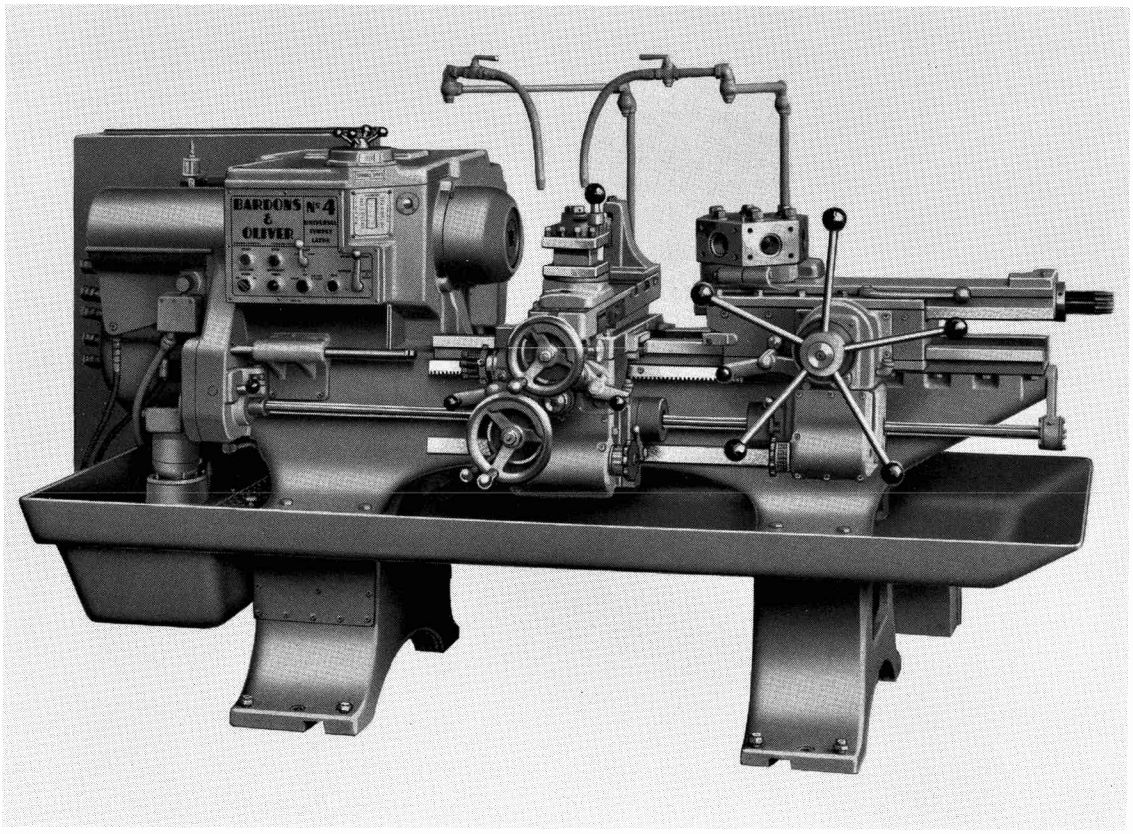
BARDONS & OLIVER

No. 4

UNIVERSAL TURRET LATHE



INSTRUCTION MANUAL

NO. 4 UNIVERSAL TURRET LATHE

The Bardons & Oliver No. 4 Universal Turret Lathe was designed and built to produce accurate work over a long period under conditions of hard usage. In order that the inherent accuracy be retained, extreme care must be given to the installation of the machine. Thorough inspection of the machine should be made at regular intervals, the frequency depending on the type of work handled and the accuracy desired.

Do not attempt to run the machine until all of the following instructions for Unpacking, Installing, Lubrication, Electrical Connections, and Leveling have been carefully and completely followed in the order listed.

UNPACKING

Turret Lathes for domestic customers are shipped in individual crates: those for foreign customers are shipped in individual boxes. While the machine is being unpacked, particular care should be taken not to mar the finish or damage the working parts.

Whenever possible, tools, chucks, and fixtures are attached directly to the machine. Wrenches and other items which cannot be attached, together with a data envelope, will be found in a separate box fastened to the platform or skids.

Contained in the data envelope are the instruction manual, electrical diagram, parts catalogue, and packing list. Be sure this data is preserved and delivered to the proper departments.

Check and account for each item on the packing list before disposing of any crating or boxing material.

INSTALLING

The machine is mounted on heavy wooden skids to prevent bed warpage in shipping. Locate the machine approximately in its final position before removing the skids. In removing the skids care must be taken to prevent undue twisting which might cause permanent distortion of the bed.

If possible, the legs should rest on a concrete foundation. A wooden floor lacks rigidity and its surface swells or shrinks according to climatic conditions.

To maintain accuracy, place steel bearing plates under each leg, as shown on the outline drawing of the machine. These plates should be grouted in concrete flush with the floor. If it is impossible to set these plates in or on concrete, they may be bolted down to a wooden floor. Here it is advisable to use plates affording a much larger bearing area on the floor. Drill and tap for the hold down screws after the bearing plates are firmly fastened to the floor.

On machines equipped with the hydraulic collet chuck and bar feed unit, assemble the bar feed unit according to the construction drawing in the back of the manual and place the unit in its approximate position with respect to the machine. The bar feed unit should be located on bearing plates the same thickness as used under the machine.

LUBRICATION

The headstock is fully enclosed and spray lubricated. Controlled by a pressure switch, the main motor does not start until the oil pressure in the headstock is sufficient to insure full lubrication of all moving parts. The head end bracket receives lubrication from the headstock and has no separate oil reservoir.

The aprons are splash lubricated. The plunger pumps on the aprons lubricate the bearing surfaces of the turret slide, the cross slide, carriage, feed screw, and nut, as well as bearing surfaces in each apron not reached by the splash system. Since the plunger pumps take oil from the aprons, it may be necessary to add oil to the aprons more often than to the headstock.

The apron oil reservoirs are filled to the proper level before shipment. Fill the headstock and check the aprons. Make sure that the oil level in each reservoir is at approximately the center of the gage glass. Check the oil levels before starting the machine, as the level drops somewhat after the machine is started. Raising the oil level above the center line on the gage will cause oil leakage at various points and excessive oxidation or gumming of the oil.

On machines equipped with the hydraulic collet chuck and bar feed unit, connect the two hydraulic lines to the collet chuck cylinder underneath the end of the spindle. Each hose and fitting are suitably marked. Fill the oil reservoir in the hydraulic unit to the center line on the gage.

The instructions on the lubrication chart must be followed. If the machine is operated on a multi shift basis, the headstock and aprons should be drained, flushed and refilled two or three times as often as called for on the chart.

ELECTRICAL CONNECTIONS

The machine is shipped from the factory with all electrical equipment wired. It is only necessary to connect the main power lines to the terminals on the disconnect switch in the upper right hand corner of the electric control cabinet. When the headstock oil reservoir is filled as outlined in the "LUBRICATION" instruction, close the disconnect switch and press the "START" button located on the push button control

panel. If the power lines have been connected to give the correct rotation of the motors, the gage in Figure 4 will show about 25 lbs. pressure, and the main motor will start. If the gage does not show pressure within a few seconds, press the "STOP" button and reverse two of the incoming leads.

On machines equipped with the hydraulic collet chuck and bar feed unit, insert the plug attached to the end of the cable on the bar feed stand into the receptacle on the right hand side of the electric control cabinet on the machine. The hydraulic pump, located in the bar feed stand, will not operate unless the main motor is running. With the main motor running, the pump is started by turning the selector switch to "COLLET". Pressure of 75 to 100 lbs. should be indicated within a few seconds by the gage located on the side of the hydraulic unit.

LEVELING

The accuracy originally built into the machine will be lost unless the machine is properly leveled. To maintain this accuracy the level of the machine should be checked at least twice a year.

Before leveling, allow the machine to reach normal operating temperature. To level, raise the machine by turning the leveling screws so that a 1/8 inch thickness gage may be slipped between the bottom of each leg and the bearing plate. Use a precision level about fifteen inches long. Starting at the head end, place the level lengthwise on the bed ways, and level by turning the adjusting screws. Then place the level across the bed ways and level. Repeat the two operations at the tail end of the machine. After leveling at each end, repeat the leveling process until all readings are equal. After proper alignment, bolt down the legs and recheck the level.

If extremely accurate work is to be done on the machine, the leveling can be further checked by chucking a round bar and taking a turning cut with the carriage or hexagon turret. Any remaining misalignment will be indicated by the amount of taper in the turned diameter. This can be corrected by slight adjustment of the leveling screws.

On machines equipped with the hydraulic collet chuck and bar feed unit, this unit should be bolted to the floor only after it is leveled and aligned with the spindle. To level and align the unit (Figure 1), do as follows: Place the unit in approximately the proper position with respect to the machine, and make necessary electrical and hydraulic connections. Insert a test bar (equal to the maximum capacity of the collet) through the revolving scroll chuck and just through the collet. The bar should be straight, of a uniform diameter and about 12 feet long. Close the collet. Place a parallel between the support bars and the test bar as shown in Figure 2. Using a 1-1/4 inch parallel for the 2 inch capacity machine, and a 2-1/4 inch parallel for the 2-1/2 inch capacity machine, raise the second stand until the test bar is level. Check alignment of support bars by placing level lengthwise on top of the bars and then crosswise on the bars adjacent to the parallel. Adjust by leveling the second stand. Level the first stand lengthwise and at right angle to the support bars. Using the test bar as a guide, align the stands with the center line of the spindle. Recheck level of test bar and support bars. As a check of alignment, the test bar should be concentric with the hole in the abutment sleeve. Recheck the levels throughout the bar feed unit.

To insure proper installation of the bar feed unit, tighten the chuck until it grips the test bar. Loosen the chuck just enough so that it can be moved back and forth over the test bar. It must slide freely over the whole length. After lining up and leveling the bar feed stands, bolt them securely to the floor.

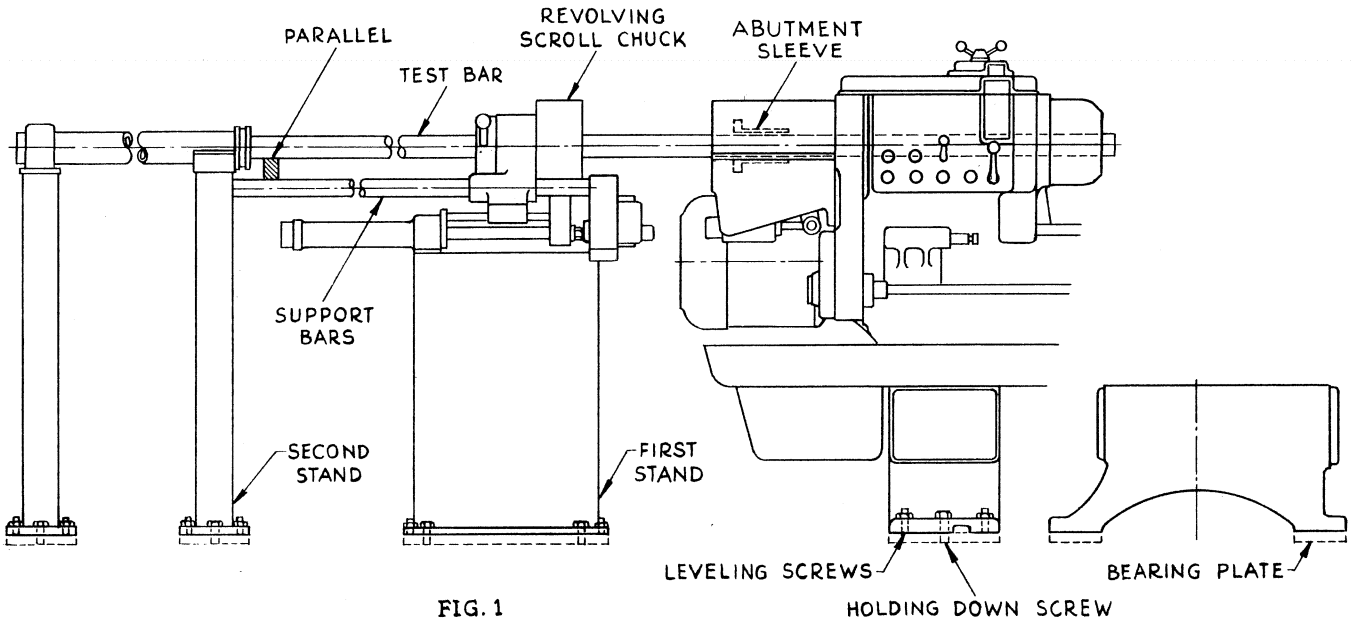


FIG. 1

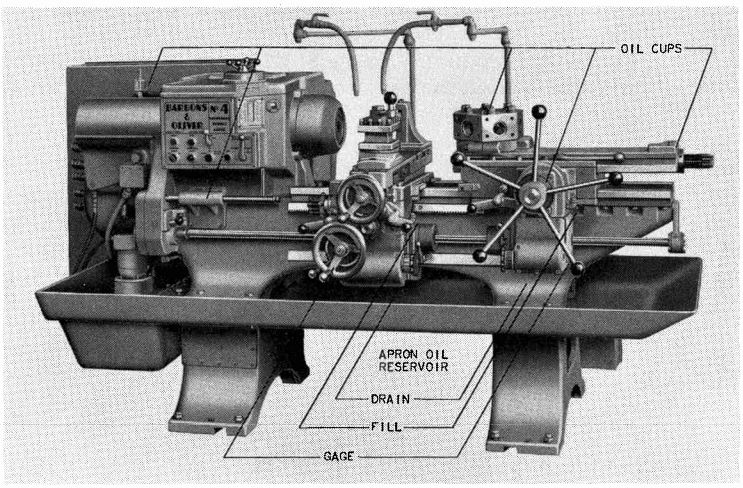
LUBRICATION CHART

INSTRUCTIONS

Before Starting	--	Fill all oil reservoirs to the center line on the gages. Fill oil cups. Depress apron pump handles 3 or 4 times.
Every 4 hours	--	Fill oil cups. Depress apron pump handles 3 or 4 times.
Every 3 months	--	Drain apron oil reservoirs. Flush with solvent type flushing oil. Refill reservoirs.
Every 6 months	--	Drain headstock oil reservoirs. Flush thoroughly with solvent type flushing oil. Clean oil filter on inside of reservoir cover. Refill headstock.

OIL SPECIFICATIONS

Headstock and Bar Feed	--	High grade mineral oil, with a viscosity of 145 - 155 seconds at 100°F.
Aprons	--	High grade extreme pressure lead naphthanate type oil having a viscosity of 300 - 325 seconds at 100°F.
Oil Cups	--	High grade oil of about S.A.E. 10 viscosity.



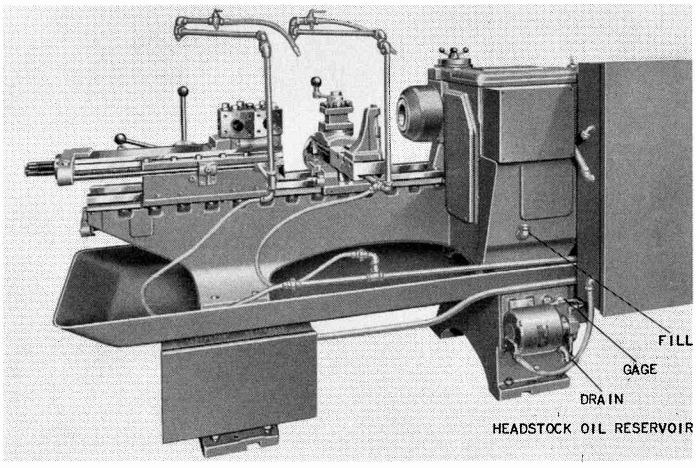


FIG. 2

HEADSTOCK OPERATION

The #4 Universal Turret Lathe has a 16 speed selective geared headstock. All headstock controls are conveniently grouped on one panel just below the preselector dial. (Figure 3)

FIG. 3

A single lever (A) controls starting, stopping, and reversing of the spindle through an electric multiple disc clutch and an electric multiple disc brake. The same lever is used to initiate the spindle speed changes.

Speed changes are accomplished by means of a preselector valve in the rear of the headstock which is positioned by the preselector dial in the front of the headstock. This dial directly indicates the 16 spindle speeds and also the corresponding surface or cutting speeds for various diameters of work.

The "START" button starts the head lubricating pump. When the pressure in the lubricating system is sufficient to insure oil spray of all moving parts of the headstock, a pressure switch then starts the main motor. Oil pressure from the headstock lubricating system is also utilized to shift the gears. The desired spindle speed may be preselected at any time. When rotating the preselector dial be sure that the detent has accurately centered the dial at the new position before changing speeds. When the spindle control lever (A) is in the "FORWARD" position, the lever is pulled straight out to initiate the speed change. It should not be held out after contact has been made. Changing of speeds is accomplished automatically by plugging the motor, shifting to the required gear ratios, and re-energizing the main motor. This entire cycle should occur in about two seconds, or within the time required to index the hexagon turret to the next tool station. The cycle should occur smoothly and without any perceptible clashing of gears, as a result of the multi-governor control.

HEADSTOCK ADJUSTMENTS

1. Figure 4 shows the lubricant pressure gage mounted in a cavity located on the back of the headstock. The gage should show between 25 and 30 lbs. pressure when the machine is running. During the shifting cycle, about 200 lbs. pressure should be indicated to insure proper shifting. After checking the gage be sure to turn off the stop cock and replace the cover.

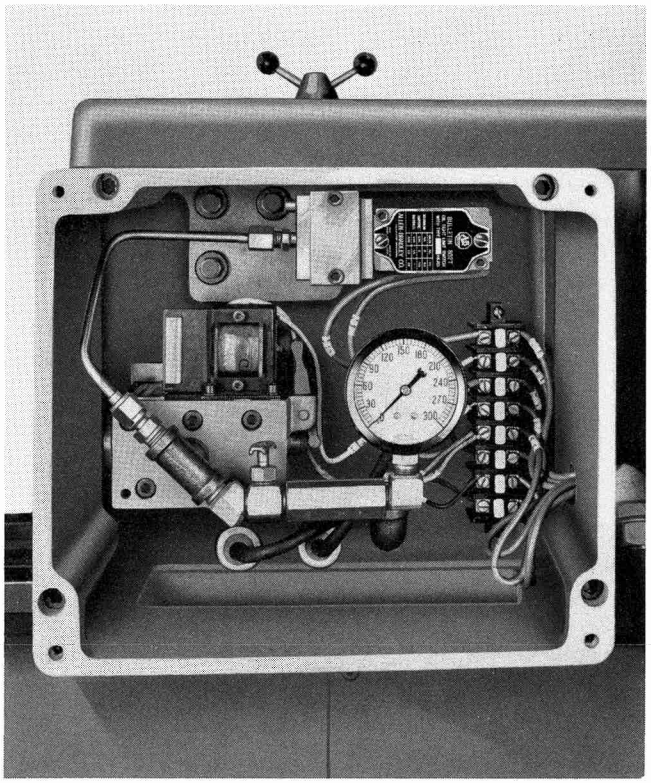


FIG. 4

2. Inside the electrical control cabinet (Figure 5) there are three adjustable rheostats. These control from top to bottom, "FORWARD and REVERSE", "JOG", and "BRAKE". Quicker engagement of the clutches and brake results from clockwise rotation of the rheostats. "FORWARD and REVERSE", and "BRAKE" should be set so that no grabbing or jerking results. The "JOG" adjustment should be set lower on the dial than the "FORWARD and REVERSE" adjustment. The rheostats are carefully adjusted at the factory and should not require attention for some time. When adjustment is required move the rheostats only one or two small graduations at a time.

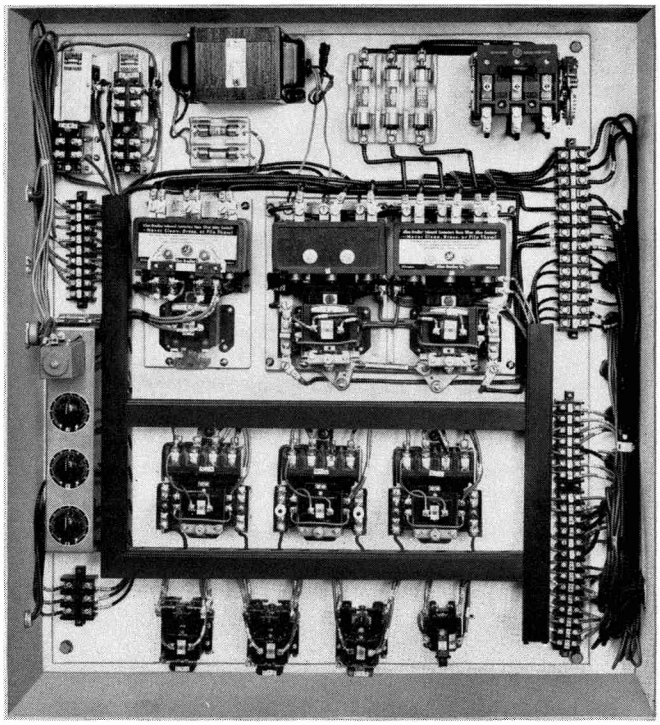


FIG. 5

3. The speed of the gear shafts at the shifting point is determined by two speed switches. (Figure 6) The lower speed switch is for the lower eight speeds, and the upper speed switch is for the higher eight speeds. Each speed switch has an adjusting screw to regulate the speed of the gear shafts at the instant of shifting. On the lower speed switch the adjusting screw is on the left. On the upper speed switch the adjusting screw is on the top. Turning the screws clockwise will increase the gear shaft speeds at the shifting point. These speed switches were preset at the factory and should not require adjustment.

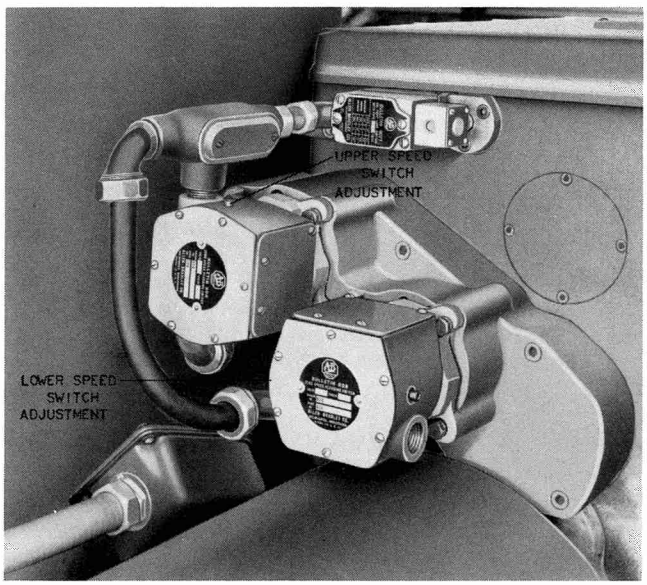


FIG. 6

4. The actual gear shifting time, not counting the deceleration to shifting speed or the acceleration to the new speed, is controlled by the time delay relay, TDR-1 in the electric control cabinet. (Figure 5) There is an adjustment screw for varying the time. Turning the adjustment screw counterclockwise, increases the shifting time. Ample time must be allowed for complete engagement of the gears. Changing from speed number nine to speed number eight requires shifting the maximum number of gears. The shifting time should be regulated at that speed change. It should be remembered that the brake is not used during the shifting cycle. Deceleration is accomplished by plugging the motor. The deceleration time is not adjustable.

FIG. 7

5. The spindle is mounted in two single row precision tapered roller bearings. A split adjustment nut, located on the rear end of the spindle outside the headstock may be easily reached with a pin wrench. In adjusting, all end play should be eliminated, but no preloading should be introduced. Figure 7 illustrates the proper manner for checking the spindle bearings.

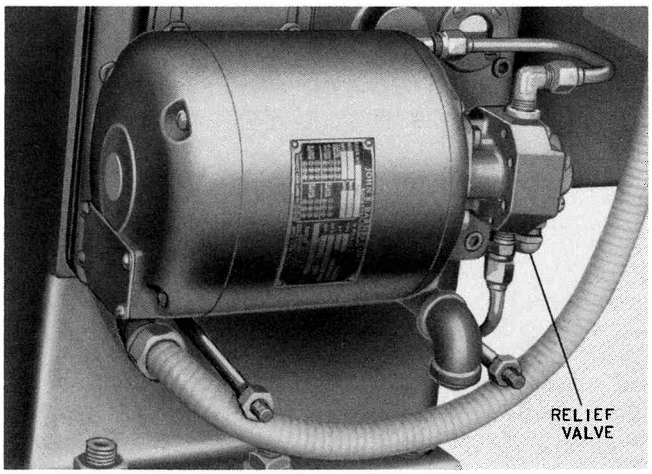


FIG. 8

DIAGNOSIS OF IMPROPER HEAD OPERATION

The following chart lists difficulties which may be experienced with the head operation, and indicates the cause and remedy for each trouble. If the suggested remedy does not correct the trouble, write or telephone our Factory Service Department.

TROUBLE	CAUSE	REMEDY
Main Motor does not start.	Clogged oil filter.	Drain headstock oil reservoir and clean filter.
	Blown fuse.	Check main fuses at the top center of the electric control cabinet.
	Overload relay is open.	Reset MS-1 in the electric control cabinet. (Figure 5)
Gears fail to shift.	Oil pressure below 175 lbs. during shifting cycle. (Figure 4)	Unscrew relief valve from oil pump (Figure 8) and clean. Drain headstock oil reservoir and clean filter.
	Not enough time allowed for shifting.	Turn TDR-1 in the electric control cabinet counterclockwise. See adjustment 4.
	Shifting speed switch set too low.	See adjustment 3.
Gears occasionally fail to shift, with excessive gear clash resulting	Oil pressure is too low.	Drain headstock oil reservoir and clean filter on back of reservoir cover.
Gears clash when shifting.	Shifting speed switch is set too high.	See adjustment 3.
Spindle slows down while cutting.	Clutch rheostat set too low.	Adjust the clutch rheostat in the electric control cabinet. See adjustment 2.
	Main motor overloaded.	Reduce rate of speed or feed.

CARRIAGE AND SADDLE APRONS

The aprons provide six feed changes in geometric progression for the cross and longitudinal travel of the cross slide and for the hexagon turret slide. By a convenient lever at the head end bracket, all feeds may be reduced to one half, thus making available twelve quick feed changes for each tool position.

Feed changes in each apron are made by means of a single lever, and are easily read on large rotating dials. Feeds are engaged by new "easy action" levers and are disengaged by the same levers or by adjustable stop screws or stop dogs. Positive tooth clutches in each apron assure easy engagement and long life.

Safety slip couplings are provided between the feed shaft and the aprons.

CARRIAGE AND SADDLE APRON ADJUSTMENTS

Each apron contains a safety coupling which is adjusted at the factory to slip only under conditions which would be injurious to the machine. If slippage occurs under normal loading conditions, tighten the adjusting nut slightly.

Since the feed engagement clutches are of the positive multi-tooth type, it is not necessary to adjust them to prevent slippage. Any slippage would occur in the safety coupling only. The clutch teeth should be fully meshed when the feed lever plunger is engaged.

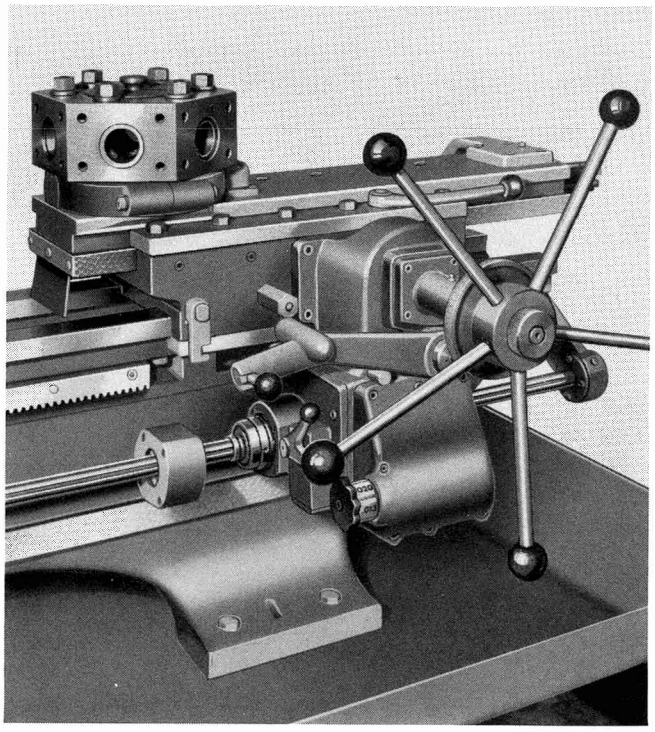


FIG. 9

TURRET, SLIDE AND SADDLE

The hexagon turret revolves on and is located centrally by a large diameter tapered roller bearing. A double bevel circumference clamp ring tightens the turret against the slide and preloads the bearing for accurate centering and vertical alignment. (Figure 10)

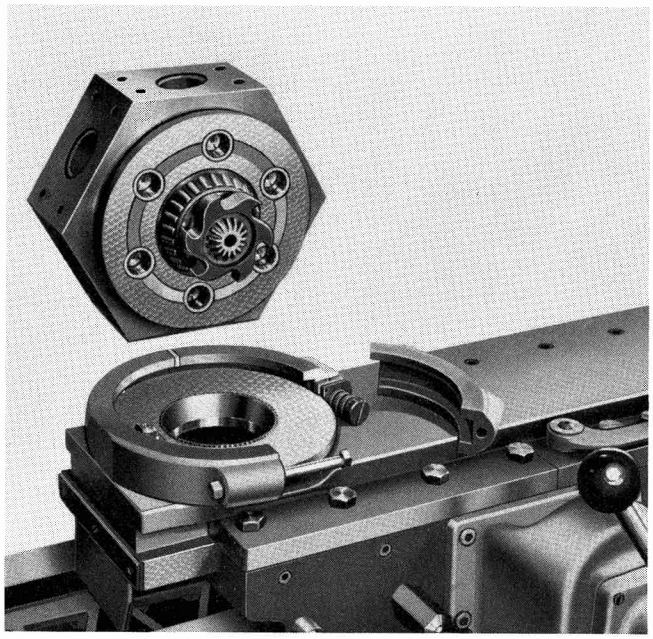


FIG. 10

The turret slide travels on hardened and ground replaceable alloy steel ways in the saddle. It is guided between double, hardened, ground and lapped alloy steel gibs on each side, and held by sturdy hardened and ground steel top caps.

To move the saddle on the bedways, loosen the eight screws beneath the lower saddle caps. Do not loosen the adjustment screws on the back side of the saddle. A latch is provided for attaching to the cross slide carriage for easy movement of the saddle along the bedways.

A neoprene apron is attached to the front end of the slide just below the turret to keep chips and dirt out of the indexing mechanism. However, the slide should be occasionally removed so that the saddle may be thoroughly cleaned. To remove the slide, place a board across the bedways beneath the front of the slide, remove the saddle caps and raise the rear end of the slide until the front end rests on the board.

The front top cap consists of three separate pieces, the middle portion serving as a slide clamp. The binder handle has a serrated hole for easy positioning.

TURRET, SLIDE AND SADDLE ADJUSTMENTS

1. The clamping action of the turret clamp ring is supplied by two heavy springs which may be adjusted. (Figure 11) To adjust, remove the turret clamp guard, remove the cotter pin from the castellated nut, and

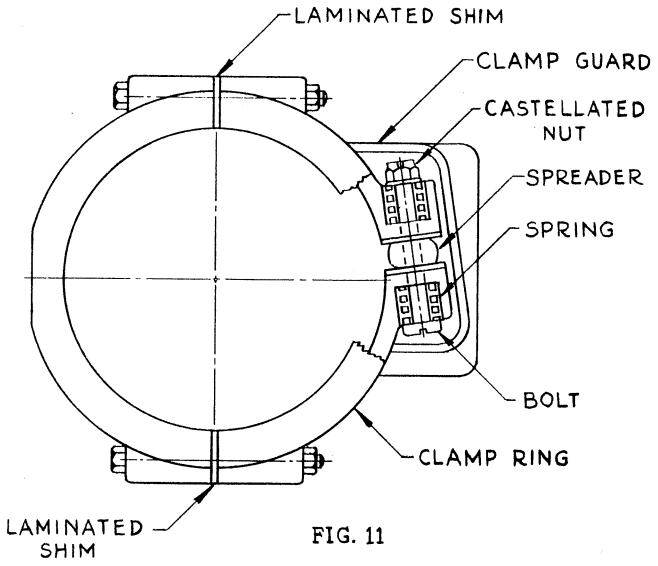


FIG. 11

holding the nut, turn the bolt. If all adjustment has already been taken up, the clamp ring must be removed. Laminated shims are located between the front and the back sections of the clamp ring. Peel off one lamination from each shim. Reassemble the clamp ring, taking care that each shim and all parts are put back exactly as they were originally. If wear has been excessive and the clamping action is still not sufficient, take another lamination from each shim as outlined. To check the clamping action, index the turret half way and then bring the slide forward. In this position the clamp ring is closed but the lock bolt is not engaged in the turret. Raise two of the turret binder bolts about two inches above the top of the turret. Place a bar between them and try to turn the turret.

2. If, after adjusting the clamp ring, the turret is still inaccurate, proceed as follows: move the slide to the rear, thus indexing the turret and opening the clamp ring. Bring the slide forward about half an inch. Insert a 1-3/4 inch bar in one of the turret holes. While applying pressure to the bar back and forth with one hand, place one finger of the other hand against the turret and on top of the clamp ring over the clamp spreader. If movement is felt at this point between the turret and clamp ring, the outer race of the tapered bearing is set too low in the slide. Then place finger against the turret and turret clamp on side opposite the clamp spreader and apply pressure as above. If movement is felt at the front of the turret the lock bolt and lock bolt bushings are worn.

Bring the slide forward until the leading edge protrudes about one inch from the saddle. Locate an indicator on the top surface of the turret. Tap the front of the clamp ring. If the indicator reading drops, either the outer race of the tapered bearing is set too high in the slide, or the flat bearing between turret and slide has become excessively worn.

The conditions outlined here should not occur for several years, even under hard usage. Correcting these troubles will entail one or more of the following operations: - relocating the tapered bearing outer race, rescraping the bearing surfaces of the turret and slide, replacing the lock bolt sleeve and bushings, and rescraping the clamp ring. Because of the skill and experience necessary to properly perform these operations, we suggest that you contact the factory Service Department before proceeding.

3. After the machine has been in operation a few months it may be necessary to adjust the slide gibs. (Figure 12) The front gibs are not adjustable. There are two rear adjustable gibs. Loosen the cap screws for each gib on the back face of the saddle. The gib adjustment screws are set into each end of the saddle.

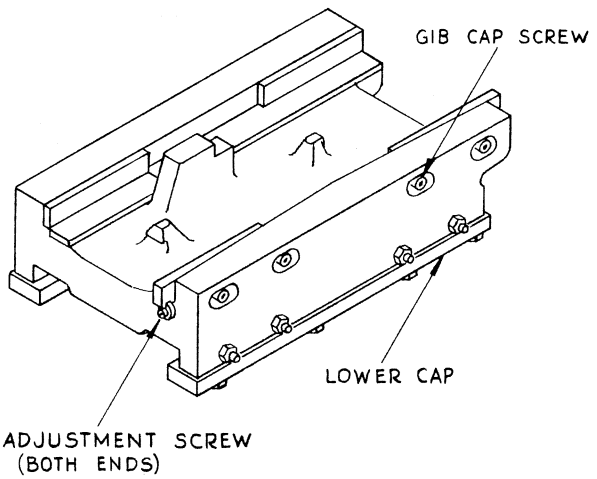


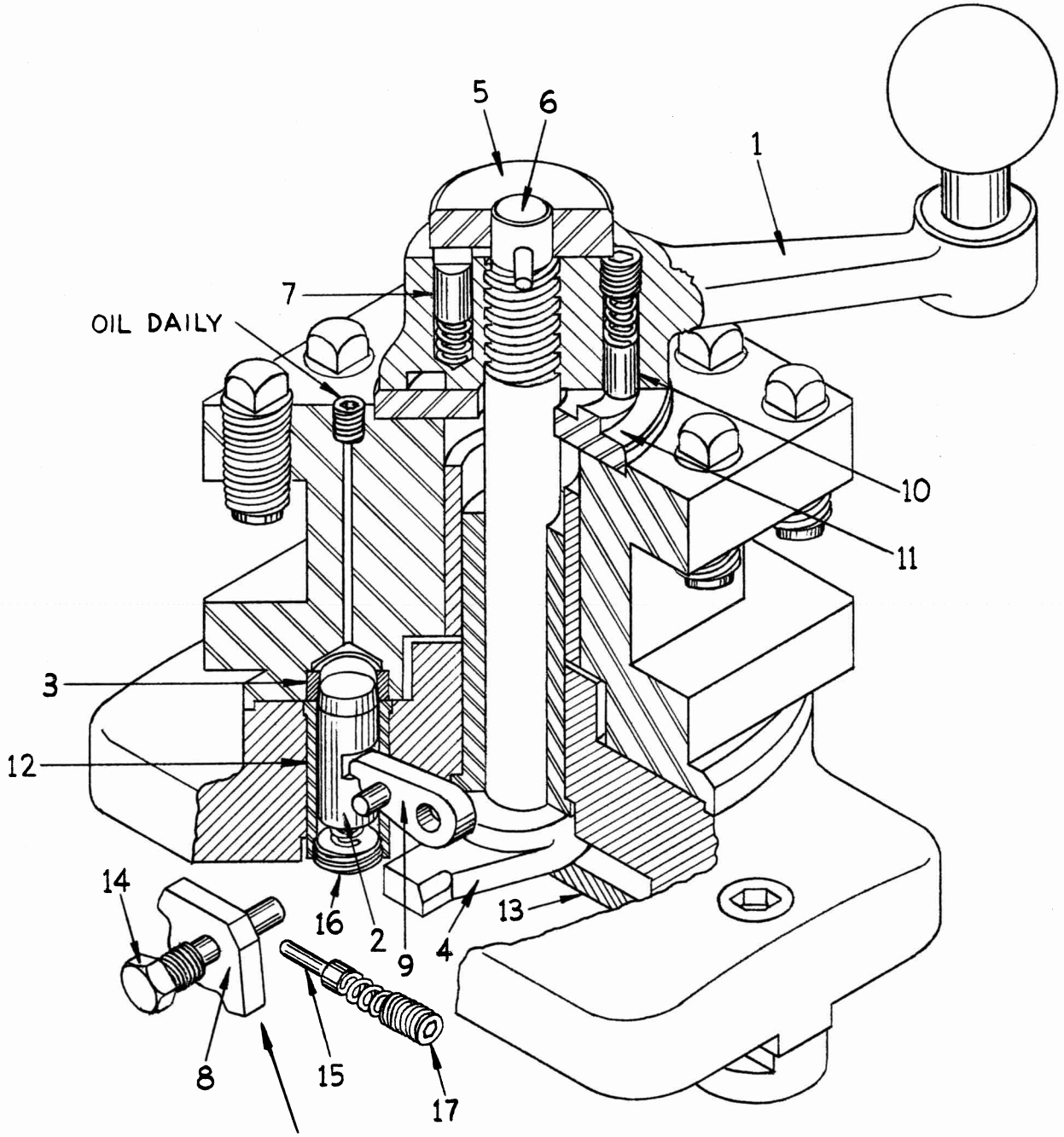
FIG. 12
(VIEW OF SADDLE LOOKING FROM REAR OF THE MACHINE)

SQUARE TURRET

The Bardons & Oliver Square Turret features rugged construction and accuracy, assuring repetitive indexing within a few ten thousandths of an inch. A protective skirt around the bottom of the turret effectively keeps chips from the bearing surfaces. Daily maintenance of the square turret consists of oiling at the point indicated on the figure.

When the indexing lever (1) is in the extreme clockwise position as shown in the figure, the lockbolt (2) is seated in the turret bushing (3) and the turret is clamped to the base. Tapered pins position the lockbolt cam (4) and stud collar (5) on the center stud (6) in the proper timed relationship. The indexing sequence is as follows: - The indexing lever is moved counterclockwise. The turret is unclamped. The hardened pin (7) in the indexing lever engages the stud collar, causing the center stud to move with the indexing lever. The lockbolt cam engages the tumbler (8), depressing the lockbolt lever (9), which in turn disengages the lockbolt. The second hardened pin (10) in the indexing lever then engages the indexing plate (11) causing the turret to turn. The lockbolt rides on a recess in the turret until the next position is reached. Moving the indexing lever clockwise returns the lockbolt cam against the lockbolt sleeve (12). The indexing lever then disengages the stud collar and moves on the double acme threads causing the turret to be clamped to the base.

To properly maintain the square turret it should be completely disassembled and cleaned at least every six months. To completely disassemble, remove the bottom plate (13), stud collar (5), indexing lever (1),



turret, center stud (6), tumbler pivot screw (14), tumbler (8), lockbolt lever (9), tumbler plunger (15), screw plug (16), lockbolt spring, and lockbolt (3) in that order. Reassemble in the reverse order, taking care that each part is placed in its original position, particularly the tumbler and lockbolt lever. Double acme threads locate the indexing lever on the center stud. It is possible to assemble this unit with the lever 180 degrees from the proper position. If the tapered pin which locates the stud collar on the center stud fits flush with both sides of the collar, the lever is properly positioned. If the pin goes in only half way, remove the indexing lever and reengage it opposite to the prior point of engagement. In adjusting the tumbler plunger the set screw should be tightened just enough to keep the tumbler in the proper indexing position. Tightening the set screw too much may cause the plunger to bind and shear.

DIAGNOSIS OF IMPROPER SQUARE TURRET OPERATION

The following chart lists difficulties which may be experienced with the square turret operation, and indicates the cause and remedy for each trouble.

TROUBLE	CAUSE	REMEDY
Turret remains stationary although indexing handle is turned one half revolution.	Indexing lever does not engage the indexing plate.	Remove the hardened pin in the indexing lever, clean, and on reassembly be sure the pin works freely.
Indexing lever moves only one quarter revolution and turret will not index.	Lockbolt does not disengage.	
	a) Set screw (17) holding tumbler plunger loosens.	Tighten set screw slowly until turret properly indexes.
	b) Tumbler plunger sticks.	Remove set screw, spring and plunger, clean, and be sure on reassembly that plunger works freely.
	c) Tumbler plunger broken.	Replace plunger. Plunger must work freely.
	d) Tumbler broken or excessively worn.	Replace tumbler.
	e) Lockbolt lever broken.	Replace lever.
Turret "Skips" or fails to stop at the next position on indexing.	Lockbolt spring worn.	Replace with about a quarter inch longer spring.
Repetitive indexing is inaccurate.	Lockbolt spring worn and lockbolt does not fully engage in turret.	Replace with about a one quarter inch longer spring.
	Lockbolt and lockbolt bushing excessively worn.	Recommend the square turret be sent back to the factory for rebuilding.
Turret drags or binds on indexing	Tools in the turret held too tightly.	Tighten tools only as much as possible with wrench provided. Do not use pipe on wrench handle.
	Bottom plate does not clear the cross slide.	Remove bottom plate, clean, and file nicks which may cause loss of clearance between the bottom plate and the base bottom.

CROSS SLIDE AND CARRIAGE

Pairs of adjustable tapered gibs are provided at the outside of the front bedway, the bottom of the rear bedway and the lower or third bedway. One long tapered gib provides adjustment for the cross slide.

The cross feed screw is mounted in two opposed radial thrust ball bearings which are slightly preloaded and do not require adjustment. An adjustable double bronze nut, located in the front face of the carriage, is provided so that backlash can be eliminated from the feed screw.

A binder handle is provided for clamping the carriage to the bedways. The handle has a serrated hole for easy positioning.

CROSS SLIDE AND CARRIAGE ADJUSTMENTS

1. After the machine has been run for a few weeks check the adjustment of the gibs. Check these adjustments about twice a year thereafter. To adjust, back off the gibs between the apron and lower bedway. Tighten the gibs between the carriage and the front bedway until the carriage just begins to bind when the handwheel is turned. Then back the gibs off slightly and make sure there is equal tension on each gib screw. After releasing the set screws on the back face of the carriage, adjust the rear gibs in the same manner as indicated for the front gibs. Adjust the gibs between the apron and lower front way last. Tighten the cross slide gib until the slide just begins to bind. Then, back the gib off slightly. Make sure all gibs are held securely in the adjusted positions.

2. To eliminate backlash between the cross slide screw and nut, loosen the locking screws holding the bronze adjustment nut. (Figure 13) Turn the adjustment nut until the backlash is eliminated, and then retighten the locking screws.

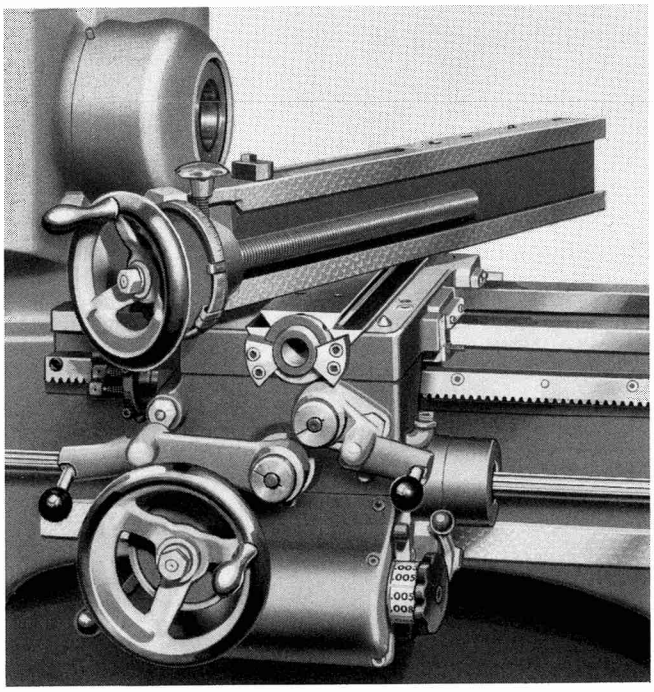


FIG. 13

HYDRAULIC COLLET CHUCK AND BAR FEED

The hydraulic collet chuck and bar feed are shown in Figure 16. Both chuck and bar feed are operated from a completely self-contained hydraulic pumping unit mounted in the bar feed stand. Controls for the unit are located on the push-button control panel on the front of the headstock.

The selector switch determines whether the collet operates separately or in conjunction with the bar feed. The operating lever controls the action of the collet separately, or controls the collet and bar feed together depending on the position of the selector switch.

Bars to be fed into the machine are held in a revolving scroll chuck. (Figure 14) Two opposite jaws are equipped with eccentric drivers which grip on the forward stroke and release on the back stroke. The other two jaws are equipped with set screws to center the work.

The bar feed cylinder has an adjustable stroke with a maximum travel of 10 inches on the 2" capacity machine and 12" on the 2-1/2" capacity machine. An "easy to read" scale graduated to 1/16" together with handy adjusting nuts simplifies the setting of the bar feed stroke.

To insert a new bar and to regulate the grip of the scroll chuck, set the selector switch to "BAR FEED & COLLET" and open the collet by moving the operating lever to "OPEN". Position the chuck about halfway between the bar stands by moving the lever at the bottom of the chuck head to the left. Swing the support tube forward and insert the bar. Pass the bar through the chuck and just through the collet. Set the bar feed stroke for length. Close the collet. Close the chuck jaws until the drivers grip the bar securely when the chuck is moved forward, but release when the chuck is moved back. Then move the chuck all the way back.

As the collet is repeatedly opened and closed the bar will feed forward by steps until the chuck reaches the block at the front of the rack bar. After that the chuck will feed the bar and strip back until it passes over the end of the bar. Insert a new bar against the end of the old bar, and move the chuck head all the way back to starting position.

COLLET CHUCK

To change collet pads remove the pad screws from the master collet. These can be reached through holes in the collet hood. (Figure 14) To avoid runout of stock, clean the master collet and pads carefully before putting in the new pads.

Dirt and fine chips working into the collet and spindle recess may cause the collet to stick and not release. To avoid this condition, remove the collet hood and clean the collet and spindle recess frequently.

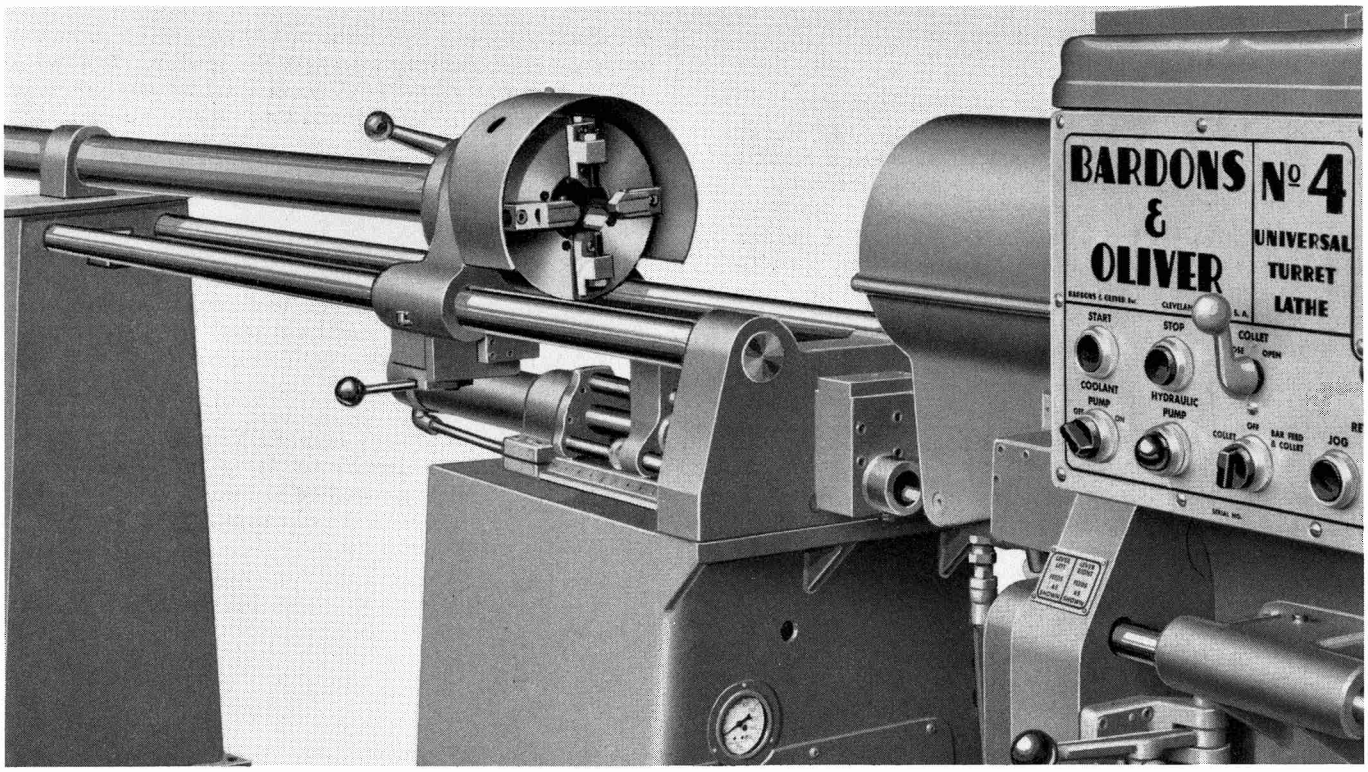


FIG. 14

COLLET CHUCK ADJUSTMENTS

1. The grip of the collet is adjusted at the rear end of the spindle by use of the spanner wrench for which holes are provided in the end of the abutment sleeve. (Figure 15) The finger holder should at all times abut tightly against the end of the spindle. The collet grip should be adjusted so that the finger rollers pass just beyond the top of the wedge incline when the collet is closed.

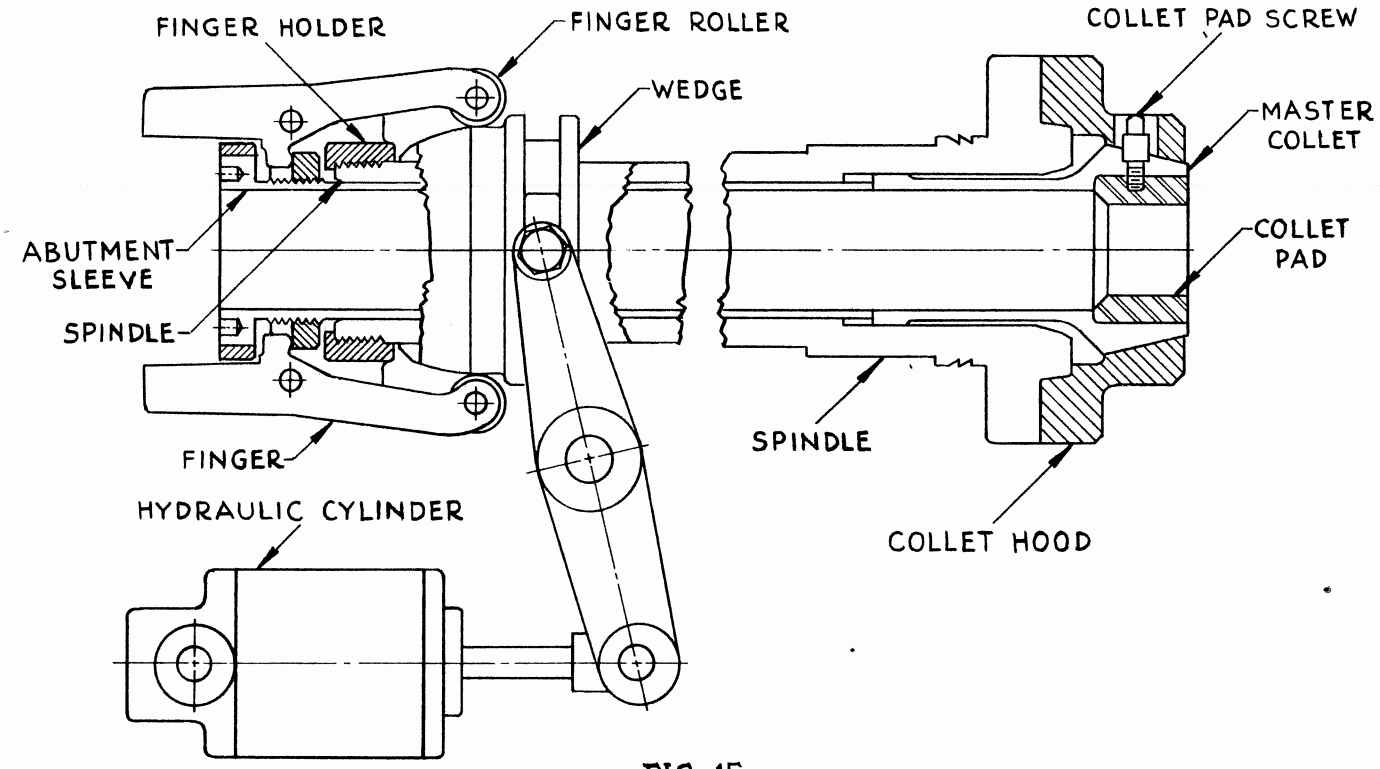


FIG. 15

COOLANT SYSTEM

An impeller type pump with integral motor drive is mounted directly over the coolant sump, and is controlled by an independent push button switch mounted on the control panel at the front of the headstock.

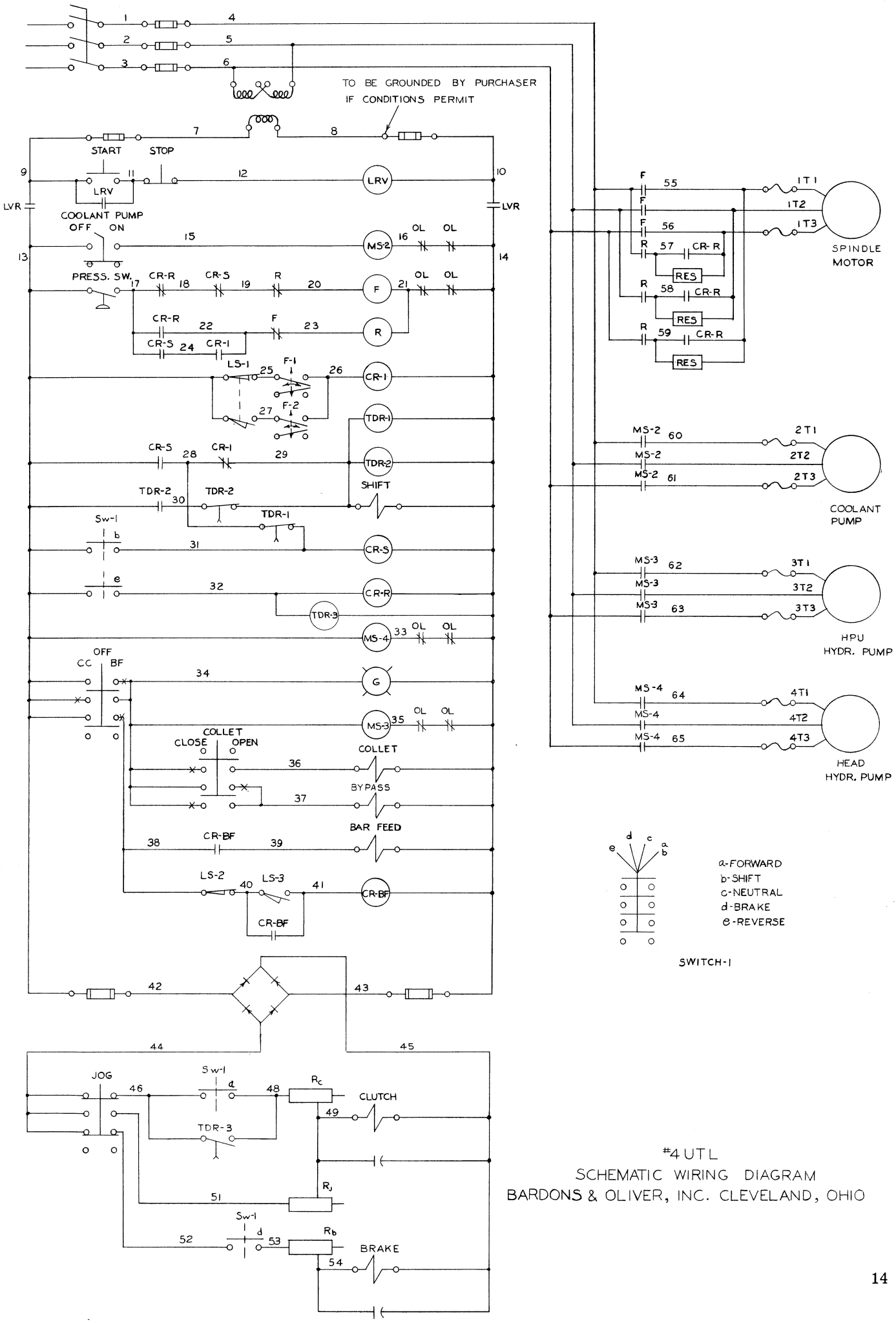
The coolant sump, located at the head end of the machine, is divided into two compartments by a baffle. Metal particles settle in the first compartment, and thus the pump located in the second compartment is protected. The sump should be cleaned frequently.

THREAD CHASING ATTACHMENT

The carriage thread chasing attachment, bolted to the carriage apron and driven by the feed shaft, is simply designed and easy to operate. Lifting the engagement lever meshes the follower with the leader. The quick acting automatic knockout controlled by the carriage stop screws facilitates threading close to a shoulder or in a blind hole.

Through the feed change lever at the head end bracket, each leader and follower cuts two or four times its own number of threads per inch. Leaders and followers are available to provide a range of from 4 to 40 threads per inch. To change leaders, disconnect the feed shaft at the head end bracket. When tightening the leader use two wrenches, one on the leader and one on the nut.

To change the follower, remove the top cover on the chasing attachment bracket. After the new follower is inserted, it may be adjusted to the leader by a screw located at the bottom of the chasing attachment.



#4 UTL
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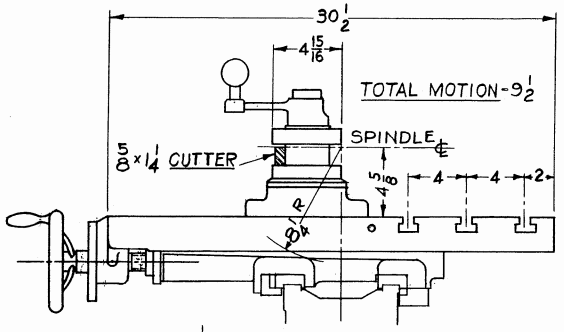
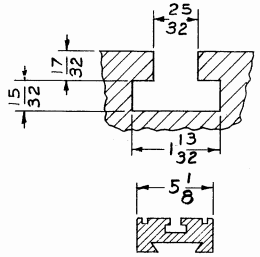
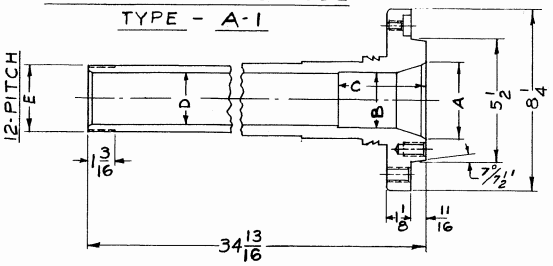
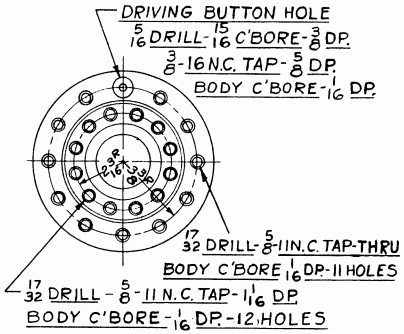


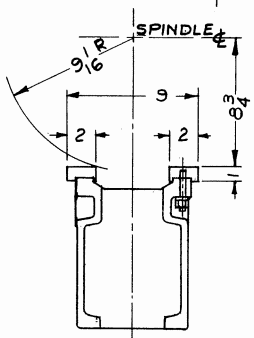


AMERICAN STANDARD
8 12 FLANGED SPINDLE NOSE
TYPE - A-1

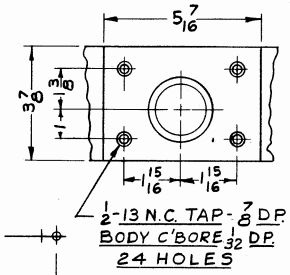
	2 IN CAP	2 1/2 CAP
A	3 1/2	3 5/8
B	2 5/8	3 3/8
C	4	4 7/8
D	2 3/8	2 7/8
E	3	3 7/8

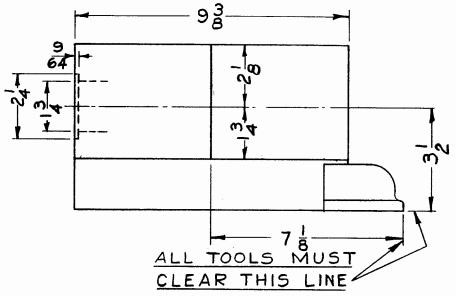


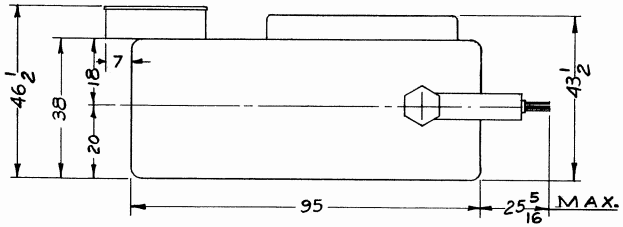


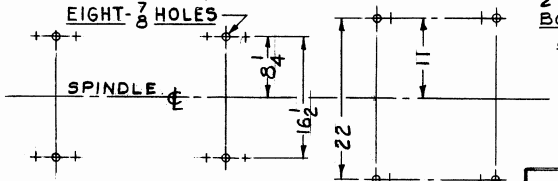


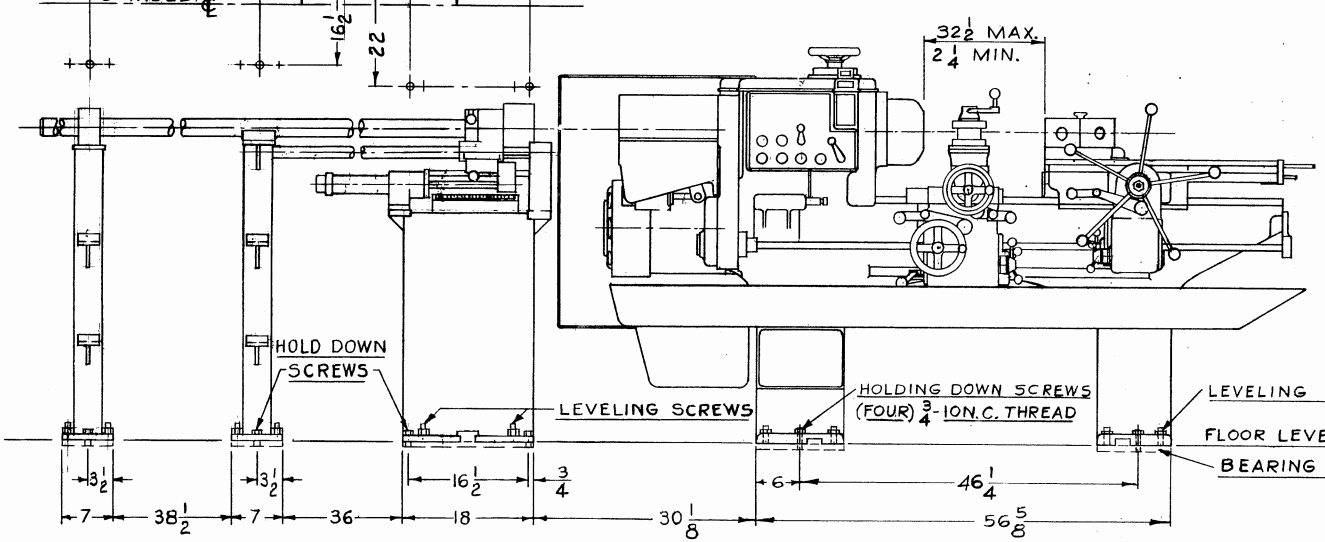
HEX. TURRET

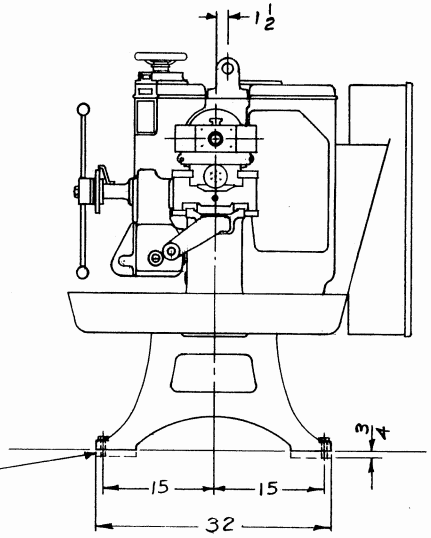












SPINDLE SPEEDS

16 — WITH 1800 R.P.M. - 10 OR 15 H.P. - 220/440 V - 3 φ - 60 ∿ MOTOR

31 - 40 - 52 - 68 - 88 - 114 - 148 - 193 - 250 - 324 - 420 - 546 - 710 - 920 - 1190 - 1550 R.P.M.

40 - 51 - 67 - 87 - 113 - 147 - 192 - 249 - 322 - 418 - 542 - 705 - 915 - 1185 - 1540 - 2000 R.P.M

POWER FEEDS

12 — TO HEXAGON TURRET SLIDE

.0025 - .004 - .005 - .0065 - .008 - .010 - .013 - .016 - .020 - .025 - .032 - .050

12 — TO CARRIAGE - LONGITUDINAL - REVERSIBLE

.0025 - .004 - .005 - .0065 - .008 - .010 - .013 - .016 - .020 - .025 - .032 - .050

12 — TO CROSS SLIDE - REVERSIBLE

.0015 - .0025 - .003 - .004 - .005 - .006 - .008 - .0095 - .012 - .015 - .019 - .030

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