

Gillard Advanced Cutting Systems

Operating Instructions

***Neuma-Torq and Vac-U-Torq
Rotary Cutting Systems***

English

Operating Instructions

Neuma-Torq and Vac-U-Torq

Rotary Cutting Systems

Construction Date

Cutter Serial No

Infeeder Serial No

Model Number

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.

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Warning!

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A GENERAL INFORMATION

1 Introduction

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

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

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

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

2. Model type and number

This manual refers only to the following machines.

2.1 Neuma-Torq rotary cutters

Model No	Capacity (Kw)	Motor size (mm)	Clutch size (mm)
400/50A	50	1.1	140
400/50B	50	1.5	170
400/100B	100	1.5	170
HD/50C	50	2.2	190
HD/100C	100	2.2	190
HD/125C	125	2.2	190
HD/150C	150	2.2	190

Introduction

Model No.	Capacity (mm)	Motor Size (kW)	Clutch size (mm)
		6	Issue 01/97/NT/VT Neuma/Vac-U-Torq Cutting Systems March 1999

500/50A	50	1.1	200
500/50B	50	1.5	230
500/100B	100	1.5	230
750/50A	50	1.1	200
750/50B	50	1.5	230
HD/50C	50	2.2	300
HD/50D	50	4.0	360
HD/100C	100	2.2	300
HD/100D	100	4.0	360
HD/125C	125	2.2	300
HD/125D	125	4.0	360
HD/150C	150	2.2	300
HD/150D	150	4.0	360
HD/200C	200	2.2	300
HD/200D	200	4.0	360

Model No	Belt Size (mm)	Motor Size (mm)
3500LC	75 X 800	0.75
3500LD	75 X 800	1.1
3500LE	75 X 800	1.5
4000LC	95 X 800	0.75
4000LD	95 X 800	1.1
4000LE	95 X 800	1.5
5000LC	150 X 800	0.75
5000LD	150 X 800	1.1
5000LE	150 X 800	1.5

2.4 Please note that these machines can be supplied in one of the following configurations.

2.4.1 Freestanding rotary cutter.

2.4.2 Combined rotary cutter and caterpillar Infeeder/haul-off.

Introduction

2.4.3 Separate rotary cutter and caterpillar Infeeder/haul-off.

Depending on which configuration has been supplied to you, please consult the relevant instructions when consulting this manual.

- 2.5 All cutter instructions refer to both Neuma-Torq and Vac-U-Torq cutters, unless it is expressly stated that the instructions only apply to one type of machine.

3 General purpose and use of the machine

These machines are an accurate extrusion cutting system. They utilise a 'flying knife' action for precision cutting. By rotating an ultra-thin knife blade in an arc at high speed, the cutters can slice through extrudate with minimal product interruption.

A clutch/brake is used to control the operation of the blade. It ensures that the torque generated by the cutter motor is separated from the blade until a signal-to-cut is given. In this way the cutters operates 'on-demand'.

All machines are tested and calibrated to give a repeat accuracy from signal-to-cut to knife penetrating the extrudate of 0.3 milliseconds (0.0003 seconds). This figure should be maintained throughout the operating life of the clutch/brake.

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

- Line speed
- Material type
- Feeding method
- Length measuring system
- Blade/guide bush configuration

Your particular application will have been discussed prior to delivery. 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 cutter 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 refer to the technical/fault finding section at rear of manual or telephone or fax. We can usually solve a problem quickly, avoiding hours of frustration.

4. Products to be cut or handled

These machines are designed to be used in the extrusion line, cutting plastic and rubber extrusion. The maximum capacity of the machine is shown in section A.2. However, actual cutting capacity will depend upon product type and wall thickness.

Introduction

5 . 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.

6. 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.

Introduction

Declaration of incorporation

93/44/EU

Manufacturer's name: Peter Gillard & Co Ltd

Product description: Rotary cutter and/or infeeders

Model type:

Serial number:

Declaration: I declare, as the authorised representative, the above machinery must not be put into service until the machinery into which it is to be incorporated has been declared 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 Nos. 0001 on page 16. 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 Crushing of fingers and hands and dislocation of joints, caused by pulling action of caterpillar infeed belts.

2 Safety conscious work practices

Cutting and caterpillar machines are potentially extremely dangerous. The knives used in the cutters are of the highest sharpness. They can easily cut through fingers, thumbs and cause severe cuts. The caterpillar belts have a powerful pull and can cause crushing, broken bones and dislocation.

Although the machines are 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 and placing the cutter in 'stand-by' mode.

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.

Safety Considerations

POSITION GUIDE ONLY!

DIAGRAM OF NEUMA-TORQ/VAC-U-TORQ DANGER AREAS

DRAWING NUMBER 001

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

The cutting action of the machine could be engaged, causing the blade to rotate.

Always use another object to clear the bore. Better a bent 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 operators to change blades, bush, or generally handle the machine.

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

Be Careful - Keep Your Fingers!

3 Safety protection

The machines are fitted with a number of features designed to minimise the possibility of damage to either operators or the machine. Please refer to drawing number 001 (page 16), which illustrates the danger areas of the machines. Please ensure that all staff have seen this and are aware of potential danger points.

3.1 Guide bush exit guard (1)

The machine will not operate unless the exit guard is shut, and the safety sensor is functioning correctly.

For machines' with a 50mm capacity, a safety sensor is provided below the guide bush. For this 30mm sensor to operate the actuator should be radially aligned to ensure the semicircles on the mating faces are matched and the two units are 1-3mm apart. The LED in the base of the sensor will then illuminate.

For machines' with a 100mm capacity and upwards, the guard over the guide bush is provided with a safety interlock. The guard must be closed for the machine to work.

3.2 Cutter block safety sensors (2)

The machine will not operate unless the clamshell guard covering the knife blade is in its 'shut' position.

Safety Considerations

3.3 Slide-away cutter head (6)

On machines fitted with a slide-away cutter head, the cutter head must be in its 'shut' position, i.e. closed-up to the Infeeder, before the cutter will operate.

Note: The infeeder will continue to operator even if a cutter guard is broken. Therefore, it is possible to slide the cutter head away and still run the infeeder. This is to allow product sizing before cutting is started.

3.4 **Guide bush inlet guard (12)**

For machines with a 50mm capacity, a safety sensor is provided below the guide bush. This sensor must match up with its partner attached to the bush itself, otherwise the cutter will not function.

For this 30mm sensor to operate the actuator should be radically aligned to ensure the semi circles on the mating faces are matched and the two units are 1-3mm apart. The LED in the base of the sensor will then illuminate.

For machines with a 100mm capacity and upwards, the guard over the guide bush is provided with a safety interlock. The guard must be closed for the machine to work.

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
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Peak C weighted instantaneous sound pressure level at workstations	94dB
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Sound power level emissions	less than 85dB
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5. **Prohibition of non-authorized 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.

Safety Considerations

C INSTALLATION

1. Weight and dimensions of machine

Weight	-	220Kgs unpacked
Dimensions	-	1120mm Long
		800mm wide
		1400mm high

2. Lifting and handling instructions

Use a forklift with a minimum capacity of 1000Kgs to load/unload the machine from transport.

Once on the floor the machine can be easily moved around using castor wheels fitted to the base of the machine.

THE NEUMA-TORQ/VAC-U-TORQ WEIGHS Approx. 250KGS. IF DROPPED ONTO AN UNPROTECTED FOOT IT MAY CAUSE SEVERE INJURY. TAKE CARE!

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 machine.
- 3.3 Unpack these items - what is supplied is dependent upon individual customer's requirements. As a minimum, 2 off set standard straight blades, a selection of fuses, Manual, Third party instructions.

Installation

POSITION GUIDE ONLY!

**DIAGRAM OF NUEMA-TORQ/VAC-U-TORQ INSTALLATION AND LIFTING
LOCATIONS**

DRAWING NUMBER 002

4 Cutter location

The Neuma-Torq/Vac-U-Torq machines should be rolled in to position within the extrusion line using castors. Once in position the machine should be raised using M24 jacking bolts at each corner of the machine to achieve the required line height.

It is important to ensure that the extrudate can be fed into the cutter without causing snags or jams. It is best if the extrudate is at the same height as the machine. Avoid pulling the extrudate.

5 Electrical supply

A standard 400 Volt, three phase, 50Hz supply is required. An earth connection is also required.

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

The electrical specification for the 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.

6 Air supply

Factory compressed air supply 10 bar maximum. The machine has its own filter regulator. This should be set to 0.3 bar maximum. If 0.3 bar is exceeded this will not improve the performance of the clutch and only cause the clutch to jam and the machine not to function. Never exceed 0.3 bar.

Installation

D MACHINE CONTROLS AND THEIR FUNCTIONS

1 Control panel details

See control panel drawing 003.

- 1.1 **Mains On lamp (1).** This illuminates when the isolation switch located on the side of the machine has been turned on.
- 1.2 **Guard lamp (2).** 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 (cutter block lid, perspex front caterpillar guard and guide bush exit guard).
- 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 (4).** This resets the fail-safe guard circuit to enable the machine to operate. A blue lamp within the button illuminates when the button is pressed. If the lamp does not illuminate when pressed re-check from section 1.2.
- 1.5 **Cut length counter (5).** Determines the cut length of product.
- 1.6 **Cutter stop button (10).** This stops the cutter motor.
- 1.7 **Clutch stop/run selector switch (11).** This sets the clutch into either cut mode (position I) or brake mode (position 0) or initiate (position 11). The machine must be initiated before it will run in automatic from pre-set counter. This is done by, starting machine and moving the selector switch to the II position and letting the spring return to I position. The machine will complete on cut and the run in automatic.
- 1.8 **Total cuts counter (13).** When on this keeps a record of the total cuts produced.
- 1.9 **Total cuts on/off switch (14).** This starts/stops the total cuts counter.

Controls

POSITION GUIDE ONLY!

NEUMA-TORQ/VAC-U-TORQ CONTROL PANEL

DRAWING NUMBER 003

E OPERATION

1 Cutter start-up

- 1.1 Please familiarise yourself with all controls located on the main control panel (see section D and drawing no. 003 page 20). Some of the controls fitted to your cutter may not be identified. This is because these controls concern optional extras or special functions. Separate instructions will explain their operation. See section G for details of these options.
- 1.2 Connect a factory compressed air supply to the inlet point located on the base of the machine. A maximum pressure of 10 bar should be connected.
- 1.3 A regulator is provided to control the airflow into the cutter. This should be set to 0.3 bar maximum.

The machine can be operated from 0.1 bar to 0.3 bar. However, it is recommended that the pressure should be set to as near as possible to 0.3 bar. At 0.3 bar the clutch will operate at peak performance. Do not exceed 0.3 bar.

- 1.4 Ensure that the electrical supply is **off** at the isolator switch and that the clutch switch (12) is at '0'.
- 1.5 Open the knife guard-cover and check that a blade has not been fitted. If there is a blade fitted it is recommended that this be removed during initial start-up. This is achieved by removing the blade clamp bolt.

To assist in releasing the clamp bolt there is a tommy bar hole in the hub.

Check that the cutter guide bushes are fitted.

- 1.6 Close the knife guard-cover. The cutter will not run with this guard open.
- 1.7 Close the bush exit guard. The cutter will not run with this guard open.
- 1.8 Turn the electrical supply on at the isolator switch. The 'Power on' lamp (1) will illuminate. Check the blue 'guards in place' lamp is illuminated.
- 1.9 Press the 'Safety circuit reset' illuminated push button (4). If all guards are closed, this lamp will now illuminate.

The machine will not work until all guards are closed and the 'safety circuit reset' button has been pressed. If the lamp will not illuminate recheck that all guards are closed. See section B.2 for assistance.

- 1.10 Press the 'cutter start' illuminated push button (9). The cutter motor will start and the lamp will illuminate.

Operation

- 1.11 Turn the 'clutch stop/run' selector switch (11) to position 'I'. Move the selector switch to position II and allow the spring return to position I. The machine will complete one initialisation and then run in auto at lengths set in counter pre-set. Note encoder must be running for counter to operate.

To test the operation of the set length counter (9) it is necessary to enter a cut length. Any figure will do, but a convenient figure is 200mm. See section 2 below for details on how to operate this counter.

Operation

2 How to operate the cut length counter Type Kubler 327

2.1 The display is a 6-digit LCD twin line display. The count resolution is 0.1mm. This allows lengths of between 0.1 to 9,999.1mm, i.e. 0-100 metres cut lengths.

2.2 Setting the cut length

2.3 The counter has three setting parameters which are selected by pressing "P" button

Set	Not used
PR1	Cut length
PR2	Batch total (option)

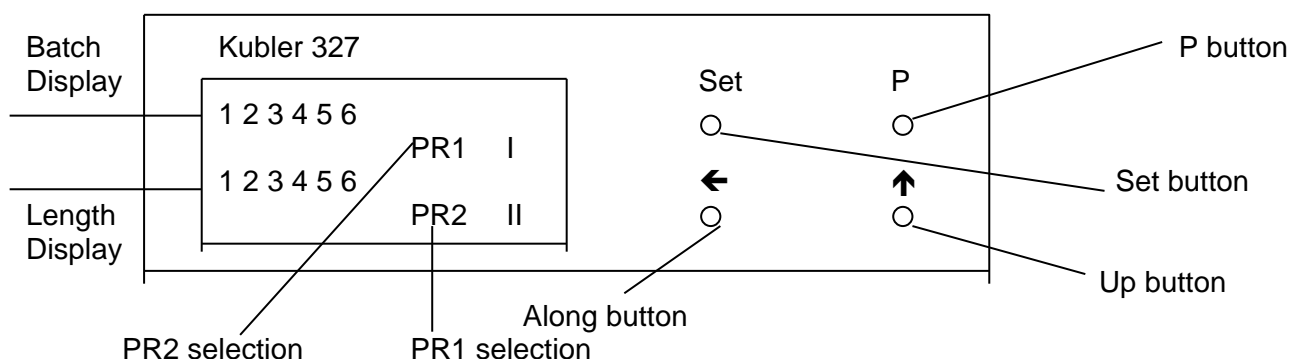
If a button is not pressed for the duration of 10 seconds the display will revert to the default screen.

The required cut length must be entered into PR1. To change the pre-set follow this procedure

1. Press P twice so PR1 is displayed
2. Use ← ↑ arrow buttons to move the cursor first along (← arrow) to the digit to be altered then up arrow (↑ arrow) to scroll the selected digit to the desired value.
3. When correct length is entered press button P twice to return to the default screen. If no button is pressed for 10 seconds this will happen automatically.
4. Press button "set" to reset default display to zero.

2.2 Button Functions

"P"	-	Selects parameters to be altered i.e. PR1 & PR2
Set	-	Reset both displays to zero.
←	-	Moves the cursor along to the digit required adjustment.
↑	-	Scrolls the digit round to the selected value.
Lower display	-	Cut length default
Upper display	-	Batch total default



The required Batch total (option) must be entered in to PR2. To change the pre-set follow this procedure.

- 1 Press "P" three times to PR" is displayed
- 2 Use ← ↑ arrow buttons to move the cursor first along (← arrow) to the digit to be altered then up arrow (↑ arrow) to scroll the selected digit to the desired value.
- 3 When correct total is entered press button "P" once to return to the default screen. If no button is pressed for 10 seconds this will happen automatically.
- 4 Press button "set" to reset default display to zero.
- 5 The decimal point in the Batch display has no function so a reading of 1.0 is ten

OPERATION

In operation the button field displays the cut length default. This display will count up as product is feed through the machine until the pre-set value is reached. Upon reaching this value the machine will complete one cutting cycle and the display will re-set to zero and begin counting up to the pre0-set again.

At the point of cut the counter will add one to the upper display field (batch total). The batch total will count up to the pre-set set by PR2 selection. On reaching the pre-set a buzzer will sound for 3 seconds and the display will re-set to zero.

Kubler 327 Length Counter

F SETTING UP PROCEDURE

1. Check that the machine is switched off at the mains isolator.
2. Fit a knife blade. Refer to diagrams 005, 006, and 007 attached. These diagrams show the 3 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 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 in towards the blade until they are just in contact with it (see diagram 0008).

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

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

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

Setting Up

POSITION GUIDE ONLY!

DIAGRAM OF NEUMA-TORQ/VAU-U-TORQ

DIAGRAM NUMBER 004

POSITION GUIDE ONLY!

**DIAGRAM OF NEUMA-TORQ/VAU-U-TORQ STRAIGHT
BLADE MOUNTING**

DIAGRAM NUMBER 005A

POSITION GUIDE ONLY!

**DIAGRAM OF NEUMA-TORQ/VAU-U-TORQ CURVED
BLADE MOUNTING**

DIAGRAM NUMBER 005B

POSITION GUIDE ONLY!

DIAGRAM OF NEUMA-TORQ/VAC-U-TORQ RAZOR BLADE INSTALLATION

DIAGRAM NUMBER 006

POSITION GUIDE ONLY!

**DIAGRAM OF NEUMA-TORQ/VAC-U-TORQ CHIP BLADE
ADAPTOR**

DIAGRAM NUMBER 007

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.
10. Switch on main isolator.
Press the safety circuit reset button (4). Until this button is pressed and illuminated, the machine will not work.
11. Press main cutter motor start button (9).
12. Set the desired length into the cut length counter (5). See section E.2 details of how to enter a length.
13. Check that the total cuts counter on-off switch (14) is in the off position. Zero the total cuts counter (13) by pressing reset button.
14. Pass the extrudate through the caterpillar infeeders and the cutter bushes.
15. 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.
16. Check that the caterpillar speed control potentiometer (7) is set to zero. If not, adjust it to zero. Press the caterpillar start button (6) to start the caterpillar motor.
17. Adjust the caterpillar speed by rotating the potentiometer (7) until the required linespeed has been reached. The potentiometer is equipped with a lock. Use this to secure the potentiometer if only one speed is required.
18. Once extrudate is passing smoothly rotate clutch brake rotary switch (11) from '0' to '1'. Press the clutch initiate button (12); this will cause the knife blade to operate once and then carry on in automatic mode on signal from the length counter.
19. Check cut length, and adjust length setting accordingly (see section E.2 for details on how to adjust the counter).
20. Once the desired length is achieved switch on the total cuts indicator (14).

Setting Up

G. NEUMA-TORQ/VAC-U-TORQ OPTIONAL ITEMS

This section describes the optional items, which may be fitted to your machine.

Cutter options

1. A-1 Blade lubrication
2. E-1 Speed cut continuous rotation cutting
3. F-1 Batch counter with buzzer
4. F-2 Batch counter with beacon
5. F-3 Automatic stop of infeeders at end of batch

1 Blade lubrication option A-1

- 1.1 When cutting cured or uncured rubber, silicone or latex rubber, or medical grade plastics, it has been found that cut quality can be vastly improved by lubricating the blade as it passes through the extrudate.

This has led to the development of our blade lubrication system for use with the machine.

- 1.2 The system consists of the following:

- 1.2.1 A cast aluminium cutter block with a stainless steel lid.

- 1.2.2 The bottom half of the cutter block forms a chamber, into which a suitable lubricant should be poured. A drain is provided at the rear of the machine to allow easy removal of liquid after use.

- 1.2.3 The knife blade passes through the lubricant on every rotation. The speed of the knife is such that all excess lubricant is thrown off as it accelerates to cut the extrudate.

It has been found that the minimal amount of lubricant adhering to the surface of the blade is sufficient to allow clean cutting.

- 1.3 The type of lubrication recommended depends upon extrudate type:

1.3.1 Cured and uncured rubber

Either plain water or striate solution. A drop of washing up liquid may be added to plain water to act as a surface agent.

Options

1.3.2 Medical extrusions

Due to the possibility of contamination, it is not recommended that normal mains water be used. A lubricant that quickly evaporates from the cut face is often the best choice.

In its place one of the following is suggested:

- Spirit/alcohol, e.g. white spirit
- Distilled water
- Silicone based lubricant, e.g. Pentaerythritol Mono Oleate

1.3.3 In some cases a degree of trial-and-error may be required to determine the optimum lubricant.

2. Speedcut continuous rotation cutting - E-1

- 2.1 This option is designed for cutting very high rates. The knife blade is continuously rotated at a speed between 400 and 1200 cuts/minute. A variable speed DC motor with tachnogenerator replaces the standard AC motor.
- 2.2 Control is provided by a ten-turn potentiometer and a digital LED cuts/minute indicator. A change over switch allows either on-demand (clutch/brake) or continuous rotation operation to be selected.
- 2.3 Cut length is determined by the relationship between blade rotation speed and line speed, e.g.

13.5 m/min line speed divided by 900 cuts minute

$13.5/900 = 0.015$ metre (15mm) cut length

- 2.4 Since line speed is normally fixed, the operator must adjust the blade speed to achieve the cut length required. The cuts/minute indicator is provided to assist this function.
- 2.5 It is recommended that the operator estimates the blade speed required using the above calculation. They will need to check the actual cut length produced and trim the blade speed up or down.
- 2.6 When the selector switch is used to select on-demand operation, the cutter motor speed is automatically set to a fixed speed, which gives optimum performance in on-demand mode. When switching the continuous rotation mode, the motor will set itself to whatever speed has been set on the ten-turn potentiometer.
- 2.7 Because of this, it is strongly recommended that the potentiometer always be set to the estimated cut rate (see section G.2.5 above).

Options

3 Batch counter with buzzer option - F-1

The batch counter is designed as a fully automatic 'reminder' to warn operators that a pre-determined batch of cut pieces have been cut.

3.1 The display has a five digit LED display. The count is in one-piece increments, up to a maximum of 9,999 pieces.

2.4 The counter has three setting parameters which are selected by pressing "P" button

Set	Not used
PR1	Cut length
PR2	Batch total (option)

If a button is not pressed for the duration of 10 seconds the display will revert to the default screen.

The required cut length must be entered into PR1. To change the pre-set follow this procedure

Press P twice so PR1 is displayed

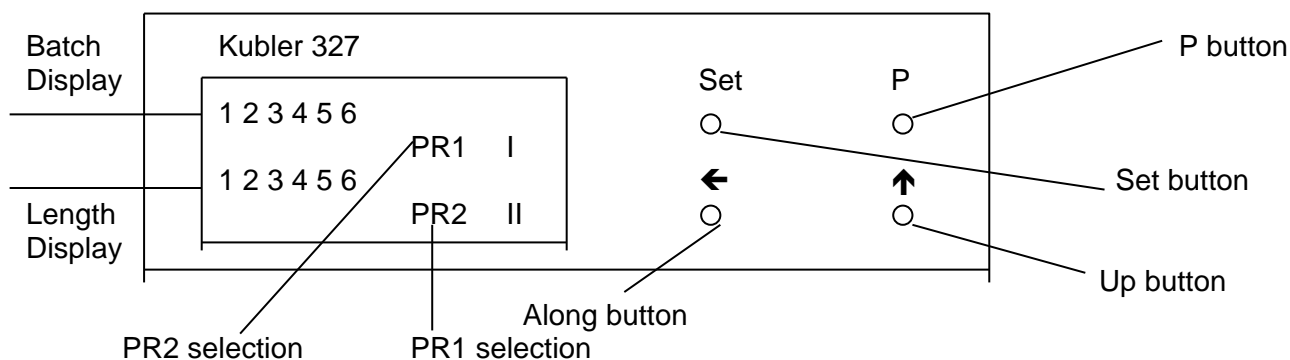
Use ← ↑ arrow buttons to move the cursor first along (← arrow) to the digit to be altered then up arrow (↑ arrow) to scroll the selected digit to the desired value.

When correct length is entered press button P twice to return to the default screen. If no button is pressed for 10 seconds this will happen automatically.

Press button "set" to reset default display to zero.

3.2.1 Button Functions

"P"	-	Selects parameters to be altered i.e. PR1 & PR2
Set	-	Reset both displays to zero.
←	-	Moves the cursor along to the digit required adjustment.
↑	-	Scrolls the digit round to the selected value.
Lower display	-	Cut length default
Upper display	-	Batch total default



The required Batch total (option) must be entered in to PR2. To change the pre-set follow this procedure.

6 Press "P" three times to "PR" is displayed

- 7 Use ← ↑ arrow buttons to move the cursor first along (← arrow) to the digit to be altered then up arrow (↑ arrow) to scroll the selected digit to the desired value.
- 8 When correct total is entered press button "P" once to return to the default screen. If no button is pressed for 10 seconds this will happen automatically.
- 9 Press button "set" to reset default display to zero.
- 10 The decimal point in the Batch display has no function so a reading of 1.0 is ten

3.2.2 OPERATION

In operation the button field displays the cut length default. This display will count up as product is feed through the machine until the pre-set value is reached. Upon reaching this value the machine will complete one cutting cycle and the display will re-set to zero and begin counting up to the pre0-set again.

At the point of cut the counter will add one to the upper display field (batch total). The batch total will count up to the pre-set set by PR2 selection. On reaching the pre-set a buzzer will sound for 3 seconds and the display will re-set to zero.

- 3.2.13 On coincidence of the preset number and the count number, a signal will be sent to a buzzer located on top of the electrical cabinet. This buzzer will emit a sound to warn the operator that the batch is complete. The sound will cease automatically after a short period of time.
- 3.2.14 The buzzer tone and duration can be controlled by adjusting the dip switches inside the buzzer itself. To access the dip switches twist the top part of the buzzer until it becomes loose from the base.
- 3.2.15 The dip switches can be set as follows:

Tone	Code	Sound ouput dBA at 1m
	12345	
Fast sweep	11110	105
Medium sweep	11101	105
Fast sweep	11011	114
Slow whoop	11001	103

A small potentiometer is provided to adjust the volume of the buzzer.

Options

4. Batch counter with beacon option - F-2

- 4.1 The batch counter is designed as a fully automatic 'reminder' to warn operators that a pre-determined batch of cut pieces have been cut.
- 4.2 The operation of the batch counter is identical to that described in section G.3.1 to G.3.2.12. Please refer to these instructions for information on how to use the counter.
- 4.3 On coincidence of the preset number and the count number, a signal will be sent to a beacon located on top of the electrical cabinet.
- 4.4 The beacon will flash to warn the operator that the batch is complete. The flashing will cease automatically after a short period of time.

Optimum Results

H OBTAINING THE BEST RESULTS FROM YOUR NEUMA-TORQ/ VAC-U-TORQ

1 Introduction

- 1.0 This section is intended to help you to get the optimum performance from your machine. 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 machine should be located on a bench or table at a convenient working height.

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 untwist before it goes into the cutter. An unwind table or stand should be used to remove any twist.

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.

Optimum Results

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, 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 profiles.

Optimum Results

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 the blade required.

Optimum Results

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 Neuma-Torq/Vac-U-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 Neuma-Torq/Vac-U-Torq.

Optimum Results

I MAINTENANCE AND INSPECTION

Please refer to diagram 010 page 50 for location of items mentioned in these instructions.

1. Monitoring during operation - consumables

Consumables items such as knife blades and caterpillar infeeders 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.

2. Monitoring during operation - non-consumables

2.1 Lamp bulbs (LED)

Although these bulbs have a rated life of many hundreds of hours operation, they will eventually fail. When they have failed, they should be replaced immediately.

DO NOT USE THE MACHINE WHEN LAMPS WILL NOT ILLUMINATE. REPLACE BULBS IMMEDIATELY TO AVOID CONFUSION AS TO WHETHER THE MACHINE IS OPERATING CORRECTLY OR NOT.

2.2.1 To replace a lamp bulb (LED)

Lever off the lens, using a small screwdriver and remove from the indicator housing. Unclip the LED from the rear of the lens unit.

Insert the new LED into the lens unit and refit the indicator housing. Ensure that the lens unit has properly located into the housing.

This machine uses 24vdc LEDs in the indicator units.

Maintenance

POSITION GUIDE ONLY!

NEUMA-TORQ/VAC-U-TORQ BLADE CLEARANCE DIAGRAM NUMBER 008

2.2 Brake sensor position

The SRC 1501 brake sensor determines the position the blade stops at after each cut. The sensor is located in an enclosure positioned adjacent to the knife shaft, at the opposite end of the face of the brake sensor. (see diagram 0011 page 52).

The position of this slotted disc relative to the knife blade has been factory set and should not be adjusted under normal circumstances.

If, for some reason, the relative blade or disc positioning requires adjustment, follow the steps below:

- 2.2.1 Loosen the screw which clamps the slotted disc onto the knife shaft so that the disc can be rotated by hand without moving the shaft.

With a blade fitted, rotate the knife shaft so that the blade is positioned at approximately 2 o'clock when looking from the end (see diagram 0011 page 52).

IMPORTANT: TURN-OFF THE MAINS ISOLATOR BEFORE FITTING A BLADE OR ROTATING THE SHAFT WITH THE BLADE FITTED.

- 2.2.3 Once the blade is in the 2 o'clock position, move the slotted disc so that the back face of the slot is vertical. Take care not to rotate the knife when this adjustment is being made.

- 2.2.4 Check that the disc runs through the central slot of the SRC1501 photocell without brushing against either face. If it does hit the photocell, damage might occur to the photocell.

- 2.2.5 Tighten the screw holding the disc onto the knife shaft. Check once again that the disc does not hit the photocell. If it does, re-adjust.

2.2.6 Re-setting SRB3211 overload protection

1. Remove cover of SRB3110
2. Locate SRB3211 Card
3. Move switch Mk1 to position 1 AND 2 (set mode)
Run machine and cycle using manual cut switch. At the same time turn potentiometer on SRB3211 card the adjacent red LED just flashes each time a cut is performed.
4. Back off potentiometer Counter Clockwise two full turns.
5. Move switch Mk1 to position 2 and 3 (run mode)
6. Replace cover

Filter Regulator

1. Drain excess liquid from bowl's of both regulator and filter assembly on a regular basis. If a lot of water is present remove bowl from unit and wipe clean with a cloth.
2. Ensure that the pressure setting is applied to the clutch; it will jam and go in to an overload continuum until pressure is reduced.
- 3.

Maintenance

POSITION GUIDE ONLY

NEUMA-TORQ/VAC-U-TORQ MECHANICAL PARTS
IDENTIFICATION
DIAGRAM NUMBER 009A

POSITION GUIDE ONLY!

Neuma-Torq/Vac-U-Torq
Fitting and setting up brake sensor
010

2.3 Clutch/brake maintenance

The NEUMA-TORQ/VAU-U-TORQ's clutch/brake has been designed to give a long operating life with minimum maintenance. As the clutch/brake self-adjusts, there is no regular

maintenance requirement, however, the clutch will eventually wear. This wear will probably become apparent due to a decline in clutch/brake accuracy. However, before you take any steps regarding the clutch/brake, check that you have not changed any other factor that might effect cut length accuracy:

- a) Have you changed the material you are cutting?
- b) Have you altered your method of feeding?

If you feel that the clutch is worn, please replace the friction ring set using the service kit listed in the spare parts list (section 3.4.4).

3. 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.

4. Planned maintenance schedule

Once per day	-	1.	Check knife blade condition
	-	2.	Check safety guard operation
	-	3.	Check emergency stop operation
Once per week	-	1.	Clean wet block if being used
Once per month	-	1.	Check drive belt tension
		2.	Check drive belt wear
		3.	Check air regulator setting 0.3 bar (Neuma-Torq)
		4.	Check vacuum pump gauge .7 bar (Vac-U-Torq)
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 blade head is square to cutter bush holder block.
		5.	Check that brake sensor disc is not rubbing worn.
As necessary	-	1.	Replace any blown lamp bulbs.

Maintenance

5. 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 (see diagram 003 page 20). As all switches are 'fail to safe' type switches, the guard lamp will not illuminate until all circuits have been checked as being safety.

When the safety circuit reset button is pressed the following actions take place:

- 5.1 Safety relay energised. This re-checks that all guards are closed.
- 5.2 The main contractors and relays are checked to ensure that they have returned to a de-energised condition since the machine was last used. As all contractors 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.

Maintenance

J PARTS LIST

1. Control Panel

Please refer to diagram no. 003 (page 20) for the location of the item numbers identified below:

Description	Qty	Part No.	Item No
Potentiometer (10K)	1	RS 173 417	7
Analogue dial	1	RS 509 428	7
Emergency stop button	1	XB2 BS542	3
Cut length counter	1	Signo 720 104	5
Total cuts counter	1	Signo 720 501	13
2 position switch	2	RS 198 501	1 & 14
Indicator lamp	2	RS 198 393	1 & 2
Push button	6	RS 198 365	4,6,8,9,10 & 12
Socket (DPDT)	2	RS 407 035	11 & 12
Socket (SPDT)	6	RS 198 400	4,6,8,9,10,& 14
Green lens	4	RS 198 472	2,6,9 & 12
White lens	2	RS 198 488	4
Red lens	2	RS 198 450	10
Green LED (pk of 3)	4	RS 407 013	2,6,9 & 12
White LED (PK of 3)	2	RS 407 029	1 & 4
Optional Items			
Batch counter	1	Signo 720 104	15
2 position switch	1	RS 198 501	15
Socket (SPDT)	1	RS 198 400	15
Buzzer	1	SMS 01	Not shown
Beacon (base)	1	XUA C211	Not shown
Beacon (red lens)	1	XUA C341	Not shown

Parts List

2. Rear electrical cabinet

Please refer to wiring diagrams no B-CUT, sheet 5 of 5 for schematic drawing of rear electrical cabinet

Description	Qty	Part No.
Clutch/brake controller	1	SRB 3101
Infeed motor DC drive	1	532 E2B
Transformer 230/240V 50HZ 100VA	1	RS 805 316
Safety relay	1	RS 316 399
24VDC Contactor	2	LPI K0910BD
Aux contact block	2	LA1 KN11
Overload 2.6-3.7	1	RS 758 967
DPCO relay 24 VDC 5A	2	RS 353 887
Relay base	2	RS 353 966

3. Mechanical items

Please refer to diagram no. 0010 (page 50) for the location of the item numbers below:

3.1 Cutter

Description	Qty	Part No.	Item No.
Cutter motor 0.37Kw	1	MT71 B14.2	2
Motor pulley	1	16L100	28
Drive belt (input)	1	270L100	01
C=Clutch (input) pulley	1	48L100	29
Clutch/brake	1	Rota0610	03
Clutch (output) alloy pulley	1	32L100	30
Driven belt (output)	1	187L100	06
Shaft pulley	1	20L100	31
Shaft bearing	2	SNP 20	07
Blade holder	1	D730110	08
Blade cap	1	D730130	08
Brake sensor	1	SRC 1501	04
Brake sensor disc	1	D730140	05
Cutter bushes	1pr	D704220-MS	21
Bush lock screw	2	MR40 PM6 x 40	16
Catch (clamshell) catch	1	01 589 MSZN	26
Catch (clamshell) base	1	10 589 MSZN	26
Catch (cabinet) catch	2	01 589 MSZN	27
Catch (cabinet) base	2	10 589 MSZN	10
Fan filter cover	1	RS 507 911	10

3.2 Infeeder

Description	Qty	Part No.	Item No.
Infeeder belts	1pr	320J12 HDB	13

Motor 0.2Kw	1	P3 345595	21
Gearbox	1	GI 376825	25
Bevel gears	2prs	323 02 DB	11
Handwheel	1	Vr125	15
Encoder	1	529016	19
Encoder coupling	1	1761026	19
Guide roller (vertical)	2	D322180	20
Guide roller (horizontal)	1		20
Horizontal drive shaft	2	D730261	Not shown
Horizontal tension shaft	2	D730270	Not shown
Vertical drive shaft	1	D730490	Not shown
Tension bearing	4	6202 2RS	Not shown
Front drive bearing	2	6002 2RS	Not shown
Rear drive bearing	2	62302 2RS	Not shown

3.3 Miscellaneous

Description	Qty	Part No.	Item No.
Carrying handle	4	M234/140	14
Filter/regulator	1	AW2000-01	18
Separator	1	AFD2000-01	18
Gauge	1	G36 10 01	18
Safety switch	3	FRS9	17

3.4 Optional items

Description	Qty	Part No.	Item No.
Tachogenerator	1	L4 395267	22
Nip pressure indicator	1	DA0304 2 002	23
Razor blade holder	1	D800080	Not shown
Chip blade holder	1	D800070	Not shown

4. Spare parts list - consumables

The parts identified below are normal consumable parts. Wear rates will depend upon machine usage and application.

Parts List

4.1 Knife blades

Standard blade designs are identified below. Custom blade shapes can be designed for particular products. Please consult the factory for details of these.

Description	Thickness	Part No.	Order Qty
	49	Neuma/Vac-U-Torq	Issue 01/97/NT/VT Cutting Systems March 1999

Razor blade	0.25mm	BLD.RZ	50
Chip blade (mild steel)	0.38mm	BLD.CHP MS	8
Chip blade (stainless steel)	0.38mm	BLD.CHP.SS	8
Standard blade	0.46mm	BLD.34N	1
Standard blade	0.6mm	BLD.36N	1
Standard blade	0.8mm	BLD.38N	1
Curved blade	0.46mm	BLD.36C	1

4.2 Cutter bushes

When ordering cutter bushes please supply details of the bore diameter size required. Profiled cutter bushes can be supplied. However, before a quotation can be prepared, details must be supplied showing profile shape.

Description	Part No.
Cutter bush mild steel – pair	D704220 MS
Cutter bush stainless – pair	D704220 SS

4.3 Clutch/brake unit

The clutch/brake unit used by the Neuma-Torq/Vac-U-Torq has a rated life of many millions of cuts. When it does wear a kit is available to replace the worn friction rings.

Description	Part No.
Friction disc replacement kit	ND080H0118

4.5 Lamp bulbs

Miniature LEDs are used to illuminate the lamps and push buttons. Two colours are available.

Description	Part No.
Green LEDs (pk of 3)	RS 407 013
White LEDs (pk of 3)	RS 407 029

Parts List

K Trouble shooting guide

Problem

Cannot start caterpillar or cutter motor

Solution

Check that all guards are closed, the guard lamp is on, and the safety circuit reset button is illuminated.

Guard lamp will not illuminate	Check that all guards are closed. Check that the emergency stop button has been reset.
Safety circuit reset button will not illuminate	Check that the guard lamp is illuminated.
Clutch initiate lamp will not illuminate	Check the clutch stop/run selector switch is set to position '1'. Check that the cutter motor is on.
Main motor will not start	Check that the motor contactors are engaged. If not, press the reset button on the contactor (refer to the attached wiring diagram for identification of components). If contactor still does not engage, check line fuses.
Counter will not accept new cut length	Check that the length requested does not exceed the maximum cut rate of the NEUMA-TORQ/VAU-U-TORQ (350 cuts/minute) at the Linespeed selected.

Trouble Shooting

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.

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Warranty