

SECTION I

SERIES I CNC SPECIFICATIONS

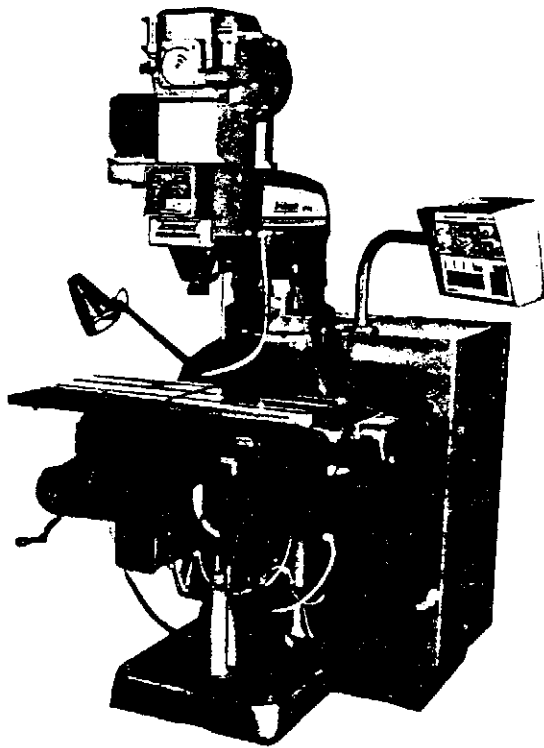
1.1 GENERAL DESCRIPTION (Figure 1-1)

1.1.1 MACHINE

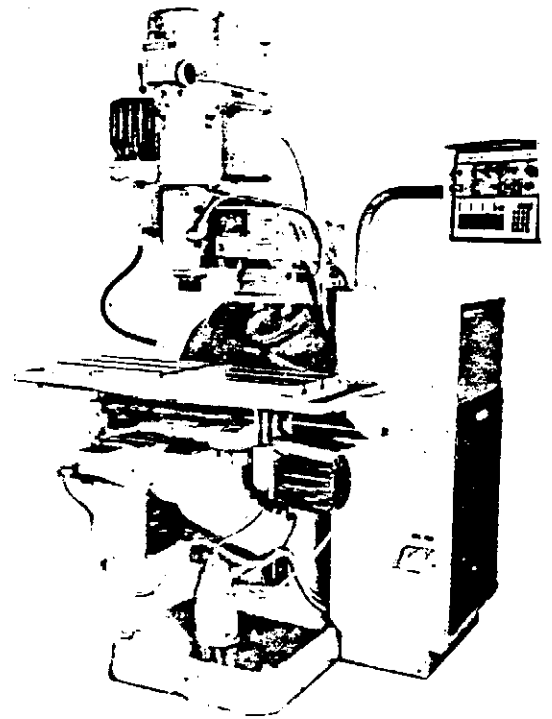
The Series I CNC machine is a specially designed version of the familiar Standard Series I Bridgeport Vertical Milling Machine to enable its full dedication to the needs of Numerical Control. It has special dual knee locks to bind the knee (manually adjusted) to the column. The knee has additional way area at the top to carry the extended deep saddle, and the table is designed for an automatic machine tool. The machine ways are chrome plated for long life, and an automatic one-shot lubrication system is provided. The ballscrew X and Y axis drives are suspended clear of the operator's working area and in such a way that they eliminate any bending moment on the table. The modified (2J) head is rated with a 2HP motor and includes the Z axis drive arrangement through the rotation of the nut in a preloaded recirculating ballscrew. This ballscrew axis is concentric with the quill and, therefore, concentric with the axis of rotation of the spindle to give precise, repeatable control, and additional support to the quill.

1.1.2 CONTROL

The Bridgeport CNC System is a micro computer based machine tool control system designed to provide not only the functions available up to this time on hard wired random logic controls, but to extend the capability of the total system by utilizing computer type architecture. The control program text is stored and may be input to that storage from an optional tape reader or from an external CRT or teleprinter or remote computer - 20 ma serial line interface for such remote equipment is supplied. The storage capacity is equivalent to 80 ft. of prepunched tape and can contain program text in the form of Word Address data (RS-274C). This text can include up to 36 Macro sub routines, each having variables that can be modified in the call statement. The text has additional repetitive sub program capability with looping techniques using up to 4 levels of nested looping instructions. The text editor residing in the micro computer memory enables the entering, altering or outputting of the text through the use of 18 command characters. The control permits 3 axis linear and 2 axis circular interpolation in switchable planes with vector velocity control. Absolute or Incremental data is permitted.



Rigid Ram



V-Ram

"Machine is shown without point of operation guarding for photographic clarity."

Figure 1-1 The Series I CNC

There are 8 canned Z cycles, 24 Z axis tool length offsets and three canned milling cycles (facing, boring and pocketing). A spindle-feed interlock is provided.

1.2 FEATURES OF THE BRIDGEPORT SERIES I CNC

Entire machine design dedicated to Numerical Control and Sold Only for that purpose.

Vertical Heavy Duty Spindle with Class 7 Bearings in 3-3/8" Dia. Quill.
#30 Quick Change Tooling.
2 HP Continuous Duty fan cooled AC Induction Motor.
Spindle Speeds 60-4200 RPM.
Head Design based upon the proven (2J) model.
Heavy head support with Special Ram.
Large Diameter Turret Support from Standard Column.
Dovetail ways throughout.
Chrome plated ways at Table to Saddle and Saddle to Knee juncture.
Ball Screws 1" diameter in X and Y axes totally enclosed.
X ball screw stationary to enable the mounting of its drive on the saddle.
Z ball screw 2" diameter concentric with and mounted to the quill.
Large ball screws supported by steep angular contact Thrust Bearings.
Mechanical Digital Counter for table and saddle position in X and Y axes.
Extended Deep Saddle to promote the accuracy and repeatability of table position.
Dual special locks on the side of the knee to bind the knee to the rigid column.
Table contains Ample Mounting Surface with Deep Coolant Gutters.
Axis Drive Motors mounted entirely clear of the operator's working area.
Travel Limit Switches with Lamp Indicator and override.
Operator's control panel for Setup and Local Control purposes.
Numerical Control System designed and manufactured by Bridgeport-Textron.

1.3 FEATURES OF THE BRIDGEPORT CNC CONTROL SYSTEM

Microcomputer based control capable of storing the equivalent of 80 ft. of EIA RS-358 tape.
Utilizes computer type architecture enabling 16 Macros* and 4 levels of nested loops. *(36 - BOSS 5 & 6)
Designed for the highest versatility, reliability and self diagnosis.
Reference Standards EIA and NEC.
Word Address Variable Block Format to EIA RS-274C.
Reference: n5g2x+34y+34z+34i34j34k34f21s4t2m2.
3-Axis Simultaneous Continuous Path Contouring.
2 Axis Circular Interpolation in the XY, YZ or ZX planes.
Absolute/Incremental Data Input.

Plus or Minus Programming with zero reference at any point.
Controlled Feedrate Direct in IPM at Constant Vector Velocity in any combination of Axis Motion.
Manual feedrate override 1-120% Infinitely Variable.
Acceleration/Deceleration override.
Canned Z cycles (8) including 2 Deep Hole Drilling Routines.
Canned Milling Cycles including Facing, Pocketing and Boring.
Feed hold and Restart without losing information or position.
Full Jog Control of any axis in any direction.
Jog Control with Jog Increments of 1.0, .1, .01, .001" (.0005" for BOSS 6).
Auto/Block/Setup Modes; Manual Data Input (optional).
Restart, Start/Continue, Edit, Remote Data Input Functions Sequence
Bi-directional Sequence Search
Display of Sequence Number, Feedrate, Spindle Speed and Tool Number.
Display of X Y Z Absolute Position, Tool Length Offset and Tool Diameter.
Storage of Tool Length Offset and Tool Diameter for 24 values.
Full Floating Zero Capability.
Programmable Mirror Image Capability, Optional Stop and Block Delete.
Editor with 16 command characters.
Local Interface: RS-232 Compatible or 20 ma Active Current Loop.
Data Input Device: Optional Tape Reader, Teleprinter, or CRT.

TOTAL SYSTEM FEATURES

Single Electrical Power Connection to Fusible Disconnect.
Electrical construction complies with the intent of NFPA 70 and 79.
Control cabinet is mounted on the machine structure.
Interlock on feed if spindle is not operating.
Factory scheduled School for General Training in Operating/Programming (1 man - 1 week).
Factory scheduled School for Maintenance (1 week and special fee).
Factory scheduled School for Computer Programming (1 week and special fee).
Factory Trained Service Engineer's Startup & Operator Training (1 day).
Single Source Service Responsibility - Bridgeport.
One-Year Warranty on Materials and Workmanship of Bridgeport's Manufacture.

1.4 OPTIONAL EQUIPMENT

The following Options are made available for this system;

Diagnostic Routines for on line debugging consisting of a set of punched tape diagnostic programs.

Option	-	Programmable Inch/Metric (Standard with B5 and B6)
Option	-	Manual Data Input (Standard with B5 and B6)
Option	-	Tape Reader
Option	-	Second 20 ma Communication Interface
Option	-	Tape Reader Adapter Panel
Option H1 or H10	-	#30 Quick Change Tool Kit
Option	-	Auxiliary Control Group (Std. with Control S/N 8563 up)
Option	-	Power Speed Changer and Spindle Brake
Option	-	Rigid Ram instead of V Ram
Option	-	Rotary Milling Table
Option B5	-	Cutter Diameter Compensation, Polar Coordinate, Transformation
Option B6	-	BOSS 5 with 0.0005" resolution (Factory fitted only)

Detailed specifications for these options are contained elsewhere.

1.5 LEADING DATA

<u>RANGE</u>	<u>INCH</u>	<u>METRIC</u>
Table Travel (X-axis)	18 in.	457mm
Saddle Travel (Y-axis)	12 in.	305mm
Quill Travel (Z-axis)	5 in.	127mm
Knee Travel (manual)	16 in.	406mm
Throat distance -- V-Ram	6-3/4-18-3/4 in.	171-476mm
R-Ram	14-1/2 in.	368mm
Table to spindle-up at gage line -- V-Ram	2 in.	51mm
R-Ram	6-3/4 in.	171mm
Maximum vertical load uniform distribution	300 lbs.	136kg
<u>TABLE</u>		
Overall Size	42 x 16-1/8 in.	1067 x 410mm
Working Surface	34 x 12-1/2 in.	864 x 318mm
T-Slots	3 on 4-3/8 in.	111mm centers
T-Slot Size	5/8 in.	16mm
Positioning Speed	120 ipm	3048mm/min
Height above floor--max.	50 in.	1270mm
<u>SPINDLE</u>		
Motor Rating	2 hp	1.5kW
Taper	#30 Quick Change	
Speed Range	60-4200 rpm	
Transmission Ratios	1:1 and 8.3:1	
Rapid Approach Rate (Z-axis)	120 ipm	3048mm/min
Controlled downfeed range (Z-axis)	.2-32.0 ipm	5-812mm/min.
Drilling Capacity--mild steel	3/4 in. dia.	19mm dia.
Milling Capacity--mild steel	1.5 cu ins/min	25cc/min
Boring Range	To 4 in.	102mm dia.
Spindle diameter	1-3/8 in.	35mm
Quill diameter	3-3/8 in	86mm

MILLING

Feedrate (BOSS 6)	.2-32.0 ipm (.2-51.0)	5-812mm/min.
Feed Increments	.1 ipm	1mm/min
Override--Infinitely Variable	1-120%	
Vector feedrate control (X Y Z)	Constant to 32 ipm (BOSS 6 - 51 ipm)	812mm/min

POSITIONING

Rapid Traverse X Y Z	120 ipm	3048mm/min
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MACHINE AND CONTROL PERFORMANCE

Positioning accuracy	± .001 in.	0.03mm
Positioning repeatability	± .0005 in.	0.020mm
System resolution Standard (and BOSS6)	.001 in. (.0005in.)	0.03mm (0.02mm)
Control logic resolution	.0001 in.	0.003mm

CONTROL SYSTEM

Control power supply--60Hz.	
3 phase	230V/460V
Control power	6A/3A per phase
Power requirements (3-axis)	1.5kVA
System	Abs/incremental CNC
Format	Word address variable block
Format detail	n5g2x+34y+34z+34i34j34f21t2m2
Reference EIA standards	RS-227,RS-274C,RS-358

CNC FEATURES

Storage capacity	80 ft. of equivalent	24m of equivalent
	EIA RS-358 tape	ASCII
Sub routines	16 Macros (36 with B5 and B6)	
Repetitive programming	4 levels of nested DO-loops	
Editing	16 command characters	
Part Program loading	Tape Reader (optional) or Data Input Device	
Data Input Device	Serial line interface @ 20 ma EIA RS-232 Interface	
Maintenance	Diagnostics Routines (Optional)	

SPACE AND WEIGHT

Floor area	75 x 65 in.	1905 x 1651mm
Height--V-Ram	82 in.	2083mm
R-Ram	86 in.	2184mm
Weight (with control)-V-Ram	2920 lbs.	1326kg
R-Ram	3120 lbs.	1416kg
Shipping weight--V-Ram	3310 lbs.	1503kg
R-Ram	3510 lbs.	1595kg

POWER

Electrical supply--60 Hz.

3 phase

Main power breaker

Electrical rating

230V/460V or 208V special

20A/10A per phase

3kVA

COLOR

Standard

Machine tool gray