Gillard Advanced Cutting Systems

Operating Instructions

S e r v o - T o r q R o t a r y
C u t t i n g S y s t e m
F R E E - S T A N D I N G

Issue 01/97/ST
Servo-Torq Cutting System

Date May1997

E n g l i s h

Operating Instructions

S e r v o - T o r q
M o d e l S T / L T 5 0 B

Construction date

Serial No

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
England
GL20 8NB
Tel: 01684 290243
Fax: 01684 290330
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www.gillard.co.uk

Issue 01/97ST
Servo-Torq Cutting System

Warning!

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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 of the Bench-Cut 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.

4 Local service and after-sales support

This machine is supported by the following companies in the countries listed. For all other countries, please contact the manufacturer directly at the address shown on page 2 of this manual.

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.

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

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: Director

Signature of authorised representative:

Place: Tewkesbury
England

Date:

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B SAFETY CONSIDERATIONS

Please refer to drawing No. M-ST-001 page 14. This shows the location of danger areas, guarding and emergency stop push button.

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 220 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.

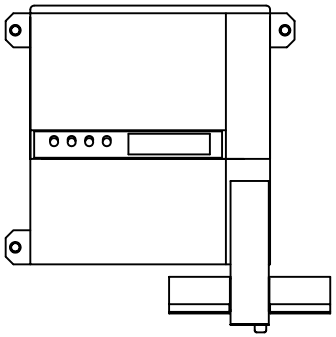
Always turn the isolator switch **off** before changing blades.

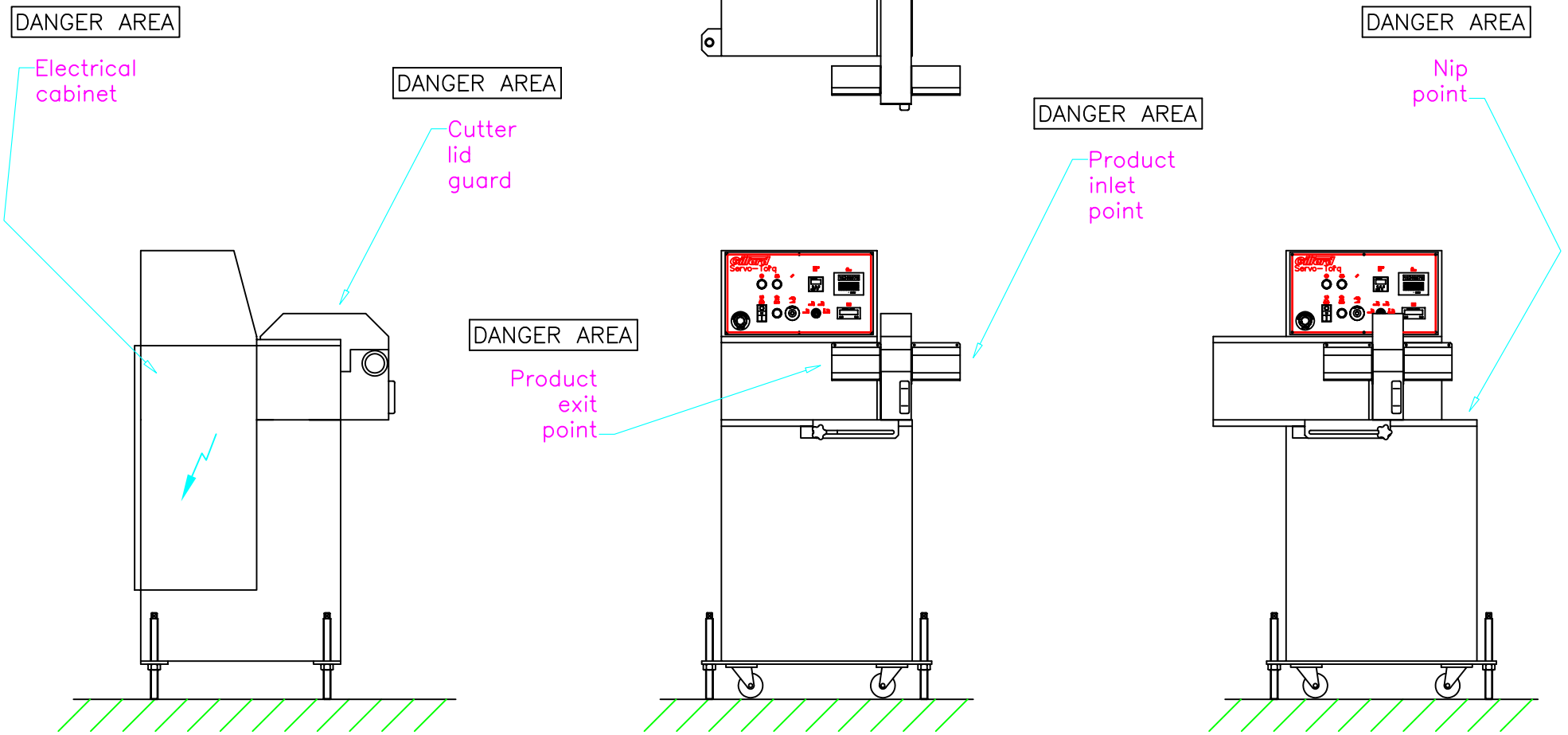
2.2 **Never** open the clam-shell safety guard or remove cutter bushes without first turning off the cutter motor.

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 extradite size to cutter bush bore.

NOTE
Machine illustrated in standard right to left format





Machine option
Showing cutter slide away open

SUPPLY VOLTAGE ___ V TO ___ V 3ph 1ph N E ISSUE 50Hz 60Hz REV —	Gillard Cutting Technology Alexandra Way Aehchurch Business Centre Tewkesbury Glos GL20 8NB England Tel: 01684 290243 Fax: 01684 290330 e-mail: sales@gillard.co.uk	DESCRIPTION SINGLE AXIS SERVO TORQ CUTTER DANGER AREAS	JOB No S-BCD-TP-01 DRAWN BY GILLARD SHEET 1 OF 13
			REF. DRAWING No S-BCD-TP-01 DATE 31/07/03 DRAWING No S-BCD-TP-01

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

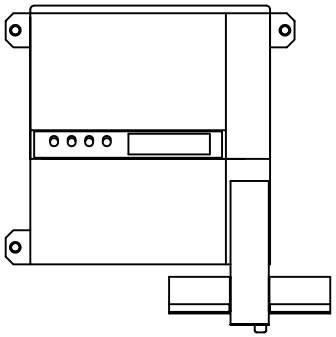
This machine conforms to the following regulations:

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

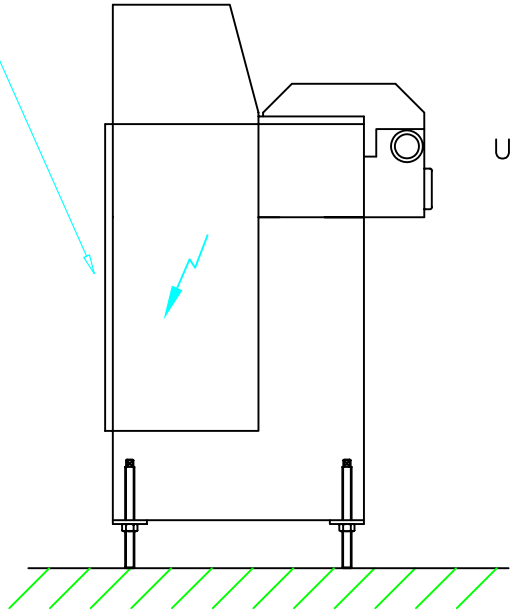
5. Prohibition of non-authorised modifications.

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.

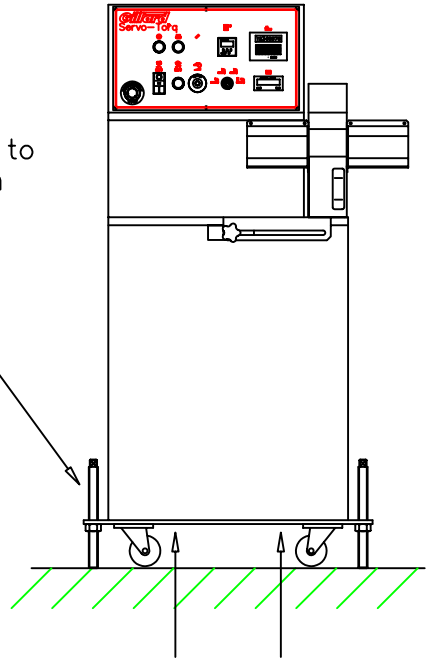


Electrical Connections
Standard UK deatils
380/440VAC 3phase, 50Hz
earth & neutral.

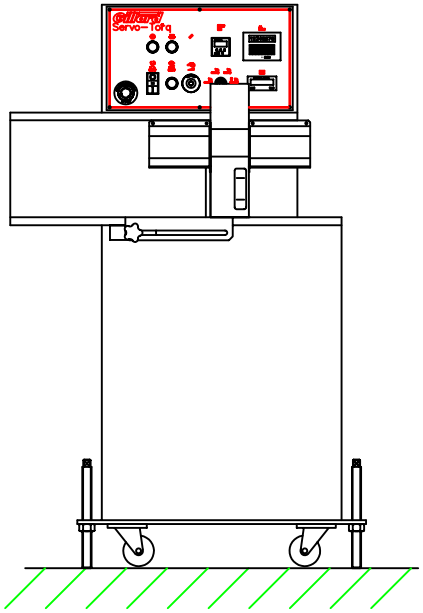
Refer to serial plate for connections
in care of special requests.



Use floor jacks to
finally position
the machine



Lifting points for fork lift.



Machine option
Showing cutter slide away open

SUPPLY VOLTAGE ____ V TO ____ V	Gillard Cutting Technology Alexandra Way Ashchurch Business Centre Tewkesbury Glos GL20 8NB England Tel: 01684 290243 Fax: 01684 290330 e-mail: sales@gillard.co.uk	DESCRIPTION SINGLE AXIS SERVO TORQ CUTTER INSTALLATION & LIFTING POINTS	JOB No S-BCD-TP-02 / REF. DRAWING No S-BCD-TP-02
3ph 1ph N E			DRAWN BY GILLARD / DATE 31/07/03
ISSUE 50Hz 60Hz			SHEET 2 OF 13 / DRAWING No S-BCD-TP-02
REV —			

INSTALLATION

1. Weight and dimensions of machine

Weight		400Kgs unpacked
Dimensions	-	1180mm Long
		820mm wide
		1340mm high

2. Lifting and handling instructions

It is strongly recommended that a suitable carriage or forklift truck is used 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 are required.

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)

MACHINE CONTROL AND THEIR FUNCTIONS

1 Control panel details

See control panel drawing M-ST-003 page

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 Safety circuit reset button. Once the guard lamp is illuminated, pressing this button will reset the safety circuit. The lamp will remain illuminated in a steady state to confirm circuit reset. If the lamp does not illuminate when pressed, re-check from section 1.2.

1.5 Datum axis button. (Must be in ACTIVE screen)
Once the safety circuit has been reset pressing this button causes the cutter axis to move to it's 'HOME' position. The machine will not begin cutting until it has performed this function. This lamp will also remain in a steady illuminated state to confirm the operation.

1.6 Cutter start/stop buttons. (Starts in ACTIVE screen only)
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.

1.7 Manual cut button. (Only in ACTIVE screen)
This button causes the machine to perform a single cut. This function will not operate until the datum axis function has completed.

1.8 Operator interface.
This panel allows the user to enter information concerning the cut product into the machine.

Control Panel

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 3 “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.
Three 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.

Diagnostic Screen.

The Diagnostic screen gives information intended to be of use for fault finding.

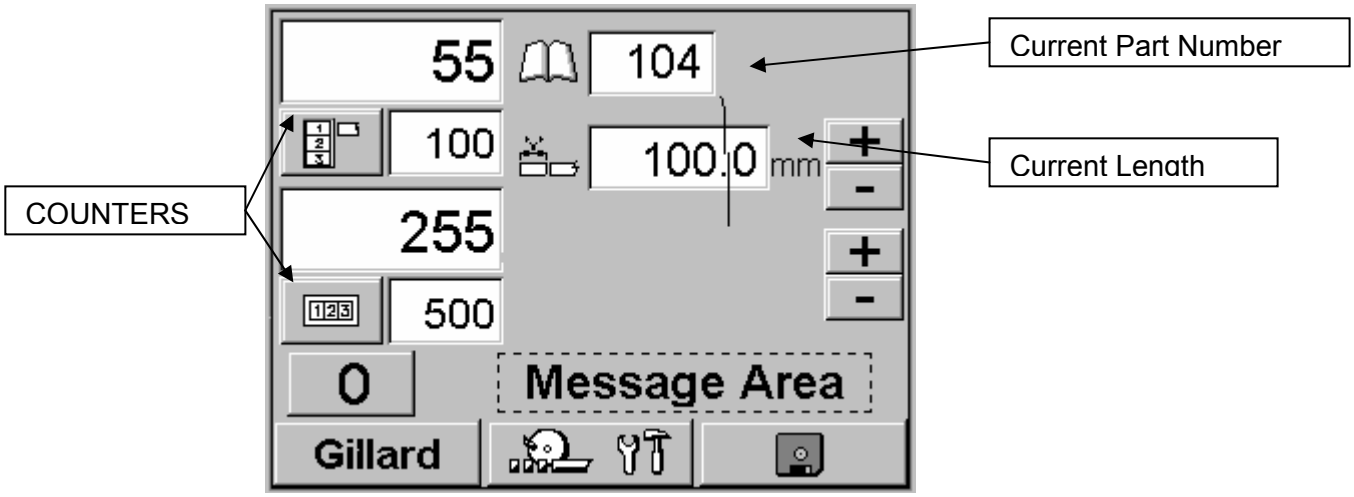
Set-Up Screen.

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

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

Cutting Screen

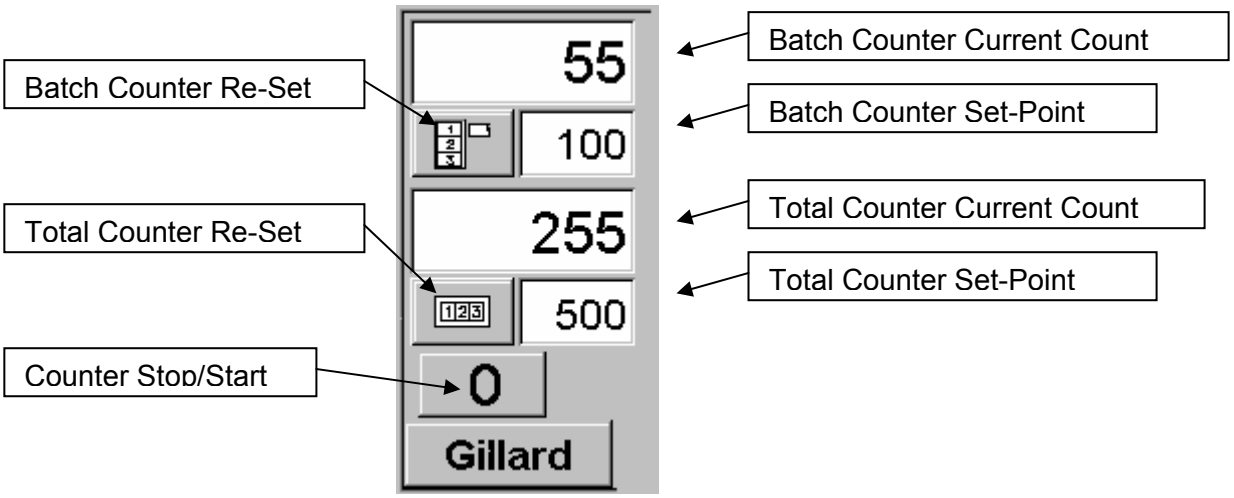
This is the main control screen, from here all normal functions can be accessed.



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

COUNTERS.

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



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

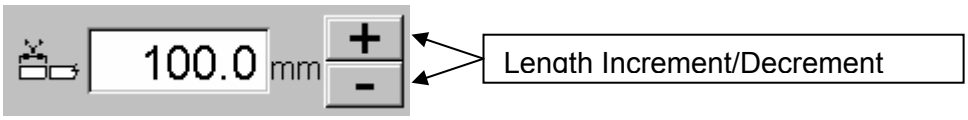
Pressing the Re-Set button sets the relevant counters current count value to zero.

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

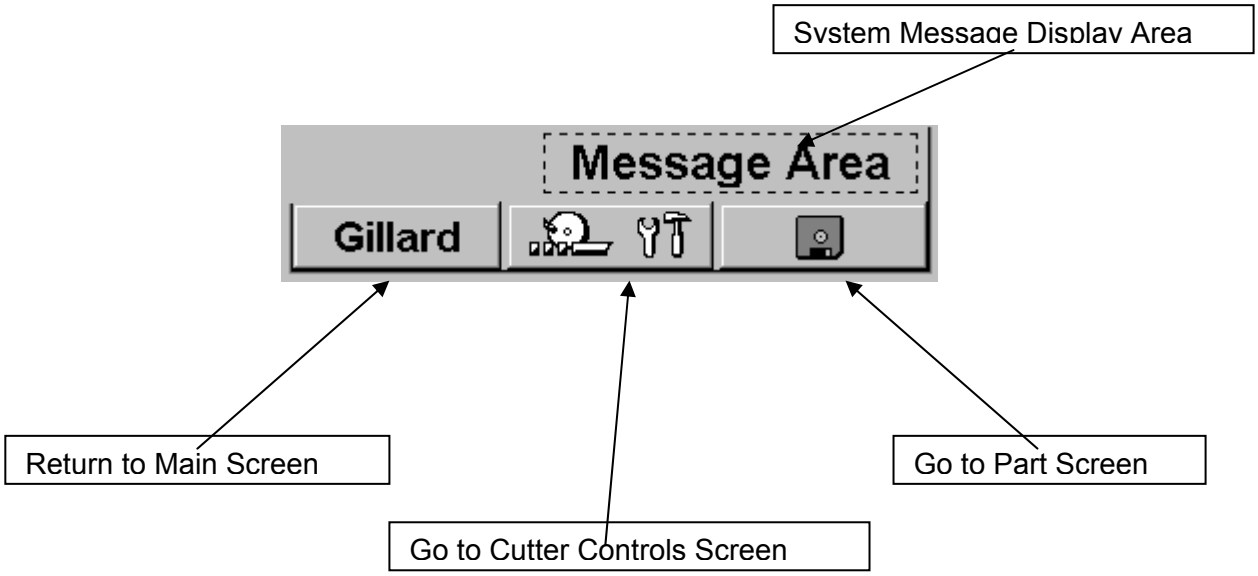
PART NUMBER

The machine is able to store up to 150 part recipes.
Valid part numbers are from 1 to 32000.
Entering a new part number here, causes the machine to load that part recipe.

LENGTH



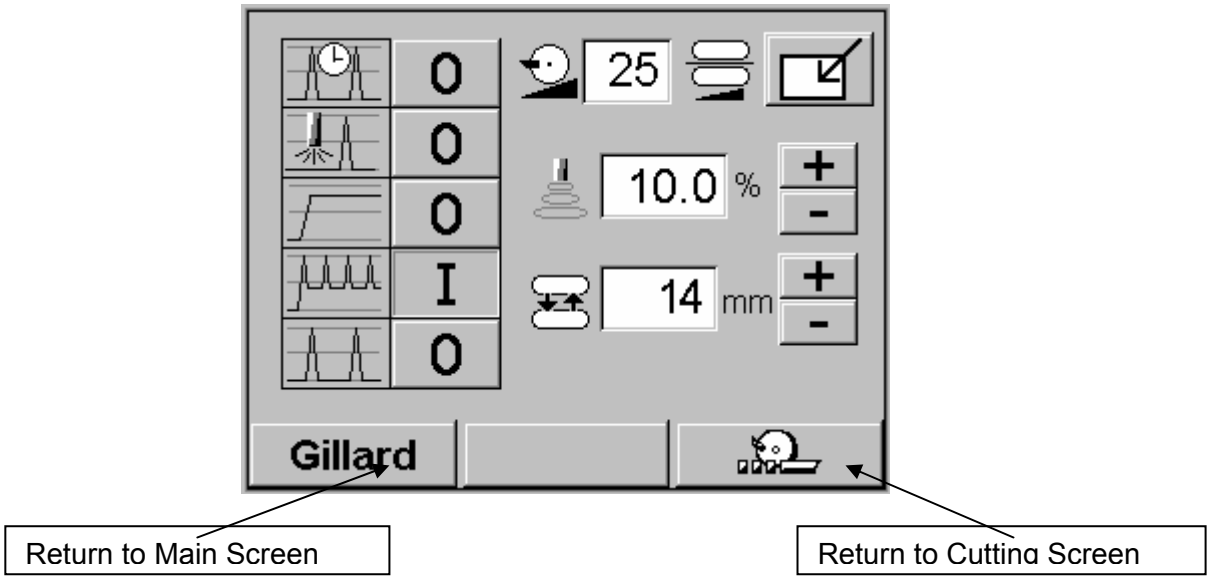
This is the length the product will be cut into when the cut cycle is started.
Acceptable values are between 1.0 and 100000.0mm in 0.1mm increments.
The increment and decrement buttons increase or decrease the length in 0.1mm steps.



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

Cutter Controls Screen

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

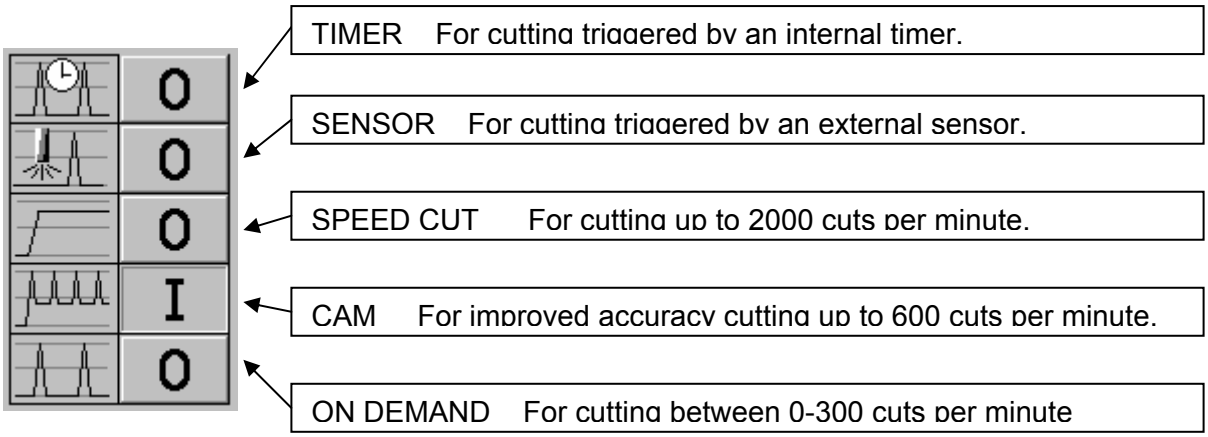


BLADE SPEED SETTING

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.

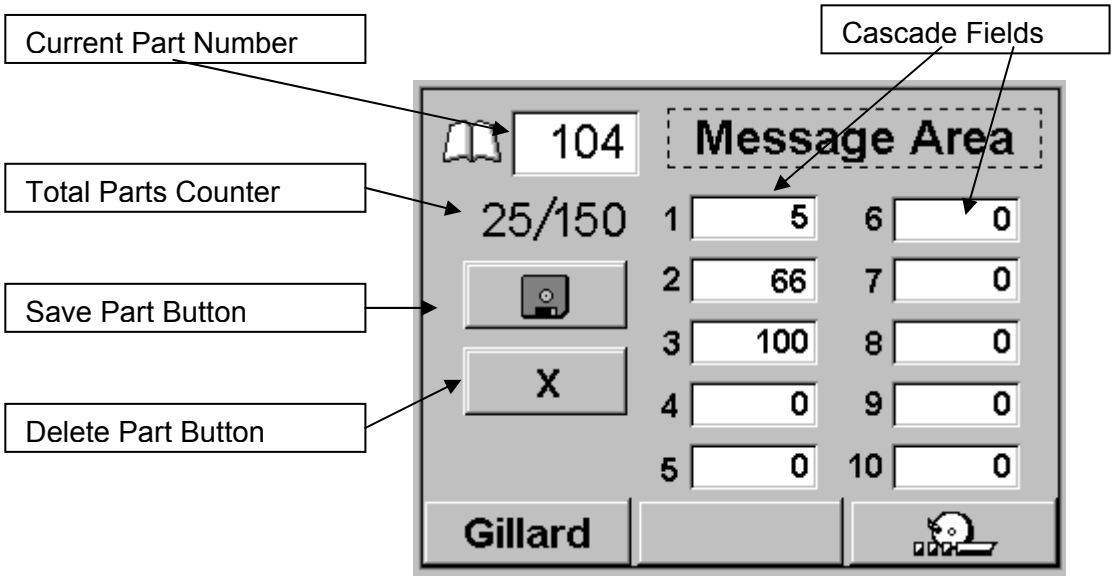
CUT MODE SELECTOR.



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

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
LINE SPEED	Not Loaded
TOTAL QUANTITY	Loaded
BATCH QUANTITY	Loaded
BLADE SPEED	Not Loaded
CUT MODE	Not Loaded

BOOM GAP Not Loaded

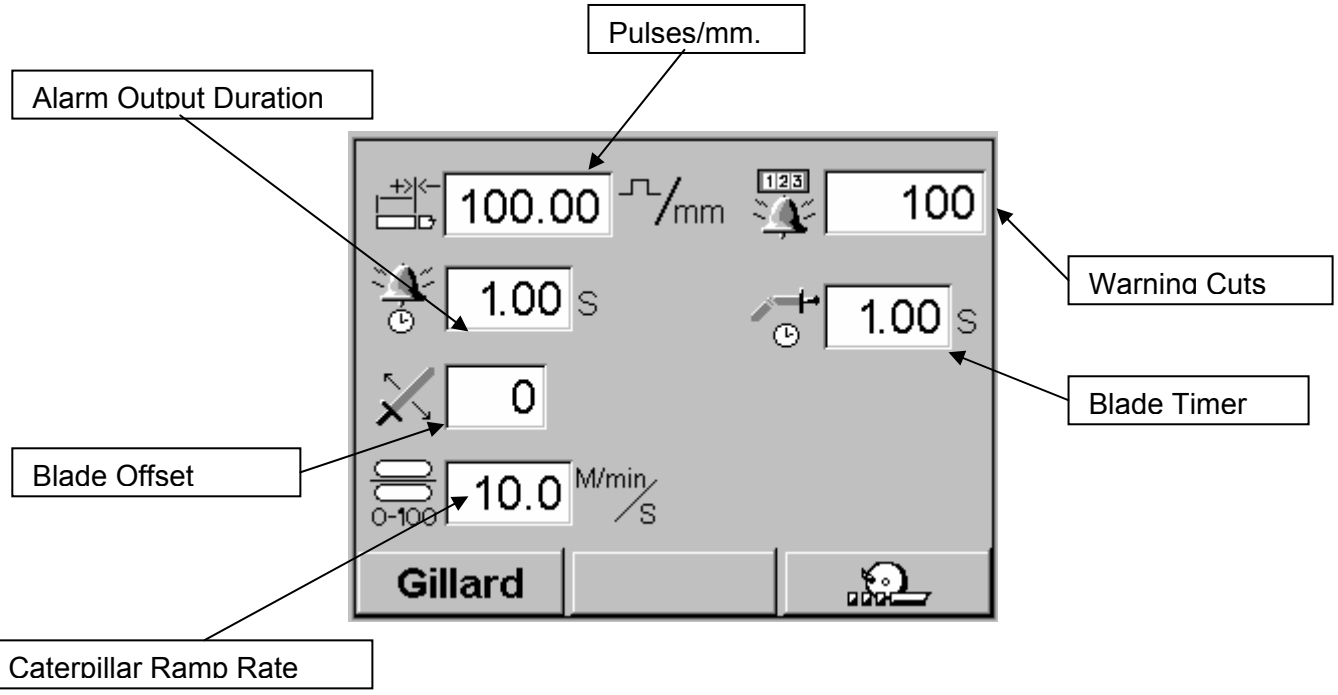
When not in cascade mode, ALL parameters are loaded.

Diagnostic Screen

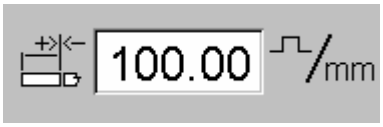
This screen displays P.L.C. I/O status, and is intended for use only by maintenance personnel, to assist with problem solving.

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

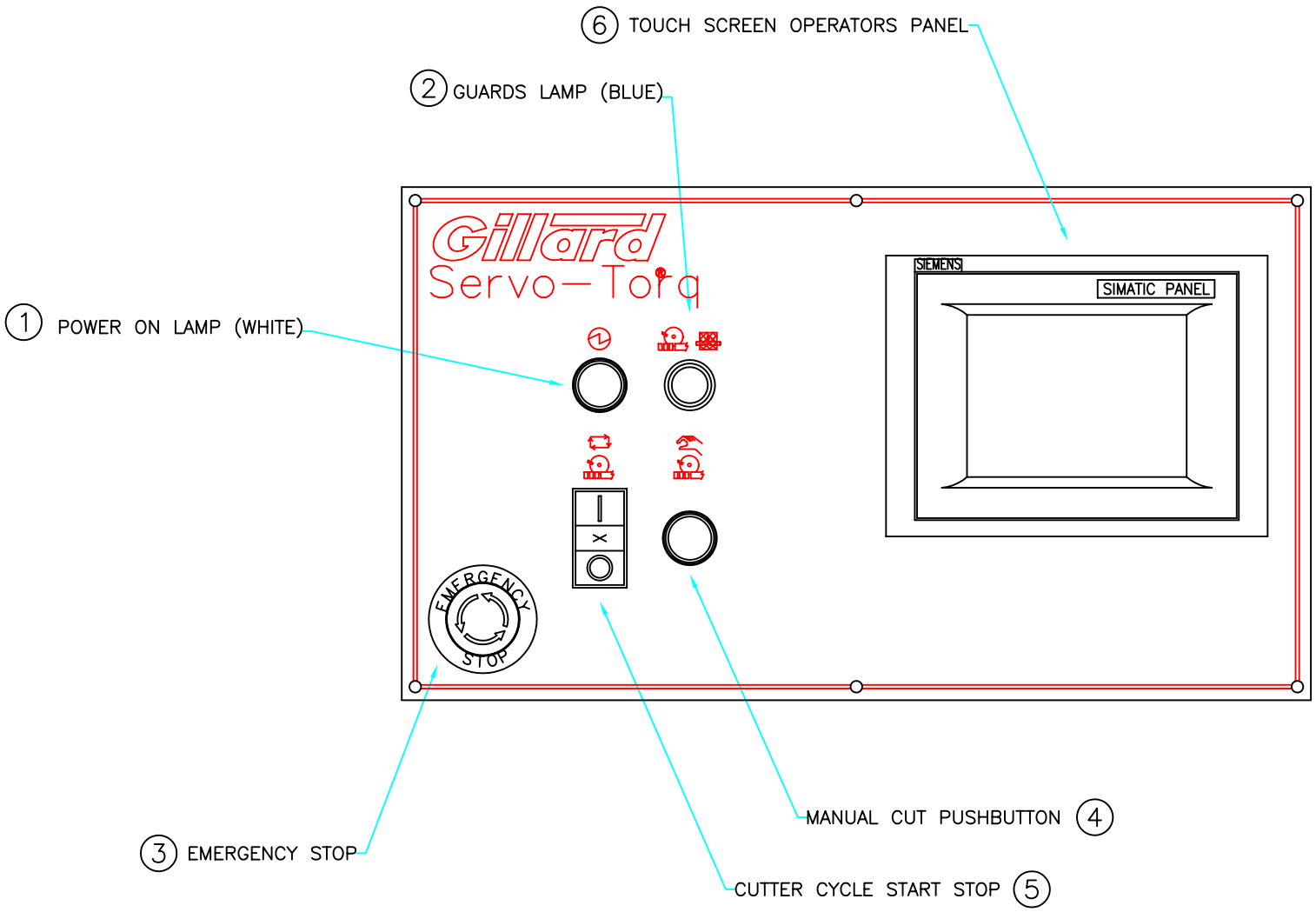
As well as Batch Complete the machine can give warning of Batch Nearly Complete.
This field sets the number of cuts before the batch quantity at which this warning will be turned on.
i.e. If a batch quantity of 100 was entered, and a Warning level of 10 was also entered.
The warning output would turn on once the machine had completed 90 cuts. It will remain on until the Batch Complete output turns on.

BLADE TIMER

On machines fitted with a 'Broken Blade Detection System' this field sets the amount of time the processor can go without seeing a blade before it triggers the alarm.

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 90 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.

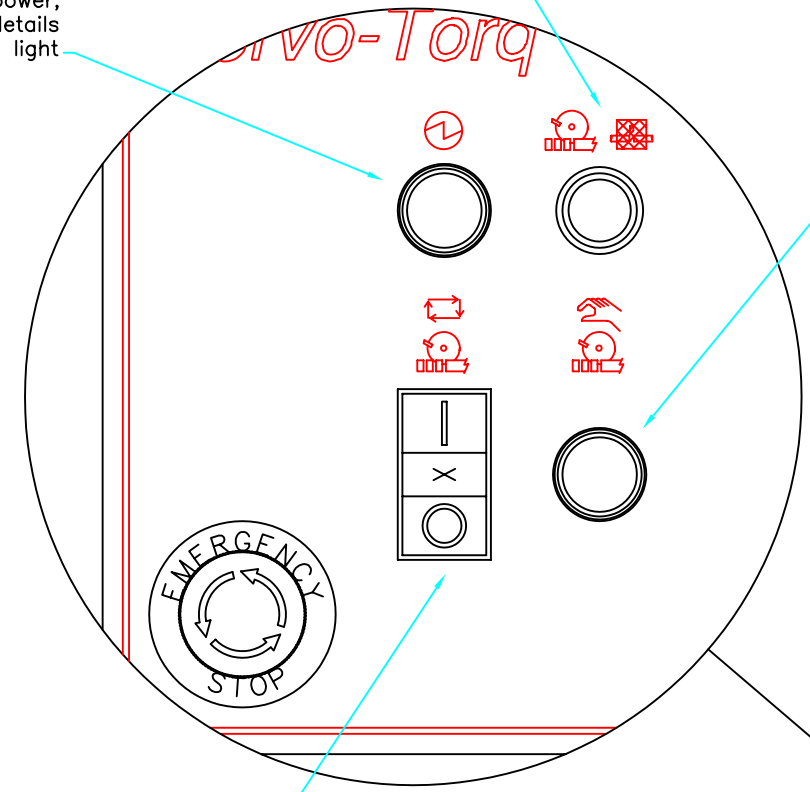


SUPPLY VOLTAGE ___ V TO ___ V 3ph ☐ 1ph ☐ N ☐ E ☐ ISSUE — 50Hz ☐ 60Hz ☐ REV —	Gillard Cutting Technology Alexandra Way Ashchurch Business Centre Tewkesbury Glos GL20 8NB England Tel: 01684 290243 Fax: 01684 290330 e-mail: sales@gillard.co.uk	DESCRIPTION SINGLE AXIS SERVO TORQ CUTTER USING SIEMENS TOUCH SCREEN PANEL PANEL DESCRIPTION	JOB No S-BCD-TP-06 DRAWN BY GILLARD SHEET 6 OF 13
			REF. DRAWING No S-BCD-TP-06 DATE 31/07/03 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.

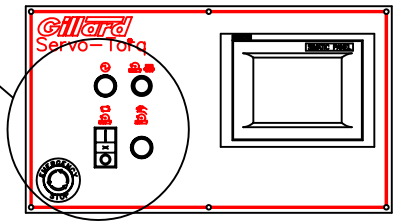
1) Connect the mains power, see machine plate for details the power lamp will light



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.

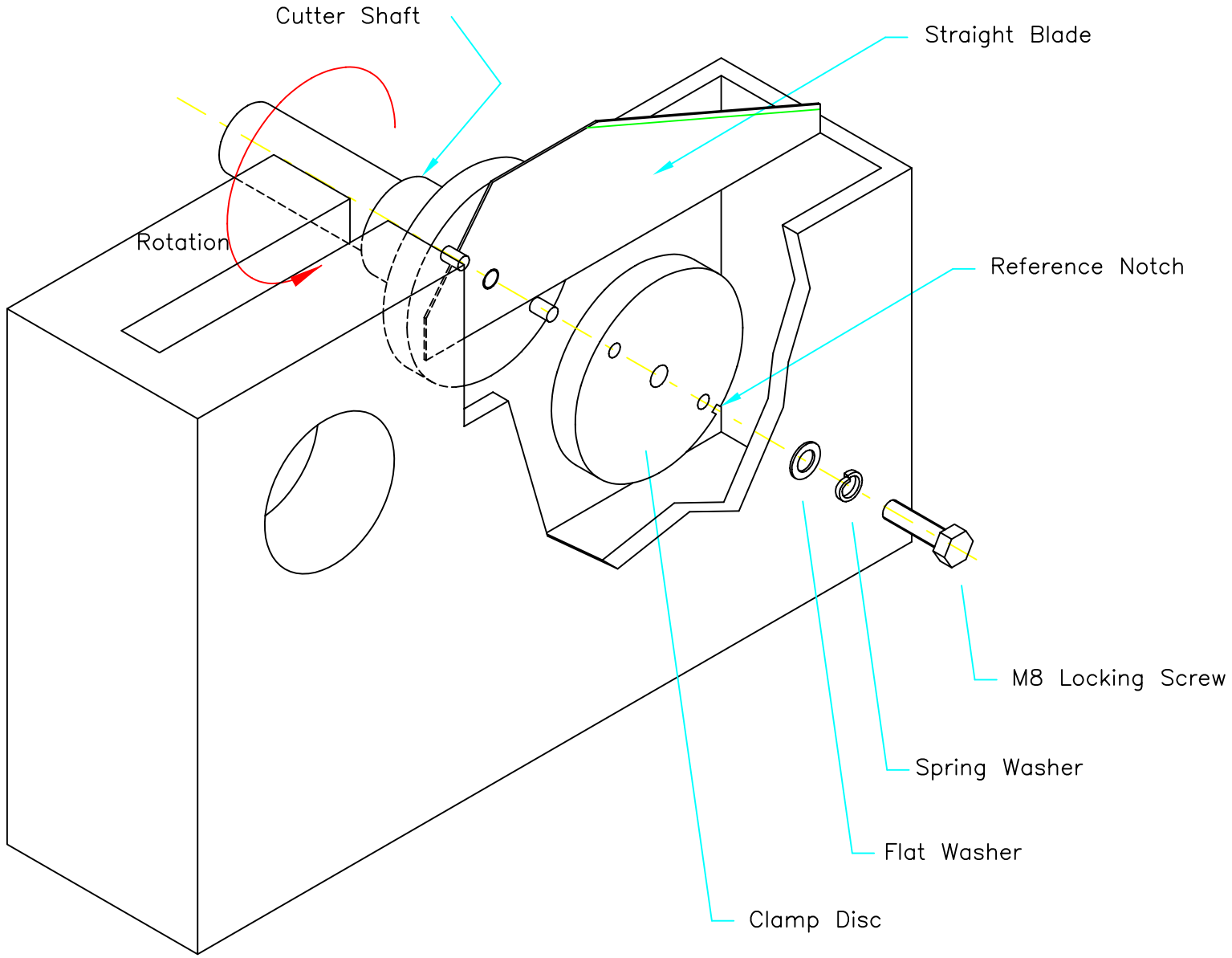
5) Press the cutter cycle start



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 ___ V TO ___ V 3ph 1ph N E ISSUE 50Hz 60Hz REV —	Gillard This drawing is the property of Gillard Cutting Technology. It must not be shown to third parties or copied without consent.	Gillard Cutting Technology Alexandra Way Ashchurch Business Centre Tewkesbury Glos GL20 8NB England Tel: 01684 290243 Fax: 01684 290330 e-mail: sales@gillard.co.uk	DESCRIPTION SINGLE AXIS SERVO TORQ CUTTER USING SIEMENS TOUCH SCREEN PANEL PUSHBUTTON OPERATION

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



SUPPLY VOLTAGE ____ V TO ____ V 3ph ☐ 1ph ☐ N ☐ E ☐ ISSUE ☐ 50Hz ☐ 60Hz ☐ REV —	Gillard This drawing is the property of Gillard Cutting Technology. It must not be shown to third parties or copied without consent.	Gillard Cutting Technology Alexandra Way Ashchurch Business Centre Tewkesbury Glos GL20 8NB England Tel: 01684 290243 Fax: 01684 290330 e-mail: sales@gillard.co.uk	DESCRIPTION SINGLE AXIS SERVO TORQ CUTTER STRAIGHT BLADE MOUNTING

JOB No S-BCD-TP-09	REF. DRAWING No S-BCD-TP-09
DRAWN BY GILLARD	DATE 31/07/03
SHEET 9 OF 13	DRAWING No S-BCD-TP-09

E SETTING UP PROCEDURE

1 Check that the machine is switched off at the mains isolator.

2 Fit a knife blade. Refer to diagrams M-ST-003A AND M-ST-003B 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.

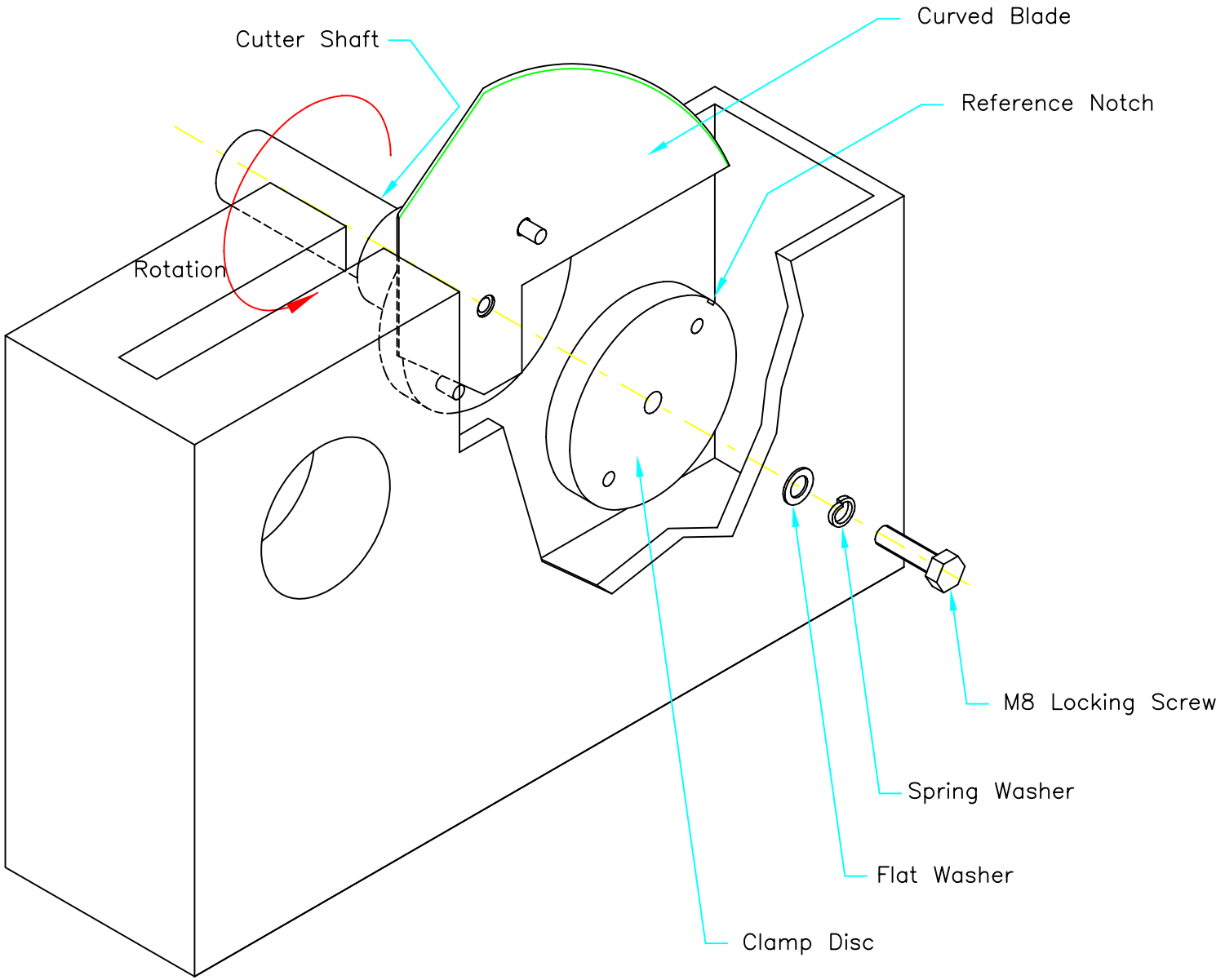
4 Insert the cutter bushes into the cutter bush holder.

5 Rotate the blade by hand (take care) until it lies across the centre line of the bushes.

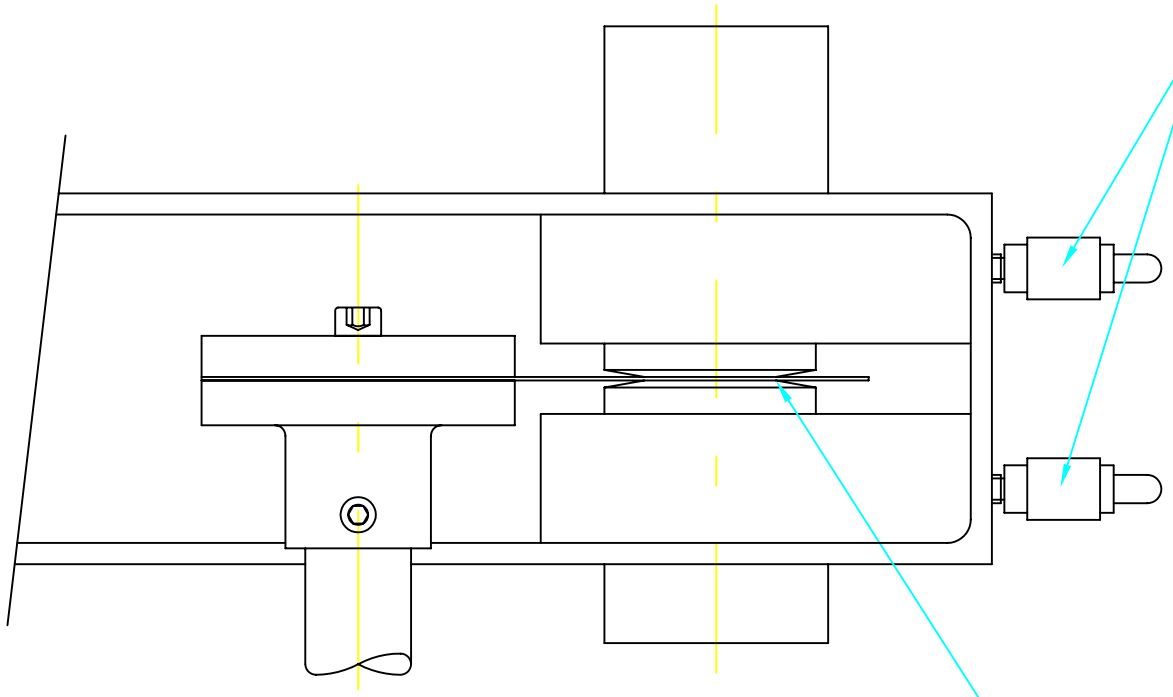
6 Slide the bushes into the block up to the stops.

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 extradite - 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.

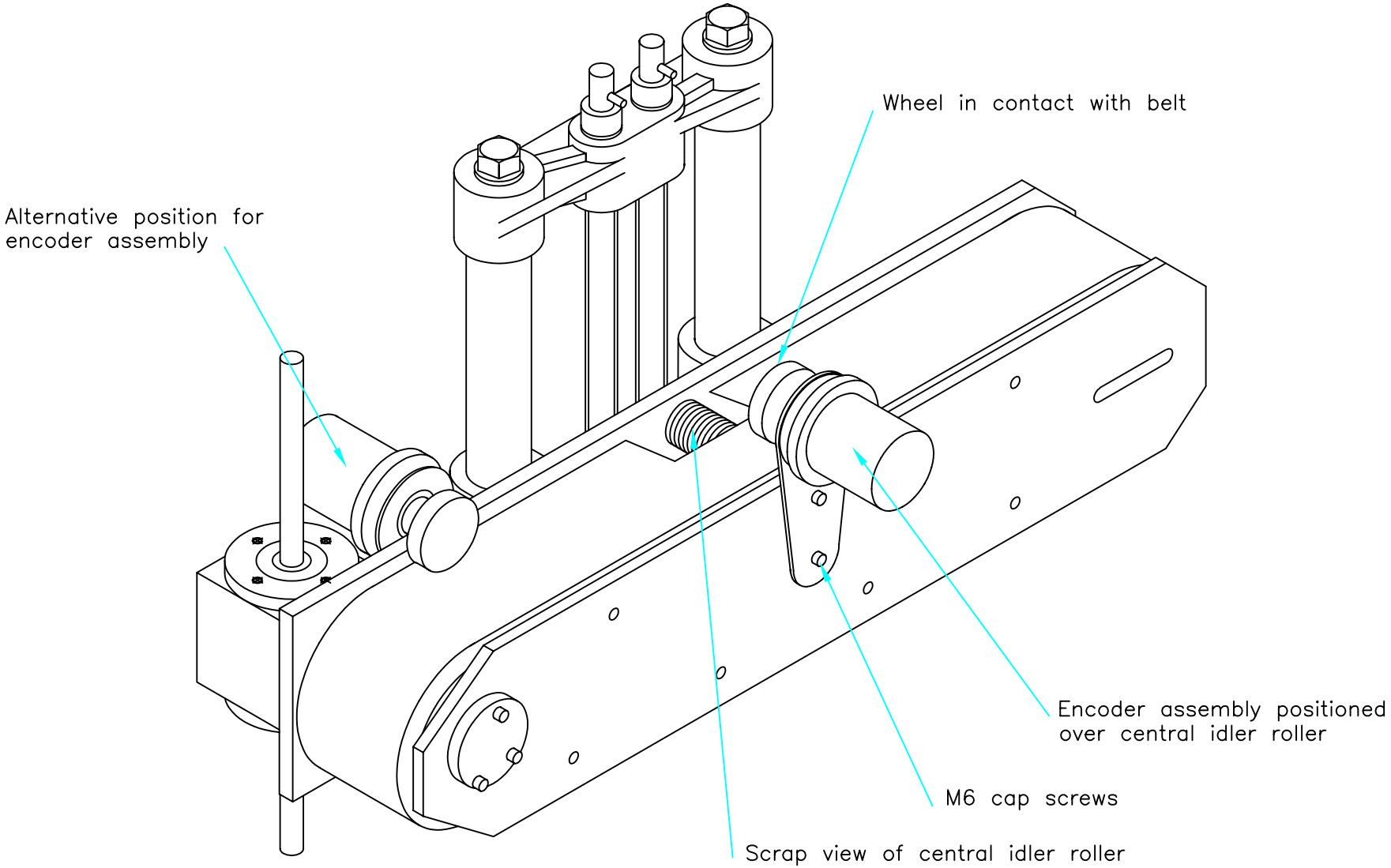


SUPPLY VOLTAGE ___ V TO ___ V 3ph 1ph N E ISSUE 50Hz 60Hz REV —	Gillard Cutting Technology Alexandra Way Ashchurch Business Centre Tewkesbury Glos GL20 8NB England Tel: 01684 290243 Fax: 01684 290330 e-mail: sales@gillard.co.uk	DESCRIPTION SINGLE AXIS SERVO TORQ CUTTER CURVED BLADE MOUNTING	JOB No S-BCD-TP-08 DRAWN BY GILLARD SHEET 8 OF 13	REF. DRAWING No S-BCD-TP-08 DATE 31/07/03 DRAWING No S-BCD-TP-08



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 ____ V 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 290243 Fax: 01684 290330 e-mail: sales@gillard.co.uk	DESCRIPTION SINGLE AXIS SERVO TORQ CUTTER BLADE CLEARANCE	JOB No S-BCD-TP-11 DRAWN BY GILLARD SHEET 11 OF 13	REF. DRAWING No S-BCD-TP-11 DATE 31/07/03 DRAWING No S-BCD-TP-11



SINGLE AXIS ROTARY CUTTER
Installation of Encoder Assembly

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S-BCD-TP-14

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

8 Rotate blade by hand two or three times to ensure that it moves freely.

9 Close all guards. The machine will not operate until all guards are closed. Guard light will illuminate

10 Switch on main isolator.

Press the safety circuit reset button (4). Until this button is pressed and illuminated, the machine will not function.

11 Pass the extrudate through the caterpillar infeeder 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.

F 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. An un-wind table or stand should be used to remove any twist.

3. Infeeder Control

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

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 effect 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

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 infeeder, which precedes cutter.

This reduces the tendency for flexible extrudates to snag or droop as they leave the infeeder 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 infeeder. 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 infeeder.

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. 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 materiel 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 infeeder 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 infeeder. 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 effect 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 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 90º 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 infeeder. 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.

G MAINTENANCE AND INSPECTION

Please refer to diagram 010 page 51 for location of items mentioned in these instructions.

1. Monitoring during operation - Consumables

Consumable items such as knife blades and caterpillar infeeder belts 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.

1.2 **Caterpillar infeeder belts**

The belts should be replaced if the belt surface is torn, split or otherwise excessively worn, Belt damage may cause variations in length measuring accuracy.

To change the caterpillar belts:

1.2.1 Fully slacken off the two tension screws location at the right-end of each caterpillar boom. By slackening these screws, the idler roller will move into the machine, thus reducing the tension on the caterpillar belt. When loose enough slide the belt off the front of the boom plate.

Note: or the lower caterpillar belt, it may be necessary to remove the guide-in roller bracket (when fitted)

1.2.2 Once the old belt has been removed, fit the new belt by sliding it over the poly-vee rollers. Ensure that the poly-vee ribbing on the back of the belt matches the poly-vee grooves in the rollers.

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

Once per day	-	1.	Check knife blade condition
		2.	Check caterpillar belt condition
		3.	Check safety guard operation
		4.	Check emergency stop operation
Once per week	-	1.	Clean wet block if being used
		2	Lubricate infeeder vertical drive shaft and adjusting screw
Once per month	-	1.	Check drive belt tension
		2.	Check drive belt wear
Once per six months	-	1.	Visually check for loose wires
		2.	Visually check for loose bolts
		3.	Check hinges and lids for damage
		4.	Check that the infeeder is stationary when speed control set to zero.
		5	Check boom height adjustment screw for ease of movement. Brush with light machine oil or grease if dry.
		6.	Run infeeder at full speed and check for excessive noise.
		7.	Check that the blade head is square to cutter bush holder block.
Once per year			**C**heck caterpillar gears for wear. To do this, rock caterpillar belts back and forth by hand. If excessive movement is possible, it is probable that the gears are worn.
As necessary	-	1.	Replace any blown lamp bulbs.

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 reset button is pressed 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 reset button will not illuminate if there is a fault in any motor contactor, guard switch or emergency stop switch.

WARRANTY

Standard products manufactured by **Peter Gillard & Co Ltd**, hereinafter referred to a 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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