Operating Guide IM/C1900-OGR Rev. J

C1900 Series
Circular Chart Recorders

The Company

We are an established world force in the design and manufacture of measurement products for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

EN ISO 9001:2000

Cert. No. Q 05907

EN 29001 (ISO 9001)

Lenno, Italy – Cert. No. 9/90A

Stonehouse, U.K.

0255

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:

1. The relevant sections of these instructions must be read carefully before proceeding.
2. Warning labels on containers and packages must be observed.
3. Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
4. Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.
5. Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
6. 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.

CONTENTS

1 INTRODUCTION

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.

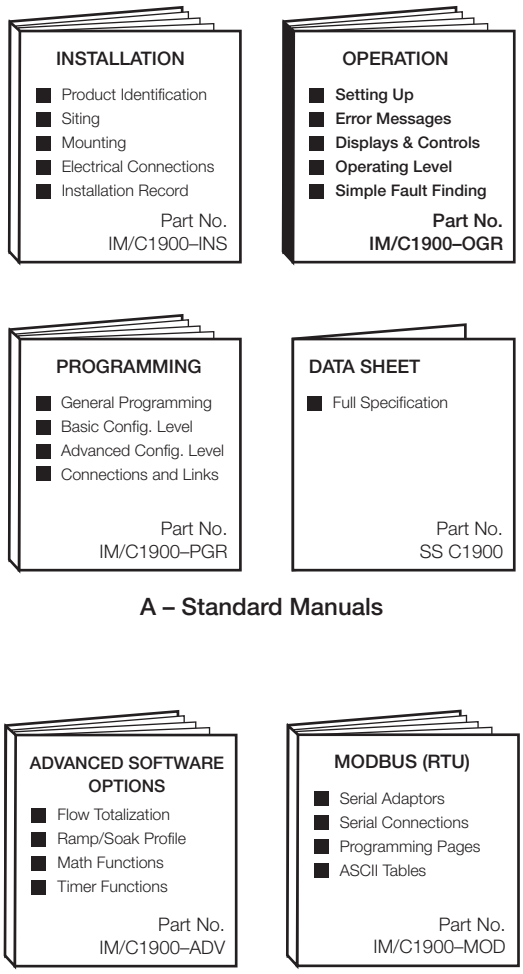


Fig. 1.1 C1900 Documentation

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.

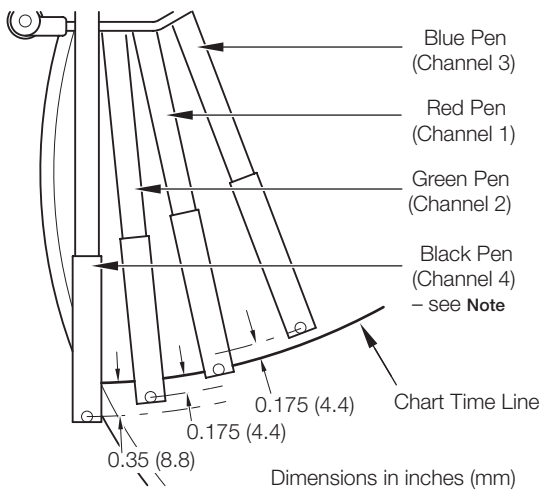
a) Check that the input sensors are installed correctly.

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.



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

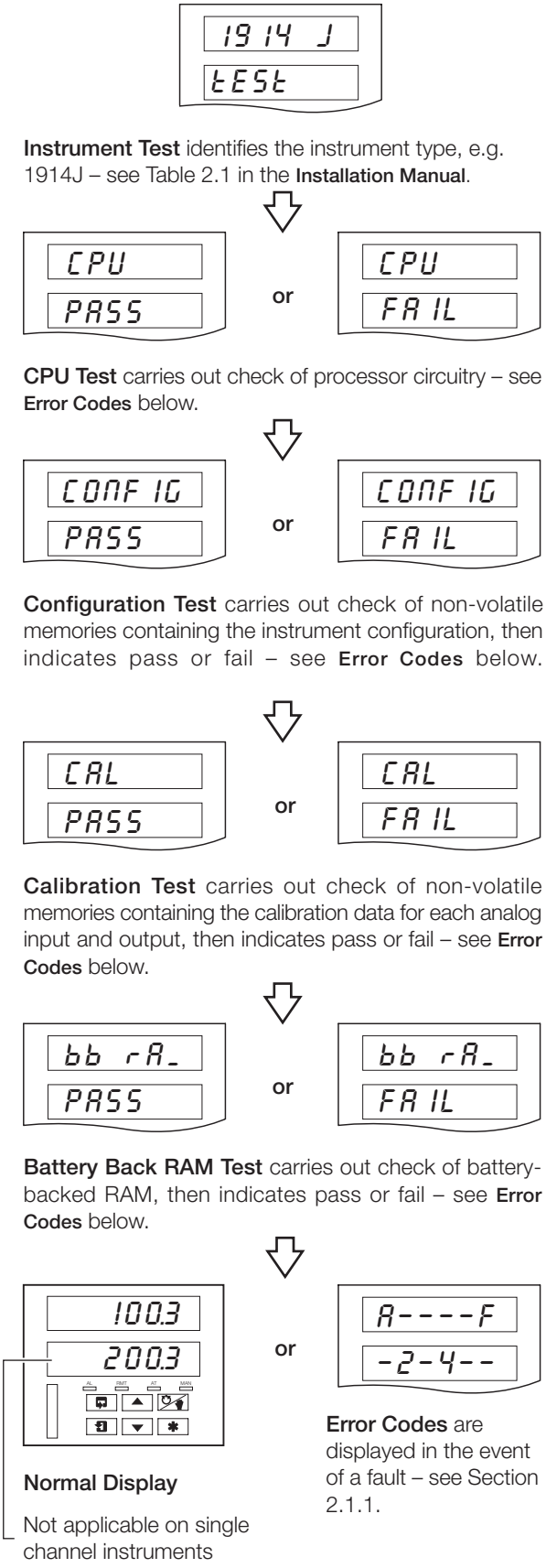
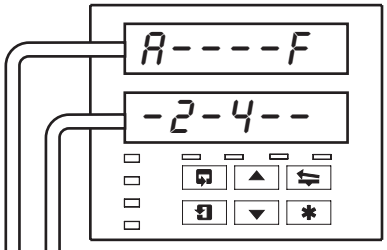


Fig. 2.2 Instrument Displays at Start-up

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

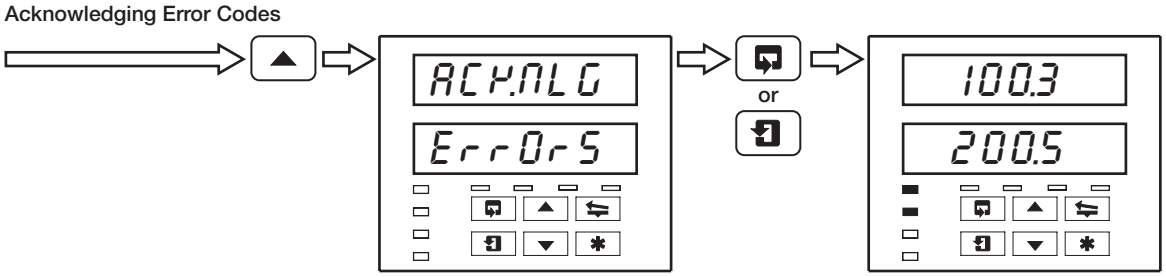
Calibration errors

Code	Error		Action
–	No error		None
1	Main board	Analog input and/or analog output calibration is corrupt	Power down and then up again. If fault remains, contact the local Service Organisation.
2	Module in position 2		
3	Module in position 3		
4	Module in position 4		
5	Module in position 5		
6	Module in position 6		

Code	Error	Action
-	No error	None
A	Main program data stored in non-volatile memory on main board is corrupt	Check and correct program data
C	Timer set up stored in battery backed RAM is corrupt	Check and correct data in **Set Up Timer Page***
d	Maths set up stored in battery back RAM is corrupt	Check and correct data in **Set Up Maths Page***
F	Totalizer set up in battery backed RAM has been corrupt	Check and correct data in **Set Up Totals Page***

* Refer to the **Advanced Software Manual**

Acknowledging Error Codes



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.

Fig. 2.3 Power-up Error Codes

2.2 Fitting the Chart – Fig. 2.4

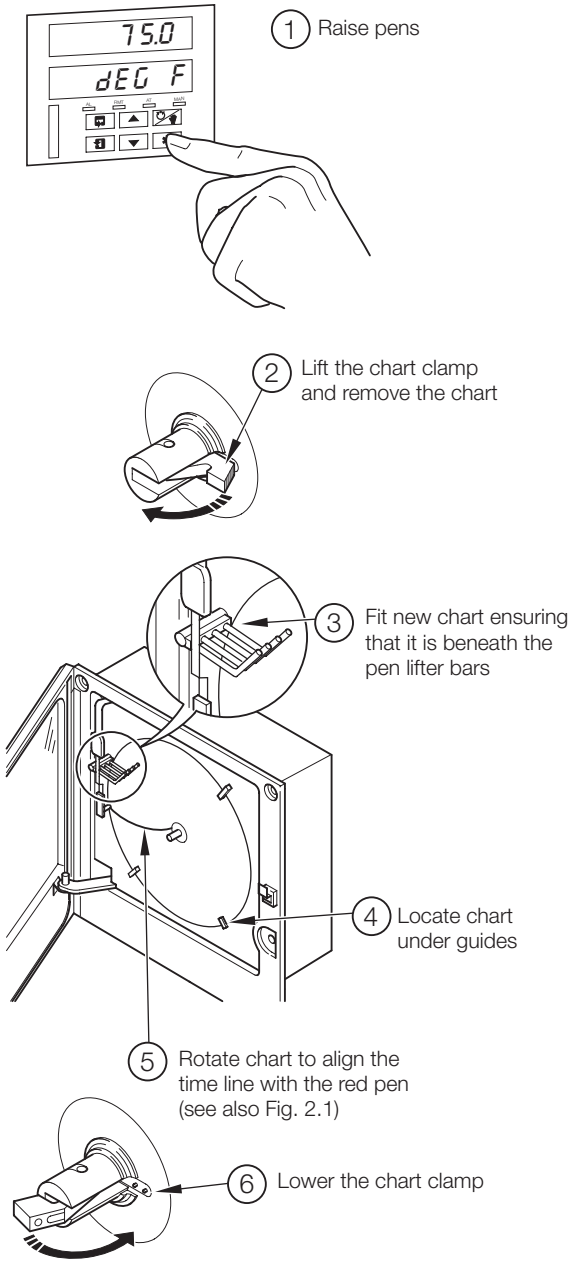
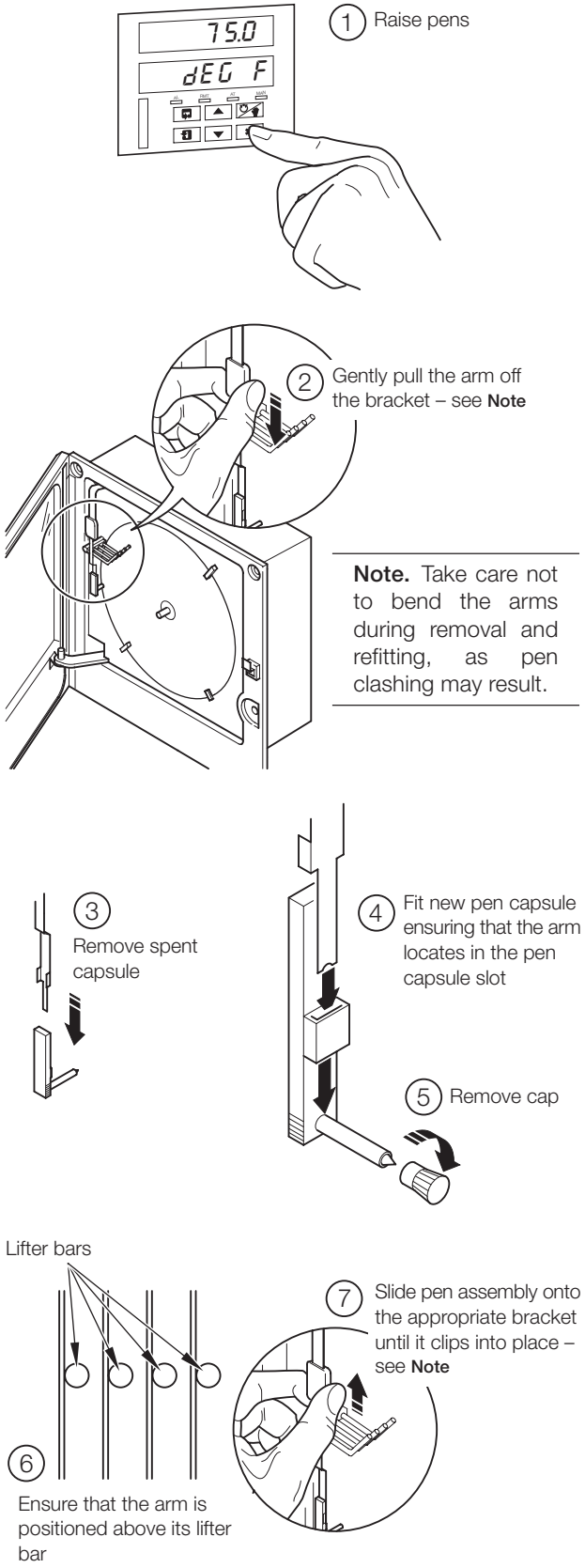


Fig. 2.4 Fitting the Chart

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



Note. Take care not to bend the arms during removal and refitting, as pen clashing may result.

Fig. 2.5 Fitting the Pen Capsules

3 DISPLAYS & CONTROLS

The displays, LED indicators and operation/programming controls are located on the faceplate on the front panel of the instrument – see Fig 3.1.

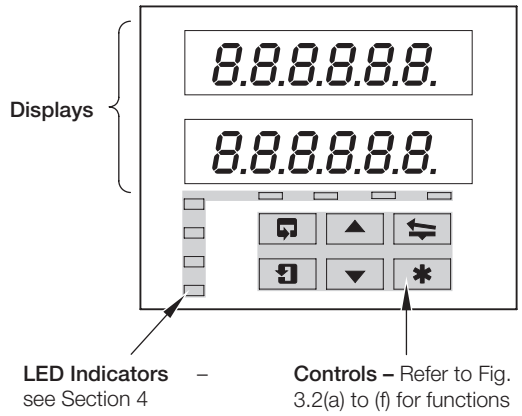
3.1 Displays and LED Indicators – Fig. 3.1

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
} Status of process variable alarms

CH1 – Channel 1
CH2 – Channel 2
CH3 – Channel 3
CH4 – Channel 4
} Current channel displayed

Fig. 3.1 Location of Displays, Controls and LED Indicators

A	A		L	L	
B	b		M	_	
C	C	or c	N	n	or n
D	d		O	0	or o
E	E		P	P	
F	F		Q	C.	
G	G		R	r	
H	H	or h	S	S	
I	I		T	t	
J	J		U	U	
K	K.		V	U.	
			Y	y	

Table 3.1 Character Set

3.2 Use of Controls – Fig. 3.2(a) to (f)

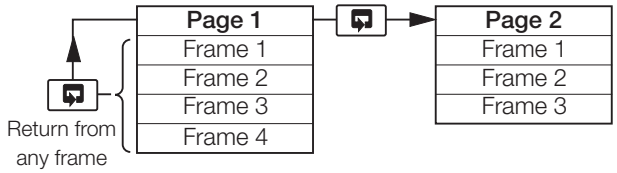


Fig. 3.2(a) Advancing to Next Page

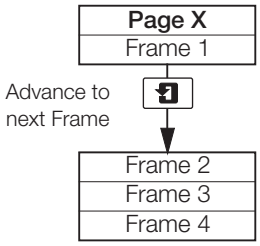
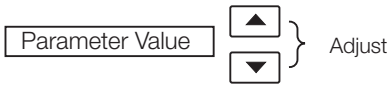
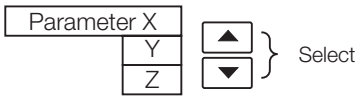


Fig. 3.2(b) Moving Between Parameters



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.

Fig. 3.2(c) Adjusting a Parameter Value



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.

Fig. 3.2(d) Selecting a Parameter Choice


Lift/Lower pen on alternate operations

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.

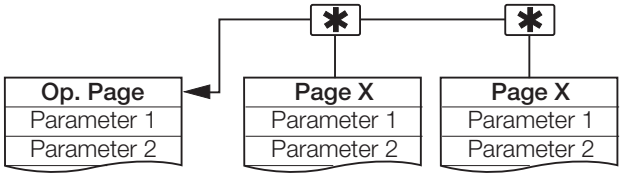
Fig. 3.2(e) Lifting/Lowering the Pens

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


Acknowledge all alarms

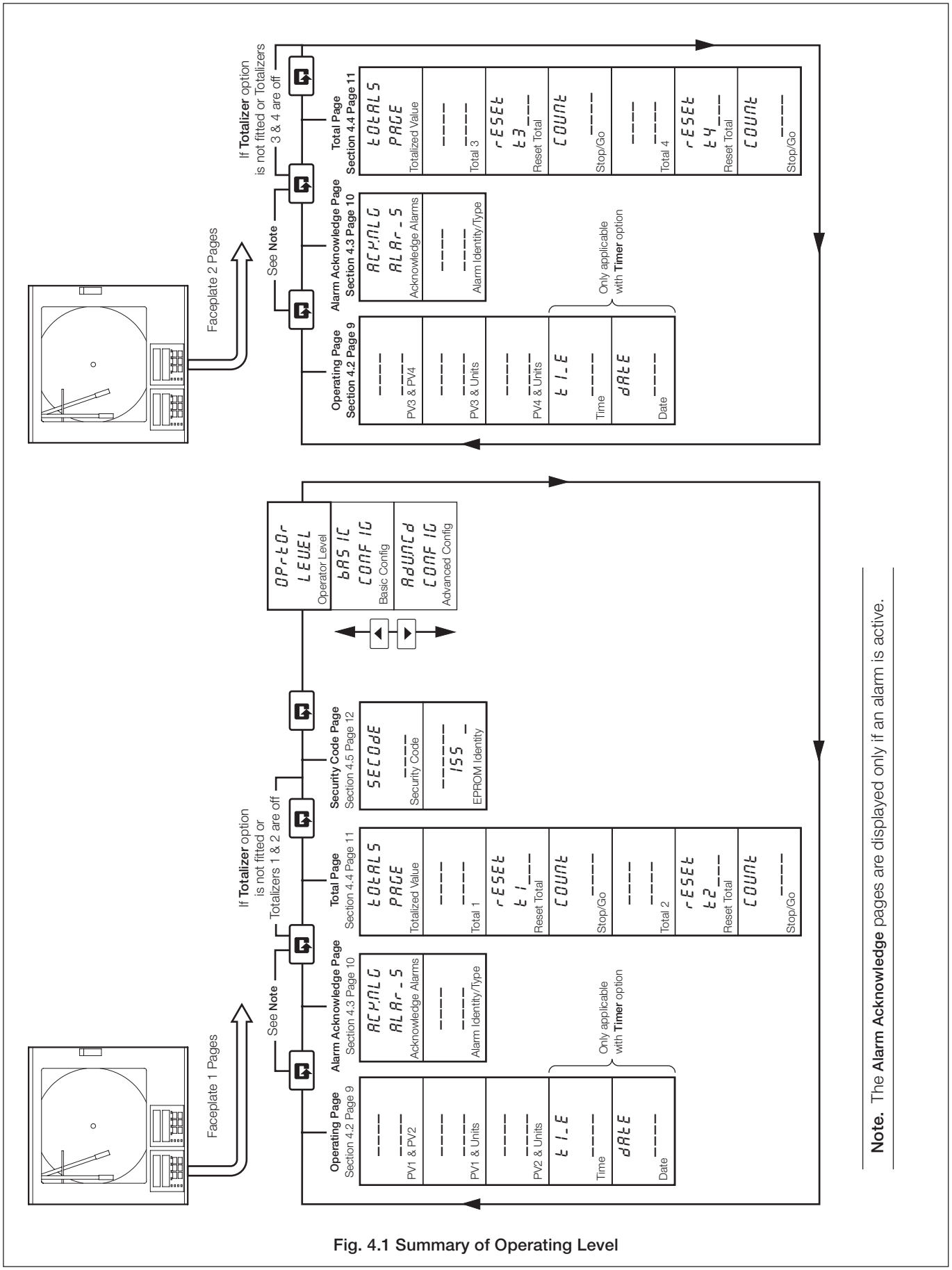
or

Return operator to top of **Operating Page**.



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

Fig. 3.2(f) Selecting Programmable Functions



Note. The **Alarm Acknowledge** pages are displayed only if an alarm is active.

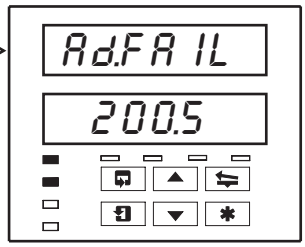
Fig. 4.1 Summary of Operating Level

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.

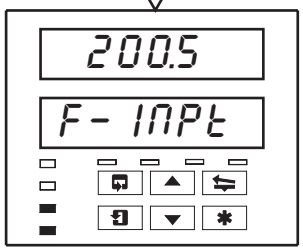
4.1 Input Error Messages – Fig. 4.2

Message	Reason	Action
Ad.FA IL	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.FA IL' message is still present, contact the local service organization
F- INPt	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



Hardware failure on Process Variable 1

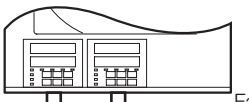


Input out of range on Process Variable 4

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

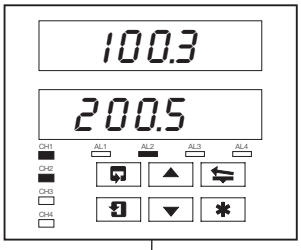
Fig. 4.2 Input Error Messages Displayed in the Operating Page

4.2 Operating Page Displays



Faceplate 1 for channels 1 and 2

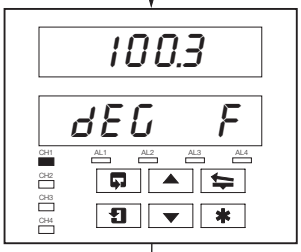
Faceplate 2 for channels 3 and 4



Process Variable 1 (PV1)

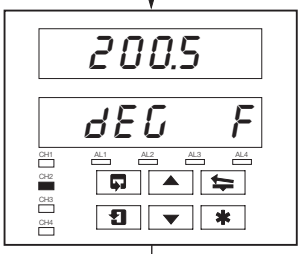
Process Variable 2 (PV2)*

*Not displayed on single pen recorder.



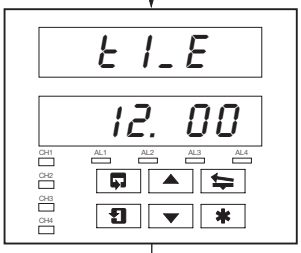
Process Variable 1 (PV1)

Temperature Units for PV1 as set in the **BASIC CONFIGURATION LEVEL**. Display is blank if 'nONE' is selected.



Process Variable 2 (PV2)

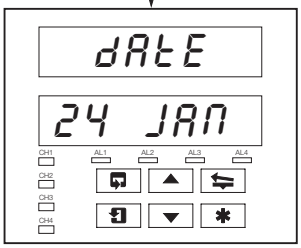
Temperature Units for PV2 as set in the **BASIC CONFIGURATION LEVEL**. Display is blank if 'nONE' is selected.



Current Time*

Time* (displayed using 24hr clock)

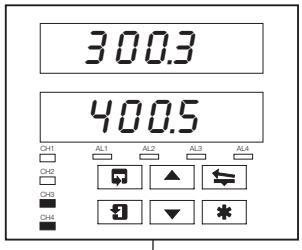
*Displayed only when timer option is fitted.



Current Date*

Day and Month*

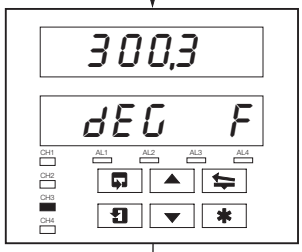
*Displayed only when timer option is fitted.



Process Variable 3 (PV3)

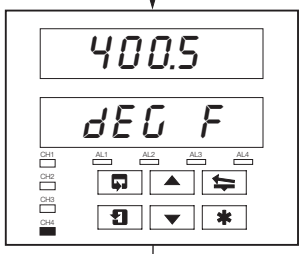
Process Variable 4 (PV4)*

* Not displayed on three pen recorders.



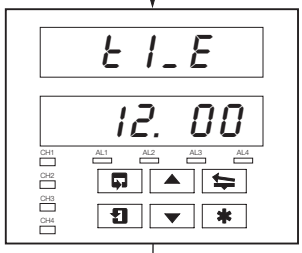
Process Variable 3 (PV3)

Temperature Units for PV3 as set in the **BASIC CONFIGURATION LEVEL**. Display is blank if 'nONE' is selected.



Process Variable 4 (PV4)

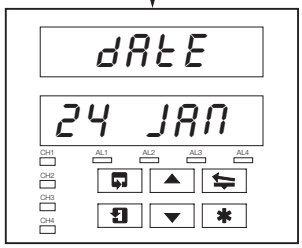
Temperature Units for PV4 as set in the **BASIC CONFIGURATION LEVEL**. Display is blank if 'nONE' is selected.



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.

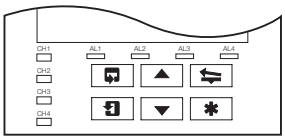
4.3.2 Acknowledging Alarms

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.

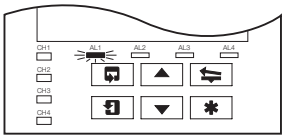
Unacknowledged alarms can be acknowledged from the faceplate controls on the front panel in two ways:

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**).

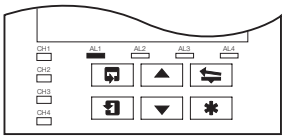
In the **Alarm Acknowledge Page** – by pressing the ▲ key – see Section 4.3.3 following.



No LED illuminated indicates no alarms active.
The **Alarm Acknowledge Page** is not displayed in the **OPERATOR LEVEL**.



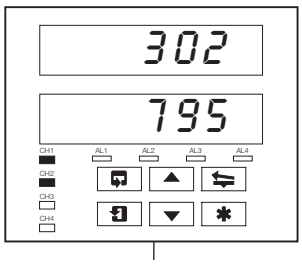
A flashing LED indicates an unacknowledged alarm on that channel. For example, a flashing **AL1** LED indicates an unacknowledged alarm on channel 1.
The **Alarm Acknowledge Page** is now displayed in the **OPERATOR LEVEL**.



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.

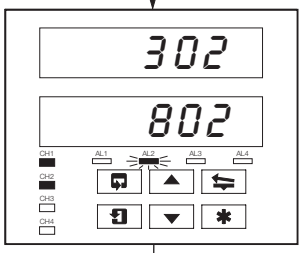
Fig. 4.3 Alarm LED Indications

4.3.3 Using the Alarm Acknowledge Page



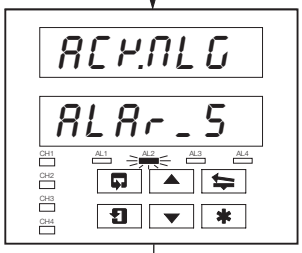
No Alarm Active
No LED indicators illuminated.

Alarm Activated

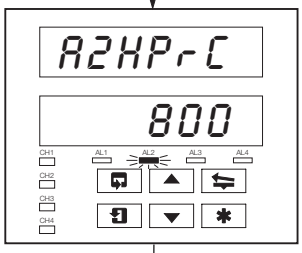


Alarm Active
AL2 LED indicator flashing, indicating active alarm on channel 2.

Use ⊡ key to go to top of **Alarm Acknowledge Page**.

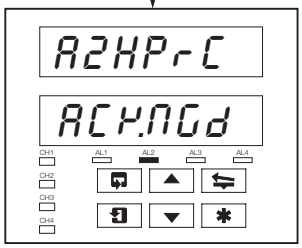


Alarm Acknowledge Page
Use ⊡ key to advance to next frame



Alarm Identity
Upper display: shows the alarm identity and type.

Lower Display: shows the trip level of the alarm identified in the upper display.



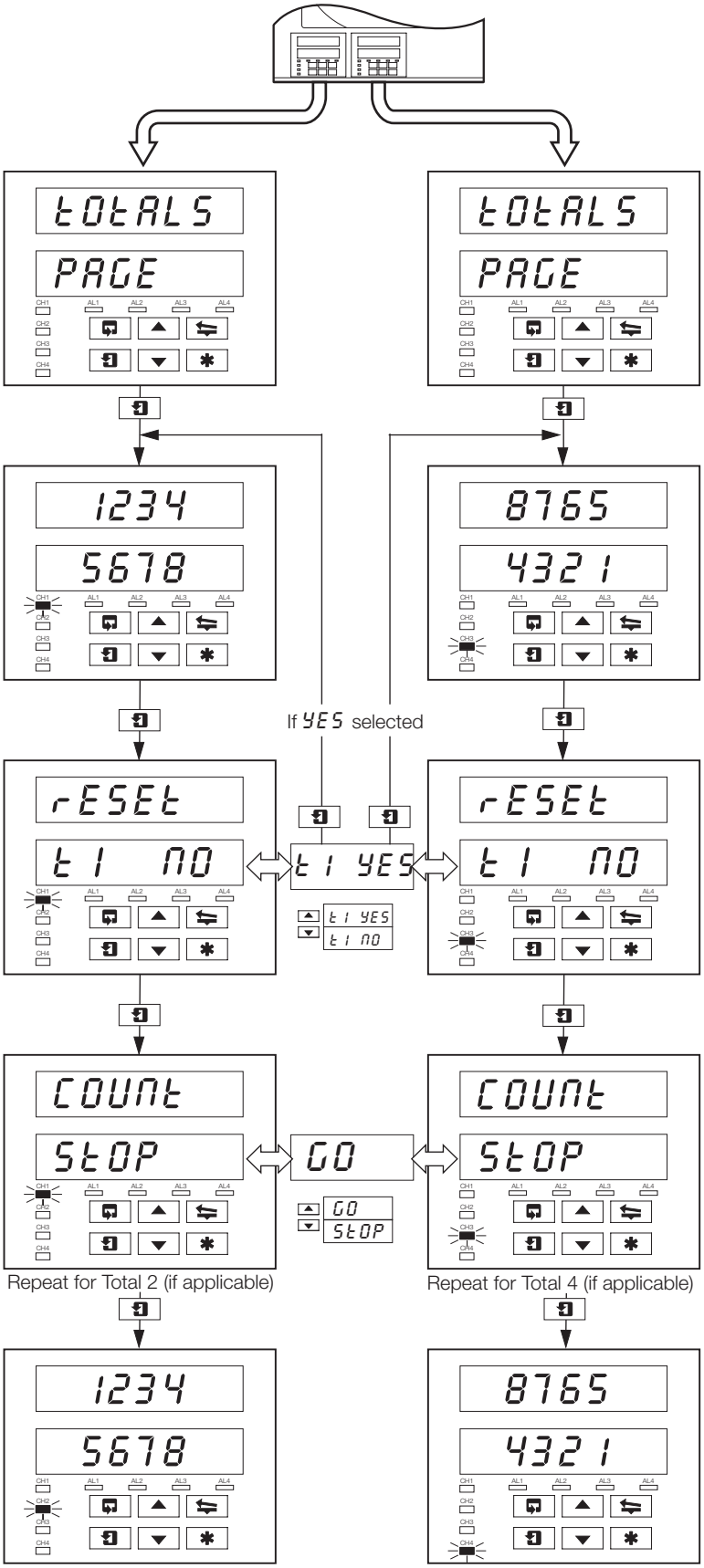
Acknowledge Alarm
Use ▲ key to acknowledge the alarm (see). When the alarm is acknowledged, 'ACK.NGd' is displayed and a constant LED indicates the acknowledged alarm.

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.

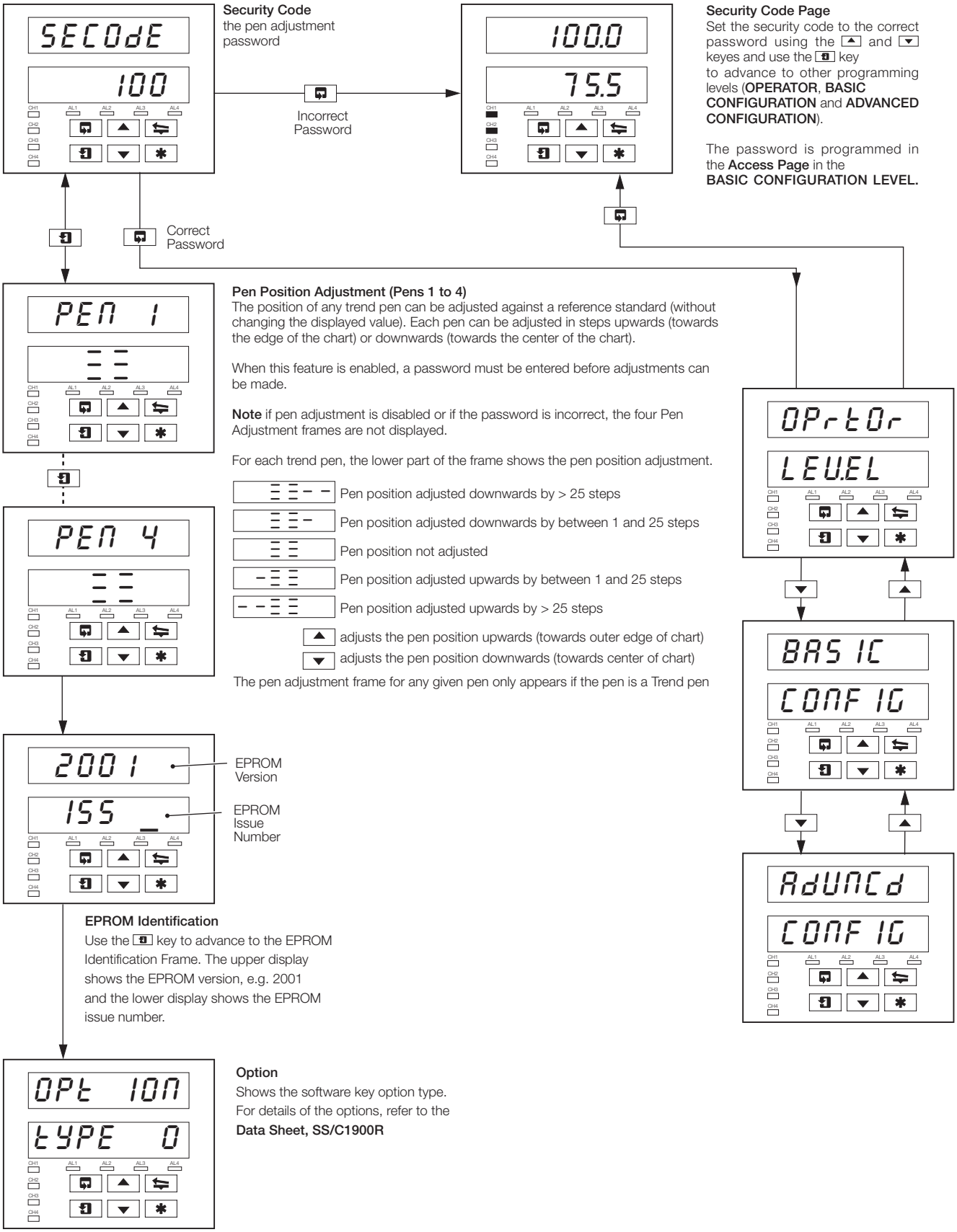
Note. If the Counter Stop/Go is disabled in **Set Up Totals Page**, the frame can be viewed but not altered. If a digital signal is assigned to the **Totalizer Stop/Go**, an active digital signal sets the counter to GO and the Counter cannot be stopped from the front panel.

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**.



5 SIMPLE FAULT FINDING

Symptom	Possible Cause	Action
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

Item	Part No.
Pen Capsules (pack of 3)	
Black	C1900/0119
Blue	C1900/0120
Red	C1900/0121
Green	C1900/0122
Violet*	C1900/0123
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	
24V	B11071 (4A)
115V	B11070 (1A)
230V	B11069 (500mA)

*True time line event option only.

NOTES