

COMMANDER 1900 Series
Circular Chart Recorders

Agents Manual

All Versions

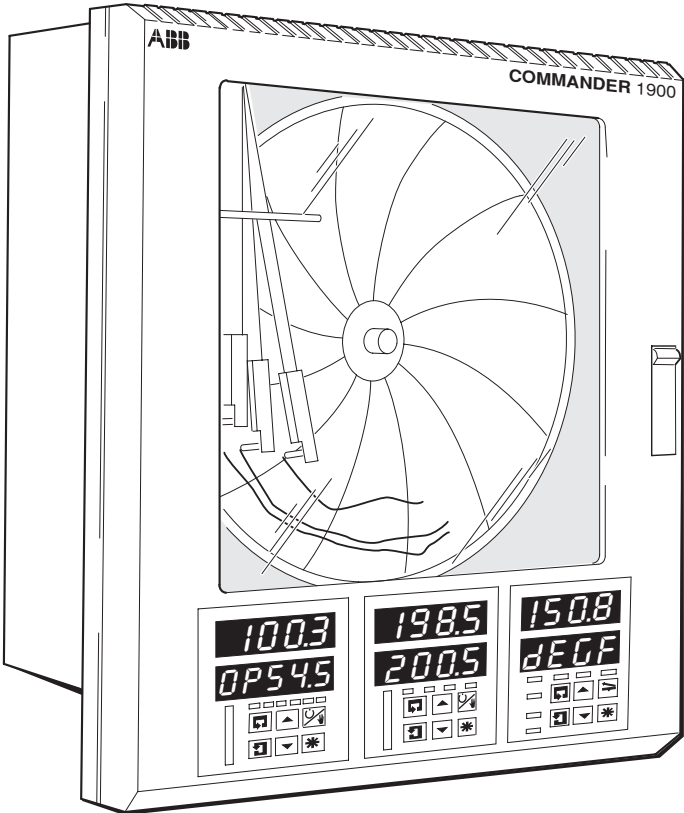


ABB AUTOMATION

The Company

ABB Automation is an established world force in the design and manufacture of instrumentation 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.

The NAMAS Calibration Laboratory No. 0255 is just one of the ten flow calibration plants operated by the Company, and is indicative of ABB Automation's dedication to quality and accuracy.

BS EN ISO 9001



St Neots, U.K. – Cert. No. Q5907
Stonehouse, U.K. – Cert. No. FM 21106

EN 29001 (ISO 9001)



Lenno, Italy – Cert. No. 9/90A



Stonehouse, U.K.

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.

Although **Warning** hazards are related to personal injury, and **Caution** hazards are associated with equipment or property damage, 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 Marketing Communications Department, ABB Automation.

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.

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1 INTRODUCTION

The COMMANDER 1900 Series of documentation is shown in Fig. 1.1.

The COMMANDER 1900 instrument can be configured for specific applications using different combinations of front panels and modules. The **COMMISSIONING LEVEL** is used in the setting up and calibration of the instrument.

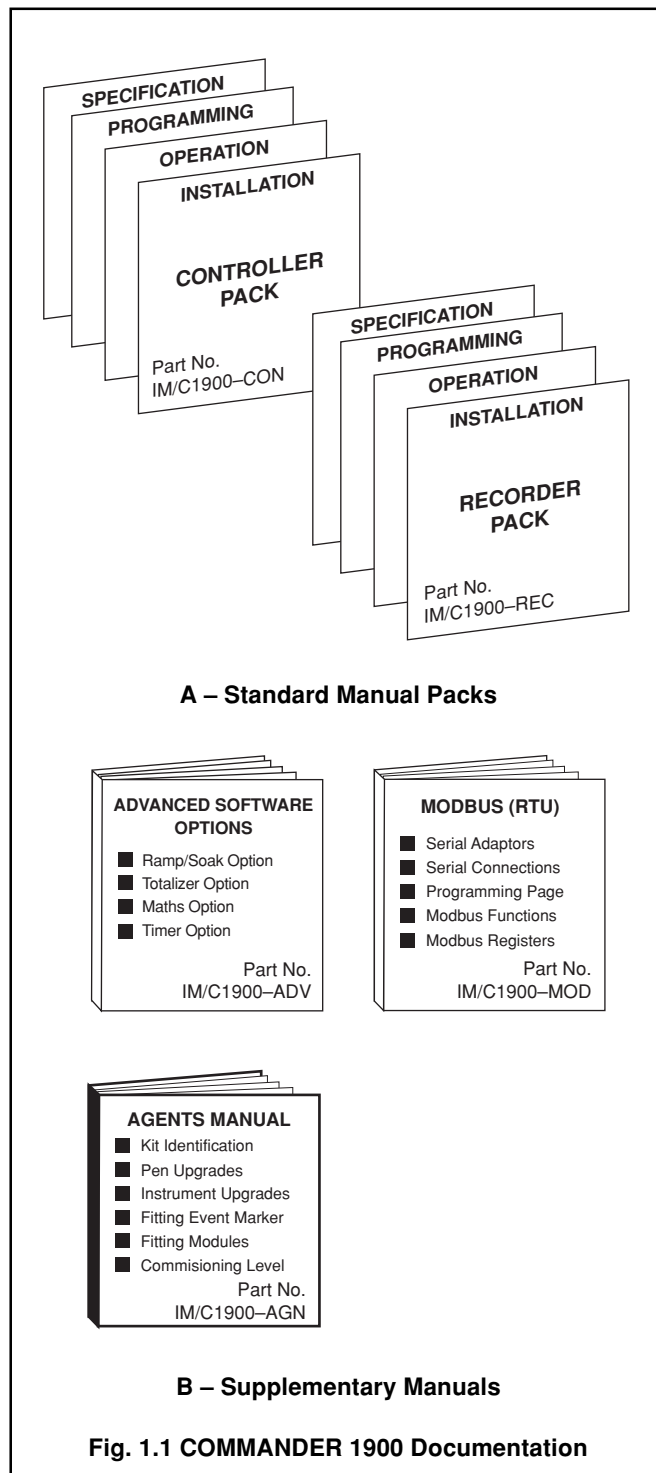


Fig. 1.1 COMMANDER 1900 Documentation

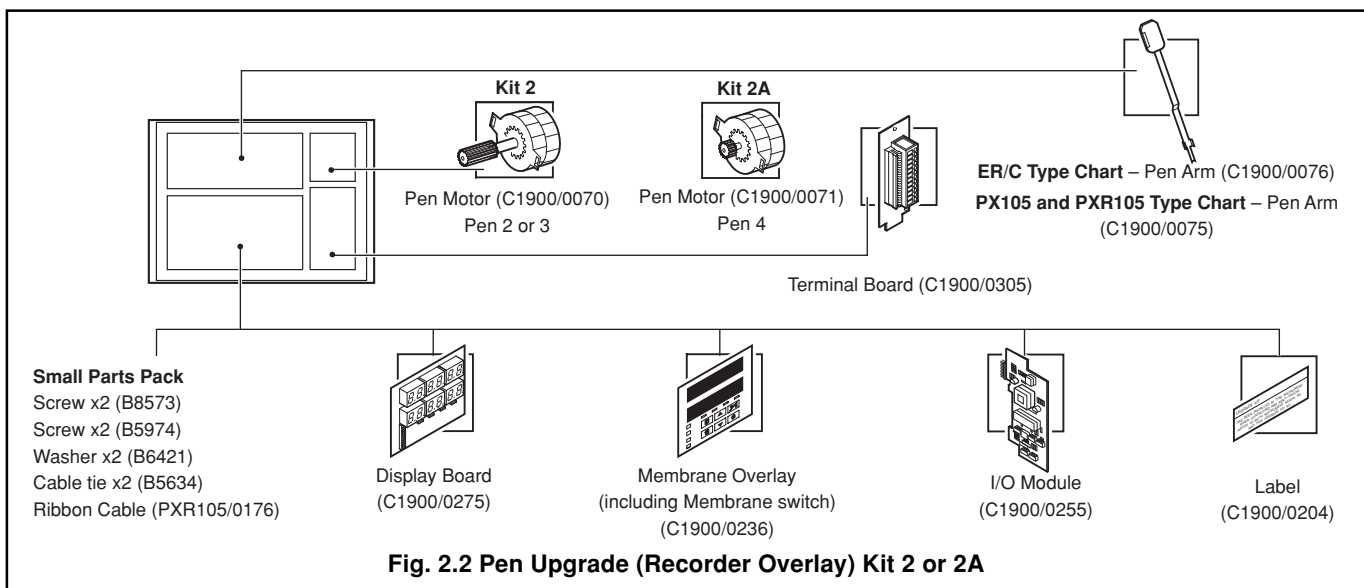
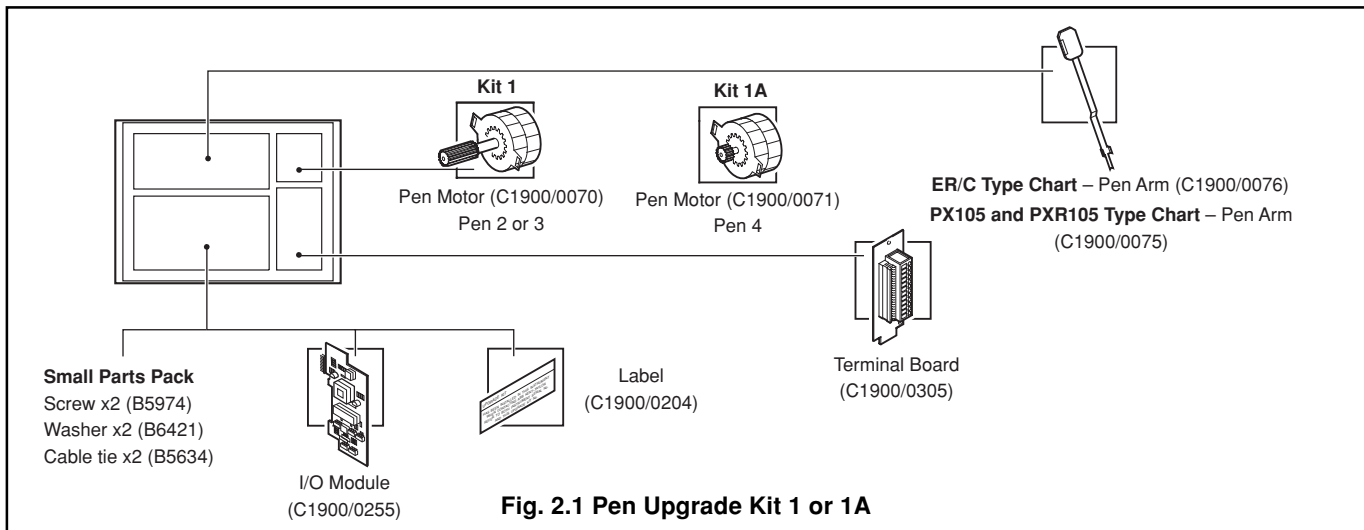
2 PREPARATION

2.1 Agents Upgrade Kit Identification – Figs. 2.1 to 2.6

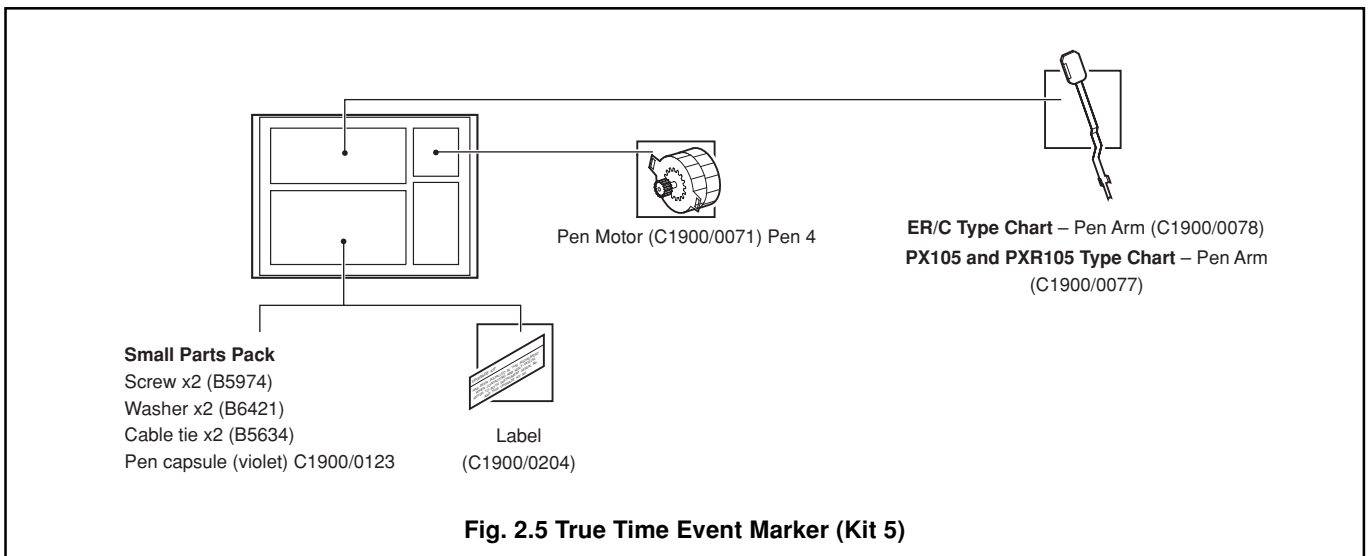
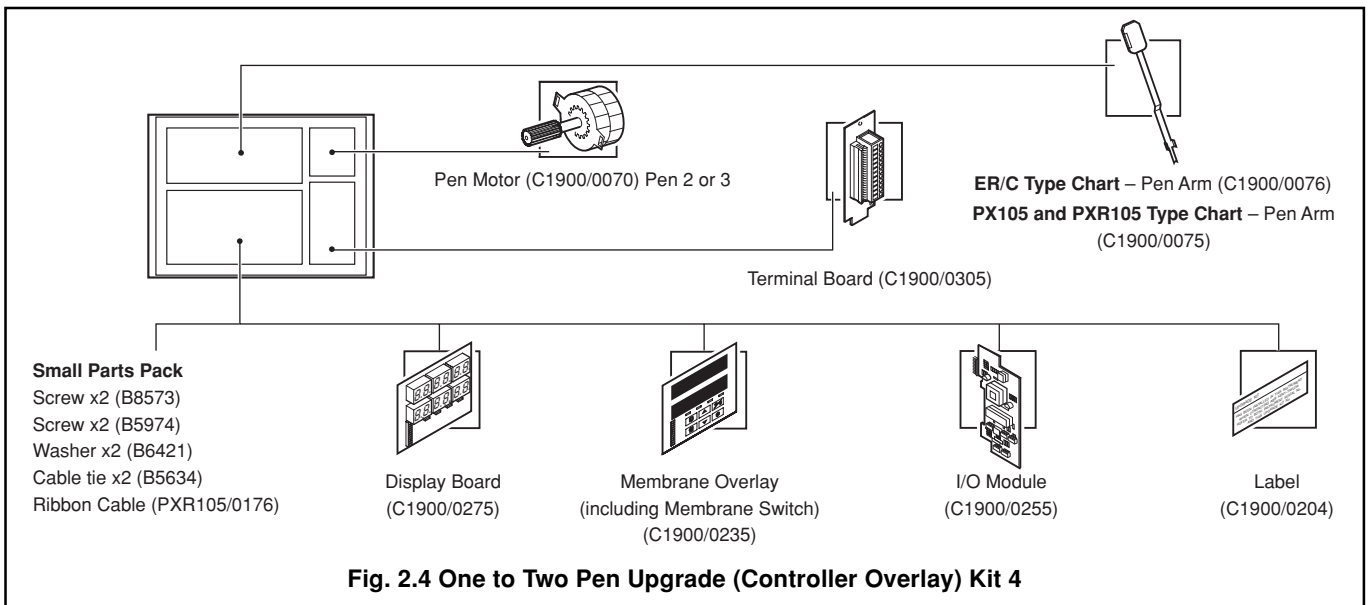
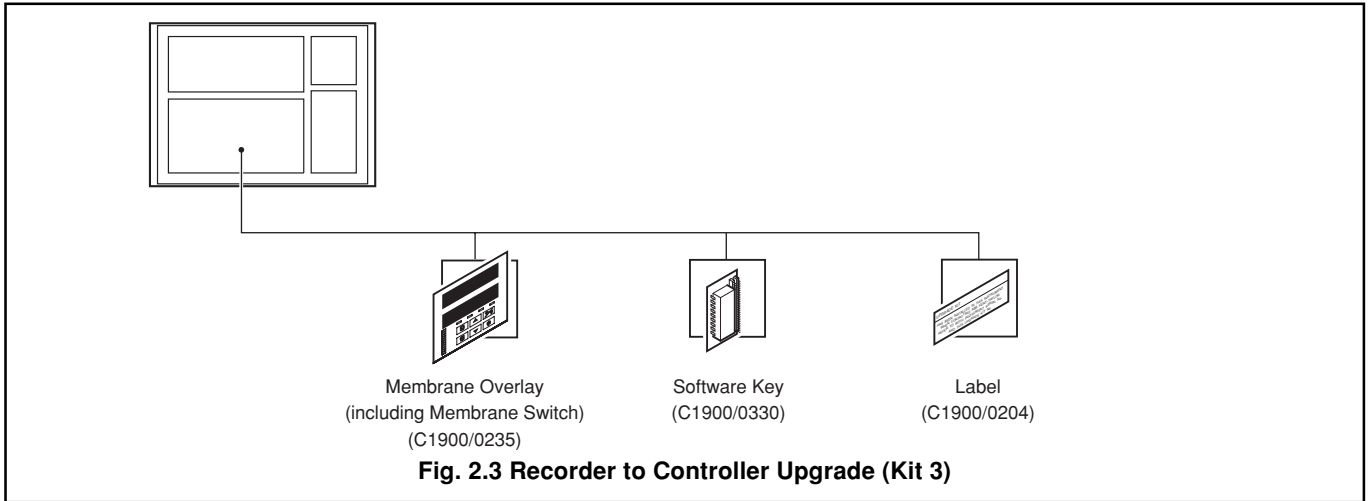
i Information. Due to variations in pen geometry and position of chart fixings it is not possible to convert instruments from one chart/pen type to another, i.e. ER/C to PX105/ PXR105. The 5th code letter in the instrument code identifies the chart type (see *Section 2 of the Installation Guide*). For example, an ER/C type chart can only be fitted to instruments with J or R in the instrument code number.

Similarly, when fitting additional or replacement pens, ensure that the correct pen arm is used. Pen arms used with ER/C type charts are identified by a hole located near the motor end of the arm. This hole is not visible on pen arms used with PX105 and PXR105 charts.

Kit Number	Purpose	Part Number ER/C Type Chart	Part Number PX105 and PXR105 Type Chart
Kit 1	Two or three pen upgrade	C1900/0720	C1900/0726
Kit 1A	Fourth pen upgrade	C1900/0721	C1900/0727
Kit 2	Pen upgrade (Recorder Overlay)	C1900/0722	C1900/0728
Kit 2A	Fourth pen upgrade (Recorder Overlay)	C1900/0723	C1900/0729
Kit 3	Recorder to Controller upgrade	C1900/0724	C1900/0724
Kit 4	One to two pen upgrade (Controller Overlay)	C1900/0725	C1900/0730
Kit 5	True time event marker	C1900/0708	C1900/0731



...2.1 Upgrade Kit Identification



...2 PREPARATION

...2.1 Upgrade Kit Identification

Identify the upgrade kit required and the relevant faceplate positions as detailed in Fig 2.6

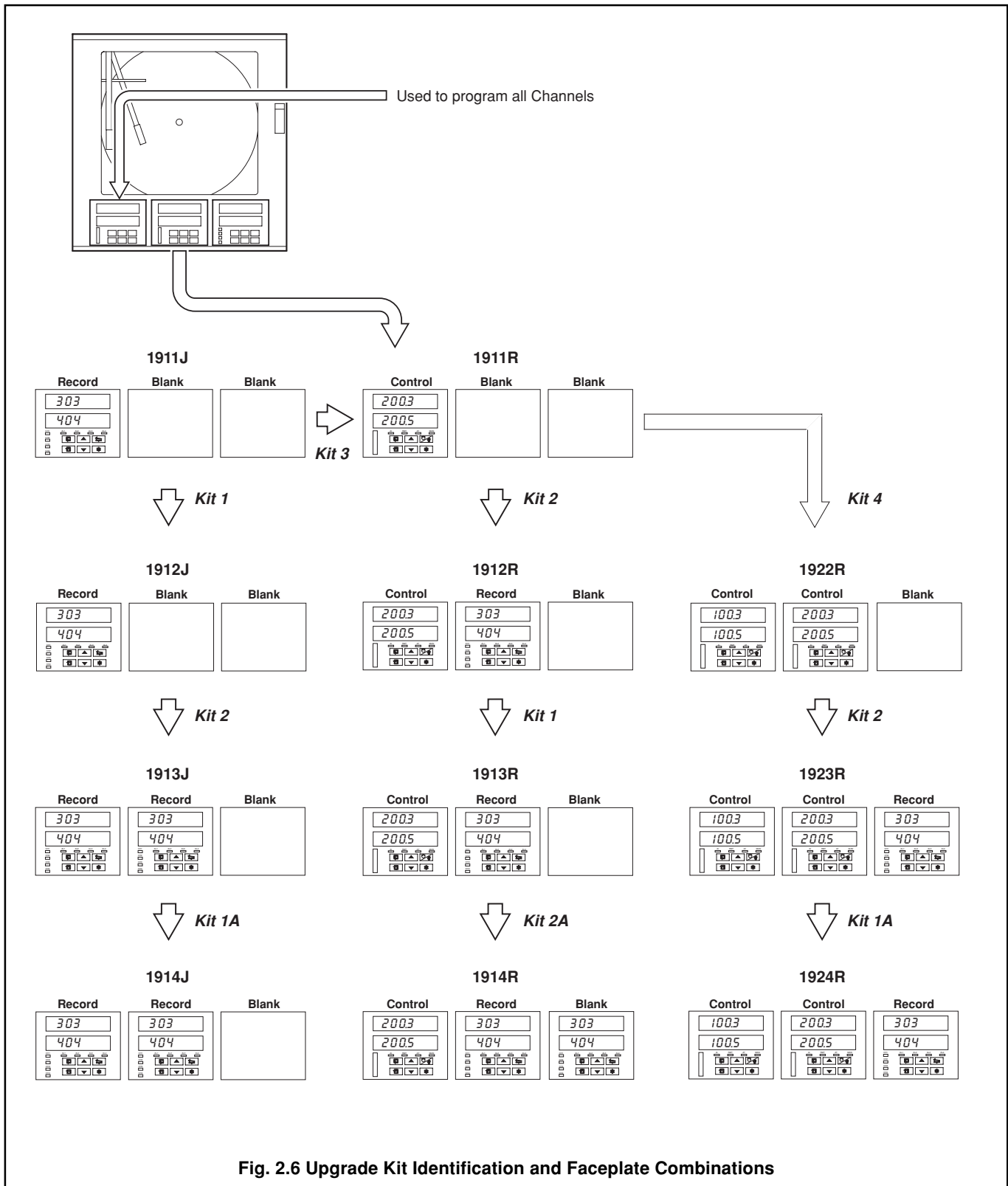


Fig. 2.6 Upgrade Kit Identification and Faceplate Combinations

3 FITTING ADDITIONAL PEN(S)

To fit additional pen(s) perform **all** the following procedures:

- a) Fit module in required position – see Section 3.1.
- b) Fit the required motor and pen assembly – see Section 3.2.
- c) Fit the required display board – see Section 3.3.
- d) Access the **COMMISSIONING LEVEL** to change the instrument type and re-configure instrument – see Section 3.4.

3.1 Fitting a Standard Input/Output Module – Fig. 3.1 and 3.2



Warning. Before making any connections, ensure that the power supply, any high voltage-operated control circuits and high common mode voltages are switched off.

- a) Disconnect all power supplies from the instrument.
- b) Identify the module position – see Fig. 3.1.

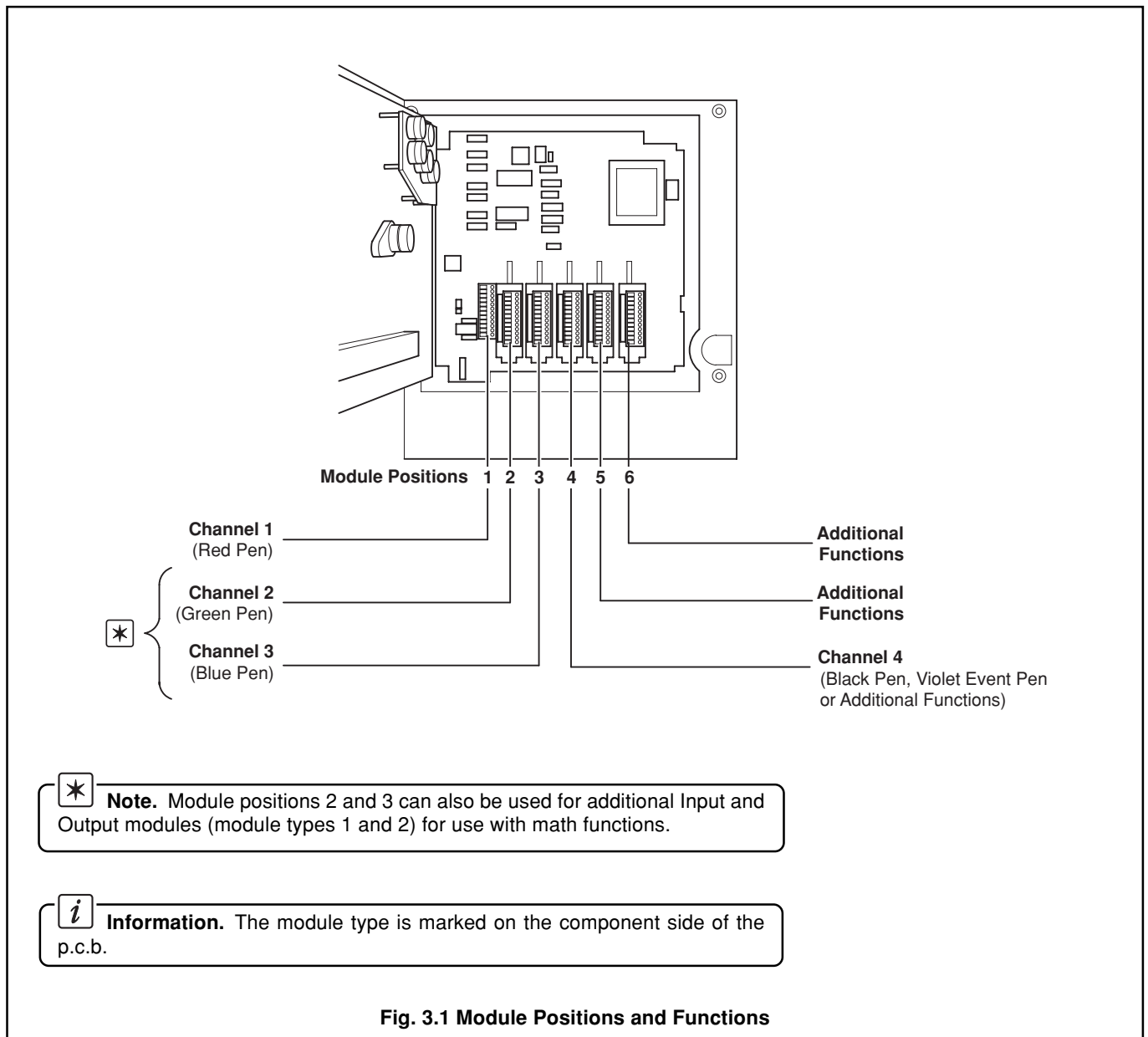


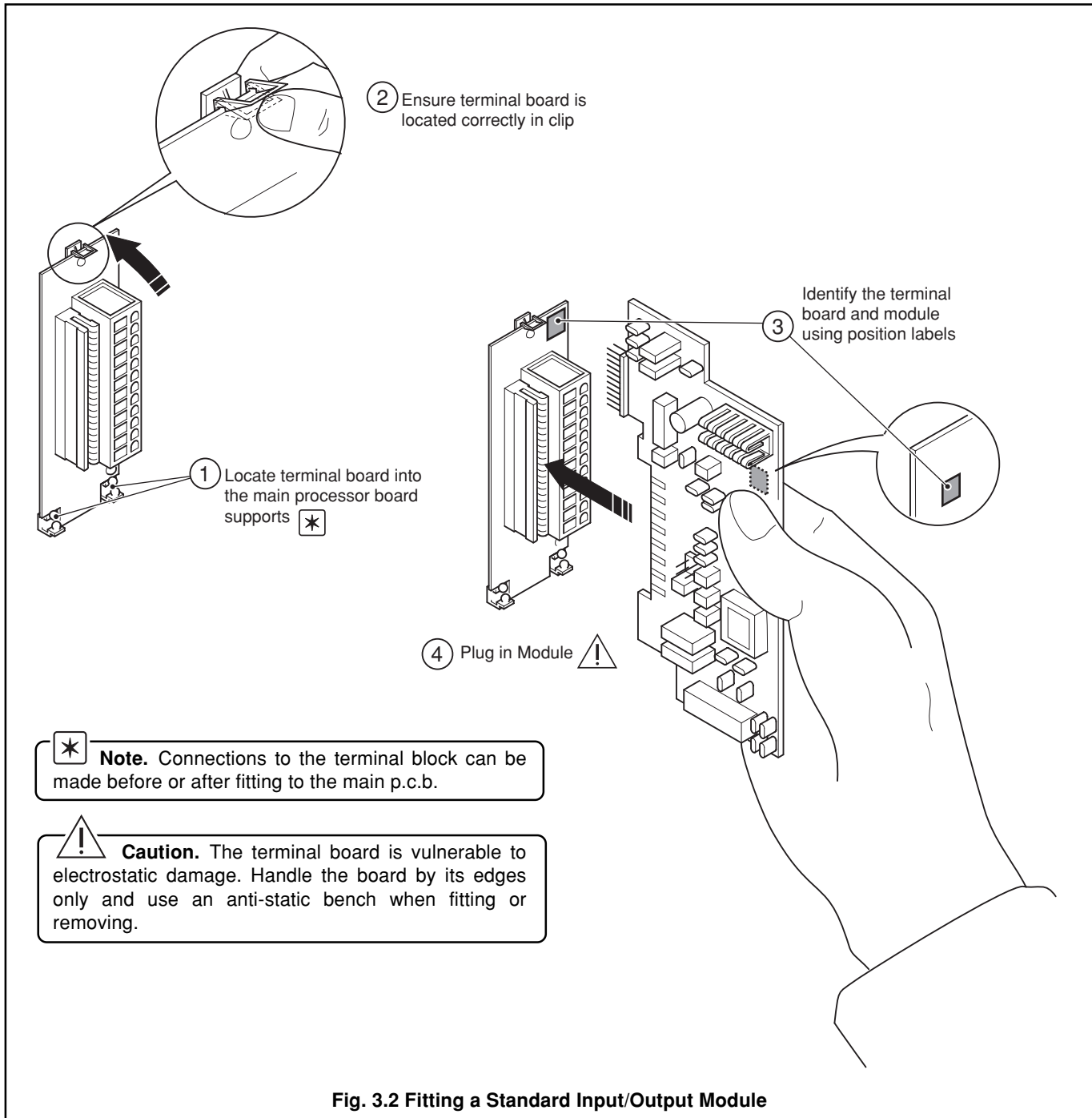
Fig. 3.1 Module Positions and Functions

...3 FITTING ADDITIONAL PEN(S)

...3.1 Fitting a Standard Input/Output Module

- c) If necessary, remove and discard knockout(s) from instrument case.
- d) Carefully clean out hole(s) and ensure all debris is removed from inside the instrument.
- e) Route the leads and cables into the case.
- f) Identify the module position.
- g) Fit the required module as detailed in Fig. 3.2.

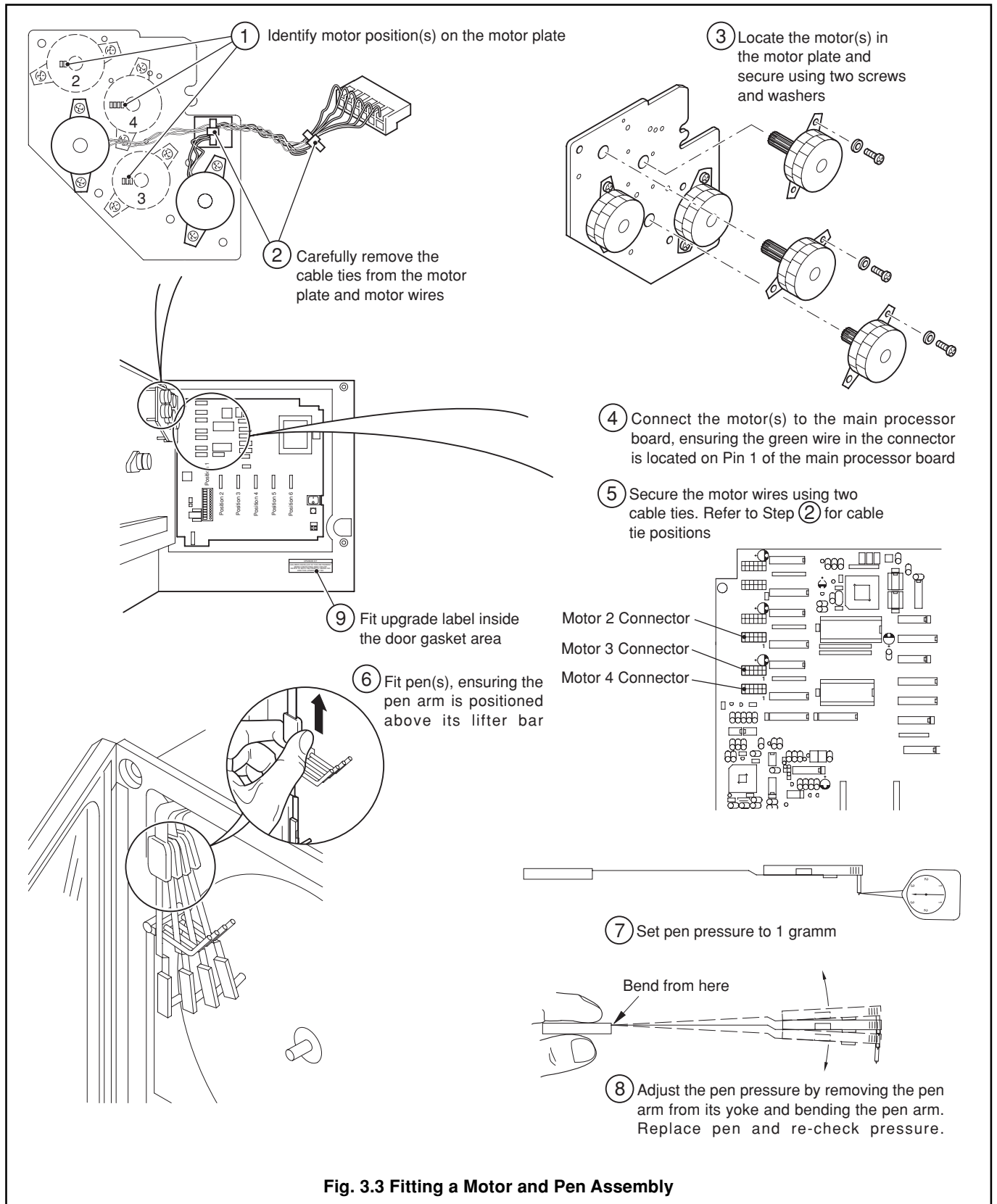
On completion proceed to Section 3.2.



3.2 Fitting a Motor and Pen Assembly – Fig. 3.3

a) Fit the required motor and pen assembly as detailed in Fig. 3.3.

On completion proceed to Section 3.3.



...3 FITTING ADDITIONAL PEN(S)

3.3 Fitting a Display Board – Fig. 3.4

a) Fit the required display board as detailed in Fig. 3.4.

On completion proceed to Section 3.4.

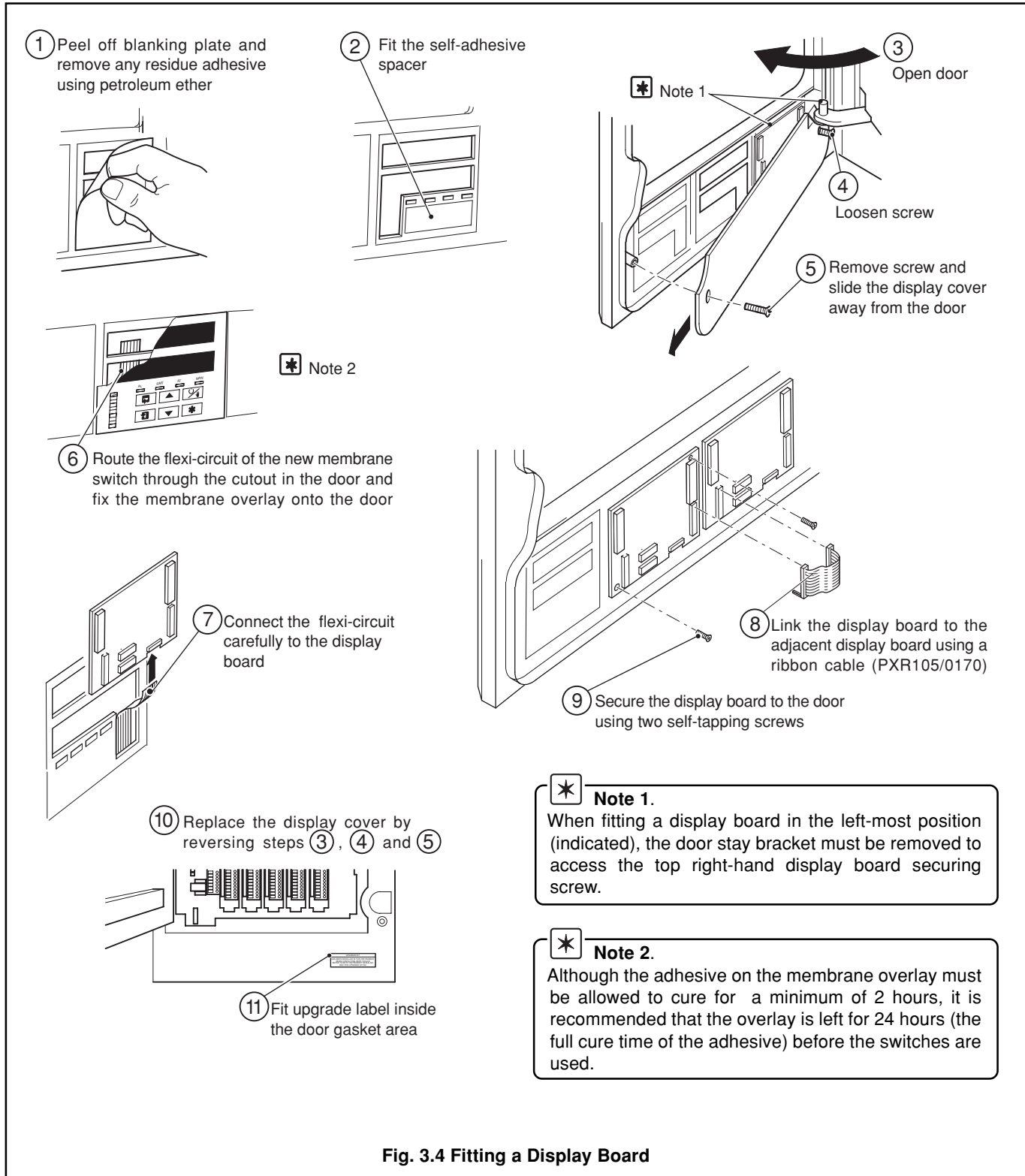


Fig. 3.4 Fitting a Display Board

3.4 Changing the Software Configuration – Fig. 3.5

To enable the use of the additional pen(s), it is necessary to change a number of parameters in the **COMMISSIONING LEVEL**:

- Access the **COMMISSIONING LEVEL** – see Fig. 3.5.
- Select the **Instrument Type** frame and set the instrument type required – see Section 8.1.
- Assign the new inputs to a process variable, remote set point or position feedback in the **Input Assignment Page** – see Section 8.4.
- Assign the new pen(s) to a process variable, remote set point or position feedback in the **Pen Assignment Page** – see Section 8.5.
- Calibrate the new pen(s) in the **Pen Calibration Page** – see Section 8.8.



Note.

- Inputs and analog outputs are calibrated at the factory and do not require re-calibration.
- Some parameters are reset during the start-up sequence. Therefore, after the instrument has been re-configured, the instrument must be switched OFF and then switched ON.

- If a new display is fitted, set the display brightness and test in **Display Set Up Page** – see Section 8.9.

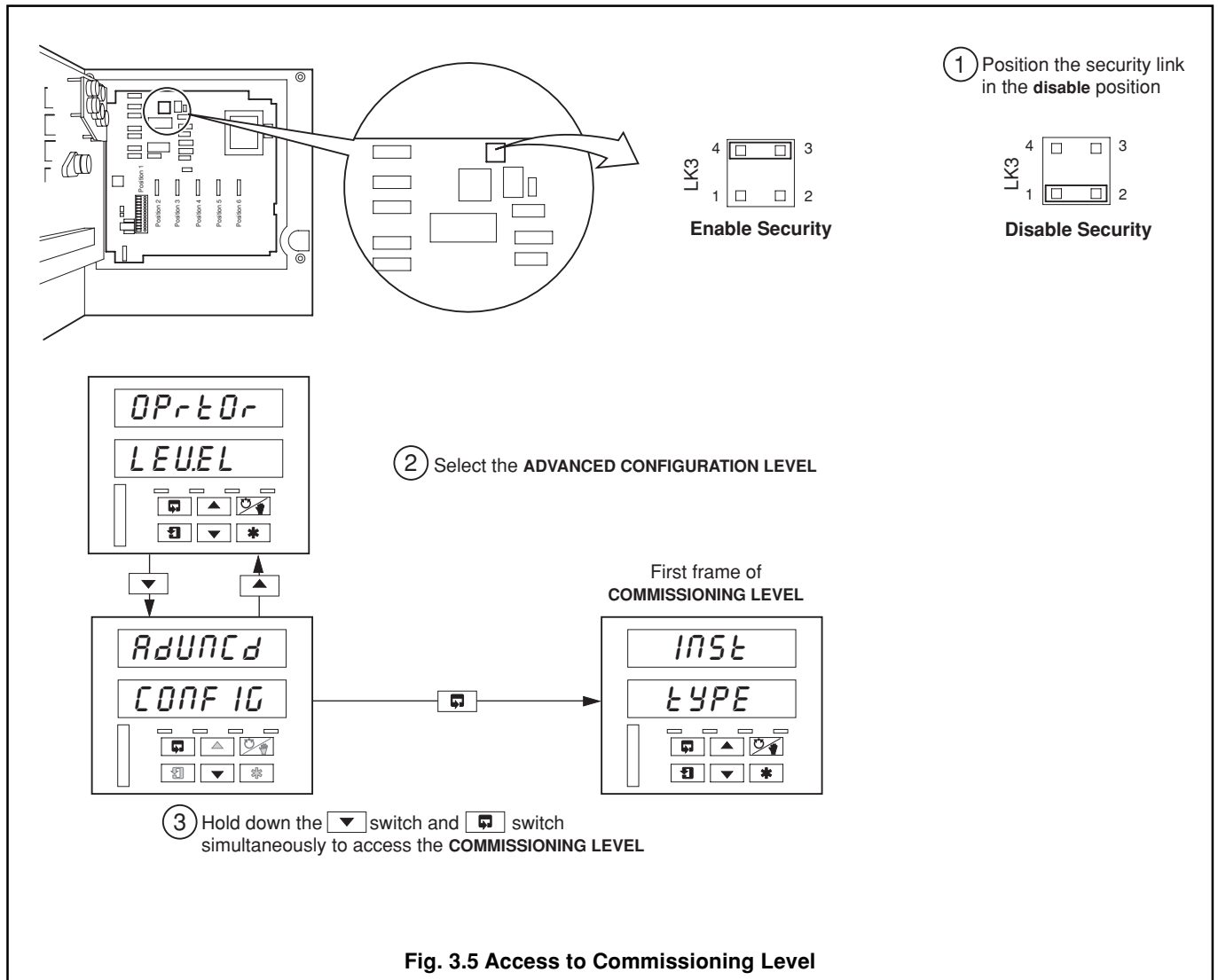


Fig. 3.5 Access to Commissioning Level

4 RECORDER TO CONTROLLER UPGRADE

To upgrade a recorder instrument to a controller instrument perform **all** the following procedures:

- Replace recorder faceplate(s) with controller faceplate(s) – see Section 4.1.
- Fit correct software key to allow access to control parameters – see Section 4.2.
- Access the **COMMISSIONING LEVEL** to change the instrument type and re-configure instrument – see Section 4.3.

4.1 Fitting a Controller Faceplate

- Fit a controller faceplate as shown in Fig. 4.1.

On completion proceed to Section 4.2.

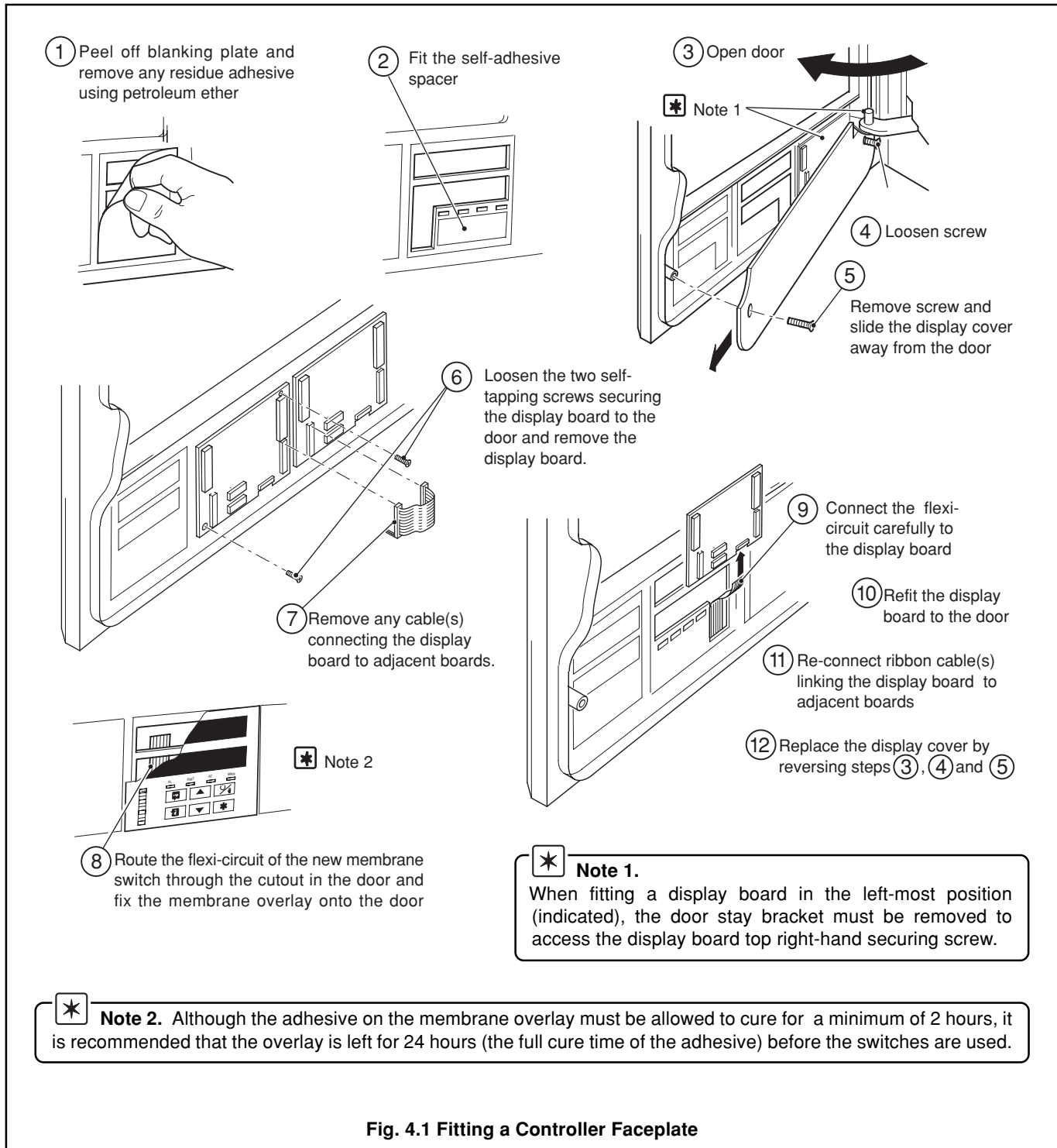
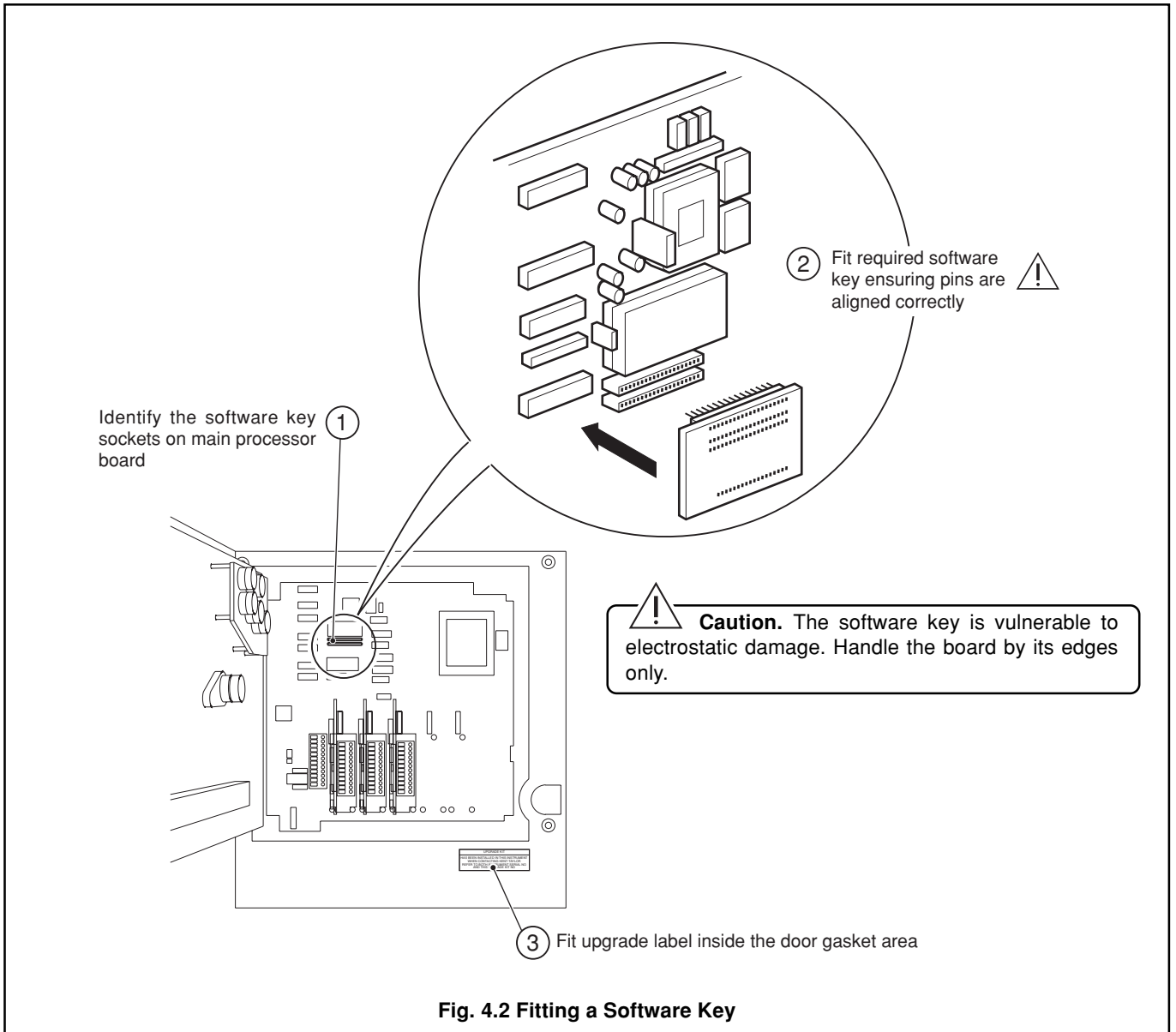


Fig. 4.1 Fitting a Controller Faceplate

4.2 Fitting a Software Key

- a) Fit the required software key as shown in Fig. 4.2.
- b) Switch on and configure the instrument using the *Advanced Software Options* manual.

On completion proceed to Section 4.3.



...4 RECORDER TO CONTROLLER UPGRADE

4.3 Changing the Software Configuration – Fig. 4.3

To use the instrument as a controller, it is necessary to change a number of parameters in the **COMMISSIONING LEVEL**:

Note. This procedure must also be completed when a *replacement* processor board has been fitted to controller versions of the instrument.

- Access the **COMMISSIONING LEVEL**.
- Select the **VERSION** page and set the lower display to CONtrL.
- Select the **Instrument Type** frame and set the instrument type required – see Section 8.1.
- Re-assign the inputs to a process variable, remote set point and position feedback signals in the **Input Assignment Page** – see Section 8.3.

Note.

- Inputs and analog outputs are calibrated at the factory and do not require re-calibration.
- Some parameters are reset during the start-up sequence. Therefore, after the instrument has been re-configured, the instrument must be switched OFF and then switched ON.

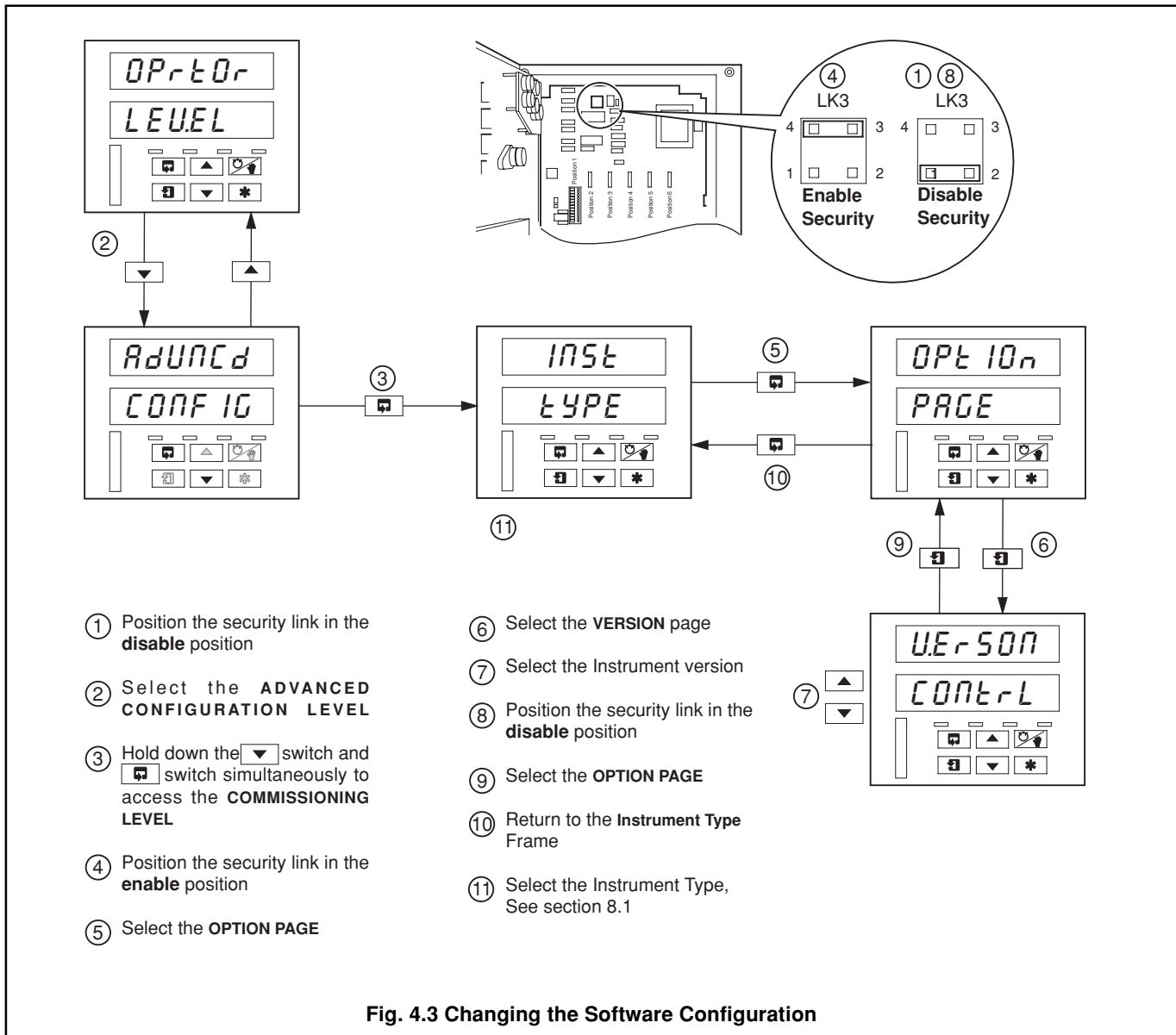


Fig. 4.3 Changing the Software Configuration

5 FITTING A TRUE TIME EVENT MARKER

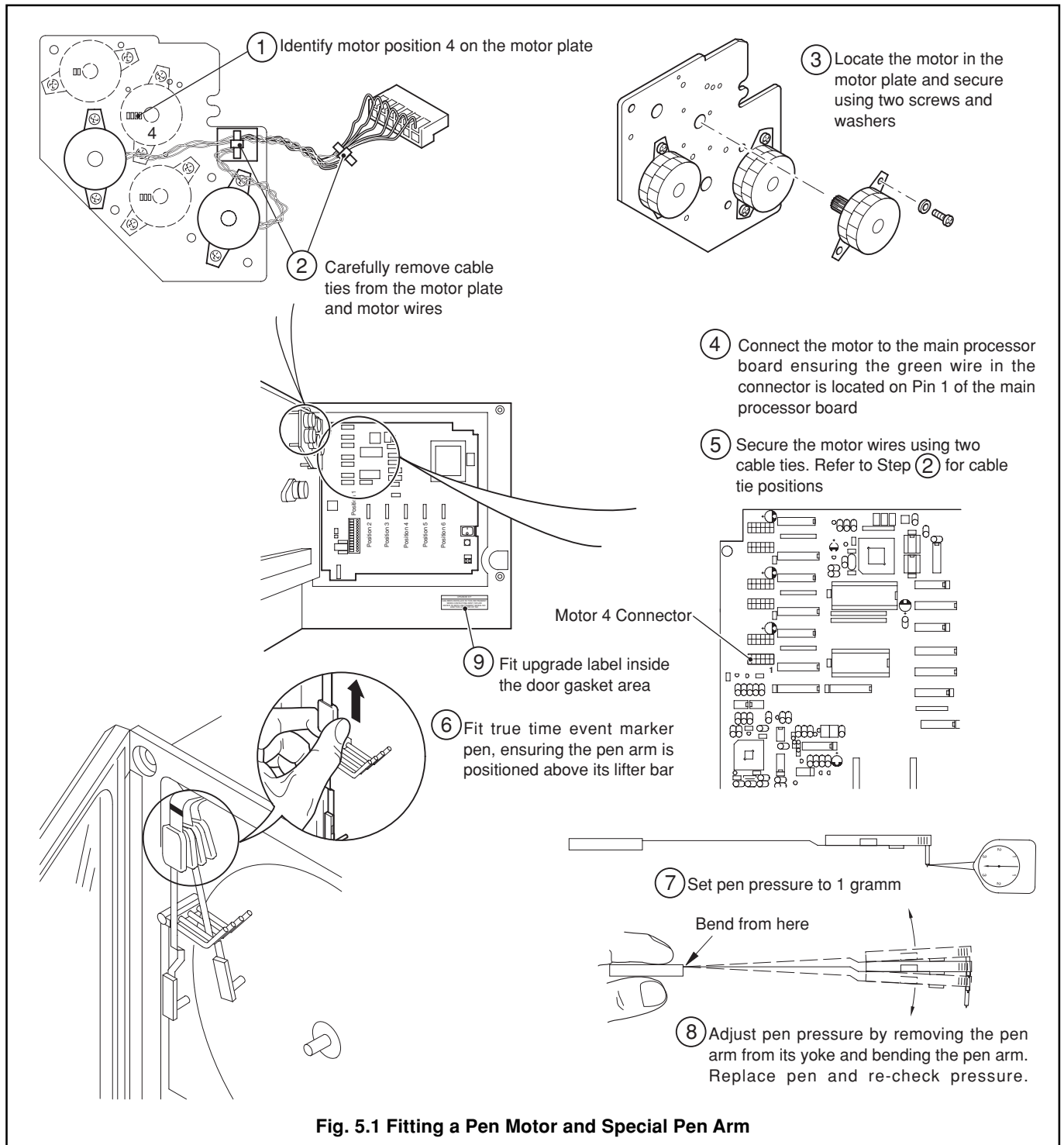
To fit a true time event marker perform **all** the following procedures:

- Fit pen motor in position 4 and special pen arm assembly to pen bracket 4 – see Section 5.1.
- Access the **COMMISSIONING LEVEL** to select event pen option – see Section 5.2.
- Set up pen 4 event marker sources in **Set Up Range Page, BASIC CONFIGURATION LEVEL**.

5.1 Fitting a Motor and True Time Event Marker

- Fit a new motor in position 4 on the motor plate and a true time event pen arm assembly to pen bracket 4 (black identification band) – see Fig 5.1.

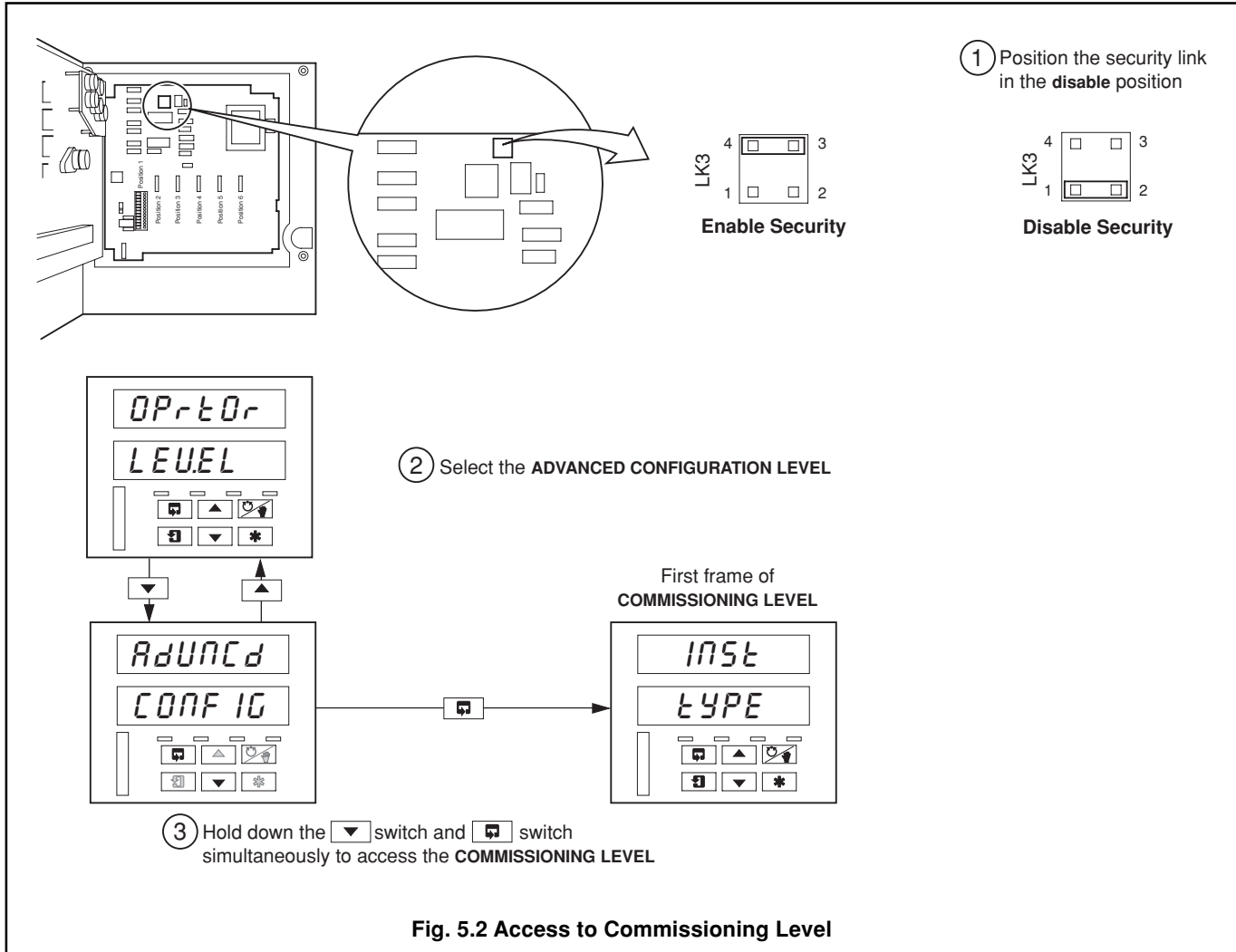
On completion proceed to Section 5.2.



...5 FITTING A TRUE TIME EVENT MARKER

5.2 Changing the Software Configuration – Fig. 5.2

- Switch on the instrument.
- Access the **COMMISSIONING LEVEL** – see Fig. 5.2.
- Set the **Event Option Enable** frame to Yes – see Section 8.1.
- Set up pen 4 event marker sources in the **Set Up Pen Range Page, BASIC CONFIGURATION LEVEL**.



6 FITTING ADDITIONAL MODULES



Information.

- There are five module types – standard input/output, analog input relay, four relay, digital input/output and RS 485 serial communications.

6.1 Fitting an Input and Relay Module



Warning. Before making any connections, ensure that the power supply, any high voltage-operated control circuits and high common mode voltages are switched off.

- Disconnect all power supplies from the instrument.
- Identify the module position – see Fig. 6.1.

Module Type	Module Part Number
Standard Input/Output	C1900/0255
Analog Input Relay	C1900/0256
Four Relay	C1900/0285
Digital Input/Output	C1900/0325
RS 485 Serial Communications (Modbus)	C1900/0295

Table 6.1 Module Identification

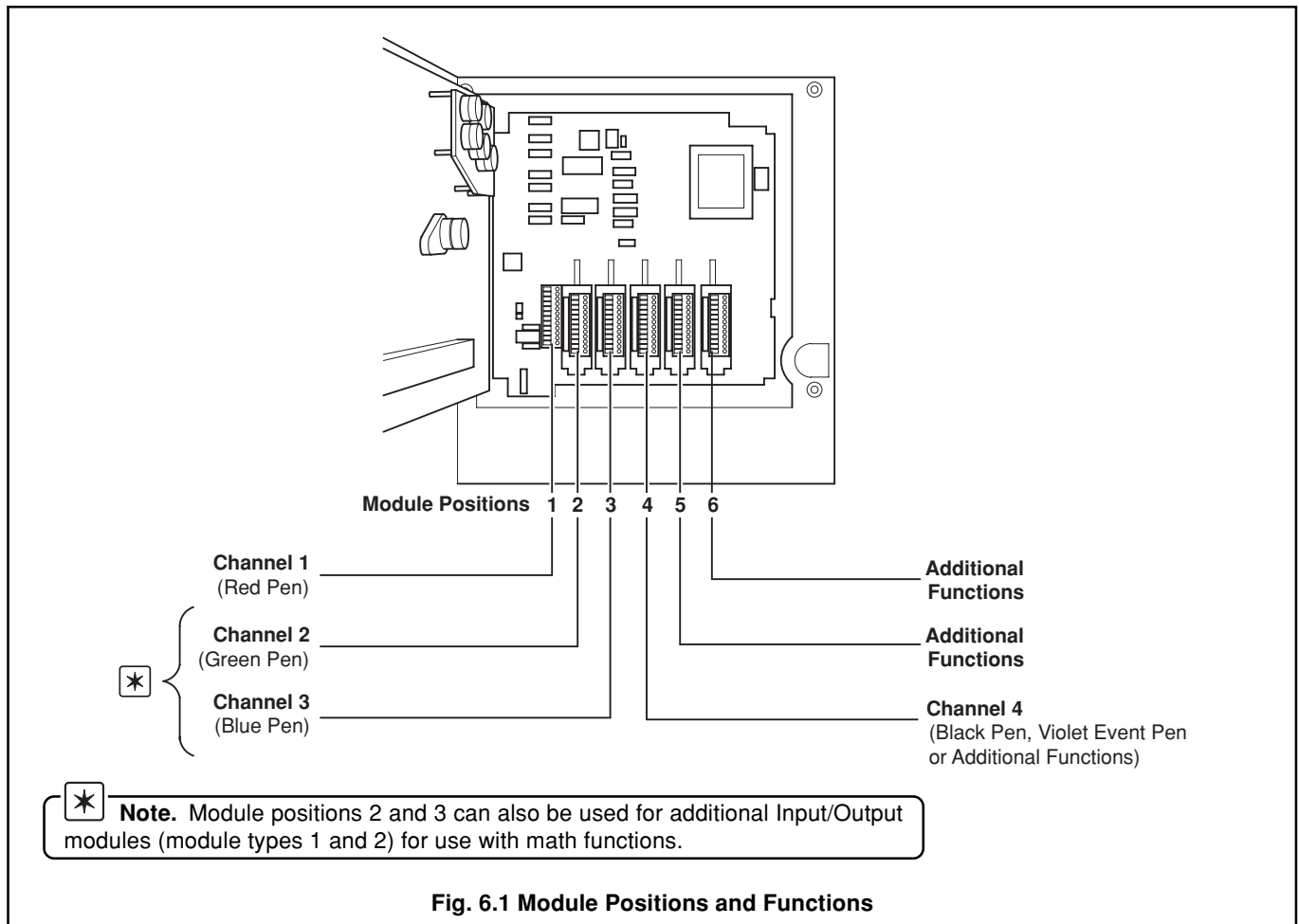


Fig. 6.1 Module Positions and Functions

...6 FITTING ADDITIONAL MODULES

...6.1 Fitting an Input and Relay Module

- c) If necessary, remove and discard knockout(s) from instrument case.
- d) Carefully clean out hole(s) and ensure all debris is removed from inside the instrument.
- e) Route the leads and cables into the case.
- f) Identify the module position.
- g) Fit the required module as shown in Fig. 6.2.

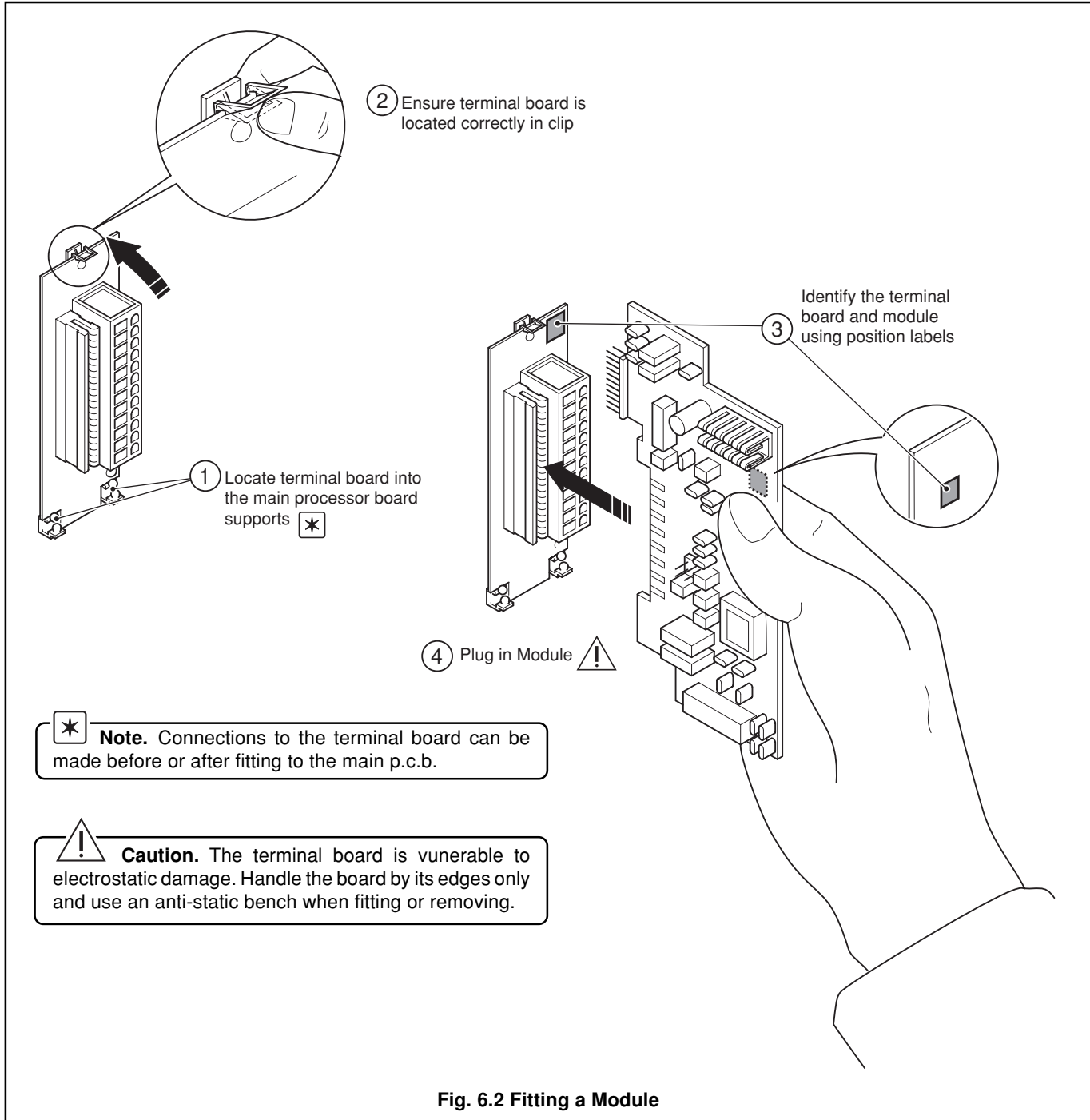


Fig. 6.2 Fitting a Module

7 ADDING ADVANCED SOFTWARE OPTIONS

To add additional software options perform **all** the following procedures:

- Fit correct software key to allow access to control parameters.
- Configure the instrument using the *Advanced Software Options Manual, IM/C1900-ADV*

7.1 Software Key Identification – Fig. 7.1

The software key is a p.c.b. assembly which must be fitted to the main processor board to enable access to the additional programming pages required to configure the instrument.

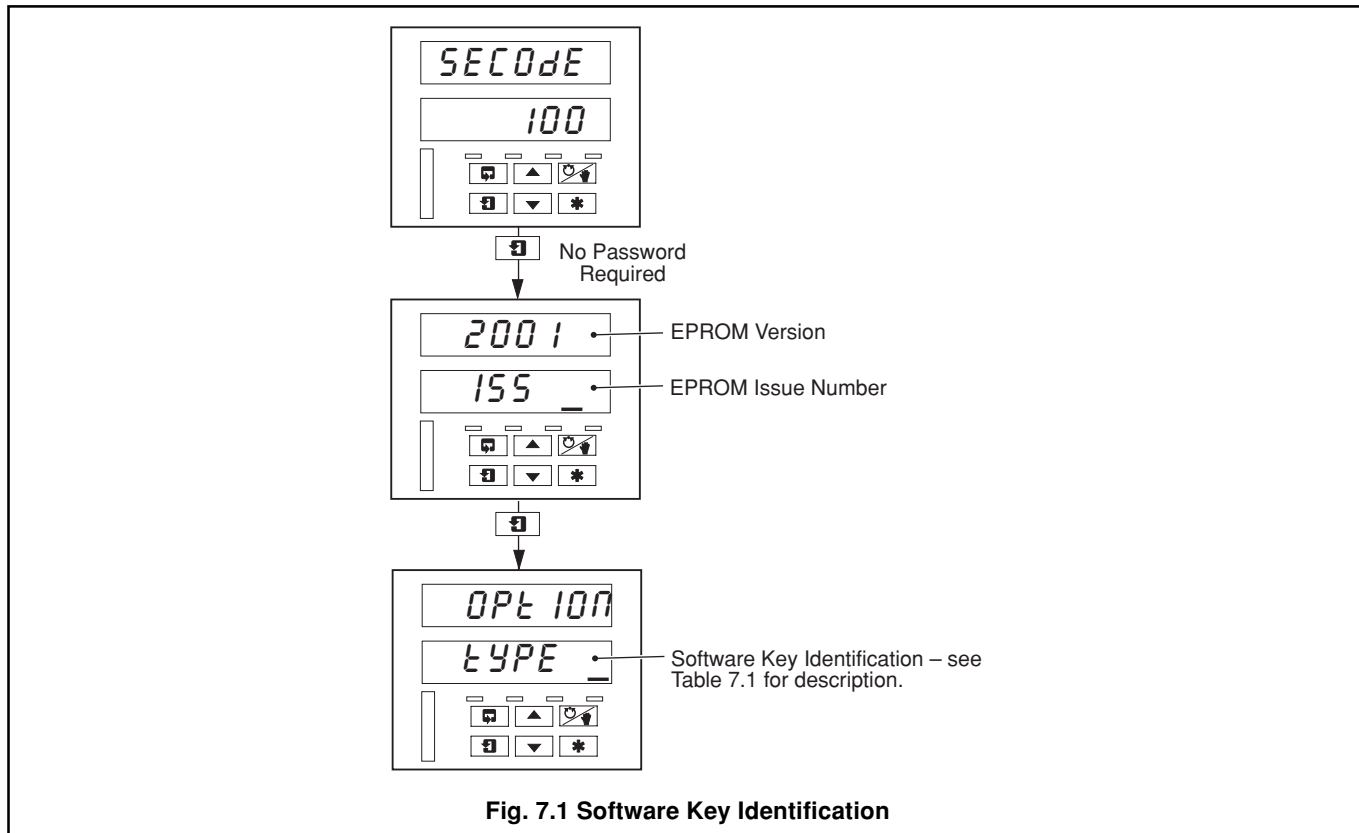


Fig. 7.1 Software Key Identification

Software Key	OptionType	Part Number	
		Recorder Version	Controller Version
Standard Controllers and Recorders •1			
Totalizer	<i>B</i>	C1900/0336	C1900/0331
Ramp/Soak	<i>S</i>	–	C1900/0332
Math & Timer	<i>R</i>	C1900/0337	C1900/0333
Totalizer, Math & Timer	<i>B</i>	C1900/0338	C1900/0334
Totalizer, Ramp/Soak, Maths & Timer	<i>C</i>	–	C1900/0335
Pasteurizer Versions •2			
1951J Hot Product Recorder	<i>G</i>	C1900/0353	
1952R Hot Product Recorder/Controller	<i>H</i>	–	C1900/0354
1953R Hot & Cold Product Recorder/Controller	<i>J</i>	–	C1900/0355
Retort Controllers •3			
1960K	<i>K</i>	–	C1900/0356
1960L	<i>L</i>	–	C1900/0357

•1 Refer to IM/C1900-ADV for additional programming and operating information

•2 Refer to IM/C1900-PAS for additional programming and operating information

•3 Refer to IM/C1900-MPC for additional programming and operating information

Table 7.1 Software Key Identification

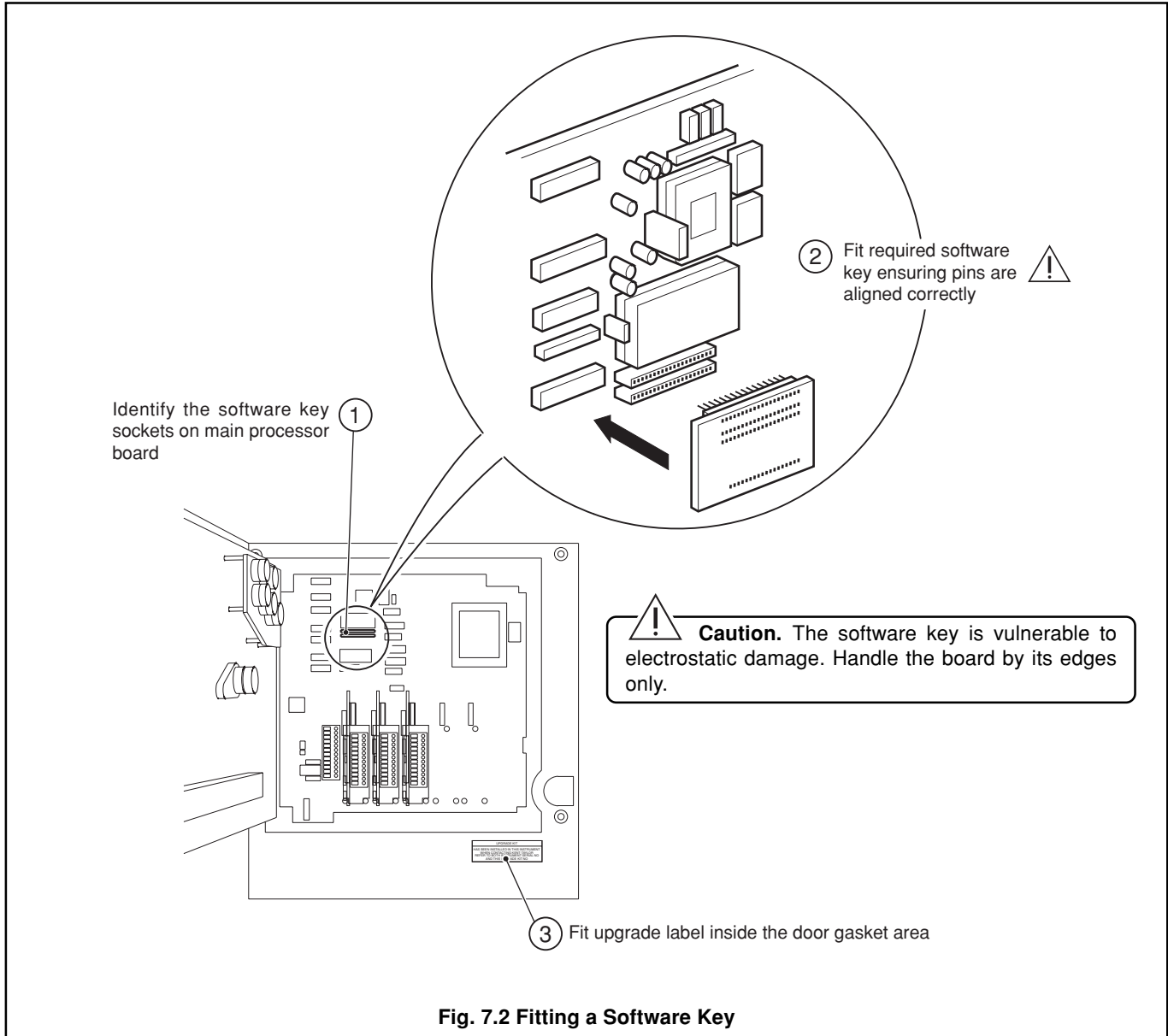
...7 ADDING ADVANCED SOFTWARE OPTIONS

7.2 Fitting a Software Key – Fig. 7.2



Warning. Ensure all power supply, any high voltage-operated control circuits and high common voltages are switched off.

- a) Fit the required software key – see Fig. 7.2.
- b) Switch on and configure the instrument using *Advanced Software Options* manual.



..8 COMMISSIONING LEVEL

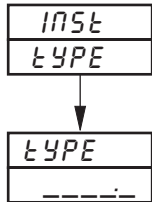
8.1 Set Up Instrument Type Page (All Models Except C1950 Series Pasteurizer Versions)

i **Information.**

- Select instrument type – controller/recorder, chart type, number of pens and instrument version.
- Enable or disable event pen option.
- Enable or disable 3rd faceplate (recorder versions 1913 and 1914, controller version 1914 only).

***** **Note.**

- If fitting a *replacement* processor board to a controller version, the instrument version must be set before the instrument type – refer to Section 4.3
- For access to the **COMMISSIONING LEVEL** refer to steps 1 to 3 of Fig. 4.3.



Page Header – **Instrument Type**

To advance to the **Company Standard Page** press the switch.

Instrument Type

Select the instrument type required.

19 x x .x

└─ controller/recorder chart type:

J	ER/C type chart	– recorder	} See
R	ER/C type chart	– controller	
K	PX105 and PXR105 type chart	– recorder	
S	PX105 and PXR105 type chart	– controller	
C	Special chart	– recorder	
D	Special chart	– controller	

└─ number of standard pens (1 to 4)

└─ version: 0 non-upgradable version
 1 recorder version
 1 or 2 controller version (number of control channels)

***** **Note.** Due to variations in pen geometry and position of chart fixings of the instruments, the 5th code letter in the instrument code number (see Section 2 of the *Installation Guide*) and the chart type selected in this frame must be compatible. For example, an ER/C type chart can only be fitted to instruments with J or R in the instrument code number.

Event Option Enable

Enable or disable true time event option:

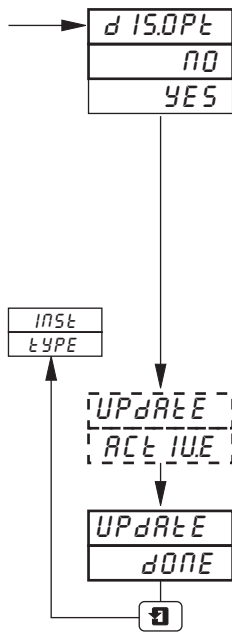
YES – enable
 NO – disable

Pen 4 can only be used as a true time event marker if the **Event Option** is enabled and is fitted with a special event arm. The true time event marker operates on the same time line as pen 1.

***** **Note.** The true time event option is not available on 4 pen instruments or non-upgradable instruments.

Continued on next page.

...8.1 Set Up Instrument Type Page (All Models Except C1950 Series Pasteurizer Versions)



Display Option

This frame allows the second and third faceplates on specific instruments to be enabled or disabled:

- YES – enable
- NO – disable

The *d ISOPT* frame is only displayed on the following versions :

- recorder versions – 1913 and 1914
- controller version – 1914.

***** **Note.** The display option is set automatically according to the instrument type and must not be adjusted.

Update Done

The *ACT IUE* frame is displayed momentarily as any changes are stored in the non-volatile memory. *dONE* is displayed on completion.

Return to **Instrument Type** frame.

***** **Note.** The parameters changed in this Page are updated during the start-up sequence. Subsequently, switch OFF the power supply to the instrument, wait 5 seconds and then switch ON again.

..8 COMMISSIONING LEVEL

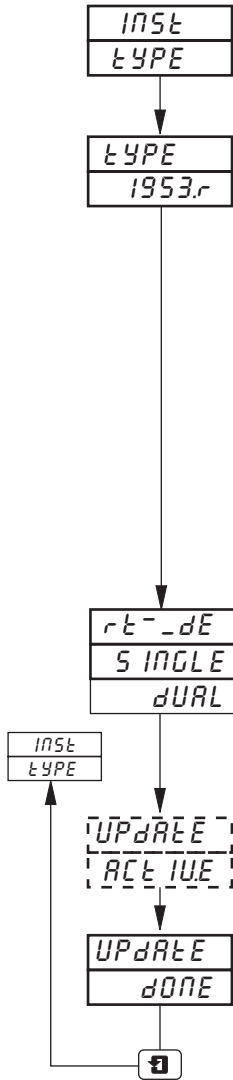
8.2 Set Up Instrument Type Page (C1950 Series Pasteurizer Versions Only)

i **Information.**

- Select controller/recorder chart type.
- Select single or dual RTD.

*** Note.**

- For access to the **COMMISSIONING LEVEL** refer to steps 1 to 3 of Fig. 4.3.



Page Header – Instrument Type

To advance to the **Company Standard Page** press the switch.

Chart Type

Select the controller/recorder chart type required.

19 51 .x
 └─ controller/recorder chart type:
 J ER/C type chart – recorder
 K PX105 and PXR105 type chart – recorder
 C Special chart – recorder

19 52 .x
 19 53 .x
 └─ controller/recorder chart type:
 R ER/C type chart – controller
 S PX105 and PXR105 type chart – controller
 D Special chart – controller

Single or Dual RTD.

Select either single or dual (second divert) RTD.

See *User Guide (Pasteurizer Versions) Section 7* for further information on the use of a second divert RTD.

Update Done

The *ACt IVE* frame is displayed momentarily as any changes are stored in the non-volatile memory. *dONE* is displayed on completion.

Return to **Instrument Type** frame.

- * Note.** The parameters changed in this Page are updated during the start-up sequence. Subsequently, switch OFF the power supply to the instrument, wait 5 seconds and then switch ON again.

8.3 Company Standard Page

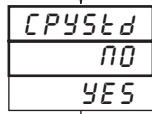
i Information.

- Select Company Standard settings.
- Select Security Type – enable or disable access to control and program settings.
- Select Mains Filter – noise rejection frequency.



Page Header – **Company Standard Page**

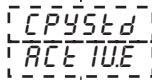
To advance to the **Input Assignment Page** press the switch.



Set Company Standard

Select *YES* to reconfigure the instrument to the company standard settings.

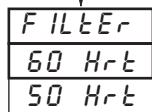
The *ACT IUE* frame is displayed momentarily as any changes are stored in the non-volatile memory. *DONE* is displayed on completion.



***** **Note.** If the software in use is earlier than version 5, reconfiguring the instrument to the company standard resets the crystal frequency to 8MHz. If a 12MHz crystal is fitted, the frequency must be re-set in the **Crystal Type** frame below.

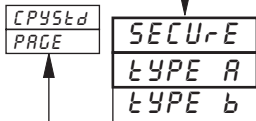


***** **Note.** If the software in use is version 2101 issue 1 or later, the crystal frequency is fixed at 12MHz. A frequency of 8 MHz is obtainable only on earlier software versions.



Mains Filter

Select the mains filter of the supply used to ensure maximum noise rejection on analog inputs.



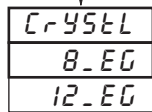
Security Type

Select type of security required in **OPERATOR LEVEL** :

- A* – access to control and program settings with correct security code
- b* – no access to control or program settings even with correct security code.

***** **Note.** The security system can be overridden and the **COMMISSIONING LEVEL** accessed, irrespective of the security type selected in this frame (refer to Section 3.4 for link positions).

Software version 2101 issue 1 or later in use



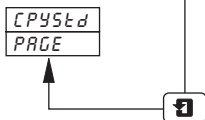
Crystal Type

Select crystal type fitted on main processor board:

- 8_EG* – 8 Megahertz crystal
- 12_EG* – 12 Megahertz crystal

***** **Note.** The parameter selected in this frame is dependent on the type of crystal fitted on the main processor board. An incorrect crystal frequency results in an **AD-F A I L** message.

***** **Note.** If the software in use is version 2101 issue 1 or later, the crystal frequency is fixed at 12MHz and this frame does not appear.



Return to **Company Standard** frame.

***** **Note.** The crystal frequency is read during the start up procedure. If the frequency has been re-set:

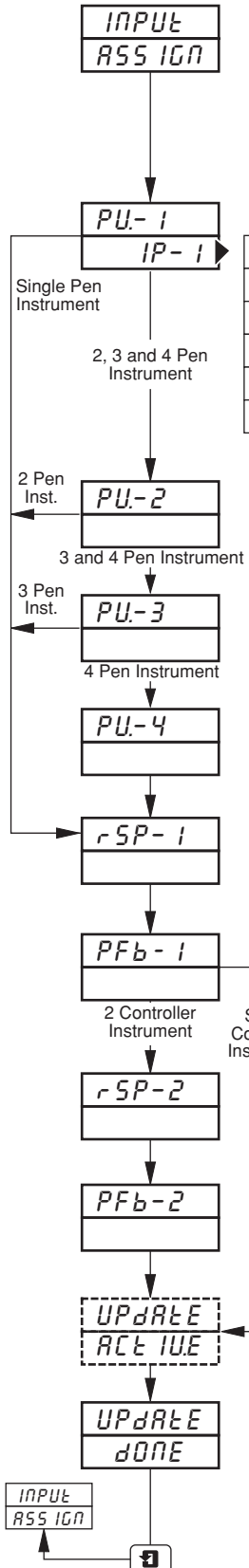
- Return to the **Company Standard** frame.
- Switch the instrument OFF then ON.

...8 COMMISSIONING LEVEL

8.4 Input Assignment Page

i **Information.**

- Assign Inputs – Process Variables, Remote Set Points and Position Feedbacks can all be assigned to any analog input or math block result (if applicable).



Page Header – Input Assign

***** **Note.** Entry and access to and from this page can only be implemented from the page header.

To advance to the **Pen Assignment Page** press the switch.

Process Variable 1

Select analog input or math block result for Process Variable 1.

- IP-1 to IP-6 – analog input 1 to 6 (if available)
- bLP-1 to bLP-4 – math block 1 to 4 (if available)

Process Variable 2

Select analog input or math block result for Process Variable 2 – see *PU-1* for description of inputs and math blocks.

Process Variable 3

Select analog input or math block result for Process Variable 3 – see *PU-1* for description of inputs and math blocks.

Process Variable 4

Select analog input or math block result for Process Variable 4 – see *PU-1* for description of inputs and math blocks.

Remote Set Point (Controller 1)

Select analog input or math block result for Remote set point for Controller 1 – see *PU-1* for description of inputs and math blocks.

Position Feedback (Controller 1)

Select analog input or math block result for Position Feedback for Controller 1 – see *PU-1* for description of inputs and math blocks.

Remote Set Point (Controller 2)

Select analog input or math block result for Remote set point for Controller 2 – see *PU-1* for description of inputs and math blocks.

Position Feedback (Controller 2)

Select analog input or math block result for Position Feedback for Controller 2 – see *PU-1* for description of inputs and math blocks.

Update Active/Done

The *ACT IVE* frame is displayed momentarily as any changes are stored in the non-volatile memory. *DONE* is displayed on completion.

Return to Input Assign frame

8.5 Pen Assignment Page

i Information.

- Select pen function – trend or event.
- Select source for trend pens from process variables, remote set points or position feedback signals.

PEN
RSSIGN

Page Header – Pen Assignment

To advance to the **Input Calibration Page** press the  switch.

PEN-1
EUEnt
tRENd

Pen 1 Type

Select pen function required:

- tRENd – trend pen
- EUEnt – event pen



Note. The event pen and the true time event marker are separate functions and only the **Event Pen** can be selected in this page. The **True Time Line Event Pen Option** allows marking on the same time line as the red pen and requires a special pen arm and motor assembly – see Section 5.

1-SrcE
OP-2
OP-1
PU-4
PU-3
PFB-2
SP-2
PU-2
PFB-1
SP-1
PU-1

Pen 1 Source

Select the signal to be recorded on pen 1 – the selections in this frame relate to instrument type.

PEN-2
EUEnt
tRENd

Pen 2 Type

Repeat as for **Pen 1 Type**, if applicable.

2-SrcE

Pen 2 Source

Repeat as for **Pen 1 Source**, if applicable.

PEN-3
EUEnt
tRENd

Pen 3 Type

Repeat as for **Pen 1 Type**, if applicable.

3-SrcE

Pen 3 Source

Repeat as for **Pen 1 Source**, if applicable.

PEN-4
EUEnt
tRENd

Pen 4 Type

Repeat as for **Pen 1 Type**, if applicable.

4-SrcE

Pen 4 Source

Repeat as for **Pen 1 Source**, if applicable.

PEN
RSSIGN



Return to **Pen Assignment** frame.

...8 COMMISSIONING LEVEL

8.6 Input Calibration Page

i Information.

- Low range calibration (100mV).
- High range calibration (1V).
- Cold junction compensation calibration.

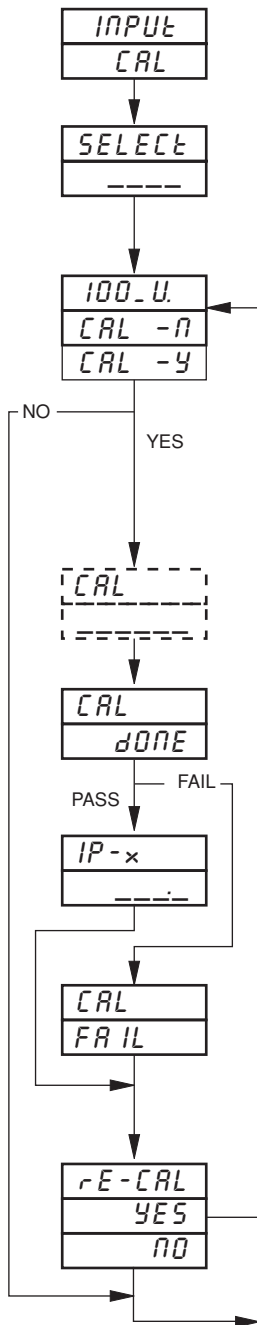
The following equipment is required to carry out input calibration:

DC Voltage Calibrator – accuracy of 1V and 100mV range ($\pm 0.05\%$ of setting).

Thermometer – accuracy of $\pm 0.1^\circ\text{C}$.

***** Note.

- Do not perform the input calibration procedures if the d.c. voltage calibrator or thermometer have not been calibrated.
- Take note of the link positions before carrying out the 100mV, 1V and Cold Junction calibration procedures.



Page Header – Input Calibration

To advance to the **Output Calibration Page** press the  switch.

Select Input

Select input required.

Calibrate 100mV Enable

If 100mV calibration is required, set the input links to mV – see *Section 4 of Installation Guide*.

Connect a d.c. voltage calibrator to the selected input and apply 100mV.

Select *CAL -y* to enable 100mV calibration.

If 100mV calibration is not required select *CAL -n*.

Calibrate 100mV

If calibrate 100mV is enabled, (-) is displayed in the lower display during calibration. *DONE* is displayed on completion.

Calibration Pass

If calibration is successful, the selected input displayed on the upper display and the input value displayed on the lower display.

Calibration Fail

Calibration failure may be due to the following:

- incorrect input link setting
- incorrect input signal applied
- faulty non-volatile memory.

Re-calibration Enable

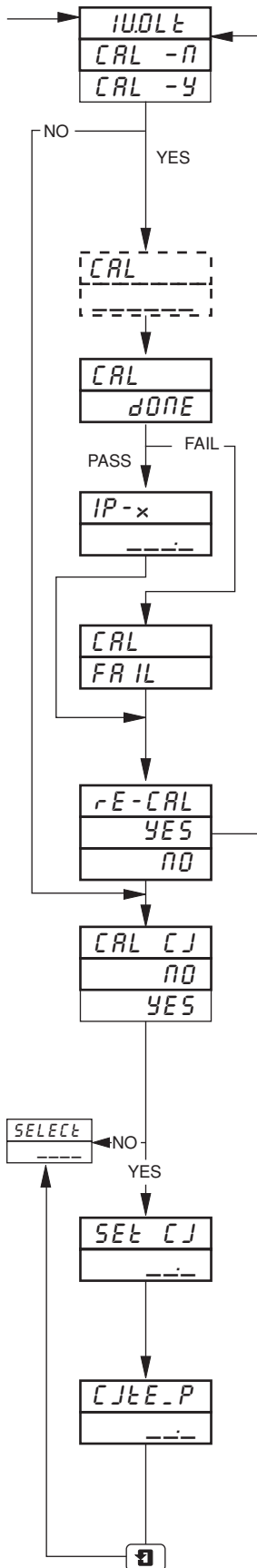
Enable or disable 100mV re-calibration:

YES – repeat 100mV calibration

NO – advance to the next frame.

Continued on next page.

...8.6 Input Calibration Page



Calibrate 1V Enable

If 1V calibration is required, set the input links to V – see *Section 4 of Installation Guide*.

Connect a d.c. voltage calibrator to the selected input and apply 1V.

Select *CAL -y* to enable 1V calibration.

If 1V calibration is not required select *CAL -n*.

Calibrate 1V

If calibrate 1V is enabled, (-) is displayed in lower display during calibration. *DONE* is displayed on completion.

Calibration Pass

If calibration is successful, the selected input is displayed on the upper display and input value is displayed on the lower display.

Calibration Fail

Calibration failure may be due to the following:
 incorrect input link setting
 incorrect input signal applied
 faulty non-volatile memory.

Re-calibration Enable

Enable or disable 1V re-calibration:
YES – repeat 1V calibration
NO – advance to the next frame.

Calibrate Cold Junction

An automatic cold junction (ACJC) transistor (TR10) is fitted on the main p.c.b. adjacent to module position 1.

If cold junction calibration is required, set the input links to mV – see *Section 4 of Installation Guide*.

Select *YES* to enable cold junction calibration.

If cold junction calibration is not required select *NO*.

Set Cold Junction Temperature

Measure the temperature adjacent to the automatic cold junction transistor (TR10). Set the measured temperature in °C.

If the input links are set incorrectly *CHECK LINKS* flashes until the links are reset.

Cold Junction Temperature

Check cold junction temperature is the same as the value set in the *SET CJ* frame above.



Note. If the cold junction temperature is different from the value set in the *SET CJ* frame above, reset the cold junction temperature.

Return to **Select Input** frame.



Note. Reset the links to their original positions before proceeding to the next Page.

..8 COMMISSIONING LEVEL

8.7 Output Calibration Page

i **Information.**

- 20mA Calibration.
- 4mA Calibration.

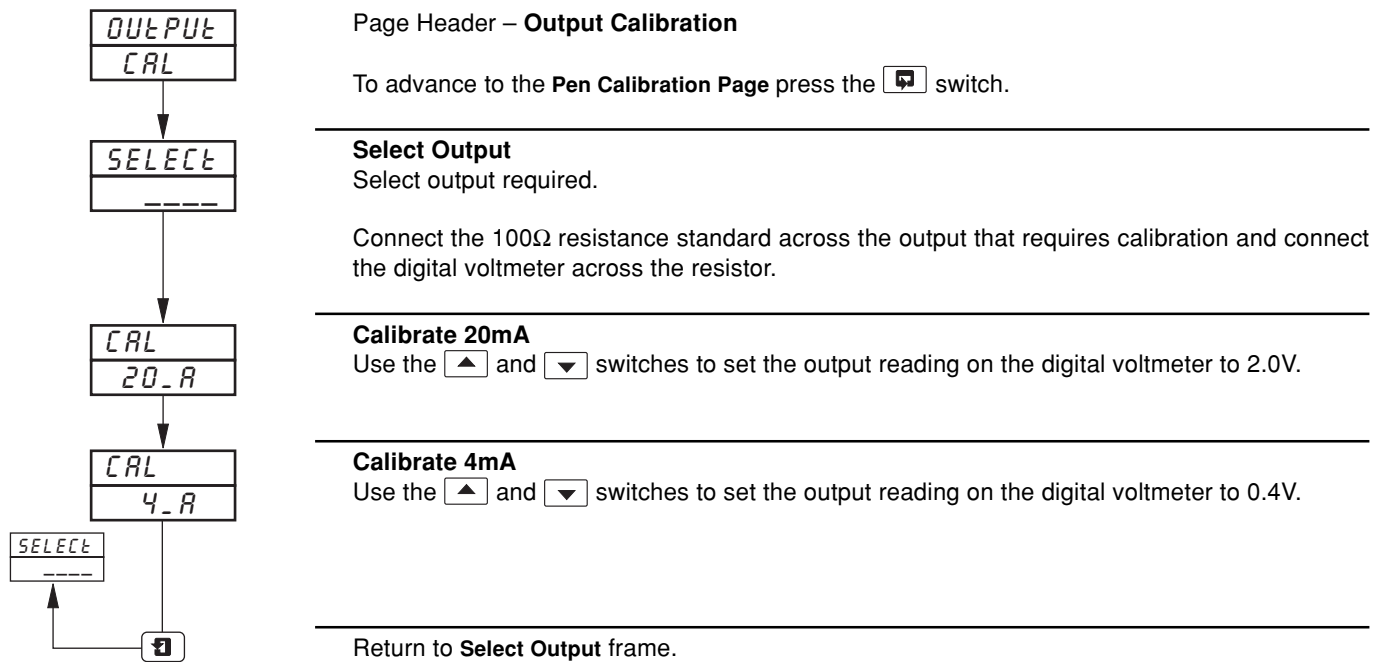
The following equipment is required to carry out input calibration:

Digital Voltmeter – accuracy 0.02% of reading.

100Ω Resistance Standard – accuracy ±0.01%

*** Note.** Do not perform the output calibration procedures if the digital voltmeter has not been calibrated.

! Caution. The main input and current output calibration data (unique to each instrument) is contained in the non-volatile memory ICs 24 and 25. Do not interchange these ICs between instruments.



8.8 Pen Calibration Page

i Information.

- Pen Calibration – range high and range low.
- Pen Linearity Check.

PEN
CAL

PEN 1
HI ---

PEN 1
LO ---

PEN x
HI ---

PEN x
LO ---

L INCHP.
RCE IUE

L INCHP.
DONE

PEN
CAL



Page Header – Pen Calibration

To advance to the Display Set Up Page press the switch.

Pen 1 Range High Calibration

Pen 1 moves to its 100% position on the chart. Use the and switches to position the pen on the 100% chart line.

Pen 1 Range Low Calibration

Pen 1 moves to its 0% position on the chart. Use the and switches to position the pen on the 0% chart line.

Pen 2 to 4 Range High Calibration

Repeat as for Pen 1 Range High Calibration, if applicable.



Note. On instruments configured for true time event marker, the true time event pen calibration uses Pen 4 High Calibration. Set the pen to the 100% position on the chart.

Pen 2 to 4 Range Low Calibration

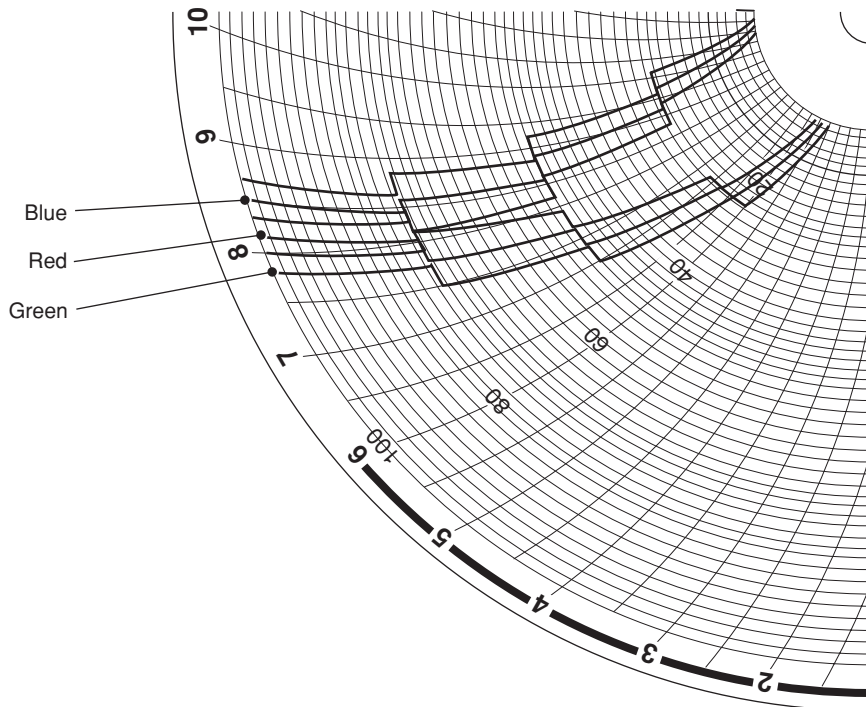
Repeat as for Pen 1 Range Low Calibration, if applicable.



Note. Pen 4 Low Calibration is omitted on instruments configured for true time event marker.

Pen Linearity Check

The pens automatically draw the pen linearity check test pattern shown below.



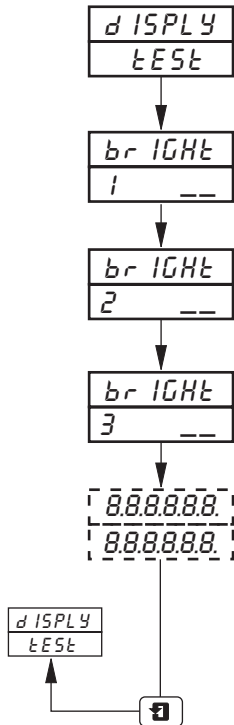
Return to Pen Calibration frame.

...8 COMMISSIONING LEVEL

8.9 Display Set Up Page

i Information.

- Display Brightness – illuminates all display segments, bar graph segments (if applicable) and l.e.d.s.
- Display Brightness.



Page Header – **Display Test**

To advance to the **Relay Test Page** press the switch.

Display 1 Brightness

Set brightness required for display 1 (4 to 15). The higher the value the brighter the display.

Display 2 Brightness

Set brightness required for display 2 (if fitted).

Display 3 Brightness

Set brightness required for display 3 (if fitted).

Display Test

The display test alternate between '888888' on the upper display, '888888' on the lower display, the l.e.d. indication and bar graph displays of each faceplate fitted.

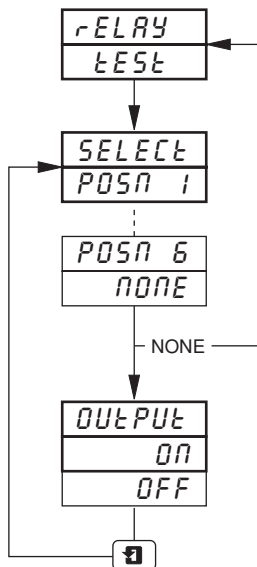
Ensure all segments in the upper and lower displays, all l.e.d. indications and bar graph displays are illuminated.

Return to **Display Test** frame.

8.10 Relay Test Page

i Information.

- Relay Test.



Page Header – **Relay Test**

To advance to the **Digital Input Test Page** press the switch.

Select Module Position

The selections in this frame relate to modules fitted. Select module position required,

Select Output State

Select the relay output state for the module selected in the previous frame:



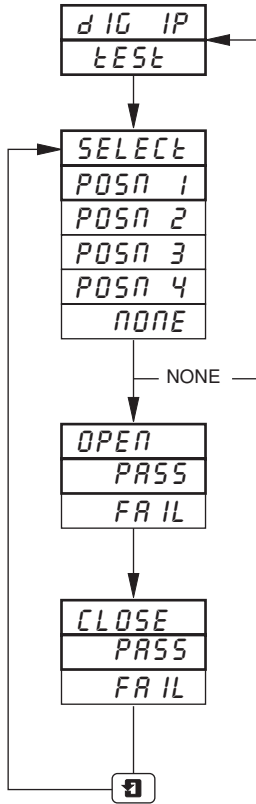
Note. All relays on the selected module are turned *ON* or *OFF* together.

Return to **Select Module Position** frame.

8.11 Digital Input Test Page

i Information.

- Digital inputs open circuit test.
- Digital inputs closed circuit test.



Page Header – Digital Input Test

To advance to the **Output Test Page** press the switch.

Select Module Position

The selections in this frame relate to modules fitted with digital inputs. Select module position required.

Digital Input Open Circuit Test

Open circuit all digital inputs on the selected module.

PASS is displayed if all digital inputs are confirmed open circuit. *FAIL* is displayed if any of the digital inputs are not open circuit.

Digital Input Close Circuit Test

Short circuit all digital inputs on the selected module.

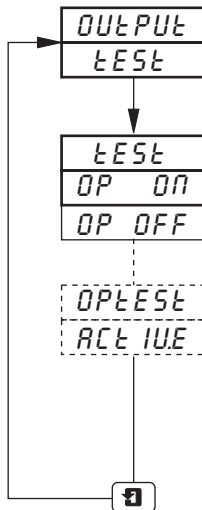
PASS is displayed if all digital inputs are confirmed short circuit. *FAIL* is displayed if any of the digital inputs are not short circuit.

Return to **Select Module Position** frame.

8.12 Output Test Page

i Information.

- Output test – used to check chart and pen movement over a 24 hour cycle.



Page Header – Output Test

To advance to the **Diagnostics Page** press the switch.

Output Test Enable

The output test cycles each of the current outputs through a number of steps. The chart duration is automatically set to 24 hours.

Select *OP ON* to enable the output test. *OP TEST ACT IUE* is displayed until the test is complete.

To disable the output test select *OP OFF*.



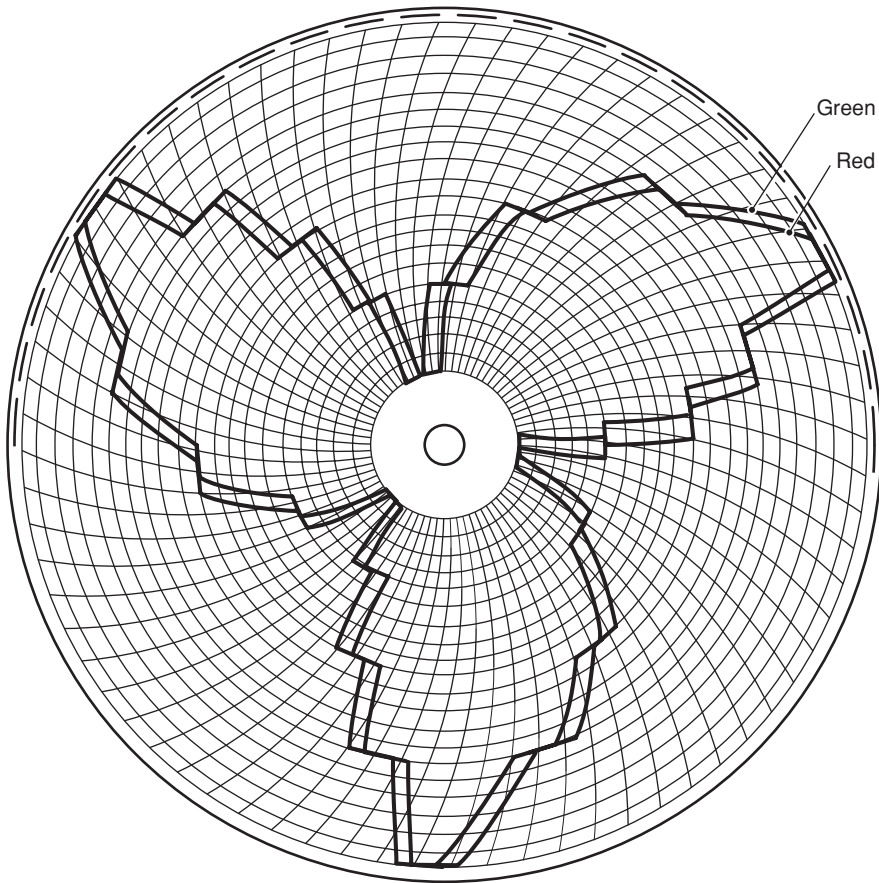
Note. To produce the correct test pattern, the current output of each module must be linked to its analog input and the plug-in links set for mA – see *Section 4 of the Installation Guide*.

Return to **Output Test** frame.

...8 COMMISSIONING LEVEL

...8.12 Output Test Page

The output test can be used to check the chart and pen movement and detect any linearity or hysteresis errors in pen positioning.



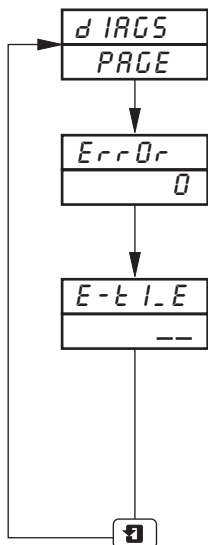
Output Test Pattern

8.13 Diagnostics Page



Information.

- Instrument timing.



Page Header – **Diagnostics Page**

To advance to the **COMMISSIONING LEVEL** frame press the  switch.

Error Code

This frame is for factory use only.

Instrument Timing

The display indicates the number of 8ms interrupts used to process the enabled functions.

The total executive cycle time is 240ms.

Example – a display of 20 indicates 160ms of the executive cycle time have been used to process the enabled functions.

Return to **Diagnostics Page** frame.

9 INSTRUMENT REPAIR

9.1 Non-volatile Memory ICs



Caution. The main input and current output calibration data (unique to each instrument) is contained in the non-volatile memory ICs 24 and 25. Do not substitute between instruments or each other. If for any reason these ICs are replaced then both the main input and the current output will require recalibration – *see sections 8.5 and 8.6.*

9.2 Microprocessor Board Replacement



Caution. Replacement microprocessor boards are despatched from the manufacturing unit with Company Standard settings. Before replacing a microprocessor board, make a note of all non-standard or instrument-specific configuration data. When mechanical installation is complete and the instrument has powered up successfully, carry out the configuration procedure as detailed in Sections 8.1 to 8.12.



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