu when DHCP setting is set to yes.*
Sub	Subnet mask.	The subnet mask when combined with the IP address identifies the subnet (part of the bigger network) that the 470N/NIL unit is connected to. *Not visible in NTP setting menu when DHCP setting is set to yes.*
GtU	Gateway.	The gateway address is used by the digital clock when it needs to send information to computers and devices connected to other networks and subnets. *Not visible in NTP setting menu when DHCP setting is set to yes.*
NtP	NTP time server IP address.	This is the Internet Protocol address of the NTP time server that the 470N/NIL digital clock uses as a time source.

4) Program the unit Subnet Mask in dotted-decimal notation (e.g. 255.255.255.192). Use the plus and minus switches to increment and decrement each value. The arrow switch will move on to the next value, the circle switch will return to the previous value.

5) Program the Gateway in dotted-decimal notation (e.g. 192.168.0.1). Use the plus and minus switches to increment and decrement each value. The arrow switch will move on to the next value, the circle switch will return to the previous value.

6) Program the IP address of the NTP Time Server in dotted-decimal notation (e.g. 192.168.0.21). Use the plus and minus switches to increment and decrement each value. The arrow switch will move on to the next value, the circle switch will return to the previous value.

7) Using the supplied CAT5 patch cable, connect the V-470/V-474N/NIL series time zone display to your TCP/IP computer network. Check that the orange link LED illuminates confirming that correct connection has been made to the network.

The unit will now automatically request time information from the programmed NTP time server and should synchronise within 3 minutes. Please refer to page 6.2 for details of confirming the unit synchronisation status.
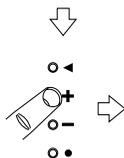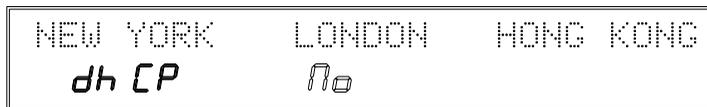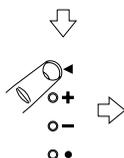
Network Setting Mode

```
 NEW YORK      LONDON      HONG KONG
   07:47       12:47        19:47
```

Normal time display

```
 NEW YORK      LONDON      HONG KONG
   Fut i
```

Function 'Time Setting Mode'. Press '+' three times to move to NTP setting mode.

```
 NEW YORK      LONDON      HONG KONG
   Fu Nt
```

Function 'NTP Setting Mode'. Press '<' to select.

```
 NEW YORK      LONDON      HONG KONG
   dh CP      No
```

Function 'NTP Setting Mode' with DHCP setting flashing. Press '+' to enable DHCP. Press '<' to step on to set the unit IP address. *Note: If DHCP is enabled, the unit IP address, Subnet mask and Gateway settings will not be visible.*

Network Setting Mode (cont..)

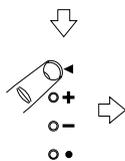NEW YORK   LONDON   HONG KONG
IP 1   192

Function 'NTP Setting Mode' with unit IP address 1st byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 2nd byte of the unit IP address.

NEW YORK   LONDON   HONG KONG
IP 2   168

Function 'NTP Setting Mode' with unit IP address 2nd byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 3rd byte of the unit IP address.

NEW YORK   LONDON   HONG KONG
IP 3   000

Function 'NTP Setting Mode' with unit IP address 3rd byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 4th byte of the unit IP address.

NEW YORK   LONDON   HONG KONG
IP 4   044

Function 'NTP Setting Mode' with unit IP address 4th byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the Subnet mask.

NEW YORK   LONDON   HONG KONG
Sub1   255

Function 'NTP Setting Mode' with Subnet mask 1st byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 2nd byte of the Subnet mask.
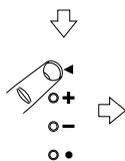
NEW YORK   LONDON   HONG KONG
Sub2   255

Function 'NTP Setting Mode' with Subnet mask 2nd byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 3rd byte of the Subnet mask.
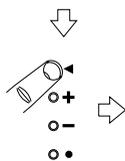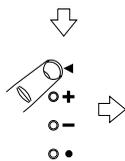
Network Setting Mode (cont..)

```
NEW YORK      LONDON     HONG KONG
   Su b3           2 55
```

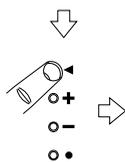Function 'NTP Setting Mode' with Subnet mask 3rd byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 4th byte of the Subnet mask.

```
NEW YORK      LONDON     HONG KONG
   Su b4           1 92
```

Function 'NTP Setting Mode' with Subnet mask 4th byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the Gateway.

```
NEW YORK      LONDON     HONG KONG
   Gt U1           1 92
```

Function 'NTP Setting Mode' with Gateway 1st byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 2nd byte of the Gateway.
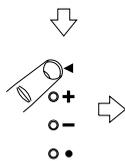
```
NEW YORK      LONDON     HONG KONG
   Gt U2           1 68
```

Function 'NTP Setting Mode' with Gateway 2nd byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 3rd byte of the Gateway.

```
NEW YORK      LONDON     HONG KONG
   Gt U3           0 00
```

Function 'NTP Setting Mode' with Gateway 3rd byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 4th byte of the Gateway.
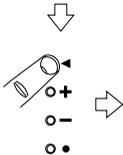
```
NEW YORK      LONDON     HONG KONG
   Gt U4           0 01
```

Function 'NTP Setting Mode' with Gateway 4th byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the NTP server IP address.
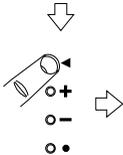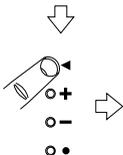
Network Setting Mode (cont..)

NEW YORK	LONDON	HONG KONG
NE P1	192	

Function 'NTP Setting Mode' with NTP server IP address 1st byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 2nd byte of the NTP server IP address.

NEW YORK	LONDON	HONG KONG
NE P2	168	

Function 'NTP Setting Mode' with NTP server IP address 2nd byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 3rd byte of the NTP server IP address.

NEW YORK	LONDON	HONG KONG
NE P3	0 00	

Function 'NTP Setting Mode' with NTP server IP address 3rd byte flashing. Press '+' or '-' to change setting. Press '<' to step on to the 4th byte of the NTP server IP address.
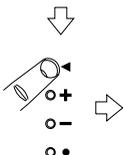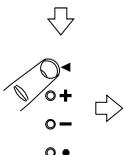
NEW YORK	LONDON	HONG KONG
NE P4	0 21	

Function 'NTP Setting Mode' with NTP server IP address 4th byte flashing. Press '+' or '-' to change setting. Press '<' to exit setting mode and return to normal time display.

NEW YORK	LONDON	HONG KONG
07:47	12:47	19:47

Normal time display.

Web Interface

The status of the 470N / NIL series digital clock can be remotely monitored and various settings adjusted by use of the web interface. Having performed the initial setup procedure and connected the 470N / NIL series digital clock to your computer network, the web interface may be accessed by entering the unit IP address into a standard web browser.

Status screen

Figure 7 shows the main Status screen.

The status screen indicates general setup and status information including product type and firmware versions, synchronisation source and status along with network setup information.

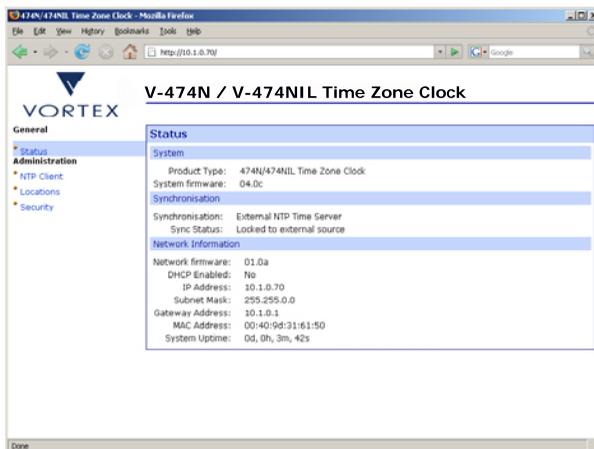This screen has no password protection security and may be accessed by any user.

figure 7 - Web interface status screen

Administration Password protection

The 'NTP Client', 'Locations' and 'Security' screens in the administration section of the web interface are all password protected to prevent unauthorised user access. Clicking on any of these three links will cause the 'Enter Network Password' screen to be displayed.

The user name for all 470N / NIL units is 'admin'. Units are supplied with the password preset to 'password'.

Please note that the system will automatically log-out any user after a short period of inactivity. Additionally, users are automatically logged-out upon closure of the web browser.

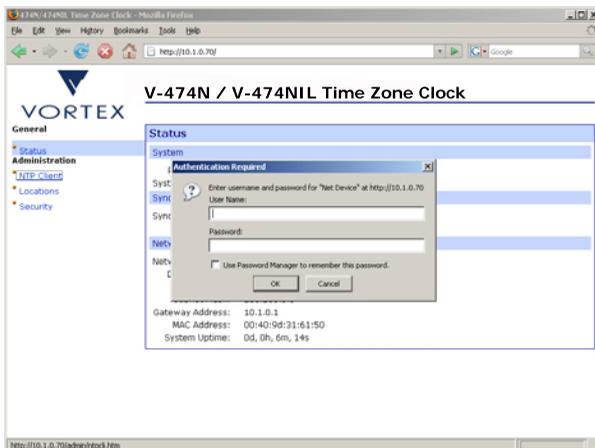If required, the preset password may be reprogrammed via the 'Security' screen.

figure 8 - Web interface password protection

Attention: It is not possible to alter the administration password without first inputting the current password. If adjusting the administration password, please ensure that records are kept in a secure location.

NTP Client Setup

The NTP Client setup screen indicates in detail the synchronisation status of the 470N / NIL digital clock.

Initially, the screen will detail the IP address of the NTP time server (as programmed in the initial setup process) along with a status code (as detailed in the table below) and the unit stratum code.

From this screen, it is possible to enter IP addresses for an additional three NTP time servers.

If multiple NTP time servers have been enabled, the 470N /

figure 9 - NTP Client setup screen

NIL digital clock will monitor the status of these servers and select the most suitable source. This selection is based on a number of factors including long-term stability and stratum. The currently selected NTP time server is indicated visually by a star.
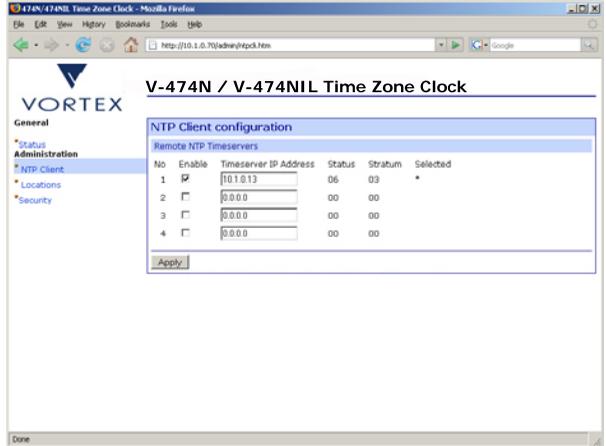

NTP Synchronisation Status Table

Display Code

00	**Initialising** The Ethernet port is initialising.
01	**Error** There is a non-specific error.
02	**Transmission failure** The 470N / NIL digital clock is unable to transmit data to the NTP Time Server.
03	**Receive failure** The 470N / NIL digital clock is not receiving data from the NTP Time Server.
04	**Receive error** The 470N / NIL digital clock is receiving unreliable data from the NTP Time Server.
05	**Synchronised** The 470N / NIL digital clock is synchronised to the NTP Time Server.
06	**Reception success** The 470N / NIL digital clock is receiving data and is sycnhronised to the NTP Time Server.

NTP Stratum definitions

Stratum	Definition
0	**Unspecified or Unavailable** This stratum is used to describe the stratum level of the orignal time signal source. In the case of GPS the actual GPS signal from the satellites can be viewed as stratum 0.
1	**Primary Reference Server** A server that derives its time from a external time reference, e.g. GPS or radio time code, is defined as a stratum 1 time server. Stratum time servers are at the root of the synchronisation subnet.
2-15	**Secondary and Greater Stratum Devices** A client synchronised to a time server operates at one stratum higher than the synchronisation source. If the 470N / NIL display is synchronised to a Stratum 1 device, the 470N / NIL display will be at Stratum 2.

Illuminated Location Setup

470 / 474NIL series time zone displays are fitted with illuminated LED location legends. If required, the displayed location text may be reprogrammed in the field to display a maximum of 10 alphanumeric characters.

Figure 10 shows the location setup screen. To reprogram a timezone or location, the correct display number should first be selected and the 'Config' button clicked. The displays are numbered from left to right (or top to bottom on 470 versions) when viewed from the front of the unit.

When the correct display number has been selected, the 'Location Setting' data at the bottom of the screen will be updated to display the current settings.

To amend the displayed text, enter a maximum of 10 alphanumeric characters in the Zone Legend box. The correct location code should then be selected from the drop down list (please refer to page 4.3 for a full list of location codes). Click on 'Apply' to update the selected display

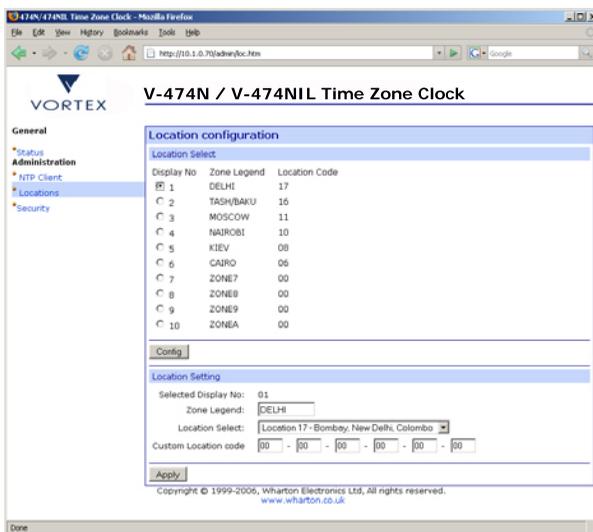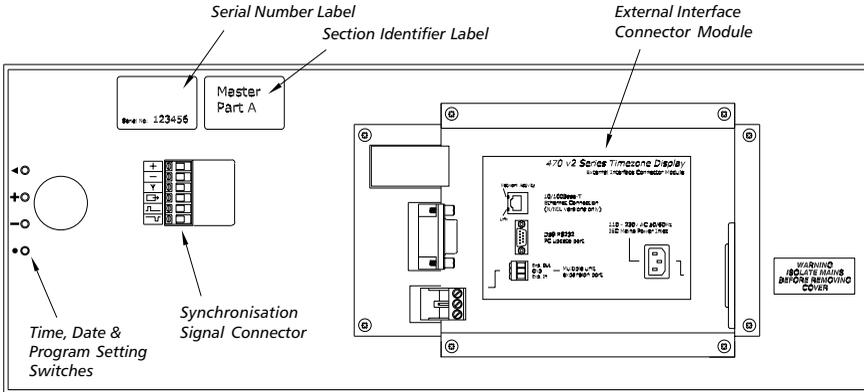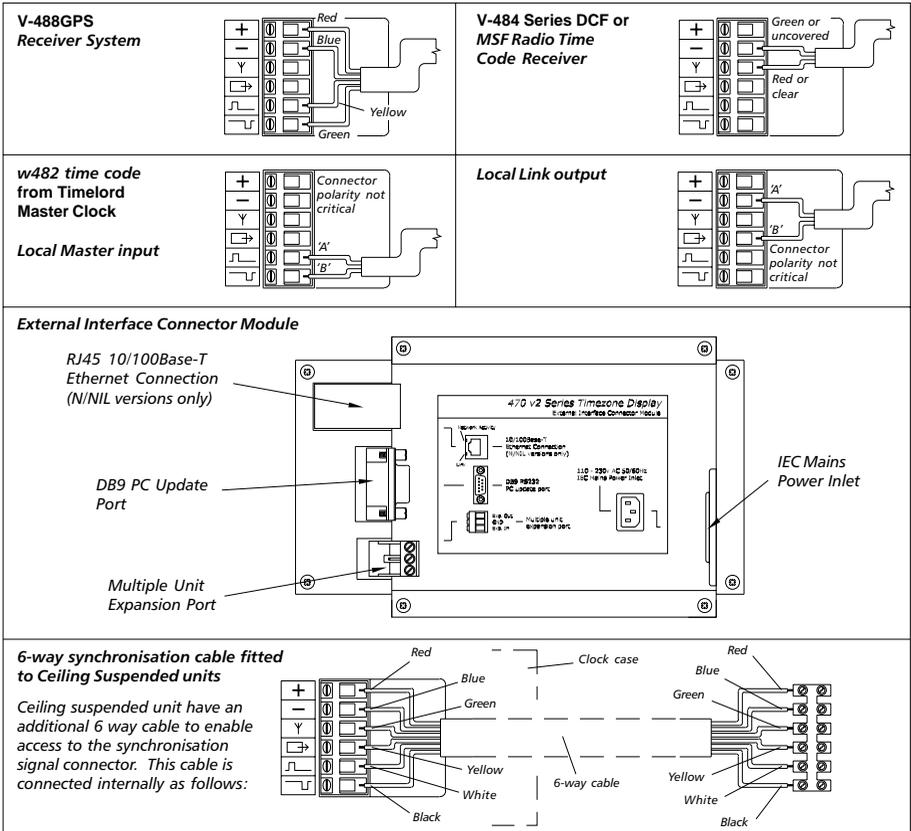Please refer to page 4.1 for details of the programmable timezone function.

figure 10 - Location setup screen

Appendix A - External Signal Connections

Rear view of V-474A/AIL digital clock

V-488GPS
Receiver System

Red
Blue
Yellow
Green

V-484 Series DCF or
MSF Radio Time
Code Receiver

Green or
uncovered

Red or
clear

w482 time code
from Timelord
Master Clock

Local Master input

Connector
polarity not
critical

'A'

'B'

Local Link output

'A'

'B'

Connector
polarity not
critical

External Interface Connector Module

RJ45 10/100Base-T
Ethernet Connection
(N/NIL versions only)

DB9 PC Update
Port

Multiple Unit
Expansion Port

IEC Mains
Power Inlet

6-way synchronisation cable fitted
to Ceiling Suspended units

Ceiling suspended unit have an
additional 6 way cable to enable
access to the synchronisation
signal connector. This cable is
connected internally as follows:

Red
Blue
Green
Yellow
White
Black

Clock case

6-way cable

Red
Blue
Green
Yellow
White
Black

Appendix B - Cable Specifications

V-470A/V-474A v2 -> V-488GPS interconnection

The V-488GPS 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 V-470A/V-474A v2 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 ($0.5mm^2$) cable should be used.

V-470A/V-474A v2 -> V-484 MSF and DCF radio receiver interconnection

The V-484 series radio receiver is supplied with a 3m long unscreened cable as standard. The cable length may be extended to 10m using unscreened cable, RS 528-2235 - 22 awg or equivalent. In areas of high electrical noise a screened twisted pair should be used. The cable screen should be grounded at the V-470A/V-474A v2 end only.

The cable length may be extended to 200m using a screened twisted pair cable, RS 528-1917 - 22 awg or equivalent. (UL style 2092, Alpha 2401). For screened LSOH (Low Smoke Zero Halogen) applications RS 528-2308 (two pairs 7/0.25 - 22 awg) may be used. Equivalent to UL style 2493.

V-470A/V-474A v2 -> Timelord master clock interconnection

The w482 time code transmitted from a Timelord series master clock is designed to have considerable immunity to external electrical interference and screened cable is only required in areas of high electrical noise.

Normal installations may use standard mains cable. (e.g. twin $1.5mm^2$) The size of the cable depends on the overall cable length, the number of clocks and their spacing on the cable. The use of twin 1.5mm2 cable will be adequate for installations of up to 50 V-470A/V-474A v2 using up to 1km of cable.

Unscreened data cables should not be run in proximity to power cables supplying fluorescent lighting or other sources of electrical noise. In areas of high electrical noise a screened twisted pair should be used. The cable screen should be grounded at the Timelord end only by means of the rear grounding terminal. A suitable screened cable is RS 528-2241, (twin 16/0.254 - 18 awg) equivalent to Alpha 2421, BICC H8093, UL style 2092 which is adequate for a spur controlling 25 clocks over a 1km cable run or a greater number of clocks over a shorter distance.
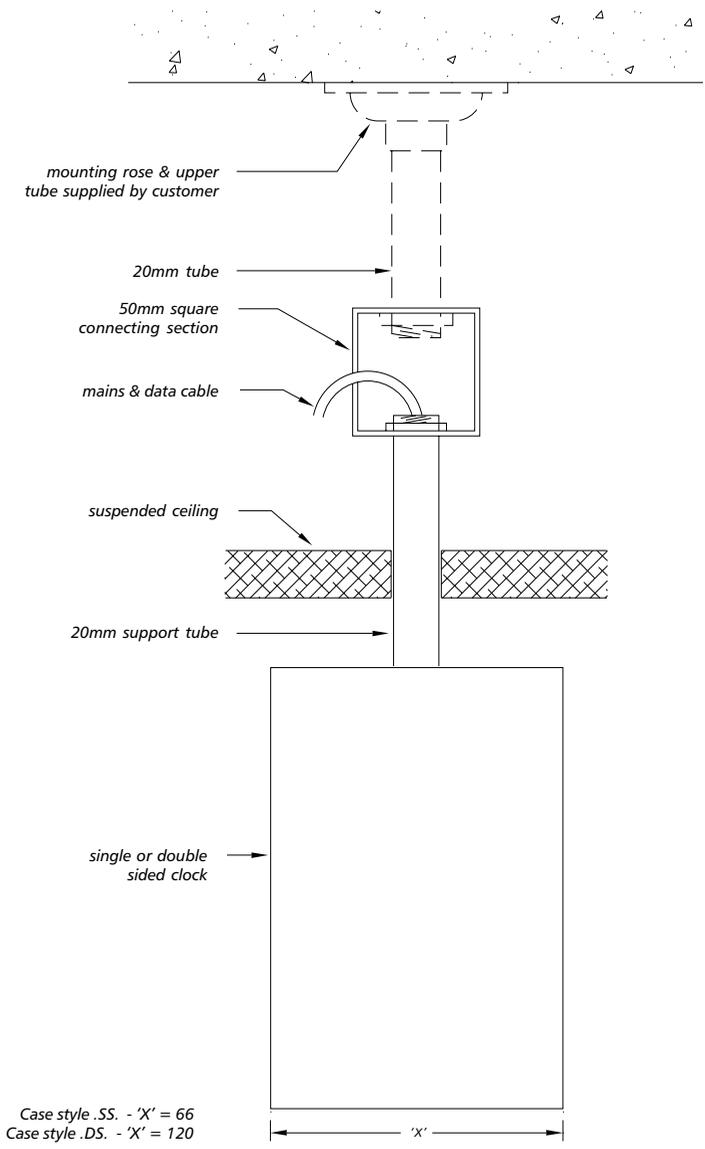
For a Cat 5 installation, (24 awg) a single pair can be used to connect up to 10 V-470A/V-474A v2 series time zone displays at a distance of up to 250m. For further distances or greater numbers of clocks, additional cores should be paired together, lowering the cable resistance.

If in doubt one should always consider the use of the next heavier gauge cable as this invariably increases system integrity at minimal additional system cost and allows for future system expansion.

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

Appendix C - Mounting Details

Ceiling Suspended Case

mounting rose & upper tube supplied by customer

20mm tube

50mm square connecting section

mains & data cable

suspended ceiling

20mm support tube

single or double sided clock

Case style .SS. - 'X' = 66
Case style .DS. - 'X' = 120

'X'

note: please refer to the relevant application note for further details of case sizes

Surface Mounting Case

66   16

'X'
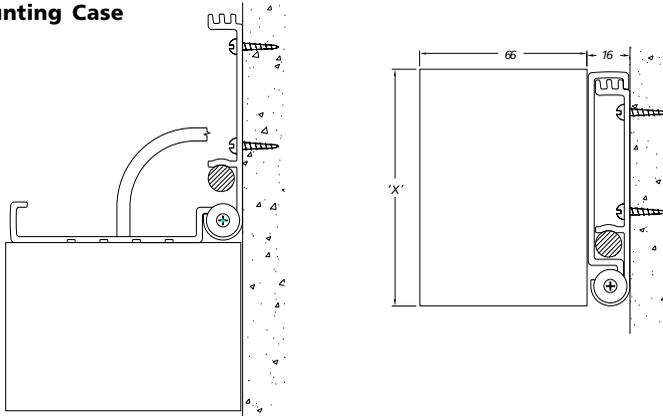
Flush Fitting Panel Case

3   55

6

'X'

6

22 - maximum panel thickness
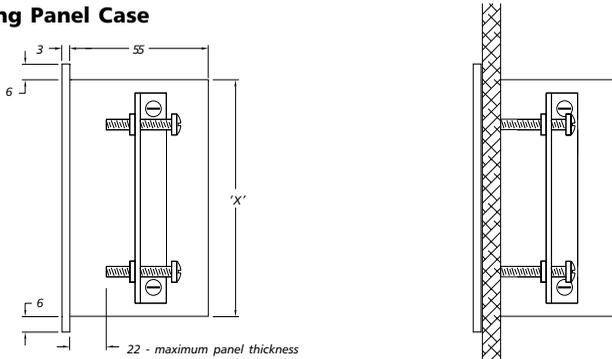
*'X' = standard surface mounting
case body height*

Flush Fitting Case with Mounting Box

80

'X'

*Spring loaded
mounting spigot*

Steel mounting box
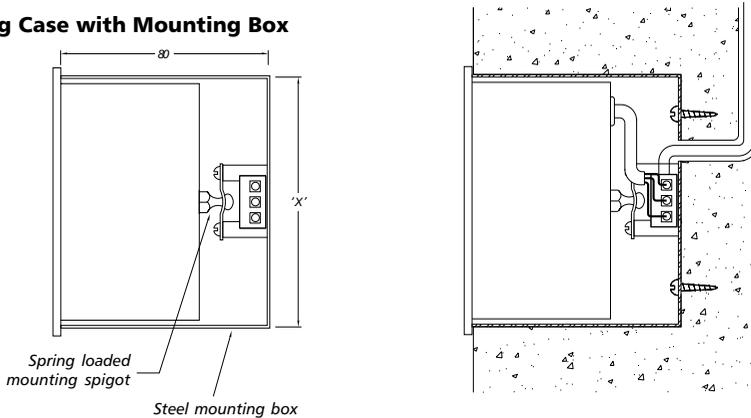
Appendix D - Frequently Asked Questions

How can I tell if the V-470A/V-474A v2 series time zone display has synchronised to my chosen synchronisation time source?

When the V-470A/V-474A v2 series time zone display is synchronised (or programmed for stand-alone operation), the colon LEDs between the hours and minutes display of the left-hand time zone will illuminate continually. If the unit is unsynchronised, the colon LEDs between the hours and minutes display of the left-hand time zone will flash.

Why are some or all of the times shown on the V-470A/V-474A v2 series time zone display not correct, even though the unit is synchronised?

Check that the location is set correctly for each zone - *please refer to chapter 4 for further details*.

Why have some or all of the zones on the V-470A/V-474A v2 series time zone display not performed seasonal time changes?

Check that the location is set correctly for each zone - *please refer to chapter 4 for further details*.

If the unit is unsynchronised, check the date is correctly programmed - *please refer to chapter 5 for further details*.

Will the V-488GPS receiver system work internally?

The V-488GPS receiver system is designed for external mounting. We would recommend positioning the system on the roof of the building with a clear view of at least 75% of the sky - *please refer to chapter 6 for further information*.

Can I extend the cable supplied with the V-488GPS receiver system?

The system is supplied with 25 metres of four-core screened cable for connection to a V-470A/ V-474A v2 series time zone display. This cable length may be increased up to a maximum of 50 metres using a similar type of cable or up to a maximum of 200 metres using a heavier gauge cable - *please refer to chapter 6 and appendix B for further information*.

Why will the V-470A/V-474A v2 series time zone display not synchronise to the MSF or DCF radio time code signal?

Under normal circumstances the MSF signal provides reliable operation at distances of up to 1000km from Anthorn in the United Kingdom. The DCF signal is normally usable up to 1500km from Frankfurt in Germany.

In good conditions the V-470A/V-474A v2 series time zone display, when used with a V-484 series radio time code receiver should synchronise to MSF or DCF within 3 minutes. During this period, the 'code' LED housed inside the 484 series radio time code receiver should flash once per second.

However, MSF and DCF suffer greatly from electromagnetic interference which can cause the V-470A/V-474A v2 series time zone display not to synchronise. In this instance, the 'code' LED housed inside the V-484 series radio time code receiver may flash erratically. To minimise interference problems, we would recommend mounting the 484 series radio time code receiver away from any computer or electronic equipment, fluorescent lighting, lift equipment, metal girders, reinforced concrete walls or any other sources of electrical noise.

MSF is off-air for maintenance on the second Thursday of every March, June, September and December - *please refer to chapter 6 for further information*.

Will the V-484 series radio time code receiver work internally?

The V-484.02 MSF and V-484.03 DCF radio time code receivers are suitable for either internal or protected external mounting. For reliable operation, we would recommend mounting these units externally if possible.
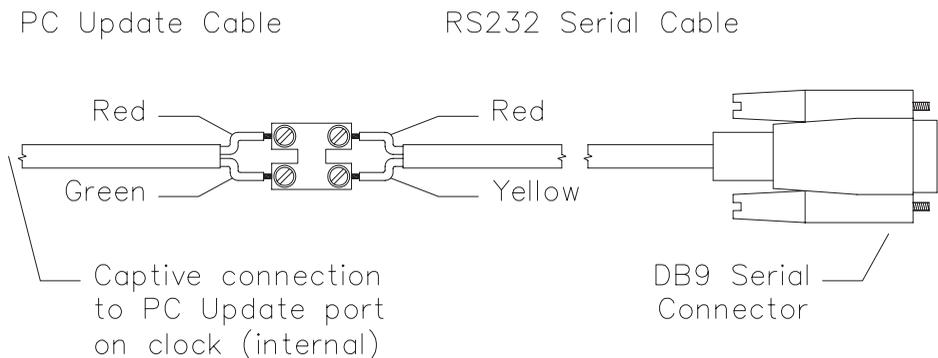
The V-484.06 MSF and V-484.07 DCF radio time code receivers are suitable for internal use only - *please refer to chapter 6 for further information*.

Can I extend the cable to my V-484 series radio time code receiver?

The cable connection to a V-484 series radio time code receiver may be extended up to a maximum of 10m using a similar specification cable. This connection may be extended up to a maximum of 200 metres using a screened twisted pair cable as specified in appendix B.

How do I change the locations on a single sided (.SS) and double sided (.DS) ceiling suspended AIL type time zone display?

Ceiling suspended AIL type time zone displays are supplied with an additional data cable and a serial cable which are used to configure the user programmable location legends. Please connect the PC Update cable to the Serial cable are detailed below - *please refer to chapter 7 for further information regarding programming location legends*.

PC Update Cable   RS232 Serial Cable

Red

Green

Red

Yellow

Captive connection
to PC Update port
on clock (internal)

DB9 Serial
Connector