C1900
Circular chart recorder/controller

Multi-recipe profile controller versions

Measurement made easy

For more information
Further publications are available for free download from:
www.abb.com/recorders
or by scanning this code:

<table>
<thead>
<tr>
<th>Search for or click on</th>
<th>Data Sheet C1900 Circular chart recorder/controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS/C1900RC-EN</td>
<td></td>
</tr>
<tr>
<td>Quick Reference Guide</td>
<td>C1900 Circular chart recorder/controller</td>
</tr>
<tr>
<td>IM/C1900-QC</td>
<td></td>
</tr>
<tr>
<td>Installation Guide</td>
<td>C1900 Circular chart recorder and recorder/controller</td>
</tr>
<tr>
<td>IM/C1900-INS</td>
<td></td>
</tr>
<tr>
<td>Operating Guide</td>
<td>C1900 Circular chart recorder/controller</td>
</tr>
<tr>
<td>IM/C1900-OGC</td>
<td></td>
</tr>
<tr>
<td>Programming Guide</td>
<td>C1900 Circular chart recorder/controller</td>
</tr>
<tr>
<td>IM/C1900-PGC</td>
<td></td>
</tr>
<tr>
<td>Operating Instructions</td>
<td>C1900 Circular chart recorder and recorder/controller</td>
</tr>
<tr>
<td>IM/C1900-MOD</td>
<td></td>
</tr>
</tbody>
</table>
Electrical safety

This equipment complies with the requirements of CEI/IEC 61010-1:2001-2 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use'. If the equipment is used in a manner NOT specified by the Company, the protection provided by the equipment may be impaired.

Symbols

One or more of the following symbols may appear on the equipment labelling:

- **Warning** – refer to the manual for instructions
- **Caution** – risk of electric shock
- Protective earth (ground) terminal
- Earth (ground) terminal
- Direct current supply only
- Alternating current supply only
- Both direct and alternating current supply
- The equipment is protected through double insulation

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of the Technical Publications Department.

Health and safety

To ensure that our products are safe and without risk to health, the following points must be noted:

- The relevant sections of these instructions must be read carefully before proceeding.
- Warning labels on containers and packages must be observed.
- Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
- Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.
- Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
- When disposing of chemicals ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual or any relevant hazard data sheets (where applicable) may be obtained from the Company address on the back cover, together with servicing and spares information.
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 INTRODUCTION</td>
<td>2</td>
</tr>
<tr>
<td>1.1 Multi-recipe Profile Control Models</td>
<td>2</td>
</tr>
<tr>
<td>1.1.1 Type K Retort Controller Models</td>
<td>2</td>
</tr>
<tr>
<td>1.1.2 Type L Advanced Profile Control Models</td>
<td>2</td>
</tr>
<tr>
<td>2 DISPLAYS AND CONTROLS</td>
<td>3</td>
</tr>
<tr>
<td>2.1 Type K Instrument Displays and LED Indicators</td>
<td>3</td>
</tr>
<tr>
<td>2.2 Type L Instrument Displays and LED Indicators</td>
<td>3</td>
</tr>
<tr>
<td>2.3 Faceplate Combinations and Product Codes</td>
<td>4</td>
</tr>
<tr>
<td>3 ELECTRICAL INSTALLATION</td>
<td>5</td>
</tr>
<tr>
<td>3.1 Identifying the Input/Output Modules</td>
<td>5</td>
</tr>
<tr>
<td>(and accessing the Configuration Levels)</td>
<td>5</td>
</tr>
<tr>
<td>3.2 Standard Connections</td>
<td>5</td>
</tr>
<tr>
<td>4 CONTROL CONFIGURATION LEVEL</td>
<td>6</td>
</tr>
<tr>
<td>4.1 Control Configuration Level</td>
<td>6</td>
</tr>
<tr>
<td>4.2 Introduction to Ramp/Soak Profile Control</td>
<td>7</td>
</tr>
<tr>
<td>4.2.1 Program Configurations</td>
<td>7</td>
</tr>
<tr>
<td>4.2.2 Guaranteed Ramp/Soak</td>
<td>8</td>
</tr>
<tr>
<td>4.2.3 Power Recovery Function</td>
<td>8</td>
</tr>
<tr>
<td>4.2.4 Self-seeking Set Point</td>
<td>9</td>
</tr>
<tr>
<td>4.2.5 Retort Function</td>
<td>9</td>
</tr>
<tr>
<td>4.2.6 Time Events</td>
<td>10</td>
</tr>
<tr>
<td>4.2.7 Profile Start and End States</td>
<td>10</td>
</tr>
<tr>
<td>4.3 Soak Adjustment – Type K Instruments</td>
<td>10</td>
</tr>
<tr>
<td>4.3.1 Cook Segment Soak Adjustment</td>
<td>10</td>
</tr>
<tr>
<td>4.3.2 Current Segment Soak Time Adjustment</td>
<td>11</td>
</tr>
<tr>
<td>4.4 Soak Adjustment – L Type Instruments</td>
<td>12</td>
</tr>
<tr>
<td>4.4.1 Current Segment Soak Time Adjustment</td>
<td>12</td>
</tr>
<tr>
<td>4.5 Ramp/Soak Profile Control</td>
<td>13</td>
</tr>
<tr>
<td>4.6 Ramp/Soak Profile Program</td>
<td>17</td>
</tr>
<tr>
<td>5 ADVANCED CONFIGURATION LEVEL</td>
<td>20</td>
</tr>
<tr>
<td>5.1 Advanced Configuration Level</td>
<td>20</td>
</tr>
<tr>
<td>5.2 Timer</td>
<td>21</td>
</tr>
<tr>
<td>5.2.1 Set Up Timer</td>
<td>21</td>
</tr>
<tr>
<td>5.2.2 Set Up Clock</td>
<td>24</td>
</tr>
</tbody>
</table>
The COMMANDER 1960 Series documentation is shown in Fig. 1.1. This supplement provides additional information for Ramp/Soak Control and details four Profile Control variants within the COMMANDER 1900 range. It must be read in conjunction with the standard COMMANDER 1900 Controller documentation.

1.1 Multi-recipe Profile Control Models

The COMMANDER 1960 Profile Controller is a development of the COMMANDER 1900, incorporating advanced Ramp/Soak profiling capabilities.

There are four models in the series:
- 1961R single pen, single loop ramp/soak control
- 1962R two pen, single loop ramp/soak control
- 1963R three pen, single loop ramp/soak control
- 1964R two pen, dual loop ramp/soak control

Each model is available with a choice of software providing additional specialized features.

1.1.1 Type K Retort Controller Models

- Front panel adjustment of principal soak temperature and soak time.
- Continuous display of principal soak temperature, soak time and current segment number.
- LED indication of whether ramp or soak is being performed.
- LED indication of profile status.
- 6 time-event states common to all segments.
- Guaranteed ramp/soak by segment.

1.1.2 Type L Advanced Profile Control Models

- Front panel adjustment of the current soak time.
- Continuous display of level (soak segments) or target set point (ramping segments).
- Continuous display of time remaining in current segment.
- Continuous display of current segment number.
- LED indication of whether ramp or soak is being performed.
- LED indication of profile status.
- 6 time-event states common to all segments.
- Guaranteed ramp/soak by segment.
2 DISPLAYS AND CONTROLS

2.1 Type K Instrument
Displays and LED Indicators – Fig. 2.1 and 2.2

Controller Faceplate

Displays (refer to IM/C1900–OGC, Section 3)

LED Indicators

Bar Graph Display

Controls (refer to IM/C1900–OGC, Section 3 for functions)

Ramp/Soak Control Faceplate

Soak level of cook segment

Time remaining in cook segment

Current segment

Status LEDs – show whether a ramp or a soak is being performed (Flashing under fault conditions)

LED Indicators – show the current status of the profile i.e running, on hold or stopped

Controls – Refer to Fig. 2.2 for functions

Fig. 2.1 Controls and LEDs – Type K

Note. If the profile is stopped, the display shows a series of dashes.

2.2 Type L Instrument
Displays and LED Indicators – Fig. 2.3 and 2.4

Controller Faceplate

Displays (refer to IM/C1900–OGC, Section 3)

LED Indicators

Bar Graph Display

Controls (refer to IM/C1900–OGC, Section 3 for functions)

Ramp/Soak Control Faceplate

Level or target setpoint of current segment (i.e end of ramp/soak level)

Time remaining in current segment

Current segment

Status LEDs – show whether a ramp or a soak is being performed (Flashing under fault conditions)

LED Indicators – show the current status of the profile i.e running, on hold or stopped

Controls – Refer to Fig. 2.4 for functions

Fig. 2.4 Switch Functions – Type L

Fig. 2.3 Switch Functions – Type L

RUN Start the profile running

HOLD Hold (pause) the profile

STOP Stop and reset the profile

▲ Increment soak time/soak level

▼ Decrement soak time/soak level

Select between soak level and soak time adjustment
2.3 Faceplate Combinations and Product Codes – Fig. 2.5

Model 1961R derived from the C1911R single pen, single loop ramp/soak control

Model 1962R derived from the C1912R two pen, single loop ramp/soak control

Model 1963R derived from the C1913R three pen, single loop ramp/soak control

Model 1964R derived from the C1922R two pen, dual loop ramp/soak control

Note. On the C1964R both loops of control have enhanced guaranteed ramp soak software and advanced time event software but the additional Ramp/Soak Control faceplate applies only to channel 1.

Fig. 2.5 Faceplate Combinations and Product Codes
3 ELECTRICAL INSTALLATION

3.1 Identifying the Input/Output Modules (and accessing the Configuration Levels) – Fig. 3.1

To allow access to the Configuration Levels, move link 3 to the lower position
To prevent access to the Configuration Levels, move link 3 to the upper position

Note. When the chart plate is closed it can be sealed to prevent access to LK3.

Fig. 3.1 Identifying the Input/Output Modules

3.2 Standard Connections
Refer to IM/C1900-INS, Section 4.2 for input connections.
4 CONTROL CONFIGURATION LEVEL

4.1 Control Configuration Level – Fig. 4.1

The general content of the Control Configuration Level is detailed in *IM/C1900-PGC, Section 3*. Any changed or additional frames are detailed in Sections 4.5 and 4.6 of this manual.

---

**Fig. 4.1 Control Configuration Level**
4.2 Introduction to Ramp/Soak Profile Control

Information.
- 10 programs per control channel.
- Digital State program selection – allows digital inputs to select program to be run.
- 99 programmable segments – can be shared between programs and controllers – see Fig. 4.2.
- Programmable time units – can be programmed in hours or minutes.
- Program repeat – 0 to 99 times or continuously.
- Program holdback hysteresis – separate settings for ramping segments and soak segments.
  - can be applied above, below or above and below the set point.
- 6 types of ramp/soak generated events – segment active event, program active event, end of program event, holdback event, hold active event and time events.
- 6 ramp/soak commands – can be selected from the front panel or via digital signals to run/hold programs, reset programs, skip forward to next segment, skip backwards to beginning of segment, increase soak time or decrease soak time (refer to Figs. 4.7 to 4.10 for ramp/soak adjust example).
- 6 time event states – common to each segment
- Self-seeking set point function – avoids unnecessary delays when a program is started – see Fig. 4.4.
- Retort function – ensures safe operation under fault conditions – see Fig. 4.5.
- Power recovery function – determines ramp/soak profile restart position.
- End of Profile State – latched ‘ON’ until reset

The Ramp/Soak option is a set point profile generator which controls the Local set point and can be used with any type of control process for more complex control. A Profile Program is made up of Ramps (the set point is increased or decreased at a linear rate until it reaches the desired value) and Soaks (the set point is maintained at a fixed value for a set time duration).

4.2.1 Program Configurations – Fig. 4.2
There are 99 segments that can be shared between programs and control channels. For normal applications it is recommended that segments 1 to 50 are assigned to channel 1 and segments 51 to 99 are assigned to channel 2. Fig. 4.2 shows 8 segments, shared between two separate programs on channel 1.
4.2.2 Guaranteed Ramp/Soak

If the process variable deviates from the set point by more than the hysteresis value, the program status is set to ‘H-HOLD’ and Guaranteed ramp/soak is applied automatically. Each program has two associated hysteresis values;

- \( HYS_{r} \) which is applied to ramping segments, and
- \( HYS_{s} \) which is applied to soak segments.

The hysteresis value can be set within the limits ‘0’ to ‘9999’ where a setting of ‘0’ implies that no deviation from the set point value can be tolerated (‘0’ is the company standard setting).

Hysteresis can be applied in one of four ways, with individual settings for each segment;

- \( OFF \) — hysteresis not applied, ramp/soak not guaranteed.
- \( HI \) — hysteresis applied above set point (Holdback (‘H-HOLD’) set if \( PV > [SP + Hysteresis] \)).
- \( LO \) — hysteresis applied below set point (‘H-HOLD’ set if \( PV < [SP - Hysteresis] \)).
- \( HI-LO \) — hysteresis applied above and below set point (‘H-HOLD’ set if \( PV > [SP + Hysteresis] \) or \( PV < [SP - Hysteresis] \)).

![Diagram of 6-segment Ramp/Soak Profile]

**Note.** Ramping segments can have a different hysteresis to soak segments.

4.2.3 Power Recovery Function

The Power Recovery function allows pre-selection of the restart position within a ramp/soak profile when power is restored after a failure. If power is restored before the Power Down Time expires, the ramp/soak profile continues from the point at which power failed. If power is restored after the Power Down Time has expired, the profile resumes from one of the following user-selected points: start of the current program; start of the current segment or from the profile position at the time of failure. In all three cases the controller restarts in HOLD mode.
4.2.4 Self-seeking Set Point – Fig. 4.4

The Self-seeking Set Point function reduces the delay between the end of a program and the beginning of the next program. The process variable value is used as the program start point and the set point steps up to the process variable value. This has the effect of changing the overall segment time and maintains a constant ramp rate.

![Fig 4.4 Self-seeking Set Point](image)

4.2.5 Retort Function – Fig. 4.5

The Retort function ensures safe operation of retort vessels under fault conditions. If the heat source fails during a soak segment, the process variable will inevitably fall. When the process variable falls below the holdback hysteresis value the program is put on HOLD (as for normal operation). The setpoint then follows the process variable as it continues to fall (Retort Hold).

\[
\text{Setpoint} = \text{Process Variable} + \text{Hysteresis value}
\]

Upon recovery of the heat source, the process is controlled at the new setpoint value. When the process variable reaches the setpoint it is then ramped back to the initial soak value at the rate of the previous ramp (Retort Ramp). When the soak level is reached the program is released from its hold state and the segment is either completed or repeated from the beginning, depending on the retort mode selected.

The retort mode is selected in the Ramp/Soak Profile Page, CONTROL CONFIGURATION LEVEL.

**Note.** For the retort function to operate, either LO or HI-LO hysteresis must be applied to the soak segments.

![Fig 4.5 Retort Function](image)
4.2.6 Time Events – Fig. 4.6
Channel 1 and 2 can be assigned up to six Time-event states. Each state generates a source (‘tEV-1.1’ to ‘tEV-6.1’ and ‘tEV-1.2’ to ‘tEV-6.2’) which can be assigned to relays, digital outputs, logic equations etc. in the same way as any other digital signal. Time event states are provided in addition to program and segment events states and do not affect their operation. Each segment has an associated ‘EVEntS’ setting which is used to control the Time-event states.

![Fig 4.6 Time Events](image)

4.2.7 Profile Start and End States
A profile can be started in one of three ways:

a) From the dedicated front panel switch – see Figs. 2.1 to 2.4
b) internal edge-triggered Program Run Source – see Section 4.5
c) internal level-triggered Program Run/Hold Source – see Section 4.5

The ‘end of profile’ state is set automatically when the program ends and remains set until a reset signal is received. The end of profile reset signal can be configured as any digital source – see Section 4.5/ Table 4.1. If no digital signal is selected as the end of profile reset source then the end of profile state resets automatically after two seconds.

**Note.**
The value of the control set point on completion of a profile is determined by the method used to start the profile:

- If the front panel switch or edge-triggered ‘program run source’ are used to run a profile, on completion the control set point resets automatically to the profile start value, awaiting the next start signal.
- If the level-triggered ‘program run/hold source’ is used to run a program, on program completion, the control set point is held at the profile end value until the program run/hold source is set to ‘hold’, at which point the control set point is set to the profile start value.

4.3 Soak Adjustment – Type K Instruments
4.3.1 Cook Segment Soak Adjustment (Control Channel 1 only) – Fig. 4.8
The cook segment is defined as the soak segment with the highest soak level or the last segment in a series if more than one segment has this level (ie. the highest segment number).

The level and/or duration of the cook segment can be adjusted continuously, either by use of the keys on the Ramp/Soak control faceplate – see Fig. 2.1, or via digital signals – see Ramp/Soak Profile Control Page. The adjustment can be activated at any time during the program.

The Ramp/Soak control faceplate displays the time remaining in the cook segment. Initially, this is the segment duration, and it decrements to zero as the segment is being run. After the cook segment is completed, the display remains at zero until the end of the program, when it reverts back to the show segment duration. If several segments with the same soak level are cascaded, the time displayed is the total time for all these segments. Adjustments made to the soak level change the level of all these segments. Adjustments made to the soak time change the duration of the last segment only.
4 CONTROL CONFIGURATION LEVEL...

4.3.1 Cook Segment Soak Adjustment (Control Channel 1 only) – Fig. 4.8

Note. Any changes made to the cook time/temperature are saved in the program memory.

Fig. 4.7 Cook Segment Soak Adjustment – Controller 1 Ramp/Soak Control Faceplate

4.3.2 Current Segment Soak Time Adjustment (Control Channels 1 or 2) – Fig. 4.7

The Soak Adjust function allows the Soak time of a segment to be extended or reduced by a value preset in the 'SK–Adj' frame – see Ramp/Soak Profile Control Page. The soak time can be adjusted repeatedly (in preset increments) while the segment is running, either from the controller faceplate or by a digital signal (assigned in the ‘Inc.Src’ or ‘dEc.Src’ frames).

Note. Any changes made to the soak time via the controller faceplate are not saved in the program memory. At the end of the program, all soak times are reset to their original values.

Fig. 4.8 Current Segment Soak Adjustment – Controller 1 or 2 Faceplates
4.4 Soak Adjustment – L Type Instruments

4.4.1 Current Segment Soak Time Adjustment – Figs. 4.9 and 4.10

The Soak Adjust function allows the Soak time of a segment to be extended or reduced by a value preset in the 'SK–Adj' frame – see Ramp/Soak Profile Control Page. The soak time can be adjusted repeatedly (in preset increments) while the segment is running, either from the Ramp/Soak control faceplate, the Controller faceplate or by a digital signal (assigned in the 'Inc.Src' or 'dEc.Src' frames).

**Note.** At the end of the program, all soak times are reset to their original values.

---

**Fig 4.9 Current Segment Soak Adjustment – Controller 1 Ramp/Soak Control Faceplate**

---

**Fig 4.10 Current Segment Soak Adjustment – Controller 1 or 2 Faceplates**

---
4.5 Ramp/Soak Profile Control
In this Section, parameters in the lower display denoted ■ are Company Standard Settings. The instrument is dispatched programmed with these settings.

Page Header – Profile Control.
To advance to the Profile Program page press the [ ] switch.

Select Controller
Select the Controller to be programmed:
- Ctrl 1 – Controller 1
- Ctrl 2 – Controller 2 (if fitted)
- NONE – No controller selected

Ramp/Soak Profile Enable
If ON is selected, Profile Control is enabled and the Profile States Page is displayed in the OPERATOR LEVEL. If OFF is selected Profile Control is disabled and the Profile States Page is omitted from the OPERATOR LEVEL.

Program Time Units
Select the time units required:
- MINS – Minutes
- HOURS – Hours
The time base selected applies to all segments.

Program Run/Hold Source
The run/hold source is level triggered i.e. the active logic state must be maintained to select the alternative function.

If a program is activated or placed into operator hold mode using Program Run/Hold Source, the Program Run Source and Program Hold Source have no effect.

Select the source required to activate program run/hold – see Page 16, Table 4.1.

Program Run Source
The run source is leading edge triggered i.e. the active logic state can be removed after the function is selected.

Select the source required to run a program – see Page 16, Table 4.1.

Program Hold Source
The hold source is leading edge triggered.

Select the source required to place the program running into operator hold mode – see Page 16, Table 4.1.

The program is restarted using the Program Run Source.

Segment Skip Forward Source
If the segment running is the last segment of the program, the set point advances to the last set point value of the segment and stops the program. The skip source is leading edge triggered.

Select the source required to skip to the next segment – see Page 16, Table 4.1.

Continued on next page.
...4 CONTROL CONFIGURATION LEVEL

...4.5 Ramp/Soak Profile Control

Segment Skip Backward Source
The skip source is leading edge triggered.

Select the source required to skip back to the beginning of the ramp/soak segment running – see Page 16, Table 4.1.

Program Reset Source
The reset source is leading edge triggered.

If the program is running normally and is reset, the program returns to the beginning of the first segment and continues to run. If the program is on hold and is reset, the program returns to the beginning of the first segment and stops. No action is taken if a program has already finished.

Select the source required to reset a running program – see Page 16, Table 4.1.

Soak Time Increment Source (Current Segment)
The soak time of the current segment can be increased (by an amount set in the Soak Time Adjust frame) each time the source is activated. (ie. the source is leading edge triggered).

Select the source required to increase the soak time – see Page 16, Table 4.1.

Soak Time Decrement Source (Current Segment)
The soak time of the current segment can be decreased (by an amount set in the Soak Time Adjust frame) each time the source is activated. (ie. the source is leading edge triggered).

Select the source required to decrease the soak time – see Page 16, Table 4.1.

Soak Time Adjust (Current Segment)
The value set is added or subtracted from the soak time of a running segment via a digital signal or from the Controller 1 or 2 faceplates, when in the Current Profile Segment frame of the Operating Page.
The units of time are set in the Time Units frame. If OFF is selected this function is disabled.

Set the value required, between 0.1 and 100.0.

Reset Enable
Select ENBL-Y to enable or ENBL-N to disable the Profile Reset frame in the Profile States Page, OPERATOR LEVEL.

Skip Enable
Select ENBL-Y to enable or ENBL-N to disable the Skip Segment frames in the Profile States Page, OPERATOR LEVEL.

Self Seeking Set Point
If ON is selected the controller inserts the current process value as the starting point on initiation of the profile. This value is stored in the profile program and can be overwritten manually or when the program is next initiated. The ramp rate is unaffected. If OFF is selected the self seeking set point is disabled.

Retort
Select R to complete soak segment or b to repeat soak segment. If OFF is selected the retort mode is disabled.

Continued on next page.
4 CONTROL CONFIGURATION LEVEL...

...4.5 Ramp/Soak Profile Control

Highest Soak Set Point Increment Source (K Type only)
The highest soak set point value can be increased by activating a digital signal. The source is level triggered, therefore prolonged activation causes a larger change.

Select the source required to increase the set point value – see Page 16, Table 4.1.

Highest Soak Set Point Decrement Source (K Type only)
The highest soak set point value can be decreased by activating a digital signal. The source is level triggered, therefore prolonged activation causes a larger change.

Select the source required to decrease the set point value – see Page 16, Table 4.1.

Soak Time Increment Source (K Type only)
The soak time can be increased by activating a digital signal. The source is level triggered, therefore prolonged activation causes a larger change.

Select the source required to increase the soak time value – see Page 16, Table 4.1.

Soak Time Decrement Source (K Type only)
The soak time can be decreased by activating a digital signal. The source is level triggered, therefore prolonged activation causes a larger change.

Select the source required to decrease the soak time value – see Page 16, Table 4.1.

Ramp/Soak Control Faceplate Enable (L Type only)
The control keys on the Ramp/Soak Control Faceplate can be enabled/disabled.

Select EnbL-Y to allow the RUN, STOP and HOLD keys to be used.

End of Profile Reset Source
The end of profile state is an internal digital signal that is set automatically when the program is complete. The end of profile reset source is used to reset the end of profile state.

Select the source required to reset the end of profile state – see Page 16, Table 4.1.
If ‘NONE’ is selected the end of profile state is reset after 2 seconds.

Power-down Recovery Option
Select the profile restart position when power is restored after a failure and the Power Down Time Period (see below) has expired: A – Start of the current program, controller set to Hold mode; b – start of the current segment, controller set to Hold mode; C – profile position unchanged, controller set to Hold mode.

Power-down Time Period
Set the time period (0.0 to 99.9 minutes) during which, if power is restored, the profile continues from the point at which power failed. If the Power-down Time is exceeded the Power-down Recovery Option, selected above, is invoked.

Return to Select Controller frame.
### 4.5 Ramp/Soak Profile Program

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.FAIL</td>
<td>Power Failure</td>
</tr>
<tr>
<td>ALMACK</td>
<td>Alarm D</td>
</tr>
<tr>
<td>Source Description</td>
<td></td>
</tr>
<tr>
<td>Logic equation 8</td>
<td>Logic equation 1</td>
</tr>
<tr>
<td>Digital Input 6.8</td>
<td>Digital input 1.1</td>
</tr>
<tr>
<td>Digital Input number</td>
<td>Module number</td>
</tr>
<tr>
<td>Channel 3 Alarms (if applicable)</td>
<td></td>
</tr>
<tr>
<td>Channel 2 Alarms (if applicable)</td>
<td></td>
</tr>
<tr>
<td>Channel 1 Alarms</td>
<td></td>
</tr>
<tr>
<td>NONE</td>
<td>No source required</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Table 4.1 Digital Sources</td>
<td></td>
</tr>
</tbody>
</table>
4.6 Ramp/Soak Profile Program

In this Section, parameters in the lower display denoted ■ are Company Standard Settings. The instrument is dispatched programmed with these settings.

**Page Header – Profile Program.**

To return to the top of the CONTROL CONFIGURATION LEVEL, press the switch.

### Select Program

Select the program to be configured:

- **Ch1–1 to Ch1–10** – Channel 1 programs 1 to 10
- **Ch2–1 to Ch2–10** – Channel 2 programs 1 to 10 (if available)
- **NONE** – no program selected

### Program Begin

Select the program start segment, between 1 and 99.

**Note.** Start a new program at least one segment after the end of the previous program, i.e. if program 1.1 uses segments 1 to 4, select segment 6 as the start segment for program 1.2. Segments can only be used in more than one program if the start, end, ramp and soak values are identical in each program that the segments are used.

### Program End

Select the program end segment between, 1 and 99.

### Select Segment

Select the segment to be programmed (1 to 99).

When all segments have been programmed, select 0 to advance to Repeat Program frame.

Continued on next page.
...4 CONTROL CONFIGURATION LEVEL

...4.6 Ramp/Soak Profile Program

- **Segment Start Value**
  Set the segment start value. The segment start value can only be set if it is the first segment of a program.

  A Ramp has different start and end set point values. A Soak has the same start and end set point values. Adjacent segments of different Ramp or Soak programs MUST have the same start and end values, unless an intermediate ‘spacer’ segment is used.

- **Segment End Value**
  Set the segment end value.

  If segment start/end values are the same (Soak), the next frame displayed is the Soak Time frame. If they are different (Ramp), the next frame displayed is the Ramp Rate frame.

- **Soak Time**
  Set soak time duration required, between 0 and 999.9.

  The time units (hours or minutes) are configured in Ramp/Soak Time Units frame, Profile Control Page.

- **Ramp Rate**
  Set the ramp rate.

  The ramp rate is entered as the number of engineering units that change during the time period (hours or minutes) configured in the Ramp/Soak Time Units frame, Profile Control Page.

  Example – If a ramp of 10°F at 2°F every minute is required, the ramp rate value entered is 2.0 (in the minutes time base).

  Ramp rates set excessively low over a wide range cannot be displayed properly at the Current Profile Segment (Time Remaining) frame. This display shows a maximum of 999.9 units of time. The display is decremental when the time remaining is less than 999.9.

- **Guaranteed Ramp/Soak Hysteresis**
  Select the hysteresis application required.

  - **OFF** – hysteresis not applied, ramp/soak not guaranteed.
  - **HI** – hysteresis applied above set point (‘H-HOLD’ set if PV > [SP + Hysteresis])
  - **LO** – hysteresis applied below set point (‘H-HOLD’ set if PV < [SP – Hysteresis])
  - **HI-LO** – hysteresis applied above and below set point ( ‘H-HOLD’ set if PV > [SP + Hysteresis] or PV < [SP + Hysteresis])

- **Time Events**
  Up to six Time-events can be assigned to the segment currently being programmed – see Fig. 4.8.

  Press the ▲ key to turn event 1 ON.
  Press the ▼ key to turn event 1 OFF.
  Press the ✦ key to advance to the next event.

  Example. ‘1-3-4-5’ indicates time events 1, 3, 4 and 6 active during this segment time events 2 and 5 inactive

Return to Select Segment Frame.
4 CONTROL CONFIGURATION LEVEL...

4.6 Ramp/Soak Profile Program

---

**Repeat Program Profile**

Set the number of times the program is to be repeated, between 0 and 99 or infinity.

If infinity is selected the program is repeated until stopped by the operator.

---

**Guaranteed Ramp Hysteresis**

The Guaranteed Ramp Hysteresis applies above the process variable, below or both depending on the application selected – see Hysteresis Application frame.

Set the value of the hysteresis band (in engineering units), between 0.001 and 9999.

Setting ‘0’ is used if no deviation from the profile is allowed.

---

**Guaranteed Soak Hysteresis**

The Guaranteed Soak Hysteresis applies above the process variable, below or both depending on the application selected – see Hysteresis Application frame.

Set the value of the hysteresis band (in engineering units), between 0.001 and 9999.

Setting ‘0’ is used if no deviation from the profile is allowed.

---

**Program Source**

The program source is leading edge triggered i.e. the active logic state can be removed after the function is selected.

Select the source required to select the program – see Section 4.5/ Table 4.1.

---

Return to Select Program frame.
5 ADVANCED CONFIGURATION LEVEL

5.1 Advanced Configuration Level – Fig. 5.1

The general content of the Advanced Configuration Level is detailed in IM/C1900-PGC, Section 5. Any changed or additional frames are detailed in Sections 5.2.1 and 5.2.2 of this manual.
5.2 Timer

5.2.1 Set Up Timer

**Information.**
- Two timers available.
- ‘ON’ duration of 1 minute to 167 hours 59 minutes (1 week).
- **Programmable Timers** – can operate on specific days, hours or minutes for an exact period of time.
- **Timer ‘ON/OFF’ states** – can be used to delay the start of ramp/soak profiles, energize relay outputs, acknowledge alarms, stop the chart, select auto/manual control modes and local/remote set points, in logic calculations, start/stop/reset totalizers, reset maths results or run/hold/reset profile programs/segments.

**Example A** – setting up timer:
- Monday enabled
- Tuesday disabled
- Wednesday disabled
- Thursday disabled
- Friday enabled
- Saturday disabled
- Sunday disabled
- on hour set to 10.00am
- on minute set to 30 minutes
- duration in hours set to 49 hours
- duration in minutes set to 30 minutes

---

**Example A** – shows timer option programmed to energize relay output for 49 hours 30 minutes over a two day period
...5 ADVANCED CONFIGURATION LEVEL

...5.2.1 Set Up Timer

Example B – setting up timer:
- Monday enabled
- Tuesday enabled
- Wednesday enabled
- Thursday enabled
- Friday enabled
- Saturday disabled
- Sunday disabled
- on hour set to 06.00am
- on minute set to 0 minutes
- duration in hours set to 16 hours
- duration in minutes set to 10 minutes

Example C – shows timer option programmed to energize relay output for 16 hours 10 minutes from Monday to Friday

Example B – shows timer option programmed to energize relay output for 40 minutes every 20 minutes past the hour on a Monday only

Example C – setting up timer:
- Monday enabled
- Tuesday disabled
- Wednesday disabled
- Thursday disabled
- Friday disabled
- Saturday disabled
- Sunday disabled
- on hour set to All
- on minute set to 20 minutes
- duration in hours set to 0 hours
- duration in minutes set to 40 minutes

Example C – shows timer option programmed to energize relay output for 40 minutes every 20 minutes past the hour on a Monday only
...5.2.1 Set Up Timer

Page Header – Set Up Timer
To advance to the Set Up Clock frame press the [ ] switch.

Select Timer
Select timer to be programmed:
- Timer 1
- Timer 2
- no Timer selected

Timer On/Off Enable
Select ON to enable or OFF to disable.

Monday Enable
If Monday is enabled the timer becomes active on Monday. Select ON to enable or OFF to disable.

Tuesday Enable
Repeat as above for Tuesday to Sunday.

On Hour
Set the hour at which the timer becomes active. If ALL is selected the timer becomes active every hour (ALL is located above 24).

On Minute
Set the minute at which the timer becomes active.

Duration Hour
Set the duration of the timer in hours.

Duration Minute
Set the duration of the timer in minutes.

Return to Select Timer frame.
5.2.2 Set Up Clock

**Information.**
- Real time system clock included with timer option.
- Provides date, month, day, hours, minutes.

---

**Page Header – Set Up Clock**

To return to the top of the ADVANCED CONFIGURATION LEVEL press the [ ] switch.

**Current Time**
Current time displayed.

**Current Date**
Current date displayed.

**Current Day**
Current day displayed.

**Set Clock**
If the date, day and time are correct in the above frames, select \( \text{NO} \) to return to the Set Up Clock frame. To set the clock’s date, day or time select \( \text{YES} \).

**Year**
Set the year.

**Month**
Set the month.

**Date**
Set the date.

**Day**
Set the day – \( \text{MN} \) (Monday), \( \text{TUE} \) (Tuesday), \( \text{WED} \) (Wednesday), \( \text{THU} \) (Thursday), \( \text{FRI} \) (Friday), \( \text{SAT} \) (Saturday), \( \text{SUN} \) (Sunday).

**Hour**
Set the hour (using 24 hour clock).

**Minute**
Set the minute.

**Update**
ACtIVE is displayed until update is complete, \( \text{DONE} \) is displayed on completion of update.

Return to Set Up Clock frame.