

#### Contact Details:

Denford Limited, Birds Royd, Brighouse, West Yorkshire, HD6 1NB, UK.

For General Enquiries:

Telephone: 01484 712264 Fax: 01484 722160 E-mail: info@denford.co.uk

#### For Customer Services and Technical Support:

Telephone: 01484 722733 Fax: 01484 722160 ISDN: 01484401157:01484401161 E-mail: customerservices@denford.co.uk Technical Support: Monday to Friday 8.30am - 4.30pm GMT

For Sales Enquiries:

Telephone: 01484 717282 Fax: 01484 718229 E-mail: sales@denford.co.uk

Denford Limited reserves the right to alter any specifications and documentation without prior notice. No part of this guide or its accompanying documents may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of Denford Limited. All brands and products are trademarks or registered trademarks of their respective companies. Copyright Denford Limited - Version 2.04.02. All rights reserved.





Microrouter CNC Machine Quickstart Guide

approved

#### Contents

Warning Notices	. 3
About this Guide	.4
Before Beginning to Setup	. 5
Safety Features - Overview and Precautions	.6
Safety Features - Emergency Stop Button	.7
Safety Features - Interlock Guard Switch	. 8
Unpacking & Lifting your Microrouter	.9
Deciding on a Site for your Microrouter	. 10
Levelling your Microrouter	. 10
Connecting the Mains Supply	. 11
Accessing the Microrouter Electrical Panels	. 11
Electrical Diagrams	. 11
Connecting your PC to the Microrouter	. 12
Removal of Protective Coatings	. 14
Dust Extraction & General Wood Precautions	. 14
Component Connection Schematic Diagram	. 16
Switching the Microrouter On	. 17
Switching the Microrouter Off	. 18
Technical Support	. 18
CD-ROM based Manuals	. 19

#### Notes

Use this section to make a note of any parts of the software you have changed or configured, for example, common tooling set-ups, machine parameters, changes to installation paths or passwords etc.

### **CD-ROM** based Manuals

The CD-ROM below contains full versions of your CNC machine and control software manuals, for use as a CD based on-line reference, copying onto your computer system, or printing into traditional hard copies. All manuals are provided in Adobe Acrobat (.pdf) format - ensure that the Adobe Acrobat Reader software, included on the CD-ROM, is installed on your computer before attempting to access the manuals.



## Switching the Microrouter Off

Warning - 🗇 X	Follow these instructions to switch off your Microrouter:
	<ol> <li>Wait for the Microrouter to fully complete any machining or processing of any operational instructions.</li> </ol>
Never attempt to access the electronic hardware systems of the machine	<ol> <li>Open the safety guard door and remove any finished parts from the working area.</li> </ol>
with the mains power switched ON.	<ol> <li>To close down the communication link between the Microrouter and your PC, exit the CNC control software, as described in your</li> </ol>
Note that hazardous	separate CNC Control Software User's Manual.
immediately after switching off the power.	<ol> <li>To cut power to the Microrouter, press the square, red, Microrouter on/off power switch to the up (off) position.</li> </ol>
If the machine has previously been switched on, wait at least 5 minutes before attempting to open the electrical panel access plate.	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 the Microrouter.

# **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 FAQ section on our website.

When you request support, please be at your CNC machine, with vour 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.
- 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 are provided on the back page of this guide.

# Warning Notices

#### Warranty Disclaimer.

The Warranty on your Microrouter CNC 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. 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 Microrouter CNC 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 Microrouter CNC machine.

#### Foreseen Use of Machine

Your Microrouter CNC machine is designed for routing hard and soft woods, certain ceramics and plastics. In each case, the appropriate tooling, speeds and feeds should be used as recommended by the material supplier. Your Microrouter CNC machine is not intended for use with any ferrous or metallic materials.

Facility is provided for dust extraction. Always use the machine coupled to a vacuum system.

Do not attempt to use your Microrouter CNC machine for manual operations. Do not remove the router head and attempt to use it independently of the machine. 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.

### About this Guide

Using this manual	This guide provides information describing how to transport, site and setup your Denford CNC machine. Information regarding the operation and maintentance of your CNC machine is included in the full CNC machine and control software manuals, supplied in Adobe Acrobat format, on CD-ROM.
	Please note that the Electrical Diagrams for your CNC machine are not included in this guide or the CD-ROM - they are delivered separately in the standard equipment box supplied with your machine.
	If you have any doubts and/or questions regarding the specification, servicing, or features of your CNC 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.
Disclaimer	We take great pride in the accuracy of information given in this guide, but due to nature of hardware and software developments, be aware that specifications and features of this product can change without notice. The information contained in this guide is correct at the date of printing only - April, 2002. 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.
Language	This manual is written using European English.
Contact	Any comments regarding this manual should be referred to the following e-mail address: customerservices@denford.co.uk

### Switching the Microrouter On

Warning - D X	<ul> <li>Follow these instructions to switch on your Microrouter:</li> <li>1) Check the RS232 machine lead is fitted securely between the serial (COM) port socket on the machine controller PC and the RS232 socket, located on the righthand end panel of the Microrouter cabinet.</li> </ul>
hardware with the mains power switched on, since this could seriously damage components inside your	<ol> <li>When fitted, check the RS232 controller lead is fitted securely between the serial (COM) port socket on the machine controller PC and the RS232 socket on the DeskTop Tutor controller keypad.</li> </ol>
CNC machine.	<ol> <li>Check that all access panels are in position and securely fastened.</li> </ol>
	<ol> <li>Check that all inlet/exhaust vents are clear from obstructions.</li> <li>Check the flexible hose from your separate dust collection vacuum system is securely fitted to the connection hole, located on the lefthand end panel of the Microrouter cabinet</li> </ol>
	<ul><li>6) Plug the Microrouter mains supply cable into an available power socket. Switch the power socket on.</li></ul>
Warning - I X	7) The square, red, Microrouter on/off power switch is located on the righthand end panel of the cabinet. Press the switch to the down (on) position. The switch will illuminate when power is being supplied to the electronic components.
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 access	If the Microrouter does not begin its power-up routine, switch off the mains power supply to the CNC machine. Check all connections and fuses, referring to the CD-ROM machine manu - Section 8 - Machine Electronics, if necessary.

8) Switch on the machine controller PC and start the CNC control software. Establish a communication link with the Microrouter please refer to your separate CNC Control Software User's Manual for details outlining this procedure.

If a communication link cannot be established, recheck the connections on the RS232 machine lead, followed by the communication settings of your CNC control software, referring to the CD-ROM machine manual - Section 9 - Technical Support, if necessary.

plate.

### Component Connection Schematic Diagram



#### \* Note

The RS232 serial cable connects the Microrouter to the PC port labelled COM 2. The RS232 cable is the long, thin cable fitted with a 9 pin D female connector at one end and a 25 pin D male connector at the opposite end. Connect the 25pin D male end of the RS 232 cable to the 25 pin D female **RS 232** port on the righthand side panel of the Microrouter. Connect the remaining 9 pin D female end of the RS 232 cable to the 9 pin D male **COMP** port on your PC. Note - a 9 pin to 25 pin adapter may also be required if your COM port has a 25 pin connection.

#### Before Beginning to Setup...

Before beginning to setup your Microrouter 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 - 🗖 X Note Microrouter CNC machine: The standard equipment listed here is Microrouter CNC machine. Note that the precise specification of correct at the time of your Microrouter will depend on any options selected at the time printing - April, 2002 of ordering (see below). but is liable to change • 1 x RS 232 serial link cable (25-9 pin connection)\*. through continuous development of our 1 x Metric allen/hex keys (2mm, 2.5mm, 3mm, 4mm, 5mm, 6mm). products. 2 x spanners. Please refer to your • 1 x routing bit \*\*. invoice for the definitive 1 x 6.3A fuse. list of standard 1 x silicone lubricant aerosol can. equipment shipped with your machine. 1 x Microrouter CNC machine warranty pack. 1 x Microrouter CNC machine inspection certificate. - 🗆 X 1 x Microrouter CNC machine manual (this book) plus additional Note OEM product manuals (as required). \* Short 9-25 pin serial • 1 x CNC Machine Control Software manual. link adaptor cables can be used to convert the 1 x CNC Machine Control Software CD-ROM and/or floppy disks. RS232 connectors according to the type of COM port fitted to your The following optional equipment may also be supplied with, or computer. ordered for, your Microrouter CNC machine: Additional Software: CAD/CAM. Offline CNC Machine Control. Machine work bench and/or PC & PC workstation. Note - 🖪 X Vacuum table. \*\* Only use the Vacuum for dust collection. Microrouter CNC machine with standard Additional work holding systems. 1/4" or 1/8" shank · Various tooling packages. routing bits, designed · Courseware, project books and project material packages. for operational speeds Video conferencina system. up to and including 26.500RPM. Additional and/or on-site training courses.

- 🗖 X

## Safety Features - Overview and Precautions

#### Safety Features Overview.

The following safety features are standard on your Microrouter CNC machine:

- 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 & 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 Microrouter CNC machine.

General Safety Precautions :

- Wear clothing suitable for machine operation 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.
- 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. 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 electrical control panels.
- If power fails turn off the mains power switch immediately and unplug the machine from the mains power socket.
- Lubricate the required machine areas at the intervals specified in this manual, to prevent the axes from seizing (see the Maintenance section for further details).
- Observe caution when adding or removing machine tooling.
- When an emergency stop is required, press the circular red emergency stop button, located on the right front panel of the machine.

### **Dust Extraction & General Wood Precautions**

Dust Extraction Exit Hole Location.



#### General Wood Dust Safety Precautions.

Obtain "material safety data sheets" from your material suppliers and enforce the recommended precautions. Be aware that certain hardwood dust particles, such as oak, are known carcinogens. Please consult your materials supplier for further details.

Wood dust particles that remain inside the working area of the Microrouter, after a part has been machined, should be removed using the vacuum. The dust extraction pipe can be withdrawn from the end panel of the Microrouter and used for this purpose. NEVER USE A PRESSURISED AIRLINE for this purpose.

When emptying the dust extraction system base unit, wear suitable respiratory protective equipment that is CE marked. Other personal protective equipment, such as eye protection, overalls and gloves should also be considered.

Wood 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.

The following health problems are among the effects associated with exposure to wood dust particles:

- · Skin disorders.
- · Obstruction to the nose.
- Rhinitis.
- Asthma.
- Nasal cancer.

### **Removal of Protective Coatings**

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

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

#### Safety First! - D X

# Warning

The silicone lubricant aerosol is extremely flammable. Never use the silicone lubricant aerosol near a naked flame, on any other machine, or for any other purpose. Carefully read and follow any instructions or notices included with the aerosol. Wear safety glasses and a suitable respiratory mask when using the aerosol

2) Tie-wraps may be used in the working area of the machine, to prevent movement of X axis components during transit.

To gain entry to the working area of the machine, power must be supplied to the machine, in order to release the switch that locks the safety guard door.

Insert the mains supply plug into an available socket, then power up the machine using the square red on/off switch mounted on the righthand side panel of the Microrouter cabinet. The on/off switch will illuminate when power is being supplied to the machine.

Cut and discard the tie-wraps.

 Before using the machine, spray the slides and leadscrews with the silicone lubricant (aerosol can) provided.

### **Dust Extraction & General Wood Precautions**

#### Dust Extraction Systems.

Your Microrouter is designed to run with a dust extraction system, used to remove any potentially harmful wood dust particles from within the working area of the machine.

The dust extraction system used should be independently tested to ensure that dust is kept well below the maximum exposure limits set by law. Denford can supply dust extraction systems for your Microrouter, or you may wish to connect your own existing system. The Microrouter should only be used with the dust extraction system enabled.

Connect the pipe from your dust extraction system to the exit hole, located in the top, rear corner of the left end of the Microrouter cabinet. An adapter may be required, in order to obtain an efficient seal.

# Safety Features - Emergency Stop Button



The emergency stop button is located on the right front panel of the machine.



To active 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 the machine. When pressed, it has the effect of stopping all axes and spindle movements immediately. The 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 machine.

To active 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.

### Safety Features - Interlock Guard Switch



An interlock guard switch is fitted to the front machine door. The switch itself is hidden from view behind the cabinet metalwork. A closed machine door will remain locked when:

- The machine is switched off (ie, not in use). To release the lock, power up the machine, using the square red on/off button on the right cabinet end panel.
- The emergency stop button is fully pressed in. To release the lock, push in and turn the emergency stop button counterclockwise until it spring back out to its ready position.
- Machining is taking place. The lock will release when the machining operations have been completed and the CNC control software switched to operate in jog mode.

Front of machine (note metalwork casing shown removed).





### Connecting your PC to the Microrouter

Warning - X X Do not connect cables

both connect cables between any electrical hardware with the mains power switched on, since this could seriously damage components inside your CNC machine. 4) Connect the remaining 9 pin D female end of the RS 232 cable to the 9 pin D male COM port on your PC, ideally COM 2. Most computers usually have two COM ports situated on the back panel of your PC. If you cannot identify any of the ports on your PC, please refer to your original PC manufacturers operating manual for further guidance. Note that older computers may be fitted with a 25 pin D male COM port, which may require the fitting of an additional 9 to 25 pin adaptor to your RS 232 cable.



rd Short (standard) pin D 9 pin D COM port.



25 pin D male connector fitted to pc (back) panel. 25 pin D female connector fitted to RS232 cable (using a 9 to 25 pin adaptor).

9 pin D female connector fitted to RS232 cable. 9 pin D male connector fitted to pc (back) panel.

5) Do not confuse the 25 pin D female parallel (printer) port on your PC with the 25 or 9 pin male D COM ports. If your CNC machine control software is supplied with a security key, the 25 pin D male connector of this key must be fitted to the 25 pin D female parallel port, as shown right. Security keys are also referred to as dongles.

A schematic diagram illustrating these component connections is shown on page 16.



25 pin D 25 pin D male female connector on connector security key fitted to pc (dongle). (back) panel.

# Connecting your PC to the Microrouter

#### Warning - 🗖 X

Do not connect cables

between any electrical

power switched on.

since this could

CNC machine.

seriously damage

hardware with the mains

components inside vour

To connect your PC to the Microrouter:

- Connect the elements of your PC together as described in your original PC manufacturers operating manual. At this stage, your PC should not be switched on.
- 2) The PC must be physically connected to the Microrouter, using the supplied RS232 cable. This is the long, thin serial link cable fitted with a 25 pin D male connector at one end and a 9 pin D female connector at the opposite end, as shown below right.
- 3) Connect the 25 pin D male end of the RS 232 cable to the 25 pin D female port mounted on the righthand side panel of the Microrouter cabinet (when viewed from the front of the machine), as shown below left. The port is labelled **RS 232**.



#### Note

#### PC Terminology:

The COM ports on your PC may be labelled as Serial ports. Most COM ports have a 9 pin D MALE connector, though some older computers may be fitted with additional PCI COM cards having a 25 pin D MALE connection. In this case, a 9 to 25 pin adaptor cable can be added to the RS 232 cable supplied with your machine. The RS 232 cable supplied with your machine must always be used, since this cable features crossovers on some of the pin connections. You must also configure the machine control software to recognise which numbered COM port is being used by the RS232 machine lead. Details on this procedure are outlined in your separate CNC machine control software manual. The Parallel port on your PC may be labelled as the Printer port. The printer port has a 25 pin FEMALE connector.

# Unpacking & Lifting your Microrouter

Cut the top of the delivery box open and carefully remove any packaging, strengtheners and bracing struts, where fitted.

To obtain better access to the Microrouter, remove all the sides from the delivery box, leaving the machine standing on its wooden delivery pallet.

Remove any support packaging, used to help secure the Microrouter to its pallet. When fitted, these supporting struts are usually positioned between the machine feet sections.



Denford does NOT recommend direct lifting of the Microrouter. Use a professional hoist and a single 500KG (1120 lb), 7 metre (275") endless nylon sling to lift the Microrouter, arranged as shown in the diagram above.

Pass the sling around the middle of the machine casing, spreading the load around the area of the safety guard door handle. Note that the machine will be heavier at the righthand end of the cabinet, due the integrated electronic systems situated here. Perform an assisted lift, whereby the hoist operator and at least one assistant can manually monitor the balance and security of the load as is it moved. To transport the Microrouter over longer distances, use a suitably sized trolley. Always use sensible lifting precautions in accordance with Health and Safety Regulations in your establishment.

- 🖪 X

# Deciding on a Site for your Microrouter

Site your Microrouter in a well ventilated room. The Microrouter is a bench mounted machine, so it should be sited on a bench of sturdy construction to take the weight of the machine and of a height which enables comfortable operating and programming to take place.

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, we recommend positioning the pc on a movable workstation, to allow easier access to the various vents and removable panels on the Microrouter cabinet, when required.

Position any vacuum pumps used with the dust extraction at the rear, or under, the machine table. 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.



Plan View showing Ideal Machine Layout and Operating Positions.

#### Levelling your Microrouter

Your Microrouter rests level on the two hollow sections which run beneath the machine cabinet. The machine itself has been levelled to the machine cabinet prior to dispatch, so it is only necessary to level the table on which the Microrouter is to be situated.

#### Connecting the Mains Supply

Warning - D X Do not connect cables between any electrical	The Microturn is delivered with standard mains specification cable connected directly into the isolator. The cable should be fitted with a standard 13 amp plug suitable for the mains power supply. All electrical connections should be completed by suitably qualified electrical engineers.
naroware with the mains power switched on, since this could seriously damage components inside your CNC machine.	Mains supply required: 50/60 Hz, 1 Phase, 110/115, 16 AMP - 220/ 240 Volts, 8 AMP. Cable required: 3 Core, 1.5mm <sup>2</sup> per core. Spindle motor: 1.5HP, 5.0 AMP. Axis stepper motors: 200 steps/rev.

#### Accessing the Microrouter Electrical Panels



The Microrouter electronics are loacted in the right end of the machine. Using a 4mm allen (hex) key, remove the eight bolts, then withdraw the cover plate, to gain access to the electrical panel, as shown below.



## **Electrical Diagrams**

The Electrical Diagrams for your Microrouter are not included in this manual - they are delivered separately in the standard equipment box supplied with your machine.

that any inlet/exhaust vents are not covered or blocked.