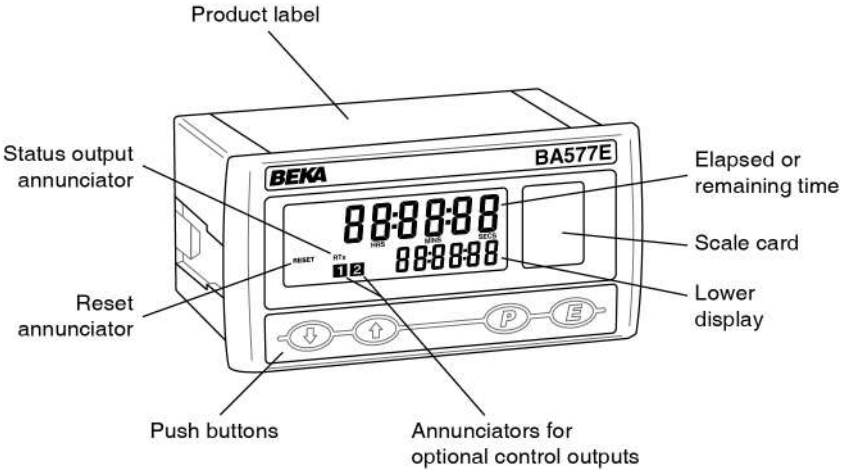


BA577E
One input
General purpose
Timer or Clock
Issue 5



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1. DESCRIPTION

The BA577E is a general purpose, panel mounting instrument with a single input that can be configured as a Timer or as a Clock. As a Timer the BA577E is able to measure and display the elapsed time between external events, or control external events via two optional factory fitted control outputs.

When configured as a Clock, the instrument can display time in a variety of formats and the two optional control outputs may be configured to switch loads *on* and *off* at pre-set times.

This instruction manual is divided into sections.

Common features

2. System design
3. Installations
4. Accessories

Timer

5. Operation as a timer
6. Configuration example
7. Maintenance

Clock

8. Operation as a clock
9. Configuration example
10. Maintenance

This instruction manual supplements the abbreviated instruction sheet supplied with each instrument.

2. SYSTEM DESIGN

Fig 1 illustrates the basic circuit that is used for all BA577E Timer installations. Clock installations are the same, except that the input terminals 5 & 6 are not used. For simplicity the optional control outputs are described separately in section 2.4 of this manual.

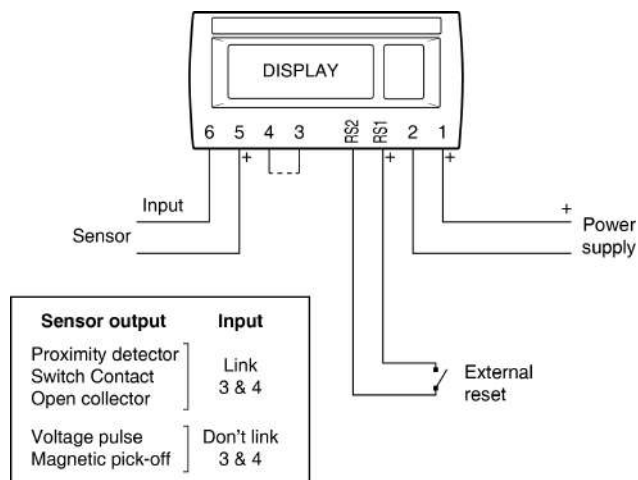


Fig 1 BA577E connection

2.1 Power supply

The BA577E requires a supply of 10 to 30V dc between terminal 1 & 2 and consumes:

	10mA	without optional backlight
plus	22mA	with optional backlight
plus	6mA	when terminals 3 & 4 are linked

2.2 Sensor input

As shown in Fig 1 the BA577E Timer can be controlled by a wide range of sensors, which must have a continuous not momentary output. The BA577E input is not used when the instrument is configured as a Clock.

The following table shows the instrument's input switching thresholds when configured to operate with various sensors. For reliable operation the BA577E input must fall below the lower threshold and rise above the upper threshold.

Sensor	Switching thresholds	
	Lower	Upper
Low voltage range	1.0V	3.0V
High voltage range	3.0V	10.0V
Magnetic pick-off	0	40mV peak
Proximity detector	1.2mA	2.1mA
Switch	100Ω	1000Ω
Open collector	2kΩ	10kΩ

Switch contacts, proximity detectors and open collector sensors require energising which is achieved by linking terminals 3 and 4 together as shown in Fig 1.

2.2.1 Switch contact input

Any switch contact may be directly connected to input terminals 5 & 6. The BA577E contains a configurable debounce circuit to prevent false triggering of the instrument. Three levels of debounce protection are available. See section 5.5.6.

2.2.2 Open collector input

Any sensor with an open collector output such as an opto-isolator may be directly connected to input terminals 5 & 6. The BA577E contains a configurable debounce circuit to prevent false triggering. Three levels of debounce protection are available. See section 5.5.6.

2.2.3 2-wire proximity detector input

Most NAMUR 2-wire proximity detectors may be connected to the BA577E sensor input, providing the minimum operating voltage of the proximity detector is less than 7.5V. The BA577E contains a configurable debounce circuit to prevent false triggering of the instrument. Three levels of debounce protection are available. See section 5.5.6.

2.2.4 Magnetic pick-off input



☐₀ L in the input configuration menu is a low level input intended for use with a magnetic pick-off sensor which is not suitable for controlling the BA577E.

2.2.5 Voltage input

Two voltage input ranges are independently selectable in the BA577E Timer configuration menu, $U_{0LLE5} L$ and $U_{0LLE5} H$. The BA577E contains a configurable debounce circuit to prevent false triggering of the instrument. Three levels of debounce protection are available. See section 5.5.6.

2.3 Remote reset

Connecting the external reset terminals RS1 and RS2 together will reset the BA577E total display when configured as a Timer and synchronise the displayed time when configured as a Clock. Remote resetting may be accomplished by any switch

Note: When used as a Timer the BA577E may also be reset from the display mode by operating the  and  push buttons simultaneously for more than two seconds. See 5.5.19

2.4 Control outputs (optional)

Each of the two factory fitted optional control outputs is a galvanically isolated single pole solid state switch as shown in Fig 2. The outputs are polarised and current will only flow in one direction. Terminals A1 and A3 should be connected to the positive side of the supply.

Note: Because of the series protection diode some test meters may not detect a closed alarm output

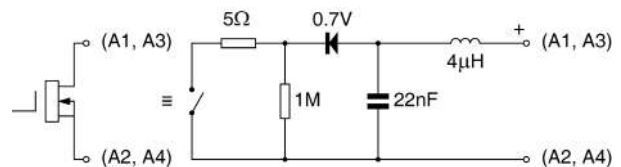


Fig 2 Equivalent circuit of each control output

The solid state output of each alarm may be used to switch any circuit with parameters equal or less than:

$$V \text{ max} = 30V$$

$$I \text{ max} = 200mA$$

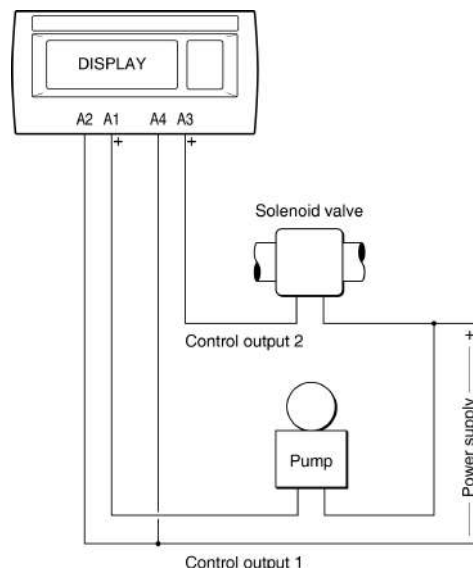


Fig 3 Typical control output application

3. INSTALLATION

3.1 Location

The BA577E has a robust glass reinforced Noryl enclosure with a toughened glass window. The front has IP66 ingress protection and a gasket seals the joint between the instrument enclosure and the panel, the rear of the instrument has IP20 ingress protection.

The BA577E may be installed in any panel providing that the operating temperature is between -40°C and +70°C. At temperatures below -20°C the display will become increasingly slow with reduced contrast but the instrument will continue to function normally.

Fig 4 shows the overall dimensions of the instrument together with the recommended panel cut-out dimensions. To achieve an IP66 seal between the instrument enclosure and the instrument panel the smaller tolerance aperture must be used.

Although the front of the BA577E has IP66 protection it should be shielded from continuous direct sunlight and severe weather conditions.

4.2 EMC

The BA577E complies with the requirements of the European EMC Directive 2014/30/EU. For specified immunity all wiring should be in screened twisted pairs, with the screens earthed at one point.

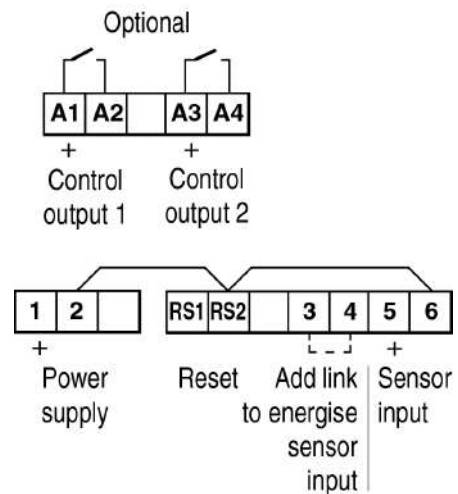
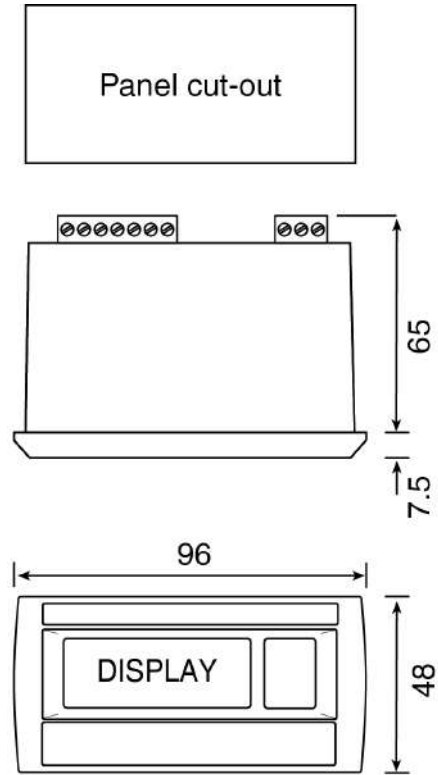
Recommended panel cut-out dimensions for all installations

Mandatory to achieve an IP66 seal between instrument and panel

90 +0.5/-0.0 x 43.5 +0.5/-0.0

DIN 43700

92.0 +0.8/ -0.0 x 45 +0.6 -0.0



Support panel wiring to prevent vibration damage

Note: Optional backlight is internally powered

Fig 4 BA577E dimensions & terminals

3.3 Installation Procedure

- Cut the specified aperture in the panel. To achieve an IP66 seal between the instrument enclosure and the instrument panel the aperture must have the tighter tolerances specified in Fig 4.
- Slide the gasket over the body of the BA577E before inserting the instrument into the panel aperture.
- Firstly ensure that both the panel mounting clamps are closed by turning the knurled screws fully anti clockwise until the two pins in the clamp foot align with holes in the clamp body.
- Place a clamp in the recess on each side of the instrument, pulling gently to slide it onto the dovetail as shown in Fig 5. Push the knurled screw slightly forward to engage the thread and tighten by turning clockwise until it is just finger tight. When the clamps are fitted ensure that the gasket behind the front panel bezel is correctly positioned before fully tightening the clamps to secure the instrument. The maximum recommended clamp tightening torque is 22cNm (1.95 lbf in) which is approximately equivalent to finger-tight plus one half turn. **Do not over tighten.**
- Connect the panel wiring to the rear terminal block(s) as shown in Fig 4. To simplify installation, the terminals are removable so that the panel wiring can be completed before the instrument is installed. In areas subject to vibration wiring should be secured to prevent damage to the connectors.

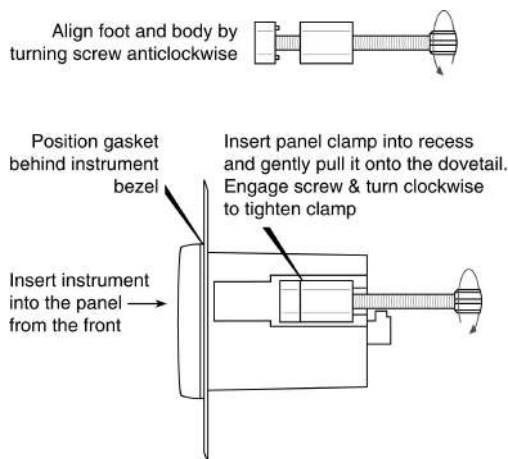


Fig 5 Fitting panel mounting clamps

3.4 Scale card

The BA577E's units of measurement are shown on a printed scale card in a window at the right hand side of the display. The scale card is mounted on a flexible strip that is inserted into a slot at the rear of the instrument as shown in Fig 6. Thus the scale card can easily be changed without removing the BA577E from the panel or opening the instrument enclosure.

New instruments are supplied with a printed scale card showing the requested units of measurement, if this information is not supplied when the instrument is ordered a blank card will be fitted.

A pack of self-adhesive scale cards printed with common units of flow measurement is available as an accessory from BEKA associates. Custom printed scale cards can also be supplied - see 4.3

To change a scale card, unclip the tapered end of the flexible strip at the rear of the instrument by gently pushing it upwards and pulling it out of the enclosure. Peel the existing scale card from the flexible strip and replace it with a new printed card, which should be aligned as shown below. Do not fit a new scale card on top of an existing card.

Install the new scale card by gently pushing the flexible strip into the slot at the rear of the instrument, when it reaches the internal end-stop secure it by pushing the end of the flexible strip downwards so that the tapered section is held by the rear panel.

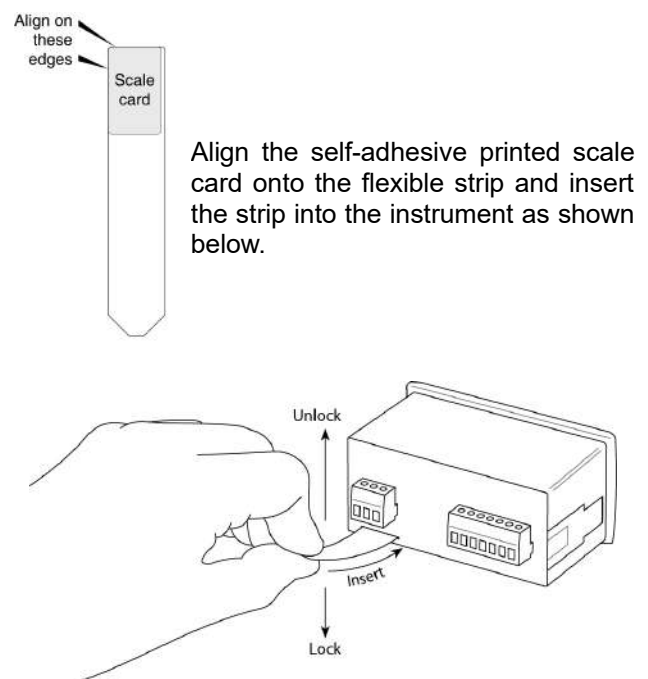


Fig 6 Inserting the flexible strip carrying the scale card into slot at the rear of the instrument.

4. ACCESSORIES

4.1 Display backlight

The BA577E Timer or Clock can be supplied with a factory fitted backlight that produces green illumination enhancing display contrast and enabling the display to be read at night or in poor lighting conditions. The backlight is internally powered from the instrument power supply so no additional wiring is required, but the supply current increases as shown below.

	BA577E Timer current consumption
Without backlight	10mA
Additional for backlight	22mA
Addition with terminals 3 & 4 linked	6mA
Total current	<hr/> 38mA max

	BA577E Clock current consumption
Without backlight	10mA
Additional for backlight	22mA
Total current	<hr/> 32mA max

4.2 Control outputs

Although the dual isolated control outputs are factory fitted options, they are described in the main body of this instruction manual as they will be used for the majority of applications, see section 2.4. If control outputs are required they should be specified when the instrument is ordered.

4.3 Scale card

The BA577E has a window on the right hand side of the display through which a scale card showing the units of time such as hours can be seen. New instruments are fitted with a scale card showing the units of measurement specified when the instrument was ordered, if the units are not specified a blank scale card will be fitted. A pack of scale cards pre-printed with common units of measurement is available as an accessory. These can easily be fitted on-site without opening the instrument enclosure or removing it from the panel. See section 3.4 of this instruction manual.

Custom scale cards for applications requiring less common units of measurement are also available.

4.4 Tag information

New instruments can be supplied with a tag number or application information printed onto the rear panel adjacent to the terminals. This information is not visible from the front of the instrument after installation.

4.5 Rear cover sealing kit

The BA577E Timer or Clock's rear of panel ingress protection can be increased from IP20 to IP66 with a BA495 rear cover sealing kit. Manufactured from 316 stainless steel the cover incorporates two M20 unthreaded entries for cable glands. It allows the BA577E Timer or Clock to be installed in an open panel, or to provide additional rear protection when installed within an enclosure.

5. OPERATION AS A TIMER

When configured as a Timer the BA577E can measure and display the elapsed time between external events such as measuring and displaying how long machinery is operating. The Timer can be started and stopped by a remote sensor with a continuous output, or from the front panel push buttons.

The addition of two optional factory fitted isolated control outputs allows the Timer to control external events such as opening a valve for a predetermined time. Again the Timer can be started and stopped by a remote sensor, or from the front panel push buttons.

When controlling external events the [Y][E] function enables the BA577E Timer to be configured to repeat the timing period up to 99 times with a configurable delay between timed periods up to 100 hours or to repeat continuously.

The BA577E may be configured to *time-up* from zero to the set time 5E1 E, or to *time-down* from the set time to zero. The set time may be entered and displayed in hours, minutes or seconds, or a combination of units. Elapsed or remaining time is continuously displayed and a separate display may be activated to show the Timer set time 5E1 E. Resetting the timer cycle can be accomplished via the front panel push buttons or by a remote contact.

A grand total time is maintained which can be viewed by operating the front panel push buttons. It may be reset to zero from within the configuration menu, or the instrument may be configured to allow resetting from the front panel push buttons.

Fig 7 shows a simplified block diagram of the BA577E when configured as a Timer. The input can be configured to accept inputs from a wide variety of sensors. When the sensor requires energising to detect it's state, such as a switch contact, open collector or a two wire proximity detector, a link connected between terminals 3 & 4 supplies power to the sensor input.

The instrument can be supplied with the following factory fitted accessories:

- Internally powered Backlight
- Dual isolated Control Outputs

The two factory fitted solid state isolated control outputs may be independently configured to close and open at specified parts of the timer cycle, such as when the timer starts or finishes.

5.1 Initialisation

Each time power is applied to a BA577E initialisation is performed. After a short delay the following display sequence occurs:

All segments of the display are activated

BA577E is ready to start functioning using the configuration information stored in the instrument's permanent memory.

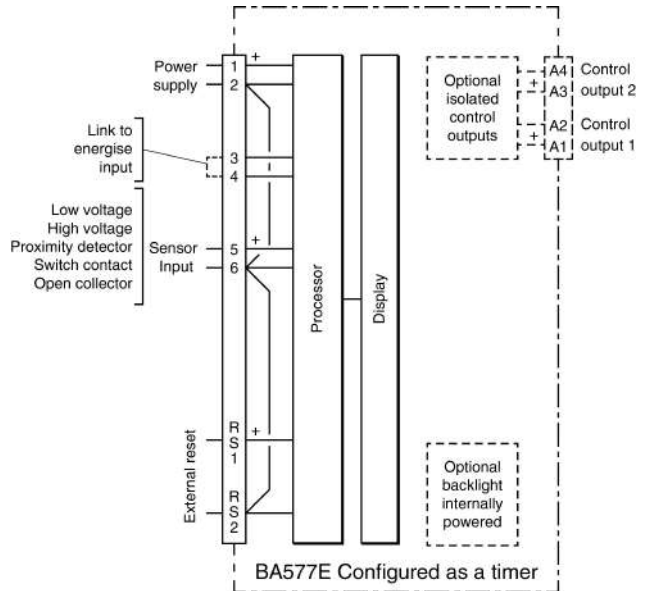


Fig 7 BA577E block diagram with Timer configuration.

5.2 Controls when configured as a Timer

The BA577E is controlled and configured via four front panel push buttons. In the display mode i.e. when the instrument is displaying time the push button functions are:

Push Button Functions

- ▼ When local control is enabled starts the Timer. See 5.5.8

- ▲ When local control is enabled stops the Timer. See 5.5.8

- E + ▲ Shows the grand total time in hours and tenths of an hour irrespective of Timer configuration. If buttons are held for longer than ten seconds the grand total may be reset to zero if the grand total reset sub-function Lr t is enabled in the Lr r 5Et configuration function. See 5.5.20

To reset the grand total to zero from the display mode press the E + ▲ buttons for ten seconds until Lr na is displayed, using the ▼ or ▲ button change the display to Lr 5E5 and press E.

- ▼ + ▲ Resets the Timer to zero or to the set time 5Et t depending on whether the Timer is configured to *time-up* or *time-down* when the two buttons are operated simultaneously for more than three seconds. This is a configurable function. See 5.5.19

- P + ▲ When enabled in the configuration menu, operating these two buttons simultaneously provides direct access to the set time 5Et t and allows adjustment when the timer is in the display mode. See 5.5.15

- P + ▼ Shows in succession, firmware version number, instrument function ELRP5E and any output accessories that are fitted:
 - R Dual Control Outputs

- P + E Access to configuration menu

5.3 Displays when configured as a Timer

The BA577E has two digital displays and associated annunciators as shown on front cover of this manual.

Elapsed time The upper display shows the elapsed time since the Timer was started when *timing-up* from zero and the remaining time when *timing-down* from the set time. The display may be formatted as hh:mm:ss; hh:mm; mm:ss or ss.

Lower display The display options available on the lower display depend on whether the Timer repeat cycle function CYCLE5, which can repeat the timing period up to 99 times, or continuously with a configurable delay between periods, is enabled.

CYCLE5 disabled

The lower display shows the set time 5Et t, or the lower display may be disabled if not required. See 5.5.7

CYCLE5 enabled

The lower display shows the total number of repeat cycles requested together with the number of the current cycle. Each operation may be briefly named at it's start or periodically throughout the cycle. The lower display may also be disabled if not required. See 5.5.7

Reset annunciator

Activated while elapsed time is being reset to zero or to the set time 5Et t.

Grand total annunciator



Activated when the grand total time is being shown on the upper display.

Control output annunciators

Show status of both optional control outputs.

5.4 Timer structure

Fig 8 illustrates the Timer structure and function shown as a state diagram. It applies when the instrument is measuring the time between events or is controlling external events.

The circles in Fig 8 represent the five Timer states, *Reset*, *Running*, *Restart-delay*, *Paused* and *Complete*. The lines between the circles represent the event required to move the Timer between states. e.g. to initiate timing the Timer is moved from the *Reset* state to the *Running* state by a start event. This could be an input signal or operation of the  button. Similarly, to pause the Timer while it is timing, the Timer must be moved from the *Running* state to the *Pause* state by a stop event which could be an input or operation of the  button.

Reset

In this state the Timer is readied for operation. The Timer is stopped and loaded with zero for timing-up or 5E6 t for timing-down.

Running

Entered by a start event from the *Reset* or *Paused* states. The Timer times-up to 5E6 t or times-down to zero depending upon its configuration.

Pause

Entered by a stop event from *Running* or *Restart-delay*. Timer is stopped, a start event returns the timer to its previous state.

Restart-delay

Entered automatically from *Running*. At the end of the delay time automatically returns to *Running*.

Complete

Entered automatically from *Running* when there are no more timing cycles to perform.

When the [4][4][5] function is enabled the timing cycle can be repeated a specified number of times, or continuously.

5.5 Configuration as a Timer

The BA577E is configured via the four front panel push buttons. All the configuration functions are contained in an easy to use intuitive menu that is shown diagrammatically in Fig 9.

Each menu function is summarised in section 5.5.2 of this manual and each summary includes a reference to more detailed information.

All new BA577E instruments are supplied configured as requested at the time of ordering. If configuration is not requested, the BA577E will be supplied with default Timer configuration as shown below, but the instrument can easily be re-configured on-site.

Function	Display	Default
Access code	[odE	0000
Function	Functi on	ELAPSE
Input	Input	oP.CoL
Debounce	dEBounCE	dEFRAULt
Display 2	d, SP-2	5td
Start stop	StArStoP	L oCRL
Units	uni tS	12:00:00
Set time	5Et t	00:00:00
Enable repeat cycle	[4][4][5	oFF
Access set time from display mode.	RE5Et t	oFF
Direction of count	uP or dn	dn
Recovery from power supply failure.	P-FR, L	, dLE
Local total reset	t-rESEt	on
Local grand total reset	Gt-rESEt	oFF
External reset	E-r5Et	5td
Enable control output 1 *	EnbL	oFF
Enable control output 2 *	EnbL	oFF

* Optional output

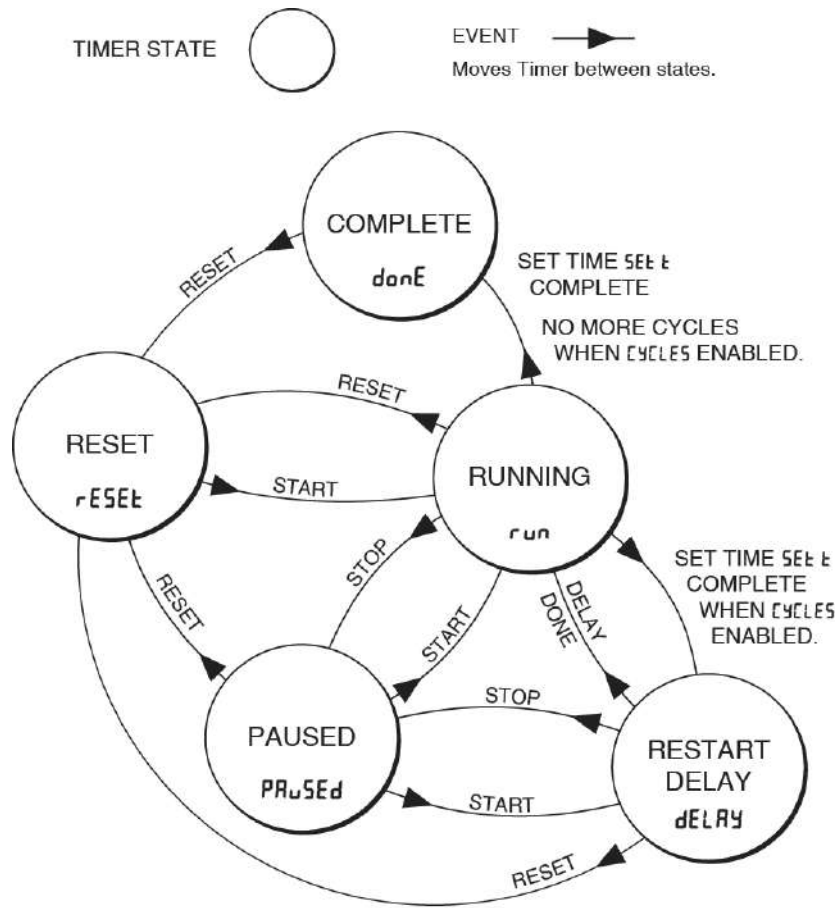




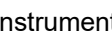
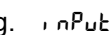


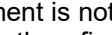







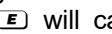




Fig 8 Timer structure showing states and events

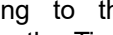

5.5.1 Accessing configuration functions

Throughout this manual front panel push buttons are shown as , ,  and  and legends displayed by the instrument are shown in a seven segment font just as they appear on the instrument e.g.  and .

Access to the configuration menu is obtained by operating the  and  push buttons simultaneously. If the instrument is not protected by an access security code the first parameter  will be displayed. If a security code other than the default code  has already been entered, the instrument will display . Press  to clear this prompt and enter the security code for the instrument using the  or  push button to adjust the flashing digit and the  push button to transfer control to the next digit. If the correct code has been entered pressing  will cause the first parameter  to be displayed. If an incorrect code is entered, or a push button is not operated within ten seconds, the instrument will automatically return to the display mode.

All configuration functions and prompts are shown on the upper eight digit display.

Once within the main configuration menu the required function can be selected by scrolling through the menu using the  or  push buttons. The Timer configuration menu is shown diagrammatically in Fig 9.

When returning to the display mode following reconfiguration, the Timer will display  followed by  while the new information is stored in permanent memory.

5.5.2 Summary of Timer configuration functions

This section summarises all the Timer configuration functions. When read in conjunction with Fig 9 it provides a quick aid for configuring the Timer. If more detail is required, each section of this summary contains a reference to a full description of the function.

Display Summary of function

Function **Instrument function**
 Defines the function of the instrument.
 May be set to:

- ELAPSE Timer configuration
- CLAC Clock configuration

All the entries in this Timer summary assume that the BA577E is configured as a Timer by selecting ELAPSE.

See section 5.5.3

Input Configuration of Input
 Contains a sub-menu with two sub-functions:

- INPUTYPE Selects input sensor type
- DEBOUNCE Defines input debounce

See section 5.5.4

INPUTYPE
 Configures the Timer sensor input to accept one of six types of input:

- OPCOL Open collector •
- VOLT L Voltage <1 >3V
- VOLT H Voltage <3 >10V
- MAGNETIC Magnetic pick-off
- PROXIMITY Proximity detector •
- SWITCH Switch contact •

- Energise input by linking terminals 3 & 4.

See section 5.5.5

DEBOUNCE
 Defines the level of debounce applied to the input to prevent false functioning:

- DEFRAUL
- HEAVY
- LIGHT

See section 5.5.6

Display Summary of function

d, SP-2 Lower display
 Configures the lower display to show set time SEt or, when the CYCLE5 repeat function is activated, the restart delay count-down plus the cycle count number.

With CYCLE5 not enabled:

Select Lower display shows
 SEt Set time SEt

OFF Disables lower display.

See section 5.5.7

With CYCLE5 enabled:

Select Lower display shows
 SEt Cycles requested and cycles performed with time-down shown during requested delay period. Brief notification of timer status i.e. CYCLE or DELAY at start of each period.

LRBEL Exactly as SEt but with periodic notification of timer status i.e. CYCLE or DELAY.

OFF Disables lower display.





See section 5.5.7

START-STOP Starting and stopping the timer
 Defines how the Timer is started and stopped.

	Start	Stop
LCAL	▼ button	▲ button
CONTROL 1	Input high	Input low
CONTROL 2	Input low	Input high

High and low input ranges are specified for a maintained voltage input. For other types of sensor input.

See section 5.5.8

Display	Summary of function	Display	Summary of function
units	<p>Units of display Selects displayed units.</p> <p>12:00:00 Hours, minutes & seconds 12:00 Hours & minutes * 30:00 Minutes & seconds 30 Seconds</p> <p>Excludes delay of optional control outputs which is always shown in seconds and the grand total which is always shown in hours. * Only available if 5E t and r5t dELR, if already entered, specify zero seconds or seconds which are exactly divisible by sixty. See section 5.5.9</p>	uP or dn	<p>Direction of count Defines whether the Timer <i>times-down</i> from 5E t to zero or <i>times-up</i> from zero to the set time 5E t. See section 5.5.16</p>
5E t	<p>Set time When controlling an external event via the optional control outputs the BA577E will <i>time-down</i> from the set time to zero or <i>time-up</i> from zero to the set time. Note: Timer will only start if a non zero value is entered for set time 5E t. See section 5.5.10</p>	P-FR, L	<p>Power Failure Defines how the Timer functions when power is restored after a power failure. Contains three sub-functions, dLE, PRuSE and Eont, nuE.</p> <p>dLE Timer returns in stopped state as if having completed a single timing cycle displaying Timer value when power was lost. Timing resumes when reset followed by start instructions are received.</p> <p>PRuSE Timer returns in paused state displaying Timer value when power was lost. Timing resumes when start instruction is received.</p> <p>Eont, nuE Timer will continue without any manual intervention. See section 5.5.17</p>
CYCLES	<p>Repeat timing cycle Contains a sub-menu with three sub-functions, EnbL, CYCL Cnt and r5t dELR. See section 5.5.11</p> <p>Cycle function enable EnbL Enables or disables the CYCLES function without changing the parameters. See section 5.5.12</p> <p>Cycle count CYCL Cnt Defines the number of times that the timer cycle is repeated. See section 5.5.13</p> <p>Restart delay r5t dELR Defines the time delay between timer cycles. See section 5.5.14</p>	LoC r5E t	<p>Local reset Contains two sub-functions which when enabled allow the Timer and the grand total, which represents total Timer run-time, to be reset to zero via the front panel push buttons while the Timer is in the display mode. See section 5.5.18</p> <p>Local total reset r5E tEnbL When on is selected, Timer is reset to zero, or 5E t if <i>timing-down</i>, when the  and  buttons are operated simultaneously for more than three seconds in the display mode. See section 5.5.19</p> <p>Local grand total reset CLr Gtnt When on is selected the grand total, which represents total run-time, may be reset to zero by operating the  and  buttons simultaneously for more than 10 seconds in the display mode. Note: Once reset, the grand total can not be recovered. See section 5.5.20</p>
RC5E t	<p>Access 5E t and r5t dELR from display mode. Enables 5E t and r5t dELR to be adjusted from the display mode. Also contains a sub-function RCLd which defines a separate code to protect access from the display mode to 5E t and r5t dELR. See section 5.5.15</p>		

Display	Summary of function	Display	Summary of function
oP1	<p>Control output 1 (Optional) Contains sub-menu with four sub-functions, <i>EnbL</i>, <i>oP1 on</i>, <i>oP1 off</i> and <i>oP1 dELR</i>. See section 5.5.21</p> <p>Control output enable <i>EnbL</i> Enables or disables control output 1 without changing the parameters. See section 5.5.22</p> <p>Control output 1 on at <i>oP1 on</i> Defines when the control output turns <i>on</i> (closes). See section 5.5.23</p> <p>Control output 1 off at <i>oP1 off</i> Defines when the control output turns <i>off</i> (opens). See section 5.5.24</p> <p>Control output 1 delay <i>oP1 dELR</i> Introduces a configurable delay between the <i>oP1 on</i> condition occurring and the control output turning <i>on</i> (closing). See section 5.5.25</p>	<p>CLR GRtOt Reset grand total to zero This function resets the grand total, which represents the total Timer run-time, from within the configuration menu when <i>CLR YE5</i> is selected and <i>5urE</i> is entered to confirm the instruction. Note: Once reset, the grand total can not be recovered. See section 5.5.27</p>	
		Code	<p>Security code Defines a four digit alphanumeric code that must be entered to gain access to the instrument's configuration menu. Default code <i>0000</i> disables the security function and allows unrestricted access to all configuration functions when the P and E buttons are operated simultaneously in the display mode. See section 5.5.28</p>
		r5Et dEF	<p>Reset to factory defaults Resets the BA577E to the factory default configuration shown in section 6.5 when <i>5urE</i> is entered to confirm the instruction. See section 5.5.29</p>
oP2	<p>Control output 2 (Optional) Functions as control output 1. See section 5.5.26</p>		

5.5.3 Instrument function: Funtion

The BA577E may be configured as a Timer or as a Clock. This section of the instruction manual describes the Timer, for details of Clock configuration see section 8.

To reveal the existing function of the instrument select Funtion from the configuration menu and press **[P]**. If ELRPE is displayed, the instrument is already configured as a Timer therefore press **[E]** to return to the Funtion prompt in the configuration menu. If LbC is displayed, press the **[▲]** or **[▼]** button to change the setting to ELRPE followed by the **[P]** button which will result in a 0000 prompt being displayed with the first digit flashing. This is a request for the instruction to be confirmed by entering SurE using the **[▼]** and **[▲]** buttons to adjust the flashing digit and the **[P]** button to move control to the next digit. When SurE has been entered, pressing **[E]** will reconfigure the instrument to a Timer and return the display to Funtion in the configuration menu.

5.5.4 Input: Input

The Input function contains two sub-functions InputType which defines the type of sensor that may be connected to the input and dEBounce which adjust the amount of input noise rejection.

5.5.5 Input type: InputType

InputType is a sub-menu in the Input function which defines the type of input sensor that may be connected to the input. To check or change the type of input, select Input in the configuration menu and press **[P]** which will reveal the InputType prompt, pressing **[P]** again will show the existing input type. If set as required press **[E]** twice to return to the configuration menu, or repeatedly press the **[▲]** or **[▼]** button until the required type of input is displayed and then press **[E]** twice to return to the configuration menu.

One of following six types of input may be selected:

Display	Input type	Switching thresholds	
		Low	High
oPCL	Open collector ²	2	10kΩ
UoL5L	Voltage range low ¹	1	3V
UoL5H	Voltage range high ¹	3	10V
Pr.dEt	Proximity detector ²	1.2	2.1mA
CotRCL	Switch contact ²	100	1000Ω

Notes:

1. Maximum voltage input +30V.
2. For sensors that require energising i.e. proximity detectors, switch contacts and those with open collector outputs, terminals 3 & 4 of the BA577E Timer should be linked together.
3. For the Timer to function correctly, the input signal must fall below the lower switching threshold and rise above the higher switching threshold for the times shown in the debounce section 5.5.6 below.

5.5.6 debounce: dEBounce

dEBounce is an adjustable sub-menu in the Input function which prevents the Timer mis-functioning when the input has noisy edges, such as those resulting from a mechanical contact closing and bouncing. Three levels of protection may be selected and the amount of debounce applied depends upon the type of Timer input that has been selected in the InputType function.

The following table shows the minimum time that the input signal must be continuously above the upper input switching threshold and continuously below the lower switching threshold to ensure that the Timer processes the input signal. Input switching thresholds are shown in section 5.5.5.

Debounce level	Min continuous input	
	Type of Input	
	Contact	All others
Default	1600µs	40µs
Heavy	3200µs	350µs
Light	400µs	5µs

5.5.7 Lower display: d, 5P-2

The configuration of the lower display which has six 6mm high digits, depend upon whether the repeat timer function CYCLE5, which can repeat the timing period up to 99 times or continuously with a configurable delay between periods, is enabled. The configuration options are:

CYCLE5 disabled

The lower display shows the set time SET t or the lower display may be disabled.

CYCLE5 enabled

The lower display shows the total number of repeat cycles requested together with the current cycle number. During the configurable delay between cycles the display times-down from the requested delay time to zero. Each operation may be briefly named at it's start or periodically throughout the cycle.

The lower display may also be disabled if not required.

To check or change the configuration of the lower display select d, 5P-2 from the configuration menu and press [P] which will reveal the existing setting which can be changed by pressing the [▲] or [▼] button followed by the [E] button to enter the selection and return to the configuration menu.

If the CYCLE5 function is not enabled the following two options are available:

- 5td** Lower display shows the Timer's set time SET t, from which the BA577E will time-up or time-down depending upon the direction of count selected in the uP or dn function.
- oFF** Lower display disabled.

If the CYCLE5 function is enabled the following three options are available:

- 5td** Lower display shows the number of cycles requested together with the current cycle number. During the configurable delay period the display times-down from the requested delay to zero. A brief notification of timer status i.e. CYCLE or dELAY is shown at start of each period.

02 - 11

Current cycle number Number of cycles requested, not shown when cycle is continuously repeated.

- LABEL** Exactly the same as 5td, but timer status i.e. CYCLE or dELAY is shown periodically.
- oFF** Lower display disabled.

5.5.8 Starting & stopping the Timer: 5tAr5toP

The Timer may be started and stopped by a sensor input signal or by operation of the front panel [▲] or [▼] push buttons.

To check or change the control of the Timer, select 5tAr5toP from the configuration menu and press [P] which will reveal the existing setting which can be changed by pressing the [▲] or [▼] button followed by the [E] button to enter the selection and return to the configuration menu. Options available are:

Voltage inputs or control from front panel

Display	Start	Stop
Control 1	Input high	Input low
Control 2	Input low	Input high
LoARL	[▼] button	[▲] button

Contact and open collector inputs

Display	Start	Stop
Control 1	Open	Closed
Control 2	Closed	Open

Proximity detector input

Display	Start	Stop
Control 1	Low current	High current
Control 2	High current	Low current

5.5.9 Units of display: un, t5

Defines the format of all displayed times, except the delay time of the optional control outputs which is shown in seconds and the grand total which is shown in hours and tenths of an hour.

To check or change the units of display, select un, t5 from the configuration menu and press [P] which will reveal the existing setting. The required units can be selected by pressing the [▲] or [▼] button followed by the [E] button to enter the selection and return to the configuration menu. The options available are shown below:

Display	
12:00:00	Hours, minutes & seconds
12:00	Hours & minutes*
30:00	Minutes & seconds
30	Seconds

* Only available when time in seconds specified in any Timer function is zero or divisible by 60.

The Timer's maximum elapsed time in any format is equivalent to 99 hours, 59 minutes & 59 seconds.

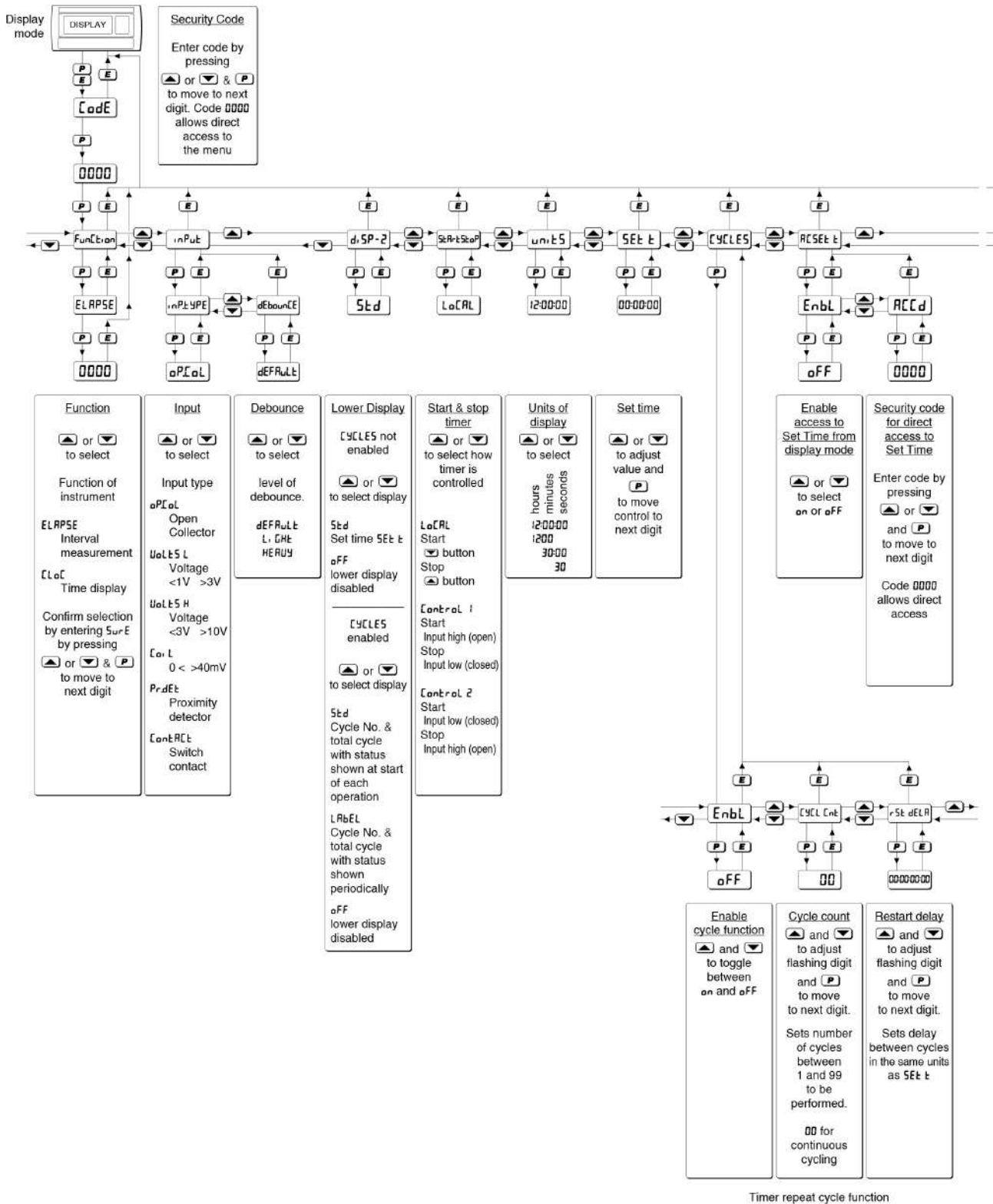
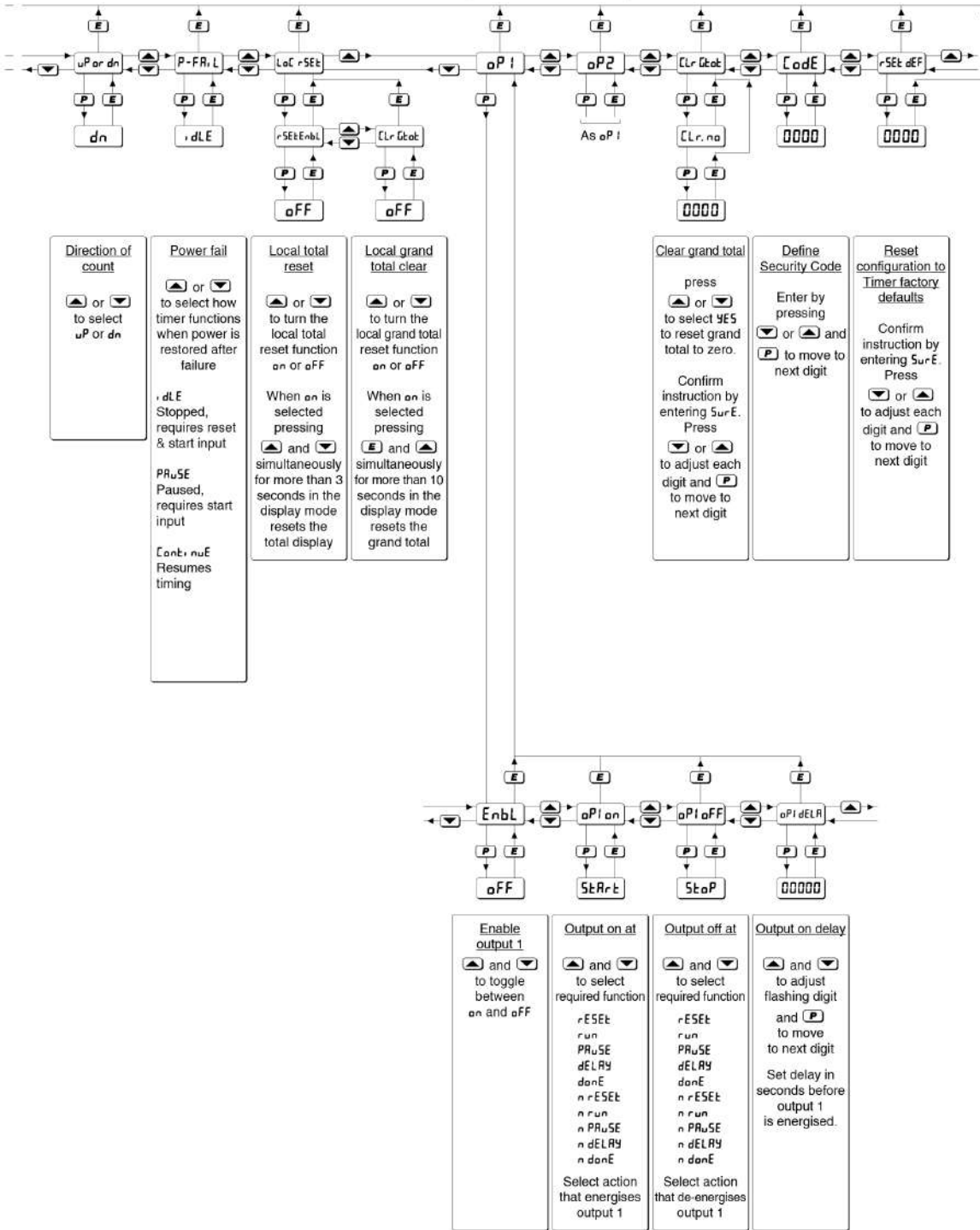


Fig 9 Timer Configuration menu

Only included when optional Control Outputs are fitted



Control output 1 configuration

5.5.10 Set time: 5EŁ Ł

This is the Timer's setpoint. When controlling an external event via the optional control outputs the BA577E will time-down from the set time to zero or time-up from zero to the set time.

To check or change the set time, select 5EŁ Ł from the configuration menu and press **P** which will reveal the existing setting with the most significant digit flashing. The flashing digit may be adjusted by pressing the **▲** or **▼** button followed by the **P** button to transfer control to the next digit. When set as required, enter the selection and return to the 5EŁ Ł prompt in the configuration menu by operating the **E** button.

Note: If 5EŁ Ł is zero the Timer will not function when an external start input is received or the **▼** button is operated.

5.5.11 Repeat timing cycle: ŁYŁŁE5

This powerful function which allows the BA577E timing cycle to be repeated up to 99 times or continuously with a configurable delay between cycles of up to 99 hours, 59 minutes & 59 seconds.

To check or adjust the repeat timing cycle, select ŁYŁŁE5 from the configuration menu and press **P** which will enter a sub-menu containing three sub-functions, EŁbŁ, ŁYŁŁ ŁŁŁ and Ł5Ł dELŁ which are described in the following sections.

5.5.12 Cycle function enable: EŁbŁ

This sub-function allows the repeat timing cycle to be enabled or disabled without altering any of the repeat timing cycle parameters. To check or change the function select EŁbŁ from the repeat timing cycle sub-menu and press **P** which will reveal if the repeat cycle function is ON or OFF. The setting can be changed by pressing the **▼** or **▲** button followed by the **E** button to return to the repeat timing cycle sub-menu.

5.5.13 Cycle count: ŁYŁŁ ŁŁŁ

This sub-function defines the number of times that the timer cycle is repeated. It may be set to any number between 1 and 99, or to 00 for continuous repetition.

To check or change the function select ŁYŁŁ ŁŁŁ from the repeat timing cycle sub-menu and press **P** which will reveal two digits with the most significant flashing. The flashing digit may be adjusted by pressing the **▲** or **▼** button followed by the **P** button to transfer control to the next digit. When set as required, enter the selection and return to the ŁYŁŁ ŁŁŁ prompt in the sub-menu by operating the **E** button.

5.5.14 Restart delay: Ł5Ł dELŁ

This sub-function defines the time delay between repeat timing periods. It is shown in the format selected in the units function and may be set to any time between zero and the maximum time allowed in the selected format.

Time format selected in	Maximum delay
ŁŁŁ Ł5	
12:00:00	99:59:59
12:00	99:59
30:00	5999:59
30	359999

To check or change the reset delay time select Ł5Ł dELŁ from the repeat timing cycle sub-menu and press **P** which will reveal the delay time in the selected format with the most significant digit flashing. The flashing digit may be adjusted by pressing the **▲** or **▼** button followed by the **P** button to transfer control to the next digit. When set as required, enter the selection and return to the Ł5Ł dELŁ prompt in the sub-menu by operating the **E** button.

Can also be adjusted from the Timer display mode, see 5.5.15

5.5.15 Adjusting the set time 5EŁ Ł and restart delay Ł5Ł dELŁ from the display mode: RŁ5EŁ Ł

When this function is enabled the Timer's set time 5EŁ Ł and restart delay Ł5Ł dELŁ can be adjusted from the display mode by simultaneously operating the **P** and **▲** push buttons. Thus allowing an operator to adjust these parameters without having access to the instrument's configuration menu. The function contains two sub-functions, EŁbŁ which activates the function and RŁŁŁ which defines a separate code for access to 5EŁ Ł with the Timer in the display mode.

To check or change the function, select RŁ5EŁ Ł in the configuration menu and press **P** which will reveal the EŁbŁ prompt, pressing **P** again will show if the function is ON or OFF. If adjustment of the set time from the display mode is not required press the **▲** or **▼** button to select OFF and then press **E** Ł twice to return to the configuration menu. If the function is required, select ON and press **E** to return to the EŁbŁ prompt from which RŁŁŁ, which allows a separate access code to be entered, can be selected by pressing the **▲** or **▼** button.

Access to 5EŁ Ł and Ł5Ł dELŁ from the display mode may be protected by a four digit alphanumeric security code which must be entered to gain access. Default security code 0000 allows unrestricted access. With RŁŁŁ displayed, press **P** to enter a

new access code. The Timer will display 0000 with one digit flashing. The flashing digit may be adjusted using the ▲ or ▼ push button, when set as required operating the [P] button will transfer control to the next digit. When all the digits have been entered press [E] twice to return to the RESEt t prompt in the configuration menu. The revised access code will be activated when the BA577E is returned to the display mode.

Please contact BEKA associates sales department if the access code is lost.

5.5.16 Direction of count: uP or dn

The Timer may be configured to *time-up* from zero to the set time 5Et t while displaying elapsed time, or to *time-down* from the set time 5Et t to zero while displaying the remaining time.

When the repeat timing cycle function [YCLE5] is enabled, it is recommended that a down count is selected so that the progress of the timer can be observed with a known completion time i.e zero. If set as an up counter, elapsed will be displayed, but 5Et t at which the Timer will stop is not shown.

To check the direction of count, select uP or dn from the configuration menu and press [P] which will reveal the existing setting which can be changed by pressing the ▲ or ▼ button followed by the [E] button to enter the selection and return to the configuration menu.

5.5.17 Power Fail: P-FR, L

Defines how the Timer powers-up and functions when power is restored after a power supply interruption. Three options are available, dLE, PRuSE and Count, nuE.

dLE The Timer is stopped in the state it achieves when it has timed-up to 5Et t or timed-down to 0000, with the elapsed or remaining time when power was lost shown on the upper display. The Timer must be reset before it can be restarted. If the repeat timing cycle is in use the number of cycles completed will be lost when the Timer is reset.

PRuSE The Timer is stopped in the state it achieves following receipt of a stop input to pause timing. The elapsed or remaining time when power was lost is shown on the upper display. Timing resumes when a start instruction is received. If a start input exists when power is restored timing will start immediately.

Count, nuE When power is restored the Timer will continue from where it stopped without any manual intervention.

To check or change the function, select P-FR, L from the configuration menu and press [P] which will reveal the existing setting which can be changed by pressing the ▲ or ▼ button followed by the [E] button to enter the selection and return to the configuration menu.

5.5.18 Local reset: LoC r5Et

The Local reset function contains two separate sub-functions rESEt.EnbL and [Lr GtEt which when enabled allow the Timer and the grand total to be reset via the instrument's front panel push buttons while the Timer is in the display mode.

5.5.19 Local total reset: r5Et.EnbL

rESEt.EnbL is a sub-function in the LoC r5Et function which when activated allows an operator to reset the Timer from the display mode by operating the ▲ and ▼ push buttons simultaneously for more than three seconds.

To check or change the local total reset select LoC r5Et in the configuration menu and press [P] which will reveal the rESEt.EnbL prompt, press [P] again to show if the local total reset is on or off. If set as required operate the [E] button twice to return to the configuration menu, or the ▲ or ▼ button to change the setting followed by the [E] button twice to enter the change and return to the LoC r5Et prompt in the configuration menu.

Note:

The Timer may also be reset remotely by connecting terminals RS1 and RS2 together for more than one second. See section 2.3

5.5.20 Local grand total reset: [Lr GtEt

The grand total is the total run-time of the Timer that may be viewed by operating the [E] and ▲ push buttons simultaneously in the display mode. When activated [Lr GtEt allows an operator to reset the grand total display to zero from the display mode by operating the [E] and ▲ push buttons simultaneously for more than ten seconds.

[Lr GtEt is a sub-function in the LoC r5Et menu. To check or change the setting select LoC r5Et in the configuration menu and press [P] which will reveal rESEt.EnbL. Using the ▼ or ▲ button select [Lr GtEt and press [P] which will show if local grand total reset is on or off. If set as required operate the [E] button twice to return to the configuration menu, or the ▼ or ▲ button to change the setting followed by the [E] button twice to enter the change and return to the LoC r5Et prompt in the configuration menu.

5.5.21 Control output 1 (optional): $\alpha P I$

Control output 1 is an optional factory fitted, galvanically isolated solid state switch contact which can be configured to turn *on* and *off* when the Timer enters specified states. When control output 1 is *on* the '1' annunciator on the Timer display is activated.

The function contains four sub-functions, $E n b L$, $\alpha P I \alpha n$, $\alpha P I \alpha f f$ and $\alpha P I d e L R$. To gain access to the sub-menu select $\alpha P I$ in the configuration menu and press P which will show the $E n b L$ prompt from which the other sub-functions can be accessed using the \blacktriangledown or \blacktriangle button.

Control output 1 may be configured to turn *on* when the Timer enters a selected Timer state and to turn *off* when the Timer enters another specified Timer state. e.g. if $r u n$ is selected in the $\alpha P I \alpha n$ sub-function and $d o n E$ is selected the $\alpha P I \alpha f f$ function. Control output 1 will turn *on* when the Timer enters the $r u n$ state and will stay *on* until the Timer enters the $d o n E$ state. Alternatively, the control output phase may be reversed by selecting the n states such as $n r E S E t$.

If control output 1 is required to be *on* in only one Timer state, this can be achieved with the following configuration.

$\alpha P I \alpha n$	state required	e.g. $r u n$
$\alpha P I \alpha f f$	n state required	e.g. $n r u n$

In this example when the Timer enters the $r u n$ state control output 1 turns *on*. When the Timer moves from the $r u n$ to any other state, control output 1 turns *off*.

The Timer configuration example in section 6.2. of this manual illustrate the use of the control outputs. Further examples can be found in Application Guide AG374 which is available on the BEKA website.

5.5.22 Control output 1 enable: $E n b L$

This function allows control output 1 to be enabled or disabled without altering any other control output parameters. To check or change the function select $E n b L$ from the control output 1 sub-menu and press P to reveal if control output 1 is *on* or *off*. The setting can be changed by pressing the \blacktriangledown or \blacktriangle button followed by the E button to return to the control output 1 output sub-menu.

5.5.23 Control output 1 on at : $\alpha P I \alpha n$

Control output 1 may be configured to turn *on* when the Timer enters in any one of the five Timer states. Alternatively, the control output 1 phase may be reversed, by selecting an n state which will cause the control output to turn *on* when the Timer enters any other than the specified Timer state. Timer states are shown in Fig 8.

To define when control output 1 turns *on* select $\alpha P I \alpha n$ from the sub-menu and press P to show the existing setting. Pressing the \blacktriangledown or \blacktriangle button will scroll through the options:

Display	Control output 1 turns on when Timer enters selected state
$r E S E t$	Reset state
$r u n$	Running state
$P R U S E d$	Paused state
$d E L R Y$	Restart delay state
$d o n E$	Complete state
	Control output 1 turns on when Timer enters any other than the selected state
$n r E S E t$	Reset state
$n r u n$	Running state
$n P R U S E d$	Paused state
$n d E L R Y$	Restart delay state
$n d o n E$	Complete state

When the required setting has been selected press E to enter the selection and return to the sub-menu.

5.5.24 Control output 1 off at: $\alpha P I \alpha FF$

Control output 1 may be configured to turn *off* when the Timer enters any one of the five Timer states. Alternatively, the phase of control output 1 may be reversed, by selecting an *n* state which will cause the control output to turn *off* when the Timer enters any other than the specified Timer state. Timer states are shown in Fig 8.

To define when control output 1 turns *off* select $\alpha P I \alpha FF$ from the sub-menu and press P to show the existing setting. Pressing the \blacktriangledown or \blacktriangle button will scroll through the options:

Display	Control output 1 turns off when Timer enters selected state
$r ESEt$	Reset state
$r un$	Running state
$PRuSEd$	Paused state
$dELAY$	Restart delay state
$donE$	Complete state
	Control output 1 turns off when Timer enters any other than the selected state
$n r ESEt$	Reset state
$n r un$	Running state
$n PRuSEd$	Paused state
$n dELAY$	Restart delay state
$n donE$	Complete state

When the required setting has been selected press E to enter the selection and return to the control output 1 sub-menu.

5.5.25 Control output 1 on delay time: $\alpha P I dELR$

Control output 1 may be delayed from turning *on* (output closed) for a fixed time following the selected condition occurring. e.g. when the Timer enters the *run* state. This delay is useful for many control applications, for example when the control output is connected to the reset terminals RS1 and RS2 to automatically reset the BA577E Timer.

The delay can be adjusted in 1 second increments up to 32,400 seconds, which is 9 hours. If a delay is not required zero should be entered. To adjust the delay select $\alpha P I dELR$ from the control output 1 sub-menu and press P which will reveal the existing delay time with one digit flashing. The flashing digit can be adjusted using the \blacktriangledown or \blacktriangle button and the P button to move to the next digit. When the required delay has been entered, press E to return to the control output 1 output sub-menu.

5.5.26 Control output 2 (optional): $\alpha P 2$

Control output 2 is an optional, galvanically isolated solid state switch contact which can be independently configured to turn *on* and *off* when the Timer is any of its five states. Its functions and configuration are identical to control output 1 described in sections 5.5.21 to 5.5.25

The control output status is shown by the '2' control output display annunciator.

5.5.27 Reset grand total from within the configuration menu: $\llcorner \llcorner \llcorner \llcorner$

The grand total is the total run-time of the Timer that may be viewed by operating the E and \blacktriangle push buttons simultaneously in the display mode.

The grand total can be reset to zero from within the configuration menu using this $\llcorner \llcorner \llcorner \llcorner$ function, or from the display mode if $\llcorner \llcorner \llcorner \llcorner$ is activated in the local grand total clear function - see 5.5.20

To zero the Timer grand total from within the configuration menu select $\llcorner \llcorner \llcorner \llcorner$ and press P which will cause the instrument to display $\llcorner \llcorner .no$ with *no* flashing. Press the \blacktriangledown or \blacktriangle push button until $\llcorner \llcorner .yE5$ is displayed and then press P which will result in a $\llcorner \llcorner \llcorner \llcorner$ prompt being displayed with the first digit flashing. This is a request for the instruction to be confirmed by entering *5urE* using the \blacktriangledown and \blacktriangle buttons to adjust the flashing digit and the P button to move control to the next digit. Pressing E will then reset the grand total to zero and return the Timer to the configuration menu.

Note: Once reset, the grand total can not be recovered.

5.5.28 Security code: Code

Access to the instrument configuration menu may be protected by a four digit alphanumeric security code which must be entered to gain access. New instruments are configured with the default security code 0000 which allows unrestricted access to all configuration functions.

To enter a new security code select Code from the configuration menu and press **P** which will cause the Timer to display 0000 with one digit flashing. The flashing digit may be adjusted using the **▲** and **▼** push button, when set as required operating the **P** button will transfer control to the next digit. When the new security code has been entered press **E** to return to the Code prompt. The revised security code will be activated when the Timer is returned to the display mode.

Please contact BEKA associates sales department if the security code is lost.

5.5.29 Reset configuration to Timer factory defaults: rSEt dEF

When the BA577E is configured as a Timer this function resets the instrument to the Timer factory defaults shown in sections 5.5

To reset the configuration select rSEt dEF from the configuration menu and press **P**. The BA577E will display 0000 with the first digit flashing which is a request to confirm the instruction by entering 5urE. Using the **▲** or **▼** button set the first flashing digit to 5 and press **P** to transfer control to the second digit which should be set to u. When 5urE has been entered pressing the **E** button will reset all the configuration functions and return the instrument to the display mode.

Note:

rSEt dEF does not reset the grand total to zero.

6. TIMER APPLICATION EXAMPLES

This section illustrates two common applications for the BA577E when configured as a Timer.

6.1 Measuring the time that a contact is closed.

In this example a BA577E is required to display the time that a process area contact is closed. The display is required in hours and minutes and is to be reset to zero by an external push button, not by the instrument front panel push buttons. The operator is required to zero the grand total by operating the **E** + **▲** buttons simultaneously. No security codes are required to protect access to the configuration menu or to the grand total reset. When power is restored after a supply interruption the Timer is to resume normal operation without manual intervention.

Figure 10 shows BA577E wiring for this example.

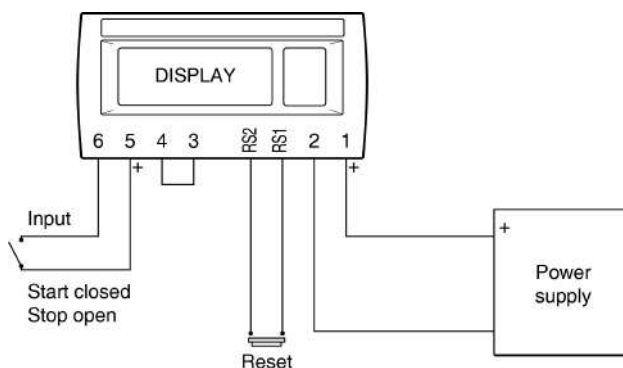


Fig 10 Wiring for displaying time a contact is closed

The required instrument configurations for this example are shown below.

Function	Display	Setting
Access code	Code	0000
Function	Function	ELAPSE
Input	Input	Contact
Terminals 3 & 4 linked to energise input		
Debounce	debounce	default
Display 2	di SP-2	off
Start stop	StartStop	Control 2
Units	units	12:00
Set time	Set t	9999:99:99
Direction of count	up or dn	up
Power fail	P-FAIL	Contact, null
Local total reset	rSEt.Enbl	off
Local grand total reset	Ctrl total	on

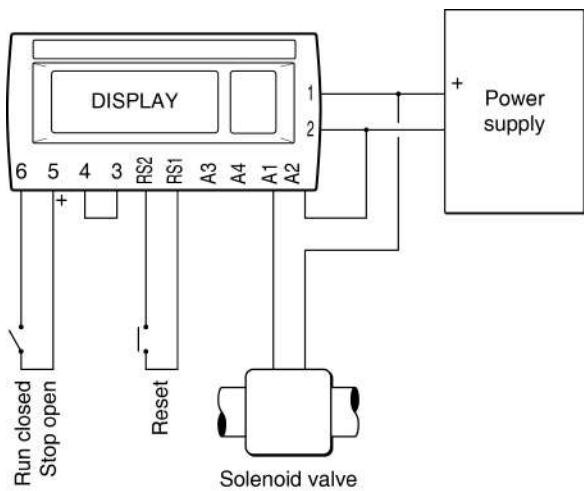
6.2 Controlling a solenoid valve

The BA577E Timer is required to open a solenoid valve for 5 minutes when an external contact is closed. 55 minutes after the valve is closed it is to be opened again for another 5 minute period. This process is to be repeated 10 times after which the Timer is to automatically reset so that is ready to start the next 10 cycles when the external contact is closed.

In this example control output 2 has been wired to the timer reset terminals and configured with a five seconds control output delay after the solenoid valve has closed for the tenth time. Therefore five seconds after the tenth cycle has been completed the system automatically resets and is ready for the next timing cycle to be initiated.

The lower display is required to show timer status at the start of each period.

After a power interruption the timer is required to resume operation from the point at which it stopped when the start button is operated.



The required instrument configuration for this example are shown below.

Function	Display	Setting
Access code	Code	0000
Function	Function	ELAPSE
Input debounce	inputTYPE	CONTACT
	debounce	DEFAULT
Display 2	di SP-2	Std
Start stop	Start stop	CONTROL 2
Units	units	12:00
Set time	Set t	00:05
Timer repeat cycle	CYCLES	
Cycle function enable	Enbl	on
Cycle count	CYCL CNT	10
Reset delay	rst DELA	00:55
Access set time from display mode.	RESET - t	OFF
Direction of count	uP or dn	uP
Power failure	P-FAIL	PRUSE
Local total reset	RESET.Enbl	on
Local grand total reset	Clr Gtot	OFF
Enable control output 1	Enbl	on
Control output 1 on at	oP1 on	run
Control output 1 off at	oP1 OFF	n run
Control output 1 delay	oP1 DELA	00000
Enable control output 2	Enbl	on
Control output 2 on at	oP2 on	done
Control output 2 off at	oP2 OFF	RESET
Control output 2 delay	oP2 DELA	000057

In this example local total reset `RESET.Enbl` is `on`. This enables the Timer to be reset when power is first connected by operating the and down button simultaneously for more than 3 seconds.

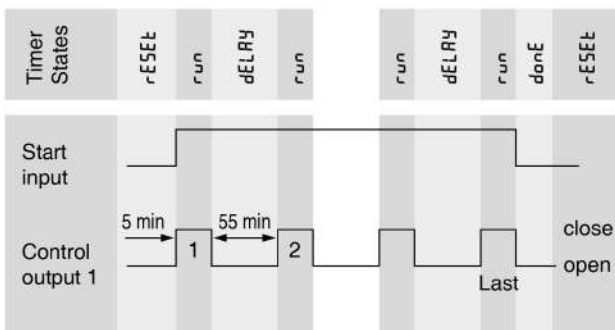




Fig 11 Control of a solenoid valve

7. MAINTENANCE when configured as a Timer

7.1 Fault finding during commissioning



If a BA577E fails to function as a Timer during commissioning the following procedure should be followed:

Symptom	Cause	Check:
No display	No power supply, or incorrect wiring. Note: Terminals 2, 6 & RS2 are interconnected within the instrument.	That there is between 10 and 30V on terminals 1 & 2 with terminal 1 positive.
Instrument configuration menu does not correspond with Timer section of this manual.	BA577E may be configured as a clock.	That <code>FUNCTION</code> in configuration menu is set to <code>ELAPSE</code> not to <code>CLK</code> .
Timer will not start.	Timer not reset	Reset timer via external contact or by operating  and  buttons simultaneously if the local total reset <code>RESET ENBL</code> has been activated.
	Set time <code>SEt t</code> has not been entered.	Enter a value for <code>SEt t</code> other than zero.
Timer will not respond to external input.	Input incorrectly configured, or sensor incorrectly connected.	Input configuration and input energising link is correctly fitted for selected sensor.
Control output(s) do not function.	Control outputs have not been enabled.	Enable Control Output(s) in the configuration menu.
Unable to enter configuration menu.	Incorrect security code	That the correct security code is being used. Contact BEKA if code is lost.

7.2 Fault finding after commissioning

ENSURE PLANT SAFETY BEFORE STARTING MAINTENANCE

If a BA577E fails after it has been functioning correctly, the following table may help to identify the cause of the failure.

Symptom	Cause	Check:
No display	No power supply	That there is between 10 and 30V on terminals 1 & 2 with terminal 1 positive.
Timer will not start.	Timer not reset	Reset timer via external contact or by operating  and  buttons simultaneously if local total reset <code>RESET ENBL</code> has been activated.
	Reset terminals RS1 & RS2 are linked which will inhibit Timer.	Remove link.
Control output(s) do not function.	Control Outputs have not been enabled.	Enable Control Output(s) in the configuration menu.
Unable to enter configuration menu.	Incorrect security code	That the correct security code is being used. Contact BEKA if code is lost.

If this procedure does not reveal the cause of the fault, it is recommended that the instrument is replaced.

Note:

If configuration changes are made to `INPUT`, `STARTSTOP`, `CYCLE5`, `UP` or `dn`, `OP1` or `OP2` functions the Timer will be forced into a fail safe `idle` condition. This stops the Timer in the state it achieves when it has timed-up to `SEt t` or timed-down to `0000`. The Timer must be reset before it can be restarted.

7.3 Servicing

We recommend that faulty BA577E Timers are returned to BEKA associates or to our local agent for repair. It is helpful if a brief description of the fault symptoms is provided.

7.4 Routine maintenance

The mechanical and electrical condition of the instrument should be regularly checked. Inspection frequency should be chosen to suit the environmental conditions.

7.5 Guarantee

Instruments which fail within the guarantee period should be returned to BEKA associates or our local agent. It is helpful if a brief description of the fault symptoms is provided.

7.6 Customer comments

BEKA is always pleased to receive comments from customers about our products and services. All communications are acknowledged and whenever possible, suggestions are implemented.

8. OPERATION AS A CLOCK

When configured as a clock the BA577E can display local time in a variety of twelve or twenty four hour formats. The displayed time can be adjusted via the front panel push buttons which may be protected by a user definable four digit security code to prevent unauthorised or accidental adjustment.

The clock may be synchronised to an external time standard via the instrument's reset terminals. When these two terminals are connected together by an external switch contact, the clock display will be reset to a preconfigured time and will resume running from this time when the contacts are opened.

When fitted with the optional galvanically isolated control outputs the clock can be configured to turn each solid state output *on* and *off* twice during each twenty four hour period.

Fig 12 shows a simplified block diagram of the BA577E configured as a clock.

The instrument can be supplied with the following factory fitted accessories:

Backlight Internally powered

Dual isolated control outputs

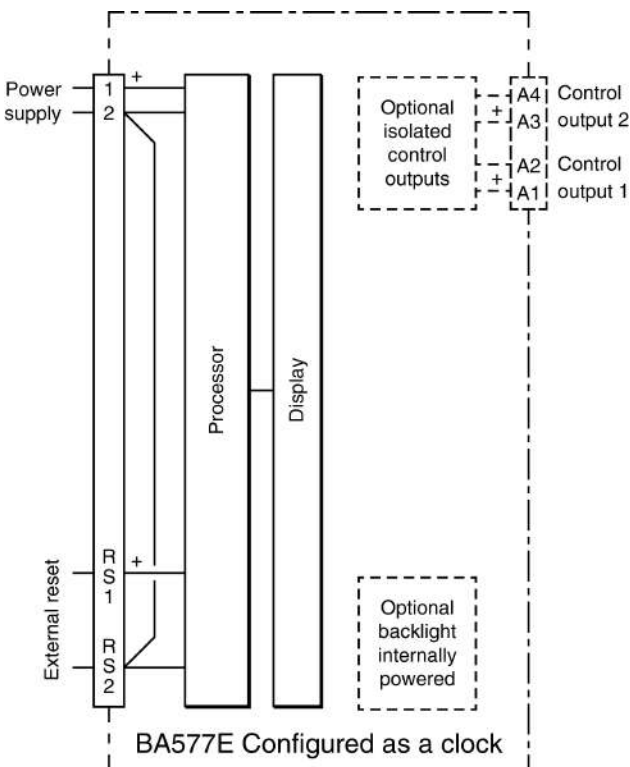


Fig 12 BA577E block diagram with clock configuration.

8.1 Initialisation and loss of power

Each time power is applied to a BA577E initialisation is performed. After a short delay the following display sequence occurs:

All segments of the display are activated

Instrument starts functioning using the configuration stored in the instrument's permanent memory.

Following initialisation, the instrument will display a flashing display which is a request for the local time to be entered. The clock will not start to function until a display time has been entered, or the remote reset contacts are closed and opened to synchronise the clock to a preconfigured time.

If during normal operation the power supply is interrupted for more than 30ms, the display will return to the flashing condition and the display time will have to be re-entered. Longer interruptions may be tolerated by powering the Clock from an instrument supply with large output capacitance.

8.2 Controls when configured as a clock

The BA577E clock is configured and adjusted via four front panel push buttons. In the display mode i.e. when the instrument is displaying time, the push button functions are:

- P** + **▼** Shows in succession, firmware version number, instrument function [L o] and output accessories that are fitted:
-R Dual Control Outputs
- P** + **E** Access to configuration menu

Note: When optional control outputs are fitted, the BA577E clock may be configured to provide direct access to the control output *on* and *off* times from the display mode when the **P** and **▲** push buttons are operated. - see section 8.4.13

8.3 Displays when configured as a clock

The BA577E clock has a single digital display plus annunciators.

- Time display** Shows time in selected 12 or 24 hour format.
- Reset annunciator** Activated while clock is being synchronised and external reset contacts are closed.
- Control output annunciators** Show status of both optional control output.

8.4 Configuration as a clock

The BA577E is configured and calibrated via four front panel push buttons. All the configuration functions are contained in an easy to use intuitive menu that is shown diagrammatically in Fig 13.

Each menu function is summarised in section 8.4.2 of this manual and each includes a reference to more detailed information.

All new BA577E instruments are supplied configured as requested at the time of ordering. If configuration is not requested, the BA577E will be supplied with default Timer configuration as shown in section 5.5.





If a BA577E Clock is requested without detailed configuration information, the instrument will be supplied with default Clock configuration as shown below, but can easily be re-configured on-site.








Default Clock Configuration

Function	Display	Default
Access code	[odE	0000
Function	Funct, on	[Lo[
Display	d, SPkRY	12:00
Synchronise time	SYN[t	R 12:00:00
Enable control output 1*	EnbL	oFF
Enable control output 2*	EnbL	oFF
Enable access alarm times from display mode.	R[SP	oFF
Access code for alarm times from display mode.	R[[d	0000



Note: * Control outputs are an option

8.4.1 Accessing configuration functions

Throughout this manual push buttons are shown as , ,  and  and legends displayed by the Clock are shown in a seven segment font as they appear on the instrument e.g. d, SPkRY and [odE.

Access to the configuration menu is obtained by operating the  and  push buttons simultaneously. If the instrument is not protected by an access security code the first parameter Funct, on will be displayed. If a security code other than the default code 0000 has already been entered, the instrument will display [odE. Press  to clear this prompt and enter the security code for the instrument using the  or  push button to adjust the flashing digit, and the  push button to transfer control to the next digit. If the correct code has been entered pressing  will cause the first parameter Funct, on to be displayed. If an incorrect code is entered, or a push button is not operated within ten seconds, the instrument will automatically return to the display mode.

All configuration functions and prompts are shown on the upper eight digit display.

Once within the main configuration menu the required function can be selected by scrolling through the menu using the  or  push buttons. The Clock configuration menu is shown diagrammatically in Fig 13.

When returning to the display mode following reconfiguration, the Clock will display dRtR followed by SRUE while the new information is stored in permanent memory.

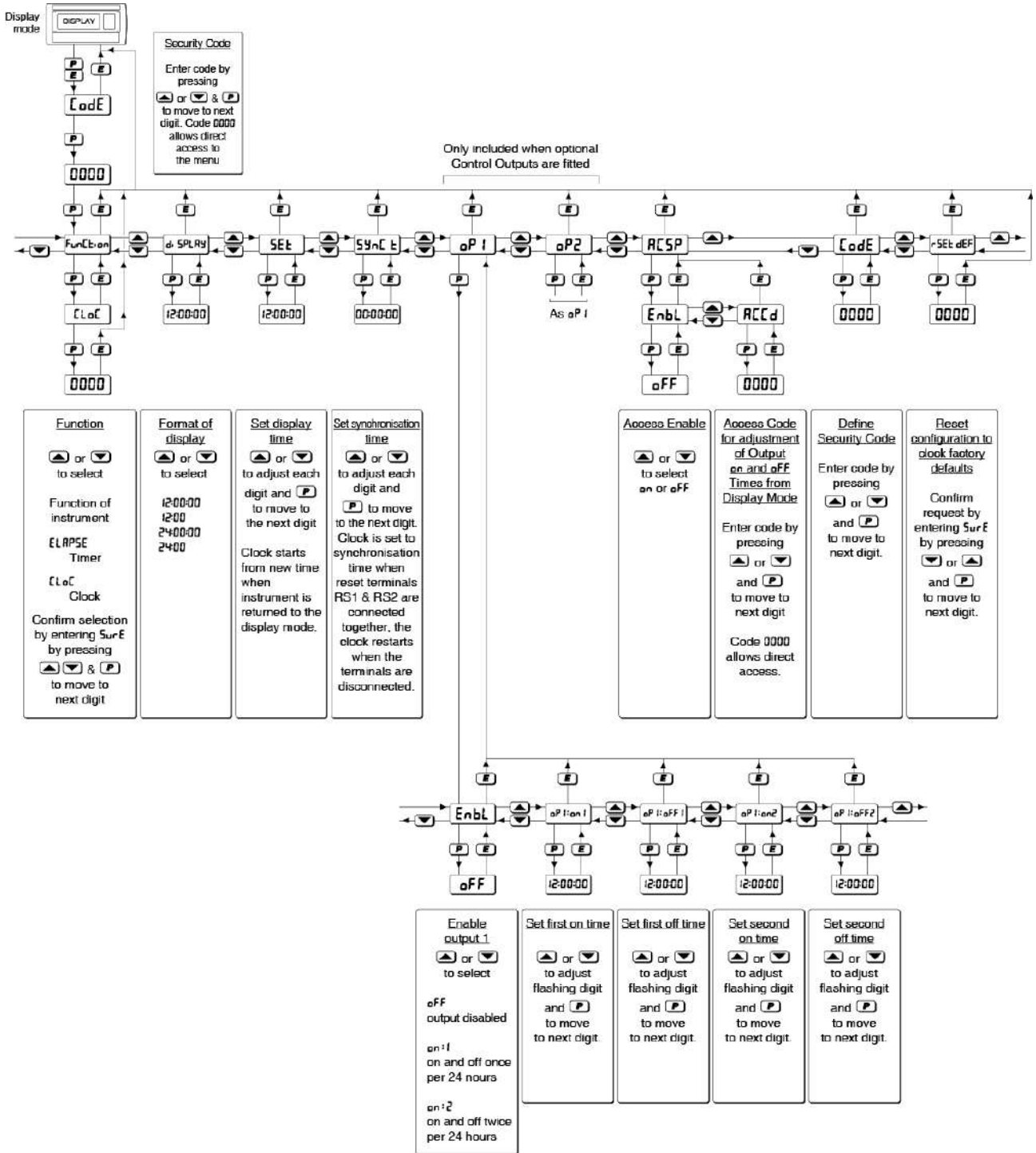


Fig 13 Clock Configuration menu

8.4.2 Summary of Clock configuration functions.

This section summarises all the Clock configuration functions. When read in conjunction with Fig 13 it provides a quick aid for configuring the Clock. If more detail is required, each section of this summary contains a reference to a full description of the function.

Display	Summary of function
Funct on	<p>Instrument function Defines the function of the instrument. May be set to:</p> <p>ELAPSE Timer CLoc Clock</p> <p>All the entries in this Clock configuration summary assume that the BA577E is configured as a Clock by selecting CLoc. See section 8.4.3</p>
d, SP LAY	<p>Display format Defines the clock display format, four alternatives are available. Select:</p> <p>12:00:00 Twelve hours with seconds 12:00 Twelve hours without seconds 24:00:00 Twenty four hours with seconds 24:00 Twenty four hours without seconds See section 8.4.4</p>
SEt	<p>Set clock display time Enables the clock displayed time to be adjusted, the clock resumes operation when the instrument is returned to the display mode. See section 8.4.5</p>
SynC t	<p>Synchronising time Defines the time to which the clock display is set when the reset terminals RS1 and RS2 are connected together. The Clock restarts from the synchronising time when terminals RS1 and RS2 are disconnected. See section 8.4.6</p>

Display	Summary of function
oP 1	<p>Control output 1 (Optional) Control output 1 can turn <i>on</i> (output closed) and <i>off</i> (output open) twice in each twenty-four hour period. This function contains five sub-function:</p> <p>EnbL Enables output 1 and defines if it turns on and off once or twice in each 24 hours.</p> <p>oP 1: on 1 Time when oP 1 turns <i>on</i> 1st time oP 1: off 1 Time when oP 1 turns <i>off</i> 1st time oP 1: on 2 Time when oP 1 turns <i>on</i> 2nd time oP 1: off 2 Time when oP 1 turns <i>off</i> 2nd time See section 8.4.7 to 8.4.9</p>
oP 2	<p>Control output 2 (Optional) As control output 1 described above. See section 8.4.10 to 8.4.12</p>
ALSP	<p>Access control output alarm-times from display mode. Contains two sub-functions, EnbL which when activated allows the control output times to be adjusted from the display mode (displaying time). The second sub-function ALCd defines a four digit alphanumeric access code which may be used to protect access to the alarm-times from the display mode. Default code 0000 disables this security feature and allows unrestricted access. See section 8.4.13</p>
Code	<p>Security code Defines a four digit alphanumeric code that may be used to protect access to the Clock configuration menu. Default code 0000 disables this security function and allows unrestricted access to all configuration functions when the [P] and [E] buttons are operated simultaneously in the display mode. See section 8.4.14</p>
rSEt dEF	<p>Reset to factory defaults Resets the BA577E to the factory default configuration shown in section 8.4 when SurE is entered to confirm the instruction. See section 8.4.15</p>

8.4.3 Instrument function: $F_{un}C_{lock}$

The BA577E may be configured as a Timer or as a Clock. This section of the instruction manual describes the Clock configuration, for details of Timer configuration see section 5.5.

To reveal the existing function of the instrument select $F_{un}C_{lock}$ from the configuration menu and press \mathbf{P} . If C_{lock} is displayed, the instrument is already configured as a Clock therefore press \mathbf{E} to return to the $F_{un}C_{lock}$ prompt in the configuration menu. If $ELAPSE$ is displayed, press the \blacktriangle or \blacktriangledown button to change the setting to C_{lock} followed by the \mathbf{P} button which will result in a 0000 prompt being displayed with the first digit flashing. This is a request for the instruction to be confirmed by entering $5_{ur}E$ using the \blacktriangle or \blacktriangledown button to adjust the flashing digit and the \mathbf{P} button to move control to the next digit. When $5_{ur}E$ has been entered, pressing \mathbf{E} will change the instrument to a Clock and return the instrument to the display mode. To configure the Clock enter the configuration menu by pressing the \mathbf{P} and \mathbf{E} buttons simultaneously until $F_{un}C_{lock}$ is displayed.

8.4.4 Display format: d_{isplay}

The BA577E Clock may be configured to display time in a 12 or 24 hour format with or without seconds. When a 12 hour format is selected, AM is denoted by an R prefix at the left hand side of the display, similarly a P is displayed to denote PM.

To check or change the display format of the clock, select d_{isplay} from the configuration menu and press \mathbf{P} which will reveal the existing setting which can be changed by pressing the \blacktriangle or \blacktriangledown button followed by the \mathbf{E} button to enter the selection and return to the configuration menu. The options available are shown below:

$12:00:00$	Twelve hour format with seconds
$12:00$	Twelve hour format without seconds
$24:00:00$	Twenty four hour format with seconds
$24:00$	Twenty four hour format without seconds

8.4.5 Set clock display time: $5E_{t}$

This function sets the time displayed by the Clock which must be entered each time the BA577E Clock is powered. Until a set time is entered the Clock will display a flashing $00:00:00$ or $00:00$ for 24 hour formats, or $R 12:00:00$ or $R 12:00$ for 12 hour formats.

To adjust the clock set time, select $5E_{t}$ from the configuration menu and press \mathbf{P} that will show $00:00:00$ or the existing set time with the hours flashing. When setting the clock display time seconds are always shown.

Using the \blacktriangle or \blacktriangledown button adjust the flashing hours and then press \mathbf{P} to transfer control to the minutes display, pressing \mathbf{P} again will transfer control to the seconds display. When the clock display time has been adjusted press \mathbf{E} to start the Clock and return to the $5E_{t}$ prompt in the configuration menu.

8.4.6 Enter synchronising time: $5_{yn}C_{t}$

When the external reset terminals RS1 and RS2 are connected together the clock is stopped and the displayed time is set to the synchronising time. When the connection between the reset terminals is removed, the clock restarts from the synchronising time. This function enables the BA577E clock to be synchronised with a master clock.

To enter the synchronising time, select $5_{yn}C_{t}$ from the configuration menu and press \mathbf{P} which will reveal the existing synchronising time with the hours flashing. Using the \blacktriangle or \blacktriangledown button adjust the hours and then press \mathbf{P} to transfer control to the minutes display, pressing \mathbf{P} again will transfer control to the seconds display. When the synchronising time has been set as required, press \mathbf{E} to return to the configuration menu.

8.4.7 Control output 1 (Optional): oP_{1}

Control output 1 is an optional factory fitted galvanically isolated solid state switch contact output which can be configured to turn *on* (output closed) and *off* (output open) twice in each twenty-four hour period. The control output status is shown by the '1' control output display annunciator.

Function oP_{1} contains a sub-menu with five sub-functions:

E_{nbl}	Number of times output 1 turns <i>on</i> & <i>off</i> in 24 hours.
$oP_{1}:o_{n}1$	First time oP_{1} turns <i>on</i> (closes)
$oP_{1}:o_{FF}1$	First time oP_{1} turns <i>off</i> (opens)
$oP_{1}:o_{n}2$	Second time oP_{1} turns <i>on</i> (closes)
$oP_{1}:o_{FF}2$	Second time oP_{1} turns <i>off</i> (opens)

To check or change the function of Control output 1 select oP_{1} from the configuration menu and press \mathbf{P} which will reveal the first sub-function E_{nbl} .

8.4.8 Enable Control output 1: E_{nbL}

This is a sub-function in the Control output 1 function $\alpha P 1$ which allows output 1 to be enabled or disabled without changing any of the *on* or *off* times and also determines whether output 1 turns *on* and *off* once or twice in each twenty four hour period.

Select $\alpha P 1$ in the configuration menu and press P which will result in the E_{nbL} prompt being displayed. Pressing P again will enter the sub-function from which one of the three options may be selected using the \blacktriangle or \blacktriangledown button:

Display	Control output 1
αFF	Control output 1 disabled
$\alpha n : 1$	Turns <i>on</i> & <i>off</i> once per 24 hours
$\alpha n : 2$	Turns <i>on</i> & <i>off</i> twice per 24 hours

When the required option is displayed operating E will enter the selection and return to the E_{nbL} prompt from which another sub-function may be selected if control output 1 has not been disabled.

8.4.9 On and off times: $\alpha P 1 : \alpha n 1$; $\alpha P 1 : \alpha FF 1$ $\alpha P 1 : \alpha n 2$; $\alpha P 1 : \alpha FF 2$

The control output will have one or two *on* and *off* times depending upon whether control output 1 has been configured to turn *on* and *off* once or twice in each 24 hour period. - see 8.4.8.

All of the times are adjusted in the same way. To adjust any of them select $\alpha P 1$ from the configuration menu and press P which will result in the E_{nbL} prompt being displayed. The \blacktriangle or \blacktriangledown button will scroll through the sub-functions. Only $\alpha P 1 : \alpha n 1$ and $\alpha P 1 : \alpha FF 1$ will be present if control output 1 has been configured to switch *on* and *off* once in a 24 hour period in the E_{nbL} sub-function.

Select the required sub-function

$\alpha P 1 : \alpha n 1$	Time $\alpha P 1$ turns <i>on</i> first time
$\alpha P 1 : \alpha FF 1$	Time $\alpha P 1$ turns <i>off</i> first time
$\alpha P 1 : \alpha n 2$	Time $\alpha P 1$ turns <i>on</i> second time
$\alpha P 1 : \alpha FF 2$	Time $\alpha P 1$ turns <i>off</i> second time

When selected, pressing P will show the existing time with the hours flashing. Using the \blacktriangle or \blacktriangledown button adjust the hours and then press P to transfer control to the minutes display, pressing P again will transfer control to the seconds display. When the time has been set as required press E to return to the sub-menu from which another *on* / *off* time may be selected for adjustment. When all the *on* / *off* times have been entered, return to the configuration menu by pressing the E button twice.

8.4.10 Control output 2 (Optional): $\alpha P 2$

Control output 2 is an optional factory fitted output which can be configured to turn *on* (output closed) and *off* (output open) twice in each twenty-four hour period. The control output status is shown by the '2' control output display annunciator.

Function $\alpha P 2$ contains a sub-menu with five sub-functions:

E_{nbL}	Number of times output 2 turns <i>on</i> & <i>off</i> in 24 hours.
$\alpha P 2 : \alpha n 1$	First time when $\alpha P 2$ turns <i>on</i> (closes)
$\alpha P 2 : \alpha FF 1$	First time when $\alpha P 2$ turns <i>off</i> (opens)
$\alpha P 2 : \alpha n 2$	Second time when $\alpha P 2$ turns <i>on</i> (closes)
$\alpha P 2 : \alpha FF 2$	Second time when $\alpha P 2$ turns <i>off</i> (opens)

To check or change the function of Control output 2 select $\alpha P 2$ from the configuration menu and press P which will reveal the first sub-function E_{nbL} .

8.4.11 Enable control output 2: E_{nbL}

This is a sub-function in the Control output 2 function $\alpha P 2$ which allows output 2 to be enabled or disabled without changing any of the *on* or *off* times and also determines whether output 2 turns *on* and *off* once or twice in each twenty four hour period. Select $\alpha P 2$ in the configuration menu and press P which will result in the E_{nbL} prompt being displayed. Pressing P again will enter the sub-function from which one of the three options may be selected using the \blacktriangle or \blacktriangledown button:

Display	Control output 2
αFF	Control output 2 disabled
$\alpha n : 1$	Turns <i>on</i> & <i>off</i> once per 24 hours
$\alpha n : 2$	Turns <i>on</i> & <i>off</i> twice per 24 hours

When the required option is displayed operating E will enter the selection and return to the E_{nbL} prompt from which another sub-function may be selected if control output 2 has not been disabled.

8.4.12 On and off times: $\alpha P 2 : \alpha n 1$; $\alpha P 2 : \alpha FF 1$ $\alpha P 2 : \alpha n 2$; $\alpha P 2 : \alpha FF 2$

The control output will have one or two *on* and *off* times depending upon whether control output 2 has been configured to turn *on* and *off* once or twice in each 24 hour period. - see 8.4.11.

All of the times are adjusted in the same way. To adjust any of them select $\alpha P 2$ from the configuration menu and press P which will result in the E_{nbL} prompt being displayed. The \blacktriangle or \blacktriangledown button will scroll through the sub-functions. Only $\alpha P 2 : \alpha n 1$ and $\alpha P 2 : \alpha FF 1$ will be present if control output 2 has been configured to switch *on* and *off* once in a 24 hour period in the E_{nbL} sub-function.

Select the required sub-function

oP2:on 1	Time oP2 turns <i>on</i> first time
oP2:off 1	Time oP2 turns <i>off</i> first time
oP2:on 2	Time oP2 turns <i>on</i> second time
oP2:off 2	Time oP2 turns <i>off</i> second time

When selected pressing **[P]** will show the existing time with the hours flashing. Using the **[▲]** or **[▼]** button adjust the hours and then press **[P]** to transfer control to the minutes display, pressing **[P]** again will transfer control to the seconds display. When the time has been set as required press **[E]** to return to the sub-menu from which another *on / off* time may be selected for adjustment. When all the *on / off* times have been entered, return to the configuration menu by pressing the **[E]** button twice.

8.4.13 Access control output *on* & *off* times from display mode: **RC5P**

This function activates a separate menu that provides direct access to the control output's *on* and *off* times when the Clock is the display mode (displaying time). An operator may therefore adjust the *on* and *off* times without having access to the instrument configuration menu. Further protection is provided by a separate security code. When this function is enabled the *on* and *off* times of the two control outputs may be adjusted from the display mode by simultaneously operating the **[P]** and **[▲]** push buttons. The function contains two sub-functions, **EnbL** which activates the function and **RCd** which defines a separate access code that may be used to prevent the *on* and *off* times being accidentally adjusted from the display mode.

To check or change the function, select **RC5P** in the configuration menu and press **[P]** which will reveal the **EnbL** prompt, pressing **[P]** again will show if the function is *on* or *off*. If adjustment of the control output times from the display mode is not required press the **[▲]** or **[▼]** button to select *off* and then press **[E]** twice to return to the configuration menu. If the function is required, select *on* and press **[E]** to return to the **EnbL** prompt from which **RCd**, which allows a separate access code to be entered, can be selected by pressing the **[▲]** or **[▼]** button.

Access to the control output times from the display mode may be protected by a four digit alphanumeric security code which must be entered to gain access. Default security code **0000** allows unrestricted access. With **RCd** displayed, press **[P]** to enter a new access code. The BA577E Clock will display **0000** with one digit flashing. The flashing digit may be adjusted using the **[▲]** or **[▼]** push button, when set as required operating the **[P]** button will transfer control to the next digit. When all the digits have been adjusted press **[E]** twice to return to the **RC5P** prompt in the configuration menu. The revised security code will be activated when the BA577E is returned to the display mode.

8.4.14 Security code: **LoDE**

Access to the instrument's configuration menu may be protected by a four digit alphanumeric security code which must be entered to gain access. New instruments are configured with the default security code **0000** which allows unrestricted access to all configuration functions.

To enter a new security code select **LoDE** from the configuration menu and press **[P]** which will cause the Clock to display **0000** with one digit flashing. The flashing digit may be adjusted using the **[▲]** and **[▼]** push button, when set as required operating the **[P]** button will transfer control to the next digit. When all the digits have been adjusted press **[E]** to return to the **LoDE** prompt. The revised security code will be activated when the Clock is returned to the display mode.

Please contact BEKA associates sales department if the security code is lost.

8.4.15 Reset configuration to Clock factory defaults: **r5Et dEF**

When the BA577E is configured as a Clock, this function resets the configuration to the Clock factory defaults shown in sections 8.4 of this manual.

To reset the instrument configuration select **r5Et dEF** from the configuration menu and press **[P]**. The Clock will display **0000** with the first digit flashing which is a request to confirm the instruction by entering **5urE**. Using the **[▲]** or **[▼]** button set the first flashing digit to 5 and press **[P]** to transfer control to the second digit which should be set to **u**. When **5urE** has been entered pressing the **[E]** button will reset all the configuration functions to the factory defaults and return the instrument to the display mode as a Clock with default configuration.

9. CLOCK CONFIGURATION EXAMPLE

In this example a BA577E is required to function as a Clock. Time is to be displayed in a 24 hour format including seconds. For external synchronisation the displayed time is required to change to 12:00:00 when the external reset terminals are connected together.

Both control outputs are required to close and open once in each 24 hour period. Control output 1 (OP1) is to turn *on* (close) at 07:30:00 and *off* (open) at 09:30:00, control output 2 (OP2) is to turn *on* (close) at 18:00:00 and *off* (open) at 22:30:00.

For this application the operator needs to adjust the control output *on* and *off* times from the display mode via an access code of 1111. To prevent tampering the instrument configuration menu is to be protected by security code of 1209

9.1 Configuration procedure

The BA577E may be configured as a Clock on-site without disconnection from external wiring.

Step 1 Enter the configuration menu

Enter the configuration menu by simultaneously pressing **P** and **E**. Assuming a security code has not already been entered the instrument will respond by displaying *Funct, on* which is the first item in the configuration menu. See Fig 13.

Step 2 Configure instrument as a Clock

With *Funct, on* displayed press **P** to reveal the existing function of the instrument. If *ELC* is displayed no change is required, therefore return to the *Funct, on* prompt by pressing the **E** button.

If *ELRPE* is displayed, press the **▲** or **▼** button to change the setting to *ELC* followed by the **P** button which will result in a *0000* prompt being displayed with the first digit flashing. This is a request for the instruction to be confirmed by entering *SurE* using the **▼** and **▲** buttons to adjust the flashing digit and the **P** button to move control to the next digit. Pressing **E** will then change the instrument to a Clock and return the display to *Funct, on* in the configuration menu.

Step 3 Select display format

Using the **▲** or **▼** button select *d, SPLY* in the configuration menu and press **P** which will reveal the current display format. Using the **▲** or **▼** button select *24:00:00* which is the required 24 hour format with seconds and press **E** to enter the selection and return to the configuration menu.

See 8.4.4

Step 4 Enter the synchronisation time

Using the **▲** or **▼** button select *SynC t* in the configuration menu and press **P** to reveal the current synchronisation time with the hours flashing. Using the **▲** or **▼** push button adjust the hours to 12 and press **P** to transfer control to the minutes. Using the **▲** or **▼** push button adjust the minutes to 00 and press **P** to transfer control to the seconds which should be adjusted to 00, in the same way. When the seconds are set enter the selection and return to the *SynC t* prompt in the configuration menu by pressing the **E** button.

See 8.4.6

Step 5 Enable control output 1 and enter the *on* and *off* times.

Using the **▲** or **▼** button select *OP1* in the configuration menu and press **P** to reveal the *EnbL* prompt in the control output 1 sub-menu.

In this application control output 1 is required to turn *on* and *off* once every 24 hours. With *EnbL* displayed press **P** and using the **▲** or **▼** button select *on t* followed by the **E** button to return to the *EnbL* prompt.

The control output *on* time should now be entered by selecting *OP1: on t* in the control output 1 sub-menu using the **▲** or **▼** button. Pressing **P** will reveal the existing *on* time which should be adjusted to 07:30:00 using the **▲** or **▼** button and the **P** button to transfer control to the following digits. When entered return to the *OP1: on t* prompt by pressing the **E** button.

The *off* time should now be entered by selecting *OP1: off t* from the sub-menu and adjusting the time to 09:30:00. Finally press **E** to return to the *OP1: off t* prompt in the sub-menu and press **E** again to return to *OP1* in the configuration menu.

Step 6 Enable control output 2 and enter the on and off times.

Using the \blacktriangle or \blacktriangledown button select OP2 in the configuration menu and press P to reveal the ENBL prompt in the control output 2 sub-menu. Follow the procedure described in step 5 above, but set control output 2 to turn on at $18:00:00$ and off at $22:30:00$.

Step 7 Allow control output times to be adjusted from the display mode & enter separate security code.

Using the \blacktriangle or \blacktriangledown button select RESP in the configuration menu and press P to reveal the ENBL prompt, pressing P again will show if this function is on or off. Using the \blacktriangle or \blacktriangledown button select on followed by E to return to the ENBL prompt. A separate security code which must be entered to gain access to the Control Output times in the operating mode, is entered in the REED function which may be selected by operating the \blacktriangle or \blacktriangledown button once. Pressing E will reveal the existing access code with one digit flashing. This should be changed to the required code of 1111 by adjusting the flashing digit using the \blacktriangle or \blacktriangledown button and the P button to transfer control to the next digit. When 1111 has been entered press E twice to return to the configuration menu.

Step 8 Define the configuration menu security code.

Defining a security code prevents unauthorised access to the configuration menu. Using the \blacktriangledown or \blacktriangle button select CODE from the configuration menu and press P which will reveal 0000 with the first digit flashing. This example requires the security code to be 1209. Using the \blacktriangledown and \blacktriangle buttons set the flashing digit to 1 and press P to transfer control to the second digit. When all have been entered press E to return to the main configuration menu.

See 8.4.14.

Step 9 Return to the display mode

The BA577E is now configured as required for this example. Pressing the E button will save the configuration and return the BA577E to the display mode with all the digits flashing indicating that the set time has to be entered.

Step 10 Enter the set time

Finally the current time to be displayed by the Clock should be entered. Re-enter the configuration menu by pressing the P and E buttons simultaneously which will result in CODE being displayed. Pressing P will allow the access code 1209 to be entered using the \blacktriangledown or \blacktriangle button to adjust the flashing digit and the P button to transfer control to the next digit. When all four digits have been adjusted press P to enter the configuration menu and using the \blacktriangledown or \blacktriangle button select SET and press E to reveal $00:00:00$ with the hours flashing. Using the \blacktriangledown or \blacktriangle button adjust the flashing hours digit and press P to transfer control to the minutes and then to the seconds. When all have been set as required, press E to start the clock from the entered time and return to the display mode.

10. MAINTENANCE when configured as a Clock

10.1 Fault finding during commissioning

If a BA577E fails to function as a Clock during commissioning the following procedure should be followed:

Symptom	Cause	Check:
No display	No power supply, or incorrect wiring. Note: Terminals 2 & RS2 are interconnected within the instrument.	That there is between 10 and 30V on terminals 1 & 2 with terminal 1 positive. That there are no connections to terminals 3, 4, 5 & 6.
Configuration menu does not correspond with the Clock section of this manual.	BA577E is configured as a Timer.	That Function in configuration menu is set to CLC not to ELRP5E .
Clock display flashes 00:00:00	Local time has not been entered.	Enter the local time in the 5E4 function of the instrument configuration menu.
Control output(s) do not function.	Control outputs have not been enabled.	Enable Control Output(s) in the configuration menu.
Clock will not start	Reset terminals RS1 and RS2 are connected together and the clock is resetting.	If reset annunciator on the instrument display is activated, disconnect link between RS1 and RS2.
Unable to enter configuration menu.	Incorrect security code	That the correct security code is being used. Contact BEKA if code is lost.

10.2 Fault finding after commissioning

ENSURE PLANT SAFETY BEFORE STARTING MAINTENANCE

If a BA577E fails after it has been functioning correctly as a Clock, the following table may help to identify the cause of the failure.

Symptom	Cause	Check:
No display	No power supply	That there is between 10 and 30V on terminals 1 & 2 with terminal 1 positive.
Clock display flashes 00:00:00	Instrument power supply has been interrupted and local time has been lost.	Enter the local time in the 5E4 function of the instrument configuration menu.
Control output(s) do not function.	Control outputs have not been enabled.	Enable Control Output(s) in the configuration menu.
Clock will not start	Reset terminals RS1 and RS2 are connected together and the clock is resetting.	If reset annunciator on display is activated, disconnect connection between RS1 and RS2.
Unable to enter configuration menu.	Incorrect security code	That the correct security code is being used. Contact BEKA if code is lost.

If this procedure does not reveal the cause of the fault, it is recommended that the instrument is replaced.

10.3 Servicing

We recommend that faulty BA577E Clocks are returned to BEKA associates or to our local agent for repair.

10.4 Routine maintenance

The mechanical and electrical condition of the instrument should be regularly checked. Inspection frequency should be chosen to suit the environmental conditions.

10.5 Guarantee

Instruments which fail within the guarantee period should be returned to BEKA associates or our local agent. It is helpful if a brief description of the fault symptoms is provided.

10.6 Customer comments

BEKA is always pleased to receive comments from customers about our products and services. All communications are acknowledged and whenever possible, suggestions are implemented.