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Pen/Chart change instructions
100mm Recorders with digital displays

These instructions are for use with digital display recorders with status levels prior to L19 (Multipoint recorders) or L22 (Continuous-trace recorders).

The following sections describe the fitting and replacement of charts and pens/print cartridges for the original design of recorder which was not fitted with configuration keyswitches. Also included are details of recorder configuration and display interpretation.

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Operations Management

1 CHART REPLACEMENT

Notes
1. If this is a multipoint recorder then for 'pens' read 'print cartridge'
2. For recorders with status levels K13 or higher, if the cassette type (i.e. roll or z-fold) is changed, or if the recorder loses its configuration, the recorder must be reconfigured for the correct cassette type or the chart drive will not operate correctly. The manufacturer's local service centre should be contacted for advice.
3. Once the chart has been replaced, return the cassette to the recorder and operate the two switches simultaneously for over four seconds (to return to normal operations) or for about one second if you wish to check the pens' zeros/spans against the new chart. See section 3, below.

Open the door of the recorder and operate the two switches (at bottom left and bottom right of the recorder) simultaneously for approximately one second, then release. (Do not expect anything to happen until you let go!)

This causes the pens to go to their park positions.

1.1 Z-Fold charts

Remove the cassette, by pulling on the two latches ('A' in the top figure). If a used chart is present, open the take-up retainer and remove the used chart.

Open the top of the paper payout tray, and remove any residual paper dust. Open the chart guide.

Unpack the replacement chart and fan it several times to separate the leaves and to remove as much perforation dust as possible.

Orient the chart so that the circular holes are to the left, the slots to the right, and the red end-of-chart line to the back (all directions relative to the front of the cassette). Place the chart into the payout tray, unfolding three or four leaves at the same time. Pull the free end of the chart over the drive roller and down behind the chart guide and lay the free leaves in the take-up tray.

Ensure that the paper folds naturally into the tray, that the printed grid is uppermost and that the slots are at the right hand edge of the chart (i.e. the circular holes are to the left).

Close the take-up retainer and the chart guide, ensuring the paper holes/slots fit over the sprockets on the drive roller. Close the top of the paper payout tray, ensuring that the chart is contained behind the flanges on the top.

Park Pens

A   A

1 second

Remove old chart

Take-up retainer

Fan new chart

Place new chart in payout tray
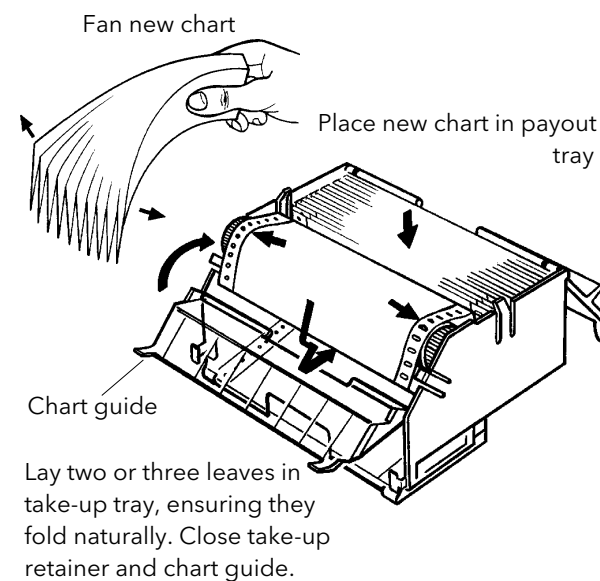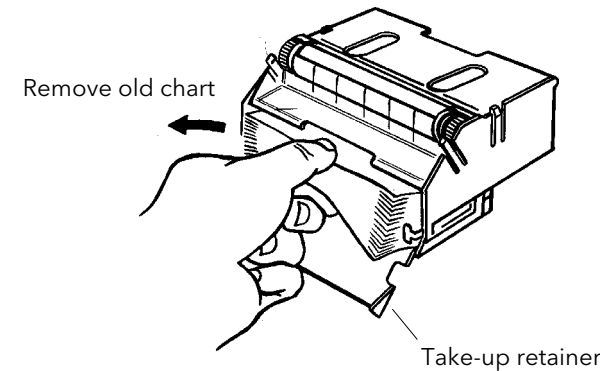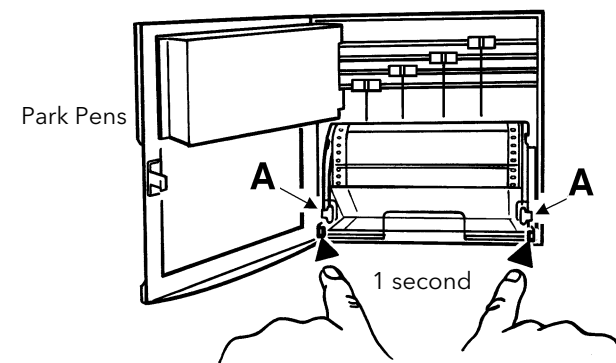
Chart guide

Lay two or three leaves in take-up tray, ensuring they fold naturally. Close take-up retainer and chart guide.

Close top

Retain chart behind flanges
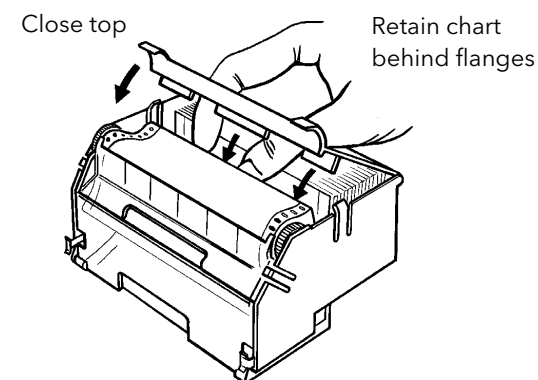
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5 CHART SPEEDS

The chart speeds available with the original recorder design are given in the table below.

Range	Speed (mm/hr)					Recorder type
	1	2	3	4	5	
1	Off	5	20	60	120	Continuous and multipoint
2	Off	10	20	60	120	
3	Off	10	30	60	120	
4	Off	20	30	60	120	
5	Off	30	60	120	300	Continuous only. Annotation (if fitted) inhibited above 300 mm/hr.
6	Off	20	120	600	1200	
7	Off	20	300	1200	3600	
8	Off	20	3600	18000	36000	

Table 5 Chart speeds

1.2 Roll charts

Carry out the 'Park' procedure described in section 1 above. Once the chart has been replaced, return the cassette to the recorder and operate the two switches simultaneously for over four seconds (to return to normal operations) or for about one second if you wish to check the pens' zeros/spans against the new chart. See 'Setting up the recorder' below.

① Remove cassette by pressing down on, then pulling on the retaining clip.

② Open cassette top

③ Remove inner tube

④ Insert new chart roll

⑤ Open cassette top

⑥ Lift 'ears' to eject take-up spool with used chart.

⑦ Pull off either end pinion

⑧ Slide the chart off the take-up spool, then push the pinion fully back onto the empty spool.

⑨ Feed chart under paper guide/chart tear-off.

⑩ Tear the corners off the chart, then fold about 5 mm of the point back

⑪ Insert the fold into the slot, then roll the paper onto the take-up spool, and re-insert the spool into the cassette.

⑫ Close the cassette top

⑬ Close the paper guide/chart tear off strip, ensuring that the chart is 'square' with the cassette.

⑭ Tension the chart.

2 CHANGING THE PENS/CARTRIDGE

Note: Care should be taken to avoid pen/cartridge contact with skin or clothing

2.1 CONTINUOUS TRACE RECORDERS

Open the recorder door, and the scale plate, both hinged at their left edge.

With power applied to the recorder, operate both push switches together, for between 1 and 2 seconds.

After the switches have been released, the pens will 'fan' to allow easy access.

Pull the pens forwards off their guide bars.

Fit the new pens and close the scale plate. Operate the switches simultaneously for over 4 seconds to return to normal recording, or for between 1 and 2 seconds to check the pen zeros and spans (section 2.5)
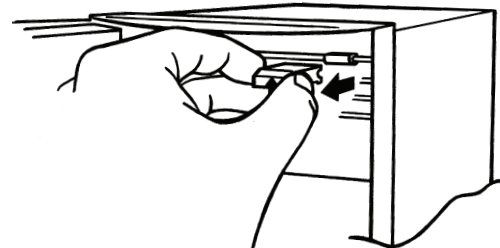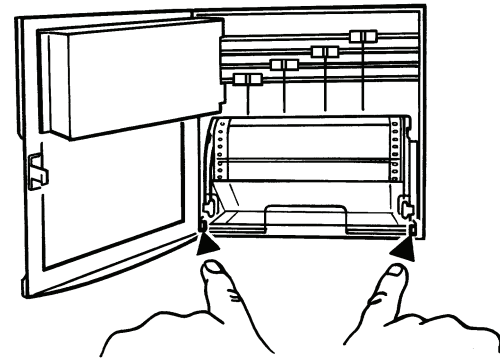
2.2 MULTIPOINT RECORDERS

Open the door and the scale plate, both hinged at their left edge.

With power applied to the recorder, operate both push switches simultaneously for between 1 and 2 seconds. After the switches are released, the printhead travels to the centre-chart position.

Remove the chart cassette and pull the exhausted print cartridge 'vertically' downwards out of its holder.

Offer up the new cartridge to the printhead, and push it upwards into place.

Return the chart cassette to the chassis. Operate the switches simultaneously for over 4 seconds to return to normal recording, or for between 1 and 2 seconds to check the printhead zeros and spans (section 3.1.3).
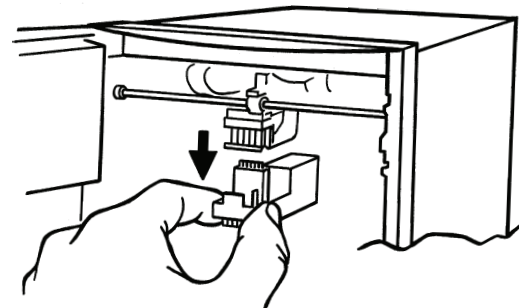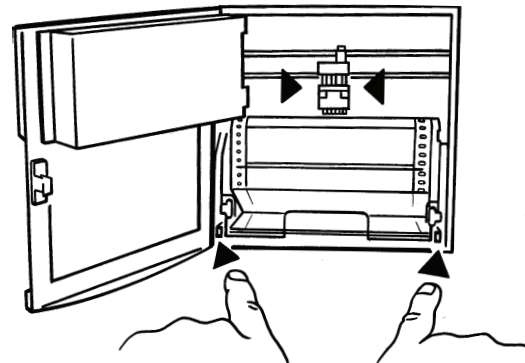
4 DISPLAY INTERPRETATION

The four-character, blue display shows the process value of each channel in turn, with each channel remaining on display for 5 seconds. Current channel number is indicated by a green numeric character to the left of the display unit.

Current channel number
Minus sign
Channel hold symbol
Alarm 2 (high)
Alarm 2 (low)
Alarm 1 (high)
Alarm 1 (low)
Channel value
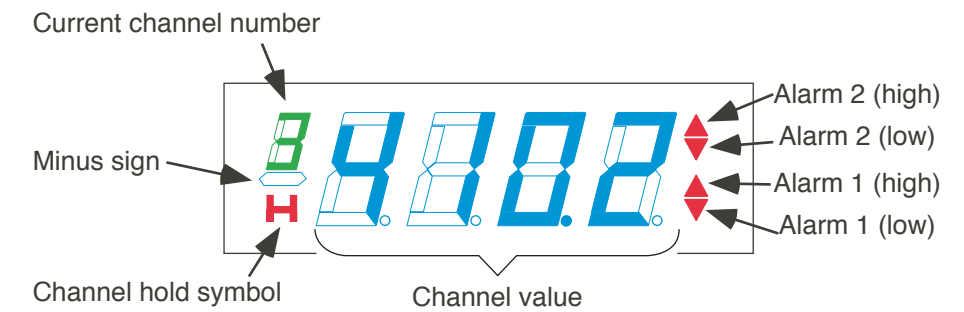
Figure 4 Recorder display

Operation of the left push button switch for between 1 and 2 seconds causes the currently displayed channel's value to remain permanently on display (Channel hold). Channel hold is indicated by a red 'H' below the channel number.

The channel numbers can be scrolled through manually in both normal and channel hold mode by operation of the right-hand push switch.

The red arrow heads to the right of the display indicate which (if either) of the displayed channel's alarms is active, and whether the alarm is absolute high or absolute low, as defined at time of order.

3.3 Multipoint recorder (Cont.)

11 Operate both keys simultaneously for more than 4 seconds to return to normal recording. End of setup indicated by black line drawn from 0 to 50%.

10 Date set up is carried out using the same method as described below for time setting. Final enter causes date to be printed.

9 After all alarms are set up, and 'entered', RH key causes 'Time' to be selected for entry. (Pen dots at 30%)

Enter causes the 10s of hours select line to be printed on the chart in green, with the current value being indicated by the blue pen. LH and/or RH keys are used to edit.

Enter followed by RH key causes next line to be printed. Hours units and Minutes 10s and units are set up in the same way.

When minutes units have been set up, wait until exact time, then Enter. Time is printed on the chart.

8 RH key causes next alarm 1 to be selected (not shown). Continue until all alarm setpoints set up, then Enter.

7 RH key causes 'Ch1 Alarm 2' set up to be selected for entry (violet pen dots at 80%). Enter causes the violet pen to indicate current setpoint. Use left/right keys to adjust, then Enter.

6 RH key causes 'Ch 1 Alarm 1' set up to be selected for entry (violet pen dots at 20%). Enter causes the violet pen to indicate current setpoint. Use left/right keys to adjust, then Enter

5 RH key causes 'Chart span' set up to be selected for entry (green pen dots at 90% chart width). Enter causes the blue pen to indicate current span. Use left/right keys to adjust, then Enter

4 Enter causes blue pen to indicate current zero. Use left/right keys to adjust, then Enter.

3 RH key causes 'Chart zero' set up to be selected for entry (green pen dots at 10% chart width).

2 RH key causes 'Chart Speed' set up to be selected for entry (green pen dots at 50%). Enter key causes pen to indicate current selection. Use left/right keys to select new chart speed, then Enter.

1 Enter stops tracing and causes the print head to park at the centre of the chart (50%).

Chart annotations: RH key wraps-around from 12 to 1. Pen dots at 70% to show that date is next parameter. Pen dots at 30% to show that time is next parameter. Alm 2 setpoint. Alm 1 setpoint. Enter then use RH key to move to next parameter. Use LH/RH keys to select chart speed. Chart speeds.

DAYS<0X> : 0 1 2 3 4 5 6 7 8 9
DAYS<X0> : 0 1 2 3
MONTH: 1 2 3 4 5 6 7 8 9 10 11 12
YEAR<000X>: 0 1 2 3 4 5 6 7 8 9
YEAR<00X0>: 0 1 2 3 4 5 6 7 8 9
MINS<0X>: 0 1 2 3 4 5 6 7 8 9
MINS<X0>: 0 1 2 3 4 5
HOURS<0X>: 0 1 2 3 4 5 6 7 8 9
HOURS<X0>: 0 1 2
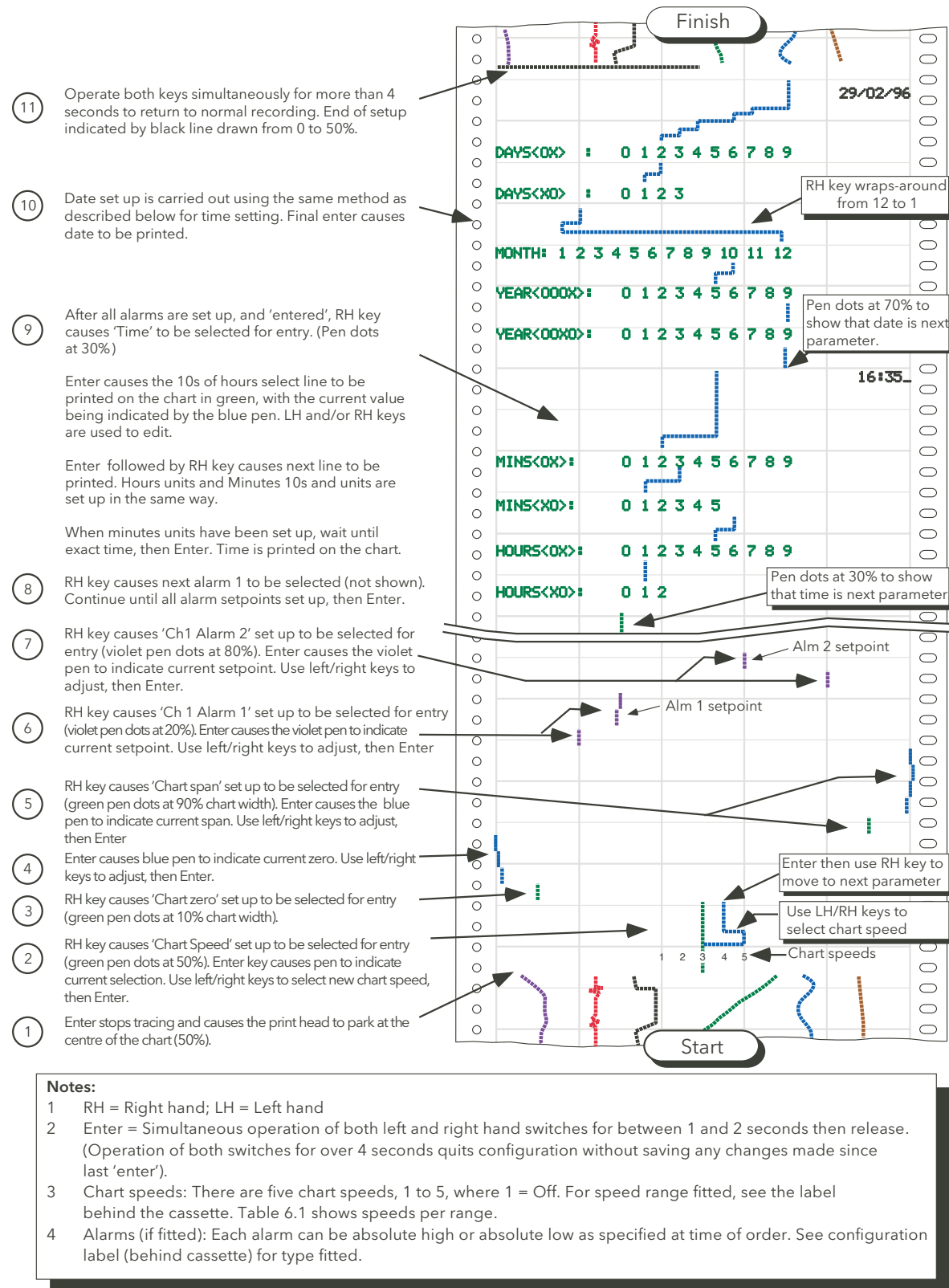29/02/96
16:35

Notes:
1. RH = Right hand; LH = Left hand
2. Enter = Simultaneous operation of both left and right hand switches for between 1 and 2 seconds then release. (Operation of both switches for over 4 seconds quits configuration without saving any changes made since last 'enter').
3. Chart speeds: There are five chart speeds, 1 to 5, where 1 = Off. For speed range fitted, see the label behind the cassette. Table 6.1 shows speeds per range.
4. Alarms (if fitted): Each alarm can be absolute high or absolute low as specified at time of order. See configuration label (behind cassette) for type fitted.

Figure 3.3b Simulated chart sample

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3 SETTING UP THE RECORDER

An auto-repeat feature is included in the recorder interface, so when a key has to be operated repeatedly, the key can be held continuously actuated instead, if appropriate, until the required number of increments has been achieved.

3.1 CONTINUOUS TRACE RECORDER WITH NO ANNOTATOR

Activating the two pushbutton switches for approximately 1 second causes the chart to stop and the pens to fan ready for replacement. Repeated operations of the right hand switch scrolls through the list below. At any point, a further 1 second operation of both keys simultaneously ('Enter') allows access to the parameter for adjustment using either or both the switches.

1 Pen fan	7 Pen 3 zero	13 Channel 2 alarm 1
2 Chart speed	8 Pen 3 span	14 Channel 2 alarm 2
3 Pen 1 zero	9 Pen 4 zero	15 Channel 3 alarm 1
4 Pen 1 full scale (span)	10 Pen 4 span	16 Channel 3 alarm 2
5 Pen 2 zero	11 Channel 1 alarm	117 Channel 4 alarm 1
6 Pen 2 span	12 Channel 1 alarm	218 Channel 4 alarm 2

3.1.1 Setting the chart speed

When chart speed is selected for setup, all the pens move to the centre of the chart except for pen 1 which drives to 40%, 45%, 50%, 55% or 60% of span according to the currently selected speed (40% = Chart drive off). The left and right switches can be used to move the channel 1 pen to the required chart speed position. A further simultaneous operation of the two switches causes the new chart speed to become operational.

The recorder's chart speed range is defined at time of order. The speed range-number can be found on the configuration label on the bulkhead behind the chart cassette. Table 5 shows the speeds associated with that range.

3.1.2 Setting pen zeros and spans

Each time a pen zero setup is selected all the pens move to 10% of chart width, except the selected pen which moves to 5%. A further enter drives this pen to where it thinks chart zero is. The left and/or right switches move the pen 0.15 mm left or right respectively each operation, allowing the pen to be aligned with the chart zero.

Similarly when a pen span is selected, all the pens move, to 90% of chart width except the selected pen which moves to 95%. After a further 'Enter', the selected pen moves to where it thinks chart span is. The left and/or right switches move the pen 0.15 mm left or right respectively each operation, allowing the pen to be aligned with the chart span.

3.1.3 Setting alarm thresholds (setpoints)

Each time an alarm 1 setup is selected all the pens move to 20% of chart width except the selected pen which moves to 15%. After a further 'Enter', the selected channel's pen will drive to its current set point. The left and/or right switches move the pen approximately 0.15 mm left or right respectively each operation, allowing the setpoint to be adjusted. A further simultaneous operation of the switches causes the new information to be saved, and alarm 2 to be moved to.

Similarly when an alarm 2 is selected for editing, all the pens move to 80% chart width except the selected pen which moves to 85%. After a further 'Enter', the selected pen moves to its current setpoint. The left and/or right switches move the pen 0.15 mm left or right respectively each operation, allowing the setpoint to be adjusted.

The recorder's alarm types are defined at time of order and are specified on the label behind the cassette.

3.1.4 Return to recording

At any time during setup, simultaneous operation of the two push switches for over 4 seconds returns the recorder to normal operation.

3.1 CONTINUOUS TRACE RECORDER WITH NO ANNOTATOR (Cont.)
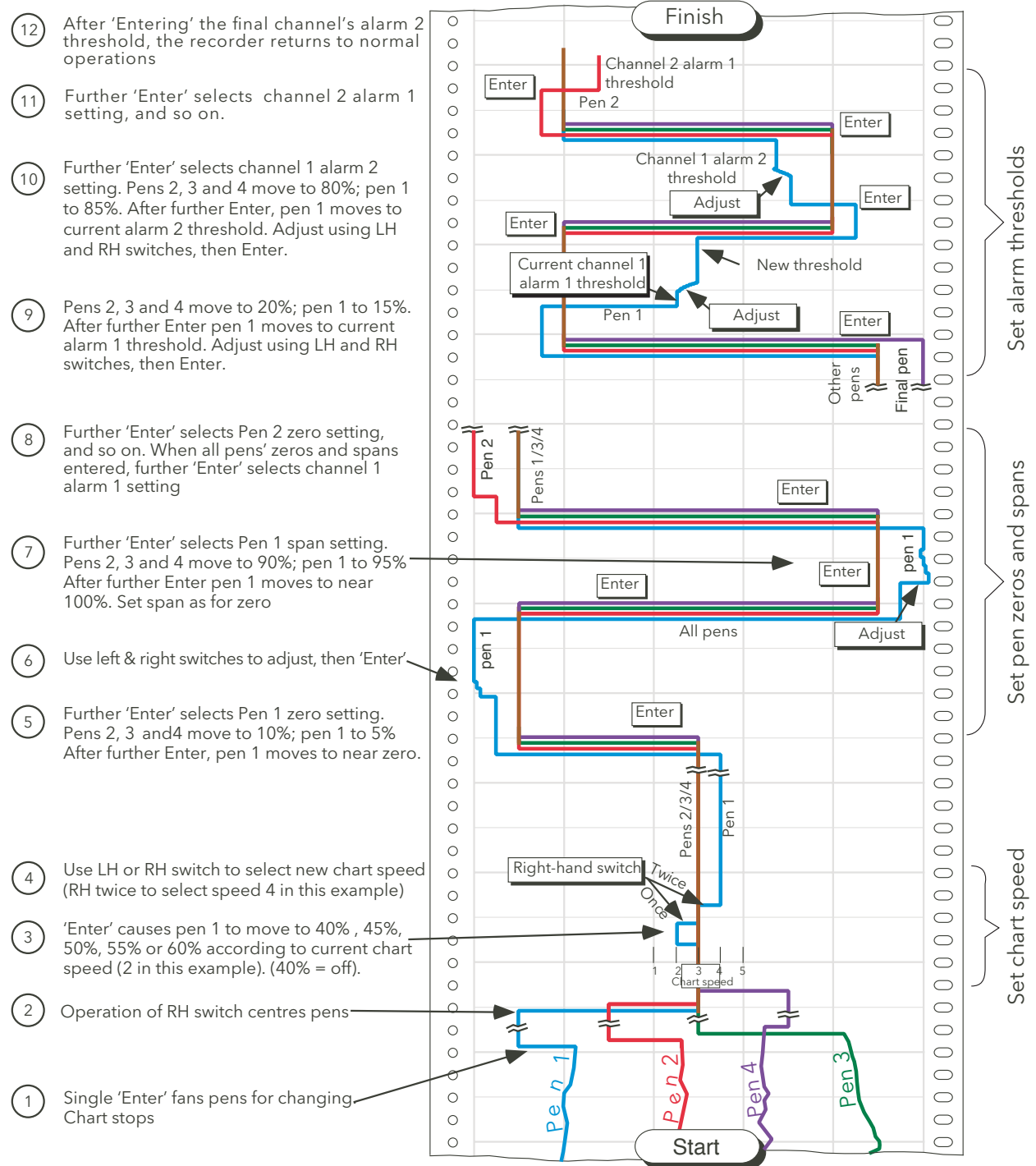
(12) After 'Entering' the final channel's alarm 2 threshold, the recorder returns to normal operations

(11) Further 'Enter' selects channel 2 alarm 1 setting, and so on.

(10) Further 'Enter' selects channel 1 alarm 2 setting. Pens 2, 3 and 4 move to 80%; pen 1 to 85%. After further Enter, pen 1 moves to current alarm 2 threshold. Adjust using LH and RH switches, then Enter.

(9) Pens 2, 3 and 4 move to 20%; pen 1 to 15%. After further Enter pen 1 moves to current alarm 1 threshold. Adjust using LH and RH switches, then Enter.

(8) Further 'Enter' selects Pen 2 zero setting, and so on. When all pens' zeros and spans entered, further 'Enter' selects channel 1 alarm 1 setting

(7) Further 'Enter' selects Pen 1 span setting. Pens 2, 3 and 4 move to 90%; pen 1 to 95% After further Enter pen 1 moves to near 100%. Set span as for zero

(6) Use left & right switches to adjust, then 'Enter'.

(5) Further 'Enter' selects Pen 1 zero setting. Pens 2, 3 and 4 move to 10%; pen 1 to 5% After further Enter, pen 1 moves to near zero.

(4) Use LH or RH switch to select new chart speed (RH twice to select speed 4 in this example)

(3) 'Enter' causes pen 1 to move to 40% , 45%, 50%, 55% or 60% according to current chart speed (2 in this example). (40% = off).

(2) Operation of RH switch centres pens

(1) Single 'Enter' fans pens for changing. Chart stops

Notes:
1   RH = Right hand; LH = Left hand
2   Enter = Simultaneous operation of both left and right hand switches for between 1 and 2 seconds then release.
    (Operation of both switches for over 4 seconds quits configuration without saving any changes made since last 'enter'.)
3   Chart speeds: There are five chart speeds, 1 to 5, where 1 = Off. For speed range fitted, see the label behind the cassette. Table 6.1 shows speeds per range.
4   Alarms (if fitted): Each alarm can be absolute high or absolute low as specified at time of order. See configuration label (behind cassette) for type fitted.

Figure 3.1 Simulated chart sample

3.2 CONTINUOUS TRACE RECORDER WITH ANNOTATOR

Apart from the fact that the annotator prints only in black, the setting up procedure for continuous-pen recorders with annotation is the same as that given below for multi-point recorders.

3.3 MULTIPOINT RECORDER

Operating the two switches simultaneously for between 1 and 2 seconds, causes the printhead to park at 50% chart width.

Operating the right-hand switch moves to the next parameter, or operating both switches together for about 1 second, enters the parameter's setup.

Parameters appear in the following order:
Chart speed,
Chart zero,
Chart span,
Alarm setpoints
Time
Date.

Once in setup, the right and left hand keys are used to adjust the value. Operating both keys together for 1 to 2 seconds 'enters' the new value.

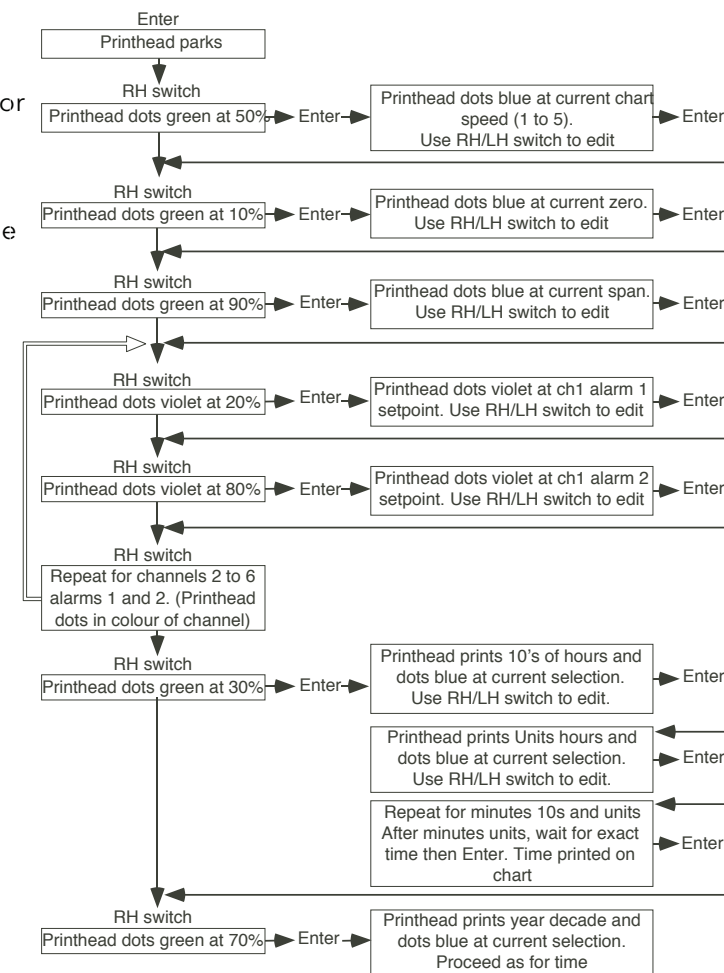Figure 3.3b shows the programming sequence, including changing the time from 15:12 to 16:35, and the date from 12/12/95 to 29/2/96.

Figure 3.3a Setup sequence