

TURN 270
CNC Lathe
User's Manual



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1: Warning Notices

Warranty Disclaimer.

The Warranty on your CNC machine will be invalidated if any modifications, additional ancillary equipment is fitted, or any adjustments are made to the controlling devices without prior notification from Denford Limited. Please refer to the information held in your separate Warranty pack, for specific details.

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

Maintenance Disclaimer.

Always obtain permission from the person responsible for machinery in your establishment before accessing the electrical control panel or machine casings to carry out **any** maintenance work. All work must be carried out by personnel suitably qualified for each maintenance task, to avoid damage to both the machine systems and the maintenance personnel. Denford Limited **cannot accept responsibility** for any damage and/or loss that may occur through incorrect maintenance of your machine.

Use of Machine.

Your CNC machine is designed for machining a range of resistant materials such as wax, plastic, free cutting alloys, aluminium and steel. In each case, the appropriate tooling, speeds and feeds should be used as recommended by the material supplier.

Your machine is **not** intended for use with MDF or hard woods which may react with the machine lubricants causing oxidation of the machine surfaces, or with any materials which may contain known carcinogens.

Do **not** machine any toxic, radio-active or volatile materials.

Use of the machine for any purpose other than those for which it is designed may result in injury, and may also invalidate the warranty.

The machine should only be used under constant supervision, to help guard against, and respond to, any unforeseen hazard such as fire or explosion. First aid and firefighting equipment (CO₂ Extinguisher) should be located nearby in a clearly signed and prominent position.

1: Warning Notices

Sound Level Disclaimer.

The Noise Level test published in this manual is for the machine and any essential equipment such as dust extraction equipment, and complies with the relevant standards. It cannot make provision for noise resulting from the cutting process, since this is a variable, depending on such factors as material, cutting data and tooling.

Any ancillary equipment supplied by Denford will also comply with the relevant standards. However, when used jointly with the machine in a machining environment, the combined sound levels emitted may require that Personal Protection Equipment, such as ear defenders, be used. Other factors, such as high ambient noise levels and nearby machinery and equipment can also increase the sound levels.

It may be possible to reduce the sound levels by changing the machining process and/or repositioning the machine and/or its ancillary equipment.

If, under these circumstances, it is felt that the sound level is still unacceptably high, then independent advice should be sought and complied with.

If you have any doubts and/or questions regarding the use, specification, servicing, or features of your machine, please contact Denford Customer Services.

Denford Limited reserves the right to change the specification and/or operating features regarding this CNC machine without notice or documentation.

Portable Appliance Testing.

***This machine has an Inverter drive fitted with Internal EMC filters.
The Insulation Resistance test should not be carried out with the filter in circuit.***

If the test is carried out with the filter in circuit then the appliance will fail the Insulation Resistance Test and damage can be caused to the machine.

In-Service Testing.

This is the testing carried out as a routine to determine whether the equipment is in a satisfactory condition.

In-Service testing will involve the following:

- Preliminary inspection
- Earth continuity tests (for Class 1 equipment)
- Insulation testing (for Class 1 equipment)

1: Warning Notices

Portable Appliance Testing (continued).

Electrical testing should be performed by a person who is competent in the safe use of the test equipment and who knows how to interpret the test results obtained. This person must be capable of inspecting the equipment and, where necessary, dismantling it to check the cable connections.

If equipment is permanently connected to the fixed installation, e.g. by a flex outlet or other accessory, the accessory will need to be detached from its box or enclosure so that the connections can be inspected. Such work should only be carried out by a competent person.

Preliminary inspection

Formal visual inspections should only be carried out by persons competent to do so.

- Cables located so as to avoid damage
- Means of disconnection/isolation readily accessible
- Equipment positioned to avoid strain on cord
- Equipment is being operated with the covers in place
- Indiscriminate use of multi-way adaptors and trailing sockets is avoided
- Identify signs of overheating
- Identify signs of damage to insulation
- Check the correct size fuse is fitted (13A)
- Check the flexible cable connections and anchorage.

Before carrying out the following tests ensure the machine is disconnected from any external equipment or supplies.

Ensure USB and RS232 connections are removed prior to testing.

Earth continuity Test (Class 1 equipment)

The test should be carried out at 25A for a period of 5 – 10 Seconds

The reading should be less than $0.1 + R$ (where R is the resistance of the lead)

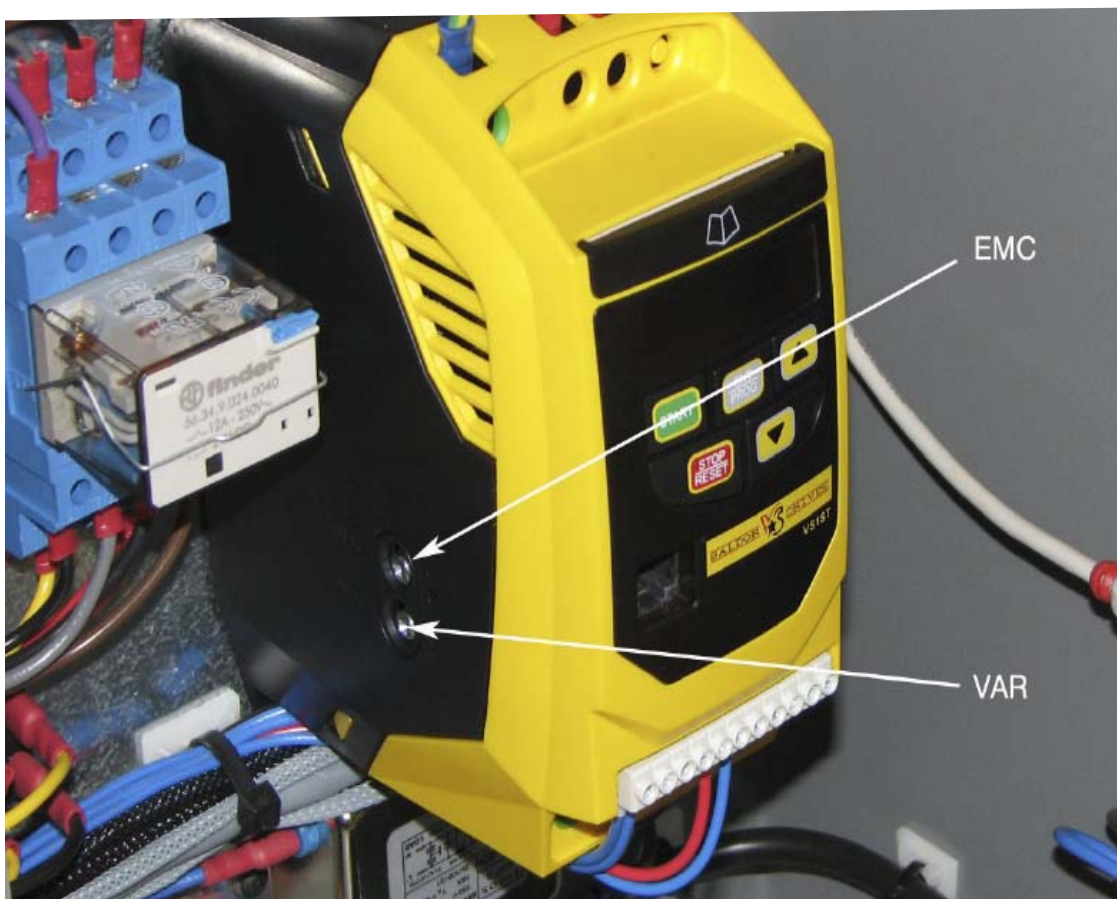
1: Warning Notices

Portable Appliance Testing (continued).

Insulation Resistance Test (Class 1 equipment)

A qualified electrical engineer should make the following modifications before carrying out the Insulation Test.

- Remove the cover from the electrical panel.
- Locate the Spindle drive and remove the EMC and VAR screws.



The insulation resistance test can now be carried out

The applied test voltage connected between Live/Neutral and Earth should be 500VDC
The insulation Resistance should be greater than 1M Ohms

The EMC and VAR screws must be refitted prior to operating the machine again.

1: About this Manual

Using this manual	<p>This manual provides information describing how to transport, site, setup and operate the basic functions of your Denford CNC machine, including any operational features of hardware specific to the Denford machine series.</p> <p>This manual does not provide any information regarding the software packages used please refer to the help section within the appropriate software.</p> <p>Please note that the Electrical Diagrams for your machine are not included in this manual - they are delivered separately in the standard equipment box supplied with your CNC machine.</p> <p>If you have any doubts and/or questions regarding the specification, servicing, or features of your machine, please contact Denford Customer Services. Denford Limited reserves the right to change the specification and/or operating features regarding this CNC machine without notice or documentation.</p>
Disclaimer	<p>Please note that due to the nature of hardware and software developments, the specifications and features of this product can change without notice. The information contained in this manual is correct at the date of printing only - August 2010.</p> <p>No liability can be accepted by Denford Limited for loss, damage or injury caused by any errors in, or omissions from, the information supplied in this manual.</p>
Screenshots	<p>Please note that any screenshots are used for explanation purposes only. Any numbers, wording, window or button positions may be different for the configuration of the CNC machine control software being used to control your machine.</p>
Language	<p>This manual is written using European English.</p>
Contact	<p>Any comments regarding this manual should be marked for the attention of our technical authoring team and referred to the following e-mail address: customerservices@denford.co.uk</p>



1: Introducing your TURN 270 Lathe

Congratulations on your purchase of a TURN 270 CNC Lathe. In this manual you will learn how to setup and use your Machine correctly and safely.



Your machine is a full two axis CNC Lathe with large capacity together with rapid traverse rates of up to 2500 mm/min. Suitable for all levels of education and training, it is manufactured to meet industrial standards.

Main Features:

- Designed specifically for Education and Training.
- Manufactured to industrial standards.
- Programming via International Standards Organisation format, incorporating controls such as FANUC.
- CE approved for safety.
- Capable of cutting common resistant and prototyping materials Aluminium, Steel, Brass, MDF, Wax, Plastics and Acrylics.
- Links to various CAD/CAM software packages.
- Totally enclosed high visibility interlocked guard.
- Spindle speed and feedrate override controls.

1: Before Beginning to Setup

Before beginning to set up your TURN 270 CNC machine, please check your separate order documentation, making sure that all items have been delivered to your establishment. Any missing or damaged items should be reported to Denford Customer Services as soon as possible.

The following equipment is supplied as standard with your TURN 270 CNC Lathe. Note that the precise specification of your CNC machine will depend on any options selected at the time of ordering.

- 1 x Allen (hex) keys pack.
- 1 x Spare fuse pack.
- 1 x TURN 270 CNC machine warranty pack.
- 1 x User document pack comprising:-
 - 1 x Commissioning guide.
 - 1 x Denford VR CNC Machine Control Software CD-ROM
 - 1 x TURN 270 CNC machine manual (Supplied on VR Turning CD-ROM)
 - Any additional OEM product manuals.
- 1 x USB Cable.
- 1 x Mains Cable.
- 1 x L.H. Turning Tool & Tip.
- 1 x Parting off Tool & Tip.
- 1 x Torx Driver.
- 1 x Toolpost Hexagon Socket Key (If manual toolpost specified).
- 1 x Chuck Key.
- 1 set Internal and External Chuck Jaws.

The following optional equipment may also be supplied with your TURN 270 CNC lathe (please refer to your separate order documentation for confirmation):

- Manual Tailstock with Non-Revolving Centre. (Factory Fitted).
- Revolving Centre for Manual Tailstock.
- Pneumatic Safety Guard Door. (Factory Fitted - requires compressed air).
- Pneumatic Chuck. (Factory Fitted - requires compressed air).
- Comprehensive Tooling Packages for Auto Turret and Manual Toolpost.
- Universal Bench with Computer Support Extension.
- Air Compressor.
- CAD/CAM Software.
- Additional and/or On-site Training Courses.

2: Safety Features Overview and Precautions

Safety Features Overview.

The following safety features are standard on your Lathe:

- Emergency stop button.
- Manually operated, totally enclosed guard door with interlock switch.
- Option on control software to check CNC programs using toolpath graphics, prior to machining.
- Automatic tool retraction and spindle stop for tool changing.

Safety Precautions.

Safety is very important when working with all forms of machinery but particularly when working with CNC equipment, due to the hazardous voltages, speeds and forces that exist in the hardware. Follow the rules below at all times, when using your Lathe.

General Safety Precautions :

- Wear clothing suitable for machine operation and follow the safe working procedures in place at your establishment. When cleaning down machine, or handling tooling, consider additional protective clothing such as respiratory masks, eye protection, gloves and overalls.
- 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.
- Always secure the work on the table or in a fixture or vice.
- Ensure that the correct cable for the power source is used.
- Ensure the mains power is switched off (and preferably unplugged) before starting any maintenance work on the machine. Depending on ancillary equipment supplied with machine there may be more than one power supply to the machine. When isolating machine always ensure that **all** power sources have been disconnected. Post a notice informing others not to use the machine since it is undergoing maintenance.
- Hazardous voltages can still exist immediately after switching the machine off. Always wait at least 5 minutes before accessing the CNC machine electronics.
- If power fails turn off the mains power switch immediately and unplug the machine from the mains power socket.
- Service the required areas at the intervals specified in this manual (see the Maintenance section for further details).
- Observe caution when handling machine tooling or cleaning down machine, particularly with regard to hot and/or sharp cutters. Consider wearing protective gloves.
- When an emergency stop is required, press the circular red emergency stop button, located on the right side of the CNC machine front panel.
- Visually check door and window for signs of cracks or chips. Any damage should be reported immediately to Denford and a suitable replacement obtained without delay.
- Regularly check door hinges for correct tension and adjust or replace if necessary.

2: Safety Features Overview and Precautions

General Dust Safety Precautions.

Obtain "material safety data sheets" from your material suppliers and enforce the recommended precautions. Be aware that dust particles from certain hardwoods and other materials, such as oak and MDF, could contain known carcinogens: these materials should **not** be used on this machine. Please consult your materials supplier for further details.

Dust particles that remain inside the working area of the machine after a part has been machined, should be removed using a vacuum.

NEVER USE A PRESSURISED AIRLINE for this purpose.

When clearing the machine of dust particles wear suitable respiratory protective equipment that is CE marked. Other personal protective equipment, such as eye protection, overalls and gloves should also be considered.

Dust particles on the floor can cause slipping. This should be monitored by the operator and removed before it becomes a hazard.

Launder overalls regularly, provide good washing facilities with hot and cold water, soap and towels and encourage a high standard of personal hygiene.

Failure to adhere to the material safety data sheets, could lead to the following health problems which are among the potential effects associated with exposure to certain dust particles:

- Skin disorders.
- Obstruction to the nose.
- Rhinitis.
- Asthma.

2: Safety Features - Emergency Stop



The emergency stop button is located on the right front panel of the CNC machine. To activate an emergency stop, press the button fully in until it clicks.

A circular, red emergency stop button is located on the right front panel of your machine, as shown above. When pressed, it has the effect of stopping all axes and spindle movements immediately. The guard interlock switch will also close. When the safety guard door is in its closed position, this will prevent access to the working area of the CNC machine.

To activate an emergency stop, press the button in until it clicks. The emergency stop button will continue to cut all power to the machine drives and continue to keep the interlock switch closed, until the release sequence is performed.

To release a closed emergency stop button, push in and turn the button clockwise until it springs back out.

After releasing an emergency stop, you may need to reset any CNC control software messages and home the CNC machines axes.

Check the emergency stop button is released before attempting to power up the CNC machine.

2: Safety Features - Interlock Guard Switch

An interlock guard switch is fitted to the front machine door. The switch unit itself is attached behind the lower machine panel, accessible from beneath the front of the machine. The lock must be manually released to enter the working area when the 24 volt circuit has failed and the door is clamped electrically.

Note

A closed safety guard door cannot be opened when:

- The machine is switched off (ie, not in use). To release the interlock guard switch, supply power to the machine.
- The emergency stop button is fully pressed in. To release the lock, push in and turn the emergency stop button counter-clockwise until it springs back out to its ready position.
- Machining is taking place. The interlock guard switch will release when the machining operations have been completed and the machine controlling software is operating in Jog Mode.

Warning



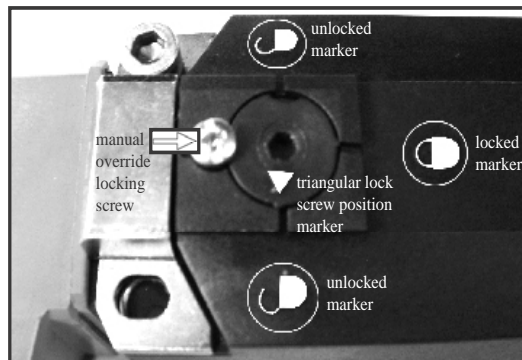
Danger of serious injury! Do not let unauthorised personnel use the machine when the guard lock feature is disabled. Ensure the guard lock feature is switched back on as soon as possible. Under no circumstances must the safety switch actuator be removed (or a spare or replacement actuator, or other device be used) to defeat the safety interlocking system.



Left: The interlock guard switch unit (circled) is located behind the lower front machine panel.

An override facility is provided on the interlock guard switch, allowing **temporary** removal of the guard lock feature. For manual interlock release, the power supply must be switched off.

- 1) Working beneath the front edge of the machine, locate the interlock guard switch unit.
- 2) Using a small flat or crosshead screwdriver, loosen the manual override locking screw until the circular black plastic lock screw can be turned (refer to photograph below).
- 3) Using a 3mm allen key, turn the circular black plastic lock screw one quarter turn to switch off the guard lock feature. If in doubt refer to the lock/unlock symbols embossed on the casing surface.
- 4) If necessary, tighten the manual override locking screw slightly. If you need to leave the machine, post a warning note informing



Left: Looking directly at the face of the interlock guard switch unit.

3: Unpacking and Lifting your CNC



If your CNC machine has been supplied inside a delivery box, cut the top of the box open and remove any packaging carefully. To obtain better access to the machine, remove all the sides from the delivery box. Your Lathe weighs 140 kg. for bench mounting: with floor standing unit it weighs 255 kg.

With the bench mounting unit a suitable method of transportation must be used as the unit is not fitted with wheels: for example secure machine on a pallet and transport using a pallet truck.

If lifting by crane, suitable certified slings must be used as shown in following the illustration.



Denford do **not** advise manual lifting of this machine, however if no other suitable alternatives are available, the machine could be lifted by at least 4 people, one at each corner. The use of suitably rated lifting bars through the hollow sections under the machine may assist in lifting the machine.

Always use sensible lifting precautions in accordance with Health and Safety Regulations in your establishment. Particularly in the case of manual lifting be aware of the danger of trapping.

Ensure that your CNC machine is both secure and balanced before lifting. Do not tip the machine whilst lifting.

All lifting equipment must be certified as being suitable for the loads involved.

3: Choosing a Site for your CNC Machine

Site your machine in a well ventilated room. This CNC machine can be bench mounted or floor standing, depending on the specification. If it is to be sited on a bench, the bench must be of sturdy construction to take the weight of the machine and of a height which enables comfortable operating and programming to take place.

If the machine is supplied with a Universal Machine Bench, the adjustable corner feet should be wound down to contact the floor to help minimise noise and vibration.

Ideally, the user will operate the machine when standing at its front, with a clear view of both the machine working area (through the transparent guard window) and the personal computer being used as the controller unit (which should be angled towards the user), as shown in the diagram below.

Sufficient room should also be provided for effective maintenance to be carried out around the machine itself. In particular, leave enough space for removal of the large plate covering the electronics at the right hand side of the cabinet. Positioning the PC on a movable workstation may allow easier access to the various vents, connectors and switches on the machine cabinet, when required.

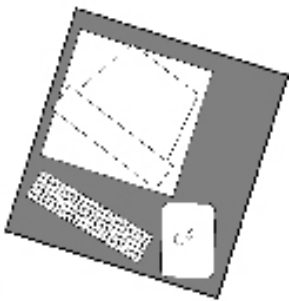
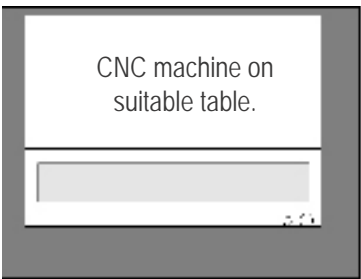
Do not place the machine in a position which allows any of the cabinet vents to be covered. Ensure all cables, pipes and flexes are routed to avoid the possibility of users tripping over them.

Dimensional Data.

- Machine Length (left to right) 1000mm (39.5")
- With PC Extension Fitted 1600mm (63")
- Machine height (top to bottom) 675mm (26.5")
- When Fitted on Base 1440mm (56.5")
- Machine depth (front to back) 750mm (29.5")

Allow space to remove the cover plate at the right hand side of the cabinet.

Computer desk, monitor, keyboard and mouse angled towards Operator.



Plan View showing Ideal Machine Layout and Operating Positions.



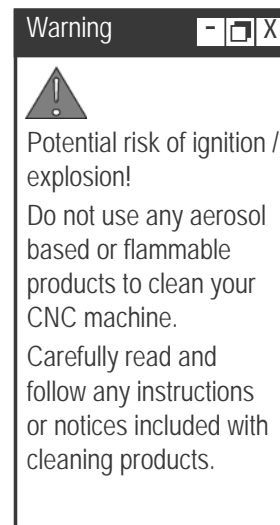
Machine Operator.

3: Removing Protective Coatings and Packaging

Once your CNC machine has been sited and connected electrically, the protective coatings and transit packaging must be removed from the working area to prepare the machine for running:

- 1) The protective plastic sheeting on the guard door and window must be removed prior to cleaning them with an antistatic cleaner.
- 2) Tie-wraps may be used in the working area of the machine, to prevent movement of components during transit. Additional items from your order may also be supplied packaged inside the working area.
- 3) To gain entry to the working area of the machine, power must be supplied to the machine, in order to release the switch unit that locks the safety guard door. Note that the switch unit will also remain locked when the emergency stop button is fully pressed in.

Warning - Aerosol based or flammable products must not be used to clean your CNC machine. To avoid the potential risk of ignition / explosion, ensure that any trapped solvent vapours can exit fully from any enclosed areas on the CNC machine. Wait at least 1 hour before attempting to operate the CNC machine.



4: Switching the CNC machine On

Note

The safety guard cannot be opened until the Lathe is powered up to release the interlock guard switch.

Warning

Do not connect cables between any electrical hardware with the mains power switched on, since this could seriously damage components inside your CNC machine.

Warning

Never attempt to access the electronic hardware systems of the machine with the mains power switched ON.

Note that hazardous voltages can still exist immediately after switching off the power.

If the machine has previously been switched on, wait at least 5 minutes before attempting to open the electrical panel cover plate.


Many electronic components are sensitive to electrostatic damage - ensure components and/or personnel are suitably earthed to minimise this risk.

Follow these instructions to switch on your CNC Machine:

- 1) Check the Denford machine link cable is fitted securely between the USB port socket on the machine controller PC and the USB socket, located on the right-hand panel of the machine cabinet.
- 2) Check that all access panels are in position and securely fastened.
- 3) Check that all inlet/exhaust vents are clear from obstructions.
- 4) Check that the guard door is fully closed.
- 5) Plug the machine mains supply cable into an available power socket. Switch the power socket on.
- 6) The on/off power switch is located on the right-hand panel of the machine cabinet, immediately above the power socket. Press the front edge of the switch. The switch will illuminate when power is being supplied to the machine.
If the machine does not begin its power-up routine, switch off the mains power and check all connections and fuses.
- 7) Switch on the machine controller PC and start the CNC machine control software.

See the commissioning leaflet for more details
- for help please contact technical support

4: Switching the CNC Machine Off




Never attempt to access the electronic hardware systems of the machine with the mains power switched ON.

Note that hazardous voltages can still exist immediately after switching off the power.

If the machine has previously been switched on, wait at least 5 minutes before attempting to open the electrical panel cover plate.

Many electronic components are sensitive to electrostatic damage - ensure components and/or personnel are suitably earthed to minimise this risk.

Warning



Depending on ancillary equipment supplied with machine there may be more than one power supply to the machine.

When isolating machine always ensure that **all** power sources have been disconnected.

Follow these instructions to switch off your CNC machine off:

- 1) Wait for the Machine to fully complete any machining or processing of any operational instructions.
 - 2) Open the safety guard door and remove any finished parts from the working area.
 - 3) Close the safety guard door.
 - 4) Close down the communication link between the CNC control software and the machine, then exit the CNC control software, as described in your separate CNC Control Software User's Manual.
 - 5) Shut down and switch off the machine controller personal computer.
 - 6) Power down the machine by pressing the rear edge of the on/off mains power switch. The on/off switch is mounted on the right-hand cabinet panel immediately above the power socket. The red light will be extinguished.
- Note that cutting the machine power will trigger the closing of the interlock guard switch. This will lock a closed safety guard door in position, preventing access to the machine working area. The interlock guard switch will automatically reopen when power is next supplied to your machine.
- 7) Switch off the mains power socket.

4: Homing the Machine Axes (Home Mode)

Note



The sequence of events required to home the Lathe will depend on the type of CNC machine control software being used - please refer to your separate CNC Machine Control Software User's Manual for specific details.

Immediately after establishing a communication link between the CNC control software and the CNC machine, both axes of the CNC machine, and the Auto Turret (if fitted) must be homed. The process is commonly referred to as homing the machine, or datumming each machine axis.

When a communication link is first established between the CNC machine and the CNC machine control software, or when the CNC machine "loses" position, the software will not know the true position of the machine axes.

Homing the CNC machine defines:

- The machine datum, by physically driving the machine axes to a fixed zero reference point.
- The constraints of the co-ordinate grid system used for plotting any programmed movements, effectively the working envelope of the CNC machine.

After homing the machine, the zero position of the the co-ordinate grid system is referred to as the machine datum. You can find the position of the machine datum by switching the co-ordinate display in your CNC control software to read Machine Co-ordinates. The position of the machine datum is achieved when the X & Z panels of the co-ordinate display both read zero.

Note



The CNC machine control software Jog and Auto Modes will not become available until the machine has been configured by homing the machine axes.

Note

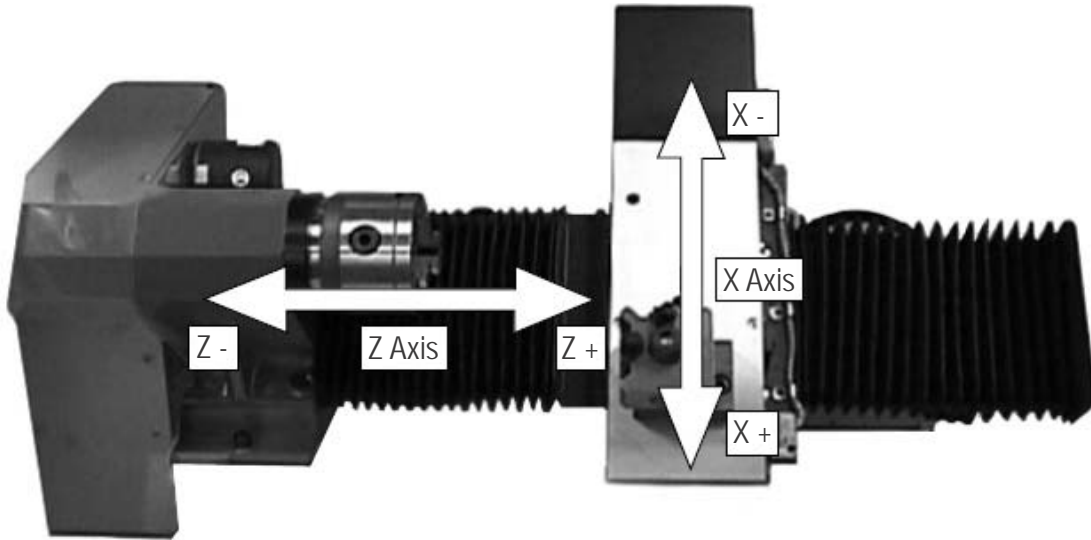


The machine datum position is set by Denford and can never be moved, since it defines the physical movement capability of the CNC machine.

In addition to homing the CNC machine after it has first been switched on, we also recommend homing the CNC machine after loading or configuring any offsets.

4: Axis Definitions

TURN 270 with Manual Toolpost.



Z Axis.

The centre of the Z axis runs along a line between the spindle and tailstock, or in other words, the centreline of rotation of the spindle, parallel with the longest edges of the machine bed.

Minus (-) Z movements of the toolpost are left, towards the headstock end of the machine.

Positive (+) Z movements of the toolpost are right, towards the tailstock end of the machine.

X Axis.

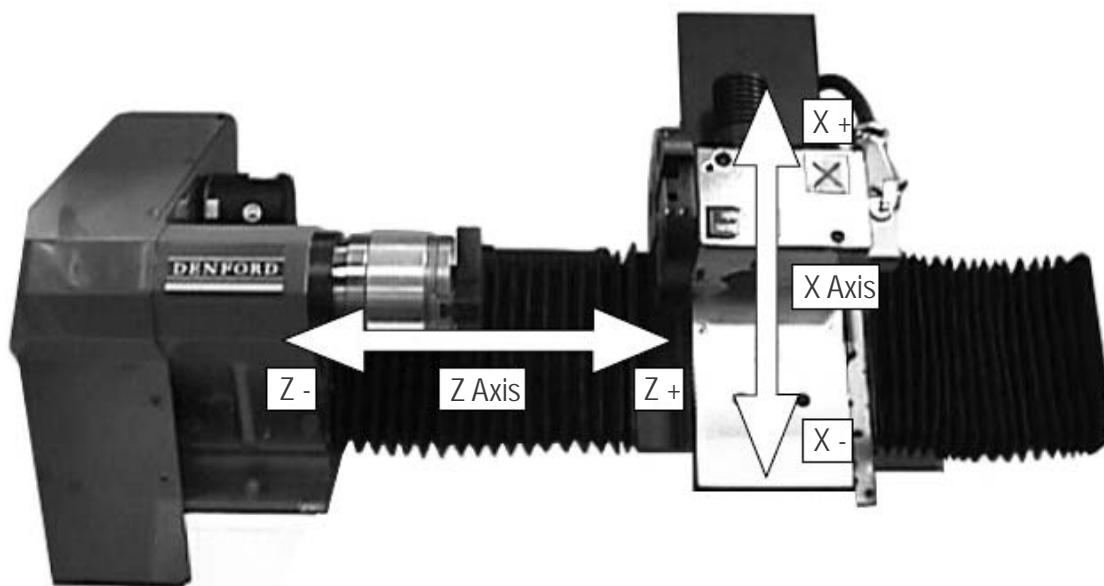
The X axis runs at 90 degrees to the Z axis, parallel with the longest edges of the cross-slide.

Minus (-) X movements of the toolpost are towards the centreline of rotation.

Positive (+) X movements of the toolpost are away from the centreline of rotation.

4: Axis Definitions

TURN 270 with Automatic Indexing Toolpost.



Z Axis.

The centre of the Z axis runs along a line between the spindle and tailstock, or in other words, the centreline of rotation of the spindle, parallel with the longest edges of the machine bed.

Minus (-) Z movements of the toolpost are left, towards the headstock end of the machine.

Positive (+) Z movements of the toolpost are right, towards the tailstock end of the machine.

X Axis.

The X axis runs at 90 degrees to the Z axis, or in other words, perpendicular to the Z axis, parallel with the longest edges of the cross-slide.

Minus (-) X movements of the toolpost are towards the centreline of rotation.

Positive (+) X movements of the toolpost are away from the centreline of rotation.

4: Machine Operators Panels

Spindle Speed and Feedrate Override Controls.

The spindle speed and feedrate of the TURN 270 can be manually overridden during a machining operation, using the potentiometer controls fitted to the operators panel.

The spindle speed can be overridden between 50% and 120%.

The feedrate can be overridden between 0% and 150%.

To increase the spindle speed or feedrate, rotate the appropriate control clockwise.

To decrease the spindle speed or feedrate, rotate the appropriate control counterclockwise.

The degree of adjustment applied to each value is displayed in the CNC control software.

Note

Spindle speed and feedrate override changes will only be registered when an actual spindle speed or feedrate is being applied by the CNC control software.

Warning



Depending on ancillary equipment supplied with machine there may be more than one power supply to the machine.

When isolating machine always ensure that **all** power sources have been disconnected.

Mains Power Switch.

To supply power to the CNC machine, press the front edge of the on/off power switch: the switch will illuminate. To cut power to the CNC machine, press the rear edge of the on-off power switch. Do not cut the mains power when machining or processing of any operational instructions is taking place. Note that cutting the machine power will trigger the closing of the interlock guard switch. This will lock a closed safety guard door in position, preventing access to the machine working area. The interlock guard switch will automatically reopen when power is next supplied to your machine.

Emergency Stop Button.

Note

Activating an emergency stop will also trigger the interlock guard switch. This will prevent a closed safety guard door from being opened.

The emergency stop button is a circular red push button. Pressing the emergency stop button has the effect of stopping all axes and spindle movements immediately. To activate an emergency stop, press the button in fully until it clicks. The emergency stop button will remain closed (continuing to cut all power to the machine drives) until the release sequence is performed. To release a closed emergency stop button, push and turn the button clockwise until it springs back out, then wait 10 seconds for the machine systems to reset, unlocking the safety guard door.

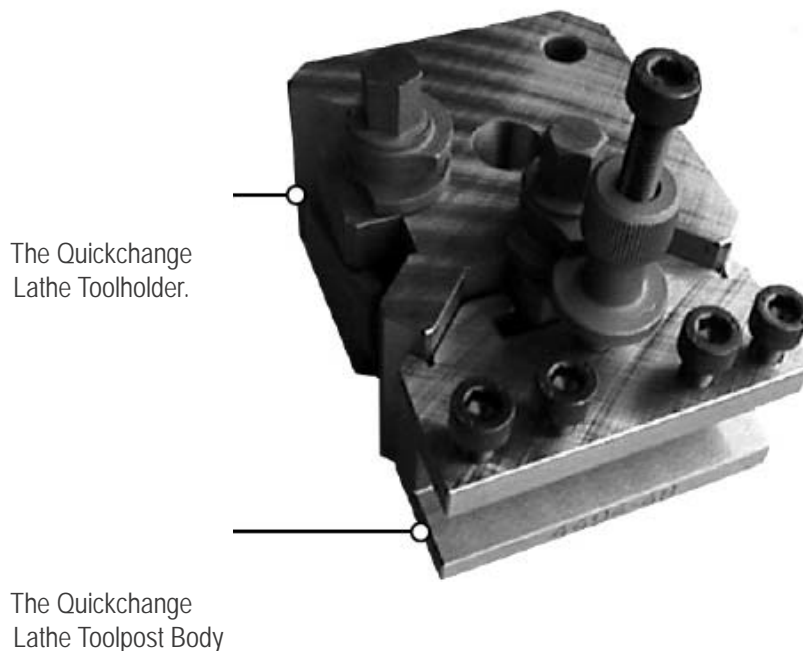
5: Quickchange Manual Tooling System

Introduction.

The quickchange manual tooling system can be supplied as an option with the TURN 270 CNC lathe, unless an optional automatic indexing toolpost has been specified.

The system comprises of two elements:

i) The toolpost body, which is mounted to the cross slide.



ii) The tool holder, which is fitted to one of the two location slots on the sides of the toolpost body. Tool holders are held in position using a spring loaded slide and bracket assembly, to allow easy manual removal and replacement of tools, when necessary. Height adjustment is achieved using a grooved nut and collar bolt.

5: Quickchange Manual Tooling System

Manual Tooling System Fitting Tools.

The following tools are used to fit and adjust the components of the quickchange manual tooling system.



M10 Spanner.



Toolpost Hex
Socket Key.



4mm Allen
(Hex) Key.

Warning



Caution.
If the cutting tool has
been recently used, it
may still be HOT.

Safety First !

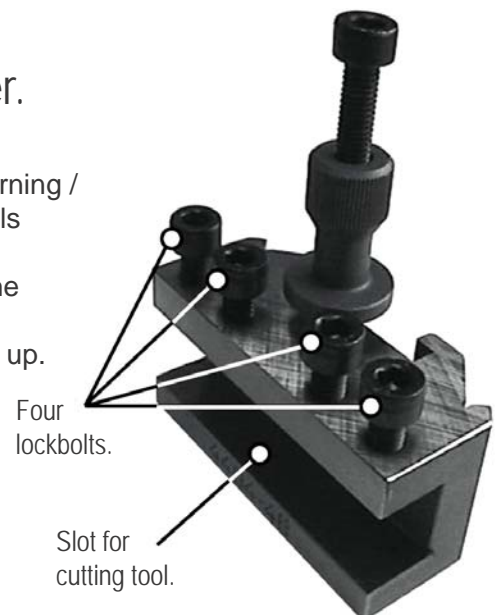


Never open the safety
guard door and enter
the working area when
the spindle or machine
axes are moving.

Fitting a Tool to the Toolholder.

1) Using a 4mm allen (hex) key, unscrew the four lockbolts on the toolholder. When directly viewing the top of the bolt heads, turn counter-clockwise to loosen or clockwise to tighten them.

Diameter turning /
external tools
must be
fitted with the
cutting
edge facing up.



2) Place the cutting tool into the toolholder, in the correct orientation.

Diameter turning / external tools must be fitted with the cutting edge facing up.

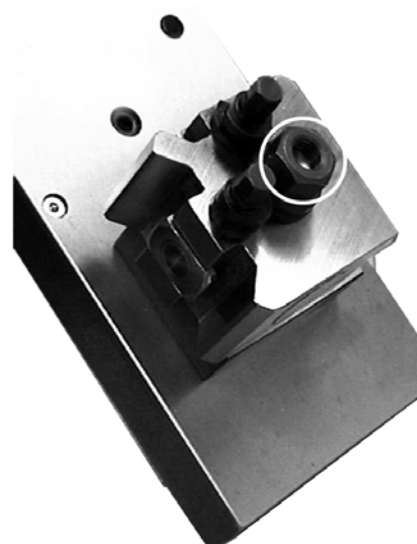
3) Tighten the lockbolts until they just begin to grip the upper surface of the cutting tool body. Tighten each bolt used by one quarter turn. Continue this procedure until all bolts are fully

5: Quickchange Manual Tooling System



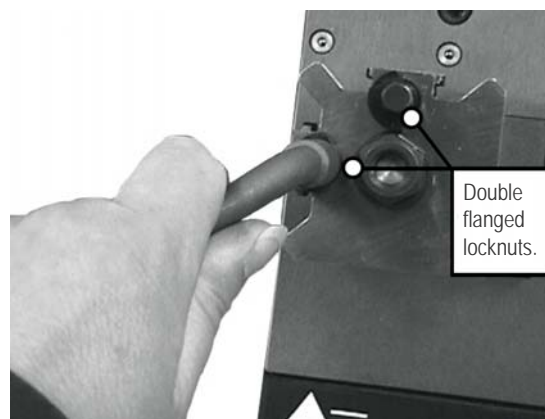
Toolpost Body Angle Adjustment.

To adjust the angle of the toolpost body, use an M10 spanner to release the locknut. The locknut is located on the central toolpost mounting stud, shown circled right. When directly viewing the top of the nut, turn counter-clockwise to loosen or clockwise to tighten.



Fitting the Toolholder to the Toolpost Body.

1) Using the supplied toolpost hex socket key, turn the appropriate locknut so the double flanges are pointing towards the centre of the toolpost, as shown left and below.



Double flanged locknut closed.



Double flanged locknut open.



continued....

5: Quickchange Manual Tooling System

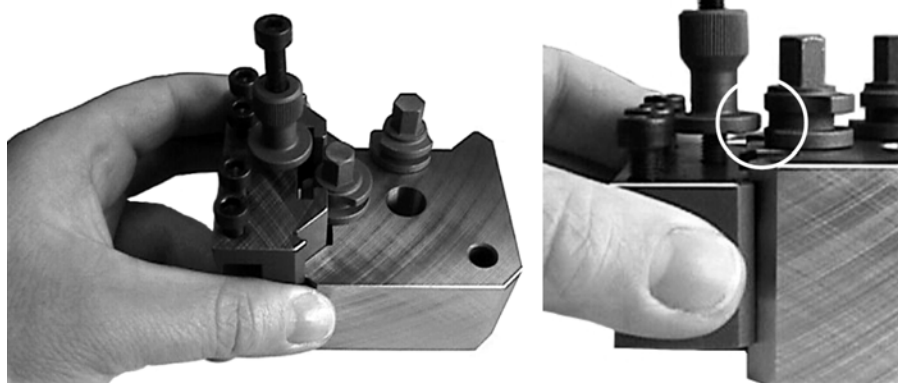
Fitting the Toolholder to the Toolpost Body continued...

Safety First !



Never open the safety guard door and enter the working area when the spindle or machine axes are moving.

2) Aligning the guides on the toolholder with the guides and spring loaded bracket on the toolpost body, slide the toolholder down into the toolpost bracket (shown below left). Lower the toolholder until the single flange on the toolholder height adjustment screw is level with the space between the two flanges on the toolpost locknut (shown below right).



Slide the toolholder onto the toolpost... ..then align the single flange.

3) Turn the toolpost locknut, so the single flange on the toolholder height adjustment screw is loosely held between the two flanges on the toolpost locknut. At this stage, do not fully tighten the locknut, since this will prevent any toolholder adjustment from being carried out.



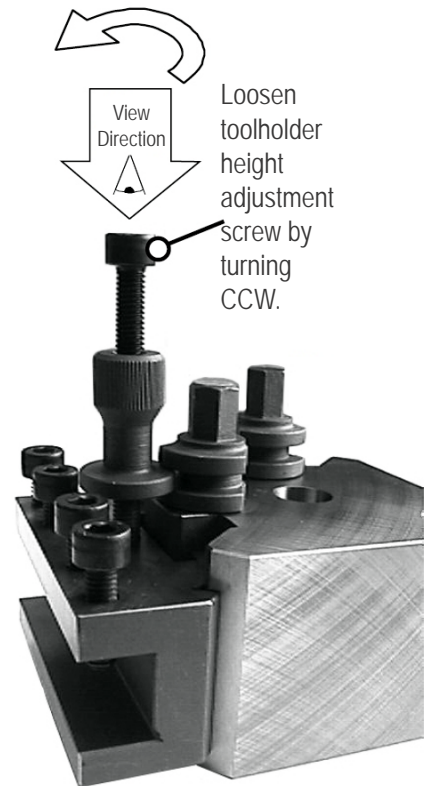
Turn the locknut to its closed position, holding the toolholder in position.

5: Quickchange Manual Tooling System

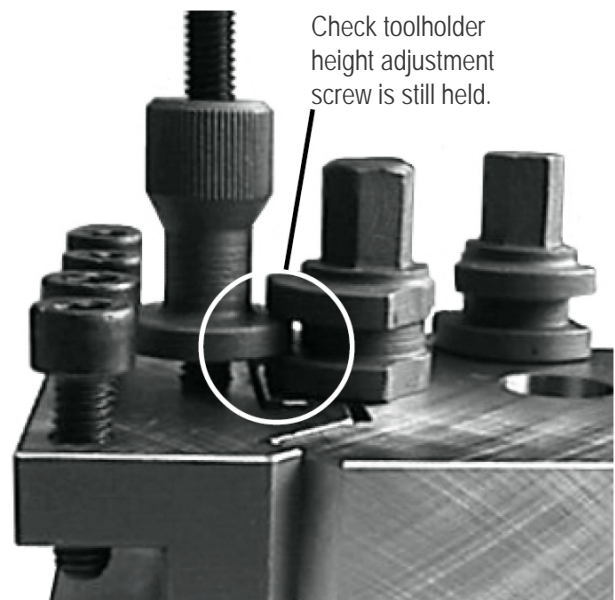
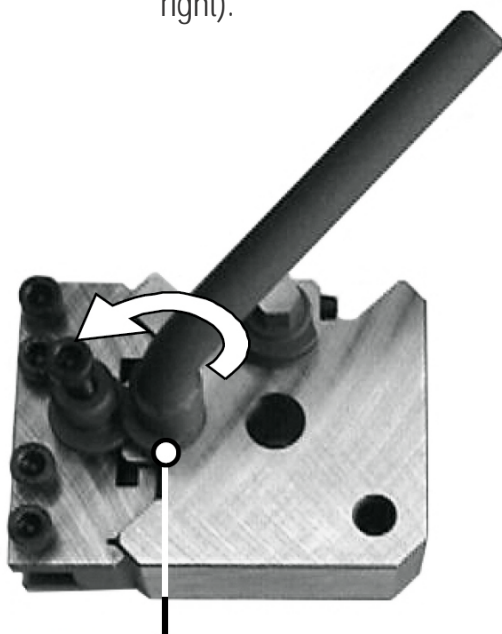
Toolholder Height Adjustment.



1) Using a 4mm allen (hex) key, release the lockbolt on the toolholder height adjustment screw (shown right). When directly viewing the top of the bolt head, turn counter-clockwise to loosen. If you intend to raise the height of the toolholder, you must unscrew the bolt further, to allow toolholder movement.



2) Loosen the double flanged locknut on the toolpost body, if tight. When directly viewing the top of the locknut, turn counterclockwise to loosen (shown below left). Check that the single flange on the toolholder height adjustment screw is still held between the two flanges on the toolpost locknut (shown below right).

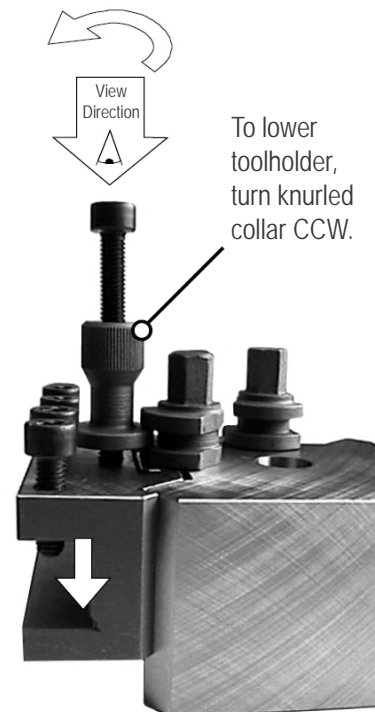
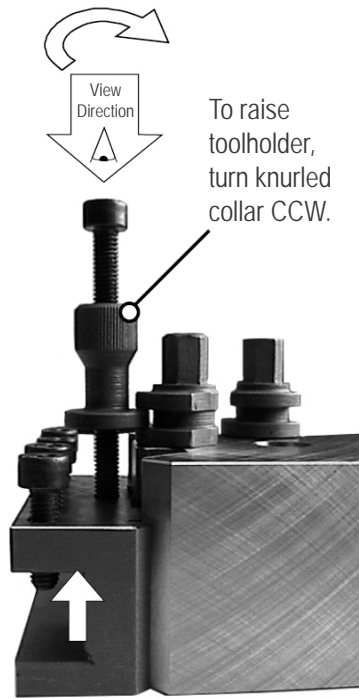


continued...

5: Quickchange Manual Tooling System

Toolholder Height Adjustment continued...

3) Holding the knurled collar, turn the height adjustment screw to raise or lower the toolholder. When directly viewing the top of the screw, turn counter-clockwise to lower or clockwise to raise the toolholder.



4) Tighten the double flanged locknut on the toolpost body, then screw in and tighten the lockbolt on the toolholder height adjustment screw.

6: Automatic Indexing Tooling System

Introduction.

The optional Automatic Indexing Toolpost is designed to automatically change cutting tools, when required. Each numbered toolpost station, or slot, is designed to contain one tool holder, which in turn contains the cutting tool profile.

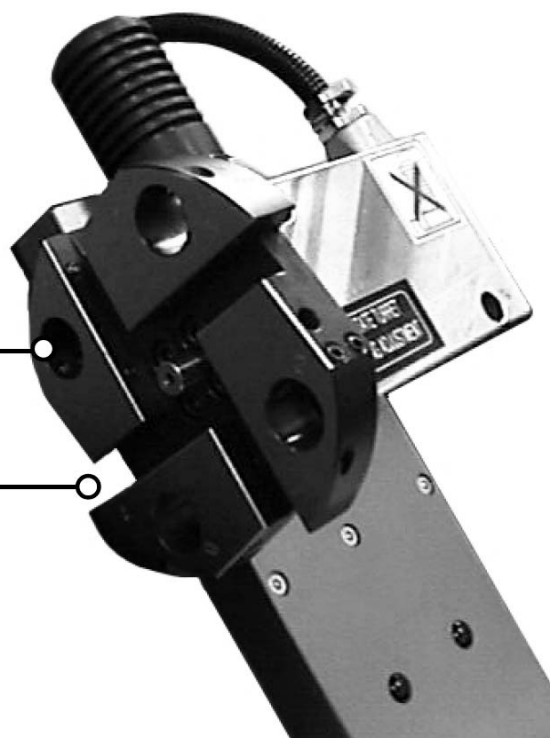
On an eight station toolpost, diameter turning / external working tool profiles, such as roughing or threading profiles, must be assigned to the odd numbered stations, 1, 3, 5, 7. End / internal working tool profiles, such as boring bars or drills, must be assigned to the even numbered stations, 2, 4, 6, 8. This will directly affect how tool numbers are assigned to the cutting tool profiles used by your CNC program.

For example, if your CNC program used a roughing profile, finishing profile and drill, odd tool numbers must be assigned to the roughing profile and finishing profile, whilst an even number must be assigned to the drill.

Denford recommends that you establish a standardised numbering system for the most common tool profiles used with your CNC programs.

Even numbered circular hole stations are used for end / internal tool profiles.

Odd numbered straight slot stations are used for diameter turning / external



6: Automatic Indexing Tooling System

Automatic Tooling System Fitting Tools.

The following tools are used to fit and adjust the components on the automatic indexing toolpost.



M5 Spanner.



4mm Allen
(Hex) Key.



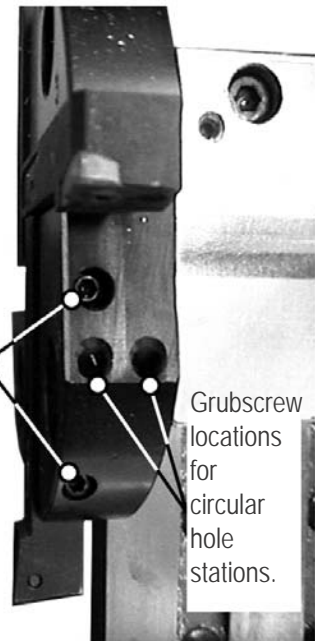
2.5mm Allen
(Hex) Key.

Fitting a Toolholder to the Toolpost.

- 1) If required, fit the cutting tool profile in an appropriate toolholder.
- 2) Using a 4mm allen (hex) key, unscrew the two grubscrews on the appropriate numbered toolpost station. When directly viewing the top of the grubscrews, turn counter-clockwise to loosen or clockwise to tighten them.



This is the currently active cutting tool.
Diameter turning / external tools must be fitted with the cutting edge facing down.



Grubscrew locations for straight slot stations.

Grubscrew locations for circular hole stations.

- 3) Place the cutting tool / toolholder into the numbered station, in the correct orientation. Diameter turning / external tools must be fitted with the cutting edge facing down.
- 4) Tighten the grubscrews until they just begin to grip the cutting tool / toolholder. Continue to tighten each grubscrew by one quarter turn. Continue this procedure until both grubscrews are fully tightened and the cutting tool / toolholder is held securely.

6: Automatic Indexing Tooling System

Height Adjustment of the Automatic Indexing Toolpost.



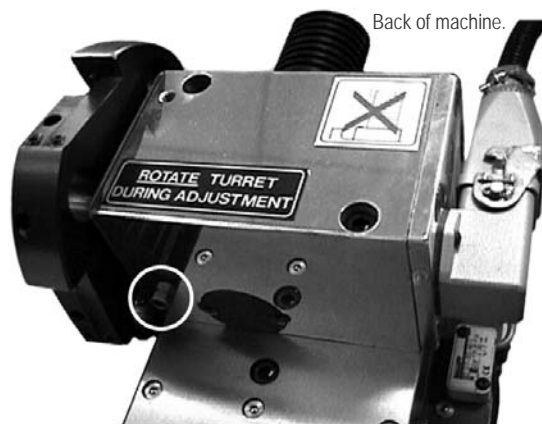
Any height adjustments made to the toolpost will be applied equally to all tool profiles used in the various numbered toolpost stations.

To adjust the height of the toolpost:

1) Using an M5 spanner, release the locknut on the lower grubscrew, mounted on the toolpost side facing the front of the machine. Next, release the locknut on the upper grubscrew, mounted on the toolpost side facing the rear of the machine. When directly viewing the face of a locknut, turn the spanner in an anticlockwise direction to unscrew.



Above: The "upper" locknut/grubscrew (circled), mounted on the toolpost side facing the back of the machine, is used to release the toolpost height adjusting mechanism.



Above: The "lower" locknut/grubscrew (circled), mounted on the toolpost side facing the front of the machine, is used to adjust the height of the toolpost.

2) Using a 2.5mm allen key, unscrew the upper grubscrew, mounted on the toolpost side facing the rear of the machine, by 3 or 4 complete revolutions. When directly viewing the face of a grubscrew, turn the allen key in an anticlockwise direction to unscrew.

3) Using your CNC machine control software, enter a tool change request that will allow the turret to revolve. Ideally, this will be the number of the tool to be adjusted.

continued...

6: Automatic Indexing Tooling System

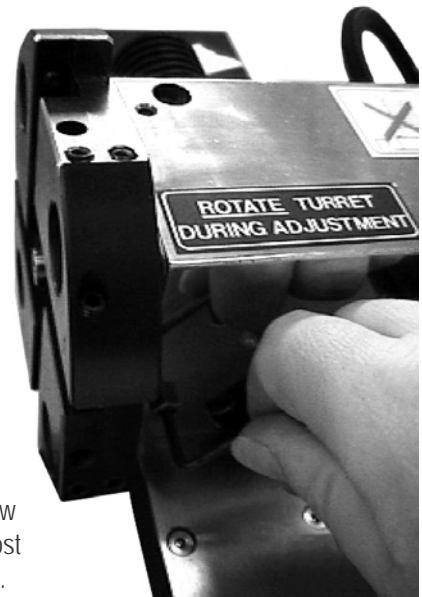
Safety First ! - [X]



Never open the safety guard door and enter the working area when the spindle or machine axes are moving.

4) **Whilst the turret is in motion**, adjust the height of the toolpost by turning the lower grubscrew, mounted on the toolpost side facing the front of the machine. When directly viewing the face of a grubscrew, turn the 2.5mm allen key in an anticlockwise direction to increase the toolpost height, or in a clockwise direction to decrease the toolpost height.

Warning - Do not attempt to adjust the height of the toolpost when the turret is stationary. This could result in serious damage to the locking plate inside the toolpost body.



Right: Turn the "lower" grubscrew to adjust the height of the toolpost ONLY when the turret is moving.

5) Using a 5mm spanner, retighten the locknut on the lower grubscrew, mounted on the toolpost side facing the front of the machine. When directly viewing the face of a locknut, turn the spanner in an clockwise direction to tighten.

6) Using a 2.5mm allen key, retighten the upper grubscrew, mounted on the toolpost side facing the rear of the machine, until you feel the grubscrew make contact with the inner plate. When directly viewing the face of a grubscrew, turn the allen key in an clockwise direction to tighten.

7) Finally, using a 5mm spanner, retighten the locknut on the upper grubscrew, mounted on the toolpost side facing the rear of the machine. When directly viewing the face of a locknut, turn the spanner in an clockwise direction to tighten.

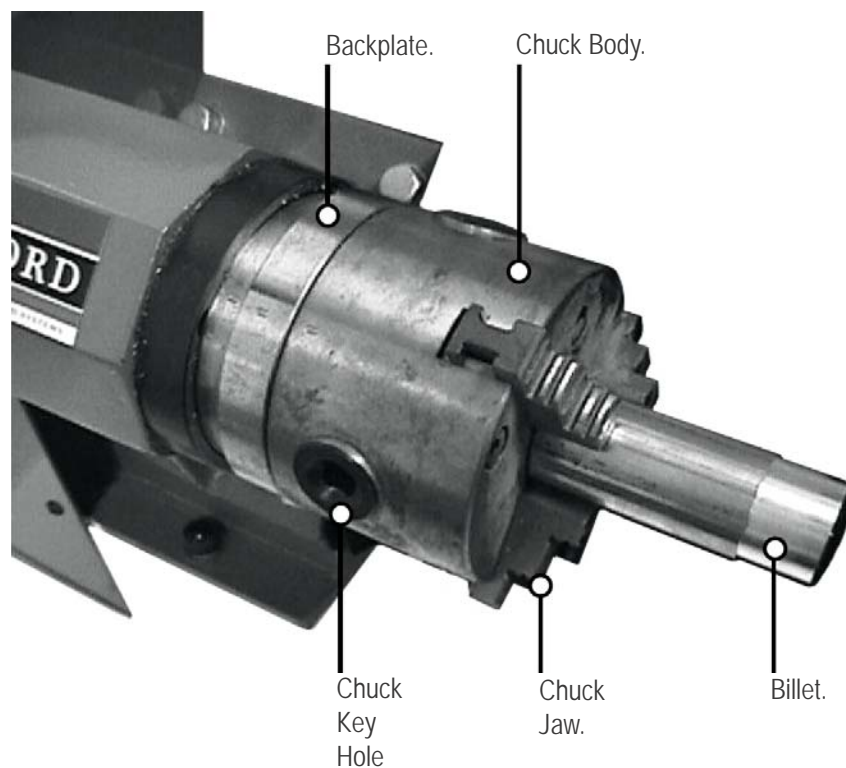
7: Manual Chuck Operation

Introduction.

The manual 3 jaw self-centring chuck is supplied as standard with the TURN 270 CNC lathe, unless an optional pneumatic chuck has been specified.

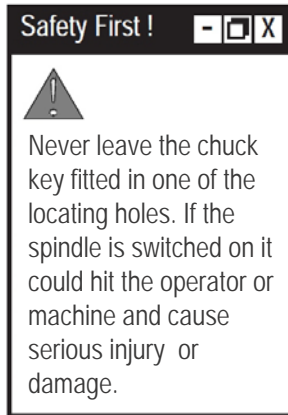
The system comprises three basic elements:

- i) The backplate, which is secured against the spindle nose - not supplied when 100mm chuck is fitted.
- ii) The chuck body, which is secured against the backplate or against the spindle nose in the case of the 100mm chuck.
- iii) One set of external chuck jaws (fitted to the chuck shown below) and one set of internal chuck jaws. Three jaws are provided in each set.



7: Manual Chuck Operation

Fitting the Billet in a Manual 3 Jaw Chuck.



1) The chuck jaws are adjusted using a chuck key - a "T" shaped bar with a square locating peg, shown below. This fits into one of the three square holes equally spaced around the perimeter of the chuck body.

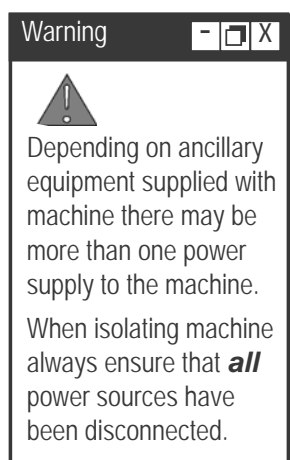
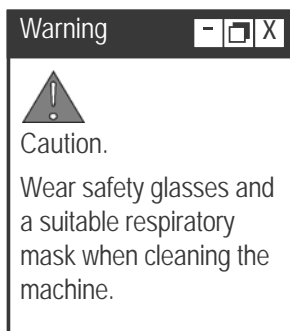


2) Open the chuck jaws by turning the chuck key in a counterclockwise direction, until there is sufficient space to fit the billet, as shown below.



- 3) Place the billet between the chuck jaws. If possible, try to position the billet so that the largest amount of material is held inside the chuck, or by the chuck jaws.
- 4) Whilst supporting the billet inside chuck body, close the chuck jaws by turning the chuck key in a clockwise direction.
- 5) Check the billet is held securely in the chuck jaws. Remove the chuck key from the square locating hole.

8: Planning Procedure for Maintenance



When carrying out any maintenance, pay special attention to the following items, ensuring safe and correct working procedures in accordance with Health and Safety Regulations in your establishment:

- Before starting any maintenance work, define the task and obtain the information relevant to carry out the maintenance. Also, define the time period needed to complete the task, to obtain the correct tools and order any spare parts, if required.
- During the maintenance work period, display a suitable notice stating that the machine is under maintenance and should not be used until the notice is removed.
- Safety must be a priority when carrying out any maintenance work. Covers and safety guards that are removed during the maintenance work must be replaced after the task is completed.
- All work must be carried out by suitably qualified personnel.
- Never attempt to access the electronic hardware systems of the machine with the mains power switched ON.
- Hazardous voltages can still exist immediately after switching off the power. If the machine has previously been switched on, wait at least 5 minutes before attempting to open the electrical panel access plate.
- When replacing electrical components, ensure the new parts are of suitable replacement specification.
- All work completed on the machine, whether progressive, or preventative, should be logged to ensure a complete service record is available for future referral. We recommend the following two pages are used to log any maintenance tasks undertaken.
- When maintenance work has been completed, check that the replaced or serviced parts work correctly, before allowing general operation of the machine.

9: Maintenance Schedule

Every Day

- Remove any swarf.
- Clean tooling system and tool holders.

Every Week

- Clean the machine thoroughly.
- Check all exposed screws and nuts for tightness.
- Visually check door and window for signs of cracks or chips.
Any damage should be reported immediately to Denford and a suitable replacement obtained without delay.
Door Part Number ST6/0612
Window Part Number ST6/0613

Every Two Months

- Check the condition of any electrical connections.
- Check and thoroughly clean all components of the tooling system.
- Check all cables for kinks and breaks.
- Check door hinges for correct tension and adjust if necessary.
If, after fully hand tightening the centre screw of both hinges with an appropriate tool, the door falls when released from a position 15 degrees forward of vertical, new hinges should be obtained and fitted without delay.
Denford part Number BI01229

Every Three Months

- Lubricate the machine ballscrews.
- Clean microswitches.

Every Six Months

- Lubricate the machine slideways.
- Remove the chuck jaws and clean the chuck.

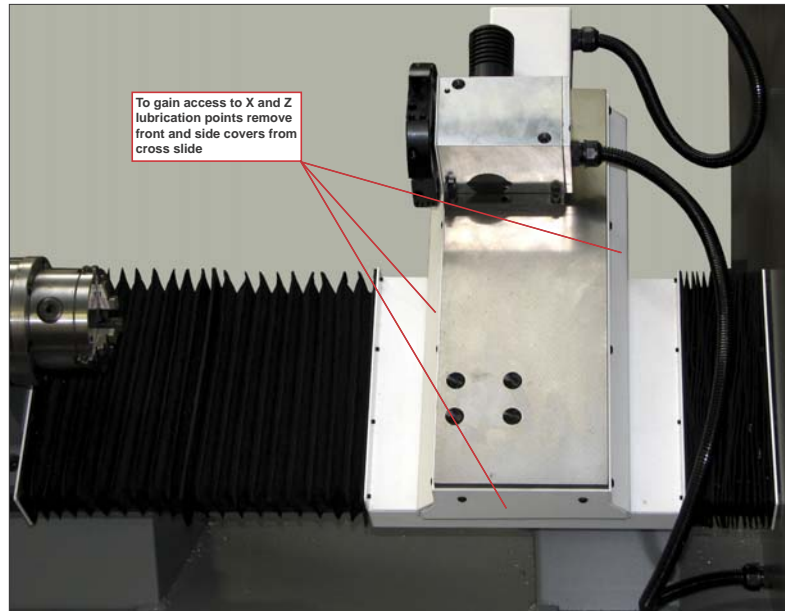
Every Year

- Check machine alignments and accuracy.
- Check spindle bearing adjustment.
- Check and regrease axis bearings.
- Check spindle drive belt for wear.

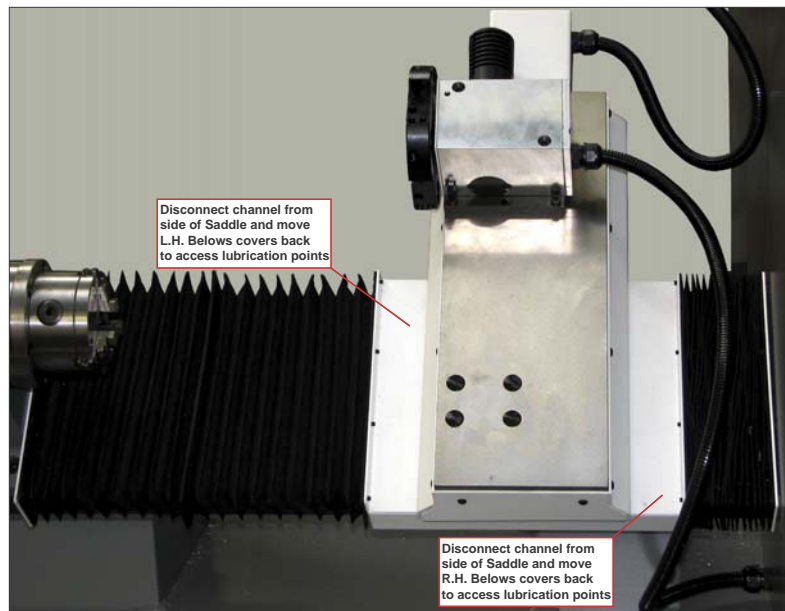
10: Lubrication Chart

Lubrication point	Lubricating System	Frequency	Recommended Lubricant	Quantity
Machine Slideways	Grease Gun to Grease Nipple	Every 6 Months	Shell Alvania II or equivalent	Apply until grease exudes from seals
X Axis Ballscrew	Grease Gun to Grease Nipple	Every 3 Months	Shell Alvania II or equivalent	Apply until grease exudes from seals
Z Axis Ballscrew	Grease Gun direct to Screw Shaft	Every 3 Months	Shell Alvania II or equivalent	Apply 3 shots along exposed length of shaft
Axis Bearings	Apply by Syringe	Every 12 Months	Shell Alvania II or equivalent	2cc/bearing
Spindle Bearings	Apply by Syringe	On Bearing Renewal	Kluber Isoflex NBU15	4cc/bearing

11: Ballscrew and Slideway Lubrication

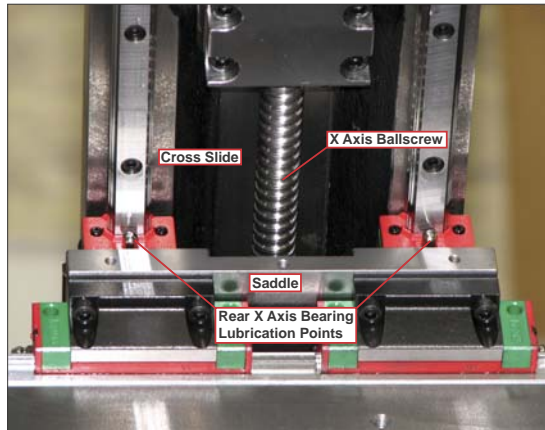


To gain access to X and Z Slideway and Ballscrew lubrication points, and X and Z home switches, remove cross slide covers as shown above.

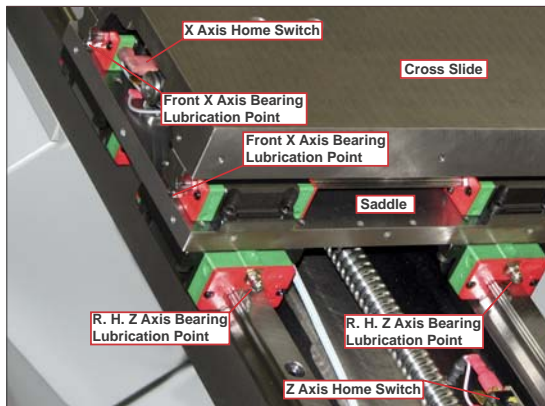


Also disconnect channels from the side of the saddle as shown above, and withdraw respective bellows covers.

11: Ballscrew and Slideway Lubrication

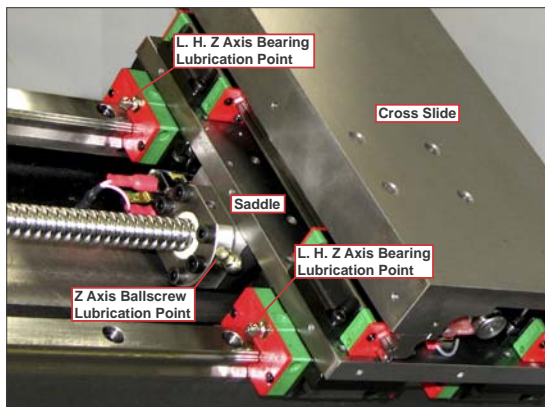


For best access to rear X axis slideway lubrication points and X axis ballscrew lubrication jog X axis to uppermost position. To lubricate X axis ballscrew, apply 3 shots of grease along the exposed length of the ballscrew. Jog X axis fully from end to end of travel. Repeat 3 times.



For best access to front X axis lubrication points and Z axis home switch, jog X axis to uppermost position.

For best access to R.H. Z axis lubrication points, and Z axis home switch, jog Z axis to L.H. side of machine.



For best access to L.H. Z axis slideway lubrication points, and Z axis ballscrew lubrication point, jog Z axis to R.H. side of machine.

12: Cleaning the Microswitches

The X and Z axes have home position microswitches.

Using a soft bristled brush, carefully clean dust and debris away from the microswitches, to an area where it can be removed using a vacuum cleaner.

For location of these switches see above.

13: Maintenance Log

Date of maintenance work.	Name of personnel carrying out the maintenance.	Details of maintenance work completed.

13: Maintenance Log

Date of maintenance work.	Name of personnel carrying out the maintenance.	Details of maintenance work completed.



14: Technical Support

Denford Limited provides unlimited telephone and e-mail Technical Support on this CNC machine to registered users. On-site visits by our engineers may be chargeable. Please refer to the information held in your separate Warranty pack, for specific details.

Before contacting Denford for support, please read your hardware and software manuals and check the Denford websites for support.

Internet (access technical support and FAQ sections):

www.denfordata.com/bb

When you request support, please be at your CNC machine, with your hardware and software documentation to hand. To minimise delay, please be prepared to provide the following information:

- CNC Machine Serial Number (from the machine ID panel).
- Registered user's name / company name.
- The CNC machine control software name and version number (from the "Help/About" menu option).
- The wording of any error messages that appear on your computer screen, if applicable.
- A list of the steps that were taken to lead up to the problem.
- A list of any maintenance work that has been carried out on the CNC machine.

Contact Details:

Denford Limited,

Armytage Road, Brighouse, West Yorkshire, HD6 1QF, UK.

Telephone: 01484 728000

Fax: 01484 728100

E-mail: customerservices@denford.co.uk

Technical Support: Monday to Friday 8.30am - 4.30pm GMT

For international dialling: +44 and remove first 0 in each city code.



15: Specification of the TURN 270

Safety Features:

- Manual operation, totally enclosed, interlocked, safety guard door.
- Emergency stop button.
- Toolpath graphics to verify part programs prior to machining.

Mechanical Details:

- Travel X axis - 150mm (6")
- Travel Z axis - 225mm (9")
- Swing Over Bed - 190mm (7.5")
- Swing Over Cross Slide - 100mm (4")
- Distance Between Centres (Non-Revolving Centre) - 270mm (10.5")
- Distance Between Centres (Revolving Centre) - 225mm (9")

Dimensions:

- Machine width - 1000mm (39.5")
- Machine width with base - 1600mm (63")
- Machine height - 675mm (26.5")
- Machine height with base - 1440mm (56.5")
- Machine depth - 750mm (29.5")

Weights:

- Machine weight - 140kg (308 lbs)
- Machine weight on base - 255kg (560 lbs)

Electrical Details:

- Mains supply required:
220/240Volts, 50Hz, 8 Amps.
- Spindle motor: 1.5 kw
- Spindle Speeds: 0 - 4000RPM.
- Axis stepper motors

Performance:

- Rapid traverse rate up to 2500 mm/min (197 in./min)
- Max Feed traverse rate up to 2500 mm/min (197 in./min)

16: EC Declaration of Conformity for Machines Prior to 29.12.09



EC Declaration of Conformity

The responsible person Mr P T Harkness
Business Name Denford Limited
Address Brighouse
 West Yorkshire
 United Kingdom

Declares that the machinery described:
1. Make Denford Limited
2. Model TURN 270
3. Serial Number

Conforms to the following The Machinery Directive 98/37/EC
Directives The EMC Directive 89/336/EEC
 The LVD Directive 73/23/EEC

Also the following standards
(where applicable)

And complies with the relevant
health and safety requirements

Signature of responsible person
.....

Position Senior Design Engineer
Signed at Brighouse
 West Yorkshire
 United Kingdom

16: EC Declaration of Conformity for Machines After 29.12.09



EC Declaration of Conformity

The responsible person and person authorised to compile the Technical File

Mr P T Harkness

Business Name

Denford Limited

Address

Armytage Road
Brighouse
West Yorkshire
HD6 1QF
United Kingdom

Declares that the machinery described:

1. Make Denford Limited
2. Model TURN 270 Lathe
3. Serial Number

Fulfils the relevant provisions of the following Directives

Machinery Directive 2006/42/EC
Low Voltage Directive (LVD) 2006/95/EC
EMC Directive (2004/108/EC).

Also the following standards (where applicable)

EN 953 1997 + A1 2009: Safety of machinery – Guards. General requirements for the design and construction of fixed and movable guards.
EN 954-1 1997: Safety of machinery - Control systems - Part 1 General principles for design.
EN 60204-1 2006: Safety of Machinery - Electrical-equipment of machines Part 1 General requirements.
EN ISO 12100-1 2003: Safety of machinery. Basic concepts, general principles for design - Part 1 Basic terminology, methodology.
EN ISO 12100-2 : Safety of machinery. Basic concepts, general principles for design - Part 2: Technical principles.
EN ISO 13732-1 2006: Ergonomics of the thermal environment. Methods for the assessment of human responses to contact with surfaces - Part 1: Hot surfaces.
EN ISO 13850 2008: Safety of machinery - Emergency stop -Principles for design.
BS EN ISO 14121-1 2007: Safety of machinery - Risk assessment Part 1 Principles.
EN 55011 2007: Limits and methods of radio interference characteristics of industrial, scientific and medical equipment. Conducted Emissions.
EN 55011 2007: Limits and methods of radio interference characteristics of industrial, scientific and medical equipment. Radiated Emissions.
EN 61000-4-2: 1995 +A1 +A2 2001: Testing and Measurement Techniques; Electrostatic Discharge immunity test.
EN 61000-4-3: 2002 +A1 + A2 2005: Electromagnetic Compatibility – Basic Immunity Standard. Radiated radio frequency electromagnetic field immunity test.
EN 61000-4-4 2004: Testing and measurement techniques. Electrical fast burst/transient immunity test.

Signature of responsible person

.....

Position

Senior Design Engineer

Signed at

Denford Ltd., Armytage Road, Brighouse

Date

.....

17: TURN 270 Series Noise Level Test Results

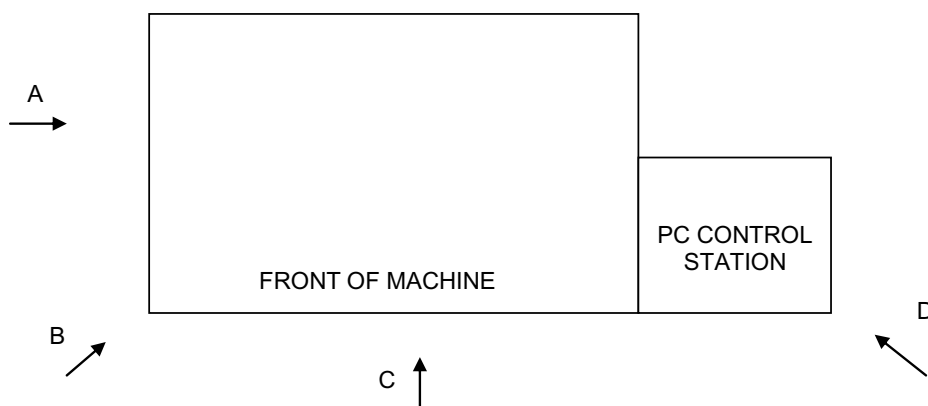
Noise Level test

Test Report No: NL-TRN-02
Machinery Manufacturer: Denford Limited.
Machinery Type/Model: TURN 270 CNC Lathe

Equipment:
Meter Ref. Standard ST-805
Denford TURN 270

Test Conditions:

Spindle speed: 0 - 4000 RPM.
Axis speed: 0 - 2500 mm/min
Ambient background noise: <50 dB(A).



A, B, C, D & E are measurement positions 1 metre from the machine and at a height of 1.6 metres above floor level.

Results;

All values are measured in dB(A)

Condition	A	B	C	D
Test Program	63	62	62	63

Test Program

Spindle speed varying between 0 and 4000 RPM
Machine axes in combination 0 to 2,500mm/min.

The entire test cycle was run at each of the positions shown and the maximum figures registered at each position were recorded in the above table.

18: Glossary

DRIVE	The controller unit for a disk system.
DRY RUN	An operation used to test how a CNC program will function without driving the machine itself.
DWELL	A programmed time delay.
EDIT	The mode used for altering the content of a CNC program via the Desktop Tutor or qwerty keyboard.
END OF BLOCK SIGNAL ...	The symbol or indicator (;) that defines the end of a block of data. The equivalent of the pc [return] key.
ERROR.....	The deviation of an attained value from a desired value.
G-CODE	The programming language understood by the machine controller.
FEEDRATE	The rate, in mm/min or in/min at which the cutting tool is advanced into the workpiece. For Turning and drilling, the feedrate applies to the reference point on the end of the axis of the tool.
FILE	An arrangement of instructions or information, usually referring to work or control settings.
FORMAT	The pattern or way that data is organised.
FNC	FANUC Miller file, extension ".fnc". Contains G and M codes describing the machine and cutting operations.
G CODE	A preparatory code function in a CNC program that determines the control mode.
HARDWARE	Equipment such as the machine tool, the controller, or the computer.
HOME	Operation to send the axes of the CNC machine to their extreme limits of movement. Defines the co-ordinate based grid system of the CNC machine. Commonly referred to as homing the machine, or sending the machine to its home position.
INCREMENTAL	Incremental programming uses co-ordinate movements that are related from the previous programmed position. Signs are used to indicate the direction of movement.
INPUT	The transfer of external information (data) into a control system.
INTERFACE	The medium through which the control/computer directs the machine tool.
JOG CONTROL.....	Manual movement mode for the machine axes, using very small pre-defined movements, called jog steps. One stepped movement is applied per movement key/button press.
M CODE	A miscellaneous code function in a CNC program used to indicate an auxiliary function (ie, coolant on, tool change etc.).
MACHINE CODE	The code obeyed by a computer or microprocessor system with no need for further translation.
MACHINE DATUM	A fixed zero reference point set by the machine manufacturer. The machine datum is used to define the co-ordinate based grid system of the CNC machine. All machining co-ordinates originate from this point. However, this point can be temporarily moved using the machine offset facility.

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MACHINE OFFSET	The workpiece offset file used with VR and real CNC machines.
MDI	Manual Data Input - A method used for manually inserting data into the control system (ie, Desktop Tutor, qwerty keyboard etc.).
MODAL	Modal codes entered into the controller by a CNC program are retained until changed by a code from the same modal group or cancelled.
NC	Numerical control.
OFFSET	Combination of two types of file, the workpiece offset and the tool offset. Used to describe the workpiece datum, a zero reference used on the CNC machine to ensure machining occurs in the correct place on the billet. Offsets are used to shift parts of the three dimensional co-ordinate based grid system, used by the CNC machine.
PART DATUM	Used as a zero reference point in a CNC file. All machining co-ordinates originate from this point.
PART PROGRAM.....	A list of coded instructions which describes how the designed part, or component, will be manufactured. The part program is also referred to as the CNC file, program, or G and M code program.
PC	Personal computer.
PRJ	Denford CNC Project file, extension ".prj". Project files contain global information about user defined settings in the VR CNC Turning software, such as tooling setup, tooling library, offsets, toolbar and window positions etc.
PROGRAM	A systematic arrangements of instructions or information to suit a piece of equipment.
RAPID TRAVERSE	Fast movement of the cutting tool through the 3 machine axes between cutting settings.
REFERENCE POINTS	The machine has 3 reference points used in setting the limits of movement for its slides (axes).
RPM.....	Revolutions per minute (rev/min) - a measure of spindle speed.
SIMULATION OFFSET.....	The workpiece offset file only used with VR CNC Turning software 2D and 3D graphics.
SLIDES.....	The 3 machine axes - see axis.
SPINDLE	Rotating element of machine head, into which cutting tools are fitted.
SPINDLE SPEED	The rate of rotation (velocity) of the machine head / cutting tool, measured in RPM.
SOFTWARE	Programs, tool lists, sequence of instructions etc...
TOOL OFFSET	When machining, allowances must be made for the size of tools being used, since they all differ in length. The tool offset is the amount the Z value must be moved (or offset), so that all the different cutting tool tips used line up with each other, so they can all be used by one CNC file. See OFFSET.
TRAVERSE	Movement of the cutting tool through the 3 machine axes between cutting settings.
TXT	Standard Windows text only file, extension ".txt".
WORK (WORKPIECE)	The actual material being milled. The work is sometimes referred to as the billet or



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WORKPIECE DATUM	Used as a zero reference point on the real billet. All machining co-ordinates originate from this point, when offset files are used.
WORKPIECE OFFSET	A file containing X, Y and Z values that can shift the entire three dimensional co-ordinate based grid system, used by the CNC machine. See OFFSET.
WORD	A combination of a letter address and digits, used in a CNC program (ie, G42, M04 etc.).
VIRTUAL REALITY.....	A fully interactive, three dimensional, computer based simulation of a real world object or event.
XNC	Denford Compiled CNC file, extension ".xnc". A compiled file is a FANUC Miller file that is formatted to allow 3D elements such as the 3D Viewer to run as quickly as possible. XNC files can also be used to drive an attached CNC machine when run through the VR CNC Turning software.
Z TOOL OFFSET	See Tool Offset

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Language :

This manual is written using European English.

Questions and Comments :

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