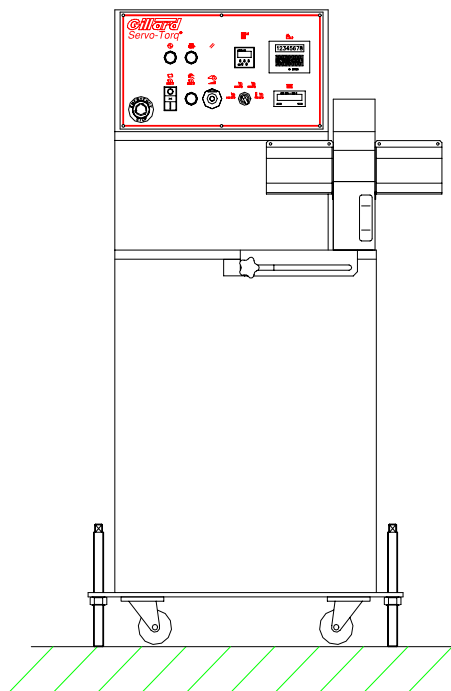


# Gillard Advanced Cutting Systems

## Operating Instructions

### SERVO-TORQ ROTARY CUTTING SYSTEM FREE-STANDING



Date December 2008

*English*

# **Operating Instructions**

## **SERVO-TORQ**

### **MODELS ST-LT, ST-HD & ST-XHD**

Construction date....November-2009

Serial No 7447

## ***Warning!***

Ensure that all personnel involved in the installation, operation and maintenance of this machine, as well as those persons who will act as supervisory personnel for this listed above, have read and understood fully these instructions and those contained in the accompanying supplier's instruction manuals and instruction sheets, before attempting to install, operate or perform maintenance on this machine.

Should any questions arise regarding the safe and proper installation, operation or maintenance of this machine, contact the manufacturer at the address listed below before proceeding. No modifications or alterations are to be made to this product without the prior express written consent of Peter Gillard & Co Ltd.

**Gillard Cutting Technology**  
Alexandra Way  
Ashchurch Business Centre  
Tewkesbury  
Gloucestershire  
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GL20 8NB

Tel: 01684 290243  
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[www.gillard.co.uk](http://www.gillard.co.uk)

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## **A. GENERAL INFORMATION**

### **1 Introduction**

Your machine was carefully inspected, both mechanically and electrically, prior to shipment.

It should be free from scratches and in perfect mechanical and electrical order upon receipt. Check the machine for any physical damage which may have occurred in transit.

If there is any indication of damage, inform us, so that we can take prompt action to remedy the problem.

If the machine appears to be in good condition proceed with the following instructions. Make sure to familiarise yourself with the power, safety and control requirements before starting the machine.

### **2 General purpose and use of the machine**

The Servo-Torq is an extrusion cutting system. It utilises a 'flying knife' action for cutting. By rotating an ultra-thin knife blade in an arc at high speed, the Servo-Torq can slice through extrudate with minimal product interruption.

An AC BRUSHLESS SERVO MOTOR is used to power the flying knife. The Servo motor is powered via a DIGITAL SERVO AMPLIFIER. The combination of amplifier & motor has been carefully selected, and is capable of position holding to within 0.01%.

The machine is capable of a number of cutting modes. A SINGLE AXIS POSITION CONTROLLER calculates the optimum cutting mode from the data entered into the OPERATOR INTERFACE.

The type of accuracy achieved by your machine will depend upon a number of factors:

- ☐ Linespeed
- ☐ Material type
- ☐ Feeding method
- ☐ Length measuring system
- ☐ Blade/guide bush configuration

Your particular application will have been discussed prior to placing an order. If you feel that your machine is not achieving the performance specified please contact us.

When cut accuracy problems do occur, they are rarely due to the Servo-Torq itself. We have paid particular attention in these operating instructions to explaining the Influence of non-cutter factors on cut length accuracy.

**If you have any problems please telephone us or fax us. We can usually solve a problem quickly, avoiding hours of frustration.**

### **3 Products to be cut or handled**

The Servo-Torq is designed to be used in an extrusion line, cutting flexible and rigid plastic and rubber extrusions. The maximum capacity of the machine is 30mm. However, actual cutting capacity will depend upon product type and wall thickness.

## 5. Standards to which this machine complies

The machine is supplied in accordance with the Supply of Machinery (Safety) Regulations 1992 (EU Machinery Directive 89/392).

A CE mark will have been affixed to the machine to signify compliance with the above mentioned Directive. Either a Declaration of Conformity or a Declaration of Incorporation will have been completed and filed after this page.

The following European Standards have been applied to the machine design.

<b>EN 292-1:1991</b>	Safety of Machinery, - Basic Concepts - General Principles for Design, Part 1 Basic Terminology, Methodology.
<b>EN 292-2:1991</b>	Safety of Machinery - Basic Concepts - General Principles for Design, Part 2 Technical Principles and Specifications.
<b>EN 294:1992</b>	Safety of Machinery - Safety Distances to prevent danger zones being reached by the upper limbs.
<b>EN 418:1992</b>	Safety of Machinery - Emergency Stop equipment functional aspects, Principles for design.
<b>EN 60 204-1: 199</b>	Electrical Equipment of Machines Part 1 - Specification for General Requirements.

# Declaration of conformity

## 93/44/EU

**Manufacturer's name:** Peter Gillard & Co Ltd

**Product description:** Servo-Torq Rotary Cutter

**Serial N/o** XXXX

**Declaration:** I declare, as the authorised representative, the above machinery is in conformity with the provisions of 93/44/EU Directives.

**Name of authorised representative:** Mr C.N. Gillard

**Position of authorised representative:** Managing Director

**Signature of authorised representative:**

**Place:** Tewkesbury  
England

**Date:** 26/03/2009

## **B SAFETY CONSIDERATIONS**

Please refer to drawing No. M-ST-001. This shows the location of danger areas, guarding and emergency stop switches, re-set procedure.

### **1. Hazards in case of non-compliance with safety guarding**

**UNDER NO CIRCUMSTANCES SHOULD GUARDING BE MODIFIED OR REMOVED. MODIFICATION OR REMOVAL OF GUARDING CAN RESULT IN THE FOLLOWING HAZARDS:**

- 1.1 Loss of fingers, thumbs and severe cuts to hands, caused by rotation of knife blade.
- 1.2 Fatal electrical shock - Contact with 400 Volts MAY KILL OR INJURE

### **2 Safety conscious work practices**

Cutting machines are potentially extremely dangerous. The knives used in the Servo-Torq are of the highest sharpness. They can easily cut through fingers, thumbs and cause severe cuts.

Although the Servo-Torq is fully safety protected, it is strongly recommended that the following additional safety guidelines be followed:

- 2.1 **Never** attempt to change cutter blades when the electrical supply is connected to the machine.

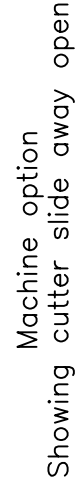
**Always** turn the isolator switch **off** before changing blades.


- 2.2 **Never** open the clam-shell safety guard or remove cutter bushes without first turning off the cutter motor.

For absolute safety it is recommended that the isolator switch be turned **off** to disconnect electrical supply.

- 2.3 **Never** use cutter bushes whose inner bore is considerably larger than the extrudate size being cut. **Always** match extrudate size to cutter bush bore.

Machine illustrated in standard  
right to left format



 <p><b>Gillard Cutting Technology</b>          Alexandra Way          Teakburn Business Centre          Teakburn          Glasgow GL20 8NB          England          Tel: 01864 290243          Fax: 01864 290330          e-mail: sales@gillard.co.uk</p>		<p><b>DESCRIPTION</b></p> <p>SINGLE AXIS SERVO TORQ CUTTER          DANGER AREAS</p>		<p><b>QCB No.</b>          S-BCD-TP-01</p> <p><b>DRAWN BY</b>          GILLARD</p> <p><b>DATE</b>          31/07/03</p> <p><b>SHEET</b> 1 <b>OF</b> 13</p> <p><b>REF. DRAWING No</b>          S-BCD-TP-01</p> <p><b>DRAWINGS No</b>          S-BCD-TP-01</p>	
<p><b>SUPPLY VOLTAGE</b> <input type="checkbox"/> V <b>TO</b> <input type="checkbox"/> V</p> <p><b>3ph</b> <input type="checkbox"/> <b>1ph</b> <input type="checkbox"/> <b>N</b> <input type="checkbox"/> <b>E</b> <input type="checkbox"/></p> <p><b>ISSUE</b> <input type="checkbox"/> <b>50Hz</b> <input type="checkbox"/> <b>60Hz</b> <input type="checkbox"/></p> <p><b>REV</b> —</p>		<p><small>This drawing is the property of Gillard Cutting Technology. It must not be shown to third parties or copied without consent.</small></p>			

- 2.4 **Never** attempt to use fingers to remove cut pieces from the cutter bush bore.

The cutting action of the Servo-Torq could be engaged, causing the blade to rotate, slicing through whatever was in the bush bore.

**Always** use another object to clear the bore. Better a damaged blade than a lost finger.

- 2.5 **Never** leave knife blades lying around where they could be used for purposes for which they were not intended.

**Always** keep your spare blades in a safe place and allow only trained personnel to change blades.

- 2.6 **Never** allow unskilled personnel to change blades, bushes or generally handle the Servo-Torq

**Always** brief your staff, including part-timers, of the potential danger of the equipment.

## **Be Careful - Keep Your Fingers!**

### **3 Safety protection**

The Servo-Torq is fitted with a number of features designed to minimise the possibility of damage to either operators or the machine. Please refer to drawing number M-ST-001 to illustrate the danger areas of the Servo-Torq. Please ensure that all staff have seen this and are aware of potential danger points.

#### 3.1 Cutter Clam-shell guard (1)

The machine will not operate unless the clam-shell guard covering the knife blade is in its down position.

#### 3.2 Inlet and Outlet Guide Bushes (2 & 3)

Under no circumstances attempt to operate the machine without the inlet and outlet guide bushes in place.

### **4. Noise emissions**

This machine conforms to the following regulations:

The Supply of Machinery (Safety) Regulations 1992 (SI 1992/3073).

Equivalent continuous A weighted sound pressure level at workstations	70dB
---	------

Peak C weighted instantaneous sound pressure level at workstations	94dB
--	------

Sound power level emissions	less than 85dB
-----------------------------	----------------

## **5. Prohibition of non-authorised modifications.**

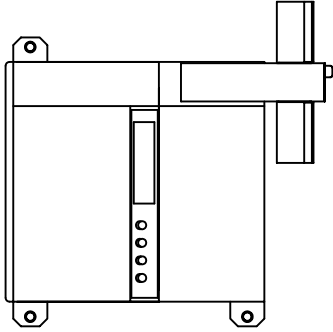
No modification or alterations are to be made to this product without the prior express written consent of Peter Gillard & Co Ltd. Failure to do this will void all legal obligations from Peter Gillard & Co Limited regarding this product.

A

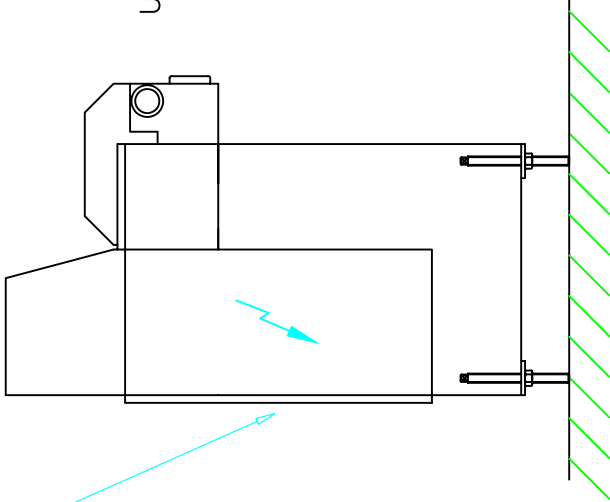
Electrical Connections  
Standard UK deatils  
380/440VAC 3phase, 50Hz  
earth & neutral.

Refer to serial plate for connections  
in care of special requests.

B

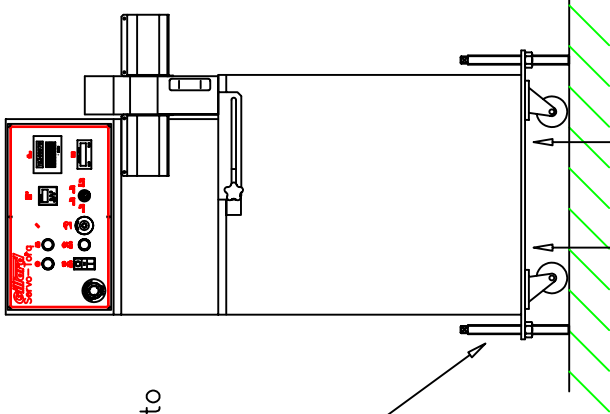


C

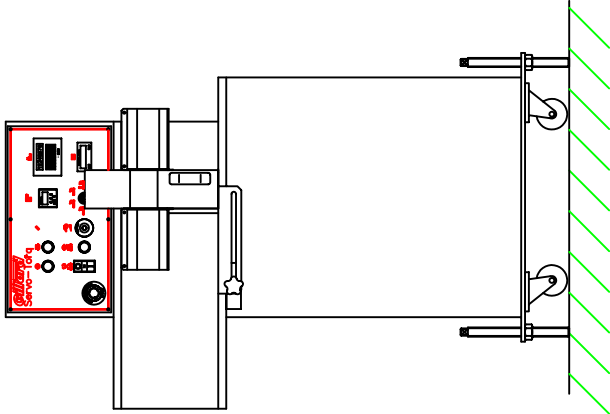


Use floor jacks to  
finally position  
the machine

D



Lifting points for fork lift.



Machine option  
Showing cutter slide away open

SUPPLY VOLTAGE	<input type="checkbox"/> V	To	<input type="checkbox"/> V
3ph	<input type="checkbox"/> 1ph	<input type="checkbox"/> N	<input type="checkbox"/> E
ISSUE	<input type="checkbox"/> 50Hz	<input type="checkbox"/> 60Hz	<input type="checkbox"/>
REV	—		



**Gillard Cutting Technology**  
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DESCRIPTION

SINGLE AXIS SERVO TORQ CUTTER  
INSTALLATION & LIFTING POINTS

JOB No	S-BCD-TP-02	REF. DRAWING No	S-BCD-TP-02
DRAWN BY	GILLARD	DATE	31/07/03
SHEET	2	OF	13
DRAWING No	S-BCD-TP-02		

## **C    INSTALLATION**

### **1.    Weight and dimensions of machine**

Weight	-	ST-LT 400Kgs
	-	ST-HD 450Kgs
	-	ST-HD 550Kgs
	-	
Dimensions	-	.9M Long
		.9M Wide
		1.6M High

### **2.    Lifting and handling instructions**

Always use a suitable carriage or forklift truck to move the Servo-Torq more than a few metres. The carrying handles are designed for lifting the Servo-Torq onto its working surface, not for transporting the machine over long distances.

### **3    Unpacking instructions**

- 3.1 Carefully check that all crating, packing and transportation strapping has been removed from the machine.
- 3.2 Check that all loose items have been removed from within the top cabinet and electrical cabinet of the Servo-Torq.
- 3.3 Unpack these items - what is supplied is dependent upon individual customer's requirements. As a minimum, a knife blade, Manual, Blank cutter bushes will have been supplied.

### **4    Electrical supply**

A standard 415 Volt, three phase, 50Hz supply plus, fused at 20A per phase. A neutral and earth connection dependant of order specification.

If requested, your machine will have been supplied with a different electrical specification.

The electrical specification for your machine will be noted on the serial number plate. Please check this before connecting an electrical supply.

**WE CANNOT BE HELD RESPONSIBLE FOR ANY DAMAGE CAUSED TO THE MACHINE BY BEING CONNECTED TO AN INCORRECT ELECTRICAL SUPPLY.**

**CHECK THE SUPPLY REQUIRED BEFORE MAKING A CONNECTION.**

A suitably qualified electrician should undertake all electrical installations. See drawing M-ST-002 for location of electrical cabinet (6)

## D MACHINE CONTROL AND THEIR FUNCTIONS

### 1 Control panel details

#### BCD CONTROLLER OPTION

See control panel drawing S-BCD-TP-03/04/05

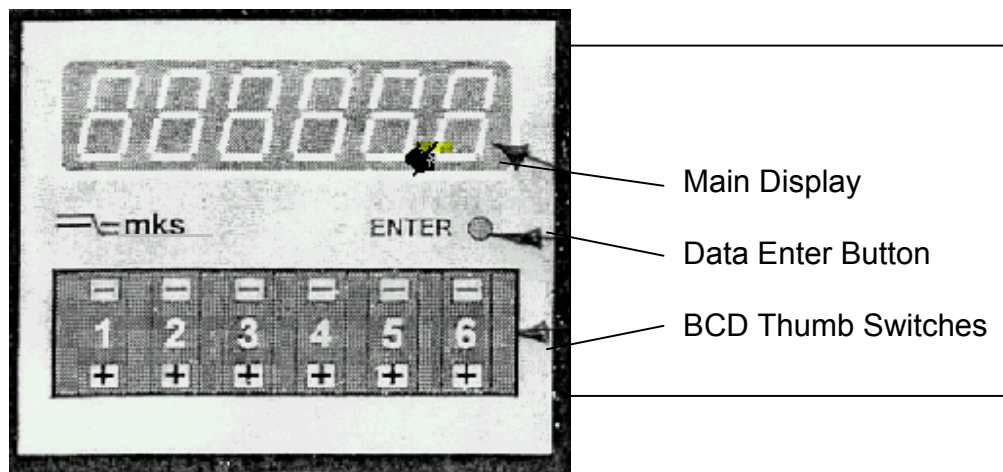
- 1.1 **Power on lamp (1).** (White) This illuminates when the electrical isolation switch located on the side of the machine has been turned on.
- 1.2 **Guard lamp (2).** (Blue) To enable the machine to run, this lamp must be illuminated. If it is not, check that the emergency stop button has been reset and that all guards are closed.
- 1.3 **Emergency stop button (3).** When pressed the whole machine will stop immediately. The switch must be reset before operations can recommence.  
  
This switch is only to be used in emergencies.
- 1.4 **Manual cut button (4).**  
This button causes the machine to perform a datum cut after power up and one cut thereafter.
- 1.5 **Cutter start/stop buttons (5).**  
Pressing the start button begins the cutting cycle.  
NOTE: The product must be moving through the machine, and the encoder must be sending a pulse train, before the machine will begin cutting.
- 1.8 **Operator interface BCD Counter (6)**  
This panel allows the user to change the cut length of the machine. See full instructions on later pages of this manual for full details.
- 1.9 **Cutting mode selector (7)**  
A four-position switch which will select the cutting mode.  
  
The options are:
  - 1) On demand cutting for general cutting of product 1-350 cuts per minute
  - 2) Cam profile cutting for medium speed cutting when a high blade speed is required. Speed range 160 – 750 cut pieces per minute
  - 3) Continuous cutting for high speed cutting. Speed range 600 – 2000 cut pieces per minute
  - 4) Sensor mode (optional extra) an end sensor mounted to a bar, detects the end of the product. Used for accurate length cutting 1 – 60 cut pieces per minute
- 1.10 **Total cuts and cut rate combined counter (8)**  
A combined counter indicating total cut pieces. Re-set to zero by pressing right hand button. Press left hand button to toggle to rate display.
- 1.11 **Batch Counter (optional extra) (9)**  
The counter can be set to a pre-set value at which depending on machine spec. a buzzer or lamp will operate as a warning.

## 2 How to operate the cut length counter Type MKS-BCD-LED6C CAN-V2000

If the machine is fitted with a batch counter option refer to counter/batch operating instructions on page 35

2.1 The display has a 6-digit red LED display. The resolution of the counter represents one counter digit per .1mm of product length.

2.2 **To set the counter cut length pre-set.**



1. Main display indicates the length total as it counts up to the pre-set value

2. BCD thumb switches are used to set the preset value

3. Enter button is used to input the BCD set length in to machine

2.4 **To change the pre-set value**

2.5 Use the + & - pushbuttons to move the BCD indicators round to the desired length

2.6 The BCD thumb switch positions will not take effect until the enter button is pressed.

2.7.1 When the desired length is indicated on the BCD thumb switches, press enter to change the length in the machine.

- 2.8 The main LED display will now count up to the new input value, complete a cut and reset to zero.

### 3. Stopping the machine

- 3.1 To stop the machine when the cutter is running, press button (9) (cutting cycle stop/start) and the machine will stop cutting.
- 3.2 To remove power from the machine, turn off the main isolator switch.

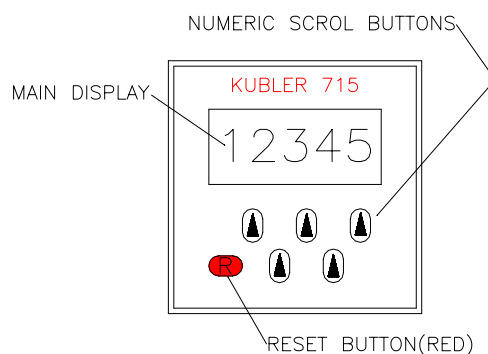
**Once you have completed sections 1 to 3 move onto section F 'Setting up procedure'.**

## 3 How to operate the Batch Counter

### Type Kubler 715 (Optional Extra)

- 3.1 The display has a 5 digit red LED display.

#### 3.2 Front panel Description.



#### 3.3 To set the Batch Count pre-set value.

1. In normal mode the main display indicates the present cuts completed value as it counts up to the pre-set batch total.
2. To reset the total to zero press reset button (red)
3. To adjust the preset value enter the adjustment screen by pressing one of the numeric buttons (Arrow Up). The main display will then indicate the present pre-set value
4. The numeric keys (Up Arrow) are now used to scroll round to the desired batch count total. The numeric keys each increment their respective digit of the pre-set value.
5. When correct value is reached the value will be stored after no button presses for 2 seconds and the screen will revert back to normal mode

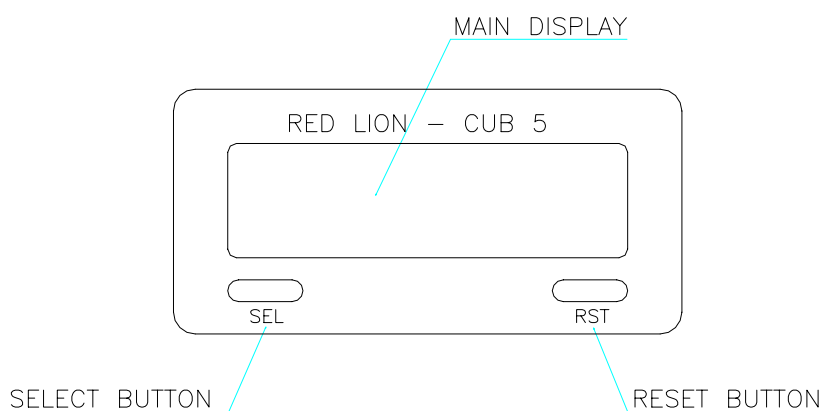
- 6 The machine will either be fitted with a Beacon(light) or Buzzer(sound) Depending on specification. On reaching the preset value the warning (Buzzer or Beacon) will operate for 3 seconds (adjustable) and the counter will reset to zero and start counting next batch quantity.

### 3 How to operate the Total/Rate Counter

#### Type Red Lion Cub 5B

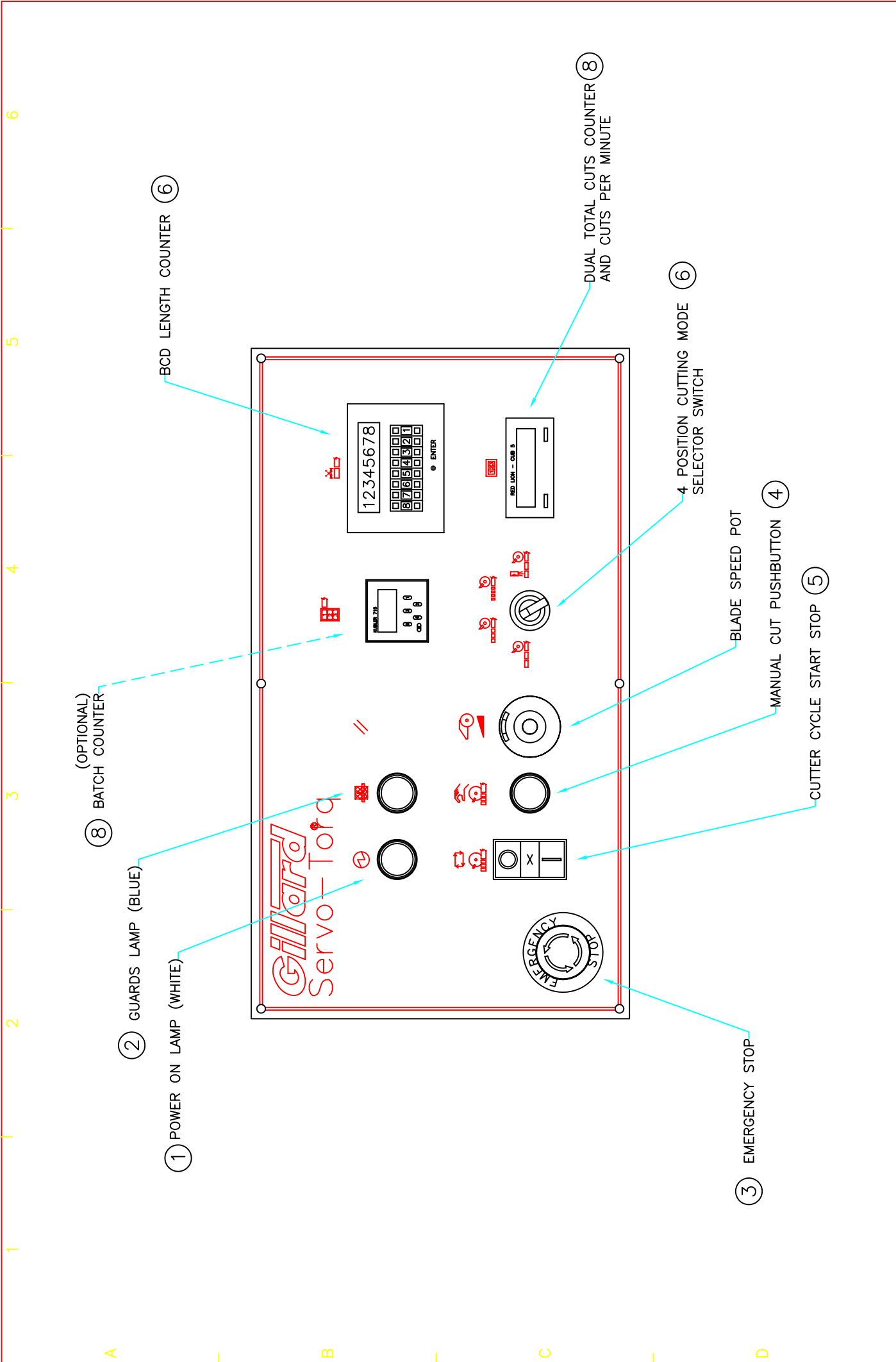
- 3.1 The counter has an 8 digit back lit red LED display.

- 3.2 Front panel Description.



#### To operate the Total/Rate counter.

- A The counter has 2 display modes available
- |    |                       |  |
|----|-----------------------|--|
| 1, | <b>Rate Mode</b>      | Displays the cut rate in cuts per minute<br>R in left of main display indicates mode |
| 2, | <b>Totaliser Mode</b> | Displays the total number of cuts since last reset                                   |
- B
- |    |                   |  |
|----|-------------------|--|
| 1, | <b>SEL Button</b> | Toggles between rate and totalise mode   |
| 2, | <b>RST Button</b> | Resets the current count value to zero in totaliser mode. No effect in Rate mode |



SUPPLY VOLTAGE		TO	V	
3ph	1ph	N	E	
ISSUE		50Hz	60Hz	
REV				
Gillard Cutting Technology Alexandra Way Aldershot Business Centre Tisbury Gloucestershire GL20 8NB Tel: 01684 290243 Fax: 01684 290330 e-mail: sales@gillard.co.uk				
SINGLE AXIS SERVO TORQ CUTTER USING BCD LENGTH COUNTER PANEL DESCRIPTION				
JOB No		REF. DRAWING No		S-S-BCD-TP-03
DRAWN BY		DATE		GILLARD 31/07/03
SHEET		OF		3 13 S-BCD-TP-03

2) Release emergency stop, close all guards and the blue "guards lamp" will light

1) Connect the mains power, see machine plate for details the power lamp will light

3) See sheet 4 to set length on BCD length counter

4) Press manual cut pushbutton to perform a single cut

**Note**

You can only perform a single cut when the cutter is not in cycle.

5) Select cutting mode from table below.

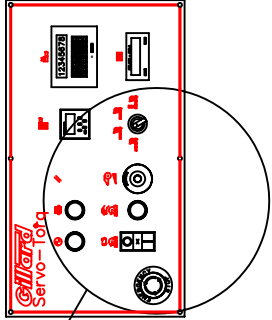
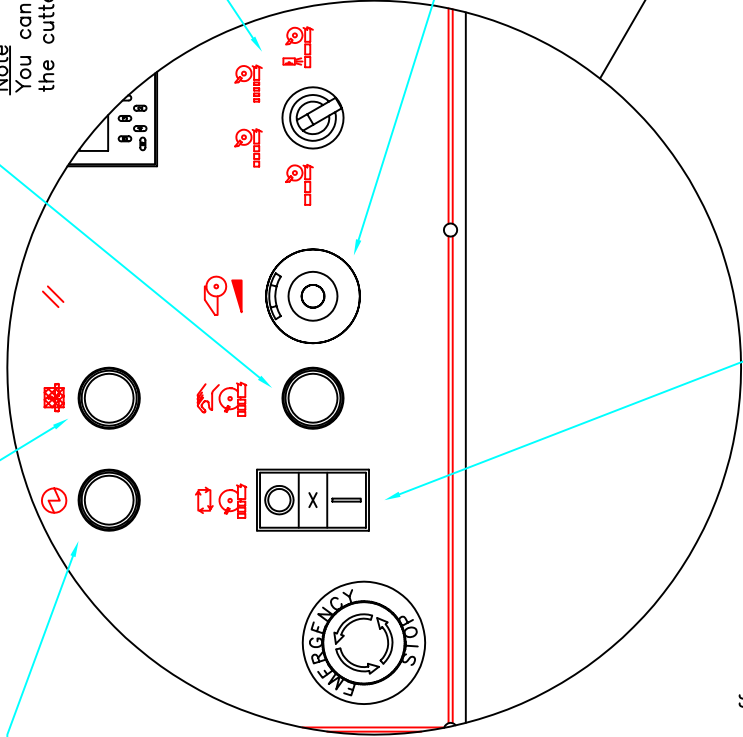
1st position for cutting from 0 to 350 cuts per min  
0 - 145 at 100% blade speed  
145 - 220 lower blade speed to 60%  
220 - 330 lower blade speed to 35%

2nd position for cutting from 350 to 750 cuts per min  
3rd position for cutting from 50 to 2000 cuts per min  
4th position - cutting from an external signal e.g. sensor

6) Set the blade speed

7) Press the cutter cycle start

**Note**  
Mount the encoder on the product or haul off.  
The encoder is will only count turning in a clockwise direction when viewed from the front.



SUPPLY VOLTAGE	<input type="text"/>	TO	<input type="text"/>	V
3ph	<input type="checkbox"/>	1ph	<input type="checkbox"/>	N
ISSUE	<input type="text"/>	50Hz	<input type="checkbox"/>	60Hz
REV	<input type="text"/>			



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E-mail: [sales@gillard.co.uk](mailto:sales@gillard.co.uk)

**DESCRIPTION**

SINGLE AXIS SERVO TORQ CUTTER  
USING BCD LENGTH COUNTER  
PUSHBUTTON OPERATION

JOB No	S-BCD-TP-04	REF. DRAWING No	S-BCD-TP-04
DRAWN BY	GILLARD	DATE	31/07/03
SHEET	4 OF 13	DRAWING No	S-BCD-TP-04

## OPTION 1

BATCH COUNTER

Set batch quantity by pressing

buttons 1 to 5.

Reset by pressing "R".

## OPTION 2

## DELAY & DURATION COUNTER

e.g. CONVEYOR AIR BLAST

Preset 1 is the delay in seconds.

Preset 2 is the duration of the

output in seconds.

Preset 3 is the output count.

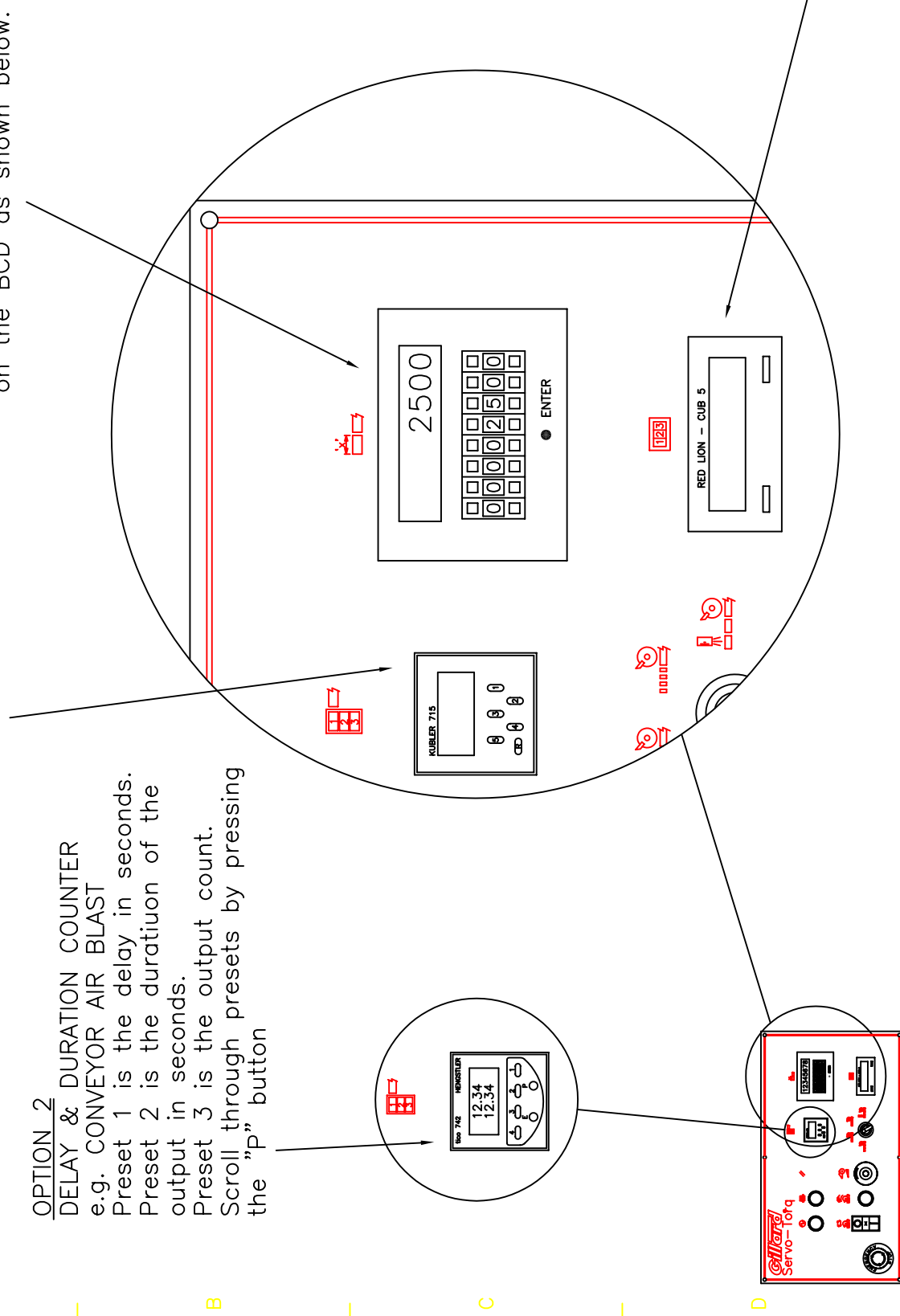
Scroll through presets by pressing

the "P" button

## SETTING THE CUT LENGTH ON THE BCD COUNTER

1) The last digit (far right) is in increments of 0.1mm.

2) To enter a length of 250mm you should enter 2500 on the BCD as shown below.



(Version 2)

TOTAL CUTS &  
CUTS PER MINUTE  
COUNTER

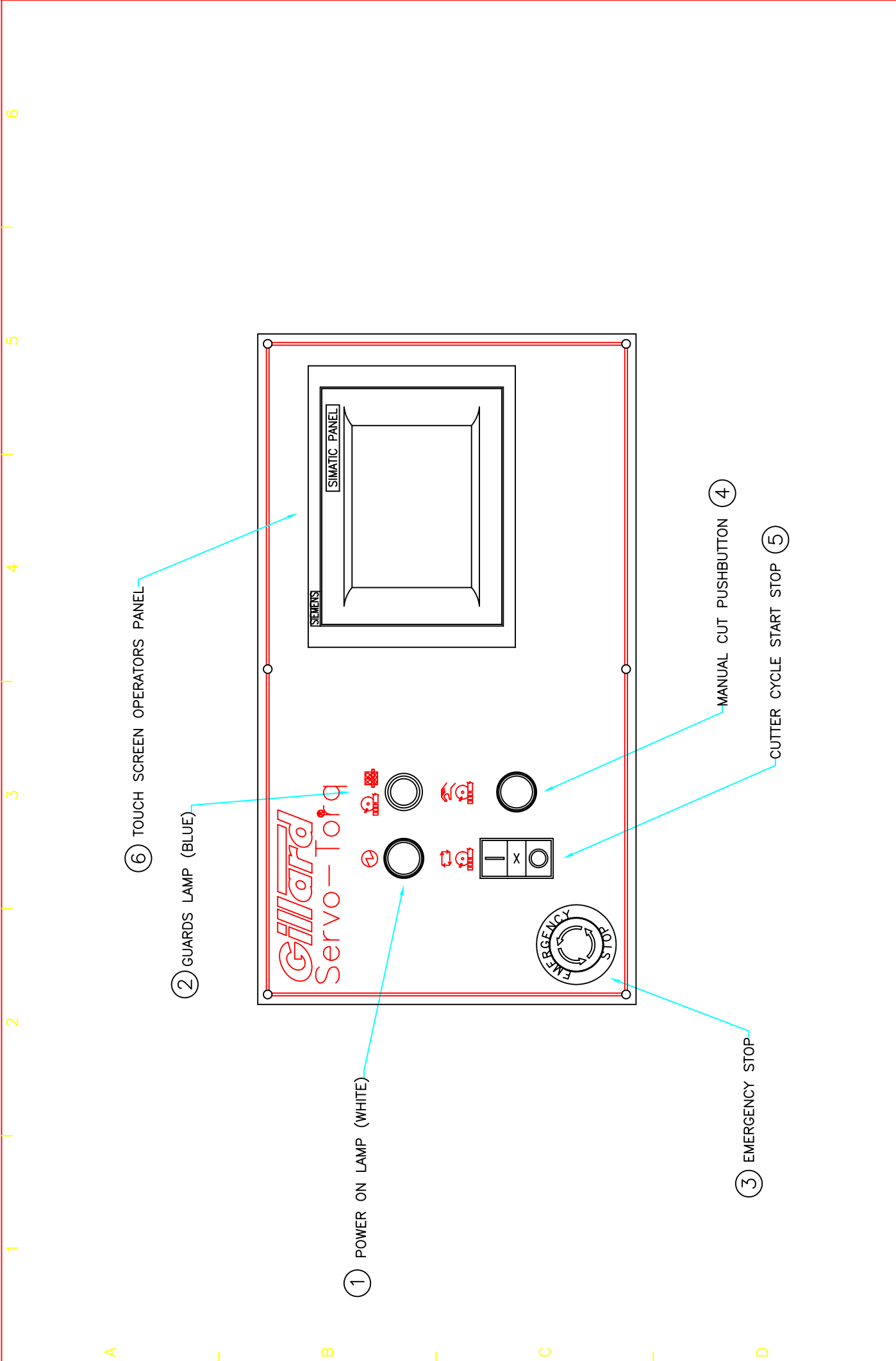
Press the right button to toggle between modes.  
Press the left button to reset the total cuts.

## 2 Control panel details

### TP170 HMT OPTION

See control panel drawing S-BCD-TP-06/07.

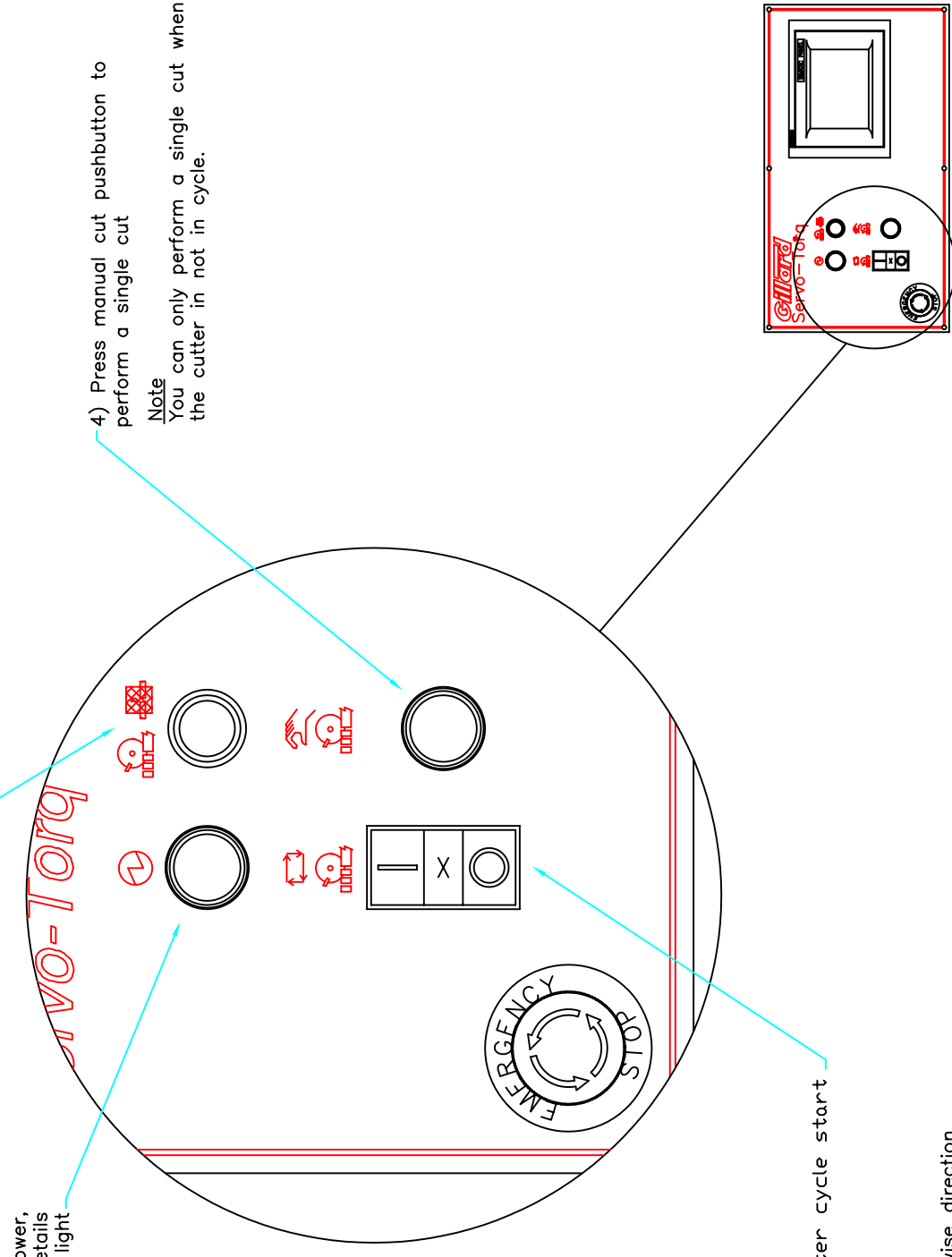
- 1.1 **Power on lamp (1).** (White) This illuminates when the electrical isolation switch located on the side of the machine has been turned on.
- 1.2 **Guard lamp (2).** (Blue) To enable the machine to run, this lamp must be illuminated. If it is not, check that the emergency stop button has been reset and that all guards are closed.
- 1.3 **Emergency stop button (3).** When pressed the whole machine will stop immediately. The switch must be reset before operations can recommence.  
  
This switch is only to be used in emergencies.
- 1.4 **Manual cut button (4).**  
This button causes the machine to perform a single cut. This function will not operate until the datum axis function has completed
- 1.5 **Cutter start/stop buttons (5).**  
Pressing the start button begins the cutting cycle.  
NOTE: The product must be moving through the machine, and the encoder must be sending a pulse train, before the machine will begin cutting.
- 1.6 **Operator interface TP170 HMI (6)**  
See full instructions on following pages for full details of HMI operation
- 1.7.1 **Cutting mode selector (7)**  
A four-position switch which will select the cutting mode.



SUPPLY VOLTAGE		TO	V	
3ph	1ph	N	E	
ISSUE		50Hz	60Hz	
REV		—		

Gillard Cutting Technology Alexandra Way Ashchurch Business Centre Tewkesbury Glos GL20 8NB England Tel: 01684 280243 Fax: 01684 280330 e-mail: sales@gillard.co.uk		DESCRIPTION		JOB No		REF. DRAWING No	
<b>Gillard</b> <small>This drawing is the property of Gillard Cutting Technology. It must not be shown to third parties or copied without consent.</small>		SINGLE AXIS SERVO TORQ CUTTER USING SIEMENS TOUCH SCREEN PANEL PANEL DESCRIPTION		S-BCD-TP-06		S-BCD-TP-06	
				DRAWN BY GILLARD		DATE 31/07/03	
				SHEET 6 OF 13		DRAWING No S-BCD-TP-06	

- 
- 2) Release emergency stop, close all guards and the blue "guards lamp" will light
- 3) See "Touch Screen Operator's" manual to set cut length and setting options.
- 4) Press manual cut pushbutton to perform a single cut
- Note  
You can only perform a single cut when the cutter in not in cycle.



Note  
Mount the encoder on the product or haul off.  
The encoder is will only count turning in a clockwise direction when viewed from the front.

SUPPLY VOLTAGE	<input type="text"/>	TO	<input type="text"/>	V	<input type="text"/>
3ph	<input type="text"/>	1ph	<input type="text"/>	N	<input type="text"/>
ISSUE	<input type="text"/>		50Hz	<input type="text"/>	60Hz <input type="text"/>
REV	<input type="text"/>				

**Gillard**

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DESCRIPTION

JOB No	REF. DRAWING No
S-BCD-TP-07	S-BCD-TP-07
DRAWN BY	DATE
GILLARD	31/07/03
SHEET	DRAWING No
7 OF 13	S-BCD-TP-07

## OPTION

### 3 Touch Screen Operator Interface Panel

Your Gillard Servo-Torq is fitted with a Siemens TP170A Touch Screen operator interface panel.



This panel gives access to all the machine functions, via a series of pre-programmed screens.

Use the “Touch Fields” at the bottom of the screen to select the required screen.

Change the values displayed on the screens, by touching the field to be changed.  
A data input screen appears, type in the new value and press ‘ENTER’ to confirm the new value.

Pressing ‘ESC’ before pressing ‘ENTER’ will cancel the entry, and return the display to its previous value.

If an attempt is made to enter a value outside the permissible limits of any variable, the screen will display an error message indicating the limit, and the variable will revert to its previous setting.

Some functions are password protected and can only be accessed once a valid password has been entered.

The screen pictured above is the “Main” or “Title” Screen.



Pressing this button, when it is displayed on any screen, will take the display back to this Main screen.

Other screens can be selected by pressing the relevant “buttons” on the main screen, these are,-



Cutting Screen.

This is the normal operating screen, it allows access to all the machine control variables required for normal machine operation.



Set-Up Screen.

This screen is password protected, and allows access to various calibration functions.



Tools Screen.

This screen allows the operator to access general functions that need only occasional changes.



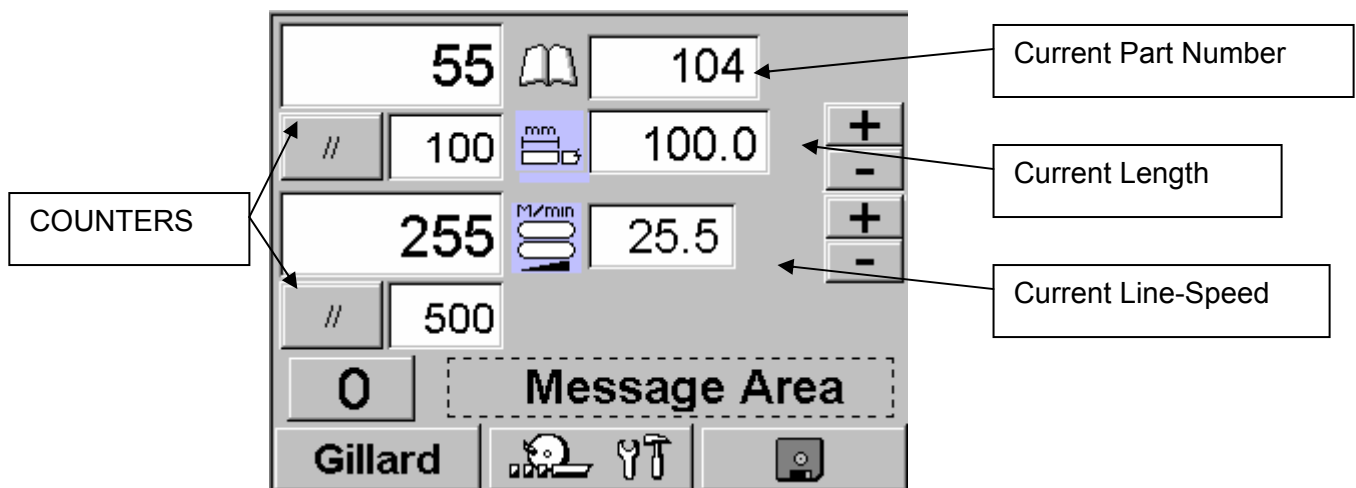
Parts Screen

Allows operators to store and delete part information, and control “cascade” functions.

NB Screens may vary according to which options are fitted to your machine, but all symbols always have the same function.

## Cutting Screen

This is the main control screen, from here all normal functions can be accessed.

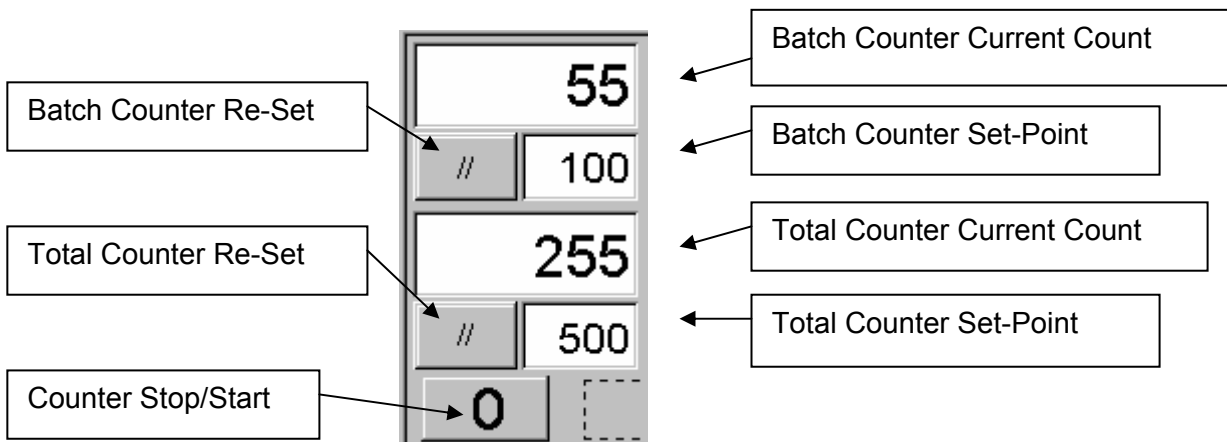


The variables displayed on this screen control the basic operation of the machine.

In “Timer” mode, a similar screen is displayed except that the “Length” field is replaced by a “Cut Time” field.

## COUNTERS.

The display has both a Batch, and a Total Cuts Counter.

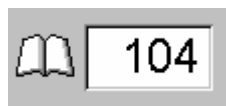


Counter Stop/Start, toggles the counters ON or OFF.

Pressing the Re-Set button sets the relevant counters current count value to zero.

An output is available from the main PLC on both Batch, and Total counters reaching preset.

## PART NUMBER

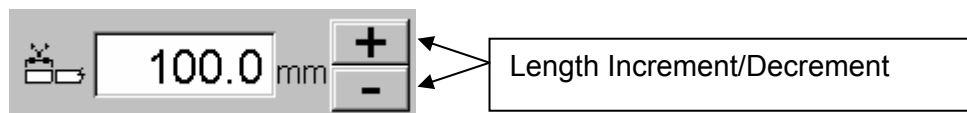


The machine is able to store up to 150 part recipes.

Valid part numbers are from 1 to 999999.

Entering a new part number here, causes the machine to load that part recipe.

## LENGTH



This is the length the product will be cut into when the cut cycle is started.

Acceptable values are between 1.0 and 100000.0mm in 0.1mm increments.

The increment and decrement buttons increase or decrease the length in 0.1mm steps.

## LINE SPEED

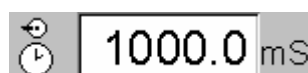


This is the speed in metres/minute that the caterpillar will run at when it is running.

Acceptable values are from 0.0 to maximum speed in increments of 0.1m/min.

The increment and decrement buttons increase or decrease the speed in 0.1M/min steps.

## CUT TIMER



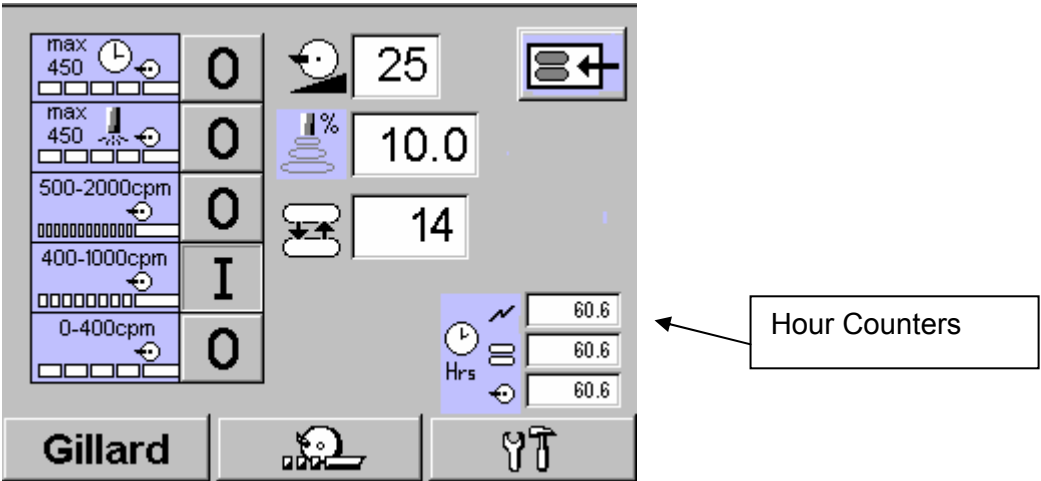
In this field the time between cuts is set for when the machine is cutting in timer mode.

In the above example the machine will do one cut every second.

SYSTEM MESSAGE AREA  
Warning Messages etc are displayed in this portion of the screen.

Tools Screen

This screen allows operators to “fine tune” and set-up the cutting cycle parameters.



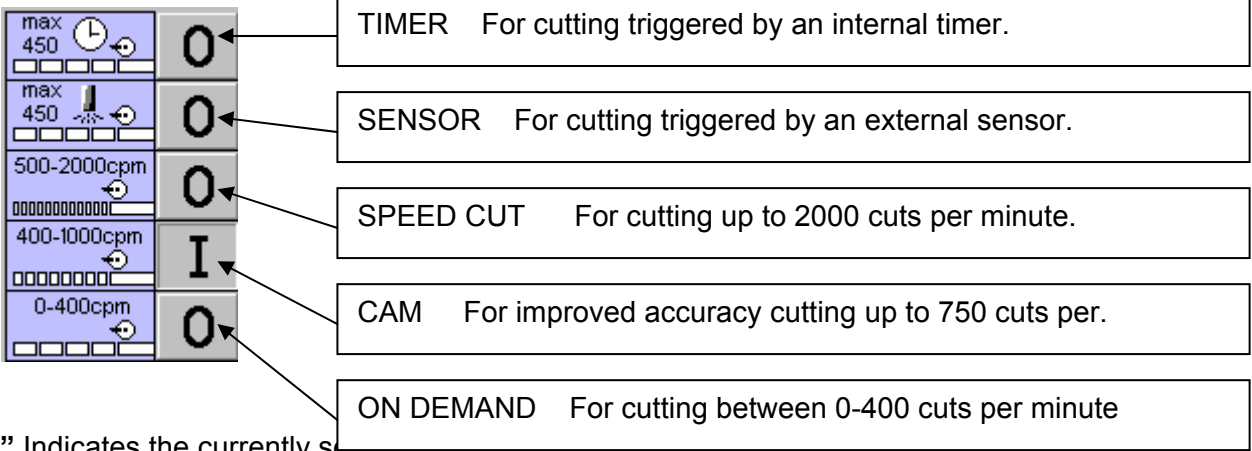
BLADE SPEED SETTING



From here you can set the speed of the knife during a cut.  
The speed can be adjusted from between 10 and 100%.  
This speed has no effect when the machine is in Speed-Cut mode.

NB the lower the speed the lower the cutting force.  
Do not set the blade speed too low, or it may not be able to cut the product.

CUT MODE SELECTOR.



“I” Indicates the currently selected mode.  
Selecting a new mode automatically de-selects the previous mode.

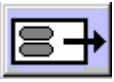
CATERPILLAR SPEED CONTROL MODE SELECTOR



Indicates which method of controlling the caterpillar speed is currently operative.  
The options are,-



LOCAL      The speed is set via the operator panel.



REMOTE      The caterpillar speed will follow the remote input signal.

SONAR TRIM LEVEL



Indicates and adjusts the level of speed control taken from a Sonar Trim device.  
Only effective in local speed control mode.  
0.0% = No Sonar effective, 100% = Full Sonar control.

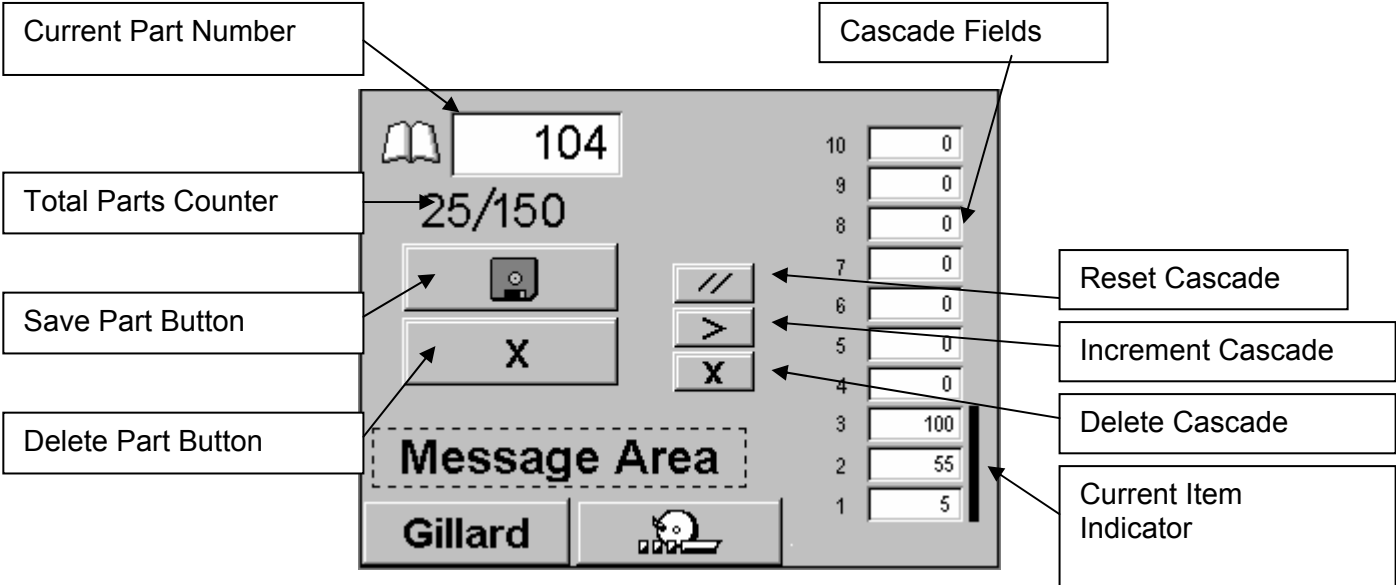
BOOM POSITION CONTROL



Displays and adjusts the current boom gap.  
(Only with motorized boom control).

**Part Screen**

This screen is for saving and deleting part recipes, and for setting up cascade cutting.



## SAVE PART BUTTON

Pressing the "SAVE" button causes the current part information to be saved.  
The information which is saved as a "Part Profile" is all the current values of the following,-

LENGTH  
LINE SPEED  
TOTAL QUANTITY  
BATCH QUANTITY  
BLADE SPEED  
CUT MODE  
BOOM GAP

This profile can be recalled, and loaded at any time by entering the saved part number in the "CURRENT PART" field.

Note the new values take immediate effect, the machine will begin cutting the new length immediately it is loaded if the cutting cycle is running.

## DELETE PART BUTTON

The DELETE button, deletes the currently displayed part.

## TOTAL PARTS COUNTER

Indicates the number of parts currently stored in memory.

## CASCADE FIELDS

"Cascade Cutting" is a feature to permit the automatic cutting of several different parts.  
The machine loads the first profile in the list, and cuts this profile until it has cut the number indicated in the "Total Quantity" field, it then automatically loads and begins cutting the next item in the list.  
The machine continues doing this until it has cut all the items in the current list, it then returns to item 1 and starts the list again.  
Up to 10 items can be loaded in a cascade.

The screen pictured shows a 3 item cascade.

When the cutting cycle is started the machine will cut part number 5, indicated in cascade field 1.  
It will then load part number 55 as indicated in cascade field 2, followed by part number 100 as displayed in cascade field 3.

Once the program reaches the 0 in cascade field 4, it will reset the program back to cascade field 1, and reload part number 5.

The machine will automatically try to run a cascade if the number in cascade field 1 is greater than 0.

It is assumed that when running a cascade, the machine is "In Line", therefore, parameters that would adversely affect the line are not loaded in cascade mode.

LENGTH	Loaded
CUT TIME	Loaded
LINE SPEED	Not Loaded
TOTAL QUANTITY	Loaded
BATCH QUANTITY	Loaded
BLADE SPEED	Not Loaded
CUT MODE	Not Loaded
BOOM GAP	Not Loaded

When not in cascade mode, ALL parameters are loaded.

## Reset Cascade

Resets a running cascade to the first part in the list.

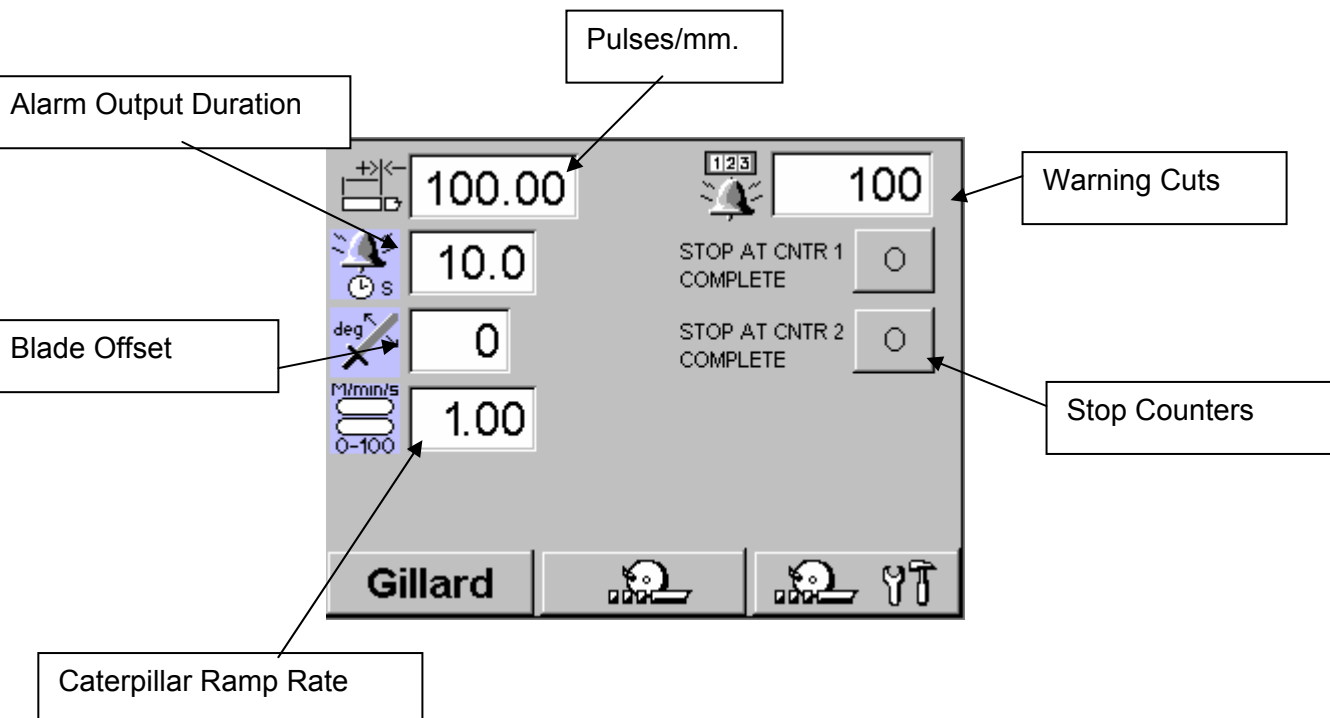
Increments a running cascade to the next part in the list

## Delete Cascade

Clears the current cascade list.

## Set-Up Screens

A series of Set-Up options can be accessed via this screen.  
This screen is protected by a password.



## PULSES / MM



Permits calibration of the machines cut length.

This value is the number of encoder pulses the machine will count for each mm of product.

Increasing or decreasing this value will increase or decrease the actual lengths the machine cuts for a given entered length.

i.e. if a length of 100.0mm is entered on the Cutting Screen, but the actual length the machine is producing is 90mm. Increasing the value in this field by 10% will increase the 'actual' cut length, so that it is equal to the 'entered' cut length.

## ALARM OUTPUT DURATION



The machine is equipped with various outputs which can be used to draw attention to certain conditions.

For example a Batch Complete output.

This field permits the operator to set the duration of these outputs.

## WARNING CUTS



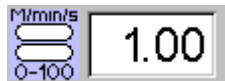
As well as Batch Complete the machine can give warning of Batch Nearly Complete.

This field sets the number of cuts before the batch quantity at which this warning will be turned on.

i.e. If a batch quantity of 100 was entered, and a Warning level of 10 was also entered.

The warning output would turn on once the machine had completed 90 cuts. It will remain on until the Batch Complete output turns on.

## CATERPILLAR RAMP RATE



On machines fitted with an integral caterpillar, the acceleration and deceleration rates of the caterpillar belts can be set via this field, thereby assisting with integrating the machine into an existing line.

The value is set as metres per minute per second.

i.e. if a line speed of 10.0M/min was set, and a ramp rate of 1.0M/min/S was also set.

The caterpillar belts, when started would take 10 seconds to reach the set line speed, and 10 seconds to come to a stop once the stop button was pressed.

NB. This field is only effective in 'Local' speed control mode.

In 'Remote' mode the caterpillar speed is directly linked to the 'Raw' speed input signal.

The value is also ignored in an 'Emergency Stop' condition.

In the case of an emergency stop the belts are brought to rest as fast as possible.

## BLADE OFFSET

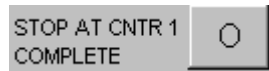


This field allows the user to select a different blade start position according to what type of blade is fitted to the machine.

The options are from 0 to 360 degrees.

Having the wrong start position set could cause problems, as the blade may not be moving at full cutting speed when it is attempting to cut the profile.

The default position for a standard straight blade is 45 degrees.



When set to "I" the machine will stop on reaching the required value of the relevant counter.

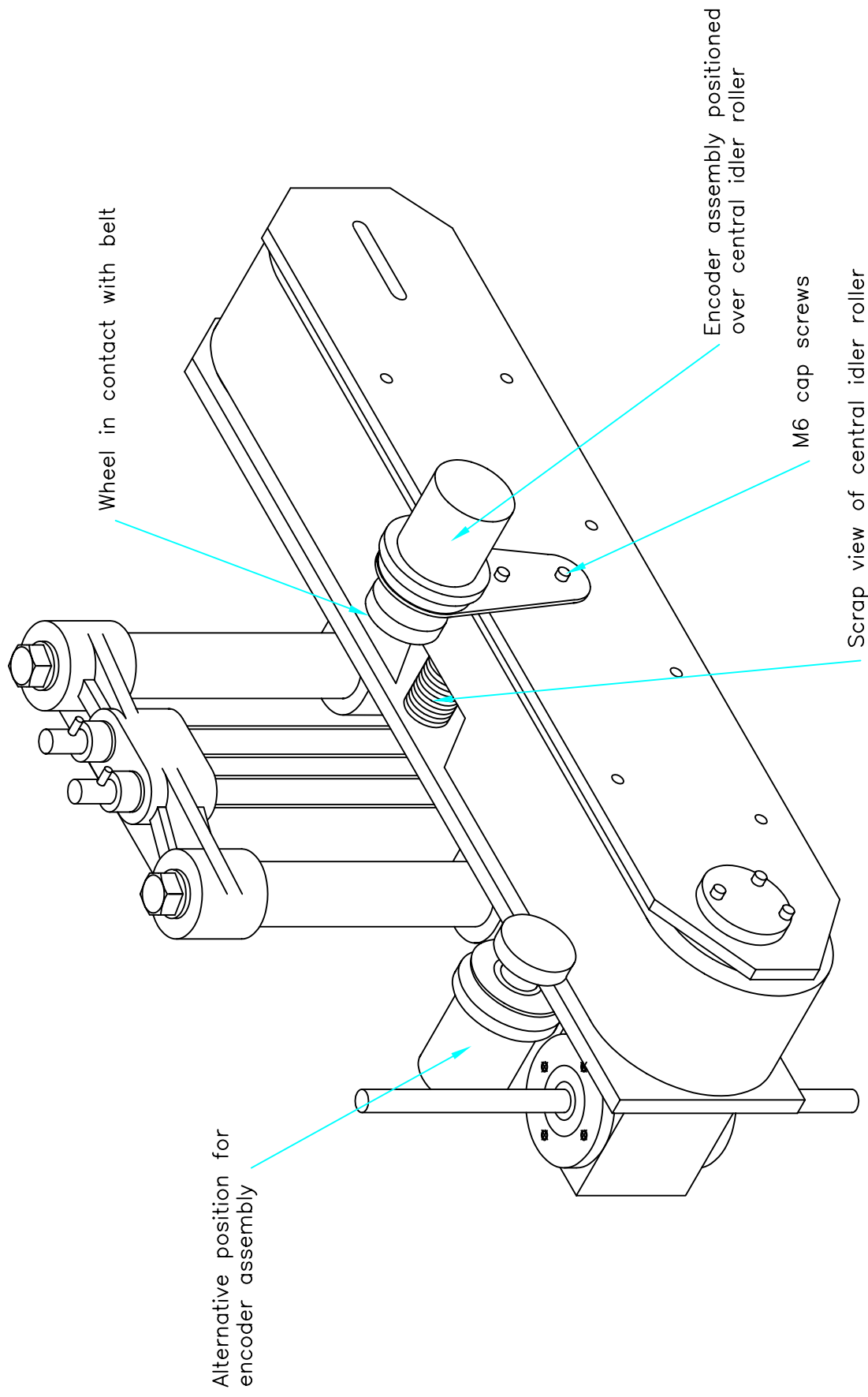
(Revised 5/06/2002)

## **E     Encoder Mounting**

The Servo-Torq machine will be supplied with an encoder, wheel and bracket. This unit is mounted to a existing haul-off to provide length feed back.

See S-BCD-TP-14 drawing for mounting instructions. Note the encoder should always be mounted on the flat part of the belt for the most accurate results.

The encoder is uni-directional and will count up on the BCD or TP170 HMI when turned in a clockwise direction. If your mounting position resists a anti-clockwise encoder turn direction, contact Gillard technical help (+ 44 (0) 1684 290243) for wiring modification.



## **F. SETTING UP PROCEDURE**

1. Check that the machine is switched off at the mains isolator.
2. Fit a knife blade. Refer to diagrams S-BCD-TO-08 and S-BCD-09 attached. These diagrams show the 2 main types of blades that will have been supplied with your machine (please note: the razor and chip blade holders are options). Follow the instructions below for information on fitting the blades and holders.

**TAKE CARE! BEFORE CONTINUING MAKE SURE YOU HAVE READ SECTION B - SAFETY CONSIDERATIONS, IN THIS MANUAL.**

### **BLADES ARE DANGEROUS - KEEP YOUR FINGERS!**

- 2.1 Remove the blade cap clamp bolt. To assist in releasing the bolt there is a Tommy bar hole in the hub.
- 2.2 Remove the blade cap. Rotate the knife shaft until the score line on the edge of the blade head is visible. This score line should be uppermost when you attach the blade.
- 2.3 For standard blades (not razor or chip blades) fit the clamp bolt through the cap and then through the hole in the knife blade. Then attach both blade and cap to the blade head.
- 2.4 For the razor and the chip blades, the blades must be fitted to the holder provided before the holder itself is attached to the blade head.

With the blade in the holder, fit the clamp bolt through the hole in the holder and attach to the blade head. The blade cap is not required for these types of blades.

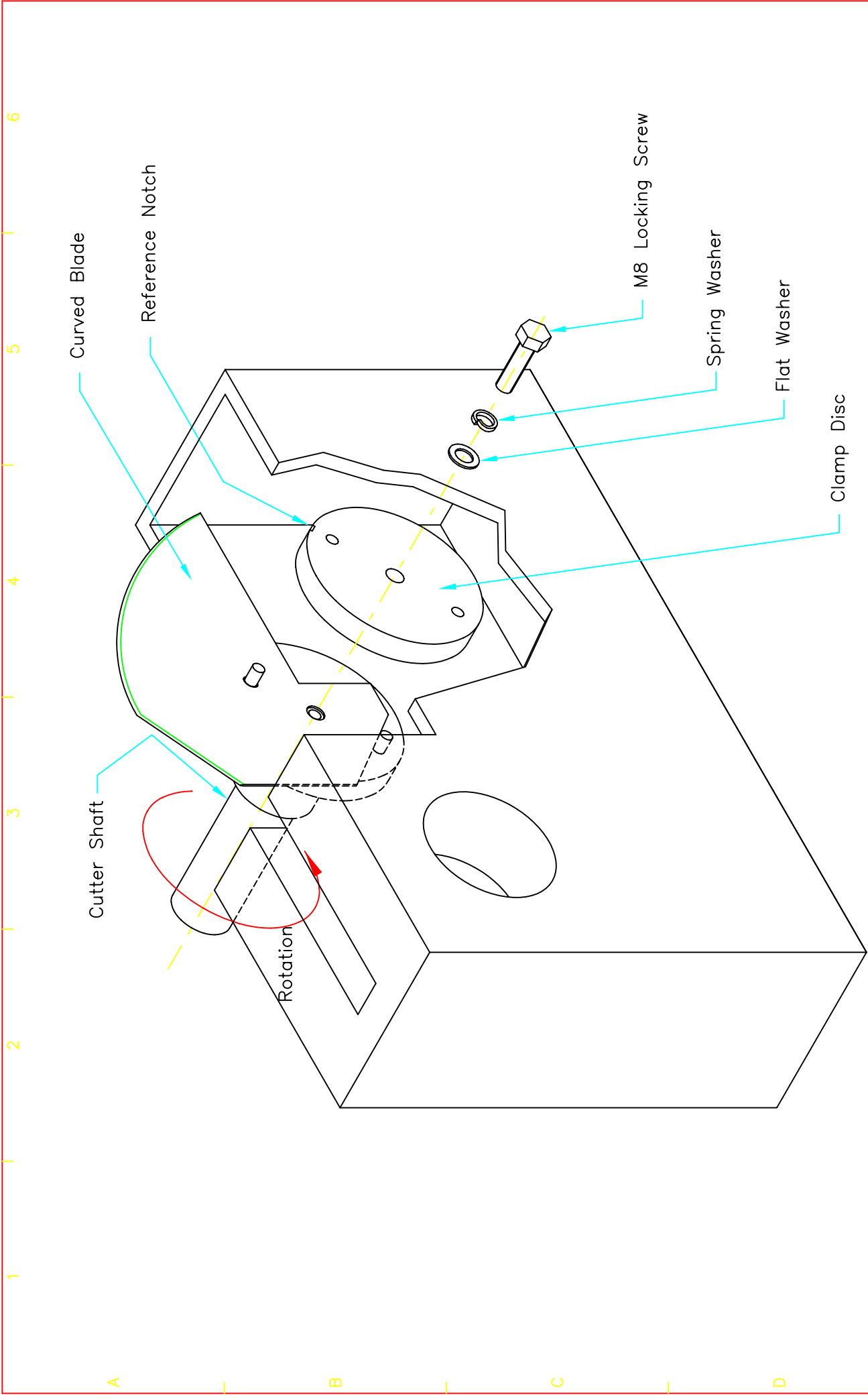
**IT IS ESSENTIAL THAT THE BLADE IS CORRECTLY LOCATED AS SHOWN IN THE DIAGRAMS.**

3. Select the correct cutter bushes to suit section or tube to be cut.
4. Insert the cutter bushes into the cutter bush holder.
5. Rotate the blade by hand (take care) until it lies across the centre line of the bushes.
6. Slide the bushes into the block up to the stops.

It is recommended that the blade is allowed to just 'brush' the faces of the bushes.

It is vital that the clearance between the blade and the bushes is kept to an absolute minimum to prevent the extrudate - particularly flexibles - from being pushed down between the bushes by the blade. In addition, the bushes act as guides for the blade during the cutting sequence.

7. Tighten bush clamping bolts and check that the bushes have not moved.



SUPPLY VOLTAGE	<input type="checkbox"/> V	TO	<input type="checkbox"/> V
3ph	<input type="checkbox"/> 1ph	N	<input type="checkbox"/> E
ISSUE	<input type="checkbox"/> 50Hz	<input type="checkbox"/> 60Hz	
REV	—		



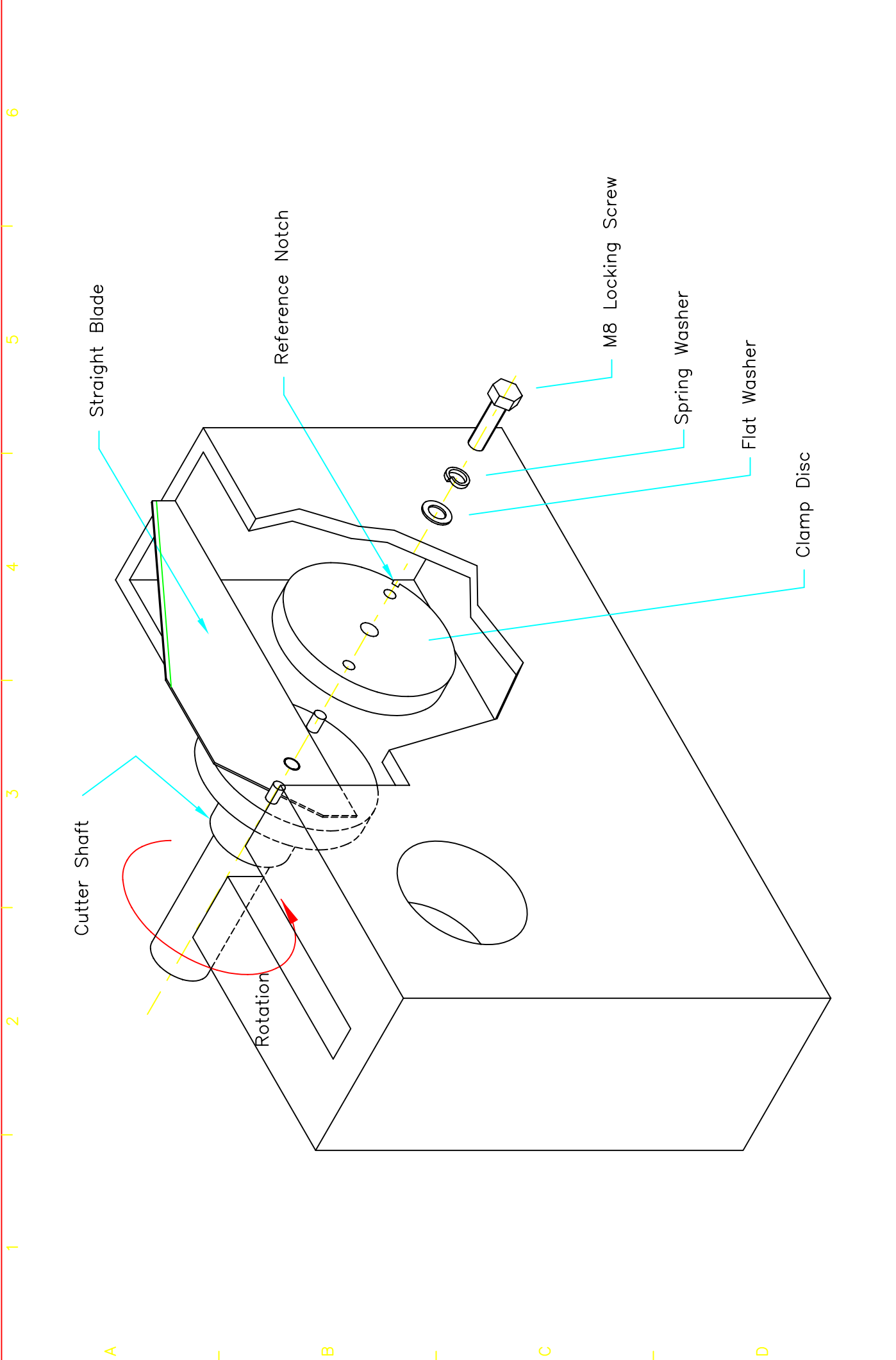
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DESCRIPTION

SINGLE AXIS SERVO TORQ CUTTER  
CURVED BLADE MOUNTING

JOB No	S-BCD-TP-08	REF. DRAWING No	S-BCD-TP-08
DRAWN BY	GILLARD	DATE	31/07/03
SHEET	8 of 13	DRAWING No	S-BCD-TP-08



 <p><b>Gillard Cutting Technology</b> Ashchurch Business Centre Tewkesbury Glos GL20 8NB England Tel: 01684 290243 Fax: 01684 290330 e-mail: sales@gillard.co.uk</p>		DESCRIPTION				SINGLE AXIS SERVO TORQ CUTTER STRAIGHT BLADE MOUNTING				JOB No S-BCD-TP-09		REF. DRAWING No S-BCD-TP-09	
SUPPLY VOLTAGE <input type="checkbox"/> V TO <input type="checkbox"/> V		3ph <input type="checkbox"/> 1ph <input type="checkbox"/> N <input type="checkbox"/> E		ISSUE <input type="checkbox"/> 50Hz <input type="checkbox"/> 60Hz		DRAWN BY GILLARD		DATE 31/07/03		SHEET 9 OF 13		DRAWING No S-BCD-TP-09	
REV —												DRAWING No S-BCD-TP-09	

8. Rotate blade by hand two or three times to ensure that it moves freely.
9. Close all guards. Switch on mains isolator. The machine will not operate until all guards are closed. Guard light will illuminate
10. Switch on main isolator  
  
Press the safety circuit re-set button (4) until this button is pressed and illuminated, the machine will not function.
11. Pass the extrudate through the caterpillar infeeders and the cutter bushes.
12. Pull the extrudate so that it is straight as it passes through the caterpillar belts and guide bushes. Rotate the caterpillar boom adjustment handle to clamp the caterpillar belts on to the extrudate

#### **Razor Blade Holder (optional extra)**

The razor blade adaptor is designed for high speed cutting of materials up to 10mm diameter max. See drawing S-BCD-TP-15 for mounting details

#### **Chip Blade Holder (optional extra)**

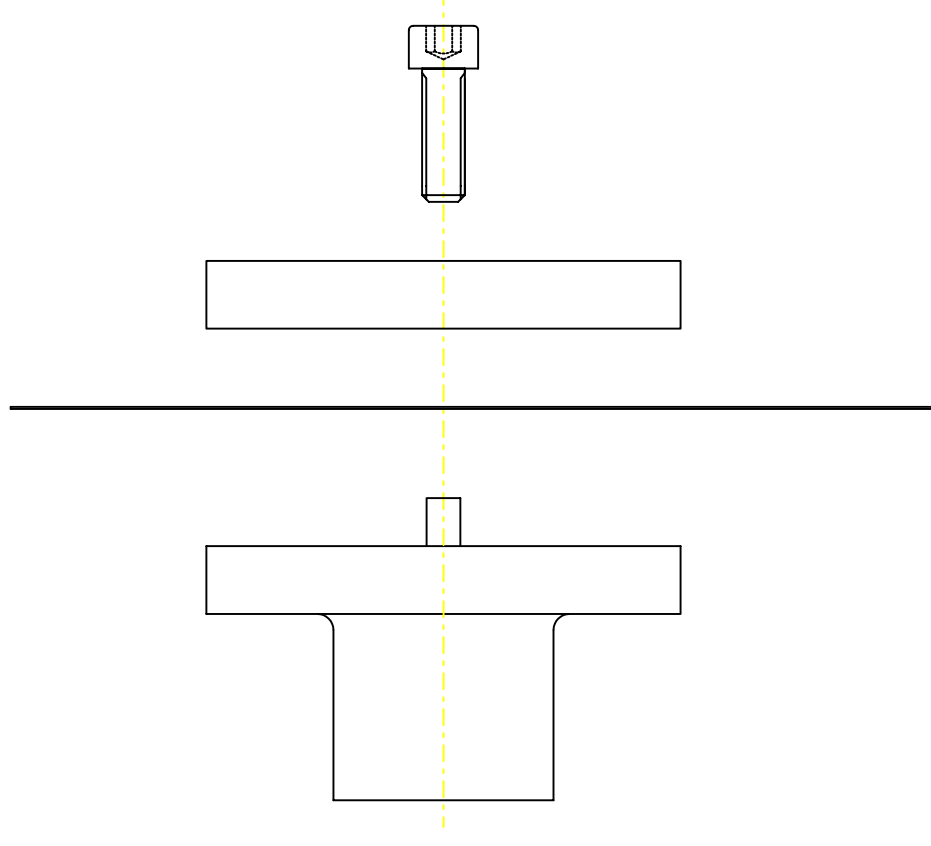
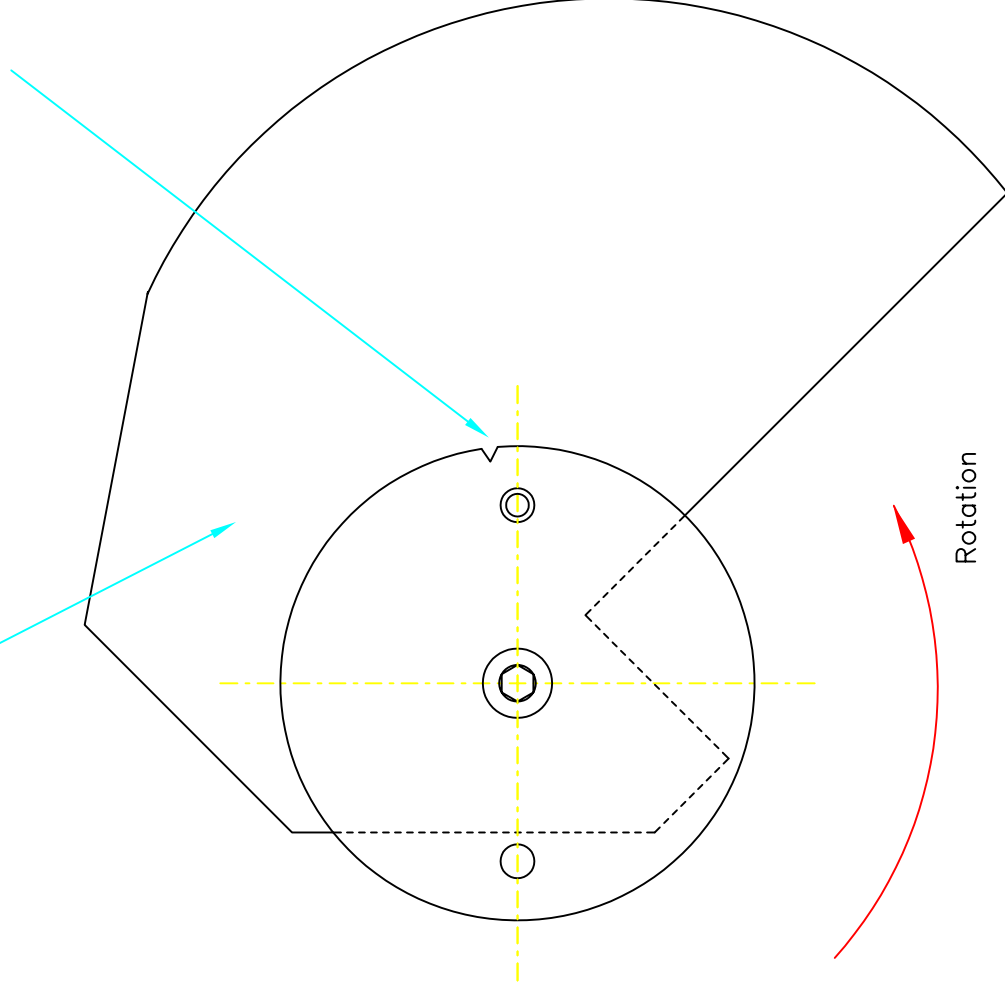
The chip blade adaptor is designed for accurate, high speed cutting when a good cut quality is required. The holder is especially suited to cutting medical tube up to 40mm diameter. See drawing S-BCD-TP-16 for mounting details.

#### **Single axis Servo-Torq Cutter common options list**

- 1 A-1 Blade lubrication. The blade housing is able to be filled with lubricate to aid cutting. Fill bath up to top of level and ensure blade is submerged as it passes through the bath.
- 2 L-3 Quick release cartridge block. The cutter bush assembly is able to be removed from the main cutter block/machine for ease of bush changing. See diagram S-BCD-TP-10 for more details.
- 3 D-1 Fibre optic length control. A fibre optic photo electric sensor mounted on a support bar senses the front edge of the tube. For accurate length cutting. See drawing S-BCD-TP-04 section 5 for selection
- 4 F-1 Batch counter. Pre-set counter which counts up to a pre-set then sounds an alarm or illuminates a lamp. Ideal for batch cutting in to boxes.
- 5 J-1 Razor blade holder. Small blade ideal for accurate cutting of products up to 10mm dia (depending on wall thickness)
- 6 J-2 chip blades holder. Medium blade ideal for accurate cutting of products requiring high cut quality up to a maximum of 40mm dia (depending on wall thickness)
7. O-1 Slide-away cutter head. The cutter block and motor assembly can be moved away to allow easy thread up and sizing of tube before cutting starts.
8. G3 Broken blade sensor. Photo electric sensor mounted in the cutter housing which detects the blade. If the blade should break during cutting, an alarm will be sounded in the form of a buzzer or lamp depended on machine spec.

Blade

Ensure reference mark is in the correct position relative to the blade



# SERVO TORQ ROTARY CUTTER Curved Blade Mounting

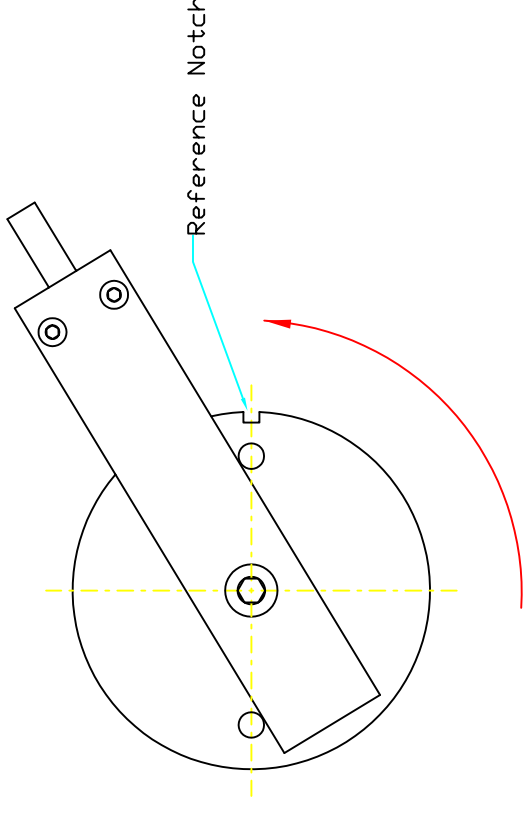
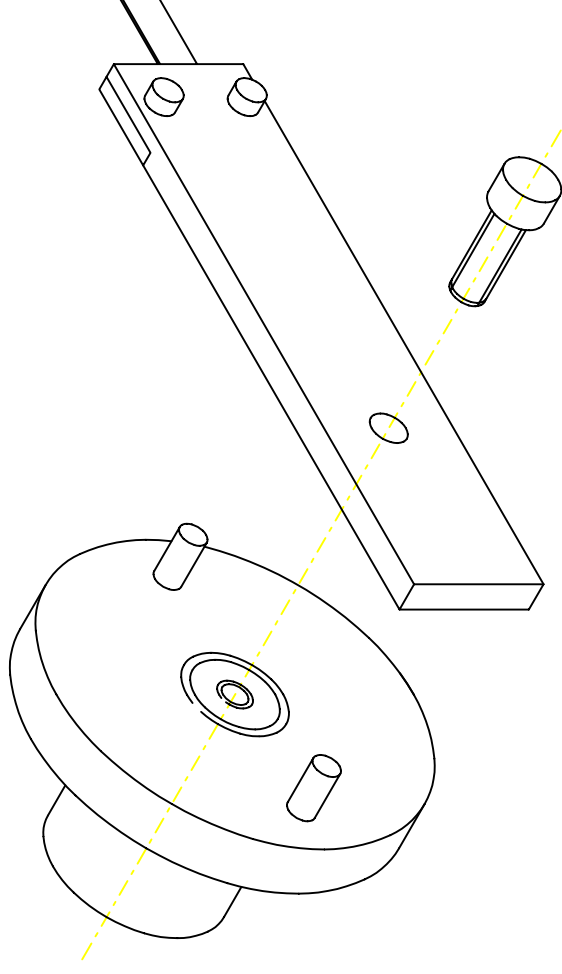


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M-ST-017

## RAZOR BLADE OPTIONAL EXTRA



Thrust taken on pins.

**SINGLE AXIS ROTARY CUTTER**  
Installation of Adaptor for Razor Blade

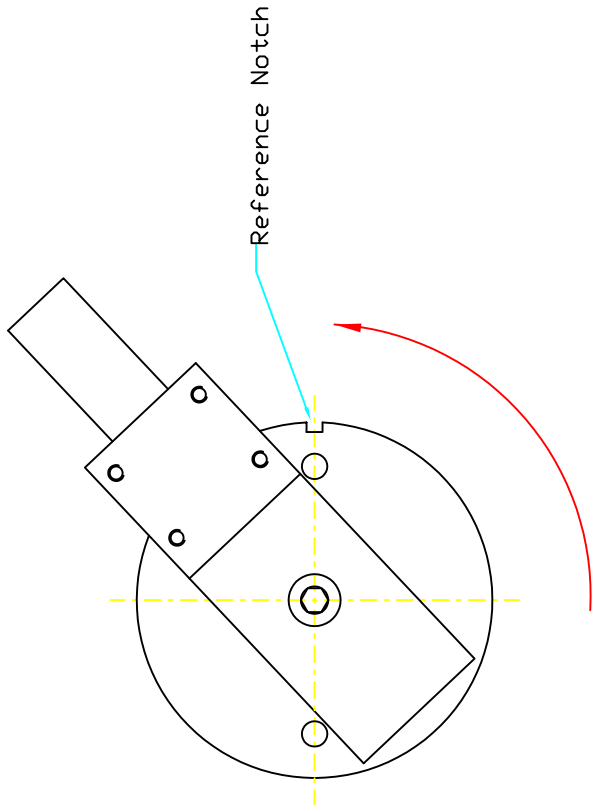
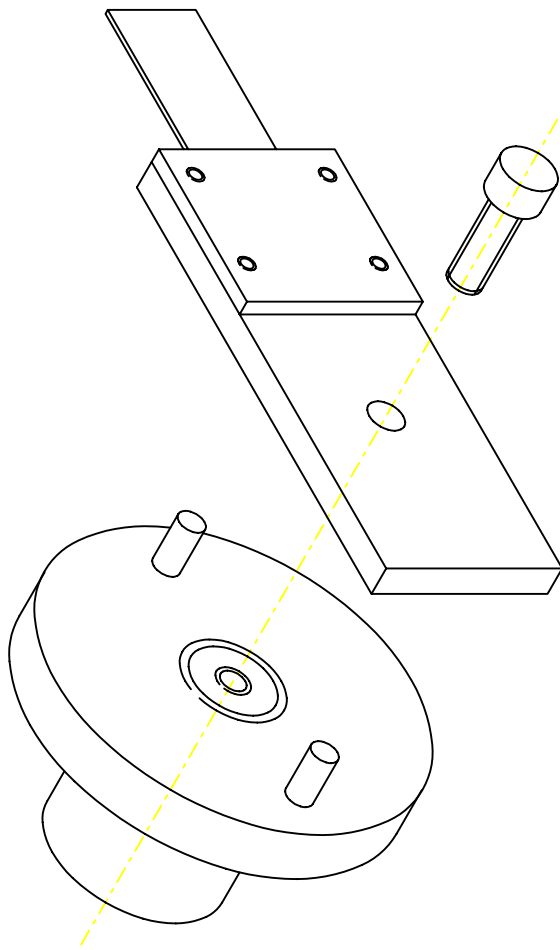


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**S-BCD-TP-15**

# CHIP BLADE OPTIONAL EXTRA



Thrust taken on pins.

SINGLE AXIS ROTARY CUTTER  
Installation of Adaptor for Chip Blade



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S-BCD-TP-16

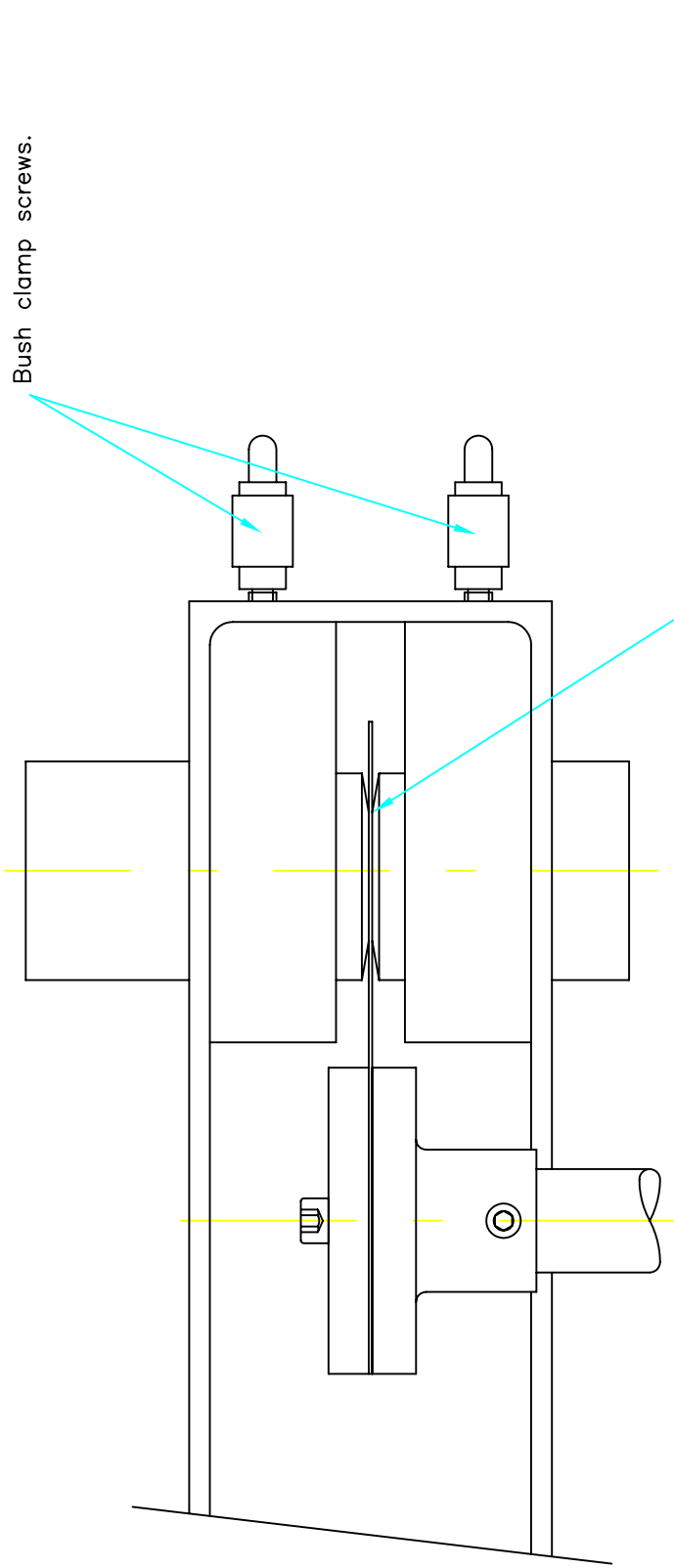
1 2 3 4 5 6

A

B

C

D



Bush clamp screws.

Guide bushes should just touch the blade when the bushes are correctly set. A 'whoosh' sound should be heard as the blade rubs against the inlet and outlet bush face. It should be possible to rotate the blade through the bush gap by hand.

SUPPLY VOLTAGE	<input type="text"/>	V	TO	<input type="text"/>	V
3ph	<input type="checkbox"/>	1ph	<input type="checkbox"/>	N	<input type="checkbox"/>
ISSUE	<input type="text"/>	50Hz	<input type="checkbox"/>	60Hz	<input type="checkbox"/>
REV	<input type="text"/>				

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DESCRIPTION

SINGLE AXIS SERVO TORQ CUTTER  
BLADE CLEARANCE

JOB No	S-BCD-TP-11	REF. DRAWING No	S-BCD-TP-11
DRAWN BY	GILLARD	DATE	31/07/03
SHEET	11 of 13	DRAWING No	S-BCD-TP-11

A

OPTIONAL EXTRA  
L-3 quick release cartridge block

B

Locating Dowel

C

Guide Bush

Cartridge Block

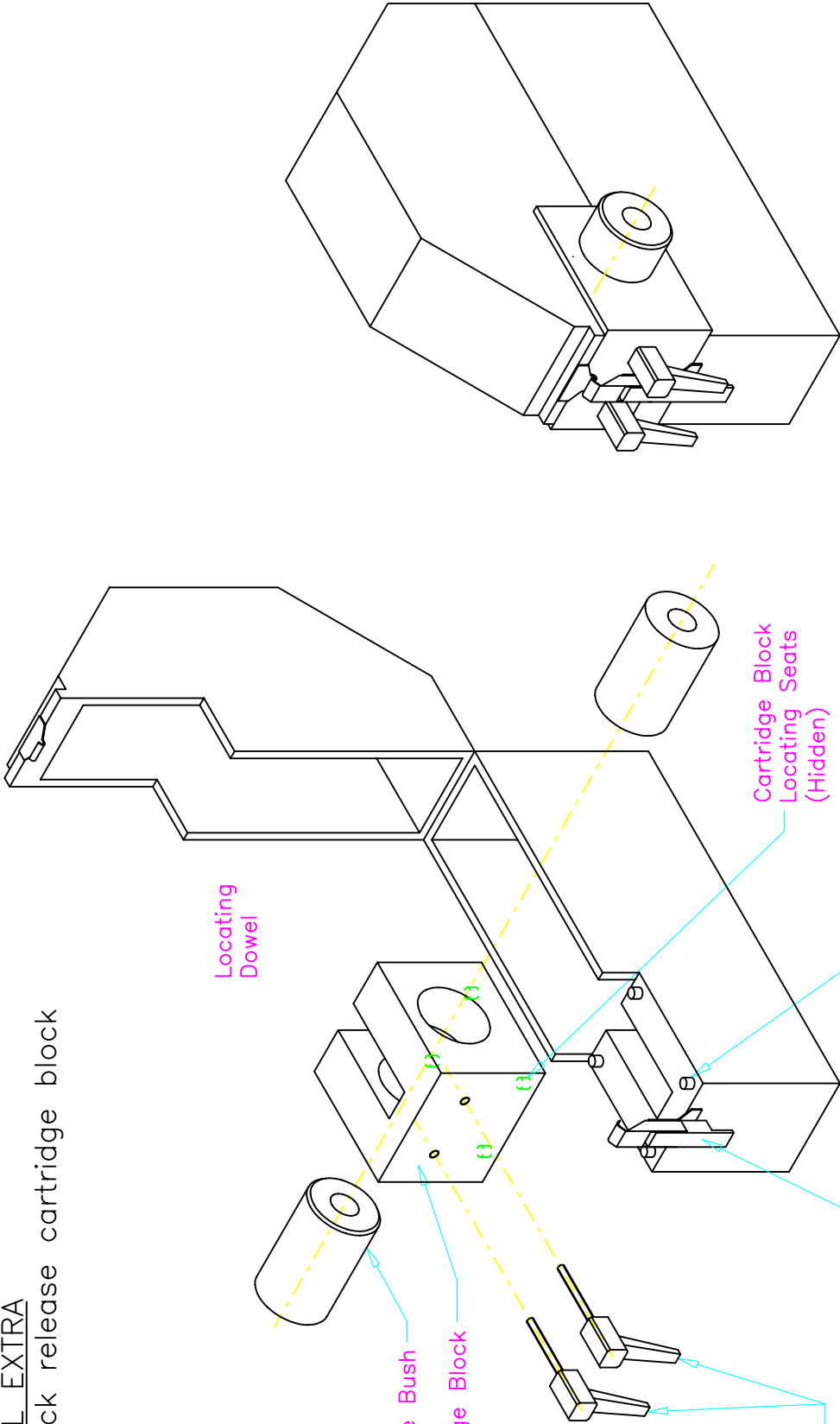
D

Locking Handles

Lid Catch

Cartridge Block Locating Seats (Hidden)

Cartridge Block Locating Pins



6

5

4

3

2

1

SUPPLY VOLTAGE	<input type="text"/> V	TO	<input type="text"/> V
3ph	<input type="text"/> 1ph	<input type="text"/> N	<input type="text"/> E
ISSUE	<input type="text"/> 50Hz	<input type="text"/> 60Hz	<input type="text"/>
REV	—		



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DESCRIPTION

SINGLE AXIS SERVO TORQ CUTTER  
STANDARD CARTRIDGE CUTTER BLOCK

JOB No	S-BCD-TP-10	REF. DRAWING No	S-BCD-TP-10
DRAWN BY	GILLARD	DATE	31/07/03
SHEET	10	OF	13
DRAWING No	S-BCD-TP-10		

## **G OBTAINING THE BEST RESULTS FROM YOUR SERVO-TORQ**

### **1 Introduction**

- 1.0 This section is intended to help you to get the optimum performance from your Servo-Torq rotary cutter. It runs through the main causes of poor cut quality and accuracy and suggests correct procedures to overcome these problems. A checklist is provided at the end of this section to help you quickly pinpoint possible causes of poor performance.
- 1.1 Advice is always readily available from experienced personnel at GILLARD should you require it.
- 1.2 Cut quality and accuracy are principally affected by the following:
- a. Cutter positioning
  - b. Infeeder control
  - c. Cutter bushes
  - d. Knife blades
  - e. Type of cutting action

### **2 Cutter positioning**

The material to be cut should be fed into the cutter from a similar operating height. It is not recommended that the material be pulled off the floor.

For very flexible extrudates, which are easily stretched, it is strongly recommended that a relaxing loop of material be allowed to form before the infeeder. This will ensure that the extrudate is not stretched as it enters the infeeder.

It is also important to ensure that any pre-coiled material is allowed to un-twist before it goes into the cutter. A un-wind table or stand should be used to remove any twist.

### **3. Infeeder Control (Customer supplied with Free-standing cutter)**

#### **3.1 Speed stability**

Infeeder speed variation should be avoided as far as possible. Do not adjust the speed unnecessarily during a production run. Allow time for the caterpillar to accelerate from rest to production speed before checking cut length accuracy.

**The more stable the infeeder speed the better the accuracy on cut length.**

#### **3.2 Caterpillar belts (Customer supplied Haul-off with Free-standing cutter)**

Check that your caterpillar belts are in good condition. Very worn belts, or belts where the surface joint has come apart, should not be used.

Even dirty belts can affect cut length accuracy. Ensure that the belt is clean and free from grease or any other matter.

**Keep your caterpillar belts in good condition.**

### 3.3 Nip Pressure (Customer Supplied Haul-off with Free-standing cutter)

Check that the nip pressure used with the infeeder/take-off is adequate to avoid extrudate slippage and snaking within the belts. This is especially important if the infeeder is pulling material from a drum or coil, particularly if the extrudate has a curved 'memory' which encourages it to attempt to turn within the belts.

However, do not use excessive nip pressure as this may damage the extrudate and place the caterpillar infeeder under unnecessary load.

Avoid changing the nip pressure during a production run. This may effect the cut length being produced, causing apparent cut length inaccuracy. If possible, set the nip-pressure to the same setting for each product size from run-to-run.

**Set nip pressure sufficiently to avoid extrudate slippage or snaking.**

## 4. Cutter bushes

### 4.1 Product support

Cutting plastic, rubber or other material with a flying knife type cutter, such as the Servo-Torq, requires a device to support the material while the cut is in progress.

The cutter dies or bushes are cylindrical metal devices, which have been bored or otherwise machined to match the cross-sections profile of the material to be cut.

They serve the following functions:

- a. Guide the product to the cut point.
- b. Provide support for the material as it is cut.
- c. Guide and support the knife.

**Although frequently overlooked, cutter bushes are extremely important in obtaining a clean cut on extruded tubes, pipes and profile.**

### 4.2 Boring the bushes

Have the cutter bushes machined or bored to suit the product cross-sectional profile. Clearance must be provided to permit the material to freely slide through the opening. However, the clearance must not be great enough to permit excessive movement of the product material. This may cause irregular or angular cuts.

**Excessive clearance will allow the material to move laterally and may cause irregular or angular cuts.**

The opening in the pair of bushes should be continuous. Any misalignment will cause feeding problems.

Do not enlarge the entrance of the down-stream bush unless the product is being held-up on the edge at each cut. The more square the entrance, the better the cut quality.

### 4.3 Positioning the bushes

The upstream (inlet) side of the cutter guide bush should be as close as practicable to the discharge point of the caterpillar infeeders, which precedes cutter.

This reduces the tendency for flexible extrudates to snag or droop as they leave the infeeders and enter the cutter bush.

For the optimum results the inlet end of the inlet cutter bush should be coned so that it can fit in between the upper and lower belts of the infeeders. This ensures that it reaches right into the exit of the caterpillar nip giving the product no opportunity to snag or jam.

Generally, the more flexible the extrudate the nearer the cutter guide bush has to be to the caterpillar belt.

## 5. Knife Blades

**The most significant factor to successful cuts is a sharp knife.**

Different products will require different knife blade thickness.

As a general rule -

The thinnest knife blade possible should be selected when cutting flexible extrudates.

The more rigid the product, the greater the thickness of Blade required.

Despite the first statement in this section, it is sometimes found that when cutting rigid materials a better cut quality is achieved with a blade which has had its edge taken off.

The following thickness blades are available from the Factory -

0.25 mm	(0.010")
0.38 mm	(0.015")
0.46 mm	(0.018")
0.60 mm	(0.024")
0.80 mm	(0.031")

Please see the parts list section J.4 for details on ordering blades.

## 6. Type of cutting action

Possibly the most difficult selection concerning knife blades is whether the cutting action should be chopping or slicing.

Chopping directly through a product with a straight edged blade causes the least amount of engagement time and, therefore, the least interruption to the extrudate as it is continuously pushed forward by the caterpillar infeeders.

Slicing through the product with a curved blade tends to give a better-cut quality, but can considerably increase extrudate interruption time.

Using a static cutter, such as the Servo-Torq, with a continuously moving product demands a compromise between slicing angle and engagement time.

The type of blade you should use will obviously depend upon your application. However, in our experience, approximately 90% of products can be cut adequately with a straight edged 'chopping' blade.

The remaining 10% are best served with a curved 'slicing' blade. Typical products would be thin-wall tubes or profiles, or profiles with an intricate shape where a chopping action might cause material distortion or collapse.

We can offer you a selection of straight or curved blades, or produce a custom blade design especially for your product.

Additional advice is always available from the factory. Experienced staff would be pleased to share their knowledge to help you achieve the best possible results from your Servo-Torq.

## 7. PROBLEM IDENTIFICATION CHART - SERVO-TORQ SYSTEM

### PROBLEM

#### **a Poor length accuracy**

### POSSIBLE CAUSE

### RECOMMENDED ACTION

1. Extrudate Slippage in belts.

The extrudate must be firmly clamped between the upper and lower caterpillar belts. When setting up the machine, check that it is not possible to pull the extrudate out from between the belts. If it is, increase the nip pressure. In addition, check that the extrudate is not wet or slippery. Finally, make sure that the caterpillar belts are in good condition. Worn belts should be replaced. See the spares parts list within this manual for the appropriate part number.

2. Extrudate tension varying.

The extrudate must be under constant tension as it enters the caterpillar belts. This is particularly critical for materials, which easily stretch, e.g. foam rubber, silicone and very small diameter flexible plastics. Ideally, the tension on the material should be as low as possible.

3. Cutter bush set-up incorrect.

The machine must be operated at a constant linespeed to achieve best results. Do not adjust the caterpillar speed unnecessarily. Leave it locked onto a constant speed. Similarly, do not adjust the nip pressure during a run. Any changes in infeed speed or nip pressure will immediately influence cut length accuracy.

4. Cutter bush set-up incorrect

The guide bush bore should be a reasonable tight fit to the product diameter. If too tight, it may cause a product hold-up as the extrudate is pushed through by the infeed. If too loose, it may allow the product to move from side-to-side. For very flexible extrudate, the distance between the end of the caterpillar belt lead-in is kept to a minimum. It is also important that the knife blade brushes the bush faces during cutting.

5. Material not exiting bush.

Any material hold-up in the exit bush may cause compression of the on-coming extrudate end. This will affect the accuracy of the oncoming length. Making sure cut lengths are free to exit the bush. Do this by reducing the length of the exit bush, putting an internal cone into the bush or using air to blow the cut pieces out of the bush.

### **a. Poor cut quality**

- |                         |  |
|-------------------------|--|
| 1. Blade gap too large. | It is critical that the knife blade actually brushes each cutter guide bush face during the cut. The bushes should be as tight as possible to the blade, whilst still to pass through the gap when the blade head is turned by hand.   |
| 2. Bush edge not sharp. | The bush faces, which are in contact with the blade, should be straight and clean. The 90° angle between the bush face and the product bore should be as sharp no circumstances should there be a bevel or radius on this edge. check for wear on this edge from time-to-time.         |
| 3. Blade not sharp      | Check the cutting edge. Check the double bevel is even. Replace the blade if appropriate.  |
| 4. Blade gap too large. | Check that the blade is touching both bush faces as it passes through the gap between them. Reset the bushes if necessary. If the gap is too wide, the material can be pushed down into the gap by the blade, causing a jam.   |
| 5. Blade sticking.      | For many products, particularly rubbers and flexible PVC, lubricating the blade greatly assists the cutting action and eases the passage of the blade though the material. Fill the integral blade lubrication system with a lubricant. e.g. water with a dash of dish washing liquid. |

### **b. Feed difficulties**

- |                                  |  |
|----------------------------------|--|
| 1. Inlet bush too short.         | For very flexible extrudates, make sure that the distance between the end of the caterpillar belt nip & the bush lead-in is kept to a minimum. It may be necessary to turn the end of the inlet bush into a cone, so that it can fit in between the caterpillar rollers. In extreme cases, use a small tube to fit right into the nip point & guide the material into the inlet bush.    |
| 2. Exit bush too long.           | When cut short lengths or very flexible materials, make sure that the exit bush is not over long. If too long, material will have to be pushed an excessive distance through the bush, causing drag and product hold-up.   |
| 3. Bush bore not smooth.         | Make sure that the internal bush bore is smooth and free from machining rings and other potential drag points. If possible, polish the bore or use a very low friction material (e.g. Teflon) as an insert in the bush. Alternatively, use low-pressure air, blown down the bush, to create an air cushion around the extrudate to minimised drag.                                       |
| 4. Infeed guide-in not straight. | Check that the extrudate is straight as it enters the caterpillar. If the material has been coiled before it is cut, it may have a tendency to try to twist as is passes through the inlet guide rollers. If this is a problem, add additional guide in rollers to hold the infeed. In very bad cases, use a tube guide to direct the extrudate right to the caterpillar inlet belt nip. |

5. Incorrect blade shape.

Because the material is trying to move forward continuously during the cutting during the cutting action, a wide blade may cause excessive product hold-up, resulting in a jam. Check that you are using the narrowest blade possible. If necessary grind away the back of the blade to reduce hold-up.

## **H      MAINTENANCE AND INSPECTION**

### **1.      Monitoring during operation - Consumables**

Consumable items such as knife blades and caterpillar infeeders should be visually checked on a regular basis for wear. If these items are not kept in a reasonably condition, the machine performance will almost certainly deteriorate over time.

#### **1.1      Knife blades**

It is difficult to define when a blade requires replacing. However for the efficiency of the cutter it is essential that a sharp cutting edge be maintained on the blade. This ensures that:

1.1.1 A clean, swarf-free, cut edge is maintained on the extrudate.

1.1.2 Undue stress is not placed on the clutch.

If in doubt as to the sharpness of the blade, fit a new blade by following the instructions in section F.1.

**FOR SAFETY, IT IS ESSENTIAL THAT THE MAIN POWER-IN ISOLATOR SHOULD BE TURNED OFF DURING THE BLADE CHANGING OPERATION.**

### **2.      Preventative measures**

Regular maintenance inspection is vital if unscheduled breakdowns are to be avoided. Please follow the maintenance schedule listed in section 4 below. It is designed to identify problems before they cause production downtime.

### **3.      Planned maintenance schedule**

<b>Once per day</b>	-	1.	Check knife blade condition
<b>Once per week</b>	-	1.	Clean wet block if being used
		2.	Check safety guard operation
		3.	Check emergency stop operation
<b>Once per month</b>	-	1.	Check tension of servo motor drive belt
<b>Once per six months</b>	-	1.	Visually check for loose wires
		2.	Visually check for loose bolts
		3.	Check hinges and lids for damage
		4.	Check that the blade head is square to cutter bush holder block.

## 4. Functional checking of safety devices

The functional checking of all safety devices occurs each time that the machine is started. This is done automatically. When all guards are closed and the emergency stop push-button is reset, the guard lamp should illuminate. As all switches are 'fail to safe' type switches, the guard lamp will not illuminate until all circuits have been checked as being safe. When the safety circuit blue lamp is illuminated the following actions take place:

- 4.1 Safety relay energised. This re-checks that all guards are closed.
- 4.2 The main motor contactor and relays are checked to ensure that they have returned to a De-energised (safe) conditions since the machine was last used. As contactors are of a 'positive guided' type, you cannot start a motor if there is a fault in a contactor.

The safety circuit lamp will not illuminate if there is a fault in any motor contactor, guard switch or emergency stop switch.

### Cutter

#### Motor/Servo 637 Drive

##### Specification

Type	Servo motor, brushless type
Armature Current	30A maximum, at maximum 3000 rpm (check machine spec)

#### Drive

##### Specification

Type	Eurotherm 637 three phase convertor
Supply Voltage	400V 50Hz 3 phase + earth
Supply Protection	16 Amp fuses
Motor Protection	Overload protection provided by drive
Motor Feedback	Resolver feedback
Speed Ref	0-10V via 10K ohm 3W potentiometer

##### Line Speed Indicator

##### Specification

Type	Red lion cub Cub 5 red back lit LCD display
Supply Voltage	24 VDC
Consumption	3W maximum
Input Signal	24V PNP

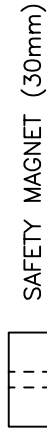
\* NOTE \*

The EXIT and INLET bushes may be fitted with a 30mm or 18mm safety magnet depending on bush diameter.

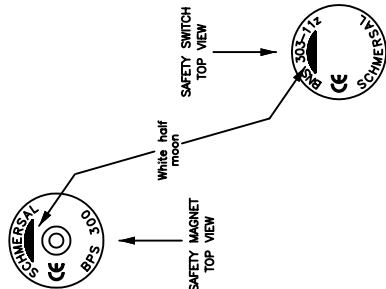
A

EXIT or INLET BUSH SAFETY MAGNET 30mm OR 18mm

- 1) The magnet & safety switch are lined up and square
- 2) The gap is between 2 to 3mm.
- 3) The white half moon shapes are facing each other.(30mm only)
- 4) The cable is not damaged

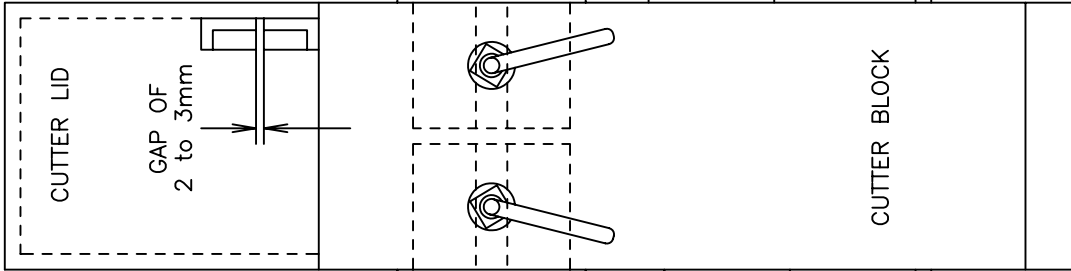


B

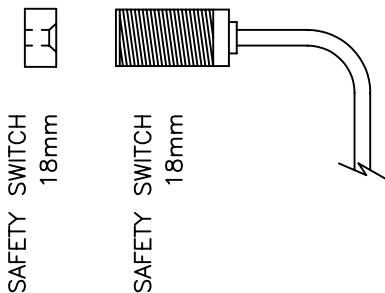
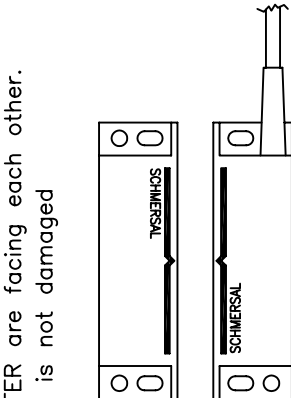


C

GAP OF  
2 to 3mm



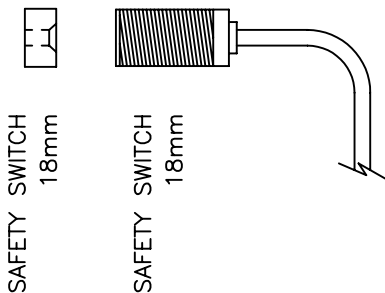
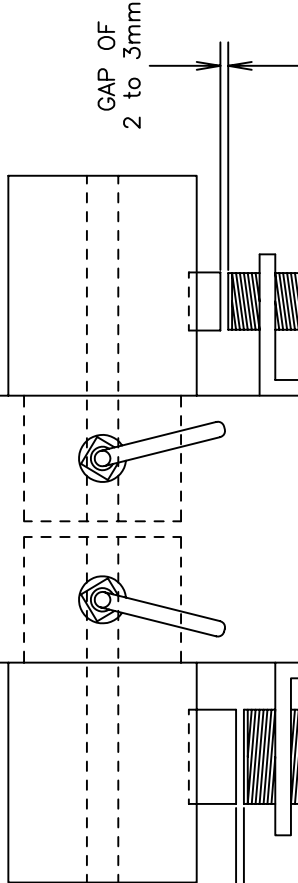
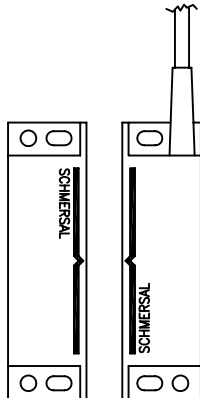
GAP OF  
2 to 3mm



D

CUTTER LID SAFETY MAGNET

- 1) The magnet & safety switch are lined up and square
- 2) The gap is between 2 to 3mm.
- 3) The POINTER are facing each other.
- 4) The cable is not damaged



SUPPLY VOLTAGE	<input type="checkbox"/> V	TO	<input type="checkbox"/> V
3ph	<input type="checkbox"/> 1ph	N	<input type="checkbox"/> E
ISSUE	A	50Hz	<input type="checkbox"/> 60Hz
REV	—		



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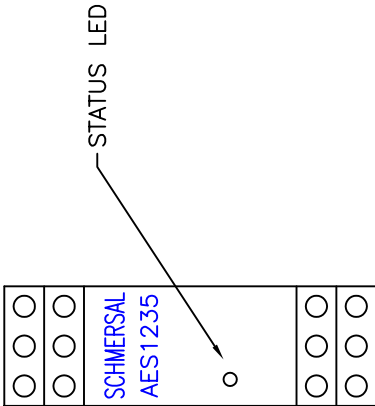
DESCRIPTION

SAFETY SWITCHES ALIGNMENT

JOB No	S-BCD-TP-12	REF. DRAWING No	S-BCD-TP-12
DRAWN BY	A. RICKARD	DATE	31/07/03
SHEET	12 of 13	DRAWING No	S-BCD-TP-12

SELECT SAFETY RELAY FITTED TO YOUR MACHINE

SCHMERSAL ASE1235  
Twin channel N/C N/O safety relay level 3



Connecting 24vdc to "A1" and Ovdc to "A2" the red LED will light.  
On closing the safety guards; terminals "S13 & S14" will be open circuit and "S23 & S24" will be closed circuit.

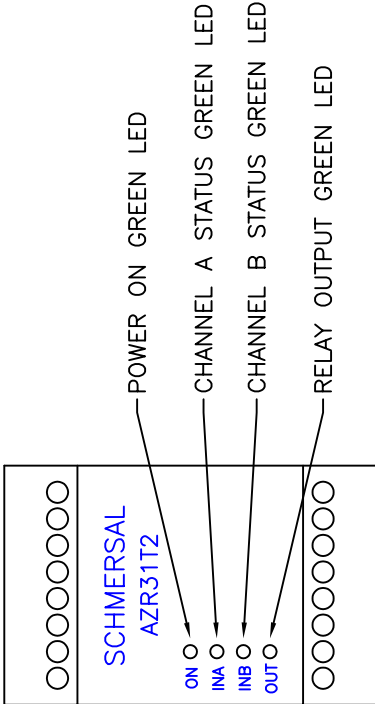
With machines fitted with auto reset the green output LED will light.  
With machines fitted with manual reset on pressing the reset pushbutton the green LED will light.

LED COLOUR STATUS CHART

- LED green = Safety guard is closed, authorized operation.
- LED flashes yellow (2 Hz) = Safety guard closed, but no authorized operation.
- LED flashes yellow (0.5 Hz) = Safety guard is open.
- LED orange 1 pulse = Fault. Safety switch partially actuated for at least 5s.
- LED orange 4 pulse = Malfunction at the outputs. Interference at switch lead or supply voltage.
- LED orange 5 pulse = One or both relays did not respond within the monitoring range.
- LED orange 6 pulse = Relays do not fall off by activation of the switch.
- LED orange 7 pulse = Cross monitoring failure. Fault in one channel.

The fault message is deleted once the fault has been rectified and after the connected switch has been acuated to check the various functions (open and then close the safety guard).

SCHMERSAL AZR 31 T2  
Twin channel N/C N/C safety relay level 4



Connecting 24vdc to "A1" and Ovdc to "A2" the green "POWER ON" LED will light.  
On closing the safety guards; terminals "S13 & S14" will be closed circuit and the green "CHANNEL A" LED will light.  
"S23 & S24" will be closed circuit and the green "CHANNEL B" LED will light.

With machines fitted with auto reset the green "RELAY OUTPUT" LED will light.  
With machines fitted with manual reset on pressing the reset pushbutton the green LED will light.

SUPPLY VOLTAGE	<input type="text"/>	TO	<input type="text"/>	V
3ph	<input type="text"/>	1ph	<input type="text"/>	N
ISSUE	A	50Hz	<input type="text"/>	60Hz
REV	—			



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DESCRIPTION

SAFETY RELAY  
LED STATUS

JOB No	S-BCD-TP-13	REF. DRAWING No	S-BCD-TP-13
DRAWN BY	A. RICKARD	DATE	31/07/03
SHEET	1	OF	1
DRAWING No	S-BCD-TP-13		

## EUROTHERM 637 LED DIAGNOSTIC DISPLAY



No display

No supply voltage present



System ready to operate

Regulator ready, not active



System active

Output stage active



Active input with switch on

Switch active X10.7



Supply under voltage

Is the power supply reset?



Fault supply under voltage

Is the power supply present?



Resolver fault

Check resolver cable



12+ Overload, drive

Mechanics stiff?



12+ Overload, motor

P-amplification too high



Over temperature at  
output stage

Adequate cooling of regulator



Over voltage

Ballast module okay



Chassis short

Check motor cables



Overload of motor or  
regulator

Mechanic stiff failed bearings cold  
grease



Motor over temperature

Check motor cooling



Motor temperature warning

Check overload of motor/cooling etc.



Ballast active

Ballast resistance usage exceeds 90%



Switch off ballast

Ballast resistance overload



Trailing window exceeded

Position control mode only



Trailing error with switch off

Position control mode only



Memory checksum error

Try to restart. Load new parameters



Internal fault

Controller fault return for repair

For further servo drive information, consult Eurotherm 631 drive OEM manual.

**Standards in accordance with EN 60204, part 1**

**Identification of conductors**

a.c. or d.c. power circuits	BLACK
a.c. control circuits	RED
d.c. control circuits	BLUE
neutral	BLUE (coded 'N')
P.E. Protective Conductor	GREEN/YELLOW

**Stop functions**

Category 0:	Uncontrolled Stop. Door interlocked local isolator
Category 1:	Emergency Stop. Guard switches and emergency stop push buttons
Category 2:	Controlled Stop. Designated push buttons.

## **Operator Panels**

**Q. The machine is fitted with a BCD length counter and it is not displaying the length counter up or I cannot enter a new length?**

A. Check cutter drives status, it should show a single dot in the bottom right hand corner on Eurotherm servo drives 637 or 631 when the drive is ready. Press the emergency stop, reset and test. Check electrical connections.

Check that the cable linking the BCD counter to the drive (CAN-BUS) is not lying parallel to mains or resolver cable; if necessary move the cable out from the trunking to achieve this.

Faulty counter? Contact Gillard engineer for further advise.

When running in cam mode the BCD will eventually display "----". This is the counter counting limit. After pressing the emergency stop and pressing enter on the BCD counter it will resume normal counting.

**Q. What should the Eurotherm 637+/631 servo display?**

A. When the drive is not active it will show a "1" on red LED display. When the guards have been reset the drive will display a dot in the bottom right hand corner with a line in the centre. This means, the drive is active and ready.

Error "2" is a resolver fault; check resolver connection.

Error "3,4 & 5" is a motor current overload; check motor connections, cut rate isn't too high, lower blade speed, blade condition and water reservoir is full. If you have further problems contact a Gillard engineer.

**Q. The servo motor on my cutter, which is fitted with a 637 Eurotherm drive, is making a loud squealing noise every 2 to 3 cuts?**

A. The probable cause of this is a loose mains plug on the 637 Eurotherm drive. This causes one of the phases to draw excessive current which in turn imbalances the servo motor.

Check motor and resolver lead connections on the drive and motor end. Cycle the power and test with the electrical door open to monitor drive status. Check 637+ drive status above.

# Peter Gillard & Co Ltd

## Parts List - Model ST-LT50B, 10A MKS

### Fabrications

B471014	1	Base	MS Fabs
B471080	1	Drive Guard	MS Fabs
B471032	1	Drive Guard Lid	MS Fabs
B471023	1	Control Console	MS Fabs
C750271	1	Inlet/Exit Guard	MS Fabs

### Gillard Manufactured parts

B471049/A	1	Cutter Block	Sevtek
B470140	1	Lid	Sevtek
B471090	1	Drip Tray	MS Fabs
D470090	1	Cutter Shaft	Sevtek
D750230	1	Blade Holder	Sevtek
D750240	1	Cap	Sevtek
B470050	1	Cutter Shaft Brkt	MS Fabs
B470062 , Size 2 motor	1	Servo Motor Bracket	MS Fabs
D470350	1	Sensor Mtg. Bkt.	Gillard
D470470	1	Fan Bracket	MS Fabs
D703060	1	Measuring Wheel	Sevtek
D750320	1	Guard Support	Gillard
D704581	2	Guide Bushe Set	Durbin
D300382	4	Jack screw	Sevtek
D801021	2	16N Blade	Quickgrind

### Standard Mechanical items

AS08064	1	Eldon Cabinet	Routeco
HTD 28-8M-30	1	Plain Bore Aluminum Pulley	CBS
HTD 28-8M-30	1	T/Lock Bore Aluminum Pulley	CBS
HTD 630-8M-30	1	Belt	CBS
1210-19 BORE	1	Taperlock Bush	CBS
SNP 30	2	Bearing	CBS
Z400	1	Hinge	Schmersal
61-55-M1-MS-ZN	1	Main cutter cabinet catch	Protex
01-655CS-ZN	1	Catch Base	Protex
MR 40 P-M 8x40	2	M8 Lock handle	Elesa
D703070		Encoder Mounting Brkt	Lasercut
HCX.76-AR	1	Column Level Indicator	Elesa
328-5377	1	Mini-Ball Valve	RS
D901012-A	1	Serial Plate	Southern United
3470-POO-080-P62	4	Swivel Castor	Tente

### Standard Electrical items

AZR 31 T2 24VDC	1	Safety Relay	Schmersal
BNS-180-02Z-5M	2	Safety Sensor	Schmersal
BP-15	2	Actuator magnet	Schmersal
BNS33-02Z-2187-3M	3	Magnetic Safety Switch	Schmersal
AZ 15/16	3	Actuator magnet	Schmersal
29-38-73-0	1	2 A Power Supply	Rifina
KIB-M08-PS-1.5-KL-SM8	1	M8 Sensor	Bernstein
403001-E03-M050	1	Sensor lead	Bernstein
KD2412PMSX-6A	1	Fan	Thermaco
PB12	1	Fan Finger Guard	Thermaco

### Servo-Motor and control equipment

ACM2N-0480-4/2.6	1	Cutter Servo motor	SSD
637F-KD6R-10	1	Servo Amplifer	SSD
AH467059U002	1	RP-CAN Card	SSD
CI-467068	1	Resolver Plug	SSD
CI-469039	1	Motor Plug	SSD
FN3258-7/45	1	637-10 Amp EMC Filter	Routeco
BCD-LED 6-CAN	1	Length Counter	HMK
CUB5B0020	1	Cub 5 Red LED counter	Routeco
745-2000-HV	1	Shaft Encoder	BEC
S-10	1	Plug	BEC

#### General electrical items

BCD-CAM-CTP	1	Front Panel	M/Art
RG M63/1	1	Rotex Gland	Roxtec
C6C3025	1	3 Pole 25A MCB	Rifina
C6C3010	1	3 Pole 10A MCB	Rifina
C6C1006	1	1 Pole 6A MCB	Rifina
3RT10 16-1BB41	1	9 AMP Contactor, Size S00	Parmley Graham
3RH 1911 1FA22	1	Aux Contact Block	Parmley Graham
3RT19 16-1LM00	1	Suppresion Diode Size S00	Parmley Graham
PM69 4025 RY64	1	Main Isolator	Rifina
RS 488-1831	1	24 V D/C Relay	RS Components
RS 196-6147	1	Relay Base	RS Components
ZB4 BV013	1	White lens	Lockwell
ZB4 BVB1	1	White LED + body 24vdc	Lockwell
ZB4 BV063	1	Blue lens	Lockwell
ZB4 BVB6	1	Blue LED + body 24vdc	Lockwell
ZB4 BW843743	1	Stop/start button	Lockwell
ZB4 BW0B55	1	24v lampholder 1n/o 1n/c	Lockwell
ZB4 BS844	1	E-Stop Button	Lockwell
ZB4 BZ104	1	Contact Block 2xn/c	Lockwell
ZBY 9330	1	Legend	Lockwell
ZB4 BA2	1	Black Push Button	Lockwell
ZB4 BZ101	1	Contact Block 1xn/o	Lockwell
RS 460-7526	1	10K Pot	RS
RS 509-973	1	Dial Ring	RS
CG4 A251-600 FS1	1	Rotary Switch	Parmley Graham
249-116	4	End stop bracket	Parmley Graham
281-901	30	4mm terminal	Parmley Graham
281-907	3	4mm earth terminal	Parmley Graham
?	4	4mm jumper	Parmley Graham
281-328	6	End plate	Parmley Graham
281-611	1	Fuse Holder	Parmley Graham
289-457	1	25 Way Module Block	Parmley Graham
RS 480-484	1	25 Male D Type Lead	RS
MISC	1	Fastners, Bushes	Misc
MISC	1	Wire, Crimps, Etc	Misc

## **WARRANTY**

Standard products manufactured by **Peter Gillard & Co Ltd**, hereinafter referred to as the "Company", are warranted to be free from defect in workmanship and material for a period of one year from the date of shipment, and products which are defective in workmanship or material will be repaired or replaced at the option of the Company at no charge to the Buyer. Final determination as to whether a product is actually defective rests with the Company.

The obligation of the Company hereunder shall be limited solely to repair or replacement of products that fall within the foregoing limitations, and shall be conditioned upon receipt by the Company of written notice of any alleged defects or deficiency promptly after discovery within the warranty period and, in the case of components or units purchased by the Company. The obligation of the Company shall not exceed the settlement that the Company is able to obtain from the supplier thereof.

No products shall be returned to the Company without its prior consent. Products which the Company consents to have returned shall be shipped CIF to the Company's factory. The Company cannot assume responsibility or accept invoices for unauthorised repairs to its components, even though defective.

The life of the products of the Company depends, to a large extent, upon type of usage thereof.

**The Company makes no warranty as to fitness of its products for specific applications by the buyer nor as to period of service unless the company specifically agrees otherwise in writing after the proposed usage has been made known to it.**

**The foregoing warranty is exclusive and in lieu of all other warranties expressed or implied, including, but not limited, to any warranty of merchantability or of fitness for a particular purpose.**

This Warranty does not apply to experimental or development products.

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## **Appendix 1**

Mechanical Diagrams & Parts List

## **Appendix 2**

### Wiring Diagrams