Linx 5900 & 7900

How To Use the Parallel I/O Option

LINX

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Contents

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1 Introduction

This document tells you how you configure the PIO (Parallel Input/Output) option on the 5900 and 7900 printer.s

You need a User Level C password to perform all the tasks that are described in this document.

☞ IMPORTANT: The PIO option has some configuration links on the PCB. The link settings depend on how you use the PIO option. Read this document carefully and make sure that the link positions are correct for your application before the PCB is installed in the printer.

(Normally, a maintenance technician performs the installation. The installation procedure is not described in this document.)

1.1 Health and Safety

Make sure that you read and understand the Health and Safety information in the 'Safety' section of the *Linx 5900 & 7900 Quick Start Guide*.

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2 About the Parallel I/O option

The Parallel I/O (Parallel Input/Output) option allows a remote host device (PLC or computer) to control the printer or to monitor the printer status. The Parallel I/O unit has eight inputs and eight outputs.

You can assign the inputs to a number of printer functions. For example:

• Start or stop the printer.

• Select a message from a list.

You can connect a number of photocells to the inputs to detect the size of the product. The printer uses the photocells states to select the correct message for each size automatically.

You can use each output to indicate an event that you define. For example:

• A warning or failure condition.

• The status of the ink jet.

2.1 Applications

The following examples are typical applications for the PIO option.

• You can use a Programmable Logic Controller (PLC) to control the printer. The PLC can stop the printer at the end of the day, or pause the print if the machine guards are open.

• You can use a group of photocells to detect the size of the product and select the correct message for the product.

2.2 Components

The Parallel I/O option is supplied as a kit of parts, as shown in the following illustration.
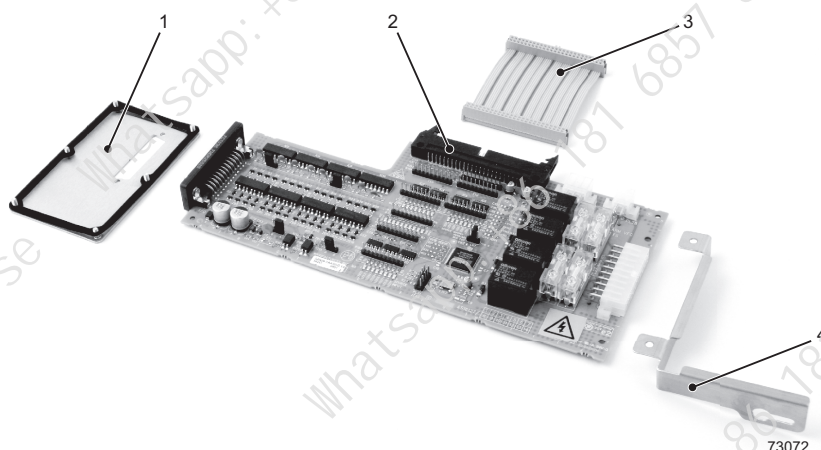

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Figure 1. PIO Option

The kit contains the blanking plate (1), the main PCB (2), the IDC connector (3), and the fixing bracket (4).

2.2.1 PCB layout

CAUTION: Static-Sensitive Devices. The PCB contains static-sensitive devices. Take the following antistatic precautions when PCBs are touched. Wear an antistatic wrist strap and connect the lead to a good electrical earth. Always hold PCBs by their edges and do not touch the components, printed circuit tracks or connector pins.
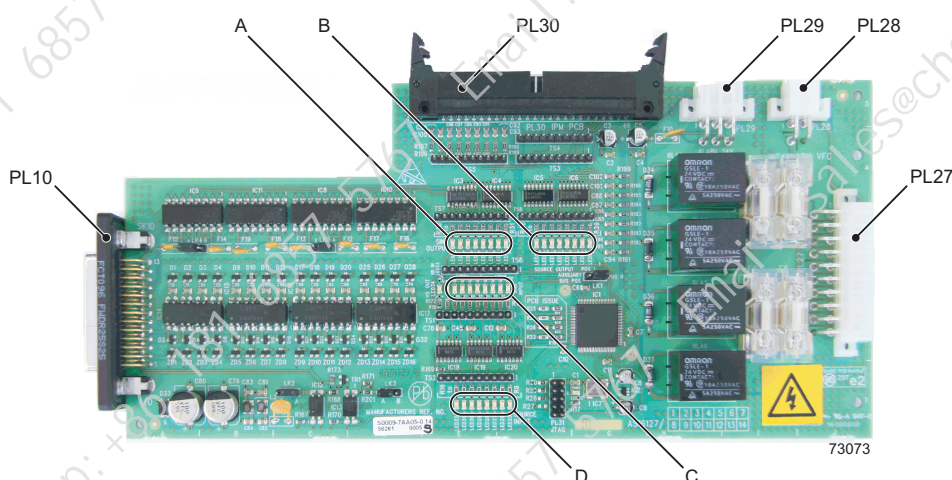
The following illustration shows the layout of the PCB.

Figure 2. Layout of Parallel I/O PCB

The following items are identified in Figure 2.

Item	Description
PL10	External connector (rear panel)
PL27	Volt-free contact multi-stage alarm
PL28	Internal volt-free contact alarm
PL29	Multi-stage 24V alarm beacon
PL30	IDC connector for data and control signals from the IPM PCB
A	LEDs 1 to 8 (indicators for outputs 1 to 8, sink mode)
B	LEDs 9 to 16 (indicators for outputs 1 to 8, source mode)
C	LEDs 17 to 24 (indicators for inputs 1 to 8, sink mode)
D	LEDs 25 to 32 (indicators for inputs 1 to 8, source mode)

Table 1. Connectors and LEDs on PIO PCB

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2.3 Optional accessories

2.3.1 Keypad option

You can fit a keypad to the printer and use the keypad to operate some or all of the inputs manually. You can assign the keypad to some inputs and use a remote host device to operate the other inputs.

2.3.2 Multi-stage alarm option

The standard 5900 and 7900 printers have one alarm output. The Parallel I/O option allows the printer to generate four separate alarm outputs. If the multi-stage alarm option is fitted, you can use the four outputs to indicate four different alarm conditions. The alarm outputs are connected to a special socket at the rear of the printer cabinet. Refer to the section 'Multi-stage alarm connectors' on page 33 for more information about these connections.

2.4 Parallel I/O setup

To configure the Parallel I/O unit from the **Print Monitor** page, press the **Menu** key. Then select **Setup** > **Parallel I/O** to display the **Parallel I/O** page.
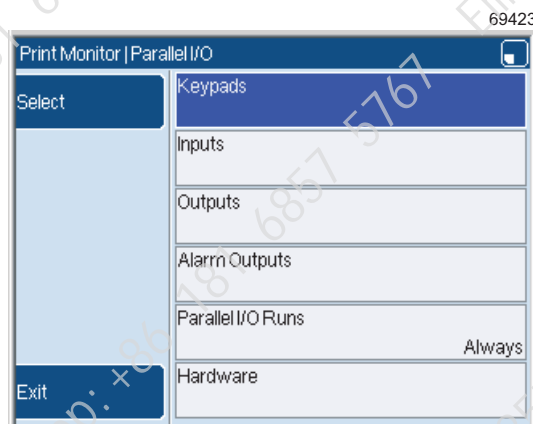
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Print Monitor	Parallel I/O	
Select	Keypads
	Inputs
	Outputs
	Alarm Outputs
	Parallel I/O Runs
	Always
Exit	Hardware

Figure 3. Parallel I/O page

2.4.1 Configure a keypad

You can use the PIO option to connect a keypad. The keypad uses some or all of the inputs and outputs. The following example shows a keypad that is connected to some inputs (A) and some outputs (B). The keypad in this example uses three inputs (1 to 3) and four outputs (1 to 4).
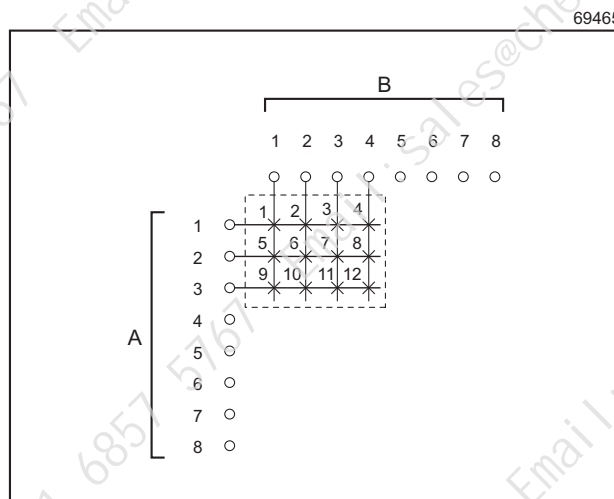

Figure 4. Keypad connections and key numbers

This arrangement provides 3 x 4 = 12 keys.

You must assign a continuous range of inputs and a continuous range of outputs (for example, inputs 1 to 4, or outputs 3 to 6). You cannot assign an input or output range that is not continuous (for example, outputs 1 and 3).

NOTE: If you connect a keypad, enter the keypad information before you configure the inputs and outputs.

Refer to 'Link positions' on page 29 and make sure that you set the following links on the PIO PCB before the PCB is installed:

LK2:   Position A (selects the internal 0 volts connection for the inputs)

LK3:   Position A (selects the internal 24 volts connection for the inputs)

LK4:   Position A (selects the internal 24 volts connection for the outputs)

LK5:   Position A (selects the internal 0 volts connection for the outputs)

To configure the software, perform the following steps:

1   Select the **Keypads** option to display the **Edit Keypads** page.
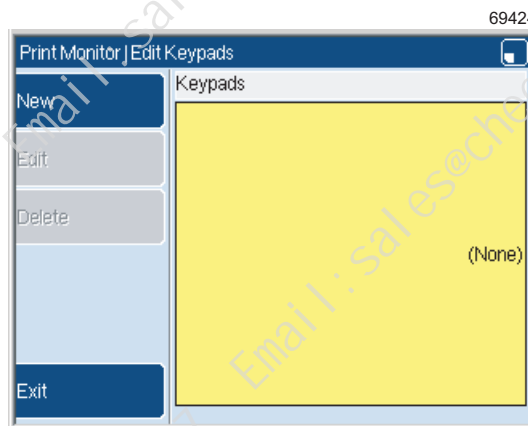

Figure 5. Edit Keypads page

2   Press the **New** key and enter the keypad name "LKP07070", as shown in the example in Figure 6.
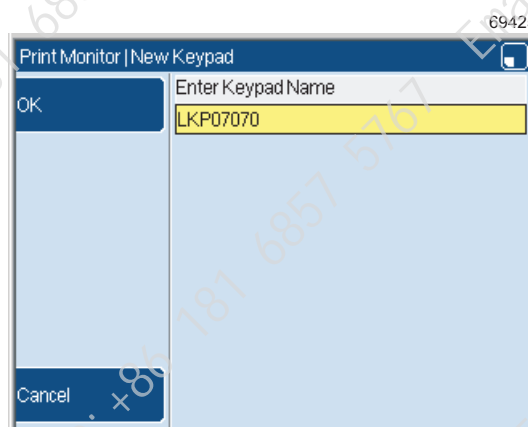

Figure 6. New Keypad page: keypad name

All keypad names use the prefix "LKP", followed by a five-digit number. The five digits have the following functions:

- Digit 1 refers to the printed circuit board for the printer and must be set to zero.

- Digits 2 and 3 define the range of inputs that the keypad uses. For example if the keypad name is "LKP07364", the keypad uses the inputs 7, 6, 5, 4, and 3.

- Digits 4 and 5 define the range of outputs that the keypad uses. For example if the keypad name is "LKP07364", the keypad uses the outputs 6, 5, and 4.

The printer does not accept a name that is not valid.

3 Press the **OK** key to return to the **Edit Keypads** page. The page displays the keypad name that you entered.
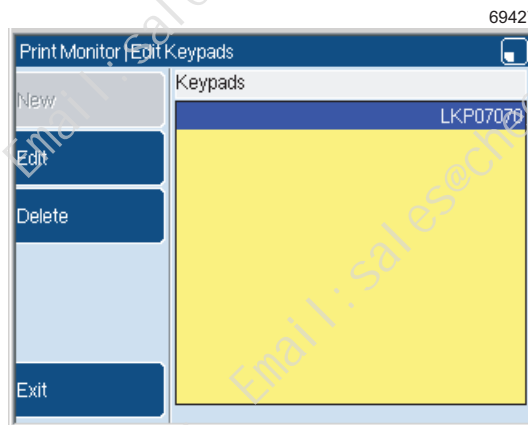

Figure 7. Edit Keypads page

You can use the **New** key to add an additional keypad if some inputs and outputs are available. The **New** key is not available in Figure 7 because the keypad in this example uses all the inputs and outputs.

NOTE: You cannot edit the keypad name on this page. If the name is incorrect, press the **Delete** key to delete the name, and then enter the correct name. (The printer displays a confirmation page before the old name is deleted.)

4 Press the **Edit** key to display the function that is assigned to each button (key) on the keypad.
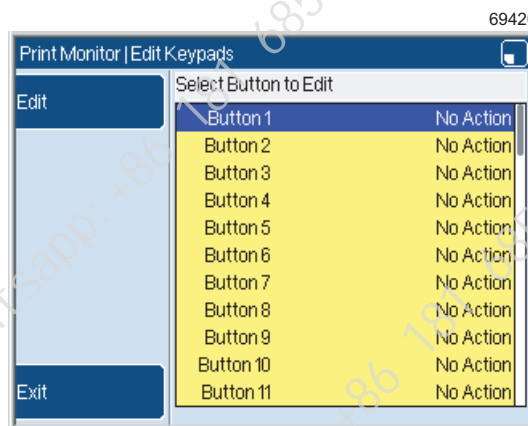

Figure 8. Edit Keypads page: button actions

The number of keypad buttons in this list depends on the keypad type. The default setting for each button is 'No Action'.

5   To change the setting, highlight the required button, and then press the **Edit** key to display the **Edit Action** page.
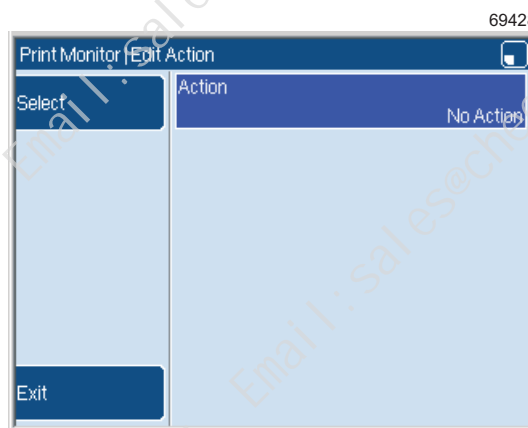
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Figure 9. Edit Action page

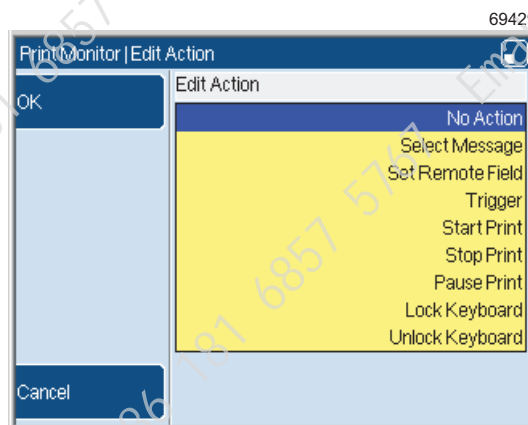**6**   Press the **Select** key to display the list of actions.

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Figure 10. Edit Action page: list of actions

NOTES:

1.   The 'Start Print' action sets the printer status to "PRINTING", but the current message is not printed until the printer receives a print trigger signal.

2.   If the printer status is "IDLE", the 'Start Print' action also starts the jet.

3.   The 'Stop Print' action also stops the jet and starts a shutdown. If a shutdown is not required, use the 'Pause Print' action instead to disable any prints (the printer status becomes "JET RUNNING").

4.   The 'Select Message' action is not available if the message store is empty.

7   Highlight the required action, and then press the **OK** key to assign that action to the keypad button.

8   If you use the 'Select Message' action, the printer displays an additional page, as shown below.
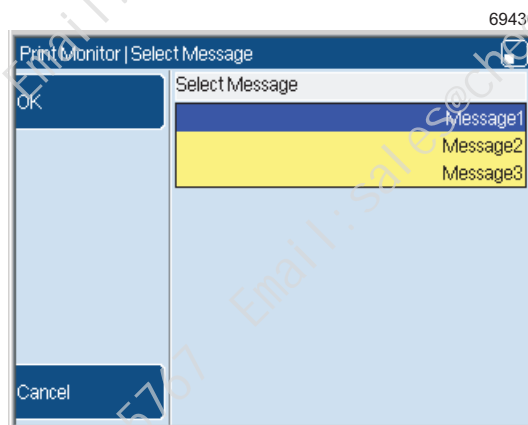

Figure 11. Select Message page

9   Highlight the required message and press the **OK** key to return to the **Edit Action** page. The 'Select Message' action has an additional menu option that shows the message that you selected.
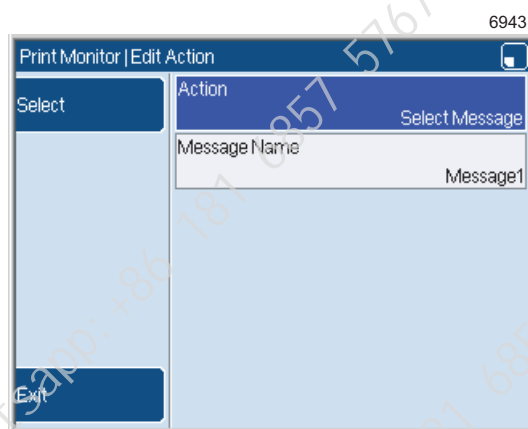

Figure 12. Edit Action page: Select Message

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L I N X

There is an equivalent page for the 'Set Remote Field' action.

Figure 13. Edit Action page: Select Remote Field

Use this page to set the **Remote Field Name** option to the name of the remote field that you created in the message. Set the **Remote Field Value** option to the required text for the remote field. When the keypad button is pressed, the contents of the remote field are changed to the text that you set.

IMPORTANT: Make sure that the field is a *remote* field and not a *buffered* remote field. To check the type of field, use the Message Editor to open the message, and then highlight the field.

(For more information about remote fields, refer to *How To Create a Remote Field*.)

10   Press the **Exit** key to return to the **Edit Keypads** page.

Figure 14. Edit Keypads page

11   Do one of the following:

- To configure another button, highlight the required button, and then repeat steps **5** to **10**.

- To return to the **Parallel I/O** page, press the **Exit** key two times.

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2.4.2 Configure the inputs

Set the links LK2 to LK5 to the default position (A), so that the printer provides the 0 V and 24 V connections. Refer to 'Input connections' on page 29 for information about the input wiring.

To configure the inputs, perform the following steps.

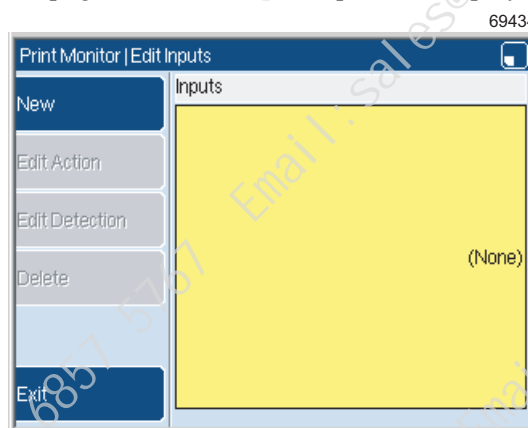1   At the **Parallel I/O** page, select the **Inputs** option to display the **Edit Inputs** page.

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Figure 15. Edit Inputs page

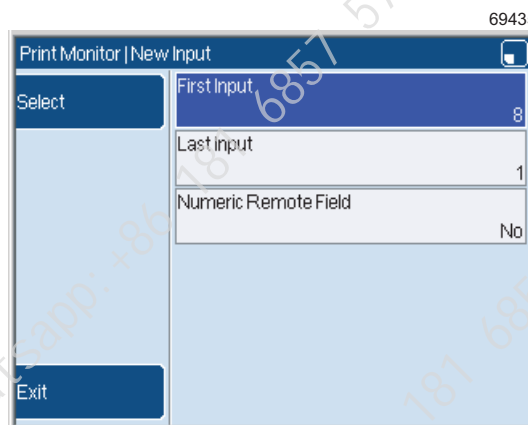2   Press the **New** key to display the **New Input** page.

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Figure 16. New Input page

This page shows the default values (8 and 1) for the first input and last input of the new range of inputs. In this example, you change these values to 6 and 4, so that the three inputs 6, 5, and 4 are assigned to the new range.

(The **Numeric Remote Field** option is described on page 19.)

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3   Select the **First Input** option to display the **First Input** page. Highlight the number '6' as shown below.
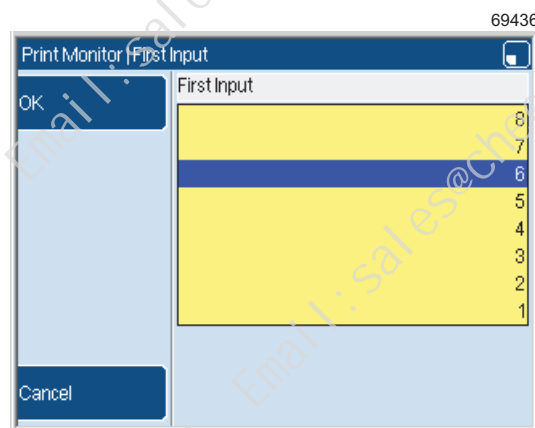

Figure 17. First Input page

4   Press the **OK** key to return to the **New Input** page. The **First Input** option is changed to 6.
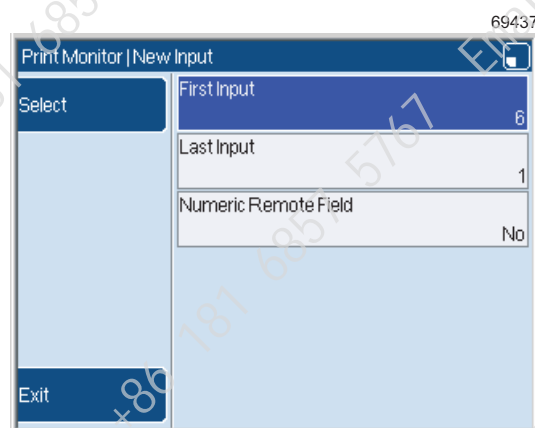

Figure 18. New Input page

5   Select the **Last Input** option to display the **Last Input** page. Highlight the number '4' as shown below.
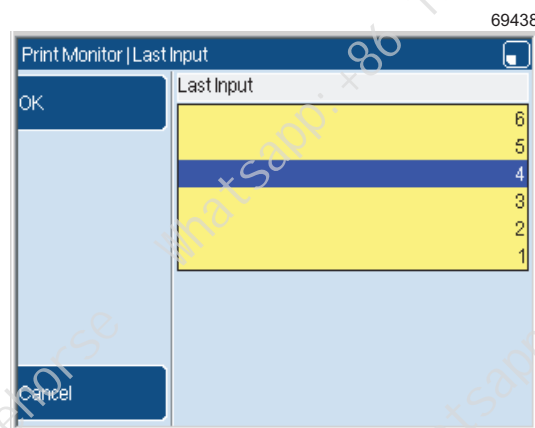

Figure 19. Last Input page

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6   Press the **OK** key to return to the New **Input** page. The **Last Input** option is changed to 4.
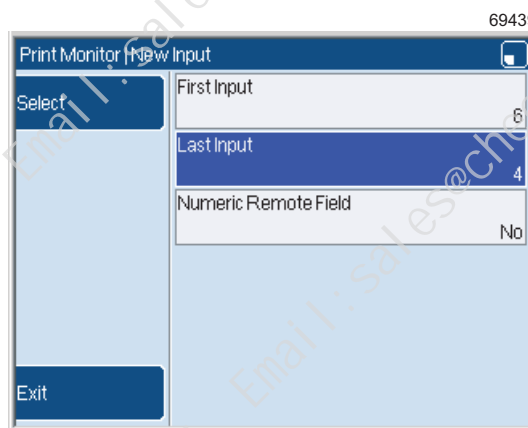
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Figure 20. New Input page

7   Press the **Exit** key to return to the **Edit Inputs** page. The page shows you the range of inputs that you assigned.
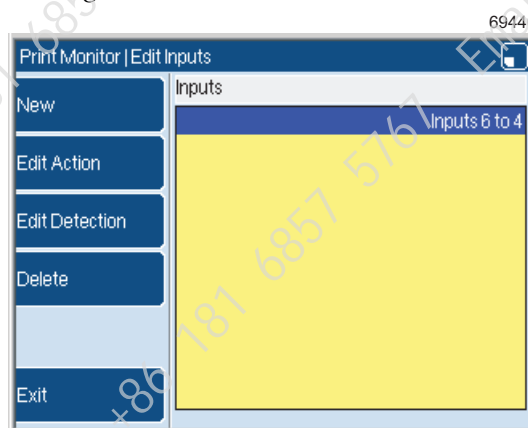
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Figure 21. Edit Inputs page

(See 'Define the input actions' on page 15 for a description of the **Edit Action** keys. See 'Define the Detection settings' on page 17 for a description of the **Edit Detection** keys.)

NOTE: You cannot edit the input range on this page. If the range is incorrect, press the **Delete** key to delete the range, and then enter the correct numbers. (The printer displays a confirmation page before the old range is deleted.)

To configure another input or another range of inputs, press the **New** key, and then repeat steps **2** to **7**. If you configure more inputs, the inputs that you assigned earlier (6 to 4) are not available in the **First Input** or **Last Input** pages.
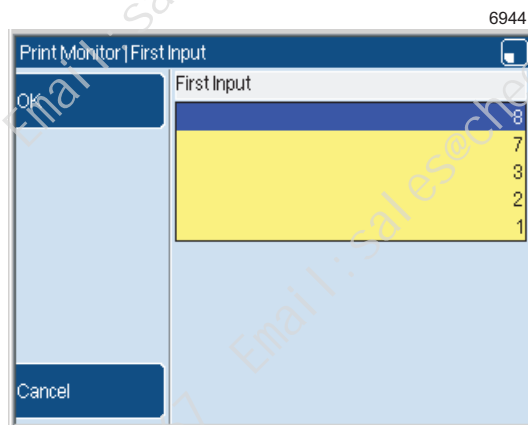
69441

Figure 22. First Input page

Define the input actions

You can assign an action to each combination of input signals. For example:

Inputs 6, 5, 4		
'Source' option	'Sink' option	Selected action
0 0 0	1 1 1	(No action)
0 0 1	1 1 0	Select Message
0 1 0	1 0 1	Start Print
0 1 1	1 0 0	Pause Print

Table 2. Input combinations and selected actions

Three inputs give you eight combinations and allow you to select eight actions (only four combinations are shown here). If you use four inputs, you can select any of the 10 actions that are available.

When the input combination is activated, the printer performs the action that you set.

To configure the inputs, perform the following steps.

1   At the **Edit Inputs** page (see Figure 21 on page 14), press the **Edit Action** key to display the following page.
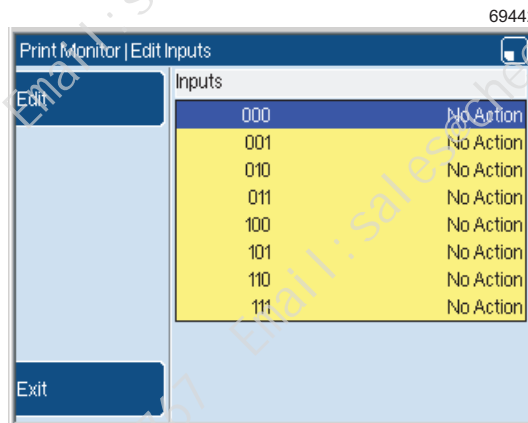

Figure 23. Edit Inputs page: input actions

The number of items in this list depends on the number of inputs that you assigned to this range. The range in this example contains three inputs and each input has two states—On and Off. The list shows all the states that are possible for the three inputs. For example, the first item ("000") indicates that all the inputs are Off. The last item ("111") indicates that all the inputs are On.

The second column in the list shows the action that occurs for each combination of input states.

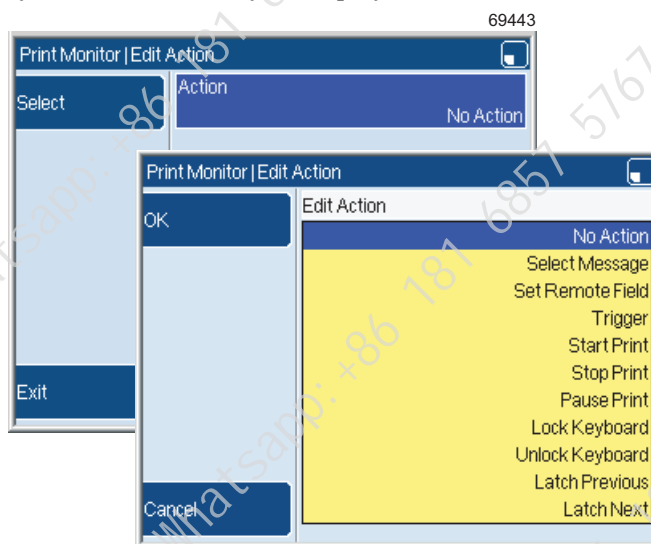Press the **Edit** key then the **Select** key to display the list of actions.

Figure 24. Edit Action page

This page is like the page that you used to define the keypad actions (see Figure 10 on page 9).

2   Select the required action (see steps **5** to **10** on page 9 to page 11).
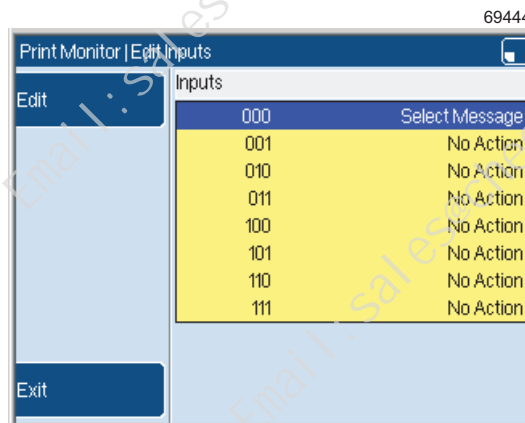
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Figure 25. Edit Inputs page: select action

3   Do one of the following:

- Select another combination of input states from the list.

- Press the **Exit** key to return to the previous page (see Figure 21 on page 14).

Define the Detection settings

You must make sure that the printer can detect the state of the input signal correctly. (Electrical noise or timing problems can cause an error.) You can define the detection method that is used. A reliable detection depends on the combination of the input line state and the change of state of the latch input line (pin 19 in Figure 4 on page 31).

1   At the **Edit Inputs** page (see Figure 21 on page 14), press the **Edit Detection** key to display the **Edit Detection** page.
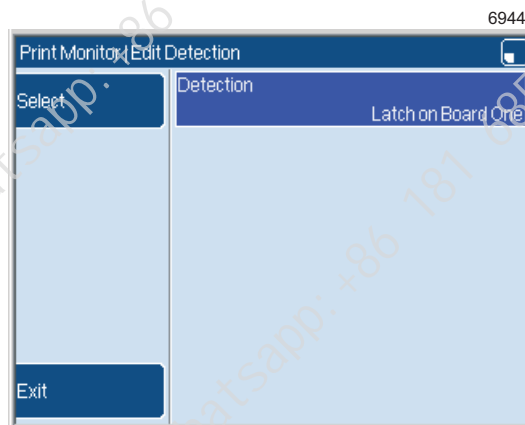
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Figure 26. Edit Detection page

2 Press the **Select** key to display the **Detection** page.
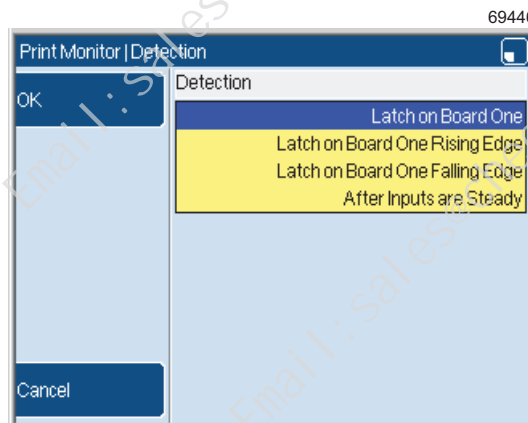

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Figure 27. Detection page

The following table shows the detection options that are available. The table also shows the event that makes the printer detect a change in the state of the input line.

Detection option	Detection event
Latch on Board One	The voltage on the latch input line changes from either a high level to a low level, or from a low level to a high level.
Latch on Board One Rising Edge	The voltage on the latch input line changes from a low level to a high level.
Latch on Board One Falling Edge	The voltage on a the latch input line changes from a high level to a low level.
After Inputs are Steady	The input voltage on the selected input is held in the new state for a minimum period. (The **After Inputs are Steady** option does not use the latch input line.)

Table 3. Detection options for change in input state

(The 'high' level is +24 V and the 'low' level is 0 V.)

3 Highlight the detection method that you require and press the **OK** key to return to the **Edit Detection** page.

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If you use the **After Inputs are Steady** option, the **Edit Detection** page has an additional option.
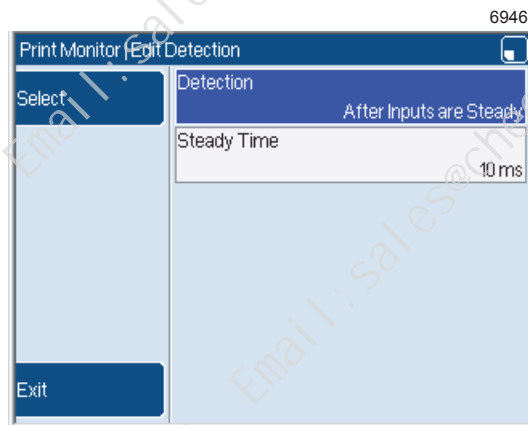

Figure 28. Edit Detection page

4 Set the **Steady Time** option as required to define the minimum period. You can set the value to 10, 50, or 100 milliseconds. (If you use a relay, the **Steady Time** option provides a debounce period for the relay contacts.)

5 Press the **Exit** key to return to the **Edit Inputs** page.

Numeric Remote Field

You can use a range of inputs to generate a numeric value which is put into a remote field. The value is encoded as a binary number. For example, a range of four inputs can generate any binary number from '0000' to '1111' (decimal 0 to 15).

To use this feature, perform the following steps.

1 Set the input range (for example 8 to 1) as shown in 'Configure the inputs' on page 12.
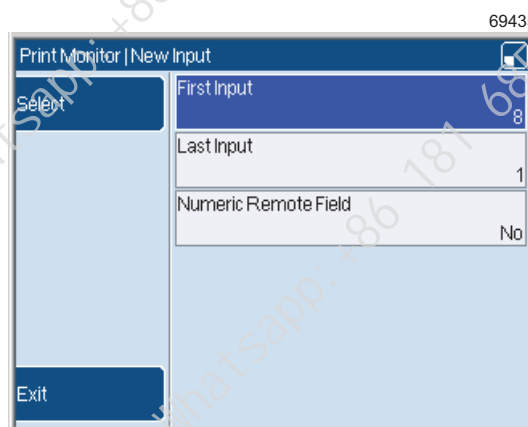

Figure 29. New Input page

2 Set the **Numeric Remote Field** option to Yes.

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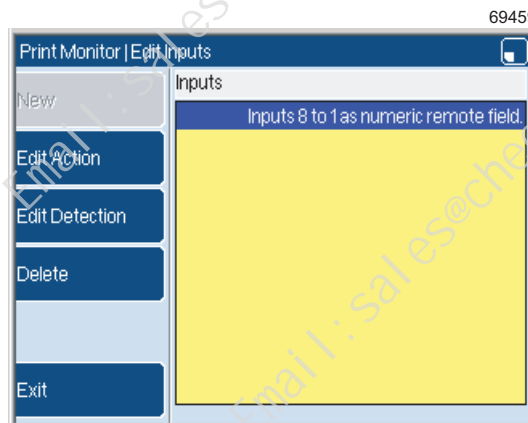**3** Press the **Exit** key to return to the **Edit Inputs** page.

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Figure 30. Edit Inputs page

The page shows the range of inputs that you use for the numeric remote field.

4 Press the **Edit Action** key to display the **Numeric Remote Field** page.
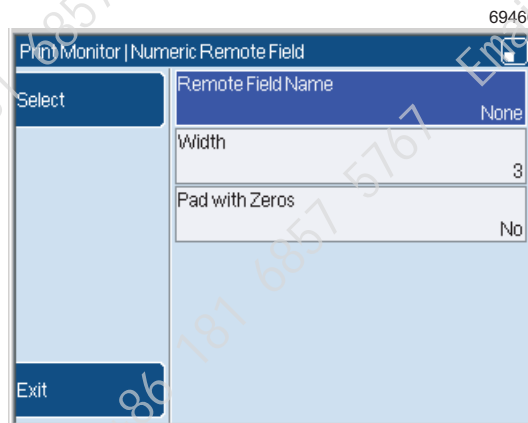
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Figure 31. Numeric Remote Field page

5 Select the **Remote Field Name** option and enter the field name.

6 Select the **Width** option and enter the width of the field (number of characters).

7 Select the **Pad with Zeros** option and set the option to either of the following values:

Yes The printer adds some zeros to fill the field if the number is smaller than the width of the field. For example if the field width is nine characters and the number is 15, the field is set to '000000015'.

No The printer does not add zeros to the field.

8 Press the **Exit** key to return to the **Edit Inputs** page.

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2.4.3 Configure the outputs

You can use any output to indicate an event that you define (if the output is not assigned to a keypad). The outputs are used separately, and are not assigned to any range.

Event

1 At the **Parallel I/O** page, select the **Outputs** option to display the **Edit Outputs** page.
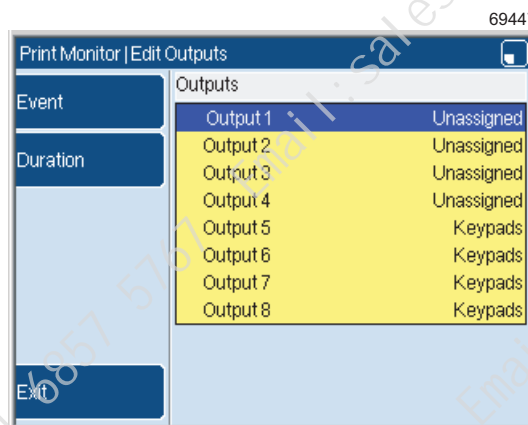

Figure 32. Edit Outputs page

You can assign only the outputs 1 to 4 in this example, because the keypad uses four outputs (outputs 5 to 8). If you highlight any of the other outputs (5 to 8), only the **Exit** key is available—the other keys are disabled.

2 To assign an output, highlight the required output and press the **Event** key. The printer displays the **Edit Outputs: Event** page.
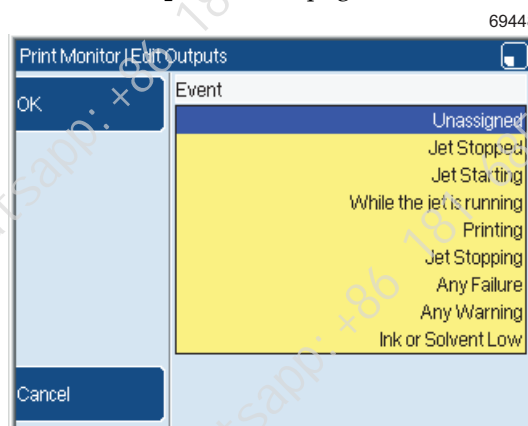

Figure 33. Edit Outputs: Event page

3 Highlight one of the events in the list, and then press the **OK** key to select that event and return to the **Event** page.

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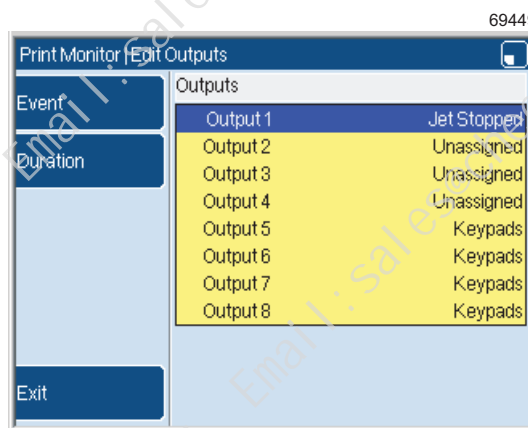**Figure 34. Edit Outputs: Outputs page**

In Figure 34, Output 1 is activated if the printer status is "IDLE".

Duration

The output signal can be a single pulse, a series of pulses, or a continuous level. You can use a different type of signal for each output.

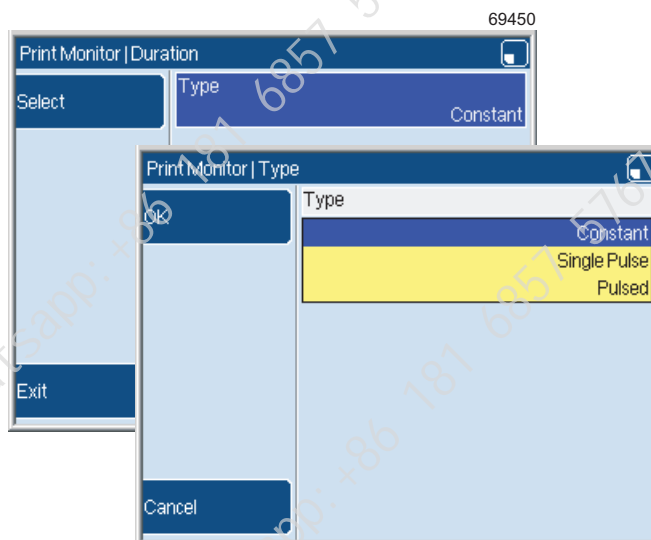**1** Press the **Duration** key then the **Select** key to see the available signal types.

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Figure 35. Duration: Type page

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2 Highlight the required type, and then press the **OK** key to return to the **Duration** page. If you selected the **Pulsed** option, the page shows two more options— **Duration** and **Pulse Count**.

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Figure 36. Duration page: Pulsed type

The **Duration** option shows the length of each output pulse (in milliseconds). The **Pulse Count** option shows the number of pulses that are generated when the output is activated.

If the output signal is set to Single Pulse, this page does not show the **Pulse Count** option. If the output signal is set to Constant, only the **Type** option is shown.

3 Press the **Exit** key to return to the **Edit Outputs** page.

2.4.4 Configure the multi-stage alarm

(Refer to the *Linx 7900 Maintenance Manual* for information about the hardware connections.)

Perform the following steps to configure the multi-stage alarm.

1 At the **Parallel I/O** page, select the **Alarm Outputs** option to display the following page.
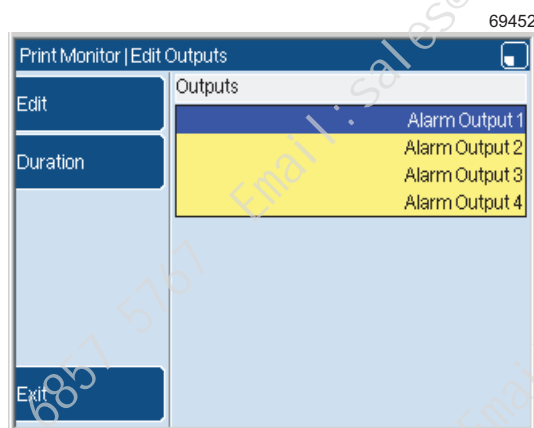
Figure 37. Edit Outputs: Outputs page

2 Highlight one of the outputs in the list, and then press the **Edit** key to display the following page.

Figure 38. Alarm Outputs page

This page shows the printer states that cause the activation of the alarm output. The default setting is 'No' for each item in the list (as shown on the right side of the page). This setting indicates that no printer state is assigned to the alarm and the alarm output is never activated.

3   To change a setting, highlight one of the items in the list and press the **Yes** key:

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Figure 39. Alarm Outputs page
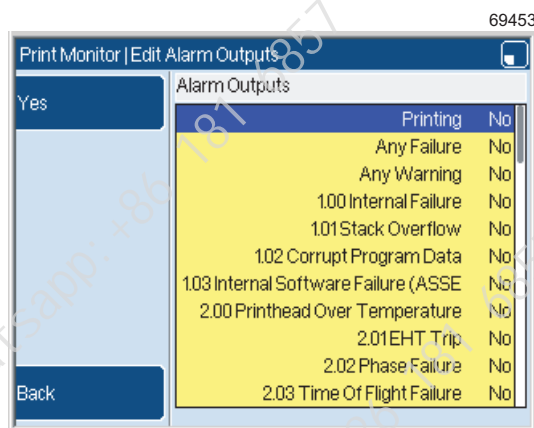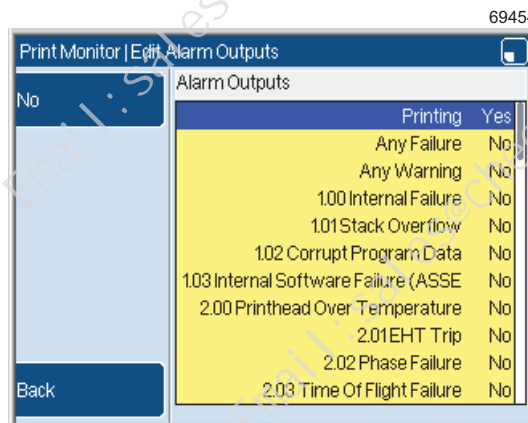
The key label changes to 'No'. If you press the key again, the setting changes to 'No' and the key label changes to 'Yes'.

In Figure 39 the first item in the list indicates that the 'Printing' state is assigned to this alarm output. The output is activated if the printer status is "PRINTING".

You can use the **Any Failure** item or the **Any Warning** item to assign a class of items to the alarm output. The alarm is activated if any event in that class of events occurs.

- If you set the **Any Failure** item to Yes, all the items that have the prefix "1" or "2" are set to Yes. (For example "1.01 Stack Overflow" or "2.01 EHT Trip".)

- If you set the **Any Warning** item to Yes, all the items that have the prefix "3" are set to Yes. (For example "3.03 Ink Low".)

4   Press the **Back** key to return to the previous page. Then press the **Exit** key to return to the **Parallel I/O** page.

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2.4.5 Parallel I/O Runs

This option on the **Parallel I/O** page tells the printer when to enable, or to disable, the Parallel I/O unit.

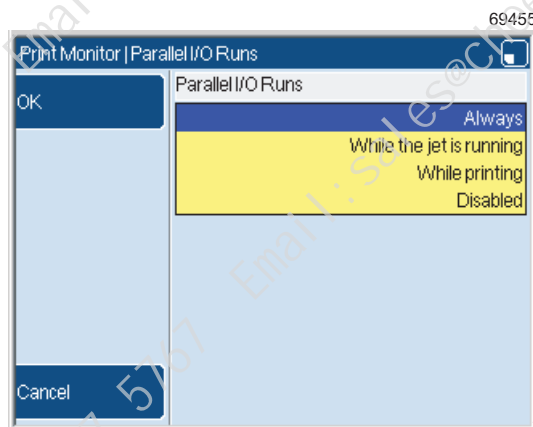1   Select the **Parallel I/O Runs** option to display the following page.

Figure 40. Parallel I/O Runs page

2   Highlight the required option, and then press the **OK** key to return to the previous page.

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2.4.6 Hardware

Use the **Hardware** page to configure the inputs and outputs to match the electrical characteristics of the external signals.

69456
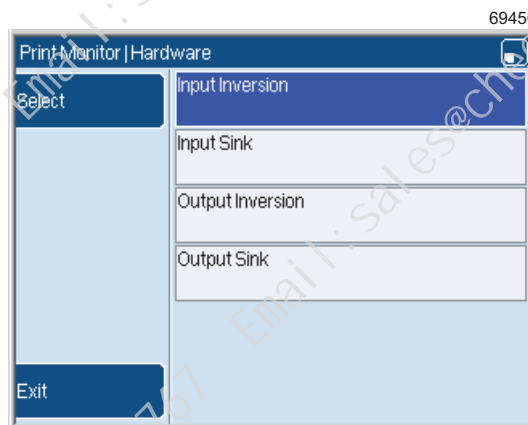

Figure 41. Hardware page

Input Inversion

1   Select the **Input Inversion** option to configure the inputs to match the polarity of the input signals.

69457
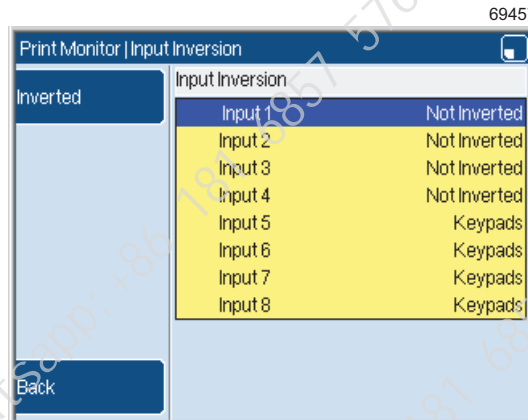
Figure 42. Input Inversion page

2   Press the **Inverted** key to change the polarity of the highlighted input to 'Inverted'.

The key label changes to 'Not Inverted'. If you press the key again, the setting changes to 'Not Inverted' and the key label changes to 'Inverted'.

The keypad in this example uses four inputs (outputs 5 to 8). You can change only the inputs 1 to 4. If you highlight any of the other inputs (5 to 8), only the **Back** key is available—the **Inverted** (or **Not Inverted**) key is disabled.

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Input Sink

You can connect two types of input signal:

Sink   Use this setting for an active low input.

Source   Use this setting for an active high input.

Refer to 'Input connections' on page 29 for more information.

To configure the **Input Sink** options, perform the following steps.

1   At the **Hardware** page, select the **Input Sink** option to configure the electrical characteristics of the inputs.

69458

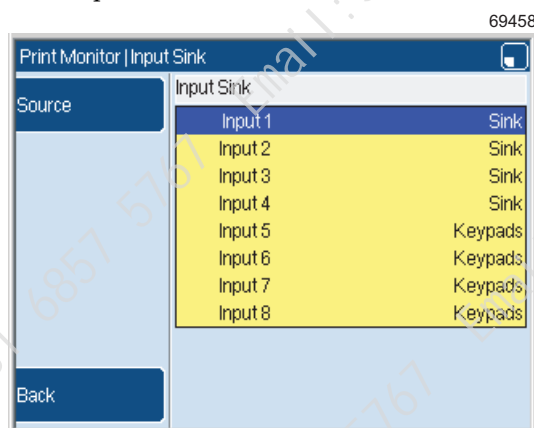**Figure 43. Input Sink page**

2   Press the **Source** key to change the highlighted input to 'Source'.

The key label changes to 'Sink'. If you press the key again, the setting changes to 'Sink' and the key label changes to 'Source'.

In this example the keypad uses four inputs (outputs 5 to 8). You can change only the inputs 1 to 4. If you highlight any of the other inputs (5 to 8), only the **Back** key is available—the **Source** (or **Sink**) key is disabled.

Output Inversion

Use the **Output Inversion** option to configure the outputs to match the polarity of the external device.

The **Output Inversion** page is like the **Input Inversion** page.

Output Sink

Two types of output signal are available:

Sink   If you use this setting, the output operates like a switch. The external device detects the state of the output—a low output is active, a high output is not active.

Source   If you use this setting, the output generates a voltage level—a high output is active, a low output is not active.

The **Output Sink** page is like the **Input Sink** page.

3 Links and Connections

3.1 Link positions

The following illustration shows the positions of the links on the PIO option PCB.
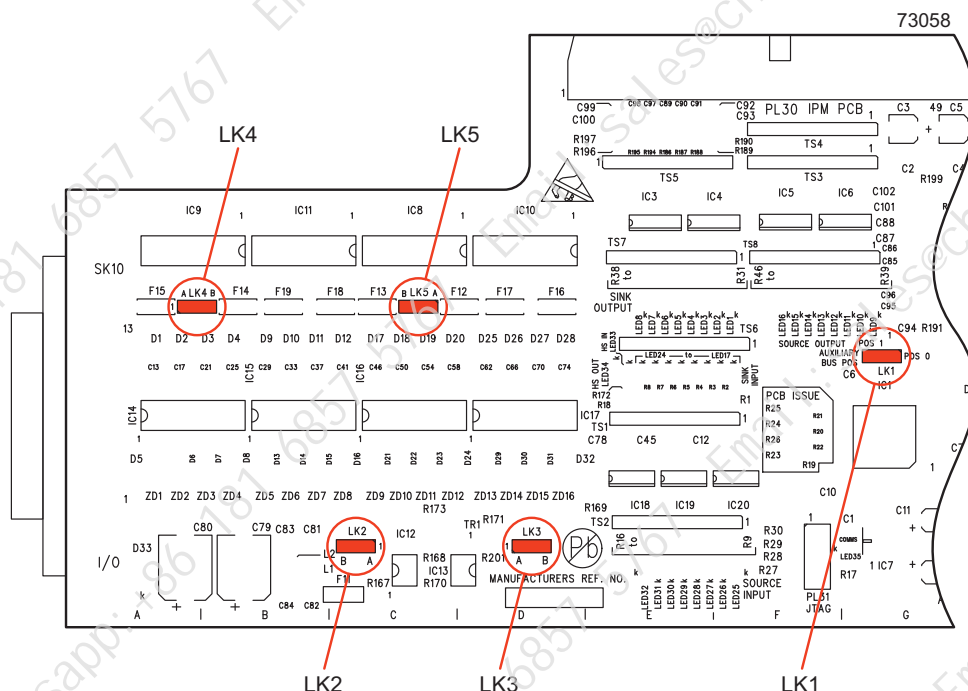
Figure 44. Link Positions

Link LK1 is not described in this document. Make sure that this link is in position 0 before the PCB is fitted into the printer.

3.2 Input connections

If the 'Sink' option is selected (see 'Input Sink' on page 28), connect any inputs that are not active to the 24 V line. To connect an active input, use a pull-up resistor on the input (A) as shown in Figure 45 (a), or use a relay (b).

Figure 45. Input connection: 'Sink' option

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If the 'Source' option is selected, connect any inputs that are not active to the 0 V line. To connect an active input, use a pull-down resistor on the input (A) as shown in Figure 46 (a), or use a relay (b).
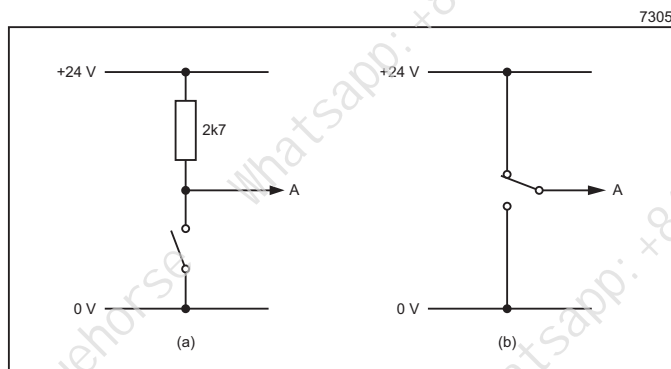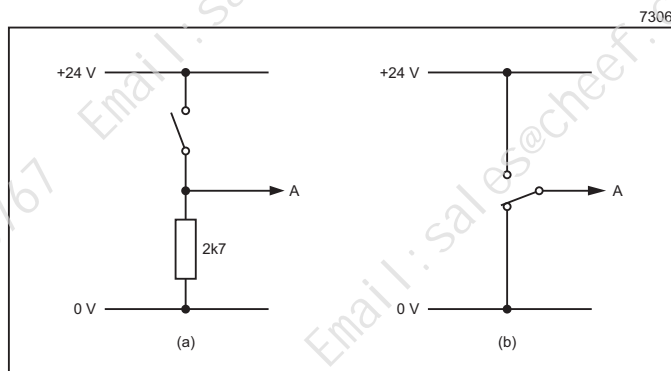

Figure 46. Input connection: 'Source' option

If the inputs are set to 'Inverted' in the **Input Inversion** menu (see page 27), reverse the above settings. (The default settings are 'Sink' and 'Not Inverted'.)

3.3 Output connections

Figure 47 shows how you connect a load (B) to an output (A) that is set to the 'Sink' option (a) or the 'Source' option (b).
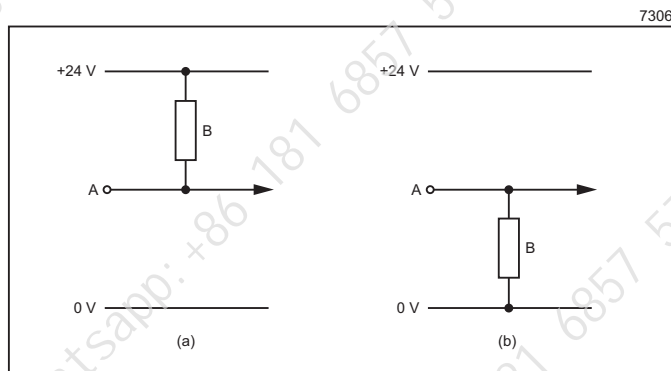

Figure 47. Output connections

The current in the load must not be more than 100 mA.

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3.4 Parallel I/O connector

The Parallel I/O connector is a 25-way D-type connector on the rear panel of the printer (see Figure 48 on page 32).

3.4.1 Pin numbers

The function of each connector pin is shown in the following table.

PARALLEL I/O CONNECTIONS	
Pin no.	**Function**
1	O V (for inputs)
2	Input 1
3	(No connection)
4	Input 7
5	Input 5
6	Input 3
7	+24 V supply (for inputs)
8	0 V
9	Output 8
10	Output 6
11	Output 4
12	Output 2
13	+24 V supply (for outputs)
14	Input 2
15	(No connection)
16	Input 8
17	Input 6
18	Input 4
19	Latch input
20	(No connection)
21	0 V (for outputs)
22	Output 7
23	Output 5
24	Output 3
25	Output 1

Table 4. Parallel I/O connections

Figure 48 shows the pin numbers for the connector.

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```
25 ○   ○ 13
24 ○   ○ 12
23 ○   ○ 11
22 ○   ○ 10
21 ○   ○ 9
20 ○   ○ 8
19 ○   ○ 7
18 ○   ○ 6
17 ○   ○ 5
16 ○   ○ 4
15 ○   ○ 3
14 ○   ○ 2
        ○ 1
```
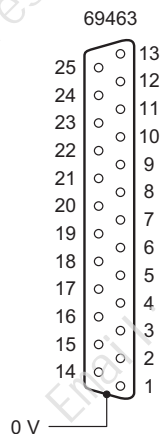
0 V

Figure 48. 25-way Parallel I/O connector

3.5 Multi-stage alarm connectors

The multi-stage alarm can use either a six-pin volt-free contact (VFC) connector or seven-pin 24 V connector for outputs.

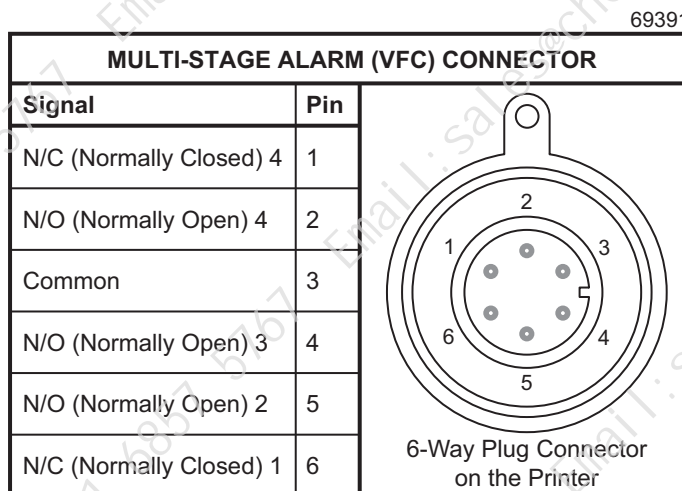The function of the connector pins for each connector is shown in the following diagrams.

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MULTI-STAGE ALARM (VFC) CONNECTOR		
Signal	**Pin**	
N/C (Normally Closed) 4	1	
N/O (Normally Open) 4	2	
Common	3	
N/O (Normally Open) 3	4	
N/O (Normally Open) 2	5	
N/C (Normally Closed) 1	6	

6-Way Plug Connector on the Printer

Figure 49. Multi-stage alarm: volt-free contact (VFC) six-pin connector

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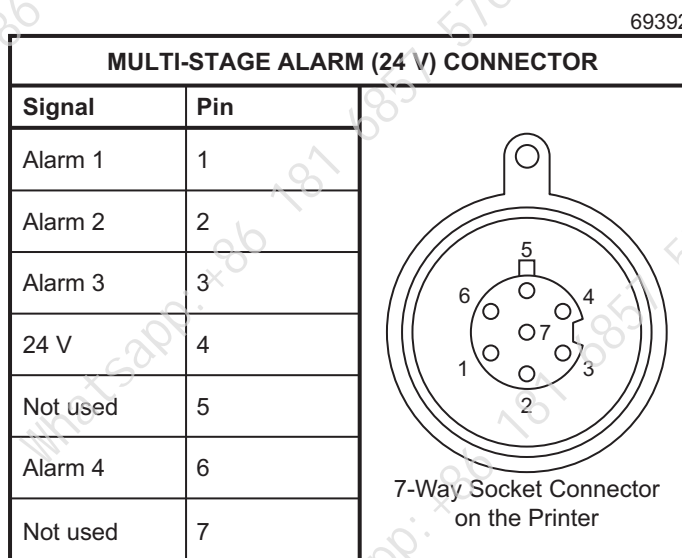| MULTI-STAGE ALARM (24 V) CONNECTOR		
Signal	**Pin**	
Alarm 1	1	
Alarm 2	2	
Alarm 3	3	
24 V	4	
Not used	5	
Alarm 4	6	
Not used	7	

7-Way Socket Connector on the Printer

Figure 50. Multi-stage alarm: 24 V seven-pin connector