

PRELIMINARY COPY
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OPERATING MANUAL
FOR THE
R2E3 SERIES I CNC
MILLING, DRILLING & BORING MACHINE

MAY, 1983

Bridgeport[®] **TEXTRON**

Bridgeport Machines Division of Textron Inc.

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SAFETY INFORMATION

To prevent serious bodily injury, you should observe the following basic safety precautions when installing, operating or servicing your Bridgeport milling machine.

1. Follow all instructions in the machine manual.
2. Wear approved industrial safety glasses and safety shoes.
3. **Do not** wear gloves, long sleeves, long hair, rings, watches, jewelry or other loose items that could become caught in moving parts.
4. Keep all parts of your body away from moving parts (belts, cutters, gears, etc.)
5. Use proper point of operation safeguarding.

These and other safety precautions are discussed in the American National Standards Institute Standard entitled *Safety Requirements for the Construction, Care, and Use of Drilling, Milling, and Boring Machines* (ANSI B11.8-1974).

This publication is available from: The American National Standards Institute
1430 Broadway
New York, New York 10018

Safeguarding for protection at the point of operation can only be designed and constructed when the parameters of the particular operation have been determined. As a result, ANSI B11.8-1974, Section 5.1, states that "*it shall be the responsibility of the employer to provide, and ensure the use of, a guard, guarding device, awareness barrier, awareness device, or shield...*".

To assist machine users in designing point of operation safeguarding for their specific machine applications, the Occupational Safety and Health Administration has published a booklet entitled *Concepts and Techniques of Machine Safeguarding* (O.S.H.A. Publication Number 3067).

This publication is available from: The Publication Office — O.S.H.A.
U.S. Department of Labor
200 Constitution Avenue, NW
Washington, D.C. 20210

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION

1.1	PURPOSE AND SCOPE	1-1
1.2	REFERENCE MANUALS	1-2
1.3	GENERAL DESCRIPTION	1-2
1.4	ARCHITECTURE	1-2
1.4.1	Milling Machine	1-3
1.4.2	Control And Power	1-4
1.4.3	ElectroMechanical Interface	1-6
1.5	MODES OF OPERATION	1-6
1.5.1	Set Up Mode	1-6
1.5.2	Run Mode	1-6
1.5.3	MDI Mode (Manual Data Input)	1-6
1.5.4	MDI Store Mode	1-6

CHAPTER 2 OPERATOR'S CONTROLS AND INDICATORS

2.1	OPERATOR CONTROLS	2-1
2.1.1	Front Panel Control	2-2
2.2	FRONT PANEL	2-3
2.2.1	Machine Controls	2-3
2.2.2	SET UP	2-6
2.2.3	RUN	2-9
2.2.4	Special Operations	2-11
2.2.5	MDI - Manual Data Input	2-12
2.2.6	Status Indicators (LED)	2-14
2.3	POWER & CONTROL/AXIS DRIVE	2-14
2.3.1	Spindle Motor Protection	2-14
2.3.2	Auxiliary Power Outlets	2-14
2.4	PORT A/PORT B INTERFACE SUBSYSTEM	2-15
2.5	RESET SWITCH	2-16
2.6	LUBE & PNEUMATIC CONTROL SUBSYSTEM	2-16
2.6.1	Lube Assembly	2-17
2.6.2	Pneumatic Assembly	2-18

CHAPTER 3 SYSTEM START UP/SHUTDOWN

3.1	START UP	3-1
3.1.1	Prestart Considerations	3-1
3.1.2	System Start Up Procedure	3-1
3.2	CONDITIONS FOLLOWING START UP	3-4
3.2.1	Default Condition	3-4
3.2.2	Self Test Diagnostic Description	3-5
3.2.3	Self Test Error Messages	3-5
3.3	NORMAL SHUTDOWN PROCEDURES	3-6
3.4	EMERGENCY STOP	3-6

3.5	POWER FAILURE	3-6
3.6	RESET	3-6
3.6.1	RESET PROGRAM Key	3-7
3.6.2	RESET Pushbutton Switch	3-7

CHAPTER 4 OPERATION IN SET UP MODE

4.1	SYSTEMS OPERATION	4-1
4.2	MACHINE COORDINATE SYSTEM	4-2
4.3	AXIS JOG	4-4
4.4	ENTERING TOOL DATA	4-5
4.4.1	Manual Knee Adjustment	4-6
4.4.2	TLO Input	4-7
4.4.3	Tool Diameters	4-10
4.4.4	Cutter Diameter Compensation	4-10
4.5	SETTING REFERENCE POINTS	4-11
4.5.1	Reference Point	4-12
4.5.2	Part Program Zero (SET XYZ)	4-13
4.5.3	Clearance Point	4-14
4.6	MOVE OPERATION	4-14
4.7	LOADING PART PROGRAMS	4-15
4.7.1	Baud Rate	4-15
4.7.2	Input From Peripheral Equipment	4-16
4.8	CLEARING DATA	4-18
4.9	EDITING	4-19

CHAPTER 5 EDITING

5.1	PROGRAM EDITING METHODS	5-1
5.2	QUICK EDIT	5-1
5.2.1	FIND	5-2
5.2.2	INSERT	5-3
5.2.3	DELETE	5-4
5.2.4	RECALL	5-4
5.2.5	AUX	5-4
5.2.6	INCR	5-4
5.2.7	POLAR	5-4
5.2.8	"0 - 9", "." (Decimal)	5-5
5.2.9	"-" (Minus Sign)	5-5
5.3	FULL EDIT METHOD	5-5
5.3.1	Description	5-5
5.3.2	Editor Commands	5-5

CHAPTER 6 OPERATION IN RUN MODE

6.1	OVERVIEW	6-1
6.2	NORMAL OPERATION	6-1
6.2.1	Pre-Start	6-2
6.2.2	Starting The Spindle	6-2
6.2.3	Program Run	6-3

6.2.4	AUTO/BLOCK Operation	6-4
6.3	SPECIAL OPERATIONS	6-4
6.3.1	The OPTION Key	6-4
6.3.2	DRY RUN Key	6-5
6.4	SPECIAL CONDITIONS	6-7
6.4.1	Travel Limit Switch	6-7
6.4.2	EMERGENCY STOP	6-7
6.4.3	Spindle Feed Hold	6-7
6.4.4	Feed Override	6-8
6.4.5	Hold	6-8
6.4.6	Screen Error Messages	6-8

CHAPTER 7 OPERATION IN MDI/MDI STORE MODE

7.1	OVERVIEW	7-1
7.2	MDI MODE	7-1
7.2.1	CANNED CYCLE OPERATING NOTES	7-2
7.3	MDI STORE	7-10

CHAPTER 8 OPTIONAL EQUIPMENT

8.1	OPTIONAL EQUIPMENT	8-1
8.2	PAPER TAPE READER	8-1
8.3	EZ-FILE~ MASS STORAGE DEVICE	8-1
8.4	#30 QUICK CHANGE TOOL KIT'	8-2
8.5	I-4 INDEXER	8-2
8.5.1	Physical Description	8-3
8.6	COOLANT SYSTEM - MIST AND/OR FLOOD	8-3
8.7	EZ-CAM~	8-3

CHAPTER 9 TOOLS AND TOOL HOLDERS

9.1	TOOL HOLDERS	9-1
9.1.1	General Description	9-1
9.2	TOOL SETTING	9-2

APPENDIX A SYSTEM STATUS/ERROR MESSAGES

A.1	SYSTEM ERROR MESSAGES	A-1
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APPENDIX B SYSTEM SPECIFICATIONS

B.1	OVERVIEW	B-1
B.2	STANDARD FEATURES OF THE BRIDGEPORT R2E3 SERIES I MACHINE	B-1
B.3	CONTROL FEATURES	B-2
B.4	TOTAL SYSTEM FEATURES	B-4
B.5	LEADING DATA (SERIES I R2E3)	B-5

APPENDIX C

CONNECTORS

APPENDIX D

GLOSSARY

LIST OF ILLUSTRATIONS

FIGURE		PAGE
1-1	The R2E3 System - Functional Blocks	1-3
1-2	R2E3 Series I	1-5
2-1	Operator's Front Panel	2-2
2-2	Machine Controls	2-3
2-3	Speed Range Control	2-4
2-4	Speed Dial R2E3	2-5
2-5	SET UP Mode Controls	2-7
2-6	RUN Mode Keys	2-9
2-7	MDI Mode - Application Keys	2-11
2-8	Tape Reader Adapter/Remote Serial Interface	2-15
2-9	Lube & Pneumatic Controls	2-17
4-1	Set up Mode Keys	4-2
4-2	Machine Coordinate System	4-3
4-3	Preset TLO Measurement	4-9
4-4	Plug Connectors for Tape/Local I/O	4-16
5-1	Quick Edit Controls Front Panel	5-2
9-1	Tool and Tool Holder	9-1
9-2	Tool Setting Drawing	9-3

LIST OF TABLES

TABLE		PAGE
4-1	Reference Points and Tracking Registers	4-12
7-1	MDI & MDI Store Mode	7-3
A-1	Error Message Sets	A-2
A-2	Error Combinations - Hex To Binary	A-3

CHAPTER 1
INTRODUCTION

1.1 PURPOSE AND SCOPE

This manual provides the operator with information and examples necessary to operate the Bridgeport R2E3 Series I CNC Milling Machine. The R2E3 is totally dedicated to Computer Numeric Control (CNC), using BOSS 8 I (Bridgeport Operating System Software, Series I).

This manual is divided into the following major sections:

- o Operator Controls, and Indicators
- o System Start Up/Shutdown
- o System Operating Modes

SET UP

RUN

MDI

MDI STORE

- o Editing Capabilities
- o Optional Equipment
- o Tool Holders
- o Appendix

System Status/Error Messages

System Specifications

o Glossary

1.2 REFERENCE MANUALS

Two other manuals exist for this product.

1. R2E3 Installation and Maintenance Manual (11040529)
2. R2E3 Programming Manual (11040532)

1.3 GENERAL DESCRIPTION

The Bridgeport R2E3 Series I CNC is a Vertical Milling Machine operated via a Front Panel with an LCD (liquid crystal display). It provides 3 axis linear and 2 axis switchable plane circular interpolation. The design makes extensive use of VLSI (very large scale integration).

A communication protocol embedded in BOSS 8 I is used in conjunction with the remote serial interface port, which will be known as Port B. The protocol, EIA RS-491, includes means for checking transmitted data for errors using the following ASCII codes: <DC1> Start Read, <DC2> Device on, <DC3> Stop Read, <EOT> End Transmission.

1.4 ARCHITECTURE

The system contains three sections, see Figure 1-1, all working together as one. The individual sections are:

1. Milling Machine (mechanical)
2. Control and Power (electrical)
3. Interface (electromechanical)

Each section is specialized and interacts with the other two to make the system function as a whole. The milling machine contains all mechanical aspects of the machine and the controller contains all electronic aspects of the machine. The electromechanical interface provides the link between the milling machine and the control.

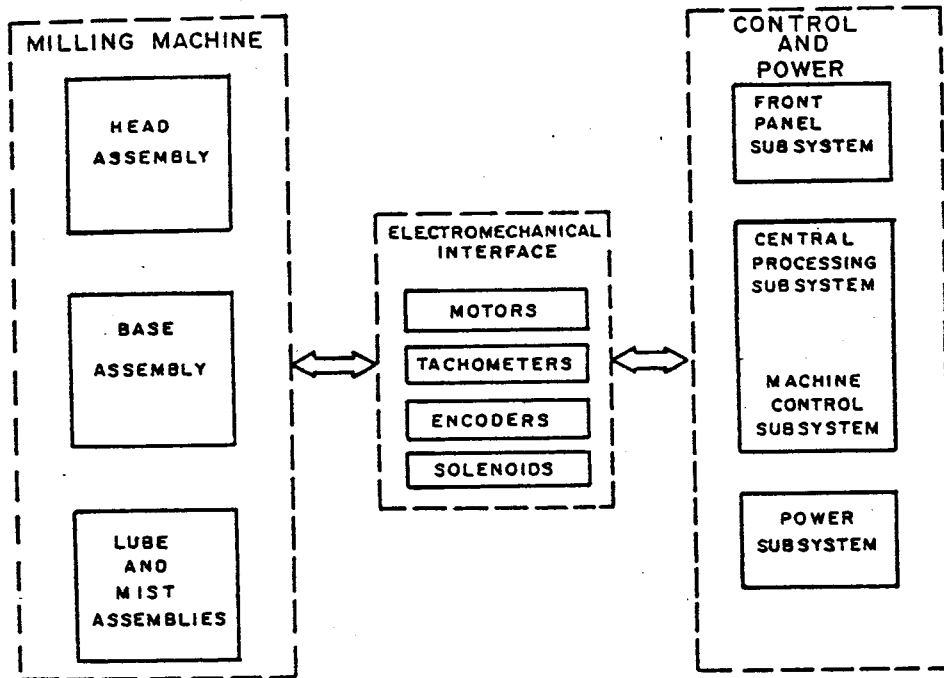


Figure 1-1: The R2E3 System - Functional Blocks

1.4.1 Milling Machine

This section contains (see Figure 1-2):

1. Head Assembly - Contains the mechanical components of the quill (Z axis), the pneumatics and their support structure. The Z axis drive motor and spindle motor are mounted to this support structure.
2. Base Assembly - Contains the saddle (Y axis), table (X axis), knee, and their support structure. The X axis and Y axis drive motors are mounted to this structure.
3. Lube and Mist Assemblies - Contains the air regulator and filter, the lubrication pump and the optional mist assembly. These components are the starting points for the distribution of pressurized air, mist coolant and way lubricant.

1.4.2 Control And Power

This section consists of (see Figure 1-2):

1. Front Panel - Most operator control is through the Front Panel, in any one of four modes following system start up. These modes are; Set Up, Run, MDI (Manual Data Input), and MDI Store. Editing is possible via the Front Panel, however it is intended for use in the Set Up mode allowing modification to existing part programs.
2. Control - All operator and electronic input plus machine feedback is analyzed by this subsystem.
3. Power - Incoming electrical power is conditioned and distributed to the controller and electromechanical parts by this subsystem.
4. Controllers - These convert electrical signals into voltage and current to the DC motors.

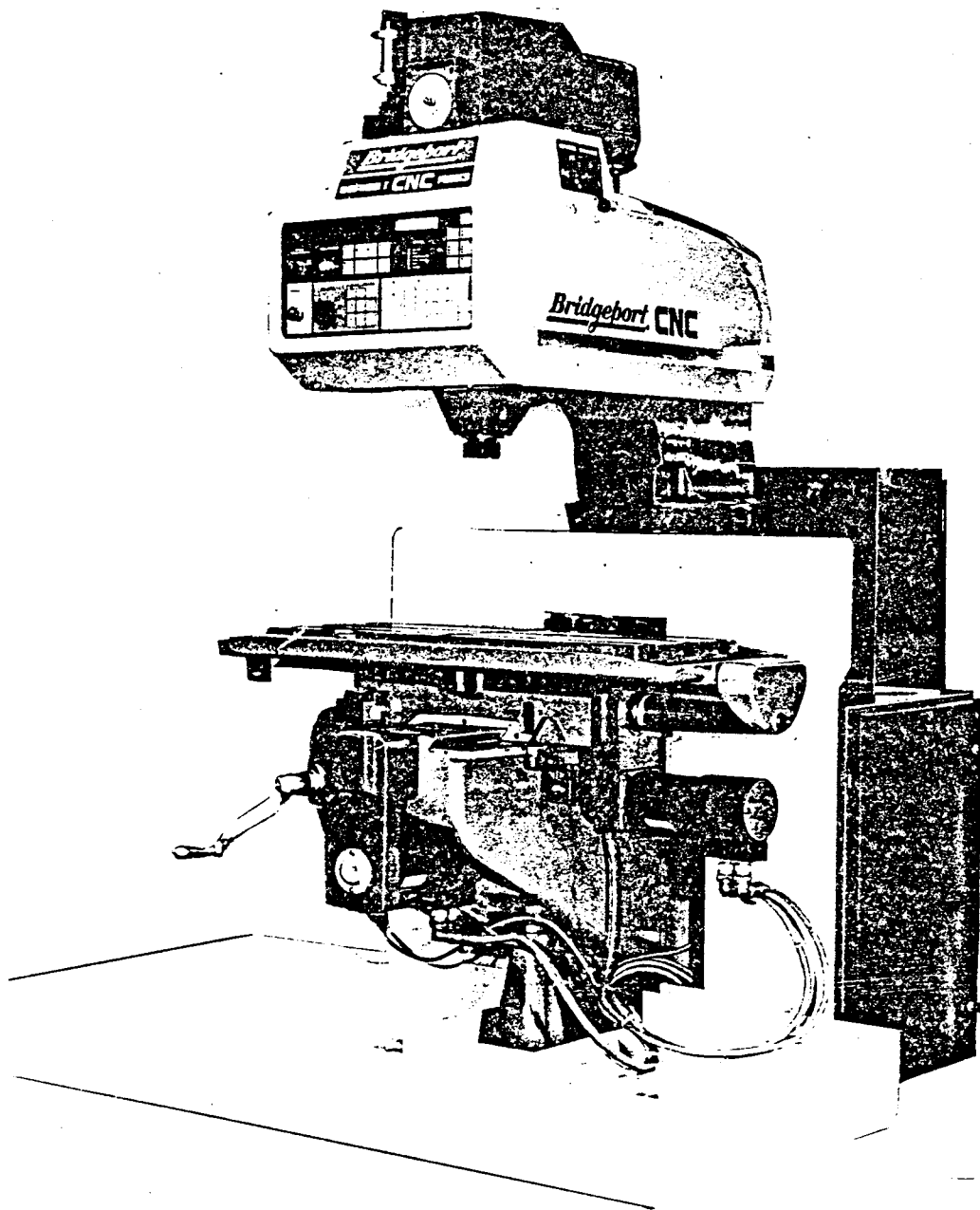


Figure 1-2: R2E3 Series I CNC

1.4.3 ElectroMechanical Interface

This section contains three parts, see Figure 1-2. These parts convert electrical signals into mechanical motion.

1. DC Motors - These take drive current from the control and convert them into axis movements.
2. Encoders and Tachometers - These convert axis movements from the motor into electrical signals which the system can decode.
3. Solenoids - These convert electrical signals to pneumatic and hydraulic power.

1.5 MODES OF OPERATION

1.5.1 Set Up Mode

Set Up prepares the machine for part making. This includes establishing machine reference points, tool characteristics, initial axis positions, and the loading of part programs.

1.5.2 Run Mode

Runs a complete part program previously loaded into memory, either in Automatic or Block-by-Block mode. Run mode will also work with DNC LINK.

1.5.3 MDI Mode (Manual Data Input)

In this mode the operator can input and execute a single program block.

1.5.4 MDI Store Mode

The MDI Store mode allows the operator to input and execute a part program on a block-by-block basis, and store each block at the end of the part program text buffer.