**C1900 Circular chart recorder**

*Measurement made easy*

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or by scanning this code:

<table>
<thead>
<tr>
<th>Search for or click on</th>
<th></th>
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</thead>
<tbody>
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<td>Data Sheet C1900 Circular chart recorder</td>
<td>DS/C1900R-EN</td>
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<tr>
<td>Quick Reference Guide C1900 Circular chart recorder</td>
<td>IM/C1900-QR</td>
</tr>
<tr>
<td>Installation Guide C1900 Circular chart recorder and controller</td>
<td>IM/C1900-INS</td>
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<tr>
<td>Programming Guide C1900 Circular chart recorder</td>
<td>IM/C1900-PGR</td>
</tr>
<tr>
<td>Operating Instructions C1900 Circular chart recorder and controller</td>
<td>IM/C1900-MOD</td>
</tr>
<tr>
<td>User Guide C1900 Circular chart recorder and controller</td>
<td>IM/C1900-ADV</td>
</tr>
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Use of instructions

Warning – an instruction that draws attention to the risk of injury or death.

Caution – an instruction that draws attention to the risk of damage to the product, process or surroundings.

Note – clarification of an instruction or additional information.

Information – further reference for more detailed information or technical details.

It must be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process system performance leading to personal injury or death. Therefore, comply fully with all Warning and Caution notices.

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.
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</tr>
</tbody>
</table>

The documentation for the C1900 series of circular chart recorders is shown in Fig. 1.1. The **Standard Manuals**, including the data sheet, are supplied with all instruments. The **Supplementary Manuals** supplied depend on the specification of the instrument.

![Diagram of C1900 Documentation](Fig. 1.1 C1900 Documentation)
2 SETTING UP

2.1 Instrument Power-up – Fig. 2.1 and 2.2

Caution. Ensure that all connections, especially to the earth stud, are made correctly.

a) Check that the input sensors are installed correctly.

b) Check that the pen(s) are installed correctly – see Fig. 2.1.

c) Switch on the supply to the instrument, any power-operated control circuits and the input signals. Wait for the pens to settle.

Note. On power-up, the pens are moved to an off-chart position for automatic referencing. Pen chatter may occur on those pens nearest the reference position. This is a normal function of the instrument.

d) The start-up sequence shown in Fig. 2.2 is displayed on faceplate 1 when the supply is first switched on.

Instrument Test identifies the instrument type, e.g.
1914J – see Table 2.1 in the Installation Manual.

CPU Test carries out check of processor circuitry – see Error Codes below.

Configuration Test carries out check of non-volatile memories containing the instrument configuration, then indicates pass or fail – see Error Codes below.

Calibration Test carries out check of non-volatile memories containing the calibration data for each analog input and output, then indicates pass or fail – see Error Codes below.

Battery Back RAM Test carries out check of battery-backed RAM, then indicates pass or fail – see Error Codes below.

Error Codes are displayed in the event of a fault – see Section 2.1.1.

Note. If the true time line event option is fitted, the violet event pen records on the same time line as the red pen, but on the outer edge of the chart.

Fig. 2.1 Checking the Pen(s) Installation

Fig. 2.2 Instrument Displays at Start-up
2.1.1 Power-up Error Codes

If any of the power-up tests fail (see Fig. 2.2), error codes are displayed to identify the fault. Refer to Fig. 2.3 for error code interpretations.

### Configuration and battery-backed RAM errors

- **R-****F**
- **-2-4--**

Calibration errors

<table>
<thead>
<tr>
<th>Code</th>
<th>Error</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Main board data stored in non-volatile memory on main board is corrupt</td>
<td>Check and correct program data</td>
</tr>
<tr>
<td>E</td>
<td>Timer set up stored in battery backed RAM is corrupt</td>
<td>Check and correct data in Set Up Timer Page*</td>
</tr>
<tr>
<td>d</td>
<td>Maths set up stored in battery back RAM is corrupt</td>
<td>Check and correct data in Set Up Maths Page*</td>
</tr>
<tr>
<td>F</td>
<td>Totalizer set up in battery backed RAM has been corrupt</td>
<td>Check and correct data in Set Up Totals Page*</td>
</tr>
</tbody>
</table>

**Note.** Acknowledging the Error Code clears the error state but does not rectify the fault. After acknowledging the error, carry out the relevant action detailed in the above tables.

* Refer to the Advanced Software Manual

---

**Fig. 2.3 Power-up Error Codes**
2.2 Fitting the Chart – Fig. 2.4

1. Raise pens

2. Lift the chart clamp and remove the chart

3. Fit new chart ensuring that it is beneath the pen lifter bars

4. Locate chart under guides

5. Rotate chart to align the timeline with the red pen (see also Fig. 2.1)

6. Lower the chart clamp

Fig. 2.4 Fitting the Chart

2.3 Fitting the Pen Capsule(s) – Fig. 2.5

1. Raise pens

2. Gently pull the arm off the bracket – see Note

3. Remove spent capsule

4. Fit new pen capsule ensuring that the arm locates in the pen capsule slot

5. Remove cap

6. Slide pen assembly onto the appropriate bracket until it clips into place – see Note

7. Ensure that the arm is positioned above its lifter bar

Fig. 2.5 Fitting the Pen Capsules

Note. Take care not to bend the arms during removal and refitting, as pen clashing may result.
The displays, LED indicators and operation/programming controls are located on the faceplate on the front panel of the instrument – see Fig 3.1.

### 3.1 Displays and LED Indicators – Fig. 3.1

The displays comprise 2 rows of 6 characters.

At the top of each programming page (the page header) both displays are used to describe the particular page selected.

When parameters within the selected page are viewed the upper display shows the parameter and the lower display shows the value or setting for that parameter.

Alarm and Channel states are indicated by separate LEDs on the faceplate of the front panel of the instrument – see Sections 4.1, 4.2 and 4.3.

---

**Information.**

- **AL1** – Channel 1
- **AL2** – Channel 2
- **AL3** – Channel 3
- **AL4** – Channel 4
- **CH1** – Channel 1
- **CH2** – Channel 2
- **CH3** – Channel 3
- **CH4** – Channel 4

---

**Table 3.1 Character Set**

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>b</td>
<td>L</td>
</tr>
<tr>
<td>C</td>
<td>c or c</td>
<td>M</td>
</tr>
<tr>
<td>D</td>
<td>d</td>
<td>N</td>
</tr>
<tr>
<td>E</td>
<td>E</td>
<td>O</td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>P</td>
</tr>
<tr>
<td>G</td>
<td>G</td>
<td>Q</td>
</tr>
<tr>
<td>H</td>
<td>H or h</td>
<td>R</td>
</tr>
<tr>
<td>I</td>
<td>I</td>
<td>S</td>
</tr>
<tr>
<td>J</td>
<td>J</td>
<td>T</td>
</tr>
<tr>
<td>K</td>
<td>K</td>
<td>U</td>
</tr>
</tbody>
</table>

---

**Fig. 3.1 Location of Displays, Controls and LED Indicators**
3.2 Use of Controls – Fig. 3.2(a) to (f)

Fig. 3.2(a) Advancing to Next Page

Fig. 3.2(b) Moving Between Parameters

Fig. 3.2(c) Adjusting a Parameter Value

Fig. 3.2(d) Selecting a Parameter Choice

Notes.
- Continued pressure on the and keys causes the rate of change of the displayed value to increase. To make small adjustments operate the keys momentarily.

Fig. 3.2(e) Lifting/Lowering the Pens

Notes.
- The key can be enabled or disabled in the Set Up Chart Page, BASIC CONFIGURATION LEVEL.
- If 'Auto Pen Lift Drop' has been selected in the Set Up Chart Page, the pens return automatically to their operating positions after a five minute delay.

Fig. 3.2(f) Selecting Programmable Functions

Notes.
- The key returns the instrument display to the start of the operating page only when the display is at the top of any page.

Information.
- The key is programmed in the Set Up Function Keys Page, ADVANCED CONFIGURATION LEVEL.

Note. Continued pressure on the and keys causes the rate of change of the displayed value to increase. To make small adjustments operate the keys momentarily.
If Totalizer option is not fitted or Totalizers 3 & 4 are off

Faceplate 1 Pages

See Note

Operating Page Section 4.2 Page 9
Alarm Acknowledge Page Section 4.3 Page 10
Total Page Section 4.4 Page 11
Security Code Page Section 4.5 Page 12

Only applicable with Timer option

PV1 & PV2
PV1 & Units
PV2 & Units
Time
dATE

PV3 & PV4
PV3 & Units

rESET
1
rESET
2

rESET
3
rESET
4

COUNT
Count
Stop/Go

COUNT
Stop/Go

rESET
1
rESET
2

rESET
3
rESET
4

COUNT
Stop/Go

Fig. 4.1 Summary of Operating Level

Note. The Alarm Acknowledge pages are displayed only if an alarm is active.
The instrument has dedicated Operating Pages in the OPERATOR LEVEL – see Sections. 4.1 to 4.4. These pages are used for general monitoring of the process measurements and are not affected by the security system which inhibits access to the PROGRAMMING LEVELS only – see Section 4.5 on page 12.

### 4.1 Input Error Messages – Fig. 4.2

<table>
<thead>
<tr>
<th>Message</th>
<th>Reason</th>
<th>Action</th>
</tr>
</thead>
</table>
| Ad.FAIL | Internal analog to digital converter system hardware has failed | • Check that the input/output board is located correctly in its socket.  
• Power down and up  
If the 'Ad.FAIL' message is still present, contact the local service organization |
| F–INPL | Input is above or below fault detection level.  
or  
Input exceeds the limits for the linearizer selected | • Check input source for possible broken sensor  
• Check input connections  
• Check input link position  
• Check input configuration in Set Up Input Page |

**Examples**

![Image of input errors]

**Note.** Error messages are cleared automatically when the fault condition no longer exists.

**Fig. 4.2 Input Error Messages Displayed in the Operating Page**
4.2 Operating Page Displays

Faceplate 1 for channels 1 and 2
Faceplate 2 for channels 3 and 4

Process Variable 1 (PV1)
- Temperature Units for PV1 as set in the BASIC CONFIGURATION LEVEL.
- Display is blank if ‘NONE’ is selected.

Process Variable 2 (PV2)*
- Temperature Units for PV2 as set in the BASIC CONFIGURATION LEVEL.
- Display is blank if ‘NONE’ is selected.

Current Time*
- Time* (displayed using 24hr clock)
  - Displayed only when timer option is fitted.

Current Date*
- Day and Month*
  - Displayed only when timer option is fitted.

Process Variable 3 (PV3)
- Temperature Units for PV3 as set in the BASIC CONFIGURATION LEVEL.
- Display is blank if ‘NONE’ is selected.

Process Variable 4 (PV4)*
- Temperature Units for PV4 as set in the BASIC CONFIGURATION LEVEL.
- Display is blank if ‘NONE’ is selected.

Current Time*
- Time* (displayed using 24hr clock)
  - Displayed only when timer option is fitted.

Current Date*
- Day and Month*
  - Displayed only when timer option is fitted.
4.3 Alarm Acknowledge Page

4.3.1 Alarm Indications – Fig. 4.3
The definitions for alarm states (on, off or flashing) are detailed in Fig. 4.3.

4.3.2 Acknowledging Alarms

**Note.** Channel 1 and 2 alarms can be acknowledged only from faceplate 1. Channel 3 and 4 alarms (if applicable) can be acknowledged only from faceplate 2.

Unacknowledged alarms can be acknowledged from the faceplate controls on the front panel in two ways:

1. In the **OPERATING LEVEL** – by pressing the key at any frame (providing the key is programmed for this function – see Section 4.1 in the Programming Manual).
2. In the **Alarm Acknowledge Page** – by pressing the key – see Section 4.3.3 following.

---

**Fig. 4.3 Alarm LED Indications**

- **No LED illuminated** indicates no alarms active. The **Alarm Acknowledge Page** is not displayed in the **OPERATOR LEVEL**.
- A flashing LED indicates an unacknowledged alarm on that channel. For example, a flashing **AL1** LED indicates an unacknowledged alarm on channel 1. The **Alarm Acknowledge Page** is now displayed in the **OPERATOR LEVEL**.
- A constant LED indicates that all active alarms have been acknowledged on that channel. The **Alarm Acknowledge Page** remains in the **OPERATOR LEVEL** until all alarm conditions are cleared on that channel.

---

### Using the Alarm Acknowledge Page

- **No Alarm Active**
  - No LED indicators illuminated.

- **Alarm Active**
  - AL2 LED indicator flashing, indicating active alarm on channel 2.
  - Use key to go to top of **Alarm Acknowledge Page**.

- **Alarm Acknowledge Page**
  - Use key to advance to next frame

- **Alarm Identity**
  - Upper display: shows the alarm identity and type.
  - Lower Display: shows the trip level of the alarm identified in the upper display.

- **Acknowledge Alarm**
  - Use key to acknowledge the alarm (see). When the alarm is acknowledged, **'ACKNGd'** is displayed and a constant LED indicates the acknowledged alarm.

If there are more active alarms on channel 2 the LED continues to flash until all alarms for that channel have been acknowledged.

**Note.** The key or a digital input can also be used to acknowledge alarm, if programmed.
4.4 Totals Page Displays
This page is omitted from both faceplates if the Totalizer Option is not fitted. The page is also omitted from faceplate 1 if both Totals 1 and 2 are set to OFF and from faceplate 2 if both Totals 3 and 4 are set to OFF – refer to the Set Up Totals Page in the Advanced Software Options Manual.

Front Panel (Batch) Flow Total 1 (3)
The batch flow total is calculated from process variable 1 (3). The flow total can be reset if Reset Enable in Set Up Totals Page is set to 'ENbL – Y'.

The flashing channel LED indicates the flow total displayed.

For example, a flashing channel 1 LED indicates Flow Total 1 parameters displayed.

Counter Reset
The Front (Batch) Flow Total can be reset to the Preset Value in Set Up Totals Page if required.

Select 't1 YES' to reset the counter ('t1' indicates Flow Total 1).

Note. If the Counter Reset is disabled in Set Up Totals Page, the counter reset frame is omitted.

Counter Stop/Go
Select 'GO' to start the counter or 'STOP' to stop it.

Note. If the Counter Stop/Go is disabled in Set Up Totals Page, the frame can be viewed but not altered. If a digital signal is assigned to the Totalizer Stop/Go, an active digital signal sets the counter to GO and the Counter cannot be stopped from the front panel.

Front Panel (Batch) Flow Total 2 (4)
Repeat the above procedure for Flow Total 2 (4).

Note. The number of totalizers is dependent on the number of pens fitted to the instrument e.g. a 3 pen instrument has 3 totalizers.
4.5 Access to Configuration Levels
A security system is used to prevent tampering with the programmed parameters by utilizing a password giving access to all programming pages – refer to the Programming Manual.

Security Code
the pen adjustment password

Incorrect Password

Correct Password

Pen Position Adjustment (Pens 1 to 4)
The position of any trend pen can be adjusted against a reference standard (without changing the displayed value). Each pen can be adjusted in steps upwards (towards the edge of the chart) or downwards (towards the center of the chart).

When this feature is enabled, a password must be entered before adjustments can be made.

Note if pen adjustment is disabled or if the password is incorrect, the four Pen Adjustment frames are not displayed.

For each trend pen, the lower part of the frame shows the pen position adjustment.

EPROM Identification
Use the key to advance to the EPROM Identification Frame. The upper display shows the EPROM version, e.g. 2001 and the lower display shows the EPROM issue number.

Option
Shows the software key option type. For details of the options, refer to the Data Sheet, SS/C1900R

Security Code Page
Set the security code to the correct password using the and keys and use the key to advance to other programming levels (OPERATOR, BASIC CONFIGURATION and ADVANCED CONFIGURATION).

The password is programmed in the Access Page in the BASIC CONFIGURATION LEVEL.
## 5 SIMPLE FAULT FINDING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Action</th>
</tr>
</thead>
</table>
| Does not power up                            | a) Internal fuse (if fitted) is blown  
b) Internal power switch (if fitted) is OFF  
c) Power supply connections are incorrect | a) Check wiring, rectify fault and replace fuse  
b) Turn power switch ON  
c) Check connections |
| Chart does not appear to move                | a) Very slow chart speed selected  
b) Chart stop function enabled                                                   | a) Select required chart speed in **Set Up Chart Page**  
b) De-activate source being used to stop chart – see **Set Up Chart Page** |
| Pens in recording position but do not drop onto paper | Chart stop function enabled                                                   | De-activate source used to stop chart – see **Set Up Chart Page**                        |
| Red pen does not move beyond 94% position on chart | When real time event pen is fitted the red pen cannot go beyond 94% to prevent pens clashing | Use chart range which prevents the need to go beyond 94% of maximum on chart              |
| Pen lift switch on front panel does not work | Pen lift switch is disabled                                                   | Enable pen-lift switch in **Set Up Chart Page**                                           |
| Pens do not remain lifted when pen lift key is used | Auto pen drop feature is enabled                                              | Disable auto pen drop in **Set Up Chart Page** if this is not required                    |
| Analog inputs are slow to respond            | A large filter time has is set                                               | Set digital filter value to give required response in **Set Up Inputs**                   |
| Time or date incorrect                       | Not set for correct local time                                               | Set correct time and date in **Set Up Clock Page** – refer to **Advanced Software Manual** |
| Totalizers cannot be set to STOP or GO      | Operator STOP/GO selection is not enabled in the OPERATOR LEVEL              | Enable counter STOP/GO in the **Set Up Totals Page**                                       |
| Totalizer cannot be set to STOP              | Digital signal assigned to the total STOP/GO function is active              | De-activate digital signal assigned to total STOP/GO function                              |
| External relays connected to relays in instrument fail to de-energize | Arc suppression capacitors are provided across the relay contacts and capacitor leakage current may be sufficient to prevent an external relay from de-energizing | Remove the arc suppression components – IC4 and IC5 on mainboard  
IC6 and IC7 on standard I/O and analog relay IC3 to IC10 on 4 relay module                   |
### 6 SPARES LIST

<table>
<thead>
<tr>
<th>Item</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pen Capsules</strong> (pack of 3)</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>C1900/0119</td>
</tr>
<tr>
<td>Blue</td>
<td>C1900/0120</td>
</tr>
<tr>
<td>Red</td>
<td>C1900/0121</td>
</tr>
<tr>
<td>Green</td>
<td>C1900/0122</td>
</tr>
<tr>
<td>Violet*</td>
<td>C1900/0123</td>
</tr>
</tbody>
</table>

**Pen Arm Assemblies**

| ER/C Type Chart (J or R in Code Number) – Standard Pen | C1900/0076 |
| ER/C Type Chart (J or R in Code Number) – Event Pen  | C1900/0078 |
| PX105 and PXR105 Type Chart (K or S in Code Number) – Standard Pen | C1900/0075 |
| PX105 and PXR105 Type Chart (K or S in Code Number) – Event Pen | C1900/0077 |

**Fuses**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>24V</td>
<td>B11071 (4A)</td>
</tr>
<tr>
<td>115V</td>
<td>B11070 (1A)</td>
</tr>
<tr>
<td>230V</td>
<td>B11069 (500mA)</td>
</tr>
</tbody>
</table>

*True time line event option only.*