Denford Cyclone U

DENFORD
COMPUTERISED MACHINES AND SYSTEMS

Operating Guide for the Cyclone TU-15Ø U Series of CNC Lathes

- Installation
- Specific Features
- Routine Maintenance

This manual applies only to the machine having the serial number shown below.

Please note that this number will be required should Denford Limited be contacted regarding this machine.

Machine Serial Number : _____

Year of Manufacture : _____

CE

Manufactured by
Denford Limited,
Birds Royd, Brighouse, West Yorkshire, HD6 1NB, England.
Telephone: +44 (Ø)1484 712264.
Fax: +44 (Ø)1484 72216Ø.
Email: service@denford.co.uk

NOTES.

CONTENTS.

INTRODUCTION.

This guide describes the correct procedures for transporting and installing your Denford Cyclone TU-15Ø U CNC lathe.

These procedures should be followed precisely to ensure your Cyclone TU-15Ø U is not damaged in any way during the installation period.

During the installation period, the protective coats and coverings applied prior to despatch should not be removed.

All installation work should be carried out by Denford or Denford approved personnel.

General operating functions are explained in the separate Generic Turning Manual delivered with your machine.

A Routine Maintenance section is also included. Please note, the Electrical Diagrams for your machine are held in a folder fixed inside the electrical control box.

IF YOU HAVE ANY DOUBTS AND/OR QUESTIONS REGARDING THE SPECIFICATION, SERVICING OR FEATURES OF YOUR MACHINE, PLEASE CONTACT CUSTOMER SERVICES AT DENFORD.

WARNING.

The Warranty on this machine will be invalidated if any modifications, additional ancillary equipment is fitted, or any adjustments made to the controlling devices without prior notification from Denford Limited.

Do not carry out any portable appliance testing (PAT) on any of the supplied equipment.

EC Declaration of Conformity.

The responsible person :	Mr N J H Crowther
Business Name :	Denford Limited.
Address :	Birds Royd, Brighouse, West Yorkshire, HD6 1NB, England.
Declares that the machinery described :	
Manufacturer :	Denford Limited.
Model Name :	Cyclone TU-15Ø U
Serial Number :	_____
conforms to the following directives :	EC Machinery directive 89/392/EEC as amended by directive 91/368 EEC and directive 93/44/EEC, CE marking directive 93/68/EEC and low voltage directive 73/23/EEC
and the following standards :	BS EN 6Ø2Ø4 - 1 : 1993
	_____
and complies with the relevant health and safety requirements.	
Signature :	_____
Position within company :	Director / General Manager
Signed at :	Denford Limited, Birds Royd, Brighouse, West Yorkshire, HD6 1NB, England.

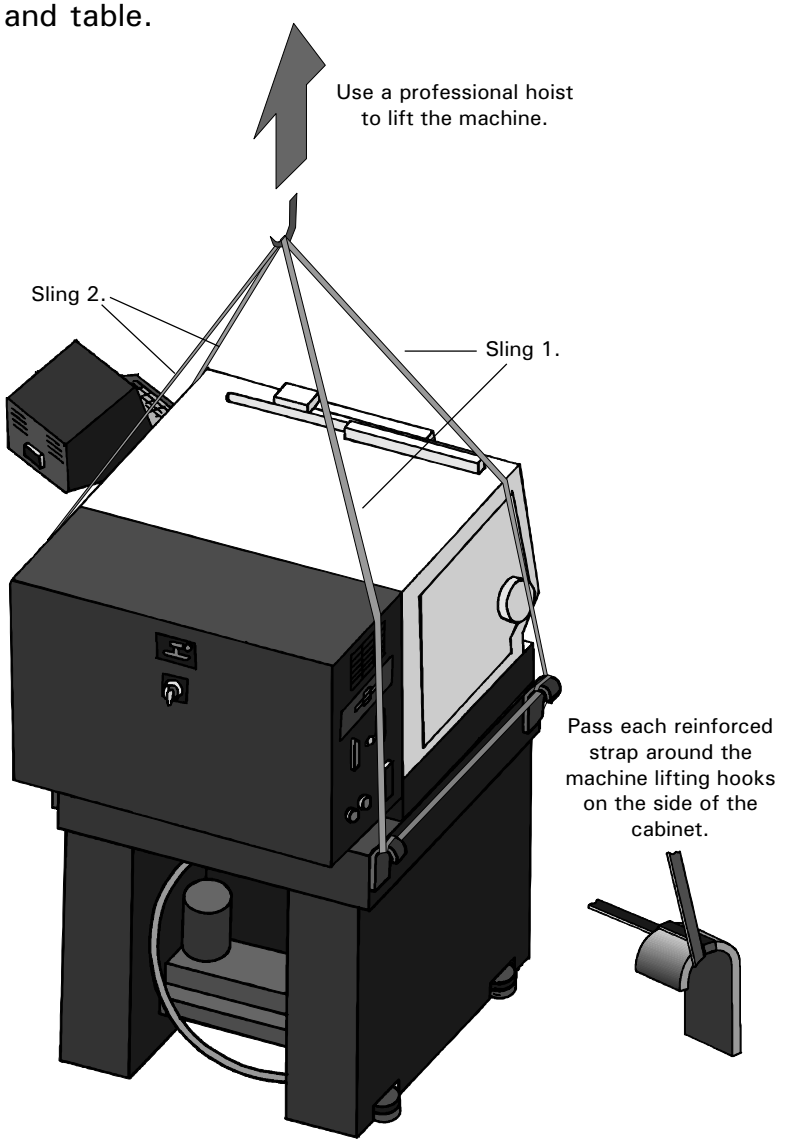
Unpacking & Lifting the Machine.

Remove any main packaging from around the machine and table.

Lift the machine using the four lifting hooks and two equal length slings (one sling per side), arranged as shown in the diagram below. Each lifting hook should be wrapped around at least once by the sling.

NOTE - The Cyclone TU-159 U is back heavy - Ensure that the machine is secure and balanced before lifting. Always use sensible lifting precautions in accordance with Health and Safety Regulations in your establishment.

The coolant pipe and the pump cable must be disconnected before attempting to lift the machine and table.



Machine dimensions:

Machine Length ..... 1145mm (45")

Machine Width ..... 11ØØmm (43.5")

Machine Height ..... 155Ømm (61")

Machine Weight (net) ..... 75Ø Kilos (1653.5 lbs)

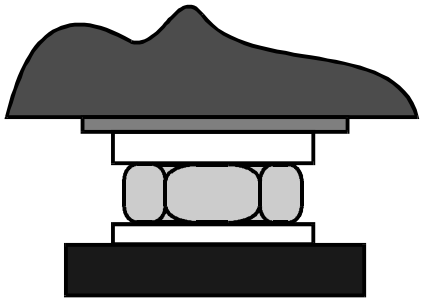
Levelling & Positioning the Machine.

Remember when positioning the machine in the room, sufficient space should be provided for effective maintenance to be carried out at both the front and back of the machine.

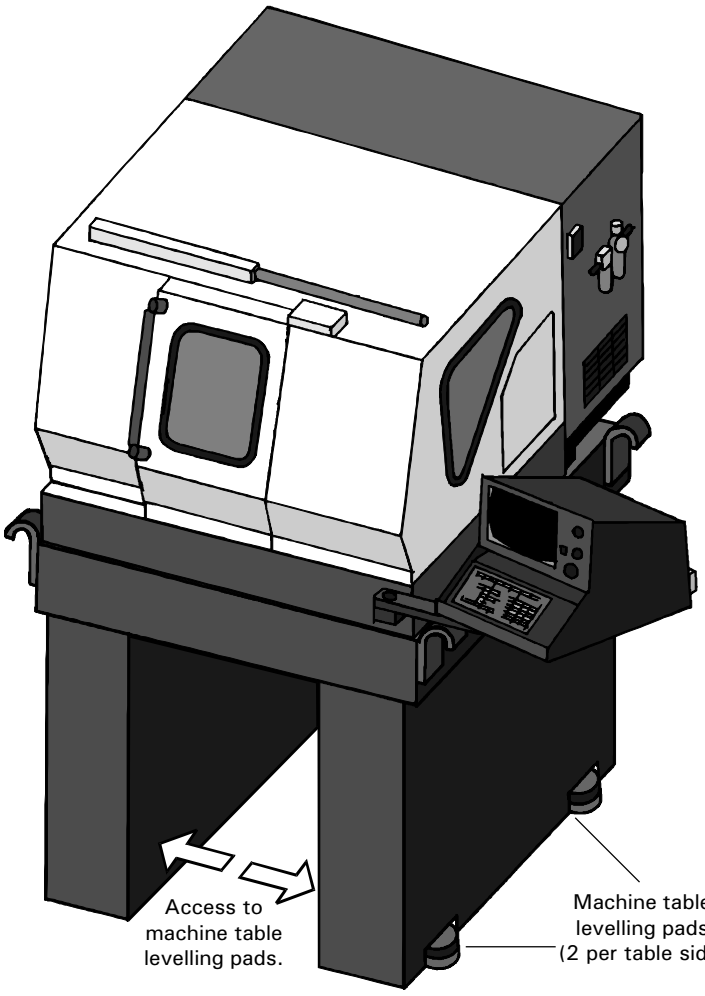
Machine extent dimensions:
From back of machine leave gap ... 6ØØ+mm (24")

The lathe machine bed is levelled to the cabinet during manufacture, so it is only necessary to level the cabinet during installation. Four adjusting machine levelling pads are located at each base corner of the machine table uprights (see diagram below).

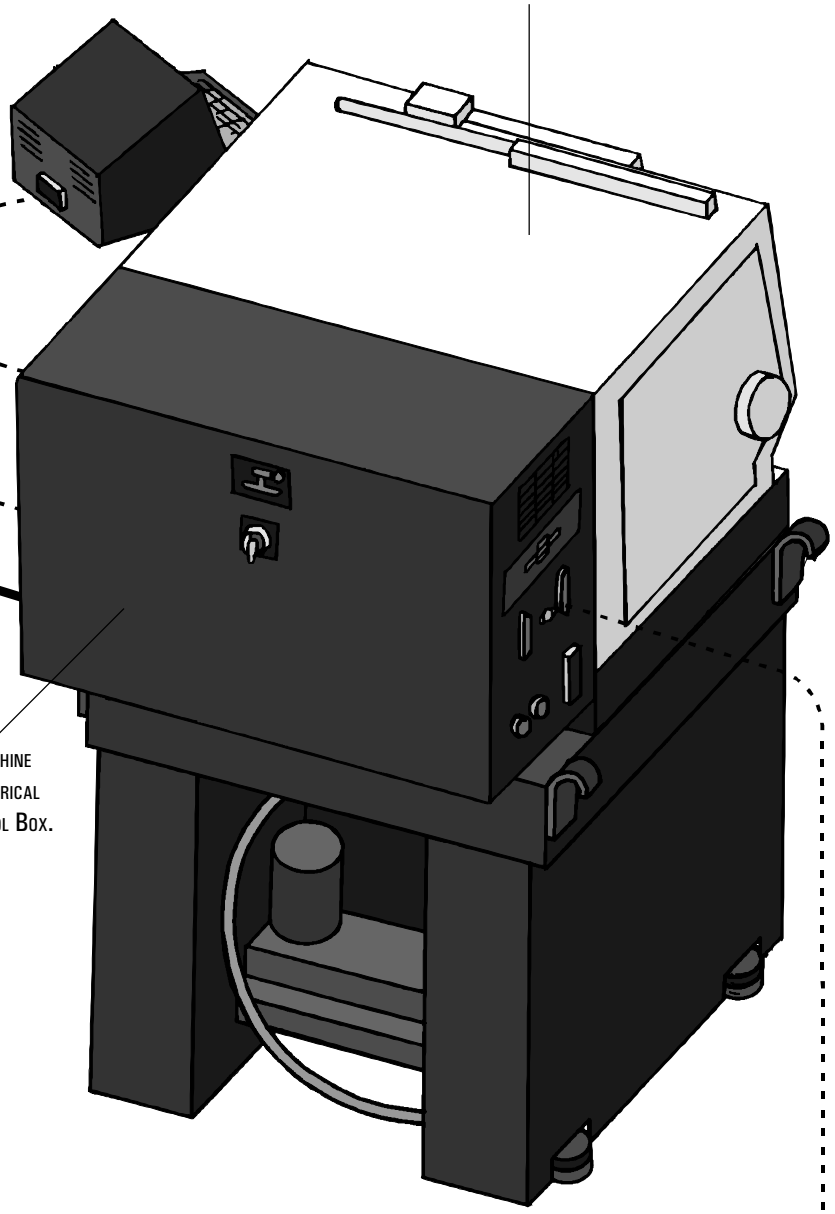
To increase the table height, turn the adjusting nut anticlockwise (when the adjusting nut is viewed from above).



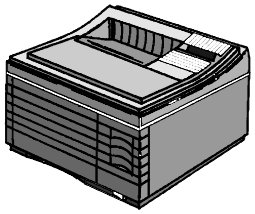
To increase the table height, turn the adjusting nut anti-clockwise (when the adjusting nut is viewed from above).



Component Connection Schematic Diagram.



Ancillary Equipment, such as this serial printer, connects to the Port labelled "RS 232".



This side of the electrical control box contains the following fittings:
- Air Intake Connectons.
- Fan Intake.
- Mains Input (3 Phase).
- Monitor & Keypad Connector.
- Slide Lubrication System.

This side of the electrical control box contains the following fittings:
- Fan Exhaust.
- Floppy (3 1/4") Disk Drive.
- RS 232 Connector.
- Keyboard Connector.
- Printer Connector.
- Auxilliary Connector.
- Footswitch Connector.
- Hydraulic Plug Connector.

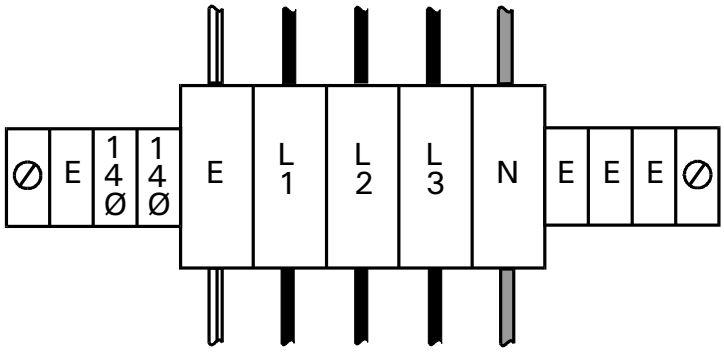
Electrical Connection.

The electrical power supply is fed to the electrical control box, fitted to the back of the machine cabinet, which in turn is connected to the lathe.

Connection procedure:

1) Unlock and open the the electrical control box at the back of the machine (breaking the delivery seal).
2) The Mains Input is found at the tailstock end of the electrical control cabinet at its base.
3) Put crimp connectors on the mains, neutral and earth wires.
4) Connect the mains wires into the top of the contact block, as shown in the diagram below.

Tool required:
Phillips head screwdriver and crimping pliers.



The supply is 38Ø/415 Volts 3 Phase 5Ø/6Ø Hz.
Cable required:- 4 Core (3 Phase Neutral & Earth) 2.5mm per phase.
Current Taken 12 Amps.

ALL ELECTRICAL WORK SHOULD BE CARRIED OUT BY A SUITABLY QUALIFIED ELECTRICAL ENGINEER.

FOR EXPORT MARKET -
CONTACT DENFORD SERVICE DEPARTMENT.

At this stage, it is required to check that the phases on the mains power are connected correctly. The simplest method to check the phases is to switch on the coolant by pressing the [COOLANT ON] button, then the [COOLANT OFF] button.

Go to the rear of the machine and remove the rubber grommet from the top of the coolant pump. If the pump spindle is rotating in a clockwise direction then the phases are wired correctly. If the spindle is rotating in an anticlockwise direction, the phases must be switched over.

Electrical Control Box Seal.

The Electrical Diagrams (and specification sheets when required) for your machine are held in a folder fixed inside the electrical control box.

Warning! Do not connect cables between any electrical hardware with the mains power switched on, since this could damage the hardware.

The electrical control box (at the rear of the machine is inspected then sealed with a yellow seal; if this seal is broken when the machine is delivered, inform the suppliers immediately. The seal should only be broken for the initial mains power connection.

Switching the Machine On/Off.

Switching the machine 'on'.

Insert the CYCLONE TU-15Ø U control software disk into the floppy disk drive, located on the headstock end of the electrical control box.
Switch on the mains power to the machine (and compressors, if required). Power up the machine by turning the yellow rotary isolator switch on the electrical control box door to the 'on' position.

The control software and all necessary drivers will automatically load.

Switching the machine 'off'.

Press [F1Ø], highlight "QUIT" and press [EOB] on the control keypad. The software will prompt you to save any previously unsaved files before closing.

Power down the machine by turning the yellow rotary isolator switch on the electrical control box door to the 'off' position.

The machine must not be turned off if a turning program is running, or the machine is cutting work....

Before starting daily operation, run the machine a few minutes at 5ØØ rpm, to warm up.

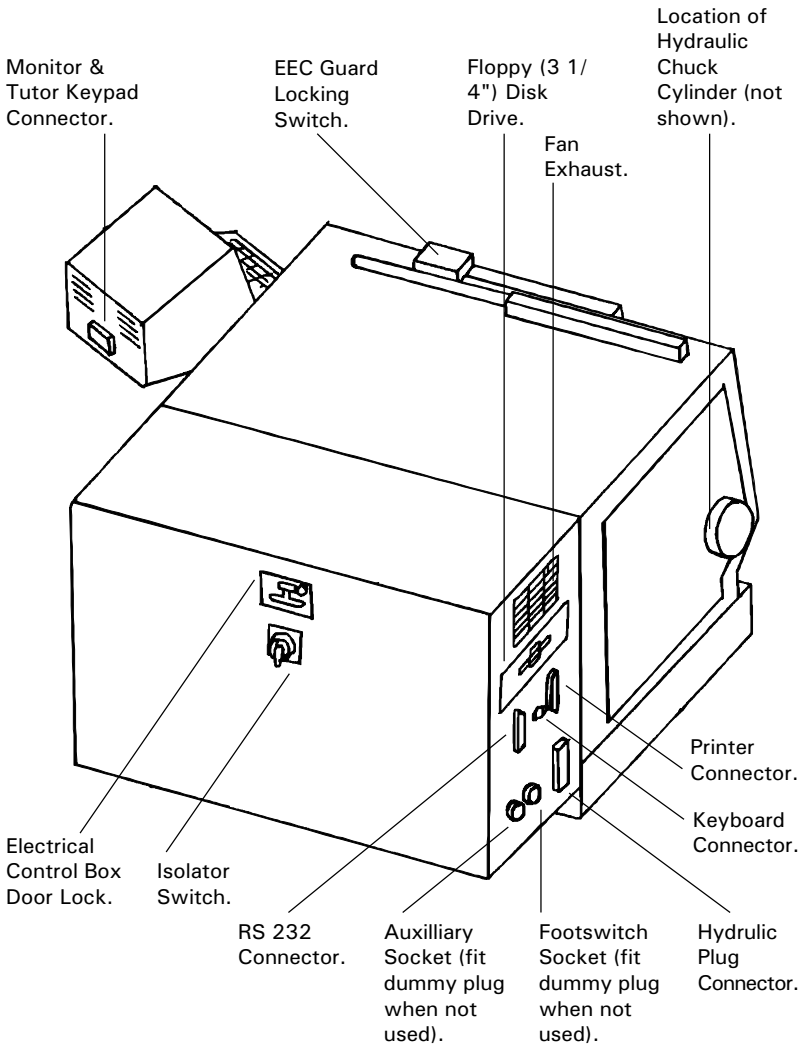
Removal of Protective Coatings.

Once the machine has been sited and connected electrically, the protective coatings must be removed to prepare the machine for running.

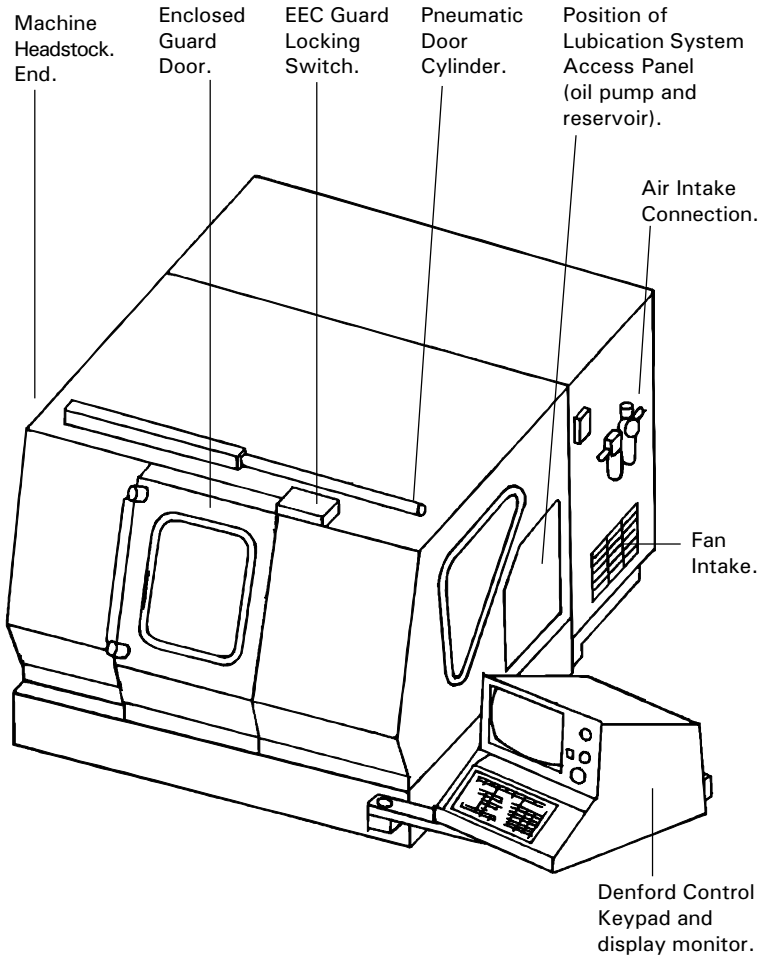
The protective coatings applied to the slideways and bright surfaces can be removed using a kerosene based solvent. The coatings must be removed from the slideways before any attempt to move them is made. Once these protective coatings have been removed, all untreated surfaces should be coated with a light covering of machine oil (eg BP: CS 68).

The protective plastic sheeting on the guard windows should be removed and the glass and perspex cleaned with an anti-static cleaner.

Cyclone TU-15Ø U - General Layout - Back View.



Cyclone TU-15Ø U - General Layout - Front View.



Safety Devices.

The Cyclone TU-15Ø U is equipped with the following safety devices:

Description.	*Location.*
Interlock front door.	Front of machine.
Chuck interlock.	Headstock housing.
Motor overload.	Electrical cabinet.
Emergency Stop Switch.	Operation Panel.
Isolator.	Electrical cabinet.

General Safety Precautions.

General Safety Precautions :

- Wear clothing suitable for operating the machine and follow the safe working procedures in place at your establishment.
- Do not place any objects so that they interfere with the guards or the operation of the machine.
- Never try to clean the machine if any part of it is rotating, or in motion.
- Ensure that the correct cable for the power source is used.
- If power fails turn off the yellow isolator (found on the electrical control box) immediately.
- Ensure the power is switched off before starting any maintenance work on the machine or opening/ working on the electrical control box.
- Check the state of the slideway lubrication daily, to prevent the axes from becoming jammed.
- Always secure the workpiece firmly in the chuck, especially when machining a heavy workpiece at high speeds with the manual chuck. (Note - The chuck clamping force will be reduced due to centrifugal force).
- When indexing (moving) the turret head (tool), ensure that it is well clear of the chuck, workpiece and tailstock before beginning the operation.
- After setting the tools, perform a trial cut by manual operation.
- Further operational safety precautions are outlined in the separate Generic Turning Manual delivered with your machine.

Note - Training courses are available on request.

Emergency Stop Button.

Key operated Emergency Stop button.

The red emergency stop button is fitted to a panel situated to the right of the monitor. When depressed it has the effect of stopping all axis and spindle movement. To reset, push the button in and turn clockwise (a key may be required). After pressing the emergency stop button, home both machines axes.

Machine Axis Limit Switches.

Machine Axis Limit Switches.

Limit switches are fitted to both machine axes to prevent overtravel.

An axis limit switch override button is fitted on the control panel to the right of the machine monitor. It should be used when the toolpost has overtravelled and activated the limit switch. To reset, depress the button and simultaneously press the appropriate axis key to move the toolpost away from the limit switch and back onto its regular section of slideway, then home each axis individually.

Pneumatic Guard Door Operation.

Pneumatic Guard Door Operation.

The opening and closing of the machine guard door is controlled using the following M codes:

To open guard, program code M38.
To close guard, program code M39.

The system defaults to guard close (M39). Pressing the Emergency Stop button has no effect on the operation of the guard. When the pneumatic power is off or disconnected, the guard can be operated manually (unless an EEC locking switch is fitted).

Note - on machines fitted with an EEC guard locking switch, the EEC guard locking switch will not allow the door to be opened if the power is not switched on.

Air Pipe Connection.

Air Pipe Connection.

The pneumatic chuck and pneumatic machine door, require an air compressor fitted with a SCHRADER quick release connector.

The connection fitted onto the machine air filter regulator is SCHRADER part number SC 8Ø51-11 1/8 BSP MALE (or Denford part number BI Ø1451S).

The female connector required on the 1/4" pipe leading to the air compressor is SCHRADER part number 9793C-12 1/4" BSP FEMALE (or Denford part number BI Ø1128S).

Datuming of Machine Axes.

Datum (home) the machine axes as follows:

1) Press the [HOME] button on the control keypad.
2) Press the [+X] key on the control keypad and wait for the cross slide to come to rest.
3) Press the [+Z] key on the control keypad and wait for the saddle to come to rest.
4) Press the [JOG] key on the control keypad. Ensure that the X and Z values read ZERO.
5) Pressing the [+X], [-X]. [+Z] and [-Z] keys and the [TRVRS] key simultaneously will move the slides at a rapid traverse speed.

   Note - If the X and Z values on the machine position are NOT zero, ring DENFORD'S SERVICE DEPARTMENT advice.

Run In Procedures.

Before working on the Cyclone TU-15Ø U for the first time, it is important that the spindle is "run in" for a set period:

Speed.	Time.
5ØØ rpm	15 min
1ØØØ rpm	1Ø min
2ØØØ rpm	1Ø min
3ØØØ rpm	1Ø min

Use the following procedure to "run in " the spindle:

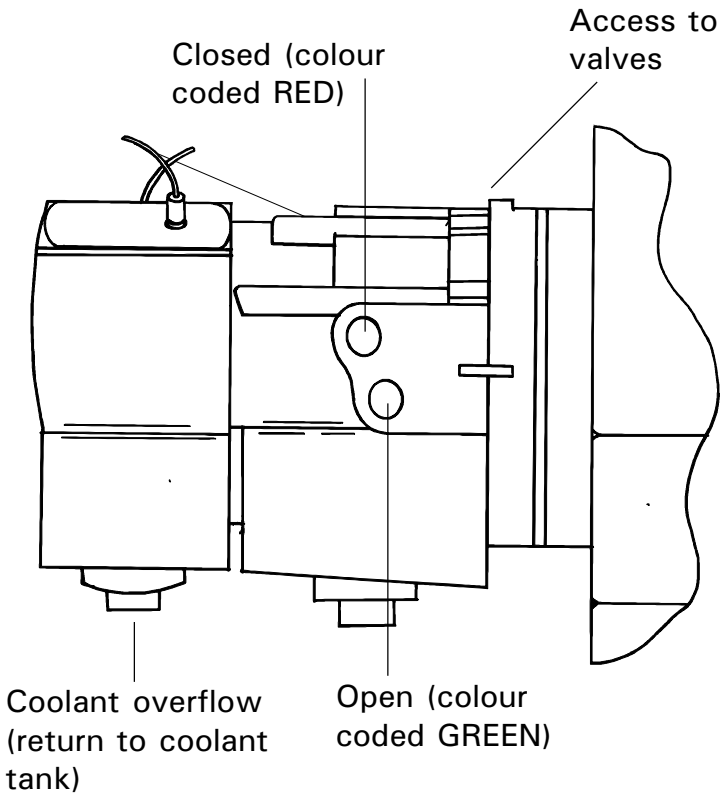
1) Datum the machine as described in the previous section.
2) Press the [EOB] key.
3) Press S5ØØ [EOB] (A speed of 5ØØ rpm has now been entered).
4) Press [SPNDL CW] on the control keypad (the spindle will now run at 5ØØ rpm clockwise).
5) After 15 minutes, change the spindle speed to 1ØØØ rpm, by pressing S1ØØØ [EOB].
6) After 1Ø minutes, change the spindle speed to 2ØØØ rpm, by pressing S2ØØØ [EOB].
7) After 1Ø minutes, change the spindle speed to 3ØØØ rpm, by pressing S3ØØØ [EOB].
8) After a further 1Ø minutes, stop the spindle by pressing [SPIDLE STOP] on the control keypad.

Note - When the guard is open, the spindle speed is restricted to 5Ø rpm, for setting purposes.

Connection Diagram for Air Chuck (Hydraulic) Cylinder.

The air chuck cylinder is mounted on the outside of the headstock end panel of the machine cabinet.

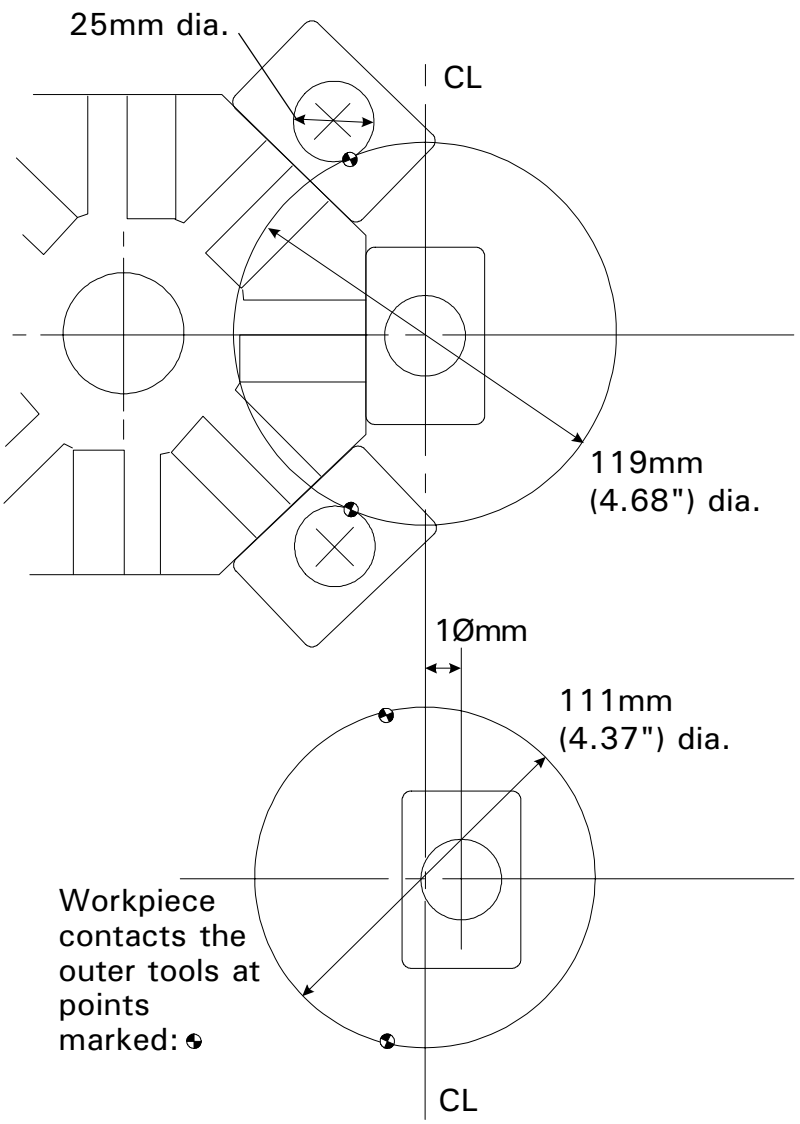
Connect the tank and compressor to the air chuck cylinder as shown in the diagram below.



Only workholding equipment approved by Denford Ltd should be used on the machine.

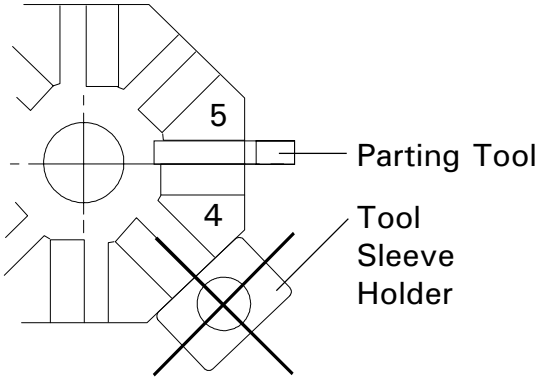
Only high speed chucks should be used and they must comply with BS 1983 and DIN 635Ø.

Turret Swing Extent.

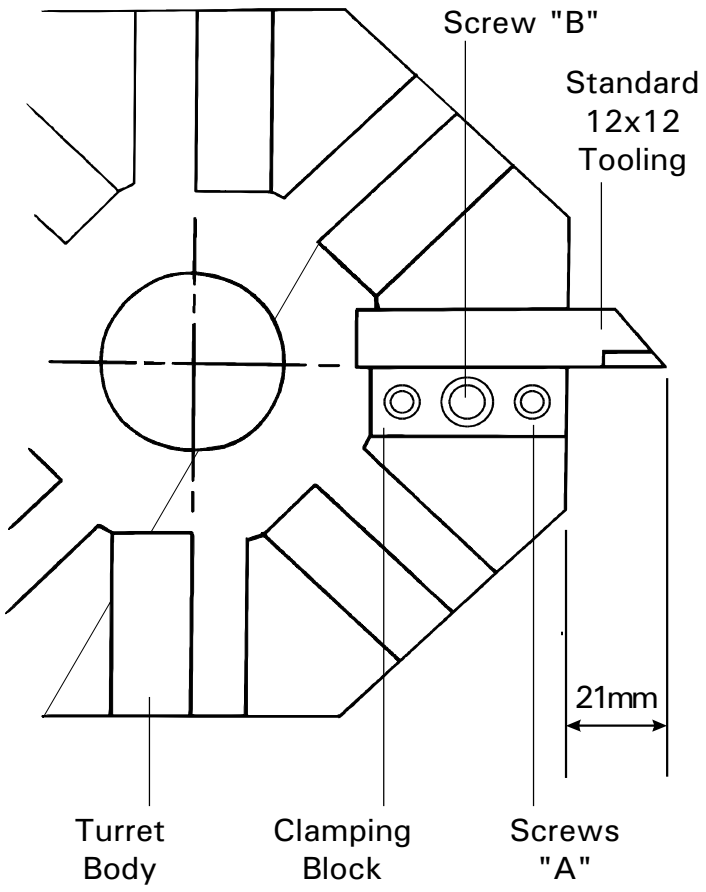


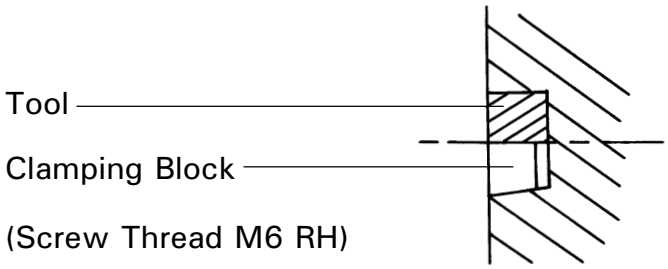
IF A PARTS CATCHER IS FITTED TO THE MACHINE THEN A TOOL SLEEVE HOLDER MUST NOT BE FITTED IN THE STATION PRIOR TO THE PARTING OFF TOOL.

i.e. If the parting off tool is fitted in station 5 then an axial toolholder must not be fitted in station 4. During the turning operation the Parts Catcher should be in the RETRACTED POSITION. In the programming block prior to parting off, the parts catcher should be activated.



Turret Tool Clamping.





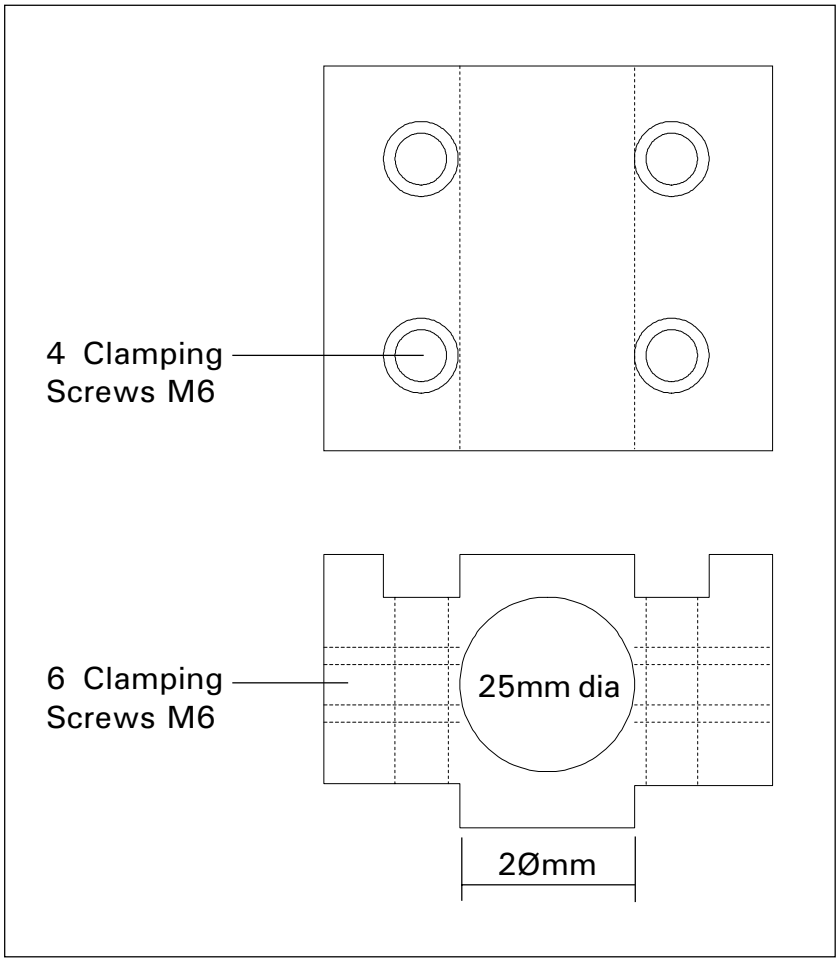
Tool Mounting Procedure:

1) Before mounting tool ensure screw 'B' is tightened down fully - see diagram on previous page.
2) Tighten clamping block on turret head using screws "A". At this point tighten screws only 3 or 4 turns.
3) Place cutting tool between clamp and turret with approximately 21mm protruding from turret.
4) Ensure tool and clamping block are square with turret head before evenly tightening screws"A".

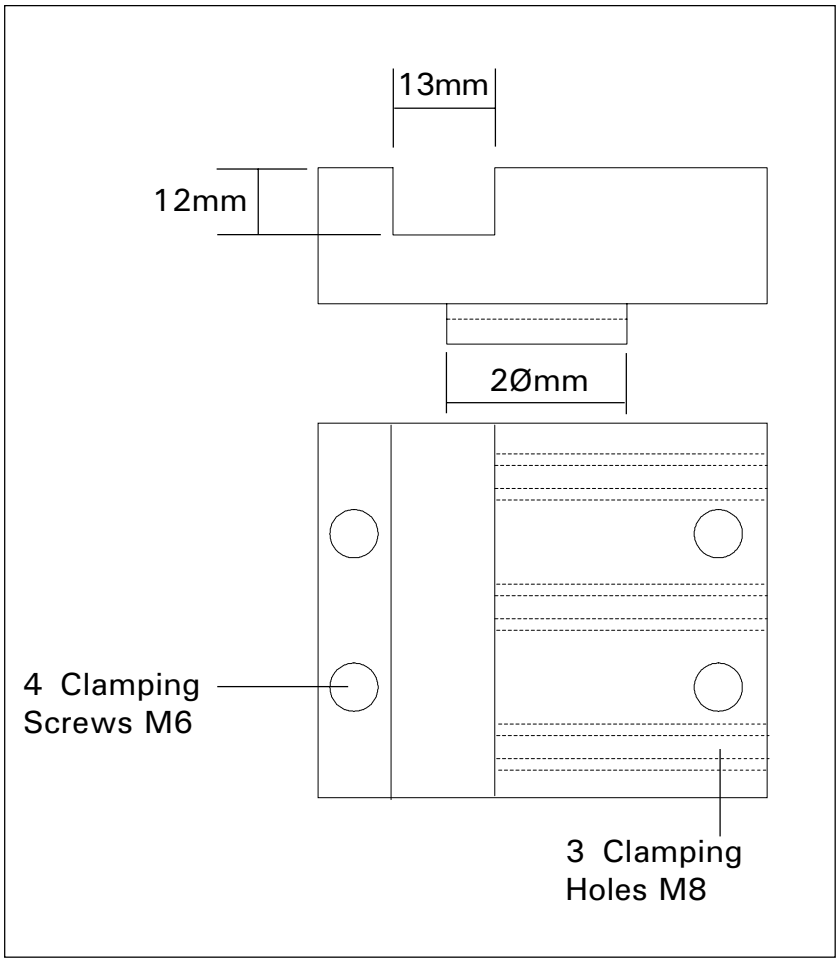
To remove cutting tool:

1) Sufficiently loosen screws "A".
2) Unscrew "B" to eject Clamping Block.
3) Remove cutting tool.

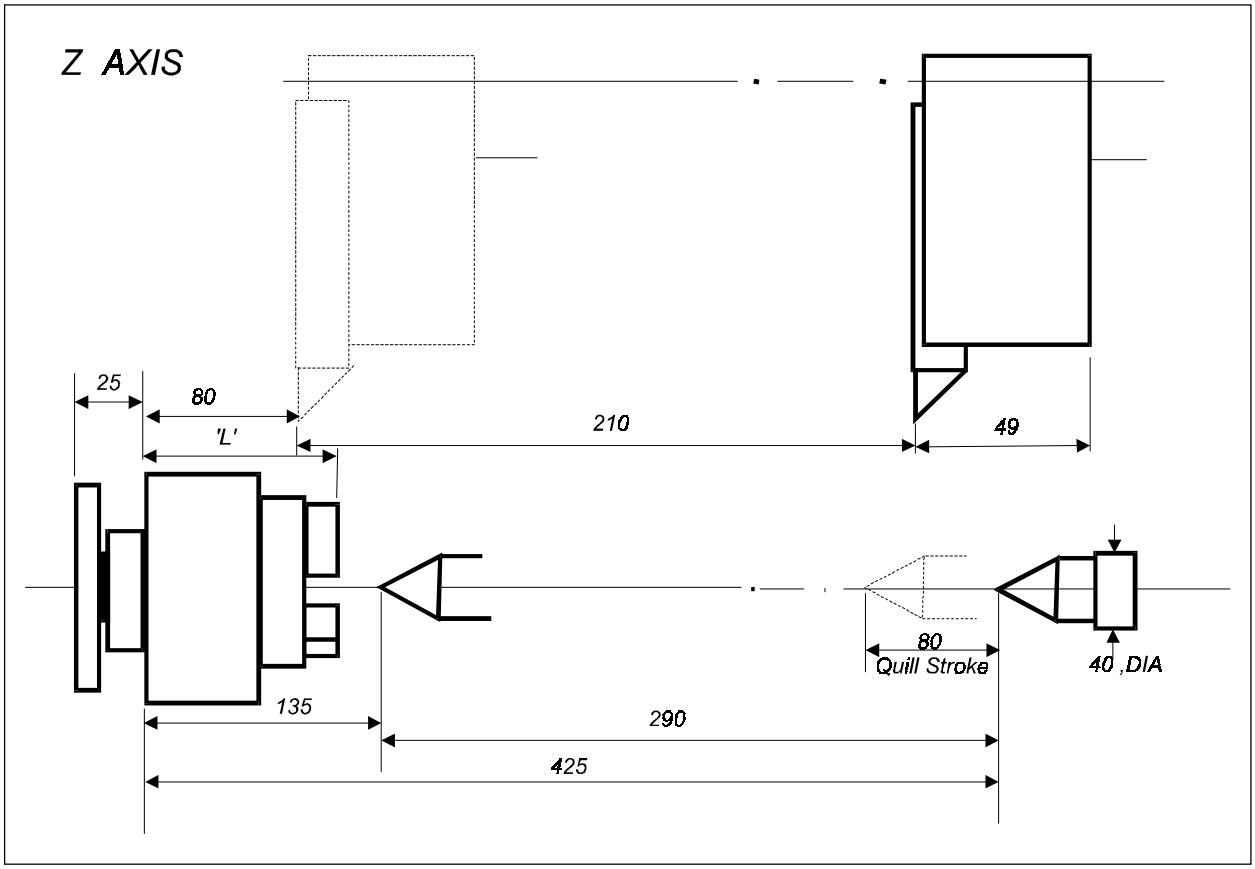
Turret Tool Sleeve Holder (AC2 / 811A).

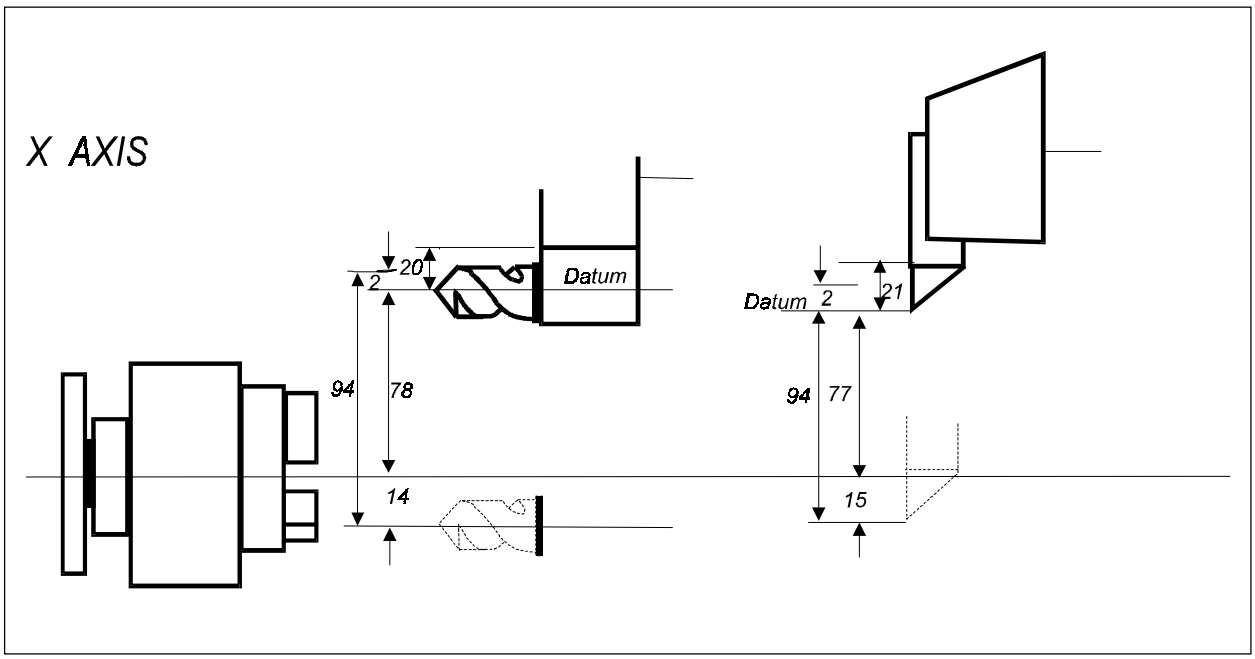


Axial Tool Holder (AC2 / 819A).

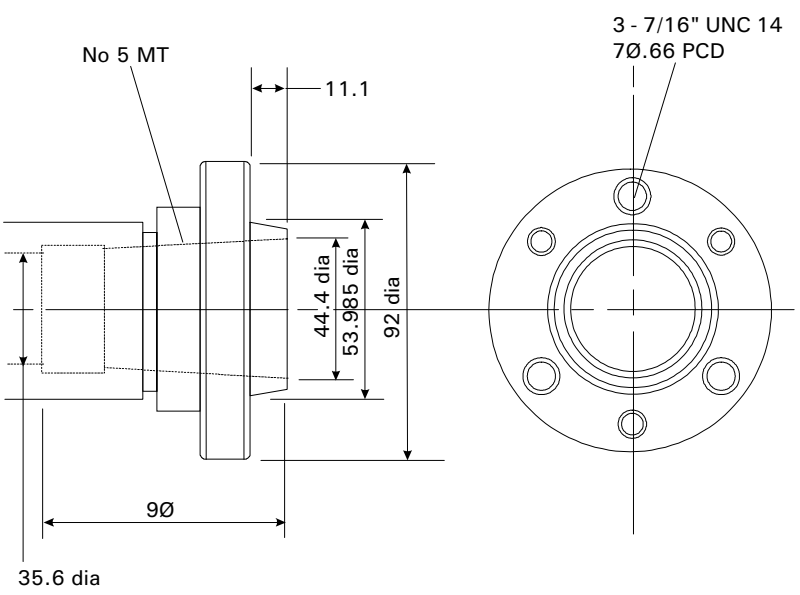


Cyclone TU-150 U
Capacity Diagrams.





Spindle Nose.



A2-3 (35mm) bore USAS B5-9

Installation & Maintainance Instructions for 5-C & 16-C Dead Length Pick Off Chucks.

Description.

This chuck operates in conjunction with standard 5-C or 16-C collets. Unlike conventional drawback chucks in which the chuck body is static and the collet moves axially rearward to clamp, these chucks permit static fixing of the collet relative to the chuck body. The collet closing sleeve is pushed forward to engage the collets closing taper via bridging bolts and spacers driven by the threaded rear actuating plate. This gives several advantages:

1) In second operation work, shouldered components can be stopped against the collet face.
2) Both collet types are internally threaded in the rear end to house either a backstop or ejector if required.
3) Drawback spring collets achieve the highest possible concentric accuracy, however, they cannot be used in the conventional mode for second operations where a tight control on component lengths is required.
4) The axial movement of drawbar collets in conventional chucks imposes undue loads on machine ballscrews when used in pick-off applications. These problems are overcome by the new design.
5) When used for picking-off, extremely short components may be gripped.

Installation & Maintainance Instructions for 5-C & 16-C Dead Length Pick Off Chucks.

Collet Chuck Removal.

CAUTION - Read thoroughly prior to removal.

1) Turn off the air pressure and remove any collet from the collet chuck
2) Remove the three 7/16" UNC screws from the collet chuck body.
3) Insert tube holding /driver and turn CCW , this will remove the chuck body and the draw tube together out of the air cylinder, they can then be removed from the machine.
4) Remove the three 7/16 UNC screws from the A2/3 - A2/5 adaptor, this can then be removed from the spindle nose. Once the spindle nose has been revealed and cleaned an alternative holding device may be fitted.

Loading Collets to the Dead Legth Pick Off Chuck.

With the chuck sleeve fully advanced, slacken the collet key actuating screw approximately one full turn. Mark the collet face with an ink marker in line with the keyway position.

Screw the collet fully into the chuck with the insertion tool provided and then back off only sufficiently to advance and tighten the collet key.

CAUTON - The maximum drawbar force and maximum speed indicated on the chuck must not be exceeded.

Maintenance.

Remove the collet, clean and replace occasionally during long production runs.

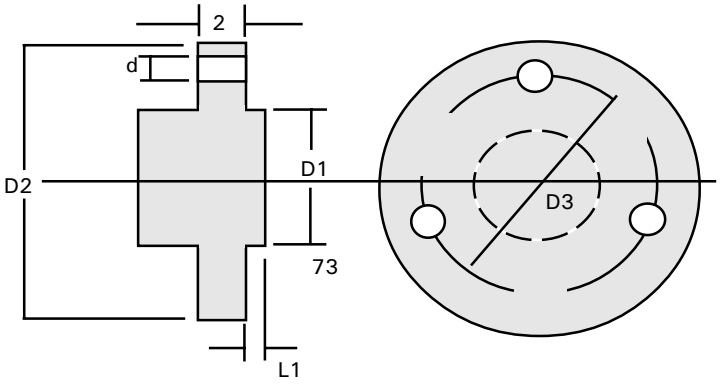
Lubricate sparingly every 5Ø (fifty) operating hours with MOLYCOTE TR42 or LITHIUM GREASE.

For further information contact Crawford Collets Ltd.

Manual Chuck Information.

Units mm

Type				Internal Jaw Run Out		External Jaw Run Out			Face &	Gripping Force		Max. Unbalance
SC (OD)		SK (OD)		Dia. of Test Round Bar	Accuracy	Test Disc		Accuracy	Peripheral Run Out	Pinion Torque	Gripping Force of 3	at Peripheral Dia.
inch	mm	inch	mm			OD	Width			kg.m	Jaws. Kg	g
3	(85)			8, 1Ø, 15	A	6Ø	2Ø	B	D	3	9ØØ	
4	(11Ø)			8, 1Ø, 2Ø		8Ø	2Ø			4.5	12ØØ	11
5	(13Ø)			1Ø, 15, 25		1ØØ	2Ø			6.5	15ØØ	
6	(165)	6	(165)	1Ø,2Ø,3Ø		125	3Ø			9.Ø	21ØØ	
7	(19Ø)	7	(19Ø)	1Ø,2Ø,3Ø		145	3Ø			11.Ø	24ØØ	21
9	(232)	9	(232)	2Ø,3Ø,5Ø		17Ø	3Ø			15.Ø	3ØØØ	
1Ø	(273)	1Ø	(273)	2Ø, 4Ø, 5Ø		2Ø5	4Ø			18.Ø	36ØØ	
12	(31Ø)	12	(31Ø)	3Ø, 5Ø, 7Ø		235	4Ø			21.Ø	39ØØ	42



KEY.

A - When the round test bar is clamped by the master pinion (arrow marked), the accuracy should be within the Ø.3Ømm T.I.R. at each position of 1ØØmm from the root (5Ømm in the case of the test bar being 8 dia. or 1Ø dia.). In the case that it is clamped by the other pinions, the accuracy should be Ø.Ø5Ømm T.I.R.

B - Peripheral run out of test disc within Ø.Ø5Ømm. Face run out of test disc within Ø.Ø2Ømm.

C - Peripheral run out of test disc within Ø.Ø5Ømm. Face run out of test disc within Ø.Ø3Ømm.

D - Peripheral run out of test disc within Ø.Ø2Ømm. Face run out of test disc within Ø.Ø2Ømm.

Units mm

Type		D1		D2		D3	L1	L2	Mounting Bolt		Max. Dia. gripped by external jaw				Allow
SC	SK	Pilot	Tolerance	PCD	Tolerance				d	Thread	SC		SK		Max. RPM
											inch	mm	inch	mm	
3		6Ø	+Ø.Ø21/+Ø.ØØ2		+/-Ø.2	88	3	1Ø	6.6	3-M6	2.75	7Ø			3ØØØ
4		8Ø	+Ø.Ø21/+Ø.ØØ2	95	+/-Ø.2	115	4	12	9.Ø	3-M8	3.75	95			25ØØ
5		1ØØ	+Ø.Ø25/+Ø.ØØ3	115	+/-Ø.2	135	4	12	9.Ø	3-M8	4.33	11Ø			25ØØ
6	6	13Ø	+Ø.Ø28/+Ø.ØØ3	147	+/-Ø.2	17Ø	4.5	15	11.Ø	3-M1Ø	5.7Ø	145	5.9Ø	15Ø	2ØØØ
7	7	155	+Ø.Ø28/+Ø.ØØ3	172	+/-Ø.2	172	4.5	18	11.Ø	3-M1Ø	6.5	165	6.89	175	2ØØØ
9	9	19Ø	+Ø.Ø33/+Ø.ØØ4	21Ø	+/-Ø.2	235	5.5	2Ø	13.Ø	3-M12	7.87	2ØØ	8.67	22Ø	2ØØØ
1Ø	1Ø	23Ø	+Ø.Ø33/+Ø.ØØ4	25Ø	+/-Ø.2	275	5.5	2Ø	13.Ø	3-M12	9.45	24Ø	9.66	245	18ØØ
12	12	26Ø	+Ø.Ø36/+Ø.ØØ4	283	+/-Ø.3	31Ø	6.5	22	13.Ø	3-M12	1Ø.83	275	11.22	285	18ØØ
14		3ØØ	+Ø.Ø36/+Ø.ØØ4	328	+/-Ø.3	355	6.5	26	13.Ø	6-M12	12.41	315			15ØØ

SC = Type with solid hard jaw, with plain back. SK = Type with 2 piece hard jaw, with plain back.

Chuck Mounting and Removal.

ENSURE THAT THE MACHINE IS ISOLATED BEFORE ENTERING THE WORKING AREA.

Mounting a Manual Chuck.

The backplate should be an A2-3 type with a front fitting to match the chuck. Thoroughly clean the spindle nose, chuck mounting register and the backplate before assembly.

The backplate is mounted to the spindle and secured by three 7/16" UNC cap head screws (5/16" Allen Key) through the front of the chuck.

Removal of a Manual Chuck.

Clean all swarf from the work area.

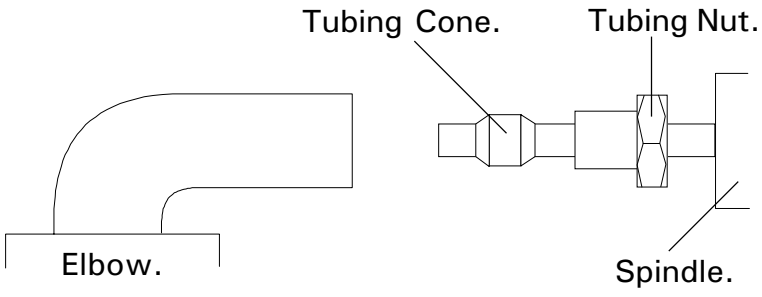
Remove the three cap head screws from the front of the chuck. Take care to hold the chuck securely whilst removing the screws. Remove the chuck from the backplate. Unscrew the three 7/16 UNC cap head screws from the backplate and remove the backplate.

Thoroughly clean and dry all parts.

Mounting a Pneumatic Chuck.

Ensure that the backplate is an A 2-3 type with a front fitting to suit the chuck.

Thoroughly clean the spindle nose, chuck mounting register and backplate before assembly.



Chuck Mounting and Removal.

The backplate is mounted to the spindle and secured by three 7/16 UNC cap head screws.

Before mounting the chuck to the backplate, ensure that the air pipe supplied is fitted to the rear of the chuck. This pipe is passed down the spindle as the chuck is mounted.

The chuck is secured by six cap head screws. Screw in through the front of the chuck.

To fit the air pipe, first remove the headstock end cover, found at the lefthand side of the machine. This is secured by eight button head screws.

Once removed, the pipe will be seen at the end of the spindle.

Remove the tubing nut from the elbow and also remove the tubing cone from within the elbow. Slide the tubing nut onto the pipe followed by the tubing cone, as shown in the diagram. Screw this assembly into the elbow. Do not overtighten this assembly.

Replace the headstock end cover.

Removal of a Pneumatic Chuck.

Clean all swarf from the working area.

Remove the headstock end cover, found at the lefthand side of the machine. This is secured by eight button head screws. Unscrew the tubing nut and pull the tube out of the elbow.

Remove the tubing cone and nut from the pipe and replace them in the elbow.

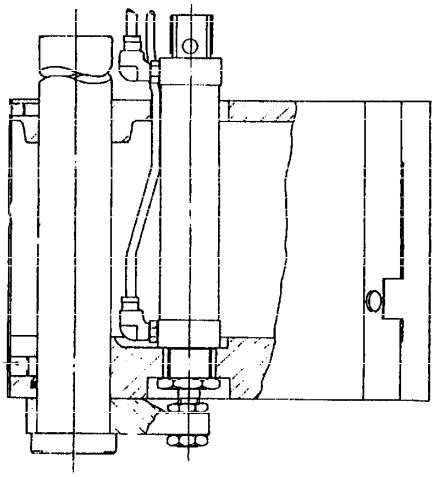
Replace the headstock end cover.

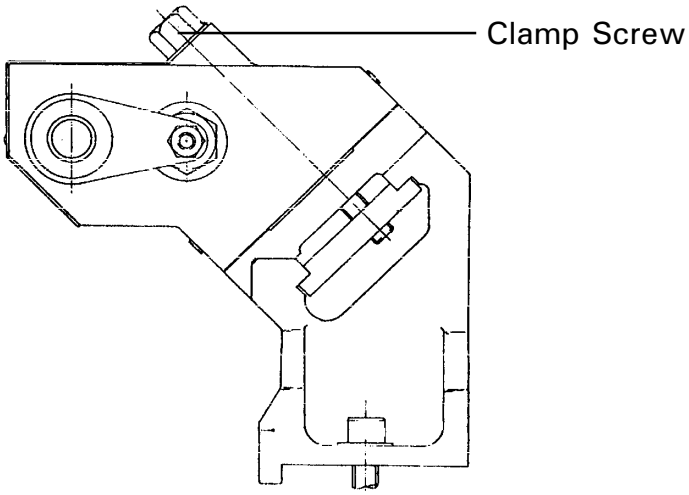
Unscrew the six cap head screws from the front of the chuck. Take care to hold the chuck securely whilst removing the screws.

Remove the chuck from the backplate. Unscrew the three UNC cap head screws from the backplate and remove the backplate from the spindle.

Thoroughly clean and dry all parts.

TAILSTOCK.





DESCRIPTION.

The barrel bore taper is No. 3 Morse, the stroke is 8Ømm and the maximum operating pressure is 1ØØpsi.

TAILSTOCK OPERATION.

The stroke is controlled by internal software and a pressure regulator rotary switch, mounted on the tailstock end of the machine cabinet side panel.

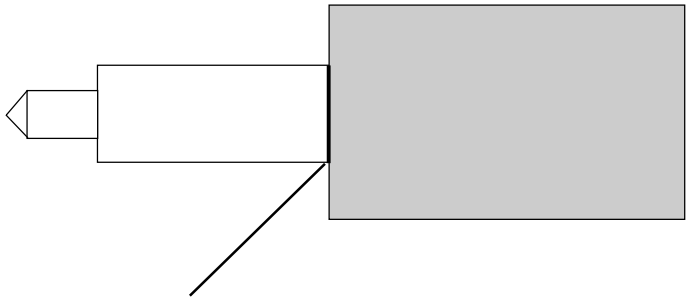
The rotary switch controls the air pressure applied to the barrel of the tailstock when moving forwards. The pressure is controllable so that when long slender items are being machined, the pressure can be reduced so as not to distort the item being turned when using the tailstock centre as a support. Turning the rotary switch clockwise will increase the pressure and counterclockwise will decrease the pressure.

Manual positioning of the tailstock is achieved by releasing the clamp screw (19mm A/F) and moving the tailstock to the required position, then tightening the clamp screw - see above diagram.

Tailstock.

Pressure Indication Line.

The tailstock barrel has an indication mark which when visible indicates that the pressure is at a minimum. When this line appears then manual positioning of the tailstock is required in the direction of the headstock to increase the pressure.



Pressure Indication Line

Coolant Filling.

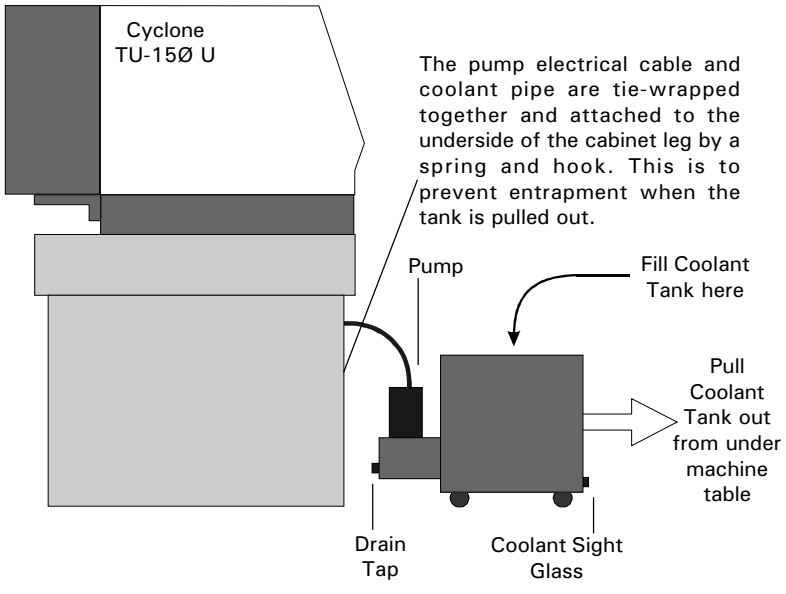
Capacity: 4Ø Litres

Recommended Type: Cincinnati Millacron Simcool C6Ø

Filling:

1) Mix the coolant as prescribed by the manufacturer.
2) Pull out the tank from beneath the machine and clean out swarf.
3) Pour in the coolant from the top of the tank (see disagram below).
4) Watch the sight level on the front of the coolant tank.
5) Stop filling when the coolant level is reached.

The % mix for Simcool 6Ø is 2 - 5% , if the mixture exceeds this percentage it may have a detrimental effect on the paintwork and seals.

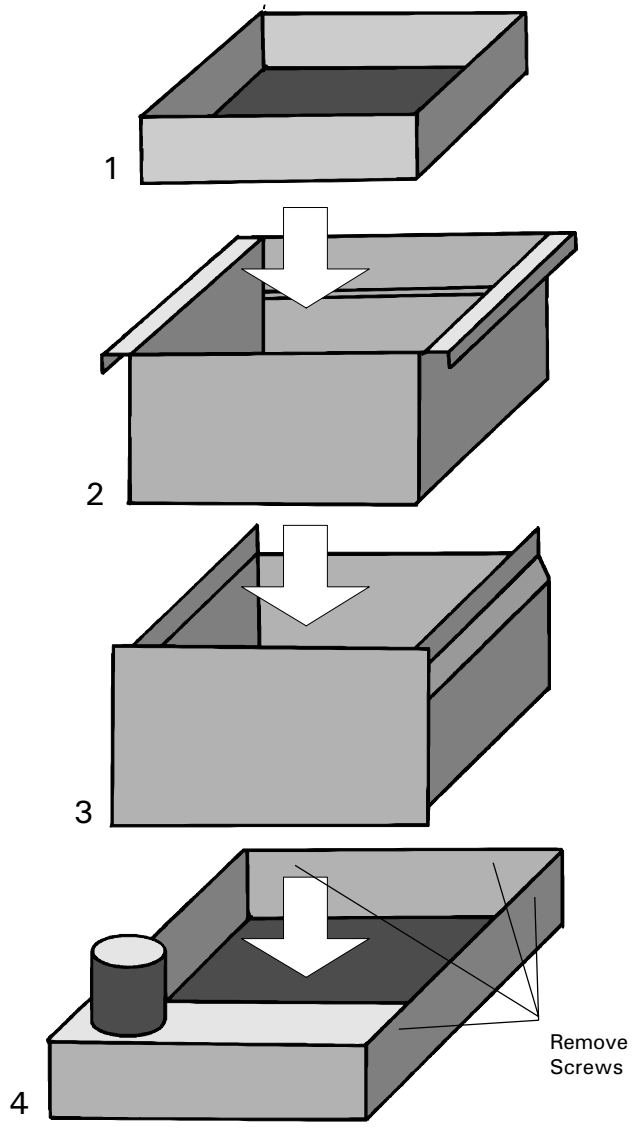


Coolant Tank.

The coolant tank breaks down into four component parts:

1) The Ferrous filter tray
2) The Non - Ferrous filter tray
3) The Main Body tank
4) The Pump Filter Tank Base.

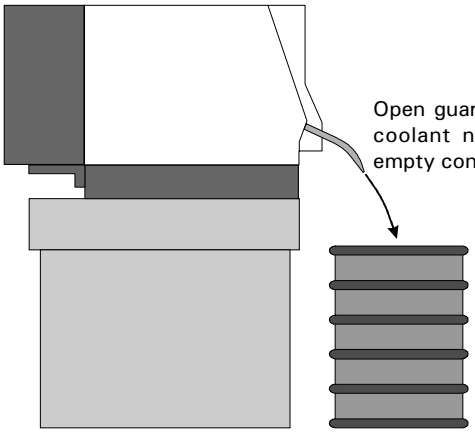
Trays 1 and 2 lift clear (separately) of the main body tank, the main body tank can then be separated from the base by removing the six screws.



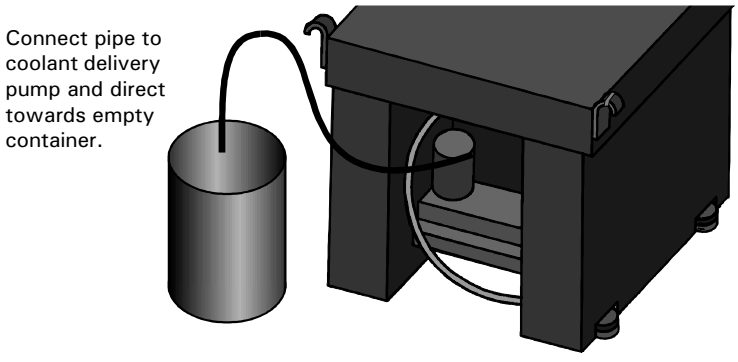
Coolant Draining.

There are basically two methods of draining the coolant tank:

1) With the coolant tank still in place beneath the cabinet base, place the drum or container which is to hold the drained off coolant as near to the machine cabinet as possible. Angle the coolant nozzle(s) into the drum and switch on the coolant flow (see diagram below). When the coolant ceases to flow, switch off the coolant and pull out the tank from beneath the cabinet (front or rear depending on the cabinet model). The tank can then be separated as in the diagram on the previous page and the remainder of the coolant removed from the base.



2) With the coolant tank still in place beneath the cabinet and with the coolant switched off, remove the coolant delivery pipe from the pump by removing the clip. Place a pipe of the same size over the pump nozzle which you have just removed the delivery pipe from, clamp with the same clip and place the other end in a drum or container, then switch on the coolant pump to drain the coolant into the drum. When the coolant ceases to flow, switch off the coolant pump, pull out the coolant tank from beneath the cabinet. The tank can then be separated as in (1) above. Ensure delivery pipe is reconnected to pump after the draining operation is completed.



Slide Lubrication System.

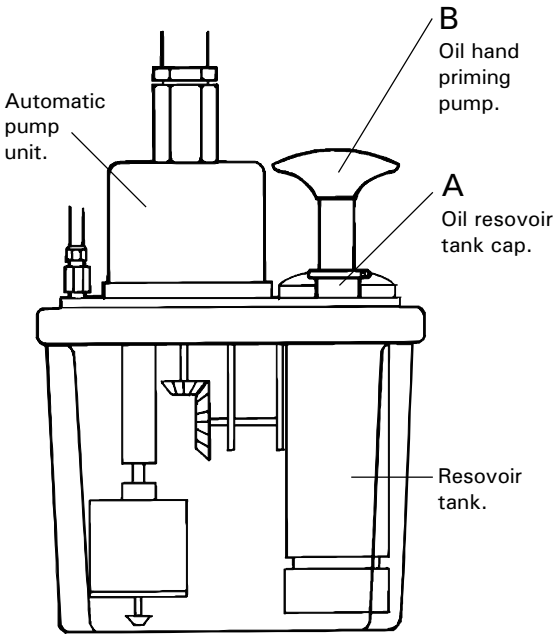
Slide lubrication system.

The slide lubrication system comprises of an oil resovoir tank and an automatic pump unit. Oil is automatically pumped to the required areas of the machine.

The slide lubrication system is located on the right-hand side of the machine cabinet, behind an access door, when viewed from the front.

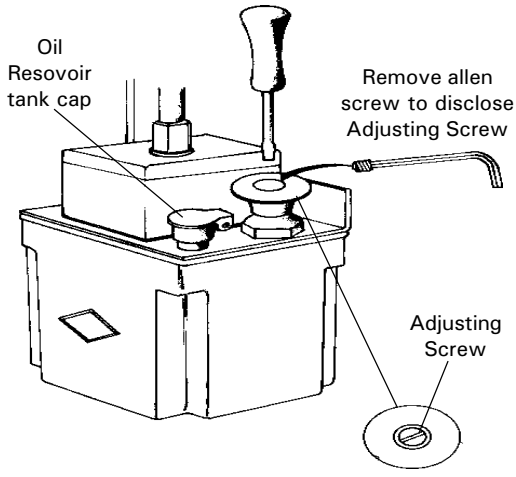
The oil level can be topped-up by adding the required grade of lubrication oil into the resovoir through cap A.

The hand priming pump, B, should only be used if there is no oil in the resovoir, ie, the pump has run dry or the oil is being renewed (shown below).

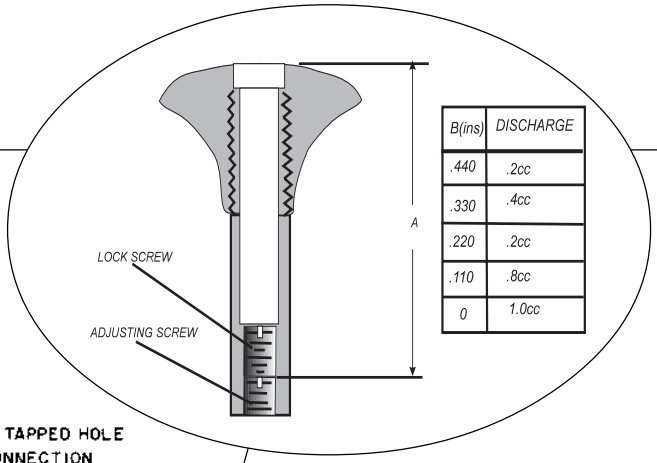


Front elevation of slide lubrication system.

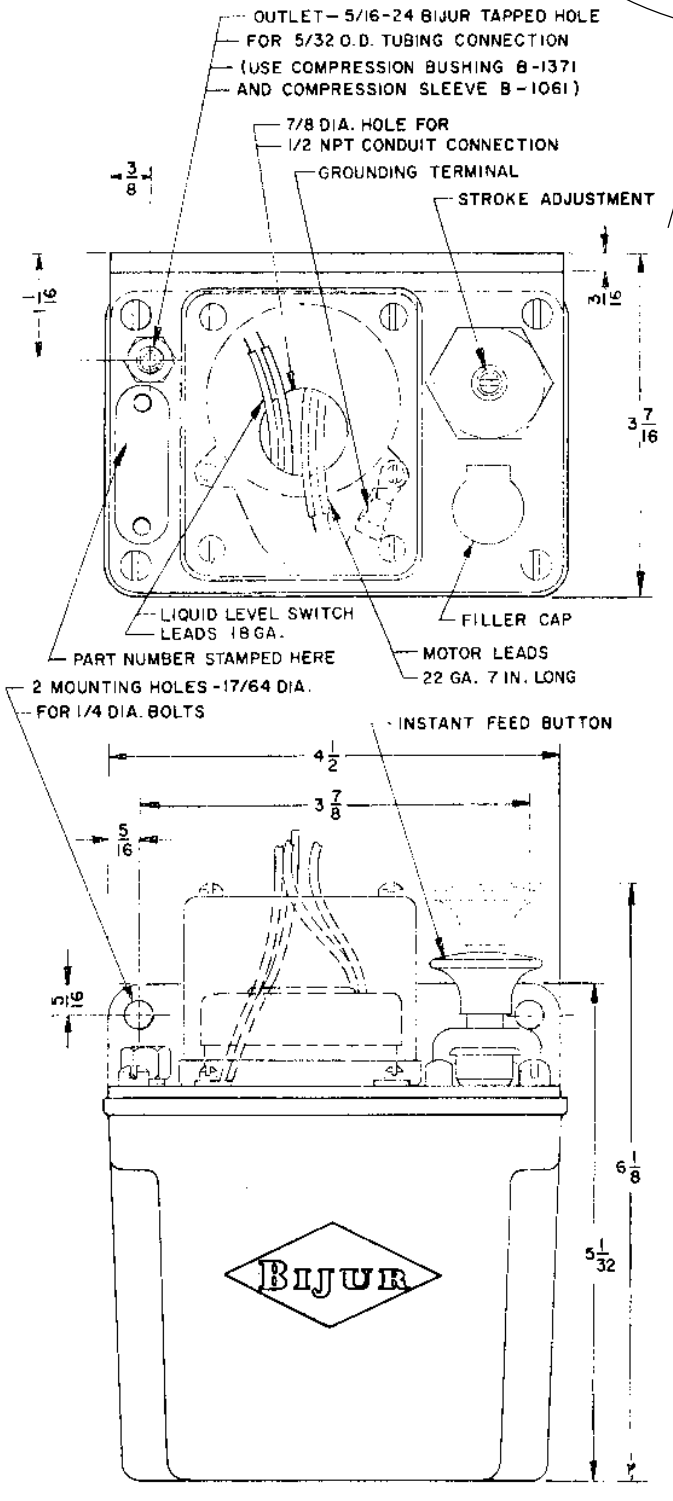
The lubrication flow is set for correct flow at the manufacturers, to lessen the flow - remove the allen screw and turn the cross-head screw clockwise. Replace the allen screw after adjustment (shown below).



Slide Lubrication System.



B(ins)	DISCHARGE
.440	.2cc
.330	.4cc
.220	.2cc
.110	.8cc
0	1.0cc



Operation.

Lubricator type TM1 is a motor driven piston pump of the spring discharge type. The motor incorporates a gear reduction which determines the operating cycle of the pump piston. The cycle times available are shown in the table above.

Discharge Volume per Stroke

Adjustable - Ø.2 cu cm. minimum

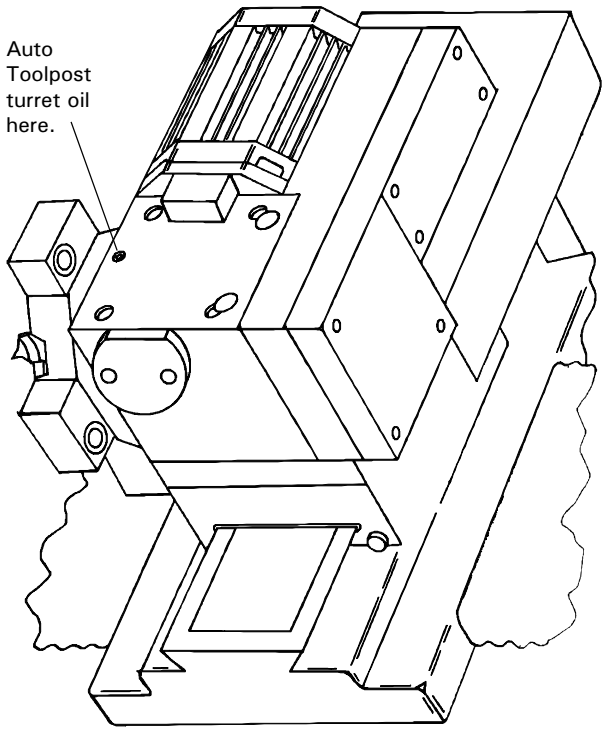
1.Ø cu. cm. maximum

The flow is set at the factory for medium flow - to lessen the flow, remove the lock screw (1/8"allen key), then measure A , turn the adjusting screw clockwise increasing A by B dimension.

Capacity.

The reservoir capacity is 1 pint (475 cu. cm.)

Auto Toolpost Lubrication.



Auto Toolpost Lubrication Point.

The turret mechanism of the auto toolpost should be oiled at weekly intervals, using a pump-action oil can. The lubrication point for the turret is shown in the diagram above.

The specification of oil used on the turret should be the same as the slide lubrication system.

Air Filter Isolator and Regulator.

Air filter regulator and lubricator (see diagram below).

The automatic toolpost, chuck and machine door are supplied with compressed air, passing through an air filter regulator and lubricator, situated on the tailstock end panel of the electrical control box.

Air supply isolator.

Turn anticlockwise to allow air to flow (as shown in the diagram below).

Turn clockwise to cut air supply and drain air pressure from the system.

Air filter regulator.

Normal operating pressure (as supplied, preset on the machine) is 1ØØ PSI (6.6 Bar).

Maximum pressure for the air regulator is 15Ø PSI (9.9 Bar).

Always check the main supply pressure before adjusting pressure at the regulator. To adjust the pressure, pull up the rotary control to unlock it from its current position. Turn the control clockwise to increase pressure, or anticlockwise to decrease pressure (when viewed from above). Push the rotary control down to relock it in its new position.

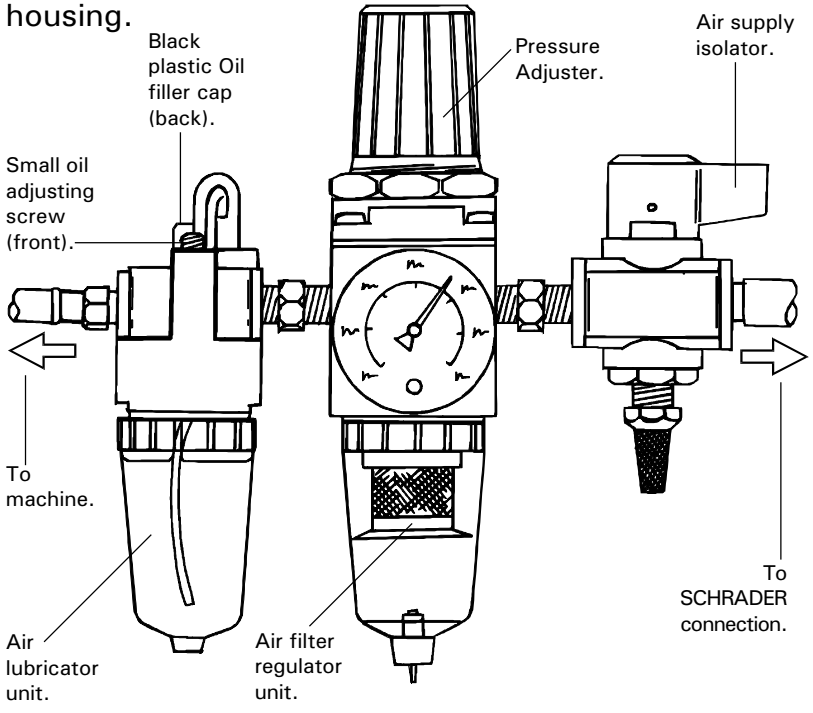
Regularly drain any water collected in the filter bottle using the cap in the base of the bottle. The interval at which this operation is required will depend on the type and condition of the air compressor being used.

Air lubricator.

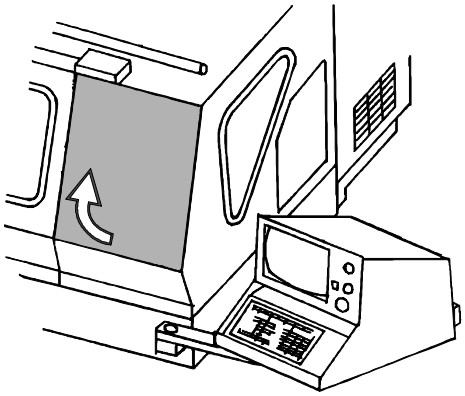
The air lubricator uses oil - ISOVG32.

Turn the front small adjusting screw clockwise to decrease the oil flow, or anticlockwise to increase the oil flow.

Oil can be added to the resovoir bottle by removing the black cap positioned behind the glass bell housing.



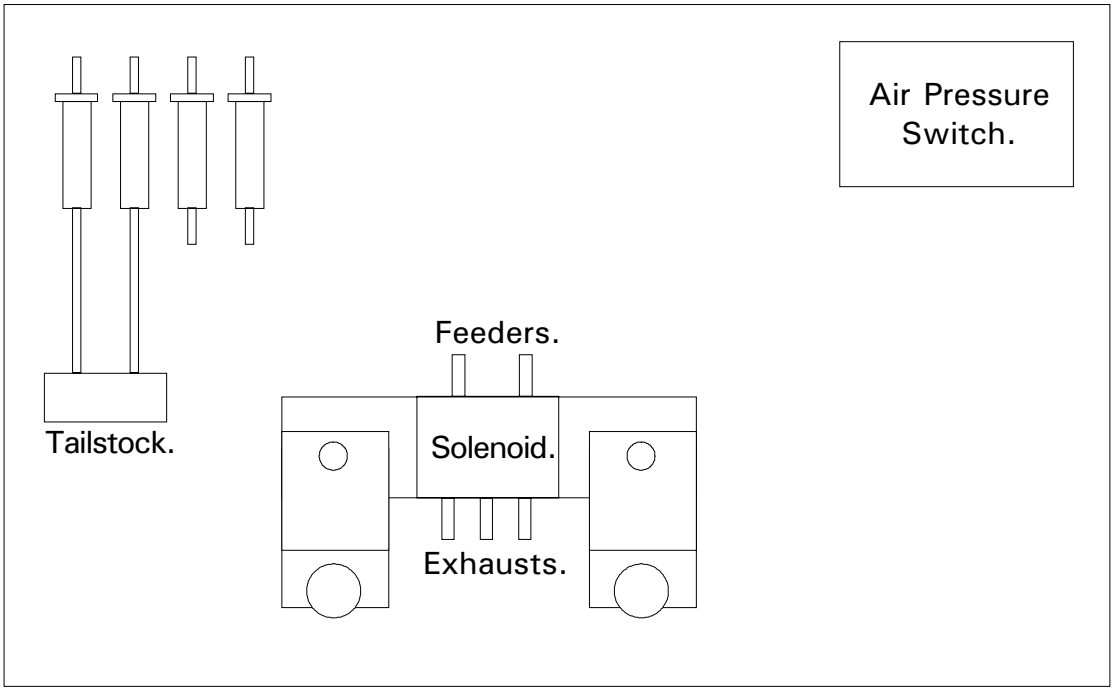
Toolpost Connection Housing.



To gain access to the toolpost connection housing, grip the aluminium channel section on the cover plate and pull down and away to the front of the machine.

Air Circuit Diagram.

Behind the panel (shown in the diagram above.



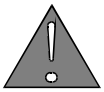
Planning Procedure for Maintenance Work.

When carrying out maintenance work, pay special attention to the following items to ensure safe and correct procedures.

1) Before starting any maintenance work, define the task and obtain the information relevant to carry out the maintenance to a successful conclusion.
2) Prior to commencing any maintenance task, define the work period to do the necessary work, obtain the correct tools, order the spare parts needed to complete the task.
3) During the maintenance work period put up a notice in a place easily seen, to the effect that the machine is under maintenance and should not be used until the notice is removed.
4) Safety should be a priority when carrying out any maintenance, covers and safety guards that are removed during the maintenance period should be replaced after the work is completed and all interlocks and micro-switches reset.
5) All maintenance work should be carried out by suitably qualified personnel.
6) When replacing electrical components ensure that they are the ones specified.
7) All maintenance work done on the machine whether progressive or preventative should be logged so that a complete service record can be kept for future referral.
8) When the maintenance is completed, check that the replaced and serviced parts are working correctly, and that the machine runs efficiently.

MAINTENANCE SCHEDULE.

Daily	-	Clean and remove swarf.
	-	Check/top-up slide lubrication oil level in reservoir.
Weekly	-	Clean machine thoroughly.
	-	Check exposed screws and nuts for tightness.
	-	Check/top-up Cutting Coolant level.
Bi-annually	-	Pneumatic Chuck / Door models - Check condition of filter and drain any build-up of water in the filter bottle.
	-	Check condition of electrical connections.
	-	Check all cables for kinks and breaks.
	-	Clean sensors and microswitches.
	-	Remove chuck jaws, clean chuck.
	-	Check adjustment of saddle strips.
	-	Check adjustment of crosslide strip.
Annually	-	Check slides for wear.
	-	Check machine alignments and accuracy.
	-	Check axis drive belt and spindle drive belt for wear.
	-	Grease axis bearings.
	-	Change Air Filters.
	-	Check headstock bearing adjustment. (Note, locknut is LH).



If in doubt about any of the above procedures, contact Denford Limited for assistance.

LUBRICATION CHART.

Lubrication Point	Lubricating System	Frequency	Recommended Oil/Grease	Quantity
Slide ways and Ballscrews	Auto pump unit	As required	BP : CS 68 Shell : Vitrea 68 Castrol : Perfecto NN	Ø.5 litre
Headstock	Grease Seal	On Maintenance of Headstock	Kluber Isoflex NBU 15	4 cc/Bearing
Axis Bearings	Grease Seal	Once a year	BP : LS 3 Shell : Alvania No. 3	2 cc/Bearing
Coolant	Electriac pump	As required	Cincinnati Millacron Simcool C6Ø	4Ø litres

MECHANICAL TROUBLE SHOOTING.

PROBLEM : Poor surface finish.

Corrective Action:

1) Ensure that the tool tip is in good condition and that the grade is suitable for the material being cut.
2) Check feeds and speeds, are they compatible with the material being cut and the grade of carbide being used for cutting?.
3) Ensure that the tool tip, tool body, tool turret or toolpost are rigid and secure. Do not overhang the tool too far from the turret or toolpost body.
4) Ensure that the axis gib strips are correctly adjusted.
5) Ensure the spindle drive belt is not worn and is correctly adjusted for tension.

PROBLEM : Coolant not flowing.

Corrective Action :

1) Has the coolant ON been programmed - MØ8 - COOLANT ON, or M13 COOLANT ON and SPINDLE FORWARD.
2) Check the level of the coolant in the tank and top up if necessary.
3) Check that the pump is working - observe flow in pipe connected to the pump.
4) Check all pipes for leakages and replace if necessary. If accumulated swarf is causing an obstruction remove the pipe and clear the obstruction and replace the pipe ensuring a good seal without leaks.

Mechanical Trouble Shooting.

ISOLATE MACHINE BEFORE MAINTENANCE COMMENCES.

MECHANICAL CORRECTIVE PROCEDURES:

1) PROCEDURE FOR ADJUSTMENT OF SPINDLE DRIVE BELT TENSION.

Tools required: Tension rod - 8mm dia, 8mm A\F Allen Key, 4mm A\F Allenkey.

a) Remove eight M6 button head screws from headstock end cover and remove the cover.

b) Release the three M1Ø Allen cap head screws holding the motor plate to the lathe bed.

c) Place the tension rod through the top RH slot and lever plate towards the back of the machine to tension the spindle drive belt.

d) Whilst still under tension tighten the bottom RH screw then release and remove the tension rod, tighten the remaining M1Ø screws.

e) Run the spindle and observe the belt to ensure there is no excessive slack, fluctuation or bulging away from the drive pulley.

f) Replace the headstock end cover and secure with the eight M6 button head screws.

2) PROCEDURE FOR ADJUSTING THE THE GIB STRIPS.

Z AXIS

Tools required: Long reach screw driver,

a) Remove eight M6 button head screws from the headstock end cover and remove the cover.

b) Remove M6 knurled headed screw from lubrication pump door at the tailstock end of the machine and open the door to full extent.

c) Release the gib strip lock screw at the headstock side of the saddle. This is accessible through the headstock housing and under the bed guards.

d) Adjust the gib strip by turning the lock screw which is accessible through the lubrication pump door.

e) Turn the screw clockwise to tighten the strip. Do not overtighten.

f) Lock the strip with the lock screw at the headstock side of the saddle.

MECHANICAL TROUBLE SHOOTING.

g) Move the saddle up and down the bed to ensure smooth and continuous movement.

h) When correctly adjusted replace headstock end cover and close lubrication pump door and secure with appropriate screws.

X AXIS

a) Remove the crosslide cover by releasing the two M8 grub screws at the rear of the indexing turret base.

b) Release with a screwdriver the gib strip lock screw at the rear of the crosslide.

c) Using the same screwdriver turn the screw at the front of the crosslide clockwise to tighten the gib strip. Do not overtighten.

d) Lock the strip in position by tightening the lock screw at the rear of the crosslide.

e) Move the crosslide up and down the saddle to ensure a smooth and continuous movement.

f) When correctly adjusted replace the crosslide cover.

3) PROCEDURE FOR CHECKING LIMIT SWITCH

Tools required: 4mm A\F Allen key.

a) Z Axis limit switches are accessible through the headstock end cover and lubrication pump door. Remove and open these covers - as previously described.

b) X Axis limit switches are accessible by removing the cross slide cover - as previously described.

c) Ensure that the limit switches are clean and dry, and the switch pillars are not sticking.

d) If the switch is found to have failed contact DENFORDS SERVICE DEPT.

Air Filters.

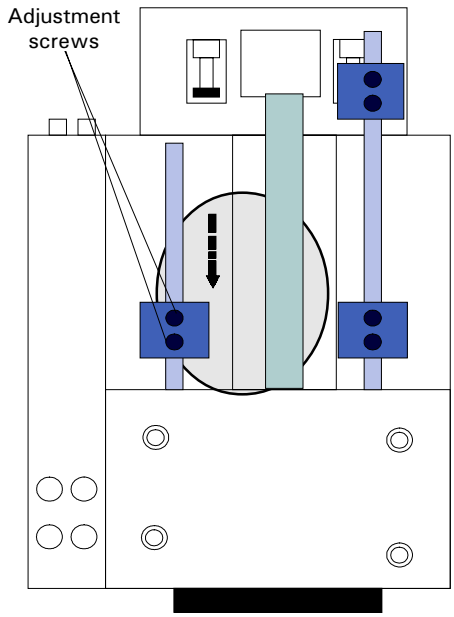
The air filters on the side panel(s) of the machine electrical control box should be changed either annually, or when "black" in colour.

When ordering new filters quote reference:

Air Inlet Filter - 12Ømm Ref: RS 5Ø7-876

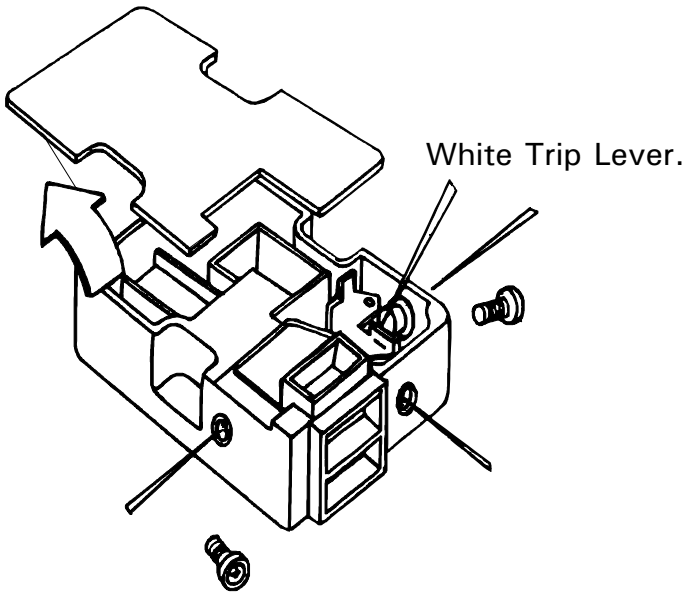
X Axis Home Position Adjustment.

Remove the cover from the rear of the crosslide to reveal the adjustment dogs as illustrated below. To adjust the datum dog, release the adjustment screws and move in the direction of the arrow. Then, re-tighten the screws, check that the axis is homing correctly and replace the cover.



GUARD DOOR SAFETY SWITCH.

Applies to machines supplied within the EEC only.



The guard door safety switch is mounted on the top panel of the cabinet at the front of the machine.

TO ENTER WORKING AREA WHEN THE 24 VOLT CIRCUIT HAS FAILED AND DOOR IS CLAMPED ELECTRICALLY

AS INDICATED IN THE ABOVE DIAGRAM :

1) The cover of the microswitch can be removed using the special tool (supplied in the toolkit) to remove the special tamper proof screws (6); the internal workings of the switch are now exposed. Alternatively, by removing any of the three screws indicated, the white trip lever may be moved using a 2mm dia. rod through the screw hole.

2) Using a screwdriver , or similar tool, move the white trip lever to the right to operate the switch, keeping this depressed the door can now be opened.

CYCLONE TU-15Ø U
SPECIFICATION.

MECHANICAL.

Swing over Bed ..... 255mm (1Ø")
Maximum Turning Diameter ..... 158mm (6.25")
Maximum Turned Length ..... 21Ømm (8.25")
Spindle Bore ..... 35mm (1.25")
Spindle Nose ..... A 2-3"
Spindle Bore Taper No.5MT
Distance between centres ..... 3ØØmm (12")
Tailstock Taper (optional) 3MT
Spindle Speeds ..... 1ØØ-5ØØØ RPM
Feedrates ..... Ø-5ØØØ mm/min
X Axis Travel ..... 94mm (3.75")
Z Axis Travel ..... 21Ømm (8.5")
Bed ..... Hardened and Ground Ways
Coolant Capacity ..... 12 litres (2.6 gals)
System Resolution ..... Ø.ØØ1mm (Ø.ØØØØ4")
Mechanical Resolution ..... Ø.Ø1mm (Ø.ØØØ4")

Optional Automatic Toolpost:
DM8 Educational Turret & heavy duty bi-directional Rotary Turret
External Tool size ..... 12mm x 12mm (Ø.5" x Ø.5")
Internal Tool size ..... 25mm (1")
Index Time ..... Ø.65 seconds

Machine Length ..... 1145mm (45")
Machine Width ..... 11ØØmm (43.5")
Machine Height ..... 155Ømm (61")
Machine Weight (net) ..... 75Ø Kilos (1653.5 lbs)

ELECTRICAL.

Mains Supply
5Ø/6Ø Hz - 3 phase - 38Ø/415 Volts - 12 Amp

Spindle Motor:
2.2 Kw / 3 H.P. AC

Axes Motor:
DC Servo - 1.2 Nm

Denford Contacts, Products and Services.

If you require specific help regarding the specification, operation or maintenance of this machine, contact Denford on the phone/fax number below. Please have the machine serial number and year of manufacture (printed on the front of this guide) to hand, when you call.

Telephone: +44 (Ø)1484 712264.
Fax: (Ø1484) 72216Ø.
Denford Limited,
Birds Royd, Brighouse, West Yorkshire, HD6 1NB, England.
Email: service@denford.co.uk

Stuck for projects and ideas?

Denford LatheCAM Designer is an easy to use CAD package specifically designed for use with Denford CNC lathes.
Components can be designed directly on-screen, or imported from other popular drawing packages. The G-code programs are then automatically generated by LatheCAM's post processor.
What simpler way is there of creating your own library of CNC files? !!

Need further training?

The Denford PTDC (Professional Training and Development Centre) is a purpose built centre specialising in project guidance, CNC machine training and software development skills for Denford customers. Training packages can be tailored to suit your needs, with the help of our experienced Education Support team. The centre can cater for training sessions from the very basics of CNC machine operation, upto the complexities of G-code programming, then further into 'new' Technology areas such as video conferencing.

Denford Limited is committed to the development of its training guides and manuals. If you have found certain sections in this setup guide useful, or feel that particular sections could be further developed, or new sections added in future, we would welcome your suggestions and comments.