PRYOR

4000 Series Marking Machines
User Guide ENG123 iss 1.1 Feb 2019

Available to download at: www.pryormarking.com/products/4000-controller

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4000 Series Marking Machine

This covers essential health and safety of the marking machine. It is intended to supplement and support the training given by the suppliers of the equipment and the operation manuals.

Weight of Machine and Ancillary Equipment

BenchDot 300-150 EZA Marking Unit inc. Base and Column	54kg
BenchDot 150-150 EZA Marking Unit inc. Base and Column	44kg
BenchDot 100-100 EZA Marking Unit inc. Base and Column	40kg
MarkMate Marking Unit Inc. Base and Column	13kg
4000 Series Marking Controller	7kg
Circumferential Fixture	10kg
Magnetic Chuck	10kg

The weights quoted are approximate.

Handling

Care must be taken when moving or handling not to drop the equipment, causing damage to operators or other persons handling the machinery. It is advisable when lifting the machine to have two people to lift, using the base and column, it must not be lifted by the cover.

Noise Emissions

Depending on the nature of the workpiece and any support required noise emitted by the machine when marking may exceed 70dB(A)Leq. Where it is established that noise emissions may exceed current regulations, noise control methods (e.g. ear defenders/machinery guards) should be utilised.

Electrical Hazards

To prevent electrical shock do not remove the cover of the controller or marking head. There are no user serviceable parts inside. Refer servicing to qualified service personnel. Only connect the controller to the correct supply voltage. This is clearly marked on the rear of the controller.

Possible Hazards whilst Operating

The motors are low force and inertia; they therefore present a low risk when used in accordance with manufacturer's instructions. Care should be taken in the vicinity of the marking head whilst setting, operating or maintaining the machine. It is important when operating the machine that any object other than the work piece to be marked is kept away from the marking area.

Eye protection should be worn when operating the machine.

We would also remind UK employers of the general risk assessment requirement in the Management of Health and Safety at Work Regulations and in addition the requirement to ensure that work equipment is used only for the operation for which it is suitable in accordance with the Provision and Use of Work Equipment Regulations.

Users outside of the UK are reminded to ensure they are compliant with local legislation and to ensure adequate control measure are in place to reduce risk to an acceptable level.

Installing and Commissioning

It is essential to read the user manual(s) prior to use.

Disposal and Decommissioning

The LCD contains a hazardous liquid. It should be disposed of in accordance with current regulations.

The controller contains a lithium battery. It should be disposed of in accordance with current regulations.

Stability of the machine

Bench machines are provided with bolt holes in the base of the machine to fasten it down.

Emergency Stop

An emergency stop is built into the controller. This should not be confused with the remote start/stop pendant. When pressed all mechanical movement is immediately stopped and power is disconnected from the drive circuits. Once activated the emergency stop button can be released by twisting it. Releasing the emergency stop will not reactivate the machine until appropriate commands are executed from the touchscreen.

Contents

1. About this manual

Versions

Please note the manual version stated in the footer of this document.
The latest version of this manual is available to download from:
www.pryormarking.com/products/4000-controller/

Introduction

This manual is a simple introduction to the Pryor range of dot peen and scribe marking machines and also a complete reference their functions.

The various machines can be broken down into 3 categories.

- Bench Mount (BenchDot™, BenchScribe)
  - o Marking head mounted on an adjustable column.
- Integrated (InDot™, InScribe)
  - o Marking head only, for custom integration in to production processes.
- Portable (PortaDot™)
  - o Lightweight markers for manually taking the mark to the part.

The tables in this section describe the range of machines covered by this manual and a brief description of each machines' capabilities.

Bench / Column Mount Machines

Bench Mount Machines	Description	Marking Area(s)
MarkMate LCD	A cost effective electric solenoid dot peen machine. The MarkMate features a manual Z axis column for marking parts of different heights. Available with optional circumferential axis, electric label/tag feeders.	100mm x 75mm (4" x 3")
BenchDot 60-60 (ZA) BenchDot 100-100 (ZA) BenchDot 150-150 (ZA) BenchDot 300-150 (ZA)	A highly flexible, accurate and fast dot peen machine. Column mounted with a wide range of marking attachments and options. Available with programmable electric solenoid (E) or for deep marking applications the heavy duty pneumatic attachment (DP). Options include Data Matrix Marking with integrated verification camera (V), Programmable Z axis / Autosense (ZA) and Circumferential rotary axis.	60mm x 60mm (2.36" x 2.36") 100mm x 100mm (4" x 4") 150mm x 150mm (6" x 6") 300mm x 150mm (12" x 6")
GantryMark™	The GantryMark range offers the largest dot peen marking areas available and is well suited to large component marking or multi component marking. Available with programmable electric solenoid (E) or for deep marking applications the heavy duty pneumatic attachment (DP). Options include Data Matrix Marking and Programmable Z axis / Autosense. (ZA)	various

BenchDot™ Compatible Options

BenchDot Machines	4000 LCD Controller	MarkMate LCD Controller	Electric Solenoid (E)	Deep Marking Pneumatic (DP)	Programmable Z Axis (Z)	Programmable Z Axis with Autosense™ (ZA)	Circumferential / Rotary Axis	Separate Start/Stop Box	Pneumatic Label/Tag Feeder	Electric Label/Tag Feeder	Extended Nosepieces & Styli	Windows® MarkMaster™ Software interface	Twin Solenoid Option	Data Matrix Marking	VeriSmart Integrated Data Matrix Verifier (V)	TCP/IP Ethernet Module	RS232 Barcode Scanner for error free data entry	Industrial Ethernet / Fieldbus Interfaces	SilentScribe LS Marking attachment kit	SilentScribe MS Marking attachment kit
MarkMate LCD		●	●				○	○	○	○	○	○		○			○			
60-60 E	●		●	○	○	○	○	●	○	○	○	○	○	○			○	○	○	○
100-100 E	●		●	○	○	○	○	●	○	○	○	○	○	○			○	○	○	○
150-150 E	●		●	○	○	○	○	●	○	○	○	○	○	○			○	○	○	○
300-150 E	●		●	○	○	○	○	●	○	○	○	○	○	○			○	○	○	○
60-60 EZA	●		●			●	○	●	○	○	○	○		○	○	○	○	○	○	○
100-100 EZA	●		●			●	○	●	○	○	○	○		○	○	○	○	○	○	○
150-150 EZA	●		●			●	○	●	○	○	○	○		○	○	○	○	○	○	○
300-150 EZA	●		●			●	○	●	○	○	○	○		○	○	○	○	○	○	○
60-60 DP	●			●	○			●	○	○		○		○		○	○	○	○	○
100-100 DP	●			●	○			●	○	○		○		○		○	○	○	○	○
150-150 DP	●			●	○			●	○	○		○		○		○	○	○	○	○
150-300 DP	●			●	○			●	○	○		○		○		○	○	○	○	○

Key
● Included
○ Available Option

Integrated Machines

InDot Range

Integrated Machines	Description	Marking Area(s)
InDot 50-25 E	The smallest and fastest marking head in the range. The InDot50-25 is designed to easily integrate into the tightest spaces in the production process. Mount the head using a range of mounting holes in any orientation. Unit measures 244x130x92mm. Available with electric solenoid (E) and Fast Pneumatic (FP) stylus. Autosense available when mounting on optional electric Z axis ((E) systems only).	50mm x 25mm (2" x 1")
InDot 130-30 E In Dot 60-60 E InDot 150-150 E	The InDot130-30 is the fastest integrated dot peen machine in the range. It features a large rectangular marking area making this machine ideal for VIN marking applications. Available with electric solenoid (E) only. Autosense available when mounting on optional electric Z axis.	130mm x 30mm (5.1"x 1.2") 60mm x 60mm (2.36" x 2.36") 150mm x 150mm (6" x 6")
InDot 130-30 DP	A Deep Pneumatic version of the dot peen marking head, using compressed air supply to provide deeper marking.	130mm x 30mm (5.1" x 1.2")

InDot™ Compatible Options

Integrated Machines	4000 Controller	Electric Solenoid (E)	Deep Marking Pneumatic (DP)	Compact Programmable Z Axis (Z)	Compact Programmable Z Axis with Autosense	Separate Start/Stop Box	Extended Nosepieces & Styli	Windows®	Data Matrix Marking	TCP/IP Ethernet Module	RS232 Barcode Scanner for error free data entry	Industrial Ethernet / Fieldbus Interfaces
InDot 50-25 E	●	●		○	○	●	○	○	○	○	○	○
InDot 130-30 E	●	●		○	○	●	○	○	○	○	○	○
InDot 130-40 E	●	●		○	○	●	○	○	○	○	○	○
InDot 60-60 E	●	●		○	○	●	○	○	○	○	○	○
InDot 150-150 E	●	●		○	○	●	○	○	○	○	○	○
InDot 60-60 DP	●		●	○		●		○	○	○	○	○
InDot 150-150 DP	●		●	○		●		○	○	○	○	○

Key
● Included
○ Available Option

Portable Machines

PortaDot Range

PortaDot™ Machines	Description	Marking Area(s)
PortaDot 50-25 E	The Portadot 50-25 E is a light weight portable dot peen machine weighing only 2.3kg. Ideal for applications where it is an advantage to take the marker to the part rather than the part to the marker. The high precision lead screw design ensures mark quality is second to none on units of this type.	50mm x 25mm (2" x 1")
PortaDot 130-30 E or DP	The PortaDot 130-30 E is the fastest handheld dot peen machine in the range. It features a large rectangular marking area making this machine ideal for VIN marking applications. Available with electric solenoid (E) and Deep pneumatic (DP).	130mm x 30mm (5.1"x 1.2")
PortaDot 100-75 E or DP	The PortaDot 100-75 is ideal for heavy duty applications. The robust metal casing makes this machine ideal for use in the harshest industrial environments, reducing the need to transport heavy items requiring marking to the marking machine. For deep marking applications the P100-75 may also be fitted with the deep marking pneumatic (DP) attachment.	100mm x 75mm (4" x 3")

PortaDot Compatible Options

PortaDot Machines	4000 Controller	Electric Solenoid	Deep Marking Pneumatic (D)	Extended Nosepieces & Styli	Windows® Software interface	'V' Plate for marking on cylindrical parts	Data Matrix Marking	TCP/IP Ethernet Module	RS232 Barcode Scanner for error free data entry	Industrial Ethernet / Fieldbus Interfaces	Manual Adjustment Z Column and Base
PortaDot 50-25 E	●	●		○	○	○	○	○	○	○	○
PortaDot 130-30 E	●	●		○	○		○	○	○	○	○
PortaDot 130-30 DP	●		●		○		○	○	○	○	○
PortaDot 100-75 E	●	●			○	○	○	○	○	○	
PortaDot 100-75 DP	●		●		○	○	○	○	○	○	

Key
● Included
○ Available Option

2. System Overview

The system consists of a controller with integrated touchscreen, remote start/stop box (optional) and marking head.

The Controller and Software

The system is controlled primarily through the touch screen. The operator can navigate through menus and data forms, and also use an on-screen keyboard.

If a keyboard is connected, the controller software lets you select the option you want by highlighting it using the cursor keys and pressing the Enter key or by pressing the appropriate function key.

You can create marks (layouts) in either straight lines or arcs.   Each layout may contain up to 40 lines of characters, with up to 100 characters in each line.   Each line has its own character size and marking force.   You may specify the horizontal and vertical position (straight lines) or the radius and start angle (arc marking) of each line.

Once a layout has been created it may be checked to see that it will fit in the available marking area.   If it will fit you may then do a trial run to make sure the mark will be in the correct position, or go ahead and actually mark the layout.

Various options are available to mark layouts at any angle, change the style of mark, change from straight to arc mode etc.

The marking head

The marking head consists of 2 main parts, the base and column (for column mounted systems) and the X-Y marking head. The gap between the marking unit and the base can easily be varied to accommodate various workpieces, fixtures etc.

Dot marking (E & DP Models)

The dot mark unit marks characters using either a 5x7 or 7x9 matrix of dots. The depth of mark may be varied for each line in a layout.   The stylus should be replaced or reground if it becomes worn or chipped.

The minimum size of the 5x7 and 7x9 varies from machine to machine. See the table below for actual sizes on each machine.

Machine	5 x 7 Minimum size and size increments	7 x 9 Minimum size and size increments
MarkMate	0.18mm	0.24mm
All BenchDot Machines, InDot 60-60, InDot 150-150	0.15mm	0.20mm
PortaDot 50-25	0.21mm	0.28mm
PortaDot 130-30, InDot 130-30	0.09mm	0.125mm
PortaDot 100-75, InDot 50-25	0.18mm	0.24mm

Varidot marking

In this mode you are allowed to choose the size of the character and the gap between the dots used to form the character. The minimum character size and increment steps are the same as the 5x7 characters.

This is useful if you want to mark large characters. Varidot marking does not give good results when marking smaller size characters (below 2.5mm), the dot spacing tends to look rather erratic.

Scribe Marking (SP & SDPH Models)

Scribe machines produce a mark by pneumatically pressing a stylus into the workpiece to scribe each character or shape. There are 2 different types of scribe attachment designed to achieve different types of mark. The fine diamond tip unit is designed for shallow fine marks down to 1mm in height.
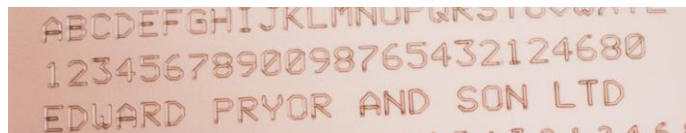
Diamond Tip Mark

The other attachment features a solid carbide tip with a wider tip angle and tip radius. This unit is designed to mark deeper and wider marks for larger characters above 4mm in height. A typical application for the carbide tip unit is automotive VIN marking as shown below.

Carbide Tip Mark

The diamond tip and the carbide tip assemblies may be fitted to the following Bench and Integrator Machines.

BenchScribe 60-60SP, 100-100SP, 150-150SP, 300 – 150SP.
InScribe 60-60SP, 150-150SP

However for a higher power solution to allow faster and deeper scribing with the carbide tip only the following machine should be used. This machine is particularly well suited to automotive VIN marking applications.

InScribe 140-40

3.   Guide to Effective Marking

The 4000 series marking machines can mark a very wide range of work pieces using a variety of different character styles, sizes and depths.

Fixturing

IMPORTANT - Unless the work piece is held firmly then there is little hope of obtaining a good quality mark. Scribe machines in particular require very firm fixturing as the lateral forces involved are very high during the marking process.

If you have a wide variety of work pieces to mark then you may have to make several interchangeable fixtures.   Use a magnetic chuck, or similar, to allow these fixtures to be changed over quickly and accurately.

Work piece material

The machines may mark a very wide range of materials but some materials are easier to mark than others.

The harder the material, the shallower the depth of mark will be.   The type of material will also influence the life of the stylus, the stylus tip will wear or chip quickly the harder the material. The angle of the stylus tip may be changed to reduce the chance of chipping.   Changing the angle may also increase the readability of the mark.

Surface finish

Smooth, well finished work pieces are easier to mark than rough, scaled work pieces. The worse the finish, the deeper the mark will have to be to remain readable.

Painted work pieces may be marked but the paint may chip, try changing the stylus tip angle to reduce the chipping.

Work piece flatness

The machine can mark on surfaces which are not completely flat but the depth of the mark will vary across the surface.   For dot marking, as the gap between the stylus tip and the surface of the work piece increases, the depth of the mark will increase. If the difference in gap is only 1 to 2 mm (0.040" to 0.080") then the mark produced may be acceptable.

If you have to mark a heavily contoured surface (a cylindrical work piece, for example) then there are several things that should be considered:

- Try to use as large a gap as possible.   If you have an initial gap of 5 mm (0.200") then a change of 1 mm (0.040") will have less effect than the same change would have had with an initial gap of 2 mm (0.080"), for example.

- Mark a line of text by splitting it into several sections and then marking each with a different force to compensate for the change in gap. If using this approach the Split Line software function will assist if marking variable data.

- Reduce the character size or width so that the whole mark is shorter.

Depth of mark (Dot Marking)

The depth of mark depends on the following factors
- marking force (programmed on the controller)
- marking gap (distance between stylus tip and workpiece)
- material hardness of the work piece
- stylus tip angle.
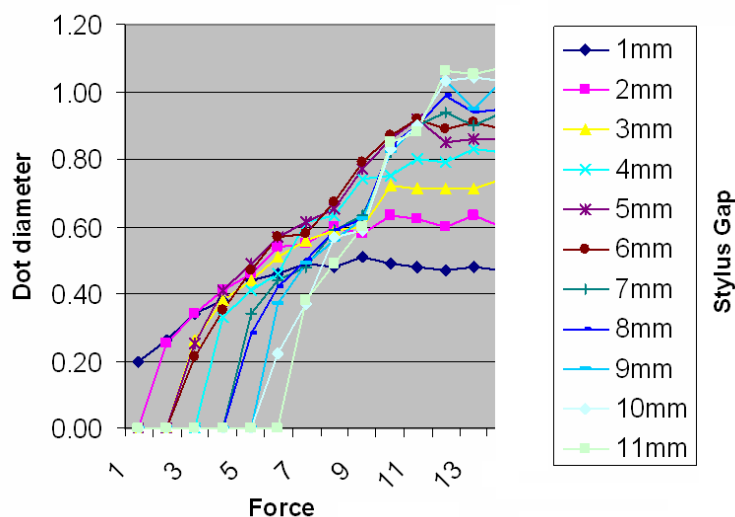
(90° Stylus – Note marking depths vary depending on material hardness and stylus tip angle)

The effect of marking force versus marking gap is illustrated in the above chart.

Marking gap (Dot Marking)

The marking gap is the distance between the stylus tip and the surface of the work piece.   Changing the marking gap changes the depth of mark.   The larger the gap, the deeper the mark.

If the marking gap is too big then the stylus will start to stick and drag the work piece. To overcome this, use a larger force or a smaller gap.

Stylus tip angle (Dot Marking)

The stylus tip angle (normally 90° included) may be varied to increase stylus life, increase the depth of the mark or increase the readability of the mark (though not all of these at once!)

A small included angle (perhaps 60°) will give a deep mark but stylus life will be reduced.   The deeper mark obtained may even be less readable because the diameter of individual dots will be less.

A large included angle (perhaps 120°) will result in a longer stylus life.   A less deep mark will be obtained but the mark may be more readable, this is because individual dots will be wider. Marking Data Matrix codes with a stylus angle of 120° often produces the best results and leads to the most readable codes.

A ministress stylus (radius tip) will help to eliminate any stress on the work piece but will result in a shallower mark.

Character size (Dot Marking)
The machines can mark characters from 0.15 to 49.95 mm (0.006" to 1.967") high. Avoid using very large or very small characters, if possible.   We class small characters as being up to 1.00 mm (0.040"), medium characters as being 1.00 mm to 4.00 mm (0.040" to 0.160"), and large characters as being larger than 4.00 mm (0.160").

Large characters take longer to mark than medium size characters, they also need to be marked more deeply to remain readable.   If you need to mark large characters then consider using the 7x9 or Varidot style instead of the normal 5x7 style (the more dots there are, the more readable the mark).

Marking gap (Scribe Marking)
Although the machine will mark with the tip anywhere between 0.5mm and 7mm from the work piece, the recommended distance of the stylus tip from the work piece is between 3mm and 4mm.

Depth of mark (Scribe Marking)
Light marks are easy to produce on most materials.   Deeper marks are the more challenging marks.   Large characters can be produced to a greater depth than small ones.

The four factors which most influence the depth of a mark are:

1)   Material being marked
2)   Marking force (Air Pressure Setting)
3)   Stylus Tip Radius
4)   Stylus Tip angle

Having decided on the tip radius and tip angle to suit the material being marked, the depth of the mark is most easily adjusted by varying the marking force.

Marking force (Scribe Marking)
The marking force is controlled by adjusting the air pressure.   Increasing the air pressure, increases the marking force.

As a starting point, the air pressure should be set to 45 psi.

Warning : Do not turn the air pressure up too high. If the stylus is driven too hard into the material it can stick in the material and cause the motors to stall producing a bad mark. If the machine is stalling try reducing the air pressure or reducing the marking speed.

Stylus tip Radius (Scribe Marking)

This is normally determined by trials on the material prior to delivery of the machine. Typical radii are between 0.5mm and 1mm.

Generally, the smaller the radius, the deeper the mark, but small radii can lead to tearing of the material instead of forming it.

Larger tip radii give wider marks.

Stylus tip angle (Scribe Marking)

The standard tip angle for the carbide tip is 110 degrees included.   This can be modified for special applications if required.

4.   Getting Started

Setting up

For column mounted systems it is important to use a sturdy bench and fasten the base of the machine using the 2 mounting holes on the base.

Before using the marking head for the first time fit the stylus nozzle, solenoid core (slug), stylus and spring in position and check the stylus moves freely,

The system is very easy to connect, all the connectors on the rear of the controller are labelled.
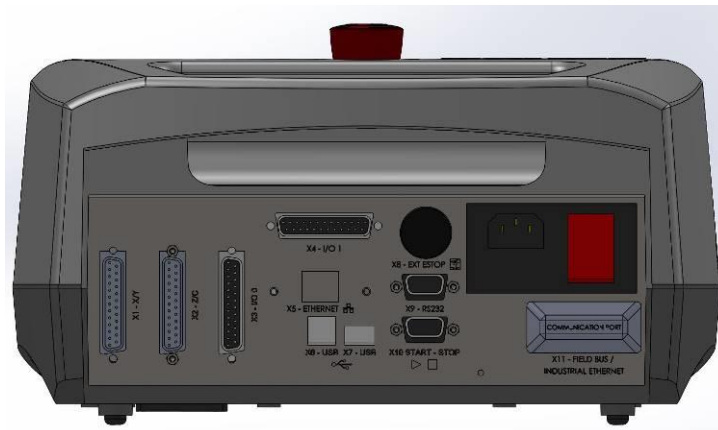
Connector Label	Function
X1 – X/Y	Connects directly to the Marking Head
X2 – Z/C	Connects directly to the Z axis. However if also using a Circumferential axis, connect it directly to the circ axis first then connect the Z axis cable to the secondary port on the circ axis. (Optional)
X3 – I/O 0	Digital I/O port, provides 8 digital inputs and 6 digital outputs for interfacing to external devices. (Optional)
X4 – I/O 1	Expansion Digital I/O port, provides an additional 8 input and 6 output signals (Optional).
X5 - Ethernet	Ethernet TCP/IP port, for connecting the controller to TCP/IP communication networks.
X6 – USB Type B	USB communication port. For connecting the controller to a windows PC. The connection will create a virtual com port on the PC.
X7 – USB Type A	USB Socket. For connecting USB flash memory or USB keyboards to the controller.
X8 – EXT ESTOP	External emergency stop connector. Replaces the built-in ESTOP to allow remote systems to interface to the controller's emergency stop functions where necessary. (Optional).
X9 – RS232	RS232 Serial Port. 9 pin connector for interfacing with PC's, PLCs, Barcode scanners and other serial communication devices.
X10 – START-STOP	Remote Start/Stop. For connection to the controllers remote start cycle and stop cycle button panel.
X11 – FIELDBUS / INDUSTRIAL ETHERNET	Anybus interface. Depending on the option purchased, the machine can be controlled by automation systems using a variety of industrial Ethernet or fieldbus interfaces such as Profibus, ProfiNet, Ethernet/IP, EtherCAT, DeviceNet, Modbus etc. (Optional)
X12 – I/O 2	Expansion Digital I/O port, provides an additional 8 input and 6 output signals (Optional on Integrated 4000 controller).
X13 – I/O 3	Expansion Digital I/O port, provides an additional 8 input and 6 output signals (Optional on Integrated 4000 controller).

Note: Ensure the Marking Head and C / Z Motor connectors are firmly connected to the controller and screwed in place. Never attach or remove the connectors when the controller is powered up and operating. This may damage the motor driving electronics.

Switch the system on using the switch on the rear of the controller. The machine will not operate unless the emergency stop button is untwisted and released.

The Main menu should be displayed when power is switched on:

Main Menu		i	15:03:41 19/10/16
F1 Mark Layout			**F6** Preview
F2 Load Layout			**F7** Edit Variables
F3 Trial Run			**F8** Create Layout
F4 Save Layout			**F9** Edit Serial Numbers
F5 Edit Layout			**F10** Other Menu
0.0	No layout		**PRYOR**
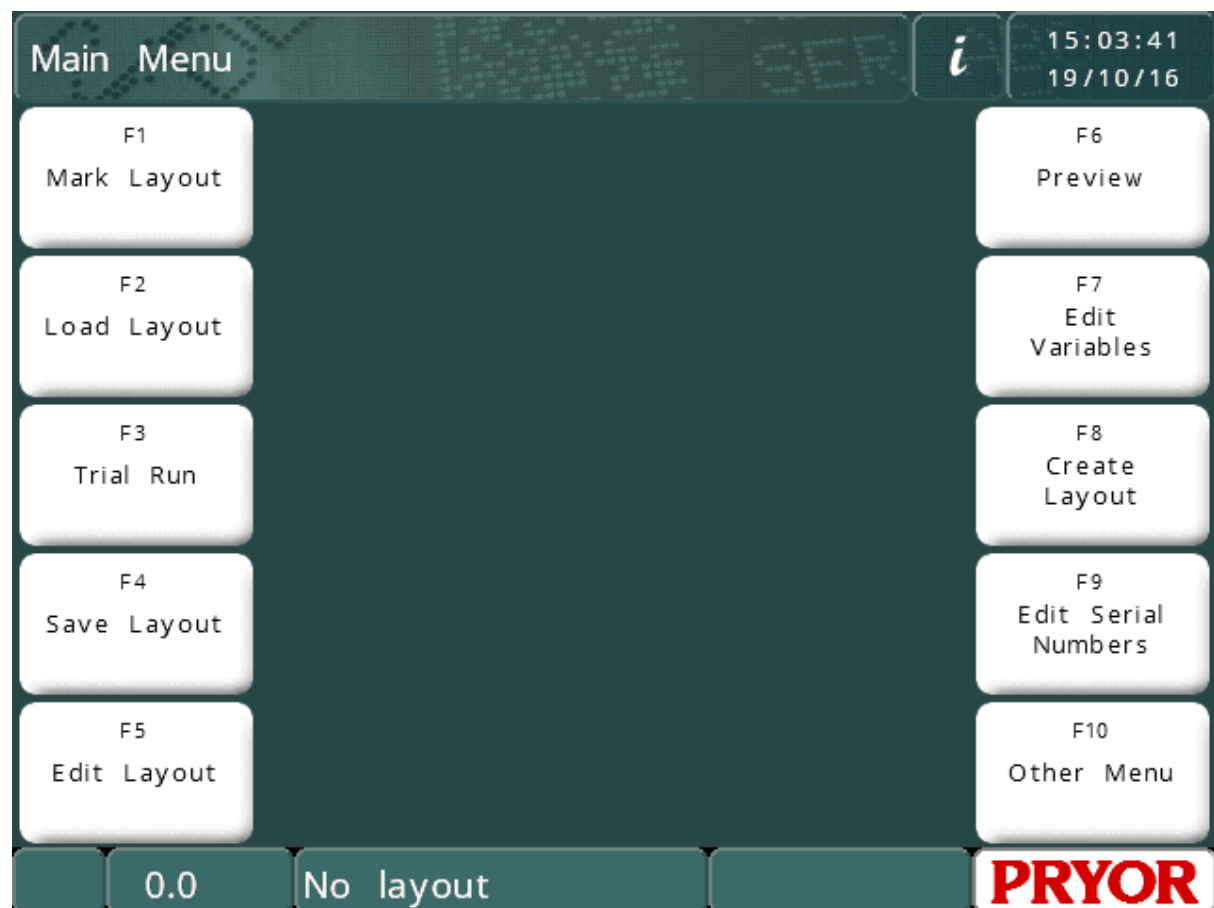
Menu options can be chosen by pressing on the menu buttons on the touch screen. If a keyboard is connected, options can be selected from a menu by using the cursor up/down keys to highlight the required option and then pressing ENTER or by pressing the appropriate function key shown screen.

Animated Help Topics
The controller has a built in animated help topic feature. On the main menu click the information button to list a series of getting started help topics.

The help topics simulate marking and trial running of the machine. All marking head movements are disabled when running help topics.

Configuring the controller

Described below is how to set the main mode of operation and how to enable hardware options

If you require to change the mode of operation or add hardware follow the instructions below, otherwise you may skip this part of the manual and move on to the 'Layouts' section.

To set up the machine type, go to the Machine Details screen (F10 F10 F10 from the main menu) and then press the settings button in the bottom right of the screen. The controller then prompts for a password.

Alternately, if a keyboard is fitted, you can press and hold down the F9 key and switch the controller on. The same password prompt will then be displayed.

Type in 'PRIORITY UPGRADE' and press enter. The 'Edit Machine Configuration' screen is now displayed.
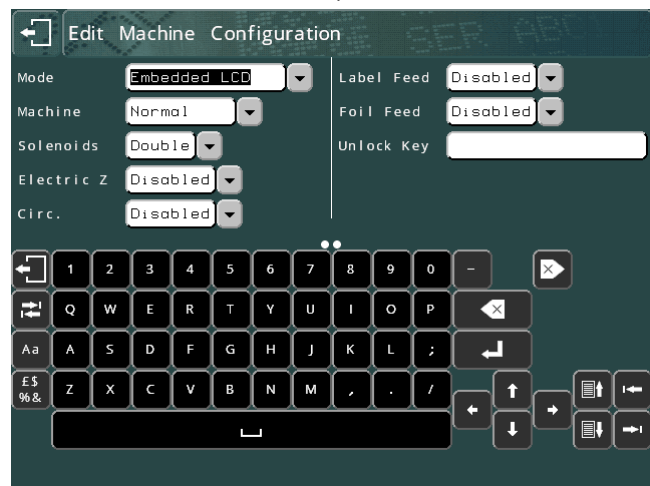
There are several drop-down selection settings on this screen. Touch the required setting or its drop down icon to see the available options. Touch the option to select it, or press outside the drop-down box to leave it unchanged.
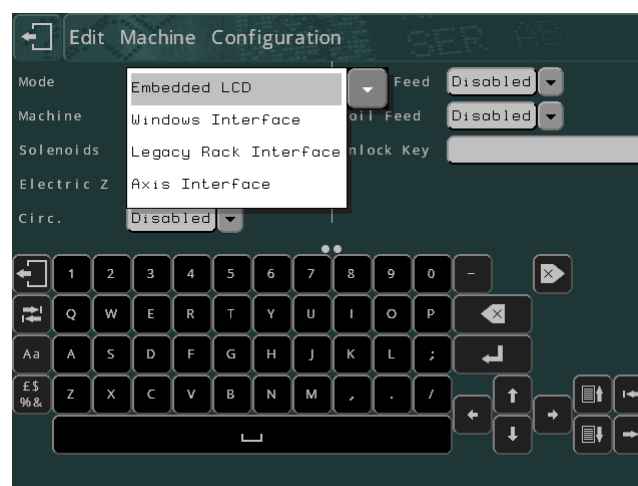
The following parameters can be configured:

Mode

There are two common modes available, 'Windows Interface' or 'Embedded LCD'

Windows Interface
Selecting this mode of operation, allows the controller to be used with Pryor's Win2068, MarkMaster or Traceable-IT software. A separate manual covers the use of the PC software. This manual only covers use of the machine in 'Embedded LCD' mode.

Embedded LCD
Selecting Embedded LCD mode configures the controller as a standard controller. All marking details and layout parameters are entered by a system of menus on the LCD screen.

The following parameters cover the hardware options. Enabling a hardware option allows it to be configured in the menu system of the controller, otherwise its options are hidden.

Solenoids

Single or double.

Electric Z, Circumferential, Label feed, Foil feed

These options can be enabled if supported and the necessary hardware has been purchased.

Layouts

To produce any kind of mark a layout must be created.   A layout contains information about the *Text* to be marked, its *Size*, *Force* and *XY* position.   The controller can save many layouts in memory.

Creating a layout

Select "F8) Create layout" from the Main menu on the touch screen. The display will then show the layout edit screen.

Type some text and then press the ENTER key [image]. The cursor will then move on to the Size column. Enter a size of 3.0 mm (0.12").
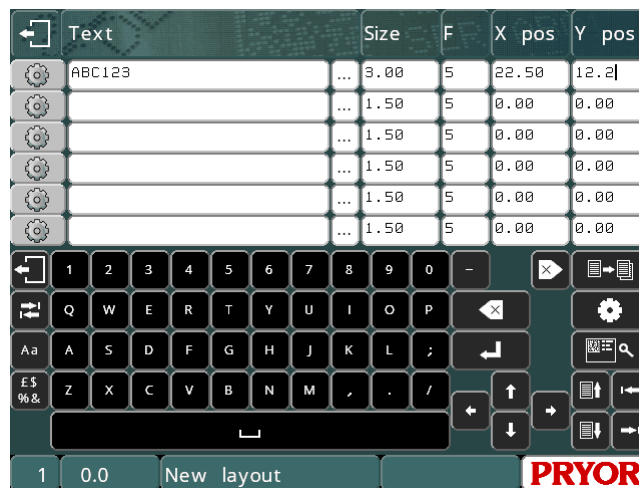
Leave the *Force* unchanged for now.

Press the ESC key [image] to go back to the Main menu. A preview of the layout will be shown in the centre window.
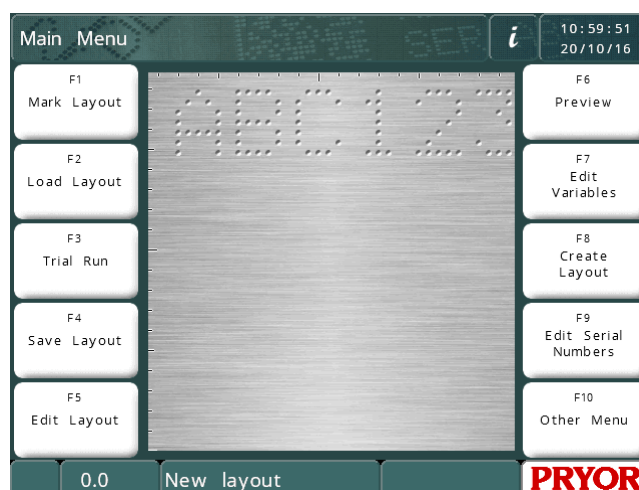
NB The display will vary depending on your machine's steps/mm and marking area.

Preview

Select "F6) Preview" from the main menu. The entire marking area is displayed and in the top left corner, the text you have entered.
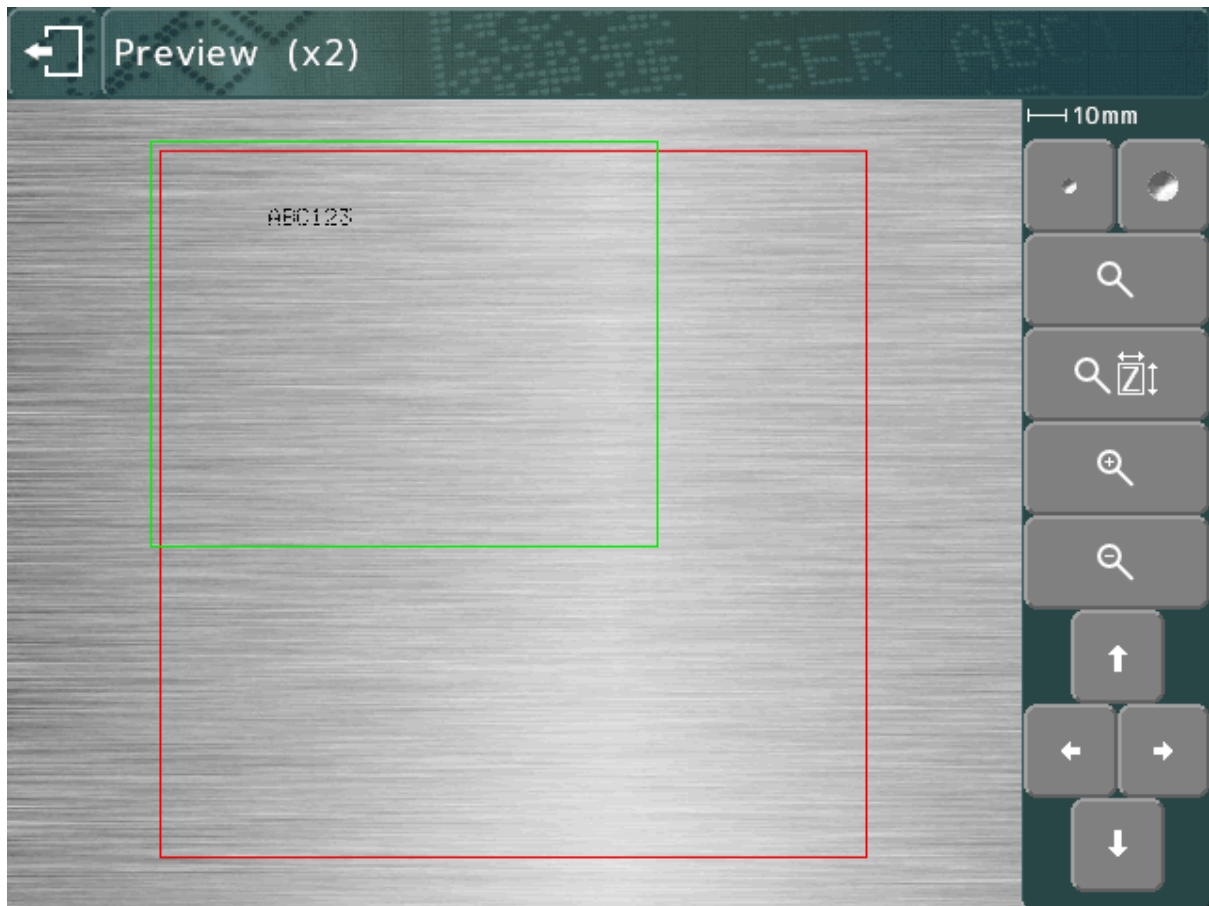
The mark may be very small. To zoom in use the cursor keys to move the green box over the text and press the 🔍 button. Press ESC ⬅ to go back to the zoomed out view.

You can also drag the green box using the touch screen. Touch inside the green box, move across the screen, then let go. The box will turn orange while moving, then appear in the new location when you let go.

To zoom in (the green box will get smaller) press the 🔍⊕ button.

To zoom out (the green box will get bigger) press the 🔍⊖ button.

You can also use the 🔍⃗Z↕ button to automatically zoom in and choose a zoom level to fit the mark to the screen.

The cursor keys may now be used to move over the enlarged image. You can also drag the viewing area using the touch screen.

The ☐ ⬭ buttons may be used to modify the dot size on the preview. This will not affect the mark, but can be used to make the preview represent the actual mark more accurately for the material you are using. The system will try to replicate dot size in relation to the force used, but the actual results will depend on the material being marked.

(larger dots representing overmarked characters)
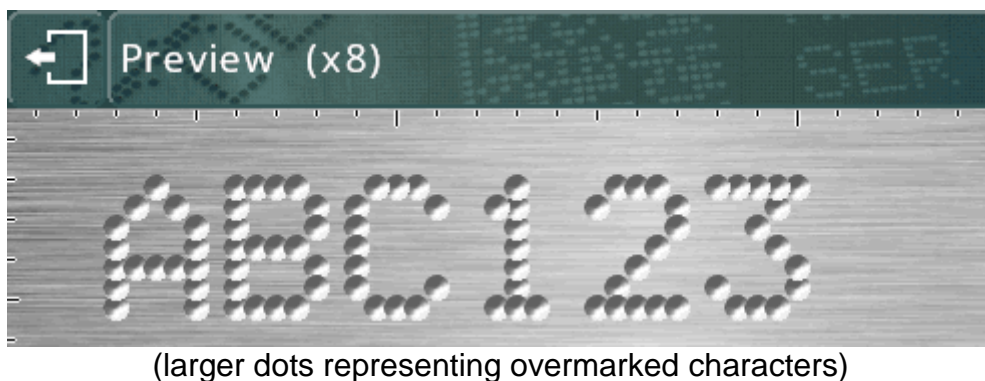
Use the ☐↔▦ button to toggle a grid overlay. This will display a grid at 1mm or 10mm intervals, depending on the zoom level.
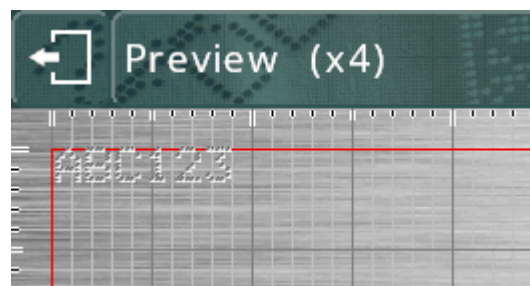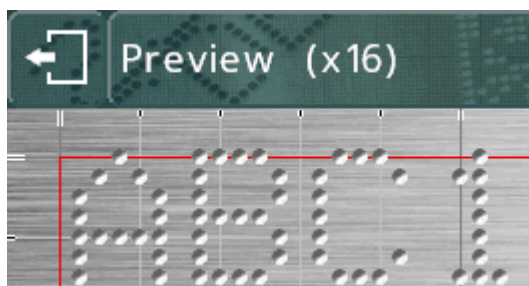
The and buttons may be used to increase/decrease the magnification while zoomed in.

Press the button to return to the previous view, then again to return to the Main menu.

Trial run

Trial run does not mark the work piece, it moves the marking head to where each line would be marked and then traces round the envelope of each line in the layout.

Select "F3) Trial run" from the main menu. The marking head will home and then move to the top left of the first line of the layout.

The buttons on screen can be used to modify the mark:
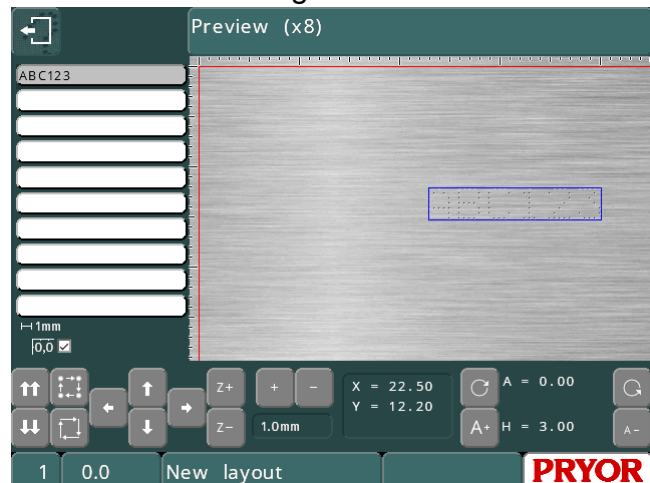
Icon	Mode Function
	Exit trial run
	Select the previous line
	Select the next line
	Trace around the line stopping on corners
	Trace around the line without stopping
	Move object one jog step up (mm)
	Move object one jog step down (mm)
	Move object one jog step left (mm)
	Move object one jog step right (mm)
Z+	Jog Z down by one jog step (mm)
Z−	Jog Z up by one jog step (mm)
+ −	Change Jog step size 0.1mm, 1mm, 10mm *
	Rotate clockwise by one jog step (degrees) *
	Rotate anticlockwise by one jog step (degrees) *
A+	Increase text size by one jog step (mm)
A−	Decrease text size by one jog step (mm)

* In Imperial mode, the steps are still 0.1mm, 1mm and 10mm, but are shown in inches. The angle will still change by 0.1, 1 or 10 degrees, even though 0.004", 0.039" and 0.394" are displayed.

In addition, a line in the layout can be selected by pressing on the text in the list to the left, or on the mark in the preview screen. The head will move through all intervening lines in order to avoid possible collisions with the part being marked.

The marks can also be moved around by dragging on them in the preview. The mark must be already selected, then touch the mark again, move your finger on the screen, then let go of the screen.

Marking a layout

Position a workpiece under the marking head and adjust the gap between the stylus and the workpiece (for Bench machines use the handle on top of the column, for portable machines use the adjustable face mask).   Use a gap of about 2 mm (0.08").

To mark the layout select "F1) Mark layout" or the green button on the remote control. The marking head will mark the work piece.   If the mark is not deep enough then increase the gap or increase the force (and vice-versa).

There are two ways to stop the marker. The red button on the remote control (if used) will abort under control without losing the current layout, the emergency stop interlock on the controller will stop marking by removing all power from the motors and punch. The default E-stop configuration is to keep the rest of electronics running while power to the motors and punch is disconnected.

If the machine is a portable unit, it is possible to configure the Start button to also work as a Stop button while the machine is marking. To activate this mode press F10, F10, F3, F6 from the main menu and change the 'Start Button Function' setting to 'Start/Stop'.

Saving a layout

Press "F4) Save layout" from the main menu. The display will show a list of all the layouts stored.   Layouts must be given a name when they are saved. Type in a suitable name and press ENTER ⏎ or ✓. The layout will be saved and the Main menu will then be displayed.
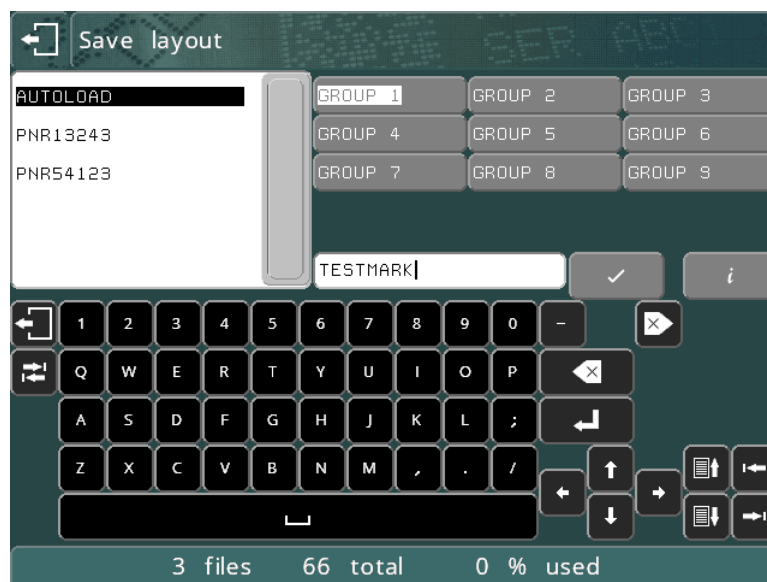
On the right hand side if the display is a list of groups (GROUP 1-9), different groups may be selected using group buttons or left and right cursor keys.

Loading a layout

Press "F2) Load layout" from the main menu.
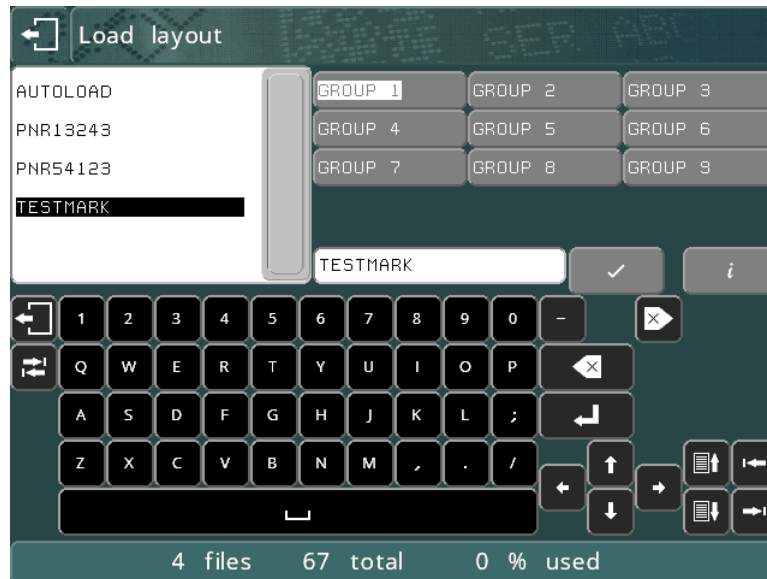
Use the up down cursor keys to select the file and the left right cursor keys to select the Group.

Alternately, you can press the group buttons and touch the layout name.

If there are more layouts off the end of the list, you can touch the scroll bar or press the page up and down buttons ⬆ and ⬇ to move through the list.

Press ENTER ⏎ or ✓ to load the layout.

Editing a layout

To make changes to the current layout select F5) Edit layout. The *Text*, *Size*, *Force* and *XY* position may be selected by touching the entry box on screen. The cursor can be moved within the entry box by touching a second time in the required place, or by using the cursor keys.

To add a serial number to the second line of the current layout select the text column of the second line. Type 001 (or any number) as the start value of the serial number. Change the *Size* to 3.0 mm (0.12") and the *Y* position to 10.0 mm (0.4").

To make line 2 a serial number press the ⚙ button on line 2. This will display the line parameter screen for line 2.

Each line has a large set of parameters associated with it, *Contents* is one of these and is normally set to *Text*. Press on the entry box to open up the drop-down list and choose *Serial*.

Press ⬅ to return to the layout edit screen and then press ⬅ again to return to the Main menu. Remember to save any changes made to the layout by pressing F2) Save layout.

Mark the layout a few times by selecting F1) Mark layout, notice that the serial number increments every time the layout is marked.

Deleting a layout
To delete a layout select F10) Other menu then F2) Delete layout.
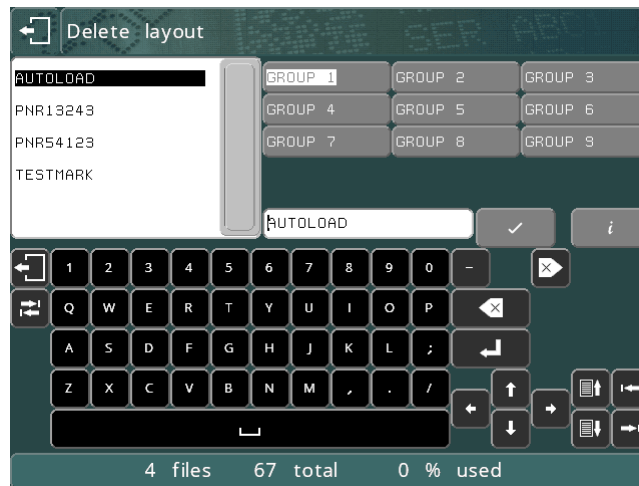
Select the group and then the file name using the touch screen, then press ☑ or touch the file name for a second time.

Press ⬑ to return to the Main menu.

Copying a layout

Once a complicated layout has been created and saved it is sometimes useful to be able to make a copy of it, the copy can then be edited to change part of it without having to create the layout again.

Select F2) Load Layout, Select the group and then the file name using the touch screen, then press ☑ or ⮐ or touch the file name for a second time.

Now select F10) Other Menu then select F1) Save Layout As. Select the group you want to save the layout in using the group buttons, then type in the name of the new layout and press ☑. The currently loaded layout will now take on the new name and group.

Press ⬑ to return to the Main menu.

5. Layouts

Introduction

A layout consists of a number of lines of information (up to 40). Each line has its own *Text*, *Size*, *Force*, *XYZ* position and many other parameters.

The controller can store up to 9000 layouts (organised as 9 groups of 1000 for ease of use).

Layouts can be saved with a name up to 19 characters long.

Text, size (height), force, XY position
The *Text* of each layout line may contain up to 100 characters.

The *Size* of the characters (height) may be 0.15 mm to 999.90 mm (0.006" to 40") in steps of 0.15 mm (0.006") (for 5x7 dot and varidot style, dependent on machine type). For most character styles the width of the character (including the space between characters) is equal to the *Size*.

The *Force* may be 0 (no mark) to 14 (deep mark). If a twin solenoid is fitted then *Force* may be from 00-99, one digit for each solenoid, with a force from 0 to 9. Some marking heads may have some restriction on marking force.

The *X* and *Y* position may be specified to place a mark anywhere in the available marking area with 0.025 mm (0.001") resolution.

Line Parameters

Each line has an extensive set of parameters associated with it. These are very powerful, they are described briefly in the table below and other sections of the manual cover them in greater detail.
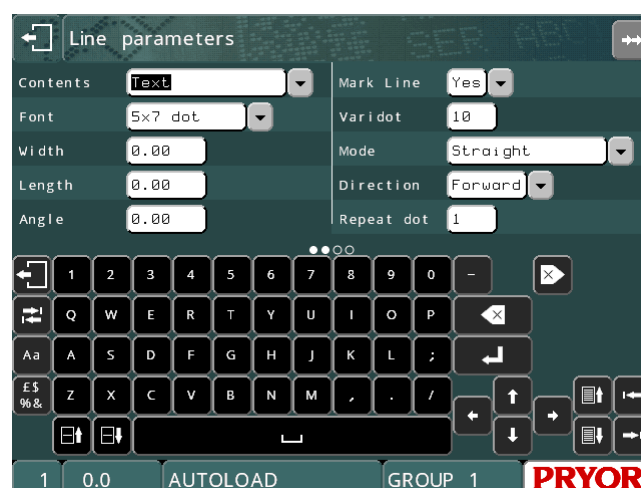
Press the ▭↑ ▭↓ buttons to change the line's data that is displayed. The line number is shown in the bottom left of the screen.

Press the ⬛⬆ ⬛⬇ buttons to show another page of parameters for this line. You can also drag on the parameters section of the screen to change the page of parameters.

Contents

The *Contents* parameter specifies what a line is for. A layout line normally contains the text to be marked but it may be any of the following:

Contents	Text
Text	*Text* is marked exactly as it appears.
Serial	*Text* is a serial number and is incremented after the layout is marked.
Global serial	*Text* is replaced by the global serial number when the layout is marked.
Variable	*Text* is a variable and can be modified from the Edit Variables screen or by transmitting variable data for marking via a communication port.
Global variable	*Text* is replaced by the global variable when the layout is marked.
Time/date	Time/date information is inserted in the *Text* at specified places when the layout is marked.
Logo	*Text* specifies the name of a dot logo.
HPGL logo (Smooth)	*Text* specifies the name of a HPGL logo.
HPGL logo (Sharp)	*Text* specifies the name of a HPGL logo.
I/O control	*Text* contains commands to make use of programmable digital inputs and outputs.
Barcode	*Text* is replaced by text from a barcode reader.
Comms Command	*Text* is transmitted out of the RS232 port to a third party device such as a barcode printer. See serial communications section for more details.
Data Matrix	*Text* is encoded into a Data Matrix code. See Data Matrix section for further details.
Data Entry via Prompt	*Text* is replaced by variable information entered at an on-screen prompt. Also supports Barcode scanners. See Data Entry via prompt section for more details.
Obliterate Data Matrix	Allows a Data Matrix code to be rendered unreadable by crossing it out and filling in the codes timing pattern.
Serial via Prompt	When used with Data Entry via Prompt mode and MultiMark enabled, this allows a starting serial number to be entered and the value will increment for the number of cycles entered by the user.
Variable / Serial	*Text* is treated like a Serial Number but can be modified via the communication port in select layout mode. Useful for setting a starting number.
Special	Reserved for special applications.

Font

The *Font* parameter specifies the style of character. The available styles are:

Font	Description
5x7 dot	Standard 5x7 dot matrix. 0.15 mm (0.006") minimum *Size*.
5x7 varidot	Characters are formed from lines of dots, the spacing between dots can be specified. Not good for small characters.
7x9 dot	7x9 dot matrix. 0.20 mm (0.008") minimum *Size*.
5x9 OCR dot	Dot matrix characters conforming to the OCR standard. 0.20 mm (0.008") minimum *Size*.
5x9 OCR varidot	Vector characters conforming to the OCR standard. Not good for small characters.
Vector	Used for the Fast Pneumatic and Scribe Machines. This is the same as the 5x7 font but has continuous lines.
HPGL	Used on dot and scribe machines. A simple vector font that can be overridden by downloading HPGL files for each letter.

Minimum sizes stated are for 40 steps/mm. The minimum size is based on 1 step between dots.

Dot fonts displayed on the mark preview screen:
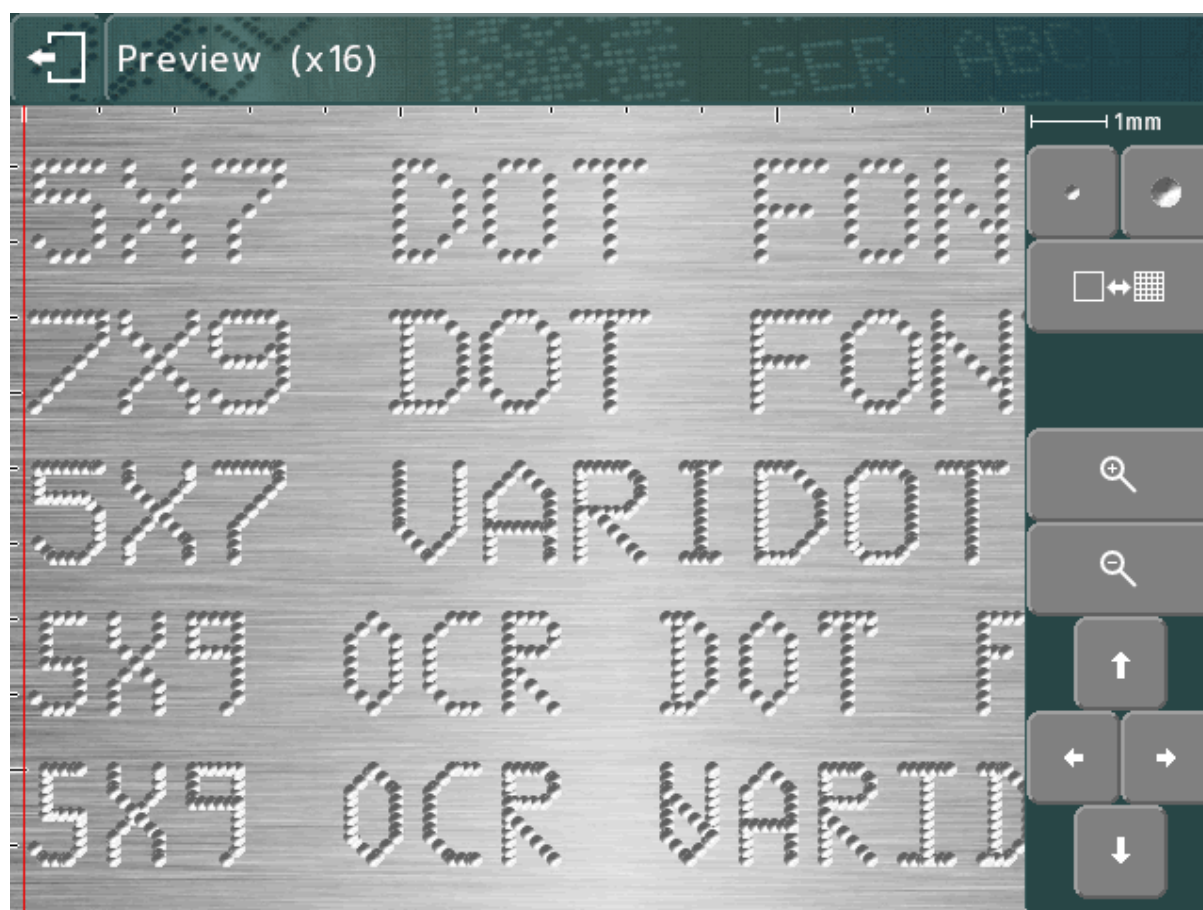
HPGL font displayed in dot mode on the mark preview screen:
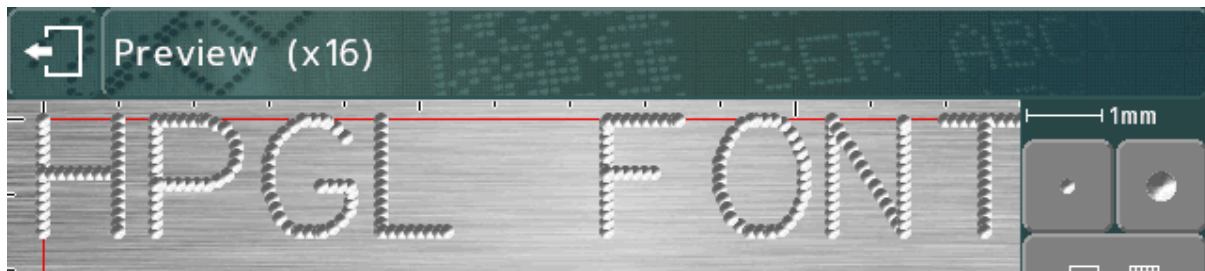
Scribe fonts displayed on the mark preview screen

Varidot

This parameter specifies the spacing between dots. For electric solenoid dot marking the range is 5 to 255 steps.

For pneumatic solenoid dot marking it is 50 to 255 steps.

The actual spacing between dots will vary with the steps/mm pitch of the head hardware.

HPGL logos and fonts are also marked using this spacing.

Repeat dot

To obtain a deeper mark it is possible to mark each dot several (1-9) times.   This will result in slower marking speeds.

Mode

This specifies linear/arc marking for lines of text. The available modes are:

Mode	Description
Straight	Straight line, the *XY* position specifies the top left of the envelope, *angle* specifies rotation about the *XY* position.

Straight centred	As above, but the *XY* position specifies the centre of the envelope.
Arc (cw)	Arc of text with the base of the characters facing the centre of the circle, *XY* position specifies the centre of the circle, *radius* specifies the inside radius of the circle, *angle* specifies the start position of the arc on the circle.
Arc (ccw)	As above but with the base of the characters facing away from the centre.
Arc (cw) centred	As *Arc (cw)* but the arc is centred about *Angle*.
Arc (ccw) centred	As *Arc (ccw)* but the arc is centred about *Angle*.

Prompt

When *Contents* is set to *Variable*, *Serial or Data Entry Via Prompt* then this parameter is used as a prompt that will be displayed when the serial numbers or variables are being edited.

Width

Character width can be specified independently of the *Size* (height). The width includes the spacing between characters. If the *Width* parameter is set to 0.0 then it will be calculated automatically. Range is 0.00 mm to 999.90 mm (40").

Angle

If the *Mode* parameter specifies a straight mark then *Angle* specifies the angle by which the mark will be rotated around its *XY* position. If *Mode* specifies an arc mark then *Angle* specifies the start angle of the *Text*. Range is -359 to +359 degrees.

Radius

If the *Mode* parameter specifies an arc mark then *Radius* specifies the inside radius of the arc that the *Text* is marked on, if *Mode* specifies a straight mark then *Radius* is ignored.

Z

If an electric Z axis is fitted then *Z* specifies the position that the Z axis will move to before marking the line. If a pneumatic Z axis is fitted then a value of 0.0 will retract the Z axis, a value of 1.0 will extend the Z axis. The Z axis movement will take place after any *XY* movement for a layout line.

If Auto sense is used then *Z* may be used to specify a Z axis position relative to the auto sensed zero position.

Length

If *Mode* specifies a straight mark then *Length* specifies the maximum length of the mark, the character width will be automatically condensed to ensure that *Length* is not exceeded. If *Length* is set to 0 then it is ignored.

If *Mode* specifies an arc mark then *Length* specifies the maximum length in degrees.

Direction

It is possible to mark lines bi-directionally in order to reduce the amount of time wasted moving between lines.   By default *Direction* will alternate between *Forward* and *Reverse* for consecutive lines.

Serial Increment, Every, Marked

If a line contains a serial number then *Serial increment* specifies how much to increment the number by, *Serial every* specifies how often to increment the number, and *Serial Marked* specifies the position in the current run if *Serial Every* is greater than 1.   These parameters are ignored for the global serial number.

Diameter/Position

When *Circumferential* marking mode is selected then *Diameter* may be used to specify a different diameter for each line of a layout.   If it is set to 0.0 then the diameter specified when the layout was created will be used.

When *Normal* or *Reverse* marking mode is selected then *Position* may be used to specify the distance to move the Circumferential motor. This may be used to drive a special fixture (linear, rotary etc.) to different positions for each line of a layout.   The axis will move to the position specified by *Position* before any *XY* movement for the current layout line.

Editing layouts

Editing keys
The following buttons can be used when editing a layout:

Icon	Action
⬆	Moves to the previous line.
⬇	Moves to the next line.
⬅	Moves left one character.
➡	Moves right one character.
⬅︎	Moves to the beginning of an entry.
➡︎	Moves to the end of an entry.
▤⬆	Moves up several lines
▤⬇	Moves down several lines
▤⬆	Move up one line in the layout (only available when editing parameters)
▤⬇	Move down one line in the layout (only available when editing parameters)
↵	Moves to the start of the next field.
⤫	Deletes the character under the cursor.
⬅⤫	Deletes the character to the left of the cursor.
␣	Inserts a space where the cursor is.
⇄	Moves to/from line parameter screen for the current line.
⬅	Leave current screen / go back one menu
▤→▤	Accesses the cut/paste menu.
⚙	Edit layout parameters such as offsets, home method and autosense gap.
▦⌕	View mark preview.

The following buttons can be used when editing a text field:

Using the on-screen keyboard, the Aa button will toggle between upper and lower case letters.
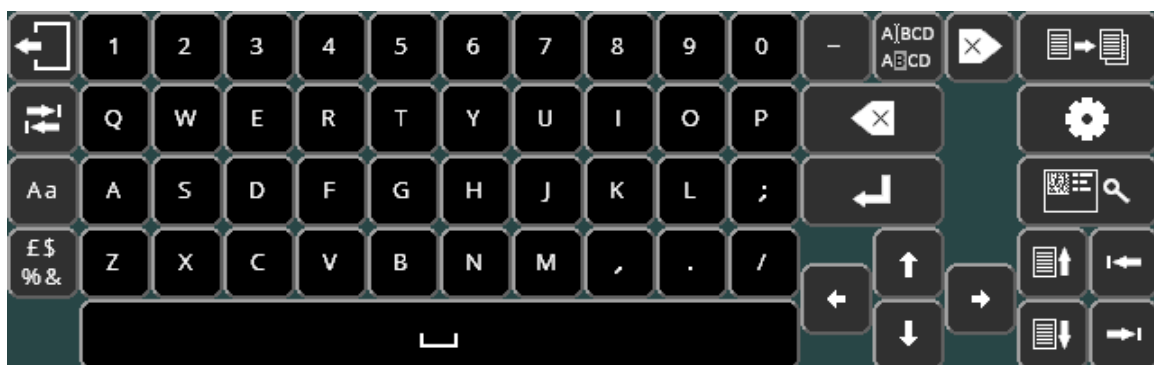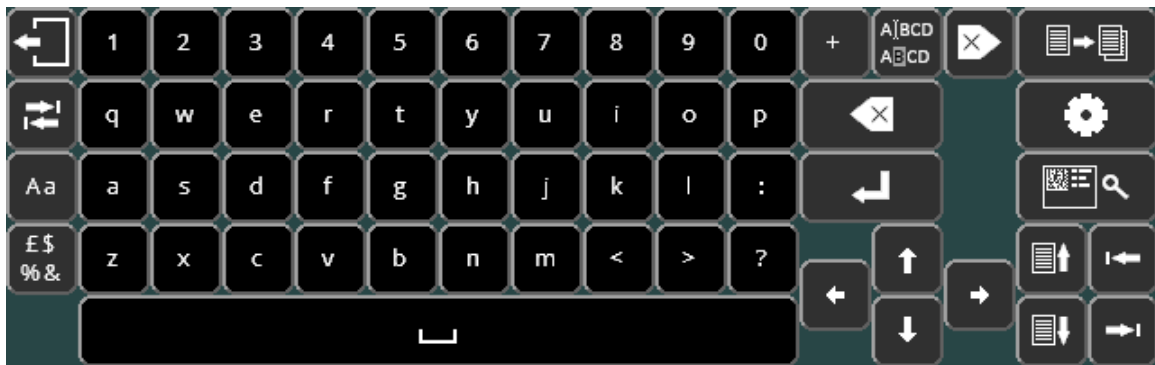
The £$ %& button will cycle through the special character keyboard layouts. Note that special characters cannot be used for filenames, and the special character keyboard layouts will not be available when loading and saving files.
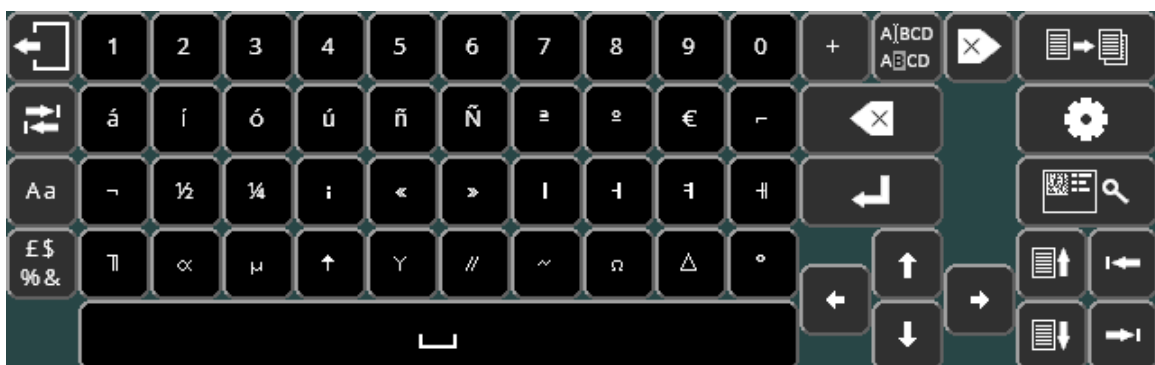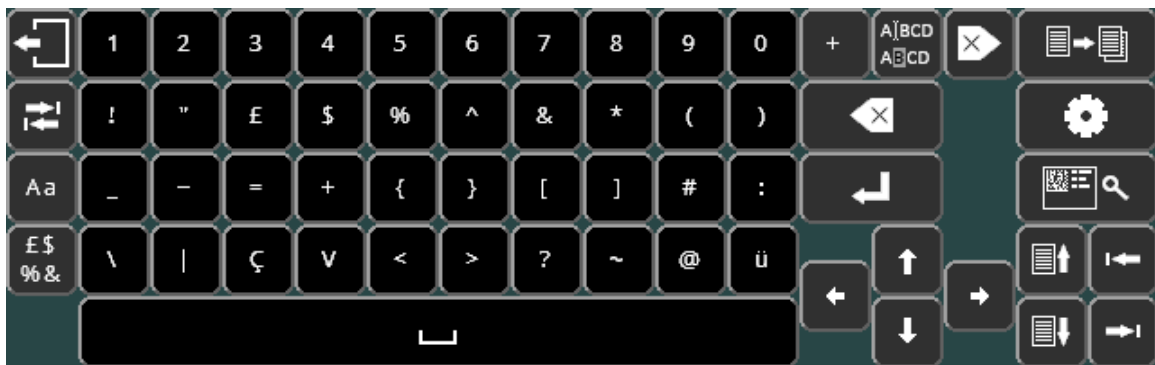
Pressing Aa will return to the standard alphanumeric keyboard layout.

If the Cyrillic keyboard setting is enabled, pressing the [RЯ] button will toggle the Cyrillic keyboard layout:

The shift button [Aa] will then toggle the upper/lower case Cyrillic keyboard.

To enable the Cyrillic keyboard, select [ЙЦУКЕН] on the Various screen (F10 F10 F3 F6 from the main menu)
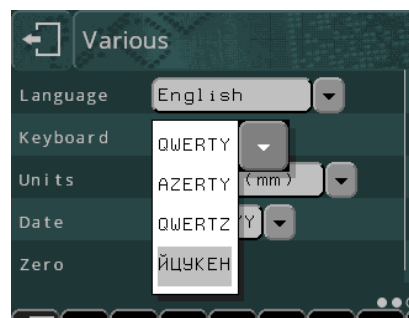
Cut/paste menu

Press [▤→▤] to access the cut and paste menu. This allows easy manipulation of complete layout lines.

Option	Action
F1) Cut line	Remove the current line from the layout and put in a buffer. Move up remaining lines to fill the gap.
F2) Copy line	Copy the current line into a buffer and leave the line unchanged.
F3) Paste line	Create space for a blank line at the current line and copy the buffer into the space.
F4) Insert blank line	Create space for a blank line at the current line.

6.   Serial Numbers and Variables

Serial numbers

Introduction
Serial numbers automatically increment or decrement after a layout has been successfully marked. Serial numbers can consist of numbers or letters, the actual sequence they follow can be defined if the standard 0000-9999 configuration is inadequate.   Serial numbers can be any length but should include leading zeros.

There are two kinds of serial numbers, global and layout.

Global serial number
There are 10 global serial numbers. Each one counts independently of the others when used. This could be used for instance when producing goods for two different customers who both specify their own serial numbers to be shared across all their products.

A global serial number is unique, it increments by 1 every time that it is marked.   If the global serial number is specified in 5 places in a layout then the layout will mark 5 sequential numbers.   The global serial numbers are shared by all layouts.   To put a global serial number in a layout set the line parameter *Contents* to *Global serial* and enter the number of the global serial number to use in the "Use global serial" line parameter.

The *Text* of the line will be replaced by the current value of the selected global serial number when the layout is marked.

The global serial number will follow the sequences specified in the serial number configuration screen, but the increment value cannot be changed and reset events cannot be set.

Layout serial numbers
Each layout has its own serial numbers.   They are stored in the *Text* of a layout and are saved with the layout.   Layout serial numbers may increment or decrement by specified amounts after a specified number of marks have been completed.   The configuration of each layout serial number is specified in the line parameters.   To put a serial number into a layout enter the starting value into the layout *Text*, then set the line parameter *Contents* for that line to *Serial*.   If necessary configure the *Serial Increment* and *Serial Every* parameters for that line to change the way the serial number increments.   A *Prompt* may also be specified as a reminder of what each serial number is for when they are being edited in the "edit serial numbers" screen.

Automatically Resetting Layout Serial Numbers
A layout serial number may be automatically reset to a predefined value on a certain event. The events available for reset are.

- *Never (Default)*
- *On Hour Change*

- *On Day Change*
- *On Week Change*
- *On Month Change*
- *On Year Change*
- *On Shift-Code Change*
- *On Shift-Text Change*

To configure a serial number to be reset change the *Ser.Reset* value from *Never* to one of the above options. Then set '*Reset to'* to the value the serial number should default back to on the configured event.

Editing serial numbers
To edit serial numbers (to reset a number back to 0001, for example) it is possible to just select F5) Edit layout, a better solution is to use F9) Edit serial numbers.   This shows the current value of the global serial numbers and the values of any serial numbers in the current layout along with the prompts associated with them.   The numbers can easily be changed without having to edit a potentially large layout.

Serial number configuration
By default, the controller will increment numbers only.   To increment letters the serial number configuration must be changed. Select F3) Serial numbering from the Configuration menu and enter a new sequence after the 0123456789 sequence already present.   The new sequence should include the letters needed in the order that they should occur.

If the sequence ABCDEFGHIJKLMNOPQRSTUVWXYZ is added as sequence 2, then the serial number AA98 would increment to AA99, AB00, AB01 etc. If the letters I, O and U are not needed or allowed, then they should be left out of the sequence.

If sequence1 is changed to 0123456789ABCDEF instead, the number will count up in hexadecimal, AA99, AA9A, AA9B etc.

Similarly, changing the sequence to 01234567 would count in octal, and 01 would count in binary.

Serial numbers will not add more digits if they reach their limits, they will roll around instead. For example 9999 will roll around to 0000 and then on to 0001. The number of digits will be preserved with leading zeroes.

Any character not in the sequence will stop digits to the left incrementing, and will cause a roll around. For example with a single sequence of 0123456789, serial number AA99 will increment to AA00.

Variables

Introduction
Variables enable lines of text to be changed without having to edit the whole layout. When the variables are edited prompts can be displayed so that the operator knows what each variable is.

There are two kinds of variables, global and layout.

Global variable
There is only one global variable.   It is shared between all layouts.   To put the global variable into a layout set the line parameter *Contents* to *Global variable*.   The *Text* of the line will be replaced by the global variable when the layout is marked.

Layout variables
Each layout has its own variables.   They are stored in the *Text* of the layout and are saved with the layout.   To put a variable in a layout set the line parameter *Contents* to *Variable*.   A *Prompt* may also be specified to as a reminder of what each variable is when the variables are edited.

Editing variables
To edit variables select F7) Edit variables from the Main menu.   This shows the value of the global variable and the values of any variables used in the layout along with any prompts associated with them.

For a more advanced prompt based approach to loading layouts and entering variables, see the 'Data Entry Via Prompt' section of the manual.

Variables can also be used for automation. For example, lines set to variable can be filled remotely when using the communications protocol "select layout"

7.   Time and Date Functions

Introduction

The controller has a real-time clock that provides time and date information. This information can be incorporated in a layout in many different ways.

Setting time/date and date format

To set the time and date select F1) Time/date from the Configuration menu. To select the appropriate date format select F6) Various from the Configuration menu.

Time/date in a layout

Live time/date information may be placed in a line of text by incorporating special commands in the *Text* and setting the line parameter *Contents* to *Time/date*. The commands are:

Command	Value
$HOUR$	Hour 00-23.
$MINUTE$	Minute 00-59.
$SECOND$	Second 00-59.
$DATE$	Date 01-31.
$MONTH$	Month 01-12.
$YEAR$	Year without century 00-99.
$CENTURY$	Century 19-20.
DOW	Day of week name MON-SUN.
MOY	Month of year name JAN.-DEC.
DOY	Day of year 001-366.
$WEEK$	Week number 01-52. First day of the week is Monday, week 1 is the first week with at least 4 days in it. Last week is 52, carried forward to start of new year.
$MONTH-CODE$	Month code letter (configurable).
$YEAR-CODE$	Year code letter (configurable).
$SHIFT-CODE$	Shift code letter (configurable).
$YEAR-UNITS$	Year units digit 0-9.
$JULIAN$	Counts each day of the year as a 2 digit alpha code. Jan 01 = AA, Jan 02 = AB, up to Dec 31 = OA (non leap year)
$DOW-UNIT$	Monday = 1, Sunday = 7
$SHIFT-TEXT$	Used to mark variable data configured in the Advanced Shift code feature.
$DOM-UNIT$	Single digit day of month code. 1st = A, 2nd = B, 26th = Z, 27th = 1, 28th = 2 etc. (configurable)

A layout with the text "$HOUR$:$MINUTE$ on DOW $DATE$ $MONTH$" would mark for example as "15:27 on WED 17 APR" using the values from the real-time clock.

Time/Date codes can be entered in the currently set language. The English codes will always be active as a fall back.

English	Czech	Dutch	Finnish	French	German
MONTH-CODE	KÓD MĚSÍCE	MAAND-CODE	KUUKAUSIKOODI	CODE-MOIS	MONATSCODE
YEAR-CODE	KÓD ROKU	JAAR-CODE	VUOSIKOODI	CODE-ANNEE	JAHRESCODE
HOUR	HODINA	UUR	TUNTI	HEURE	STUNDE
MINUTE	MINUTA	MINUUT	MINUUTTI	MINUTE	MINUTE
SECOND	SEKUNDA	SECONDE	SEKUNTI	SECONDE	SEKUNDE
DATE	DATUM	DAG	PVM.	DATE	DATUM
MONTH	MĚSÍC	MAAND	KUUKAUSI	MOIS	MONAT
YEAR	ROK	JAAR	VUOSI	ANNEE	JAHR
CENTURY	STOLETÍ	EEUW	VUOSISATA	SIECLE	JAHRHUNDERT
WEEK	TÍDEN	WEEK	VIIKKO	SEMAINE	WOCHE
DOW	DVT	DOW	DOW	JDS	TDW
MOY	MVR	MOY	MOY	MDA	MDJ
DOY	DVR	DOY	DOY	JDA	TDJ
YEAR-UNITS	JEDNOTKY ROKU	JAAR-EENHEDEN	VUOSIYKSIKKö	UNITE-ANNEE	JAHRESEINHEITEN
SHIFT-CODE	KÓD SMĚNY	SHIFT-CODE	SHIFTKOODI	CODE-EQUIPE	SCHICHT-CODE
JULIAN	JULIAN	JULIAN	JULIAN	JULIAN	JULIAN
DOW-UNIT	JEDNOTKY DVT	DOW EENHEID	DOW-UNIT	DOW-UNIT	DOW-UNIT
SHIFT-TEXT	SHIFT-TEXT	SHIFT TEKST	SHIFT-TEXT	SHIFT-TEXT	SCHICHT-TEXT
DOM-UNIT	DOM-UNIT	DOM EENHEID	DOM-UNIT	DOM-UNIT	DOM-UNIT

English	Italian	Polish	Portuguese	Spanish	Swedish
MONTH-CODE	CODICE-MESE	MIESIAC-KOD	CODIGO-MES	CODIGO-MES	MÅNADSKOD
YEAR-CODE	CODICE-ANNO	ROK-KOD	CODIGO-ANO	CODIGO-AÑO	ÅRSKOD
HOUR	ORA	GODZINA	HORA	HORA	TIMME
MINUTE	MINUTO	MINUTA	MINUTO	MINUT	MINUT
SECOND	SECONDO	SEKUNDA	SEGUNDO	SEG	SEKUND
DATE	DATA	DATA	DATA	FECHA	DATUM
MONTH	MESE	MIESIAC	MES	MES	MÅNAD
YEAR	ANNO	ROK	ANO	AÑO	ÅR
CENTURY	SECOLO	WIEK	SECULO	SIGLO	SEKEL
WEEK	SETTIMANA	TYDZIEN	SEMANA	SEMA	VECKA
DOW	GDS	DOW	DOW	DDS	DAG/VECKA
MOY	MDA	MOY	MOY	MDA	MÅNAD/ÅR
DOY	GDA	DOY	DOY	DDA	DAG/ÅR
YEAR-UNITS	UNITA-ANNO	ROK-UKLAD	UNIDADE-ANO	YEAR-UNITS	YEAR-UNITS
SHIFT-CODE	CODICE-DEVIAZ	SHIFT-CODE	SHIFT-CODE	SHIFT-CODE	SHIFT-CODE

JULIAN	JULIAN	JULIAN	JULIANO	JULIAN	JULIAN
DOW-UNIT	DOW-UNIT	DOW-UNIT	DOW-UNIT	DOW-UNIT	DOW-UNIT
SHIFT-TEXT	SHIFT-TEXT	SHIFT-TEXT	SHIFT-TEXT	SHIFT-TEXT	SHIFT-TEXT
DOM-UNIT	DOM-UNIT	DOM-UNIT	DOM-UNIT	DOM-UNIT	DOM-UNIT

Month and Year codes

Each month can be configured to have a particular letter or year associated with it, and each year can also have a letter or number associated with it.

Select F1) Time/date from the Configuration menu and enter 12 characters for the month codes (the first character is for JAN., the second for FEB. etc.) Enter a string of characters for the year code (the first character is for 1990, the second for 1991 etc.).

Shift codes

Every hour of the week can have its own shift code. To configure the shift codes select F1) Time/date from the Configuration menu and enter 7 sets of 24 characters. The first character of each set is for 00:00:00 to 00:59:59, the second character is for 01:00:00 to 01:59:59 etc.

If the actual shifts start on the half hour then set the real-time clock half an hour out to compensate or use Advanced Shift Codes.

Advanced Shift Codes

Scroll down the Time/Date configuration screen to see the *Mark Text(n)*, *From Time(n)*, *To time (n)* settings. There are up to six sets of these settings which allow

the day to be split into different zones. In each zone different variable text may be marked. The command to mark the Advanced Shift code variable is $SHIFT-TEXT$.

Example
Mark Text(1)…… SHIFT 1
From Time (1)…..06:30:00
To Time(1)……..14:29:59
Mark Text(2)…… SHIFT 2
From Time (2)…..14:30:00
To Time(2)……..22:29:59
Mark Text(3)…… SHIFT 3
From Time (3)…..22:30:00
To Time(3)……..06:29:59

The example above will mark the text 'SHIFT 1' between 6:30 in the morning to 14:30 in the afternoon. Then between 14:30 to 22:30 the text 'SHIFT 2' will be marked. Then between 22:30 and 06:30 the text 'SHIFT 3' will be marked.

Start of day (SOD)

Normally the date changes at 00:00 midnight. If the working day runs from 06:00am to 06:00am the next day then it may be necessary for the date to change at 06:00am, not at midnight. The start of day feature allows the date to change at any time in the day. Any time/date functions that use the date will reflect the delayed date change.

To configure the start of day select F1) Time/date on the Configuration menu and enter *SOD hour* and *SOD minute* that the date should change.

Note that the date displayed by the controller will be the real date, not the delayed date.

8. Logos

Introduction

As well as being able to mark the standard character set in various styles and sizes the controller can also mark complex logos.   These logos may be created in the controller using a simple editor (dot logos), or drawn on a PC using one of the many CAD programs available (HPGL logos).

Dot logos

Dot logos are made up of a pattern of dots. Each logo can be up to 160 dots wide by 160 dots high and may be marked at a variety of sizes. Up to 50 dot logos can be created and stored in the controller.
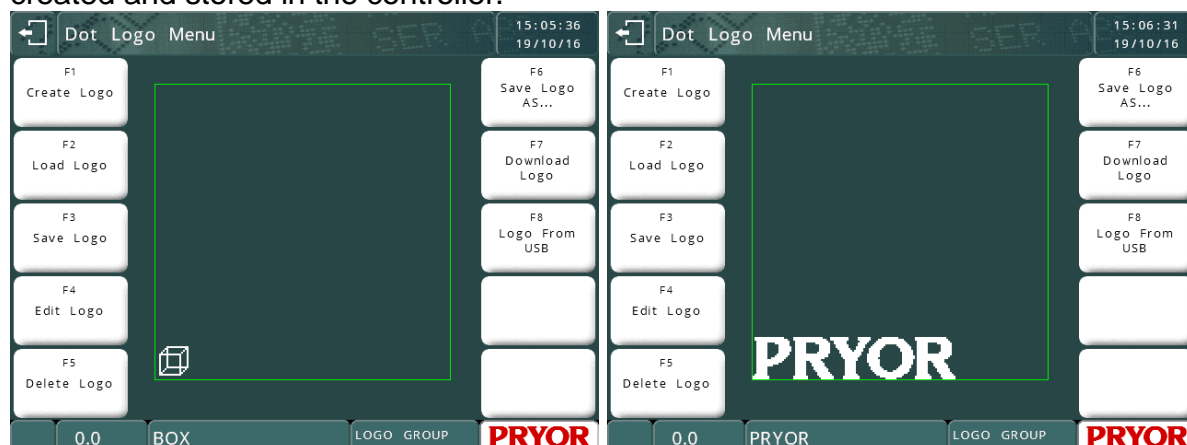
Note:
Dot Logos are only available on Dot marking machines. This feature is not supported on fast pneumatic or scribe systems. For logo marking on these machines use HPGL logos.

Creating dot logos
Select F1) Create logo from the Logo menu, the logo editing screen will be displayed. The blank area on the left hand side is used to show the whole logo, the gridded area on the right hand side shows an enlarged image of the area of the logo round the current cursor position.
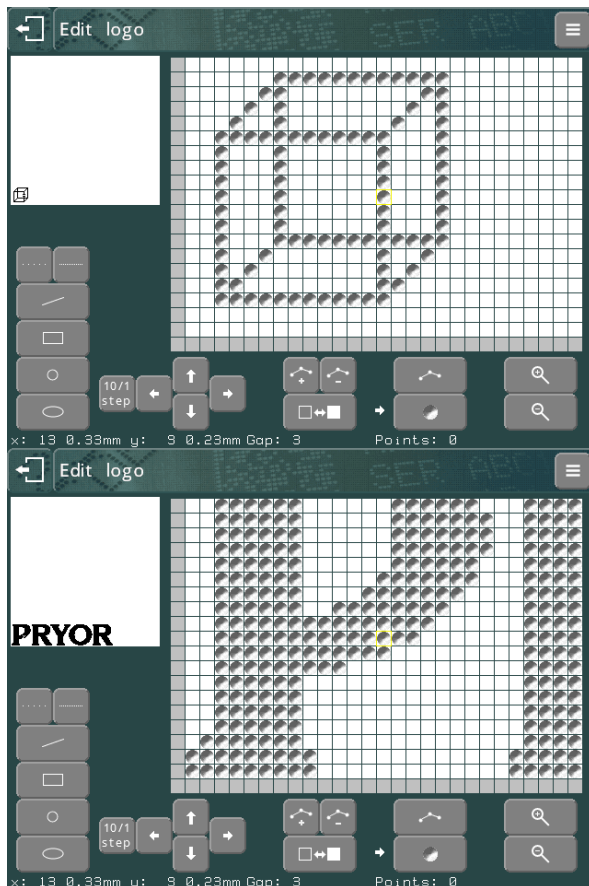
Touch the enlarged view to toggle a dot on and off.

Drag on the screen to move the view around the logo area.

Pressing and will zoom the expanded view in and out.

Press the key to return to the Logo menu.

Logos should be created in the bottom left of the logo area, try to leave no blank space below or to the left of the logo. Blank space to the left and below the logo will be included in size calculations, making marking size inaccurate.

Loading, saving and deleting dot logos
When a logo has been created it may be given a name and saved by selecting F3) Save Logo from the Logo menu.   Once a logo has been saved then it may be used in a layout.

Marking dot logos
To put a logo in a layout enter the name of the logo in the *Text* and set the line parameter *Contents* to *Logo*.

You may also choose a logo from the file system if the line parameter *Contents* are already set to *Logo* by pressing the button for that line.

The *Size* (height) of the logo can be set to any multiple of the minimum size of the logo, the minimum size is the height of the logo in dots multiplied by the minimum spacing between dots (normally 0.025 mm) (0.001").

Advanced editing features

To help create logos a set of simple drawing tools are available. These tools use markers as guidelines. Toggle between putting markers and dots on the screen by using the and buttons.

Markers (small blue squares) may then be placed by pressing the touch screen. Up to 10 markers may be placed in the logo at a time.

To delete markers press the key.

To use the drawing tools place the appropriate number of markers in the logo and press one of the drawing tool buttons located in the lower left.

Alternately, press to select the drawing tool menu. The following tools are available:
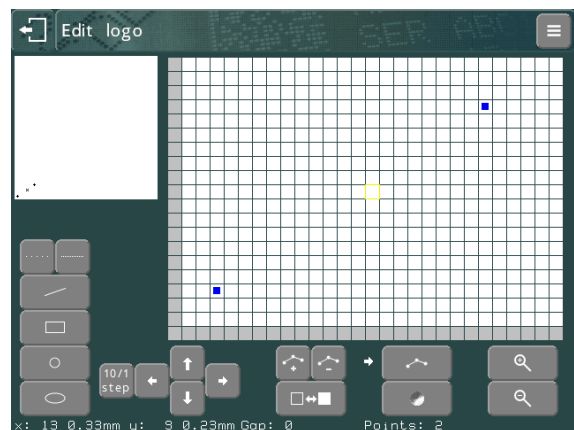
Option	Action
F1) Line	Draws a straight line between 2 or more markers.
F2) Box	Draws a box using 2 markers as diagonal corners.
F3) Circle	Draws a circle passing through 2 markers.
F4) Ellipse	Draws an ellipse to fit in the envelope defined by 2 markers.
F5) Copy	Copies an area defined by 2 markers into a buffer.
F6) Paste	Copies the contents of the buffer into the logo at the position defined by 1 marker at the top left of the area to be pasted.
F7) Cut	Clears the area defined by 2 markers after copying the contents into a buffer.
F8) Undo	Undoes the last operation performed.

Circles and ellipses are drawn with spaces between each dot, the size of the space is specified by the gap shown in the bottom of the screen. This gap can be adjusted using the   keys. A gap of 0 produces a solid line.
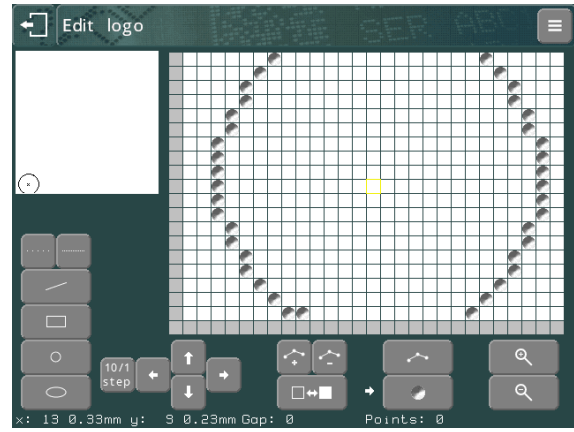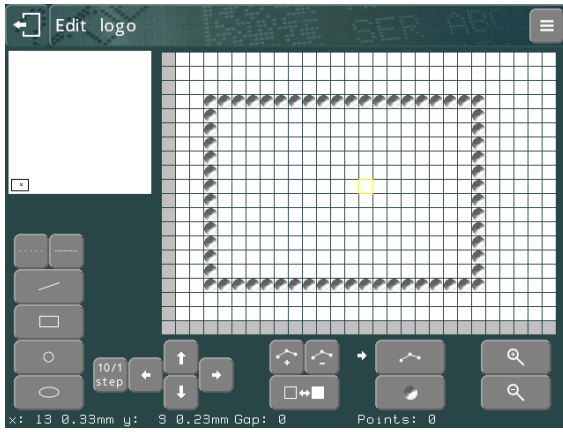
HPGL logos

Creating HPGL logos

Many CAD package can be used to create HPGL files which may be transferred to the controller. The only restriction is that the HPGL file must only contain commands for pen up/down and move absolute/relative, any other commands are ignored. Most packages generate arcs and circles as a series of straight lines so this restriction is not normally a problem.
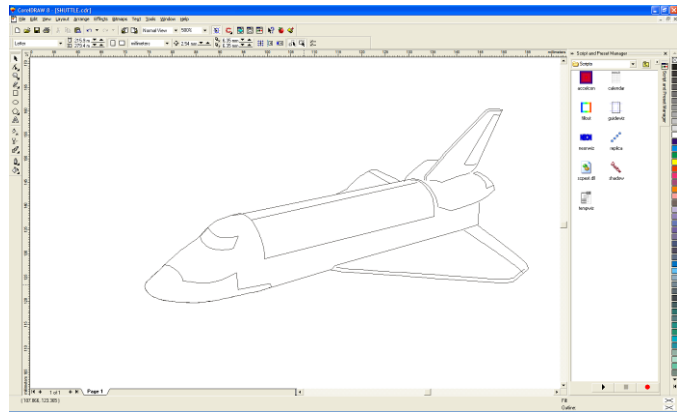
Corel Draw is a popular vector based drawing package and exports *.plt (HPGL) files in a format understood by the controller.

Transferring HPGL logos

When a HPGL file has been created on the PC it may be transferred to the controller either by USB memory stick or via the RS232 serial or USB port. Downloading logos is described in the comms utility program manual
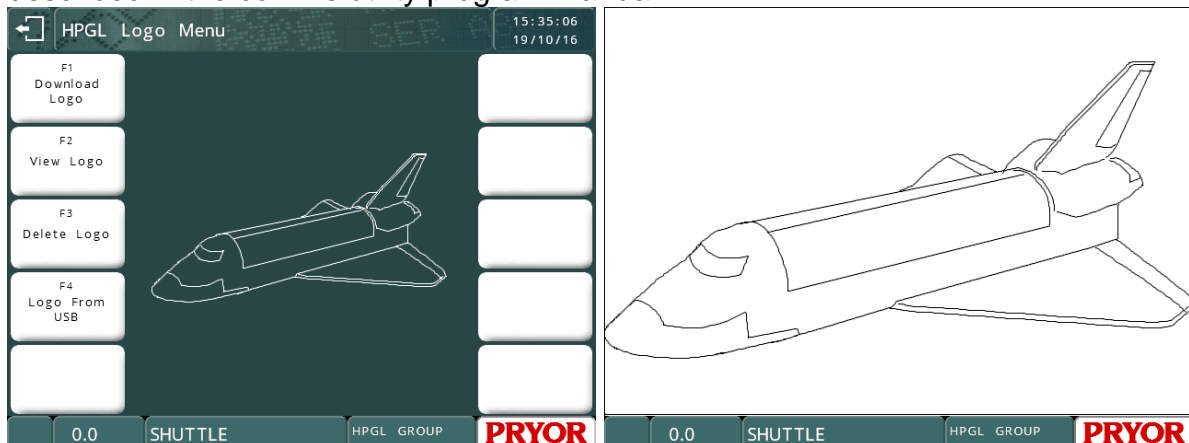
Once a logo has been saved in memory it can be used in a layout.

Marking HPGL logos

To put a logo in a layout enter the name of the logo in the *Text* and set the line parameter *Contents* to *HPGL logo (Smooth)* or *HPGL logo (Sharp).* The *Size* of the logo (height) should be specified, as should the *Varidot* spacing between dots.

You may also choose a logo from the file system if the line parameter *Contents* are already set to a *HPGL Logo* by pressing the ⬚ button for that line.

Embedded logos

The controller is supplied with two logos embedded in the memory. These are "*CE_LINE_LOGO" and "*CE_BLOCK_LOGO".
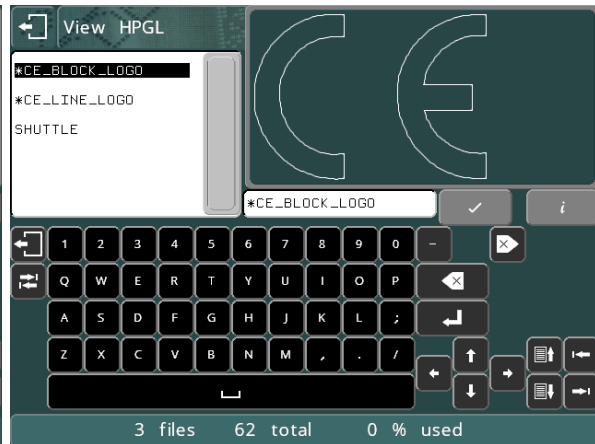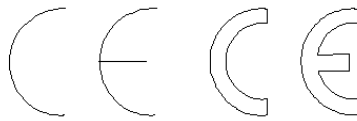
9.   Communications

Introduction

The controller features several ports of communication.
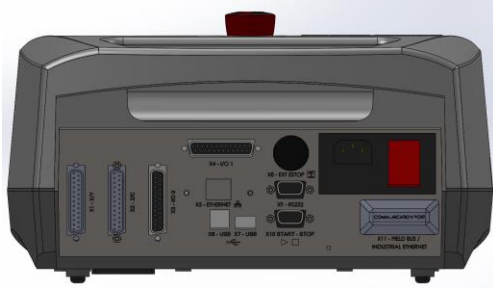
4000 Bench Rear Panel   4000 Integrator Connector Panel

Standard Ports
1 x RS232 (9 pin D – X9)
1 x USB A (Host – X7)
1 x USB B (Slave – X8)

Optional Ports
TCP/IP Ethernet (X5)
Range of field communication buses such as Ethernet/IP, Profibus, ProfiNet, DeviceNet, EtherCAT (X11) etc.

USB Interface

The standard controller features a USB Slave Port. This acts as a virtual com port when connected to a PC. When the drivers are installed and the controller is connected to the PC a new com port will be created on the PC (Com 4 for example).

Link to USB Driver Download

Field Bus Options

The controller may be fitted with an optional communication module which will allow the machine to be controlled by external control systems such as a field bus enabled PLC. Common field buses supported are Ethernet/IP, Profibus, ProfiNet, DeviceNet, ModBus, EtherCAT etc. For further details consult the separate manual that accompanies this option.

Ethernet TCP/IP Option

The controller may be fitted with an optional RJ45 Ethernet Port. Most of the controller's communication modes can be used with this option. Normally a PC using the Ethernet connection will open a communications socket to the controller using its IP address and port number configured in the Configure communications screen.

Configuration

To configure the communications ports select F8) Configure Comms from the Configuration menu.

The following parameters may be configured individually for each port:

Parameter	Options
Function	*Unused, Barcode, Printer, Batch, Remote, Select layout, Serial Command, Host, Network, Select Layout via Prompt.*
Baud rate	300,1200,2400,4800,9600,38400,57600,115200.
Data bits	7,8.
Parity	*None, odd, even.*

RS232 Connector pinout

The pinout for the 9 pin serial port connector is:

Pin	Signal	Comments
1	DCD	*Data Carrier Detect.
2	RXD	Data to controller port.
3	TXD	Data from controller port.
4	DTR	*Data Terminal Ready
5	GND	Signal ground
6	DSR	*Data Set Ready
7	RTS	Request to Send
8	CTS	Clear to Send
9	+5v	5 volt supply from controller (100 mA max.).

Note
 * Signals DCD, DTR & DSR are internally linked within the marking controller.

Barcode (RS232 Only)

This mode allows external equipment (typically a barcode reader) to put text directly into the current layout.   If a line in the layout has its line parameter *Contents* set to *Barcode* then the *Text* of that line may be replaced by data from the bar-code reader.   More than one line in a layout may be configured as *Barcode*, the first will be replaced by the first barcode scanned, the second replaced by the next barcode

scanned etc.   If the wrong code is scanned then press the 🔲 key to reset to the start of this sequence.

Each line also has an additional parameter called *Barcode Len*. If configured to zero any length of barcode can be scanned and marked. But if a number is programmed then that is the expected length of the barcode data for that line. If a barcode is scanned of a different length then an error message is displayed on screen.

The barcode reader should send an STX character (ASCII code 2) before the text and an ETX (ASCII code 3) after the text. An EOT (ASCII code 4) character can be sent to make the controller mark the current layout, an SOH (ASCII code 1) character can be sent to reset the barcode entry sequence.

Most barcode readers can be configured to send an STX prefix and an ETX terminator.

When the barcode reader is configured and the serial communications parameters match those of the scanner. You can use the Test Communications screen (F10, F10, F4, F6 from main menu. When a barcode is scanned you should see the following data on the controller screen.

[02]BARCODE_DATA[03]

The [02] and [03] is the controllers' way of the displaying the STX and ETX characters respectively. If these are not displayed then the reader will fail to insert the data in to the layout for marking.

For an alternative barcode reading mode see the 'Data Entry via Prompt' section. This mode allows the layout name as well as variable data to be scanned in a single cycle.

Barcode scanners configured specifically for the controller can be purchased direct from enquiries@pryormarking.com

Printer

A printer with an RS232 serial interface may be connected to the controller to keep a printed record of all information that has been marked. Alternatively, the data that would have been sent to the printer can be received by other equipment and used for other purposes.

To configure the printer output select F9) Configure printer from the Configuration menu. The following parameters may be configured:

Parameter	Description
Lines/page	The number of lines to be printed before sending a form feed character to the printer. If it is set to 0 then no form feed character will be sent.
New line	The sequence of characters that must be sent to the printer to move to the next line (*CR., LF* or *CR+LF*).
Print	Specifies what information should be printed. Choices are *Everything* (all the text marked) or *Variables* (only variables, serial numbers, bar-codes and time/date).
Gap	Leave a single line gap between each layout *Yes* or *No*.
Time/date	Print the current time/date at the top of *Each page* or before each *Layout*.

If an error occurs while a layout is being marked (stop is pressed or a proximity switch fails) then "BAD MARK" will be printed. Printer output can be turned on and off by selecting F6) Printer on/off from the Other menu.

If you require to interface to a barcode label printer, see the Serial Command Section, alternatively contact info@pryormarking.com requesting information relating to compatible barcode label printers.

Remote operation

A remote device can operate the controller by sending character codes via the RS232 serial or USB Slave interface to simulate keys being pressed on the touchscreen. The codes for most of the touchscreen characters are standard ASCII, the table below lists the exceptions (mainly cursor control and function keys):

Code	Function	Code	Function	Code	Function
1	Cursor right	10	Insert	19	F5

2	Cursor left	11	Delete	20	F6
3	Cursor up	12	Page up	21	F7
4	Cursor down	13	Page down	22	F8
5	Home	14	Escape	23	F9
6	End	15	F1	24	F10
7	Backspace	16	F2	25	Reset controller
8	Tab	17	F3		
9	Enter	18	F4		

As each character is processed by the controller it is transmitted back to the external device.

Select layout

Introduction
This mode allows an external device to perform the following operations via the RS232 or USB serial port:

- Select any layout from any group.
- Replace any variables in the current layout with new data.
- Mark the current layout.
- Get the currently loaded layout name
- Get the controller software version
- Modify the currently loaded layouts' XYZ offsets
- Home the Marking Head

Select layout is a powerful mode and can be used in a wide variety of situations.

Method
To select a layout the external device must send an STX (ASCII 0x02) character followed by the layout name followed by an ETX (ASCII 0x03) character.   This will load the specified layout from GROUP 1.   To load a layout from a specified group then the layout name must be prefixed with the group number (1-9, or ? to search all groups) followed by a colon.   If the layout does not exist an error message will be displayed.

Any variables (line parameter *Contents* set to *Variable*) in the current layout may be replaced with new text by sending an STX character followed by the variable text followed by an SOH character.   If there are several variables in the layout then the first variable will be replaced by the first data sent, the second variable will be replaced by the next data sent etc.

The current layout can be marked by sending an EOT (ASCII 0x04) character.

Basic Example : Transmit the following…

<STX>AB1234<ETX><STX>MFR A1234<SOH><STX>SER 12345<SOH><EOT>

Where   <STX> is ASCII 0x02
                <ETX> is ASCII 0x03
                <SOH> is ASCII 0x01
                <EOT> is ASCII 0x04

This will load layout "AB1234" from group 1. Insert "MFR A1234" into the first line in the layout set to Variable. Then insert "SER 12345" into the next line set to variable. Finally the <EOT> character will automatically start the mark.

The ENQ (ASCII 0x05) character can be sent to the controller and it will respond with the currently loaded layouts name. This can be useful for checking the correct layout has been loaded.

The VT (ASCII 0x0B) character can be sent to the controller and it will respond with the controllers software version number.

The LF (ASCII 0x0A) character can be sent to the controller and it will home the marking head.

It is possible to modify a layouts X, Y and Z offsets by transmitting data in the following format.

<SYN>2.50 1.60 10.00<E1B>

Where
<SYN> is ASCII 0x16
<E1B> is ASCII 0x17
2.50 is the programmed value for the X offset
1.60 is the programmed value for the Y offset
10.00 is the programmed value for the Z offset

Feedback
When a layout has been marked the controller will transmit a single character back to the remote device. This will be an ACK (ASCII code 6) if the layout was marked without error, or a NAK (ASCII code 21) if an error occurred (stop was pressed, proximity switch failed).

Alternatively, the second communication port can be configured as *Printer* and the data that has been marked can be verified by the external device.

Wear warnings
There are additional select layout commands to access the wear warnings over the serial port. These are detailed in section 19.

Batch mode

Introduction
Batch mode allows a remote device to send a batch of items to the controller. Each item specifies a layout name and the contents of any variables in that layout. The items are held in a first in first out queue that can hold up to 64000 characters. Items can be added to the queue without overwriting previous items.

Method

To transfer a batch of items to the controller select F3) Receive batch from the Batch Marking menu (F10, F10, F7). The controller will then wait for items from the external device.

For each item the remote device must send an STX character followed by the layout name (layout must be in group 1) followed by a CR character. The value of each variable can then be sent in turn, each value followed by a CR character. An ETX character must be sent to terminate each item. Many items can be sent one after the other using the same format. The controller will return to the batch menu when there have been no characters received for 0.5 second after the last ETX.

When a batch of items has been received by the controller each item can be marked in turn by selecting F1) Mark next from the Batch menu, or by pressing the green button on the remote control. When an item has been successfully marked it will be removed from the queue.

The number of items in the queue can be displayed by selecting F5) Batch information from the Batch menu, the queue can be emptied by selecting F4) Delete batch, F2) Skip next can be used to discard a single item from the queue.

If an item specifies a layout that does not exist then an error message will be displayed.

Serial Command Mode

The serial command mode allows data to be transmitted from the controllers' serial/USB or Ethernet port at any point within a marking layout. This mode is useful when interfacing to Serial printers or data logging applications.

Method

To configure Serial Command mode, select F8, configure comms from the configuration menu. Set the required port to 'Serial Command'. The default setting is 'Unused'. Then configure the Baud Rate, Parity and Data bits to match those of the external device. The Communication port is now configured.

Any line within a marking layout can be configured to 'Comms Command'. This is done through the 'Contents' entry in the 'Line Parameters' setup (F2 in Edit Layout). When a line is set to Serial Command any text entered into the line will be transmitted out of the communication port during a marking cycle.

Serial Command Line Commands

Commands can be placed on any lines configured to Serial Command. These commands allow text on other lines of the layout to be transmitted along with non-printable ASCII characters.

[Ln] - Command

The [Ln] command allows text on other lines be transmitted out of the configured serial port. Where 'n' is the line number within the layout of the text to be transmitted.

Eg. [L3] would transmit any text on line 3 out of the communication port.

It is possible to transmit fixed text and many commands on the same line configured to Serial Command.

[An] - Command

The [An] command is used to transmit non-printable ASCII characters. Where n is the decimal ASCII value of the required character.

Eg. [A13] would transmit the Carriage Return character which has a decimal ASCII value of 13.

For reference, other useful ASCII values include.

ASCII Character	Decimal Value	Keystroke in Hyperterminal	Appearance in Hyperterminal
SOH	1	CTRL-A	☺
STX	2	CTRL-B	☻
ETX	3	CTRL-C	♥
EOT	4	CTRL-D	♦
ENQ	5	CTRL-E	none
ACK	6	CTRL-F	♠
BEL	7	CTRL-G	none
LF	10	CTRL-J	Line feed
CR	13	CTRL-M	Carriage return
NAK	21	CTRL-U	§
ESC	27	CTRL-[	none

Serial Command Example
Enter the following data into a layout,

    1. EDWARD
    2. [A2][L1]PRYOR of [L4][A3]   (Note Line 2 is configured to Serial Command)
    3.
    4. SHEFFIELD

and the following layout will transmit,

    <STX> EDWARD PRYOR of SHEFIELD <ETX>

Note: To transmit the '[' character use the '[[]' command.

Host

This mode is reserved for special applications.

Test communications

To verify that data is being received and transmitted from the controller select F6) Serial ports from the Test hardware menu, then Terminal Program.

Port A is the 9 pin D connector.
Port B is a USB serial adaptor connected to the USB B connector.
Only passive Anybus modules can be tested here.
The Ethernet port is only active if an Ethernet module has been fitted.

The bottom part of the text area will display characters that have been received; the top part will display characters that have been transmitted (by typing on the touchscreen). You can send STX ETX EOT and SOH control codes using the buttons on the right.

Non printable ASCII characters are displayed as [02] for an STX, [03] for an ETX etc.

Press TAB to cycle between port A, port B, Anybus or Ethernet, or press the button at the top right of the screen.

If data comes in to a port that you are not monitoring, the red indicator beside its button will turn green.
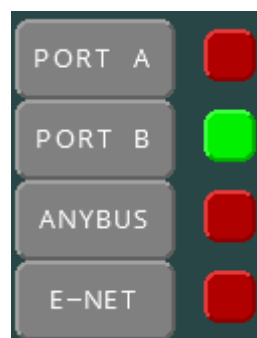
Press or or select the port again with the button to clear the display, or press ESC to exit.

10. Digital Inputs and Outputs

Introduction

The controller has optional plug-in I/O modules, each module has 8 opto-isolated 24v inputs and 6 solid state relay outputs that are available to interface to external equipment. A 24v 500 mA power supply is also available.

The 4000 series Bench controller supports up to 2 I/O modules.
Total of 16 inputs / 12 outputs.

I/O Port 0 – X3
I/O Port 1 – X4
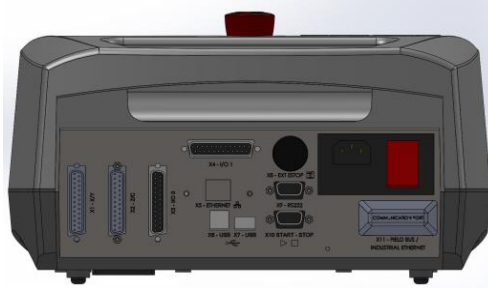
The 4000 series Integrated (Panel mount) controller supports up to 4 I/O modules.
Total of 32 inputs / 24 outputs.

I/O Port 0 – X3
I/O Port 1 – X4
I/O Port 2 – X12
I/O Port 3 – X13

Configuration

The inputs and outputs can be configured to operate in several modes. Select F7) Configure hardware from the Configuration menu and change *In/outs* to the appropriate mode (*Programmable*, *Select layout*, *Remote* or *Special interface*).

Connector pinout

The connector pinout is:

Pin	Name	Description
6-, 19+	OUT1	Relay 1 connections.
5-, 18+	OUT2	Relay 2 connections.
4-, 17+	OUT3	Relay 3 connections.
3-, 16+	OUT4	Relay 4 connections.
2-, 15+	OUT5	Relay 5 connections.
1-, 14+	OUT6	Relay 6 connections.
10	IN1	Input 1.
23	IN2	Input 2.
9	IN3	Input 3.
22	IN4	Input 4.
8	IN5	Input 5.
21	IN6	Input 6.
7	IN7	Input 7.
20	IN8	Input 8.
11	INGND	Input 1-8 isolated GND.
12, 13	GND	Controller GND.
24, 25	24V	Controller 24V 500 mA max.

Interfacing

Inputs

The inputs are opto-isolated 24v with an isolated signal ground.

To interface a switch connect one side of the switch to 24V and the other side to the relevant input IN1-8, INGND must be connected to GND.

To interface an external 24v signal connect the signal to the relevant input IN1-8 and the GND of the external signal to INGND, this maintains complete isolation between the controller and the external signal.

Outputs

The outputs are solid state relay connections capable of switching 24V d.c. at up to 1A.   The contacts should not be used to switch a.c. signals directly.

To interface an indicator lamp, connect one side of the lamp to GND, connect the other side to the negative (-) side of the Output relay, then connect the positive (+) side of the output relay to 24V. As illustrated in the diagram below for OUTPUT 1.
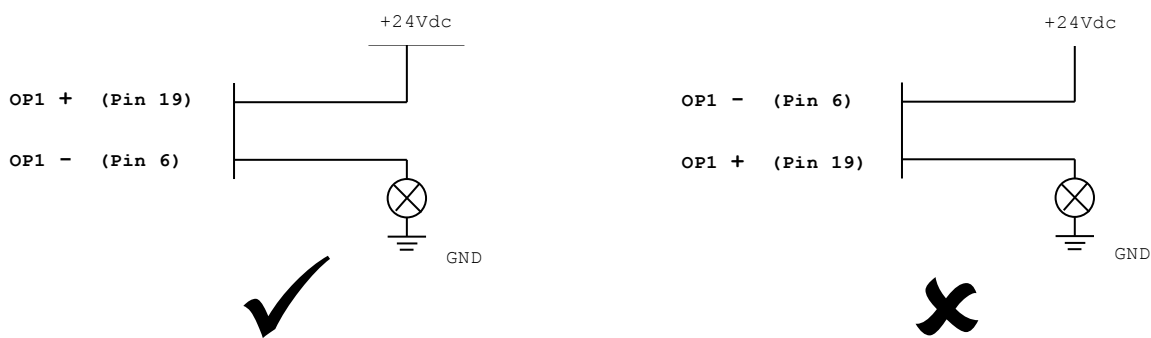
When switching inductive loads it is very important to suppress any interference caused at the source of the interference.   This means using suppression diodes or snubber networks across external relay coils and contacts.   If this is not done then the controller may malfunction.

24V supply
The 24V supply available from the controller is only really meant to supply enough current to operate the inputs to the controller.   It is possible to drive small indicator lamps, relays etc. but it is recommended that an external 24V supply is used if possible.

I/O Breakout Board
An I/O breakout board is available for each I/O module. Contact info@pryormarking.com quoting part number 10031659 for further details.

I/O Programmable mode
This mode allows commands contained in a layout to make use of the inputs and outputs.   To insert a command in a layout enter the commands in the *Text* and then set the line parameter *Contents* to *I/O control*.   More than one command can be put on one line, separate each command with a space.

Outputs can be used to operate clamps, index fixtures or operate workpiece feeds etc.   Inputs can be used to make a layout, wait for operations to complete, skip parts of a layout etc.

All outputs are automatically turned off when a layout is marked or when the red button on the remote control is pressed.
The following commands are available:

Command	Description
GO	Wait for green button on the remote control to be pressed. Useful for inserting pauses in a layout.
NOGO	Wait for green button on the remote control to be released.
+n	Switch output n on Where n is… 1 to 6 for I/O Port 0 11 to 16 for I/O port 1 21 to 26 for I/O port 2 31 to 36 for I/O port 3
-n	Switch output n off Where n is… 1 to 6 for I/O Port 0 11 to 16 for I/O port 1 21 to 26 for I/O port 2 31 to 36 for I/O port 3
Tn	Wait for input n to become true Where n is… 1 to 8 for I/O Port 0 11 to 18 for I/O port 1 21 to 28 for I/O port 2 31 to 38 for I/O port 3
Fn	Wait for input n to become false Where n is… 1 to 8 for I/O Port 0 11 to 18 for I/O port 1 21 to 28 for I/O port 2 31 to 38 for I/O port 3
Dn	Delay for n*0.1 seconds (n is 1 to 99).
Mn	Process the next line of the layout if input n is true Where n is… 1 to 8 for I/O Port 0 11 to 18 for I/O port 1 21 to 28 for I/O port 2 31 to 38 for I/O port 3
G	Decrement global serial number
The following commands are available in firmware version 20.10 and above:	
ATn	Abort mark if input n is true.
AFn	Abort mark if input n is false.
JTn ll	Jump if input n is true to line ll (ll is 1-40)
JFn ll	Jump to line ll if input n is false (ll is 1-40)
Jll	Jump to line ll (ll is 1-40)
P"message"	Display a popup box with the message in quotes.
C	Clear the popup prompt.
H	Home the XY axis

I/O Select layout mode

This mode allows external equipment to select, and mark, one of 31 different layouts.   Outputs from the controller indicate various status conditions. This feature is only supported on I/O port 0. Additional I/O ports fitted to the controller can use I/O programmable commands if required while in Select Layout mode.

The input/output allocations are for I/O Port 0:

I/O	Name	Description
IN1	START	Starts marking current layout.
IN2	STOP	Aborts marking current layout.
IN3	RESET	Resets current error condition.
IN4	S1	Binary select, value 1.
IN5	S2	Binary select, value 2.
IN6	S4	Binary select, value 4.
IN7	S8	Binary select, value 8.
IN8	S16	Binary select, value 16.
OUT1	READY	Controller is ready to select a layout.
OUT2	BUSY	Controller is marking a layout.
OUT3	ERROR	An error has occurred.
OUT4	PWR ON	Always ON while controller is powered up. This is a configurable option in the Configure Hardware menu and can be used to detect when the controller is On but not necessarily 'Ready' in the Main menu.

To select a layout the layout number (0-31) must be applied to the S1-16 inputs in binary format. The names of the layouts (must be in GROUP 1) selected by the various codes are given below:

Number	S16	S8	S4	S2	S1	Layout name
0	0	0	0	0	0	Use the current layout
1	0	0	0	0	1	LAYOUT-01
2	0	0	0	1	0	LAYOUT-02
3	0	0	0	1	1	LAYOUT-03
4	0	0	1	0	0	LAYOUT-04
...	...	...	...	...	...	...
30	1	1	1	1	0	LAYOUT-30
31	1	1	1	1	1	LAYOUT-31

The READY signal indicates that the controller is waiting for a layout code.   When the appropriate code has been applied to the inputs then selected layout can be loaded and marked by applying a pulse to the START input.   The controller will reset the READY output and set the BUSY output while the layout is being marked. When the layout has been marked the controller will reset the BUSY output and SET the ready output, ready for another cycle.

If an error occurs at any time (selected layout does not exist, no layout loaded, proximity switch failure etc.) then an error message will be displayed and the

ERROR output will be set. The error condition can be cleared by pressing a key or by pulsing the RESET input.

If more than 31 different layouts need to be selected then use the RS232/USB/Ethernet communication port layout select mode to select any layout from any group.

I/O Special interface mode

This mode is reserved for special applications.

I/O Remote mode

This is a mode which will allow the use of the programmable commands as in Programmable mode but will also allow the currently loaded layout to be marked using a remote signal.

Inputs 1,2 and 3 and outputs 1,2, 3 and 4 are reserved for remotely marking the layout. The other inputs and outputs may be used as in programmable mode.

The input/output allocations are:

I/O	Name	Description
IN1	START	Starts marking current layout.
IN2	STOP	Aborts marking current layout.
IN3	RESET	Resets current error condition.
OUT1	READY	Controller is ready.
OUT2	BUSY	Controller is marking a layout.
OUT3	ERROR	An error has occurred.
OUT4	PWR ON	Always ON while controller is powered up. This is a configurable option in the Configure Hardware menu and can be used to detect when the controller is On but not necessarily 'Ready' in the Main menu.

The following commands are available:

Command	Description
GO	Wait for green button on the remote control (if supplied) to be pressed. Useful for inserting pauses in a layout.
NOGO	Wait for green button on the remote control (if supplied) to be released.
+n	Switch output n on Where n is… 5 to 6 for I/O Port 0 11 to 16 for I/O port 1 21 to 26 for I/O port 2 31 to 36 for I/O port 3
-n	Switch output n off Where n is… 5 to 6 for I/O Port 0 11 to 16 for I/O port 1 21 to 26 for I/O port 2 31 to 36 for I/O port 3

Tn	Wait for input n to become true
	Where n is…
	4 to 8 for I/O Port 0
	11 to 18 for I/O port 1
	21 to 28 for I/O port 2
	31 to 38 for I/O port 3
Fn	Wait for input n to become false
	Where n is…
	4 to 8 for I/O Port 0
	11 to 18 for I/O port 1
	21 to 28 for I/O port 2
	31 to 38 for I/O port 3
Dn	Delay for n*0.1 seconds (n is 1 to 99).
Mn	Process the next line of the layout if input n is true.
G	Decrement global serial number
The following commands are available in firmware version 20.10 and above:	
ATn	Abort mark if input n is true.
AFn	Abort mark if input n is false.
JTn ll	Jump if input n is true to line ll (ll is 1-40)
JFn ll	Jump to line ll if input n is false (ll is 1-40)
Jll	Jump to line ll (ll is 1-40)
P"message"	Display a popup box with the message in quotes.
C	Clear the popup prompt.
H	Home the XY axis

If a command relating to input or output 1,2, or 3 is used in the layout it will not be processed.

Test inputs/outputs
To verify that general inputs and outputs are working correctly select F4) General IO from the Test hardware menu.
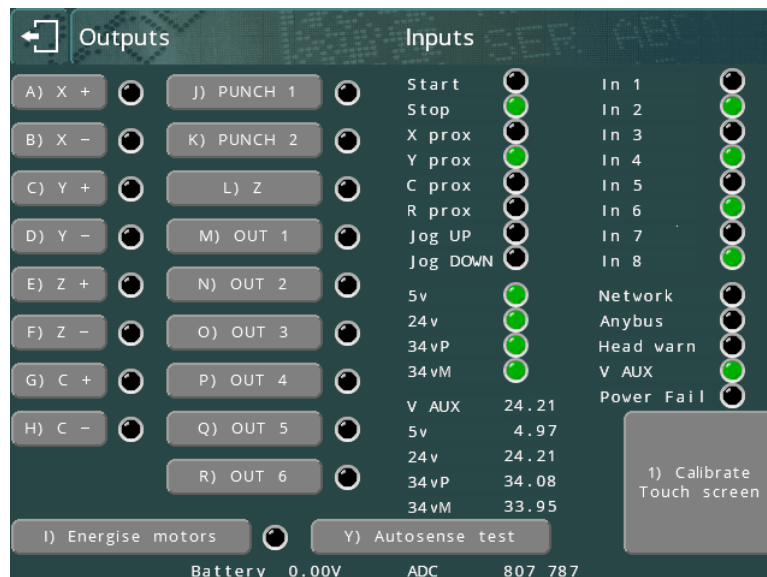
This will show the IO for I/O Port 0, as well as others for head proximity switches etc. Outputs and motors can be tested by pressing the appropriate on-screen button.

Press ESC to exit.

The IO for all fitted extended IO cards can be tested by selecting F5) IO Cards from the Test hardware menu. The state of outputs OUT1-6 for each card can be toggled by pressing the appropriate on-screen buttons, and the state of the inputs is shown by a red/green indicator.
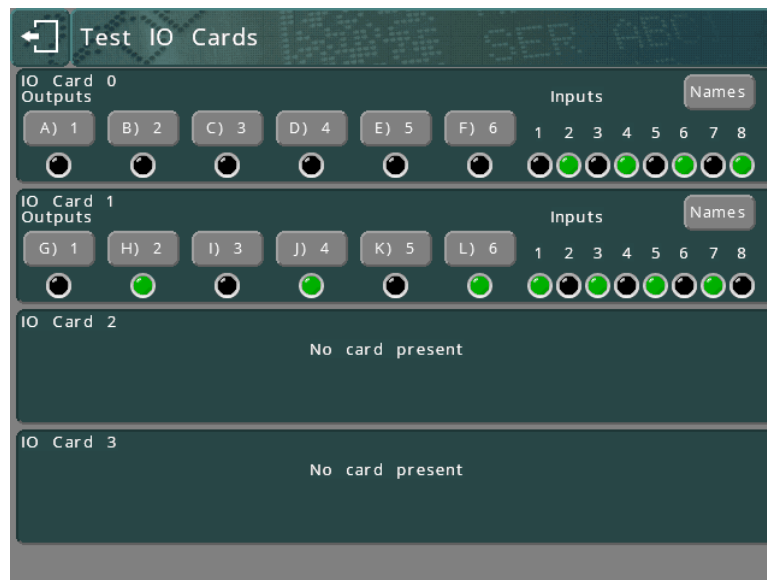
Indiviual Names can be assigned to each input and output using the Names button. These names will be used as part of the onscreen status messages when programmable I/O mode is used.

Press ESC to exit.

11. Miscellaneous

Backup/restore

The entire memory contents of the controller can be saved to a USB flash drive for safety.   If a fault subsequently occurs and the contents of the memory are lost then they can be loaded from USB flash drive.

This feature can also be used to copy full configurations or individual files from one controller to another. Files are forward compatible between firmware versions but not backward. It is recommended to have all controllers on the same firmware version if copying files between controllers.
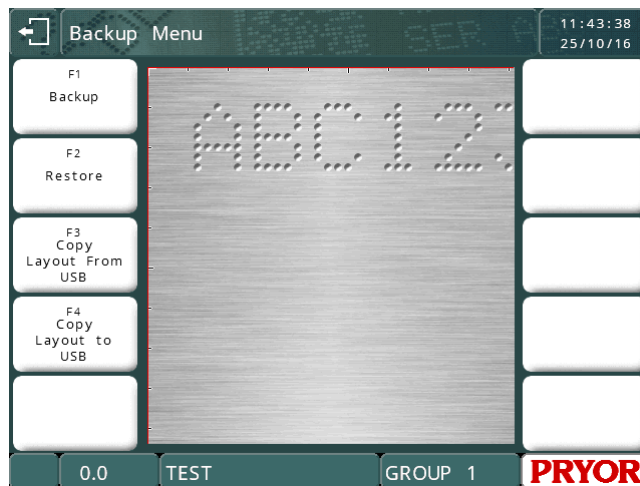
Backup

Selecting F1) Backup will copy the layouts and settings to a USB flash disk. A folder will be made on the USB disk called BACKUPS, which will have a sub folder named after the machine's serial number.

The file name of the backup will be based on the current date, in the format DDMMYY.BAK. If more than one backup is made in a day, the filename will have "_1", "_2" etc appended to make a unique file name.

The controller will show the filenames as it works through all the files, before returning to the Backup Menu.

Restore

Selecting F2) Restore allows the operator to navigate through the file system on the USB flash drive. The file can be a .BAK file created by a 4000 series controller, or a .CCF file created by a 3000 series controller.

Once a file is chosen, the controller will show the contents of the backup.
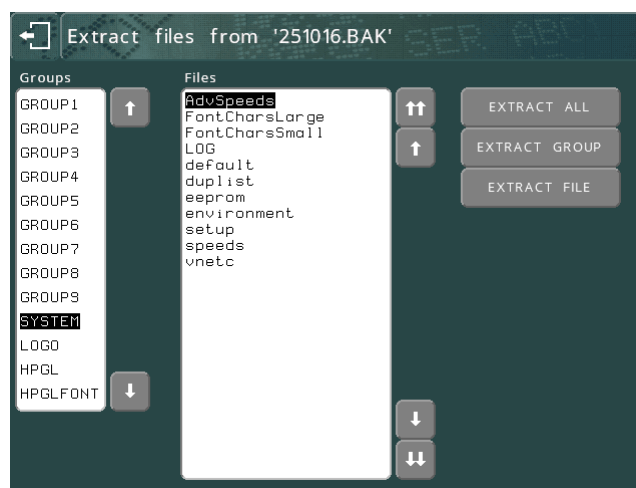
The operator can then choose individual files or folders by either touching the name on the screen, or moving the highlighted box using the ⬆ and ⬇ buttons to move up and down by one line.

If there are more files off screen, the ⏫ and ⏬ buttons will move up and down one page.

The extract buttons can be used to selectively restore files from the backup. For example, when duplicating layout files onto another machine, you would only take the layout files, and would not want to take the system folder, because files in there are machine specific.

- The Extract File button will restore the currently highlighted file.
- The Extract Group button will restore all the files in the currently highlighted group.
- The Extract All button will extract all the files in the backup.

Any files restored will overwrite the ones already in the controller's file store.

Press ESC ⬅ when finished.

If any files from the system group are restored, the controller will perform a reboot to make sure the settings are applied.

Copy Layout to USB
Copy Layout from USB
These functions can be used to copy individual files to and from a USB flash drive.

Files are copied to a folder called LAYOUTS, in a subfolder named after the serial number of the machine.

File names are limited to 8.3 format, i.e. an 8 character filename and 3 character extension. If the name of the layout does not meet this restriction, the operator will be prompted to provide a valid name.

Passwords

Any of the options on any of the menus can be protected by a two level password system.   Select F2) Passwords from the Configuration menu.

Legacy
If User Management is set to Legacy, the two password system will be used. Change *Password 1* and *Password 2* and to select which password is required to use each option from each menu. This is the same as the system used on the 3000 series of controllers.

Each menu has a string of 10 characters associated with it, the first character is the security level for option 1 etc.   The security level for each option may be 0 (no password required), 1 (*Password 1* required), or 2 (*Password 2* required).

In this example, Item 10 on the main menu (the Advanced Menu) has been protected with password 1, and item 2 on the Config menu (Passwords) has been protected with password 2.

Any menu buttons protected by a password will be marked with a padlock
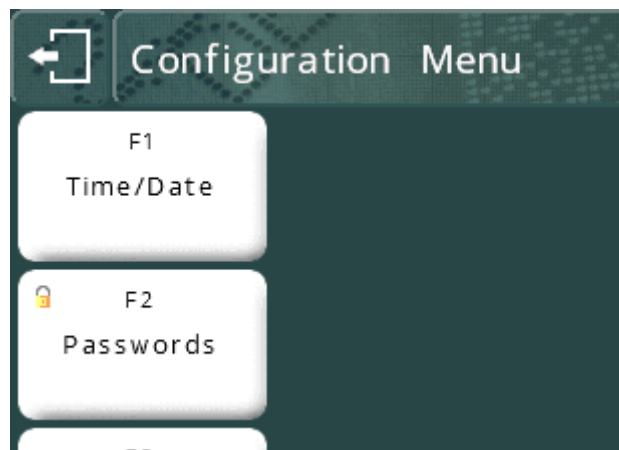
Now, when the operator attempts to use one of these menu items, the correct password must be entered before the system will proceed:
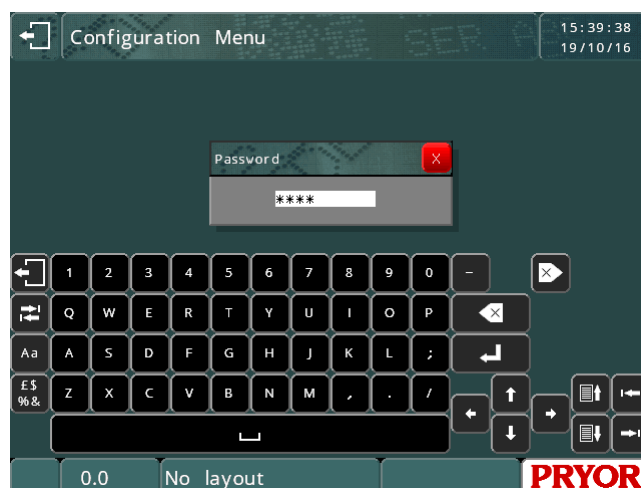
Local

If the User Management is set to Local, the number strings against the menu represent the user level required to select that menu item, rather than the password number. The Passwords menu option is now replaced with the User Manager menu.
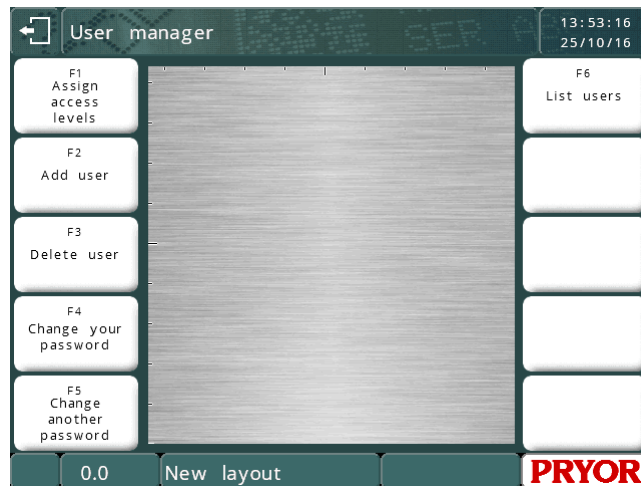
Assign Access Levels leads to the original passwords screen.

Add User allows the operator to add user accounts.

User accounts can have one of three levels associated with them, User, Supervisor or Administrator.

- Users can only access menu items assigned access level 0.
- Supervisors can access levels 0 and 1
- Administrators can access levels 0, 1 and 2.

It is recommended to add at least one Administrator account before leaving this menu. If no account with the correct access level is set up, the system will allow anyone through until an account is set up.

Change your password allows the currently logged in user to change their password.

Change another password allows the currently logged in user to change the password of another user. It is recommended that this item is protected with Supervisor or Administrator level.

List Users will list the current user accounts and levels.
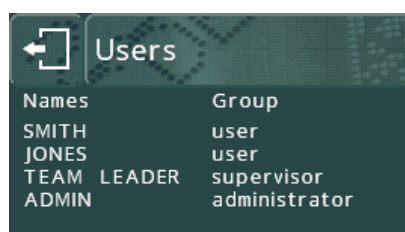
Once user accounts have been created, the controller will prompt for a user to log in when it is powered up.
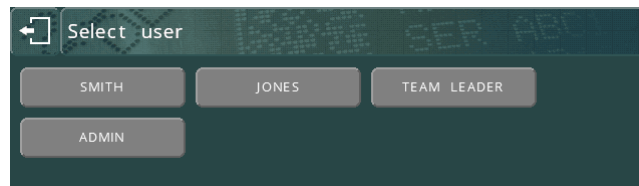
The operator can then navigate through the menu system until they encounter a menu selection they don't have a high enough access level to select. At this point, the controller will prompt for a user with a higher access level to log in. This access is granted for one time only, and will only prompt with accounts that have a high enough level.
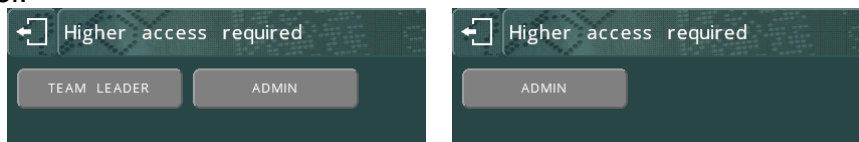
To log out, return to the main menu, and press the log out button
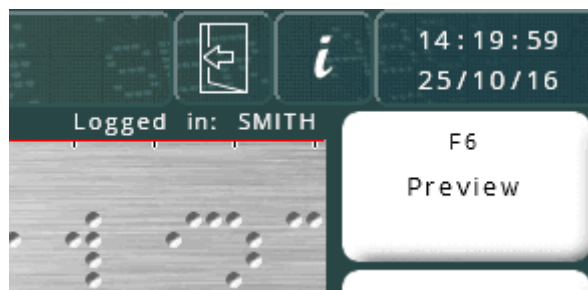
After logging out, the controller will return to the Select User screen.

Database
If User Management is set to Database, it works exactly the same as Local mode, but the user list and access levels are taken from Traceable-IT's SQL database. This requires an Ethernet module, and a connection to the SQL database. The connection is provided by the Pryor TCPIP SQL Service running on a PC.

Counters

The controller can count the number of times a layout has been successfully marked and stop at a pre-set limit.   The value of the counter is displayed on the menu screen.

There are two kinds of counters; layout counters and the global counter.   A layout counter counts the number of times a particular layout has been marked, it is saved with the layout.   The global counter counts the number of times any layout has been marked.
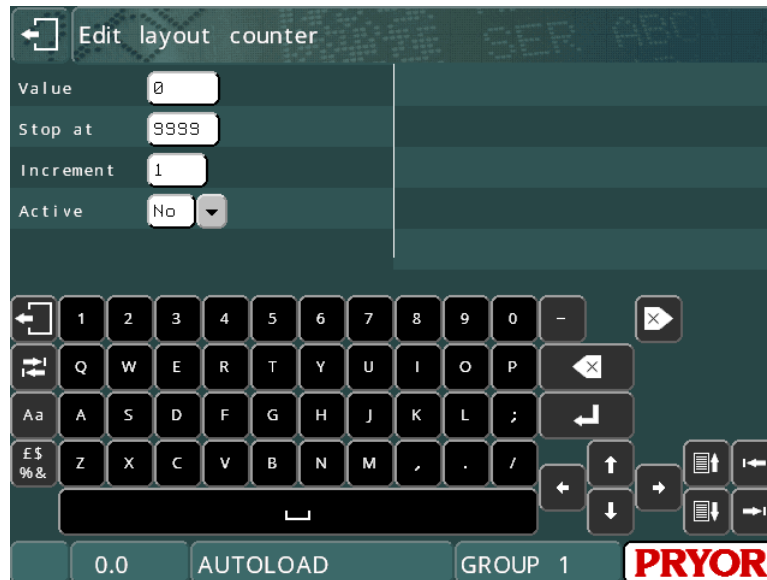
The *Active* state (*Yes* or *No*), current *Value*, *Stop* value, and the *Increment* can be configured for both types of counter. If a layout counter is set to be active, *Value* set to 0, *Stop* set to 100 and *Increment* set to 1 then that layout may be marked 100 times successfully before marking is disabled.   The counter must be disabled or the *Value* reset before it can be marked again.

The *Value* of the global counter is displayed on the menu screen in preference to the layout counter if both are active.

To configure the layout counter select F9) Layout counter from the Other menu, to configure the global counter select F8) Global counter from the Other menu.

Home position

The marking head has a fixed XY axis home position, normally at the top left corner of the marking area. The *XY* positions of marks are normally specified relative to this home position, unless offsets are defined.

If an electric Z axis is fitted then it has a fixed zero position at the top of the column. Because of the slow speed of this axis it is usually inconvenient to move back to this zero position before and after every mark.   For this reason the Z axis proximity switch is usually disabled and the zero position fixed manually by driving the axis up or down and selecting F5) Set Z home from the Other menu.   An alternative is to leave the switch enabled and use a Z axis offset, or to use the Auto sense feature.

To move to the home position without marking a layout select F4) Move home from the Other menu.

The method by which the marking head finds the home position (X axis then Y axis or vice versa) can be configured, select F7) Configure hardware from the Configuration menu and select the appropriate *Home method*.
The proximity switches for the XYZ axes can also be enabled/disabled by selecting F7) Configure hardware from the Configuration menu and selecting the appropriate value for *X prox*, *Y prox* and *Z prox* (*None* or *PNP* or *NPN*).

The Circumferential/programmable axis also has provision for a proximity switch to fix a zero position, this is not normally used.

Layout Data

A layout can have some configuration data that is unique to that particular layout.

A layout can have its XYZ zero position defined as being offset from the absolute home position defined by the XYZ proximity switches. This may be used to prevent excessive movement to/from the absolute home position if the workpiece is an awkward shape.

Offsets may also be used to move an entire layout around the marking area without having to change the XY positions of each line of the layout.
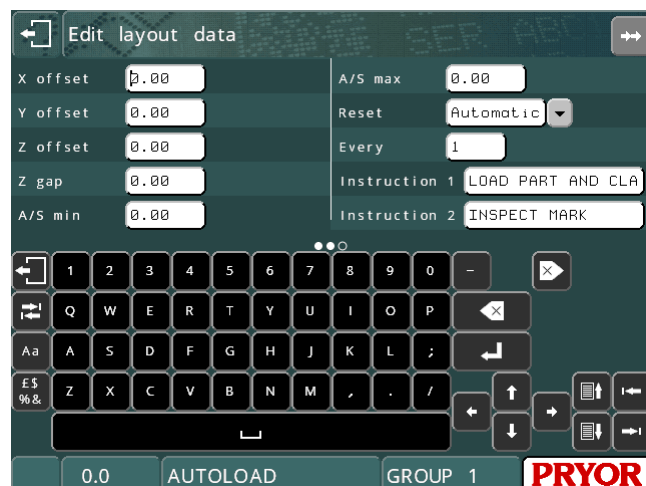
Offsets are specific to a layout and are saved with the layout. To configure an offset select F3) Layout Data from the Other menu. The following parameters are available:

Parameter	Description
X offset	Position of new X zero position relative to absolute X zero.
Y offset	Position of new Y zero position relative to absolute Y zero.
Z offset	Position of new Z zero position relative to absolute Z zero.
Z gap	If Auto sense is used this specifies the required gap between the stylus tip and the workpiece.
A/S Min	During an autosense the Z axis will travel to this position before starting to autosense. Can speed up a marking cycle.
A/S Max	During an autosense the Z axis will stop and an error will be displayed if the Z axis travels further than this position.
Reset	Automatic (the controller automatically returns to the absolute zero position at regular intervals to ensure the offset zero position is still correct) or manual (only return to absolute zero when Move to home function selected).
Every	The number of marks between automatic reset cycles.
Instructions	Work instructions or prompts that are displayed on the main screen

If the red button is used to abort marking then the marking head will automatically return to the absolute zero position when the layout is marked again.

If a Circumferential fixture is used then whenever a new layout is made the *Y offset* will be automatically set to half the height of the marking area. This assumes that the centreline of the fixture is located along on the centreline of the marking area. If the fixture is located at a position other than along the centreline (to save movement time) then the *Y offset* must be edited after a layout has been created.

Up to 3 lines of instructions can be stored in the layout, which are displayed on the main screen underneath the preview.

Proximity shifts

Normally the marking head will have a home position at the top left corner of the marking area, this may be inconvenient for some types of fixture. If the proximity switches are physically moved so that the head has a new home position then the controller must be configured for the new position. Select F7) Configure hardware from the Configuration menu, enter the XY position of the new home (relative to the previous home position) using *X prox shift* and *Y prox shift*. The configuration of the proximity switches (*X prox* and *Y prox*) may also need to be changed (*NPN* or *PNP*) if using the same option.
Note that all *XY* positions will still be specified as though the home position was still at the top left corner of the marking area.

Quality/speed [1]

The controller can mark at various different speeds. The slowest speed will mark very high quality characters, the higher speeds will mark faster with a slight loss of quality. Every line of each layout can be configured to mark at different speeds. The default speed is Slow.

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[1] Speed configuration is not availble on MarkMate

To edit the line speed, while editing a layout, press TAB with the required line

selected, or on the required line to access the line parameters screen. You can then use the quality and speed slider bars to change the marking speed.
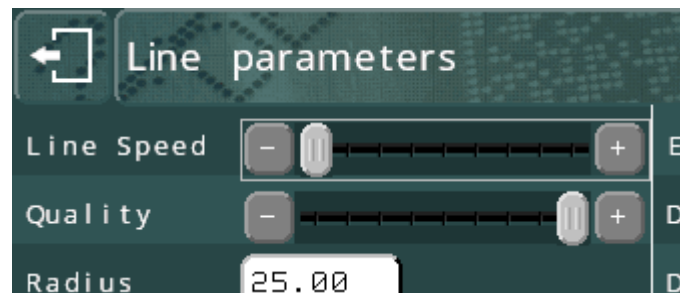
Various other speeds such as Home Speeds can be configured by selecting F7) Quality / speed from the Other menu.
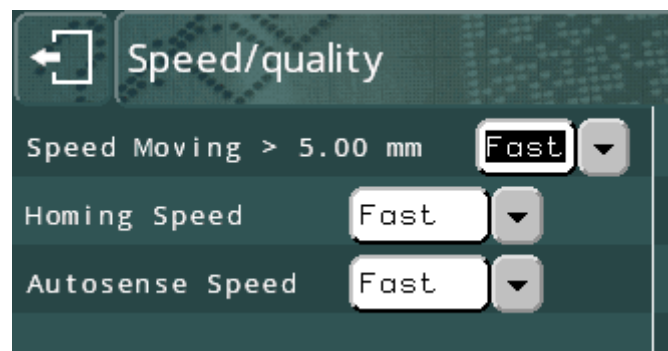
Various menu

The VARIOUS menu is accessed with F6 from the CONFIGURATION MENU. It enables settings to be changed that affect the way the system works.

Language -The controller can operate in a variety of languages. The language is selected here.

Keyboard - This setting determines the keyboard layout for the machine.

Units - The controller can use either mm or inches to represent distances.

Date -Sets the format to be used when displaying the date.

Zero - The character used to represent the number '0' can be marked with or without a slash. Use this setting to change the style.

One - This changes the way the number '1' is marked.

Auto save - If *Auto save* is selected then the current layout will be automatically saved after the layout is marked.   If the layout contains serial numbers this will ensure that if the controller is switched off the saved layout will contain up to date serial numbers and variables.

Hotkeys – Allows fast loading and marking of up to 10 commonly used layouts. Enable the feature for a keyboard 1 – 10 selection or a touch screen selection menu when Mark Layout is selected.

Rotate screen – Invert the screen. This is used in special installations where the screen has to be mounted upside-down.

Use layout/data prompts – Whether to prompt for a layout name for every mark.

Clear var after mark – This will clear all lines set to variable or barcode on completion of the mark. This is used to avoid double marking data.

Unload layout after mark – Another setting to avoid double marking.

Auto preview before mark – Shows the preview screen before marking. This can be used to verify the correct layout and data is loaded.

Right align numbers – this determines how data is shown in data entry boxes on screen. The mark is not affected.

Start/stop reset on start – Normally set to YES. Set to NO if sensors are connected to the start and stop inputs.

Screen saver – Used to save power by turning off the backlight on the screen. Defaults to ON for battery powered machines.

Autoload last layout – Will load the last used layout when powered on. This overrides the use of the AUTOLOAD layout name.

Default layout

If there is a layout called DEFAULT in GROUP 1 then this layout will be used as the basis for a new layout when F8) Create layout on the Main menu is selected.   The default layout has priority over the default line.

Default line

Each time a new layout is created each line will be copied from the default line.   The default line can be edited so that a new layout can have a different default character *Size*, *Font*, *Force* etc.   To edit the default line select F4) Default line from the Configuration menu.   The default line will be ignored if a default layout is present.

Autoload

If there is a layout called AUTOLOAD in GROUP 1 then the controller will automatically load this layout when the controller is switched on.

Marking mode

The controller can mark in 3 different modes. Select F8) Marking mode from the Advanced menu to change the mode.   The chosen mode will be used to mark all layouts until it is changed.

The following modes are available:

Mode	Description
Normal	Characters and logos are marked normally using the XYZ axes. The Circumferential axis can be used to drive an additional programmable axis.
Reverse	Characters and logos are marked in mirror image. The X position is measured from the right hand side of the marking area, the Y position is measured as normal.
Circumferential	Characters and logos are marked around the circumference of a circular work piece.

Group names

The groups used to store layouts are normally called GROUP 1 to GROUP 9. These names may be edited to reflect the type of layouts stored in them. Select F5) Names / Hotkeys from the Configuration menu.

The group name will also be displayed at the bottom of the screen, alongside the layout name, instead of "group 1".

Hot Keys

The hot key function must be enabled on the "Various" menu. (F10-F10-F3-F6 from the main menu) to allow entry of hot key data.

Set to' Yes' to use an external keyboard 0 – 9 keys or set to 'Hotkey menu' to create the Choose file hotkey screen shown below.

To access the hot key configuration screen, select F5) Names / Hotkeys from the configuration menu. Hotkeys allow you

to link 0 – 9 numeric keys on a keyboard to different commonly used layouts. Pressing the appropriate hotkey will instantly load the layout associated with it. This saves having to navigate the load layout screen for commonly loaded layouts.

The assigned hot key can also be used to generate a special marking menu using the setting on the Various menu.
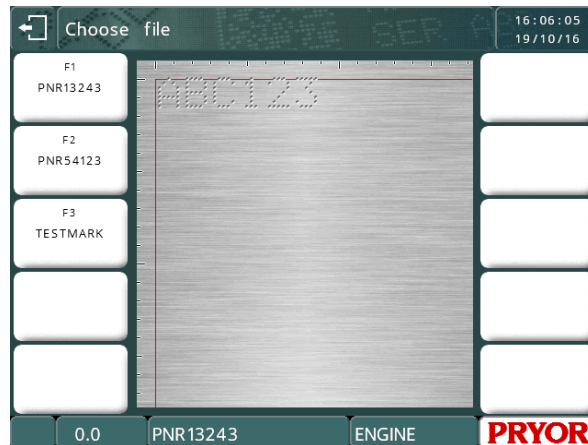
Speeds and timings

These relate to the mechanical marking head and are set at the factory for the optimum marking speed and mark quality for that type of marking head.   Do not change these values unless advised to do so by your distributor as it could lead to a loss of mark quality or machine damage.

Controller reset

Occasionally it may be necessary to reset the controller.   There are two types of reset, hard and soft.

Soft reset

A soft reset returns all configuration information to default values.   To perform a soft reset hold the green start button on the remote control down while switching the controller on.

A soft reset can also be performed by pressing the setup button on the (F10, F10, F10) Machine Details screen and pressing the settings button, or by switching the controller on while pressing the F9 key on an external keyboard. Both methods will display a password prompt. Enter the password "SOFT RESET" and press enter.

Hard reset

A hard reset resets all configuration to default values and deletes all layouts and logos.   To perform a hard reset hold both the red and green buttons down while switching the controller on.

A hard reset can also be performed by pressing the setup button on the (F10, F10, F10) Machine Details screen and pressing the settings button, or by switching the controller on while pressing the F9 key on an external keyboard. Both methods will display a password prompt. Enter the password "HARD RESET" and press enter.

If a machine has sensors or switches connected to the red or green button inputs instead of a start/stop box, the reset functionality can be disabled to stop settings being lost. Set "start/Stop reset on start" to "No" on the Various menu. (F10-F10-F3-F6 from the main menu)

Data Matrix Option

Data Matrix codes can be created and marked by setting the line contents to 'Data Matrix' in the Advanced Line Parameters screen.

The size and shape of the Data Matrix is also defined in the Advanced Line Parameters, using the 'DMx Format' and 'DMx Spacing' parameters.

The 'DMx Format' parameter controls the shape of the Matrix, which can be SQUARE (this grows automatically depending on the number of characters to be encoded), or a range of various sized RECTANGLES. The table below shows the maximum number of characters which can be encoded within the rectangle format matrix (Note this value is reduced when encoding Non-Printable ASCII characters)

Code Size	Max number of characters
Square	Grows in size up to 3116
8 x 18	10
8 x 32	20
12 x 26	32
12 x 36	44
16 x 36	64
16 x 48	98

The 'DMx Spacing' parameter controls the spacing between the dots and therefore the size of the matrix.

The 'DMx Style' parameter changes the way the Data Matrix is actually marked. There are three options;

OPTIMISED:- which is the fastest mark and marks the dots in any order. This option is the least accurate and may produce unreadable codes.
LEFT THEN RIGHT:- which is the medium speed and marks the dots in rows, left to right and right to left alternately.
LEFT TO RIGHT:- which is the slowest but most accurate mark. It marks the dots in rows from left to right.

It is possible to mark serial numbers, time date entries or variables as Data Matrix codes, consult the line commands section for further details.

Encoding Non Printable characters in to a Data Matrix code. [2]

The Data Matrix standard ISO16022 allows non printable characters such as R_S (Record Separator), G_S (Group Separator), EO_T (End of Text), C_R (Carriage Return), L_F (Line Feed) etc to be encoded into the matrix using the tilde (~) character as a command character.

Some of the more commonly used characters and commands are given below.

EO_T = ~D
C_R = ~M
L_F = ~J
G_S = ~]
R_S = ~^

Therefore typing ~] in to a Data Matrix code will actually encode the G_S character into the code rather than the 2 characters ~]

If you are required to encode data to conform with the ISO15434 standard you need to encode data similar to the following formats.

[)>R_S12G_SMFR A1234G_SSER 123456789$R_S$$EO_T$

Therefore to encode this information into a Data Matrix you would have to type in the layout.

[)>~^12~]MFR A1234~]SER 123456789~^~D

To simplify this, the software in the controller provides a simpler method for entering the [)>R_S12G_S prefix and the $R_S$$EO_T$ suffix. The example below illustrates this

[12]MFR A1234~]SER 123456789

When the software sees the [12] command the prefix and suffix are automatically added to the data on the line. You still need to enter the G_S separator between the data but the [12] takes care of the prefix and suffix automatically.

If you require to mark using format DD instead of 12 you can use the [DD] command.

If marking Data Matrix codes for ISO1534 which use the 05 or 06 format. You can use the ~5 or ~6 command to automatically add the suffix and prefix characters for those respective formats.

For example.

~59512345~]01AB12345~]21123456789 will actually decode…

[)>R_S05G_S9512345G_S01AB12345 G_S 21123456789$R_S$$EO_T$

---

[2] Not Supported on MarkMate

~617V12345~]1PAB12345~]S123456789 will actually decode…

[)>^R_S06^G_S17V12345^G_S1PAB12345 ^G_S S123456789^R_S^{E}O$_T$

Data Matrix Marking on the MarkMate.

- The MarkMate machine has some restrictions when marking Data Matrix codes.

- No support for the encoding of non-printable characters within the Data Matrix code.

- Limited to encoding up to 15 characters within the Data Matrix code.

- Minimum cell spacing (DMx Spacing) is 0.3mm (0.012").

Line Commands

There are several line command options available on the machine. Line commands are entered on a line and are often enclosed in square brackets such as [L1]. Each type of command is explained below.

Link Line Commands
The link line command syntax allows many lines in the layout to be combined on to a single line in the layout. This is especially useful when marking Data Matrix codes or when you wish to mark variable information several times in a layout without having to edit the variable several times.

It is possible to link forwards or backwards in a layout but you cannot link to the same line as the current line. To link the data from line 3 to the current line, type [L3] on the current line.

The example below shows how 3 lines of human readable text are linked together into a Data Matrix code with a slash (/) separator between the fields.

Line	Text	Line Content (Advanced Line Parameters)
1	[L2]/[[L3]/[L4]	Data Matrix
2	MFR A1234	Text
3	PNR AB12345	Text
4	SER 12345678	Text
5		

The Data Matrix code will be encoded with the following information.

"MFR A1234/PNR AB12345/SER 12345678"

The next example allows a single variable to be marked 5 times on 5 different components in a single cycle.

Line	Text	Line Content
1	AB12345	Variable
2	[L1]	Text
3	[L1]	Text
4	[L1]	Text
5	[L1]	Text

Marking the [character
The software uses the [character as the start character for command processing. It is therefore not possible to mark this character by directly entering it on a line. If you wish to mark a [, you must enclose it in a command of its own. Eg. [[]

Split Line Command (V14.60 onwards)
The split line command is similar to the link line command but it allows the start and end character positions to be specified of the text being copied to the line. This is very useful if a barcode is scanned into the layout but the first 3 characters and the last 2 characters are not required to be marked. In this situation the full barcode

would be scanned onto a line configured not to mark. Then on another line the Split line command would take only the characters to be marked.

The Split line syntax is described below.

[SPx:y-z]

Where:-
x = the line number to link to (i.e. the section of text required)
y = the starting character
z = the end character (Note if the end of the line occurs before this end character value only the characters available are printed)

Example 1:
A barcode ABC1234567DEF is scanned into the marker but only the 1234567 is required to be marked.

Line 1 - Contents = Barcode, MarkLine = No
Line 2 – [SP1:4-10]

The barcode ABC1234567DEF is scanned into line 1. As the line parameter 'MarkLine' is set to No this line is skipped during marking. Then Line 2 uses the Split Line command to take characters 4 to 10 of line 1. Hence marking 1234567.

Example 2:
A Barcode input is required to be split across two lines, with the 1st 9 characters on one line and the remaining characters marked on the next line.

Line 1 = The barcode to be input, this line has the "MarkLine" Parameter set to NO and the Contents set to barcode.
Line 2 = [SP1:1-9]
Line 3 = [SP1:10-17]

The printout for code 1234567890ABCDEFG would then be printed as shown below:-

123456789
0ABCDEFG

Example 3:
A large serial number needs to be marked on a curved component. The Z height needs to change during the marking of the serial number to keep the gap between the stylus and the part similar throughout the mark.

Line	Text	X	Y	Content	MarkLine	Z
1	ABC123DEF456	0.00	0.00	Serial	No	0.00
2	[SP1:1-5]	10.00	10.00	Text	Yes	20.00
3	[SP1:5-9]	16.00	10.00	Text	Yes	18.00
4	[SP1:9-12]	22.00	10.00	Text	Yes	20.00

Line 1 is the serial number which is not marked as the MarkLine parameter is set to No. The following 3 lines each mark 4 characters of the serial number at different Z heights to compensate for the curve of the part. The X and Y values of each line position the characters so they appear continuous when marked.

Data Entry via Prompt Mode

This mode provides a simplified user interface for the machine operator. In this mode the software will prompt, step by step, for the layout name and any variables to be typed or scanned (using a barcode scanner). When the details are entered the screen displays a preview of the mark, pressing F1 or the green start button will then mark the layout. Each variable has a configurable prompt value which is displayed during the data entry.

To configure an example of the Data Entry via Prompt mode, follow the procedure below.

1. From the main menu press F10, F10, F3, F6) Various Menu.
2. Switch the 'Use Layout/Data Prompt' to 'On'
3. Press ESC 4 times to return to the main menu.
4. Create a new layout by pressing F8.
5. Type some text on lines 1 and 2.

6. Set the line 'Content' to 'Data Entry via Prompt' on lines 1 and 2. (Press ⚙ on the line to set this.)
7. Set the Prompt value for line 1 to 'Batch Code' and for line 2 'Serial Number'

(Press ⚙ on the line to set this.)
8. Position lines 1 and 2 so they can be marked on a test part or plate
9. Escape back to the main menu and save the layout (using F2). Save the layout with the name 'DATATEST'.
10. If you are using an RS232 barcode scanner, to configure this in this mode press F10, F10, F3, F8 from the main menu. Then set either Port A to 'Layout via Prompt', ensure that the Baud, Parity and Flow control match the settings of the scanner. (Note the scanner must be configured to transmit an <STX> prefix and an <ETX> suffix.).
11. To test the layout return to the main menu and press F1.
12. The screen will now request the user to scan or type the layout name. Type 'DATATEST' and press ENTER.
13. The screen will then prompt for the 'Batch Code'. Type '123' and press ENTER.
14. The screen will then prompt for the 'Serial Number'. Type '456' and press ENTER.
15. The screen will then display the mark preview. Now press Mark or the green start button to mark the data.
16. When the mark is complete the screen will prompt for the layout name to be entered again and the process repeats from step 12 above.

Using the Multi-Mark option.

If marking batches of the same part using the same layout, rather than having to scan the part number (layout name) on every mark. It is possible to do this once and enter the quantity to be marked. The software will then loop around prompting only

for the variables on each cycle. To activate this feature press F10, F10, F3, F6) Various from the main menu and set 'Multi-Mark' to 'On'

It is also possible to enter a starting serial number and have the controller automatically increment the number for every mark without prompting on every mark. To do this set the line parameter to 'Serial via Prompt' when using the Multi-Mark option.

Data only
If 'Use Layout/Data Prompt' is set to 'Off', and there are Data Entry via Prompt lines in a layout, the controller will still prompt for the data to mark, but will not prompt for the layout.

Saving Marked Data to Excel (Logging CSV files)
The controller can store all data marked to its internal file system or a USB flash drive. This can be a useful auditing tool to track when parts are marked and what data is marked on them. The files can then be copied to a PC and analysed in Excel.

The controller creates a new file for each day and names the file in the format DD_MM_YY.csv or MM_DD_YY.csv, depending on the date format setting. On a USB flash drive a folder called LOGS is automatically created.

To configure this mode select F10, F10, F3, F9 Configure Printer/Log File.

Log File Setting	Description
Log as CSV file	• No – Feature disabled • Plain – Records the data in the file as it is marked. Leading zeros may be removed when loaded into excel. • "data" – Records the data within quotes, this can help maintain leading zero data. • "="data"" – Records the data in a format that can also log commas.
Log to internal file	Set to Yes to log data to the controllers own internal file system
Log to USB file	Set to Yes to log the data to a USB flash memory stick
Days to keep files	Defines the number of daily files to keep. The controller will delete the oldest files to prevent too many files building up over time. Max = 999 days.
New line	Defines whether the end of line character of the file should be a carriage return, line feed or both.
Print	Log all data or just log variables.

IMPORTANT
To ensure the logging feature is enabled you must switch the feature on using the 'Printer - Log File On/Off' button in the 'Other menu' (F10, F6).

If logging data to the controllers internal file system the files can be copied to a USB flash drive using the 'Copy mark logs to USB' button in the Log Menu (F10, F10, F4, F10, F7).

Mark logs can also be viewed on the controller from the View mark logs button in the Log Menu (F10, F10, F4, F10, F6).

Example of a marked log shown loaded into Excel

Loading Marking Data from CSV files

It is possible to perform batch marking or data lookups using an externally generated CSV file. The data file can contain a header line, a column indicating a layout to use for that data line, and a column for a unique identifier.

If you are generating your CSV files from Excel, use the "save as" option, and use the "CSV (Comma delimited)" type.

The feature can be enabled from the Various menu (F10 F10 F3 F6 from the main menu) Once the option is turned on, more options appear below it:

Layout column number specifies the column number that contains the layout to use for the mark. Set this to 0 to disable the layout selection feature if your data file does not include a layout name. The data will be placed into the currently loaded layout if the layout column feature is disabled.

Unique ID column number (UID) specifies the column number that contains the unique identifier that will be used to look up the data required. The operator will type or scan an identifier, and the line of data that has that entry in the UID column will be used.Set this to 0 to disable the UID feature. Data will be marked sequentially, starting with the first line if the UID feature is disabled.
To set the controller up to use a barcode scanner for the UID, set the com port use to Layout Via Prompt.

The **Headers** setting us used to tell the controller whether the first line in the CSV file is data or the names of the columns.

Example CSV input file
```
Layout,Part No.,name,Weight,W,Voltage
CSV1,AB9123,PowerDrive,15kg,2000,230
CSV1,AB9123a,PowerDrive,15kg,2000,115
CSV2,XR100,XR Small,9kg,100,230
CSV2,XR200,XR Medium,20kg,200,230
CSV2,XR400,XR Large,44kg,400,230
CSV3,N3000,Normal type,15kg,1000,115
```
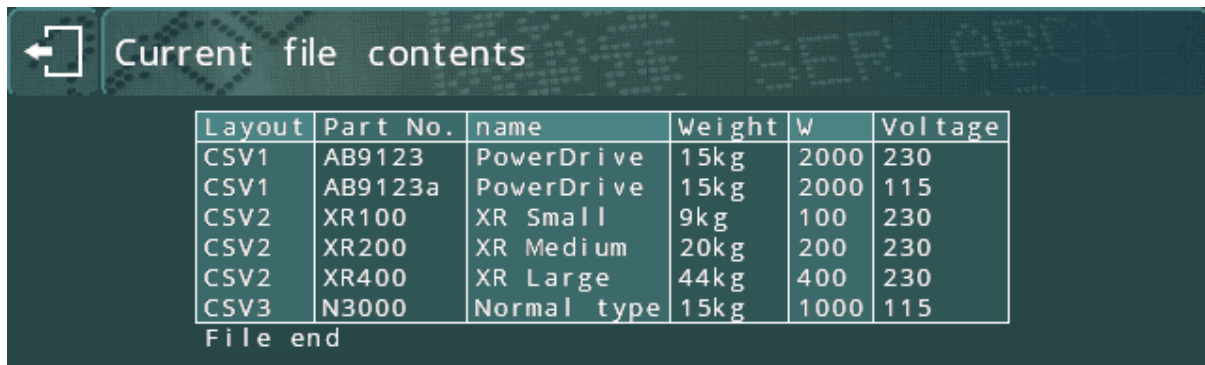
When the CSV input option is selected, the marking menu will be replaced with the CSV marking menu. The menu will be different if there is a UID column, and if the machine is set up with a label feeder.

Select **Load From USB** to select the input file to use. This file will be copied from the USB stick into the controller's memory, so the stick can be removed. The controller will not modify the file on the USB stick.

The file contents can be checked using the **View File Contents** option

Layout	Part No.	name	Weight	W	Voltage
CSV1	AB9123	PowerDrive	15kg	2000	230
CSV1	AB9123a	PowerDrive	15kg	2000	115
CSV2	XR100	XR Small	9kg	100	230
CSV2	XR200	XR Medium	20kg	200	230
CSV2	XR400	XR Large	44kg	400	230
CSV3	N3000	Normal type	15kg	1000	115

File end

If the system is using a UID to lookup the data to mark, up to one screenful of the file will be shown from the top.
If there is no UID, the data will be shown from the next line to be marked.

View Record Details will show the data for one record.

			Layout
Layout	CSV2		UID
Part No.	XR100		
name	XR Small		
Weight	9kg		
W	100		
Voltage	230		

If UIDs are being used, the operator will be prompted for a UID to select the record to view.
If UIDs are not in use, the next record to be marked will be shown.
If enabled, the data for the layout name and UID will be highlighted.

To reference the CSV data in a layout, you can use the CSV command in the layout text.
[CSV:*n*] will insert the data from column n, e.g. [CSV:2] will put the data from column 2 into the mark.
[CSV:*name*] will insert the data from the column with the specified name. Headers must be enabled for this to work correctly because the header line is used to determine the names.

These commands can be mixed with other text, and multiple commands placed on one line.

Layout example:

	Text		Size	F	X pos	Y pos
⚙	PART :[CSV:PART NO.]	...	1.50	5	1.00	1.00
⚙	NAME :[CSV:NAME]	...	1.50	5	1.00	3.50
⚙	POWER:[CSV:W]W [CSV:VOLTA	...	1.50	5	1.00	6.00
⚙	[CSV:1]	...	1.50	5	0.00	9.00

This will produce the mark
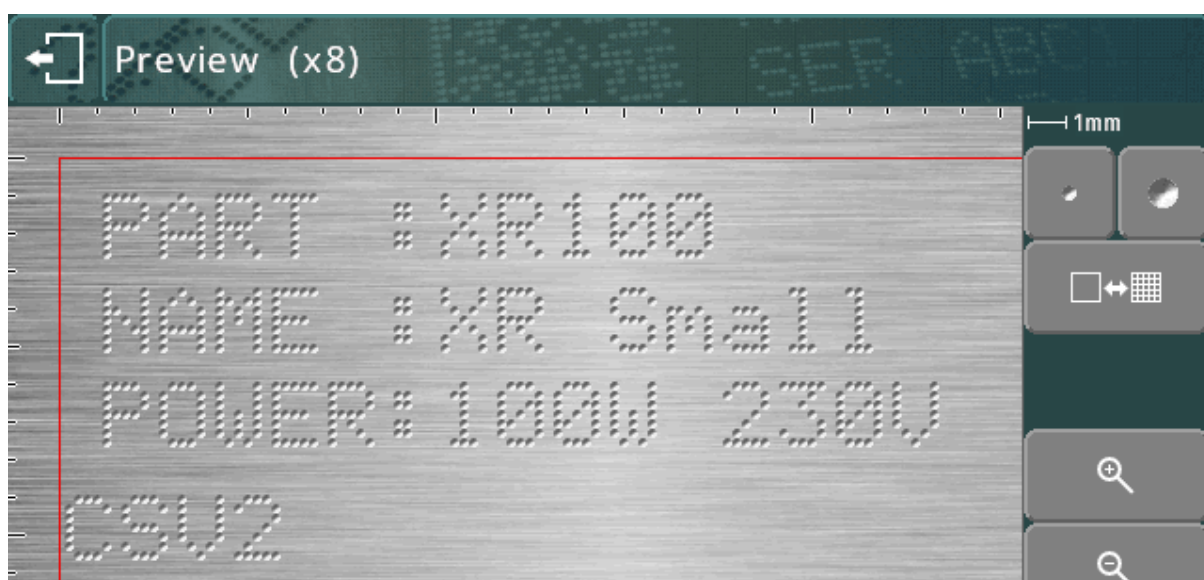
Preview (x8)

If the UID feature is turned off, the preview pane in the middle of the menu screen will show the next set of data to be marked.
If UID is in use, the last data marked will be shown.

If headers are enabled, an extra button will appear on the help screen for text lines.

Text

```
1) ABCDEFGHIJK
2) 12345
3) LMNOP

[L2][L3]    = 12345LMNOP
[L2]-[L3]   = 12345-LMNOP
[SP1:3-5]   = CDE

[DD]1234    = [[])>[RS]DD[GS]1234[RS][EOT]
[DD]12/34   = [[])>[RS]DD[GS]12[GS]34[RS][EOT]
[12]1234    = [[])>[RS]12[GS]1234[RS][EOT]

[CSV:1]     = Column 1
```

[CSV:header]
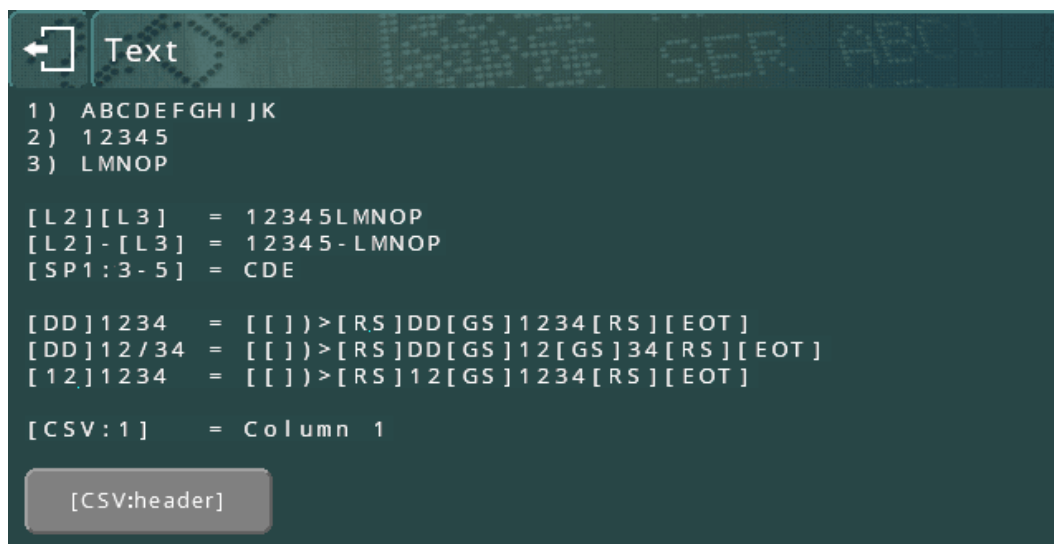
When the button is pressed it will bring up a screen of buttons for the operator to select a header. There will be a button for each header in the CSV file.
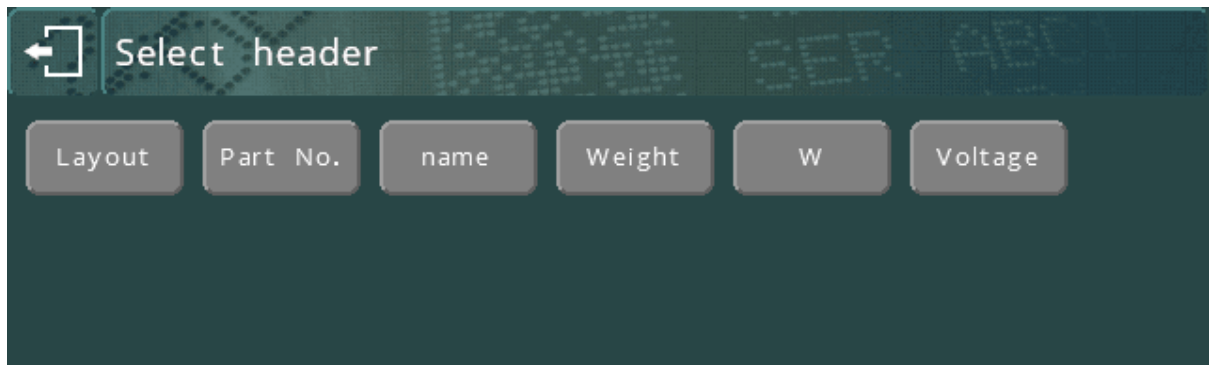
If a header button is selected, the controller will return to the edit screen, and the CSV command for that header will be inserted into the current cursor position in the text line.

12. Marking Heads

There are several types of head available in the 4000 series range. The software will be configured for each type so no configuration should be necessary. For reference, the parameters that may be configured for a marking head are:

Machine	X Proximity	Y Proximity	X Limit	Y Limit	X Steps/mm	Y Steps/mm
MarkMate	PNP	PNP	100mm	75mm	33	33
60-60	PNP	PNP	60mm	60mm	40	40
100-100	PNP	PNP	100mm	100mm	40	40
150-150	PNP	PNP	150mm	150mm	40	40
300-150	PNP	PNP	300mm	150mm	40	40
P50-25	PNP	PNP	50mm	25mm	63	29
I-50-25	PNP	PNP	50mm	25mm	32	32
100-75	PNP	PNP	100mm	75mm	33	33
130-30	PNP	PNP	130mm	30mm	64	64
140-40	PNP	PNP	140mm	40mm	50	50

Select F7) Configure hardware from the Configuration menu to change the parameters.

Note that all character sizes, varidot spacings etc. discussed in this manual apply to the marking heads with 40 steps/mm axis resolution.

13. Marking Assemblies

There are several types of marking assemblies available.   It may be necessary to configure the hardware before the controller can be used. Check the compatibility tables at the beginning of the manual for compatibility with a specific machine type.

MarkMate

The MarkMate machine features an electric solenoid allowing 9 different forces.

Electric solenoid (E)

This allows 10 different speeds, 14 different forces, and varidot spacing down to 0.075 mm.(0.003") Twin solenoids can also be fitted.   Auto sense can be fitted on powered Z axis units. The E option is recommended for precision applications requiring a fine degree of depth control such as Data Matrix marking.

Pneumatic Deep Marking assembly (DP)

This allows a single marking speed, a single force, and varidot spacing down to 1.25 mm. (0.05") Auto sense and twin solenoids are not available.

Fast Pneumatic (FP)

The fast pneumatic assembly reciprocates at a high frequency to create a continuous line effect, this approach gives a very fast marking cycle however its depth capabilities are limited. The speed of the head can be slowed down to achieve a deeper mark. Autosense is not available.

Diamond Tip Scribe Assembly (SP)

This allows fine detail characters as small as 1mm to be scribe marked. The stylus is pneumatically driven into the material. The depth of the mark is adjusted by changing the air pressure on the supplied air regulator.

Carbide Tip Scribe Assembly (SP)

The carbide tip assembly allows wider lines to be scribed. It is therefore more suited to larger characters generally greater than 4mm in height. The stylus is pneumatically driven into the material. The depth of the mark is adjusted by changing the air pressure on the supplied air regulator.

Heavy Duty Carbide Tip Assembly (SDPH)

The heavy duty carbide tip assembly is very similar to the standard assembly except that the pneumatic bore size is larger allowing more force to be applied by the stylus tip. This results in a deeper mark. This option is only available on the 140-40SDPH models as these marking heads feature a more robust mechanism with up-rated drive motors.

Twin electric solenoids

This allows 10 different speeds, 9 different forces, and varidot spacing down to 0.075 mm.(0.003"). Auto sense can be fitted on powered Z axis units.   Restrictions apply to Auto sense on twin solenoid machines

See section 4-1, 'Configuring the controller' for details of how to configure the twin solenoid option.

Using the twin solenoid

If the parameters have been changed, the machine is now ready for use.

Make a layout, but change the forces as a double number. The first number relating to the left hand solenoid, the second number works with the right hand solenoid.

Note, if the first (left hand solenoid) is switched off by using a zero force, the zero is not recognised on the screen only the second force is seen.

The marking will be the same on each solenoid.

If a part of the text is not required from both solenoids, turn the required solenoid off (zero force). Several lines of text may be needed to achieve this.

To achieve incremental serial numbers on each component to mark, two lines of the layout are required.

	t solenoid	Second solenoid
ie	123	124
second batch	125	126
of components		

Enter F8 new layout

	Size	Force	X pos	Y pos
LINE 1 123	1.5	50	0.0	0.0
LINE 2 124	1.5	05	0.0	0.0

Using the 'TAB' function for each line move cursor down using down arrow key until the cursor is on Ser.Inc change from 1 to 2 leave Ser.Every at 1. Do this for each line required.

Press ESC then F1 to mark.

Experiments may be required to ensure that the correct incrementing is achieved.

To ensure a consistent depth of mark for both components make sure the styli are ground in pairs and are the same length so the marking gap is the same.

14. Electric Z-axis

The BenchDot™ ZA machines are fitted with an electric Z motor. It is possible to upgrade a non ZA machine using the kit below.

The Z axis must be configured before it can be used.   The following parameters are applicable:

Parameter	Description
Z axis	Type of Z axis (*None* or *Electric).*
Z prox	Z axis Proximity switch (*None* or *PNP*). Normally set to *None.*
Z limit	Length of Z axis travel available. Normally set to 375.0 mm
Z steps/mm	Number of motor steps required for 1.0 mm (0.04") of Z axis travel – Normally set to 67.
Z/C motor	Function of Z axis and Circumferential motor drives (*Unused*, *Z-axis*, *Circumferential* or a combination)

Select F7) Configure hardware from the Configuration menu to change these parameters.

The electric Z axis has an extra switch on the remote control. This is for Up/Down control jogging for the Z axis.   These are active when the Main menu is displayed.

The Z axis can be used in 3 different ways.

Programmable Positions relative to the Home Sensor Position.

Each line in a layout can have its own Z position. This position is the distance from either the Home sensor nut on the column, or if a Z offset is used the distance from the offset position. You should have the Z Prox set to PNP when operating in this

mode. To program a Z position for each line of the layout press F2 when editing the line and set the Z position.

Manually Jogging the Z axis

If marking similar layouts on a variety of components of differing heights it may be useful not to program Z moves in to the layout and simply jog the Z axis manually to the correct marking height using the Z up and down buttons on the Remote Start/Stop box. To operate in this mode, switch the Z Prox to None. Then return to the main menu. You can now jog the axis using the up/down buttons. When ready to mark, press F10, F5) Set Z Home. The mark will now take place from the newly jogged position.

Using AutoSense™ to Detect the Part Height Automatically.

If the machine is fitted with the Autosense module, then the machine can automatically detect the height of the part and move to a programmed distance from the part for marking. See the Autosense section for further details.

15. Circumferential Fixture

Introduction

The circumferential fixture is used for marking around the diameter of the work pieces which cannot be marked in the conventional way on the standard XYZ arrangement.

Setting up the Circumferential Fixture

The fixture is supplied with 2 bolts or tee nuts with which to mount it to the base.   It can be positioned with the top dead centre of the circumferential fixture on the centre line of the Y-Axis marking areas.   Eg. 100 x 100 marking area centreline will be 50.0mm from home position of stylus or, 4" x 4" marking area will be 2" from stylus home position.   This setting can be adjusted by changing the Y offset (F10, F3) to suit the position.   Also ensure the marking head and any stylus are not allowed to come into contact with the fixture. Damage will occur if this happens.

Setting up the Controller

A 25 way to 25 way cable is provided to connect the controller (X2) to a circumferential fixture. This cable is wired pin to pin and is identical to the head cable used between the controller and the marking head. If a z axis and circ fixture is to be used, the Z axis connects via the secondary port on the circ fixture, using a 25 way to 15way cable. Ensure the cables are firmly connected and screwed in place. Never disconnect the cables when the machine is powered up and operating, this could damage the drive electronics.

Guide to effective marking

Unless the work piece is held firmly then there is little hope of obtaining a good quality mark. The Circumferential marking fixture is supplied with a standard 3" 3 jaw chuck for general use. This will not cover every size and shape of work piece, but should cover a wide range of work pieces.   If the work piece/s you require will not fit the 3 jaw chucks, special mandrels, faceplates, tooling etc. can be provided for the work piece/s in question.   Information is given to enable the customer to make their own mandrels, or if required the customer should contact the supplier of the equipment .

The work piece should be supported at both ends whenever possible, especially if a heavy mark is required.

To achieve holding work pieces that are more than 100 mm (4") dia, the housing fixture and roller support fixture may have to be raised.

IMPORTANT
When setting up the fixture, ensure the stylus, stylus nozzle and solenoid does not make contact with any part of the fixture, chuck, mandrel or work piece.

A long nozzle and long stylus (100 mm) (4") is recommended for use with this fixture.

NOTE

When the trial run or marking button is pressed the stylus movement comes forward then along the Y Axis, at the end of marking the reverse movement occurs.

If for any reason the stop button is pressed then the stylus stays in that position, to return to home press F10, F4.

If in any doubt whether the fixture work piece and marking head may interfere with each other, do a trial run or marking trial with a zero force and the stylus well above the fixture work piece.

Character Size

The Circumferential marking fixture will allow you to mark characters 5 x 7 and 7 x 9 style and varidot, 0.15 mm to 10.05 mm (0.006" to 0.5").   Avoid using very large characters on small diameters if possible as the inscription will not be very apparent. Logos and HPGL files can also be used.

Diameters

The diameters that are allowed range from 6.4 mm to 150 mm. (0.25" to 6").

When making a new layout F8, the diameter needs entering.   This should be the diameter of the part that is being marked.

The Circumferential fixture must be configured before it can be used. Select F7) Configure hardware from the Configuration menu and set *Z/C motor* to *Circumferential*.   If used in combination with an electric Z axis then set *Z/C motor* to Z Axis and Circumferential

The Circumferential fixture motor may be used in both *Circumferential* and *Normal* marking modes.

Circumferential

In this mode the motor is used to drive the rotary fixture and mark around the circumference of workpieces.

When a layout is created the diameter of the workpiece must be entered, this can later be edited using F9) Edit diameter on the Advanced menu.   This diameter will be used for each line of the layout.   If a workpiece has a diameter which varies then the line parameter *Diameter* may be used to specify a different diameter for each line.

Note that a Y-offset is automatically used for each layout created.   This is generated at the midpoint of the Y axis but may be moved to reduce movement time. Select F3) Layout Data from the Other menu to move the offset.

Other parameters defining the operation of the Circumferential fixture motor in circumferential marking mode are available in the EDIT CONFIGURATION screen. They are:

Parameter	Description
C prox	C axis proximity switch (*None*, *NPN* or *PNP*). Normally set to *None*.
C steps/rev	Number of C axis motor steps required to turn the fixture through 1 revolution. Normally 400.
C segments	Number of imaginary segments to split one revolution into. Normally set to 80. Increase this number to get less variation of marking gap, but *C segments* must divide into *C steps/rev* exactly.

Normal

In this mode the motor is used as a programmable axis, the position it moves to for each line of a layout is specified (in user defined units) by the line parameter *Position*.

Parameters defining the operation of the motor in *Normal* marking mode are:

Parameter	Description
C prox	C axis proximity switch (*None*, *NPN* or *PNP*). Normally set to *None*.
C Steps/unit	Number of C axis motor steps required to move the axis through 1 user defined unit.

16. Auto Sense

The sensor will only work if an electric z-axis is also fitted to the BenchDot™ machine. Autosense is only available on electric solenoid dot marking machines.

This enables the machine to sense the height of the work piece and mark, ideal for marking different work piece heights with the same depth of force every time.

This attachment is not a safety device and care must be taken when setting up for marking.

Method of Operation

The machine uses the stylus to find the height of the part being marked. The repeatability of this sensor feature with a z-axis machine is within plus or minus 0.2 mm (0.008").

The auto sense unit must be configured before it can be used. Select F7) Configure hardware from the Configuration menu, set *Auto sense* to *Yes*, and set the *Slug offset* to typically 1.00 mm.(This value may be adjusted depending upon the operating conditions. See the checklist section of the manual for the Slug Offset value for your machine.)

When a layout is created the Z gap parameter is set to 0.0.   This will disable the operation of the Auto sense unit. Select F3) Layout Data from the Other menu and set *Z gap* to the required gap.   If a different gap is required for each line of a layout then the line parameter *Z* can be used to specify an offset movement on the Z axis.

In the Layout Data screen there are 2 additional autosense related values. 'Autosense Min' and 'Autosense Max'. If these values are set to zero they are ignored. 'Autosense Min' causes the Z axis to drive to the programmed position relative to home before the autosense starts. This can help to speed up a marking cycle as a standard Z move is faster than an autosense move. The 'Autosense Max' value is a maximum travel position for the Z axis when autosensing for this specific layout. If the Z axis travels past this position relative to home then the Z axis will stop, the autosense cycle will abort and an error message

will be displayed on screen. This can be a useful feature for detecting if a part has not been loaded in to a fixture and therefore prevent marking the machine base or fixture.

It is possible to Autosense several times during a single marking cycle by using the 'Autosense Backoff' line parameter. Applying a non zero value to line 2 or above will cause the Z axis to back off the programmed distance before moving to the XY position of the line and re-autosensing. It is advisable to use a distance of at least 10mm to ensure the stylus has enough gap to perform an autosense.

17. Function Key Sequences

Introduction

The various menus are reached from the Main menu by pressing the following function keys:

Menu	Keys
Other	F10
Advanced	F10, F10
Logo	F10, F10, F1
Backup/restore	F10, F10, F2
Configuration	F10, F10, F3
Test hardware	F10, F10, F4
Edit timings	F10, F10, F5
Batch marking	F10, F10, F7
Features	F10, F10, F3, F10

To reach the Main menu from any other menu press the ESC key until the main menu is displayed.

The menu buttons have F1 F2 etc on screen to assist navigation.

18. Automatic Label Feed

Introduction

This section covers the setting up and use of the Automatic Label Feed Fixture used in conjunction with the marking machines.
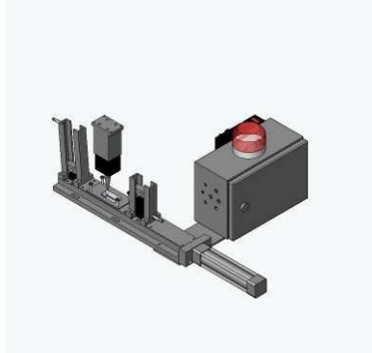
Single Pneumatic Feed

Fixture Configuration

The operation of the feed can be configured for a number of fixture arrangements i.e. output magazine, label path full sensor, label size etc. The hardware configuration screen will have the following label feed specific options:-

arameter	Description
Z/C Motor	Set this to one of the "electric label feed" options if you are using the adjustable electric label feed.
In / Outs	Digital I/O configuration (*Auto Feed*). Normally set to *Unused.* Set to "Auto Feed 1" for a single feed, "Auto Feed 2" for a double feed etc.
In Empty	Input magazine empty sensor (*None*, *NPN* or *PNP*). Normally set to PNP. Detects the presence of blank labels in the input magazine, disables the feed action until labels available.
Out Full	Output magazine full sensor (*None, NPN, PNP*). Normally set to PNP. Detects the output magazine is full, disables the feed action until cleared.
Under Head	Label under marking head sensor (*None, NPN, PNP*). Normally set to PNP if present. Indicates the presence of a label under the marking head.
Label Eject	Number of feeds required to eject the last marked label to the output magazine. Depends on the size of the label.
First Label	Specifies the number of labels feeds required to ensure a blank label is under the marking head. This field is ignored if a label under marking head sensor is configured.

Access to the label feed menu is via F1 Label Feed Menu in the main menu (previously F1 Mark Layout with the feed disabled) or alternatively F6 Label Feed Menu in the Advanced Menu.

Operating Modes

In addition to the fixture configuration the operating mode can be configured to one of three modes. Depending on the mode various options in the label feed menu will be enabled or disabled.

Manual Mode

Manual mode allows the operator to load a layout and edit any variables/ serial numbers before selecting F2 Mark Labels. The operator will be prompted to specify the number of labels required, marking will commence or cease with the START and STOP button. If the operator chooses the START option the 'feed and mark' cycle will be repeated until the required number of labels has been marked.
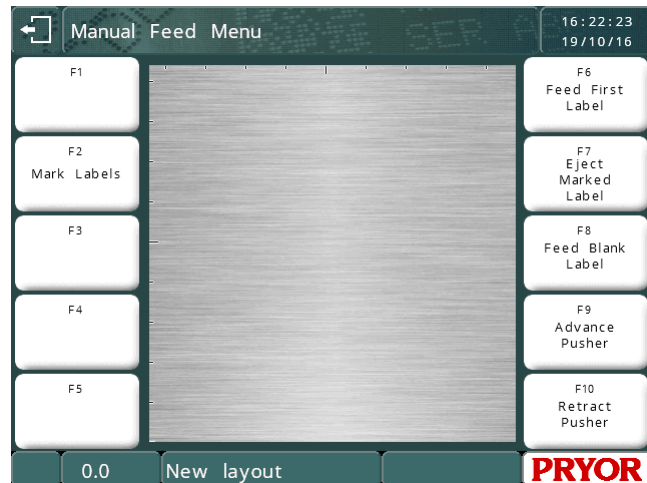
The label feed will default to 'Manual Mode' if neither of the communication serial ports is configured for Host or Batch mode.

Batch Mode

The label feed will operate in Batch Mode (as detailed in section 9 of this manual) if either of the communications ports is configured for Batch. Using a feed in conjunction with batch mode allows the entire queue to be marked automatically (F1 Mark Batch) with little user intervention required (filling / emptying input / output magazines etc.).

All menu commands previously available in the batch menu are available in the label feed menu with batch mode enabled i.e. F3 Fill Buffer, F4 Show Stats & F5 Empty Buffer.

Automatic Mode

The label feed will operate in automatic mode if either of the communications ports is configured to Host Mode. Automatic mode continually accepts and marks batches of labels from the host device.

To allow the operator to access the last label marked, when no more labels exist in the queue the last marked label is ejected. To eject a label the number of blank labels specified in the eject label parameter are fed.
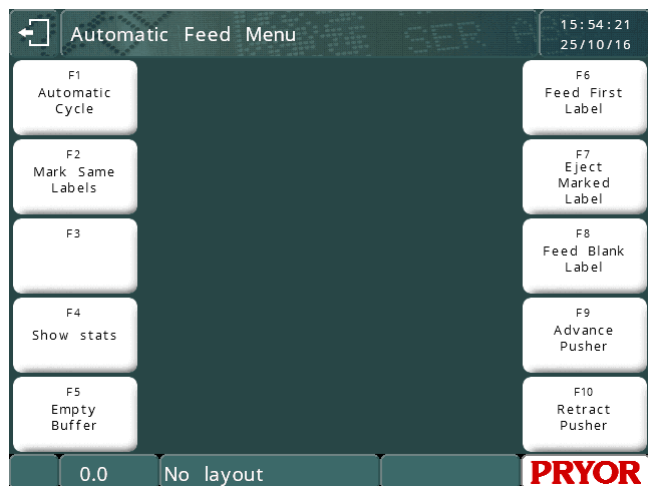
The automatic cycle is started using the F1 Automatic Cycle command in the label feed menu. At any time the automatic cycle can be stopped without destroying the contents of the unmarked queue by pressing the ESC key, returning back to the automatic cycle will result in the remaining labels in the queue being marked and allow further batches to be received.

The queue/buffer utilities F4 Show Stats & F5 Empty Buffer are available in automatic mode.
The automatic Mode receives commands using the following syntax:-

<STX>LayoutName<CR>Variable_1_Value<CR>Variable_2_Value<CR>Variable_N_Value<CR><ETX>

Where <STX> is ASCII character 2, <CR> is ASCII character 13, and <ETX> is ASCII character 3.

The RS232 serial port A, USB Port B or Ethernet TCP/IP port must be set to 'Host' mode.
In the 'Automatic Feed Menu', press F1 for 'Automatic Cycle' the "Waiting for Data…" box will be displayed
Once data is received the marking cycle will begin

Feed Utilities
The following utilities have been provided for manual control of the feed fixture:

F6 Feed First Label
If a label path sensor has been configured the feed will retract and advance the pusher until the sensor is activated i.e. a label is detected under the marking head. If no sensor has been configured then the feed will be retracted and advanced by the number of times specified in the First Label parameter.

The input and output magazines sensors are checked (if configured) prior to any feed operation.

F7 Eject Label
The feed will be retracted and advanced by the number of times specified in the Label Eject parameter.   The input and output magazines sensors are checked (if configured) prior to any feed operation.

F8 Feed Blank Label
Feed a single blank after first verifying the input and output magazines sensors (if configured).

F9 Advance Pusher
Advance the pusher.

F10 Retract Pusher
Retract the pusher.

Electric Label Feed

An adjustable electric label feed is also available. It functions in the same configurations as above, but also has some additional settings.

In/Outs should be set to **Auto feed 1**

Z/C motor should be set to **electric label feed** or **elec label feed and Z** as appropriate

Feed Length(steps) should be set so that the pusher moves back far enough to go beyond the label. This distance can be reduced with shorter labels to reduce cycle time.

Preclamp time should be set to that the clamp hits the part just as it comes into the marking position. The marker knows when the pusher will reach the final position, but the clamp takes time to move. This time determines when the clamp will start moving before the pusher reaches the final position. The number entered is how many steps before the stop position the clamp should be activated.
If the value is too large, the clamp will fire early, and the clamp may slow the label movement down and stall the motor. If it is very early, it could move across in front of the label.
If the value is too small, the clamp will fire late, and the label could skid along the slot with momentum after the pusher comes to a stop. Either increase the value, or increase the **steps** value in the timings menu to increase the acceleration and deceleration time.

Feed dir is used to change the direction of the feed to match the motor that has been fitted.

The speed of the electric label feed can be changed in the **Edit Timings Menu** under the **Electric Feed Axis** timings.

19. Advanced Features

The ADVANCED FEATURES MENU is accessed from the CONFIGURATION MENU.
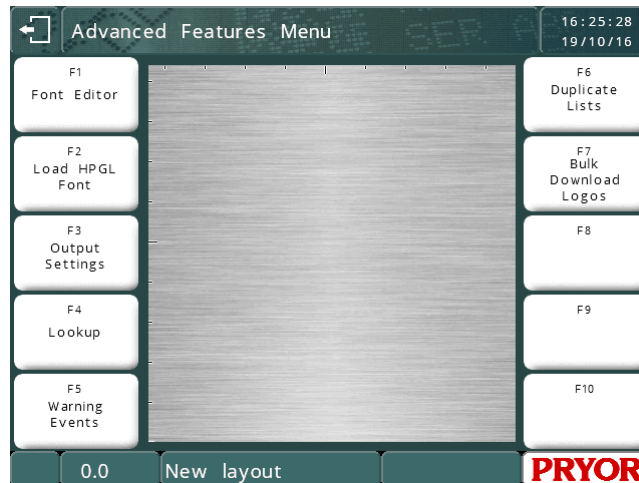
Font Editor

The Font Editor allows the operator to change the appearance of marked characters. To access the Font Editor, select FEATURES on the CONFIGURATION MENU, then select FONT EDITOR. Select the font to edit (Either 5x7 or 7x9).

The system will show the current character that is selected and ready to be edited. Buttons on screen allow editing of the character.

Press [ABCDE ►] and [ABCDE ◄] to select the character to edit.

Move the cursor around using the cursor keys. To swap a dot between marking and not marking, press the [□↔□] button. Alternately touch the dot on the grid that needs inverting.
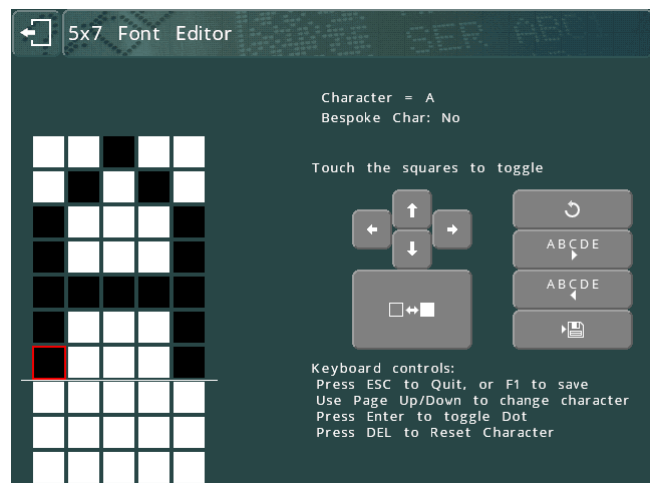
Any dots changed since the last save will be marked with a small orange square. The current dot that will be toggled with the [□↔□] key is marked with a red outline.

When you are finished, press [▶💾] or F1 on a USB keyboard to store the modified character. Whenever that character is marked using that font, the new marking definition will be used.

Instructions on how to edit the character using a keyboard are also on screen.
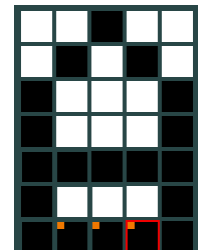
Load HPGL Font

The system has a built in HPGL font. The system can be set up to override these built in characters by downloading replacements to the controller. The LOAD HPGL FONT function allows the operator to bulk download a set of HPGL files to use when marking a line with its font type set to HPGL.

The procedure is detailed in the manual for the font downloading software.

As seen on the example preview screen for the above example download, the outlined character font is used for ABC, overriding the built in single line font. The remaining characters are marked with the built in single line font.

Output Settings

The system can output its settings to port A (RS232). This allows the settings to be printed on a printer with a serial port, or captured on a PC running a terminal emulator program.

Selecting this item brings up a menu for the operator to select which data to print.

OUTPUT ENVIRONMENT will print the system settings.

OUTPUT DATA will print all the layouts and data files stored on the system.

OUTPUT ALL will print both of the above.
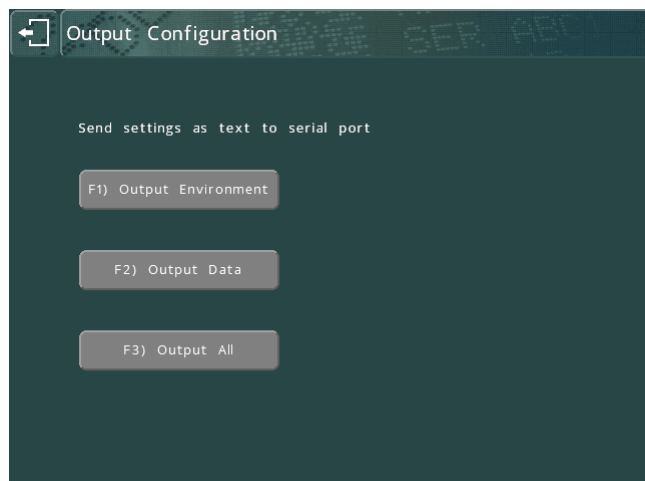
An example of part of the printed data:

```
 After... 300 300 300 300 300 300 0 0 0 0
Datamatrix
 Start... 13
 End..... 7
 Steps... 6
 Before. 0 0 0 0 0 0
 During.. 0.0 16.0 19.0 22.0 25.0 28.0 31.0 34.0 37.0 40.0
 After... 0 10 11 12 13 14 15 16 17 18


Configure Hardware
Z/C motor.. Unused
--------------------------
Z-axis..... None
--------------------------
Mark type.. Dot
Solenoids.. Single
X prox..... None
Y prox..... None
X limit.... 100.00
Y limit.... 75.00
X st/mm.... 40
Y st/mm.... 40
Home method Y then X
X prx shift 0.00
Y prx shift 0.00
--------------------------
In/outs.... Unused
Jog Ctrl... Z-axis
X Cal.mm... 0.00
Y Cal.mm... 0.00
--------------------------
In Empty... None
Out Full... None
Under Head. None
Label Eject 1
First Label 1
ACK Label Comms No


Configure Comms
Port A..... Unused
 Baud...... 57600
 Parity.... 8+None
 Flow Ctrl. Hardware
Port B..... Unused
 Baud..... 57600
 Parity.... 8+None
 Flow Ctrl. None
Station no. 1
No network card fitted


*** END Environment ***
```

Environment printout

```
*** START Data ***

*** System files
AdvSpeeds, FontCharsLarge, FontCharsSmall, defaults, environment,
hpgl_data, queue, setup, speeds, vnetc

*** Logo files
   Empty


*** HPGL logo files
*CE_BLOCK_LOGO, *CE_LINE_LOGO

*** HPGL font files
*, 0, 1, 2, 3,
4, 5, 6, 7, 8,
9, A, B, C, D,
E, F, G, H, I,
J, K, L, M, N,
O, P, Q, R, S,
T, U, V, W, X,
Y, Z

*** Layouts ***

*** GROUP 1
Layout: AUTOLOAD    X Offs: 0.00  Y Offs: 0.00  Z Offs: 0.00  Z Gap: 0.00
        Text              Type       Font Force    X      Y      Z Height  Width Length Varidot  Angle Mark_it  Spacing    Speed              Mode Radius
52FW57284                 Text      5x7 dot     1  28.00  11.00  45.00   3.10   0.00   0.00     10 180.00    Yes     0.00    Slow          Straight 25.00
6246236A34                Text      5x7 dot     1  40.00  13.00  45.00   3.10   0.00   0.00     10 180.00    Yes     0.00    Slow          Straight 25.00
[L3] PRYOR            DataMatrix    5x7 dot     1  28.00   7.00  45.00   6.00   0.00   0.00     10 180.00    Yes     0.00    Slow          Straight 25.00
.                         Text      5x7 dot     0   0.15   0.15   0.00   1.45   0.00   0.00     10   0.00    Yes     0.00    Slow          Straight 25.00

Layout: TESTLAYOUT    X Offs: 0.00  Y Offs: 0.00  Z Offs: 0.00  Z Gap: 0.00
        Text              Type       Font Force    X      Y      Z Height  Width Length Varidot  Angle Mark_it  Spacing    Speed              Mode Radius
TEST DATA                 Text      5x7 dot     2  10.00  10.00   0.00   4.50   0.00   0.00     10   0.00    Yes     0.00    Slow          Straight 25.00
CORNER                    Text      7x9 dot     2  70.00  70.00   0.00   4.60   0.00   0.00     10   0.00    Yes     0.00    Slow          Straight 25.00
000021                   Serial    Varidot     2   1.00   1.00   0.00   2.55   0.00   0.00     20   0.00    Yes     0.00  Medium          Straight 25.00


*** GROUP 2
   Empty


*** GROUP 3
   Empty
```

Data printout

Lookup

The LOOKUP function allows a layout to have text inserted in a line based on the contents of another line. The following parameters are available:

Parameter	Description
Line	The line number to check for the lookup string
Start	The first character of the line contents to start looking from. 0 means compare the whole line.
Length	The number of characters to compare. 0 means up to the end of the line.
Pair xx	A pair of text items. The first item is the text to search for, and the second item is the text to insert into the lookup line.

When a line in a layout has the contents type LOOKUP, the system will look for the first item of each lookup pair in the line set up in the lookup parameters. The line set to LOOKUP will have its text replaced from the second item of the lookup pair. If no match is found, the line will be blank.

For example, if the lookup data is set up as follows:

And a layout is set up with the first line having an engine number, with the second line being of contents type LOOKUP. If the 7th character of the engine number in line 1 is A, the contents of line 2 will be set to "XE18T". If the 7th character is a B, the second line will be set to "XE20T" etc.

Warning Events

The Warning Events can be configured to warn when a number of events have happened, e.g. a number of marks, or a number of dots marked. These events can be used to keep track of preventative maintenance periods. They can be set to warn the operator, and allow marking to continue, or they can cause an error, and stop the operator from marking any more parts.

Warnings Password

The Warnings Password protects the warning events screen from unauthorised access.

Each warning event has the following parameters:

Parameter	Description
Warning text	Text entered here will be displayed to the operator when the warning and error levels are reached.
Warn every	This specifies the warning level for the warning event. Warnings cause a message box to pop up after a mark, or can be sent over a communication port. Set this to zero to disable warning checking.
Error every	This specifies the error level. Marks cannot be made after this number unless the warning event data is reset. Set this to zero to disable error checking.
Warn to	This determines whether the warning goes to the screen, or a communication port. Setting this to "com port request" will only send the warning out of the communication port if the host system requests the warning status.
Warning Type	This is used to tell the controller whether the warning count is on the number of dots, marks, days, months or metres moved.
Current count	This is the current counter value for dots or marks.
Last warn count	This is the number of dots or marks that were performed at the time the warning was last reset.
Last warn time	This is the date and time the warning was last reset.
Active	This is set to "yes" or "no". If it is set to "yes", the warning will be tested every mark.

Reset	If this is set to "yes" when the operator exits the edit screen, the warning will be reset to the current count or time.
Password	If a password is entered, it will be used to stop unauthorised operators from clearing the warning when the warning message box pops up during marking.

When the controller has done a mark, it will increment its counters, and check the warning and error counts against these counts.

Warnings
If the count goes over the warning level, a message box is displayed:

The operator can press RESET button (the R key on a keyboard) to reset the counter, or the IGNORE button (any other key on a keyboard) to continue marking. If a password is stored for this wear warning, it must be entered to clear the counter.

It the warning is dismissed, and the counter not reset, the machine will warn again every 10 marks, and on the first mark of any subsequent days.

If "warn to" is set to "port A" or "port B", the warning string will be sent out of the specified com port, and no message box will be displayed.

If "warn to" is set to "com port request", no message box will be displayed, and the warning status can be requested by the host machine via a serial port (see "serial port functionality).

Errors

If the count goes over the error level, a message box is displayed:

This works in a similar way to the warning, except IGNORE does not perform a mark. No more marks can be made until the error is reset. If a password is stored for this wear warning, it must be entered to reset it.

Communication port functionality

If a communication port is set to "select layout", wear warning features may be used over that port. The host machine must send commands inside STX-BEL pairs.

[STX]Sn[BEL] will transmit the status of warning event 'n' over the port. STX is ASCII character 2, and BEL is ASCII character 7. ASCII characters are described in section NNNNN.

The controller will reply with [STX]s[ETX] where s is the status, and will be:

Character	Description
N	No error
W	Warning (the warning level has been reached)
E	Error (the error level has been reached)
NAK	There was an error with the command, e.g. 'n' is 0, or greater than the number of wear warnings in the system.

[STX]SA[BEL] will return the status of all 5 wear warnings in the format [STX]sssss[ETX], where the first character is the status of wear warning 1, the second wear warning 2 etc. where the status character is the same as the Sn command.

[STX]Cn[BEL] will reset wear warning 'n'. The controller will reply with [STX][ACK][ETX] if successful, or [STX][NAK][ETX] if not.

[STX]Tn[BEL] will return will return [STX]text[ETX] where 'text' is the text that is stored for wear warning 'n', e.g. "Check stylus" or whatever the operator stored for that wear warning.

[STX]Vn[BEL] will return [STX]W:aaa E:bbb C:ccc T:ddd LC:eee LT:fff[ETX] where:

aaa is the current warning level
bbb is the current error level
ccc is the current count
ddd is the wear type, e.g. "marks" or "1000 dots"
eee is the last count the warning was reset at
fff is the last time the counter was reset at, in the fixed format "HH:MM:SS DD/MM/YY"

The numeric and text variables will be variable length. There will be a space after each value.

In addition, at the end of a mark, if the error level is reached and the controller puts an error message on screen, the controller will return an "E" character instead of the normal ACK or NAK when the mark is complete. If the host sends an EOT character, it will clear the on screen message, and then return the ACK or NAK character.
If another mark is started without the error being cleared, the E character will be transmitted immediately, and the message box put on screen. Again, the host must send an EOT character to clear the popup box on the controller screen. An ACK or NAK will not be returned, because the controller did not actually start a mark.

Duplicate Lists

The controller software can keep track of data that has been marked, and produce a warning or an error if the same data is to be marked again. This feature can be used to make sure the same serial number is not marked twice, for example from the operator picking up the same job sheet twice by accident.

The system can store 5 duplicate lists, each with 100 data items.

To use a duplicate list, go to the line parameters for the line you want to check by using the tab key in edit mode, and set the "DUP check" to "warn" or "abort".

If the duplicate check is set to "warn", the system will warn the user if they try to mark a part with data that has already been marked within the last 100 marks:
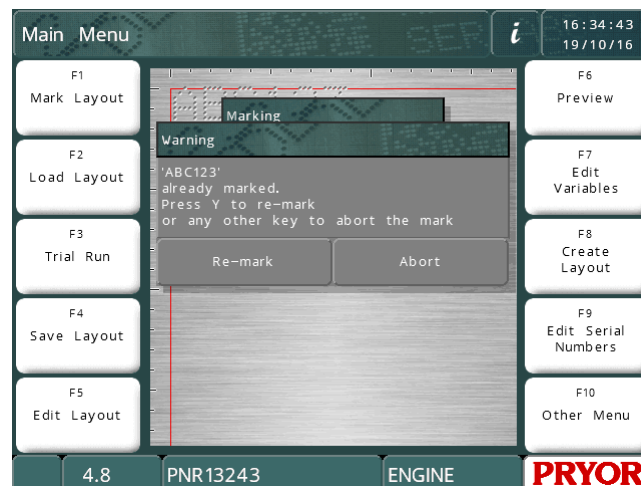
The operator can then remark the data by pressing the YES button, or abort the mark by pressing the NO button.

If "DUP check" is set to "abort", the system will not allow the data to be marked:

The system can store up to 5 separate duplicate lists. This is so you can have the same serial number on more than one different part (e.g. an engine and a gearbox) without having to dismiss warnings every time you mark. If warnings came up every mark, the operator would start to ignore them.

To select which list to use, change the "DUP list" value to the list you want to use.

The data stored in the duplicate lists can be viewed from the "Features" menu. You can get to this menu by pressing F10 F10 F3 F10 from the main menu. When a list is selected, the contents will be displayed:
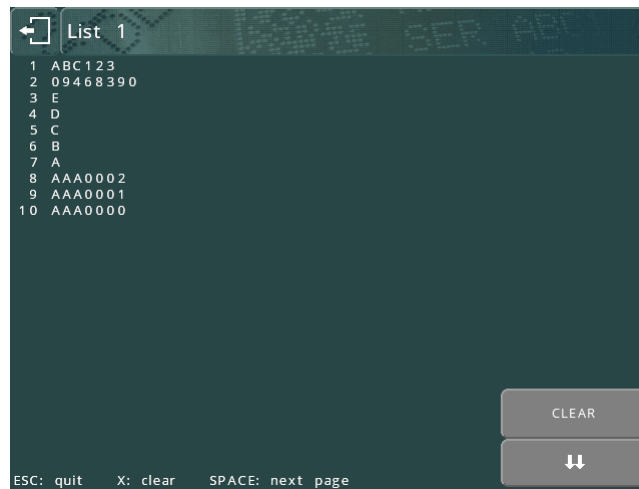
The top of the list shows the most recently marked data.

If there is more than one page of data, pressing the ⬇⬇ button (or SPACE on a keyboard) will move to the next page.

Pressing the CLEAR button (X key on a keyboard) will pop up a confirmation box. To clear the list, select Yes by pressing on the Yes button. To leave the list alone, press the No button.
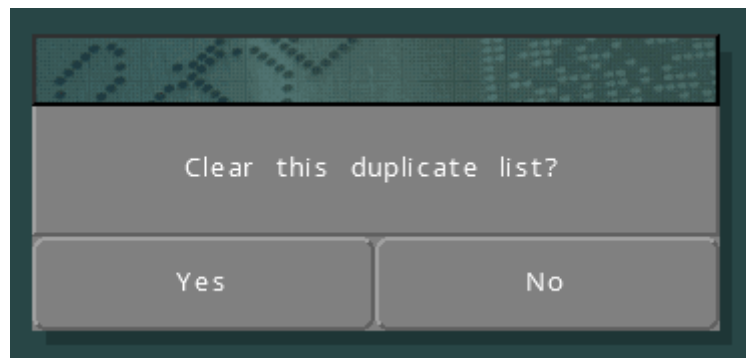
20. Maintenance

Maintaining the Electric Punch

If problems arise with an inconsistent mark check that the nosepiece(18) for the stylus is firmly screwed in to the solenoid assembly (2).

Check for contamination of the nosepiece(18) and stylus(*) at regular intervals as this will degrade the quality of the mark. If the stylus and nosepiece are contaminated then remove both and clean and lubricate with a very small amount of light oil such as 3 in 1 wiped onto the stylus.

Periodically remove the solenoid slug(6) and clean. Do not over lubricate, as this can contaminate the Autosense module(17) (if fitted).

Maintaining the AutoSense™ Module [3]

The Autosense module works in conjunction with an electric Z-axis. Portable Machines are not fitted with this feature.

The AutoSense™ enables the machine to sense the height of the workpiece and mark, ideal for marking different workpiece heights with the same depth of force every time.

This attachment is not a safety device and care must be taken when setting up for marking.

Periodically remove the AutoSense™ Module(17) by removing the two thumbscrews and clean the emitter and receiver lenses using a cotton bud. If these surfaces become contaminated the autosense feature will fail. This is noticeable when the stylus is advanced and retracted 3 times without the Z-axis advancing to the workpiece.

Electronics and their Parts

The sensor module(17) has a special optical transistor that senses whether the solenoid slug(6) is present.   This sensor has been specially enclosed to stop any damage to sensitive parts.

The wiring from the sensor is to the 24volt, 0 volt and the RP terminals on the marking head wiring.

Method of operation

The machine slowly increases power to the solenoid to extend the stylus, if it cannot extend the stylus it then retracts the stylus and tries again.   It then reduces the

---
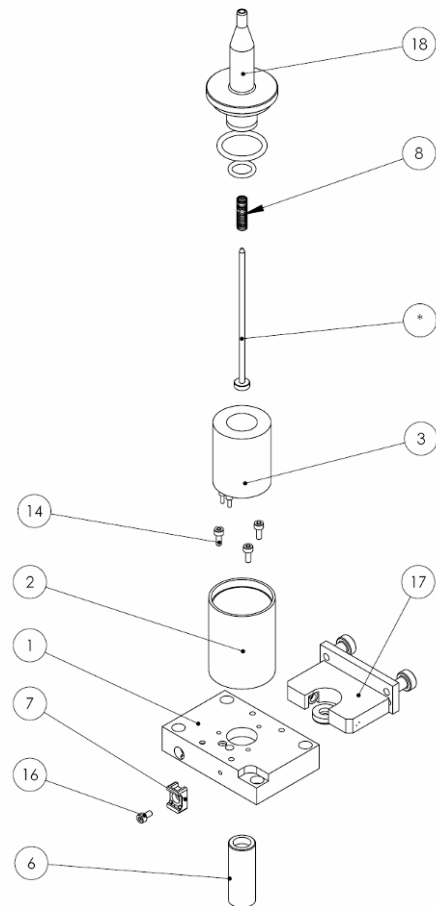
[3] Not applicable to MarkMate machines.

power to the solenoid until the stylus is just held in the extended position. The Z-AXIS then winds down. When the tip of the stylus touches the surface of the workpiece, it is then retracted by the stylus spring. Marking can then take place.

Configuration of the controller

The controller must be set up to accept the sensor attachment.

By using the function keys F10 F10 F3 F7 and then by using the up and down arrow keys change the autosense feature to YES.

The next feature down is SLUG OFFSET, this figure depends on the mechanical build up of the machine and may differ from machine to machine. A general guide is 1.0mm (0.04").
Once this has been set there should be no need to change this size. If the AutoSense module was factory fitted the Slug Offset for the machine will be written in the machine checklist section of this manual.

The repeatability of this sensor feature with a Z-axis machine is within plus or minus 0.2mm (0.008").

The actual marking gap from the stylus point to the surface of the workpiece sensed is set by using F10 F3 from the main menu (Layout Data). By changing this Z GAP a size can be obtained for the gap required between the stylus and the workpiece ie. by setting 2mm (0.080") will automatically set the distance.

By using the line parameters when setting each line of text a plus or minus Z statement can be used for different heights of marking.

Always set the starting point of the Z AXIS to the highest part of the piece to be marked leaving at least 12mm of distance between the stylus and workpiece, remember to set the reference point of the Z axis F10 F5.

NOTE -- For the sensor to work, a distance of more than ZERO must be set on the Z GAP (F10 F3).

If the controller is switched off this gap will revert to zero, this is a safety feature to save any possible damage when a new layout is being created.

If the layout is saved (F4) then the Z GAP will also be saved.

21. Fault Finding

Controller

The 4000 controller is a reliable machine and most faults can be put right by simple adjustments.   Detailed below are most of the common faults that could occur.   If after trying all these suggestions the fault still occurs then either contact your supplier or our technical department for advice.

The Controller screen is flashing on and off
Check the Emergency stop button is connected and not pressed.

The Controller does not power up when turned on
Check that the latching Emergency Stop button is connected and the button is not pressed.

Check the mains fuse in the socket at the rear of the controller.   If faulty replace with one of identical rating and type.   This should be 2.5Amp for 240V and 5Amp for 115V.   Both types being Anti Surge.

THE FOLLOWING PROCEDURE IS ONLY TO BE CARRIED OUT BY TRAINED PERSONNEL.

1. Disconnect the mains from the controller and remove the fixing screws holding the top cover to the base cabinet.

2. Carefully slide the top cover upwards and tilt to the left hand side where it can be rested on its side. Take care not to damage the ESTOP cables.

3. Carefully remove the metal lid to expose the controller electronics. You are now presented with the main circuit board and three fuses at the bottom right hand side.   Each fuse has a corresponding red LED which illuminates if the fuse is OK.

    The fuses protect the following aspects of the circuitry.

    F1 – 10A Anti-surge: Solenoid punch circuit. LED1 shows the status of this fuse. The LED1 will be off when the machine is Emergency stopped. Failure of this fuse will be detected by the software with the error message "Punch Supply Lost check fuse F1".

    F2 – 10A Anti-surge: Main power to motors. LED2 shows the status of this fuse. The LED2 will be off when the machine is Emergency stopped. Failure of this fuse will be detected by the software with the error message "Power down check fuse F2".

F3 – 3A Quick-blow: Protects all electronic devices on the PCB. If this fuse fails both LED3 and LED4 will be off. This fuse will prevent the controller powering up.

Check also LED5 and LED6, these define if the +5v and +3.3v circuits are active.

The Controller keeps rebooting to the bootloader screen.
This suggests either a hardware fault on the electronics or the layout and configuration memory has become corrupted**.**

Note: The following advice will default the machine to factory defaults and all layouts and configurations may be lost.
Switch the controller on holding down the F9 key of a USB keyboard. When prompted for a password type "SOFT RESET" and press Enter, if prompted press any key several times until you reach the main menu. This will default the machine configuration. If this does not work try "HARD RESET" this will default the layout memory, if this does not work try "WIPEOUT" this will default the entire memory. If this does not work please contact your service provider.

The Marking Head

Marking head does not move
1. Check the cable from the head to the controller (X1) is connected and fully screwed in place. If not switch off, connect the head and try the system again. Ensure that the cable is plugged into the 'X/Y X1' port and NOT the Z/C port (X2) .

2. Try the Test Hardware menu (F10, F10, F4, F4).

If none of the above correct the problem check all fuses on the printed circuit board inside the controller case.

Head moving but not punching
1. Check the connectors to the solenoid are fitted correctly. Check the connector block within the solenoid assembly and also the wiring connections on the Head PCB located under the head cover.

2. Check the punch cable for any breaks.
Check to make sure no special speeds or options have been enabled.
Check the layout text is not set at a force of zero.

3. Check that all fuses inside the controller are intact.

Motors turning but not finding home
1. Remove the cover fixing screws on the marking head, and lift the top cover clear.

2. Select the option for 'Test hardware' (F10, F10, F4, F4).   This will display the state of the proximity inputs to the controller or use a voltage multimeter between the output of the proximity and 0v (the black and the blue wires).

3. Try placing a piece of metal in front of each proximity in turn and checking that the output switches between one state and the other as the metal is used.

4. Test all the proximities X, Y and Z (if fitted) and if any are found to be faulty replace with one having the following specification, M5, PNP and to operate on 24 volts.

5. If all the proximities seem to be working check they are selected correctly on the firmware (LCD only, option 'Configure hardware' - F10, F10, F3, F7).

6. Check the fuses inside the controller are intact.

7. Check F10, F10, F3, F7 and ensure the X Prox Offset and Y Prox Offset values are set to 0.00.

8. If after trying all the above, the problem still occurs, contact your supplier and describe the problem in detail explaining what remedies you have already tried.

    Note: If a proximity switch has failed, it is possible to temporarily continue marking until a replacement sensor is fitted. To do this go to the F10, F10, F3, F7 screen and set the relevant axis Prox setting from 'PNP' to 'None'. You must ensure the problem axis is manually positioned at its Home position before starting the marking cycle. While the sensor is set to 'None' the machine will count steps back to its zero position without seeking the sensor. This should only be considered a temporary work around. Remember to put the setting back to PNP when a new sensor is fitted.

Z Axis is stalling or making excessive noise (BenchDot™ machines)
1. Remove the safety cap on the rear of the Z axis. Manually wind the Z axis down until the grease nipple on the lead screw nut assembly is visible. Then use a grease gun (Mobilgrease 28 or equiv) to fill the nut assembly with grease. Replace safety cap.

Mechanical Fault Analysis Charts

The following charts are for quick reference to the most likely faults that could occur on the Marking Head.

Contact your supplier if any further assistance is required.

Quality of mark deteriorates

Possible Cause	Action
Stylus Spring sticking	Change Stylus Spring Clean Stylus and Nosepiece
Pulleys loose (BenchDot™ Machines)	Realign Pulleys and tighten screws
Stepper Motor fault	Check wiring to motor across entire movement of slide. As the motor moves breaks in the wire can occur. Replace Stepper Motor
Ball screw and Nuts contaminated	Remove and clean
Stylus sticking in Nosepiece	Clean Stylus and Nosepiece Realign Solenoid Housing Assembly Change Stylus Change Nosepiece Check Stylus Spring Lubricate stylus with light machine oil.
Ball screw loose/tight (BenchDot™ only)	Adjust Stepper Motor Mounting Brackets Check slideway alignment.
Head Assembly loose	Tighten Screws Lifting Bracket
Stylus too loose in Nosepiece	Replace Stylus or nosepiece if worn
Solenoid Assembly incorrectly aligned	Realign Solenoid Housing Assembly Tighten Screws
Stylus Point damaged/worn	Regrind Stylus Change Stylus

Depth of mark inconsistent

Possible Cause	Action
Stylus Spring sticking	Change Stylus Spring Clean Stylus and Nosepiece
Solenoid Core sticking	Realign Solenoid Housing Check all Screws
Distance from Stylus to Workpiece excessive	Reduce gap
Stylus sticking in Nosepiece	Clean Stylus and Nosepiece Realign Solenoid Housing Assembly Change Stylus Change Nosepiece Check Stylus Spring Check solenoid liner for excessive wear – change solenoid. Lubricate stylus with light machine oil.
Solenoid Assembly incorrectly aligned	Realign Solenoid Housing Assembly Tighten Screws
Stylus Point damaged/worn	Regrind Stylus Change Stylus

Mark of insufficient depth

Possible Cause	Action
Stylus Spring sticking	Change Stylus Spring
Solenoid Core sticking	Realign Solenoid Housing Check all Screws
Distance from Stylus to Workpiece excessive or insufficient	Reduce or increase gap
Stylus sticking in Nosepiece	Clean Stylus and Nosepiece Realign Solenoid Housing Assembly Change Stylus Change Nosepiece Check Stylus Spring Lubricate stylus with light machine oil.
Stylus not sharp or Point damaged	Regrind or change Stylus Change angle on Stylus Point
Incorrect Marking Force	Check the marking force in the layout.
Air Pressure too low (DP machines)	Check air pressure on pneumatic machines. Ensure the return pressure is lower than the drive pressure.

Excessive depth of mark

Possible Cause	Action
Material too soft	Reduce height of Stylus
Distance from Stylus to Workpiece excessive	Reduce gap
Incorrect Marking Force	Reduce the force in the layout. If already at Force 1, then contact service provider for advice to reduce the punch timings.

No movement of the Stylus when marking should take place

Possible Cause	Action
Stylus Spring sticking	Change Stylus Spring
Stylus Core sticking	Realign Solenoid Housing Check all Screws
Adjusting Screw on Solenoid Assembly loose	Tighten Screw
Distance from Stylus to Workpiece excessive	Reduce gap
Mild Steel Ring on the Stylus loose	Tighten
Stylus sticking in Nosepiece	Clean/Replace Nosepiece Replace Stylus
Solenoid Assembly incorrectly aligned	Realign Assembly
Controller fault	See Electrical Fault Finding

No movement of the Marking Head in the X-Y Axis

Possible Cause	Action
Pulleys loose / Gears slipping	Tighten taper lock bush on Pulleys
Controller Fault	See Electrical Fault Finding
Stepper Motor fault	Check wiring to motors across the full area of the marking area.
Leadscrew and Nuts contaminated	Clean out Leadscrew Nuts, re-grease

22. Preventative Maintenance

Controller Memory Backups

It is recommended to take regular backups of the controllers memory to allow quick recovery in the event of a memory corruption event. See the backup restore section of the manual for further details.

12 Monthly

BenchDot™ Machines Only

It is recommended that both the lead/ball screws on the marking head are lubricated with a high quality synthetic grease such as Mobilgrease 28 or the nearest equivalent.   Do not use normal grease, it will harden and impair the lead screws from working efficiently.

The Auto-sense assembly should be checked for contamination of dirt/oil, and that the emitter/collector faces are clean, when doing this, check that the stylus, guide and slug is free to move.

6 Monthly

The stylus spring should be replaced every six months.

If using a machine with an electric programmable Z axis then the Z axis lead screw assembly will require re-greasing. To do this remove the safety cap from the rear of the column labelled 'Grease Point', manually move the Z axis until the grease point is visible and use a grease gun (Mobilgrease 28 or equiv) to fill the nut cavity via the grease nipple. Replace the safety cap.

If using a manual Z axis lubricate the column rods, the manual Z axis leadscrew and the carriage running rods with a general light machine oil.

Every Month

Check that the solenoid and slug are clean, also check the solenoid liner for wear.

Every Day

The stylus, stylus guide and stylus spring should be checked every day, they must be kept clean and free from contamination and lubricated with a light machine oil.

NB. If the equipment is working in a particularly harsh environment the maintenance should be more frequent

23. Machine Drawings

Portable Machines

PortaDot 50-25

LD2HEAD1 Portadot 50-25 Assembly
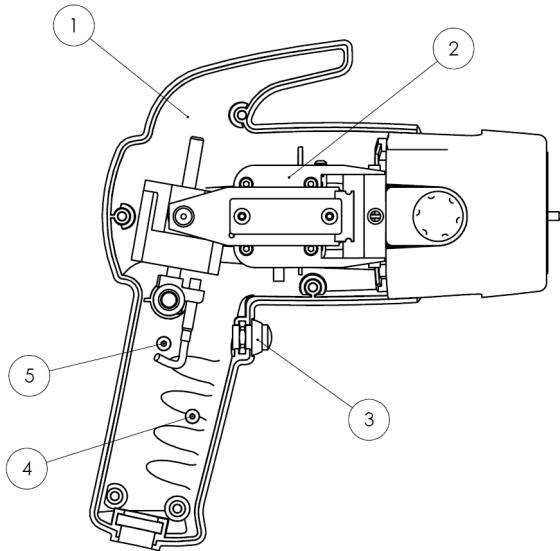
LD200-A02 50-25 Case Assembly
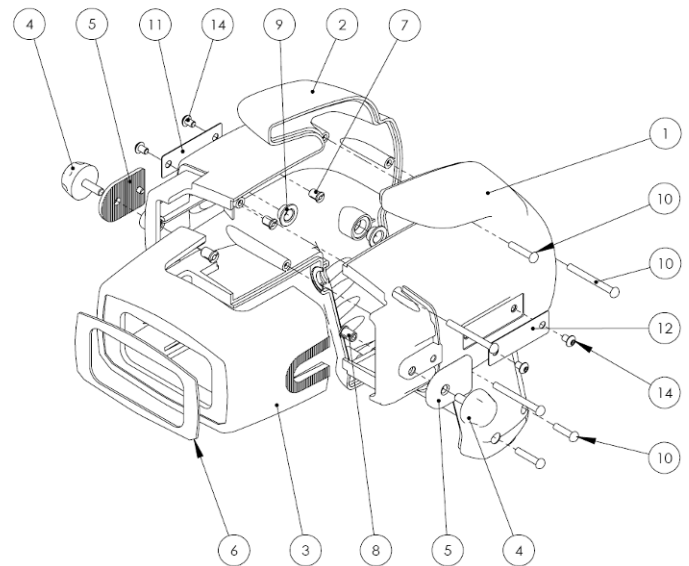
Item No.	Stockcode	Description	Qty.
1	LD200-A02	LD2 Case	1
2	LD200-A01	LD2 Internals	1
3	LD200053	Actuation switch for LD2 head	1
4	10014879	4 x 3/8" Pozi Pan Head Self Tapper Screw	1
5	10014880	4 x 1/4" Pozi Pan Head Self Tapper Screw	1
6	LD2KIT03	LD2 Portadot 3 metre cable assembly	1
6	LD2KIT04	LD2 Portadot 6 metre cable assembly	1
6	LD2KIT05	LD2 Portadot 10 metre cable assembly	1

Item No.	Stockcode	Description	Qty.
1	LD200032	Right Hand Casing	1
2	LD200033	Left Hand Casing	1
3	LD200034	Flat Mask	1
4	LD200036	Knob	2
5	LD200037	Clamp Plate	2
6	LD200038	Rubber Pad	1
7	LD200041	M4 Threaded Insert	4
8	LD200042	M5 Threaded Insert	2
9	LD200009	Pivot Bush	4
10	LD200046	PT Screw, Pozi Drive, Pan Head Screw	6
11	LABEL016	LD2 Label	1
12	LABEL015	Serial Number Label	1
14	BUTSC004	M4 x 6 Button Head Socket Screw (ISO)	4

LD200-A01 50-25 Internals
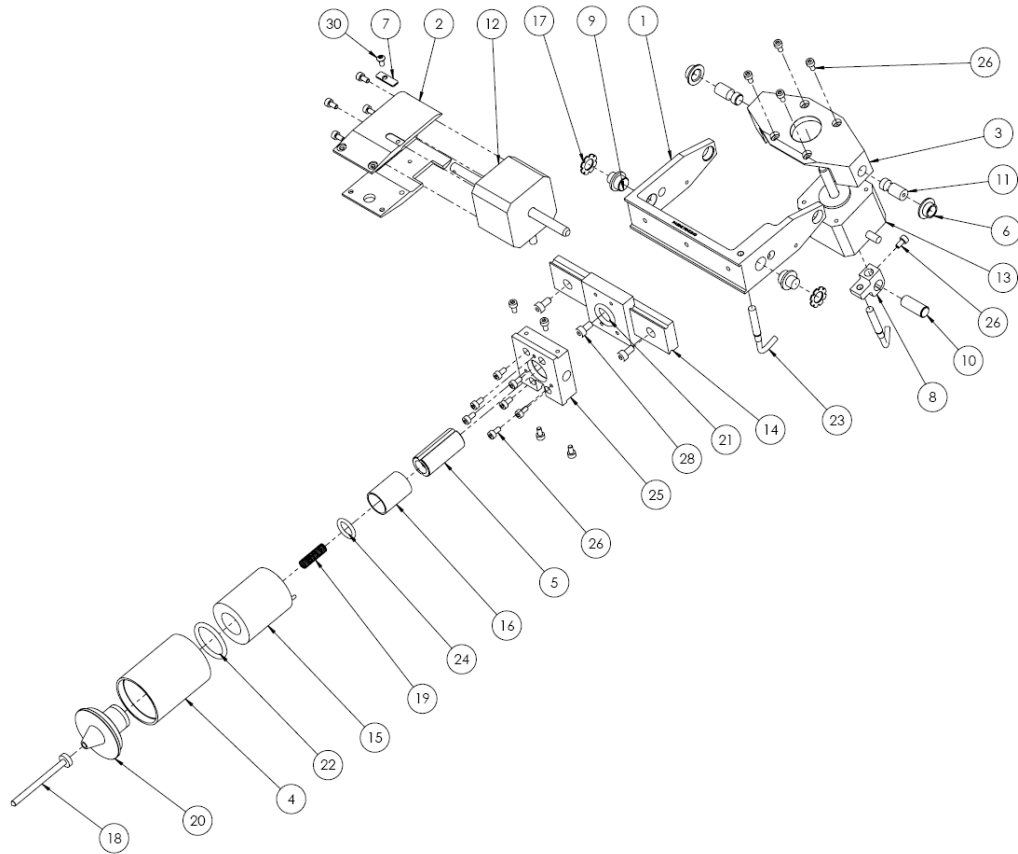
Item No.	Stockcode	Description	Qty
1	LD200001	Pivot Frame	1
2	LD200002	X Bracket	1
3	LD200003	Y Bracket	1
4	LD200005	Solenoid Housing	1
5	LD200007	Solenoid Armature	1
6	LD200009	Pivot Bush	2
7	LD200010	Proximity Sensor Pad	1
8	LD200011	Y Motor Clevis	1
9	LD200012	Pivot Pin - Pivot Frame	2
10	LD200013	Pivot Pin - Clevis	1
11	LD200014	Pivot Pin - Y Bracket	2
12	LD200015-F	X Axis Motor and Leadscrew	1
13	LD200016-F	Y Axis Leadscrew & Motor	1
14	PMHIT009	LD2 Linear Guide	1
15	PMHIT016	Solenoid Coil	1
16	LD200020	Armature Guide Bush	1
17	WASH0010	M8 Toothed Lock Washer	2
18	EP119S45	4mm x 50mm Solid Carbide Stylus	1
19	10013200	Styli Spring For LD2	1
20	10015071	Round Sol End Cap - Composite	1
21	SEAL0001	O Ring, Armature Buffer	1
22	SEAL0002	O Ring, 23,47 x 2,95	1
23	119PSW	5mm x 0.5 Proximity Sensor	2
24	2M07	RM0116-24 O-Ring	1
25	10009470	Solenoid Mounting Pad Push in Auto Sense	1
26	CAPSC001	M3 x 6 Cap Socket Hd. Screw	20
27	GRUB0033	M4 x 6 Cup Point Grub Screw (ISO)	2
28	CAPSC007	M4 x 8 Cap Head Socket Screw (ISO)	3
29	CAPSC005	M3 x 16 Cap Socket Hd. Screw	1
30	BUTSC001	M3 x 6 Button Head Socket Screw (ISO)	2
31	HITEC017	Self Adhesive 2.5mm Cable Tie Base	1
32	HITEC025	0.5mm White Bootlace Ferrule	20
33	HITEC016	M3 x 6 Pan Head Screw	1
34	HITEC076	M3 Shakeproof Washer	1

PortaDot 130-30

10027455 PortaDot 130-30
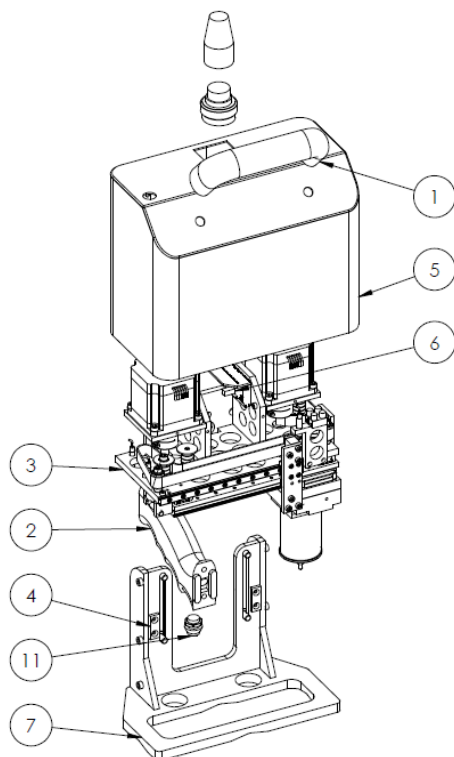
Item No.	StockCode	Description	Qty.
1	119PORCH	Handle	1
2	10025470	Pistol Grip	1
3	10027339	130-30 Mechanism	1
4	10027700	Location tenon	2
5	10028637	Cover	1
6	10029008	Tilt switch	1
7	10031160	Standard 130-30 mask	1
8	BUTSC001	M3 x 6 Button Head Socket Screw (ISO)	4
9	BUTSC019	M8 x 16 Button Head Socket Screw (ISO)	2
10	CAP00003	Cover Cap	1
11	LD200053	Switch	1

10027339 130-30 Marking Head Assembly

Item No.	StockCode	Description	Qty.
1	119PSW	Proximity Sensor	4
2	10008005	Bearing	28
3	10009473	Nylon P-Clip	2
4	10022287	Head interface PCB assy - compact connector	1
5	10023011	LED Tape	1
6	10023275	Timing Belt (Long)	1
7	10025282	Linear Rail (75mm Long)	2
8	10025328	Linear Rail (175mm Long)	2
9	10027331	X-Y Base Plate	1
10	10027334	Brace plate	2
11	10027338	Base Plate	1
12	10027344	Motor Spacer	2
13	10027354	Linear Rail (155mm Long)	1
14	10027365	Linear Rail (60mm Long)	1
15	10027368	Nosepiece mounting plate	1
16	10027372	Slide support	1
17	10027373	Slide brace	1
18	10027379	Drive plate	1
19	10027382	Proxy bracket	1
20	10027388	Timing Pulley	2
21	10027395	Fixed Roller Spacer	5
22	10027397	Belt clamp spacer	1
23	10027398	Belt Roller Support	2
24	10027570	Proxy bracket	1
25	10027573	Proxy flag	2
26	10027587	Belt clamp	2
27	10027628	Shaft Coupling	2
28	10027972	Intermediate rail mounting plate	1
29	10027983	Timing Belt (Short)	1
30	10028641	Integrator PCB mounting plate	1
31	10029638	LED mask	1
32	10031099	Motor	2
33	10031252	Large Washer	3
34	80000510	M2 x 5 Cap Head Socket Screw	4
35	BUTSC001	M3 x 6 Button Head Socket Screw (ISO)	2
36	CAPSC001	M3 x 6 Cap Head Socket Screw (ISO)	14
37	CAPSC002	M3 x 8 Cap Head Socket Screw (ISO)	48
38	CAPSC004	M3 x 12 Cap Head Socket Screw (ISO)	1
39	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	16
40	CAPSC013	M4 x 25 Cap Head Socket Screw (ISO)	7
41	CAPSC113	M2 x 8 Cap Head Socket Screw (ISO)	16
42	CAPSC114	M2 x 12 Cap Head Socket Screw (ISO)	4
43	DOWEL001	3 x 10 Dowel Pin (ISO)	1
44	HITEC199	Terminal Block	1
45	WASH0001	M3 Plain Washer	2
46	WASH0002	M4 Plain Washer	7

PortaDot 100-75

HD2HEAD1 Portadot 100-75 Head Assembly
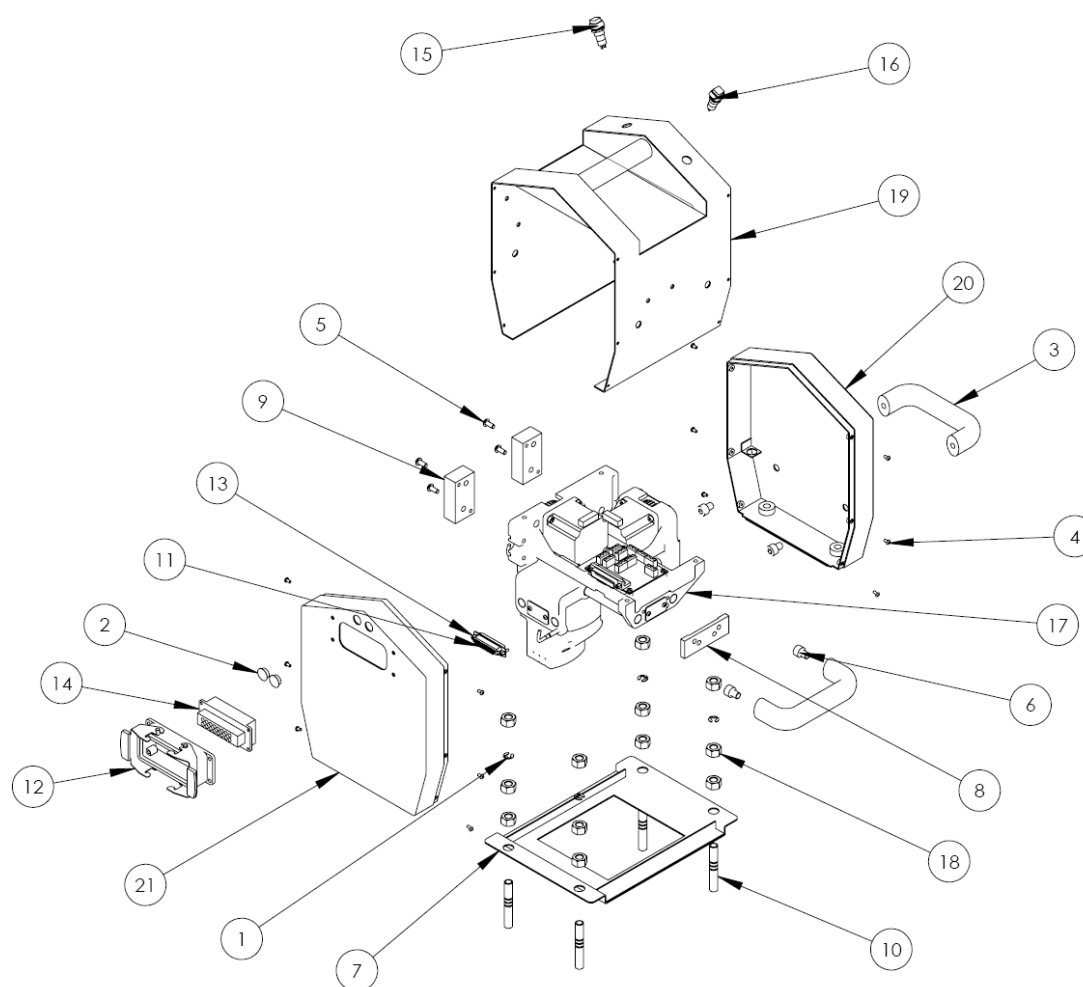
Item No.	Stockcode	Description	Qty.
1	10004586	External Circlip 6mm Dia	4
2	10004619	Blanking Plug 12.7mm Dia	2
3	119PORCH	HD2 Portadot Handle	2
4	BUTSC001	M3 x 6 Button Head Socket Screw (ISO)	12
5	BUTSC009	M5 x 12 Button Head Socket Screw (ISO)	4
6	CAPSC041	M8 x 10 Cap Head Socket Screw (ISO)	4
7	HD2-04	HD2 Base Plate	1
8	HD200088	HD2 Front Spacer	1
9	HD200089	HD2 Rear Spacer	2
10	HD200096	HD2 Support Leg	4
11	HITEC112	25 Way D Type Socket Connector	1
12	HITEC127	16 Way Panel Mounting Housing	1
13	HITEC189	M3 x 8 Screwlock	2
14	HITEC193	16 Way Plug Insert	1
15	HITEC245	Black Switch	1
16	HITEC246	Red Switch	1
17	HD2HEAD1	PortaDot 100-75 Head Assembly	1
18	NUTS0006	M10 Hex Nut (ISO)	12
19	PHD2IT01	HD2 Centre Case	1
20	PHD2IT02	HD2 Left Hand End Cover	1
21	PHD2IT03	HD2 Right Hand End Cover	1

HD2HEAD1 PortaDot 100-75 Head Assembly
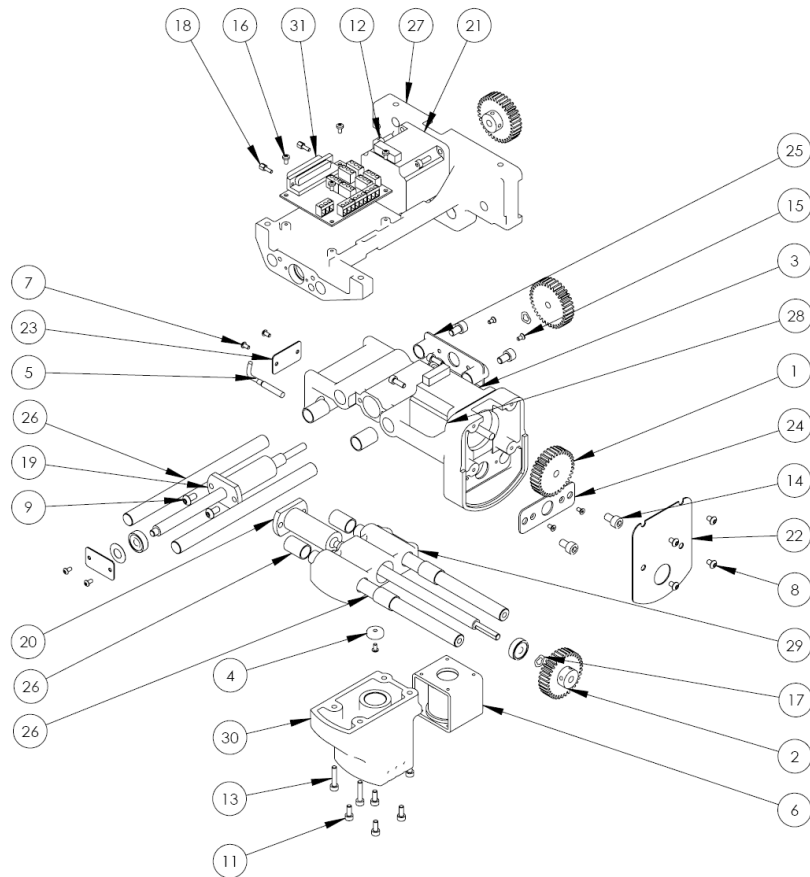
Item No.	Stockcode	Description	QTY.
1	10000395	1 Mod Spur Gear 34 Teeth, Ø6.35 Bore	2
2	10000396	1 Mod Spur Gear 34 Teeth, Ø6.00 Bore	2
3	119IT875	2 Phase Stepper Motor, 1.8° Step With 320mm Cable	1
4	119IT930	Tap Washer	1
5	119PSW	5mm x 0.5 Proximity Sensor	2
6	119SFS	Solenoid D6 A93	1
7	BUTSC001	M3 x 6 Button Head Socket Screw (ISO)	5
8	BUTSC004	M4 x 6 Button Head Socket Screw (ISO)	4
9	BUTSC008	M5 x 10 Button Head Socket Screw (ISO)	4
10	CABLE004	Punch cable 600mm long	1
11	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	4
12	CAPSC009	M4 x 12 Cap Head Socket Screw (ISO)	8
13	CAPSC012	M4 x 20 Cap Head Socket Screw (ISO)	4
14	CAPSC028	M6 x 10 Cap Head Socket Screw (ISO)	4
15	COUSC026	M3 x 6 Socket Countersunk Head Screw ISO	4
16	HITEC016	M3 x 6 Pan Head Screw	4
17	HITEC028	M6 Metric Wavey (Crinkle) Washer	2
18	HITEC189	M3 x 8 Screwlock	2
19	MMHIT025	Anti-Backlash Leadscrew & Nut	1
20	MMHIT027	Anti Backlash Leadscrew & Nut	1
21	MMHIT030	2 Phase Stepper Motor, 1.8° Step With 150mm Cable	1
22	MMHIT034	Y Slider Cover Plate	1
23	MMHIT036	Disc Spring End Plate	2
24	MMHIT039	Y-Slider Rod Plate	1
25	MMHIT040	Head Slider Rod Plate	1
26	MMHKIT01	Head Bearing Assy	1
27	MMHMT020	Head Slider	1
28	MMHMT021	Y-Slider	1
29	MMHMT022	X-Slider	1
30	MMHMT023	Solenoid Block	1
31	PCB00013	Head PCB	1

MarkMate
Overall Assembly
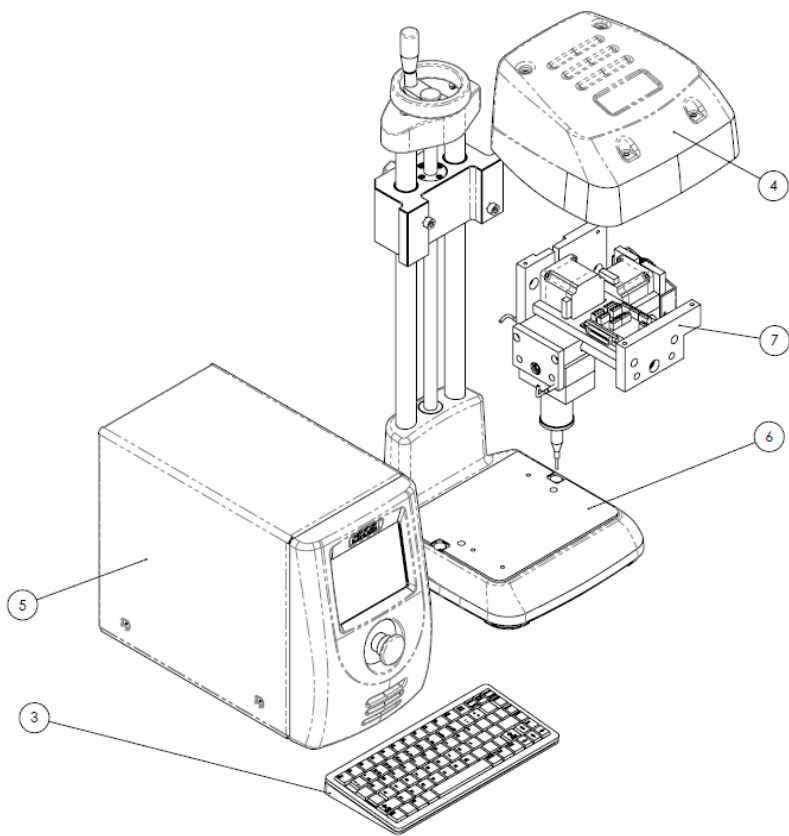
MMM Markmate Assembly

Item No.	StockCode	Description	Qty.
1	119HCEMC	Head Cable	1
2	CABLE001	Serial Cable	1
3	KEYB0003	Mini Keyboard PS2 Connector	1
4	MMBCIT2A	Markmate Head Cover	1
5	MMC	Markmate Controller	1
6	MMMBC	Markmate Column and Base	1
7	MMMH	Markmate Head	1

General Arrangement
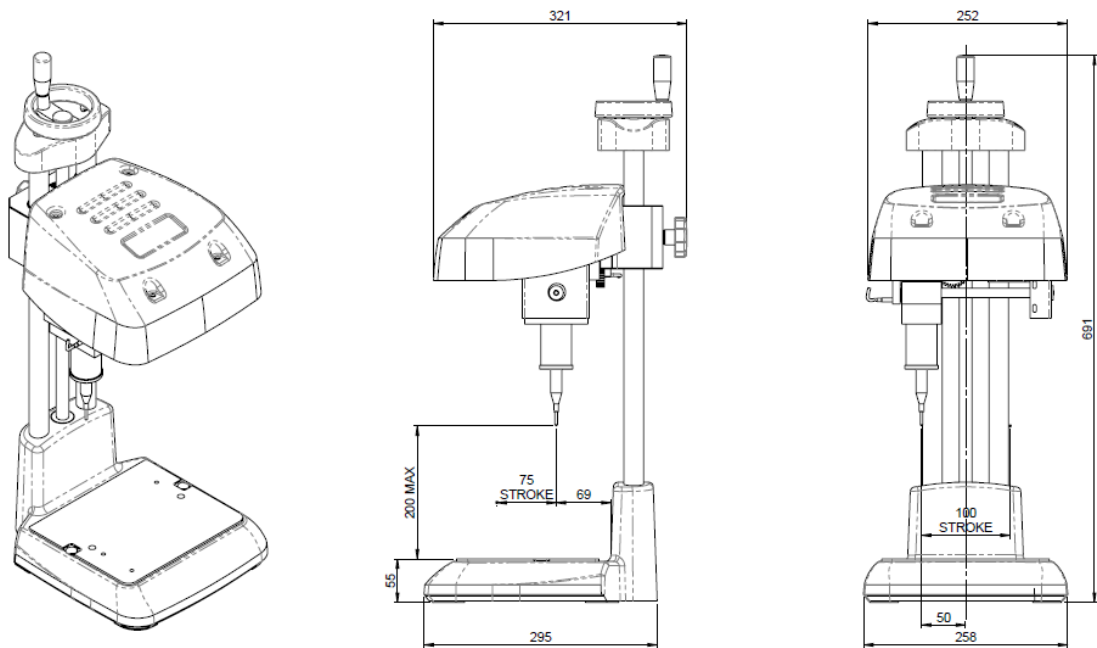
Base Layout
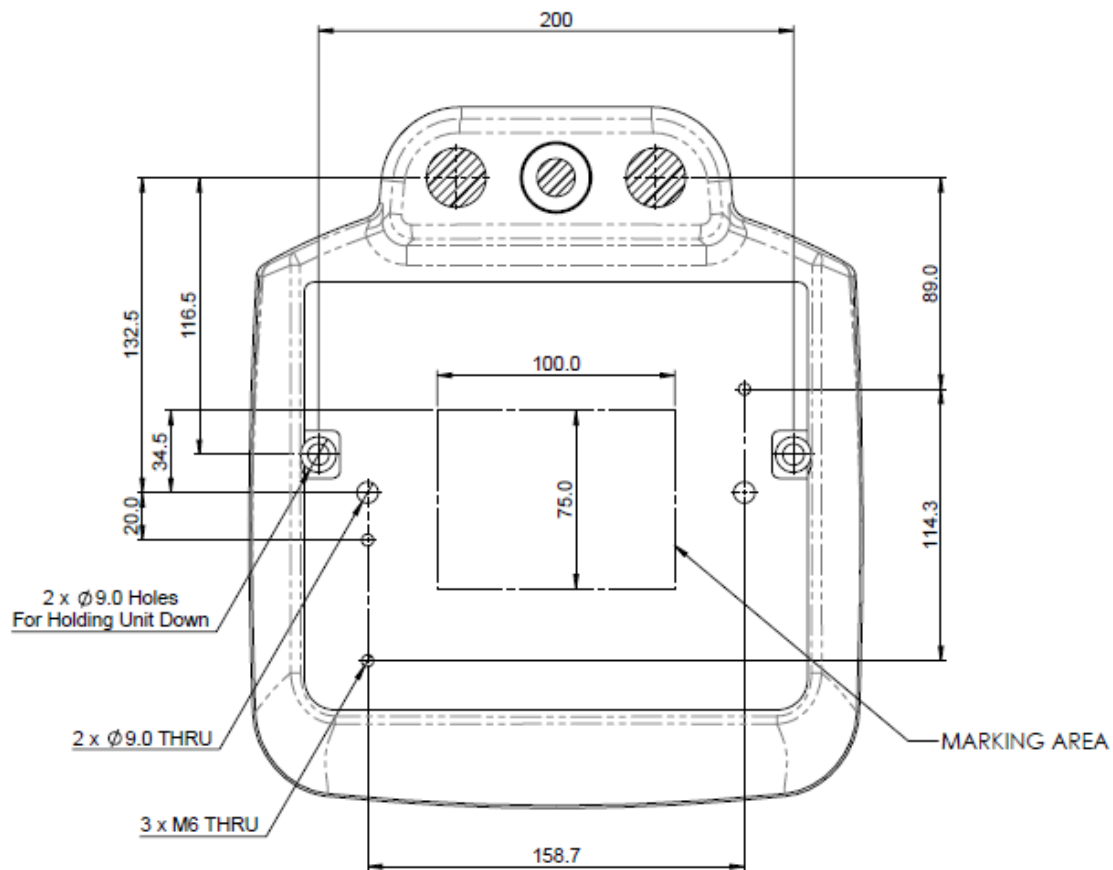
MMMBC Markmate Base & Column

Item No.	StockCode	Description	Qty.
1	10021105	Ball Bearing	2
2	10021749	Pivot Bush	4
3	10023771	Markmate Base	1
4	10023778	Markmate Top Column Block	1
5	10023781	Markmate Column Slider	1
6	10023787	Markmate Lift Screw	1
7	10023789	Markmate Column	2
8	10023792	Markmate Top Rotary Knob	1
9	10023793	Markmate Column Clamp	1
10	10023829	Lead Screw T-Nut	1
11	10023830	Lead screw-bearing Spacer	1
12	10023831	Bearing Retainer Plate	1
13	10023839	M10 Star Knob	1
14	CAPCS044	M8 x 25 Cap Head Socket Screw	4
15	CAPSC051	M8 x 75 Cap Head Socket Screw	2
16	COUSC004	M3 x 10 Countersunk Head Socket Screw	8
17	GRUB0010	M5 x 10 Cup Point Grub Screw	2
18	WASH0005	M8 Plain Washer	2

TOP BLOCK ASSEMBLY
(SCALE 1:4)

SLIDER ASSEMBLY
(SCALE 1:4)
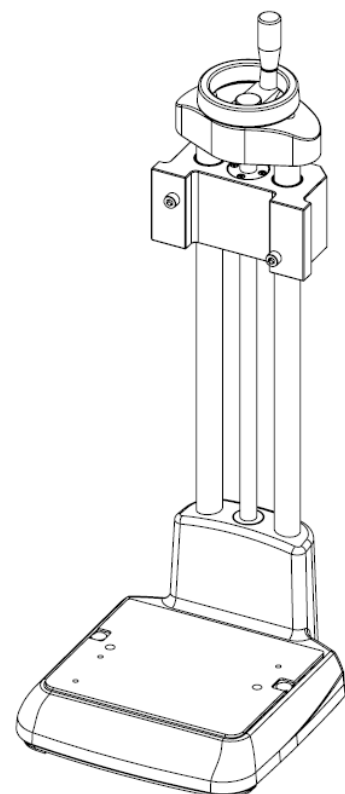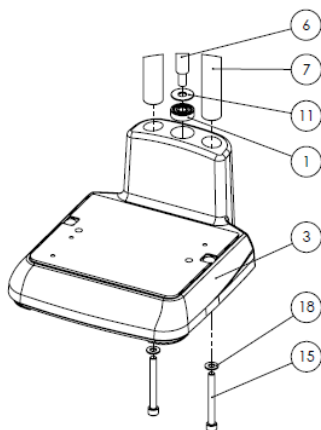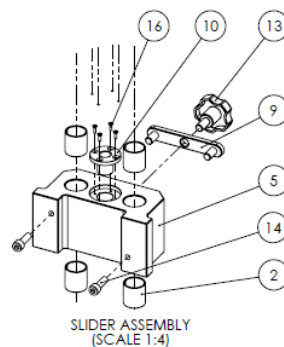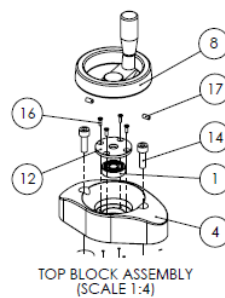
MMMH Markmate Head Assembly V2

Item No.	Stockcode	Description	Qty.
1	10000395	Spur Gear	4
2	10004257	Deep Groove Ball Bearing	4
3	10010054	HI Slug	1
4	10013200	Styli Spring	1
5	10020164-M	Hi Nose.100mm Stylus, Long throw	1
6	10021959	Markmate Sol Mounting Block	1
7	10023802	Gear Cover	1
8	110100-01	X Axis Guide Rod	2
9	110100-02	X Axis Slide Plate	1
10	110100-03	X Axis End Plate	1
11	110100-04	X Axis Motor Mounting Plate	1
12	110100-06	Lead Screw Nut	1
13	110102-05	X Axis Lead Screw	1
14	110200-07	Y Axis Guide Rod	2
15	110200-08	Y Axis Slide Plate	1
16	110200-09	X Axis End Plate	1
17	110201-10	Y Axis Motor Mount Plate	1
18	110201-11	Y Axis Base Plate	1
19	110201-12	Y Axis Lead Screw	1
20	119IT875	2 Phase Stepper Motor	2
21	119IT930	Tap Washer	1
22	119PSW	Proximity Sensor	2
23	2M07	O-Ring	1
24	BUTSC029	Button Head Socket Screw	1
25	EP119S1	Standard Styli - 3mm x 100mm	1
26	LD200005	Solenoid Housing	1
27	LD200020	Armature Guide Bush	1
28	MMBCIT2A	Markmate Head Cover	1
29	PCB00013	Marktronic Head PCB	1
30	PMHIT016	Solenoid Coil	1
31	SEAL0002	O Ring	1
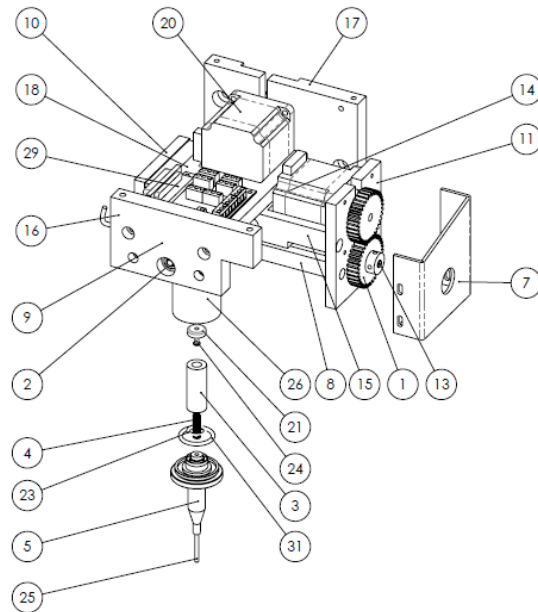
BenchDot Column

10018377 3000 Column Assembly

Item No.	Stockcode	Description	Qty.
1	10011860	15 Tooth 5 Pitch Timing Pulley	1
2	10014032	Taper Lock Bush	1
3	10014133	New Column Leadscrew No2	1
4	10014149	Handwheel	1
5	10014185	Carriage	1
6	10014221	Guard Plate	1
7	10014243	Bearing Retainer (B)	1
8	10014255	Bearing Retainer (T)	1
9	10014267	Nut Block	1
10	10014268	Linear Rail	2
11	10014353	Anchor Tongue	1
12	10014370	Pulley Spacer	1
13	10014371	Home Nut	2
14	10014372	Home Screw	1
15	10014373	Head Key	1
16	10014666	3000 Curved Column	1
17	10015150	Screw End Cap	1
18	10015641	Deep Groove Ball Bearing	2
19	10015684	Clamp Bridge	1
20	10015832	NP 1000 Spacer	4
21	10018920	Home Screw (Fixed)	1
22	119IT354	Lead Screw Nut	2
23	BUTSC004	M4 x 6 Button Head Socket Screw (ISO)	4
24	BUTSC028	M6 x 10 Button Head Socket Screw (ISO)	2
25	CAPSC002	M3 x 8 Cap Head Socket Screw (ISO)	60
26	CAPSC004	M3 x 12 Cap Head Socket Screw (ISO)	16
27	CAPSC007	M4 x 8 Cap Head Socket Screw (ISO)	1
28	CAPSC010	M4 x 16 Cap Head Socket Screw (ISO)	2
29	CAPSC012	M4 x 20 Cap Head Socket Screw (ISO)	2
30	CAPSC020	M5 x 20 Cap Head Socket Screw (ISO)	2
31	CAPSC047	M8 x 40 Cap Head Socket Screw (ISO)	1
32	DOWEL014	5 x 24 Dowel Pin (ISO)	2
33	ECLIP002	8mm External Circlip	1
34	NUTS0002	M4 Hexagon Nut	2

10018618 3000 Column Base Kit
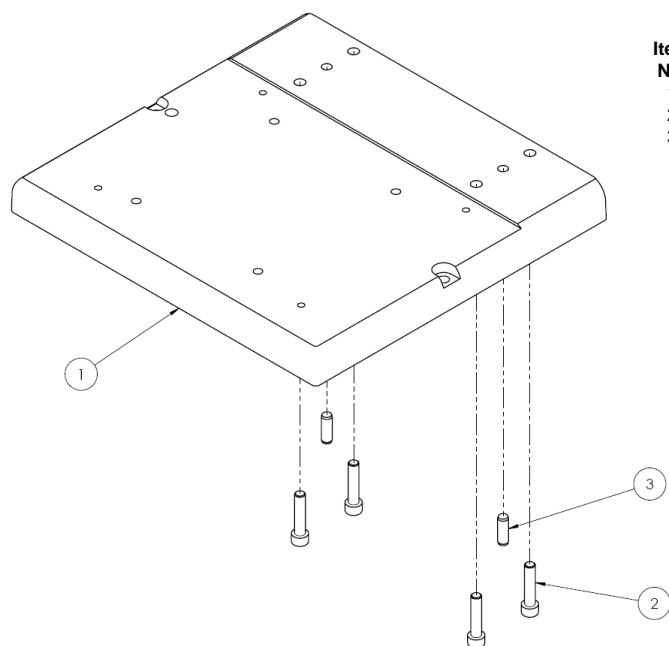
Item No.	Stockcode	Description	Qty.
1	10014684	3000 Base Machined	1
2	CAPSC062	M10 x 45 Cap Head Socket Screw (ISO)	4
3	DOWEL035	10 x 30 Dowel Pin (ISO)	2

10015545 3000 Z Axis Motor Assembly
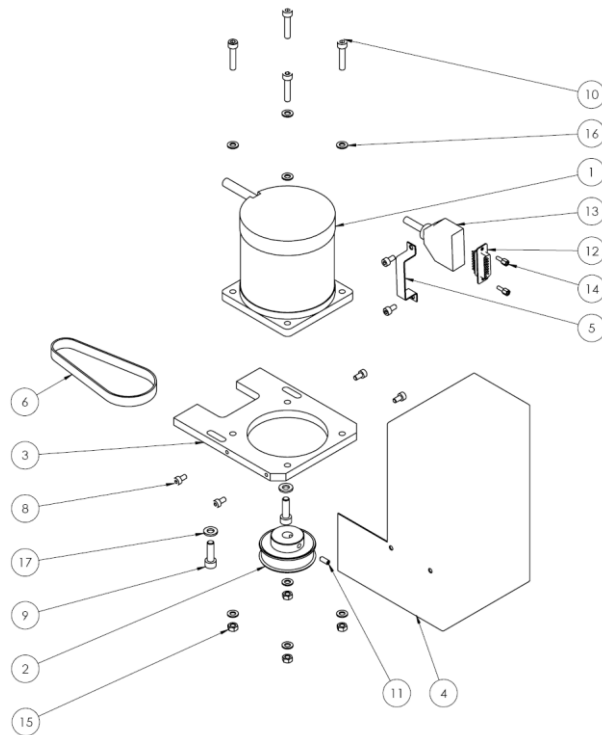
Item No.	Stockcode	Description	Qty.
1	10003491	Stepper Motor	1
2	10011861	Timing Pulley	1
3	10014215	Z Motor Plate	1
4	10014248	Rear Cover	1
5	10014423	Hood Clip	1
6	10014822	Timing Belt	1
7	CABLE003	Z Axis Cable	1
8	CAPSC007	M4 x 8 Cap Head Socket Screw (ISO)	6
9	CAPSC031	M6 x 20 Cap Head Socket Screw (ISO)	2
10	CAPSC088	M5 x 25 Cap Head Socket Screw (ISO)	4
11	GRUB0006	M4 x 10 Cup Point Grub Screw (ISO)	1
12	HITEC117	15 Way D Type Plug Connector	1
13	HITEC118	15 Pin Connector Shell	1
14	HITEC189	M3 x 8 Screwlock	2
15	NUTS0003	M5 Hex Nut (ISO)	4
16	WASH0003	M5 Plain Washer	8
17	WASH0004	M6 Plain Washer	2

BenchDot 60-60

10015609 3000 60x60 Marking Head Assembly
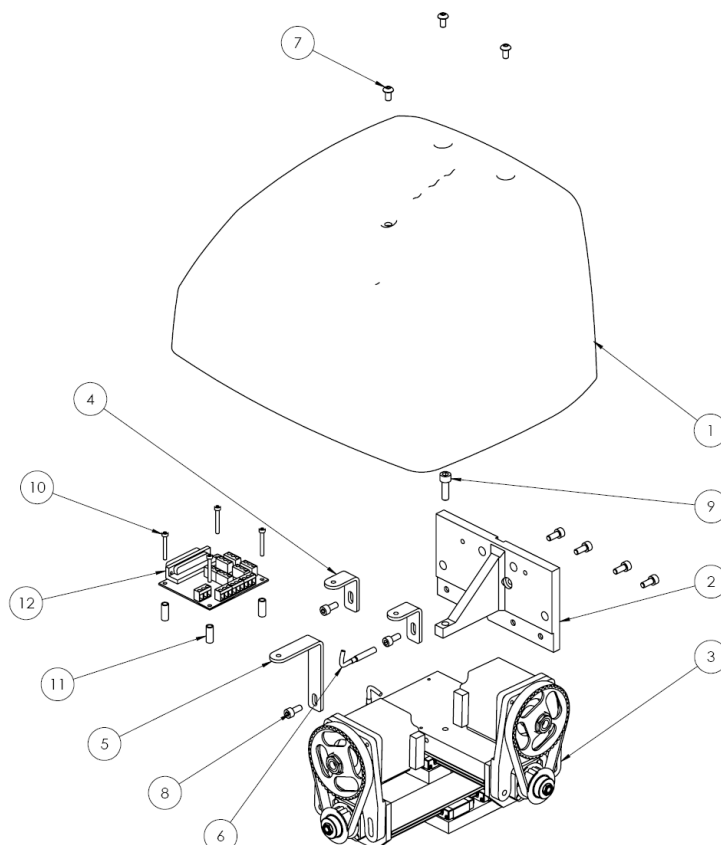
Item No.	Stockcode	Description	Qty.
1	10014142	3000 Cover (100x75)	1
2	10015107	3000 Head Attachment Bracket (60x60)	1
3	10015560	3000 Head (60x60)	1
4	10015610	Cover Bracket	2
5	10015612	Cover Bracket	1
6	119PSW	5mm x 0.5 Proximity Sensor	1
7	BUTSC008	M5 x 10 Button Head Socket Screw (ISO)	3
8	CAPSC018	M5 x 12 Cap Head Socket Screw (ISO)	7
9	CAPSC031	M6 x 20 Cap Head Socket Screw (ISO)	1
10	CAPSC075	M3 x 25 Cap Head Socket Screw (ISO)	4
11	HITEC063	Grey Spacer	4
12	PCB00013	Head PCB	1

10015090 60mm X-Axis Slide Assembly

Item No.	Stockcode	Description	Qty.
1	10007310	60mm Stepper Motor (Requires separate cable assy (stock code 10019446)	1
2	10009384	Proximity Holder Block	1
3	10014709	Ball Screw Support Unit FK	1
4	10014710	Motor Mounting Plate (3000)	1
5	10014718	Ball Screw Nut Flange	1
6	10014722	Modified Timing Pulley	1
7	10014760	Proximity Stricker	1
8	10014780	Taper Bush	1
9	10014781	Taper Bush	1
10	10014784	Timing Belt	1
11	10015087	X Slide Support Plate (60x60)	1
12	10015088	Ball Screw Bearing Mounting Plate	1
13	10015089	X Slide (60x60)	1
14	10015099	Miniature Linear Guide (145 Long)	2
15	10015100	Ball Screw	1
16	10015272	Lightened Timing Pulley	1
17	10015586	Retaining Slug	1
18	119PSW	5mm x 0.5 Proximity Sensor	1
19	CAPSC003	M3 x 10 Cap Head Socket Screw (ISO)	16
20	CAPSC004	M3 x 12 Cap Head Socket Screw (ISO)	16
21	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	3
22	CAPSC009	M4 x 12 Cap Head Socket Screw (ISO)	9
23	CAPSC019	M5 x 16 Cap Head Socket Screw (ISO)	2

10015092 60mm Y-Axis Slide Assembly
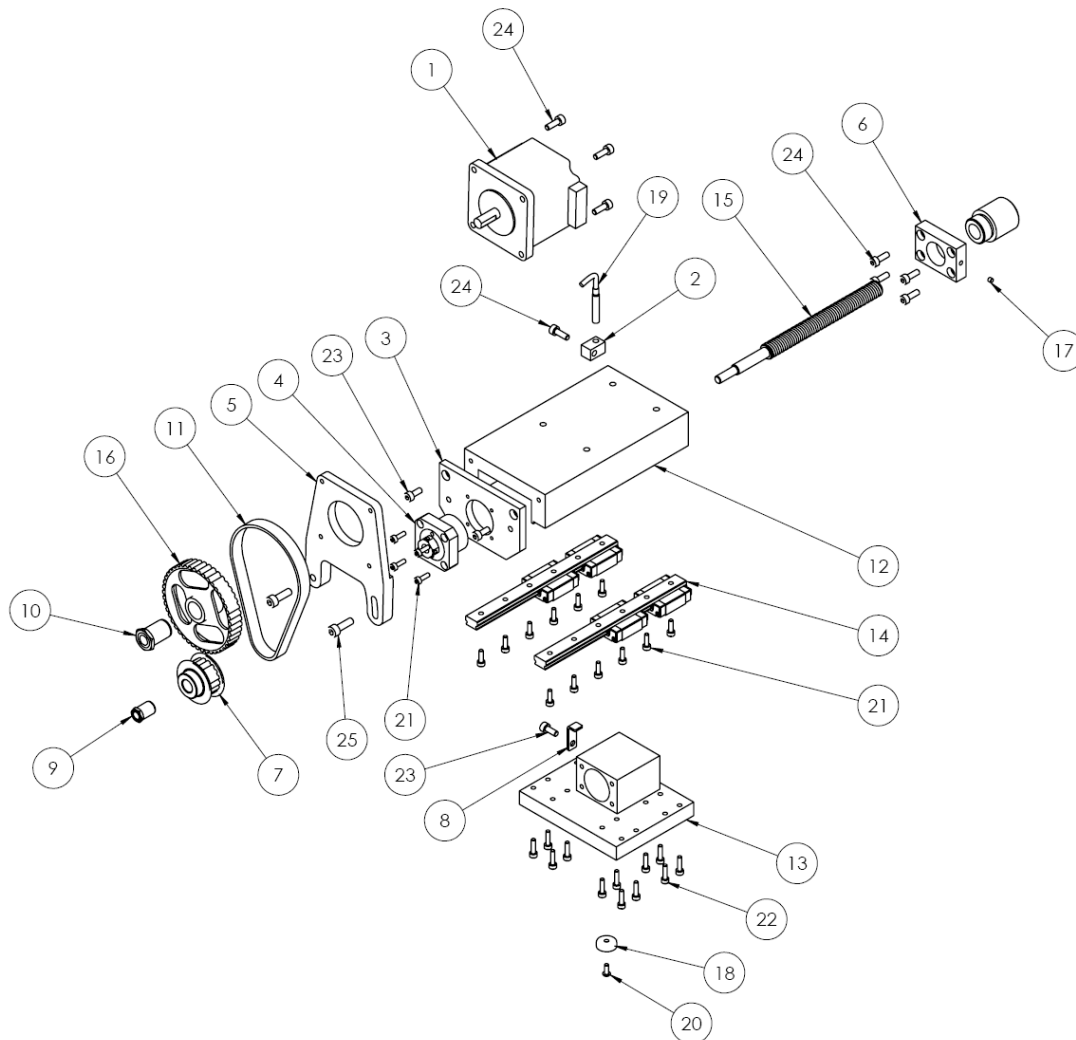
Item No.	Stockcode	Description	Qty.
1	10007310	60mm Stepper Motor (Requires separate cable assy (stock code 10019446)	1
2	10009384	Proximity Holder Block	1
3	10014706	Ball Screw Bearing Mounting Plate	1
4	10014709	Ball Screw Support Unit FK	1
5	10014710	Motor Mounting Plate (3000)	1
6	10014718	Ball Screw Nut Flange	1
7	10014722	Modified Timing Pulley	1
8	10014760	Proximity Stricker	1
9	10014780	Taper Bush	1
10	10014781	Taper Bush	1
11	10014784	Timing Belt	1
12	10015091	Y Slide Support Plate (60x60)	1
13	10015094	Y Slide (60x60, 100x100)	1
14	10015099	Miniature Linear Guide (145 Long)	2
15	10015100	Ball Screw	1
16	10015272	Lightened Timing Pulley	1
17	10015586	Retaining Slug	1
18	119IT930	Tap Washer	1
19	119PSW	5mm x 0.5 Proximity Sensor	1
20	BUTSC029	Button Head Socket M3 x 8	1
21	CAPSC003	M3 x 10 Cap Head Socket Screw (ISO)	16
22	CAPSC004	M3 x 12 Cap Head Socket Screw (ISO)	16
23	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	3
24	CAPSC009	M4 x 12 Cap Head Socket Screw (ISO)	9
25	CAPSC019	M5 x 16 Cap Head Socket Screw (ISO)	2

BenchDot 100-100

10017081 3000 100x100 Marking Head

Item No.	Stockcode	Description	Qty.
1	10021006	3000 Cover- mk2	1
2	10015107	3000 Head Attachment Bracket (60x60)	1
3	10017082	3000 Head Assembly 100x100 (Mech Assy)	1
4	10017129	Cover Bracket (100x100)	1
5	10017130	3000 Head Cover Bracket, Rear (100x100)	2
6	10017928	Front Pulley Cover 100x100 Head	1
7	119PSW	5mm x 0.5 Proximity Sensor	1
8	BUTSC001	M3 x 6 Button Head Socket Screw (ISO)	2
9	BUTSC008	M5 x 10 Button Head Socket Screw (ISO)	6
10	BUTSC035	M4 x 8 Button Head Socket Screw (ISO)	4
11	CAPSC019	M5 x 16 Cap Head Socket Screw (ISO)	4
12	CAPSC031	M6 x 20 Cap Head Socket Screw (ISO)	1
13	CAPSC075	M3 x 25 Cap Head Socket Screw (ISO)	4
14	HITEC063	Grey Spacer	4
15	HITEC237	Cable Tie Clamp	2
16	PCB00013	Head PCB	1

10017084 100mm X-AXIS SLIDE ASSEMBLY

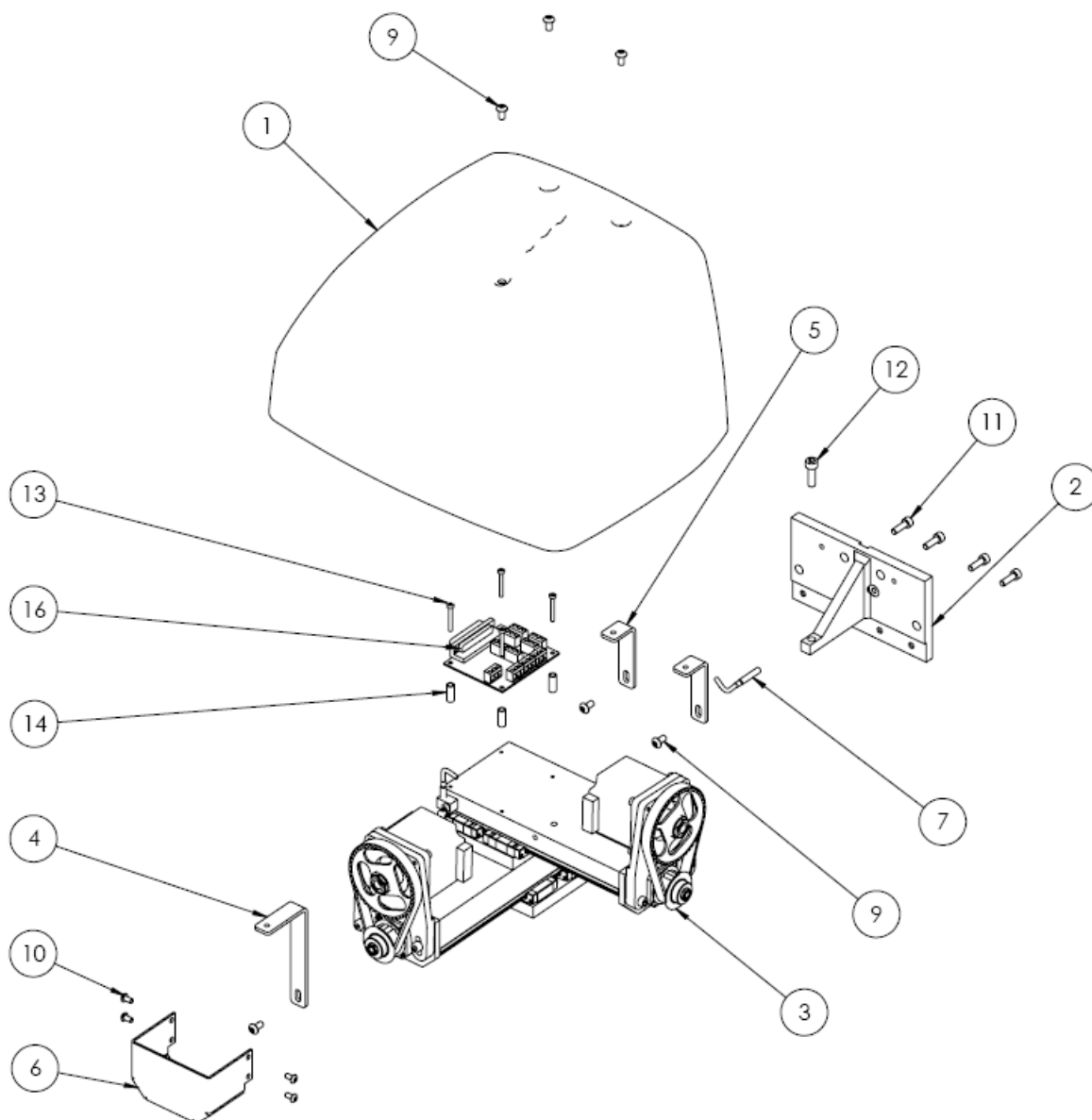| Item No.	Stockcode	Description	Qty.
1	10007310	60mm Stepper Motor (Requires separate cable assy (stock code 10019446)	1
2	10009384	Proximity Holder Block	1
3	10014709	Ball Screw Support Unit FK	1
4	10014710	Motor Mounting Plate (3000)	1
5	10014718	Ball Screw Nut Flange	1
6	10014722	Modified Timing Pulley	1
7	10014760	Proximity Stricker	1
8	10014780	Taper Bush	1
9	10014781	Taper Bush	1
10	10014784	Timing Belt	1
11	10015088	Ball Screw Bearing Mounting Plate	1
12	10015089	X Slide (60x60)	1
13	10015272	LIGHTENED TIMING PULLEY	1
14	10015586	Retaining Slug	1
15	10017086	X Slide Support Plate 100mm	1
16	10017087	Miniature Linear Guide	2
17	10017090	Ball Screw	1
18	119PSW	5mm x 0.5 Proximity Sensor	1
19	CAPSC003	M3 x 10 Cap Head Socket Screw (ISO)	20
20	CAPSC004	M3 x 12 Cap Head Socket Screw (ISO)	16
21	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	3
22	CAPSC009	M4 x 12 Cap Head Socket Screw (ISO)	9
23	CAPSC019	M5 x 16 Cap Head Socket Screw (ISO)	2

10017083 100mm Y-AXIS SLIDE ASSEMBLY
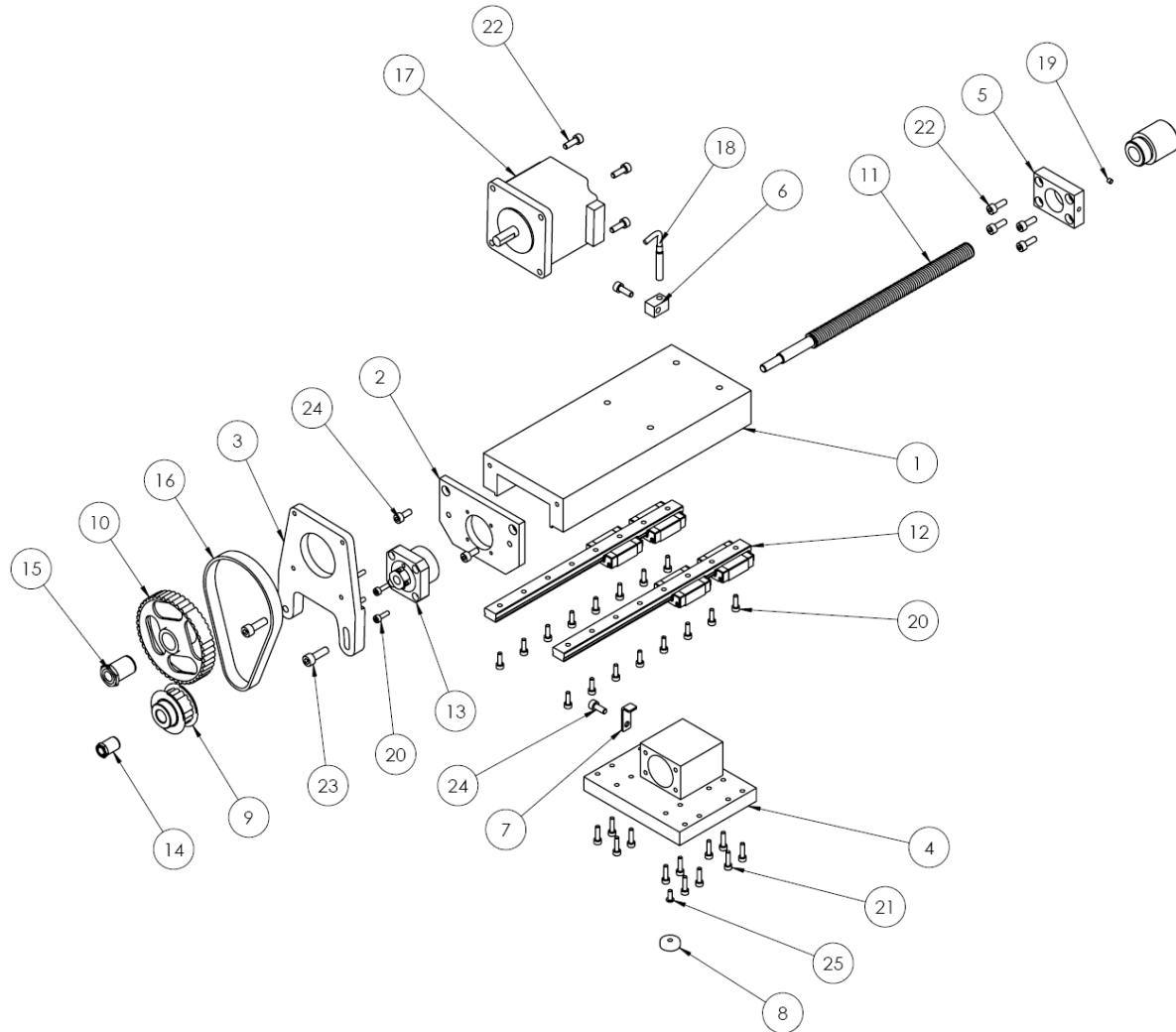
Item No.	Stockcode	Description	Qty.
1	10017085	Y Slide Support Plate (100x100)	1
2	10014706	Ball Screw Bearing Mounting Plate	1
3	10014710	Motor Mounting Plate (3000)	1
4	10015094	Y Slide (60x60, 100x100)	1
5	10014718	Ball Screw Nut Flange	1
6	10009384	Proximity Holder Block	1
7	10014760	Proximity Stricker	1
8	119IT930	Tap Washer	1
9	10014722	Modified Timing Pulley	1
10	10015272	LIGHTENED TIMING PULLEY	1
11	10017090	Ball Screw	1
12	10017087	Miniature Linear Guide	2
13	10014709	Ball Screw Support Unit	1
14	10014780	Taper Bush	1
15	10014781	Taper Bush	1
16	10014784	Timing Belt	1
17	10007310	60mm Stepper Motor (Requires separate cable assy (stock code 10019446)	1
18	119PSW	5mm x 0.5 Proximity Sensor	1
19	10015586	Retaining Slug	1
20	CAPSC003	M3 x 10 Cap Head Socket Screw (ISO)	20
21	CAPSC004	M3 x 12 Cap Head Socket Screw (ISO)	16
22	CAPSC009	M4 x 12 Cap Head Socket Screw (ISO)	9
23	CAPSC019	M5 x 16 Cap Head Socket Screw (ISO)	2
24	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	3
25	BUTSC029	Button Head Socket M3 x 8	1

3000 BenchDot 150-150
10014713 3000 150x150 Marking Head
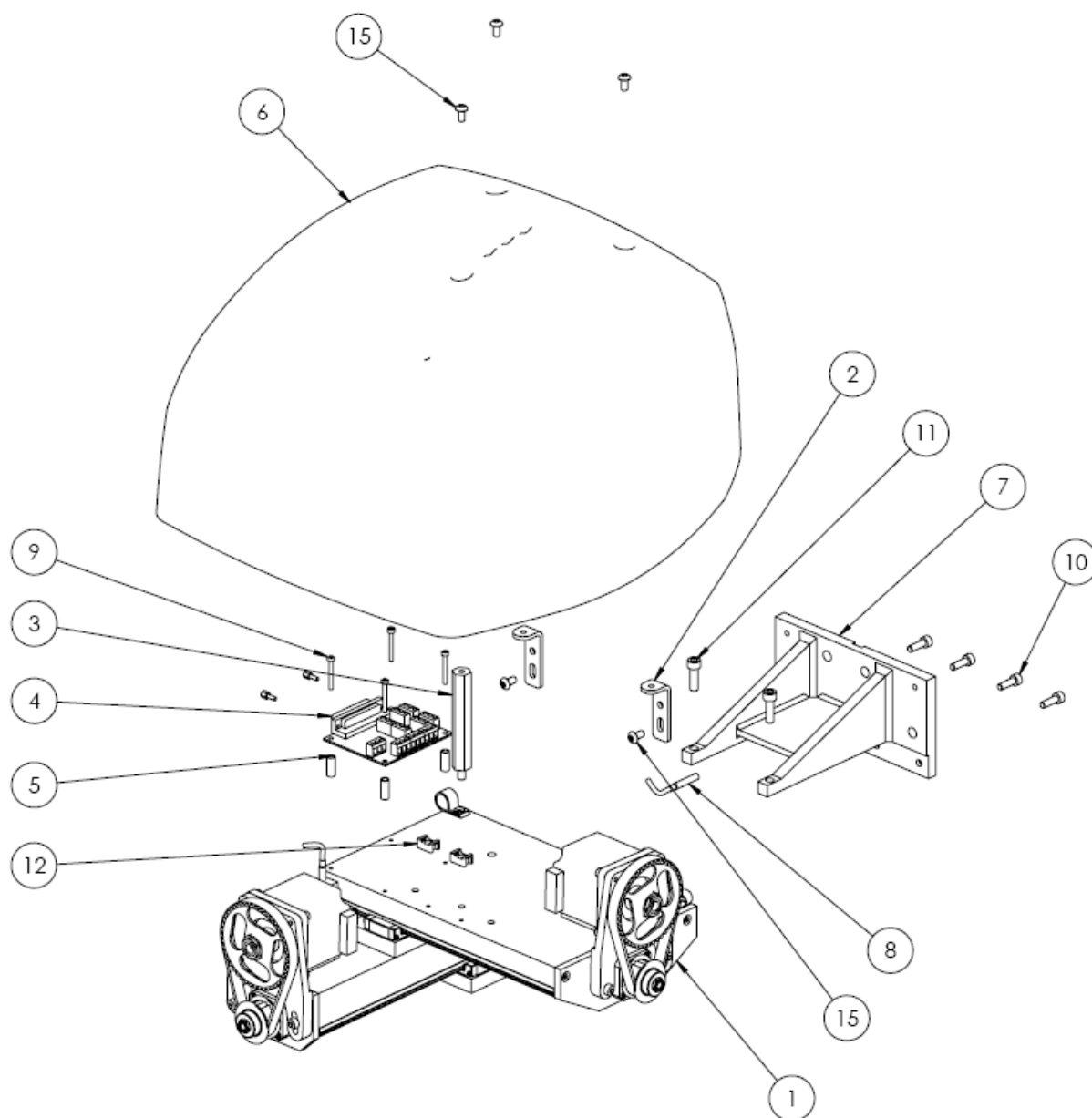
Item No.	Stockcode	Description	Qty.
1	10016132	3000 Head Assembly 150x150 (Mech Assy)	1
2	10014755	Cover Bracket	2
3	10014756	Cover Support Pillar	1
4	PCB00013	Head PCB	1
5	HITEC063	Grey Spacer	4
6	10014730	3000 Cover - 150x150 Head	1
7	10014687	Attachment Bracket	1
8	119PSW	5mm x 0.5 Proximity Sensor	1
9	CAPSC075	M3 x 25 Cap Head Socket Screw (ISO)	4
10	CAPSC019	M5 x 16 Cap Head Socket Screw (ISO)	4
11	CAPSC031	M6 x 20 Cap Head Socket Screw (ISO)	2
12	HITEC237	Cable Tie Clamp	2
13	HITEC017	Self Adhesive 2.5mm Cable Tie Base	5
14	HITEC016	M3 x 6 Pan Head Screw	3
15	BUTSC008	M5 x 10 Button Head Socket Screw (ISO)	5
16	HITEC189	M3 x 8 Screwlock	2

10014701 150mm X-Axis Slide Assembly
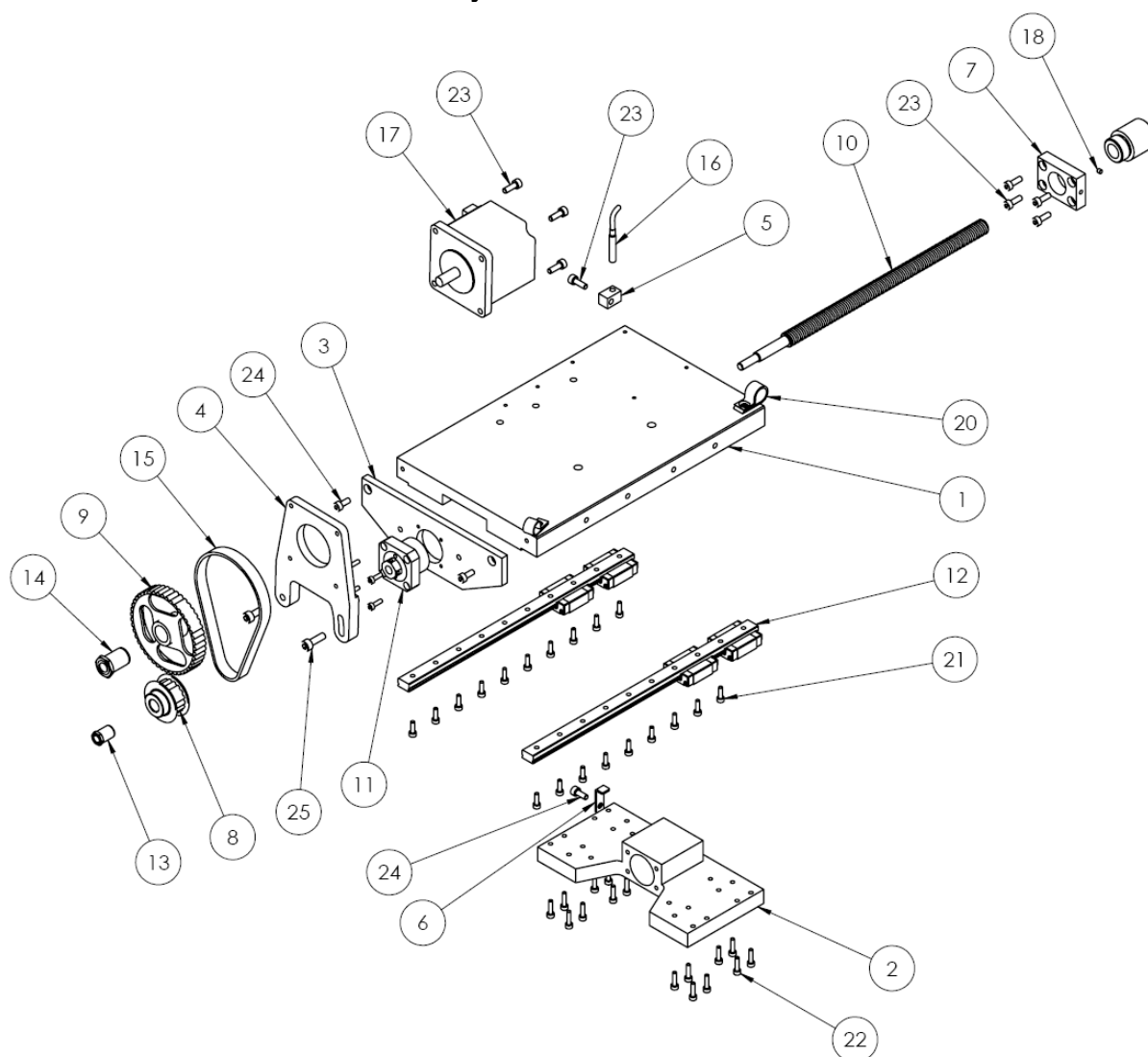
Item No.	Stockcode	Description	Qty.
1	10014676	X Slide Support Plate	1
2	10014702	X Slide	1
3	10014744	Ball Screw Bearing Mounting Plate	1
4	10014710	Motor Mounting Plate (3000)	1
5	10009384	Proximity Holder Block	1
6	10014760	Proximity Stricker	1
7	10014718	Ball Screw Nut Flange	1
8	10014722	Modified Timing Pulley	1
9	10015272	Lightened Timing Pulley	1
10	10014721	Ball Screw	1
11	10014709	Ball Screw Support Unit	1
12	10014766	Miniature Linear Guide (245 Long)	2
13	10014780	Taper Bush	1
14	10014781	Taper Bush	1
15	10014784	Timing Belt	1
16	119PSW	5mm x 0.5 Proximity Sensor	1
17	10007310	60mm Stepper Motor (Requires separate cable assy (stock code 10019446)	1
18	10015586	Retaining Slug	1
19	HITEC079	Cable Clamp	1
20	HITEC238	Cable Clamp	1
21	CAPSC003	M3 x 10 Cap Head Socket Screw (ISO)	24
22	CAPSC004	M3 x 12 Cap Head Socket Screw (ISO)	16
23	CAPSC009	M4 x 12 Cap Head Socket Screw (ISO)	9
24	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	3
25	CAPSC019	M5 x 16 Cap Head Socket Screw (ISO)	2

10013853 150mm Y-Axis Slide Assembly
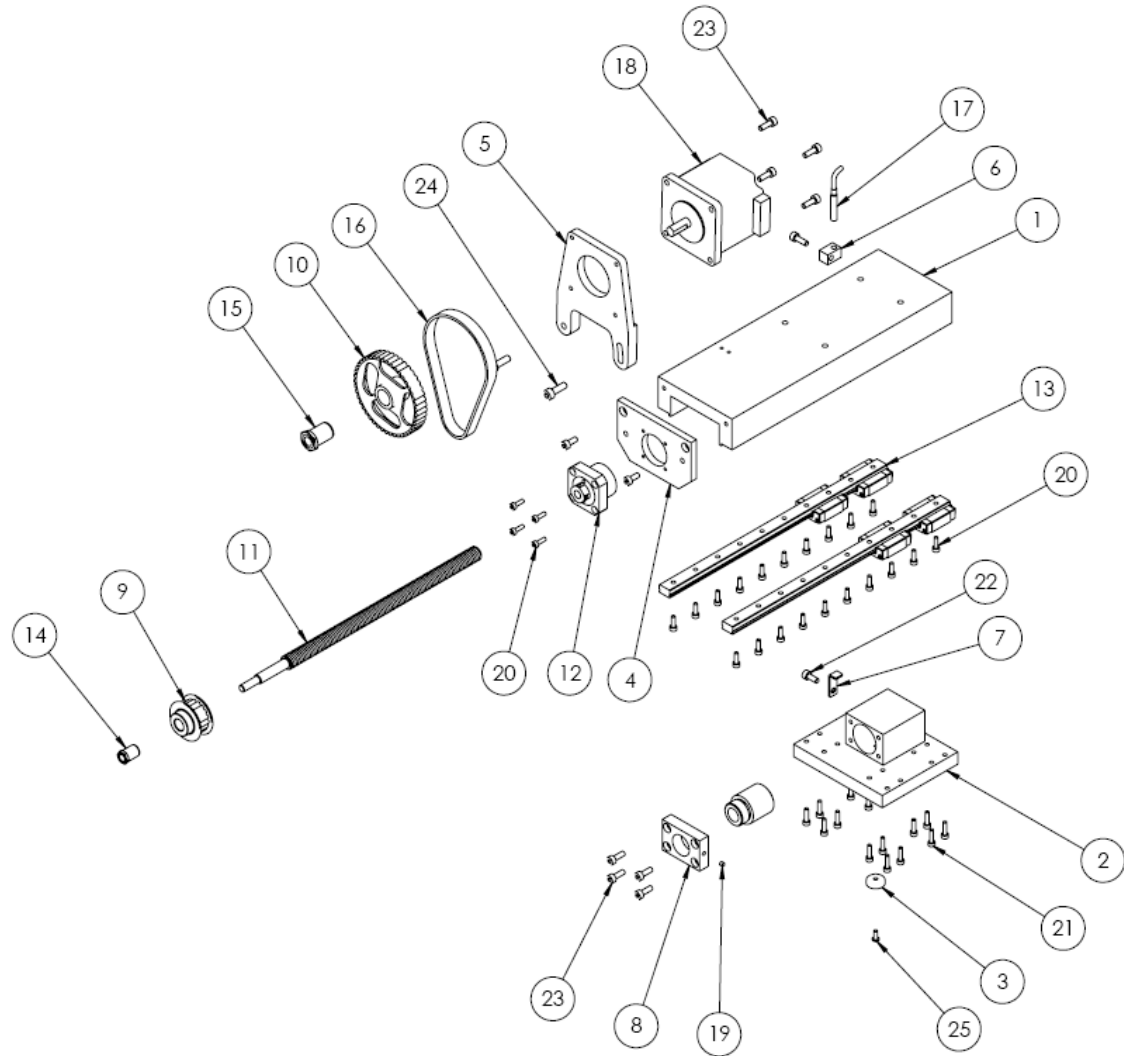
Item No.	Stockcode	Description	Qty.
1	10014677	Y Slide Support Plate	1
2	10014704	Y Slide (150x150, 300x150)	1
3	119IT930	Tap Washer	1
4	10014706	Ball Screw Bearing Mounting Plate	1
5	10014710	Motor Mounting Plate (3000)	1
6	10009384	Proximity Holder Block	1
7	10014760	Proximity Stricker	1
8	10014718	Ball Screw Nut Flange	1
9	10014722	Modified Timing Pulley	1
10	10015272	Lightened Timing Pulley	1
11	10014721	Ball Screw	1
12	10014709	Ball Screw Support Unit FK	1
13	10014766	Miniature Linear Guide (245 Long)	2
14	10014780	Taper Bush	1
15	10014781	Taper Bush	1
16	10014784	Timing Belt	1
17	119PSW	5mm x 0.5 Proximity Sensor	1
18	10007310	60mm Stepper Motor (Requires separate cable assy (stock code 10019446)	1
19	10015586	Retaining Slug	1
20	CAPSC003	M3 x 10 Cap Head Socket Screw (ISO)	24
21	CAPSC004	M3 x 12 Cap Head Socket Screw (ISO)	16
22	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	3
23	CAPSC009	M4 x 12 Cap Head Socket Screw (ISO)	9
24	CAPSC019	M5 x 16 Cap Head Socket Screw (ISO)	2
25	BUTSC029	M3 x 8 Button Head Socket Screw	1

BenchDot 300-150

10016183 3000 300x150 Marking Head

Item No.	Stockcode	Description	Qty.
1	10014755	3000 Head Cover Bracket	2
2	10016184	3000 Head Assembly 300x150 (Mech Assy)	1
3	10016187	Attachment Bracket	1
4	10017946	3000 300 x 150 Head Cover	1
5	10018002	Cable Chain + Bracket	1
6	10018037	Guard Support Pillar assby	2
7	10018604	Label. Pryor Multidot 3000 (85 x 34)	1
8	119PSW	5mm x 0.5 Proximity Sensor	1
9	BUTSC008	M5 x 10 Button Head Socket Screw (ISO)	4
10	HITEC063	Grey Spacer	4
11	PCB00013	Head PCB	1

10016171 300mm X-Axis Slide Assembly

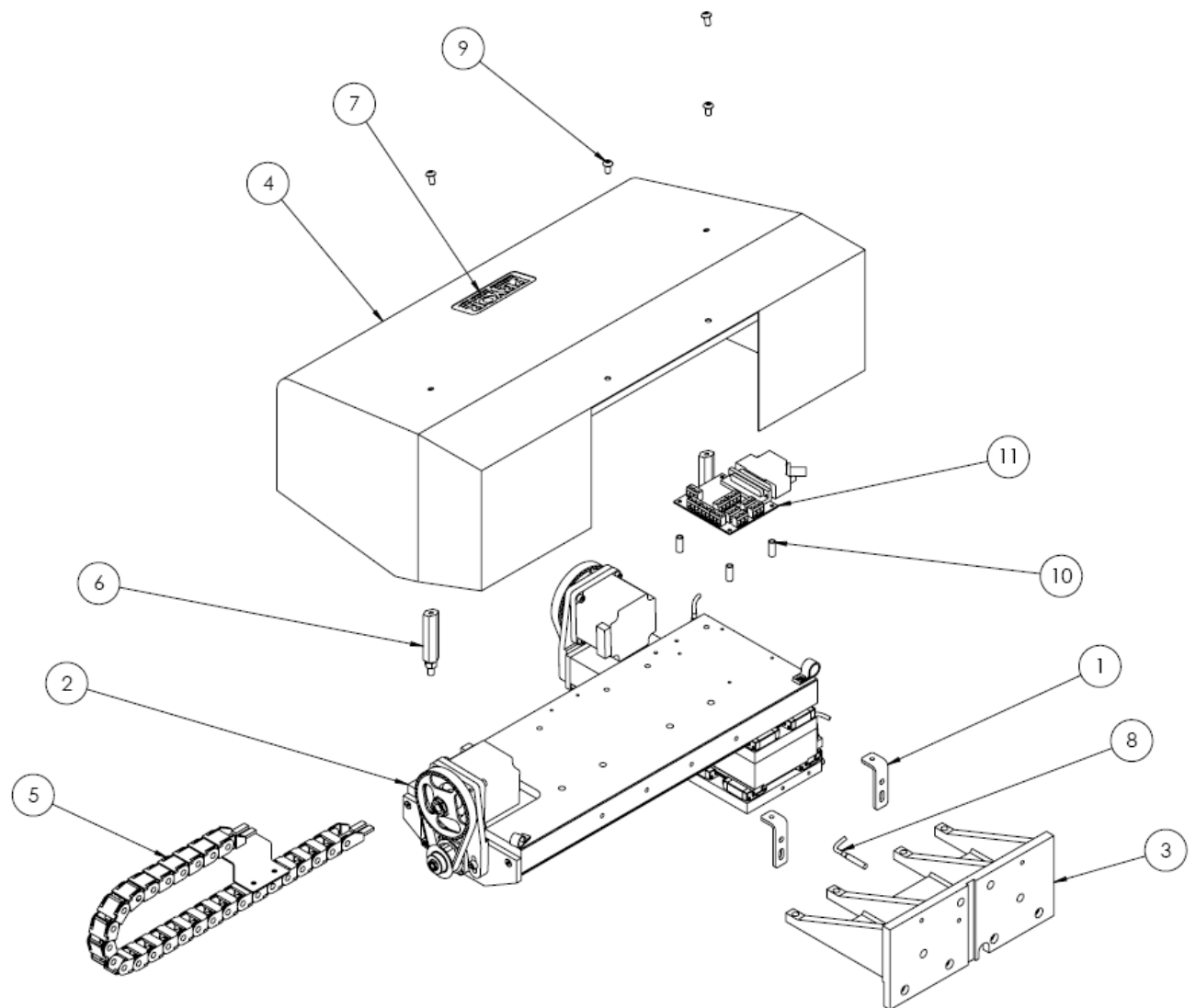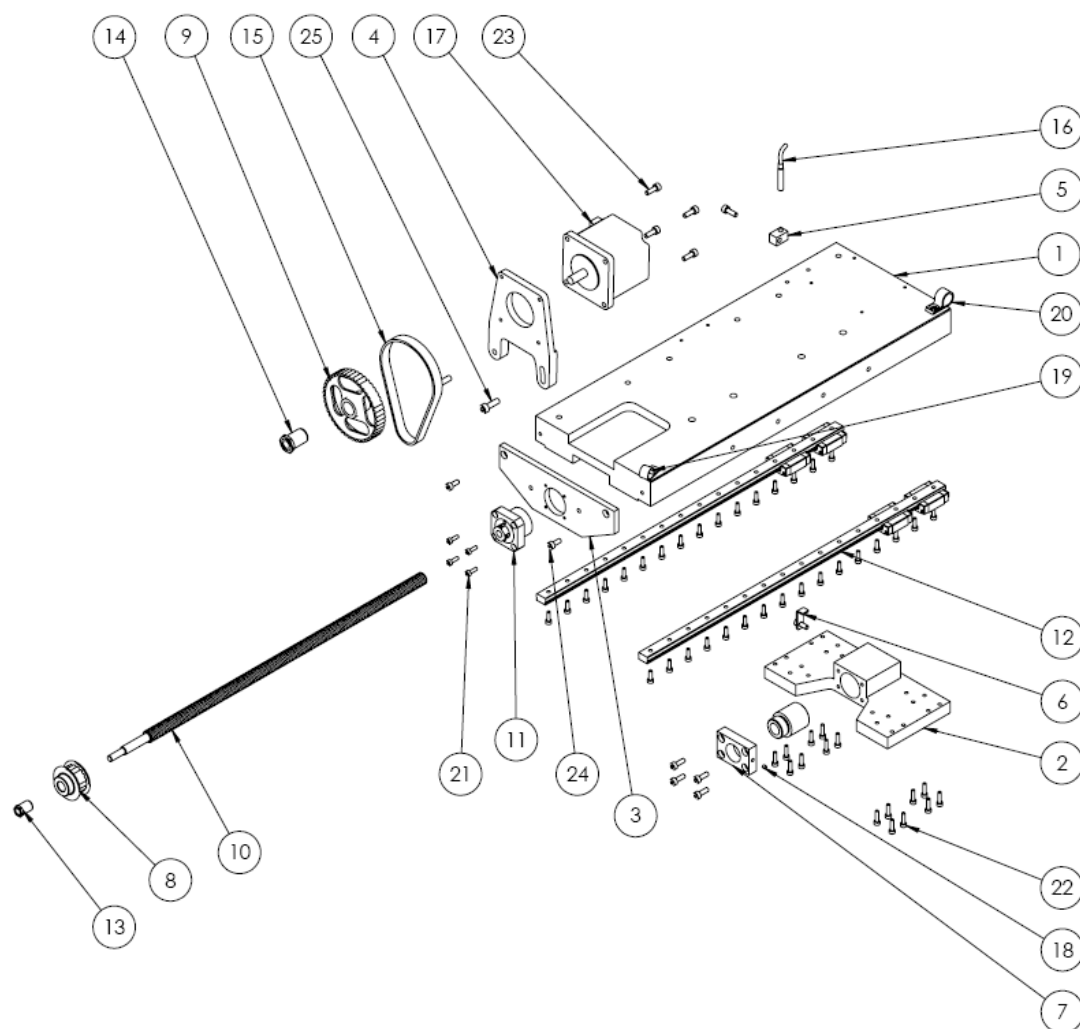| Item No.	Stockcode	Description	Qty.
1	10016172	X Slide Support Plate 300mm	1
2	10014702	X Slide	1
3	10014744	Ball Screw Bearing Mounting Plate	1
4	10014710	Motor Mounting Plate (3000)	1
5	10009384	Proximity Holder Block	1
6	10014760	Proximity Stricker	1
7	10014718	Ball Screw Nut Flange	1
8	10014722	Modified Timing Pulley	1
9	10015272	Lightened Timing Pulley	1
10	10016179	Ball Screw	1
11	10014709	Ball Screw Support Unit FK	1
12	10016177	Miniature Linear Guide (395 Long)	2
13	10014780	Taper Bush	1
14	10014781	Taper Bush	1
15	10014784	Timing Belt	1
16	119PSW	5mm x 0.5 Proximity Sensor	1
17	10007310	60mm Stepper Motor (Requires separate cable assy (stock code 10019446)	1
18	10015586	Retaining Slug	1
19	HITEC079	Cable Clamp	1
20	HITEC238	Cable Clamp	1
21	CAPSC003	M3 x 10 Cap Head Socket Screw (ISO)	36
22	CAPSC004	M3 x 12 Cap Head Socket Screw (ISO)	16
23	CAPSC009	M4 x 12 Cap Head Socket Screw (ISO)	9
24	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	3
25	CAPSC019	M5 x 16 Cap Head Socket Screw (ISO)	2

10010046 Electric Solenoid Assembly

Shown With 100mm
Stylus & Nosepiece
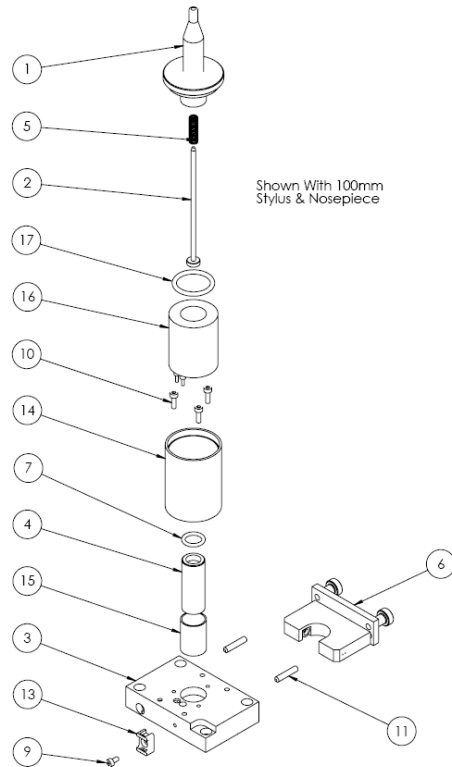
Item No.	Stockcode	Description	Qty.
1	See Separate Sheet	Nosepiece	1
2	See Separate Sheet	Stylus	1
3	10010040	HI RC Plate	1
4	10010054	HI Slug	1
5	10013200	Styli Spring	1
6	10016155	Autosense - Plug In Module	1
7	2M07	O-Ring	1
8	CABLE005	Punch cable 760mm long	1
9	CAPSC001	M3 x 6 Cap Socket Hd. Screw	1
10	CAPSC003	M3 x 10 Cap Head Socket Screw (ISO)	3
11	GRUB0008	M4 x 20 Cup Point Grub Screw (ISO)	2
12	HITEC199	Terminal Block	1
13	HITEC237	Cable Tie Clamp	1
14	LD200005	Solenoid Housing	1
15	LD200020	Armature Guide Bush	1
16	PMHIT016	Solenoid Coil	1
17	SEAL0002	O-Ring	1

Stylus & Nosepiece Range
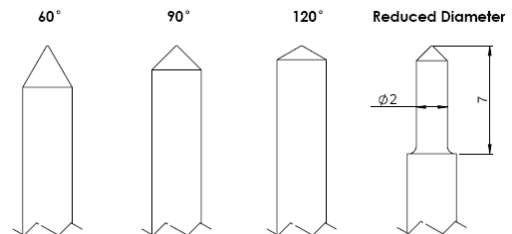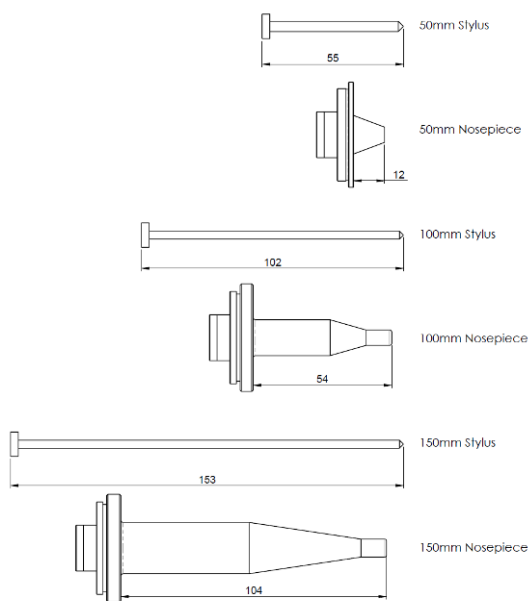
Part No.	Description
10020166	50mm Nosepiece Assembly
10020164	100mm Nosepiece Assembly
10020170	150mm Nosepiece Assembly

Part No.	Description
EP119S1	Stylus 1/8" x 100mm 90deg
EP119S15	Stylus 1/8" x 150mm 90deg
EP119S45	Stylus 4mm x 50mm 90deg
10000536	Stylus 1/8" x 100mm 60deg IAQG Spec
10000537	Stylus 1/8" x 100mm 120deg IAQG Spec
10000603	Stylus 1/8" x 100mm 90deg IAQG Spec
10000601	Stylus 4mm x 50mm 90deg IAQG Spec
10000602	Stylus 4mm x 50mm 120deg IAQG Spec
10001885	Stylus 1/8" x 150mm 90deg IAQG Spec
10001886	Stylus 1/8" x 150mm 120deg IAQG Spec
10008757	Stylus 1/8" x 100mm 90deg IAQG Spec, Reduced Dia
10008771	Stylus 1/8" x 100mm 120deg IAQG Spec, Reduced Dia
10010087	Diamond Stylus 1/8" x 100 120deg IAQG
10017945	Diamond Stylus 1/8" x 150 120deg IAQG

Note:
IAQG (International Aerospace Quality Group) Spec Has Radius Tip

InDot 50-25

Integrator 50-25 Assembly
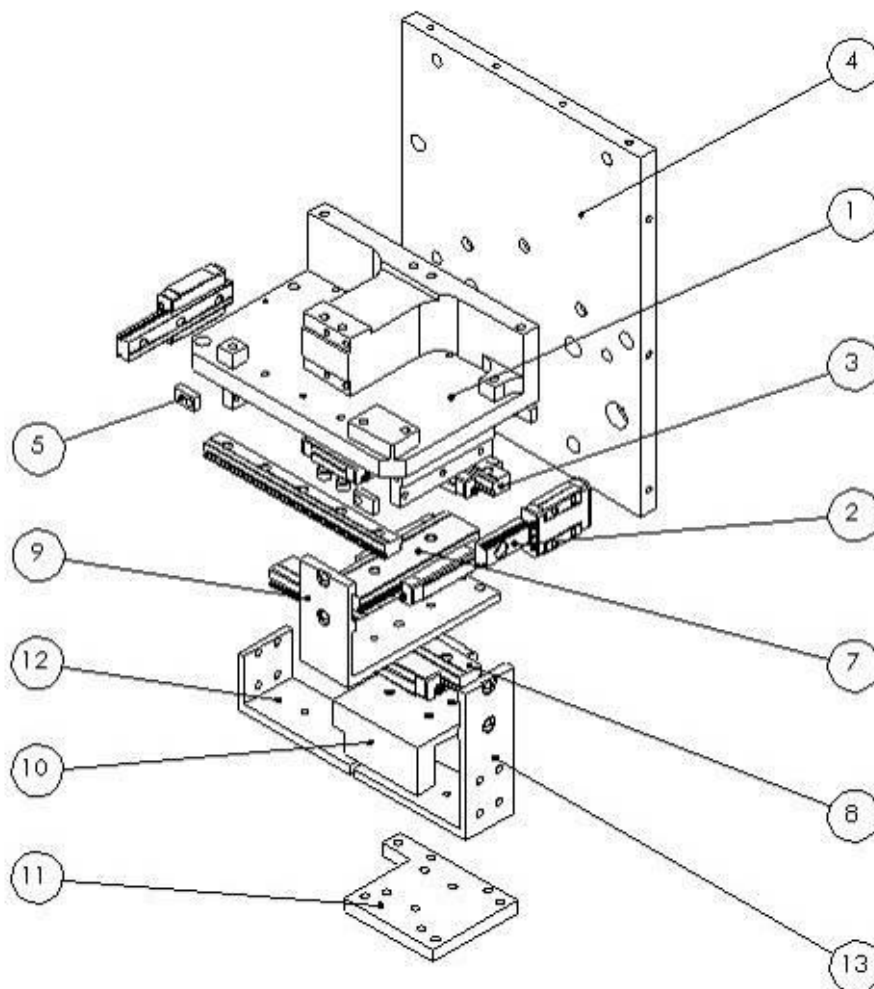
Item No.	Stockcode	Description	Qty.
1	10020866	Chassis Plate	1
2	10020920	Rail - Carriage assy - MGN9C, 55mm long	2
3	10020921	Rail Assy - MGN9 x 95mm long rail	2
4	10020958	Back plate	1
5	10021009	Carriageway end stop	4
6	10021072	Proximity actuation block	1
7	10021742	MGW9 rail assy,	1
8	10021747	MGN12 rail assembly, 100mm long	1
9	10021748	Brace Strip - short	1
10	10021752	Carriage	1
11	10021758	Carriage Brace	1
12	10021932	Brace strip - long	1
13	10021933	Brace strip - short	1
14	CAPSC001	M3 x 6 Cap Socket Hd. Screw	8
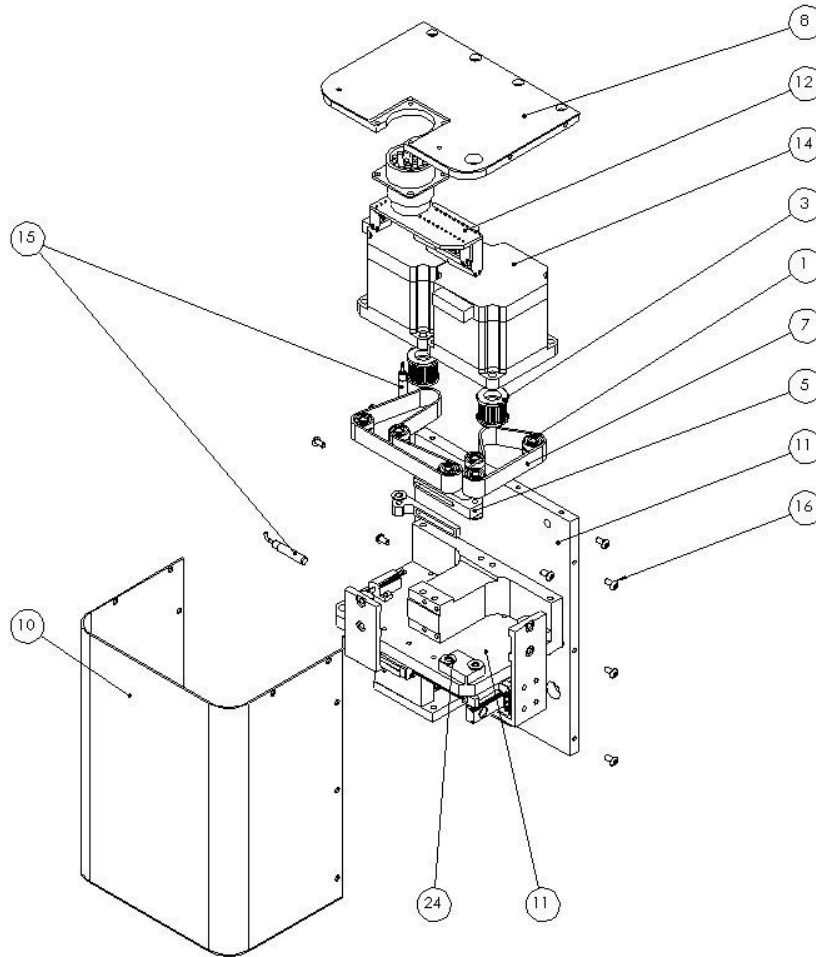
Item No.	Stockcode	Description	Default/Qty.
1	10008005	Deep Groove Ball Bearing, Ø4 x Ø12 x 4 Wide	18
2	10014032	Taper Lock Bush	2
3	10020954	Timing Pulley - Modified	2
4	10020973	12mm Belt Clamp	2
5	10021007	Belt tensioner	2
6	10021024	Timing Belt - 2.5mm pitch, 12mm wide, 265mm long	1
7	10021027	Timing Belt - 2.5mm pitch, 12mm wide, 160mm long	1
8	10021040	Top Plate	1
9	10021084	Male contacts for plugs, size 16	20
10	10021128	50-25 cover with guard mounting points	1
11	10021737	5025 Chassis	1
12	10022287	Head interface PCB assy - compact connector	1
13	119EL	Label. Pryor (60 x 20)	1
14	119IT875	2 Phase Stepper Motor, 1.8° Step With 320mm Cable	2
15	119PSW	M5 x 0.5 PNP Inductive Proximity Sensor	2
16	BUTSC001	M3 x 6 Button Head Socket Screw (ISO)	10
17	CAPSC001	M3 x 6 Cap Socket Hd. Screw	28
18	CAPSC002	M3 x 8 Cap Head Socket Screw (ISO)	20
19	CAPSC003	M3 x 10 Cap Head Socket Screw (ISO)	1
20	CAPSC004	M3 x 12 Cap Head Socket Screw (ISO)	1
21	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	4
22	CAPSC012	M4 x 20 Cap Head Socket Screw (ISO)	2
23	CAPSC013	M4 x 25 Cap Head Socket Screw (ISO)	4
24	WASH0002	M4 Plain Washer	12

InDot 130-30

10028636 InDot130-30 Marking Head
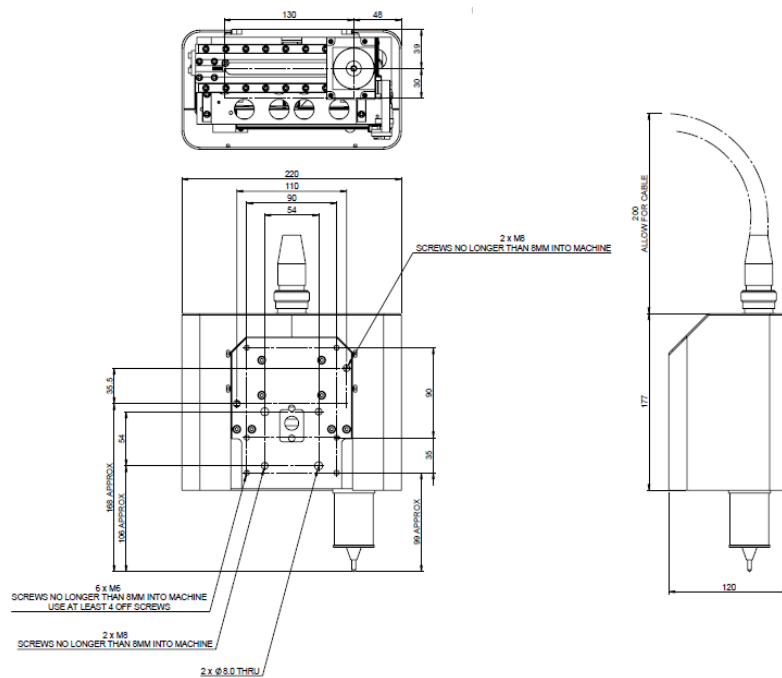
10027339 130-30 Mechanism

Item No.	StockCode	Description	Qty.
1	119PSW	Proximity Sensor	4
2	10008005	Bearing	28
3	10009473	Nylon P-Clip	2
4	10022287	Head interface PCB assy - compact connector	1
5	10023011	LED Tape	1
6	10023275	Timing Belt (Long)	1
7	10025282	Linear Rail (75mm Long)	2
8	10025328	Linear Rail (175mm Long)	2
9	10027331	X-Y Base Plate	1
10	10027334	Brace plate	2
11	10027338	Base Plate	1
12	10027344	Motor Spacer	2
13	10027354	Linear Rail (155mm Long)	1
14	10027365	Linear Rail (60mm Long)	1
15	10027368	Nosepiece mounting plate	1
16	10027372	Slide support	1
17	10027373	Slide brace	1
18	10027379	Drive plate	1
19	10027382	Proxy bracket	1
20	10027388	Timing Pulley	2
21	10027395	Fixed Roller Spacer	5
22	10027397	Belt clamp spacer	1
23	10027398	Belt Roller Support	2
24	10027570	Proxy bracket	1
25	10027573	Proxy flag	2
26	10027587	Belt clamp	2
27	10027628	Shaft Coupling	2
28	10027972	Intermediate rail mounting plate	1
29	10027983	Timing Belt (Short)	1
30	10028641	Integrator PCB mounting plate	1
31	10029638	LED mask	1
32	10031099	Motor	2
33	10031252	Large Washer	3
34	80000510	M2 x 5 Cap Head Socket Screw	4
35	BUTSC001	M3 x 6 Button Head Socket Screw (ISO)	2
36	CAPSC001	M3 x 6 Cap Head Socket Screw (ISO)	14
37	CAPSC002	M3 x 8 Cap Head Socket Screw (ISO)	48
38	CAPSC004	M3 x 12 Cap Head Socket Screw (ISO)	1
39	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	16
40	CAPSC013	M4 x 25 Cap Head Socket Screw (ISO)	7
41	CAPSC113	M2 x 8 Cap Head Socket Screw (ISO)	16
42	CAPSC114	M2 x 12 Cap Head Socket Screw (ISO)	4
43	DOWEL001	3 x 10 Dowel Pin (ISO)	1
44	HITEC199	Terminal Block	1
45	WASH0001	M3 Plain Washer	2
46	WASH0002	M4 Plain Washer	7

InDot 60-60
10015098 Integrator 60-60 Assembly
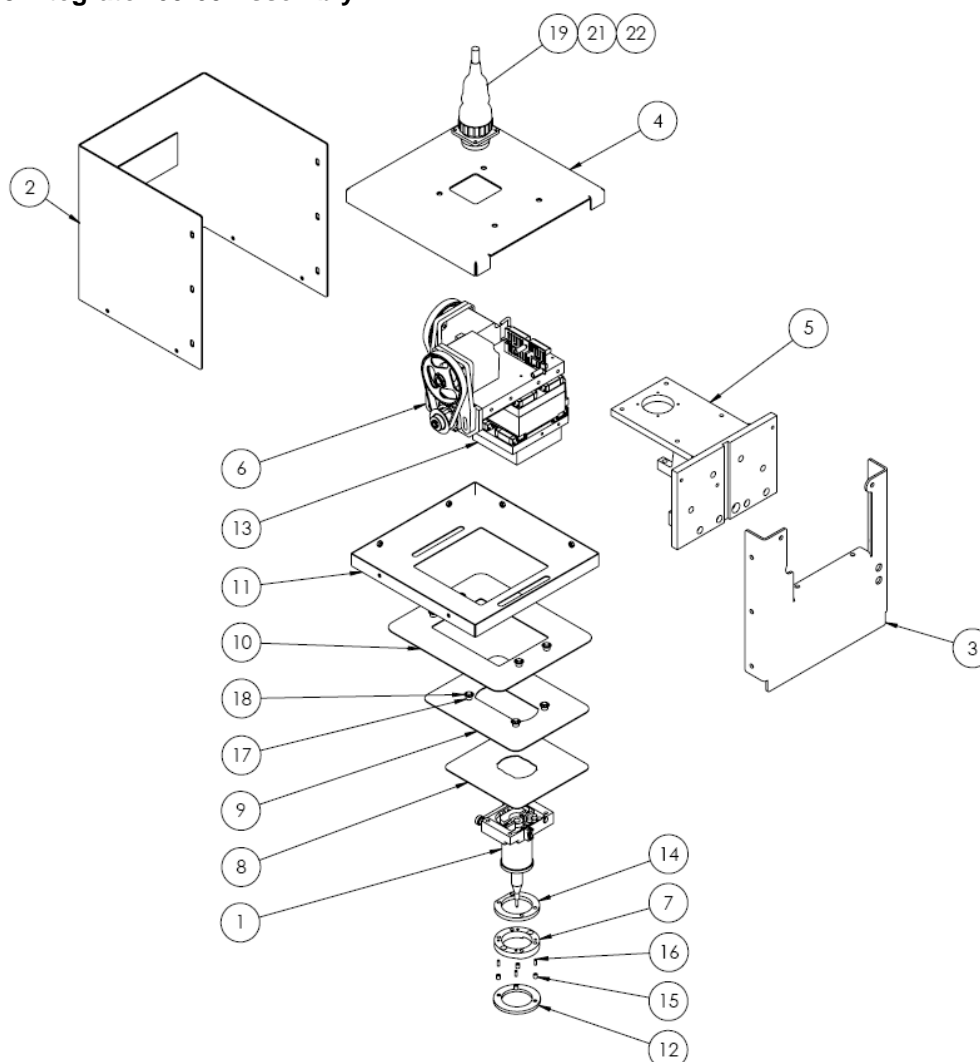
Item No.	Stockcode	Description	QTY.
1	10010046	HI Stylus	1
2	10015437	Integrator Cover (60x60)	1
3	10015438	Integrator Back Cover (60x60)	1
4	10015439	Integrator Top Cover (60x60)	1
5	10015446	Integrator Bracket (60x60)	1
6	10015560	3000 Head (60x60)	1
7	10016024	Cover Plate Guide Ring	1
8	10016032	Integrator XY Slide Plate (60x60)	1
9	10016033	Integrator Y Slide Cover Plate (60x60)	1
10	10016035	Integrator X Slide Cover Plate (60x60)	1
11	10016036	Integrator Fixed Lower Cover (60x60)	1
12	10016222	Collar	1
13	10016226	Solenoid Spacer Block	1
14	10016232	Spacer	1
15	10016431	Roller	4
16	10016594	Dowel Pin Ø3 x 8	4
17	10017594	Roller	8
18	10017596	External Fixing Washer - Ø6 Shaft	8
19	10019490	10 Metre Compact integrator cable Assby	1
20	10019496	Compact Integrator PCB & Accessories	1
21	10019500	6 Metre Compact integrator cable Assby	1
22	10019501	3 Metre Compact integrator cable Assby	1
23	HITEC063	Grey Spacer	2

InDot 150-150

10016749 Integrator 150-150 Assembly
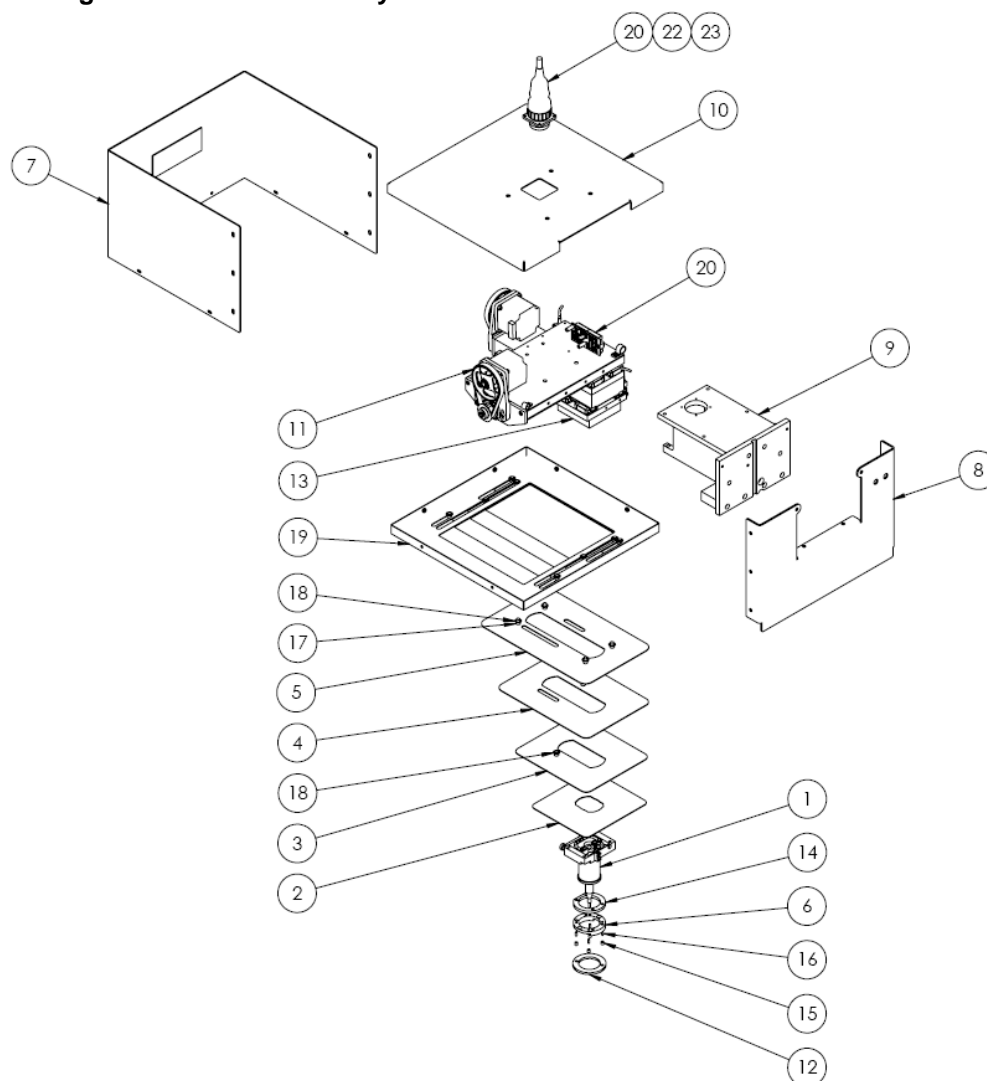
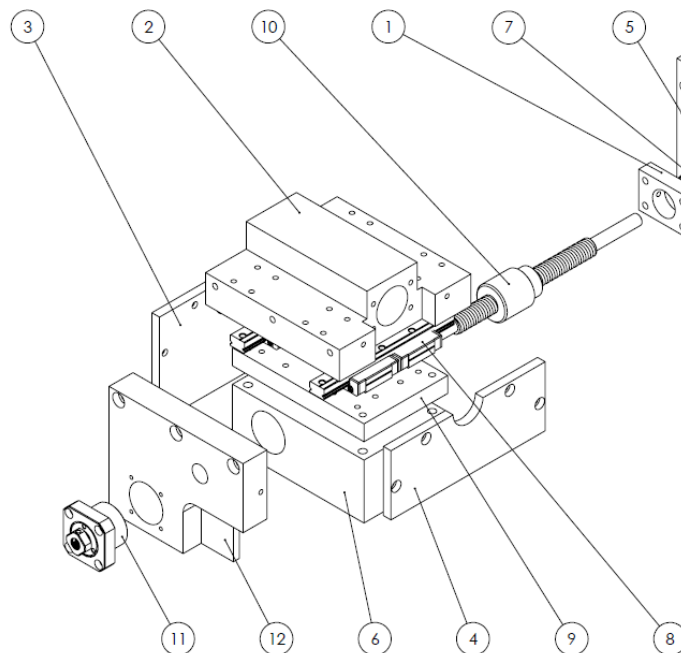| Item No.	Stockcode	Description	Qty.
1	10010046	HI Stylus	1
2	10016067	Integrator XY Slide Plate (150x150)	1
3	10016068	Integrator Y Slide Cover Plate (150x150)	1
4	10016070	Integrator Y Slide Cover Plate (150x150)	1
5	10016071	Integrator Y Slide Cover Plate (150x150)	1
6	10016102	Cover Plate Guide Ring	1
7	10016104	Integrator Cover (150x150)	1
8	10016105	Integrator Back Cover (150x150)	1
9	10016106	Integrator Bracket (150x150)	1
10	10016115	Integrator Top Cover (150x150)	1
11	10016132	3000 Head Assembly 150x150 (Mech Assy)	1
12	10016222	Collar	1
13	10016226	Solenoid Spacer Block	1
14	10016232	Spacer	1
15	10016431	Roller	4
16	10016594	Dowel Pin Ø3 x 8	4
17	10017594	Roller	6
18	10017596	External Fixing Washer - Ø6 Shaft	6
19	10017599	X Slide Cover Plates - 150x150 Integrator	1
20	10019490	10 Meter Compact Integrator cable Assby	1
21	10019496	Compact Integrator PCB & Accessories	1
22	10019500	6 Meter Compact Integrator cable Assby	1
23	10019501	3 Metre Compact integrator cable Assby	1
24	HITEC063	Grey Spacer	2

InScribe 140-40

10019783 Assembly
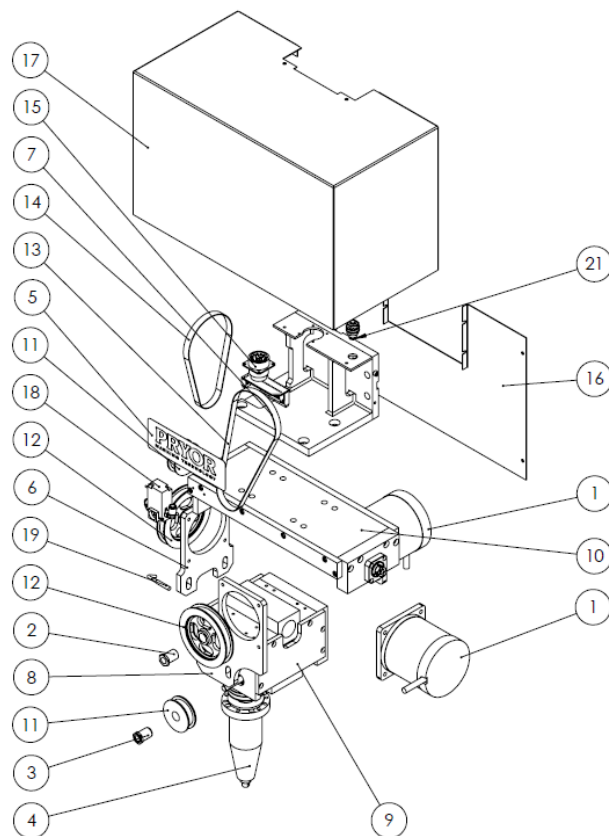
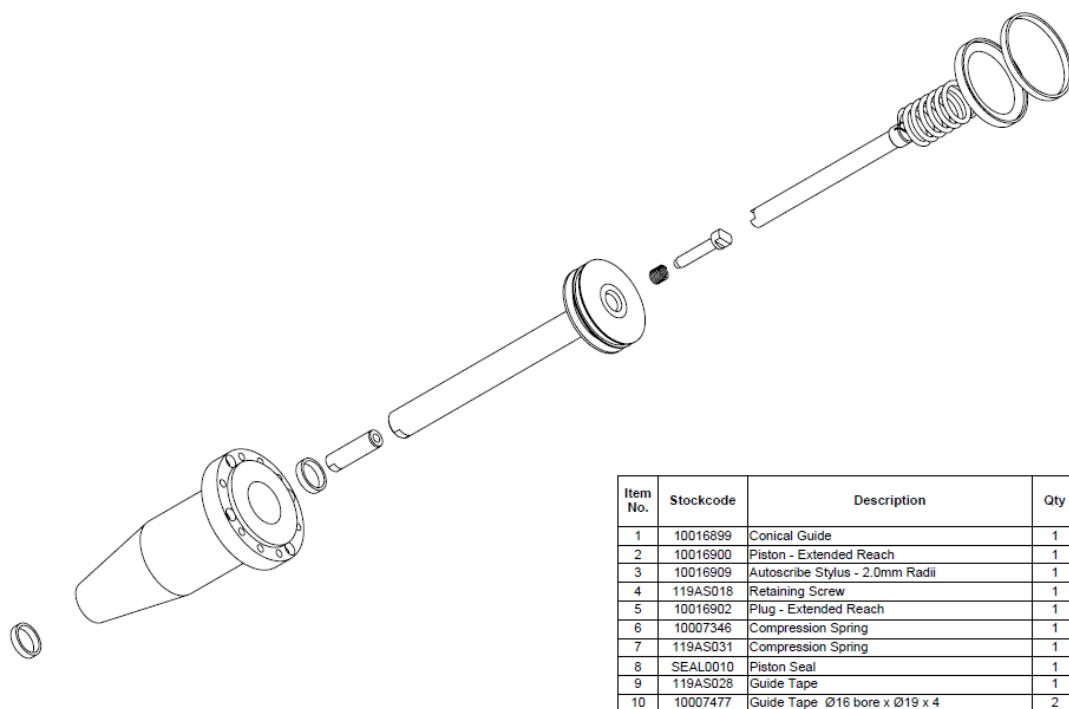| Item No.	Stockcode	Description	Qty.
1	10003491	Size 34 Double Mini Angle Type Stepper Motor 2.8 Amp	2
2	10012908	Taper Bush	2
3	10014781	Taper Bush	2
4	10016897	Autoscribe Head - Extended Reach	1
5	10018590	PRYOR label (150x50)	1
6	10019889	X-Axis motor mount	1
7	10019908	Autoscribe mounting bracket	1
8	10019958	Y-Axis motor mounting plate	1
9	10020046	Autoscribe Y-axis Slide	1
10	10020047	X Slide Autoscribe	1
11	10021872	Timing Pulley - reduced backlash, 26 teeth, 10mm belt, 5mm pitch	2
12	10021873	Modified timing pulley, reduced backlash, 52 teeth, 10mm belt, 5mm pitch	2
13	10021955	Timing belt - reduced backlash, 5mm pitch, 10mm wide, 525 long	1
14	10021956	Timing belt, reduced backlash, 5mm pitch, 10mm wide, 375mm long	1
15	10022287	Head interface PCB assy - compact connector	1
16	10023108	140-40 Rear cover	1
17	10023109	140-40 Main cover	1
18	10060015	Pneumatic Valve - 3 way, 24Vdc, flying leads	1
19	119PSW	5mm x 0.5 Proximity Sensor	2
20	CAPSC008	M4 x 10 Cap Head Socket Screw (ISO)	1
21	FIT00012	Bulkhead Fitting - Ø6	1
22	FIT00014	SWIVEL ELBOW 1/8" BSP - 6mm push in	3

10020046 Assembly

Item No.	Stockcode	Description	Qty.
1	10014718	Ball Screw Nut Flange	1
2	10020037	Slide plate - y-axis	1
3	10020092	Y-axis side plate	1
4	10020094	Y Axis side plate	1
5	10020104	Motor plate - y axis	1
6	10021860	Autoscribe cylinder/carriage	1
7	10021871	Deep groove ball bearing, 8 bore, 19 OD, 6 wide	1
8	10021891	Linear guide rail, 109mm long, 12mm wide, complete assy, 2 carriages	2
9	10021892	Spacer block	1
10	10021922	Autoscribe y-axis leadscrew assembly	1
11	10023064	Leadscrew Bearing Assembly	1
12	10023065	Bearing plate - y axis	1

10020047 Assembly

Item No.	Stockcode	Description	Qty.
1	10014718	Ball Screw Nut Flange	1
2	10020035	Autoscribe linear rail assy - x-axis	2
3	10020038	X-axis side plate	2
4	10021837	Bearing end plate	1
5	10021871	Deep groove ball bearing, 8 bore, 19 OD, 6 wide	1
6	10021919	X-axis slide plate	1
7	10021921	Autoscrbe x-axis leadscrew & nut assy	1
8	10023063	Bearing plate X-axis	1
9	10023064	Leadscrew Bearing Assembly	1

10016897 Assembly

Item No.	Stockcode	Description	Qty
1	10016899	Conical Guide	1
2	10016900	Piston - Extended Reach	1
3	10016909	Autoscribe Stylus - 2.0mm Radii	1
4	119AS018	Retaining Screw	1
5	10016902	Plug - Extended Reach	1
6	10007346	Compression Spring	1
7	119AS031	Compression Spring	1
8	SEAL0010	Piston Seal	1
9	119AS028	Guide Tape	1
10	10007477	Guide Tape Ø16 bore x Ø19 x 4	2

24. INSPECTION CHECKLIST

Inspection check list

Sales order number	
Customer name	
Job/serial number	
Software version • Embedded • WIN2068 • Mark2Verify • MarkMaster • Traceable-IT	
Slug offset	
Unlock key number	
Machine type	
Date	
Manual	

Check list:

| Operation	√	N/A
Read order details for machine specification	□	
Fit electric z-axis to column if required	□	□
Check solenoid alignment ensuring all screws are tight	□	
Fit column to base (3000). Check full movement of lead screw (all machines with a column)	□	□
Mount the head to the column when required ensuring all screws are tight	□	□
Check head for running parallel using feeler gauges (to within 0.1mm)	□	□

Check correct version of software is loaded
Embedded software:
  1. Correct version is installed (check with software department if in doubt)
  2. Set speed profiles for relevant axis's
MarkMaster software:
  1. Correct version is installed (check with software department if in doubt)
Traceable-IT software:
  2. Correct version is installed (check with software department if in doubt)
	
	□
	□
	
	□
	
	□
		
		□
		
		□

Check the controller is configured for the correct marking head. This is important to ensure the correct current is configured for the motors.	□	
Check machine details have been entered correctly	□	
Check that no play is visible/mechanically on the bearings/lead screw	□	
Check all screws are tight after any adjustments	□	
Check proximity switches are set to within 0.2mm (use feeler gauge)	□	
Check operation of the proximity switches	□	
Check full movement of the marking area	□	
Check quality of the mark (two test plates required) – before and after running the quality assurance soak test.	□	
• One for the customer	□	
• One for Pryor's record	□	
• Incorporate a Data Matrix mark and write verification results in the comments box below (mark to include serial no; date; customer; order no; assembler)	□	□
Re-check head for play	□	
Apply anti-shock bloc' lube (red) to screws	□	
Check configuration settings are correct		
1. Proximity switches are set correctly	□	
2. Electric z-axis is switched on (if required)	□	□
3. Check jog control is set to appropriate axis	□	□
4. Check autosense is set correctly (if required using feeler gauge to set slug offset)	□	□
5. Check offsets are set (if required)	□	□
Ancillary equipment is tested	□	□
Check all fixturing (positioning relevant to home position)	□	□
Check time/date	□	
Check touchscreen functions (use test hardware screen)	□	
Check start/stop box (if required)	□	□
Check emergency stop button for functioning correctly	□	
Check I/O port functionality	□	
Check cooling fan is operating inside controller	□	
Check z axis moveable home flag is fitted	□	□
Check RS232 port and USB port using test hardware screen.	□	
Check TCP/IP port functionality (if fitted)	□	□
Check functionality of the verification camera. Ensure it is correctly focused and the initial job files are installed.	□	□
Check barcode scanner is programmed correctly		
• Use test serial in embedded software (barcode should be displayed with (02) prefix and (03) suffix if using barcode scanner with serial port connector	□	□
• USB connector barcode scanner to be tested on the machine using barcodes for Traceable-IT.	□	□

Power settings for a PC: **In screen saver power settings set the following**		
• **Turn off hard disks – Never**	□	□
• **System standby - Never**	□	□
Check correct language is set	□	
Re-check movement of marking area when covers have been fitted	□	
Check that all cables do not over stretching or snag on moving parts	□	
Check general condition of the machine	□	
Check all cables/styli/springs/nose piece/slug/sample mark/manuals are present before passing to despatch	□	

Comments:

Data Matrix verification results (if applicable):

Name (print)	Signature	Date
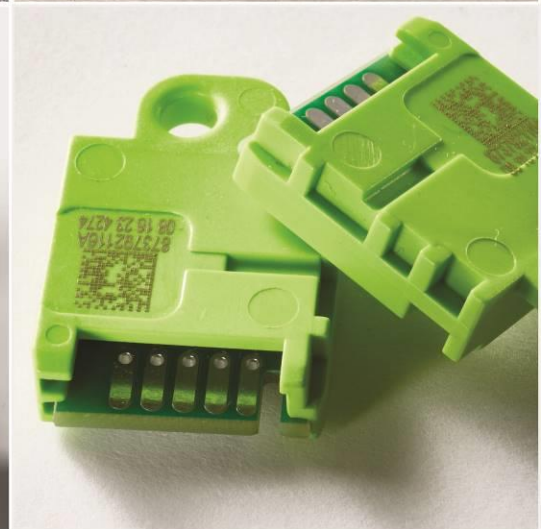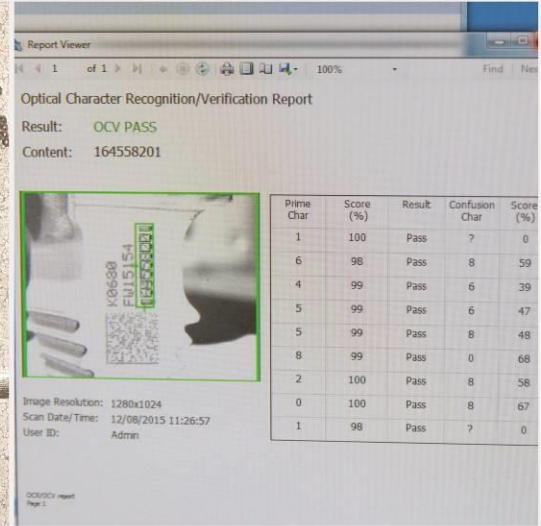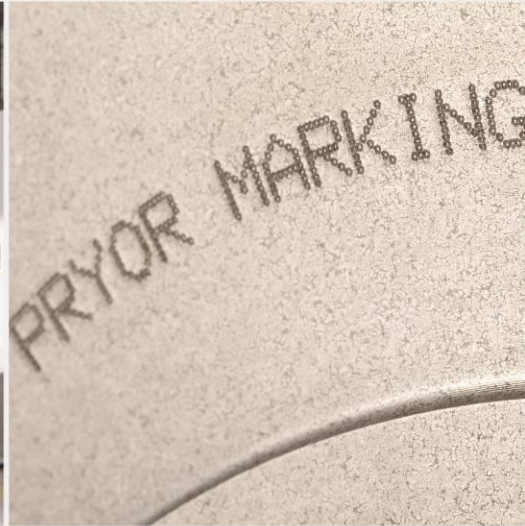
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