

M-142

INSTALLATION MANUAL

FOR THE

SERIES II CNC

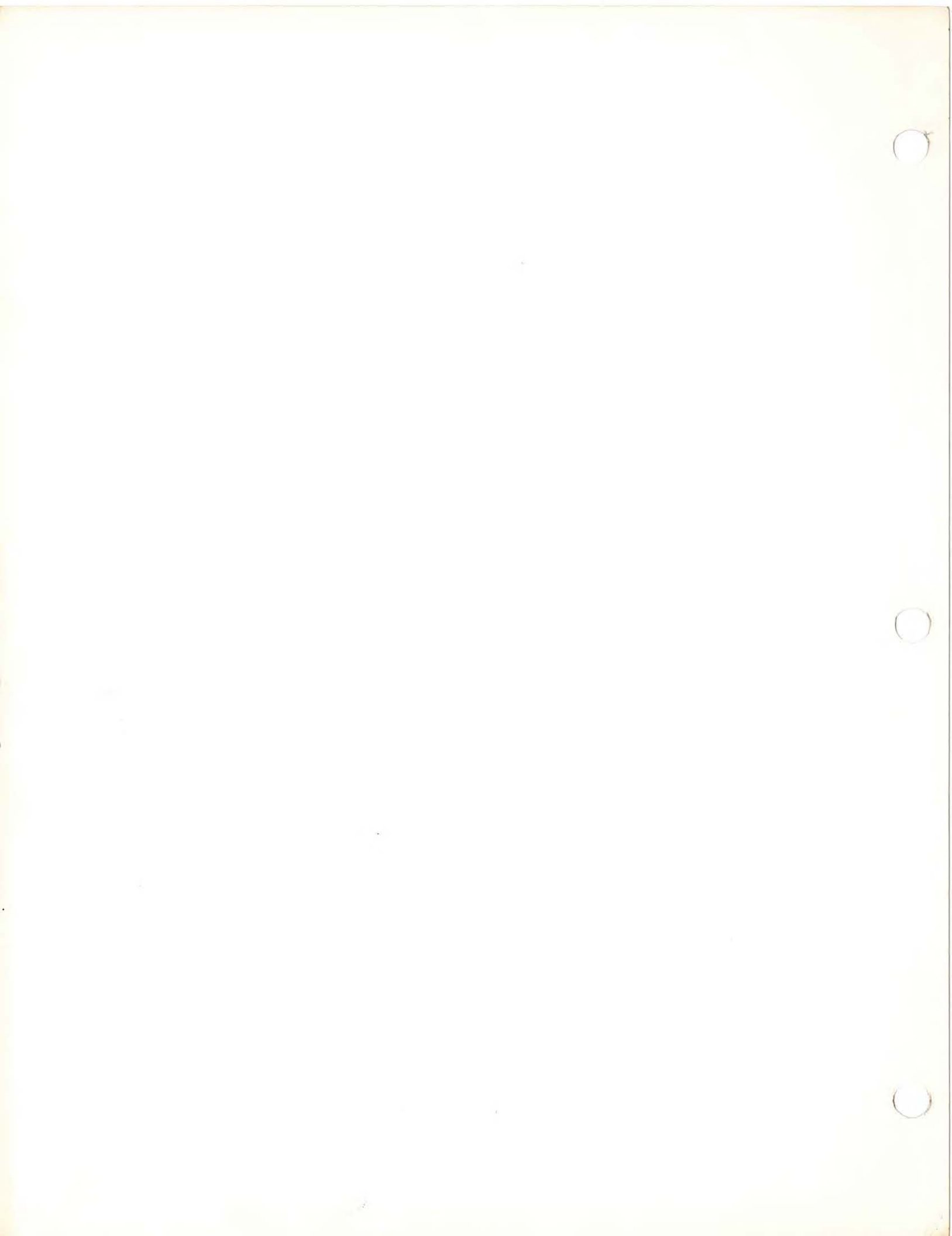
MILLING, DRILLING & BORING MACHINE

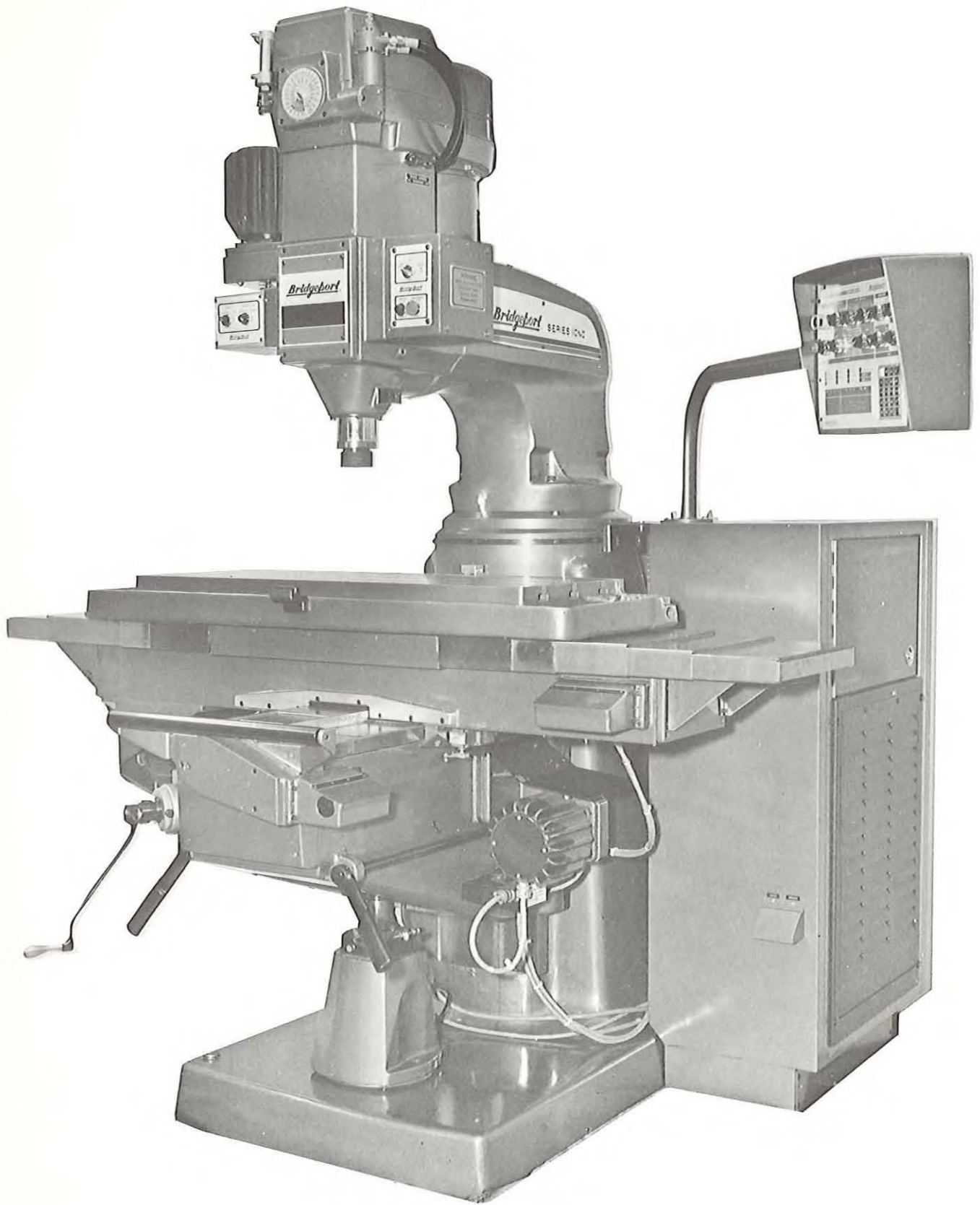
THIS MANUAL PROVIDES INFORMATION WHICH IS PROPRIETARY TO BRIDGEPORT MACHINES AND IS MADE AVAILABLE TO YOU FOR THE USE AND MAINTENANCE OF OUR PRODUCTS. ANY USE, REPRODUCTION, OR DISSEMINATION OF THIS INFORMATION FOR ANY OTHER PURPOSE IS PROHIBITED WITHOUT WRITTEN PERMISSION.

THIS MANUAL CARRIES ADDITIONAL SAFETY PRECAUTIONS AND WARNINGS. READ AND OBSERVE THE REQUIREMENTS OF THE PREFACE AND THE ENTIRE PROCEDURES CONTAINED IN THIS MANUAL.

April 1980

Bridgeport® **TEXTRON**
Bridgeport Machines Division of Textron Inc.





SERIES II CNC

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IMPORTANT

SAFETY NOTICE

This is an Automatic Machine containing several safety features for the protection of all those that operate at or near the Machine.

Perform all actions at the machine in the manner stated.

Do not operate the machine without proper protection. Bridgeport offers a general purpose Chip and Coolant Shield (Reference Option K-10 and ANSI B11.8-1974) which may be obtained through your Bridgeport Dealer. This shield is not intended to meet the needs of every conceivable operation. Special purpose shields or other devices to suit the needs of the machine when performing your specific job may be obtained from sources listed below.

The following discussion is pertinent:

POINT OF OPERATION GUARDING

The proper type of guard at point of operation on a milling machine necessitates sound judgement by the user for the provision of adequate guarding in accommodating the specific type of workpiece being machined.

For an in-depth understanding of "Point of Operation Guarding", Bridgeport recommends the following publication:

"Machine Guarding - Assessment of Need"

Published by
U.S. Department of Health, Education and Welfare
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health
Division of Laboratories and Criteria Development
Cincinnati, Ohio

This publication is available from: The Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

The design of specific type guarding for protection at point of operation on a milling machine can only be completed when the particular workpiece to be machined has been determined. As such, most industrial centers today have numerous manufacturers of machine type guarding. These manufacturers provide both general purpose type guarding and special design type, using both metal and plastic materials.

To assist Bridgeport users, the below-noted manufacturers can build your specifically designed guarding requirements.

- (1) The Cincinnati Ventilating Co., Inc.
7410 Industrial Road
Florence, Kentucky 41042
(1-606-371-1320) - Mr. R. Kevin Martin
- (2) Willco Plastics
918 A South 4th Street
St. Louis, Missouri 63102
(1-314-241-2490) - Mr. R. R. Will
- (3) Plastics Composites Corporation
8301 North Clinton
Fort Wayne, Indiana 46805
(1-219-484-3139) - Mr. John R. Larimore



SECTION I

RECEIVING THE SHIPMENT

1.1 WEIGHTS AND MEASURES

The Series II CNC shipment will consist of one skid supporting the machine and the Machine Control Unit as a single assembly.

<u>Shipping Weight</u>	<u>Load Height</u>
5400 lbs. gross with skid	97"

The machine skid is built up with 3" x 4" and 2 layers of 2" x 8" timbers so that clearance heights must consider the 8-1/4" of skid included in above. For basic widths etc. see Figure 1-1, Drawing No. 80-0015 and Figure 1-2. Skid dimensions are 7' x 6'3".

1.2 UNLOADING THE SHIPMENT

Most machines will be shipped Motor Freight with an enclosed trailer leaving Bridgeport. If the machine is shipped to a rigger for local delivery, no further comment need be made. If the shipment is Motor Freight, the standard trailer height of 51" permits direct interstate transportation within the permissible limits of 13'6".

At the Receiving Dock the skid with the machine may be jacked up for use with rollers or it may be removed with a fork lift truck of adequate capacity (see Figure 2-1).

1.3 SHORTAGES AND DAMAGE

Before signing off the receipt of the goods, check all over for signs of damage to crating, loose equipment, and other signs which may have resulted in hidden damage.

Remove the outer crating and coverings to assess any damage. Check that the bolts securing the machine to the skid are still secure and the straps are tight. Check the group of crates to ensure that the shipment is complete: Coolant Tank, Printed Circuit Cards, Wireway, Tool Holders, Special Tools such as lifting hooks, and any other item that may be on the order.

NOTE: Indicate all parts not received which have been checked off on the packing list. Communicate at once with your Bridgeport Dealer if there is some doubt about the equipment.

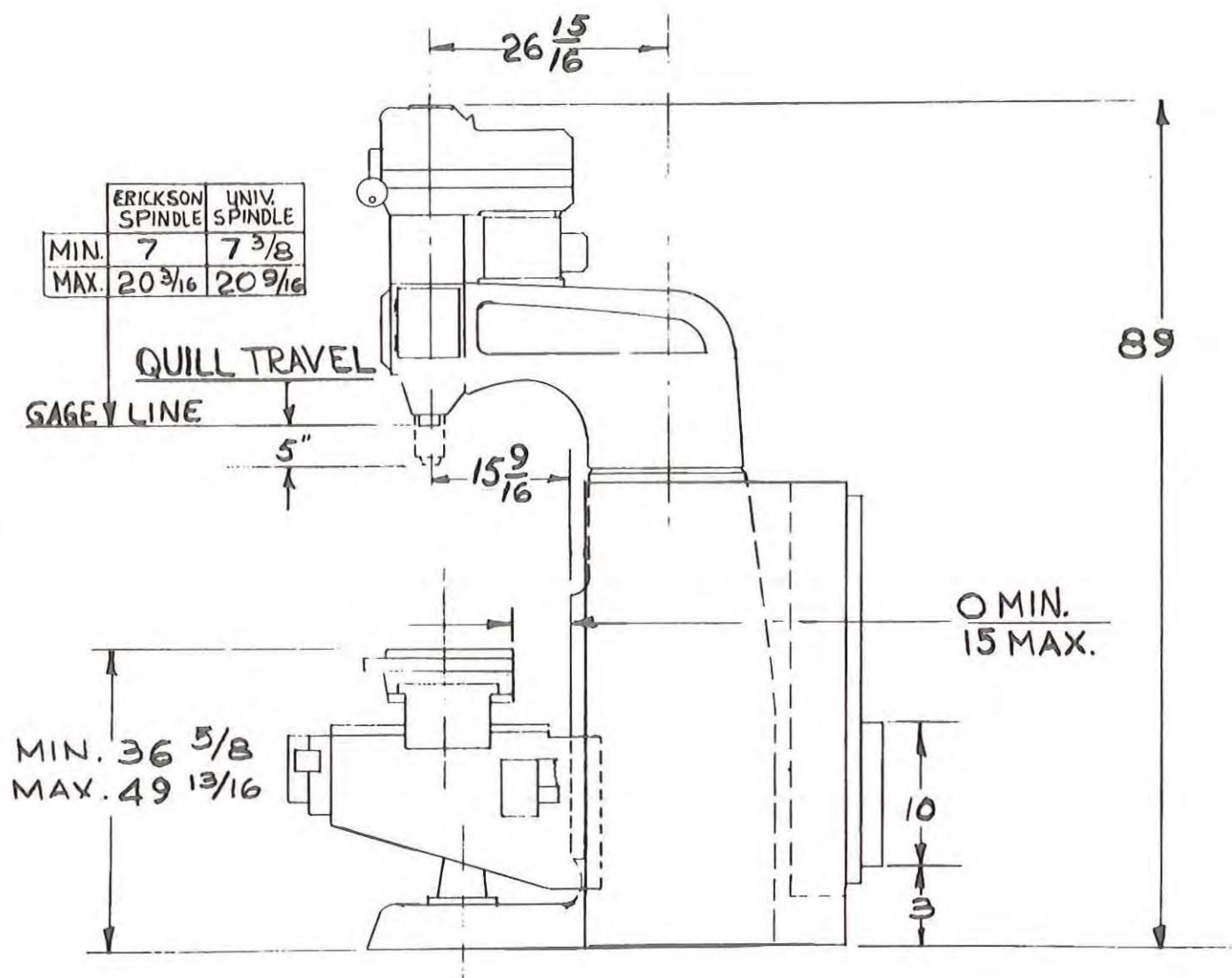


Figure 1-2. Series II CNC Side Elevation

SECTION II

LIFTING THE MACHINE

2.1 ON-SKID TRANSPORTING

This simple means of lifting the equipment is readily apparent when the machine is still on its skid. This means has been noted when removing the machine from the Motor Freight Carrier. (See Figure 2-1.)

2.2 REMOVING FROM SKID

2.2.1 Overhead Hoist

The overhead hoist method of lifting the Series II CNC is illustrated in Figure 2-2.

1. Remove the four bolts securing the machine column to the skid.

NOTE: Gross weight of the Series II CNC machine is 5400 lbs.

2. Before lifting the machine, insure that the Ram is properly secured (see Figure 2-2). The four bolts which secure the ram to the column should be torqued to 47 ft. lbs.
3. Remove the nameplate on each side of the ram. This exposes two holes in the ram. Lifting hooks (66-5754) that were supplied with the machine will use the square hole located on each side of the ram. Install the hooks into the ram as shown in Figure 2-2. A soft cloth placed between the head and the sling should protect the head from scratches.

CAUTION: Be sure all equipment is in good working order and more than adequately rated for its job.

2.3.2 Forklifting

The following equipment is required:

1. A 1-1/2 inch square steel bar that is three to five feet long.
2. A fork lift truck that is rated at 6,000 lbs. using the standard 24 inch loadcenter.

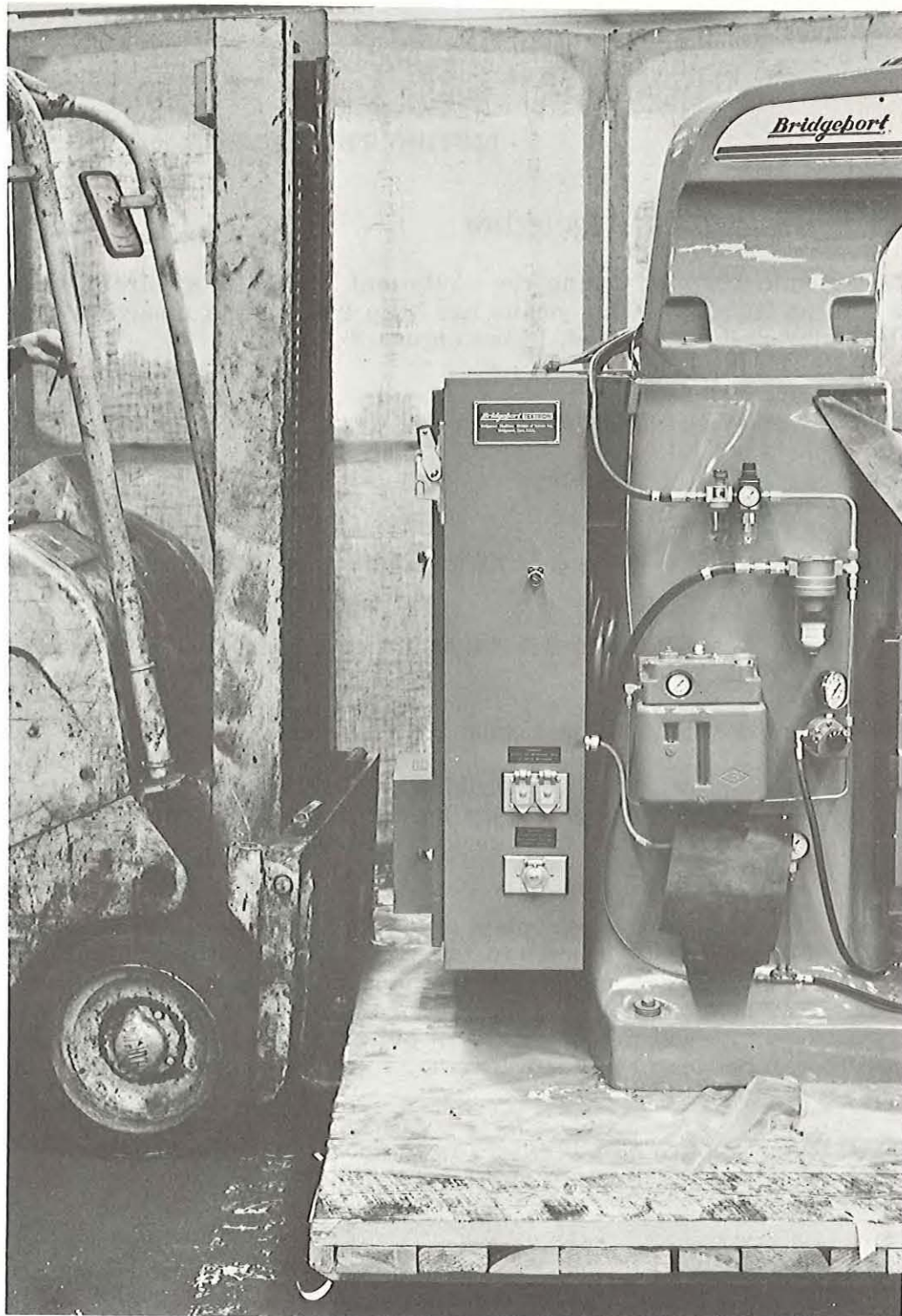
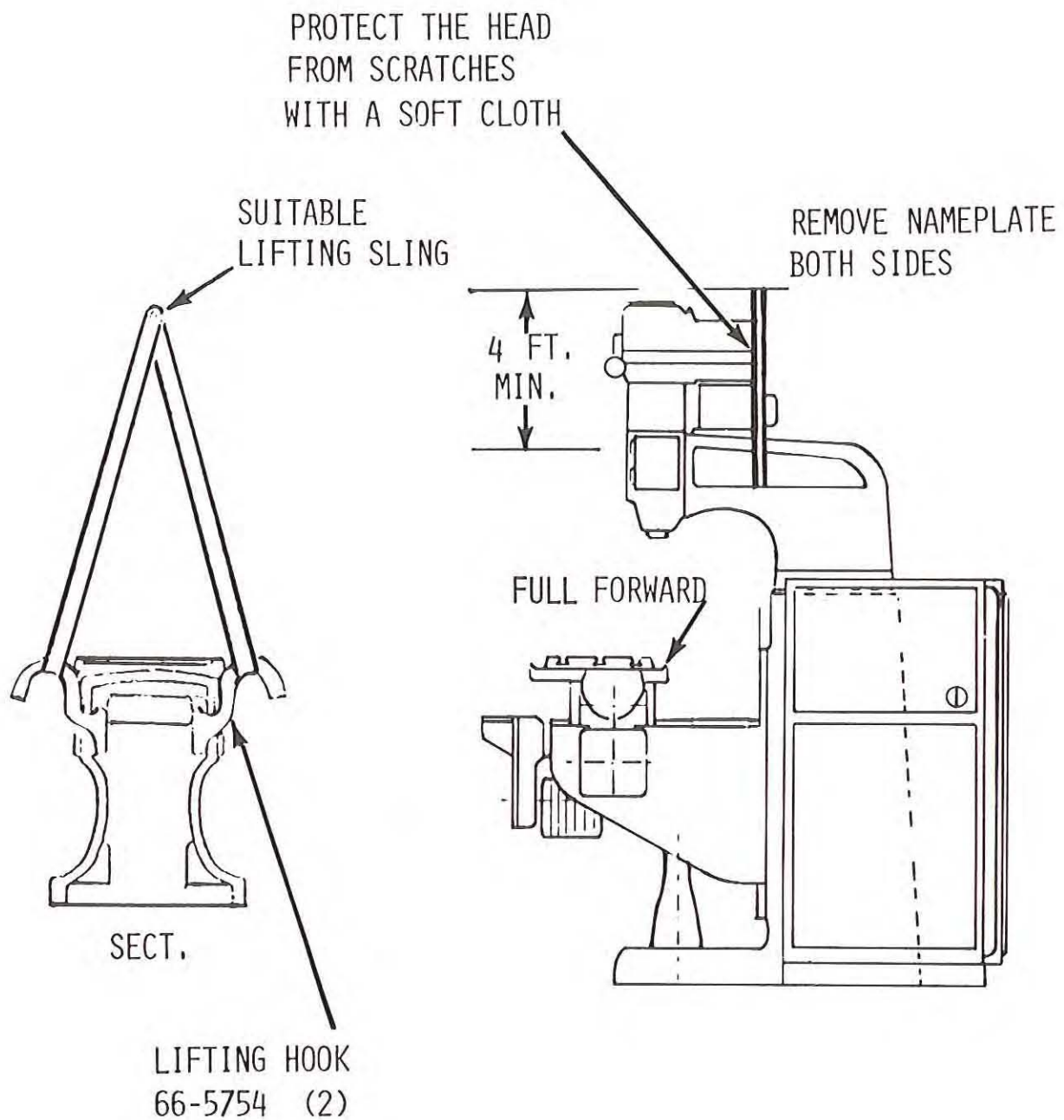


Figure 2-1 Use of Fork Lift Under the Skid



INSTALLED GROSS WEIGHT
OF MACHINE - 5000 LBS.

Figure 2-2. Overhead Hoist Lifting Procedure

3. Extensions to the forks must be provided if the forks supplied with the fork lift truck are not at least 42 inches in length. These extensions must be rated for a 6000 lb. capacity fork lift truck.
4. Two standard C-clamps.

The lifting procedure is as follows:

CAUTION: This procedure requires careful attention to detail to insure safety.

1. Remove the four bolts securing the machine column to the skid.
2. Before lifting the machine, insure that the Ram is properly secured (see Figure 2-2). On the Rigid Ram machine, the four bolts which secure the ram to the column should be torqued to 47 ft. lbs.
3. Remove the nameplate located on each side of the ram.
4. Place the recommended bar through the two inch square cored hole in the ram. This is the same hole that the lifting hooks would normally use when lifting the machine with an overhead hoist (see Figure 2-2). Center the bar to the ram.
5. Set the forks a maximum of two feet apart.
6. If required, place the extensions on the forks of the fork lift truck.
7. The fork lift truck should approach from the rear of the milling machine, straddling the ram with its forks. The forks should be put under the bar previously positioned in the ram. It is important to get the front of the fork lift truck as close to the milling machine as possible. The best method of accomplishing this is to place wooden blocks between the control cabinet and the fork lift truck up against these blocks. Take care not to hit or damage the electrical enclosure, cables or other parts of the milling machine.

8. Secure a C-clamp to each of the forks of the fork lift truck forward of the bar placed through the ram. These clamps will prevent the bar from sliding off the forks. If the fork lift truck is not positioned close enough to the milling machine or should the fork lift truck be rated at less than 6000 lbs. , the attempt to lift the milling machine will cause the rear of the fork lift truck to lift off the ground and the bar to slip off of the forks. Should a problem arise, it must be resolved before continuing with this procedure.
9. Caution should be exercised while lifting the machine. When the milling machine is two to five inches clear of the skid, the skid should be removed and the milling machine should be lowered into place.

NOTE: This procedure is for the removal of the skid only. The milling machine should be transported to its installation site on its skid.

SECTION III

PREPARATION OF THE MACHINE LOCATION

3.1 FOUNDATION AND CLEARANCES

The column and base are cast in one piece. When setting the machine on a prepared foundation of concrete (optional) or on the shop floor, use shim plates, adjustable mounting pads or thin grouting to compensate for unevenness in the floor.

Figure 3-1 shows the base dimensions and the $2\frac{1}{32}$ " diameter clearance holes for $\frac{5}{8}$ " bolts. The rear straps shown are intended to be left in place. It is recommended that the machine be bolted to the floor.

Figure 3-2 shows the necessary clearances around the machine for access door opening for maintenance and to continue the remainder of the installation.

3.2 ELECTRICAL SERVICE

3.2.1 Reference Information

For 50 or 60 Hz supply, the machine is wired for a specified voltage and fused per phase respectively. Check the label on the outside of the Power Equipment Enclosure on the back of the machine to determine the exact figures for your installation.

The electrical service entry is at the top of the Power Equipment Enclosure (see Figure 3-2) where a $1\frac{1}{8}$ " diameter hole has been provided for electrical conduit fittings.

WARNING: DO NOT CONNECT ELECTRICAL SUPPLY - SEE SECTION V.

3.2.2 Voltage Change

The Series I CNC is factory tested at the voltage specified on the order - only three choices are available viz: 208V or 230 volts or 460 volts. If the machine has to be changed over from one voltage to the other, the following is recommended:

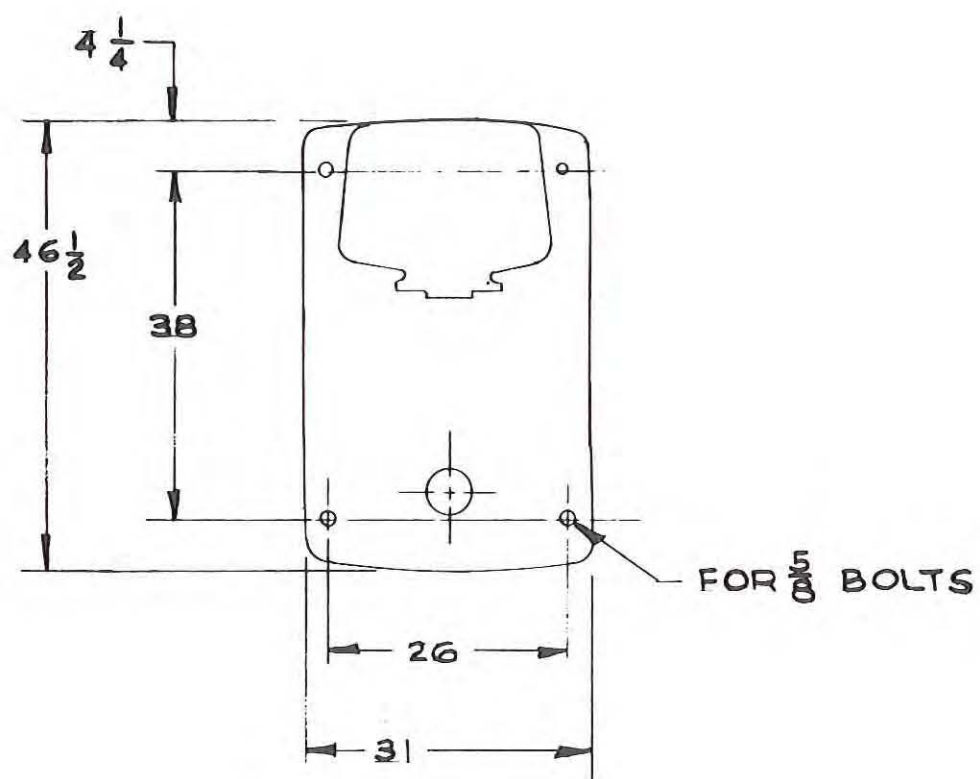


Figure 3-1. Machine Base Layout

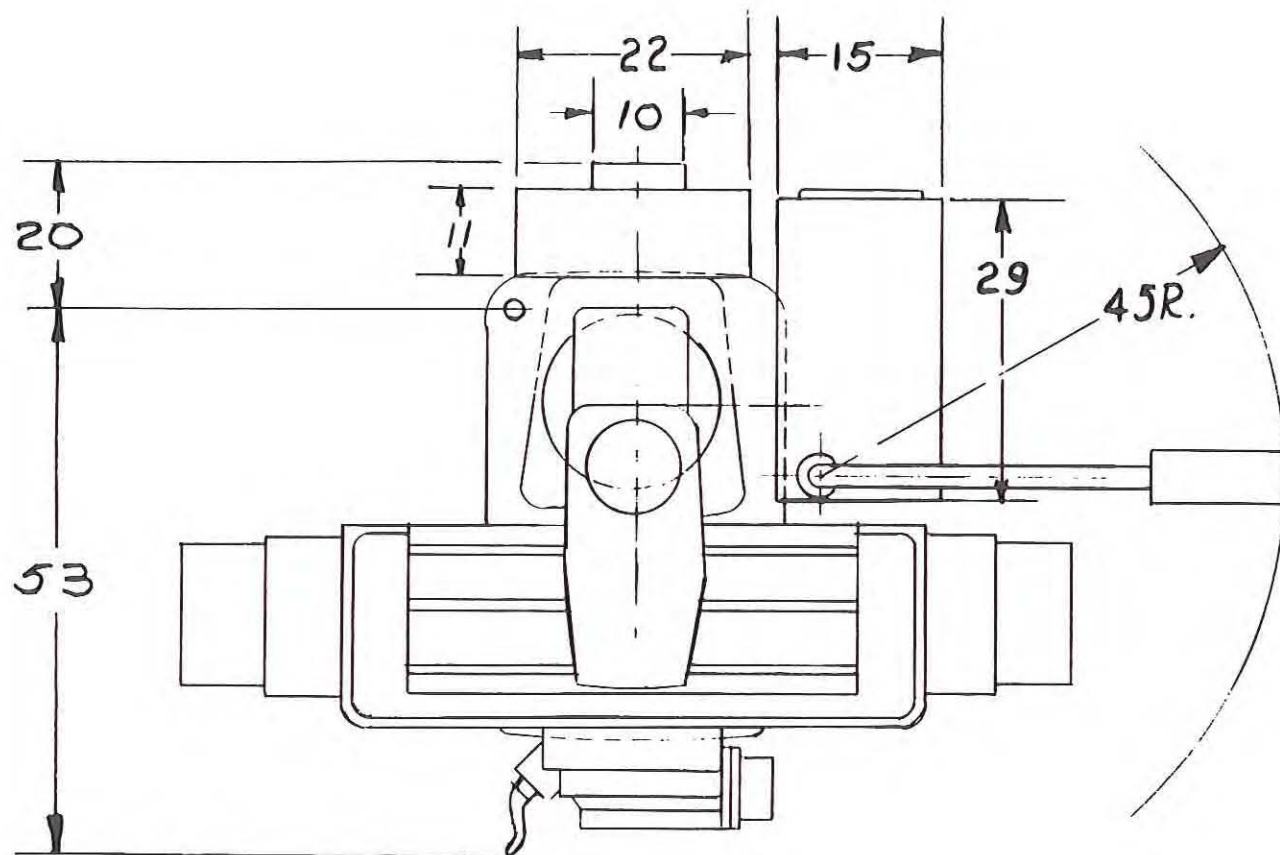


Figure 3-2 Installation Plan View

Order the appropriate Conversion Kit as follows (60 Hz Systems):

S/N 7000 Up

230V Machine Conversion Kit to 460 volts Part No.	028801
460V Machine Conversion Kit to 230 volts Part No.	028802
460V Machine Conversion Kit to 208 volts Part No.)	
230V Machine Conversion Kit to 208 volts Part No.)	Not Available
208V Machine Conversion Kit to 230 volts Part No.)	
208V Machine Conversion Kit to 460 volts Part No.)	

Reference Drawings:

D-028170 (System Schematic) Supplied with machine
D-027769 (Power Equipment Enclosure) supplied with kit

Proceed as follows for voltage conversion:

WARNING: Disconnect plant supply to the machine.

T1 Conversion:

There are two metallic jumpers which are located on the transformer. They should be connected, depending upon the input voltage, according to the following chart: (Reference drawing 027769 or D-028170 as applicable.)

<u>230V</u>	<u>460V</u>
H1 to H3	H2 to H3 (both jumpers)
H2 to H4	

1L1 and 1L2 are connected to H1 and H4 respectively, regardless of the input voltage.

T2 Conversion:

Remove all jumper wire connections on the primary side (terminals #1 thru #4). Rejumper the transformer, using the following chart: (Reference drawing 027769 or D-028170 as applicable.)

<u>230V</u>		<u>460V</u>	
<u>Jumper Length</u>	<u>Connection</u>	<u>Jumper Length</u>	<u>Connection</u>
5"	(Z) 1 to (Z) 3	7"	(Z) 1 to (Y) 4
5"	(Z) 2 to (Z) 4	3.5"	(Z) 2 to (Z) 3
5"	(Y) 1 to (Y) 3	5.5"	(Z) 4 to (X) 1
5"	(Y) 2 to (Y) 4	7"	(Y) 1 to (X) 4
5"	(X) 1 to (X) 3	3.5"	(Y) 2 to (Y) 3
5"	(X) 2 to (X) 4	3.5"	(X) 2 to (X) 3
4"	(Z) 3 to (Y) 4		
2"	(Z) 4 to (X) 3		
4"	(Y) 3 to (X) 4		

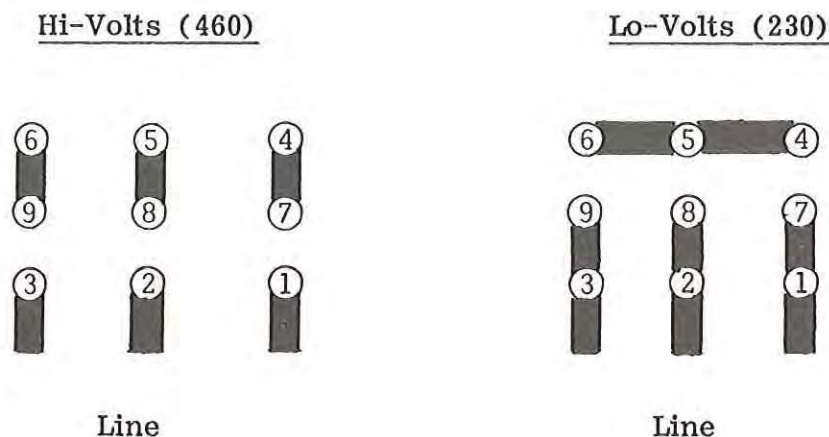
NOTE: There are two versions of T2, and consequently, two sets of jumper lengths required. The lengths shown here are for the longest runs.

Contractor Overload Conversion:

Replace the existing overload heaters with the overload heaters provided in the kit. (Refer to Drawing D-027769, IMOL) or see chart on inside of NEMA door. this is reproduced as Figure 4-5.

Spindle Motor Conversion:

There are nine motor wires numbered one through nine in the spindle motor power junction box. Connect them, using the wire lugs, along with the line leads according to the following chart:



Replace the appropriate nameplates located on the outside top and inside bottom of the power equipment enclosure door. Drive screws and pop rivets are provided.

Insert replacement fuses and the conversion is complete.

Proceed as follows for voltage conversion:

WARNING: DISCONNECT PLANT SUPPLY TO THE MACHINE

1. Replace fuses 1, 2, 3 on the Main Power Disconnect.
2. Rewire jumpers on single phase transformer T1 (1.0 KVA).
3. Rewire jumpers on 3-phase transformer T2 for axis drive system.
4. Rewire the spindle drive motor starter coils.
5. Replace the appropriate nameplates located on the Power Equipment Enclosure door with replacements provided.

Reference Drawings:

D-028170 System Schematic
D-027769 Power Equipment Enclosure (Supplements the above)

SECTION IV

PREPARATION FOR OPERATION

4.1 CLEANING THE MACHINE

After final acceptance testing at the factory, two major operations are carried out which must be fully understood in order to do an effective job of cleaning the machine:

1. Masking and Spray Painting
2. Cosmolene rust preventative application with a Spray Gun.

Clean all rust preventative from the machine with kerosene.

WARNING: DO NOT USE GASOLINE, CHLORINATED HYDROCARBONS OR ANY OTHER INFLAMMABLE OR TOXIC CLEANING AGENT.

Clean and lubricate all exposed sections of the table, saddle and knee ways. This includes the underside of all ways. It also includes the possible necessity to scrape paint from some of the hidden surfaces where the masking may not have been completely effective.

4.2 LEVELING THE MACHINE

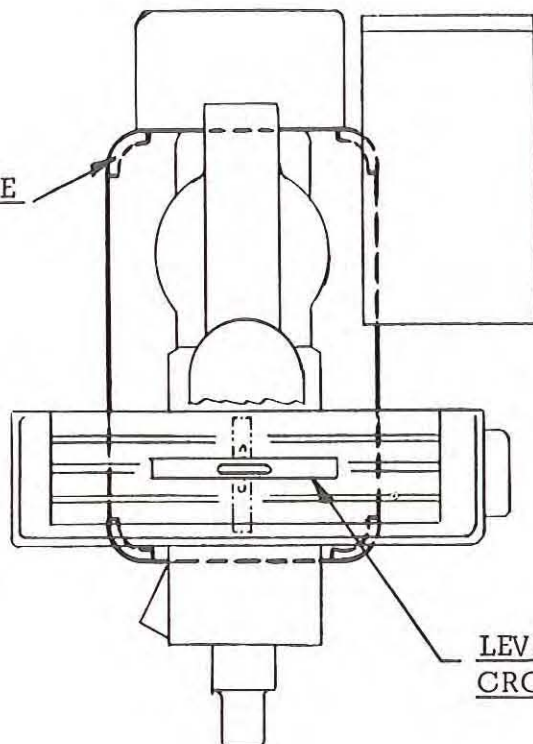
After the machine has been placed in location in its foundation (optional), it should be leveled in two directions and retained with hold-down bolts as required by OSHA. Figure 4-1 shows a precision level on the top surface of the table. Adjust by placing shims under the 4 corner pads under the machine. Repeat the procedure longitudinally and front to rear until satisfied, then secure the machine to its foundation.

4.3 LUBRICATION

There are three classes of lubrication systems:

1. Those areas lubricated for life such as spindle bearings, transmission gear box, etc.
2. Guiding members requiring occasional grease: The arm drive system and cam track.
3. The forced lubrication system from the automatic one-shot pump to supply ways, gibs and ballscrews including the Z axis. (See Figure 4-2.)

(4) LEVELING
BOSSES ON BASE



LEVEL POSITION
CROSS AND LENGTH WISE

Figure 4-1. Series II CNC Machine Level

It will only be necessary to discuss the automatic system:

CAUTION: Use only Sunoco Waylube #80 or equivalent to ensure maximum efficiency of the lubrication system. Refer to a table of equivalents shown below.

The Automatic One-Shot Lubrication System Tank can be filled to capacity (one quart or 946cc) with Sunoco Waylube 80 or any of the following equivalents:

American Oil Co. (Standard Oil Co. - Div. of American Oil Co.)	Waytac Oil No. 31
Atlantic Richfield Co.	Richway Oil No. 3, Dominion S-315 and Truslide 300 Oil "Sinclair"
Boron Oil Co.	Factoway 50
BP Trading, Ltd. and its Affiliated Companies	BP Energo HP 20-C
Chevron Oil Co.	Chevron Vistac Oil 15W
Cities Service Oil Co.	Citgo Slide Rite 2
Fiske Bros. Refining Co.	Lubriplate 3W
Gulf Oil Corp. and Subsidiaries	Gulfway 52
E. F. Houghton Co.	Waylube 297
Humble Oil & Refining Co. and its Exxon-Affiliated Companies Overseas	Febis K-53
Mobil Oil Corp.	Mobile Vactra Oil No. 2
Petrofina Group	Fina Artac EP 37
Shell Oil Co.	Tonna 33
Sinclair Refining Co.	See Atlantic Richfield Co.
Standard Oil Co. (Ohio)	Factoway 50
Sun Oil Corp.	Sunoco Way Lubricant 80

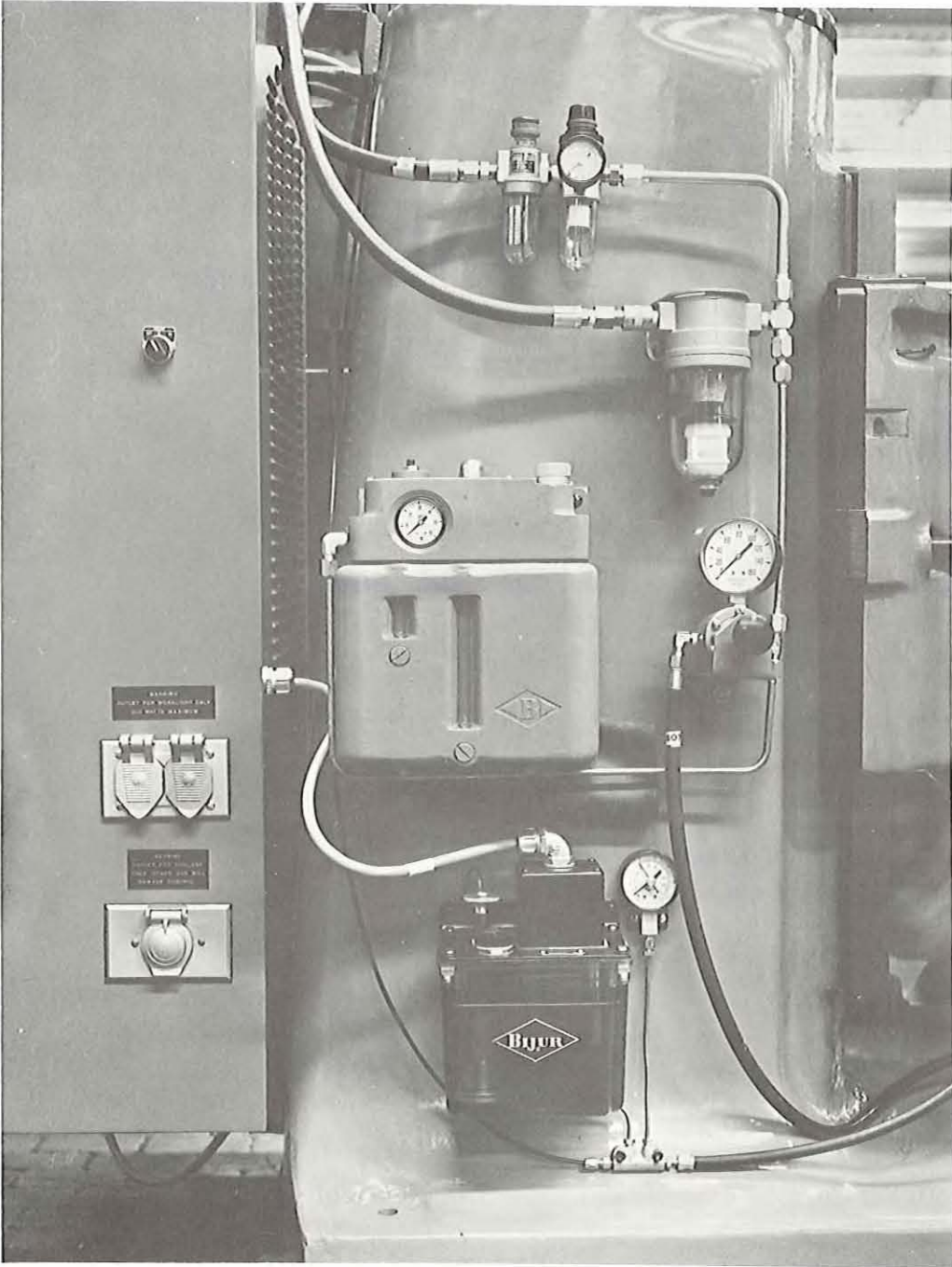


Figure 4-2. Lubrication and Pneumatic Systems

Sunray D-X Oil Co.

D-X Waycling 1320

Texaco, Inc.

Way Lubricant D

Arthur C. Withrow Co.

Withrolube 629

NOTE: The automatic lubricating system will place the machine in SETUP if the float switch detects a low level at any Programmed Stop or at any Tool Change.

The automatic system will operate in the MDI or AUTO modes of operation.

CAUTION: Do not operate the machine until it has been properly lubricated. Before starting, pull the primer handle on top of the reservoir located on the left side of the column. Repeat several times.

4.4 INSPECTION OF THE POWER EQUIPMENT ENCLOSURE

1. Open the Power Equipment Enclosure door and check all screw type terminals for tightness and proper securing of all terminal wires. In particular, check end of the cables interconnecting with the Control Equipment Enclosure. Check that all fuses are in place and secure. See Figure 4-3, 4-4 and 4-5. When satisfied, close the Enclosure door.
2. Check external cables for fraying or chafing that might have occurred during transportation.

4.5 INSPECTION OF THE CONTROL EQUIPMENT ENCLOSURE

1. At the front of the Control Equipment Enclosure, remove the access panel to the logic compartment and carry out a physical inspection. Remove the Tape Reader and check out all terminals and the unit itself. Check all terminal screws for tightness and proper securing of their associated wires.
2. Remove the Printed Circuit Cards from their packing and before installation, physically inspect the wires in the rear plane and depress the Integrated Circuits and special connects at the front to be sure that they are firmly in their carriers.
3. Place the Printed Circuit Cards in their labelled slots. Make sure cards are properly oriented before insertion. See Figure 4-6.
4. Replace the access panel and the tape reader.

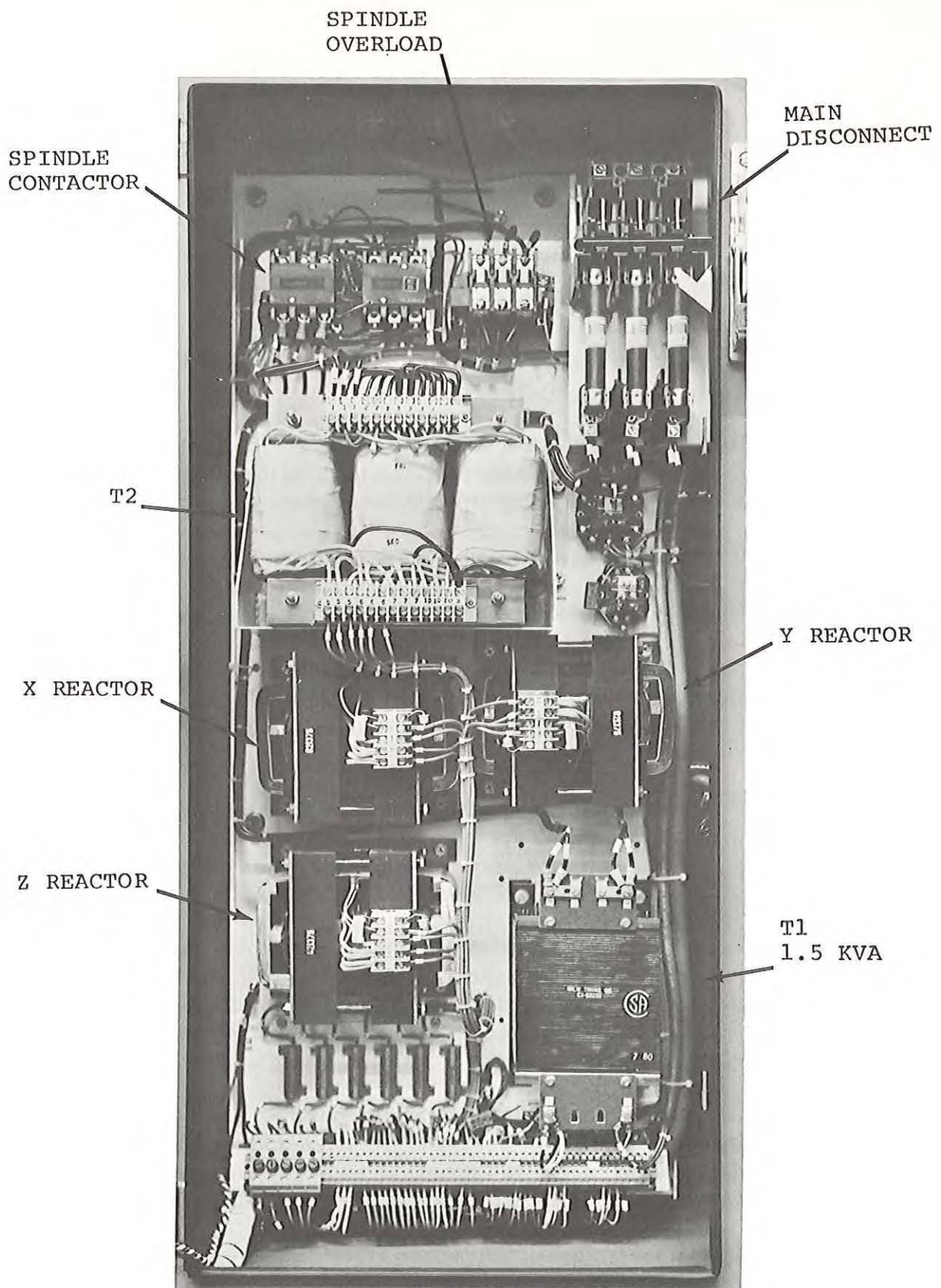
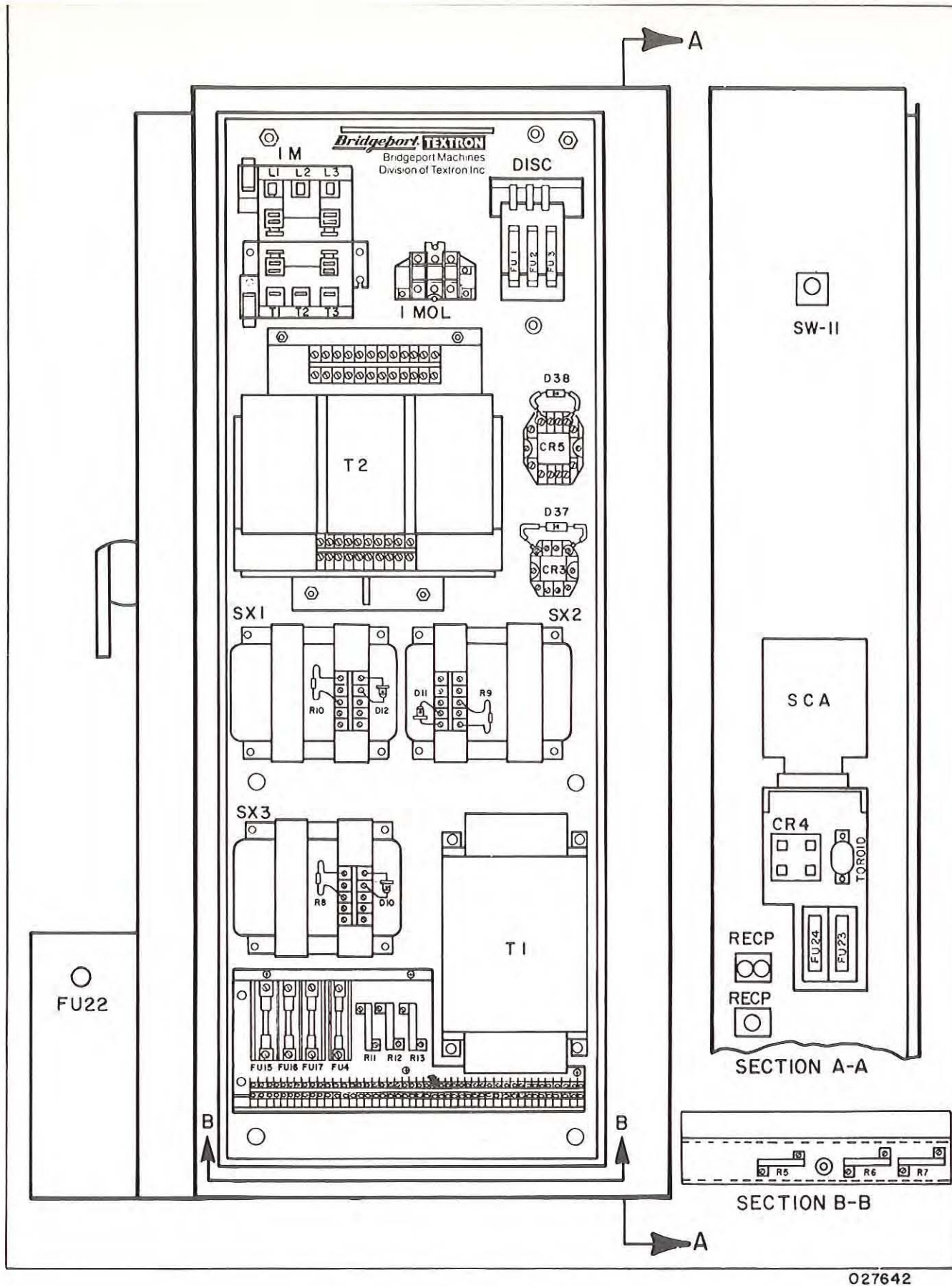


Figure 4-3 Power Equipment Enclosure



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Figure 4-4. Component Layout (B5 or B6)

FUSE NUMBER	DESCRIPTION			BRIDGEPORT P/N	SERVICE VOLTS
1, 2, 3	NOS	20 A	600 V	502693	208/230
1, 2, 3	NOS	15 A	600 V	502127	380/420
1, 2, 3	NOS	10 A	600 V	503119	460/575
4	NON	6 A	250 V	502409	
5	FNM	1 A	250 V	503548	
6	FNM	1 4/10	250 V	507864	
7	FNM	5 A	250 V	504760	
10	FNM	3 2/10 A	250 V	503671	
11	ABU	5 A	250 V	503670	
12, 13, 14	FNM	10 A	250 V	503551	
15, 16, 17	FRN	15 A	250 V	507454	
18	AGC	1.5 A	250 V	502204	
19	AGC	3 A	250 V	500497	
20	BAN	20 A	250 V	506313	
21	MDX	3 A	125 V	504787	
22	AGC	1 A	250 V	500498	
23	FRN	3 2/10 A	250 V	504687	
24	NON	3 A	250 V	503393	
OVERLOAD HEATERS CLARK P/N		BRIDGEPORT P/N		SERVICE VOLTS	
2437		503686 •		208	
2435		503389		230	
2430		503325		380	
2429		504145		420	
2427		503917		460	
2425		505975		575	

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Figure 4-5. Fuse Table

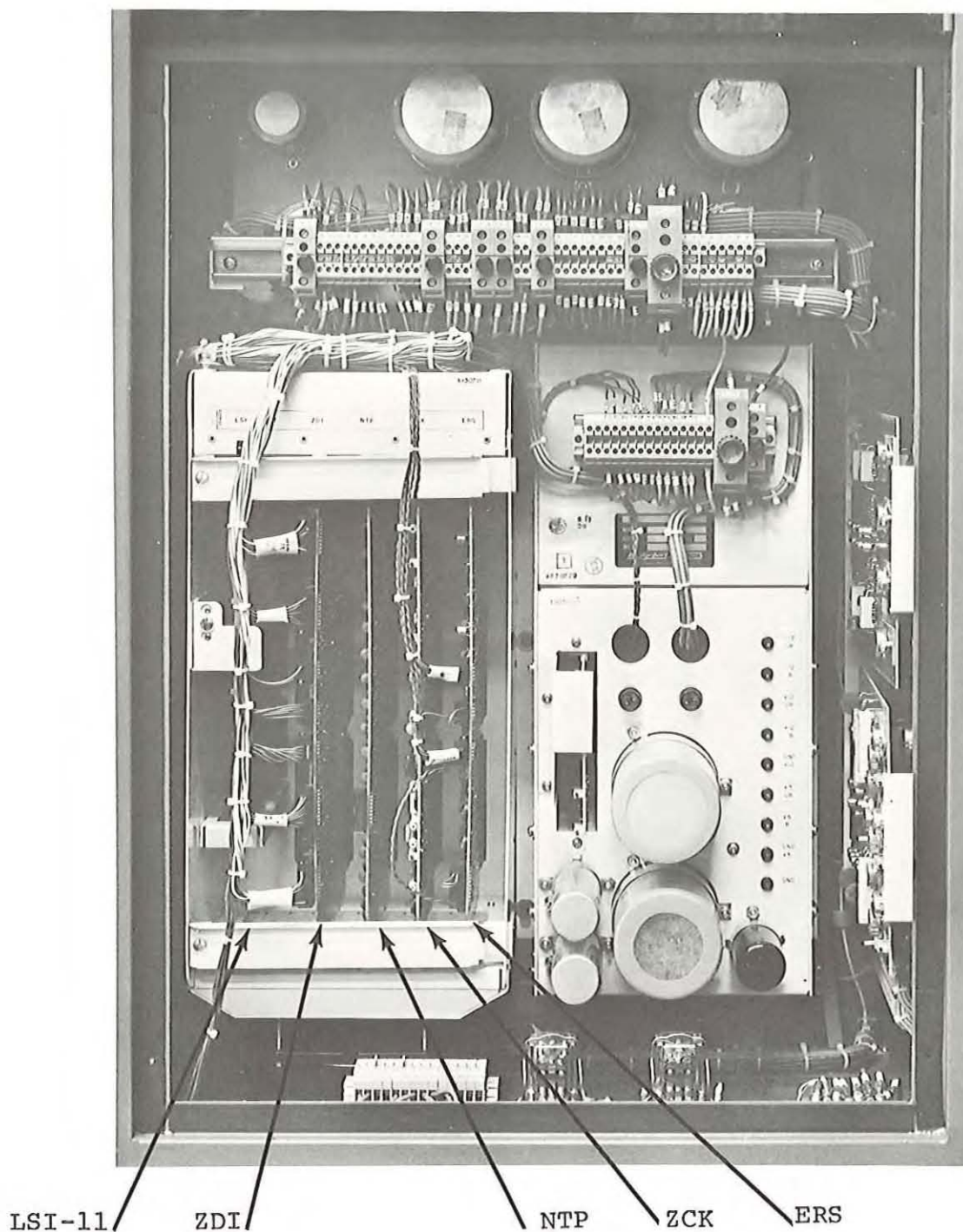


Figure 4-6. Control Equipment Enclosure

4.6 PNEUMATIC SYSTEM (Figure 4-7)

The pneumatic system is entirely on the machine and supplied with a 20 ft. length of flexible air hose (3/8 NPT male connection) connected to the shop air supply. The system requirements are approximately 12 c.f.m. force air instantaneous flow with a supply pressure of 85-125psig.

The air hoses to the speed changer and to the spindle brake have been factory installed. Check that the fitting are tight. Turn ON the air supply to the system with the valve provided and set the pressure regulating valve at 80psig. Ensure that the filter-water seperator unit is purged and that the lubricator is filled with Texaco Copella 'A'. Though difficult to set the lubricant drip rate, ensure that oil is getting through to the valves and air turbine by checking the exhaust air and its oil content periodically.

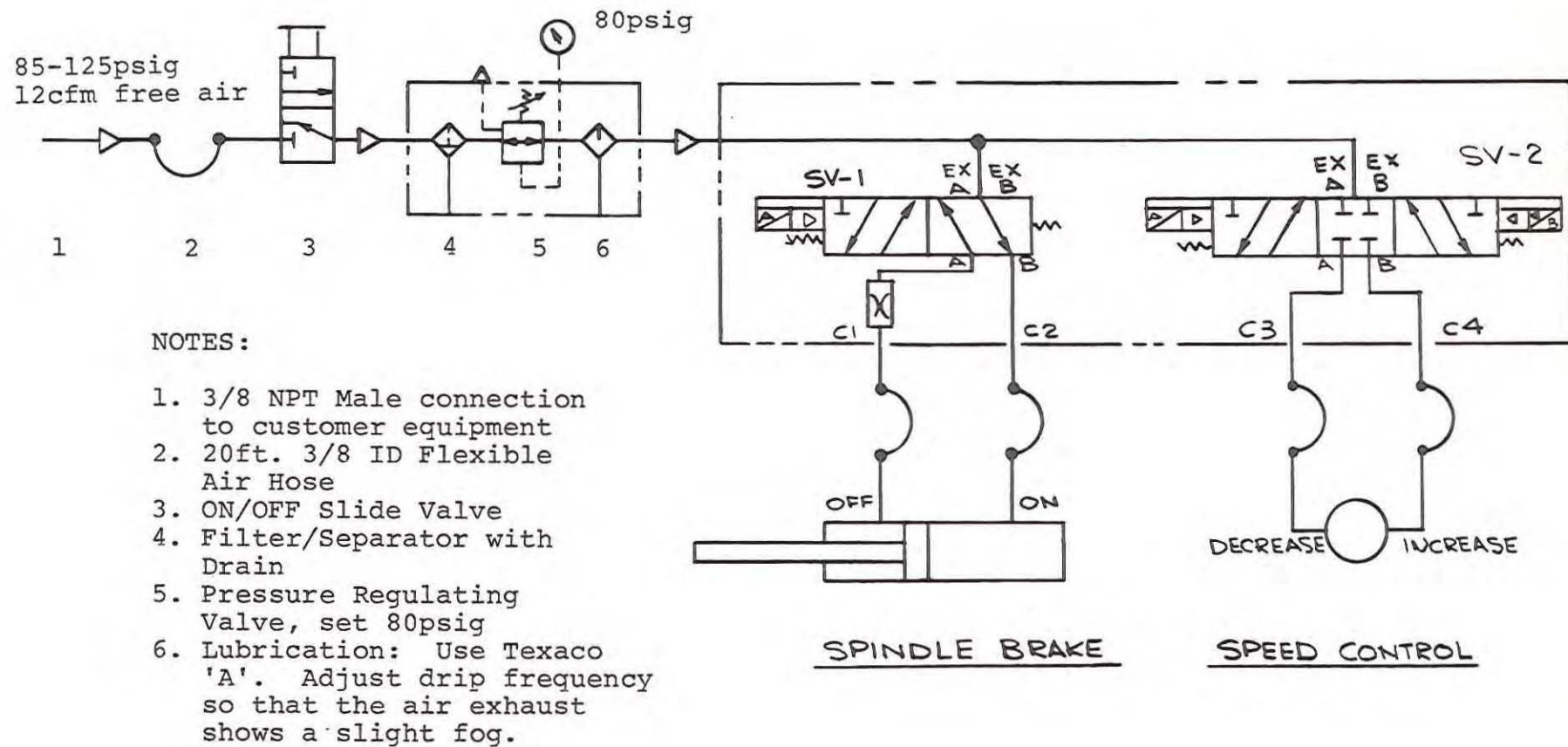
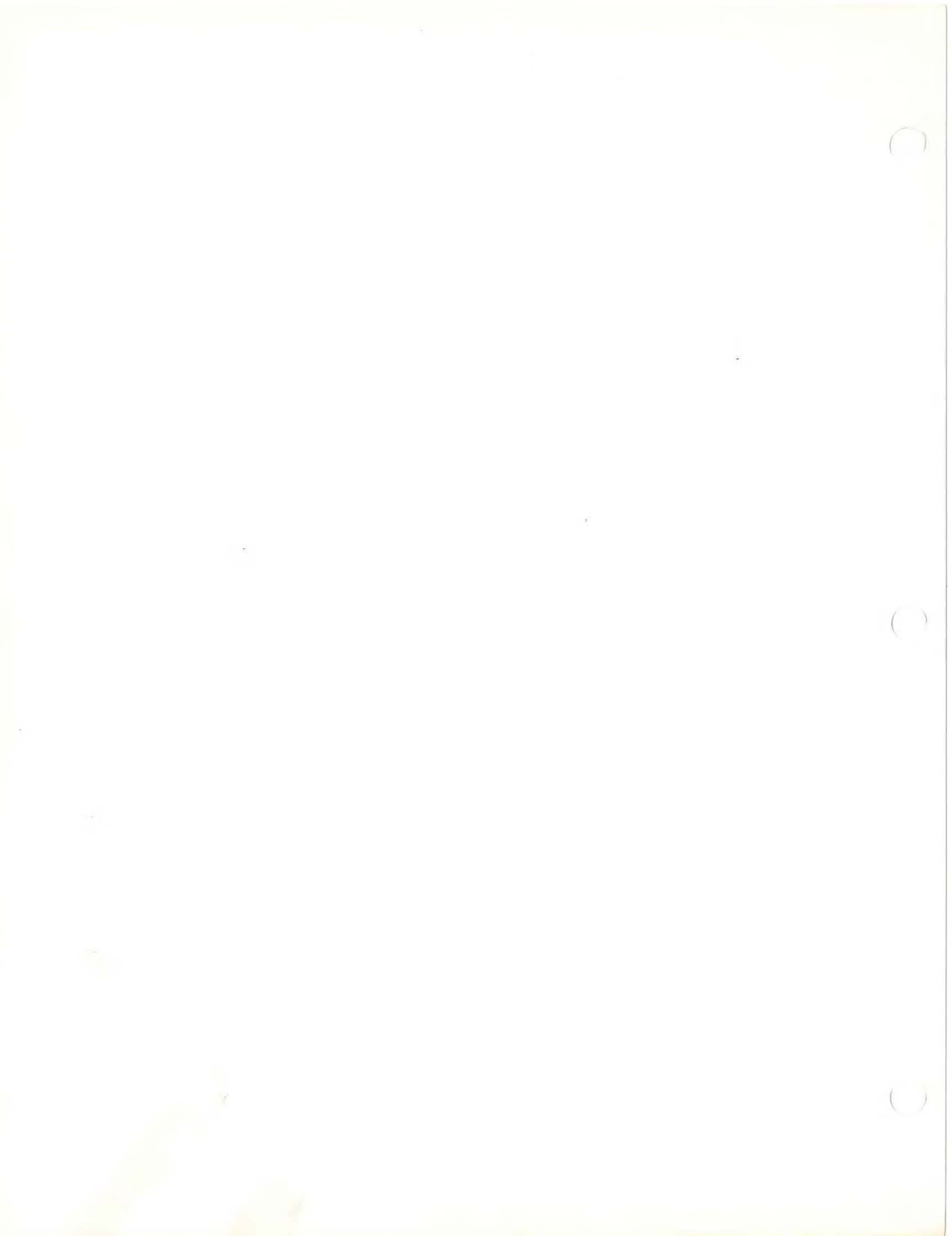


Figure 4-7 Pneumatic Diagram



SECTION V

STARTUP TO MANUAL OPERATION (Complete Startup Sheets in Appendix A)

5.1 CONNECTING ELECTRICAL POWER

The Bridgeport CNC requires 3 phase electrical power only for its entire operation. The power equipment enclosure is labeled with the voltage and current capacities in either one of the following sets of values:

208V fused 20 amps per phase
230V fused 20 amps per phase
460V fused 10 amps per phase

(Reference paragraph 3.2)

Specific phasing of the incoming power is not required. It is only necessary to get proper rotation of the spindle drive motor to match the ON/OFF switch. Thus, when in the following gear ratios and switch positions, CW rotation of the spindle should take place:

Back Gear	Low	CW rotation
Direct Drive	High	CW rotation

If this is not the case, interchange any two wires of the incoming 3 phase power.

WARNING: Turn off building power when making electrical connection to the machine.

NOTE: See paragraph 3.2.2 if a voltage change is necessary.

5.2 ELECTRICAL POWER DISTRIBUTION

When performing the following procedures, refer to Drawing D-028170. Also, see Figures 4-3 and 4-4. Subsequent paragraphs show nominal voltages with their tolerance levels in parenthesis.

NOTE: Control Serial No. (SN) is located on the lower inside of the Power Equipment Enclosure door.

Input power must be as stated on the inside of the Enclosure door label, and connected as per instructions in paragraph 5.1.

WARNING: Do not allow unauthorized personnel near the equipment while the doors are open and the equipment is electrically live.

1. Lift main DISC at Power Equipment enclosure. Measure incoming power at main fuses;

1L1 - 1L2	VAC (Nominal $\pm$ 10%)
1L2 - 1L3	VAC (Nominal $\pm$ 10%)
1L3 - 1L1	VAC (Nominal $\pm$ 10%)

2. Measure Power Supply Voltages;

T1 (1.0 KVA) Ter X 1 Tc Ter X 2	VAC (117 $\pm$ 10%)
---------------------------------	---------------------

3. Remove the filter panel below the tape reader compartment and measure the following DC control voltages:

56 VDC supply wire 74 to wire 39	VDC (56 $\pm$ 10%)
24 VDC supply wire 40 to wire 39	VDC (24 $\pm$ 10%)

These are located at FU10 and FU6 respectively.

4. At the Regulated Power Supply measure the following Unregulated and Regulated Logic Power Voltages. Measurements can be made at the test points noted;

-12 VDC Unregulated	$>15\text{VDC}$
-12 VDC Regulated	VDC (-12 $\pm$ 1%)
+12 VDC Unregulated	$>15\text{VDC}$
+12 VDC Regulated	VDC (+12 $\pm$ 1%)
+ 5 VDC Unregulated	$>10\text{VDC}$
+ 5 VDC Regulated	VDC (+ 5 $\pm$ 1%)

Acceptable Ripple = 120 mV on Regulated Supplies

Adjustments for regulated voltages can be made on the P.C. card edge which protrudes through the power supply face.

5. Check for the proper operation of 3 cooling fans.
6. With power on and in SETUP, the limit lamp (red) will be ON.

5.3 THE OPERATING MANUAL

The user is advised to study all sections of the operating manual M-140 before proceeding further. It is particularly important to read paragraphs 3.1 and 3.3 at this stage.

5.4 THE AXIS DRIVE SYSTEM

Study paragraph 4.1 of the Operating Manual M-140 and proceed as follows;

- a. Operate the lubrication system plunger.

- b. Depress the limit override and JOG each axis in turn.
- c. Depress an axis limit switch and remove the axis drive system fuse noted below to place an ammeter in series with the axis drive motor current to be measured.
- d. Input and execute a discrete motion of the axis to be measured.

X-Axis FU12 static current	amps (8.2 ± 0.1)
rapid traverse	amps Max. (3.8)
	amps Min. (3.1)
Y-Axis FU13 static current	amps (8.2 ± 0.1)
rapid traverse	amps Max. (3.4)
	amps Min. (3.3)
Z-Axis FU14 static current	amps (8.2 ± 0.1)
rapid traverse	amps Max. (3.5)
	amps Min. (3.3)

Manual Positioning an Axis (Ref. Sec. 4.1, M-140)

1. Input axis moves for X and Y while using mechanical counters and digital display to check positioning. Check feed HOLD and CONTINUE during such manual moves.
2. Repeat similar motion for the Z axis. Check at various feedrates. Input a G81 cycle followed by an M25 command.
3. Test the effective operation of FEEDRATE OVERRIDE.
4. For feedrate clock adjustments, see the Maintenance Manual and adjustments on the card. Similarly see that manual for data on deceleration breakpoints.
5. Check the front panel functions by pressing the MODE SELECT keys AUTO, BLOCK and MANUAL while checking STATUS lamps.
6. Turn POWER OFF, Latch the rear door of the Power Equipment Enclosure after a visual inspection. Replace covers on the Control Equipment Enclosure.

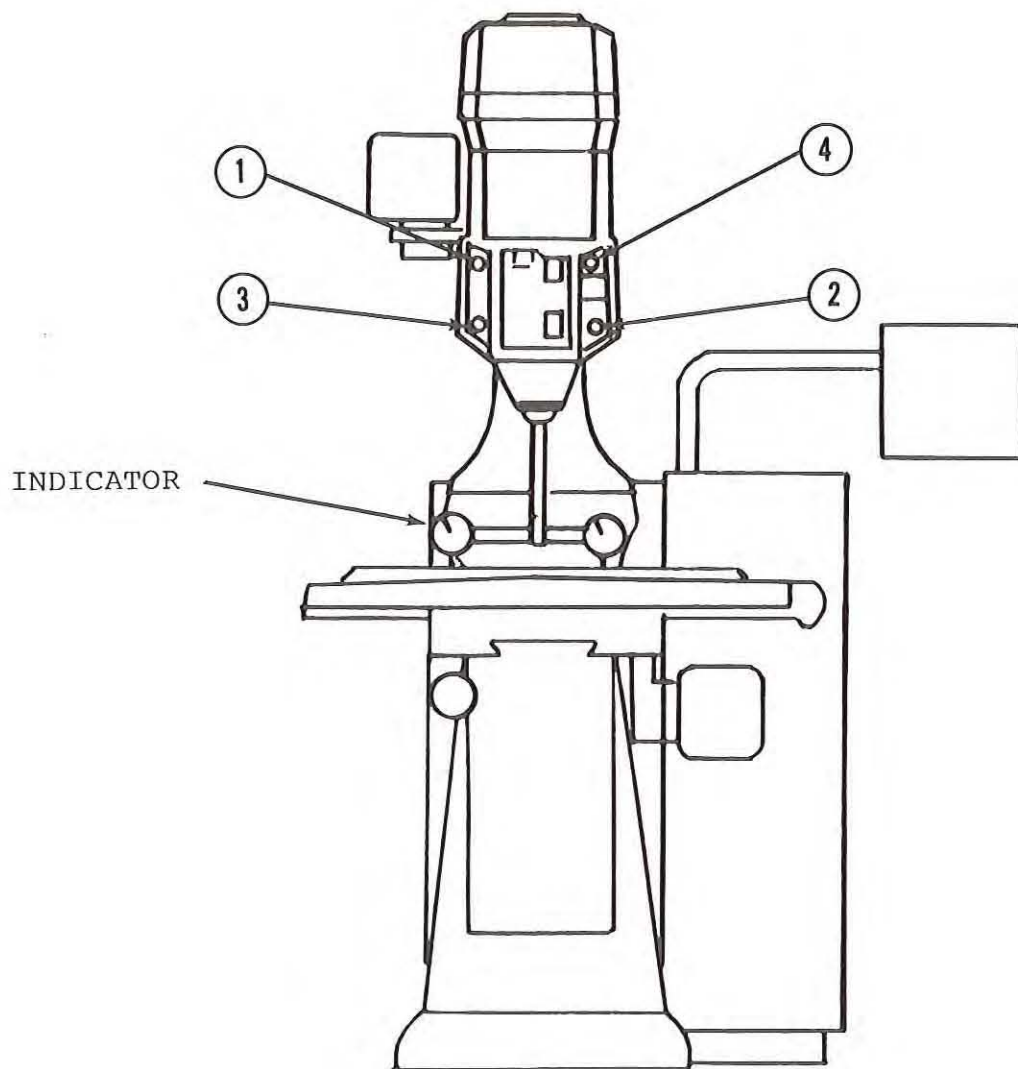
5.5 SPINDLE TRAMMELING

The spindle has been properly trammed at the factory. It is recommended that you check the setting of the head to insure that it has not moved during shipment.

- a. Set-up - The head alignment should be made with the Y axis and X axis at mid-travel.
- b. X-Axis Head Tram - This adjustment is the same as the V-ram X-axis head trammel with the following exceptions. The four binding bolts are torqued to 100 ft. lbs. per instructions in Figure 5-1. These bolts are located under the left side cover (1, Figure 5-2) and right side cover (2). If adjustment of the X-axis head trammel is necessary, remove the left and right side covers by referring to the following procedure and to Figure 5-2.
 1. Loosen set screw (3) and remove quill counter dial (4) from adapter (5).
 2. Loosen set screw (6) and remove adapter from extension (7).
 3. Remove two screws (8) and lift pulley cover (9) off motor mounting bracket (10).
 4. Loosen, but do not remove the four screws (11) securing the drive motor to the motor mounting bracket.
 5. Remove belt (12) from pulley (13).
 6. Remove four screws (14) and front cover (15).
 7. Remove two screws (16) and left side cover (1).
 8. Remove four bolts (17) and take off control box (18).
 9. Carefully note and record the color and location of all six limit switch wires. Remove the wires.

NOTE: The "home position" limit switch must be removed to remove wires.

10. Remove the two screws (19) and the right side cover (2).



NOTE:
TIGHTEN THE (4) BINDING
BOLTS IN THE NUMBERED
SEQUENCE, TO 50 LBS - FT TORQUE
THEN REPEAT AND TIGHTEN
IN THE NUMBERED SEQUENCE
TO 100 LBS - FT TORQUE

Figure 5-1. X-Axis Head Trammeling

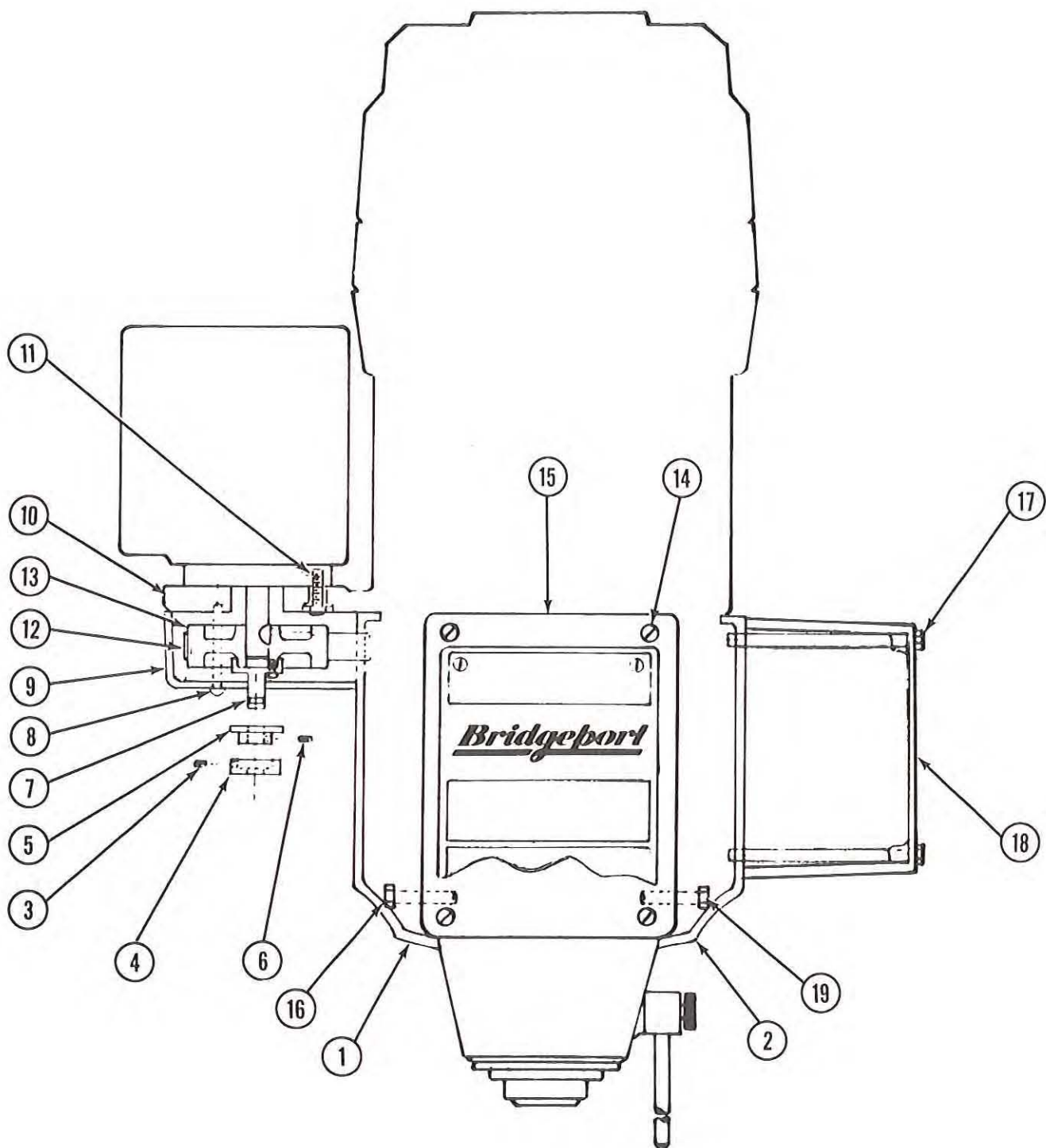


Figure 5-2. Removal of Side Covers from Head

- c. Y-Axis Head Tram - The head alignment cannot be readily adjusted in the Y axis. It has been correctly aligned at the factory by scraping the ram mounting surfaces.

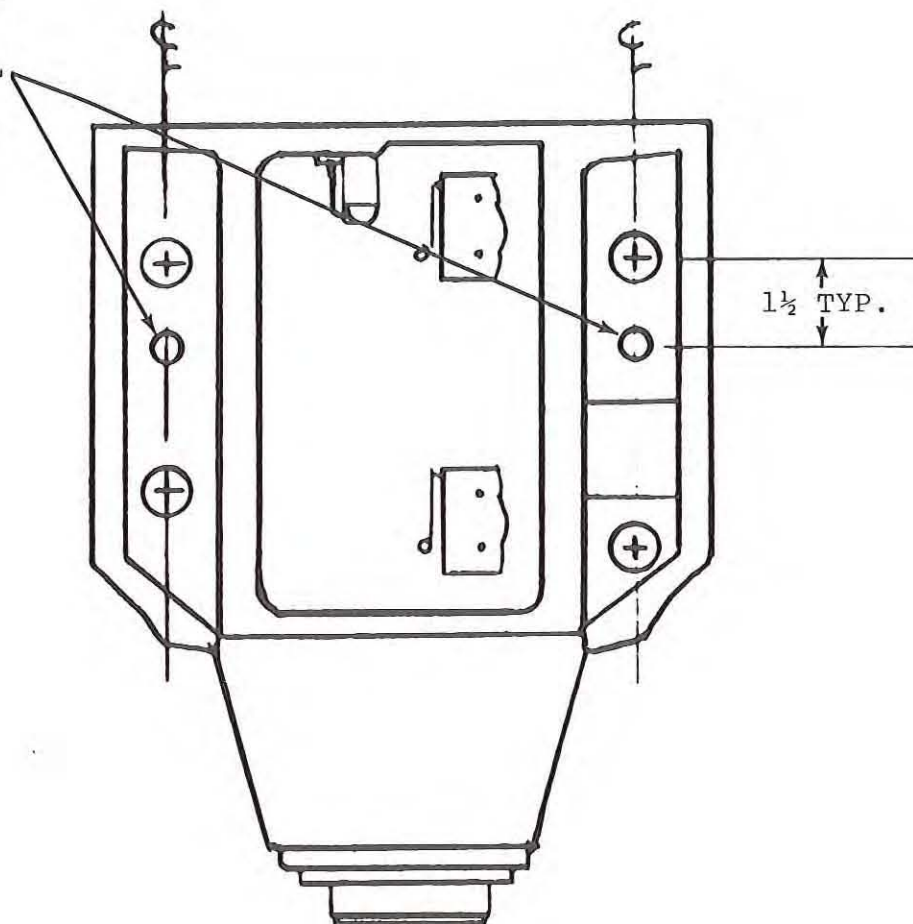
5.6 PINNING THE MILLING HEAD TO THE RIGID RAM

This procedure is not normally accomplished in the customer's shop, but is included for customers who feel they have a special need for it.

1. Complete the procedures contained in steps 1 thru 10 above to remove the right and left side covers.
2. Locate the position for the dowel pins as shown in Figure 5-3.
3. Drill and ream for a #4x1" taper pin. Pin #1180107 comes with a #8-32 thread in the large end for removal. This pin should sit approximately 1/8" below the surface.

FIELD FITTED
OPTIONAL
DOWEL PINS
TWO LOCATIONS

#2 (.221) DRILL
#4 TAPER REAM
PIN TO SIT 1/8
BELOW SURFACE



NOTE:

FIELD FITTED HEAD DOWELING.
(1-18-0107) #4X1 TAPER PIN
WITH 8-32 TAPPED HOLE.
LOCATED ON CENTER LINE
OF BINDING BOLTS.

Figure 5-3. Pinning the Head to the Ram

SECTION VI

CHECKOUT

6.1 TERMINAL CONNECTION

6.1.1 Current Loop Applications

The Bridgeport CNC has been designed with an active 20 mA current loop to be used in conjunction with a Model ASR-33 Teletype. Before attempting to use your system, inspect the teletype for the following modifications and additions.

To check for, or make, these modifications remove the cover of the Teletype. Loosen the three thumb screws in the back and remove the Platen that holds the roll of paper, the Mode Switch knob and the Face Plate. Remove the four screws under the Face Plate. You should now be able to lift the cover off. Use Figure 6-1 to locate the various parts described below.

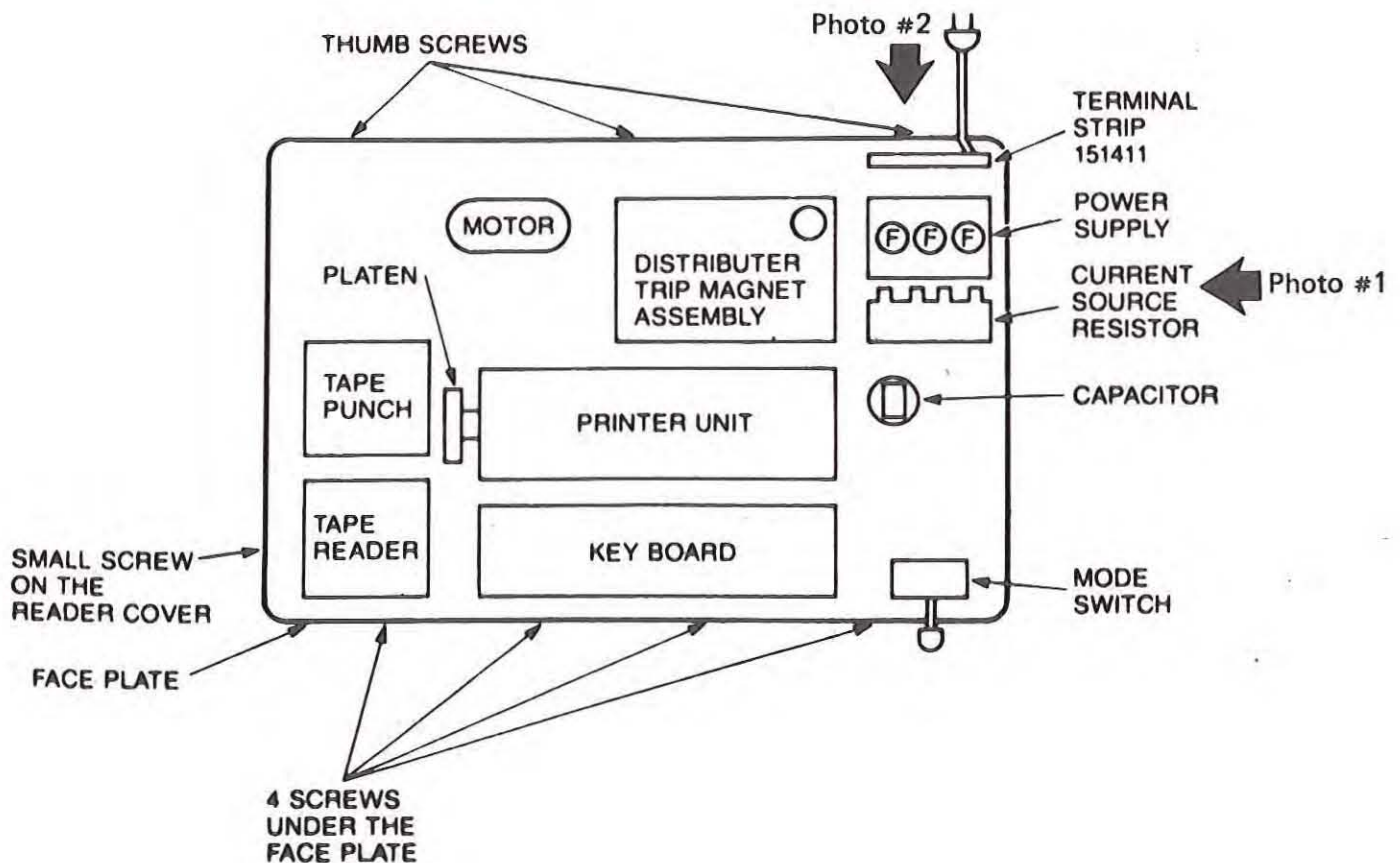


Figure 6-1. Top View Teletype Model 3320/3JE

The modifications are:

- a. Current loops changed from 60 to 20 milliamps.

The Current Source Register must be changed from 750 ohms to 1450 ohms. This is accomplished by moving the blue wire connected to the 750 ohm terminal to the 1450 ohm terminal on the resistor shown in Photo #1. The receiver current level is changed by moving the purple wire connected to terminal #8 on the Terminal Strip 151411 to terminal #9 on the same strip. Terminal Strip 151411 is shown in Photo #2 with terminal #1 at the far left.

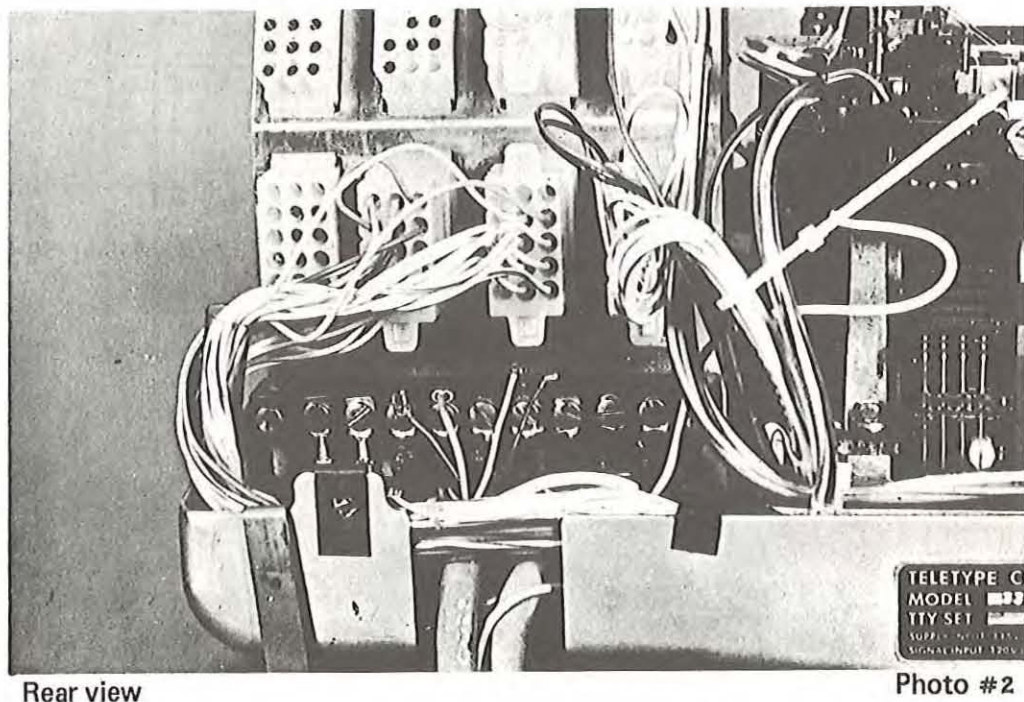
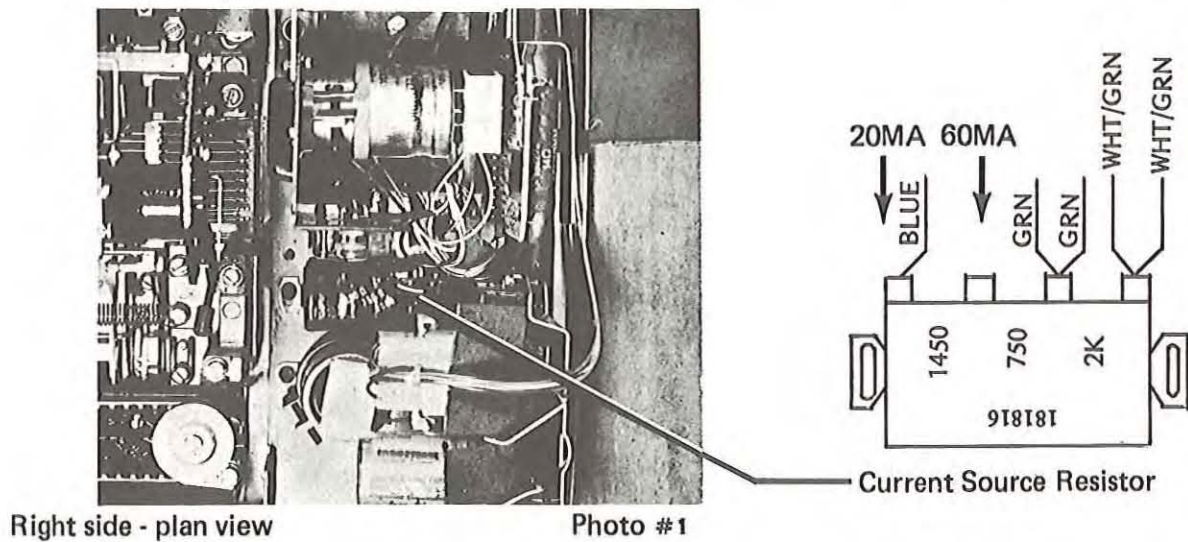


Figure 6-2. Modifications to Teletype

- b. The Teletype wired for Full-Duplex.

The half duplex wiring must be changed by moving the BROWN/YELLOW wire from terminal #3 to terminal #5 and by moving the WHITE/BLUE wire from terminal #4 to terminal #5 on the Terminal Strip 151411.

6.1.2 Current Loop Connections

- a. Connect CNC outputs to the Teletype.

The TTY outputs from the Terminal Strip 151411 shown in Figure 6-3 are connected to the CNC system with the 4 wire (2 twisted pair) cable shown with shield.

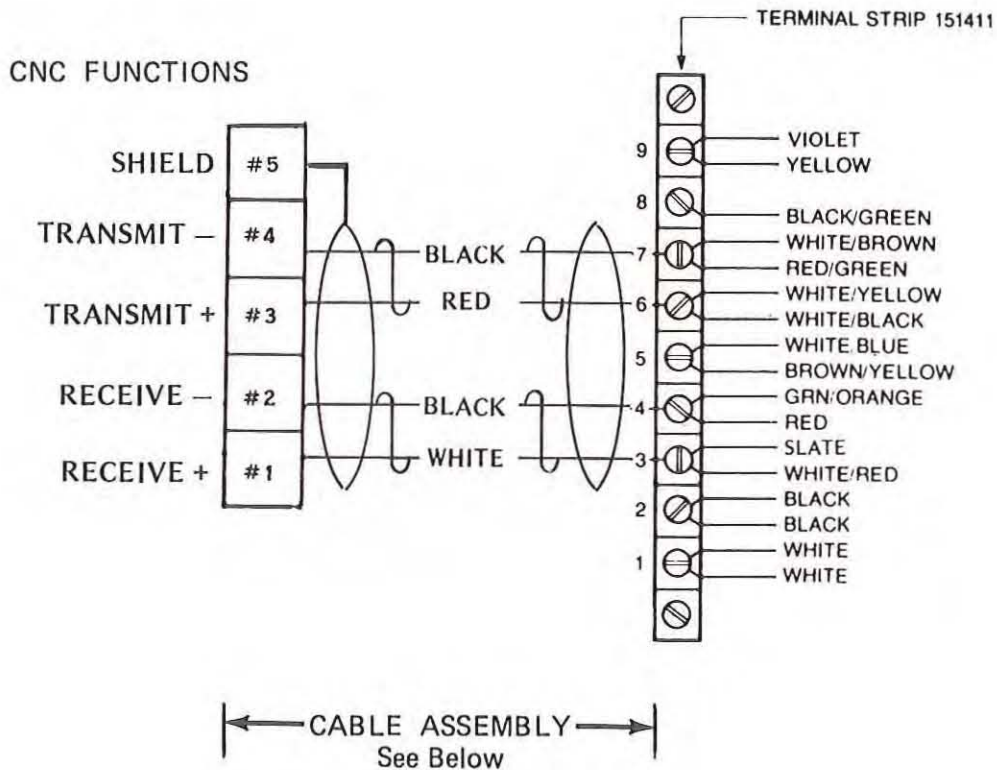


Figure 6-3. Transmission Connections

Cable assemblies are available in various lengths as follows:

CODE NO.

DESCRIPTION

1771302

Cable Connector

CODE NO.DESCRIPTION

1771009	External Data Cable Assy. 10 ft.
1771010	External Data Cable Assy. 25 ft.
1771011	External Data Cable Assy. 50 ft.
1771012	External Data Cable Assy. 75 ft.
1771013	External Data Cable Assy. 100 ft.
1771329	External Data Cable Assy. 300 ft.
1771330	*External Data Cable Assy. 500 ft.

NOTE: *Not recommended for transmission/reception data rates above 2400 baud.

b. Setting of Baud Rate Switches.

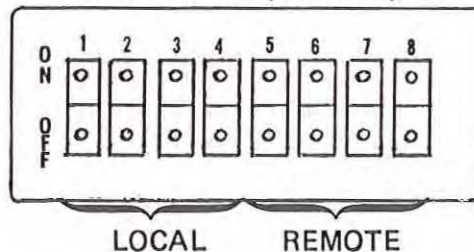
The switches which control the baud rate for the external data connectors are located on the RSI card.

To change baud rates, throw the baud rate switches to the positions indicated in the table below. Switches 1-4 control the baud rate for the LOCAL connector, while switches 5-8 control the baud rate for the REMOTE connector. The switches may be thrown by use of a pencil or the tip of a ball point pen.

Note carefully the orientation of the switch assembly which has switches 1-8 from left to right and ON at top with OFF as the bottom position.

SWITCH ASSEMBLY ORIENTATION

ERS CARD (BOSS 6)

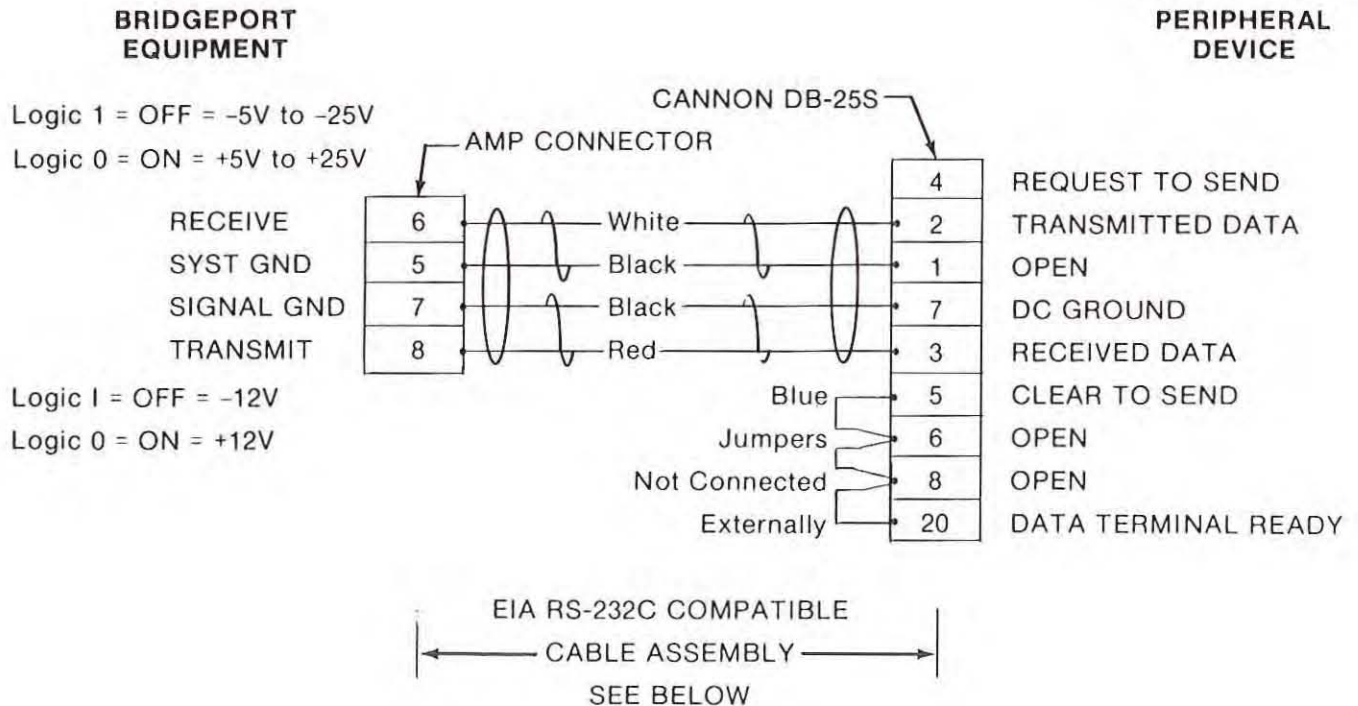


BAUD RATE	LOCAL				REMOTE			
	S1	S2	S3	S4	S5	S6	S7	S8
110	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
300	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
1200	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
2400	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
9600	ON	ON	ON	OFF	ON	ON	ON	OFF

SWITCH POSITIONS FOR TRANSMISSION RATE
(Note: Transmission Rate for TTY33 is 110 baud)

6.1.3 EIA RS-232C Interface

There is an Electronic Association Standard (RS-232C) which has been used in the industry to define signal levels and pin assignments on a standardized basis. This standard, however, is voltage dependent and, with associated line drop, it is restricted to short distances. Compatibility with this standard can, however, be achieved with the applicable interface in the Series IICNC and a special connector and cable assembly. It will be necessary to use this cable with devices that have an EIA RS-232C interface rather than a 20 mA current loop. Among several devices of this type is a modem for data transmission over telephone lines.



CODE NO.

DESCRIPTION

1771327

Ext. Data Cable 10 ft. RS-232C Compatible

1771328

Ext. Data Cable 25 ft. RS-232C Compatible

NOTE: It is necessary to remove the connector labeled K-10 on the ERS card to enable the RS-232C compatible interface.

6.2 THE OPERATING MANUAL

The latest issue of M-140 will lead the operator through all the necessary steps of previously outlined requirements of paragraph 5.3.

With the terminal connected, check out the Edit capabilities detailed in M-140.

6.3 TEST TAPES

6.3.1 General

Two test tapes are shipped with each machine. They are used to assure that all functions operate in the proper manner and to assist with the determination of any possible machine or control faults without the use of Diagnostic Tapes. The tape image data with some explanation is included in this manual. The following general instructions apply when operating with these tapes:

1. Be sure that the XY mechanical readouts are set at X0Y0 at the fully negative travel of each axis.
2. Set the start point at the XY coordinate shown on the tape image data sheet.
3. At every program STOP or BLOCK STOP, check that the ABS register and the mechanical counter have the proper relationship before restarting.

6.3.2 Test Tape No. 2 Part number 023945

This tape may be operated in AUTO or in AUTO/BLOCK

1. Instruction: Start Point X90000 Y60000 (Center of Travel) then zero X and Y ABS registers. Though the TLO's are set on the tape it is advised that one TLO be overridden by MDI input. Start Z axis in "Home" position.
2. Object: To make a meticulous check of all machine functions by observing the machine response to each and every command.

6.3.3 Test Tape No. 3 Part number 024476

This is the so-called "Asterisk" tape whose pattern is used to check the linear/circular interpolation modes in the XY plane using inch dimension.

1. Instruction: Start Point X90000 Y60000 (center of travel).
Set Gear Shift in neutral.
Place Pen in the spindle.
TLO equals zero for the tool to be used.

2. Object: To check interpolation, feedrate deceleration override (G99) and the response of the Axis Drive Motors.

6.4 THE PROGRAMMING MANUAL

1. Manual M-139 is available to verify and check the test tapes supplied with the machine. It will also provide a reference to the various codes used.
2. If a customer produced tape is available, this can be checked out on the machine in conjunction with the programming manual.
3. For Computer Programming using the APT language, see the post processor documentation in manual M-126.
4. The Bridgeport CNC will accept tapes coded in the even parity ASC II character set only.

SERIES I-CNC TEST TAPE #2
 PARTNO A023945 REV D 9/1/78
 THIS DOCUMENT INCORPORATES THE FOLLOWING DCNS:
 17290A
 17455
 19848
 19919

NOTES:

=====

SETUP: SET X AND Y MECH. COUNTERS TO
 X90000Y60000
 ZERO X AND Y ABS REGISTERS
 Z HOME
 START THE SPINDLE MOTOR
 START THE CONTROL

=====

T1/.501 SET TLO'S

T2/.502

T3/.503

T4/.504

T5/.505

T6/.506

T12/.512

T13/.513

T14/.514

T15/.515

T16/.516

T17/.517

T22/.522

T24/.524

G04/200

#1

SET SUBROUTINES'

N1000Z0M3

N1010G*X4.0Y3.0Z*F*

N1020X2.0Y-3.0

N1030G*X-4.0Y-1.0Z.25F*

N1040X-2.0Y3.0

N1050G0X0Y0T*M6

S

#2

N1100Z0M3

N1110G*X4.0Y3.0Z*Z*Z*F*

N1120X2.0Y-3.0

N1130X-4.0Y-1.0

N1140X-4.0

N1050G0X0Y0T*M6S

#3

N1200Z0M3

N1210G85X4.0Y3.0Z*F*

N1220X2.0Y-3.0

N1230G0X-.5Y-.5Z-1.0

N1240G85X-4.0Y-1.0Z*F*

N1250G0X-2.0Y3.0Z-.5

N1260G85X4.0Z.5

N1270G0M25

N1280X0Y0

N1290T*M6S

R/M CYCLE

N10G10G90G92X0Y0T1M6
 =#1G*81Z*.5F*120G*81F*60T*1
 =#1G*82Z*.25F*40G*82F*45T*13
 =#2G*83Z*.5Z*.25Z*.1F*100T*2
 =#1G*84Z*.5F*100G*84F*105T*14
 =#3Z*.5F*150Z*.2F*150T*3
 =#1G*86Z*.2F*60G*86F*40T*15
 =#2G*87Z*.5Z*.25Z*.1F*100T*4
 =#1G*89Z*.5F*200G*89F*120T*16
 N70Z0M3
 N71G1Z-1.0F200
 N72Y2.0F300
 N73G91G99G03X-20000Y-2.0J2.00
 N74G99X20000Y-2.0I2.0
 N75G1X2.0
 N80G90G0X0Y0T4M6
 N81Z0M3
 N82G1Z-1.0F80
 N83Y-2.0F240
 N84G91G99G03X2.0Y2.0J2.0
 N85G99X-2.0Y2.0I2.0
 N86G1X-2.0
 N90G90G0X0Y0T16M6
 N91Z0M3
 N92G1Z-1.0F160
 N93Y1.0F200
 N94G91G99G02X2.0Y-2.0J2.0
 N95G99X-2.0Y-2.0I2.0
 N96G1X-2.0
 N100G90G0X0Y0T5M6
 N101Z0M3
 N102G1Z-1.0F200
 N103Y-1.0F160
 N104G91G99G02X-2.0Y2.0J2.0
 N105G99X2.0Y2.0I2.0
 N106G1X2.0
 N110G90G0X0Y0T17M6
 N111G1G91Z-3.0F320
 N112X-2.5Y1.5Z1.0F400
 N113X1.0Y-2.5Z1.5
 N114X1.5Y1.0Z-2.5
 N115G0G90Z0
 N120G90G0X0Y0T6M6
 N121G1X1.0Y-1.0Z-2.0F300
 N122X-1.5Y.5Z-1.0
 N123X-.5Y-2.0Z0
 N124X1.0Y-1.0Z-2.5
 N126G0Z0
 N130G0X0Y0T24M6
 N131Z0M3
 N132G90G0X1.0Y3.0
 N133G99G2X3.0Y1.0J2.0F50
 N134G99X1.0Y-1.0I2.0
 N135G99X-1.0Y1.0J2.0
 N136X10000Y30000I2.0

BEGIN MAIN PROGRAM

N137G0X0Y0T22M6
N200G79J1.0F200 CHEK QWIK CIRC CYCLE
N210G0G78X1.25X.5Y.75F100 CHEK POCKET ROUTINE
N220G0X0Y0T14M6
#4
N10G91G81X0Z*F*
=N20/4
N20X.25
N30G0Y.5
N40G81X0Z*F*
=N60/4
N60X-.25
N70S
N100G90Z-.5
=#4Z*.4F*100Z*.4F*100
N120G0Y.5
=#4Z*.2F*120Z*.2F*120
N200G0G90X0Y0M2
E CONTROL CHARACTER FOR COMPUTER

I-CNC TEST TAPE #3 - INTERPOLATION
PART NUMBER A024476 REV D 8/30/77

=====

THIS DOCUMENT INCORPORATES THE FOLLOWING DCNS:
16280
17453
17723
19849

NOTES:
=====

SETUP: SET X AND Y MACH. COUNTERS
TO X90000Y60000
ZERO X AND Y ABS REGISTERS
BRING QUILL DOWN TO TOUCH THE PAPER
PLACE HEAD 'HI-NEUTRAL-LOW'
LEVER IN THE NEUTRAL POSITION
START THE SPINDLE MOTOR
START THE CONTROL

BE ADVISED: IF THIS SYSTEM IS WITHOUT THE
METRIC OPTION, THE BLOCK DELETE
SWITCH MUST BE ON, (UP POSITION)
TO RUN THIS TAPE.

=====

N1000G0G91392X0Y0Z0
N1001Z.1
N1G0X2.5981Y-1.50Z-.1
N2G1X.6495Y-.3750F90
N3G3X.1005Y.3750I.6495J.3750
N4X-.6000Y.7348I.7500J.0
N5G1X-1.3481Y.2753
N6G2X-.4000Y.4899I.1000J.4899
N7X.4000Y.4899I.5000J.0
N8G1X1.3481Y.2753
N9G3X.6000Y.7348I.1500J.7348
N10X-.1005Y.3750I.7500J.0
N11X-.6495Y.3751I.6495J.3750
N12X-.5614Y-.2527I.0J.7501
N13G1X-.9125Y-1.0299
N14G2X-.3742Y-.1686I.3742J.3315
N15X-.5001Y.5001I.0J.5001
N16X.0258Y.1584I.5001J.0
N17G1X.4357Y1.3051
N18G3X.0386Y.2375I.7114J.2375
N19X-.7500Y.7500I.7500J.0
N20X-.75Y-.75J.75
N21X.0386Y-.2375I.7500J.0
N22G1X.4357Y-1.3051
N23G2X.0256Y-.1534I.4743J.1584
N24X-.4999Y-.4999I.4999J.0
N25X-.3742Y.1684I.0J.4999
N26G1X-.9125Y1.0299
N27G3X-.5614Y.2526I.5614J.4974
N28X-.6495Y-.3750I.0J.7500
N29X-.1005Y-.3750I.6495J.3750
N30X.6000Y-.7348I.7500J.0
N31G1X1.3481Y-.2753
N32G2X.4000Y-.4899I.1000J.4899
N33X-.4000Y-.4899I.5000J.0

N34G1X-1.3481Y-.2753
 N35G3X-.6000Y-.7348I.1500J.7348
 N36X.1005Y-.3750I.7500J.0
 N37X.6495Y-.3751I.6495J.3750
 N38X.5614Y.2527I.0J.7501
 N39G1X.9125Y1.0299
 N40G2X.3742Y.1686I.3742J.3315
 N41X.5001Y-.5001I.0J.5001
 N42X-.0258Y-.1584I.5001J.0
 N43G1X-.4357Y-1.3051
 N44G3X-.0386Y-.2375I.7114J.2375
 N45X.7500Y-.7500I.7500J.0
 N46X.75Y.75J.75
 N47X-.0386Y.2375I.7500J.0
 N48G1X-.4357Y1.3051
 N49G2X-.0256Y.1584I.4743J.1584
 N50X.4999Y.4999I.4999J.0
 N51X.3742Y-.1684I.0J.4999
 N52G1X.9125Y-1.0299
 N53G3X.5614Y-.2526I.5614J.4974
 N54X.6495Y.3750I.0J.7500
 N55G0X-3.2476Y1.875Z-.1M1
 N101X2.8481Y-1.50Z-.1
 N102G1X.6495Y-.3750F200
 N103G99G3X.1005Y.3750I.6495J.3750
 N104G99X-.6000Y.7348I.7500J.0
 N105G99G1X-1.3481Y.2753
 N106G99G2X-.4000Y.4899I.1000J.4899
 N107G99X.4000Y.4899I.5000J.0
 N108G99G1X1.3481Y.2753
 N109G99G3X.6000Y.7348I.1500J.7348
 N110G99X-.1005Y.3750I.7500J.0
 N111G99X-.6495Y.3751I.6495J.3750
 N112G99X-.5614Y-.2527I.0J.7501
 N113G99G1X-.9125Y-1.0299
 N114G99G2X-.3742Y-.1686I.3742J.3315
 N115G99X-.5001Y.5001I.0J.5001
 N116G99X.0258Y.1584I.5001J.0
 N117G99G1X.4357Y1.3051
 N118G99G3X.0386Y.2375I.7114J.2375
 N119G99X-.7500Y.7500I.7500J.0
 N120G99X-.75Y-.75J.75
 N121G99X.0386Y-.2375I-.7500J.0
 N122G99G1X.4375Y-1.3051
 N123G99G2X.0256Y-.1584I.4743J.1584
 N124G99X-.4999Y-.4999I.4999J.0
 N125G99X-.3742Y.1684I.0J-.4999
 N126G99G1X-.9125Y1.0299
 N127G99G3X-.5614Y.2526I.5614J.4974
 N128G99X-.6495Y-.3750I.0J.7500
 N129G99X-.1005Y-.3750I-.6495J.3750
 N130G99X.6000Y-.7348I-.7500J.0
 N131G99G1X1.3481Y-.2753
 N132G99G2X.4000Y-.4899I.1000J.4899
 N133G99X-.4000Y-.4899I.5000J.0
 N134G99G1X-1.3481Y-.2753
 N135G99G3X-.6000Y-.7348I-.1500J.7348
 N136G99X.1005Y-.3750I-.7500J.0

N137G99X.6495Y-.3751I-.6495J-.3751
 N138G99X.5614Y.2527I.0J-.7501
 N139G99G1X.9125Y1.0299
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E

CONTROL CHARACTER FOR COMPUTER TAPE PUNCHING

SECTION VII

TAPE READER OPTIONS

A machine may be purchased from the factory in three different configurations. When this machine get to the customer, or after the customer has used his machine for some time, he may wish to alter the tape reader option to another configuration. This section explains the necessary field changes required with the kits that are available to accomplish these alterations.

7.1 TAPE READER TO REMOTE TAPE READER USING ADAPTER PANEL

7.1.1 Removal of Existing Tape Reader

- a. Remove power from the system by moving the On-Off lever on the power enclosure to the Off (down) position.
- b. Remove the access panel and unplug K-9 on the ZDI board. Remove the K-9 connector cable from the cabling harness starting at the PCC board end and working up until it's free of the harness. (Figure 7-1)
- c. Remove the tape reader reels, if any, and the four socket head bolts on the tape reader face plate. The face plate will tilt up slightly as the bolts are loosened. Grasp both reel spindles and with even force pull the tape reader towards you about 2/3 of the way out (approximately 6"). Now grasping both sides, remove the tape reader and place the rear end on the 2" ledge just below the lower mounting bolts. Holding the forward edge of the tape reader with one hand, reach in and unplug the power cord. The tape reader can now be completely removed. (Figure 7-2)

7.1.2 Installation of the Remote Tape Reader Panel (Ref. Figure 7-3)

- a. Lay the remote panel into the recess created by tape reader removal and reharness the K-9 connector cable attached to the panel in the same manner as was the original K-9 connector. Plug the connector onto the ZDI board and also plug the power cord into the tape reader power bracket.
- b. Replace the nameplate located on the lower inside of the power equipment enclosure door with the one provided in the kit. Pop rivets are provided.

- c. Using the four socket head bolts which secured the tape reader, secure the remote panel in the same relative position as was the tape reader.
- d. Replace the access panel and the system is ready for use.

7.2 NO TAPE READER TO REMOTE TAPE READER USING ADAPTER PANEL.

7.2.1 Removal of Blanking Panel:

- a. Remove power from the system by moving the On-Off lever on the power enclosure to the Off (down) position.
- b. Remove the access panel and then the blank face plate held in place by four socket head bolts.

7.2.2 Installation of the Remote Tape Reader Panel and Associated Hardware: (Ref. Figures 7-1 and 7-3)

- a. Attach the tape reader power bracket to the cabinet back wall as shown with the #6-32 hardware provided.
- b. Connect wires #2 and 3 as shown in Figure 7-1. Harness them with the cable which runs down the rear right side of the cabinet.
- c. Remove the end nut and washer from the load switch, and after removing the load switch plug from the switch panel, insert the switch into the panel with Pin #1 of the switch up. Replace the washer and nut, and adjust the switch depth as necessary before tightening the switch into place.
- d. Lay the remote panel into the recess exposed by the plate removal and harness the K-9 connector cable attached to the panel and the load switch cable with the cables that originate in the operator's control panel, and run down the left side of the control enclosure to the ZDI board.
- e. The K-9 connector plugs onto the ZDI board K-9, the load switch blue wire goes into ZDI K7, Pin 3 and the violet wire goes into ZDI K-7. Fold the excess wire into a service loop as are the other cables which terminate at the ZDI board.
- f. Plug the power cord into the power bracket and using the four socket head bolts which secured the blank panel, secure the remote panel in the same relative position as was the blank panel.

g. See step 7.1.2 b.

h. Replace the access panel and the system is ready for use.

7.3 NO TAPE READER TO TAPE READER INSTALLED.

7.3.1 Removal of Blanking Panel:

See paragraph 7.2.1.

7.3.2 Installation of the Tape Reader and Associated Hardware: See paragraph 7.2.2 steps a, b and c.

- a. Attach the power cord and the data cable to the tape reader.
CAUTION: The data cable securing shroud screws strip easily.
Roll and tie the power cord until it is approximately 12" long.
Ref. Figure 7-2.
- b. Holding both sides of the tape reader with the spool end out, place the rear of the reader on the 2" ledge just below the recess created by the blank panel removal. With one hand, hold the forward edge of the tape reader, and use the other hand to plug the tape power cord into the reader power bracket. Lay the data cable across the axis drive chassis with the excess hanging over the left side of the chassis.
- c. After grasping both sides of the tape reader very gently, slide it into the recess about 1/2 the reader length. Now grasp the reel spindles and ease the reader all the way in.
- d. Using the four socket head bolts which secured the blank panel, secure the tape reader in the same relative position as was the blank panel.
- e. Harness the data cable and the load switch cable with the cables that originate in the operator's control panel and run down the left side of the control enclosure to the BCC board.
- f. See paragraph 7.2.2 e.
- g. See paragraph 7.1.2 b.
- h. Replace the access panel and the system is ready for use.

7-4

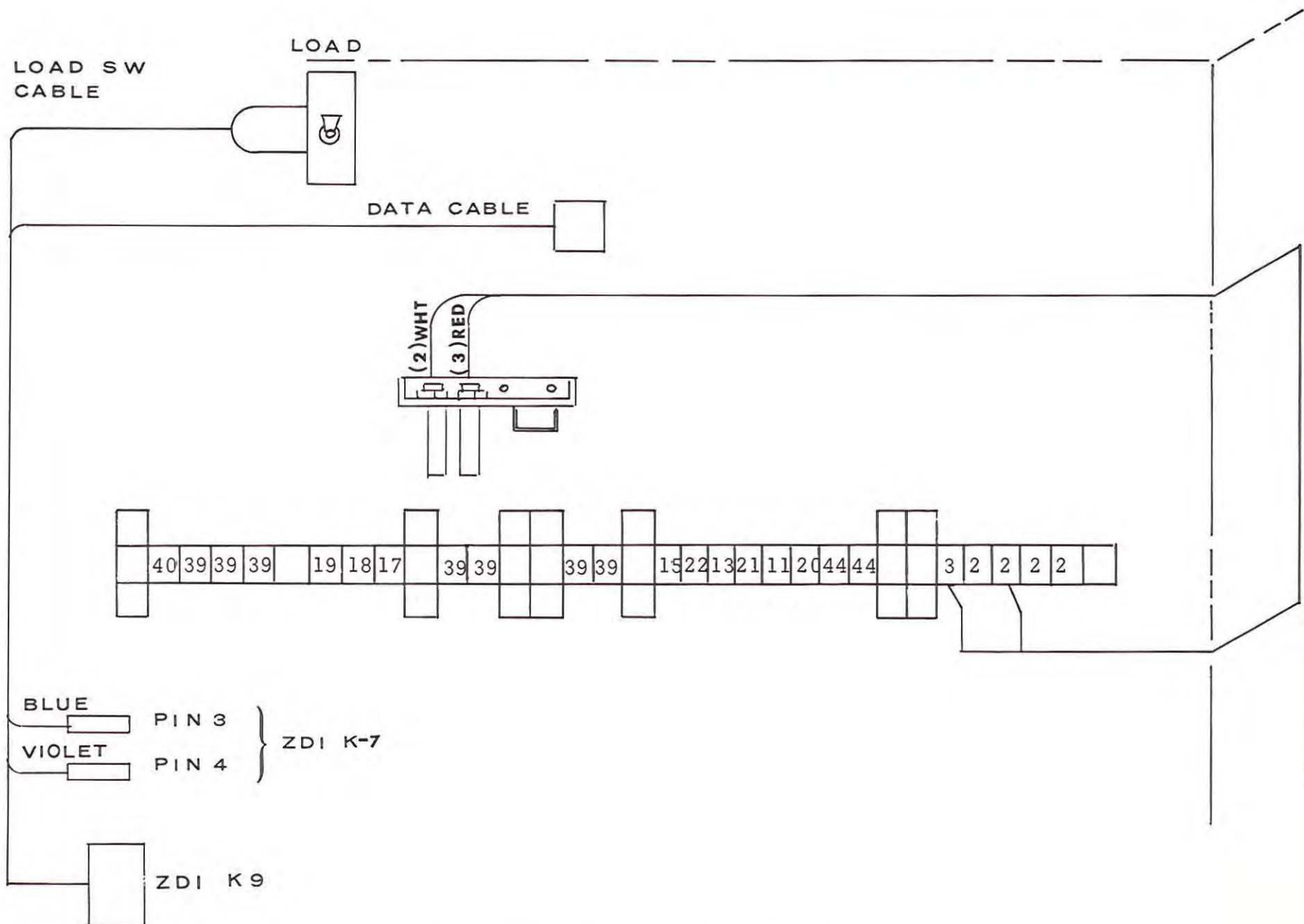


Figure 7-1 Tape Reader Data Cable

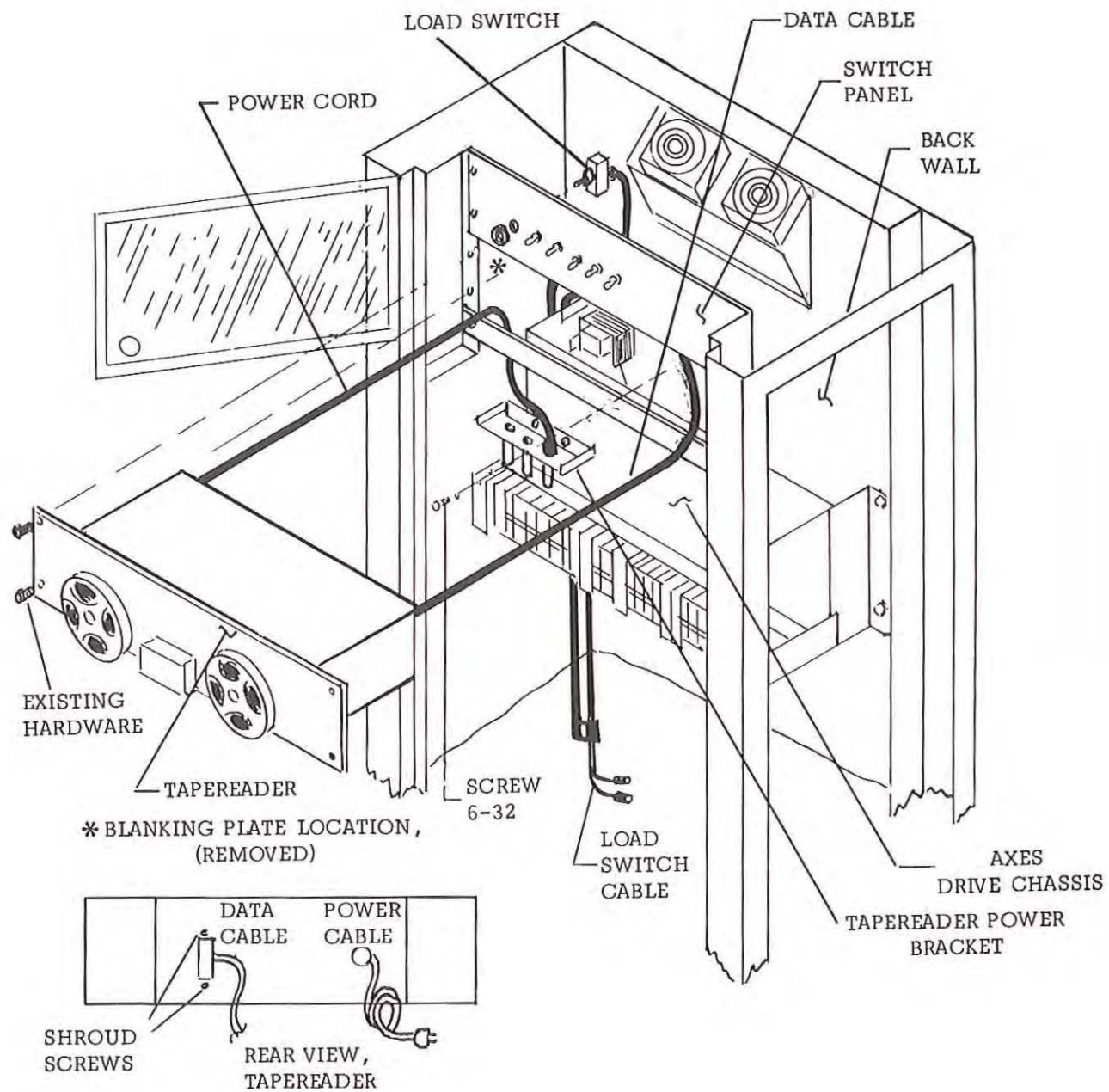


Figure 7-2. Tape Reader Installation

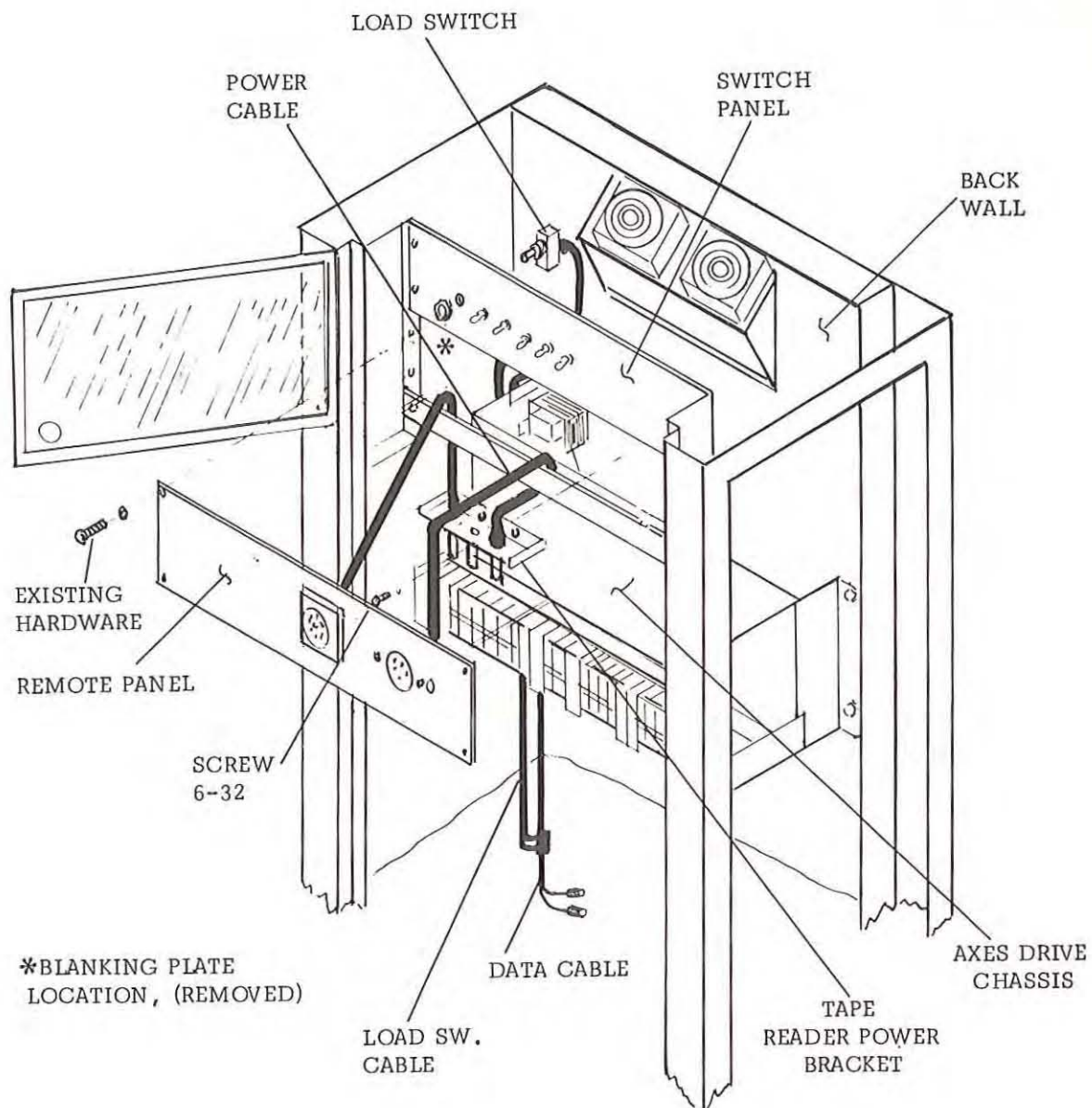


Figure 7-3 Tape Reader Adapter Panel Installation

SECTION VIII

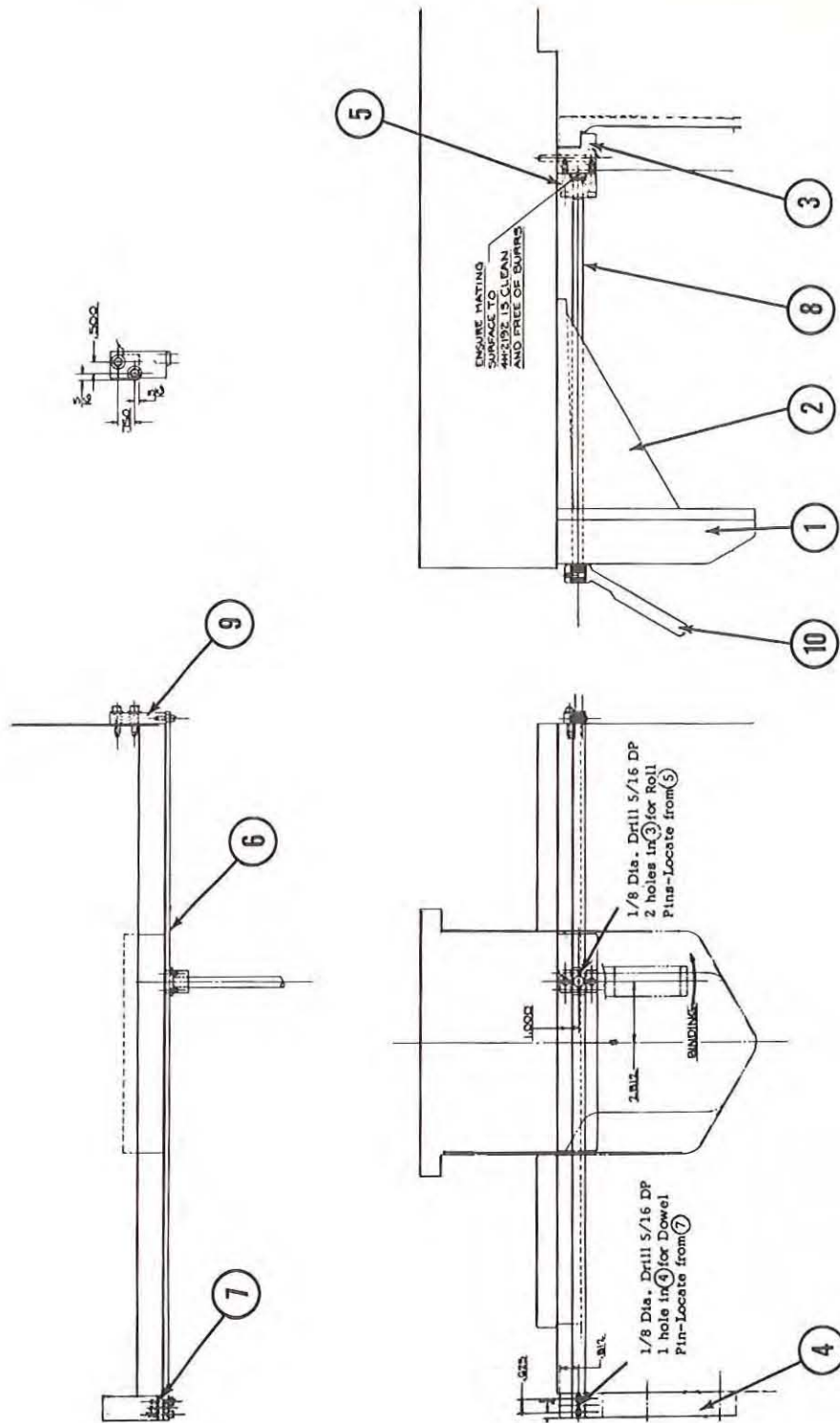
Y AXIS REED CLAMP AND ROTARY TABLE

8.1. INSTALLATION OF Y-AXIS REED CLAMP

The following procedure is required for field installation of this clamp.

1. Remove cover (1, Figure 8-1) and proceed to remove the X-axis drive motor.
2. Remove motor mounting bracket (2).
3. Remove saddle hold down (3) and install new item (3) provided with tapped holes. Torque mounting screw to 33 ft. lbs.
4. Remove knee-column hold down clamp (4) and install new item (4) provided with tapped holes.
5. Install new X-axis drive motor bracket (2).
6. Mount the brake block (5), binding strip (6) and spacer (7) to knee and saddle with all mounting screws loose.
7. Install saddle locking shaft (8) through X-axis motor mounting bracket (2).
8. Install the front binding strip mounting bracket (9) to the binding strip (6) and clamp to knee.
9. Drive Y-axis full travel and snug up all capscrews with change of position of item (9) if necessary. Ensure free travel without binding or friction. Tighten all capscrews, drill and tap front of knee per Figure 8-3. Install capscrews.
10. Recheck alignment with all capscrews tight by moving the saddle in and out without interference.
11. Drill 1/8 inch diameter x 5/16 deep for rollpins in brackets from pilot holes provided. Install rollpins.
12. Complete the installation of the X-axis drive motor.
13. Install cover (1).
14. Install saddle lock handle (10) and check the proper action of the Y-axis clamp.

Figure 8-2 shows Y-Axis Reed Clamp as installed on machine.



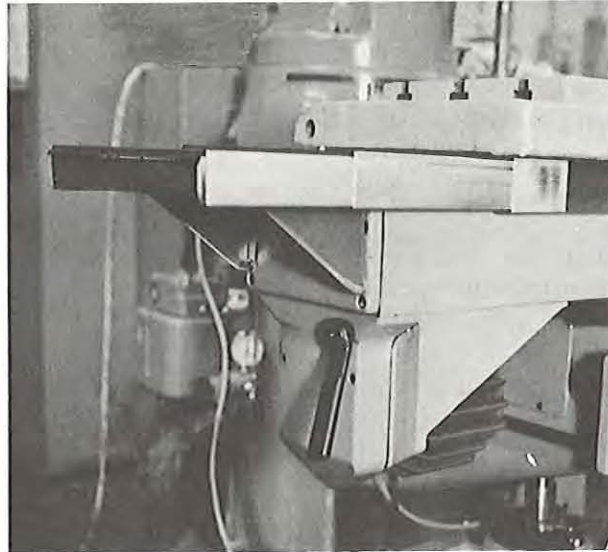


Figure 8-2. Y-Axis Reed Clamp Installed

8.2 INSTALLATION OF Y-AXIS DISCONNECT CABLE FOR USE WITH ROTARY TABLE

CAUTION: System power must be removed prior to any attachment or removal.

The rotary table electrical adapter option requires that a bracket be mounted on the left side of the knee. Figure 8-3 shows where and how to drill the holes for the bracket. The dimensions are approximate.

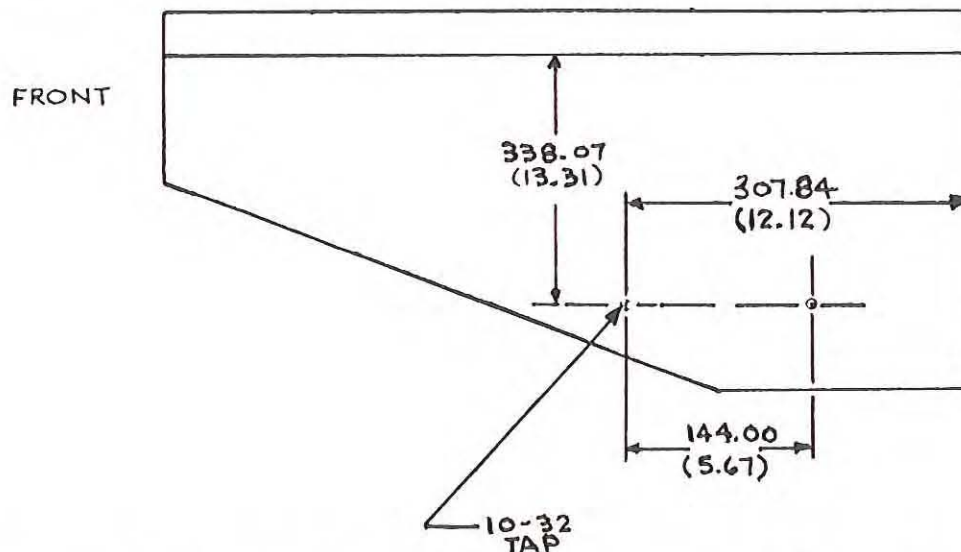


Figure 8-3. Hole Locations for Y-Axis Disconnect Cable Bracket

For operation of the Y-axis, the Y-axis motor is attached to the drive cable by way of the MS connector affixed to the cable shield and the mating MS connector on the Y-axis step motor cable.

For operation of the rotary table, disconnect the Y-axis motor cable from the drive cable and connect the rotary table cable via its MS connector to the drive table.

CAUTION: When using the rotary table, the Y-axis slide must have locking mechanism present to prevent inadvertent Y-axis motion. See paragraph 8.1.

NOTE: When the Y-axis step motor is not in use, insure that the MS connector end of the motor cable remains under the cable shield to prevent contamination by coolant and/or chips.

Correct placement of the cable clamp will provide the necessary tension on the cable to keep it under the shield when removed. See Figure 8.4.

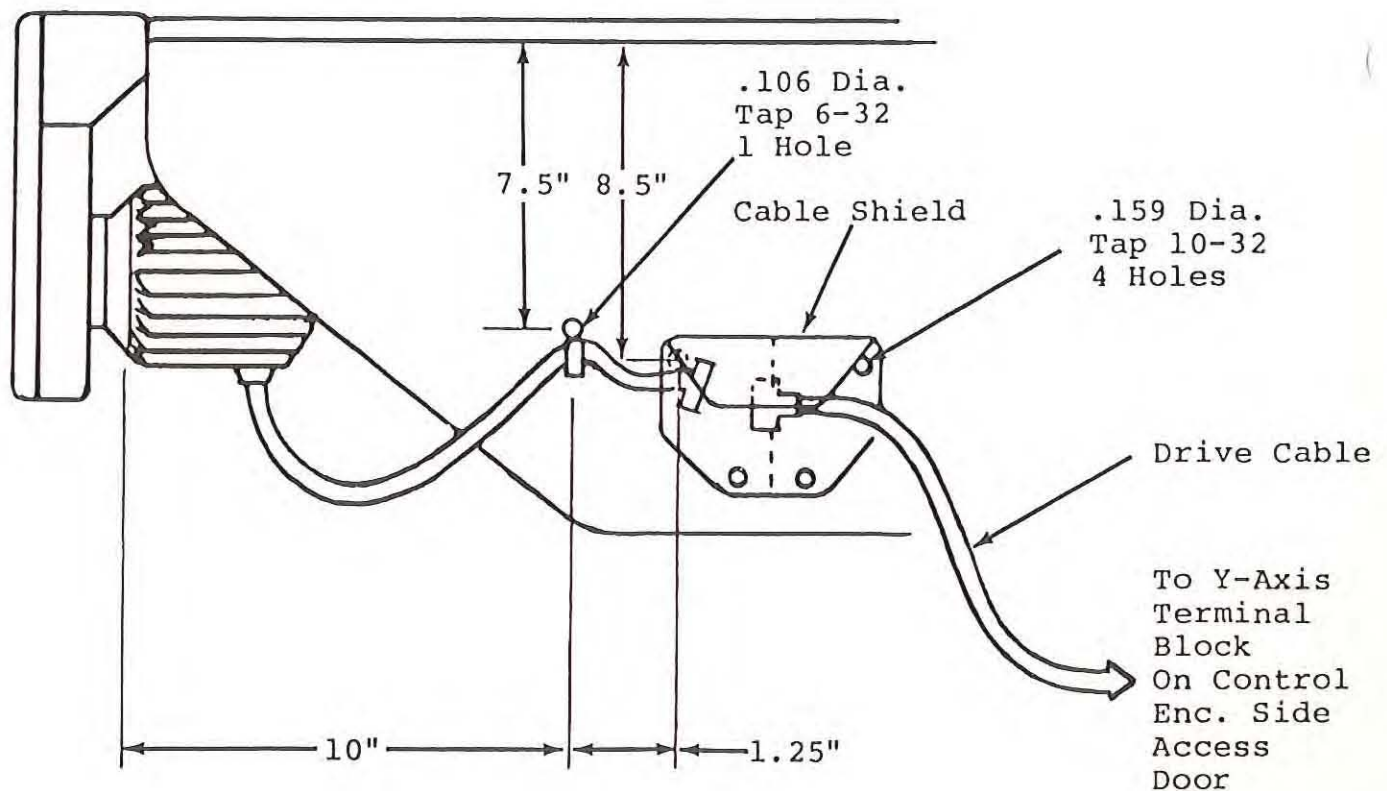


Figure 8-4. Y-axis Disconnect Cable for Rotary Table

8.3 INSTALLATION OF ROTARY TABLE

The 12 inch diameter Rotary Table is drivey by a worm gear arrangement with a 180:1 ratio. Power is supplied by a stepmotor compatible with the drive systems of all Bridgeport CNC machines (Table Assy. code 2521000). The counter incorporated into the drive system is capable of being read to 0.01° , the resolution of the total system. The rotary table can be driven from the control output to one of the linear axes. Suitable special provision has been made to utilize the Y-axis output to drive the rotary table instead of its normal output to the saddle drive motor. A special Y-axis reed clamp (3656002) and disconnect (3800031) are then made available and installed at the factory. For field installation use 2656002 and 2800031 respectively.

Depending on the requirements, the table can be mounted vertically on the left side of the machine table as in Figure 8-5, or with its working face horizontal. Note that when the table face is mounted vertically (axis of rotation horizontal), mounting holes are provided to suit the T-slot spacing.

Bridgeport Tailstock 2520003 may be used when this rotary table is mounted vertically.

CAUTION: Do not apply excessive end load with the tailstock and ensure that the table face is not distorted when clamping the workpiece (see Figure 8-6).

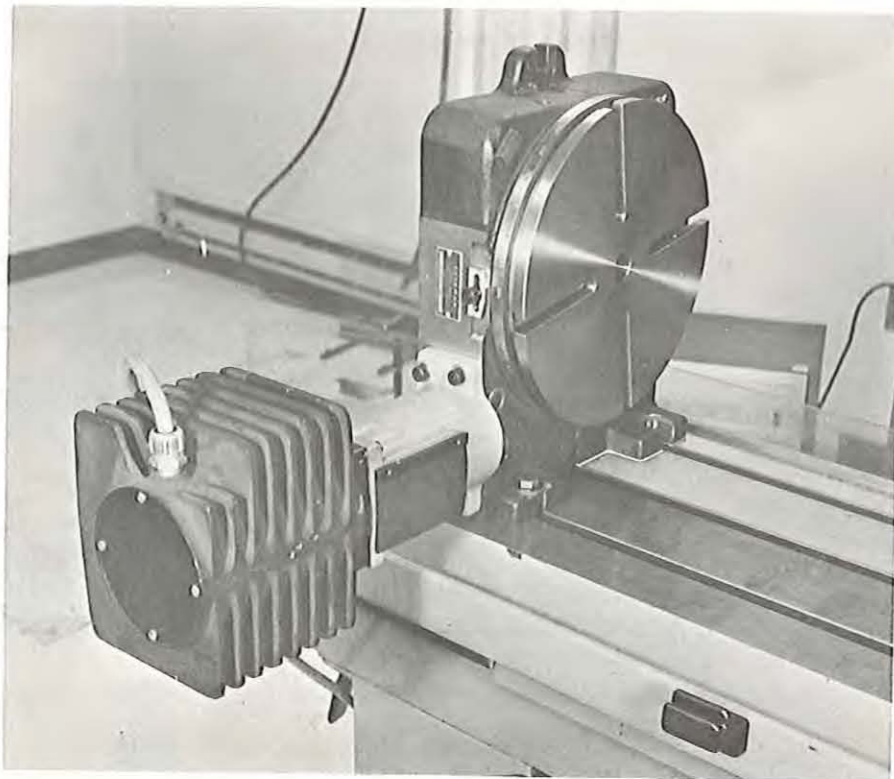


Figure 8-5. Vertical Application of Rotary Table

8.4 MOUNTING WORK PIECE TO ROTARY TABLE

NOTE: Most troubles in the use of a Bridgeport (or any other) Rotary Table can be traced to three causes:

1. Trying to accommodate pieces much too large for the tables.
2. Trying to mount workpieces with surfaces which are not flat.
3. Improper clamping or mounting .

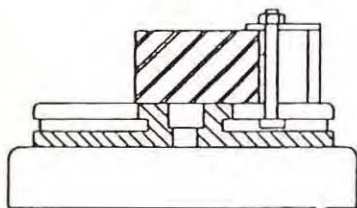
If possible, the best way to mount a workpiece is by bolting or clamping it directly to the table through drilled holes or milled slots.

When conditions prohibit direct mounting, a strap or clamp may be used. However, it is important that the strap or packing be kept as close to the workpiece as possible to prevent bowing of the clamp and consequent scoring or slipping of the piece.

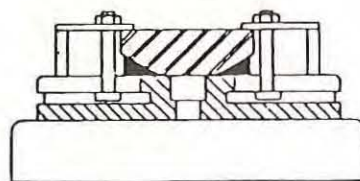
Caution must be used to keep the strap parallel with the table top and also to keep from over tightening the strap bolt. Over tightening will tend to bind the table, and in some cases may damage the piece.

Figure 8-6 below illustrates proper mounting of work piece. For assistance with unusual applications see your Bridgeport Dealer.

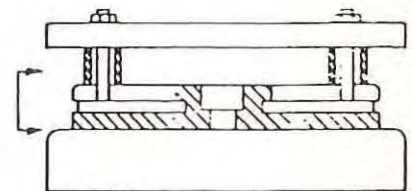
RIGHT WAY



Holding bolt mounted close to work piece

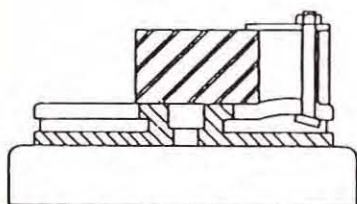


Irregular piece shimmed to provide flat bottom surface

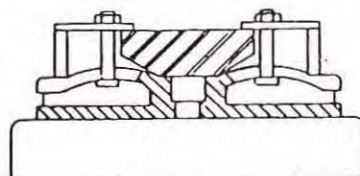


Workpiece blocked under overhang to prevent distortion of piece

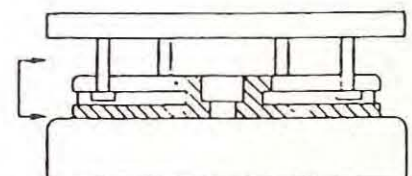
WRONG WAY



Bolt too far away from piece allows overtightening

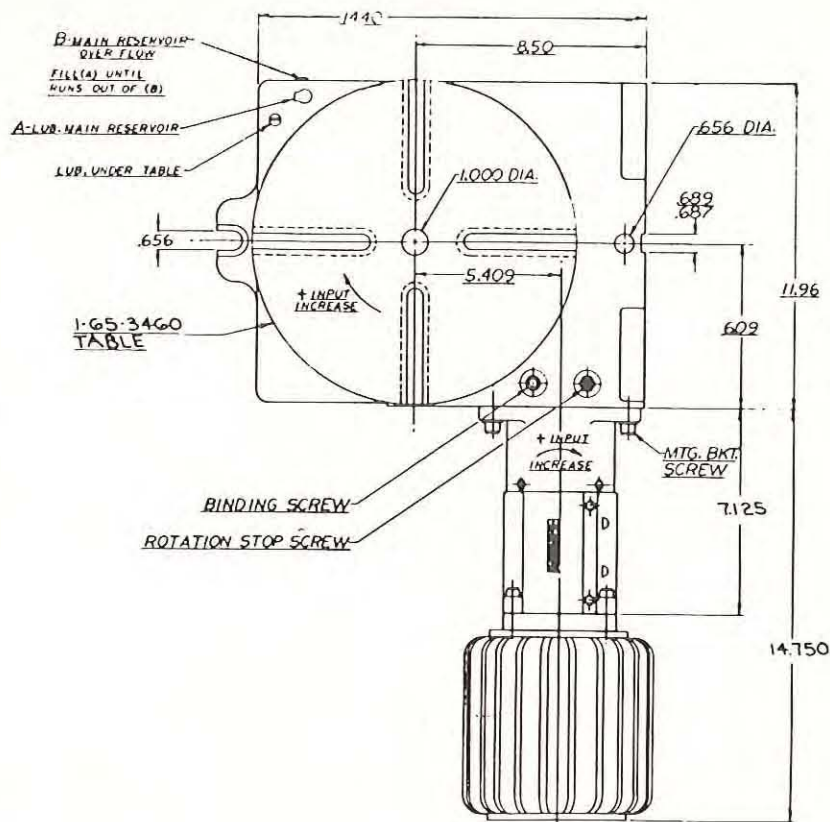
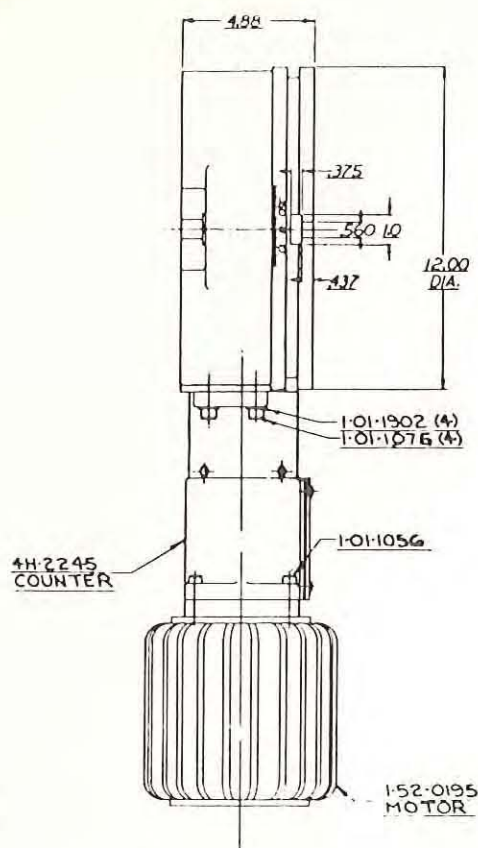


Chamfered piece unshimmed allows bolts to be overtightened and distort table top



Unblocked Piece allows overtightening and distortion of slots

Figure 8-6. Mounting of Workpiece



SPECIFICATIONS

Table Diameter.....12"
 T-Slots (4)..... 9/16" Wide
 Keyways.....11/16" Wide
 Weight (Approx.).....150 Lbs.
 Profile Height.....4-7/8"
 Load Capacity
 Horizontal.....150 Lbs.
 Off Center.....150 Lbs. @3"
 Vertical.....600 Inch Lbs.
 Max. Backlash (adj)...002" @ 6"
 Radius
 Squareness of Table
 Vertical.....002" in Total Height

Center Bore-Diameter...1.000"
 Center Bore-Runout... 0008" TIR
 Center Bore to Vertical
 Mount.....8.50"
 Static and Rotary
 Flatness.....0005" TIR
 Drive Ratio.....180:1
 Angular Accuracy.....25 Secs.
 Resolution.....0.01 Deg. (36 Sec.)
 Repeatability.....25 Secs.

Cable and 6-pin MS-Connector provided

