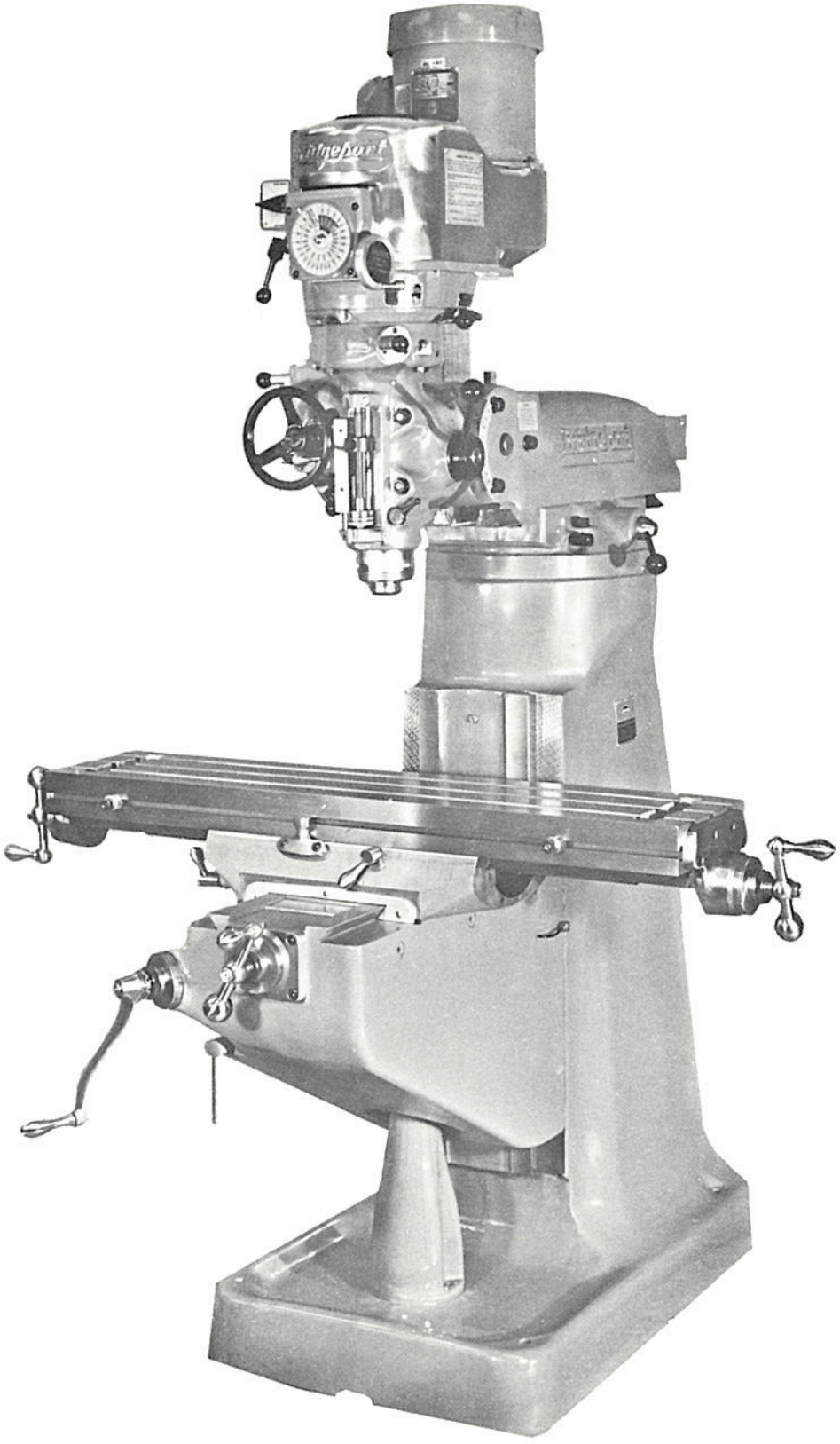
MANUAL NO. M-105B

BRIDGEPORT SERIES I MILLING MACHINE

AUGUST, 1976

INSTALLATION, OPERATION AND MAINTENANCE

Bridgeport® TEXTRON
Bridgeport Machines Division of Textron Inc.



BRIDGEPORT SERIES I TURRET MILLER MODEL BR2J

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IMPORTANT

POINT OF OPERATION SHIELDING

The proper type of shielding at point of operation on a milling machine necessitates sound judgement by the user for the provision of adequate shielding 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

The design of specific type shielding 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 shielding. These manufacturers can provide both general purpose type shielding and special design type, using both metal and plastic materials.

To assist Bridgeport users, there are many manufacturers available that are typical of the below noted who can build to your specifically designed shielding requirements.

(1). The Cincinnati Ventilating Co., Inc.
7410 Industrial Road
Florence, Kentucky 41042

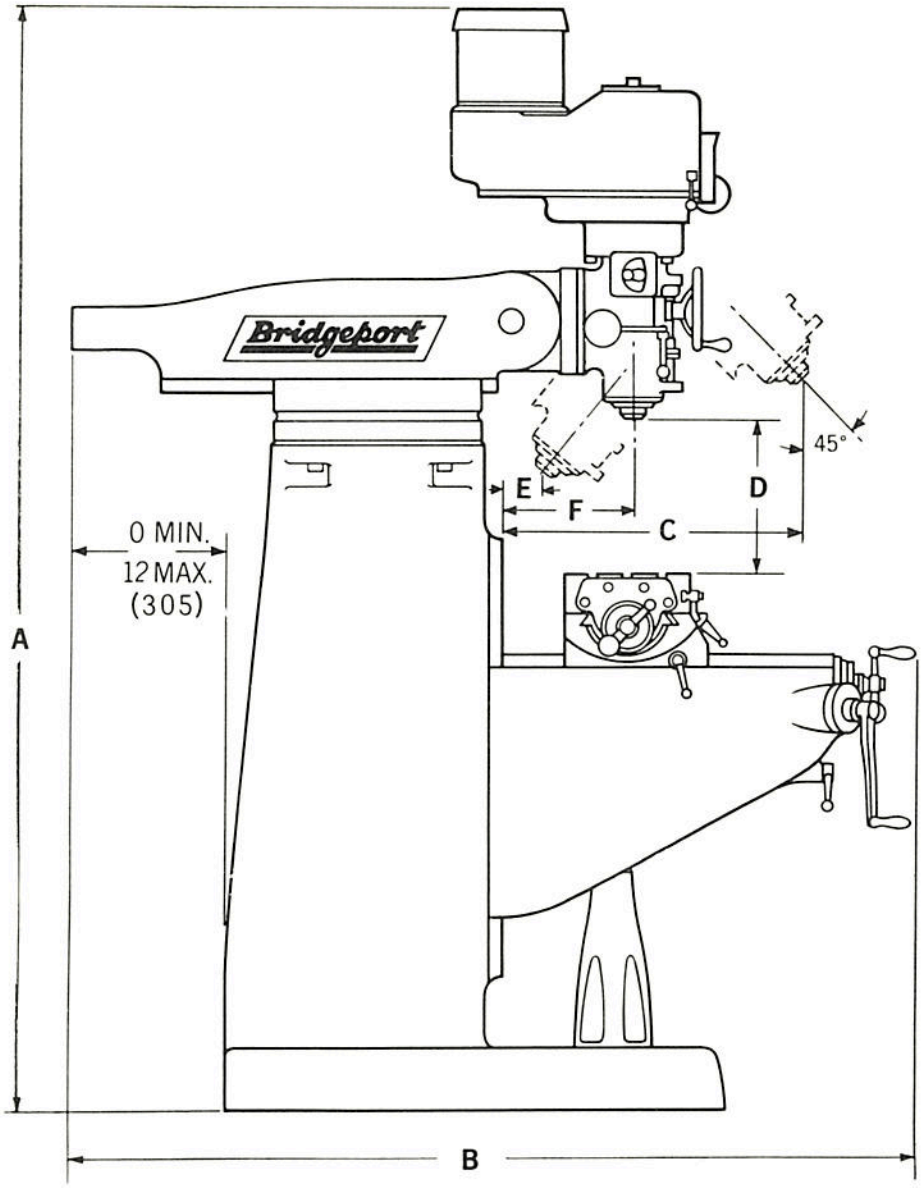
(1-606-371-1320) – Mr. R. Kevin Martin

(2). Willco Plastics
918A 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



LONGITUDINAL TRAVEL	TABLE LENGTH
30 in. (762mm)	42 in. (1067mm)
36 in. (914mm)	48 in. (1219mm)

	A	B	C	D	E	F
MIN.	82 3/16(2088)	51(1295)	8 3/4(222)	0	0	6 3/4(171)
MAX.	82 3/16(2088)	63(1600)	20 3/4(527)	18-1/2(470)	12(305)	18 3/4 (476)

NOTE: Metric specifications in parenthesis

Figure 1. Principal Dimensions

MACHINE SPECIFICATIONS

Range

Table travel (X-axis)	30 in. (762mm)	36 in. (914mm)
Saddle travel (Y-axis)	12 in. (305mm)	
Quill travel	5 in. (127mm)	
Knee travel (Z-axis manual)	16 in. (406mm)	
Ram travel	12 in. (305mm)	
Throat distance (min.)	6-3/4 in. (171mm)	
(max.)	18-3/4 in. (476mm)	
Table to spindle nose gage line (min.)	2-1/2 in. (64mm)	
Max. weight of workpiece	750 lbs. (340 kg.)	

Table

Overall sizes	9 x 42 in. (229 x 1067mm)	9 x 48 in. (229 x 1219mm)
T-Slots	3 on 2-1/2 in. (64mm) centers	
T-Slot size	5/8 in. (16mm)	
Height above floor (max.)	47-1/4 in. (1200mm)	

Milling	Std. Power Feed	High Torque Power Feed
Feed rate*	(X) 3/4-35 ipm (19-889mm/min.)	(X) 3/8-15 ipm (9.5-381mm/min.)

Space and weight

Floor area	7 x 10 ft. (2.1 x 3.1m)
Height	82-1/16 in. (2088mm)
Net weight	1988 lbs. (900 kg)
Shipping weight	2180 lbs. (989 kg)

Power

Electrical supply-60 Hz., 3 phase	208/230/460/575V

Color

Standard - Bridgeport Gray

*Power optional

MILLING HEAD SPECIFICATIONS

MODEL	"M" HEAD	"M" HEAD Hi Speed	"J" HEAD	"J" HEAD Hi Speed	"2J"	"2JS"
Power	.5 HP	.5 HP	1.0 HP	1.5 HP	1.5 HP	2.0 HP
Motor RPM	1200 RPM	3600 RPM	1800 RPM	3600 RPM	1800 RPM	1800 RPM
Speed Ranges - RPM LOW HIGH	6 Steps 275 - 4550	6 Steps 300 - 8000	8 Steps 80 - 325 660 - 2720	8 Steps 160 - 660 1320 - 5440	Stepless 60 - 500 500 - 4200	Stepless 60 - 500 500 - 4200
Quill Travel Quill Diameter	2.562 in (65 mm)	2.562 in (65 mm)	5.0 in (127 mm) 3.375 in (86mm)	5.0 in (127 mm) 3.375 in (86 mm)	5.0 in (127 mm) 3.375 in (86 mm)	5.0 in (127 mm) 3.375 in (86 mm)
Spindle Tapers:	#2 Morse #7 B&S B-3	#2 Morse #7 B&S B-3	R-8 #30 Q.C. #40	R-8 #30 Q.C. #40	R-8 #30 Q.C. #40	R-8 #30 Q.C. #40
Spindle Diameter	1.437 in (36.5mm)	1.875 in (48 mm)	1.875 in (48 mm)	1.875 in (48 mm)	1.875 in (48 mm)	1.875 in (48 mm)
Spindle Feed Rate	Manual	Manual	.0015/Rev (.038mm) .003/Rev (.076mm) .006/Rev (.152mm)	.0015/Rev (.038mm) .003/Rev (.076mm) .006/Rev (.152mm)	.0015/Rev (.038mm) .003/Rev (.076mm) .006/Rev (.152mm)	.0015/Rev (.038mm) .003/Rev (.076mm) .006/Rev (.152mm)
Drilling Capacity -Manual Drilling Capacity -Power	.50 in (12.7mm)dia.	.50 in (12.7mm)dia.	.75 in (19 mm) dia. .37 in (9.4mm)dia.	.75 in (19 mm) dia. .375 in (9.5mm)dia.	.75 in (19mm) dia. .37 in (9.4mm) dia.	.87 in (22mm) dia. .37 in (9.4mm) dia.
Boring Capacity	1.50 in (38mm)dia.	1.50 in (38mm)dia.	6.0 in (152.4mm)dia.	6.0 in (152.4mm)dia.	6.0 in (152.4mm)dia.	6.0 in (152.4mm)dia.
Milling Capacity	1.0 in^3/min (16cc/min)	1.0 in^3/min (16cc/min)	1.5 in^3/min (24cc/min	1.5 in^3/min (24cc/min)	2.0 in^3/min (32cc/min)	2.0 in^3/min (32cc/min)
Spindle to Column-Minimum Maximum			6.75 in (171mm) 20.00 in (508mm)	6.75 in (171mm) 20.00 in (508mm)	6.75 in (171mm) 20.00 in (508mm)	6.75 in (171mm) 20.00 in (508mm)

UNCRATING

Carefully remove protective crating and skids so that the machine and parts are not marred, scratched or impaired. In the event of damage in transit, communicate at once with our representative and the transportation company making delivery.

Machine should be lifted by placing a sling under overarm or by putting an eye bolt in tapped hole on top of overarm.

SHORTAGES

Check shipment carefully, against the itemized packing list which is included in the parts box. In case of shortages, report them immediately to the representative from whom the machine was purchased, indicating parts not received which have been checked on the packing list.

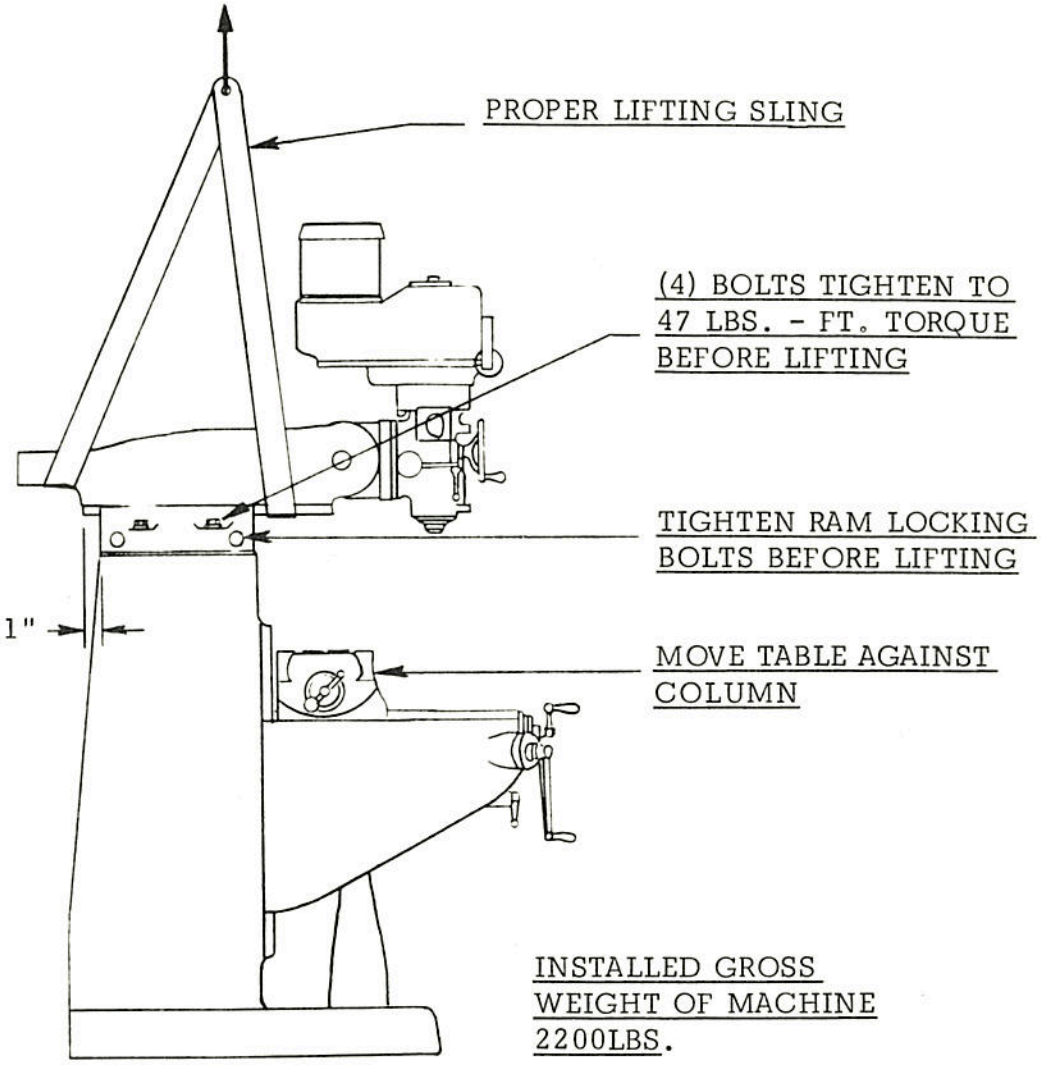
CLEANING

Thoroughly clean slush from machine with kerosene.

WARNING: It is not recommended that gasoline or any other highly inflammable cleaning agent be used.

Do not move the table, saddle, knee or any moveable part until all ways have been well cleaned and lubricated. Then, by hand, move table, saddle and knee to limit stop in one direction. Clean and lubricate exposed ways and then move each unit to the opposite limit stop and similarly clean and lubricate the exposed ways. Loosen bolts to unlock overarm, and move it forward and backward to the full length in order to clean and lubricate.

LIFTING THE MACHINE



PLACING ON SOLID FOUNDATION

The column and base are cast in one piece. When setting machine on a concrete foundation, it is advisable to use a little grout (thin mortar) to take care of any unevenness in the concrete as well as to provide a solid foundation at all points.

When setting machine on a floor that has any surface irregularities, shims should be used to correct this condition to the greatest extent possible.

NOTE: It is recommended that the machine be secured to the floor to prevent movement or tipping due to off-center loading.

See Figure 2 for installation layout.

LEVELING MACHINE

Set machine by leveling the work table lengthwise and crosswise with a precision instrument.

MOUNTING HEAD ON OVERARM ADAPTER

The face on the flange or adapter should be thoroughly cleaned as this aligns milling head square with table working surface. Then clean mounting surface of head carefully. When bolting the head to the adapter or overarm, tighten nuts evenly, using normal pressure. Care should be taken to avoid excessive pressure since this will cause distortion in the quill.

HANDLES

When crating, the three ball crank handles are sometimes turned to face the machine. In these cases the handles should be reversed before operating.

CONNECTING POWER SUPPLY

To connect the machine to the plant power supply, proceed as follows:

1. Check required machine voltage against power supply to ensure that they are compatible.

2. Connect machine wiring to power supply making sure connection is in compliance witht local safety regulations.

3. Check for correct spindle rotation. In the HIGH SPEED range, the spindle should rotate clockwise when viewed from the top of the machine.

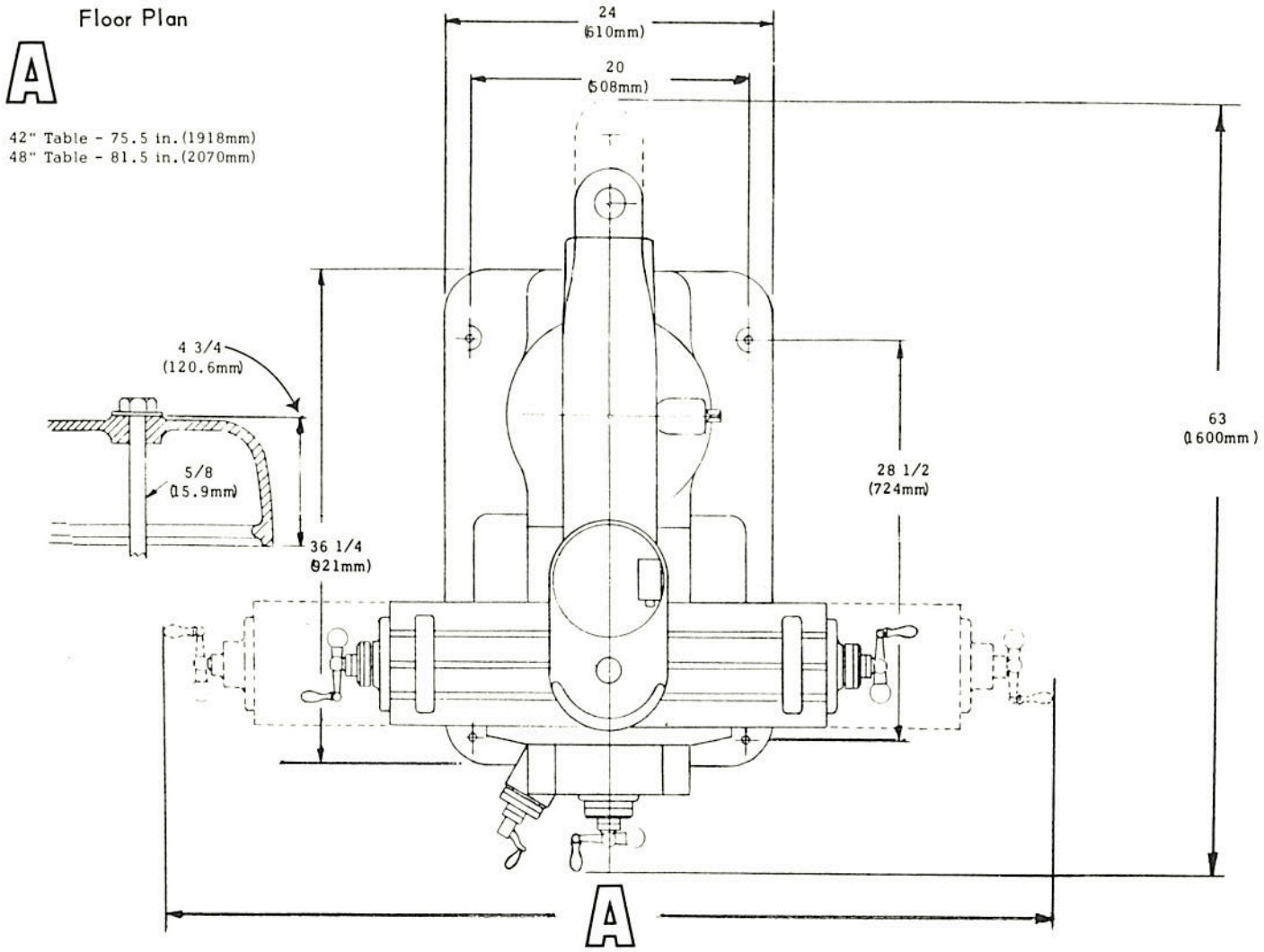


Figure 2. Installation Layout

ALIGNMENT OF HEAD

In case of precision boring or work of that nature, where it is necessary to have head perfectly square with the table, use method prescribed below. For normal milling, graduations on turret and head are close enough. To set head perfectly square with table, see Figure 3. This may be done with head and adapter on overarm, by adjusting adapter through worm gear on adapter. Loosen three binding bolts but leave drag on same for fine adjustment. To square head to table in the longitudinal axis, mount indicator as shown in Figure 4.

NOTE: When indicating as in Figure 3, it should be noted that the table is fitted to be slightly high in front, usually about .0005".

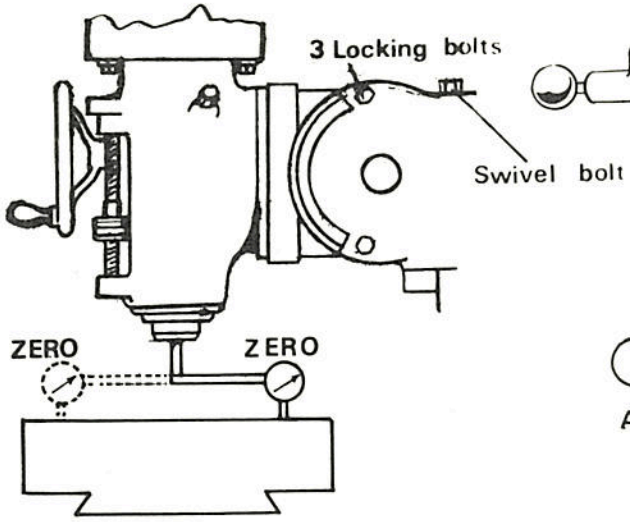


Figure 3. Head Alignment Y Axis

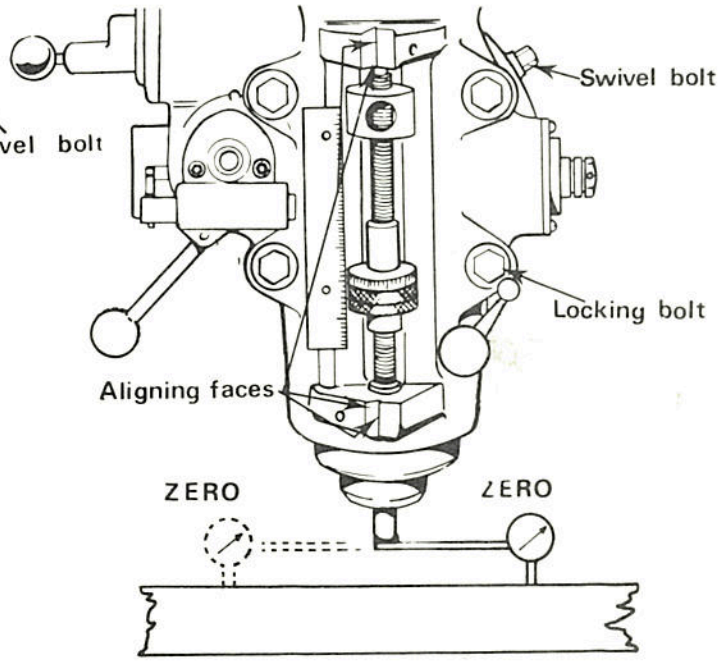
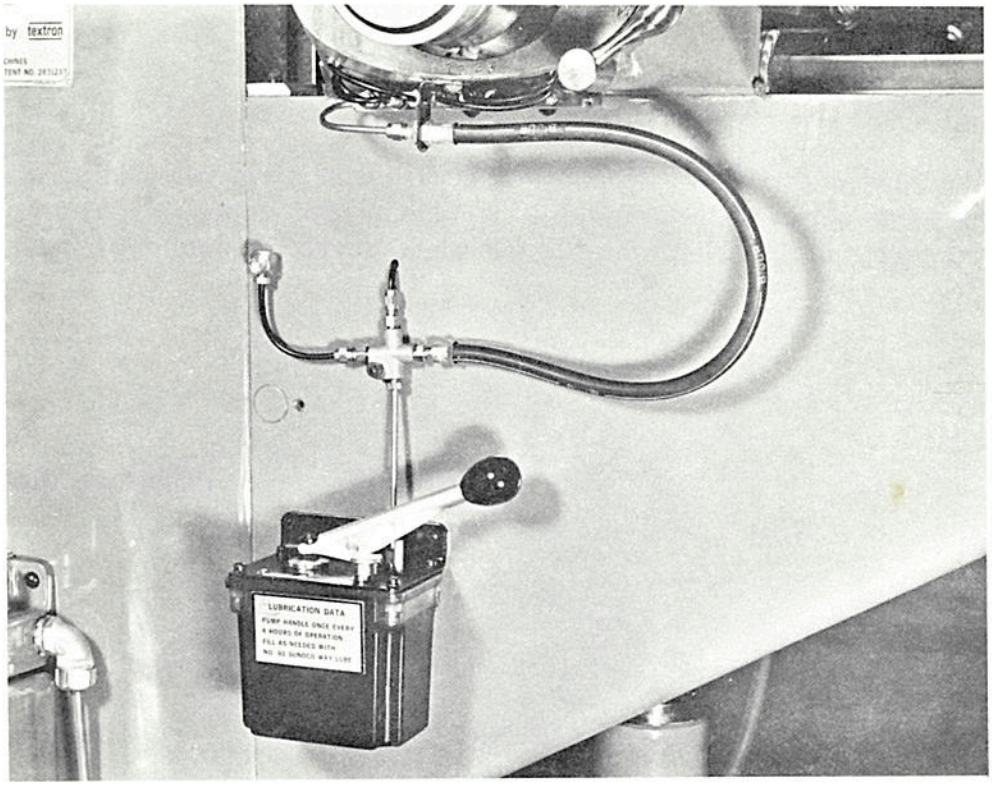


Figure 4. Head Alignment X Axis

LUBRICATION

Do not operate machine until properly lubricated. Follow the instructions given in Figure 5.



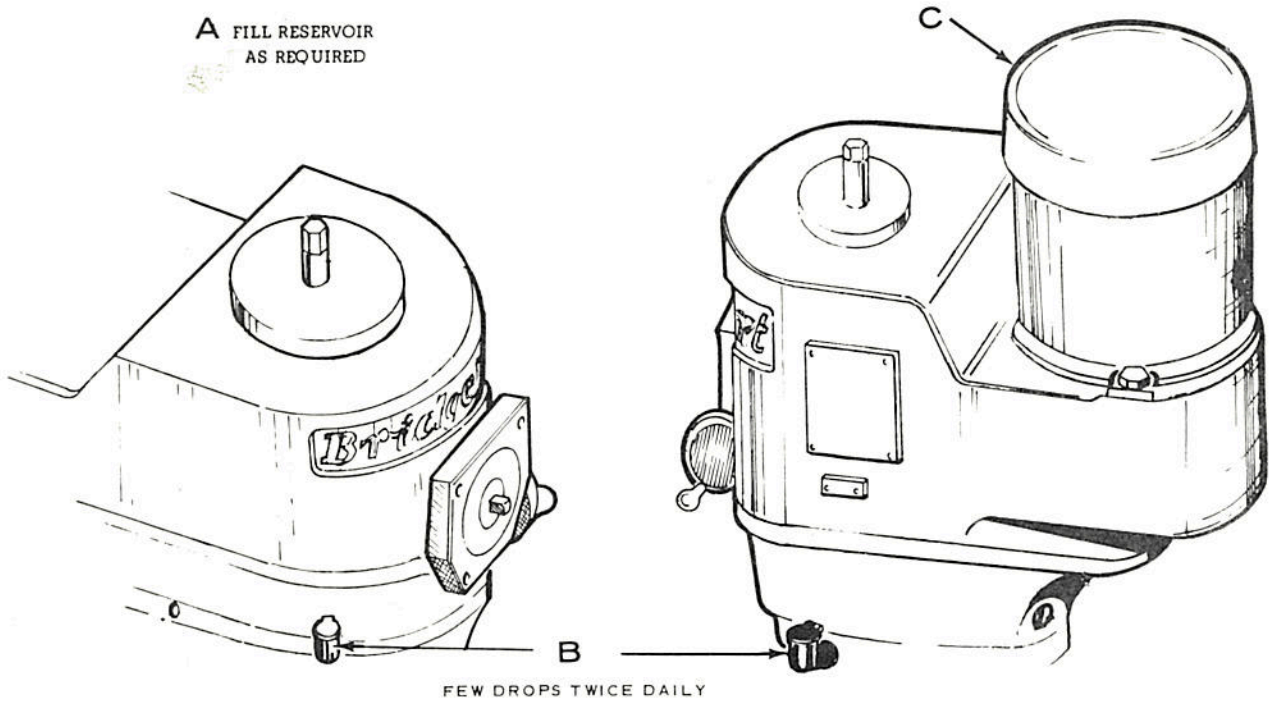


Figure 5. Recommended Lubrication

A. Way Surfaces – Lead Screws
"Sunoco" Waylube #80
or equivalent

B. Milling Heads (Spindle Bearings)
S.A.E. 10 or 10W Light Oil
(none on grease packed heads)

C. Motors are greased for life of bearings
For further instructions refer to
motor manufacturer's instruction book

ATTACHMENTS: POWER FEED
Oil to sight level with
Mobilube No. 46 S.A.E. 140

SHAPING ATTACHMENT
Shell Nassa Oil J78 or K79
Socony Gargoyle Vactra
Oil (Heavy Medium)

SHAPING ATTACHMENT (Worm drive)
Shell Nassa Oil J78 or K79
Socony Cylinder Oil 600W

ADJUSTMENT OF TABLE GIB

The table is provided with a full length tapered gib in the saddle, with an adjusting screw on the left side. To take up gib, tighten large screw slightly and repeat until a slight drag is felt when moving the table by hand.

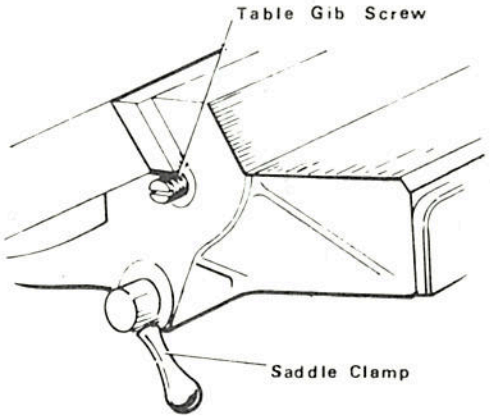
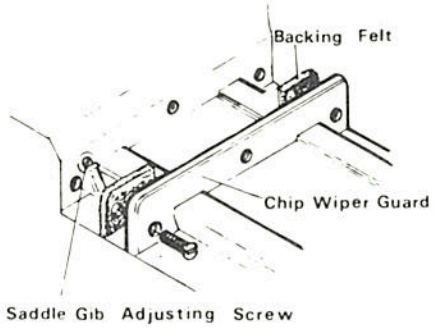


Table-saddle gib

ADJUSTMENT OF SADDLE AND KNEE GIBS

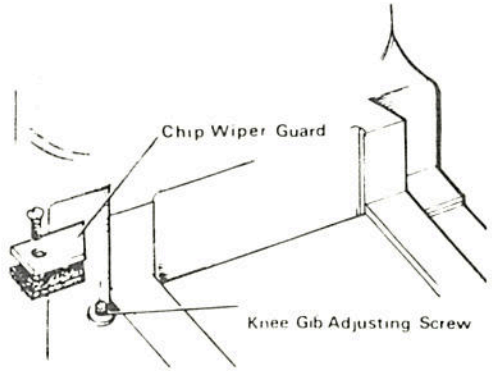
A tapered gib is used for adjusting the saddle bearing on the knee. This forms a guide for the saddle. To tighten gib same principal as described above is used; however, chip wiper has to be removed first.



Saddle-knee gib

ADJUSTMENT OF KNEE GIB

Remove chip wiper and adjust screw until smooth movement is attained.

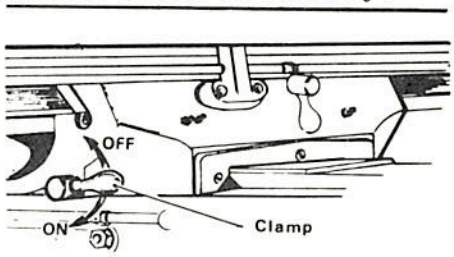


Knee-Column gib

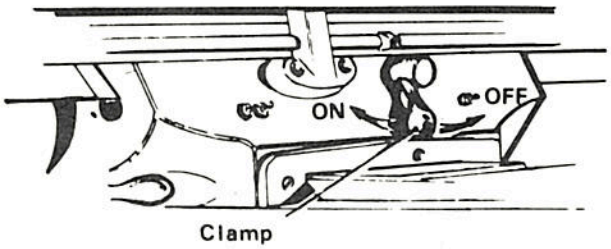
CLAMPING TABLE, SADDLE AND KNEE

When milling with longitudinal table feed only, it is advisable to clamp the knee to the column and the saddle to the knee to add rigidity to these members and provide for heavier cuts with a minimum of vibration. The saddle locking lever is located on the left-hand side of saddle.

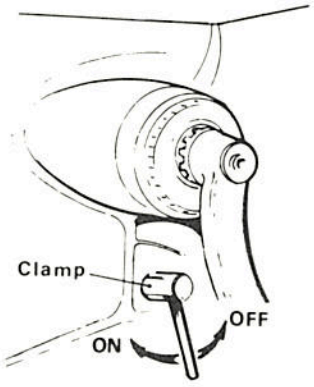
Excessive pressure can cause slight table bind. Use moderate clamping pressure, as this will hold saddle sufficiently.



The table clamp lever is located on front of saddle and should always be clamped when longitudinal movement is not required.



The knee clamping lever is at the left side of the knee and should be drawn upward to clamp the knee. This is only a tension brake and will not lock the knee completely. Leave clamped at all times unless using knee in operation.



REMOVING TABLE

Remove as follows: Ball crank handles, dial holders, bearing brackets. Screw will then turn all the way so that it can be removed. When this is accomplished, the table can easily be taken off merely by sliding from saddle. See Figure 6.

REMOVING SADDLE

Follow along the same lines as removing table; however, it is necessary to remove entire front bracket assembly completely. Then remove nut bracket which has become accessible after table has been removed. See Figure 6.

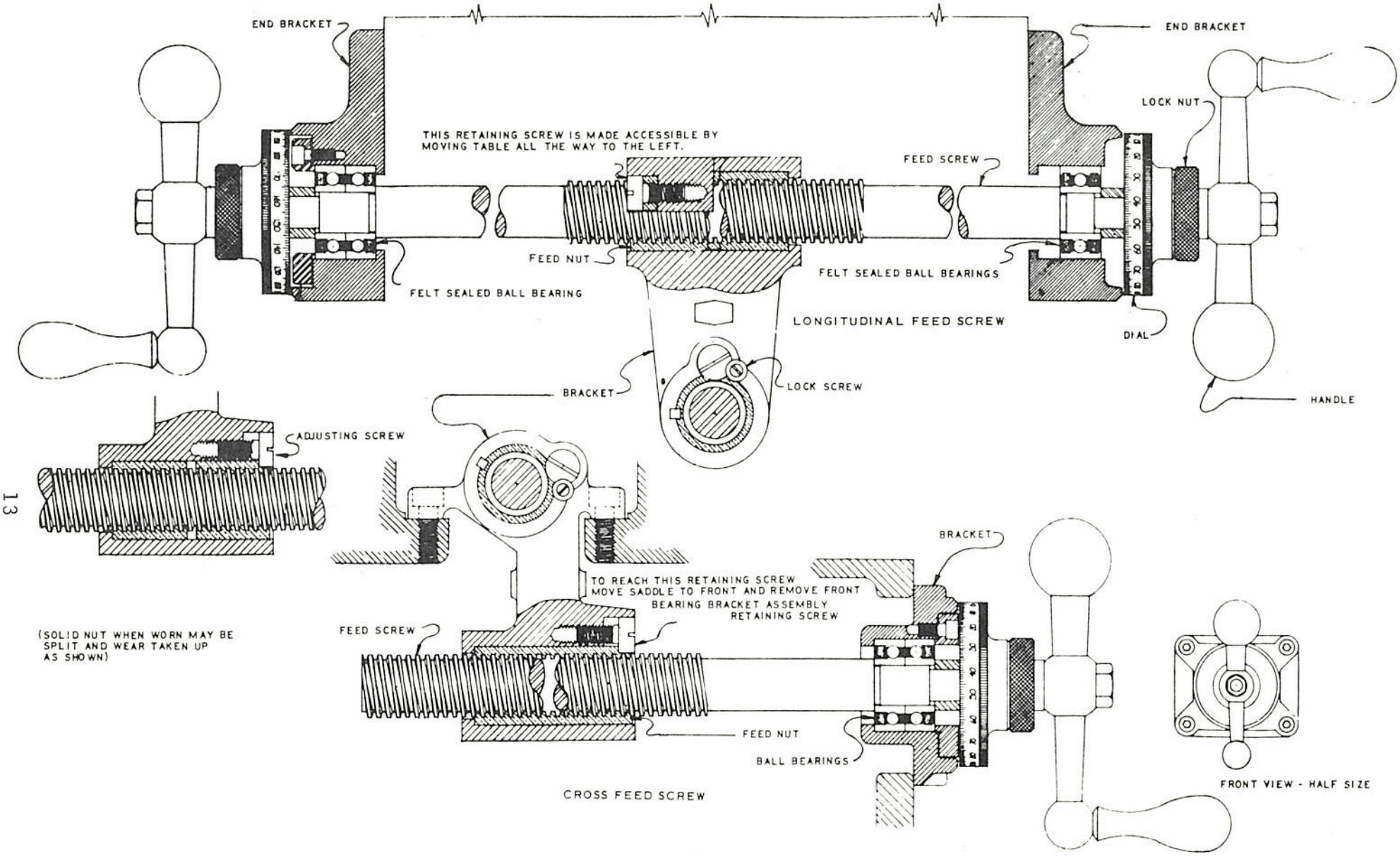


Figure 6. Longitudinal and Cross Feed Assembly

ASSEMBLY INSTRUCTIONS
FOR MOUNTING 2-J VARIDRIVE ATTACHMENT TO RAM ADAPTER

Lift the attachment by the lifting strap, fastened to the cap on the top of the best housing.

Insert the four tee bolts into the ram adapter and position them to match the bolt holes in the attachment.

Slide the attachment onto the bolts, insert the spacers and washers and secure with the nuts.

Tighten all the nuts with 25 ft. lbs. of torque, no more -- no less, and then repeat with 50 ft. lbs.

CAUTION: Improper tightening of these could cause a choppy quill movement.

Remove the lifting strap, replace screws in the spindle bearing cap.

LUBRICATION:

The useful life of this attachment will be determined to a large extent by proper lubrication. Carefully observe the nameplate recommendations and avoid substitutions. The Varidrive ball-bearings are grease-sealed for the life of the bearings.

OPERATING INSTRUCTIONS:

DO NOT attempt to change spindle RPM unless the motor is running. Dial speeds will only be approximate. Belt wear will cause a slight inaccuracy in speeds as indicated by the dial.

When tightening or loosening the drawbar it is necessary to lock the spindle. To accomplish this, use spindle brake and lock, which is located on the left side of belt housing, turning it either to the right or left until it binds, then raise handle.

Drawbar has 7/16-20 right hand thread and should be tightened with normal amount of pressure using wrench furnished with machine. To loosen collet back off drawbar and if collet does not open immediately, give knob on top of drawbar a slight tap. Spindle has non-sticking taper and collet should release readily.

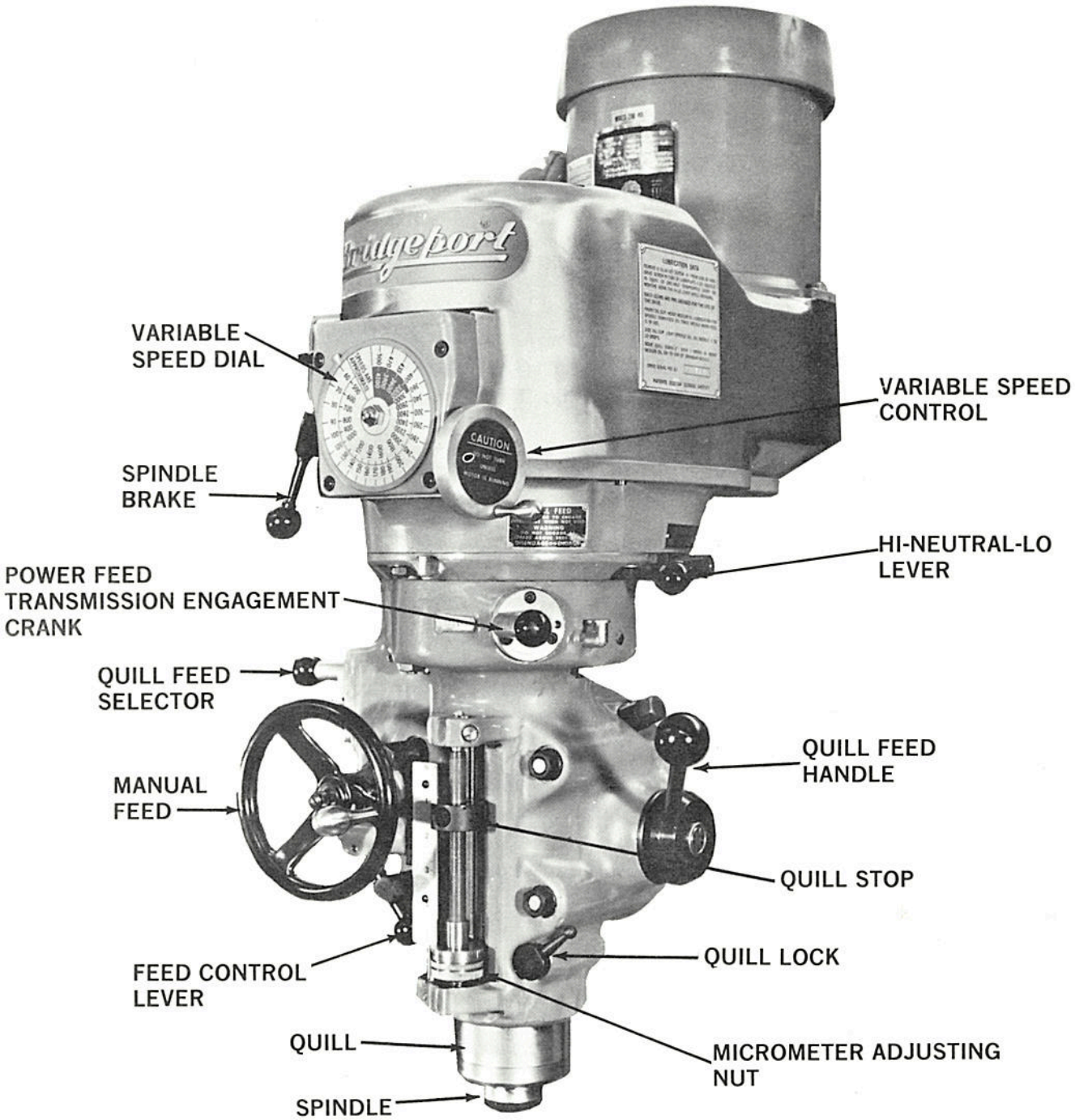


Figure 7. 2J (1-1/2 HP) Milling Attachment

SPINDLE BRAKE:

Brake lever can be moved in either direction to stop spindle; however, when locking spindle, lever should be moved to right or left and then raised. When brake is worn out it has to be replaced. There are no adjustments to be made.

CAUTION: Be certain that the spindle brake is released before starting the motor. This is important as the motor can be damaged if switch is turned on with brake in locked position.

HIGH-LOW RANGE SWITCH:

This is the motor reversing switch. When the attachment is in direct drive (High Speed) the motor and spindle are turning in the same direction. When the attachment is in "Back Gear" (Low Speed) the spindle would run backwards unless the motor direction is reversed.

The back-gear lever is marked Hi-Lo. This will indicate the proper switch position. They should be alike or the spindle will run backwards.

HI-NEUTRAL-LO LEVER:

This lever is used to put the attachment into either backgear or direct drive. Rotate the spindle by hand to facilitate meshing of clutch or gears.

Neutral can also be obtained at mid-way position. After a long period of use, the neutral position may cause noise (in neutral only) by allowing the clutch teeth to rub each other.

This can be corrected by reversing the position of the detent plate.

Neutral is provided to permit free spindle rotation for indicating and set-up work.

HI POSITION:

In the high speed position (direct drive) the spindle is driven by tapered clutch teeth. If the clutch is not meshed tightly, clutch rattle will be heard. This can be avoided by moving the detent plate upward as the clutches wear. This is also the reason for possible loss of neutral, requiring the reversal of the detent plate.

CAUTION: DO NOT shift while motor is running.

POWER FEED TRANSMISSION ENGAGEMENT CRANK:

Engages power feed worm gear. When lever is in right hand hole, the power feed worm gear is engaged. To disengage worm gear, pull knob out and crank handle in clockwise or down direction and move to opposite position.

NOTE: Crank cannot be swung around in counter clockwise direction; however, no damage will occur if moved in this direction. To engage the worm a counter clockwise movement is required.

CAUTION: Power feed worm gear may be engaged when spindle is rotating, however, it should be engaged gently to avoid damage to worm gear. The worm gear may be disengaged at any time. DO NOT use Power Feed at speeds above 3000 RPM.

IMPORTANT: It is recommended that the Power Feed worm gear be disengaged whenever the power feed is not required. This will avoid unnecessary wear on power feed worm gear.

QUILL FEED SELECTOR:

This crank is used for selecting the three feeds; 1.5, 3, and 6 thousandths per revolution. It is shifted by pulling knob out and turning from one position to the other. Feeds are stamped on cover below indentation hole. Feed is more readily engaged when spindle is running.

FEED REVERSING KNOB:

Position of this handle depends upon direction of spindle rotation. If boring with right hand cutting tools, pull feed handle towards operator until clutch becomes engaged.

Neutral position is between forward and reverse position. It is recommended that the handle be left in neutral position when not in use.

MANUAL FEED:

Reversing clutch knob should be in neutral position and feed control lever engaged. Clockwise rotation of handwheel moves quill down. The Manual Feed Handwheel and the quill feed handle may be disengaged by moving outward about 1/8".

NOTE: Feed control lever must be engaged in order to use manual feed controls. Manual Feed Handle and Handwheel may be taken off when not in use.

FEED CONTROL LEVER:

Engages over-load clutch on pinion shaft when thrown to left and will stay engaged until either quill stop comes in contact with micrometer nut, forcing feed control lever to drop out automatically, or released manually by throwing lever to right.

NOTE: Feed Control Lever is carefully set at plant to throw out automatically when quill stop goes against micrometer nut or against safety pin in top. However, if this should go out of adjustment, it may easily be brought back by regulating the screw located at bottom of tripping rod.

CAUTION: When adjusting the screw, check automatic throw off in both directions; that is with micrometer nut against the quill stop for down position and quill stop against throw out pin for up position.

QUILL FEED HANDLE:

May be removed by simply pulling handle off end of shaft. It is recommended that handle be disengaged when using power feed.

QUILL STOP:

Is used to disengage automatic feed in either direction as well as the setting point for working to given depths.

MICROMETER ADJUSTING NUT:

Is used for setting of depths. Each graduation on nut indicates one thousand of depth, it reads directly to scale mounted along side of it. Depths may be obtained by setting micrometer nut in conjunction with quill stop.

QUILL LOCK:

This is a positive quill lock to be used when quill is in stationary position such as milling operations. It is recommended that this lock be used whenever quill movement is not desired.

POSITION OF RAM:

Can be regulated by loosening two bolts on turret and pulling arm in or out to desired position.

CAUTION: Care should be taken to lock ram securely after setting.

NOTE: It is recommended that on heavy milling work, head should be kept as close to face of turret as possible, as maximum rigidity is then obtained.

RECOMMENDATIONS:

Use 2, 3, or 4 flute end mills. Eight flute end mills are usually not as satisfactory. When using shell or face mills standard cutter practice should be observed.

Power feed can be used for drilling up to 3/8" diameter drills. Use manual feed for drills larger than 3/8".

Overload clutch is set at factory to hold up to 200 lbs. down pressure on quill, which will accommodate drills up to 3/8" diameter in mild tool steel.

CAUTION: This clutch should not be tampered with in the field.

OPERATING INSTRUCTIONS

CAUTION: DO NOT try to change speed position until motor is running. This could cause breakage of parts.

Spindle Speeds are adjusted by turning the small handwheel on the front of the belt housing. There are two ranges shown; 60 to 500 and 500 to 4200.

60 to 500 is obtained through the back-gear drive and is referred to as the low range. To engage the back-gears, use the lever marked Hi-Neutral-Lo on the right rear side of the attachment. Move this to the "LO" position and use the low range on the drum switch.

When shifting to "Lo." do not force the lever if the back gears do not mesh. Hold the lever so that the gears are clear of one another, then rotate the spindle nose by hand until the gears line up, then put the unit in "Lo" (back gear).

500 to 4200 is obtained through direct drive and is the high range. The same lever and switch as above are used; selecting the "HI" range.

When shifting to "Hi," do not force the lever if the clutch teeth do not mesh. It is a simple matter to engage the brake and rotate the spindle nose by hand until the clutches engage.

Wear on the vari-drive belt will cause a slight change in the speeds as shown on the dial. This can be corrected as follows. Crank the speed control snugly against the high speed stop. (This will be near the 4200 reading on the dial.) Use a tachometer to determine the spindle speed, and turn the adjusting screw (after loosening the jam nut) until the spindle speed registers 4200 on the tachometer; tighten jam nut.

Now reposition the speed dial plate to match the tachometer reading. This is done by loosening the acorn nut in the center of the dial and setting the dial accordingly.

CAUTION: Try to avoid shifting the HI-LO lever when the feed worm is engaged.

DO NOT LOOSEN the lower 3 hex nuts on the spindle housing. These are set at the factory and are used only for clutch alignment.

SWIVELING THE VARI-DRIVE may be accomplished by loosening the upper 3 hex nuts attaching the Vari-Drive unit to the spindle housing and then swiveling to any desired position.

CAUTION: Care should be taken to secure the nuts when the attachment is in position, before the motor is turned on.

REMOVING THE MOTOR (See Figure 8)

Run the attachment to the bottom of either speed range and shut off the motor. This puts the vari-drive belt in the best position for disassembly.

1. DISCONNECT THE POWER AND THEN REMOVE THE SWITCH from the side of the belt housing.

2. Remove the cover (B) (lower end of motor shaft). Use two cover screws (A) to fasten the spring (C) on the lower end of the motor shaft, to the lower motor vari-drive pulley. This will reduce the hazard of personal injury that is always present when a heavy spring is under compression. When the pulley, spring retainer, and spring are securely fastened as a single unit, crank the speed dial to top speed position.

3. Now remove the screws (D) that fasten the motor to the belt housing.

The motor should be lifted slightly and pulled firmly away from the spindle and toward the rear of the belt housing. This will pull the vari-drive belt deeply into the spindle pulley, providing the slack needed to slip the belt over the motor pulley.

4. Now lift the motor high enough to rest the motor base GENTLY on the adjusting screw (E) seen directly in front of the motor flange. The belt can now be slipped over the lower pulley and the motor removed from the housing.

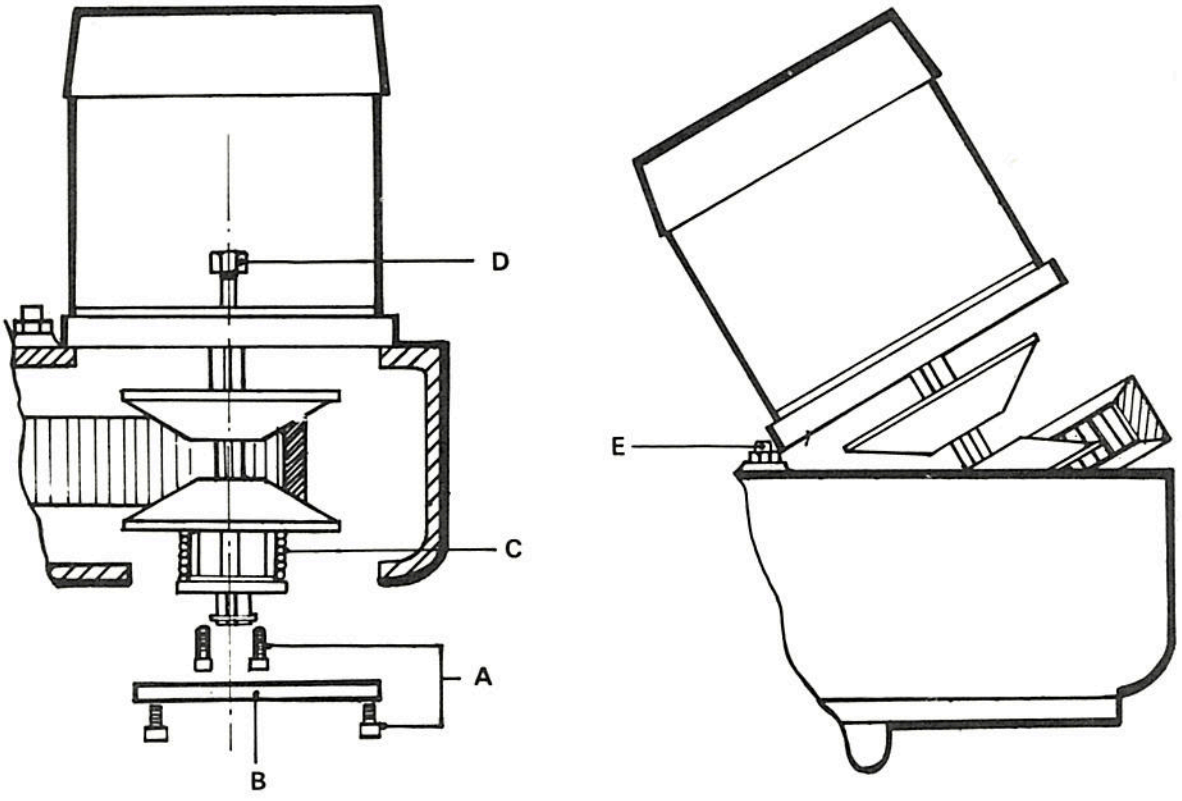


Figure 8. Motor Removal

CHANGING VARI-DRIVE BELT (Figure 9)

Complete the above procedures for removing the motor, then remove the three screws (A) and lift out the top bearing cap (B). Looking down inside of the housing, locate and remove two socket head cap screws and bushings (C). Next, the four screws (D) and the screw (E) holding the belt housing (G) to the sub-plate must be removed. Unscrew and remove the two lower screws in the speed changer bracket just below the speed dial (F).

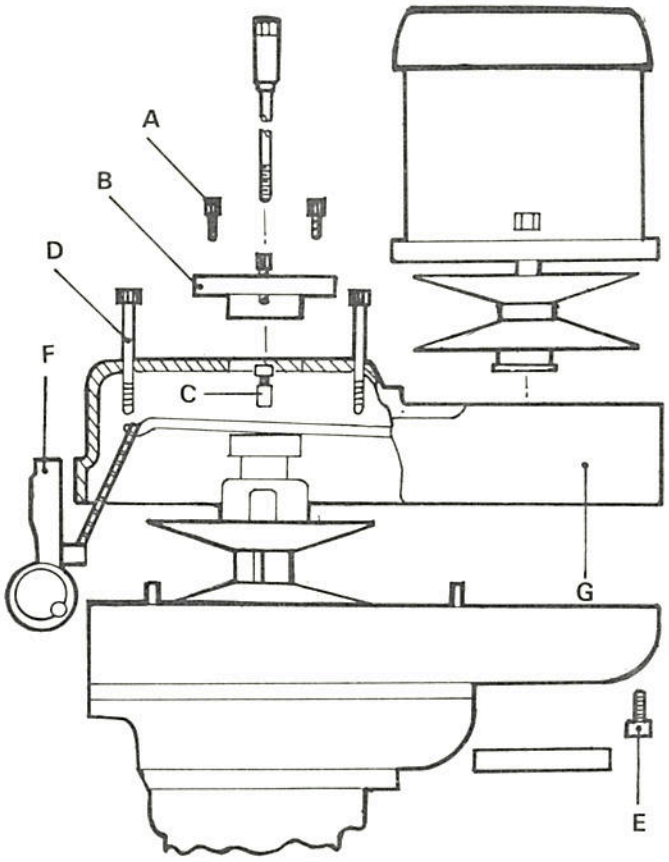


Figure 9. Removing Vari-Drive Belt

The belt housing, complete with speed changer bracket, is now removed from its sub-plate. A slight blow under the speed changer bracket may be needed to separate the housing from its base.

Remove the old belt and replace it with a new belt. DO NOT use a substitute belt purchased from other than a Bridgeport Dealer. Vibration and heat could result from the use of the wrong belt.

CHANGING TIMING BELT (Figure 10)

Complete the operation for removing the motor. Then put the (Hi-Neutral-Lo) lever in the Lo position, remove the drawbar and lower the spindle.

Remove screws (B) holding the upper and lower housings together, including the two lower screws (A) in speed changer bracket just below the speed dial.

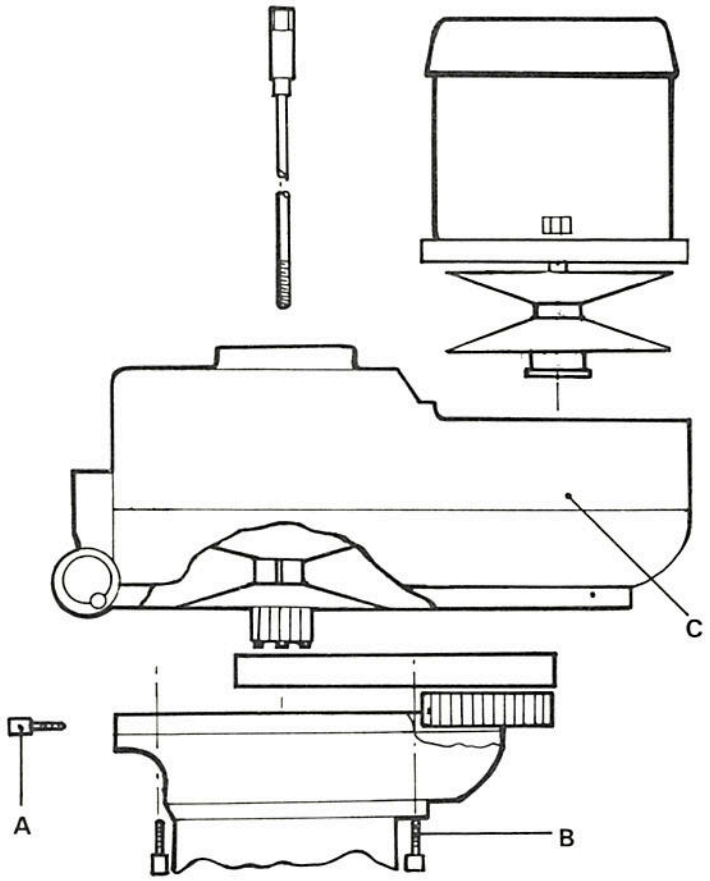


Figure 10. Removing Timing Belt

A slight blow under the speed changer bracket may be needed to separate the upper housing (C) from its base. The two upper screws on the speed changer bracket should be loosened now.

As the housings are being separated, the timing belt still connects them, resisting the separating movement. The separation can be assisted by gently pushing the timing belt off of the large pulley as the upper housing is being raised.

Remove the old belt and replace with a new belt.

GENERAL SPEED RECOMMENDATIONS

Material to be Cut	Feet Per Minute		
	Rough Cut	Rough and Finish	Light and Finish Cut
Cast Iron-Soft-(Under 200 Brinnell)	70	80-90	120
Cast Iron-Med.-(200-300 Brinnell)	55	60-70	90
Cast Iron-Hard-(Over 200 Brinnell)	40	50-60	70
Steel (Chrome Nickel 40-45 Shore)	30	40	50
Steel (Stainless)	60	80	90
Steel (Low Carbon)	80	90	140
Steel (High Carbon)	40	50	70
Bronze (Medium)	90	120	150
Bronze (Hard)	65	90	130
Brass (Hard)	100	150	200
Copper	150	200	300
Duraluminum	400	---	600
Aluminum	600	----	1000

TABLE OF CUTTING SPEEDS AND FEEDS

Feet Per Minute	15	20	25	30	40	50	60	70	80	90	100
Diameter, Inches	Revolutions Per Minute										
1/16"	917	1222	1528	1833	2445	3056	3667	4278	4889	5500	6112
1/8"	458	611	764	917	1222	1528	1833	2139	2445	2750	3056
3/16"	306	407	509	611	815	1019	1222	1426	1630	1833	2037
1/4"	229	306	382	458	611	764	917	1070	1375	1375	1528
5/16"	183	244	306	367	489	611	733	856	978	1100	1222
3/8"	153	204	255	306	407	509	611	713	815	917	1019
7/16"	131	175	218	262	349	437	524	611	698	786	873
1/2"	115	153	191	229	306	382	458	535	611	688	764
5/8"	91	122	153	183	244	306	367	428	489	550	611
3/4"	76	102	127	153	204	255	306	357	407	458	509
7/8"	65	87	109	131	175	218	262	306	349	393	437
1"	57	76	95	115	153	191	229	267	306	344	382
1 1/8"	50	67	84	102	136	170	204	238	272	306	340
1 1/4"	45	61	76	91	122	153	183	214	244	275	306
1 3/8"	41	55	69	83	111	139	167	194	222	250	278
1 1/2"	38	50	63	76	102	127	153	178	204	229	255
1 5/8"	35	47	58	70	94	118	141	165	188	212	235
1 3/4"	32	43	54	65	87	109	131	153	175	196	218
1 7/8"	30	40	50	61	81	102	122	143	163	183	204
2"	28	38	47	57	76	95	115	134	153	172	191