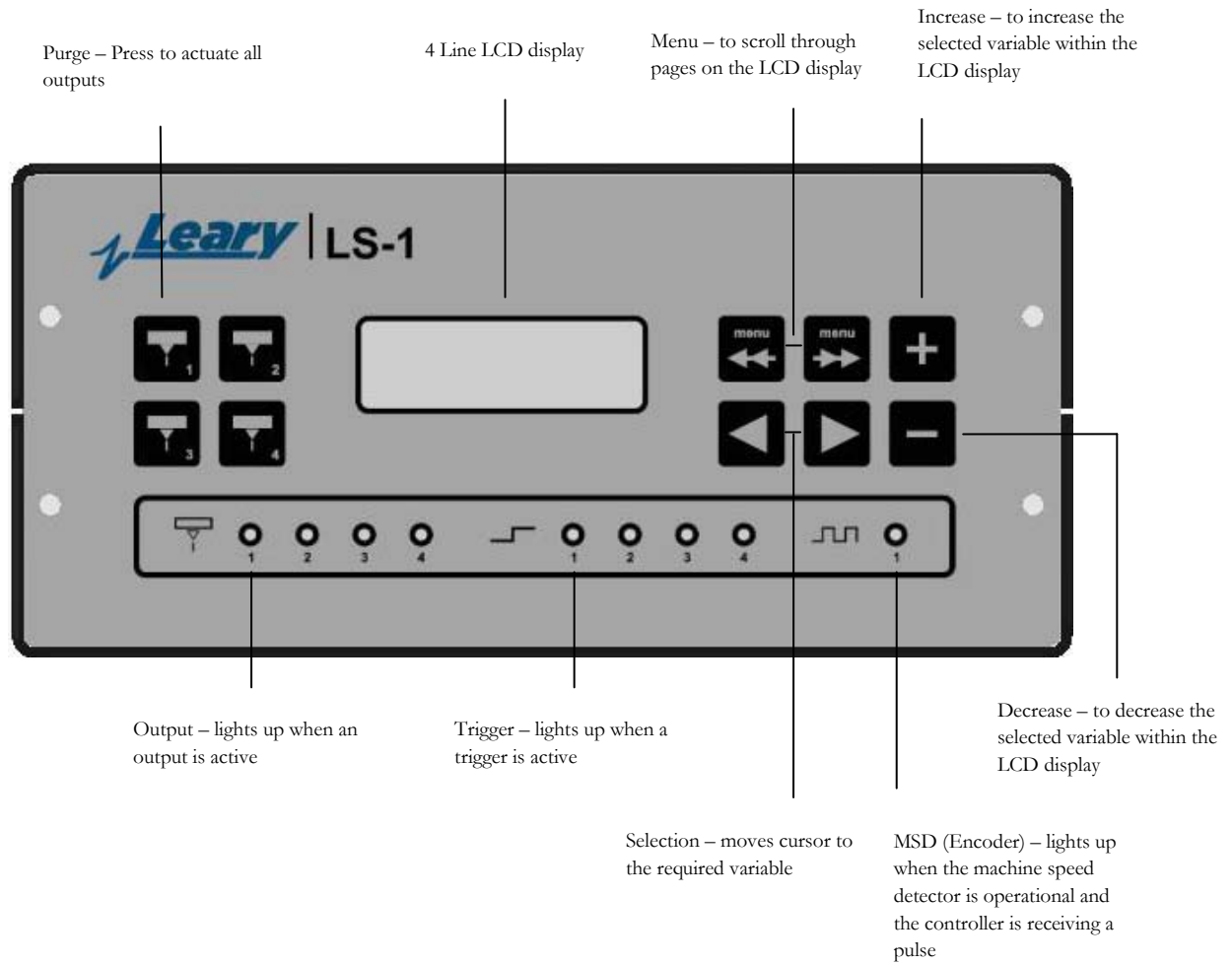


The Leary LS-1

Four Channel Controller



## The Leary LS-1 – Four Channel Controller



### Features

- LCD programming/display screen
- Four channels with up to four glue gun total capacity
- Programmable with 1-4 glue lines/rows of spots per product
- Automatically convert a glue line to a row of spots below a selected machine speed
- Digital display of production data including machine speed, work rate, and work total
- Precise adhesive volume control over the machine speed range by using a 4-point pressure curve to vary control pressure with respect to machine speed
- Low-speed cut-out inhibits valve output when the machine is running below a specified speed
- Compensation making fine pattern adjustments in either direction to compensate for various factors such as glue valve construction, adhesive, orifice size, temperature, pressure, and height
- Programmable start position and glue line lengths

- Internal timer function for fixed speed machines
- Selectable gun purge pressure
- Adjustable voltage outputs to suit all Leary guns and many other actuators including hot melt guns
- Ability to use a proprietary encoder
- Meets European EMC standards

## Specification

Input Range: 110/240VAC, 50/60Hz

Power Consumption: 315.9W max.

### Outputs:

- 4 outputs using 3-pin DIN screw-lock sockets
- Pressure control output

### Constants:

MSD Pulses: 1mm, 2mm, 0.01", internal, custom

Custom pulse: 0.01 to 1.00mm

Trigger: Leading edge or trailing edge detection

### Pattern:

Number of lines: 1-4

Delay: 0 to 0000mm

Line: 0 to 9999mm

### Pressure:

0-100% of glue supply pressure

### Channel cycle information (LEDs):

MSD: indicates pulsing signals received from the machine speed detector



Trigger: indicates trigger signal has been received from the photo head. Changes state for Leading/Trailing edge detection: LED will be “normally ON” when rear edge detection mode is selected.



Output: indicates that the outputs are active.

Yellow = “High Volts Output

Green = “Hold Volts Output”

Red = “Fault (Overload / Short circuit”



**Lockout:**

A cycle will not be re-triggered until the distance set in the lockout is passed. This function is used to ignore edges such as windows / cut-outs or dark print that otherwise will re-trigger the cycle.

**Low speed cut-out:**

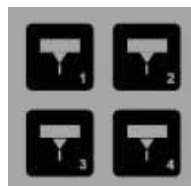
Outputs are inhibited until the machine reaches the required speed. As the machine slows down the outputs are again inhibited when the speed falls below the required setting. Range 0m/min to 300m/min.

**Low speed spotting/auto-spotting:**

Below the set speed a glue line will automatically convert its output from line to spots. Range 0m/min to 300m/min.

**Purge**

When button is pressed the relevant output is actuated. If the controller is connected to a glue regulator the adhesive will be regulated to the purge pressure set in the hidden constants. The purge output is selectable between a continuous output and a high speed intermittent cycle.



**Machine speed detector:**

Set to 1mm pulses for Pafra MSD5 and MSD4/1 and 2mm pulses for Pafra MSD4. Set to 0.01” for use with a Leary 1200ppr encoder. Custom MSDs with pulses in the range of 0.01 to 1.00mm may be selected.

## Trigger

Settings: dark to light for leading edge light to dark for trailing edge. NPN and PNP options are also selectable in hidden constants.

## Adhesive pressure control

- Automatically variable pressure system may be connected
- 4 programmable set points for speed / pressure
- Purge setting for purging pressure
- Output signal: 0 to 10 volts or 4-20mA
- Use with any Pafra Glue Regulator Unit and Pressure tank or pump, or any of the Leary high pressure GRU range.

## Production Data

Shows machine speed in m/min or ft/min, work rate per hour and total count.

# Programming Instructions for the LS-1 Controller

## Start-up instructions

The following sequence should be followed to correctly power up the LS-1 controller.

1. Check that the power cord is plugged into the back of the unit. The power source should be clean and free from spikes.
2. Prior to switching on the supply make sure that the power on/off switch on the back of the controller is turned off.
3. Switch on the power supply at the source.
4. Turn on the power to the controller by pushing the rocker on the power on/off switch to the on position.

## Keypad Operation



When pressed, the function of the purge key is to energize the output continuously. With this action the output LED illuminates. When active, the option to change the output from a continuous one to a high speed intermittent cycle is shown. Press the purge key again to cancel.



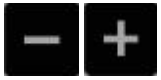
When pressed, the function of the menu keys is to navigate through each page of the menu, forwards (next page) or backwards (previous page).

In hidden constants:



When pressed, the left and right arrow keys allow for the selection of a particular parameter on the current page displayed. That selected parameter is shown in between the flashing cursors:

i.e. 



When pressed, the increase/decrease key is used to alter a particular parameter. These keys will change a numeric parameter or scroll through the options available in the parameter.

**Note:** Except for the purge key, all of the above keys can be operated whilst the machine is in production or running. All changes take effect instantly.

## Switching the controller off

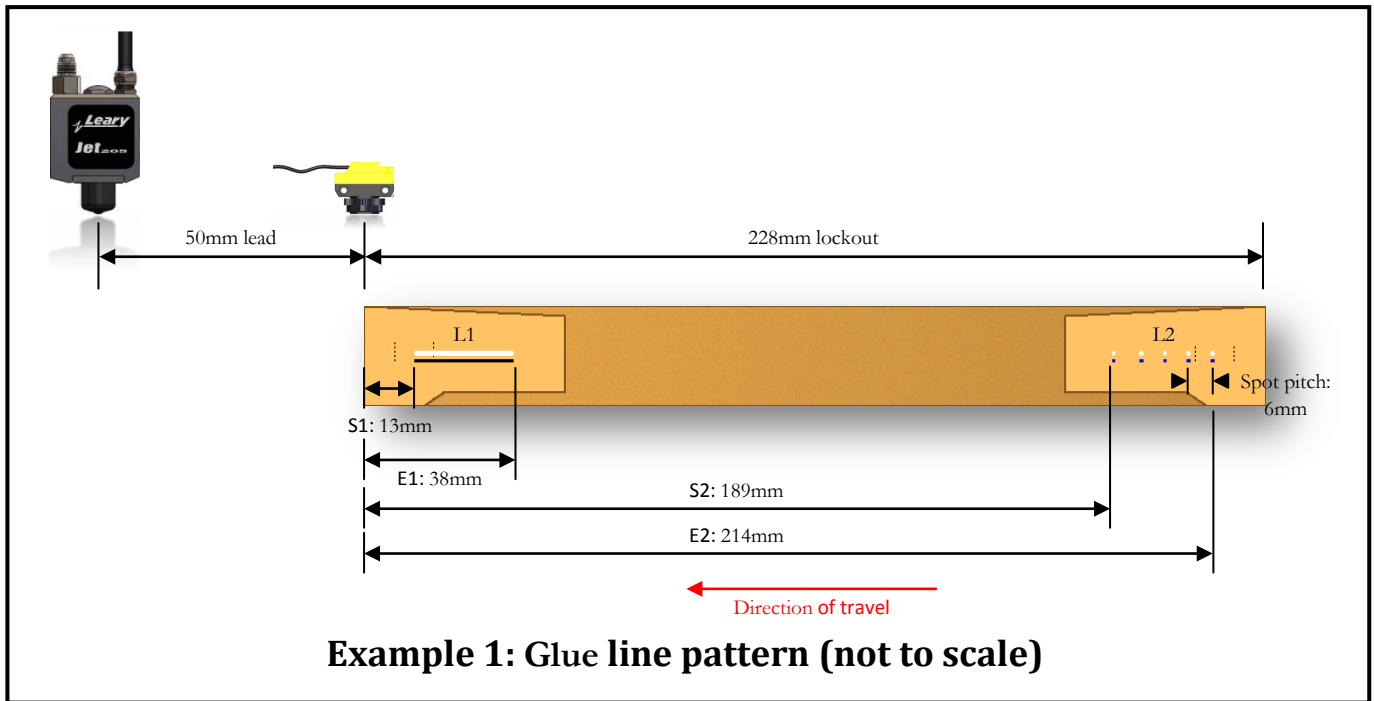
The controller can be turned off at any time by operating the power off switch. All information in the controller will be held in memory and displayed the next time the controller is used.

## Programming

For best results, follow these steps in this order:

1. Decide line positions and lengths
2. Position the glue guns
3. Position the photo head
4. Enter pattern line 1
5. Enter pattern line 2
6. Set trigger parameters
7. Set spot parameters
8. Set compensation parameters
9. Select set/run mode
10. Set pressure regulation control
11. Production data information
12. Select hidden constants
13. MSD, custom pulse, hold voltage and high time settings
14. Low speed cut-out and low speed spotting settings
15. Purge pressure setting

The illustration below is an example of a gluing application, and its parameters are used in the programming instructions in the following pages. Following this example and its settings will help you to familiarize with using the Leary range of controllers.



## Decide line position and lengths

Measure and take note of the following.

### 1. The start position of the glue line or lines (maximum 4 lines)

The start positions are referred to in Example 1 as 'S'. In example 1, the trigger is set to detect the front edge of the product (most common). In this case, the start and end distances for any pattern event are always measured from the leading trigger edge of the product.

Example 1: Start for line 1 of pattern (S1) = 13mm

Start for line2 of pattern (S2) = 189mm

### 2. The end position of the glue line or lines

Example 1: End for line 1 of pattern (E1) = 38mm

End for line 2 of pattern (E2) = 214mm

### 3. Changing from lines to spots

Any of the pattern event lines can be converted from a solid line to a series of spots (see steps 4 and 5).

Example 1: Line 2 (L2) spot pitch 6mm

Note that, with the auto pitch adjust feature disabled, for the spot pattern to finish exactly at the end of the line, the line length must be equally divided in whole numbers by the spot pitch. An allowance may be needed for the spot duration. When a line is switched to spot mode, the line length remains the master setting. Therefore, if the line length is not equally divisible by the pitch, then the last spot may be left off and the line of spots will appear short.

With auto pitch adjust feature enabled, the spot pitch is automatically adjusted so that the first spots starts at the pattern start position and the last spot finished at the pattern end position with an equal spacing between all spots.

If two or more lines are used, the spot pitch and spot time must be the same for all pattern events.

## 4. Position the glue guns

Only one glue gun is used in Example 1.

## 5. Position the photo head

The photo head must be positioned in the correct location to detect the trigger edge. In example 1, the trigger edge is the leading edge of the product. Position the photo head as follows:


- 50mm from the glue gun towards the feeder (this distance applies in most cases)
- 15mm above the surface of the work (maintain this focal length distance with guiding)
- So that the trigger edge will pass directly under the photo head
- Position the photo head over a gap in the machine or a dark, non-reflective surface.

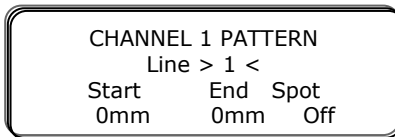
The trigger LED on the controller confirms when a trigger signal has been received. The trigger edge can be any edge that the photo head can clearly detect, and is usually either the leading edge or trailing edge of the product or one of its flaps.



## Enter pattern line 1



Follow these steps to set the start, end, and line type, i.e. spotted or solid:







Press the  key until the following page is shown:





Press the  or  key until the cursors flash each side of the start value.



Press the  or  key to change to value of the start until it reads 13mm.

Press the  or  key until the cursors flash each side of the end value.

Press the  or  key to change to value of the end reads 38mm.

Press the  or  key until the cursors flash each side of the spot value.

The first line in Example 1 is a solid line and therefore the spot function is not required.

Press the  or  key until the spot parameter displays “Off.”

This completes the settings required for line 1 of pattern and the display screen should read as follows:



CHANNEL 1 PATTERN		
Line > 1 <		
Start	End	Spot
13mm	38mm	Off

## Enter pattern line 2


Follow these steps to set the start, end, and line type, i.e. spotted or solid:



Select the Line field and press the  key until the following page is shown:


CHANNEL 1 PATTERN		
Line > 2 <		
Start	End	Spot
0mm	0mm	Off

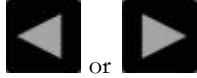
Press the  or  key until the cursors flashes on each side of the start field.



You will notice that there is a minimum value provided automatically. This value is calculated from the end of the last line by adding 1mm. This provides a safety margin so that the lines do not overlap.

Press the  key to change the value until it reads 189mm.

Press the  or  key until the cursors flashes the end parameter.


Press the  key to change the value until it reads 214mm.



Press the  or  key until the cursors flashes the spot parameter.

The second line of Exmaple 1 is a spotted line, and therefore the spot function is required.



Press the  key until the spot parameter displays “On.”.

This completes the settings for line 2 of pattern 1 and the display screen should read as follows:

CHANNEL 1 PATTERN		
Line > 2 <		
Start	End	Spot
189mm	214mm	On

### Freeform Gluing Mode:

Any of the four channels can be switched to “Freeform Gluing” mode. This is done from the hidden constants section of the menus (see page ?). When activated, the freeform gluing mode will switch the glue gun output on for the entire length of the product, less the start and end offsets. This mode is used, for example, for the gluing of the side seam flap on a carton or box. Once the start and end offsets (for example 5mm) have been set, every box will be glued starting 5mm in from the front edge and ending 5mm before the back edge – regardless of how long the box is. This means that there is no adjustment needed during the make ready process when changing from one size of carton or box to another, the LS-1 will always apply glue correctly on every box. Lines or spots can be applied.


Note; For this function to operate, the lead distance between the glue gun and the trigger must be larger than the required offset for either the start or the end.

### Run Hold Gluing Mode:

Any of the four channels can be switched to “Run Hold” mode. This is done from the hidden constants section of the menu (see page 1). When activated, the run hold gluing mode will switch the glue gun output on once the encoder starts turning. The output can be used in line or spot mode. The “low speed cut-out” option can be used in combination with run hold gluing so that the gun will not output until that speed is reached and “low speed spotting” (spots below that speed and lines above) or a combination of the two.

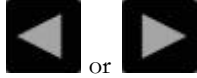
### Set trigger parameters





Press the  key until the page showing trigger information is displayed as follows:

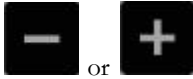
TRIGGER SETTINGS	
CH. >1<	Trigger 1
Lead	Lockout
2mm	2mm



### Lead Distance



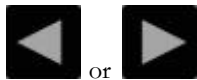
Press the  or  key until the cursors flashes the lead field (minimum 2mm).


The lead value is the distance in millimeters from the trigger to the glue gun, and is normally set at around 50mm, depending on the type of brackets being used. When entered, this enables subsequent line delay and line length adjustments to be measured from the product's leading edge. If the lead distance subsequently changes, i.e. if the trigger or glue gun is repositioned, then the lead value must be altered accordingly.



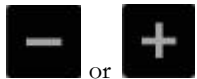
Press the  or  key until a lead value of 50mm is displayed.



## Lockout Distance



Press the  or  key until the cursors flashes the lockout value (minimum 2mm).


Lockout is the distance that the trigger passes from the trigger edge (in this case the leading edge of the product) to the other edge of the product (the trailing edge). The trigger will be disabled for the distance entered for the lockout value, thereby preventing unwanted triggering caused by any holes or contrasting colors on the product.



Press the  or  key until a lockout value of 300mm is displayed.

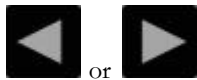
## Set Spotting Settings





Press the  key until the page showing spot parameters is displayed as follows:

SPOTTING SETTINGS	
Ch. >1<	
Spot Size	Spot Pitch
1.80ms	3mm

## Spot Size




Press the  or  key until the cursors indicate the spot size parameter.

The spot size controls the gun opening time, which governs the size of the glue spot. The value is displayed in milliseconds (ms) and is adjustable from 0.10ms to 4.5ms in steps of 0.01ms.

The spot size is dependent on several factors including the type of gun, the speed of the machine, the size of spot required, the viscosity of the glue, and the distance from the gun nozzle to the product surface. Therefore, the spot size can only be accurately set whilst the machine is running at production speed. However, suggested starting figures are as follows:



Press the  or  key to set the pitch to 5mm.

## Set compensation settings

Press the  key until the page showing compensation value is displayed as follows:

COMPENSATION SETTING	
Ch. >1<	
On Comp	Off Comp
2.50ms	2.50ms



### On Comp. (on compensation)

Press the  or  key until the cursors flashes the on comp parameter.

On compensation time represents the on response time of the gun, and is needed to keep the line start position consistent throughout a range of different machine speeds. This value is dependent on several variables including glue viscosity, nozzle size and height of the gun above the product surface. The value is displayed in milliseconds and is adjustable from 0.00ms to 50ms in steps of 0.01ms.

Press the  or  key to set the required value.

### Off Comp. (off compensation)

Press the  or  key until the cursors flashes the off comp parameter.


Off compensation time represents the off response time of the gun, and is needed to keep the line end position consistent throughout a range of different machine speeds. . Like on comp, this value is dependent on a number of variables. The value is displayed in milliseconds and is adjustable from 0.00ms to 50.00ms in steps of 0.01ms.

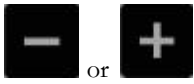
Press the  or  key to set the required value.



## Select set/run mode

This function applies when a machine stops during a control cycle. In set mode, the glue gun will stop when the machine stops, and will resume to complete the current gluing cycle when the machine restarts. In run mode, the glue gun will stop when the machine stops, but will not start again until the trigger detects a trigger to begin a new gluing cycle.



Press the  key until the page showing set/run is displayed.



Press the  or  key to toggle between the two options available: set or run.

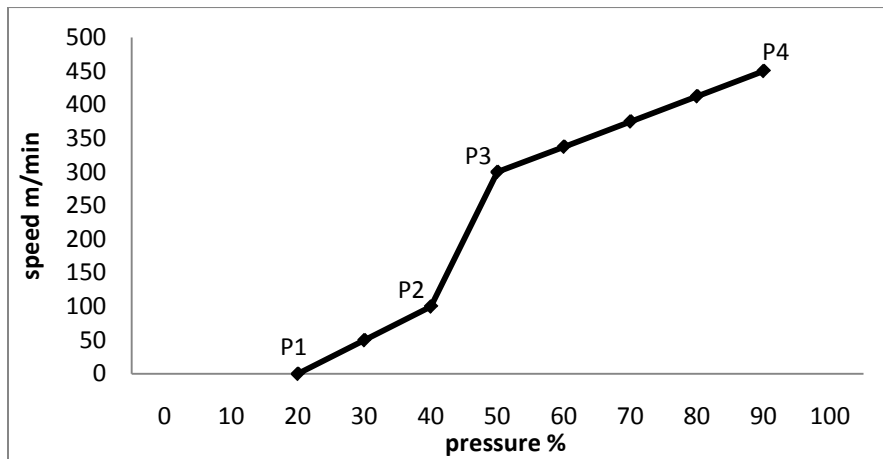
## Set pressure regulation control


This page is dedicated to the accuracy control of an in-line glue regulator unit. The control provides settings for four pressure points related to speed. These values are output from the controller in the form of a 0 to 10V signal. Four point control is given to facilitate the rheology of different adhesive types.

The menu page shows two columns of figures, the first being speed 1 to 4. Speed 1 is always set to 0m/min, and maximum setting for speeds 2, 3, and 4 is 600m/min.

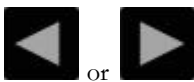
The second column shows pressure P1 to P4, shown as percentages, 100% being the maximum pressure available at the glue regulator unit.



Below is an example chart:





Press the  key until the following page is shown:


Speed1	0	P1	>0%<
Speed2	0	P2	>0%<
Speed3	0	P3	>0%<
Speed4	0	P4	>0%<






Press the  or  key until the cursors flashes the % value for P1.






Press the  or  key to set the value for P1 at 20%.



Press the  key and the cursor will move to speed 2.


Press the  or  key to set the value for speed 2 at 100m/min.



Press the  key and the cursor will move to P2.


Press the  or  key to set the value for P2 at 40%.



Press the  key and the cursor will move to speed 3.


Press the  or  key to set the value for speed 3 at 300m/min.


Press the  key and the cursor will move to P3.

Press the  or  key to set the value for P3 at 50%.

Press the  key and the cursor will move to speed 4.

Press the  or  key to set the value for speed 4 at 450m/min.

Press the  key and the cursor will move to P4.

Press the  or  key to set the value for P4 at 90%.


The display screen should now look like this:

Speed1	0	P1	>20%<
Speed2	100	P2	>40%<
Speed3	300	P3	>50%<
Speed4	450	P4	>90%<

Adjustment of the pressure and speed values can be carried out while the machine is running. Not all of the coordinates have to be used. Unused speed coordinates are set to zero, and their corresponding pressure values will automatically be set to the P1 value.

## Production data information




Press the  key until the following page is shown:


PRODUCTION DATA	
Speed	0m/min
Work Rate	0/hr
Total	0

This screen is for general information only; it does not affect the performance of the controller.

- Speed shows the actual machine running speed in meters or feet per minute.
- Work rate shows an average figure of how many product per hour are being processed.
- Total indicates the number of products that have been processed.
- Total indicates the number of products that have been processed by the system since the count was last zeroed. This value increments every time the trigger detects a product.

The total count can be zeroed by pressing the  key.





Press the  key to complete the menu loop and return to the channel 1 of pattern screen.

## Select hidden constants


The hidden constants menu contains parameters which must be set for the channel to suit the guns being used and the application requirements. Hidden constants are not available in the normal programming mode as they are considered to be permanent settings which would normally be carried out during manufacture, or by the engineer during installation.

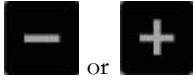
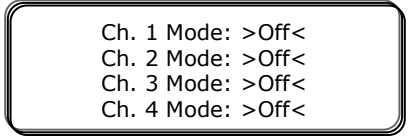
To access hidden constants, follow these steps:



- Switch off the controller
- Press the  or  keys simultaneously and hold while switching on the power.
- Release both keys.

## Channel Mode




Press the  key until the following page is shown:



Press the  or  key to set the value for channel 1 mode. The options include:

- Off
- On
- Freeform – start/end positions can be changed “per channel”. The channel output will be equal in length to the trigger input, minus the “start” and “end” offsets. Therefore, a longer trigger input will result in a longer channel output.
- Run Hold




Press the  key and the cursor will move to channel 2.

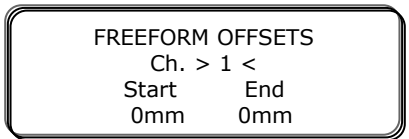
Select the mode for all four channels.



## Freeform Offsets

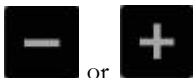
The settings on this page only apply to channels set to the “freeform” mode. The start/end positions can be changed “per channel”. In this mode, the channel output will be equal in length to the trigger input, minus the “start” and “end” offsets. Therefore, a longer trigger input will result in a longer channel output.





Press the  key until the following page is shown:




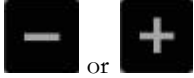
Press the  or  key until the cursors flash each side of the start value.





Press the  or  key to change to value of the offsets until it reads ?mm.




Press the  or  key until the cursors flash each side of the end value.



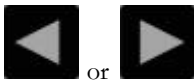
Press the  or  key to change to value of the offsets until it reads ?mm.



## Encoder Configuration



Press the  key until the following page is shown:

MSD Pulses	1mm
Custom Pulse	1.00mm
Int. Pulse	60m/min
	V0.02





Press the  or  key until the cursors indicate the MSD setting.

There are five options which can be used for the MSD and these are as follows:


- 1mm: Refers to a Pafra MSD4/1 or MSD5 speed detector.
- 2mm: Refers to a Pafra MSD4 speed detector.
- 0.01in. A Leary encoder is 0.01in. (standard 1,200ppr and small 800ppr encoders). The high resolution 3,000ppr Leary encoder cannot be used. Standard Leary encoder cables can be used.
- Internal: Internally generated pulse which is a constant 1ms simulating a 1mm MSD at 60m/min.
- Custom: Custom option allows the user to input a resolution in the range of 0.01mm to 1.0mm in increments of 0.01mm.

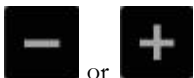




Press the  or  key to select the option required.

## Custom pulse setting




Press the  key and the cursors will move to the custom pulse setting.



Press the  or  key to select the desired value if this option is required.

## Trigger input pre-sets page:



Press the  key until the following page is shown:

Trigger 1	>	┌	<	NPN
Trigger 2	>	┌	<	NPN
Trigger 3	>	┌	<	NPN

## Trigger 4 > ⌋ < NPN


The ⌋ and ⌋ symbols are used for front edge and rear edge detection for triggers.

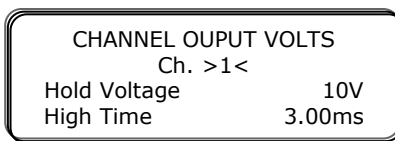
PNP and NPN inputs can be accepted. All Pafra SD5 and SD6 triggers are NPN type. An adaptor cable is required for these to be used, and the input must be set to NPN.


All Leary triggers are PNP and standard Leary cables can be used.

## Hold voltage



Press the  key until the following page is shown:



Press the  key and the cursors will move to the hold voltage setting.

Hold voltage is the voltage that keeps the gun open once initiated. The value is dependent on the gun being used, but is either 5V or 10V. Normal settings for Pafra guns are:

- 10V: Series 86, 87, 88, 22, and 22 ball seat
- 5V: Series 93




Press the  key to select the correct voltage for the gun being used.

## High time setting



High volt time represents the duration of the 33V spike and is dependent on the gun being used. The value is adjustable between 0.10ms and 50.0ms in steps of 0.1ms. Normal settings for Pafra guns are as follows:

- 10.0ms: Series 86, 87, 88
- 1.0ms: Series 93
- 3.0ms: Series 22 and Series 33
- 4.0ms: Jet 100, Jet 200 and Jet 205




Press the  key and the cursors will move to high time.



Press the  or  key to set the value required.

## Low speed cut-out and low speed spotting settings

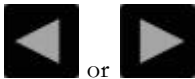




Press the  key until the following page is shown:

Low Speed Cut Out
>0m/min<
Low Speed Spotting
0m/min

### Low speed cut-out

Low speed cut-out is the machine speed below which outputs are inhibited.



Press the  or  key until the cursors indicate low speed cut out.



Press the  or  key to a value in m/min.

### Low speed spotting

Low speed spotting is a value in m/min, below which the output of the channel is converted into spotting mode. The spotting values are taken from the spot time and spot pitch values set in the normal programming menus.




Press the  key until the cursors indicate low speed spotting setting.



Press the  or  key to a value in m/min.


### Purge pressure setting




Press the  key until the following page is shown:

Purge Pressure	>50%<
Format	Metric
Auto Spot Pitch	On
Dump Output	5s






Press the  key until the cursors indicate purge pressure setting.


Press the  or  key to a purge pressure value.



Press the  key until the cursors indicate the unit format.

Press the  or  key to Inches or Metric.

Press the  key until the cursors indicate auto spot pitch.

Press the  or  key to turn auto spot pitch on or off.

Press the  key until the cursors indicate dump output.

Press the  or  key to a value for the dump output.