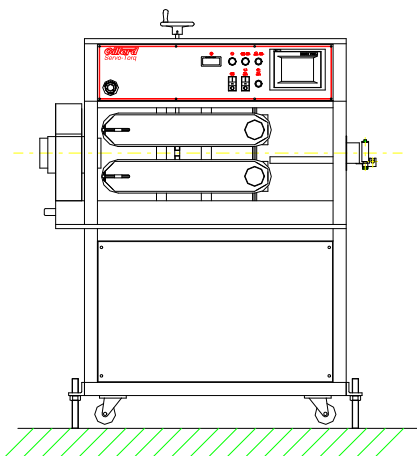


Operating Instructions

Servo-Torq Twin Axis Rotary Cutting System



English

Operating Instructions

SERVO-TORQ TWIN AXIS MODEL:

LT50 – M3300
HD100 – M4000
XHD100 – M5000

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.

Peter Gillard & Co. Limited
Alexandra Way
Ashchurch Business Centre
Tewkesbury
Gloucestershire
England
GL20 8NB
Tel: 01684 290243
Fax: 01684 290330
E-mail: sales@gillard.co.uk
www.gillard.co.uk

CONTENTS

| | Page Number |
|---|---------------|
| A. General information | 6-11 |
| 1. Introduction | 6 |
| 2. General purpose and use of the machine | 6 |
| 3. Products to be cut or handled | 7 |
| 4. Local service and after-sales support | 7-9 |
| 5. Standards to which this machine complies | 10 |
| 6. CE Declaration of conformity/incorporation | 11 |
| B. Safety considerations | 124-16 |
| 1. Hazards in case of non-compliance with safety guarding | 12 |
| 2. Safety conscious work practices | 12 |
| 3. Safety protection | 15 |
| 4. Noise emissions | 15 |
| 5. Prohibition of non-authorised modifications | 16 |
| C. Installation | 16 |
| 1. Weight and dimensions of machine | 16 |
| 2. Lifting and handling instructions | 16 |
| 3. Unpacking instructions | 16 |
| 4. Electrical Supply | 16 |
| D. Machine controls and their functions | 17-23 |
| 1. Control panel details | 17 |
| 2. How to operate the cut length counter | 22 |
| E. Option: Touch Screen Operator Interface Panel | 26-35 |
| 1. Cutting Screen | 27 |
| 2. Cutter Controls Screen | 29 |
| 3. Part Screen | 31 |
| 4. Diagnostic Screen | 32 |
| 5. Set-Up Screens | 34 |
| F. Setting up procedure | 36 |

| | | |
|-----------|---|--------------|
| G. | Obtaining the best results | 39-47 |
| 1. | Introduction | 39 |
| 2. | Cutter positioning | 39 |
| 3. | Infeeder control | 39 |
| 4. | Cutter bushes | 40 |
| 5. | Knife blades | 41 |
| 6. | Type of cutting action | 41 |
| 7. | Problem identification chart | 44-46 |
| 8. | Common option description list | 47 |
| H. | Maintenance and inspection | 51-52 |
| 1. | Monitoring during operation - Consumables | 51 |
| 2. | Preventative measures | 51 |
| 3. | Planned maintenance schedule | 52 |
| 4. | Functional checking of safety devices | 52 |
| 5. | General description | 52 |
| I. | Machine controls and their functions | 53 |
| 1. | Speed range and control | 53 |
| J. | Operation | 53-58 |
| | Mechanical | 53 |
| 1. | Height adjustment | 53 |
| 2. | Caterpillar belt tensioning | 54 |
| 3. | Lubrication | 55 |
| 4. | Standard parts | 56-58 |
| K. | Haul-off electrical spec. and fault finding supplement | 59-72 |
| L. | Warranty | 73 |

DIAGRAMS

| DIAGRAM NO. | DESCRIPTION | PAGE NUMBER |
|-------------|---|-------------|
| T-BCD-TP-01 | Danger areas | 13 |
| T-BCD-TP-02 | Installation and lifting locations | 14 |
| T-BCD-TP-03 | Control panel | 19 |
| T-BCD-TP-04 | Push button operation | 20 |
| T-BCD-TP-05 | Counter operation | 21 |
| T-BCD-TP-06 | Using a Siemens TP 170A MMI | 24 |
| T-BCD-TP-07 | Pushbutton operation | 25 |
| T-BCD-TP-08 | Curved blade mounting | 37 |
| T-BCD-TP-09 | Straight blade mounting | 38 |
| T-BCD-TP-10 | Standard cartridge cutter block | 43 |
| T-BCD-TP-11 | Blade clearance | 48 |
| T-BCD-TP-12 | Installation of adaptor for Chip blade | 49 |
| T-BCD-TP-13 | Installation of adaptor for Razor blade | 50 |
| T-BCD-TP-14 | Safety switches alignment | 65 |
| T-BCD-TP-15 | Safety relay – LED status | 69 |

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 that 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 Servo-Torq before starting the machine.

IMPORTANT NOTICE

THE CALIBRATION SCREEN REQUIRES A PASSWORD FOR USE – CODE = 2706

In normal day-to-day use, this password will not be required. **Note:** TP170 models only.

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 servomotor 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 is selectable for 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 either 50 or 100mm depending on machine type. However, actual cutting capacity will depend upon product type and wall thickness.

4 Local service and after-sales support

The following companies in the countries listed support this machine. 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: 1992 | 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 infeed

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:

B SAFETY CONSIDERATIONS

Please refer to drawing No. T-BCD-TP-01 page 15. 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 380/415 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 clamshell safety guard or remove cutter bushes without first stopping the cutting cycle and caterpillar.

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.

- 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 isolate the machine before clearing the bore.

- 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.

POSITION GUIDE

DRAWING NUMBER 01

POSITION GUIDE

DRAWING NUMBER 02

- 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 Clamshell guard (1)

The machine will not operate unless the clamshell 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.

Caterpillar hauling machines are potentially extremely dangerous. The caterpillar belts have a high power drive and a potentially dangerous nip point.

Under no circumstances should fingers, hands or arms be placed between the caterpillar belts.

Always use the machine with the guards in place.

Always use the machine with the guide-in roller assembly in place.

Never hold extrudate close to its end when 'threading' up the machine. It is potentially possible to get caught by the nip of the machine, and thus get pulled into the caterpillar.

Always present the extrudate to the nip of the caterpillar through the guide-in rollers provided.

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

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. Limited. Failure to do this will void all legal obligations from Peter Gillard & Co. Limited regarding this product.

C INSTALLATION

1. Weight and dimensions of machine

| | | |
|------------|---|--|
| Weight | - | 450Kgs unpacked (approximate depending on spec). |
| Dimensions | - | 1200mm long 900mm wide 1400mm 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.

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 400-Volt, three phase, 50Hz supply plus, fused at 20A per phase. A neutral and earth connection is 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 for location of electrical cabinet (6) and full electrical drawings at the rear of the manual.

D MACHINE CONTROL AND THEIR FUNCTIONS

The machine has the option of either BCD or TP170 control. Select the relevant section of this manual depending on machine spec. as supplied.

BCD-LED length adjustment option

See control panel drawings T-BCD-TP-03/04/05 on following pages for full details.

1 CONTROL PANEL DETAILS

- 1.1 **Power on lamp** (1) (white). This illuminates when the electrical isolation switch is in the ON position indicating power is applied to the machine.
- 1.2 **Caterpillar area guard lamp** (2) (blue). This illuminates when the caterpillar guarding is in place and the emergency stops () are in the OUT position. The caterpillar can be run with the cutter head in the OUT position to aid threading up when the machine is used on on-line applications.
- 1.3 **Cutter area guard lamp** (3) (blue). This illuminates when all the cutter area guarding is in place. These include cutter lid, exit bush and rollaway safety switches. When all switches are in position the lamp will light and the cutter may be started.
- 1.4 **Caterpillar stop/start** (4) (orange). If the caterpillar guard lamp (2) is lit, then by pressing the caterpillar start button (green), the belts will begin to move and the orange lamp within the switch will illuminate. Pressing the red button will stop the caterpillar and the orange lamp will go out.
- 1.5 **Caterpillar speed pot** (5). With the caterpillar running, the speed can be adjusted by turning the 10 turn pot. The machine will be geared to a maximum as per the customers specification. As an option, the line speed indicator 10 will display the running speed of the machine.
- 1.6 **Cutter stop/start** (6) (orange). If the cutter guard lamp (3) is lit then by pressing the cutter start button (green) the cutter will begin to operate and the orange lamp within the switch will illuminate. Pressing the red button will stop the cutter and the orange lamp will go out.
- 1.7 **Single cut button** (7) (black). If the cutter guard lamp (3) is lit and the machine is out of cycle (orange lamp no 6 not lit) the manual single cut can be done by momentarily pressing the spring return button.
- 1.8 **BCD counter** (8). Used to input cut length on machine when running in cycle. See full operational details.
- 1.9 **Cut mode selector switch** (9). Four position switch to select cutting modes
 - A. Demand mode 0.150 cuts per min. @ 100% blade speed
 0.350 cuts per min. @ 70% blade speed
 - B. Cam mode 100 – 750 cuts per minute
 - C. Speed cut mode 600 – 200 cuts per minute
 - D. On demand cutting from signal supplied by photo eye optional extra

- 2.0 **Total cuts counter** (10). Digital panel meter indicating total cut pieces. Reset to zero by pressing button on front bezel.
- 2.1.1 **Batch counter** (11). Optional extra. Preset counter which counts up to a preset number and either sounds alarm, flashes beacon or stops machines. Dependant on specification.
- 2.2 **Line Speed indicator** (12). Digital panel meter which display's caterpillar speed in Metres per minute.
- 2.1.2 **Emergency Stop** (13). Used to stop machined quickly in an emergency. Only use this button for this purpose and not for regular stopping of machine. Turn button clockwise to reset.

POSITION GUIDE

DRAWING NUMBER 03

POSITION GUIDE
DRAWING NUMBER 4

POSITION GUIDE

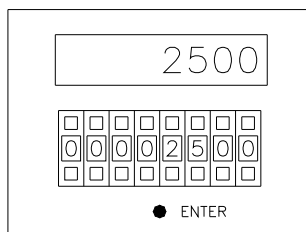
DRAWING NUMBER 5

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.

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



Main display
CD Thumb Switches
Data Enter Button

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 pre-set value
3. Enter button is used to input the BCD set length in to machine
4. **To change the pre-set value**
5. Use the + and – pushbuttons to move the BCD indicators round to the desired length
6. The BCD thumb switch positions will not take effect until the enter button is pressed
7. When the desired length is indicated on the BCD thumb switches, press enter to change the length of the machine
8. The main LED display will now count up to the new input value, complete a cut and reset to zero
9. **Stopping the machine**

10. To stop the machine when the cutter is running, press button 9 (cutting cycle stop/start) and the machine will stop cutting
11. 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'

TP170 HMI OPTION

See control panel drawings T-BCD-TP-06/07 on the following pages for full details.

Control panel details

- 1.1 **Power on lamp** (1) (white). This illuminates when the electrical isolation switch is in the on position indicating power is applied to the machine.
- 1.2 **Caterpillar area guard lamp** (2) (blue). This illuminates when the caterpillar guarding is in place and the emergency stops (8) are in the out position. The caterpillar can be run with the cutter head in the out position to aid threading up when the machine is used on in-line applications.
- 1.3 **Cutter area guard lamp** (3) (blue). This illuminates when all the cutter area guarding is in place. These indicate cutter lid, exit bush and rollaway safety switches. When all switches are in position the lamp will light and the cutter maybe started.
- 1.4 **Caterpillar stop/start** (4) (orange). If the caterpillar guard lamp (2) is lit, then by pressing the caterpillar start button (green), the belts will begin to move and the orange lamp within the switch will illuminate. Pressing the red button will stop the caterpillar and the orange lamp will go out.
- 1.5 **Cutter stop/start** (5) (orange). If all guards are in place and the blue lamps, 2 and 3 are lit, the machine can be run in auto cycle. Press the green button (5) and cutter will enter cycle and orange lamp will illuminate. Pressing red button (5) will stop cycle.
- 1.6 **Manual cut button** (6) (black). If cutter guard lamp (3) is lit and machine is out of cycle (orange lamp (5) not lit), a single manual cut can be completed by pressing black button momentarily.
- 1.7 **Touch screen panel** (7) HMI touch screen. See full details of operation in following pages.

WARNING: Only enter parameters using light presses of finger nail. Using pens and screwdrivers will damage screen and warranty will be void.
- 1.8 **Emergency Stop** (8). Used to stop machine quickly in an emergency. Only use button for this purpose and not for regular stopping of machine. Turn button clockwise to re-set.

Position guide

Drawing number 6

Position guide

Drawing number 7

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.



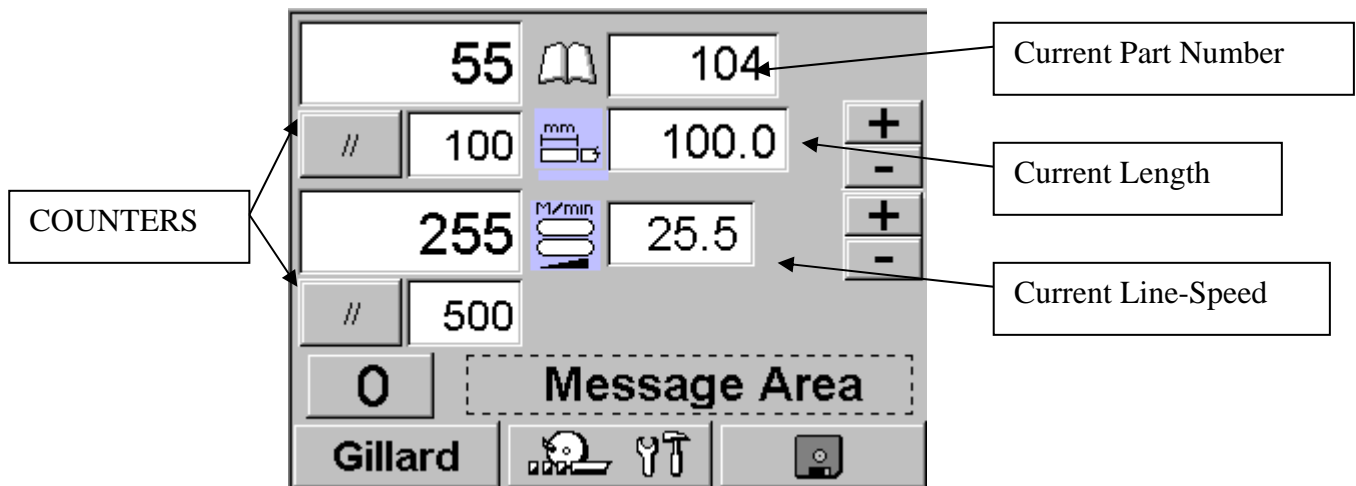
Parts Screen

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

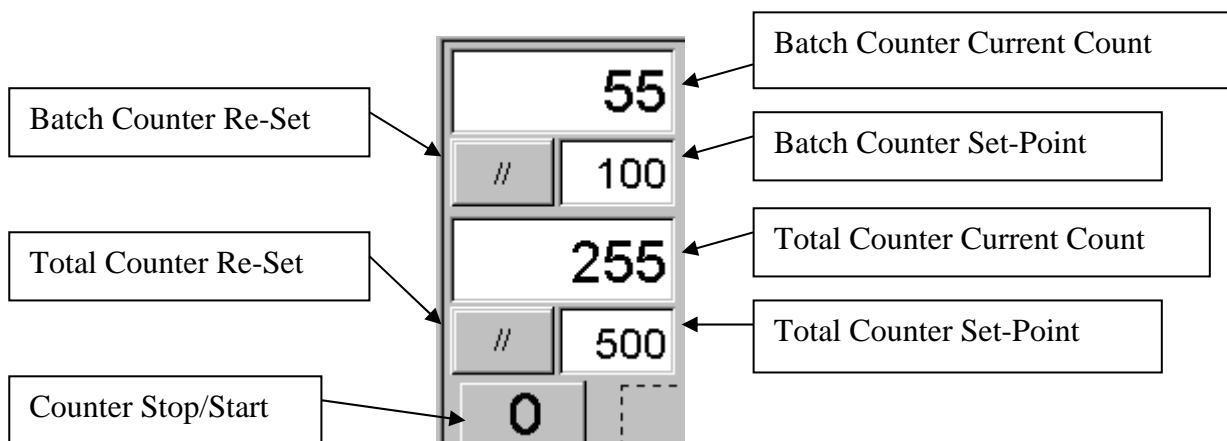
This is the main control screen, from here all normal functions can be accessed.



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.

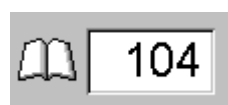
The display has both a Batch, and a Total Cuts Counter.



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

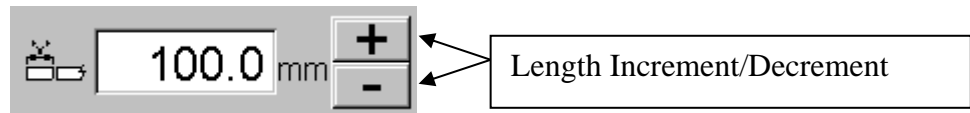
Pressing the Re-Set button sets the relevant counters current count value to zero. An output is available from the main PLC on both Batch, and Total counters reaching preset.

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



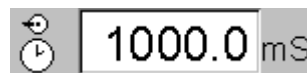
This is the length the product will be cut into when the cut cycle is started.
 Acceptable values are between 1.0 and 100000.0mm in 0.1mm increments.
 The increment and decrement buttons increase or decrease the length in 0.1mm steps.

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



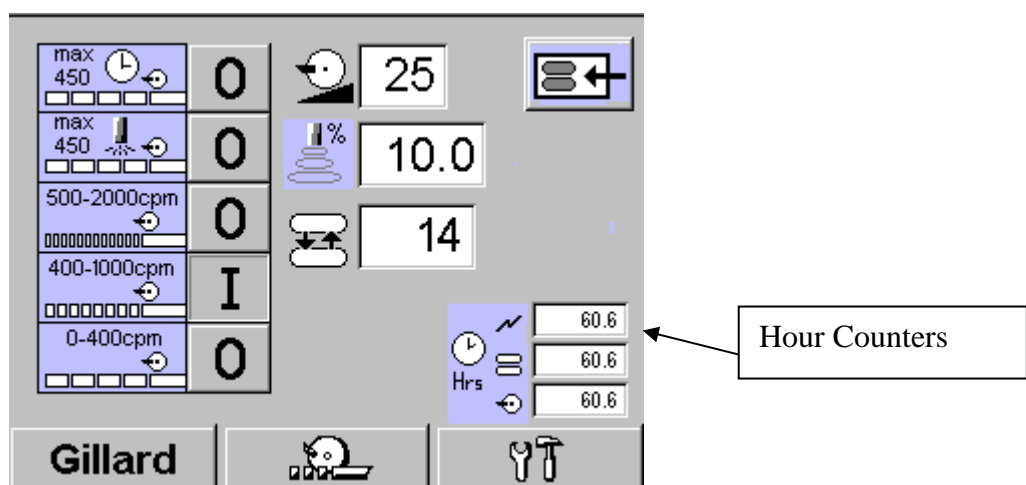
In this field the time between cuts is set for when the machine is cutting in timer mode.
 In the above example the machine will do one cut every second.

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.



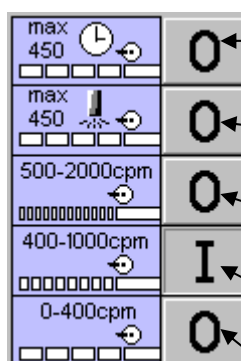
BLADE SPEED SETTING



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.



TIMER For cutting triggered by an internal timer.

SENSOR For cutting triggered by an external sensor.

SPEED CUT For cutting up to 2000 cuts per minute.

CAM For improved accuracy cutting up to 750 cuts per.

ON DEMAND For cutting between 0-400 cuts per minute

“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,-

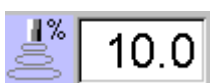


LOCAL The speed is set via the operator panel.



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.

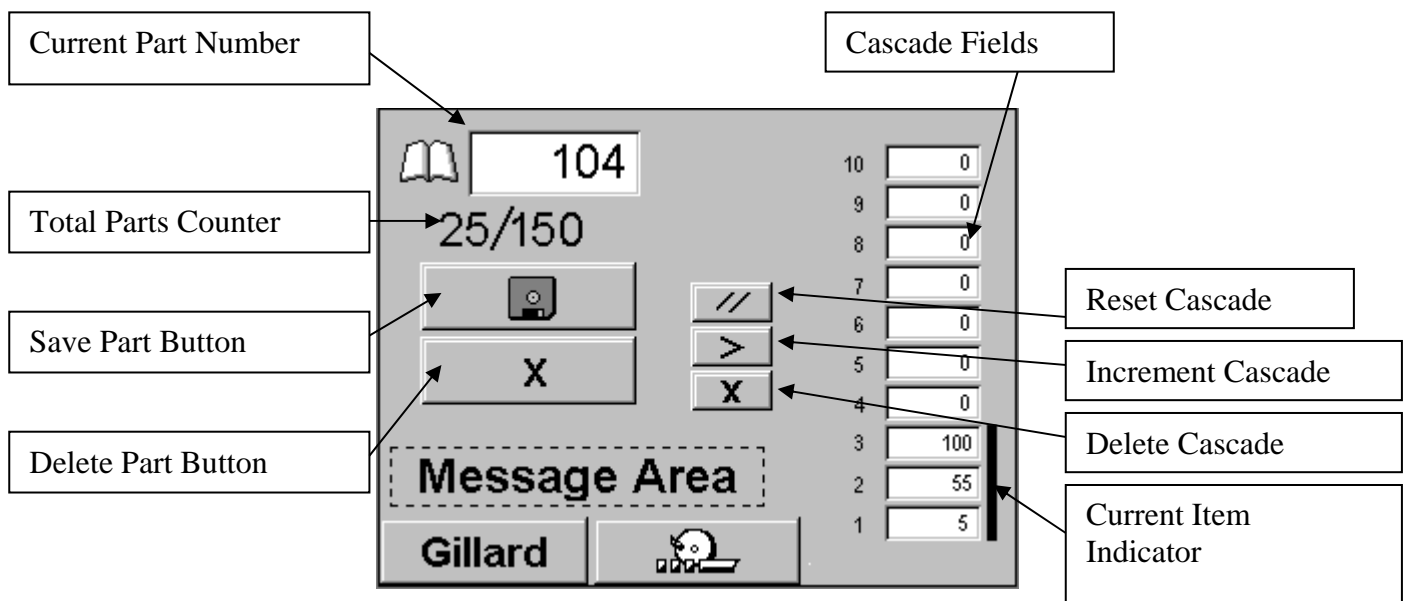
BOOM POSITION CONTROL



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.

Increment Cascade

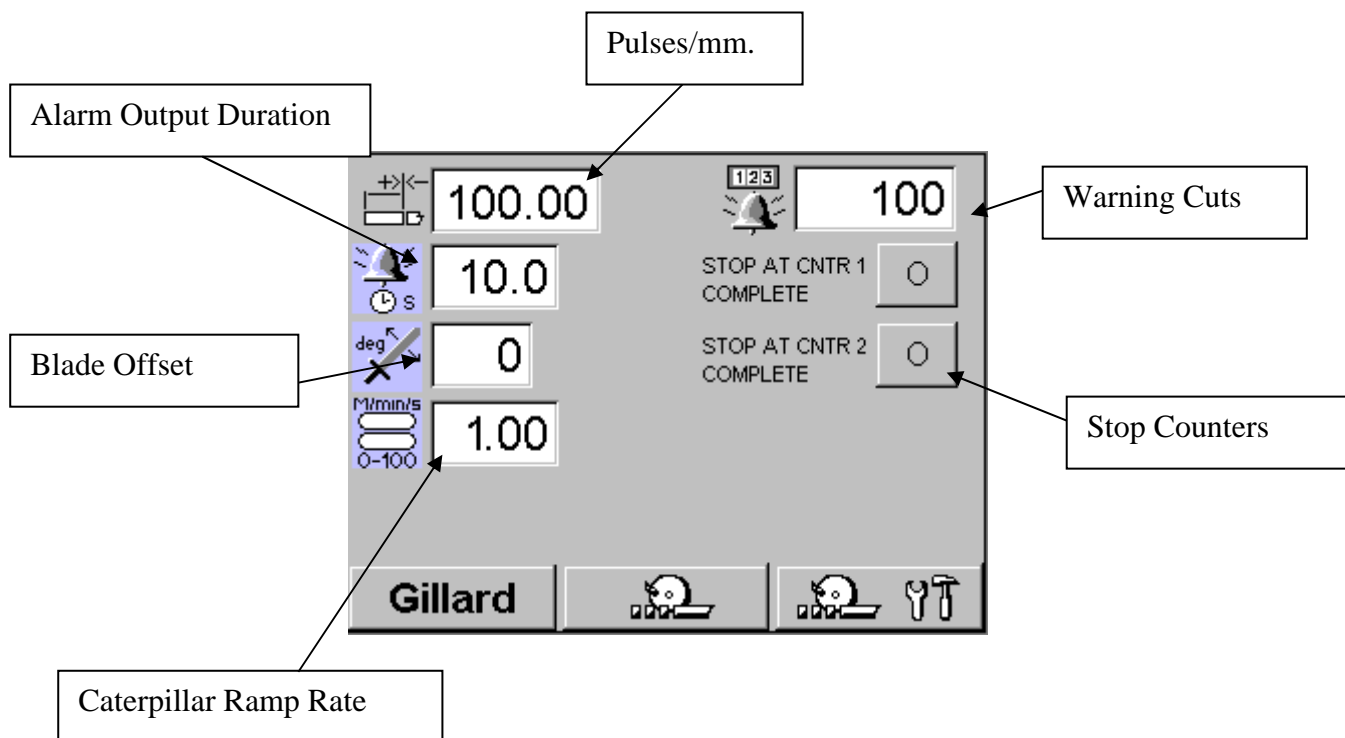
Increments a running cascade to the next part in the list

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

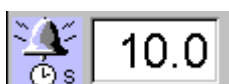


Permits calibration of the machines cut length.

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.

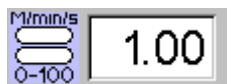
WARNING CUTS



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



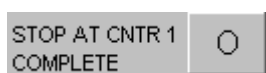
This field allows the user to select a different blade start position according to what type of blade is fitted to the machine.

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.

STOP COUNTERS



When set to "1" the machine will stop on reaching the required value of the relevant counter.

(Revised 5/06/2002)

F. SETTING UP PROCEDURE

1. Check that the machine is switched off at the mains isolator.
2. Fit a knife blade. Refer to diagrams T-BCD-TP-08 and T-BCD-TP-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 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.

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. Switch on mains isolator. The machine will not operate until all guards are closed. Guard light will illuminate

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

POSITION GUIDE ONLY!

Drawing number 8

POSITION GUIDE ONLY!

Drawing number 9

10. Pass the extrudate through the caterpillar infeeders and the cutter bushes.
11. 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.

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 infeeders. This will ensure that the extrudate is not stretched as it enters the infeeders.

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

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 infeeders 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 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

Check that the nip pressure used with the infeeders/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 infeeders 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.

POSITION GUIDE ONLY!

Drawing number 11

7. PROBLEM IDENTIFICATION CHART - SERVO-TORQ SYSTEM

| PROBLEM a Poor length accuracy POSSIBLE CAUSE | RECOMMENDED ACTION |
|--|---|
| 1.Extrudate slippage in belts. | <p>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.</p> |
| 2. Extrudate tension varying. | <p>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.</p> |
| 3.Cutter bush set-up incorrect. | <p>The machine must be operated at a constant linespeed to achieve best results. Do not adjust the caterpillar speed unnecessarily. Leave it set 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.</p> |
| 4. Cutter bush set-up incorrect | <p>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 extrudates, 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.</p> |
| 5. Material not exiting bush. | <p>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, either 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.</p> |

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 through 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 it 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.

8 COMMON OPTIONS DESCRIPTION LIST

- A A-1 blade lubrication.** Dip tank below the blade to hold lubricant. Fluids used can be soapy water, alcohol etc. Helps to improve cut quality on flexible material.
- B D-1 Fibre optic length control.** Photo electric switch mounted on slide bar to position unit at cut point. Used for accurate cutting of rigid profile of tubes. Selectable from front panel.
- C F-1 Batch counter.** Predetermine counter which can be pre-set to count up to total. Depending on spec, machine will sound buzzer/lamp or stop.
- D G-1 Cuts per minute indicator.** Either display within TP170 or individual counter indicating cut pieces per minute.
- E G-3 Broken blade sensor.** Photo eye mounted within cutter block. Which monitors blade condition each revolution. TP170 machines display warning on panel if blade fails. BCD specified machines have warning lamp on electrical cabinet.
- F J-1 Razor blade holder.** Holder supporting small blade to cut up to 10mm max. tube. Suitable for cutting flexible silicone medical tube. See diagram T-BCD-TP-15
- G J-2 Chip blade holder.** Holder supporting medium blade to cut up to 40mm max. dia tube. See diagram T-BCD-TP-14
- H L-3 Quick release cartridge bush.** Fast removable holder supporting bush supports. Allows bushes to be changed on bench. See diagram T-BCD-TP-10.
- I R-1 Linespeed indicator.** Digital panel meter displaying speed of belt travel
< 100 M/min in 0.1m/min resolution
> 100 M/min in 1.0m/min resolution
- J R-2 Length Indicator.** Digital panel meter displaying total length of product passing through machine. Re-set by pressing facia button. Resolution 0.1Metres.
- K R-6 Nip position readout.** Mechanical counter mounted below boom handwheel indicting boom gap/position resolution 0.1 millimetre
- L S-1 Air operated boom.** An air cylinder mounted at the rear of the caterpillar booms, moves the top boom up and down. Operation is by 2 arrow buttons located on the front panel. Bottom boom remains adjusted by normal screw.
- M W-2 Sonar Loop.** Used for flexible hauling application. Maintains a tension free loop and automatically adjusts caterpillar speed.
- N W-6 0-10V speed input.** Allows a external 0-10V signal to control caterpillar speed. Selectable from 2 position switch on front panel (local or remote).

POSITION GUIDE

DRAWING NUMBER 14

POSITION GUIDE

DRAWING NUMBER 15

POSITION GUIDE ONLY

DRAWING NUMBER 10

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 Servo motor and belt.

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 infeeders 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 located at the left-end of each caterpillar boom. By slackening these screws, the tension 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: For 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.

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 |
| Once per month | - | 1. Check drive belts 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 boom height adjustment screw for ease of movement. Brush with light machine oil or grease if dry. 5. Run infeder at full speed and check for excessive noise. 6. 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 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 safety 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) condition 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.

5 General Description

The machines consist of two caterpillar conveyor booms fitted with Poly 'V' belts. The caterpillars are driven by two brushless servomotors depending on specification. The speed of which is steplessly variable adjusted by either a potentiometer or HMI control panel. The motors are directly connected to the Boom Drive roller via a planetary gearbox and are speed linked electronically within the amplifier.

I MACHINE CONTROLS AND THEIR FUNCTIONS

1 Speed range and control

The machine is calibrated in our factory to the customer's requested maximum linespeed.

The ten-turn speed control potentiometer is accurate to within approximately 2% and is calibrated in 1,000 divisions. This ensures that precise speed setting is possible.

It must be remembered that the dial reading is directly proportional to the machine speed only over the range 5% to 100% (20:1). Below 5% the torque drops away and the setting is not proportional, although the machine may, of course, be run continuously at these speeds (less than 5%).

If the TP170 HMI option is fitted, the setting via the panel will be digital and accuracy will be significantly improved when compared to a 10 turn potentiometer.

As a safety precaution the machine is fitted with a fail-safe monitoring circuit. After reconnection to the electrical supply or shutting a guard door, the safety relay will auto re-set and the blue light will illuminate.

It is recommended that the operator should always set the speed control to zero before running the machine for reasons of safety. The controller will not be damaged if the machine is switched to 'run' with the dial set at any speed up to the maximum the caterpillar will immediately accelerate to this set speed.

Please see the enclosed product manual for details of the motor controller.

| |
|--------------------|
| J OPERATION |
|--------------------|

MECHANICAL

1 Height adjustment

Both booms are adjustable via the overhead handwheels.

M3300

The booms are adjusted by a counter rotating screw. The machine will be fitted with a single hand wheel which, when turned will move both booms dependent on direction of rotation

M4000 - M5000

The screw nearest to the inlet machine adjusts the position of the Lower Boom and the Upper Boom is adjusted by the screw farthest from the inlet side of the machine. The handle is removable between either screw.

Pneumatic boom option

If your machine has been fitted with a pneumatically operated upper conveyor, operation will be controlled by a switch marked 'UP' and 'DOWN' on the control panel.

On pneumatically operated upper boom machines the relationship between the upper conveyor and the lower conveyor is controlled by an adjustable turret stop assembly. This is located on the upper conveyor, and should be adjusted until the correct nip pressure is obtained for the product being extruded.

Boom adjustment option

Mechanical counters

As an option, the machine maybe fitted with orange mechanical counters. As the handwheel is adjusted the counter will display the distance moved from centreline (boom gap in millimetres).

2 Caterpillar Belt Tensioning

Remove power. Open the Caterpillar guard door and locate the belt tension adjusting bolts at the inlet side of the machine. Move rollaway assemble to out position and remove rear cover to expose belt tension screws

To tension the belts it is necessary to adjust the screw by turning it clockwise. This will draw the roller along to tensioning slot and tighten belt. Removal is opposite until the belt can be withdrawn from gearbox end.

To ensure equal tension across the entire belt width, adjust the screw on both the front and back boom plate by the same number of turns. To check ensure roller is parallel with boom plates.

WARNING

ADJUST TENSION BOLTS TO A MAXIMUM TORQUE – SEE TABLE BELOW. OVERTIGHTENING BEYOND THIS WILL CAUSE SERIOUS INTERNAL DAMAGE TO DRIVE SHAFTS AND BEARINGS OF THE MACHINE. OVERTENSION WILL VOID WARRANTY OF MACHINERY.

| MODEL | TORQUE |
|--------------|---------------|
| M3300 | .5-.7 N/m |
| M4000 | .8-.9 N/m |
| M5000 | 1.0-1.2 N/m |

3 Lubrication

Planetary gearboxes on upper and lower booms are oil filled and sealed for life. These units need no maintenance.

Adjusting screws: Do not allow to become dry but brush on a light grease or machine oil
1 per week

Haul-Off Electrical Specification & Fault Finding Supplement

Introduction

The information contained in this supplement to the 'Operating Instructions' is intended to assist machine operators and maintenance personnel in the unlikely event that problems are experienced with the operation or performance of the equipment. All information is of a general nature, and reference should be made to the documentation supplied with the machine before any maintenance is attempted.

Anyone attempting maintenance or fault diagnosis on the machine should always proceed with EXTREME CAUTION. Due to the nature of the machines they are potentially very DANGEROUS.

Section 'a' is intended to assist machine operators, and non technical personnel with problem identification and minor fault rectification. It does not assume that persons attempting to follow the instructions have any electrical knowledge. This approach may lead to some of the solutions appearing obvious.

It is important, that if a fault occurs, these instructions are followed carefully. General tampering with the machine may disguise the original fault, therefore making its eventual rectification more difficult and costly.

Section 'b' outlines the principle of operation, of the machine, and is aimed at maintenance engineers and technically competent personnel. A block diagram is included to assist with following the operating sequence.

Section 'c' is aimed at technically competent personnel, and contains information concerning the configuration of components used on the machine. As well as advice on how to ascertain whether or not a particular device is functioning correctly. Some of the procedures detailed have the potential to damage the machine if not carried out correctly. It is therefore recommended that only personnel falling into the above category attempt to use section 'c' of this document.

a, Basic Fault Finding

i, Identify the problem

Due to the principle of operation of the machine, a number of faults can display some of the same symptoms. It is therefore important that all symptoms be carefully observed before a decision is taken as to where the fault might be.

It is important not to overlook the obvious when attempting to identify the cause of a problem. Refer to the chart entitled 'Servo-torq Basic Fault Finding' for details of common problems. If all the items on the chart have been checked, and the machine is still not working correctly, then one of the machine components may have developed a fault.

To assist maintenance staff and Gillard engineers with identification of possible faults, a 'Systems Check' questionnaire is included with this document. Ensuring this chart is completed before phoning for technical support, will help engineers identify and rectify the problem more quickly, resulting in reduced 'Down Time' for your machine.

Haul-Off Basic Fault Finding

| SYMPTOM | | POSSIBLE CAUSES | OTHER POSSIBLE SYMPTOMS | SOLUTION |
|---------|----------------------------|--|--|--|
| A | MACHINE WILL NOT START | No power to the machine | 'Power On' lamp out No display on counters | Establish electrical supply |
| B | CATERPILLAR WILL NOT START | No speed signal to drive | Speed control at zero while run lamp on | Increase speed demand |
| C | CATERPILLAR STOPS | Guards open Emergency Stop buttons actuated Safety circuit not reset | 'Guard' lamp out 'Guard' lamp out 'Reset' button, lamp out | Close guards Reset emergency stops Press reset |

Systems Check

This chart assumes that the simple checks detailed on the 'Basic Fault Finding' chart have been made.

Please complete this chart before phoning for assistance.

GENERAL

| | | | | |
|---|-----------------------|--------------------------|--------------------------|---|
| Are the following indicator lamps, or counters illuminated;- | | YES | NO | |
| | Power On Lamp? | <input type="checkbox"/> | <input type="checkbox"/> | 1 |
| | Line Speed Indicator? | <input type="checkbox"/> | <input type="checkbox"/> | 2 |
| Will the Reset button illuminate? | | <input type="checkbox"/> | <input type="checkbox"/> | 3 |
| Are The following LEDs illuminated on the components, in the electrical enclosure;- | | | | |
| Caterpillar drive red LEDs;- | LED 1 stall/hold? | <input type="checkbox"/> | <input type="checkbox"/> | 4 |
| | LED 2 power? | <input type="checkbox"/> | <input type="checkbox"/> | 5 |
| | LED 3 overload? | <input type="checkbox"/> | <input type="checkbox"/> | 6 |

MOTORS

| | | | |
|--------------------------------|--------------------------|--------------------------|---|
| Does the Run lamp illuminate;- | <input type="checkbox"/> | <input type="checkbox"/> | 7 |
| Does the motor work;- | <input type="checkbox"/> | <input type="checkbox"/> | 8 |

COUNTERS

| | | | |
|--------------------------------------|--------------------------|--------------------------|---|
| Is the line speed indicator working? | <input type="checkbox"/> | <input type="checkbox"/> | 9 |
|--------------------------------------|--------------------------|--------------------------|---|

Other Symptoms

Please record any other symptoms you have observed.
ie;- Flashing indicator lamps, product jamming, unusual noises.
Try to record ALL symptoms no matter how trivial it might appear.

b, Principle of Operation

i, General

The machine operates from a 400V 50Hz 3phase N & E electrical supply. With a maximum current consumption not exceeding 25A.

Control of the machine is achieved via a 24VDC control circuit, monitored by a relay 'safety circuit', which provides a 'fail-safe' 24VDC supply. All contactors and relays used for motor starting are of the 'positive guided' type, and are monitored by the safety circuit. The supply to all motor starting contactors & relays is derived from the fail-safe supply. All guard & safety switches used on the equipment are of the 'fail to safe type', and are also monitored by the safety circuit, thus ensuring the removal of the electrical supply to the machine components, should an 'unsafe' condition occur. See drawing T-BCD-TP-13.

The chart entitled 'Electrical Specification' gives information regarding the set-up of components used on the machine. The information given, details how devices are configured for use on the Gillard range of cutters. For full device specification it will be necessary to refer to the manufacturers product information supplied with the machine.

ii, Infeeder

The caterpillar is driven by two Eurotherm 631 servo drive mounted in the electrical enclosure. Overload protection for the motor is provided by the drive. Refer to the manufacturers product manual for the full drive specification.

On Eurotherm 631 drive models the unit is fitted with full diagnostics. If a fault occurs not LED display and refer to OEM instruction manual for full details

Line speed is controlled by a potentiometer mounted on the control panel, providing a 0-10V speed reference signal to the drive (encoder or A/C models), which in some cases is trimmed by a remote dancing arm, or sonar loop detector. A Resolver is fitted to the motor, and connected to the drive enabling the motor speed to be maintained under variable load conditions. The encoder tachogenerator/encoder signal is also fed to a 3¹/₂ digit DC panel meter displaying a representation of the Tachogenerator output voltage in the form of 'line speed' in meters/minute.

Correct operation of the start contactor is ensured by inclusion of an auxiliary contact in the fail-safe circuit.

POSITION GUIDE
DRAWING NUMBER 13

ELECTRICAL SPECIFICATION

Note; *The information contained in the following charts is intended to indicate in what format equipment is used on the Gillard range, and is based on a typical machine. It is not intended to give full equipment specification. For more information consult the manufacturers literature supplied with the machine.*

i. MACHINE GENERAL

| | |
|----------------------|---|
| <u>Specification</u> | |
| Supply Voltage | 400V 50Hz 3 phase Neutral & Earth. Interrupted via Door Interlocked Isolator. |
| Consumption | 25A Maximum. |
| Control Circuit | 24VDC, Common Linked to Machine Earth. |
| Guard Circuit | 24VDC, Using 'Fail to Safe' Switches, & 'Positive Break' Relay Monitoring. |

ii. PUSH BUTTONS, SWITCHES & INDICATORS

| | |
|-------------------------|---|
| <u>Specification</u> | |
| Push Button/Switch Type | Telemecanique' ZB4' Range. |
| Indicator Lamp Type | LED 100,000 hour rated |
| Indicator Voltage | 24VDC. |
| Indicator Consumption | 2mA. |
| Emergency Stop Buttons | Telemecanique' ZB4 range . Positive Opening Contacts. |

iii. GUARD SWITCHES

| | |
|--------------------|------------|
| <u>Door Guards</u> | |
| Type | Schmersal. |

v, CATERPILLAR

Motor/D/C 512/8 DRIVE

| | |
|--------------------------|--|
| Type Armature Current | Brushless servo-motor. 6A maximum, at maximum 2000rpm (check machine spec). |
|--------------------------|--|

Drive

| | |
|---|--|
| <u>Specification</u> Type Supply Voltage Supply Protection Motor Protection Speed Ref | Eurotherm 612 Servo Amplifier. 240V 50Hz 1 Phase + Earth. 10Amp Fuses Overload Protection Provided by Drive. 0-10V via 10K ohm 10 turn 3W potentiometer or Analogue from PLC. |
| <u>Expected Control Signals</u> Terminals 8 & 11 Terminal 1 Terminal 4 Terminal 5 Terminal 13 Terminal 14 | 0VDC Connected to machine frame. 0-40VDC For 0-100% Full Speed, Tacho Input Reference to frame. 0VDC Minimum Speed Signal Reference. Run Signal Input, Taken to +24VDC for RUN condition. 0-10VDC Speed Ramp Input, representing 0-100% Full Speed Demand. +10VDC Output for Speed Reference. |

Line Speed Indicator

| | |
|---|---|
| <u>Specification</u> Type Supply Voltage Consumption Input Signal | Red lion cub 4. Cub 4V020 Red back lit LCD display 24VDC. 3W maximum. 0-20VDC representing 0-100% Full Speed, from Tachogenerator. |
| <u>Expected Signals</u> Terminal 3 Terminal 4 Terminal R Terminal S | +24VDC Supply, From 'Non Fail-safe side of control circuit. 0VDC For Supply. 0VDC For Signal Return. 0-40VDC Max, Speed Ref from Tachogenerator. |

Encoder (if fitted)

Standards In accordance with EN 60204, part 1

| | |
|--|---|
| <u>Identification of conductors</u> a.c. or d.c. power circuits a.c. control circuits d.c. control circuits Neutral P.E. Protective Conductor | BLACK RED BLUE BLUE (coded 'N') GREEN / YELLOW |
| <u>Stop functions</u> Category 0: Category 1: Category 2: | Uncontrolled Stop. Door interlocked local isolator. Emergency Stop. Guard switches and emergency stop push buttons. Controlled Stop. Designated push buttons. |

Safety Switches

See diagram T-BCD-TP-12 for full details for alignment of Schmersal safety switches.

POSITION GUIDE

DRAWING NUMBER 12

CATERPILLAR

Motor/Servo 631 Drive

Specification

| | |
|------------------|--|
| Type | Servo motor, brushless type |
| Armature Current | 6A maximum, at maximum 3000 rpm (check machine spec) |

Drive

Specification

| | |
|-------------------|---------------------------------------|
| Type | Eurotherm 631 single phase convertor |
| Supply Voltage | 240V 50Hz 1 phase + earth |
| Supply Protection | 10 Amp fuses |
| Motor Protection | Overload protection provided by drive |
| Motor Feedback | Resolver feedback or BCD counter |
| Speed Ref | 0-10V via 10K ohm 3W potentiometer |

Line Speed Indicator

Specification

| | |
|----------------|--|
| Type | Red lion cub 4. Cub 4V020 red back lit LCD display |
| Supply Voltage | 24 VDC |
| Consumption | 3W maximum |
| Input Signal | 0-20 VDC representing 0-100% full speed, from Tachogenerator |

EUROTHERM 631 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. |

L WARRANTY

Standard products manufactured by **Peter Gillard & Co. Limited**, 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.

Peter Gillard & Co. Limited
Alexandra Way
Ashchurch Business Centre
Tewkesbury
Gloucestershire
England
GL50 8NB
Tel: +44 01684 290243
Fax: +44 01684 290330
e-mail: sales@gillard.co.uk