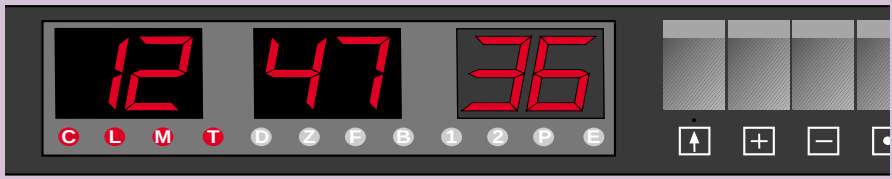
APPLICATIONS

MULTIZONE TIME AND DAYLIGHT SAVINGS PROGRAMMING

482D



▼ The 482D's time display changes to indicate the values set for various functions. Illuminated letters below the display indicate the mode in which the master clock is set (T = time display, D = date display, Z = zone programming, F = forward change setting, B = backward change setting)

DESCRIPTION

This application note explains how the 482D master clock processes multizone time and date information, and describes how to set up the system for accurate and automatic management of time for a range of different zones.

The 482D Master Clock supports 15 time zones, providing accurate tracking of time in different parts of the world, automatically compensatingfor daylight savings adjustments in each region. The master clock has a primary zone (zone 1), in which the time and date are determined by an external reference (such as MSF, DCF or GPS) or by manual setup (such as when the master clock is free-running or operating from a simple reference such as 1Hz impulses).

There are 14 subsidiary zones, in which the time is maintained by being offset in half-hour increments from the primary zone.Daylight savings information (the spring and autumn time changes) can be programmed for each zone, including the primary zone. The date of each change and the time at which it happens is independently programmed for each zone.

The primary zone and zone 2 require special consideration. The time and date information held in either one of these zones can be output via a range of optional drivers, including serial data and video timecode. Zone one can be used if the required output coincides with the reference, otherwise zone 2 is reserved for the purpose.

Determine the Reference

▼ The first step is to determine the reference time to which the master clock is locked.

This might be an off-air signal such as MSF, DCF or GPS, or a local signal such as serial data or video timecode, or the master clock may be free-running. The reference determines the time in the primary zone, zone 1, and may already contain daylight savings information.

If the master clock is locked to MSF or DCF, then the seasonal time change for zone 1 is handled automatically – both of these signals contain information about the change and the master clock recognizes and acts upon the information.

If the master clock is locked to GPS, then zone 1 remains locked to UTC at all times.

If the master clock is free-running (that is, it has no external reference) or is referenced by a simple signal such as 1Hz or 100Hz pulses, then zone 1 will follow any seasonal information you program – more of this later.

If the master clock is locked to serial data or timecode, then you must ascertain independently what is happening with these signals themselves before you decide how to set up the master clock.

Ancillary Drivers

▼ The second step is to determine whether a specific time, different from the reference time, is required to drive one of the ancillary outputs.

For instance, if the reference is MSF (GMT & BST) or DCF (CET/CEST) and you need a GMT serial time and date signal, then zone 2 must be reserved for this purpose.

If the time required from the ancillary drivers is the same as the primary zone, then you can use zone 1 for this purpose adn need not reserve zone 2.

▼ If you are using any of the optional drivers for the 482D master clock (impulses, serial data, video timecode, etc.) and the reference signal to the master clock (zone 1) is not the time you wish to output with these drivers, then you must use zone 2.

The ancillary drivers can be linked to zone 1 or zone 2 by entering programming mode (press the hidden Program button 3 times) and setting the value for program 8 to 0 (for zone 1) or 1 (for zone 2).

Calculating Offsets

▼ The third step is to determine the current offset required for each of the subsidiary zones, zones 2 to 15.

Decide first which zone relates to what geographical region. The offset is the number of hours that zone is from the time in zone 1, not from your local time. The offset is the difference at the moment you program the clock; the 482D will change the value of offsets from time to time as daylight savings information is applied to the times in each zone. That means you must also gather information about when each region changes its clocks for daylight savings.

The offset can be a positive or negative number. Typically, regions west of the primary zone have negative values and regions to the east have positive values, but this is not so when you cross the international dateline.

A word about daylight savings: We are all familiar with the concept that the clocks go forward in spring and back in autumn (remember spring forward and fall back?). It is easy to forget that as spring approaches in the northern hemisphere, autumn is approaching in the southern hemisphere. The time changes go in opposite directions. Additionally, many countries in the tropics don't have daylight savings, as the change in the length of the day is not significant.

Before programming any information into the master clock, make sure you know what you're looking at. The 482.D can display either zone 1 time or zone 2 time on the front display. To set the display to show zone 1, press the hidden Program button 3 times (P lights up under the time display), and use the index switch to step through to program 16 (shown on the left of the display). Use the plus or minus switch to set the value for program 16 to 0 (shown on the right of the display). Press the index switch again (to save the setting), then press the dot switch to exit from program mode. The panel is now showing the time for zone 1, as expected.

Programming Zone 1

▼ Zone 1 must be programmed first to enable the subsidiary zones to be offset from it.

Press the hidden Program button twice to enter zone and daylight savings programming mode (Z lights up under the main display). Zone 1 is the first to appear, indicated by a flashing 1 on the left of the display.

For zone 1, you cannot input an offset. You can only program the spring (forward) and autumn (backward) time changes. Three pieces of information are required: the date (day and month) of the forward change, the date of the backward change and the changeover pattern. Changeover patterns determine the time at which the clocks go forward of back. **GB** is forward at 1am, backward at 2am; **EU** is forward at 2am, back at 3am; **US** is forward and backward at 2am. The fourth pattern, **--**, indicates that no changeover occurs.

The changeover pattern is the first piece of information required. Press the index switch, then use the plus and minus switches to select the appropriate pattern. Even when the changeover is automatic (as with MSF and DCF) the changeover pattern must still be specified. This is **GB** for MSF, and **EU** for DCF.

Once you have selected the pattern, press the index switch again and enter the forward date (F illuminates on the panel). Use plus and minus to set the day, press the index switch and then use plus and minus to set the month. The next press of the index switch takes you to the backward date, entered in the same fashion (B lights up on the panel). The final press of the index switch will take you on to programming for zones 2-15.

When using MSF/DCF as the reference, changeover information is provided automatically. In this case, the dates must not be entered, otherwise unpredictable results may occur. If there is already a date entered, then it is important that you change this to a date other than the actual date of the changeover (you cannot set the date to zero, the default, manually).

▼ If GPS is the reference to the master clock, then zone 1 will always be set to UTC. This might not be the local time and, even if it is, you'll probably want to program daylight savings. Do not program the savings for Zone 1. Ensure that the changeover pattern is set to **--** and don't program the forward and backward dates. Instead, use one of the subsidiary zones to set up local time, programming the offset (if necessary) and any daylight savings there.

Programming Other Zones

▼ Zones 2 to 15 are referenced to zone 1, and include an offset from zone 1's time as well as daylight savings details.

The display initially shows the zone number and the time difference between this zone and the primary zone (zone 1). Press the index switch, and adjust this time difference (in 30 minute increments) to the correct offset using the plus and minus keys. The offset can have a negative value, indicating that the time zone is behind the reference time, and it can be zero, indicating that, at present, there is no difference. As time changes happen, the master clock will alter these values to reflect the current true state of affairs.

Remember that the offset must indicate the current time difference between the primary zone and this zone, including any differences caused by daylight savings in either zone. For example, if you are setting up a zone to represent GMT while the primary zone is set to BST, then the the difference should be -1, as GMT is an hour behind BST.

When the appropriate difference is set, press the index button to progress to the daylight savings setup. This is managed in exactly the same way as for zone 1: first the changeover pattern, then forward month, forward day, backward month, backward day, each adjusted by the plus and minus keys, while the index key steps on to the next stage. If the pattern is set to **--**, then the values for the two dates are ignored by the master clock – no changeover happens in this zone.

If you are tracking GMT or UTC in zone 2, then the correct setting for the changeover type is --.

Repeat the setup for each of the 14 subsidiary zones (zones 10-15 are identified by the letters A to F). Each time the master clock acts upon a date instruction, the date is set to 00:00, ensuring that the same date is not used the following year. The dates for seasonal changes can be programmed at any convenient time prior to the day of the changeover. The offset and the type of change do not need re-programming.

MULTIZONE TIME AND DAYLIGHT SAVINGS PROGRAMMING

The most common programming error resulting in incorect time from one or more zones is the failure to program a new set of changeover dates when the current set of changes has been successfully executed. The master clock automatically sets the changeover date to zero after executing a changeover, to ensure that an incorrect changeover doesn't happen by default. The new dates must be set up for each zone in which you wish a changeover to occur, and can be programmed at any time after the previous change and before the next change.

The other cause of problems is the incorrect setup of offset and seasonal information for subsidiary zones, particularly when maintaining a constant time (GMT or CET) in zone 2 for the ancillary drivers. When programming the offsets, the appropriate value is the current difference between the primary zone and the zone required, and this varies as different seasonal changes occur on different dates (or not at all in some cases). The table below illustrates the correct settings for constant time output from zone 2 when the master clock (and zone 1) is locked to an off-air signal.

Reference signal and zone 1 settings		**Settings for constant time in a subsidiary zone**	
Reference:	MSF	Time required:	GMT
Winter time:	GMT	Offset (winter):	0
Summer time:	BST	Offset (summer):	-1
Pattern:	GB	Pattern:	--
Dates:	Do not set dates	Dates:	Do not set dates
Reference:	DCF	Time required:	CET
Winter time:	CET	Offset (winter):	0
Summer time:	CEST	Offset (summer):	-1
Pattern:	EU	Pattern:	--
Dates:	Do not set dates	Dates:	Do not set dates
Reference:	GPS	Time required:	GMT
Winter time:	UTC	Offset (winter):	0
Summer time:	UTC	Offset (summer):	0
Pattern:	--	Pattern:	--
Dates:	Do not set dates	Dates:	Do not set dates
Reference:	GPS	Time required:	CET
Winter time:	UTC	Offset (winter):	+1
Summer time:	UTC	Offset (summer):	+1
Pattern:	--	Pattern:	--
Dates:	Do not set dates	Dates:	Do not set dates

Offsets from GMT are frequently miscalculated. The Vortex website, **www.vtx.co.uk**, has a comprehensive list of countries and principal cities wth their *standard* offsets from GMT (i.e. the normal time not accounting for daylight savings). Whilst we endeavour to keep the list accurate and up to date, it is sensible to check the data with someone in the country concerned before programming the clock.

Vortex Communications Ltd
75 The Grove, Ealing, London W5 5LL, UK
Tel: (+44) 020 - 8579 2743 ▼ Fax: (+44) 020 - 8840 0018
E-mail: info@vtx.co.uk ▼ Web: www.vtx.co.uk

VORTEX Communications Ltd