TABLE OF CONTENTS

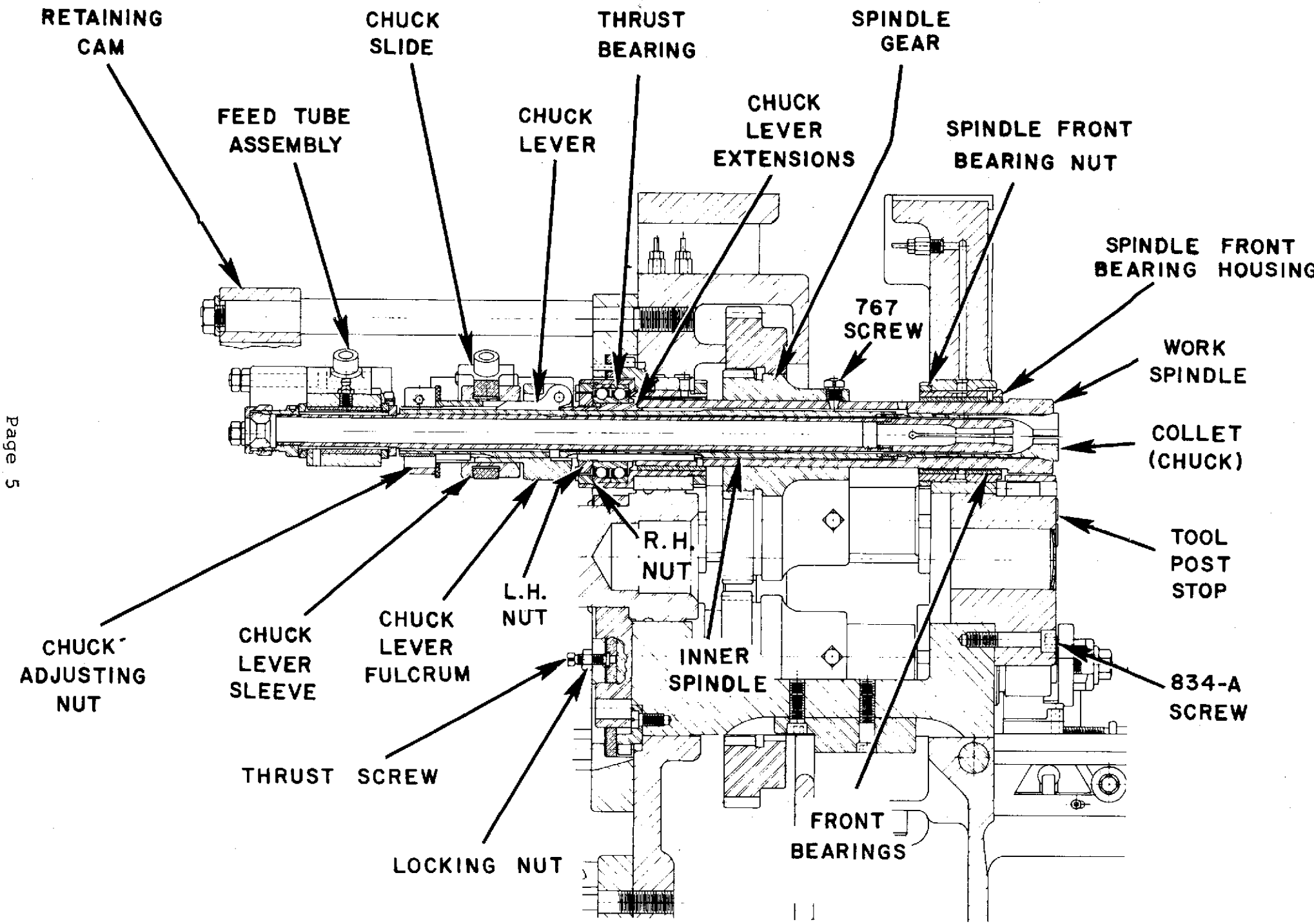
GENERAL FEATURES OF THE MODEL B

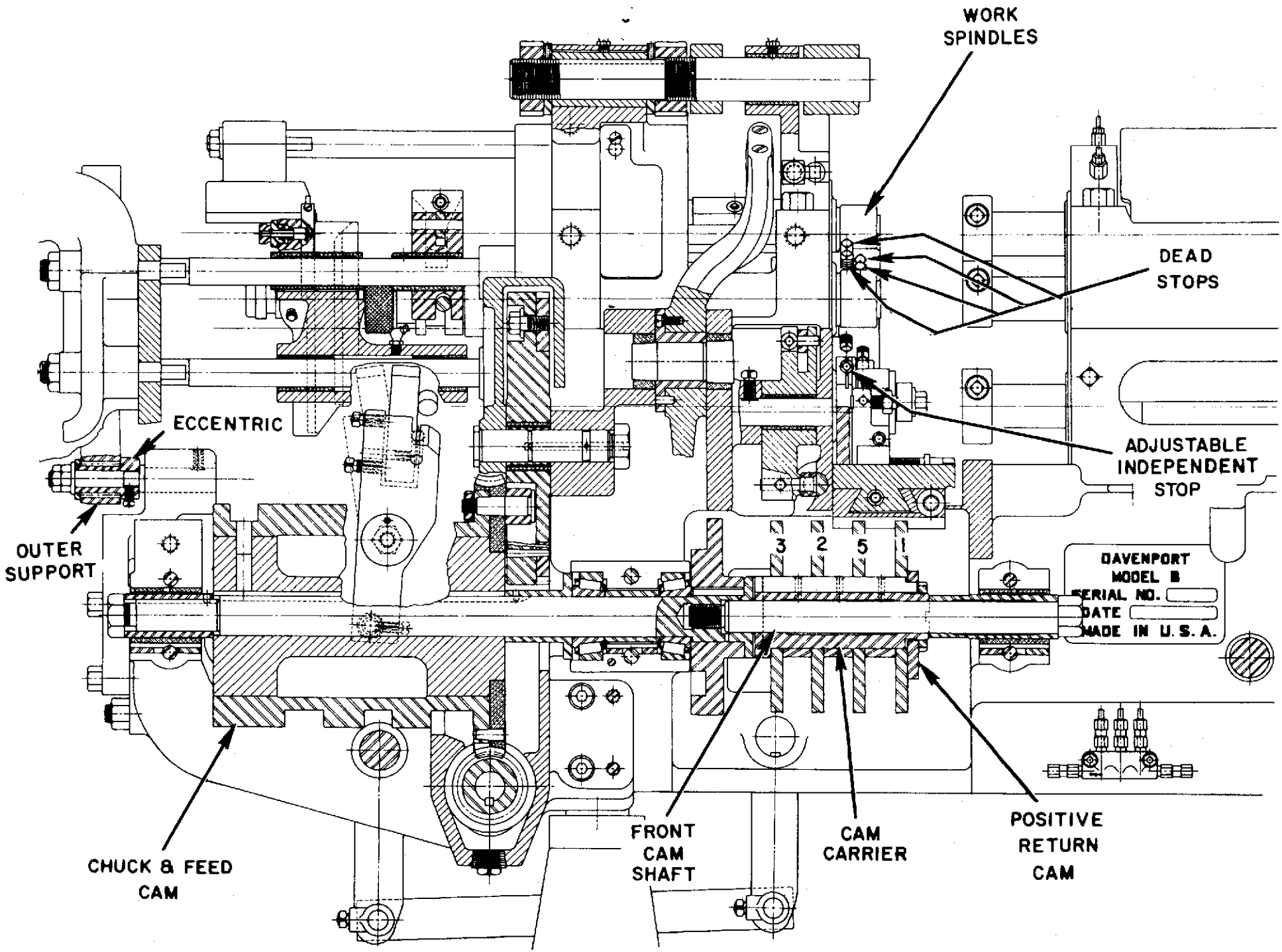
Five spindles to provide sufficient tooling positions, producing the best quality of work. We also have various attachments which may be added to eliminate secondary operations. A regular and oversize machine can be adapted to any of the three cycles by changing of the motor pulley, (75, 60, or 45 cycle). A 75 cycle machine indexes in .4 of a second. The 60 cycle machine indexes in .5 of a second. The 45 cycle machine indexes in .66 of a second. Cams on the machine are calculated in hundredths, from 0 to 50 is the working portion and 50 to 100 is the high speed or index portion. The index time is the total idle time required to withdraw tools, index carrier, feed stock, and return tools to the working positions. There are charts marked 75 cycle for the wide range of spindle change gears for the 75 cycle, 60 cycle chart for the 60 cycle machine and the 45 cycle chart for the 45 cycle machine. There are a wide range of feed change gears for the 75 cycle, the 60 cycle, and the 45 cycle. See the charts for each particular cycle.

When a machine is received it should be carefully examined to make sure it has not been damaged in transit. If it has been damaged, notify the carrier and Davenport Machine, Rochester, New York. After the crate has been removed, check all parts such as cams, wrenches, gears, and so forth with the packing list. Thoroughly clean the machine of all slushing grease. The machine should be leveled and wired. The machine can be leveled by placing a straight edge on the cross slides, on which a bubble level can be placed to see if the sides are level. The center drive can also be used as a straight edge on which a bubble level can be placed, to see if the ends are level. The machine should have the corner pads inserted under it at the time of leveling and align stock reel to the machine, then lag the stock reel stand to the floor.

The machine should be well OILED with the gun supplied. Fittings are for oil only - not grease. Fill the lube gun with Mobil DTE Oil Heavy, or its equivalent, ISO-100-VG oil and also the Bijur lube pump reservoir. Check for nuts and bolts that may have loosened in transit. Install required cams in both tool spindle and cross slide area. Now turn the machine over by hand at least one complete cycle to make sure nothing is binding.
CAUTION - Do not run the machine if low pressure is less than five pounds and high pressure is less than fifty pounds. NOTE - See further oiling instructions. NOTE - If, for any reason, the gauges are disconnected, remove spindle change gears and push flush button on unit until air is purged from line and reconnect. Align the wire case carrier and connect to machine. Without spindle gears, start the machine, engage the starting hand lever, depress flush button on lubricator for 30 minutes, stop the machine, and put on the spindle gears. Approximately 900 R.P.M. is desired for breaking in the machine. Keep the flush button on the lubricator fully depressed for 5 minutes after each gear change. CAUTION - Never revolve spindles without indexing the head as the spindles are only lubricated in the 4th position.

Run the machine at approximately 900 R.P.M. for 2 hours. Change


RETAINING CAM
CHUCK SLIDE
THRUST BEARING
SPINDLE GEAR
FEED TUBE ASSEMBLY
CHUCK LEVER
CHUCK LEVER EXTENSIONS
SPINDLE FRONT BEARING NUT
SPINDLE FRONT BEARING HOUSING
767 SCREW
WORK SPINDLE
COLLET (CHUCK)
R.H. NUT
TOOL POST STOP
L.H. NUT
CHUCK ADJUSTING NUT
CHUCK LEVER SLEEVE
CHUCK LEVER FULCRUM
INNER SPINDLE
834-A SCREW
THRUST SCREW
FRONT BEARINGS
LOCKING NUT


WORK SPINDLES
DEAD STOPS
ADJUSTABLE INDEPENDENT STOP
ECCENTRIC
OUTER SUPPORT
3 2 5 1
DAVENPORT
MODEL B
SERIAL NO.
DATE
MADE IN U.S.A.
CHUCK & FEED CAM
FRONT CAM SHAFT
CAM CARRIER
POSITIVE RETURN CAM

the spindle gears and run it approximately 1500 R.P.M. for 8 hours. Again, change the gears and run it approximately 2000 R.P.M. for 8 hours. Continue this procedure until we have run 8 hours at 2500 R.P.M., then at 3000 R.P.M. for 8 hours. Pay close attention to the bearings that may run hot. If any bearing does run hot, drop back a step, check that bearings are getting lubrication, and run until it remains normal.

Then proceed to the next faster speed. After the machine has been in operation for several days, it should be inspected very carefully to make sure all nuts and screws are tight.

Coolant tanks should be filled with a good grade of cutting oil for the job to be run. You can be producing parts while the machine is breaking in. Select from the charts at approximately 750 R.P.M. the same effective revolutions as is required to do the job at the desired R.P.M. Repeat this procedure until you have obtained the desired cycle time and R.P.M. Chucks and feed fingers should be removed occasionally and throughly cleaned. Also the inside of the inner spindle and the inside of the nose of the outer spindle should be wiped clean with an OSHA approved solvent and boiler brush to remove the sludge which accumulates and would effect the chucking and feeding mechanism. After cleaning, swab with lubricating oil. Now oil and insert collets and feed tubes.

The work spindles always revolve forward or counterclockwise as in a lathe, making it possible to use right hand cutting tools exclusively. The work spindle carrier also indexes in a counterclockwise direction bringing the work from position to position.

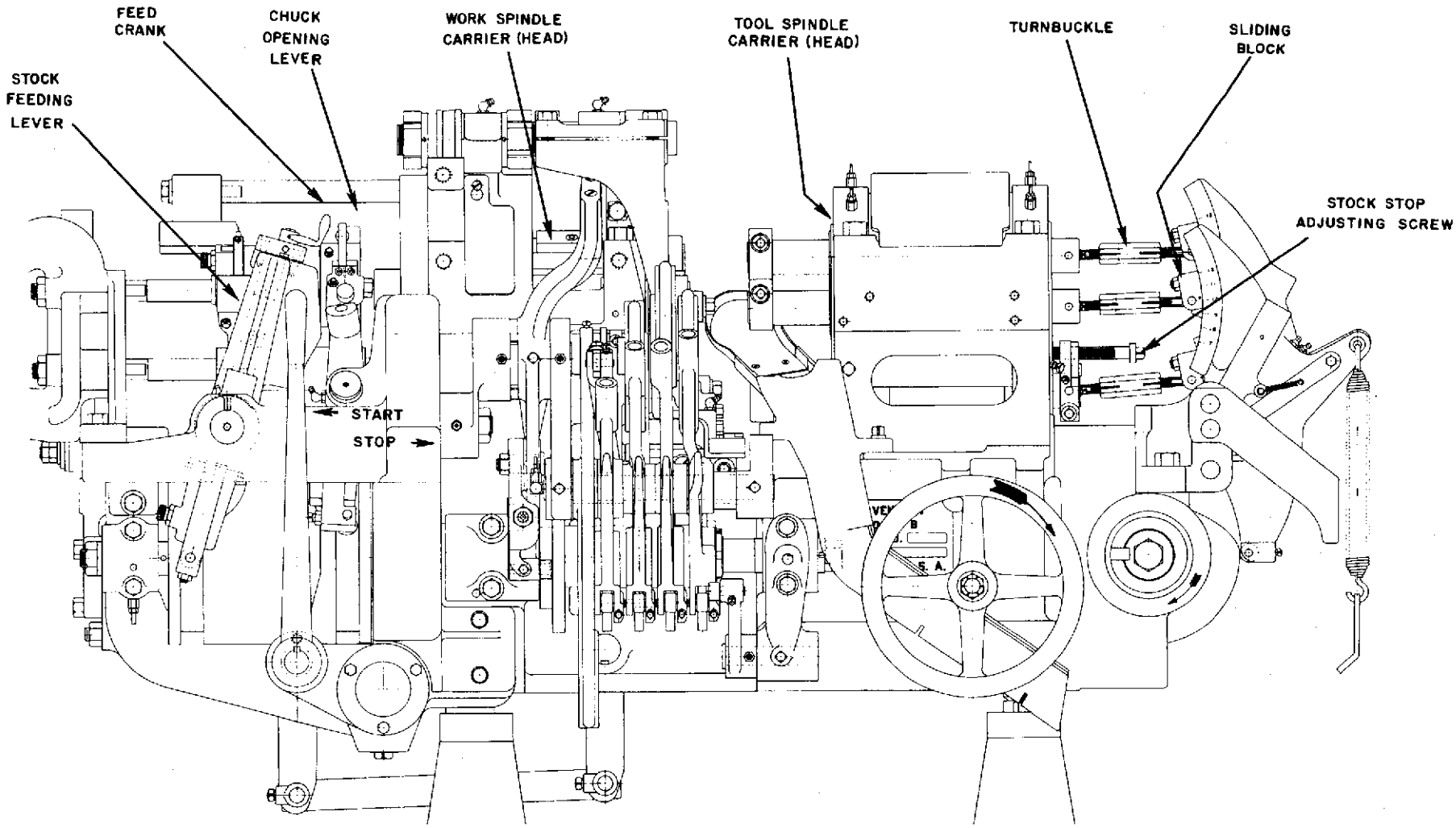
The work spindle carrier has an outer support which carries the weight of the wire case carrier, and is so designed that the feed tubes may be removed without disturbing this support. The support is indexed on rolls. The rolls are adjusted by means of an eccentric.

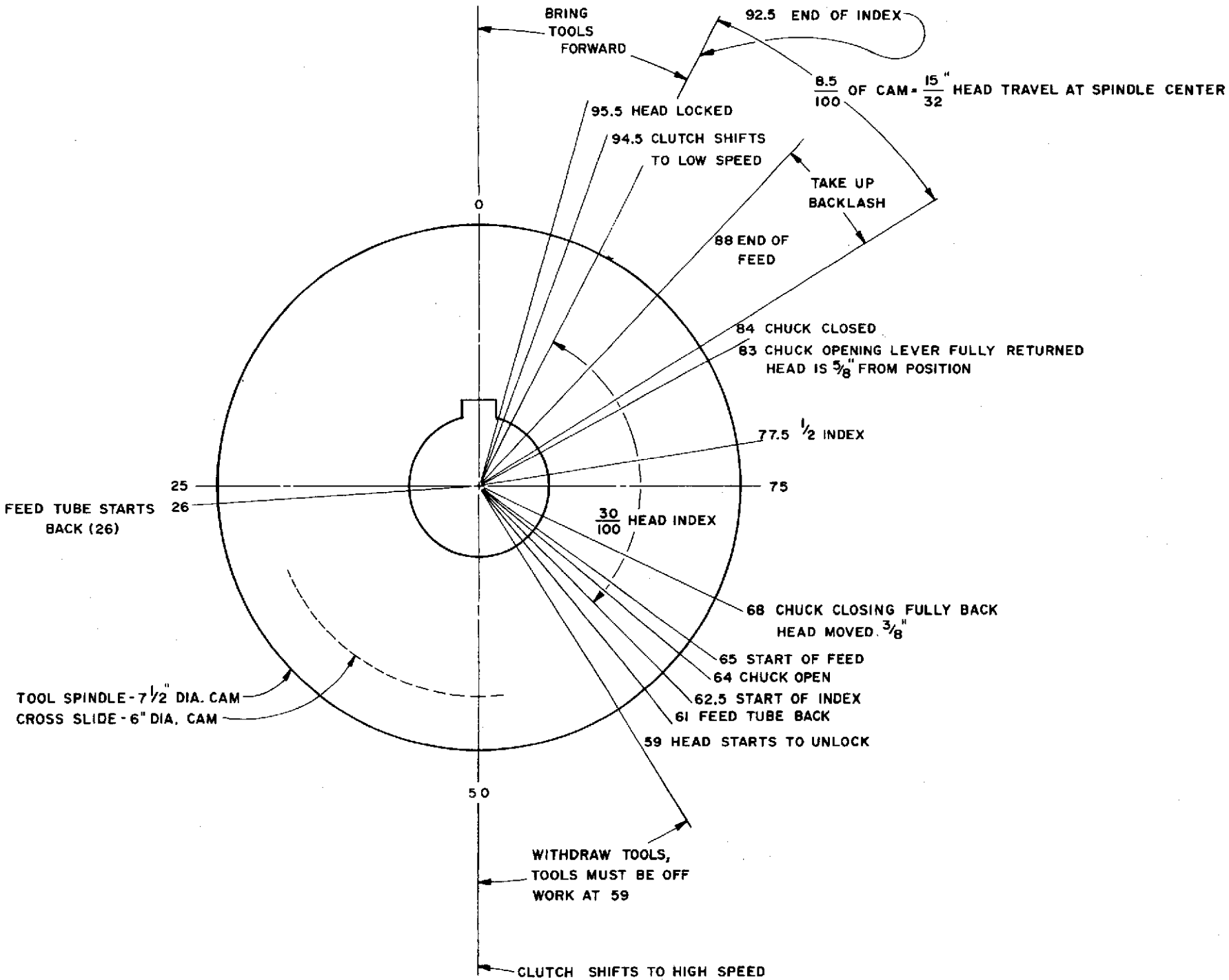
INDEPENDENT AND ADJUSTABLE FEED FOR EACH TOOL

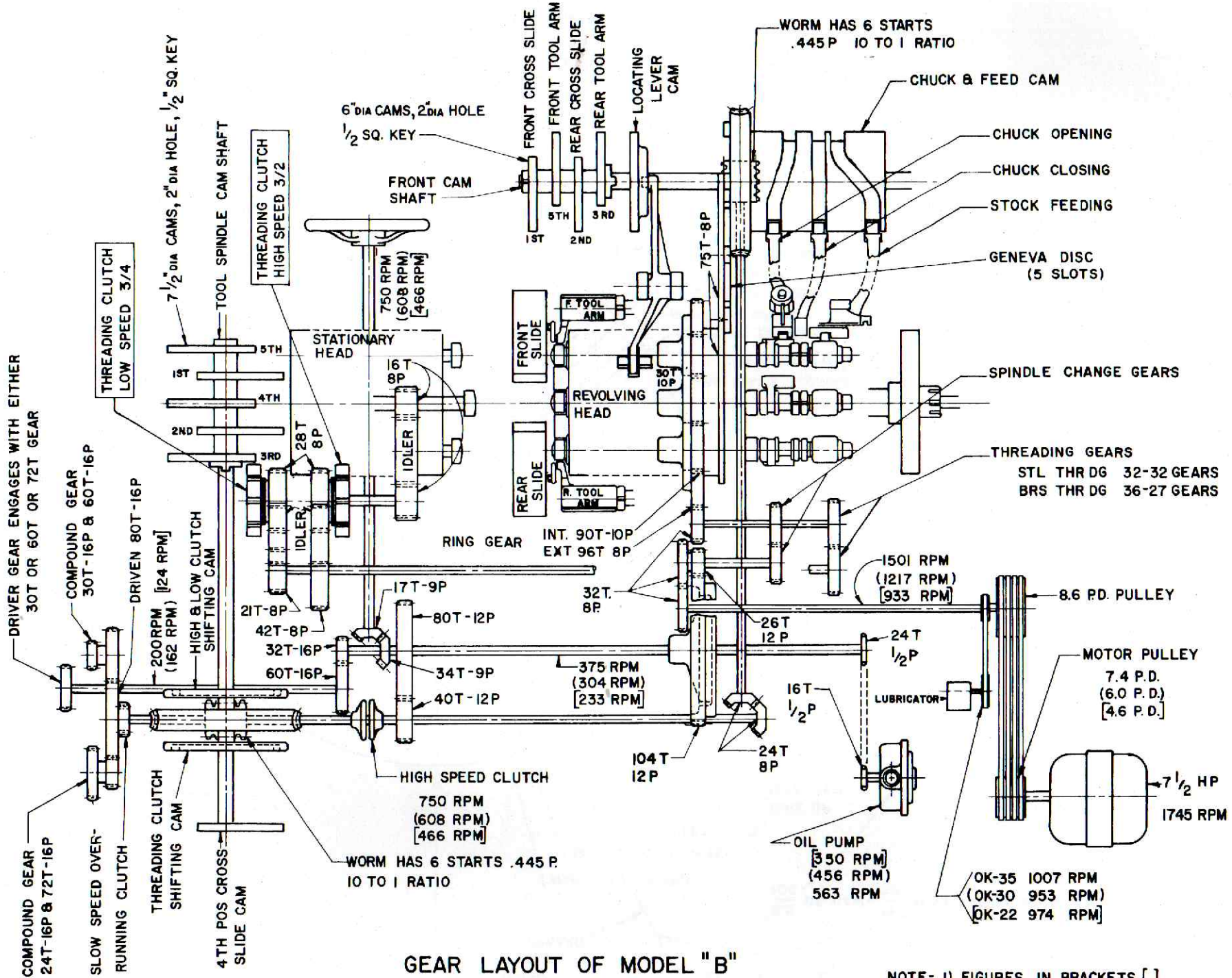
Each tool is operated by an independent cam and cam lever and is easily adjusted for depth of cut by the use of a turnbuckle which requires no clamping.

All regular cam levers have a graduated face on which the sliding block may be raised or lowered to vary the feed of the tool on most by 20% (all end working 20%; cross slides 1st, 2nd, 4th, and 5th position arm 20%; 3rd position arm is 10%). All these levers have a 3/4 diameter roll. In the third tool spindle position a special 2:1 cam lever can be used, and in the fourth tool spindle position a special 2.5:1 cam lever. These cam levers have 5/8 diameter rolls.

Independent and adjustable compensating stops for 1st, 2nd, and 4th forming slides and 3rd position rear tool arm insure the same size work from all spindles. A special stop can be mounted on the cutoff arm to allow light forming to be done on the work in the burring spindle after the piece is cutoff.


FEED CRANK
CHUCK OPENING LEVER
WORK SPINDLE CARRIER (HEAD)
TOOL SPINDLE CARRIER (HEAD)
TURNBUCKLE
SLIDING BLOCK
STOCK FEEDING LEVER
STOCK STOP ADJUSTING SCREW
START
STOP


BRING TOOLS FORWARD
92.5 END OF INDEX
8.5/100 OF CAM = 15/32" HEAD TRAVEL AT SPINDLE CENTER
95.5 HEAD LOCKED
94.5 CLUTCH SHIFTS TO LOW SPEED
TAKE UP BACKLASH
0
88 END OF FEED
84 CHUCK CLOSED
83 CHUCK OPENING LEVER FULLY RETURNED HEAD IS 5/8" FROM POSITION
77.5 1/2 INDEX
25
75
FEED TUBE STARTS BACK (26)
26
30/100 HEAD INDEX
68 CHUCK CLOSING FULLY BACK HEAD MOVED 3/8"
65 START OF FEED
64 CHUCK OPEN
62.5 START OF INDEX
61 FEED TUBE BACK
59 HEAD STARTS TO UNLOCK
TOOL SPINDLE - 7 1/2" DIA. CAM
CROSS SLIDE - 6" DIA. CAM
50
WITHDRAW TOOLS, TOOLS MUST BE OFF WORK AT 59
CLUTCH SHIFTS TO HIGH SPEED



GEAR LAYOUT OF MODEL "B"

75 CYCLE

DAVENPORT MACHINE TOOL DIV.
DOVER CORPORATION
ROCHESTER, NEW YORK

NOTE- 1) FIGURES IN BRACKETS [ ] FOR 45 CYCLE MACHINE
2) FIGURES IN PARENTHESIS ( ) FOR 60 CYCLE MACHINE

TO FIGURE INDEX TIME

The motor speed times the pitch diameter of the motor pulley divided by the drive shaft pulley pitch diameter times (934) gear divided by large gear on compound gear (MB-41) times the small gear on the compound gear (MB-41) divided by driving clutch gear times quick index drive gear divided by quick index driven gear times (bevel gear) driving clutch bracket gear divided by (bevel gear) on end worm drive shaft times worm on worm drive shaft divided by front worm wheel equals R.P.M. of cam shaft during index.

The following is an example of how to figure index:

$$\frac{\text{Motor Speed}}{1745} \times \frac{\text{(75Cycle) Motor Pulley}}{8.6} \times \frac{\text{(934) Gear}}{32} \times \frac{\text{Small Gear Compound}}{104} \times \frac{\text{Quick Index Drive Gear}}{40} \times \frac{\text{Bevel Gear}}{24} \times \frac{\text{Worm}}{60} = \frac{\text{Cycles Per Minute}}{\text{R.P.M. of Cam Shaft}}$$

$$\frac{1}{1} \times \frac{7.4}{\text{Drive Shaft Pulley}} \times \frac{32}{\text{32 Large Gear Compound}} \times \frac{26}{\text{Driving Clutch Gear}} \times \frac{80}{\text{Quick Index Driven Gear}} \times \frac{24}{\text{Bevel Gear}} \times \frac{6}{\text{Worm Wheel}} = \frac{75.08}{\text{R.P.M. of Cam Shaft}}$$

Now looking at the above calculations, it can be seen that by changing the motor pulley, index time can be changed.

TO FIGURE HIGH SPEED TIME IN SECONDS

$$\frac{\text{60 Seconds divided by 75 cycle (Indexes in High Speed)}}{2} = \frac{.8}{2} = .4 \text{ of a Second From 50 to 0}$$

TO FIGURE WORKING TIME IN SECONDS

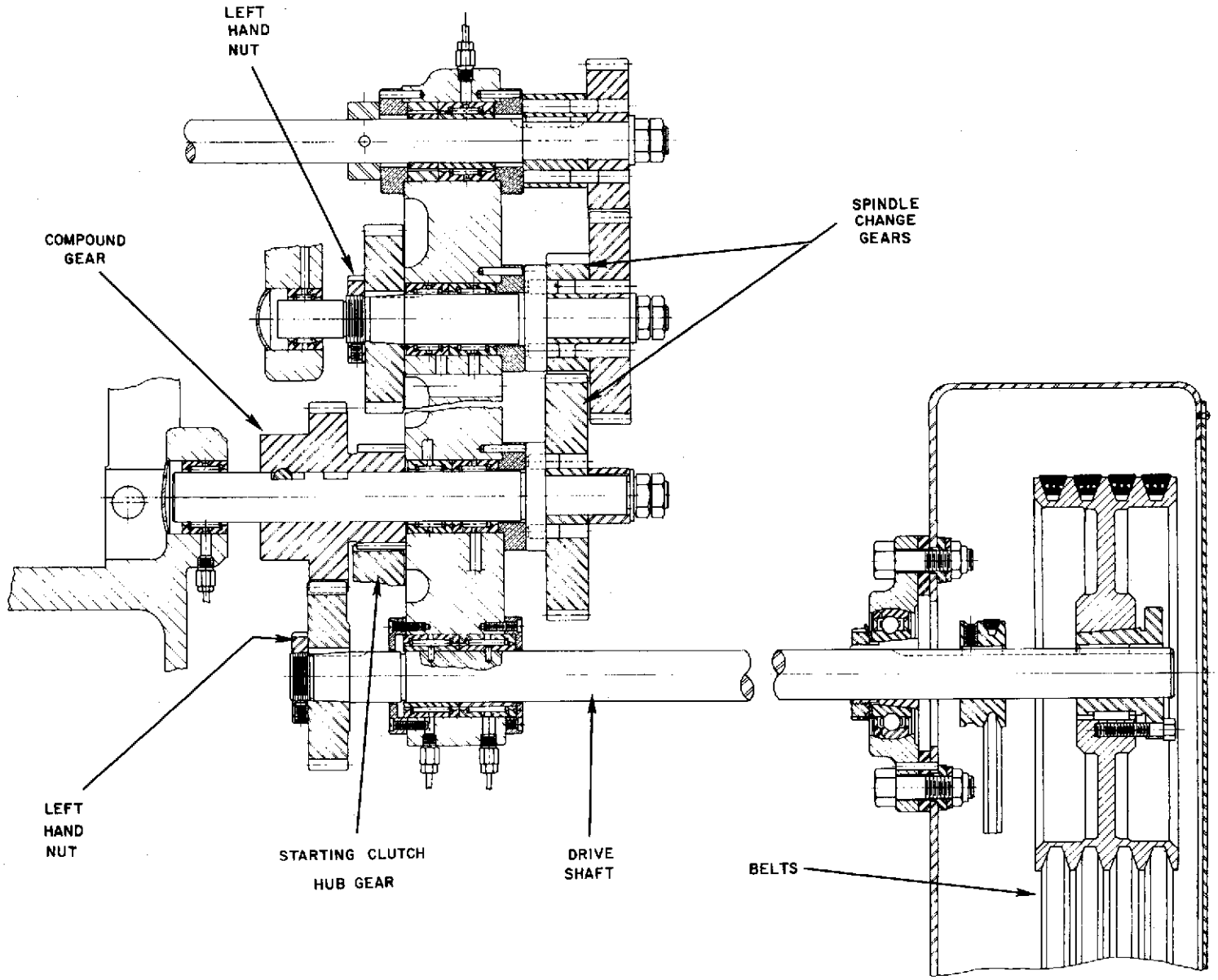
The motor speed times the pitch diameter of the motor pulley divided by the drive shaft pulley pitch diameter times (934) gear divided by large gear on compound gear (MB-41) times the small gear on the compound gear (MB-41) divided by driving clutch gear times idler shaft driving gear divided by idler shaft driven gear times change gear divided by meshing compound gear times other segment of compound gear divided by clutch body gear times worm divided by worm wheel equals R.P.M. of Cam Shaft during working (0-50) portion of time cycle.

The example shown below is at 75 indexes using a 75 tooth change gear to attain 1.2 seconds cycle time:

Motor Speed		(75Cycle) Motor Pulley		(934) Gear		Small Gear Compound		Idler Shaft Driving Gear		Change Gear		Compound Driven Gear		Worm		37.54 R.P.M. of Cam Shaft
1745 / 1	x	7.4 / 8.6	x	32 / 32	x	26 / 104	x	32 / 60	x	75 / 30	x	60 / 80	x	6 / 60	=	
		Drive Pulley Shaft		Large Compound Gear		Driving Clutch Gear		Idler Shaft Driven Gear		Compound Gear Drive		Clutch Body Gear		Worm Wheel		

$$\frac{60 \text{ Seconds divided by } 37.54 \text{ R.P.M. of Cam Shaft}}{2} = \frac{1.6}{2} = .8 \text{ Working Time (0-50)}$$

.8 Working Time plus .4 Index Time equals 1.2 Cycle Time.

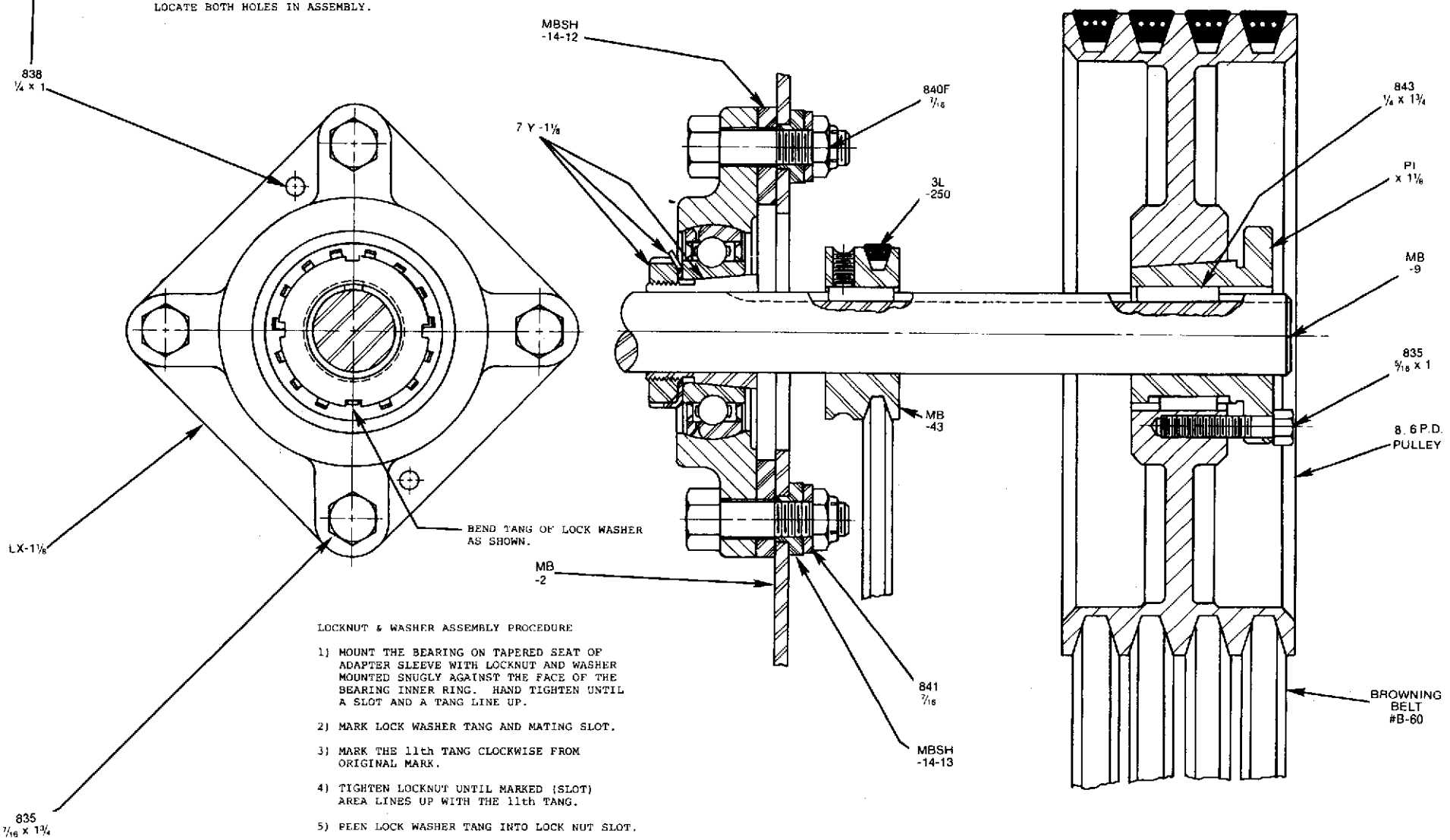

LEFT
HAND
NUT
COMPOUND
GEAR
SPINDLE
CHANGE
GEARS
LEFT
HAND
NUT
STARTING CLUTCH
HUB GEAR
DRIVE
SHAFT
BELTS

DRILL 2 HOLES AFTER ALIGNING SHAFT WITH BEARINGS ON OTHER END.

CLAMP TIGHT & DRILL WITH "D" (.246) DIA. DRILL 1" DEEP

REAM .246 DIA. HOLE IN GUARD TO .250 DIA. & DRIVE IN DOWEL PINS.

LOCATE BOTH HOLES IN ASSEMBLY.



LOCKNUT & WASHER ASSEMBLY PROCEDURE

1) MOUNT THE BEARING ON TAPERED SEAT OF ADAPTER SLEEVE WITH LOCKNUT AND WASHER MOUNTED SNUGLY AGAINST THE FACE OF THE BEARING INNER RING. HAND TIGHTEN UNTIL A SLOT AND A TANG LINE UP.

2) MARK LOCK WASHER TANG AND MATING SLOT.

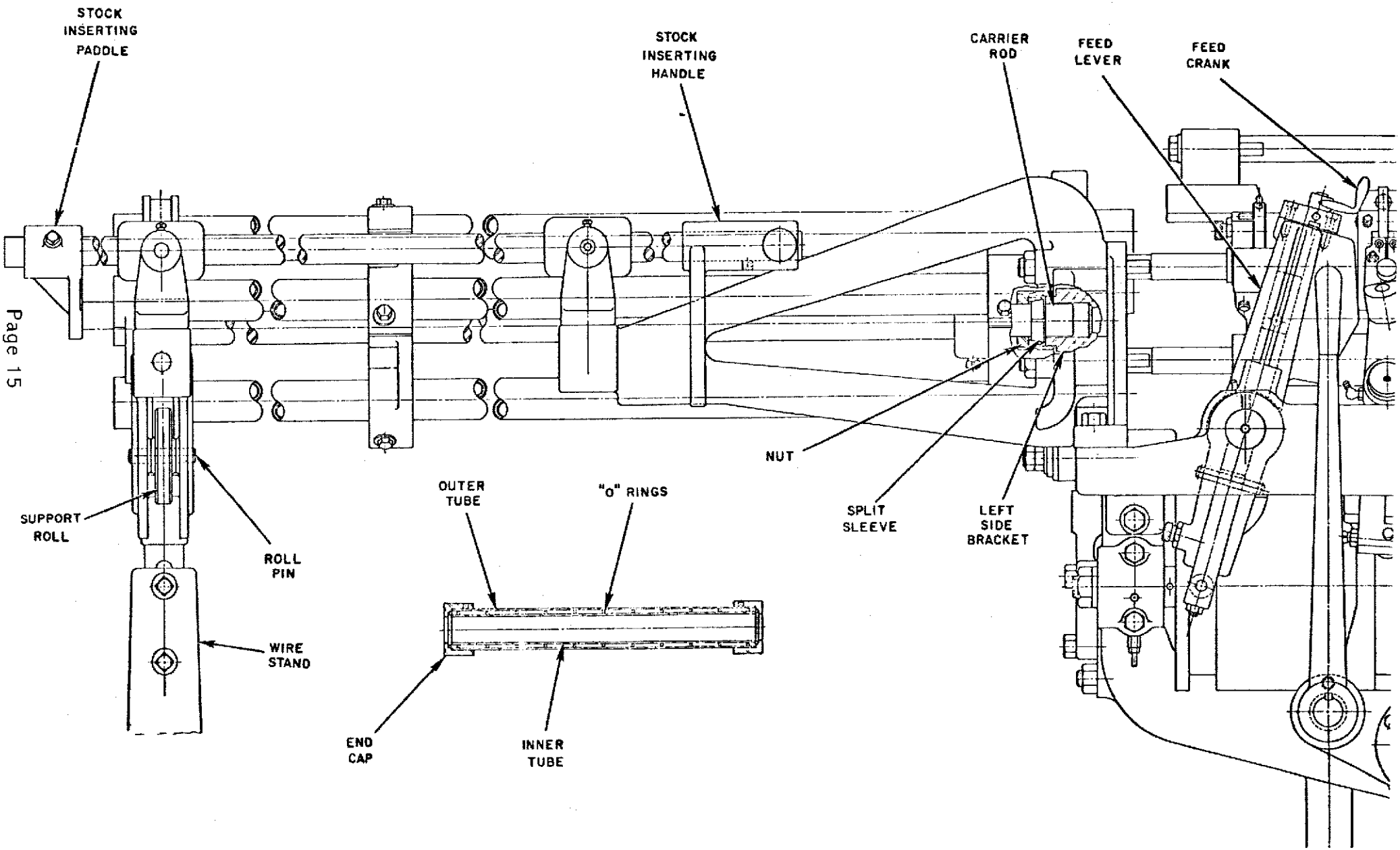
3) MARK THE 11th TANG CLOCKWISE FROM ORIGINAL MARK.

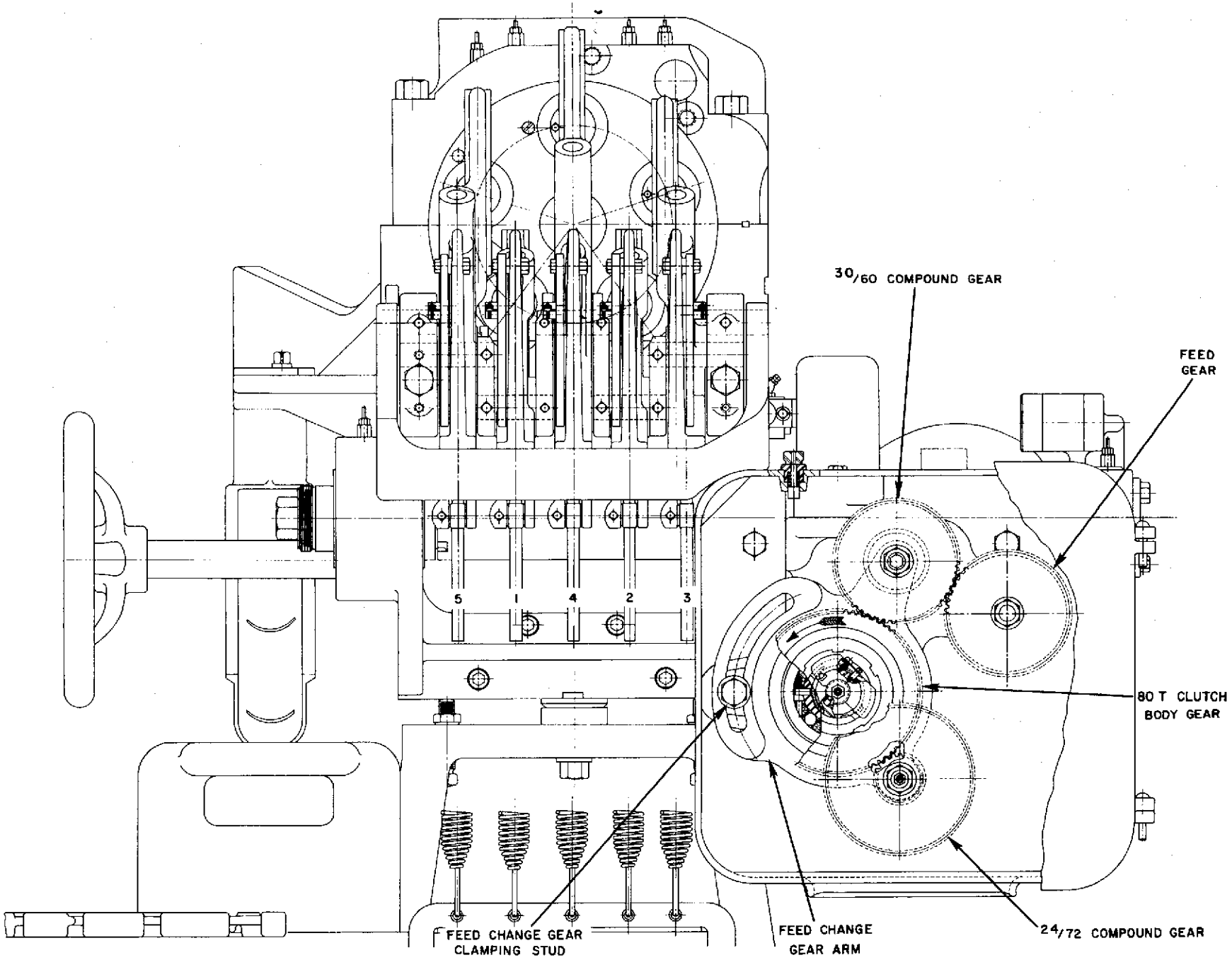
4) TIGHTEN LOCKNUT UNTIL MARKED (SLOT) AREA LINES UP WITH THE 11th TANG.

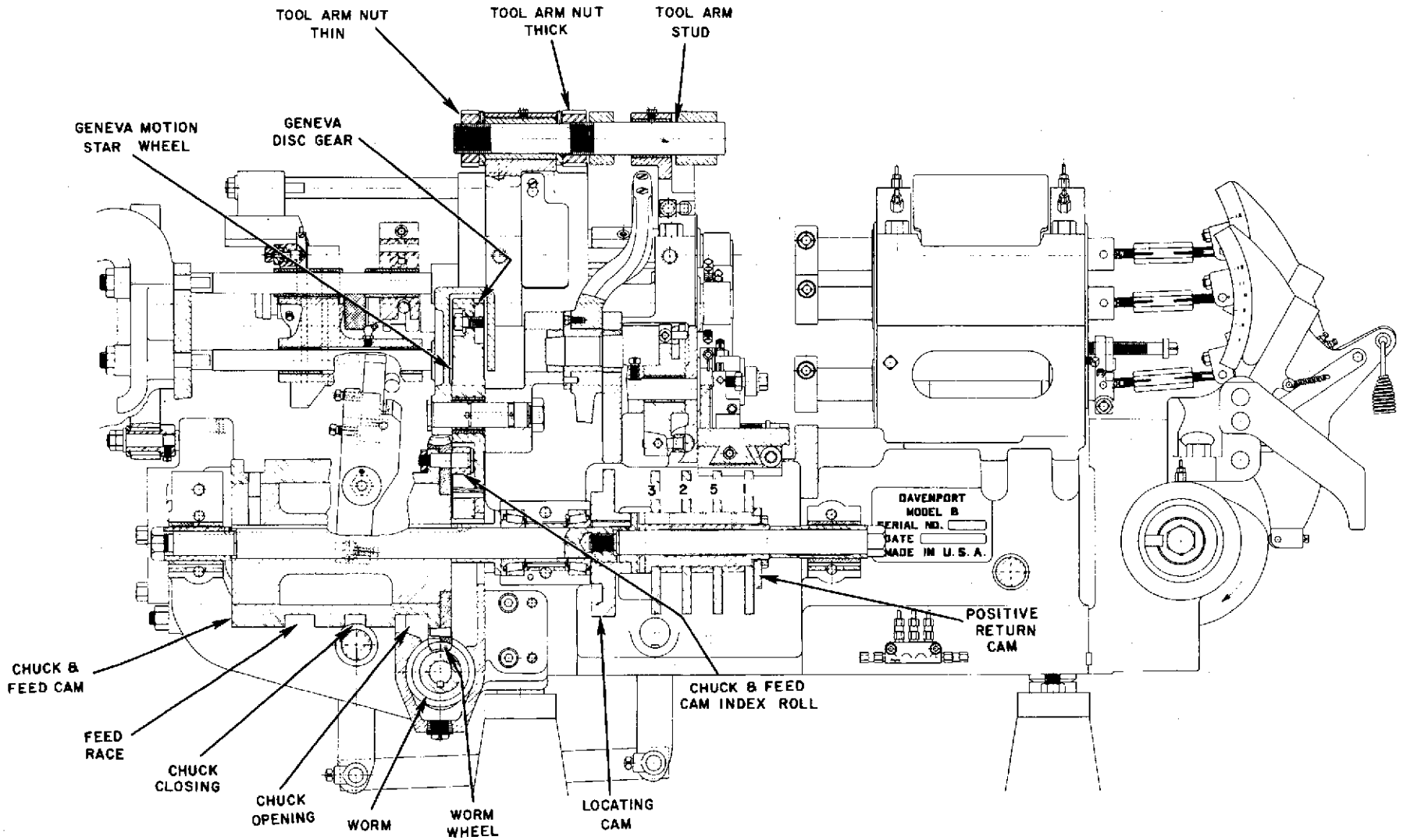
5) PEEN LOCK WASHER TANG INTO LOCK NUT SLOT.

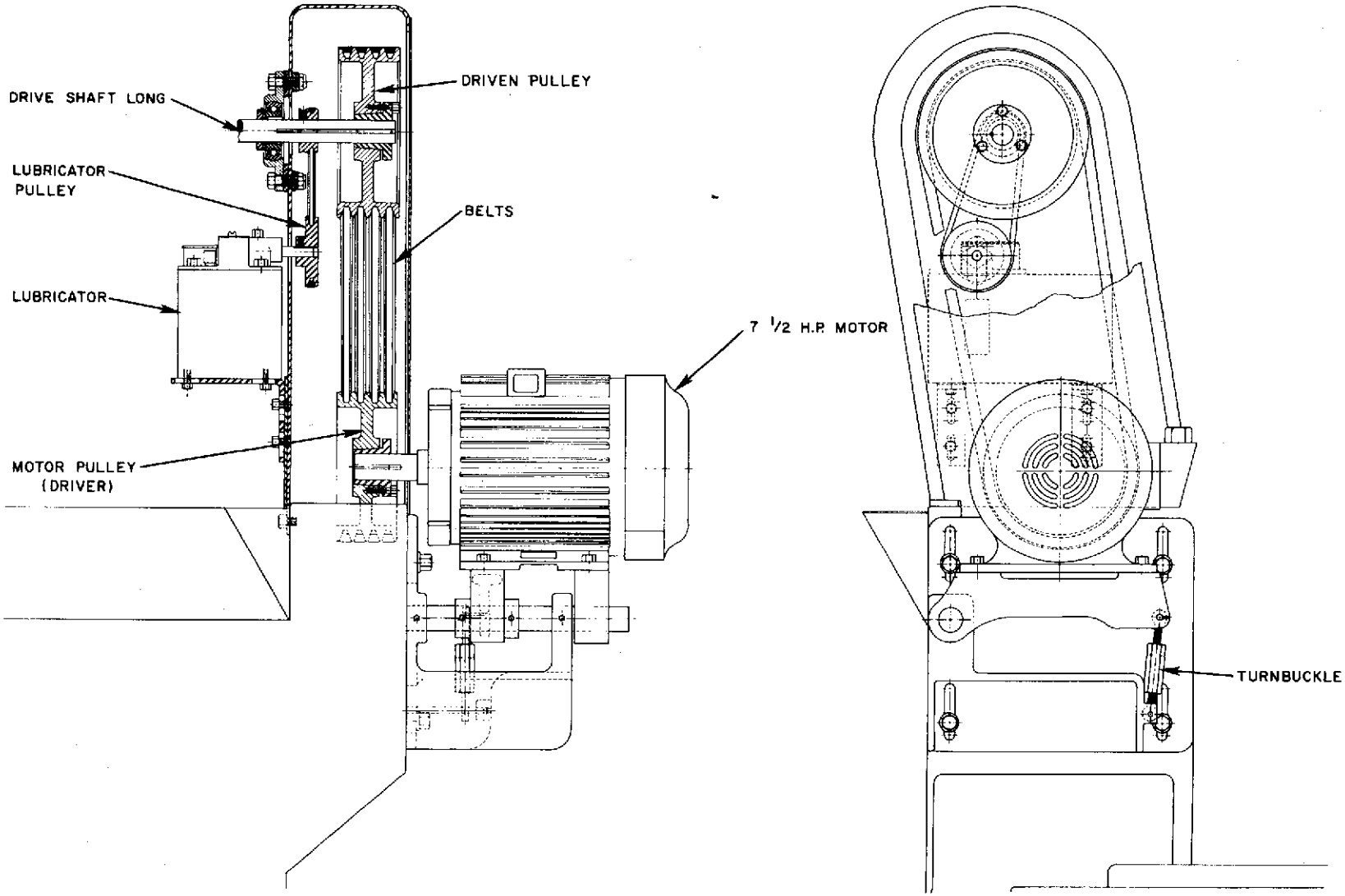
NOTE: MB-43 PULLEY IS LOCATED APPROXIMATELY 1/4" FROM MB-2.

NOTE: TAPER SLEEVE IN BEARING MUST BE TEMPORARILY KEYED TO MB-9 SHAFT WHEN TIGHTENING LOCK NUT. REMOVE KEY AFTER ASSEMBLY.


STOCK INSERTING PADDLE
STOCK INSERTING HANDLE
CARRIER ROD
FEED LEVER
FEED CRANK
NUT
SPLIT SLEEVE
LEFT SIDE BRACKET
SUPPORT ROLL
ROLL PIN
WIRE STAND
OUTER TUBE
"O" RINGS
END CAP
INNER TUBE


30/60 COMPOUND GEAR
FEED GEAR
5
1
4
2
3
80 T CLUTCH BODY GEAR
FEED CHANGE GEAR CLAMPING STUD
FEED CHANGE GEAR ARM
24/72 COMPOUND GEAR


TOOL ARM NUT THIN
TOOL ARM NUT THICK
TOOL ARM STUD
GENEVA MOTION STAR WHEEL
GENEVA DISC GEAR
3 2 5 1
DAVENPORT
MODEL B
SERIAL NO.
DATE
MADE IN U.S.A.
POSITIVE RETURN CAM
CHUCK & FEED CAM
CHUCK & FEED CAM INDEX ROLL
FEED RACE
CHUCK CLOSING
CHUCK OPENING
WORM
WORM WHEEL
LOCATING CAM


DRIVE SHAFT LONG
DRIVEN PULLEY
LUBRICATOR PULLEY
BELTS
LUBRICATOR
7 1/2 H.P. MOTOR
MOTOR PULLEY (DRIVER)
TURNBUCKLE

All regular cross slides and tool arms are operated from the cam shaft on the front of the machine. A positive return has been provided for the 1st position cross slide. An optional attachment, the 4th position cross slide, can be purchased. This attachment is operated from the extension on the tool spindle cam shaft.

The chuck and feed cam permits the feeding of a bar of stock of the largest diameter and the maximum length of feed by simply feeding against the polished stock stop. Length of stock to be fed can be quickly changed by a crank conveniently located on the feed slide at the front of the machine.

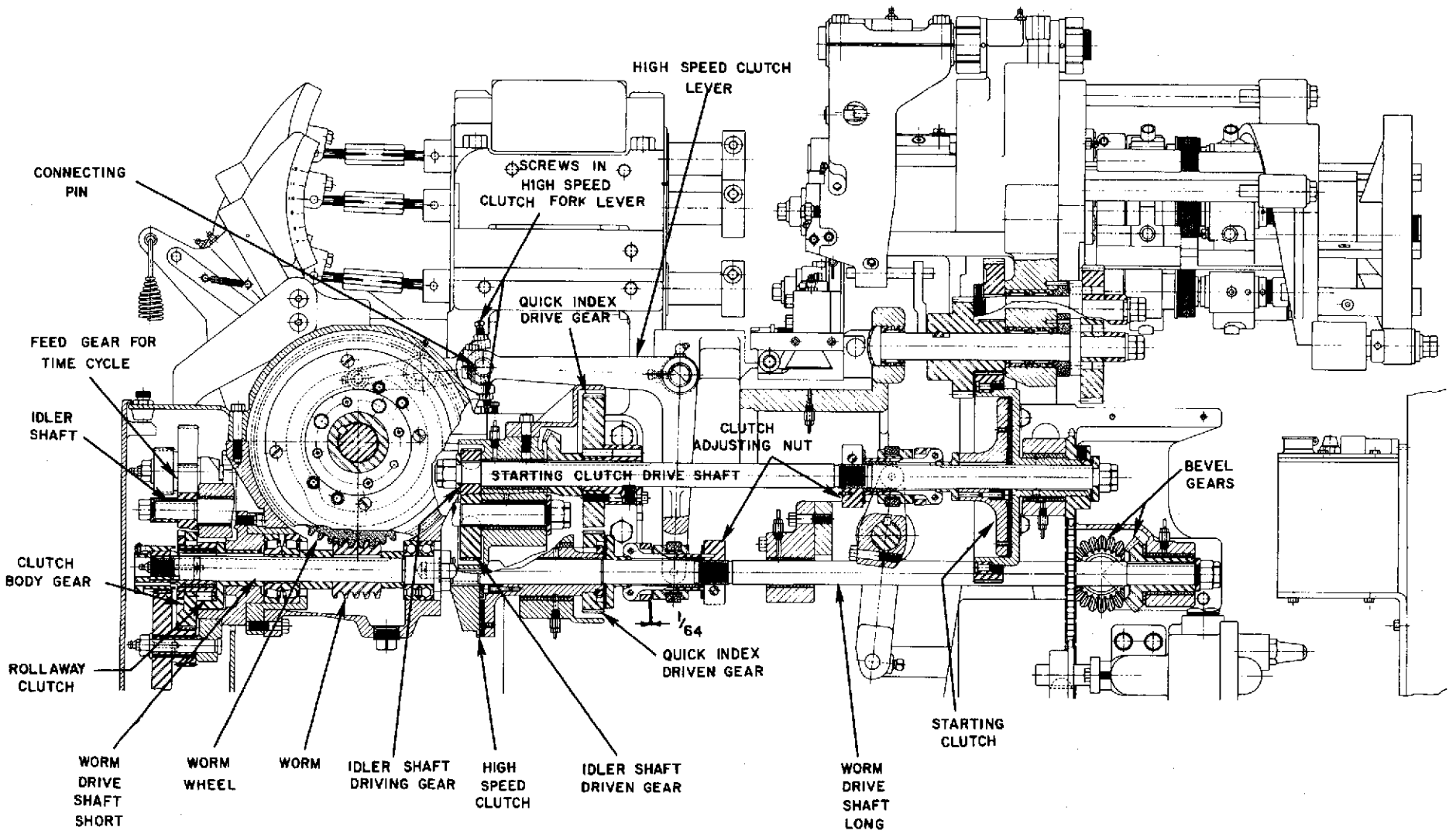
After the stock has been inserted into the carrier, it can be loaded into the collets by a simple stock loading mechanism. This is so designed, that the operator can insert all five bars into the collets without leaving the operating position.

When changing from one cycle time to another, it is necessary to change only one feed gear. Hardened plate type cams are used and are mounted on carriers, making it easy to change cams. The carriers have keys which indicate "0" on the cam shaft. When putting cams on the tool spindle carrier be sure the key is at the top and rise or lettering is on the left hand side. The tool spindle cams are put on with the 3rd position cam on first, followed by 2nd, 4th, 1st, and 5th.

When putting the cams on the front carrier the lettering faces down and the rise is on the right hand side. The front carriers sequence is 3rd, 2nd, 5th, 1st, and positive return cam. Extra cam carriers can be purchased, making it possible to assemble cams for a new set up while the machine is still in operation on its present job, thus reducing the set up time.

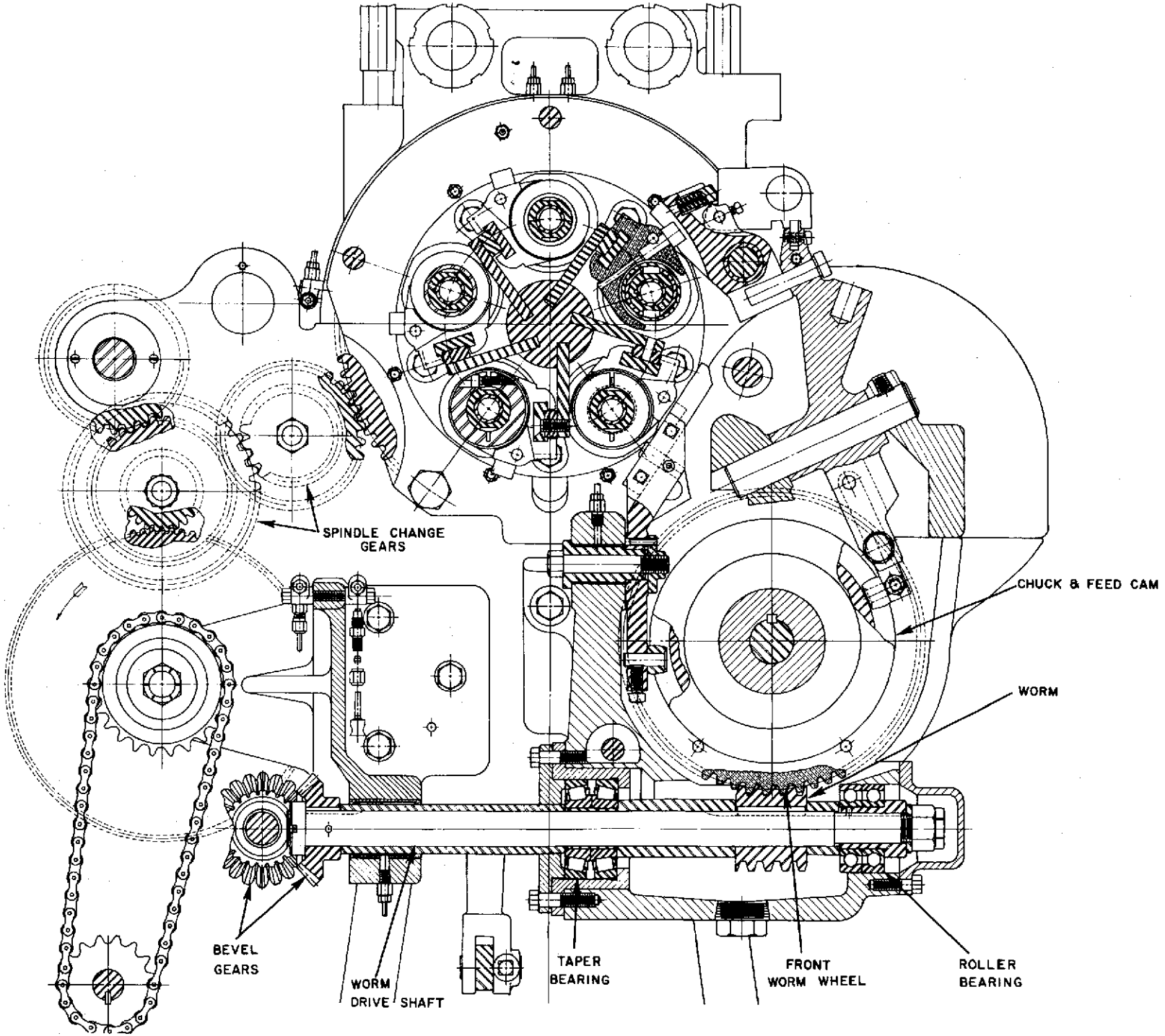
THE POWER SUPPLY OF THE MODEL B

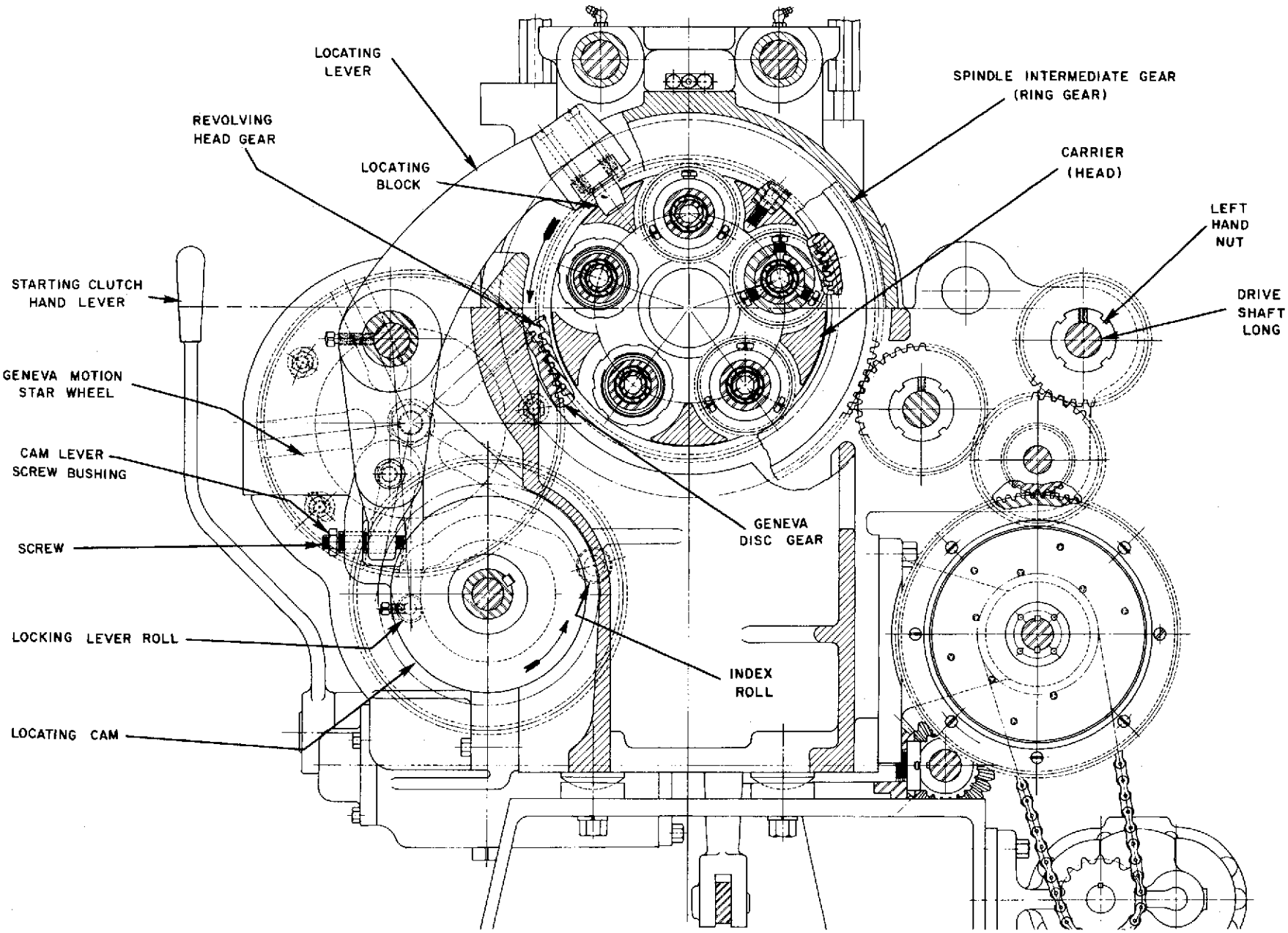
Machine is powered by a 7-1/2 H.P., totally enclosed, fan cooled, ball bearing motor which drives two V Belt Drive pulleys. The driven pulley is an 8.6 pitch diameter and the motor pulley driver for the 75 cycle is 7.4 pitch diameter. For 60 cycle, it is 6.0 pitch diameter, and for 45 cycle it is 4.6 pitch diameter. As you will note, it will only be necessary to change the one pulley to get the various cycles. There are four matched belts of even length for this drive. The final tension on these belts is applied by a turnbuckle attached to the motor mount. Next on the drive shaft long (MB-9) we find another pulley which is used for the lubricator. At 75 cycle the lubricator is driven at approximately 1000 R.P.M. Further to the left is the 32 tooth gear (934). It is secured to the shaft by a left hand nut. This gear in turn drives a 32 tooth compound gear which is (MB-41) a 26 tooth portion of the compound gear meshes the 104 tooth driving clutch hub gear (5080-227-4). An operator standing in the front of the machine pushes the starting shaft hand lever (5080-383) to the left. This engages the clutch, driving the starting clutch drive shaft (5080-141) as we proceed to the left on this shaft we find an 80 tooth gear which is the quick index gear (5080-50). It engages with the 40 tooth quick index driven gear (5080-51). You

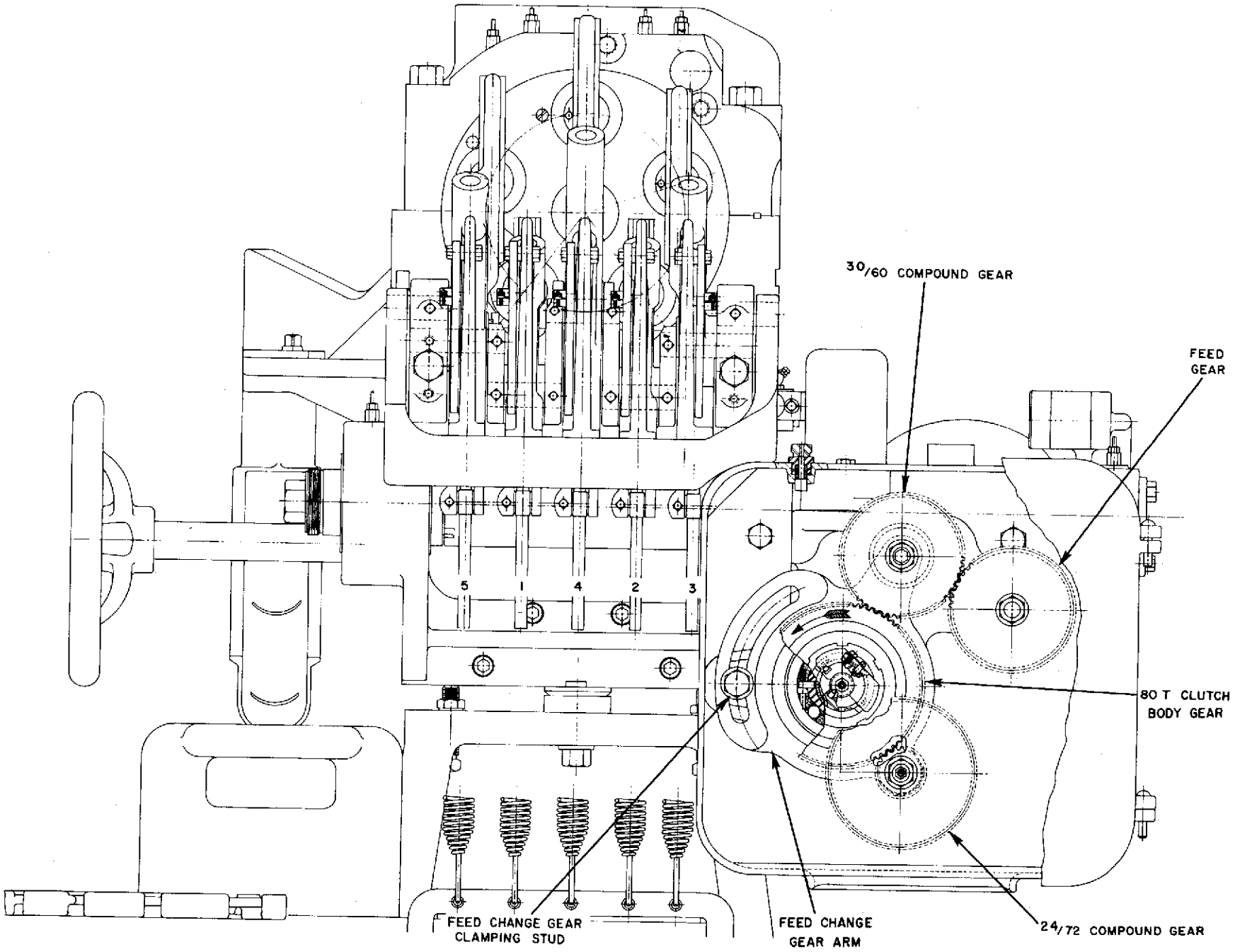

HIGH SPEED CLUTCH LEVER
CONNECTING PIN
SCREWS IN HIGH SPEED CLUTCH FORK LEVER
QUICK INDEX DRIVE GEAR
FEED GEAR FOR TIME CYCLE
IDLER SHAFT
CLUTCH ADJUSTING NUT
STARTING CLUTCH DRIVE SHAFT
BEVEL GEARS
CLUTCH BODY GEAR
1/64
QUICK INDEX DRIVEN GEAR
ROLLAWAY CLUTCH
STARTING CLUTCH
WORM DRIVE SHAFT SHORT
WORM WHEEL
WORM
IDLER SHAFT DRIVING GEAR
HIGH SPEED CLUTCH
IDLER SHAFT DRIVEN GEAR
WORM DRIVE SHAFT LONG

will bypass these gears as in low speed they are idlers. We next come to another set of gears, a 32 tooth idler shaft driving gear (5080-127) driving a 60 tooth idler shaft driven gear (5080-126). This gear in turn drives the idler shaft (5080-122). On this shaft is placed the gear of the desired time cycle. For more information on this, refer to feed change gears. You will note, that we end up with an 80 tooth gear. This is the clutch body gear (5080-131-1). Within the clutch body gear is a rollaway clutch. This gear drives rear worm drive shaft short (5080-139-2). On this shaft is a worm (5080-61) which drives a rear worm wheel (5080-20). The ratio of the worm to the worm wheel is 1:10. Attached to the rear worm wheel is a quick index clutch cam (5080-85). As this rotates it moves a lever up and down to allow the machine to engage into high and low speed. Now to go back to the 80 tooth quick index drive gear (5080-50), driving the 40 tooth quick index driven gear (5080-51). We shift the machine into high and the quick index gear will drive the quick index driven gear which in turn drives the worm drive shaft long (5080-139-1) which is coupled to the rear worm drive shaft short (5080-139-2). We are now driving through the high speed side and override the rollaway clutch by putting the rolls back into a neutral position for the length of the index. Look at the rear worm drive shaft short (5080-139-2) and see that the rear worm wheel (5080-20) drives the rear cam shaft at a speed of 1/10 of the shaft (5080-139-2). Following the worm drive shaft long (5080-139-1) to the extreme right end, we find the driving clutch bracket gear (5080-136-2). This is a 24 tooth bevel gear which meshes with 24 tooth bevel gear (607). Which in turn drives the end worm drive shaft (5080-140-2). Another worm is on this shaft that drives the front worm wheel (5080-82). NOTE - If the machine is out of time, it may be timed by this set of bevel gears by slipping it one tooth one way or the other. The worm drives this worm wheel also 1/10 the speed, therefore, both cam shafts will run at the same rate of speed. Attached to the chuck and feed cam is a chuck and feed cam index roll (5180-2). This roll is so positioned that as the machine indexes into high speed the roll is inserted into the slots of the Geneva motion star wheel (5134-1). Attached to the Geneva motion star wheel is the Geneva disc gear. This gear has 75 teeth and is indexed as the Geneva motion is indexed by the roll on the cam. This gear meshes with the revolving head-gear (5133) which also has 75 teeth, indexing the revolving head. Located on the front cam shaft (5080-69) is the locating cam (5080-75). This activates the locking and unlocking of the locating lever (5080-34-1). This lever locks the carrier into position for the machining to be performed during the working portion of the cycle (0-50).

The locating and clamping lever, which locates and clamps the carrier (or head), should be checked occasionally to make sure it is locking securely. If not, the lever should be adjusted just tight enough to resist a lead hammer blow directly over the locating block without causing the roll on the bottom of the lever to move freely. Before attempting this procedure disengage the starting clutch. When tapping the top of the lever with the hammer, use one hand to feel the roll. NOTE - There must be a drag on the roll. More pressure may be applied by loosening the cam lever screw bushing (5080-35-SB) and turning screw (5080-35-SS) clockwise. Then tighten cam lever screw bushing (508-35-ISB) and turning screw (5080-35-SS) clockwise. Then tighten NOTE - When machine is running, the roll must be turning, not skidding.


SPINDLE CHANGE GEARS
CHUCK & FEED CAM
WORM
BEVEL GEARS
WORM DRIVE SHAFT
TAPER BEARING
FRONT WORM WHEEL
ROLLER BEARING


LOCATING LEVER
REVOLVING HEAD GEAR
LOCATING BLOCK
SPINDLE INTERMEDIATE GEAR (RING GEAR)
CARRIER (HEAD)
LEFT HAND NUT
DRIVE SHAFT LONG
STARTING CLUTCH HAND LEVER
GENEVA MOTION STAR WHEEL
CAM LEVER SCREW BUSHING
SCREW
GENEVA DISC GEAR
LOCKING LEVER ROLL
INDEX ROLL
LOCATING CAM


30/60 COMPOUND GEAR
FEED GEAR
5 1 4 2 3
80 T CLUTCH BODY GEAR
FEED CHANGE GEAR CLAMPING STUD
FEED CHANGE GEAR ARM
24/72 COMPOUND GEAR

SPINDLE SPEEDS

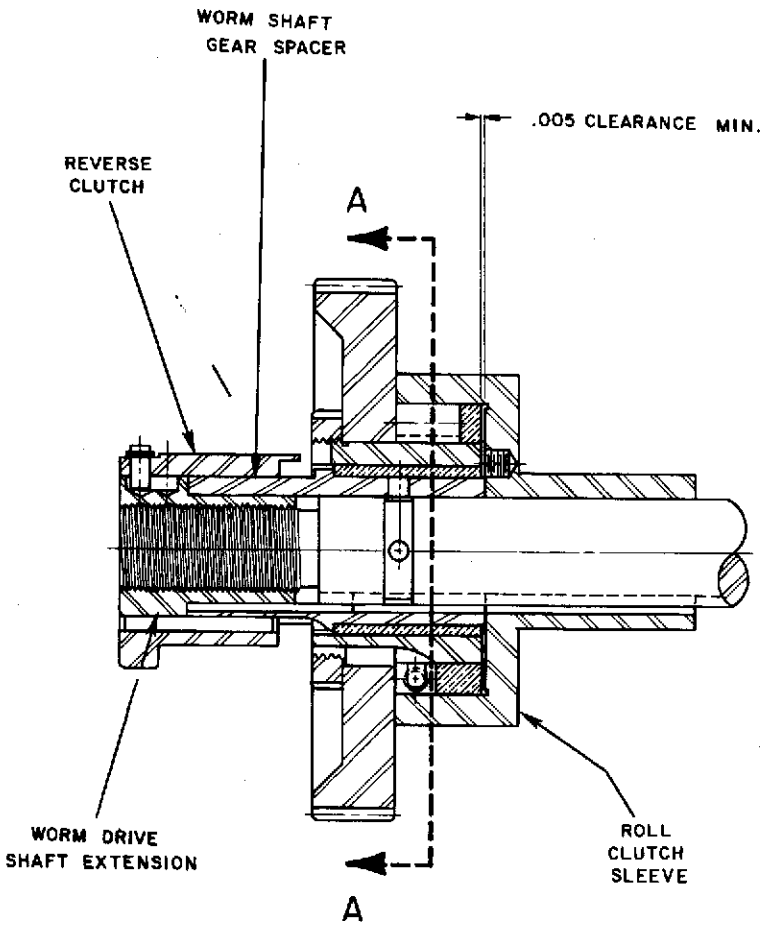
The spindle change gears are located on shafts (651-A-5) and (626-A-1). There are 27 various combinations that can be obtained; 75 cycle range 500 R.P.M. to 4500 R.P.M., 60 cycle range 400 R.P.M. to 3600 R.P.M., and 45 cycle range 311 R.P.M. to 2799 R.P.M. The driving gear is on the shaft 651-A-5 and the driven gear in on shaft 626-A-1. On drive shaft MB-9 the thread is left hand as is the large thread on shaft 626-A-1. The inner end of shaft 626-A-1 has the gear 934 (and left hand nut 945) which drives the spindle intermediate (936) ring gear which drives the work spindles. The compound gear on 651-A-5 drives the starting clutch on the feed train.

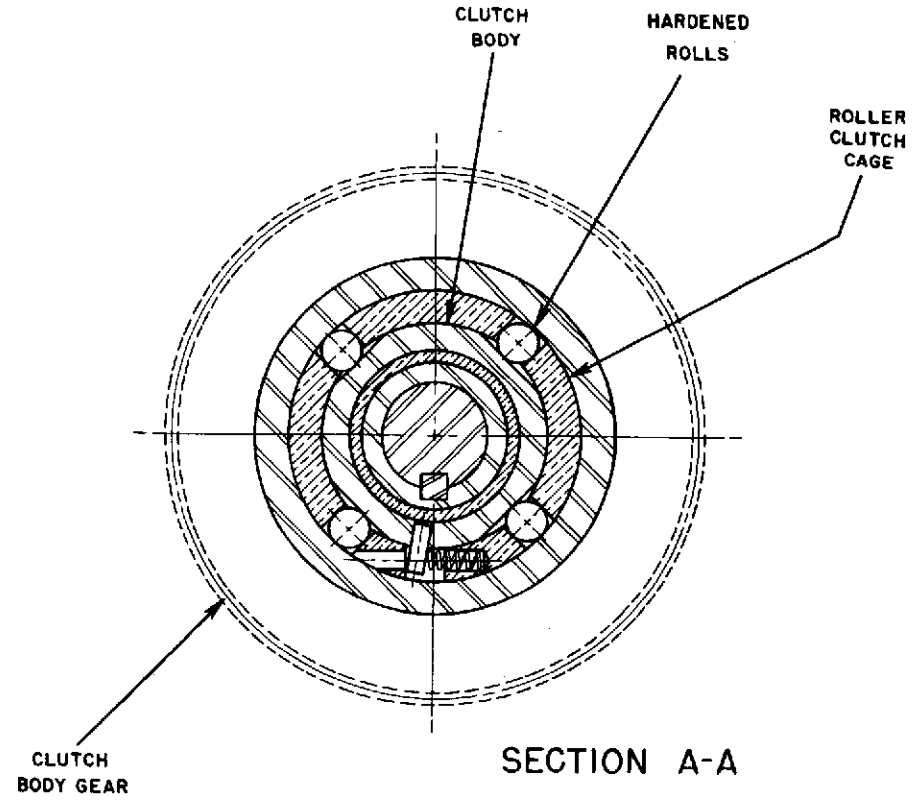
FEED

When changing the feed it is necessary to change but one gear. For direct high, there is no gear required on the idler shaft (5080-122). To maintain high speed for the entire cycle, slide the pin (5080-117) out of the engagement of the high speed clutch fork lever (5080-77), lift high speed clutch lever (5080-76) to the high speed position. To maintain direct low, use same procedure as above, but push the high speed clutch lever (5080-76) down to the low speed position. This will now give you an equal number of revolutions from 50 hundredths to 100 hundredths, as you had from 0 hundredths to 50 hundredths. Example 75 cycle 1.2 Second:

1.2 Seconds Cycle Time in Chart
\- .4 Indexing Time for 75 Cycle
.8 Working Time from 0-50
x 2 Equals 0-50 and 50-100
1.6 Direct Low

When using the low speed side, the chart should be consulted to determine which feed gear is needed for the desired revolutions. The chart is figured from 0 to 45 hundredths, which applies to many of our standard cams. To find the actual revolutions of the working time on the low side from 0 to 50, select any of the numbers in the boxes in the chart, divide by 45 and multiply by 50. The range of the 75 cycle machine can be run from .8 of a second to 18.4 including an index time of .4 of a second. The 60 cycle machine can be run from 1 second to 22.69 of a second including an index time of .5 of a second. The range of the 45 cycle is 1.3 to 29.6 seconds including an index time of .666 of a second. There are approximately 64 combinations of feed gears that can be used. To obtain the fastest range put the change gear spacer on the idler shaft (5080-122). Then install the desired feed gear. Loosen the feed change gear arm clamping stud (5080-192). Now swing the feed change gear arm so the feed gear chosen will mesh with the 30 tooth portion of the 30 tooth/60 tooth compound gear. Tighten the feed change gear arm clamping stud (5080-192). The 60 tooth portion meshes with the 80 tooth clutch body gear (5080-131-1). (This will give you a combination of feed gear driver, 30 tooth driven compound, 60 tooth driver compound, 80 tooth driven.) To run the machine in the medium range, move the spacer from the idler shaft (5080-122), install the desired feed gear and replace the spacer on the idler shaft (5080-122). Now mesh the 60 tooth portion of the


WORM SHAFT
GEAR SPACER
.005 CLEARANCE MIN.
REVERSE
CLUTCH
A
WORM DRIVE
SHAFT EXTENSION
ROLL
CLUTCH
SLEEVE
A


CLUTCH
BODY
HARDENED
ROLLS
ROLLER
CLUTCH
CAGE
CLUTCH
BODY GEAR
SECTION A-A

compound gear with the feed gear chosen. (It will now be feed gear driver, 60 tooth idler, 80 tooth driven). To run the slowest range, put the spacer on the idler shaft (5080-122) then install the desired feed gear. The feed gear chosen will mesh with the 72 tooth portion of the 72 tooth/24 tooth compound drive gear. The 24 tooth portion now will be feed gear driver, 72 tooth driven compound, 24 tooth driver compound, 80 tooth driven.) Located inside the 80 tooth clutch body gear (5080-131-1) is a rollaway clutch which drives the worm shaft while in the low speed. The rollaway clutch has four, hardened rolls of exactly the same diameter that engage the clutch body (5080-131) when the machine shifts into low speed. After extensive use of the machine, indentations may be seen in the clutch body (5080-131). This could keep the machine from shifting. The indentations should be removed from the four sides of the clutch body by grinding them uniformly. They should not vary over .0005 across from flat to flat. New rolls must be replaced to compensate for the material that was qround away.

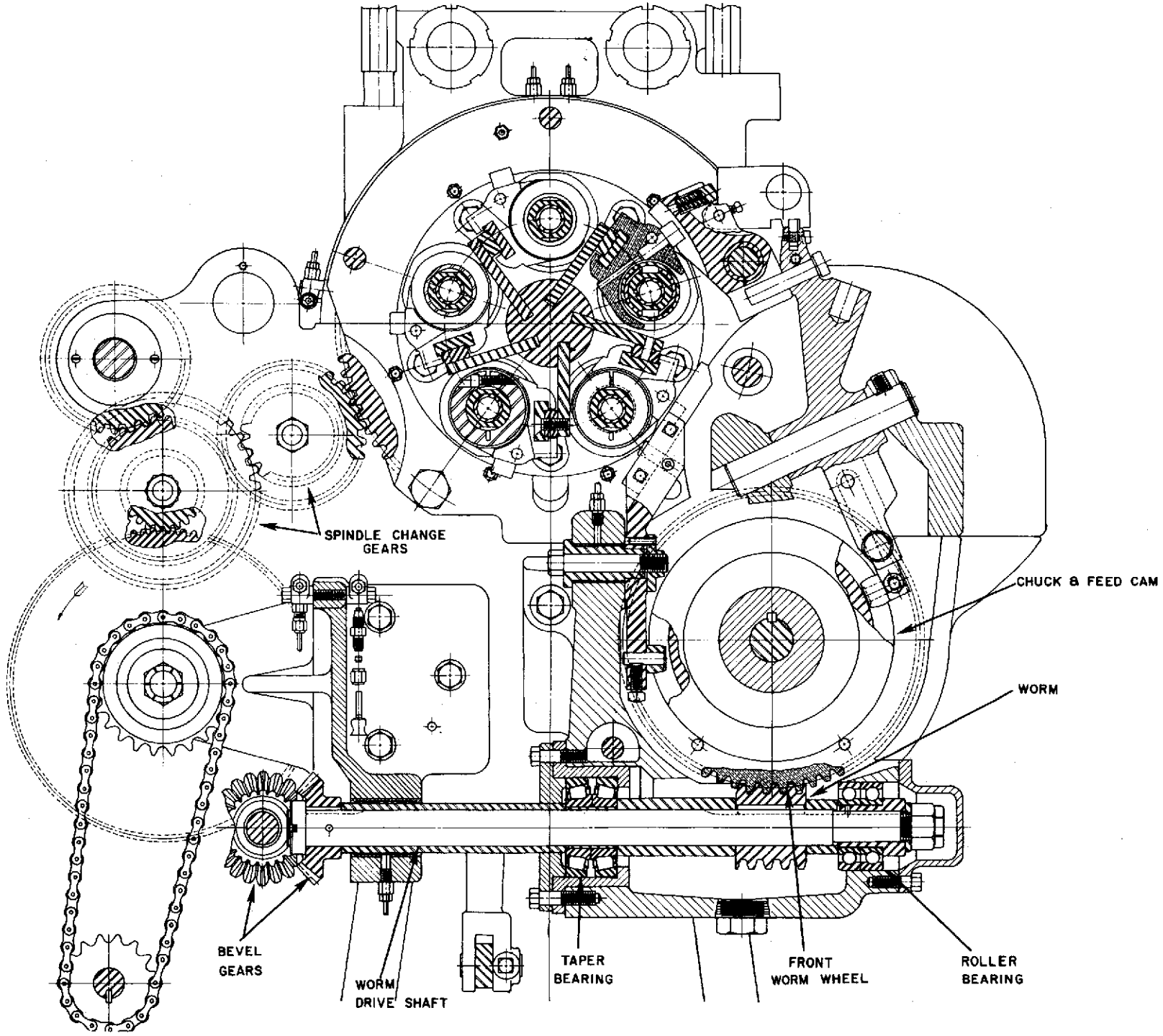
THE ROLLAWAY CLUTCH

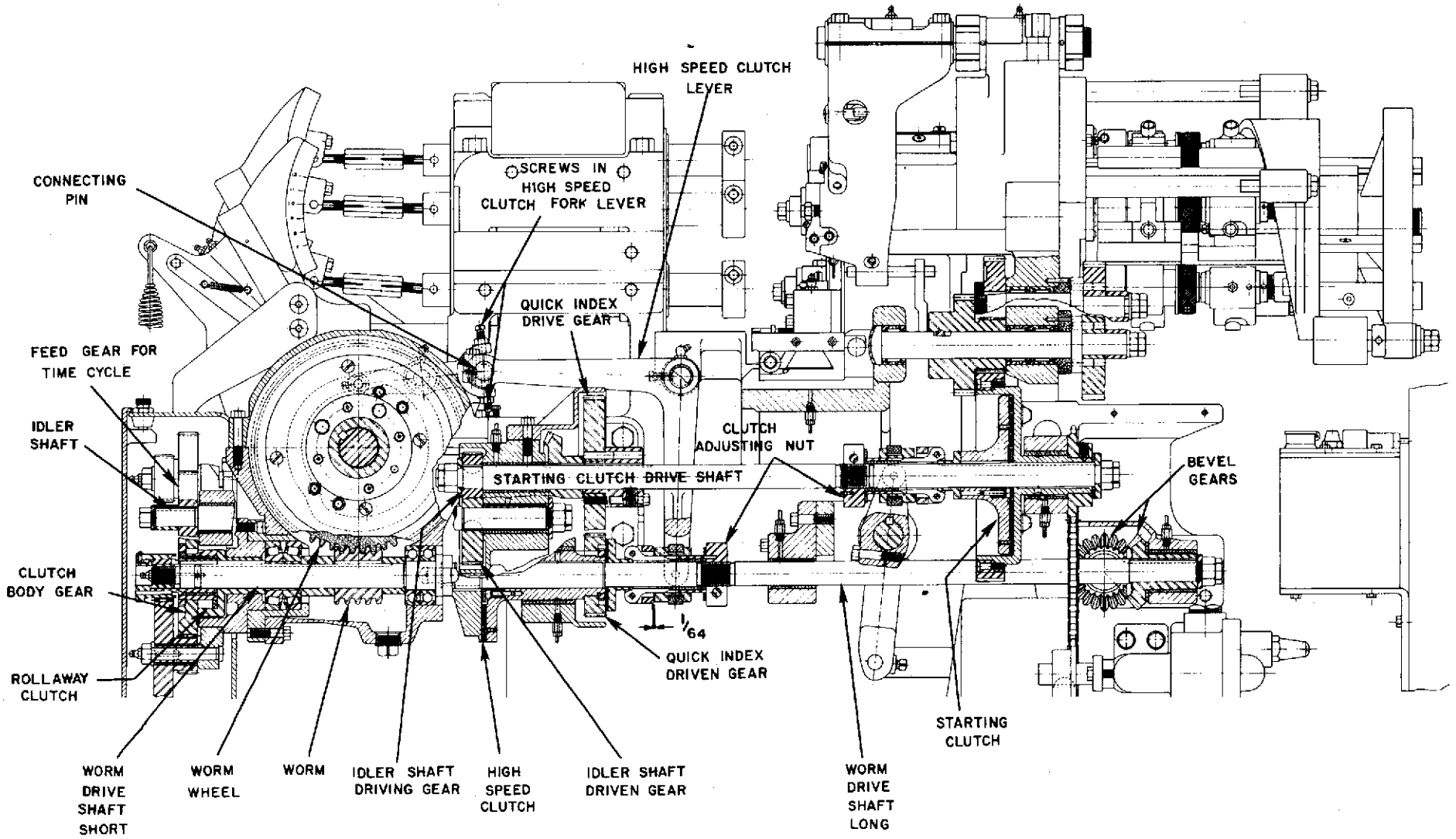
The rollaway clutch consists of several components. The clutch body (5080-131) which has four flats accurately ground to within .00025 from center. Upon these flats are placed four hardened rolls (5080-114-1) that are ground within .0002 diameter. The rolls are positioned by a roller clutch cage (5080-131-6) and are inserted into roll clutch sleeve (5080-130). When in low speed the 32 tooth idler shaft driving gear (5080-122) drives the 60 tooth idler shaft driven gear. The desired feed gear is installed on the idler shaft (5080-122). This gear train finally drives the 80 tooth clutch body gear in which the rollaway clutch is installed. Since there is no movement in the rear worm drive shaft short (5080-139-2), the thrust of the 80 tooth clutch body gear moves the rolls from a neutral position by pushing the rolls off center to a driving position, thus driving the low speed side. At 50 hundredths the high speed clutch is engaged, this means that the 80 tooth quick index drive gear (5080-50) is now driving the 40 tooth quick index driven gear (5080-51) and driving the rear worm drive shaft short (5080-139-2) at a higher R.P.M. putting the rolls in the rollaway clutch into a neutral position thus the drive from the idler shaft (5080-122) will have no effect.

If for any reason the clutch body is removed or replaced, be sure there is approximately .005 clearance between the end of the clutch body roller clutch cage and the inside face of the roller clutch sleeve.

CAM SHAFTS

Each cam shaft is driven by a large coarse pitch worm wheel, which is larger in diameter than the cams. Worm shafts are mounted on ball and taper roller bearings running in a bath of oil, the taper roller bearings takes the thrust of the worm shaft. The cam shaft located on the front of the machine actuates the feeding of stock, opening and closing of the chuck, indexing and locking the spindle carrier, and all the side working positions. The tool spindle cam shaft located


SPINDLE CHANGE GEARS
CHUCK & FEED CAM
WORM
BEVEL GEARS
WORM DRIVE SHAFT
TAPER BEARING
FRONT WORM WHEEL
ROLLER BEARING


HIGH SPEED CLUTCH LEVER
CONNECTING PIN
SCREWS IN HIGH SPEED CLUTCH FORK LEVER
QUICK INDEX DRIVE GEAR
FEED GEAR FOR TIME CYCLE
IDLER SHAFT
CLUTCH ADJUSTING NUT
STARTING CLUTCH DRIVE SHAFT
BEVEL GEARS
CLUTCH BODY GEAR
1/64
QUICK INDEX DRIVEN GEAR
ROLLAWAY CLUTCH
STARTING CLUTCH
WORM DRIVE SHAFT SHORT
WORM WHEEL
WORM
IDLER SHAFT DRIVING GEAR
HIGH SPEED CLUTCH
IDLER SHAFT DRIVEN GEAR
WORM DRIVE SHAFT LONG

at the right hand end of the machine operates the five tool spindles, threading clutches, high speed clutch, fourth position cross slide.

To put the machine in direct low, slide the connecting pin (5080-117) from between the screws on the high speed clutch fork lever (5080-77). Push high speed clutch lever large (5080-76) down so machine is in low speed.

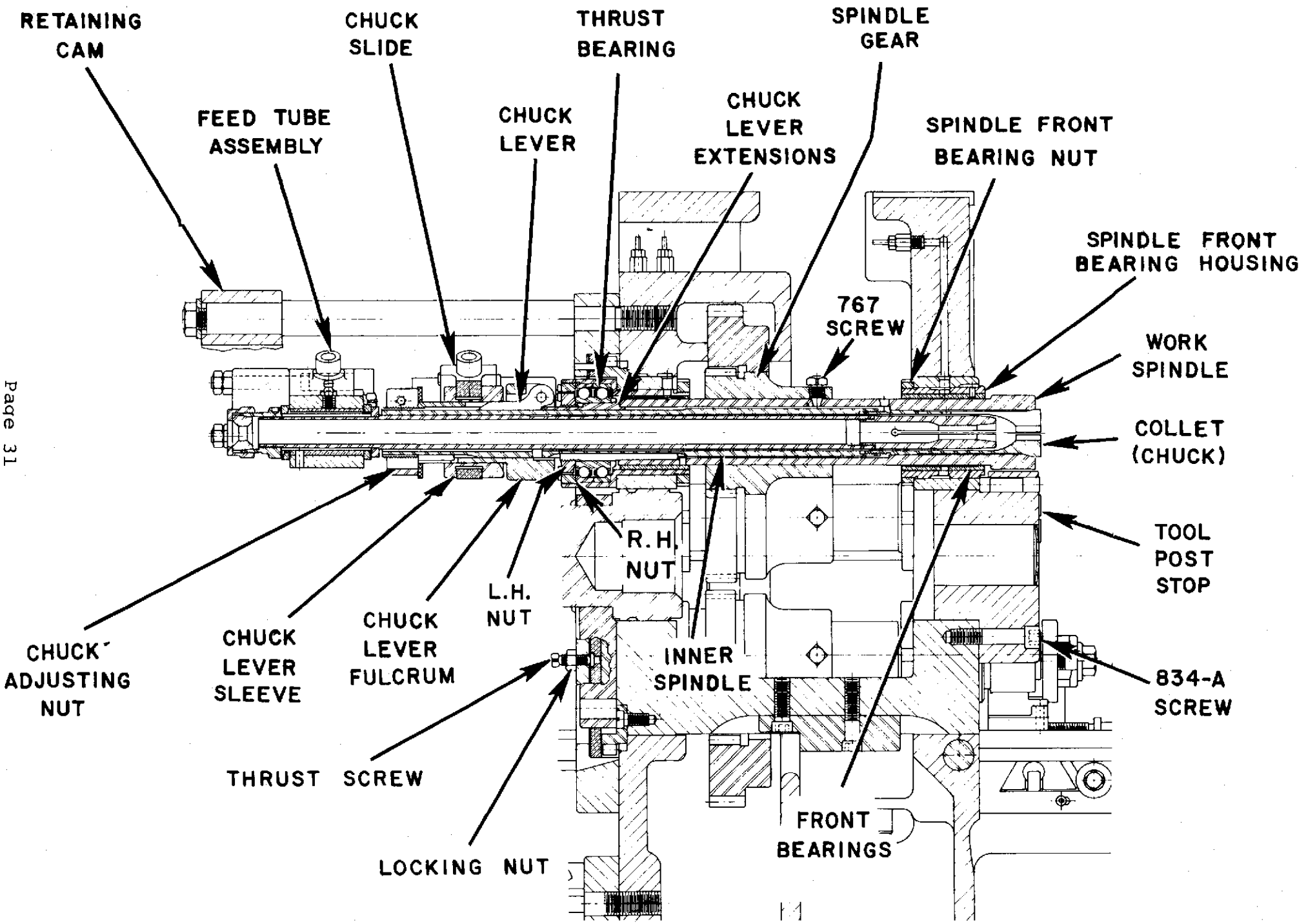
Now open the cover on the gear box and push the reverse clutch (5080-396) in until the tangs engage the slots in the clutch body (5080-131). This will allow you to move the tool spindle cam shaft backward and forward with your handwheel.

If it is ever necessary to retime the cam shafts and timing cams are not avaliable, the following procedure should be followed: Use a standard form and cutoff cam on the front cam shaft, and a standard turn and drill cam in the fourth position. Stop the front cam shaft when the roll on the cam lever is on the high point (50 hundredths), just before dropping off the standard form and cutoff cam to determine if the machine is out of time. Check the roll on the fourth position cam, this should also be on 50 hundredths. If the machine is out of time remove the nut on the end of the worm shaft long (5080-139-1), and loosen the screws holding the casting, driving clutch arm (5080-60-1), which forms the outer bearing. Moving this casting to the right allows the bevel gears to be disengaged.

You can now manually turn your handwheel to move the tool spindle cam shaft backward or forward until the roll in the cam lever is on the 50 hundredth mark; matching the same position (hundredth) as the roll on the form cam. Now the machine is back in time; mesh the bevel gears. NOTE - Handwheel can be turned to insure the bevel gear teeth to mesh properly. Fasten the outer bearings in the original position and replace the nut at the end of the worm shaft. Withdraw the tangs on the reverse clutch (5080-396) from the slots in the clutch body (5080-131). Push high speed clutch lever large (5080-76) up and slide connecting pin (5080-117) in between the screws on the high speed clutch fork lever (5080-77). Now the machine is ready for production. CAUTION - Never leave reversing mechanism engaged when running the machine with the high speed clutch, as this may cause serious damage to the clutches and drive shafts.

While the roll is on 50 hundredths in the tool spindle position, check the high speed clutch. The machine shifts into high at 50 hundredths. The chuck lever sleeve (637-1) should be within 1/64" of the shoulder of the chuck lever fulcrum (635-NK). If it is not within 1/64", adjust the screws in the high speed clutch fork lever (5080-77) to move the high speed clutch lever large (5080-76) which will move chuck lever sleeve (637-1) to within 1/64" of the shoulder of the chuck lever fulcrum (635-NK).

Timing cams can be purchased, the form and cutoff timing cam, part number 3322, which has a 3/8" radius at "0". The turning and drilling and the high speed clutch timing cam is part number 3321. This cam has a 3/8" radius at "0" and "50". The same procedure should be followed as before, except the timing of the cam shafts


RETAINING CAM
CHUCK SLIDE
THRUST BEARING
SPINDLE GEAR
FEED TUBE ASSEMBLY
CHUCK LEVER
CHUCK LEVER EXTENSIONS
SPINDLE FRONT BEARING NUT
SPINDLE FRONT BEARING HOUSING
767 SCREW
WORK SPINDLE
COLLET (CHUCK)
TOOL POST STOP
R.H. NUT
L.H. NUT
CHUCK ADJUSTING NUT
CHUCK LEVER SLEEVE
CHUCK LEVER FULCRUM
INNER SPINDLE
834-A SCREW
THRUST SCREW
FRONT BEARINGS
LOCKING NUT

will be at "0". For every hundredth the two cam shafts are out of time equals 2.4 teeth on the bevel timing gears. This is calculated as follows: 75 cycle means that the cam shaft rotates 75 times in one minute in high speed and the rear worm drive shaft runs ten times as fast, 750 R.P.M. (The worm wheel to the worm being 1:10 ratio), therefore, if the worm wheel makes one revolution , the rear worm drive shaft makes 10. On the rear worm drive shaft is a 24 tooth bevel gear, this times 10 equals 240 teeth. Now divide this by 100, representing the hundredths on the cam and this will equal 2.4 teeth. Therefore, for every hundredth the cams are out of phase, the gear will be moved approximately 2.4 teeth. For 60 cycle, divide 60.8 (actual) into 608 R.P.M., also for 45 cycle divide 46.6 (actual) into 466 R.P.M. The following is an example that will help clarify this.

$$\frac{\text{10 R.P.M. of Worm}}{\text{1 R.P.M. Worm Wheel}} \times \frac{\text{24 Tooth Bevel Gear}}{\text{1}} = \text{240 Teeth in One Revolution of Worm Wheel}$$

One revolution of worm wheel equals 100 hundredths of the cam, so then

$$\frac{\text{240 teeth}}{\text{100 hundredths}} = \text{2.4 Teeth Per Hundredth}$$

$$\frac{\text{750 R.P.M. Rear Worm Drive Shaft}}{\text{1}} \times \frac{\text{1 R.P.M. of Worm Wheel on Cam Shaft}}{\text{10 R.P.M. of Worm}} = \text{75 R.P.M. of Cam Shaft}$$

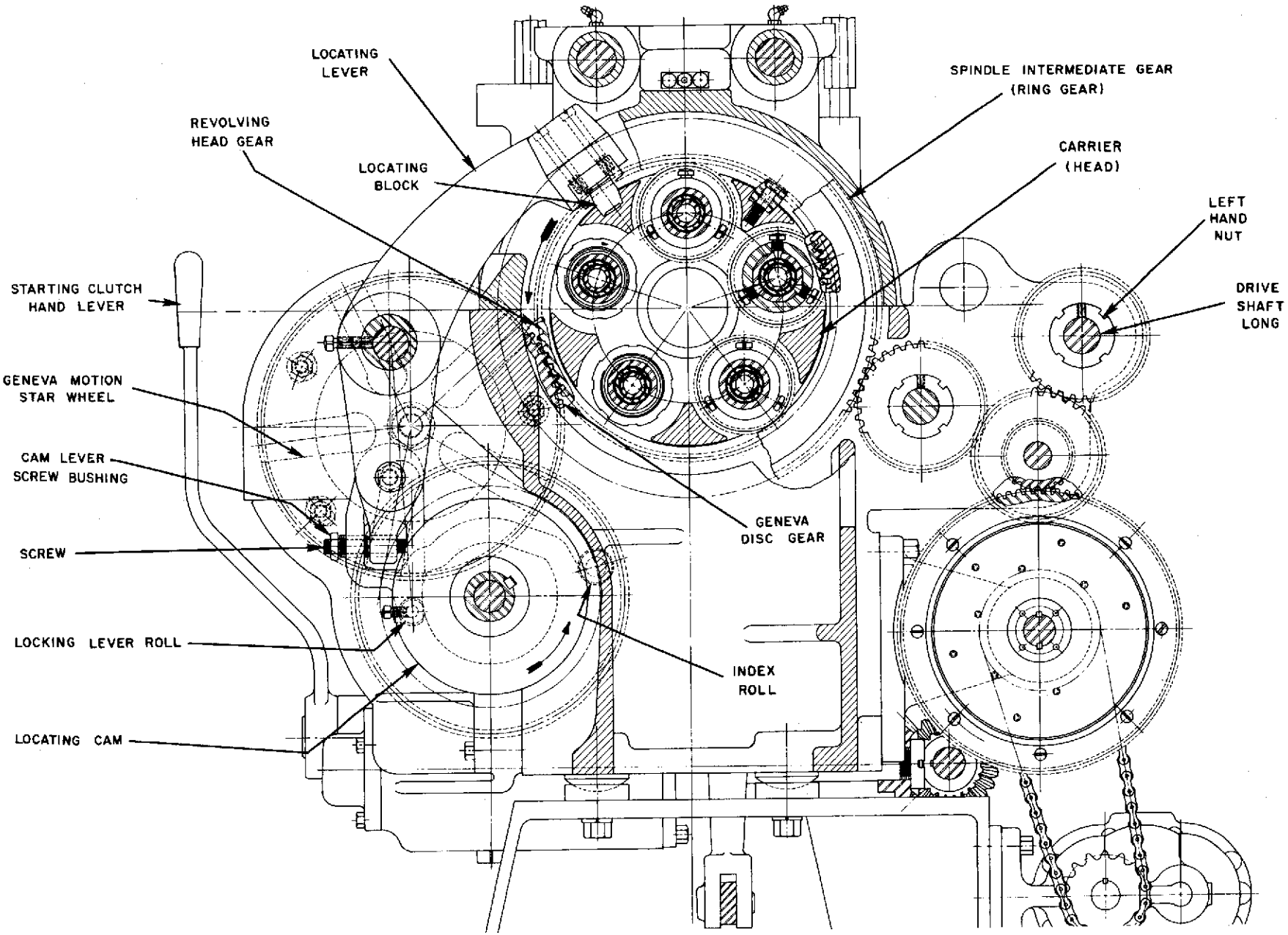
$$\frac{\text{75 R.P.M. of Cam Shaft}}{\text{75 Cycles Per Minute}} = \text{1 Revolution of Worm Wheel}$$

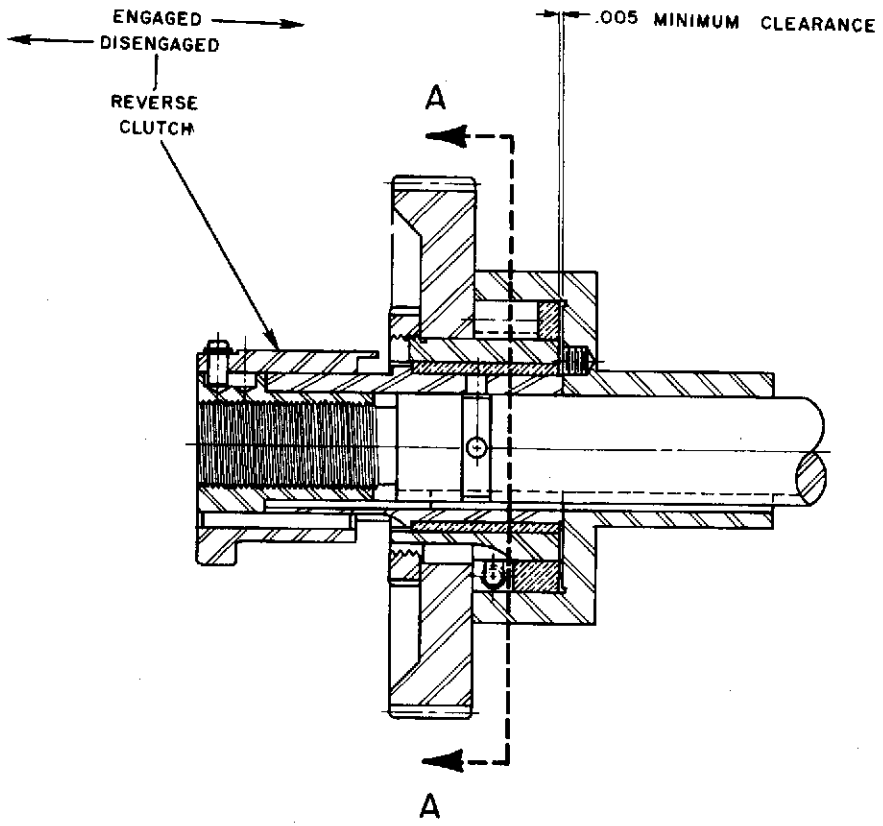
WORK SPINDLE CARRIER

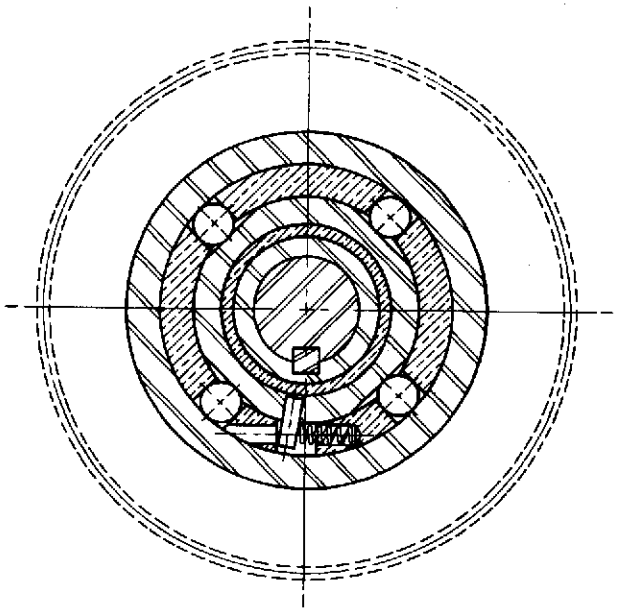
Work spindles are hardened, ground, and super finished. The work spindle front bearings are of high grade phosphorous bronze, precision machined, making fitting or taking up unnecessary. These bearings are interchangeable, easily and inexpensively replaced, insuring alignment of all spindles. The worn spindles can be reworked and new bearings fitted at a nominal charge.

The end thrust of the work spindle is taken by a double row ball bearing mounted on the inner spindle and held in a housing at the rear of the work spindle carrier. NOTE - The nut on the inner spindle that holds the bearing in is left hand, but the ball retainer nut (5080-390) in the bearing reatiner (5080-389) is right hand.

The chuck, or collet, is screwed into the inner spindle and the outer spindle is moved endwise approximately 1/32" to open and close the chuck. A chuck adjusting nut is on the outer end of the inner spindle.


LOCATING LEVER
REVOLVING HEAD GEAR
LOCATING BLOCK
SPINDLE INTERMEDIATE GEAR (RING GEAR)
CARRIER (HEAD)
LEFT HAND NUT
DRIVE SHAFT LONG
STARTING CLUTCH HAND LEVER
GENEVA MOTION STAR WHEEL
CAM LEVER SCREW BUSHING
SCREW
GENEVA DISC GEAR
LOCKING LEVER ROLL
INDEX ROLL
LOCATING CAM


ENGAGED
DISENGAGED
REVERSE
CLUTCH
.005 MINIMUM CLEARANCE
A
A



SECTION A-A

When the chuck lever sleeve (637-1) is moved to the right, it forces the chuck levers (2219-A) down. These levers push extensions (5080-2217) forward which moves the outer spindle over the chuck, closing the chuck on the stock. When installing new extensions, they must be exactly the same length. The chuck levers, when fitted in the fulcrum, must be fitted with the taper pin to depth; there must be no play or shake in the lever.

After levers are fitted in fulcrum; place the fulcrum on a smooth surface plate so the heels of the chuck levers can be indicated. Both heels must indicate the same. If levers and extensions are not fitted right, a wobble will be seen in the spindle. As much as 50% of chucking torque can be lost if not fitted properly. NOTE - A plug the same diameter as the chuck lever portion of the inner spindle should be inserted to keep the levers parallel so the heels can be measured.

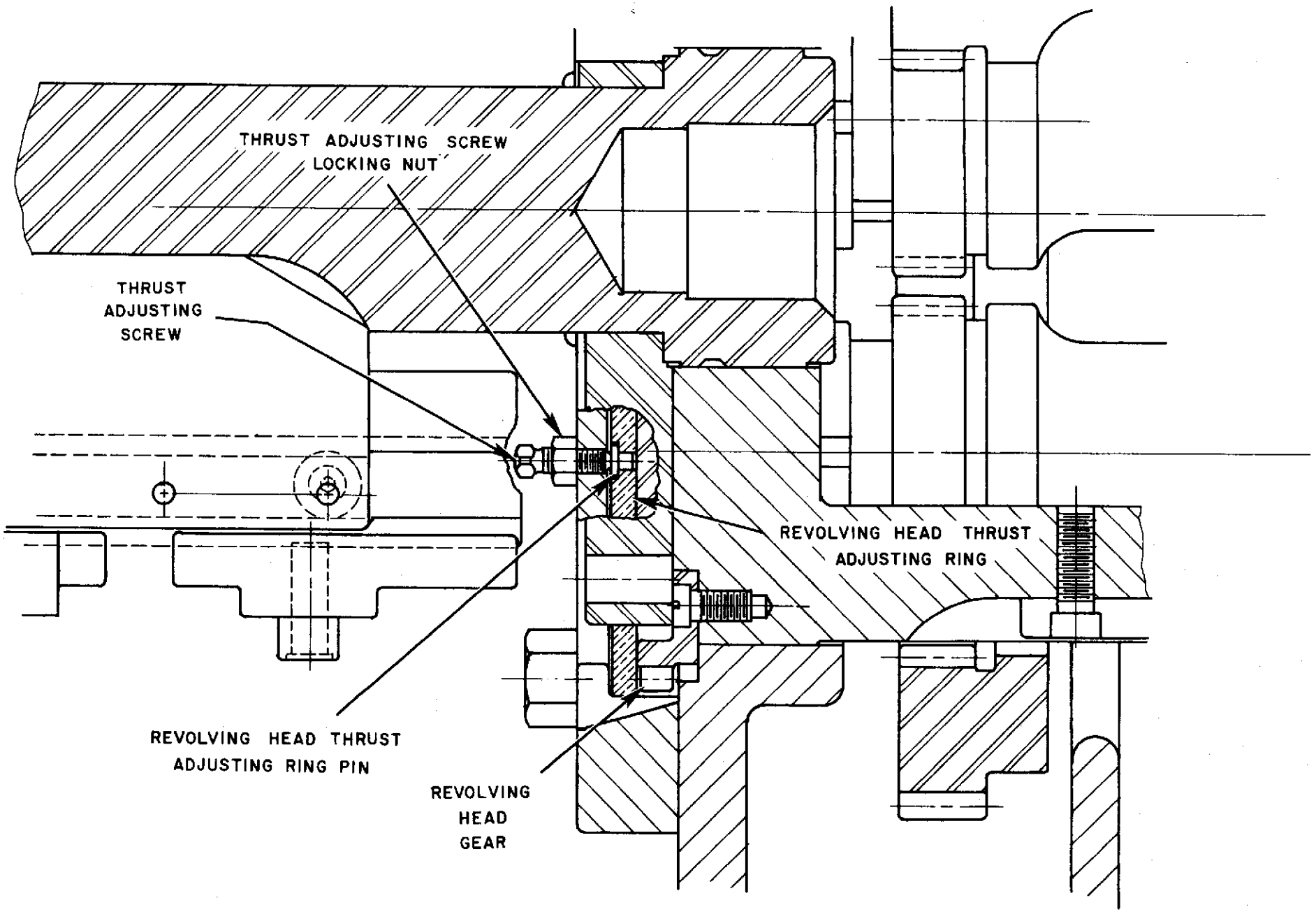
The spindle gears are driven by an internal ring gear. The ring gear has a surface ground to it's pitch diameter. The hubs of the spindle gears are also ground to their pitch diameter and runs on this surface; thus, making a perfect roller bearing.

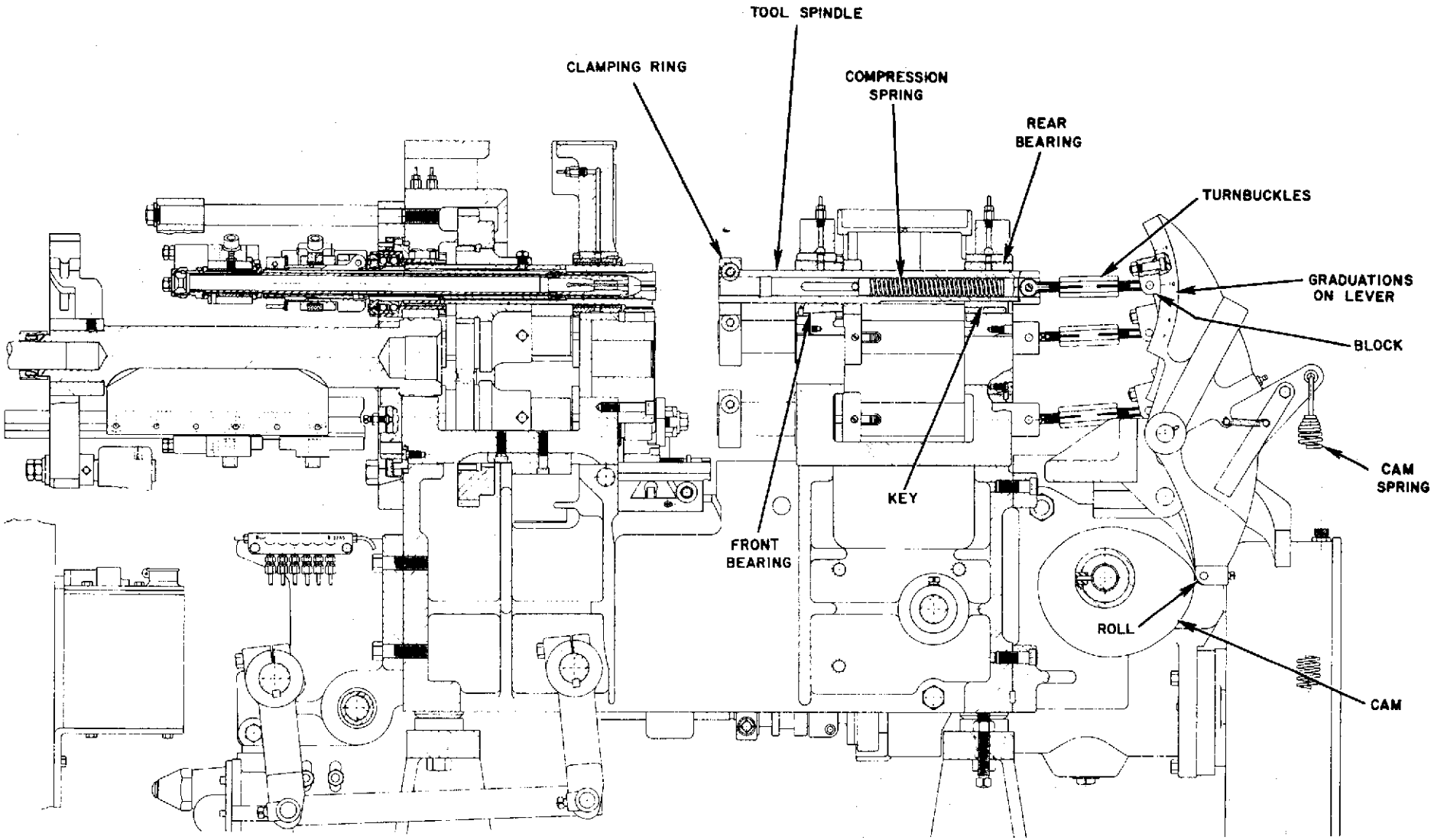
Five blocks, accurately spaced, locate the spindle carrier, the locating side of the five blocks is parallel with the radial line passing through the center of the head. The other side is tapered and the locating lever is positively locked on the locating blocks. Caution must be taken that once the pieces are severed from the bar, they are caught in the delivery chute. Any loose pieces not caught in the chute of the machine can cause a jam. Two parts in particular can be damaged: the front cam shaft can be twisted or a rib in the revolving head can be cracked. (To check for a cracked rib take a .002 feeler gauge and see if it can be inserted between the locating block and the rib; if the feeler gauge can be pushed into a depth of approximately 1/4" it is very possible the rib is cracked. To further check, use either a form tool on a slide or a knee tool in a tool spindle.

If there is a noticeable difference from one spindle, it is well to assume that the rib governing that spindle is cracked. A twisted cam shaft will be noticed by the fact that the locating lever will hit the top of the locating block. CAUTION - Do not run the machine. Cycle the machine by hand. (Running the machine under power may crack the ribs). If the locating lever hits the top of the block, back the machine up and remove the twisted cam shaft immediately.

TO BACK UP THE MACHINE MANUALLY

If for any reason it is necessary to back the machine up, slide the connecting pin (5080-117) from between the screws on the high speed clutch fork lever (5080-77). Push high speed clutch large lever (5080-76) down so machine is in low speed. Next open gear box cover and insert tangs on reverse clutch (5080-396) into slots in clutch body (5080-131). Now turn the hand wheel counterclockwise and the machine will back up. Reverse the procedure to put the machine back in running order. CAUTION - Never leave reversing mechanism engaged when running the machine with the high speed clutch, as this may cause serious damage to the clutches and drive shafts.


THRUST ADJUSTING SCREW LOCKING NUT
THRUST ADJUSTING SCREW
REVOLVING HEAD THRUST ADJUSTING RING
REVOLVING HEAD THRUST ADJUSTING RING PIN
REVOLVING HEAD GEAR


TOOL SPINDLE
CLAMPING RING
COMPRESSION SPRING
REAR BEARING
TURNBUCKLES
GRADUATIONS ON LEVER
BLOCK
CAM SPRING
KEY
FRONT BEARING
ROLL
CAM

The work spindle carrier should be checked occasionally for end play. End play causes the carrier to wear out of square, which makes it extremely difficult to hold length tolerances.

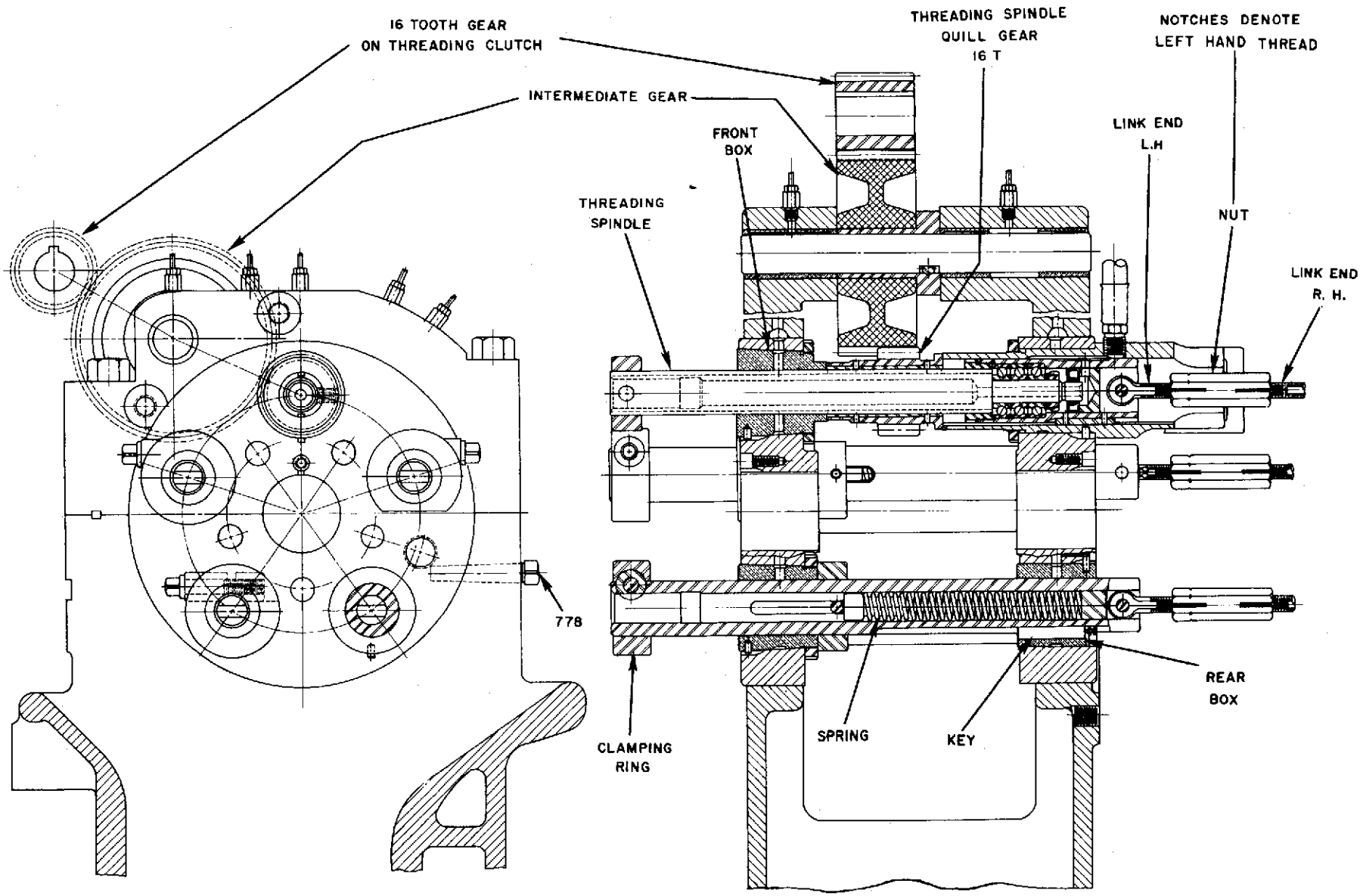
The end play of the spindle carrier is taken up by five thrust screws in the cast iron ring at the rear of the spindle carrier. The spindle carrier is put into half index and the lock nuts backed off; the square head screws are then turned in until there is a slight drag on the head; there should be no end play but should be freely rotatable. Then secure the locking nuts.

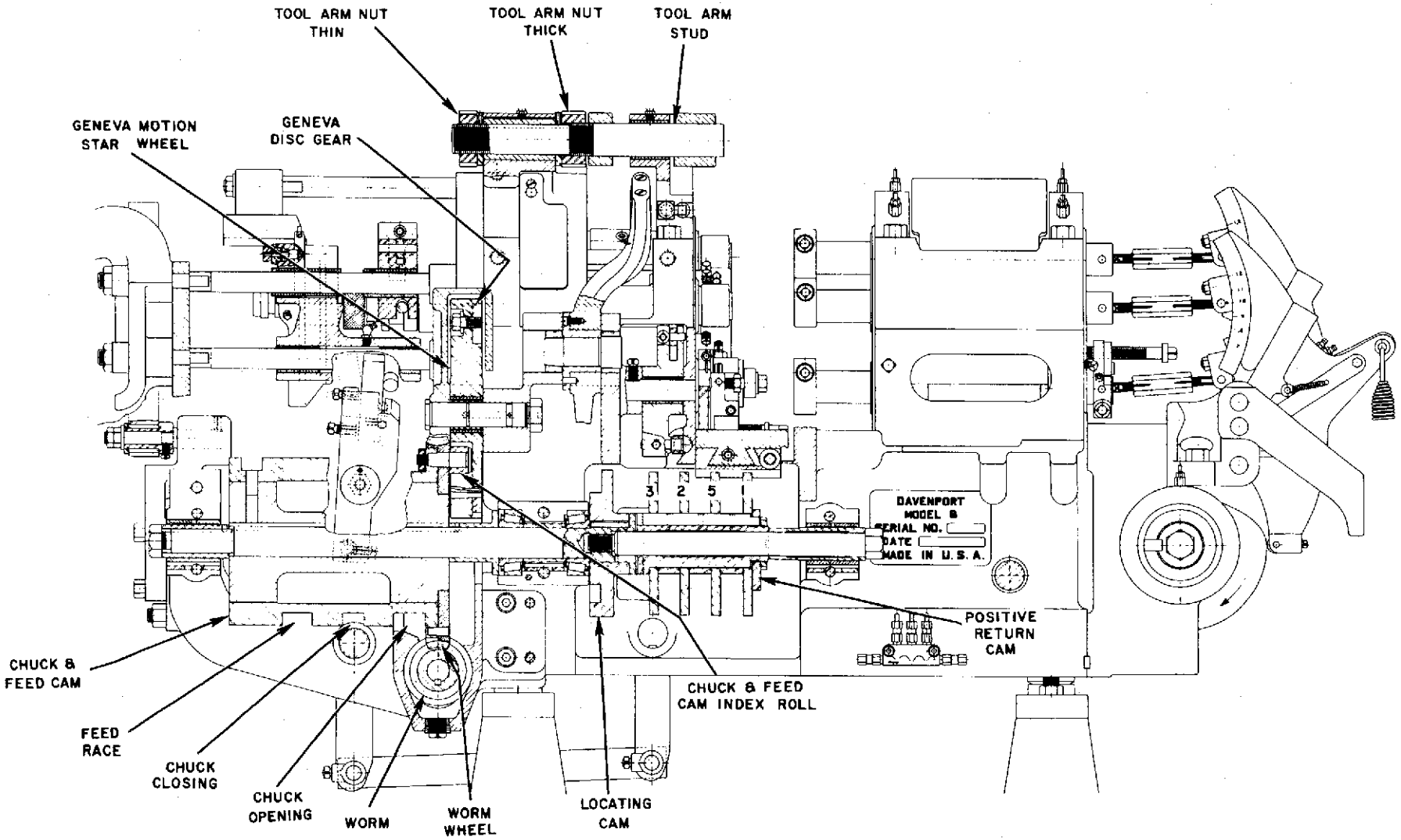
STATIONARY HEAD

The stationary head has hardened and ground tool spindles. The front and rear bearing are of a high grade phosphorous bronze. There is a key in the rear bearing which prevents the spindles from turning. There is a compression spring in the spindle which assists the cam lever spring to follow the end working cam, when the cam drops off. The tool holders are held securely in the tool spindle by a clamping ring. The hole in all standard spindles is 3/4". Various spindles and front bearings can be purchased for special application. The stationary head is pinned in the bed by a taper pin (778). The spindles are connected to the cam levers by means of turnbuckles. The turnbuckle is made up of two link ends, one link end with a right hand thread the other with a left hand thread. A tension nut connects both link ends. There are notches around the nut denoting the left hand thread end. The links connect to the cam levers which in turn are activated by the cams. These levers have 3/4" diameter rolls. The upper part of the cam lever has a "T" slot milled on an arc. The arc being graduated from .7 to 1.2. When this block on the cam lever is set at 1, the tool travels the same distance as the rise on the cam; set at .7, the tool will travel 70% of the rise. If set at 1.2, the tool will travel 120% of the rise of the cam. For example, if a cam with a rise of .500 inch is used and the block on the cam is set at .7, the tool will travel .350; if set at 1.2, the tool will travel .600. To determine position of the block on the cam lever, divide the distance the tool must travel by the amount of rise on the cam which will be used - .350 divided by .500 equals .7; .600 divided by .500 equals 1.2. A special lever for the fourth position can be purchased which gives a ratio of 2.5:1. It has a 5/8 diameter roll. In the third position we also have a special 2:1 cam lever which also has a 5/8 diameter roll. These particular cam levers are ideal when doing any deep drilling with several pull outs. These cam levers are in direct ratio with the cam. With the 2:1 cam lever you would need half the amount of rise on the cam as well as half the amount of drop. On the 2.5:1 you would have .4 the rise and .4 the drop on the cam. The fact that we have less of a drop for pullout gives us more surface on the circumference of the cam to give us more revolutions of working time.

CROSS SLIDES

There are two cross slides and two swing arms for forming or similiar work on the machine. Fourth position slide may be purchased if desired. Both slides and arms are operated from the front cam shaft. Each position is independently cammed and is operated by the

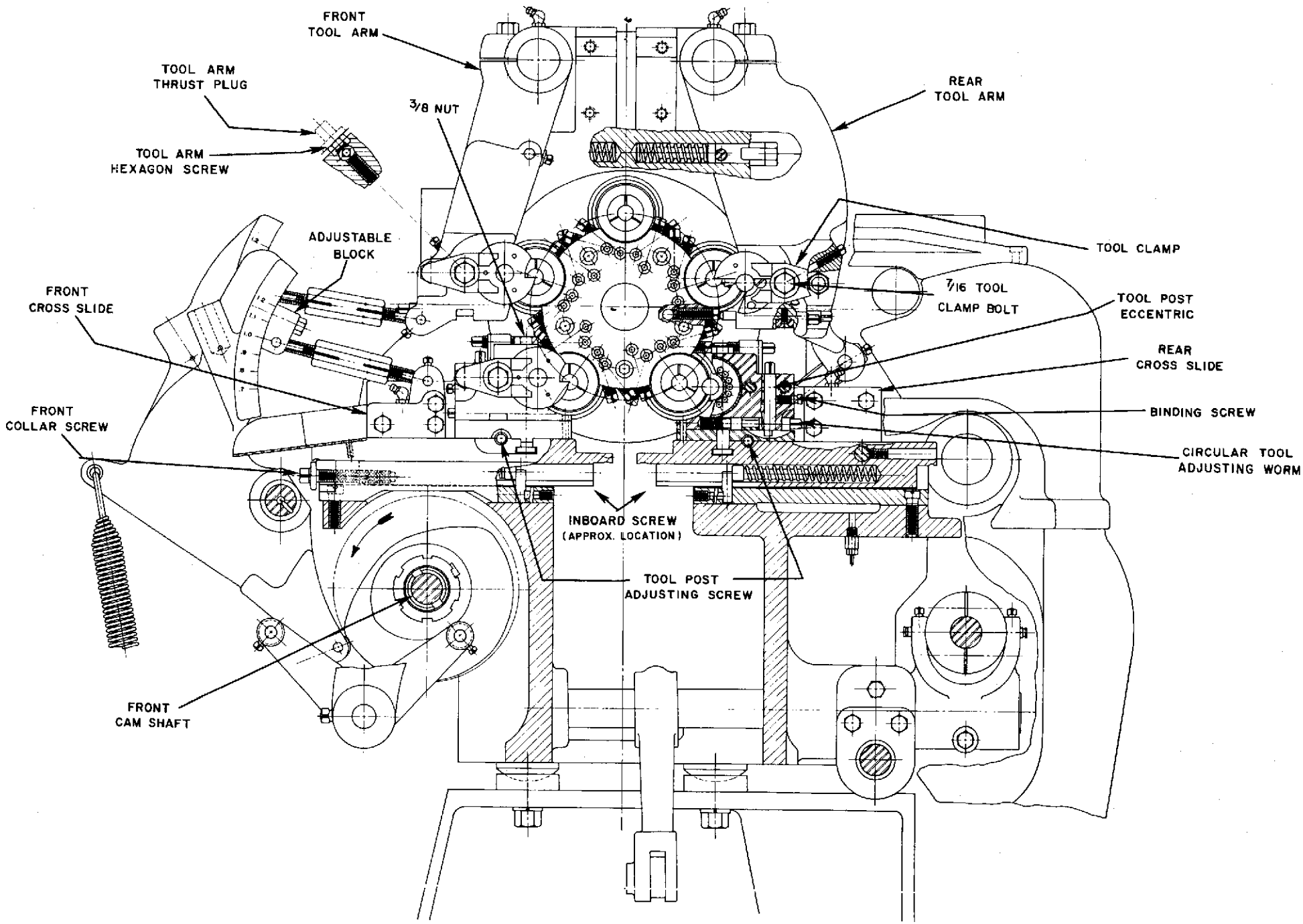

16 TOOTH GEAR
ON THREADING CLUTCH
INTERMEDIATE GEAR
THREADING SPINDLE
QUILL GEAR
16 T
NOTCHES DENOTE
LEFT HAND THREAD
FRONT
BOX
LINK END
L.H
THREADING
SPINDLE
NUT
LINK END
R. H.
778
REAR
BOX
CLAMPING
RING
SPRING
KEY

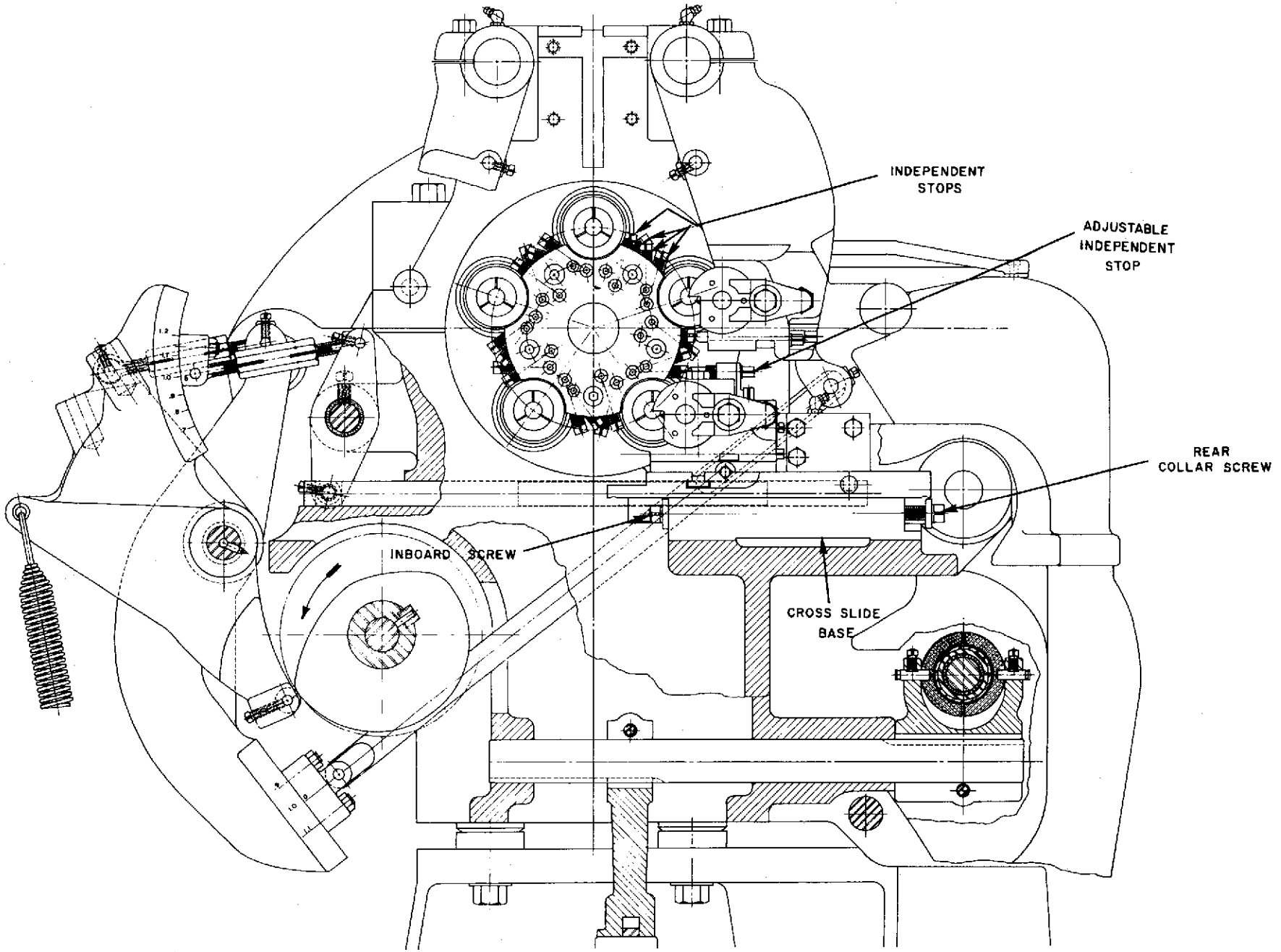

TOOL ARM NUT THIN
TOOL ARM NUT THICK
TOOL ARM STUD
GENEVA MOTION STAR WHEEL
GENEVA DISC GEAR
3 2 5 1
DAVENPORT
MODEL 8
SERIAL NO.
DATE
MADE IN U.S.A.
POSITIVE RETURN CAM
CHUCK & FEED CAM
CHUCK & FEED CAM INDEX ROLL
FEED RACE
CHUCK CLOSING
CHUCK OPENING
WORM
WORM WHEEL
LOCATING CAM

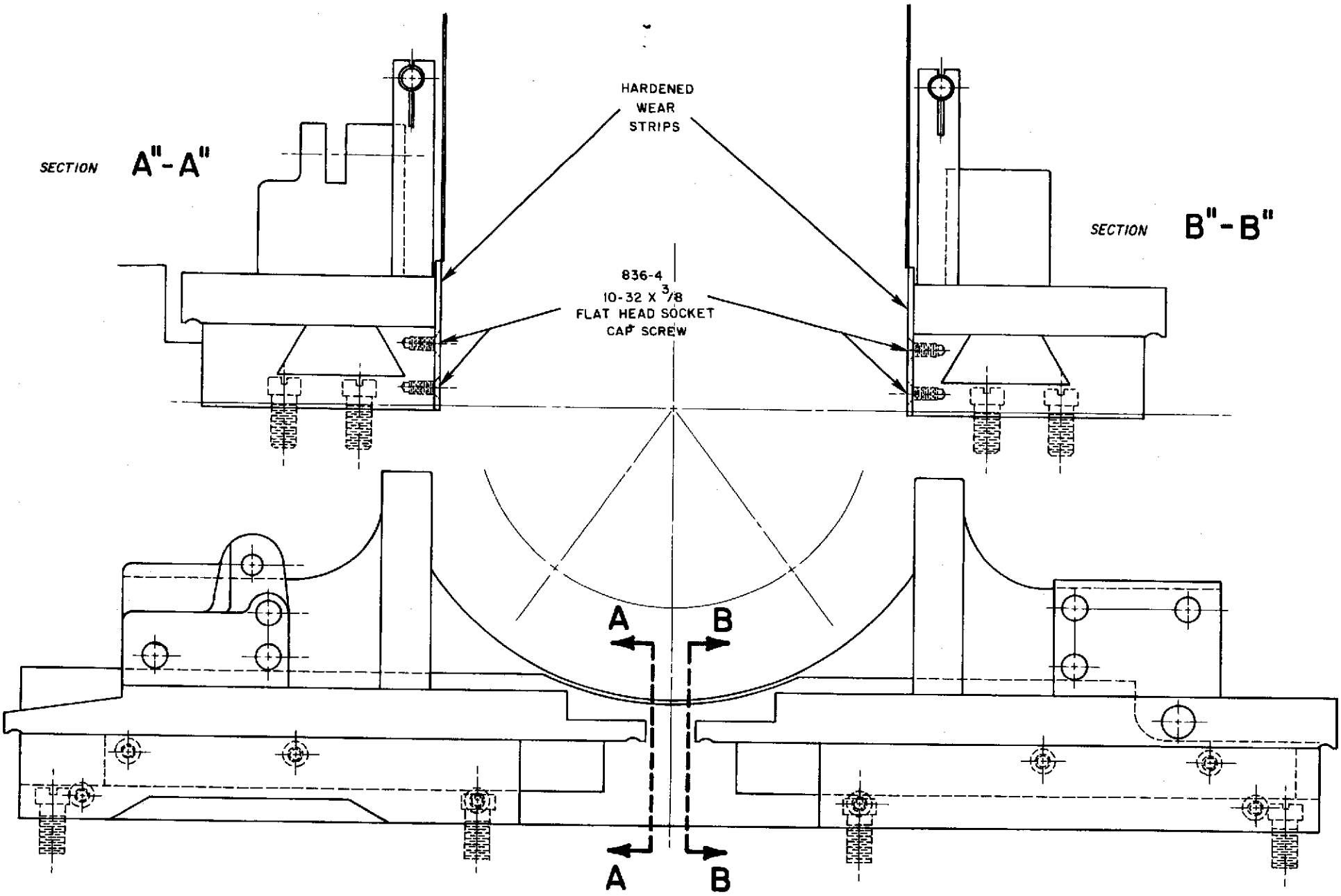
rotation of the front cam shaft and the rise on the cam. Motion is transferred through the cam lever to the adjustable block and turnbuckle. The adjustable block is retained by a "T" bolt and is adjusted from .8 to 1.2 of the cam rise. This applies to all but the third position cam lever which has an adjustment of .9 to 1.1. To adjust the tool post longitudinally loosen the 3/8 nut on top of the tool post. The tool post adjusting screw (714) has a 16 pitch thread, therefore, by turning the screw one complete turn you have moved the tool post 1/16 of an inch. Hence, every quarter of a turn will be 1/64 of an inch. To remove the taper from the cutting tool turn the tool post eccentric (715). You must first loosen the 837 square head screw that binds the tool post eccentric. When all your adjustments are done, again tighten down the 3/8 hexagon nut on top of the tool post.

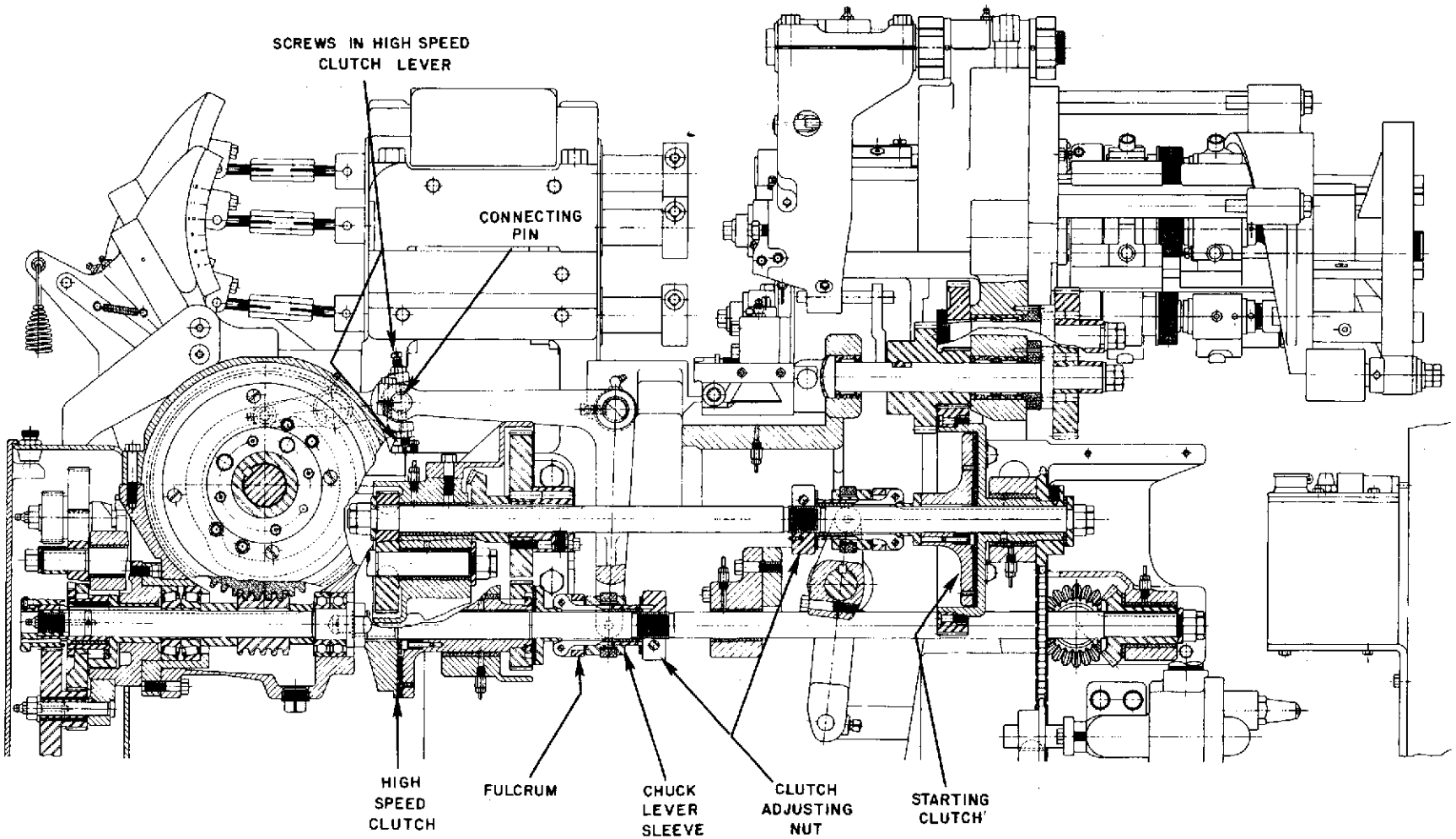
To adjust the circular tools loosen the 7/16 bolt slightly to take its pressure from the circular tool clamp (719) from the tool. The tool is now free to move, by turning the circular tool adjusting worm (713-2) rear tool arm, (713-1) front tool arm, (713-3) front and rear tool posts. Now bring the tool against the setting gauge. Always turn the screw in the direction that will be putting thrust against the cutting tool, to eliminate any backlash. To adjust the swing arms out or away from the work spindles loosen tool arm nut thin (687-2). On tool arm stud (627) there are two 16 pitch threads, therefore, every 1/16 of an inch movement there will be one complete revolution of the nut. Now to move the tool out 1/16 of an inch we would loosen nut (687-2) one complete revolution then turn nut (687-1) one complete revolution snugging against the cap. Now loosen the square head screw that binds the front and rear tool arm hexagon screw (459-HS). Unscrew this so that you will be putting a slight drag on the tool arm thrust plug (5080-13-P). To move the swing arms in, just reverse this procedure. The fourth position cross slide attachment may be purchased as extra equipment. This is used whenever an extra forming or other cross slide operation is required. The tool seat on this attachment is approximately 1/16 from collet face when figuring a job the other tools must be figured from this position. A special fourth postiion adjustable cross slide attachment can also be purchased. The slide is mounted in the fourth position the same as above except that the tool holder portion is adjustable for ease in lining up the tooling. This attachment is recommended for light cutting only. Independent adjustable compensating stops are mounted in the tool post stop (2186). These are used to tension slides and the swing arm in the 1st, 2nd, 3rd, and 4th positions. NOTE - The slides and swing arm are adjusted by means of a turnbuckle. The turnbuckle consists of two cam lever links (794-R, right hand and 794-L, left hand) and a cam lever link nut (680). The cam lever links have a 24 pitch thread, therefore, one revolution of the nut would be .083 or one flat would be approximately .014.

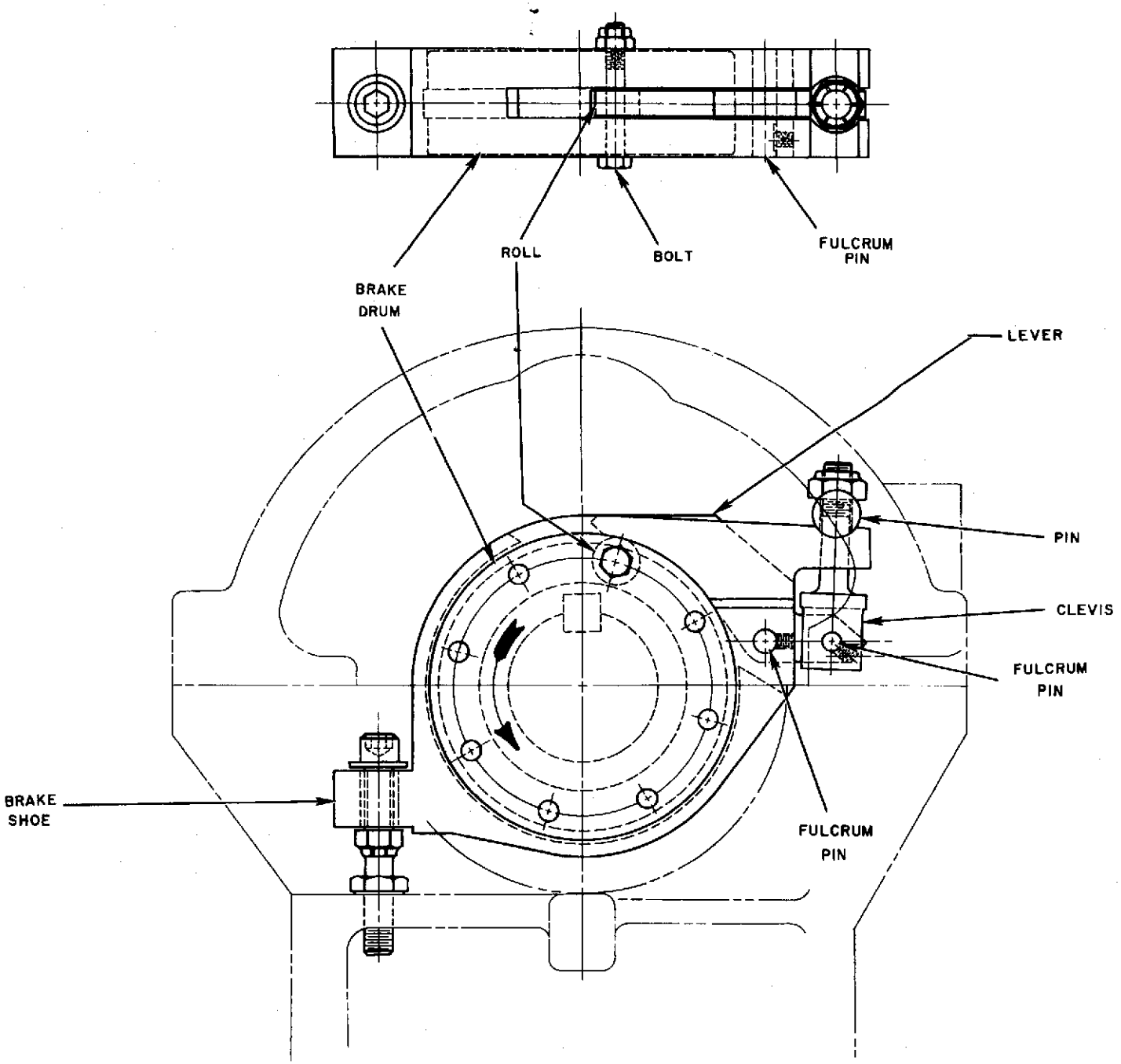
Gibs on the front and rear cross slides should be adjusted at least once a week when new, to remove looseness in the slides, as loose slides tend to vibrate and cause undue wear, reducing the life of the slides as much as 1/10 of their normal life. A loose slide also affects the finish and accuracy of the work. Cross slides should also be removed and throughly cleaned about once a month. The cross slides have replaceable bases securely attached to the bed, the cross slide ways are never uncovered.


FRONT
TOOL ARM
TOOL ARM
THRUST PLUG
TOOL ARM
HEXAGON SCREW
3/8 NUT
REAR
TOOL ARM
ADJUSTABLE
BLOCK
TOOL CLAMP
7/16 TOOL
CLAMP BOLT
TOOL POST
ECCENTRIC
FRONT
CROSS SLIDE
REAR
CROSS SLIDE
FRONT
COLLAR SCREW
BINDING SCREW
CIRCULAR TOOL
ADJUSTING WORM
INBOARD SCREW
(APPROX. LOCATION)
TOOL POST
ADJUSTING SCREW
FRONT
CAM SHAFT


INDEPENDENT
STOPS
ADJUSTABLE
INDEPENDENT
STOP
REAR
COLLAR SCREW
INBOARD SCREW
CROSS SLIDE
BASE


SECTION A"-A"
HARDENED
WEAR
STRIPS
SECTION B"-B"
836-4
10-32 X 3/8
FLAT HEAD SOCKET
CAP SCREW
A
B
A
B


SCREWS IN HIGH SPEED CLUTCH LEVER
CONNECTING PIN
HIGH SPEED CLUTCH
FULCRUM
CHUCK LEVER SLEEVE
CLUTCH ADJUSTING NUT
STARTING CLUTCH'


ROLL
BOLT
FULCRUM PIN
BRAKE DRUM
LEVER
PIN
CLEVIS
FULCRUM PIN
BRAKE SHOE
FULCRUM PIN

We now stock hardened wear strips that can be installed should the slides and machine bed become gauled from misadjustment. The front cross slide is adjusted by loosening the inboard screw on the front cross slide base. Advance the gib to adjust for wear with the screw in the front of base, now bring the inboard screw against the end of the gib and the rotation of this collar screw will bring the gib down against the bottom of the base. NOTE - Always adjust inboard screw last on the first position slide.

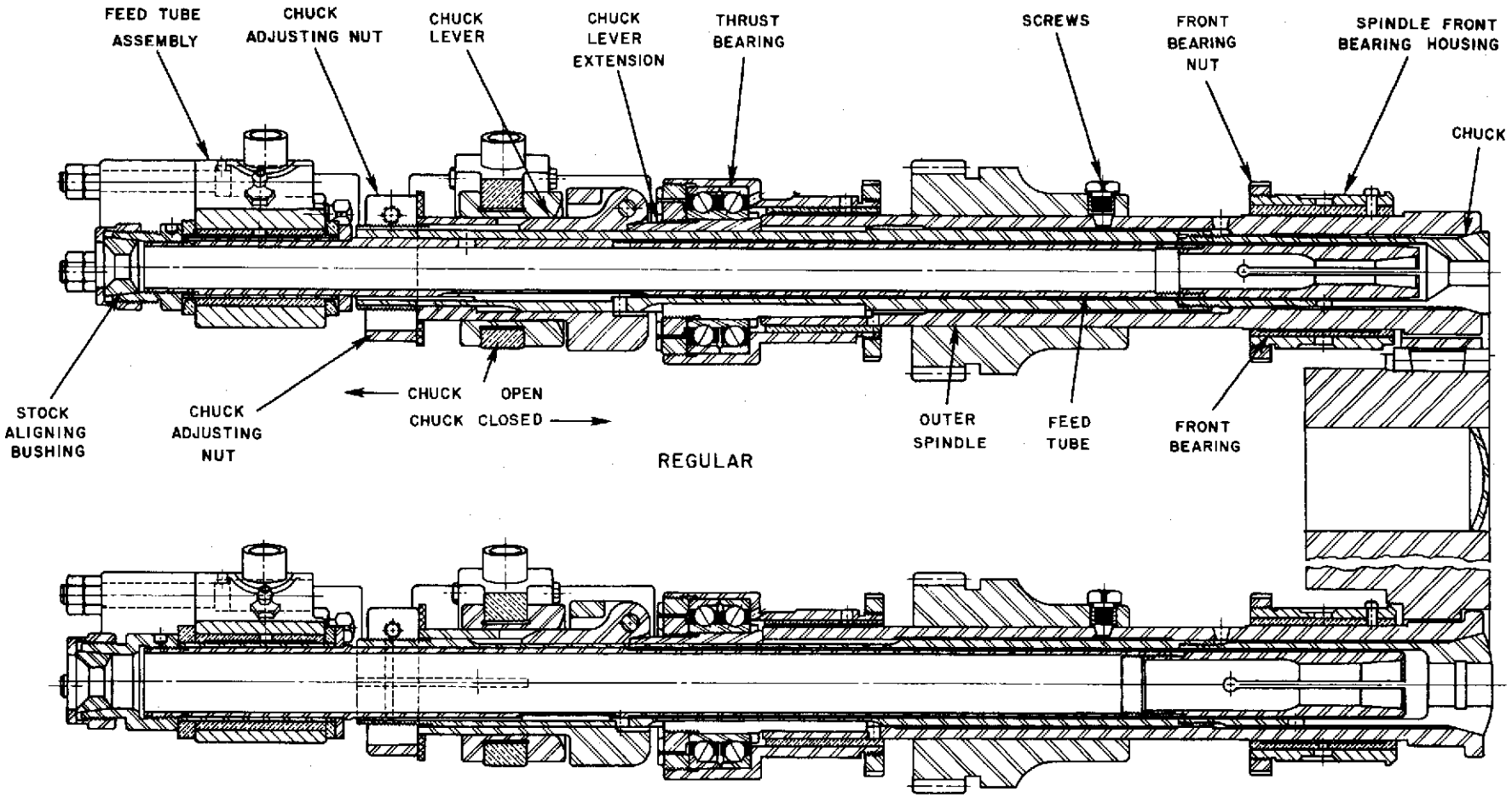
The rear cross slide is adjusted by loosening the inboard screw, advance the gib to adjust for wear with the screw in the rear of the base. Now bring inboard screw touching end of gib. Tighten rear screw, the rotation of this collar screw will bring the gib down against the bottom of the base. NOTE - Always adjust rear screw last on the 2nd position slide.

CLUTCHES

The starting clutch and the high speed clutch at the rear of the machine are both single plate friction clutches. The clutches must be kept tight enough to just carry the load without slipping. Each clutch is easily adjusted by a single nut. If both friction clutches are adjusted right and the cycle time is too slow, check the motor speed and see if the drive shaft is running the proper speed. Most frequently it is the result of improper adjustment of the screws in the high speed clutch fork lever (5080-77). By adjusting these screws it changes the position of the high speed clutch lever (5080-76). This lever moves the clutch in and out, make certain that the screws are properly adjusted, so the clutch goes in as fast as possible without the chuck lever sleeve, (637-1) hitting the chuck lever fulcrum (635NK). When the clutch is engaged, the chuck lever sleeve should be approximately 1/64" from hitting the fulcrum. Carefully adjust the screws on the yoke so that the clutch shifts out of low at 50 hundredths on the cam, this should pick up the time. This loss of time is a tremendous waste, simply loosing time in the idle portion of the cycle.

THE REAR WORM WHEEL BRAKE ASSEMBLY

The brake assembly is mounted on the tool spindle cam shaft (5080-22-10). It consists of a cast iron brake drum (5080-187-47). This is keyed to the tool spindle cam shaft. There is a groove in the middle of the brake drum to accept the roll (760). A bolt (5080-187-58) is inserted into the cast iron drum and through the roll. There are eight holes in the cast drum to give you eight various locations to put the roll in for braking. Around the outside of the drum is a bronze brake shoe (5080-187-57). Resting on top of the brake shoe or cradle portion is a pin (5080-107-52) for the clevis. Through these two parts is inserted the clevis (5080-187-53). A lever (5080-187-54) is attached to the lower half of the brake shoe by a fulcrum pin. There is also a fulcrum pin in the lower half of the clevis. When the brake drum rotates, the roll comes in contact with this lever and activates the brake. Therefore, the brake is on only momentarily. (45° or 12-1/2 hundredths of the cam.) It is not a constant brake as has been done in the past. To set the brake, the cap screw that attaches it to the bed should have a 1/32 clearance


FEED TUBE ASSEMBLY
CHUCK ADJUSTING NUT
CHUCK LEVER
CHUCK LEVER EXTENSION
THRUST BEARING
SCREWS
FRONT BEARING NUT
SPINDLE FRONT BEARING HOUSING
CHUCK
STOCK ALIGNING BUSHING
CHUCK ADJUSTING NUT
CHUCK OPEN
CHUCK CLOSED
OUTER SPINDLE
FEED TUBE
FRONT BEARING
REGULAR
OVERSIZE

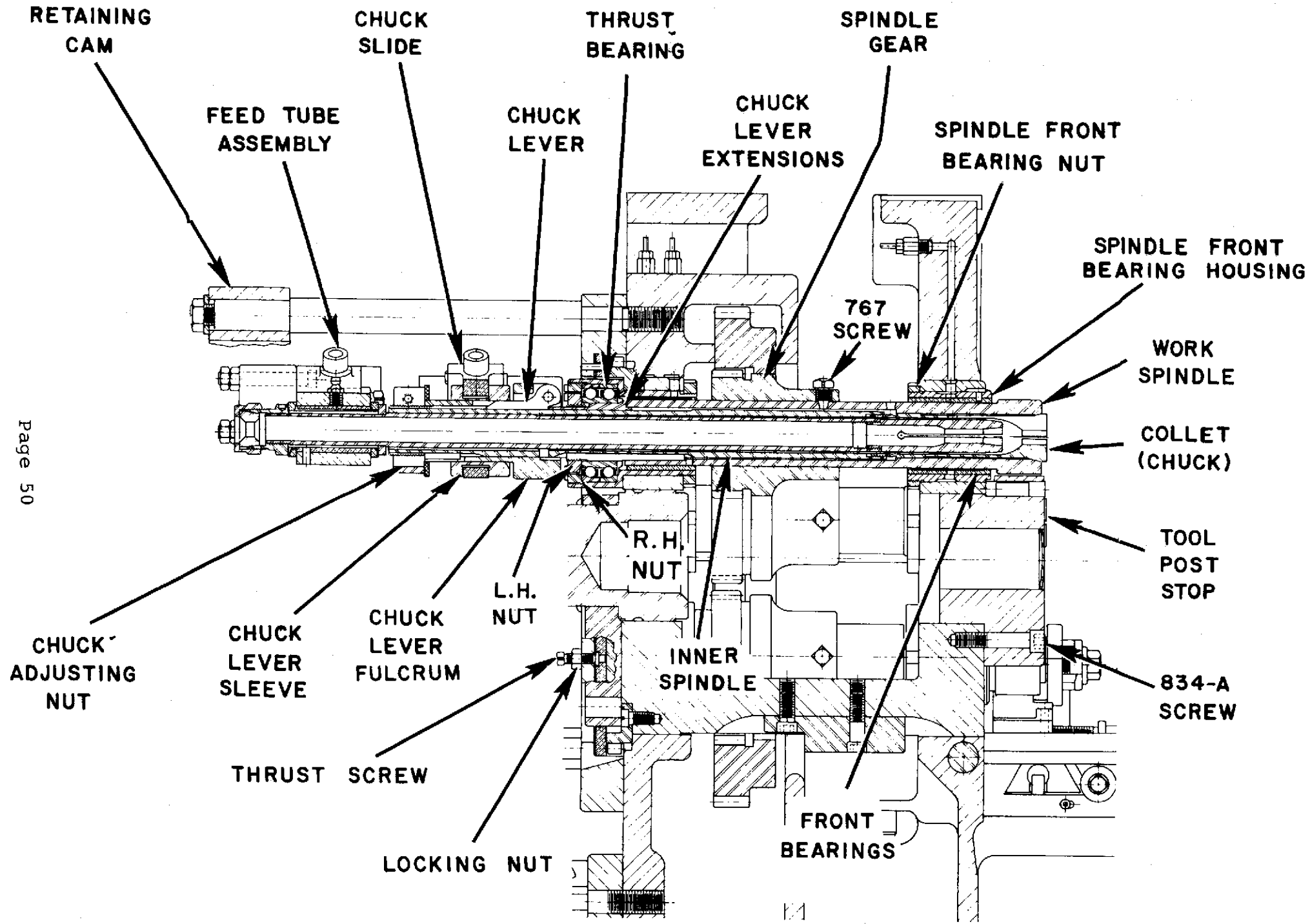
and the clutch nut below should also have a 1/32 clearance, thus allowing it to float 1/16 of an inch. If we have special cams on the machine that are dropping off simultaneously causing the machine to gallop, it is well to add an additional roll to the brake drum. This will retard the motion of the tool spindle cam shaft. If the holes in the brake drum are not in the desired position, this drum can be turned over so a new series of holes will be presented.

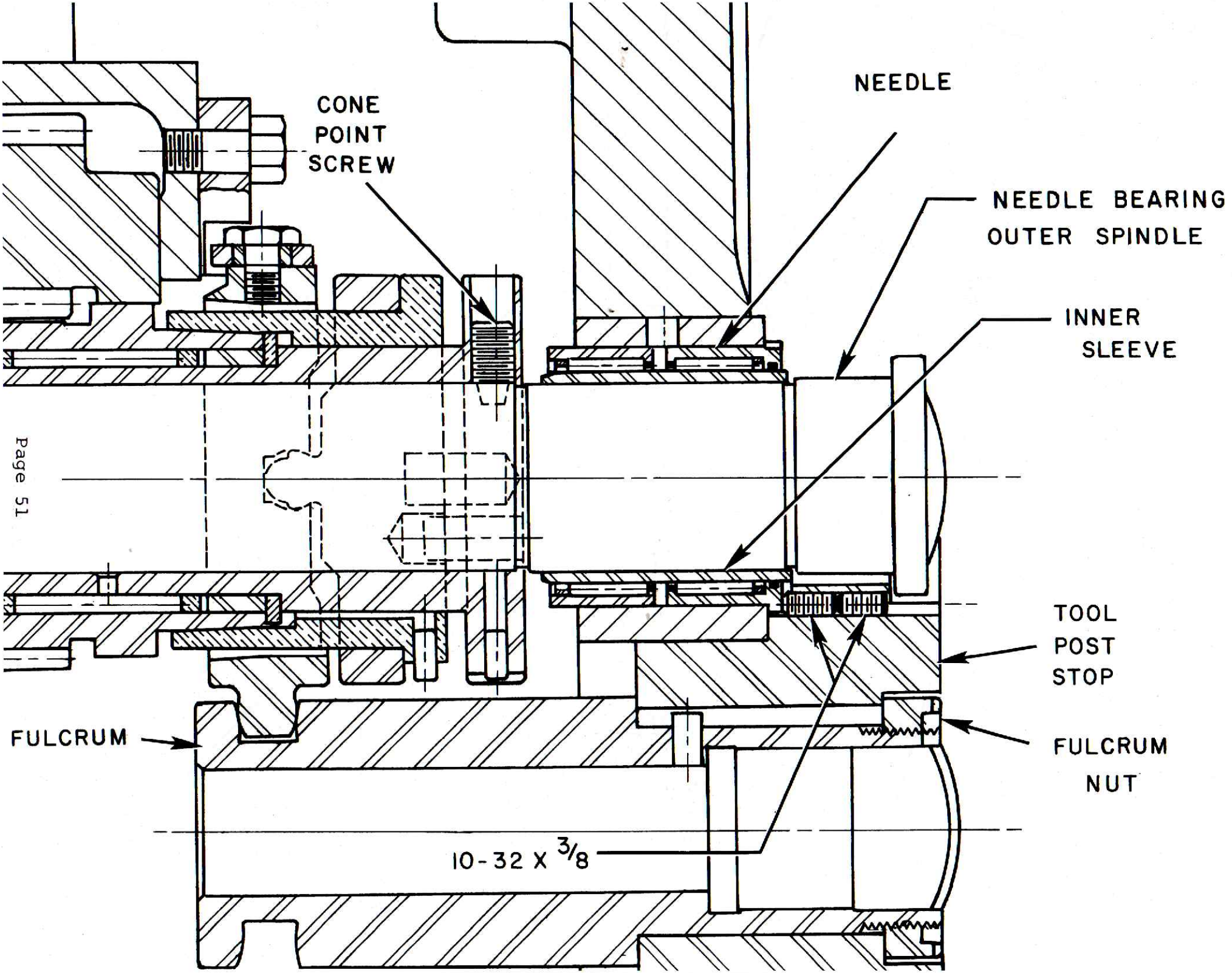
REPLACE WORK SPINDLE BEARINGS

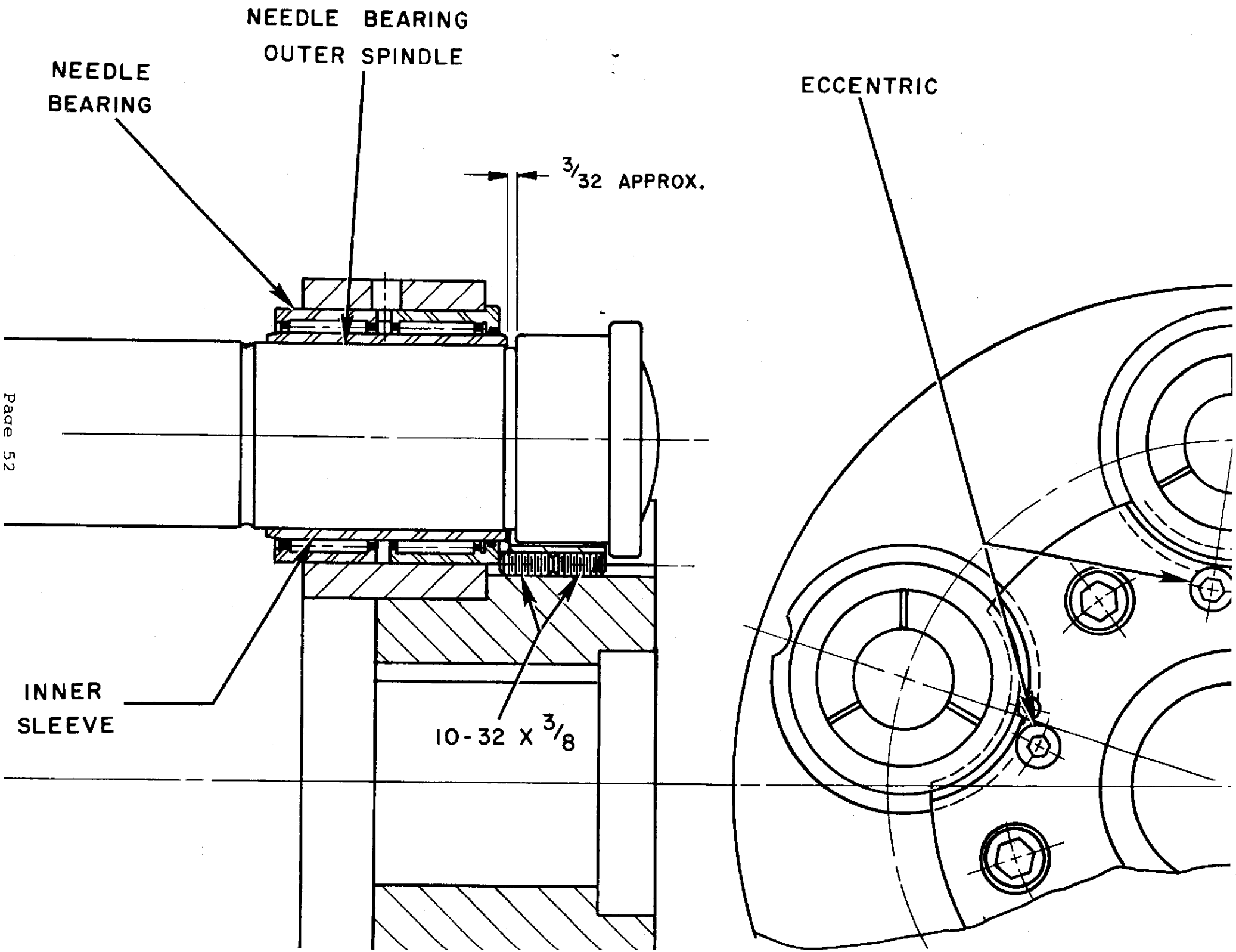
To replace the work spindle bronze bearings and work head spindles with new bronze bearings and spindles; first remove all the stock from the collets (chucks). Then remove the spindle change gears, next remove the tool spindle and the front and rear bearings in the stationary head in the fourth position. In the revolving head, remove feed tube retaining cam (126). Move the chuck slide back by hand to open the collet (chuck). This method applies to the lever chucking or the ball chucking. Remove the feed tube in the fourth position, use collet (chuck) wrench and remove collet (chuck) in the fourth position, then clean with boiler brush and OSHA approved solvent. Remove three screws (767) in work spindle gear (946). Index work head and repeat the same procedure for the remaining spindles to be replaced. To remove the spindle bronze bearings and housing, remove the five hollow hexagon cap screws (834-A) in the tool post stop (2186) and slide the tool post stop toward the stationary head. If the machine is equipped with spindle stopping, unscrew center nut (2496-4-5) and proceed as above. Unscrew the spindle front nut (MH-100-3), then remove spindle, and front bearing housing with worn bearing. Insert new bearing and housing, then replace new spindle and tighten the spindle housing front nut. Index work head to the next position and repeat the above operations until all bearings, housings, and spindles to be replaced are installed. Now slide the tool post stop (2186) toward the revolving head and fasten in place with five hollow hexagon cap screws. (If there is spindle stopping on the machine the center nut must be tightened).

The spindle gear (946) is next assembled with three screws (767) attaching it to the spindle, index work head and repeat operation until all gears are installed.

For running in the bearing, run the machine with the work head indexing. The spindle bearings get lubricated one at a time while in the fourth position ONLY. If the work head does not index, then only one bearing is being lubricated. When bearings are replaced the machine should be slowed to 750 R.P.M. and use the same procedure as breaking in a new machine. A machine equipped with roller bearings (MH-100-27-SA) or changing a machine with bronze bearings to roller bearings, use the same procedure to remove the spindle as above, then remove the outer race, or bronze bearing. Now to install the new needle bearings, make sure the outer race and the inner race on the spindle to be installed are matched as they come from the factory. Be sure to change the lubricator meter to CJB4. Under no circumstances interchange sleeves and outer races. Spindles having bronze bearing can be converted to needle roller bearing spindles at Davenport Machine Tool Division. NOTE - These spindles must be ground for the inner race.


RETAINING CAM
CHUCK SLIDE
THRUST BEARING
SPINDLE GEAR
FEED TUBE ASSEMBLY
CHUCK LEVER
CHUCK LEVER EXTENSIONS
SPINDLE FRONT BEARING NUT
SPINDLE FRONT BEARING HOUSING
767 SCREW
WORK SPINDLE
COLLET (CHUCK)
TOOL POST STOP
R.H. NUT
L.H. NUT
CHUCK ADJUSTING NUT
CHUCK LEVER SLEEVE
CHUCK LEVER FULCRUM
INNER SPINDLE
834-A SCREW
THRUST SCREW
LOCKING NUT
FRONT BEARINGS


NEEDLE
CONE
POINT
SCREW
NEEDLE BEARING
OUTER SPINDLE
INNER
SLEEVE
TOOL
POST
STOP
FULCRUM
FULCRUM
NUT
10-32 X 3/8

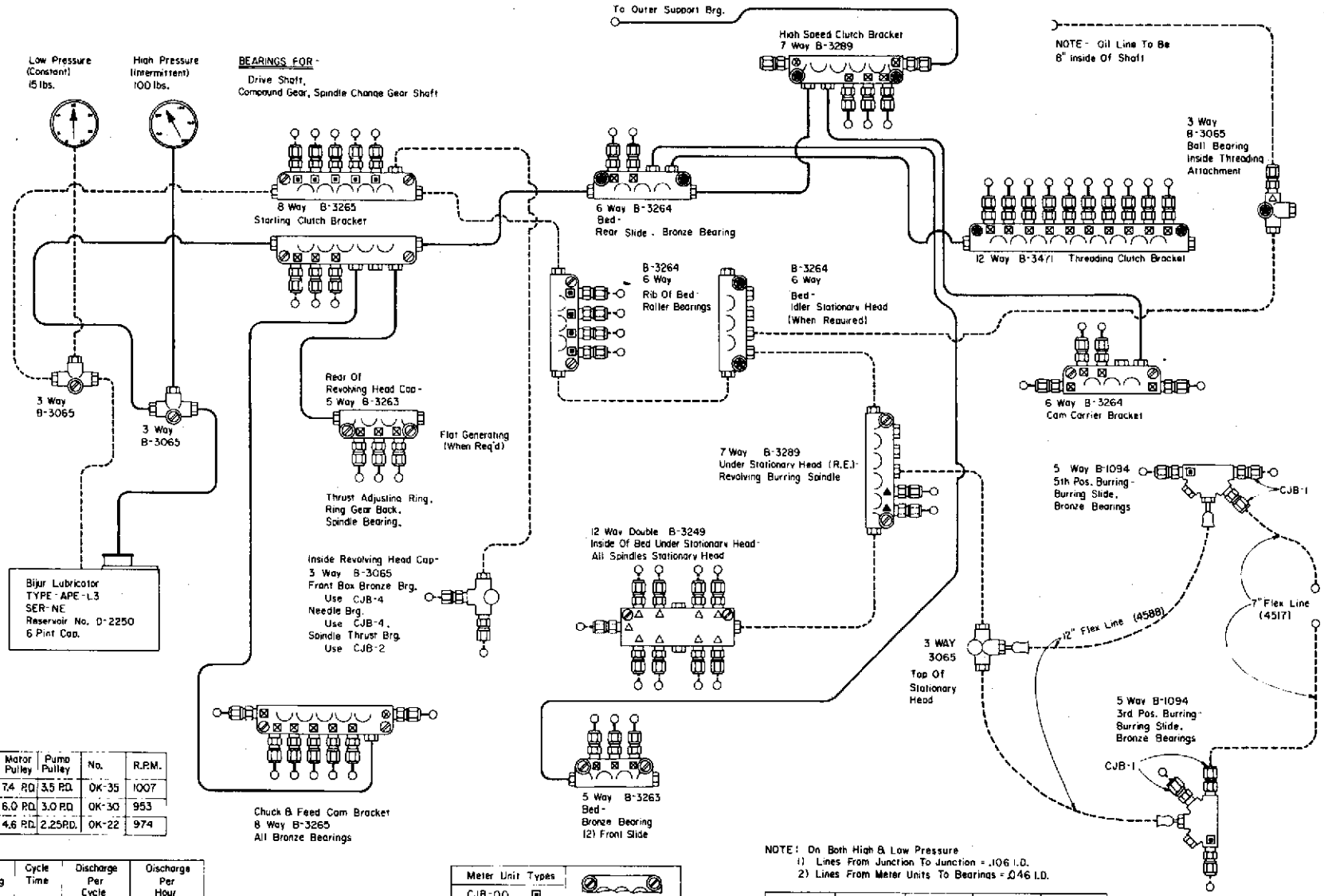

NEEDLE BEARING
OUTER SPINDLE
NEEDLE BEARING
ECCENTRIC
3/32 APPROX.
INNER SLEEVE
10-32 X 3/8

Install the outer race first, then push the tool post stop (2186) into place, making sure that one tool post stop eccentric from each spindle enters the notch in the flange of the outer race. Next replace the five hollow hexagon cap screws securing the tool post to the revolving head. Next step, insert an 836-A #10-32 x 3/8 screw into the threaded hole. Bring down snug against the housing to prevent the bearing from chugging. Back screw off 1/6 of a turn as too much pressure will distort the bearing cage. Use an 836-A #10-32 x 3/8 screw to lock this screw.

To install a new bearing on an old spindle, remove the inner sleeve from the spindle; the sleeve is removed by applying a flame to the sleeve only. It should expand and slide off. The inner sleeve of the new bearing should be put in a controlled electric oven and heated between 150°F to 170°F then very quickly be pushed by hand over the spindle to within approximately 3/32 from the spindle nose. If the sleeve closes on the 1.6725 diameter do not pound with a hammer, use a steel washer and very carefully push with arbor press to position. The end of the sleeve to the hub on the spindle nose should be approximately 3/32. NOTE - Machines being rebuilt with needle bearings do not have to be run in. But, the head must be indexed to lubricate these bearings.

LUBRICATION

Lubricating the machine is done with the Automatic Lubricating Unit and an oil gun. NOTE - The gun supplied is an oil gun, not a grease gun. CAUTION - Do not grease any of the fittings on the machine, use oil of the same grade used in the lubricator. Use a good grade of SAE #20W. In climates of extreme heat, 85°F or more, use SAE #30W. All the oil fittings should be serviced before starting the machine to run daily. The machine must be indexed a minimum of five times to insure oil to reach the bearings on the work spindle, as the work spindle is only lubricated in the fourth position. On new machines, this bearing is lubricated from a constant flow line, on the old machines, the spindle was on a cyclic line, and the flush button on the lubricator must be depressed. CAUTION - Do not run the machine if the low pressure gauge reads less than five pounds, the high pressure gauge less than fifty pounds. The system is a Dual-Purpose Lubricator. High pressure periodically forces a measured volume of oil through a cyclic line (copper or brass) and a constant flow of oil through a low pressure line (chrome plated). The lubricator is driven by a pulley on the Drive Shaft to a pulley on the Lubricator. On the 75 cycle machine with the Drive Shaft 1501 R.P.M. the pump shaft will run 1007 R.P.M. On a 60 cycle machine drive shafts 1217 R.P.M. the pump shaft will run 817 R.P.M. On a 45 cycle machine with the drive shaft 933 R.P.M. the pump shaft will run 626 R.P.M. It is recommended if the machine is going to be run for an extensive length of time at a cycle other than 75 cycle, that another pump pulley be purchased to have the pump run approximately 1000 R.P.M. NOTE - If there is too little oil at the bearings on the cyclic line check for low oil level, broken or cracked lines, loose connections, flattened lubrication outlet lines or clogged filter. If all is



Cycle	Motor Pulley	Pump Pulley	No.	R.P.M.
75	7.4 P.D.	3.5 P.D.	OK-35	1007
60	6.0 P.D.	3.0 P.D.	OK-30	953
45	4.6 P.D.	2.25P.D.	OK-22	974

Cam Setting NO.	Cycle Time	Discharge Per Cycle	Discharge Per Hour
2	25 Min.	11 Cu. Cm.	25 Cu.Cm./Hr.

Ambient Temperature F (Oil Temperature)	Normal Low Pressure	Normal High Pressure	Oil Viscosity	Oil
100	15 Lbs.	100 Lbs.	150 - 100	W-30
If The Oil Temperature Increases The Oil Pressure Will Drop In About The Same Percentage				

Meter Unit Types	
CJB-00	▣
CJB-0	△
FJB-0	⊠
FJB-2	⊗
CJB-2	▲

Front View
Rear View

Low Pressure Line (Chrome)
High Pressure Line (Copper Or Brs.)

O = 2446-36, 2446-32, & 2446-34 Ass'y

NOTE: On Both High & Low Pressure
1) Lines From Junction To Junction = .106 I.D.
2) Lines From Meter Units To Bearings = .046 I.D.

Adapter 2446-36	Sleeve 2446-32	Bushing 2446-34	Plug 2446-35	Nut 2446-33

satisfactory and machine is running at operating temperature, increase the oil feed. Carefully disconnect the drive discharge lines and remove lubricator from resevoir. NOTE - Index whole number on cam on which locating pin is engaged, pull out knurled knob and rotate until locating pin enters index hole with next higher number. Too little oil at the continuous line bearings, same inspection procedure as above. If everything is satisfactory, turn continuous bypass valve adjustment clockwise with result in increase in the oil pressure while machine is in operation until proper oil flow is achieved. Too much oil at bearings in either line, continuous or cyclic, procedures would be reverse of those described above. For too little or too much oil at one bearing only, meter units of same type but next higher or lower flow rate should be used. The cyclic bypass valve adjustment is under the name plate, continuous bypass valve adjustment in under the cone-shaped nut.

Oil the machine daily using flush button when starting up the machine. Also use the oil gun to oil all fittings prior to starting up the machine. Plugs at the bottom of the worm housing should be removed every three months and the housing flushed out with an OSHA approved solvent. Replace the plugs and fill with fresh oil.

TOOLING UP A NEW JOB

Remove high speed pin, put machine in direct low and insert manual reverse for ease of set up. Then, remove the tooling and equipment used in the previous job. Remove all tools, backup tension screws, take out the feed tubes and install new feed fingers. Remove the collets from the spindle between the 4th and 5th position and wash out the spindles with an OSHA approved solvent and boiler brush after washing swab with lubricating oil. Now oil and insert the new collets (chucks) and the feed tubes. Repeat the above operation until all collets and feed tubes have been replaced.

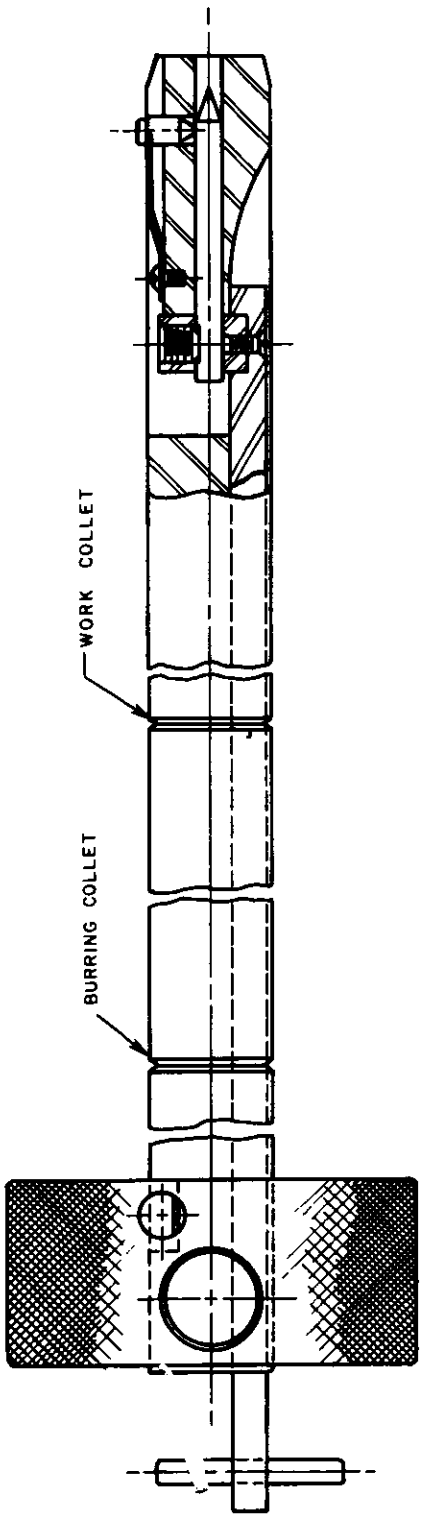
Insert five bars of stock in the machine and adjust all the collets. (Adjust the amount of stock that will be fed out by the crank on top of the feed slide). Remove the cam carriers and put on the new set in which the cams for the new job have already been mounted. Now locate the block on the cam levers to get the required amount of movement for the tools. Put on the spindle change gears and the feed gears. Now index the machine manually to be sure all components are working freely. The machine is now ready for tooling which should be correctly sharpened before starting to set up the machine.

First, put in the cutoff tool and adjust approximately 1/16" away from the face of the collet. Cutoff the end of the bar by operating the cutoff tool by hand. Open the collet and feed out the stock the length needed for the job. Close the collet by hand and cut a slight groove in the stock. Withdraw the latch (5161-1) on the top of the collet opening lever so the stock will not be fed out in any of the spindles as the work spindle head is indexed. In the first position, mount the tool holder for the first position in place. Index the spindle carrier until the stock comes in line with the stock stop face of the tool holder. (Approximately 1/2 Index).

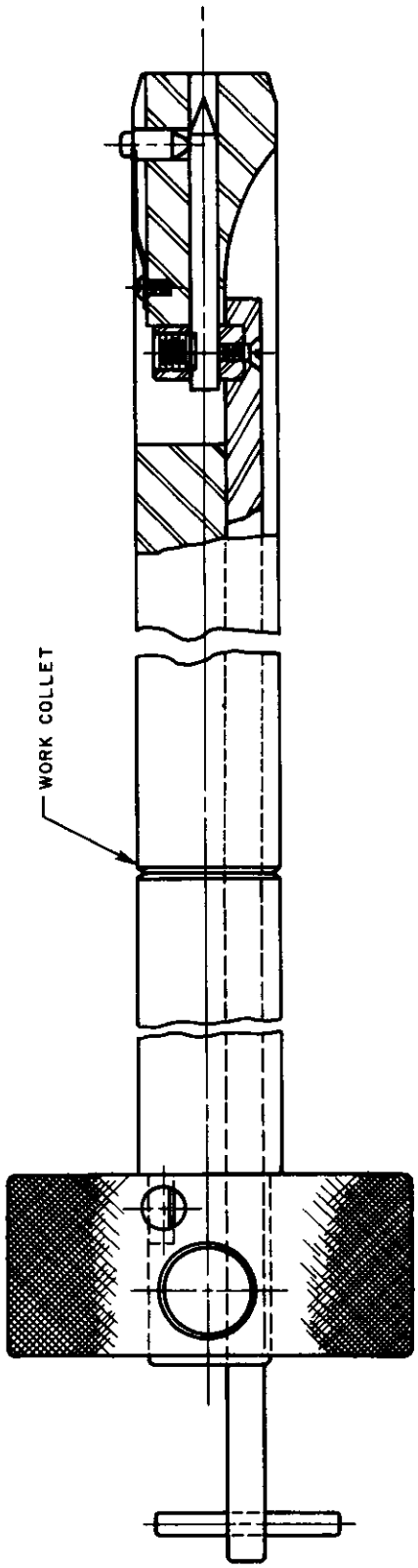
Adjust the stock stop screw (888-1) on the right hand end of the tool spindle, adjust until the face of the holder comes in contact with the stock. Now, index and lock the spindle carrier. Try the first tool by hand with the hand lever (5080-146) and adjust the tool to cut the correct size. Turn the handwheel until the roll of the cam lever is at the highest point of the cam. Now adjust the turnbuckle link connection with the cam lever so the tool is fed to the correct dimension. Index the spindle carrier to the next position, with the next tool holder use the same procedure as described above. When using a forming tool, adjust the forming tool to the correct height to the center of the work. Line it up with the groove already cut in the work piece by the cutoff tool. When the roll on the cam is at the highest point of the cam, adjust the turnbuckle connection so as to cut .010 smaller than the required size. Adjust the cross slide stop screw until it comes in contact with a .005 feeler gauge placed between the tension screw and the stop screw in the spindle carrier. Turning the tension screw 1/4 turn will give approximately .005 pressure to insure forming the same size on all spindles. Mount the balance of tools, index the spindle carrier to the next position and mount the next tool as described above. Repeat this operation until all tools are in place. Now engage latch (5161-1) to feed stock, before beginning to run the job check the piece of work from each spindle. Make any adjustments as needed.

CHANGING THE COLLETS (CHUCKS)

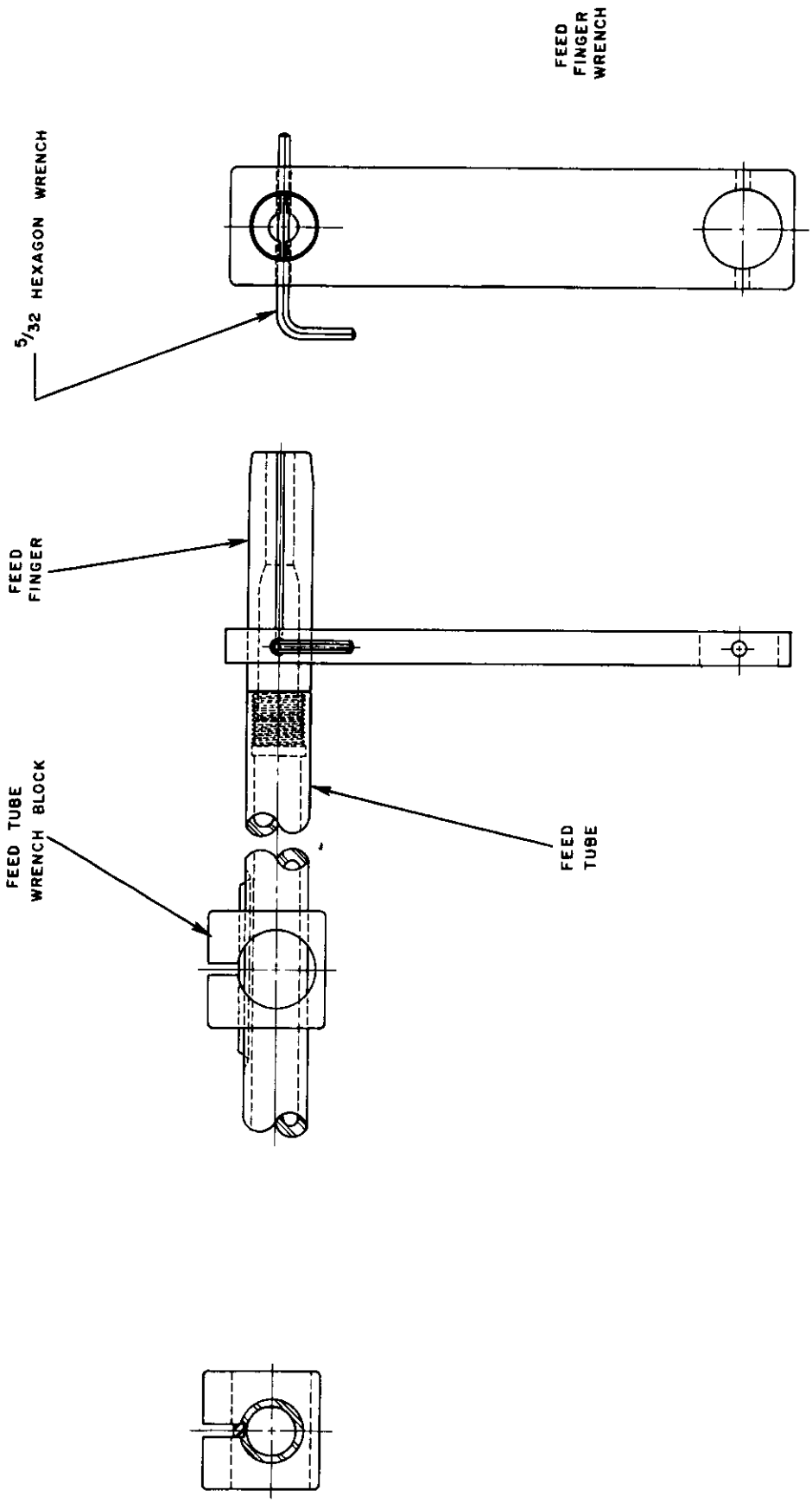
The machine is indexed to fifth position, to approximately 96 hundredths, shut the machine off. The machine should be in a position where the cutoff tool is clear of the stock just after the head locks. Loosen the set screw locking the stock reel. Back the stock reel tubes away. Raise the feed slide guide latch (5165). Withdraw the pusher tube unit toward the stock reel. Handle this unit very carefully. Remove any tool holders if it would obstruct withdrawl of the collet. Raise the chuck lever roll throwout (5080-292-3) from engagement of the cam race. Now insert the cam lever handle (5080-146) into the chuck opening cam lever (5017-1) and manually open the collet. Now manually crank (use handwheel) the machine back to approximately 1/2 index. Remove the upper rear guard (MB-387-1) on the rear of the machine. Lock the spindles by placing a brass rod between the spindle gears. Insert the chuck wrench into the inner spindle to the first mark on the wrench. Rotate the wrench clockwise or counterclockwise at the same time pushing on the pin at the end of the pusher rod until the pins in the wrench enter the holes in the collet. Insert the cam lever handle (5080-146) into the knurled collar on the end of the wrench. Turning the handle clockwise will unscrew the collet (the collet has a right hand thread). Clean inside of inner spindle and outer spindle with an OSHA approved boiler brush and OSHA approved solvent then swab with lubricating oil. Select collet for next job. Remove all burrs, if any, from the inside of the collet. Wipe all threads and lubricate with oil. Insert the collet and screw up tight. Tighten with collet wrench and remove the collet wrench. NOTE - There are two collet wrenches. One for oversize (2816-45-SA), and one for regular (2816-41-SA). Manually crank (use handwheel)



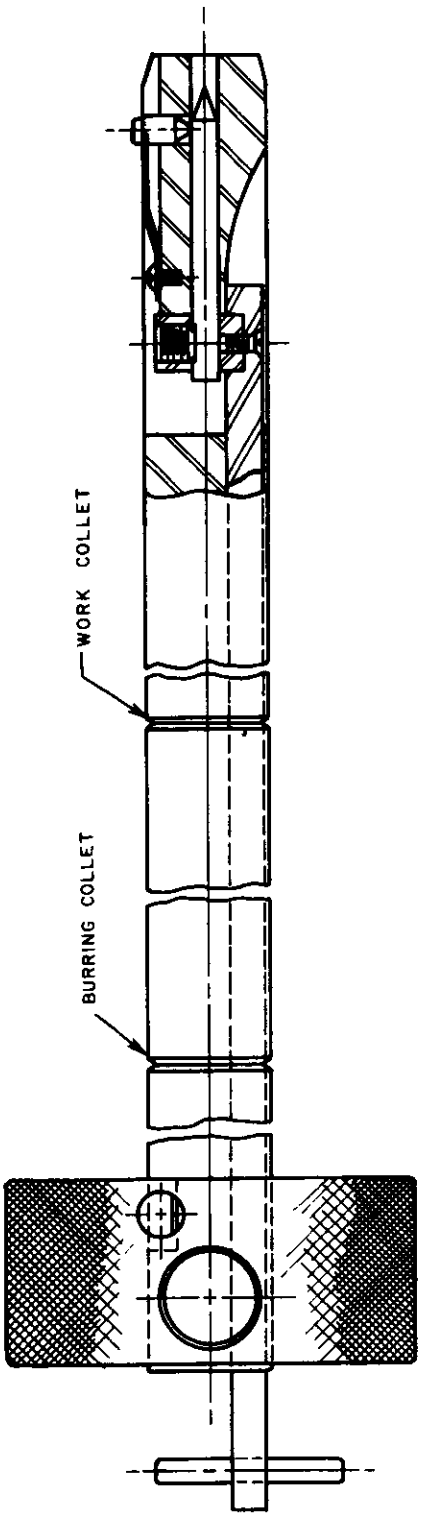
REGULAR
COLLET (CHUCK) WRENCH
AND BURRING COLLET WRENCH



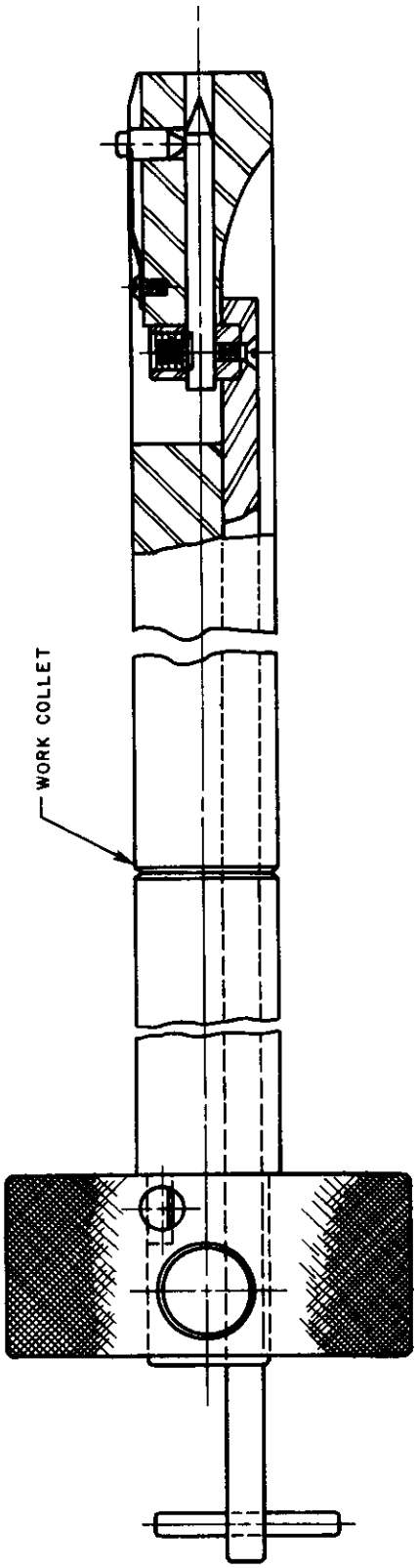
OVERSIZE
COLLET (CHUCK) WRENCH


FEED FINGER WRENCH
5/32 HEXAGON WRENCH
FEED FINGER
FEED TUBE WRENCH BLOCK
FEED TUBE

REGULAR
COLLET (CHUCK) WRENCH
AND BURRING COLLET WRENCH



OVERSIZE
COLLET (CHUCK) WRENCH



the machine back to fifth position to replace the feed tube pusher. Use feed tube wrench block (848-W) and hold in a vice so that the desired feed tube hole is exposed. Turn the feed tube so that the key fits into the slot in the wrench block. Tighten the vice. Take the feed finger wrench (848-3) and place over the feed finger. Take a 5/32 hexagon set screw wrench and put through the feed finger wrench and the feed finger. Now remove the feed finger. There is also a right hand thread on the feed finger. Wipe off and oil the feed finger tube unit, insert the new feed finger and again tighten with the feed finger wrench. Return the feed finger tube unit into the machine, and release the feed slide guide latch (5165). Using the short sample bar ends, adjust the collet tension with the chuck adjusting nut. Insert the cam lever handle (5080-146) into the chuck opening cam lever (5017-1). Open and close the collet against the stock to get the feel of the correct tension. When the correct tension has been maintained, lock the chuck adjusting nut. CAUTION - Collet (chuck) and chuck lever breakage is caused by improper tension. Use extreme care. Index the next spindle and repeat above. After assembling all collets replace stock reel tubes in proper location. Lock stock reel with set screw and replace chuck lever roll throwout (5080-292-3).

SETTING THE STOCK STOP

NOTE - The machine is still in direct low speed.

METHOD #1 - Stop the machine in loading position #5. (Approximately 55 hundredths). When cutoff tool withdraws enough to clear the stock before the head unlocks, raise the knurl knob on feed lever (5016) to free feed lever throwout (5174) and Withdraw from cam race. Put cam lever handle (5080-146) into the feed lever (5016), push the feed lever to the extreme left. Now open the collet by hand. After the collet is open feed the stock by hand. Move the feed lever as far right as necessary to feed the length of the piece required. Measurement for the correct length of piece should be as follows: Length of piece plus some amount for facing. Putting your scale against the face of the cutoff tool which is toward the stationary head, move the stock to a predetermined place on the scale. Close the collet by hand, disengage chuck slide opening guide latch (5161-1) index the machine halfway until the piece comes in line with the stock stop plate. Loosen the binding screw in the bed which binds the stock stop screw (888-1). Turn the stock stop screw, moving the first position spindle until the stock stop plate is firmly against the end of the piece. CAUTION - Under no circumstances do you use the turnbuckle connection to adjust this. Raise the knurl knob on feed lever (5016). Moving the lever by hand, line up the roll, insert the feed lever roll throwout in the cam race. Manually backup the machine until feed tube is fully withdrawn (61 Hundredths). Loosen the binding screw locking the feed screw crank handle (7186-1). Adjust now for the stock feed out. Turn the crank on the feed slide. The amount the feed slide moves can be measured between the steel washer on the feed tube and the end of the inner spindle. This distance is the length of the piece, plus the cutoff. All this plus approximately 1/4" extra feed is to take care of the backlash in the feeding mechanism.

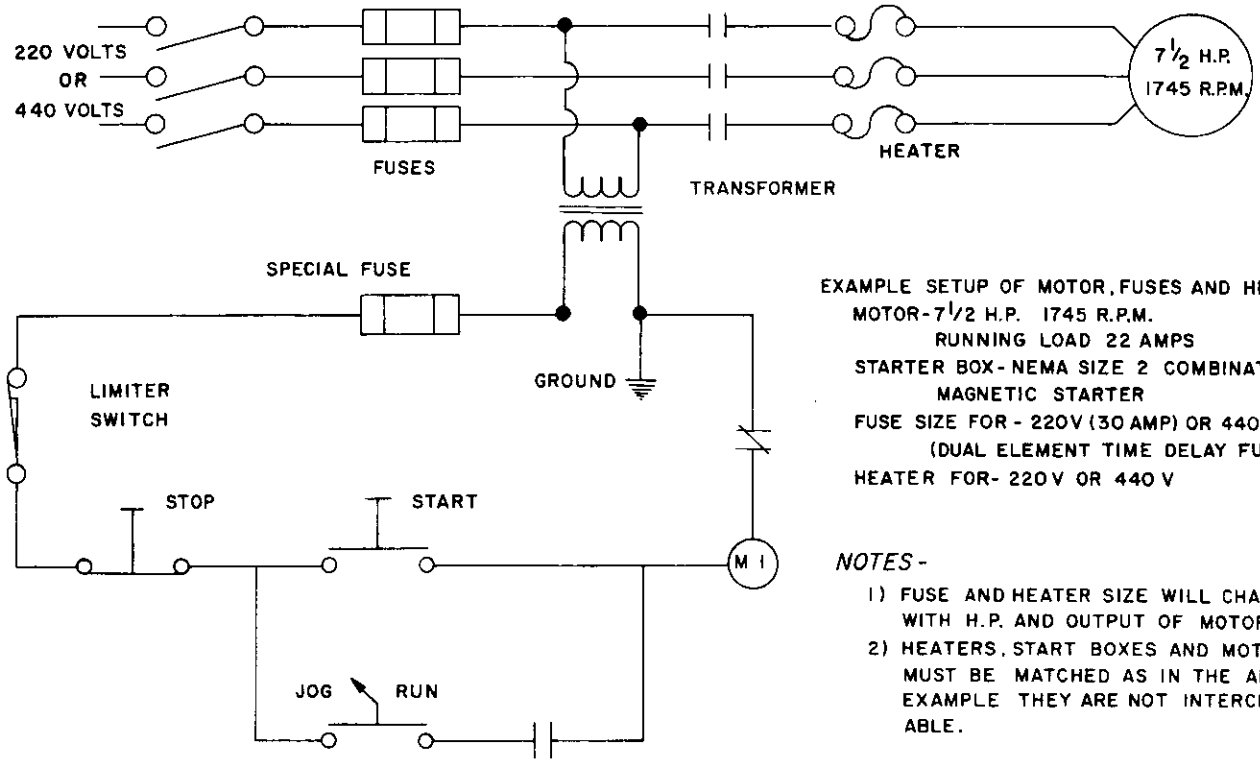
cedure for all spindles. Replace chuck lever roll throwout (5080-292-3) in chuck and feed cam and remove cam lever handle (5080-146). CAUTION When ejecting bar ends make sure they do not drop in such a way that they may cause a jam up or damage the tooling, ie, falling on the front or rear slide and jamming between that slide and a spindle.

ELECTRICAL CONTROLS

The control box line and ground wire connections are made inside the main control box. Breaker switches (usually a handle) provide a cut off of all electrical current to the machine. A set of heaters or other safety devices are incorporated to prevent overheating the motor. The heaters are a sensing device used to detect overheating and overloading the motor. A reset button is triggered when overloading or overheating occurs. Reset release cuts off the power source to the motor. CAUTION - This condition usually occurs when the machine is operating under power or feed. The feed start and stop handle must be on the stop side and/or clutch disengaged before resetting. If overload is caused by an obstruction the source must be located and removed before starting the machine.

START AND STOP BUTTON

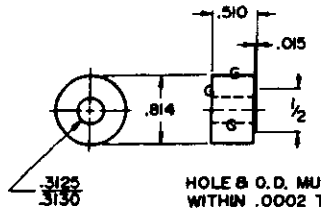
The main motor drive is usually controlled by a start and stop button. An inch or jog button is incorporated in this control which is used primarily for set up work and stocking up the machine.



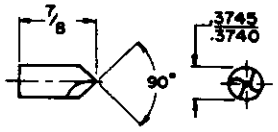
EXAMPLE SETUP OF MOTOR, FUSES AND HEATERS
MOTOR - 7½ H.P. 1745 R.P.M.
RUNNING LOAD 22 AMPS
STARTER BOX - NEMA SIZE 2 COMBINATION MAGNETIC STARTER
FUSE SIZE FOR - 220V (30 AMP) OR 440V (17 AMP)
(DUAL ELEMENT TIME DELAY FUSE)
HEATER FOR - 220V OR 440V

NOTES -

1) FUSE AND HEATER SIZE WILL CHANGE WITH H.P. AND OUTPUT OF MOTOR
2) HEATERS, START BOXES AND MOTORS MUST BE MATCHED AS IN THE ABOVE EXAMPLE THEY ARE NOT INTERCHANGEABLE.



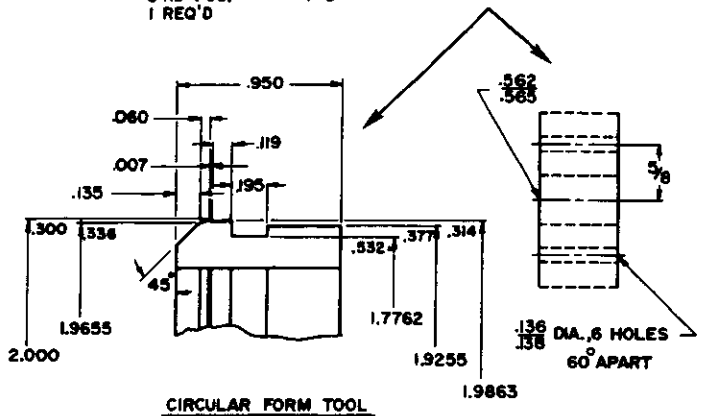
HOLE & O.D. MUST BE CONCENTRIC WITHIN .0002 TOTAL INDICATOR READING



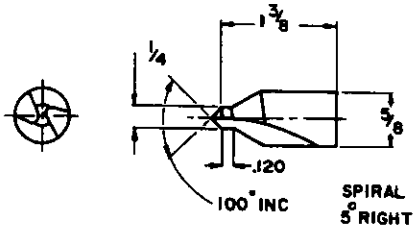
SPIRAL RELIEVE 5° LEFT HAND

SIZE TOOL ROLL
3 RD POS. T-S
1 REQ'D

SPECIAL L.H. CENTER DRILL
5 TH POS. MAT'L - H.S.S.
1 REQ'D HDN.- Rc 60-65

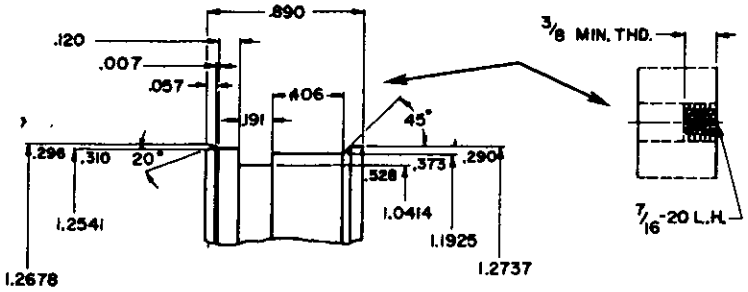


CIRCULAR FORM TOOL
2 ND POS. MAT'L- T-15 PM H.S.S.
1 REQ'D HDN.-Rc 64-66

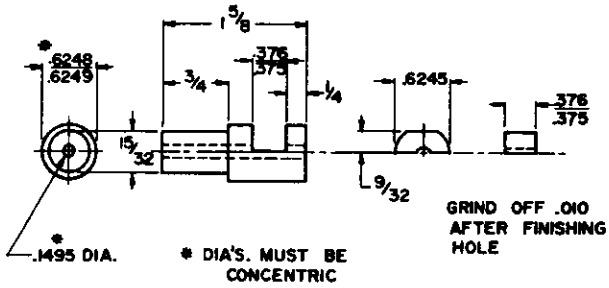


SPIRAL RELIEVE 5° RIGHT HAND

SPECIAL CENTER DRILL
1 ST POS MAT'L- EXT MACHINING ON
1 REQ'D #7 COMBINATION DRILL & COUNTER SINK



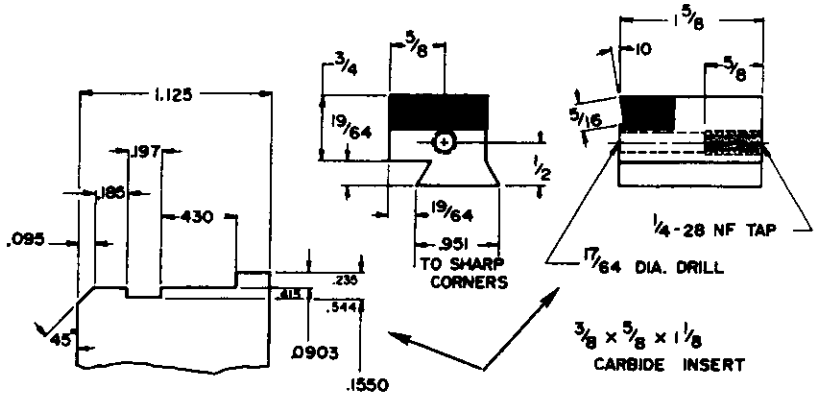
SIZE TOOL
3RD POS MAT'L.- T-15 PM H.S.S.
1 REQ'D HDN. Rc 64-66



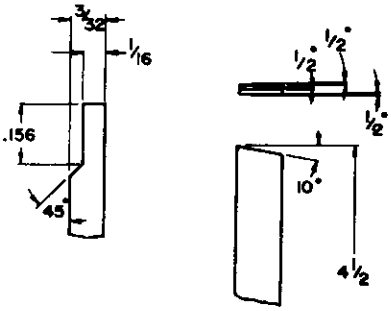
GRIND OFF .010 AFTER FINISHING HOLE

* DIA'S. MUST BE CONCENTRIC

SPECIAL DRILL BUSHING
3 RD POS. MAT'L-AISI 12L13
1 REQ'D CASE HDN.-.010 Rc 68-71



DOVETAIL FORM TOOL
1 ST POS MAT'L.-CARBIDE INSERT
1 REQ'D GRADE C-2

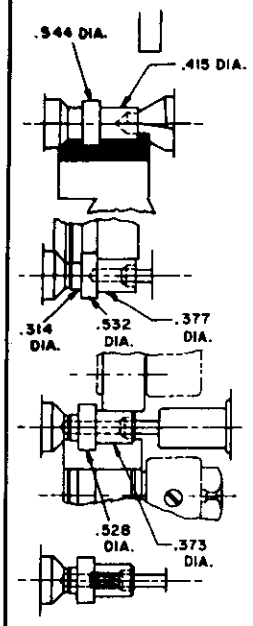


SPECIAL CUTOFF BLADE
5 TH POS. T-5
1 REQ'D Rc 65-67

SASH FORM & CUT OFF TOOLS 1/4" BELOW CENTER SASH SIZING TOOLS 1/8" BELOW CENTER	DAVENPORT MACHINE TOOL DIV. DOVER CORPORATION ROCHESTER, N.Y., U.S.A.	MARK ALL TOOLS A.J.L.-LO-1 DRAWN BY A.J.L DATE 6-17-80	6394-1 NO.	DAVENPORT INSTRUCTION BOOK LAYOUT

MATERIAL 9/16 ROUND 12L14 | SURFACE FT. PER MIN. 267 | SPINDLE R.P.M. 1810 | GEARS 35-29 | CYCLE 75

SEC. PER PIECE 2.8 | GROSS PER HOUR | FEED GEAR 50 (60 IDLER) | THREAD GEARS 32-32 | MODEL "B" WITH THREADING

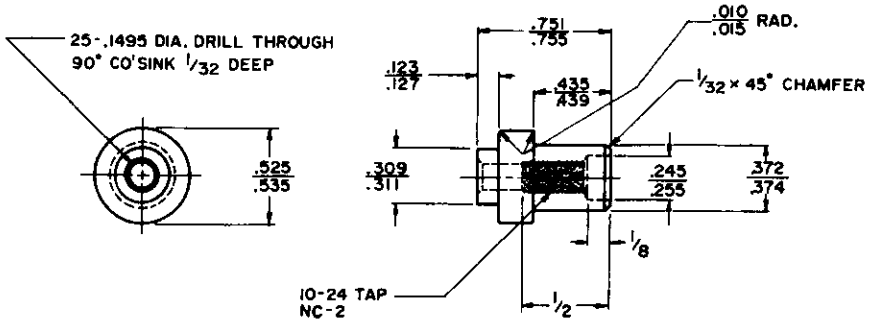


OPERATIONS	CAMS USED	FEED OF TOOL	FEED PER REV.	EFFEC REV'S	BLOCK LOC'N
STOP STOCK & DRILL .250 DIA.	1/4	.239	.0034	70	96
FORM	3/32	3/32	.0014	65	1.0
REVOLVE DRILL 1/2 TO 1 1232-98-70-SA					
DRILL 25 .1495 DIAMETER	3/8	.304	.0028	110	.81
FORM	3/32	3/32	.0014	65	1.0
REVOLVE DRILL 1/2 TO 1 1232-98-70-SA					
DRILL 25 .1495 DIAMETER	SPECIAL C-22552	.304	.0028	110	1.0
SIZE	3/32	3/32	.0014	65	1.0
TAP 10-24NC-2	#4 STEEL				1.08
CUTOFF	5/32	5/32	.0024	65	1.0
CO' SINK LEFT END	SPECIAL 5-C-1510-1	.045	.005	9	—

STATIONARY HEAD BURRING ATTACHMENT 1263-5-10-SA
CO'SINK ARM ATTACHMENT 1263-119-1-SA
5-C-1488

TOOLS REQUIRED

- 5- 9/16 ROUND COLLETS
- 5- 9/16 FEED FINGERS
- 1- 2904-10-SA STOCK STOP
- 1- 2717-SA ADJ. DRILL HOLDER
- 1- SPECIAL 1ST POSITION CENTER DRILL
- 1- 3060-1-1-SA DOVETAIL FORM TOOL HOLDER
- 1- 1 ST POSITION DOVETAIL FORM TOOL
- 2- 2714-SA REVOLVING DRILL HOLDER
- 2- #25 (.1495) DIA. DRILL H.S.S.
- 1- 1801 DRILL BUSHING WITH .1495 DIA. HOLE
- 1- 2ND POSITION CIRCULAR FORM TOOL
- 1- 3RD POSITION SPECIAL DRILL BUSHING
- 1- SPECIAL DRILL CAM C-22552
- 1- 2726-O-SA OVERSIZE SIZING TOOL WITH 3/4" PLATE
- 1- SIZING TOOL & ROLL
- 1- 2747-C TAP HOLDER
- 1- 10-24-NC TAP
- 1- 1801 TAP BUSHING
- 1- 2768-SA CUTOFF BLADE HOLDER
- 1- SPECIAL CUTOFF BLADE
- 1- 1263-5-10-SA STATIONARY HEAD BURRING ATTACH
- 1- 646-23-1 3/8 ROUND BURRING CHUCK
- 1- SPECIAL BURRING CAM 5-C-1510-1
- 1- 1263-119-1-SA COUNTER-SINK ARM & STOP ATTACH.
- 1- SPECIAL LEFT HAND CENTER DRILL
- 1- SPECIAL SWING ARM CAM 5-C-1488



DASH FORM & CUT OFF TOOLS 1/4" BELOW CENTER
DASH SIZING TOOLS 1/8" BELOW CENTER

DAVENPORT MACHINE TOOL DIV., DOVER CORPORATION, ROCHESTER, N.Y., U.S.A.

MARK ALL TOOLS A.J.L.-LO-1
DRAWN BY A.J.L. DATE 6-17-80

NO 6394

DAVENPORT INSTRUCTION BOOK LAYOUT

LAYING OUT A NEW JOB

We show two layouts of tool equipment, feeds, speeds, and production. One made from steel and the other from brass. If the description on these two layouts is followed carefully, it should enable your production man, foreman, or operator to easily tool up for an ordinary piece.

Brass, aluminum, and leaded steel are usually run at a higher spindle speed except when using the 2:1 (brass) threading method. Then, the maximum work spindle speed of 2500 R.P.M. is recommended. The 6:1 (steel) threading method can be used for speeds in excess of 2500 R.P.M. NOTE - Only run the machine at the spindle speed needed to do the job, excessive revolutions only laps the tools away and causes more wear on the work spindle bearings.

For steel work, the surface feet depends on the nature of the piece and the operations to be performed. Usually 165 to 280 surface feet for free cutting cold rolled steel and leaded stock. 50 to 80 surface feet for tool steel. A good idea of feeds and speeds of various tools can be formed by consulting almost any mechanical handbook or data machining handbook furnished by the mills. In our charts you will find a table of stocks and their resultant surface feet. The spindle speed gears can now be selected.

In our charts is also a table for time cycles and the proper feed change gear. By using these two tables you can easily determine all the speeds and feeds required for any job ranging from the slowest to the fastest, on the 75, 60, or 45 cycle machine. Determine the longest operation. When possible, divide into two or more operations. Divide the length of feed required on the longest operation by the feed per revolution. This will give you the number of effective revolutions required. After finding the number of effective revolutions required for the longest operation, consult the charts. In the column of the determined spindle speeds select the number nearest the number of effective revolutions needed. Follow along this line to the left and find the number of seconds required to make the piece, the gross production per hour and also the feed gears to be used.

If the piece is to be threaded with tap or solid die, the correct cam to be used, and location of the block on the cam lever can be found in the threading tables. Read the instructions on the threading attachment for an explanation of when and how to use the various threading methods.

On the preceeding page is a tool layout for a steel bushing. After consulting a data machining handbook for speeds and feeds and from the nature of the operations to be performed it was decided to use 270 surface feet for 9/16 diameter stock grade 12L14. We find 267 surface feet to be the closest in our chart. By following across the page to the left we find the spindle speed to be 1810 R.P.M. The spindle change gears to be a 35 tooth driver, and a 29 tooth driven gear. After looking at this job to determine the longest operation we find that we can divide the forming into the first and second positions. The drilling can be divided in the second and third posi-

tions with a half to one revolving drill, and it would take 6 revolutions for every thread in the piece, there being 3/8 of thread in the piece at 24 pitch(.375 x 24 = 9)Threads would mean there would be 9 full threads in the piece and 3 extra revolutions for lead for a total of 12 threading revolutions. Therefore, we would need the minimum of 72 revolutions in the working portion of the cam which would be from "0" to "50".

Further looking at the part, we find the counterbore in the front would need .125 plus .104 for the drill point for a total of .229 feed. We can feed this drill .005 per revolution so 46 revolutions would be needed. The next two drill positions would have to drill the remainder which is .588 divided by 2 (2nd and 3rd position drills) equals .294 plus .010 for pressure and approach equals .304. With a feed of .0035 we need 87 revolutions. Since the tool spindles rotate 30 revolutions (approximately 1/2 the revolutions of the work spindles) in the opposite direction, the work spindles would have 57 effective revoluctions. 30 revoluctions plus 57 effective revolutions equals 87 revolutions. This completes the end working operations.

The forming can be done in the first and second position. We will be forming from .562 stock diameter to .296 diameter. The .296 diameter is obtained by using the .310 finished diameter minus .005 chamfer on piece minus .002 past into the cutoff. This would then be .005 plus .002 equals .007 x 2 both sides diameter equals .014. .310 minus .014 equals .296. Now .562 minus .296 equals .266, this divided by 2 (first and second position form) equals .133. Since .133 equals the diameter it is divided by 2 to find the rise needed on the cam, .0665 is the amount of rise needed. A feed of .0025 can be used for a total of 27 revolutions. Next to figure the cutoff .300 diameter plus .010 (.005 past center) equals .310. This divided by 2 equals .155 divide by .0025 feed per revolution equals 62 revolutions needed. The hole in the part goes into the cutoff, but not into the next part. This allows the part to be cut off at approximately 22 hundredths. The hole in the part is .150 diameter. This from the .300 outside diameter leaves .150 (double wall thickness). This dimension divided by 2 actual wall thickness one side .075. Using a standard 5/32 form and cutoff can (5-C-11) the rise is from 0-45. 5/32 divided by 45 hundredths equals .0035 per hundredth, .0035 divided into the .075 wall thickness gives us 21.4 hundredths (round this off to 22 hundredths). Using this standard cam the piece is now cutoff, and remainder of the cam rise continues to clean off the bar end.

It will take approximately 28 hundredths after part has been cutoff to drop back, have countersink arm swing down and countersink. After all these calculations, the threading is found to be the longest operation with 72 revolutions from 0-50.

To find cycle time take 1810 R.P.M. divide this by 60 seconds. This equals 30.167 revolutions per second. 30.167 divided into 72 equals 2.386. Round this off to 2.4 and add .4 for index time giving a total time of 2.8 per piece.

1810 RPM
60 seconds = 30.167 R.P.S.

72 Revolutions needed
30.167 R.P.S. = 2.386 Working Time

2.386 Seconds Working Time
+.4 Second Index Time
2.786 Total Time
2.8 Seconds Rounded Off

We see that it has a time cycle of 2.8 with a 50 tooth gear as the driver, driving a 60 tooth idler gear and this in turn drives an 80 tooth driven gear.

Now to proceed with the tooling for this job. In the first position use stock stop 2904-10-SA and adjustable drill holder 2717-SA. Into the drill holder we put a combination lathe center. This center has a 5/8" body and 1/4" drill. Rework the center making two tools from one lathe center. The reason this was used, it will break the edge of the hole to remove the burr while the form tool is facing the end. In the first position we rough form with holder (3060-1-1-SA) and carbide dovetail tool, the carbide dovetail tool was chosen because we will only be penetrating the skin when forming out the .544 diameter. Second position revolve drill 1/2 to 1 and use 2714-SA drill holder with a #25 (.1495) drill and drill bushing. This drills 1/2 the depth of the .1495 diameter hole. The second position circular form tool forms the diameters to within .004 of the finished part. Third position revolve drill 1/2 to 1 and use 2714-SA drill holder with a #25 (.1495) drill and special ddrill bushing. Drill the remainder of the depth of the .1495 diameter hole. The third position sizing tool holder 2726-0-SA with a circualr sizing tool and roll are used to bring the diameters and widths to the correct dimensions. In the fourth position use tap holder 2747-C-SA and a #10-24 N.C.-2 tap and bushing.

NOTE - Most taps have low cutting edges and should be fluted out before using. Fluting out a tap can be done with a mounted grinding wheel held in either an air or electric drill. The reason for fluting is to eliminate the low cutting edges produced when the thread is ground. NOTE - Form tools will also have low cutting edges unless ground with a cupped wheel. Fifth position blade tool holder 2768-SA and 3/32" wide cutoff blade, ground 1/16" wide, back 5/32" and off on a 45 angle. This gives us the maximum rigidity with the minimum width of cutoff. The left end must be countersunk. Use 1263-5-10-SA stationary head burring attachment to hold the part while being cutoff and countersunk.

It is advantageous to use the stationary head burring attachment with the countersinking arm and stop attachment 1263-119-1-SA. The burring attachment is a revolving spindle with an independently operated chuck in line with the work spindle in the fifth position. It is driven in the same direction and exactly the same speed as the work spindles.

Longitudinal movement of the spindle is controlled by a special cam mounted on the tool spindle cam carrier, in place of the cam ordinarily used to operate the fifth position tool spindle. The chuck is opened and closed by an adjustable cam on an extension of the regular cam carrier. To countersink the bushing, as shown, the burring spindle is moved forward and the chuck closed on the piece before it is severed from the bar. After the piece is cut off, the spindle drops back far enough to allow the countersink arm to swing into position, in front of the piece which is held in the burring chuck. The countersink arm is also independently operated from a special cam fastened to the carrier which opens and closes the burring chuck. The piece is then moved forward into the countersink which is held stationary in the arm. Dropping the spindle back again allows the arm to be swung out of the way. The chuck is then opened and the continued backward movement of the spindle ejects the finished piece. NOTE - Two special cams are required, one for the swing arm and the other to move the burring spindle.

After the tools and tool holders have been determined for each position and the rise on the cam determined for each position, select a cam for each operation. Choose from the list of standard cams which has a rise nearest the amount that the tool must be fed.

Selecting the cams for this job, we would use a 1/4 drill cam in the first position with the block set at .96. Which would give a rise of .229 plus .010 for approach. The forming in the first and second positions requires a rise of .0665, since we want to start our drills first and a light feed on the tools laps the edge away, a 3/32 rise cam has been selected. We should start our first drill in the first position with a point of 100 included angle. Then thin the point to have a minimum of thrust. In the second and third position we need a rise of .294 plus .010 for a total of .304. Use a drill point of 110° included in the second position and 120° included in the third, also thin these points. Always start a drill on the corners to have a true running hole, set the block location accordingly.

Location of the cam lever block is found by dividing the amount that the tool must be fed by the rise on the cam selected. For example, we need .294 plus .010 equals .304 feed for each drill operation. A 3/8 rise cam is the nearest to this, therefore, we divide .304 by 3/8 which equals .81 the location of the cam lever block. Recommended range of the block setting is from .8 to 1.2. In the third position we have listed a special cam to do the drilling operation. This is necessary for the third position drill to clear on the index, also in this position the dropback on the cam must be less so the collar on the tool spindle does not come back and hit the bronze tool spindle bearing.

CAUTION - Form and cutoff cams (6" diameter) can be used in place of turn and drill cams. However, turn and drill cams (7-1/2" diameter) cannot be used in place of form and cutoff cams.

Now to determine our threading. Note the threading portion is .375 of an inch long with 24 pitch threads. .375 x 24 equals 9 threads in the piece. With 9 threads in a piece and 3 threads minimum lead it is a total of 12 threads and it takes 6 revolutions to cut one thread

so therefore, we need 72 revolutions. Now to determine the cam for the tapping operation. 1810 R.P.M. times 32 driver divided by 32 driven to the low side of the threading clutch gives us a 21 driver and a 28 driven. The resultant in speed would be 1357 now taking this from 1810 we get a resultant speed of 453 R.P.M., 453 revolutions per minute divided by 60 seconds gives us the resultant of 7.54 revolutions per second. We now have 7.54 revolutions for one second of the job. To determine at 2.4 seconds, (our actual working time from 0 to 50.) Since we are only going to be using from 0 to 32-1/2 on the working portion of the cam, each hundredths of the cam represents 2% of the working portion of the cam. We, therefore, have 65% from 0 to 32-1/2. Now 65% of 18.10 gives us a total of 11.765 or divide 50 into 18.1 revolutions from 0-50; this equals .362 revolutions per hundredths times 32.5 hundredths equals 11.765 actual revolutions from 0 to 32-1/2 and a pitch of 24, we divide this into the number of revolutions that we have and find that the resultant is a cam rise of .490. Looking over our steel threading cams we find that the #4 cam which has a rise of .452 would be the closest to our desired rise. Now divide .452 into the rise that we found of .490 to get the block setting and we find this to be 1.08. This would be an approximation of the block setting for your threading cam. The following is an example of the above description:

$$\frac{1810 \text{ R.P.M.}}{1} \times \frac{32 \text{ Teeth}}{32 \text{ Teeth}} \times \frac{21 \text{ Teeth}}{28 \text{ Teeth}} = 1357.5 \text{ R.P.M. of Threading Spindle}$$

1810.0 R.P.M. of Work Spindle
-1357.5 R.P.M. of Threading Spindle
452.5 Threading R.P.M.

$$\frac{452.5 \text{ R.P.M.}}{60 \text{ Seconds}} = 7.54 \text{ Revolutions Per Second}$$

7.54 R.P.S.
x2.4 Seconds 0-50
18.1 Revolutions from 0-50

$$\frac{18.1 \text{ Revolutions from 0-50}}{50 \text{ Hundredths}} = .362 \text{ Per One Hundredth}$$

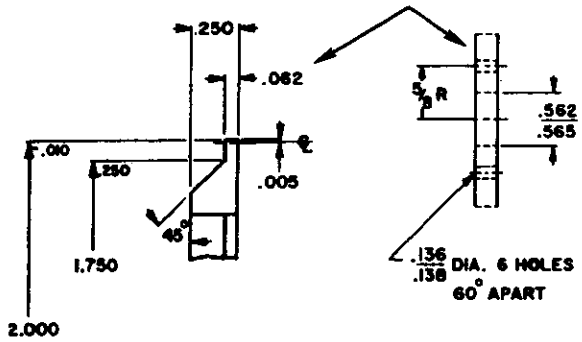
.362 Per One Hundredth
x32.5 0 to 32-1/2 Tapping Portion of Cam
11.7650 Revolutions from 0 to 32-1/2 Hundredths

$$\frac{11.765 \text{ Revolutions from 0 to 32-1/2}}{24 \text{ Threads Pitch}} = .4902 \text{ Rise Needed}$$

$$\frac{.4902 \text{ Rise Needed}}{.452 \text{ \#4 Thread Cam}} = 1.0845 \text{ Block Setting}$$

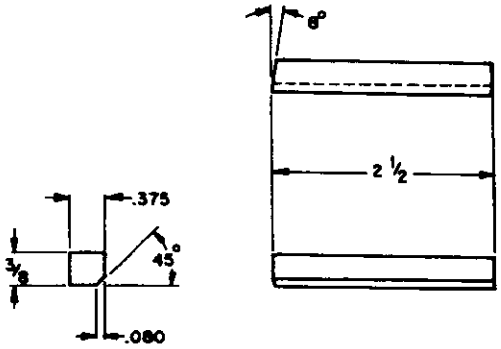
OR

18.1 Revolutions from 0-50
x65% Equals 0 to 32-1/2 Hundredths on Cam
11.765 Revolutions from 0 to 32-1/2 Hundredths



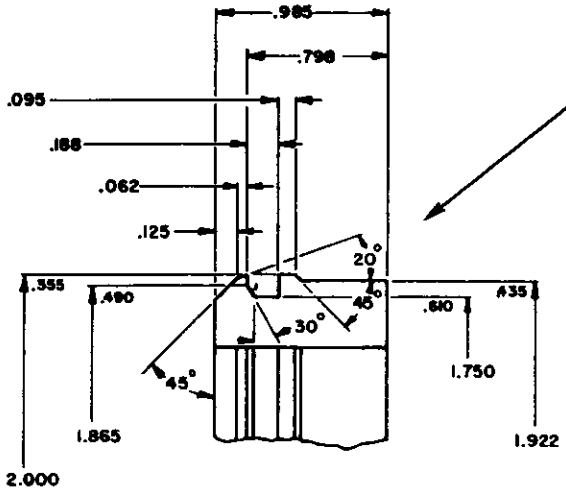
CIRCULAR CUTOFF TOOL

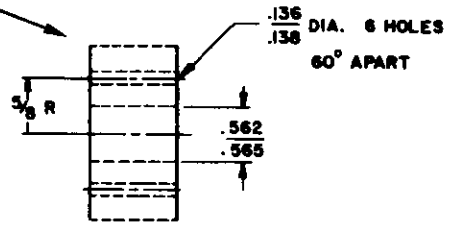
5 TH POS MAT'L.- T-15 PM H.S.S.
1 REQ'D HDN. R_c 64-66



SPECIAL BOX TOOL BLADE

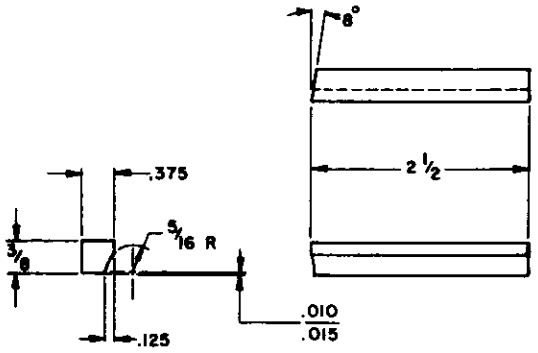
3 RD POS. MAT'L T-15 H.S.S.
1 REQ'D





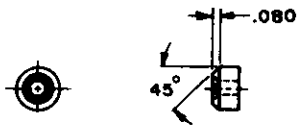
CIRCULAR FORM TOOL

2 ND POS MAT'L T-15 P M H.S.S.
1 REQ'D HDN. R_c 64-66



SPECIAL BOX TOOL BLADE

2 ND POS. MAT'L- T-15 H.S.S.
1 REQ'D



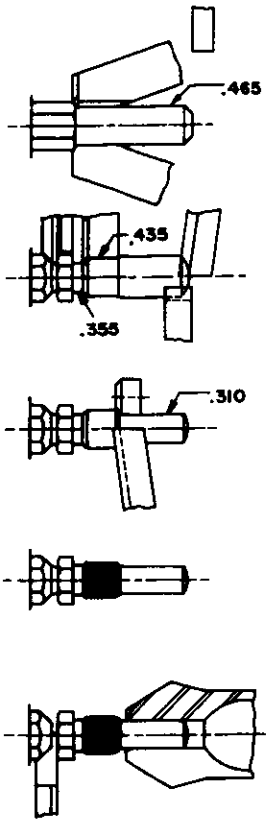
SPECIAL BOX TOOL ROLL

3 RD POS. MAT'L-(EXT. MACH) 2784-6-1
2 REQ'D

DASH FORM & CUT OFF TOOLS 1/4" BELOW CENTER DASH SERIES TOOLS 1/8" BELOW CENTER	DAVENPORT MACHINE TOOL DIV., DOVER CORPORATION, ROCHESTER, N.Y., U.S.A.	MARK ALL TOOLS A.J.L.-LO-2 DRAWN BY FRAUEL DATE 6/15/80	6393-1 NO.	DAVENPORT INSTRUCTION BOOK LAYOUT

MATERIAL 1/2" HEXAGON BRASS ROD | SURFACE FT. PER MIN. 453 | SPINDLE R.P.M. 3000 | GEARS 42-21 | CYCLE 75

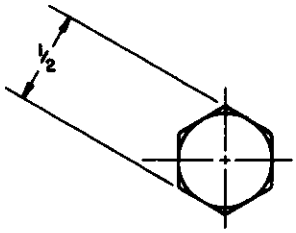
SEC. PER PIECE 2.4 | GROSS PER HOUR 1500 | FEED GEAR 60 (60 IDLER) | THREAD GEARS 32-32 LOWSIDE | MODEL "B" WITH THREADING

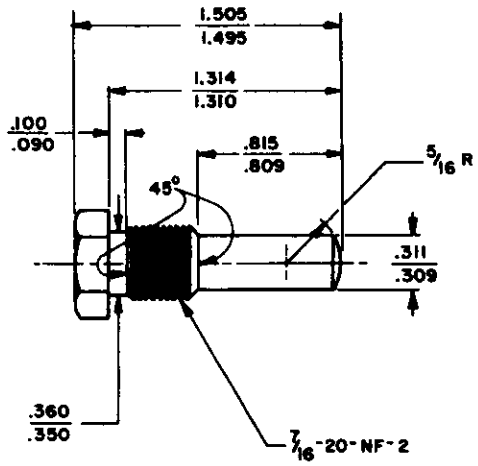


OPERATIONS	CAMS USED	FEED OF TOOL	FEED PER REV.	EFFEC REVS	BLOCK LOC'N
623-1-1-SA OIL SLEEVE					
STOP STOCK & ROUGH TURN	1 1/4	1 1/4	.0126	99	1.0
FACE RADIUS	1/8	.100	.0011	90	.8
FORM	1/8	1/8	.0014	90	1.0
FINISH TURN	7/8	13/16	.0083	98	.93
REVOLVE DIE HEAD 2250 RPM					
THREAD 7/16 -20 NF-2	4 BRASS	.625	.050	12.5	.93
CUTOFF	3/16	3/16	.0021	90	1.0
BURR	5-C -45-1	–	–	–	–

STATIONARY HEAD BURRING ATTACHMENT
1263-5-10-SA

- 5-1/2 HEXAGON CHUCKS
- 5-1/2 HEXAGON FEED FINGERS
- 1-E-2810 STOCK STOP
- 1-ADJUSTABLE HOLLOW MILL
- 1-E-2700-4 BOX TOOL
- 1-2ND POSITION SPECIAL BOX TOOL BLADE
- 1-CIRCULAR FORM TOOL
- 1-E-2785-1 BOX TOOL
- 1-3RD POSITION SPECIAL BOX TOOL BLADE
- 2-SPECIAL BOX TOOL ROLLS
- 1-2527-SA DIE OPENING & CLOSING ATTACHMENT
- 1-SELF OPENING DIE HEAD
- 1-SET 7/16-20 NF-2 CHASERS
- 1-CIRCULAR CUTOFF TOOL
- 1-1263-5-10-SA STATIONARY HEAD BURRING ATTACHMENT
- 1-5-C-45-1 BURRING CAM
- 1-646-23-1 .310 DIAMETER BURRING CHUCK
- 1-623-1-1-SA OIL SLEEVE





DASH FORM & CUT OFF TOOLS 1/4" BELOW CENTER DASH BEND TOOLS 1/8" BELOW CENTER	DAVENPORT MACHINE TOOL DIV. BARBER COLMAN CORPORATION ROCHESTER, N.Y., U.S.A.	MARK ALL TOOLS A.J.L.-LO-2 DRAWN BY FRAUEL DATE 6-16-80	NO. 6393	DAVENPORT INSTRUCTION BOOK LAYOUT

This is a tool layout for a brass adjusting screw. As the work spindles are run at high speed for brass, we find in the table the spindle speed, 3000 R.P.M. and also the gears to use, a 42 tooth driving a 21 tooth gear. By examining the operations to be performed, we find the finish turn is the longest operation. As this is to be fed by the feed per revolution to get the effective revolutions (13/16 divided by .009" equals 90 effective revolutions.

Repeating the procedure of the previous layout, we find the effective revolutions nearest to this in our charts, under the column "3000 R.P.M. of Spindle", which is 90. To the left of this column, we find the time in seconds to complete one piece of work is 2.4 seconds. The gross production is 1500 pieces per hour, and the feed gear has 60 teeth.

Next, find the feed per revolution of the remaining operations, select the cams and figure the location of the blocks.

A self opening die head is used to cut the thread. A detailed explanation of how to select the threading gears and figure the correct turn and drill cam to use will be found under the title, "Self Opening Dies".

The Stationary Head Burring Attachment is used to insure the piece being cut off without a burr.

The burring spindle is moved forward and the chuck closed on the piece soon after the cutting off tool starts the cut. After the cut off tool passes the point where the piece would normally break off, the piece is still being driven by the burring spindle and as the cutoff tool advances past this point, it completely removes the burr normally left on the piece.

The spindle then drops back, the chuck is opened and the continued backward movement ejects the finished piece. The cam (5-C-45-1) used to operate the burring spindle in this manner is furnished with the attachment.

The purpose in presenting these tool layouts is to show how, after the tool is selected, to apply it to the machine.

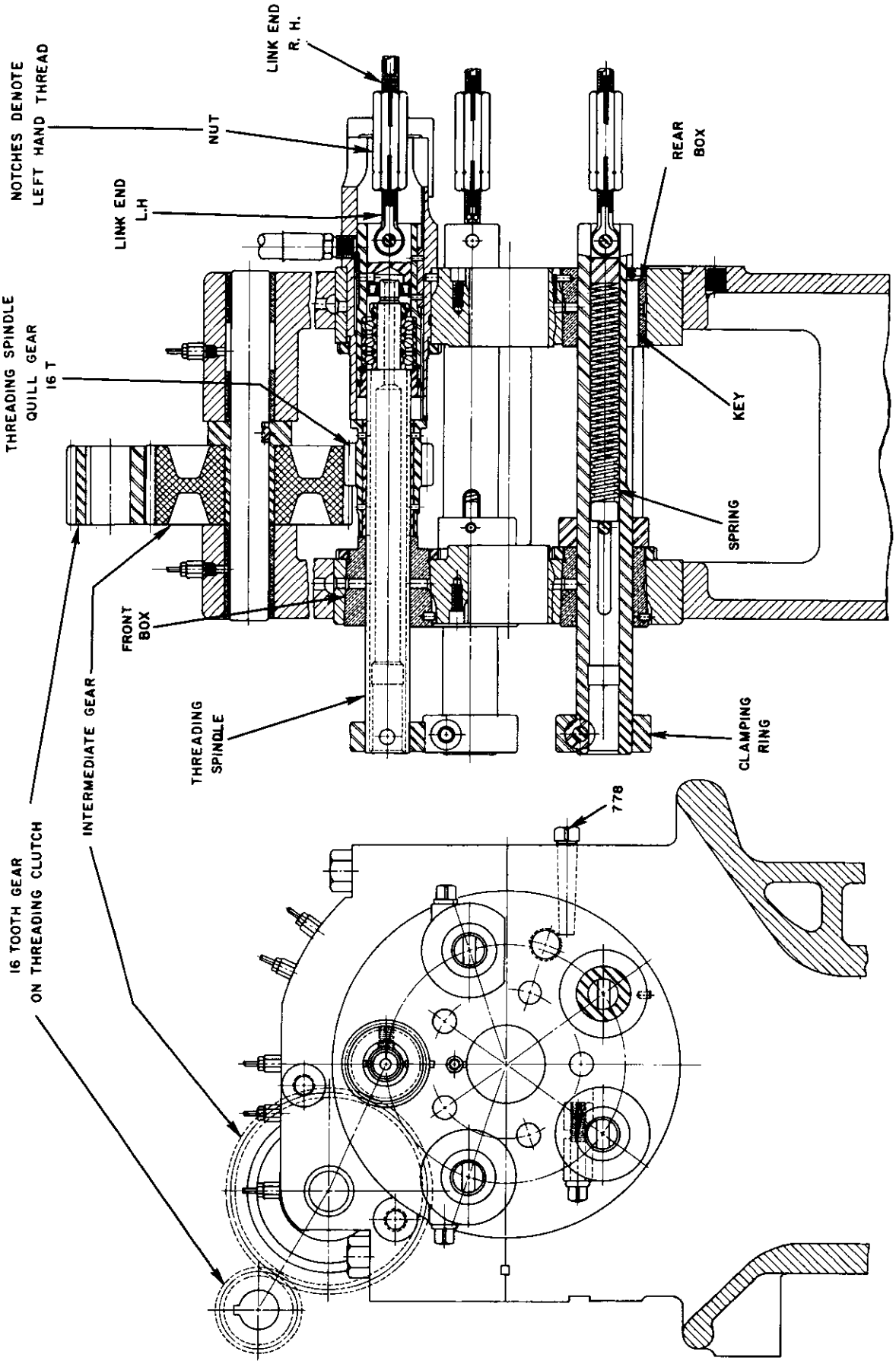
THE THREADING SPINDLE

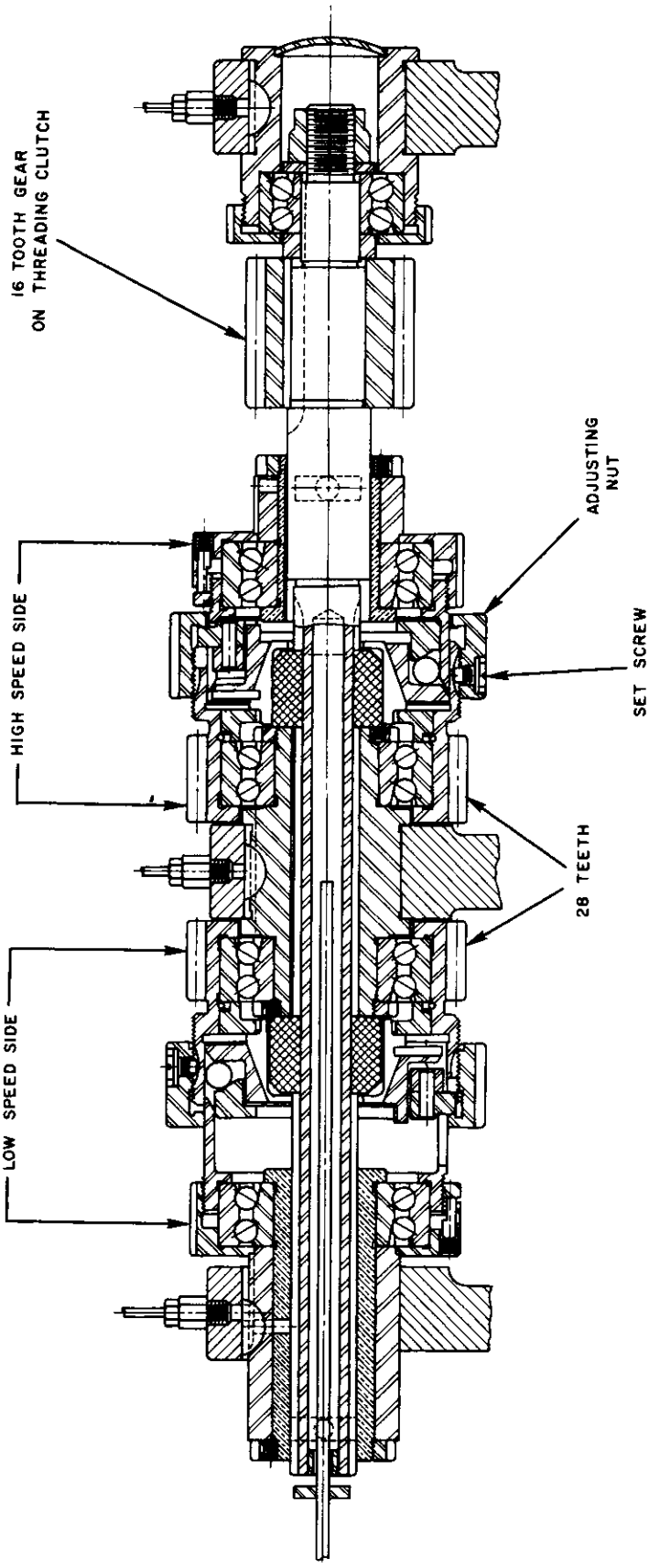
The threading spindle is hardened and ground; the front box is of phosphorous bronze and the rear box of cast iron. The term threading spindle is applied to this spindle, but this spindle is used for drilling, for broaching and for supporting the work.

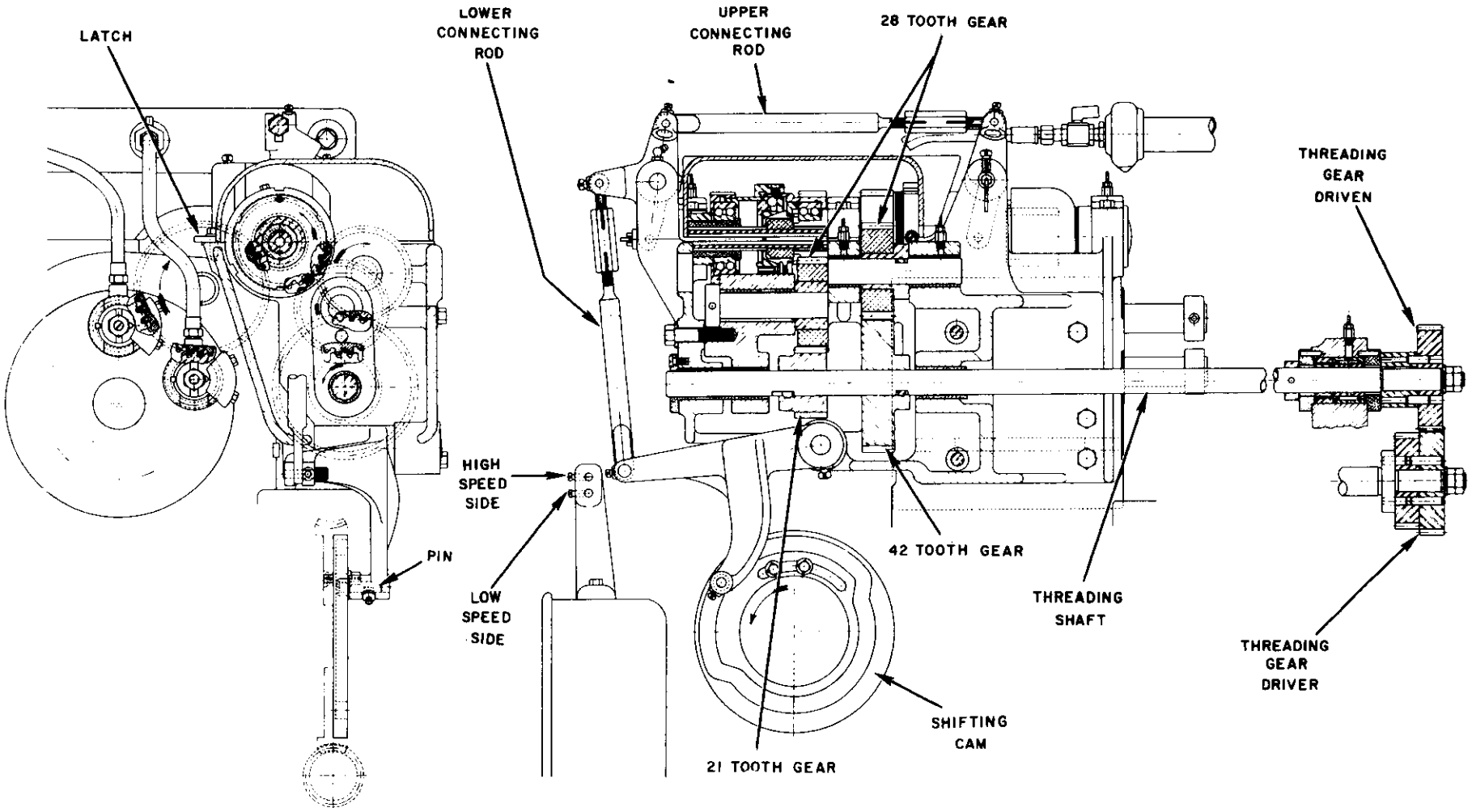
The thrust of the spindle is taken by a set of matched and marked bearings (three per set) held in a sliding sleeve. The threading spindle is driven by a quill gear which in turn is driven by an intermediate gear. This is driven from the threading clutch shaft. The intermediate gear is so located that two threading spindles may be used, one in the third position and one in the fourth position if so desired.

THE THREADING CLUTCHES

The threading clutches are located in the bracket at the rear of the stationary head. One clutch is referred to as the high speed side, the other the low speed side. To adjust the threading clutches, remove the set screw and tighten the nut the desired amount. Adjusting one slot of the clutch gear moves approximately .0026 which compressed the gripping sleeve on self-aligned clutch body by approximately .002 diameter. CAUTION - Never move more than one slot without checking with torque wrench. This ball type threading clutch shifts so easy it is absolutely necessary to use a torque wrench on the threading spindles when making an adjustment. Use a 3/4 inch plug held in the spindle with the clamping collar. The plug should have a hexagon head to suit the torque wrench. Adjust each side of the clutch to read 35 foot pounds when clutch has been run and is warmed to normal running temperature, checking often during the running-in period. NOTE - The clutch should be adjusted to read between 20 and 25 foot pounds when cold. The connecting rods with adjustable turnbuckles that shift the threading clutches must be kept properly adjusted to operate efficiently. Improperly adjusted rods may seriously damage the clutches. These rods must be adjusted separately as follows: First, disconnect the upper rod at the lever that operates the low speed side by removing the pin. The lower rod can now be adjusted to shift the low speed side correctly. If this rod is adjusted correctly, it will be approximately 1/32 from bottoming out at the end of the stroke engaging the clutch. With the roll on the low side of the clutch shifting cam, the upper rod is then reconnected and is adjusted to shift the high speed side in a similar manner, except that the roll is on the high side of the clutch shifting cam. The clutch shifting cam for operating the threading clutches is located in the worm wheel on the tool spindle cam shaft. This cam may be set to shift the clutches at the correct time. To set the clutch shifting cam loosen or if necessary remove the screws and move the line mark (zero) to one of the desired positions described on the following pages. These positions are marked on the outer rim of the worm wheel. (BR means Brass (2:1) right hand thread, SR means Steel (6:1) right hand thread.) If it is desired to use the threading spindle for other operations where it does not revolve, it can be held stationary by removing the gear on the end of the threading shaft. Also, the pin is removed from the lever and used to fasten the connecting rod in the lower hole of the casting. The low speed side is engaged and the latch is inserted between the gear.


NOTCHES DENOTE
LEFT HAND THREAD
LINK END
R. H.
NUT
LINK END
L.H
REAR
BOX
THREADING SPINDLE
QUILL GEAR
16 T
KEY
SPRING
FRONT
BOX
INTERMEDIATE GEAR
THREADING
SPINDLE
CLAMPING
RING
16 TOOTH GEAR
ON THREADING CLUTCH
778


16 TOOTH GEAR
ON THREADING CLUTCH
ADJUSTING
NUT
SET SCREW
HIGH SPEED SIDE
28 TEETH
LOW SPEED SIDE



THREADING ATTACHMENT

There are three basic threading methods used, and the 2:1 threading method will be described first.

2:1 THREADING METHOD (Formerly Brass Method)

To cut right hand threads the threading shaft is driven by two gears. A 36 tooth driver and 27 tooth driven. The intermediate on the low speed side on the swinging arm is moved out of mesh. The latch is inserted between the teeth of the gear to prevent the low speed side from revolving. The line mark (zero) and the clutch shifting cam is moved to the position (BR). This setting shifts the clutch from the low speed side, which is stopped, to the high speed side at the highest point of a brass threading cam, which is normally 25 hundredths. The threading spindle is stopped running on and revolved twice the speed of the work spindle in the same direction running off requiring two revolutions on the work spindle to cut one thread on and off.

NOTE - We do not recommend the work spindle speed to exceed 2500 R.P.M. when running the clutch in this manner. 2500 R.P.M. work spindle, threading clutch low speed stopped, (Going In) and threading spindle stationary; shift threading clutch to high side to revolve the threading spindle 5000 R.P.M. (Coming Out) NOTE - We do not recommend this clutch over 5000 R.P.M.

To cut left hand threads; everything remains the same as for right hand threads except the line marked (zero) on the clutch shifting cam is moved to the position (BL). This setting shifts the clutch from the high speed side to the low speed side which is stopped at the highest point on the threading cam. The work spindles are revolved at any speed up to 2500 R.P.M. The threading spindle is revolved at twice the speed of the work spindle, in the same direction running on, and is stopped running off requiring two revolutions of the work spindle to cut one thread on and off. The cutting speed of the threading tool is the same as cutting on the other tools.

6:1 THREADING METHOD (Formerly Steel Method)

To cut right hand threads the threading shaft is driven by two gears, a 32 tooth driver and a 32 tooth driven, both of which are located in the rear of the machine next to the spindle change gears. The 28 tooth idler gear mounted on the swinging arm is moved so it meshes with the 21 tooth gear on the low speed side and the latch is withdrawn. The line mark (zero) and the clutch shifting cam are moved to position (SR). This setting shifts the clutch from the low speed side to the high speed side at the highest point of the steel (6:1) threading cam, normally 32-1/2 hundredths which operates the threading spindle.

It may be necessary to vary this setting slightly after it is set on the mark, due to the load conditions and the speed of the cam shaft for various jobs. The threading spindle is revolved at 3/4 of the speed of the work spindle in the same direction, while the threading tool is running on. It revolves 1-1/2 times the speed of the work

spindle in the same direction while the threading tool is running off, requiring six revolutions of the work spindle to cut one thread on and off. The cutting speed of the threading tool is 1/4 the cutting speed of the other tools. For example, if the work spindle speed is 1500 R.P.M. the threading spindle speed is 1125 R.P.M., when the threading tool is running on and 2500 R.P.M. when running off. (1500 R.P.M.'s times 32 divided by 32 times 21 divided by 28 low speed side equals 1125 R.P.M. on). (1500 R.P.M.'s times 32 divided by 32 times 42 divided by 28 high speed side equals 2250 R.P.M. off). The highest point of a standard steel (6:1) threading cam is 32-1/2 one hundredths, more of the circumferance of the cam is used to run the threading tool on than to run it off.

Now look at the example, we find it takes four revolutions to cut one thread. Since there is a differential of 375 R.P.M. between the work spindle and the threading spindle, the threading spindle going slower, but when coming off the threading spindle goes 2250 R.P.M. as opposed to 1500 R.P.M. for the work spindle. This is a differential of 750 R.P.M. Therefore, it would take two revolutions to come off one thread. Based on these figures it takes six revolutions to cut one thread on and off.

$$\frac{\text{1500 R.P.M. Spindle Speed}}{1} \times \frac{\text{32 driver}}{\text{32 driven}} \times \frac{\text{21 driver}}{\text{28 driven}} = \text{1125 R.P.M.}$$

1500 R.P.M. Work Spindle
-1125 R.P.M. Threading Spindle (On)
375 Cutting Revolutions (On)

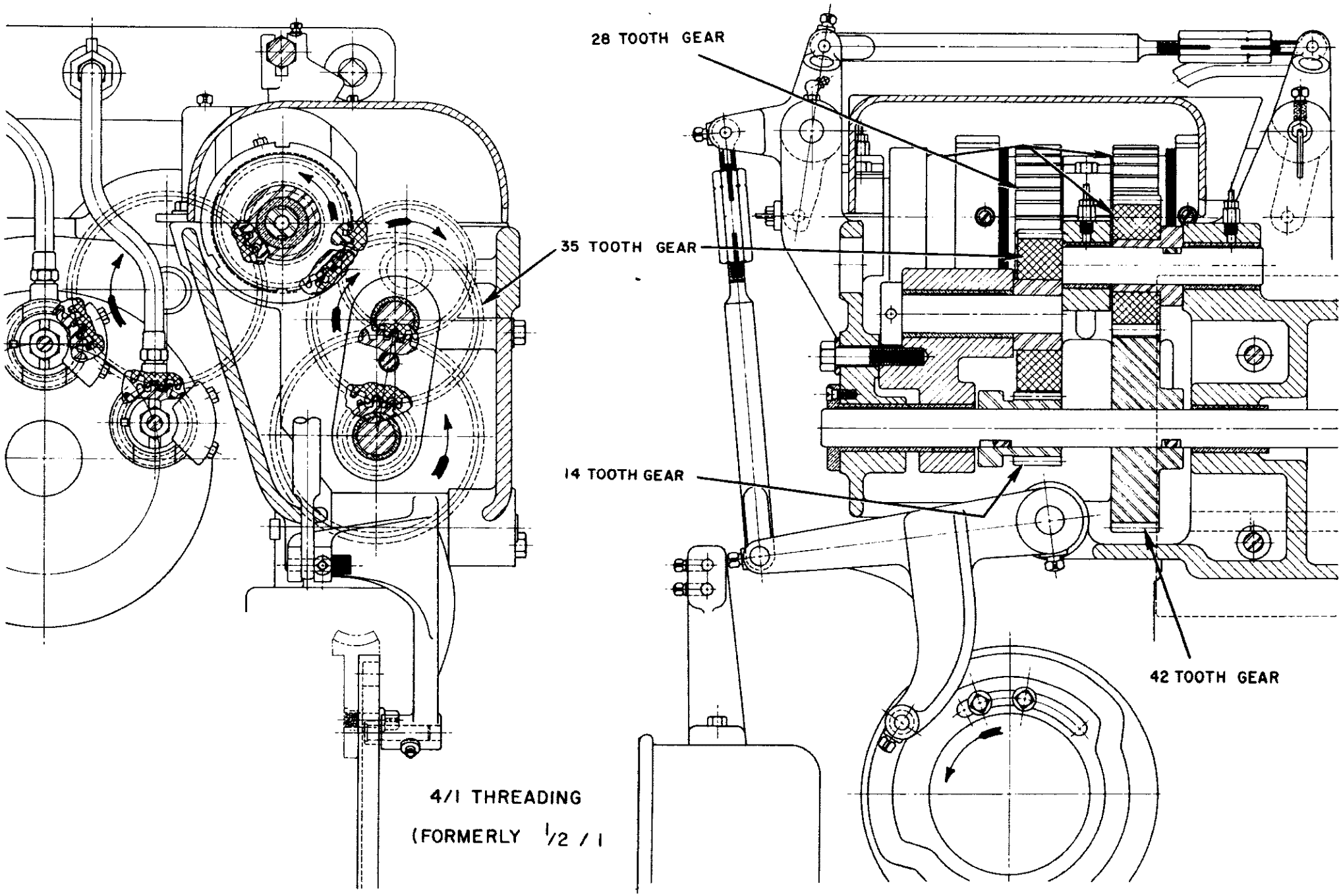
$$\frac{\text{1500 R.P.M. Spindle Speed}}{1} \times \frac{\text{32 driver}}{\text{32 driven}} \times \frac{\text{42 driver}}{\text{28 driven}} = \text{2250 R.P.M}$$

2250 R.P.M. Threading Spindle (Off)
-1500 R.P.M. Work Spindle
750 R.P.M. Cutting Speed (Off)

Assume a cycle time of 2.4 per piece, 2 seconds working time and .4 index or idle time. 375 R.P.M. equals the actual cutting speed of the work. Since this is revolutions per minute we break it down into revolutions per second by dividing this by 60. After dividing this by 60 we have revolutions per second. Using the desired working time that we have selected, we will deduct the index or idle time. This 2 second time multiplied by the revolutions per second that we have found will give us the number of revolutions in 50 hundredths. After obtaining this figure we divide this figure by 50 and multiply by 32-1/2, 0 hundredths to 32-1/2 hundredths would be a standard steel (6:1) threading cam giving us the number of effective revolutions in 32-1/2 hundredths. These revolutions divided by the pitch of the thread gives the desired rise on the cam. The cam nearest the rise we have obtained is now selected.

Divide the rise obtained by the rise on the cam that you are going tc use and you will find the block setting.

To cut left hand threads the threading shaft is driven by two


28 TOOTH GEAR
35 TOOTH GEAR
14 TOOTH GEAR
42 TOOTH GEAR
4/1 THREADING
(FORMERLY 1/2 / 1

gears, a 30 tooth driver and a 34 tooth driven. The mark zero on the clutch shifting cam is moved to the position (BL). This position is used because the standard 2:1 threading cam is used. This setting shifts the clutch from the high speed side to the low speed side at the highest point of the threading cam. The threading spindle is revolved at approximately 1-1/3 times the speed of the work spindle in the same direction running on, and it revolves approximatley 2/3's the speed of the work spindle in the same direction running off, requiring six revolutions of the work spindle to cut one thread on and off. The cutting speed of the threading tool is 1/3 the cutting speed of the other tools. If the work spindle is 1500 R.P.M., the threading spindle is 1985 R.P.M. running on and 993 R.P.M. running off. To arrive at this we go through the steps (1500 R.P.M. times 30 divided by 34 times 42 divided by 28 high speed side. This will equal 1985 R.P.M. on.) (1500 R.P.M. times 30 divided by 34 times 21 divided by 28 low speed side equals 993 R.P.M. off.)

$$\frac{\text{1500 R.P.M. Spindle Speed}}{1} \times \frac{\text{30 Driver}}{\text{34 Driven}} \times \frac{\text{42 Driver High Side}}{\text{28 Driven High Side}} = \text{1985 R.P.M.(On)}$$

1985 R.P.M. Threading Spindle
-1500 R.P.M. Work Spindle
485 R.P.M. Cutting Revolutions On

$$\frac{\text{1500 R.P.M. Spindle Speed}}{1} \times \frac{\text{30 Driver}}{\text{34 Driven}} \times \frac{\text{21 Driver Low Side}}{\text{28 Driven Low Side}} = \text{933 R.P.M. (Of}$$

1500 R.P.M. Work Spindle
-993 R.P.M. Threading Spindle
507 R.P.M. Cutting Revolutions Off

4:1 THREADING METHOD (Formerly 1/2:1 Threading Method)

This is another threading method that is a combination of our steel (6:1) method and our brass (2:1) threading method which was formerly called 1/2:1 threading method, this is now called 4:1 Threading Method. You can only cut right hand threads with this method, and must use a 32 tooth driver and a 32 driven gear on the threading shaft. (The 14 tooth gear on the low side replaces the 21 tooth gear that is normally there, and the 35 tooth idler gear replaces the 28 tooth idler gear that is normally there. Therefore, on the low side it goes to a 14 tooth driver to a 35 tooth idler to a 28 tooth driven). The shifting cam is moved so the zero and BR are in line. This shifts the clutch at 25 hundredths and uses a brass (2:1) threading cam. Assuming we have a 1500 R.P.M. spindle speed and 32-32 threading gears our formula for the low side would be thus:

$$\frac{\text{1500 Spindle Speed}}{1} \times \frac{\text{32 Driver}}{\text{32 Driven}} \times \frac{\text{14 Driver}}{\text{35 Idler}} \times \frac{\text{35 Idler}}{\text{28 Driven}} = \text{750 R.P.M.}$$

1500 Work Spindle
-750 R.P.M. Threading Spindle
750 R.P.M. Cutting Revolutions On

For the high speed side the example would be thus:

$$\frac{1500 \text{ Spindle Speed}}{1} \times \frac{32 \text{ Driver}}{32 \text{ Driven}} \times \frac{42 \text{ Driver}}{28 \text{ Driven}} = 2250 \text{ R.P.M.}$$

2250 Threading Spindle
-1500 Work Spindle Speed
750 R.P.M. Cutting Revolutions Off

Take the 750 R.P.M. divide it by 60 to give us the revolutions per second. Now take the seconds selected to do the job less the index time, multiplied by the revolutions per second and you have the effective revolutions that may be cut. Divide this by the pitch of the thread and select the desired brass (2:1) threading cam. Take the rise of the desired brass (2:1) threading cam and divide this into the rise obtained from dividing the pitch into the number of effective revolutions. This will give you the block setting.

It should be noted under threading that special cams can be used to work in conjunction with special side working cams. The line marked zero on the clutch shifting cam can be moved forward and backward. However, if it is moved far enough to allow only one screw to hold the clutch shifting cam the rear worm wheel should be removed and another bushing added to make sure there are two screws holding the clutch shifting cam.

There is a quick, easy and accurate way to determine the rise of a threading cam for any of the standard methods used for threading the machine. First, determine the number of threads that can be cut for any given cycle time using the appropriate threading method. Divide the number of threads that can be cut by the number of threads per inch. This will give you the true rise of the necessary threading cam. The appropriate threading cam can then be selected from the list of threading cams. Select the cam nearest the computed rise and adjust the block of the cam lever as necessary.

SELF-OPENING DIE HEADS

Self-Opening Die Heads either rotating or non-rotating may be used if desired to cut any of the various materials depending on the surface feet required. Two methods of rotating a self-opening die head are: from the center drive with special gears or using the threading clutch, either the high or low side of the clutches. The special gears are generally used in the second position, but may be used in any position. To cut a right hand thread you would use a smaller gear on the center drive and a larger gear on the spindle. Therefore, a standard threading cam can be used or a standard turn and drill cam utilizing the full 50 hundredths of the cam to cut a thread. It is not recommended to rotate the die head over 2250 R.P.M., as centrifical force tends to keep the die head from closing. To cut a left hand thread just reverse this procedure, use a larger gear on the center drive and a smaller gear on the spindle. The following is an example for right hand thread:

$$\frac{1500 \text{ R.P.M. Spindle Speed}}{1} \times \frac{20 \text{ Center Drive Gear}}{28 \text{ Thrd. Spindle Gear}} = 1071.43 \text{ Threading Spindle}$$

1500 R.P.M. Spindle Speed
-1071 R.P.M. Threading Spindle
429 R.P.M. Cutting Revolutions Right Hand

TO CUT RIGHT HAND THREADS (Using Threading Attachment)

Threading shaft is driven by two gears that may be selected in the threading spindle speed chart for self-opening die heads. The 28 tooth gear mounted on the swinging arm is moved so that it meshes with the gear on the low speed side and the latch is withdrawn. Also, the pin is removed from the lever and used to fasten the connecting rod in the lower hole of the casting, thus engaging the low speed side of the clutch.

The threading spindle is revolved at 3/4 of the speed of the work spindle, in the same direction. The cutting speed of the die is 1/4 the speed of the other cutting tools.

For example, if the work spindle is 1500 R.P.M., the threading spindle speed is 1125 R.P.M.:

$$1500 \text{ R.P.M.} \times \frac{32 \text{ Teeth}}{32 \text{ Teeth}} \times \frac{21}{28} \text{ (Low Speed Side)} = 1125 \text{ R.P.M.}$$

If it is desired to use the high speed side of the clutch disengage the gear on the swinging arm and insert the latch between the gear teeth taking the pin and fasten the connecting rod in the upper hole of the casting thus engaging the high speed side of the clutch.

TO CUT LEFT HAND THREADS

The same procedure is used to use either high or low side of the clutch as mentioned before. On the high speed side the gears to be used would be any combination of gears beginning with a 38 tooth gear driving 26 driver tooth gear. The combination of any two gears whose teeth add up to 64 can be used, provided the resultant is not greater than 2250 R.P.M. On the low side of the clutch, start with gears 38 tooth driving a 26 tooth, and proceed with combinations but not exceeding 2250 R.P.M. This will always drive the threading spindle faster than the work spindle thus, we can cut a left hand thread. Select the pair of gears that will give us the desired revolutions from zero to fifty, then we can use a standard cam.

To cut left hand threads, the threading shaft is driven by two gears, a 30 tooth driver and a 34 tooth driven. The pin holding the connecting rod is moved to the upper hole in the casting. This engages the high speed side.

The threading spindle is revolved at approximately 1-1/3 times the speed of the work spindle, in the same direction. The cutting speed of the die is approximately 1/3 the speed of the other cutting tools.

For example, if the work spindle speed is 1500 R.P.M., the threading spindle speed is approximately 2000 R.P.M.:

$$1500 \text{ R.P.M.} \times \frac{30 \text{ Teeth}}{34 \text{ Teeth}} \times \frac{3}{2} \text{ High Speed Side} = 1985 \text{ R.P.M.}$$

To select the correct turn and drill cam and the location of the cam lever block, use the following formulas:

Work spindle speed multiplied by driver divided by driven multiplied by 3/4 (if right hand thread) or 3/2 (if left hand thread) equals R.P.M. of threading spindle.

The difference in R.P.M. between the work spindle and threading spindle equals threading revolutions in one minute.

Threading revolutions in one minute multiplied by the working time (time in seconds to complete one piece) minus the idle time (.4 second 75 cycle machine, .5 second 60 cycle machine, .66 second 45 cycle machine) divided by 60 equals threading revolutions during the working portion (0-50) of a standard turn and drill cam.

Threading revolutions during working time divided by the number of threads per inch equals rise of cam necessary. The block can be adjusted to allow die to pull ahead slightly.

Select a standard turn and drill cam from list on cam page with a rise nearest to rise of cam necessary. Rise of cam necessary divided by the rise on the turn and drill cam selected equals location of the cam lever block.

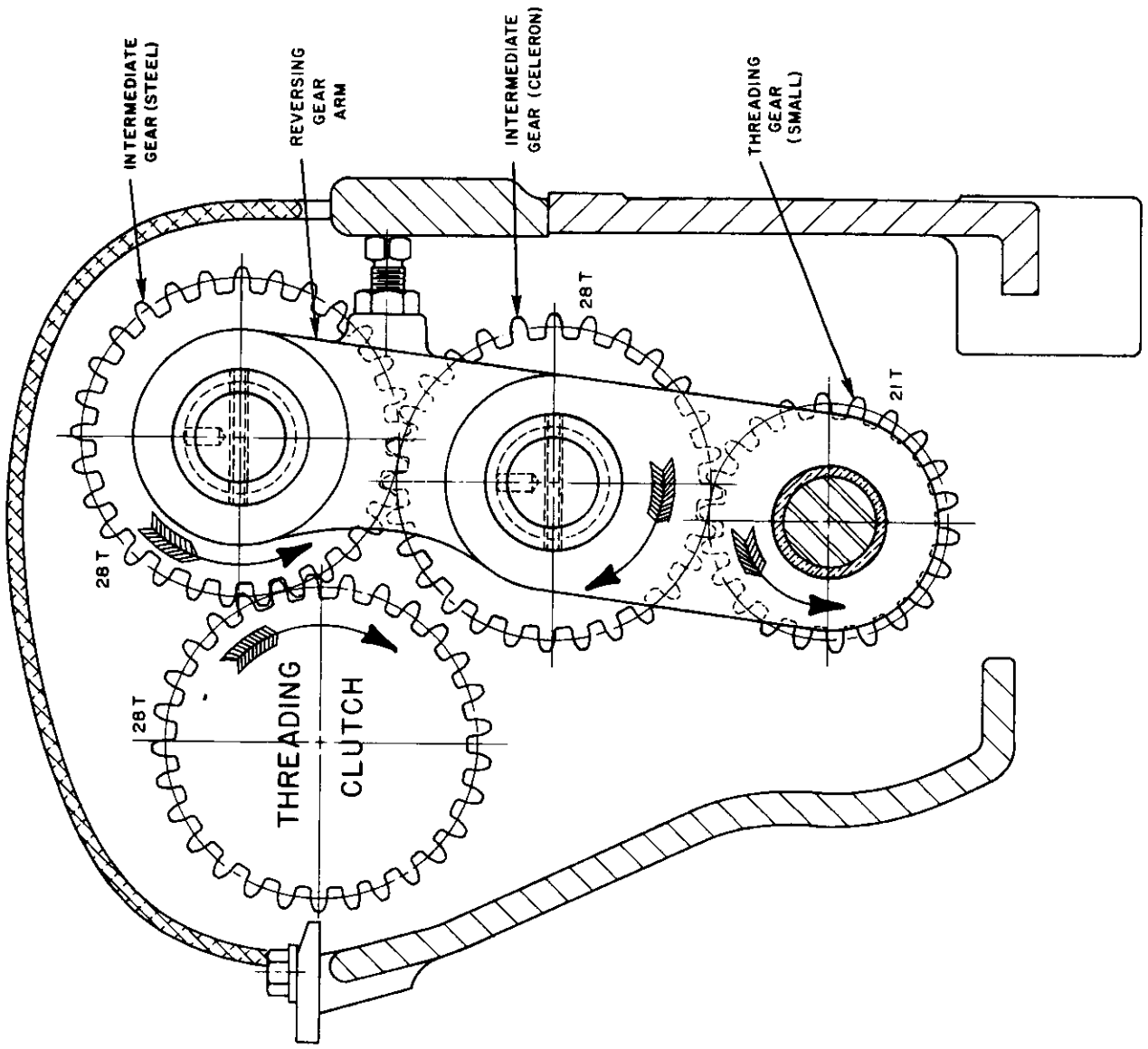
For example, if the work spindle speed is 1500 R.P.M., the time in seconds to complete one piece is 4.4 and the thread is 24 pitch right hand:

$$1500 \text{ R.P.M.} \times \frac{32 \text{ Teeth}}{32 \text{ Teeth}} \times \frac{3}{4} = 1125 \text{ R.P.M. of Threading Spindle}$$

$$\begin{array}{l} 1500 \text{ R.P.M. of Work Spindle} \\ -1125 \text{ R.P.M. of Threading Spindle} \\ \hline 375 \text{ Threading Revolutions Per Minute} \end{array}$$

375 multiplied by 4 seconds in working time equals 1500, 1500 divided by 60 equals 25 threading revolutions during working time. 25 threading revolutions divided by 24 (Threads per Inch) equals 1.041" Rise of Cam Necessary. Standard turn and drill cam selected with rise nearest is 1" or approximately 1.04 location of block.

NOTE - Always make certain that the number of threading revolutions during working portion, is at least three revolutions more than the number of threads to be cut, to allow for the lead in the chasers.


INTERMEDIATE GEAR (STEEL)
REVERSING GEAR ARM
INTERMEDIATE GEAR (CELERON)
THREADING GEAR (SMALL)
28 T
28 T
21 T
28 T
THREADING CLUTCH

When it is found there are many more revolutions than necessary to safely cut the number of threads required, it is advisable to increase the speed of the threading spindle when cutting right hand threads, or decrease the speed of the threading spindle when cutting left hand threads. This thereby reducing the threading revolutions per minute.

USING THE REVERSING BLOCK

This is a special attachment that can be purchased as an addition to the standard threading attachment, and is used to revolve the threading spindle clockwise (right hand) to thread or drill when the work spindle is stopped. Example: Spindle speed is 2500 R.P.M., time to complete one piece is 1.8 seconds, the thread is 32 pitch right hand with 1/4" of thread. Checking the chart for 75 cycle self opening die heads at 2500 R.P.M., we find that the gear changes will give too many revolutions or exceed the recommended surface feet. So, an 18 tooth driver and a 46 tooth driven are adequate. If there were not enough revolutions with this combination, we would have to increase the time cycle.

$$\frac{\text{2500 R.P.M. Spindle Speed}}{1} \times \frac{\text{18 Driver}}{\text{46 Driven}} \times \frac{\text{21 Driver}}{\text{28 Driven}} = \text{733.7 R.P.M. Thrd Revolutions}$$

$$\frac{\text{733.7 R.P.M. Threading Revolutions}}{\text{60 Seconds}} = \text{12.23 Revolutions per Second}$$

$$\frac{\text{12.23 Revolutions per Second}}{1} \times \frac{\text{1.4 Working Time}}{1} = \text{17.12 Revolutions From 0-50}$$

$$\frac{\text{17.12 Revolutions from 0-50}}{\text{50 Hundredths}} = \text{.34239 Revolutions per Hundredth}$$

$$\frac{\text{.34239 Revolutions Per Hundredth}}{1} \times \frac{\text{32.5 Hundredths of Working Time Threading Cam}}{1} = \text{11.127 Effective Revolutions From 0-32.5}$$

$$\frac{\text{11.127 Effective Revolutions form 0-32.5}}{\text{32 Pitch of Thread}} = \text{.3477 Rise Needed on Cam}$$

$$\frac{\text{.3477 Rise Needed on Cam}}{\text{.317 \#3 Steel Threading Cam}} = \text{1.096 Block Location on Cam Lever}$$

SUPPORTING WITH THE THREADING SPINDLE

In the event that we have a threading attachment on the machine and we do not have the necessary equipment to run a support spindle off the center drive in the 3rd or 4th positions, we can run it off of the threading attachment. Threading spindles can be used, by driving it in the same direction as the work spindle at exactly the same spindle speed. To do this we drive the threading shaft with two gears, a 36 tooth driver and a 27 tooth driven. The pin is used to lock the clutch in the low side by fastening the connecting rod in the lower hole of the casting. This rotates the spindle in the

same direction as the work spindles, at the same spindle speed. For example, the work spindle speed is 1500 R.P.M., the threading spindle is also 1500 R.P.M. in the same direction. 1500 R.P.M. times 36 divided by 27 times 21 divided by 28 equals 1500 low side.

DRILLING WITH THE THREADING SPINDLE

There are many times when it would be advantageous to drive the threading spindle in the opposite direction to the work spindles and use it as a drilling spindle. This can be done by locking the clutch in either of the high or low side and driving the threading shaft (5080-226-49) directly from the spindle change gear drive shaft (651-A-5). The only extra equipment necessary is a pair of special gears, 49 tooth driver and 44 tooth driven. On a 75 cycle machine, using this method, a drilling spindle speed of 2507 R.P.M. can be obtained if locked in the high speed side or 1254 R.P.M. if locked in the low speed side plus the speed of the work spindle. For example, if the work spindle speed is 1501 R.P.M. and the clutch is locked on the low speed side, the threading spindle is driven 1254 R.P.M. in the opposite direction to the work spindle, given a combined drilling speed of 2755 R.P.M. 1501 R.P.M. times 49 divided by 44 times 21 divided by 28 low speed side equals 1254 actual R.P.M. So we have 1501 R.P.M. plus 1254 opposite direction equals 2755 R.P.M. combined drilling speed actual. The work spindle speed is 1501 R.P.M. and the clutch is locked in the high speed side, the threading spindle is driven 2507 R.P.M. in the opposite direction to the work spindle. The combined drilling speed would be 4008 R.P.M. 1501 R.P.M. times 49 divided by 44 times 42 divided by 28 high speed side equals 2507 R.P.M. actual. 1501 R.P.M. plus 2507 R.P.M. opposite direction equals 4008 R.P.M. combined drilling speed actual.

CAPACITY - REGULAR MACHINE

Maximum standard Capacity of Regular Chucks (646) - 5/8 Round, 9/16 Hexagon, and 7/16 Square.

Regular Capacity of Feed Tube (5080-636-1) - 9/16 Round, 1/2 Hexagon, and 13/32 Square.

Regular Threaded Feed Fingers with .531 hole (645) - 1/2 Round, 7/16 Hexagon, and 23/64 Square.

Regular Threaded Feed Fingers (Drilled Out) with .594 hole (645) - 9/16 Round, 1/2 Hexagon, and 13/32 Square.

Special Feed Tubes with Soldered In Feed Fingers (5080-636-2)

Soldered In Feed Fingers (645-1) - 5/8 Round, 9/16 Hexagon, and 7/16 Square.

Master Feed Fingers (645-36)

Regular Master Feed Finger Pads (645-35) - 7/16 Round, 3/8 Hexagon, and 5/16 Square.

Feed Tube Nut Bushings (644-2-3) - 5/8 Round, 9/16 Hexagon, and 7/16 Square.

CAPACITY - OVERSIZE MACHINE

Maximum Standard Capacity of Oversize Chucks (2110) - 7/8 Round, 3/4 Hexagon, and 5/8 Square.

Oversize Capacity of Feed Tube (5080-2105) - 13/16 Round, 11/16 Hexagon, and 9/16 Square.

Standard Oversize Feed Fingers (2109) - 23/32 Round, 5/8 Hexagon, and 1/2 Square.

Oversize Threaded Feed Fingers (2109-1) - 13/16 Round, 11/16 Hexagon, and 9/16 Square.

Oversize One Piece Feed Tube (MB-5209) - 7/8 Round, 3/4 Hexagon, and 5/8 Square.

Master Feed Fingers (2109-9)

Oversize Master Feed Finger Pads (2109-9-1) - 11/16 Round, 9/16 Hexagon, and 7/16 Square.

Left End Feed Finger (2109-14)

Left End Feed Finger Pad (2109-14-1) - 7/8 Round, 3/4 Hexagon, and 5/8 Square.

GENERAL INFORMATION

Longest Length Feed Regular 3"

Special blocks can be furnished to feed 4-1/2" long.

Standard on Extended Bed

Longest length feed Extended Bed Machine 4-1/2" long.

Longest length turned 2-1/2"

Longest length turned Extended Bed Machine 3" long.

Number of changes of spindle speeds - 27

Range of Spindle Speeds:

75 Cycle	500 R.P.M.	to 4500 R.P.M.
60 Cycle	400 R.P.M.	to 3600 R.P.M.
45 Cycle	311 R.P.M.	to 2799 R.P.M.

Number of changes of feed gears - 61

75 Cycle	.8	to 18.4 seconds (.4 Index)
60 Cycle	1.	to 22.69 Seconds (.5 Index)
45 Cycle	1.3	to 29.6 Seconds (.666 Index)

Drive Shaft Speed

75 Cycle	1501 R.P.M.	8.6 P.D. Pulley Driven by 7.4 P.D. Motor Pulley
60 Cycle	1217 R.P.M.	8.6 P.D. Pulley Driven by 6.0 P.D. Motor Pulley
45 Cycle	933 R.P.M.	8.6 P.D. Pulley Driven by 4.6 P.D. Motor Pulley

Handwheel Shaft Speed

75 Cycle	750 R.P.M.
60 Cycle	609 R.P.M.
45 Cycle	467 R.P.M.

Indexing Head and Feeding Stock

75 Cycle	.4 Seconds
60 Cycle	.5 Seconds
45 Cycle	.66 Seconds

6:1 Threading Method (Formerly Steel Threading Method)
Threading spindle revolves in same direction as work spindle, at a ratio of 3 to4, while threading tool is running on the work, and at 3 to 2 while running off (right hand threads).

2:1 Threading Method (Formerly Brass Threading Method)
Threading spindle is stopped when tool is running on, but runs twice the speed of the work spindle when running off (right hand threads).

4:1 Threading Method (Formerly 1/2:1 Threading Method)
Threading spindle runs 1/2 the revolutions of the work spindle going on and 1-1/2 times the revolutions of the work spindle coming off.

Diameter of Circular Form Tools - 2"

Diameter of Hole in Tool Spindle - 3/4"

Outside Diameter of Tool Spindle - 1-3/8"

Minimum Distance Between Chuck and Tool Spindle Standard Machine - 2-1/8"

Minimum Distance Between Chuck and Tool Spindle Extended Bed Machine - 4-1/8"

Minimum Distance Between Chuck and Tool Spindle Extended Bed Machine - with Special Spindles - 2-1/8"

Maximum Distance Between Chuck and Tool Spindle - 4-13/16"

Maximum Distance Between Chuck and Tool Spindle Extended Bed Machine - 6-13/16"

Diameter of Standard Turning Cams - 7-1/2"

Diameter of Standard Form and Cutoff Cams - 6"

Thickness of Cams - 3/8"

Machine Designed for Motor Drive
We recommend 7-1/2 H.P., totally enclosed, fan cooled, ball bearing motor.

Motor, magnetic switch and push button, with all wiring in conduits are extra.

Floor space - 39" x 177"

Distance from top spindle to floor - 44-1/2"

Standard Equipment With Each Machine:

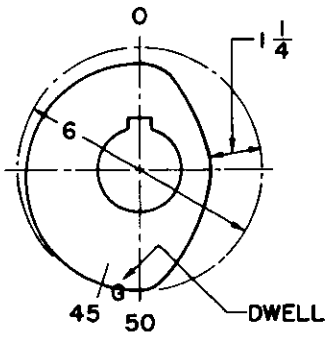
Chucks and Feed Fingers - 5 Each
Cams - 9 Standard
Spindle Change Gears - 2
Feed Change Gear - 1
Threading Change Gears - 2
Wrenches, Screw Drivers, Etc.

Dimensions & Weights

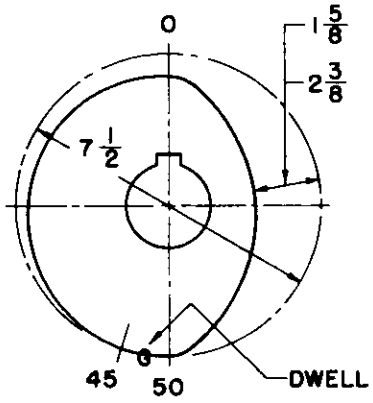
Size Crate - Machine 45"W x 98"L x 69"H
Size Crate - Machine with Silencer 55"W x 98"L x 77"H
Net Weight - Machine 3600 LBS. (Domestic or Foreign)
Net Weight - Machine with Silencer 3900 LBS. (Domestic or Foreign)
Net Weight - Wire Case Carrier - 175 LBS (Domestic or Foreign)
Net Weight - Wire Case Carrier with Silencer Cover 175 LBS. (Domestic or Foreign)
Gross Weight - Machine 3800 LBS. (Domestic Crated)
Gross Weight - Machine with Silencer 4300 LBS. (Domestic Crated)
Gross Weight - Wire Case Carrier 225 LBS. (Domestic Crated)
Gross Weight - Wire Case Carrier with Silencer Cover - 225 LBS. (Domestic Crated)
Gross Weight - Machine 4100 LBS (Foreign Crated)
Gross Weight - Machine with Silencer 4400 LBS (Foreign Crated)
Gross Weight - Wire Case Carrier 325 LBS. (Foreign Crated)
Gross Weight - Wire Case Carrier with Silencer Cover 325 LBS. (Foreign Crated)

OUTLINE OF STANDARD CAMS

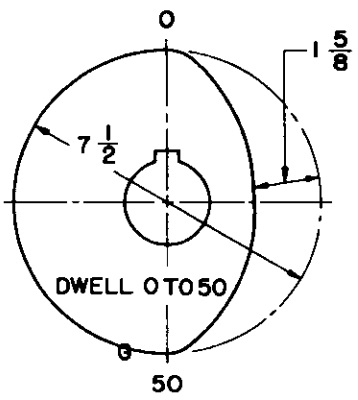
HOLE IN ALL CAMS 2" DIA. KEYWAY $\frac{1}{2}$" WIDE X $\frac{17}{64}$" DEEP
WORKING PORTION 0 TO 50 IDLE PORTION 50 TO 0



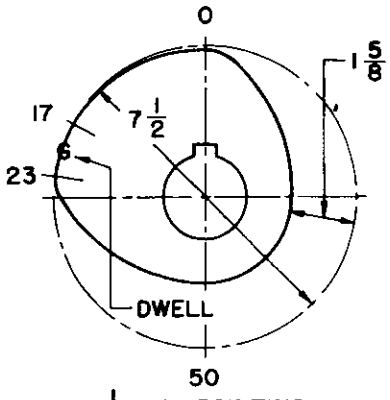
FORM & CUT OFF



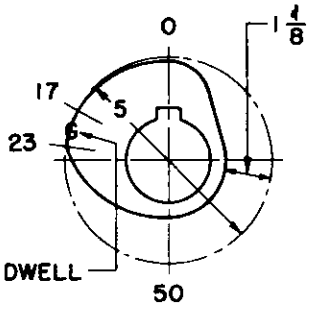
TURN & DRILL



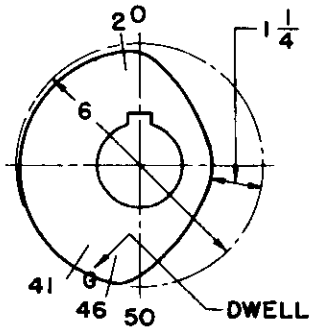
SUPPORT



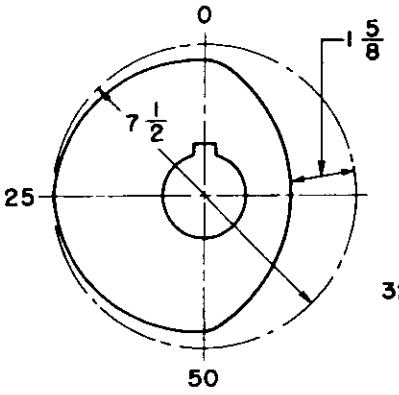
$\frac{1}{32}$ HIGH POINTING



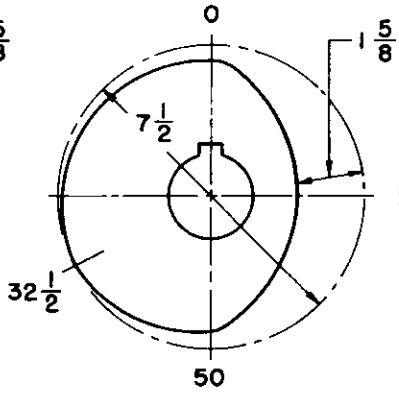
$\frac{1}{32}$ LOW POINTING



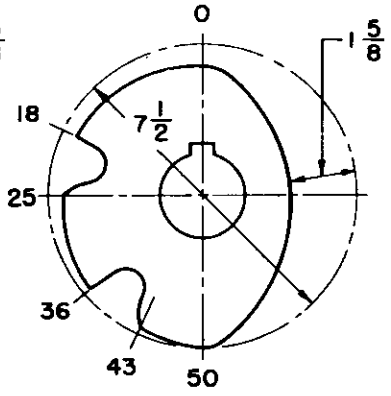
RECESS PUSHER



BRASS THREADING



STEEL THREADING



SPECIAL DRILL

Recess Pusher Cam - 5-C-31
Rise (.100" 2-41) Dwell 41-46, Drop 1-1/4"

Support Cam - 5-C-32-1
Dwell 1-52, Drop 1-5/8"

Low Pointing Cam - 5-C-42
Rise (1/32" 0-17) Dwell 17-32, Drop 1-1/8"

High Pointing Cam - 5-C-44
Rise (1/32" 0-17) Dwell 17-32, Drop 1-5/8"

6:1 THREADING CAMS (Formerly Steel Threading Cams)

CAM #	RISE	100ths	DROP	100ths	PART #
1	.118"	0-32½	.137"	32½-50	5-C-118
2	.200"	0-32½	.232"	32½-50	5-C-98
3	.317"	0-32½	.366"	32½-50	5-C-100
4	.452"	0-32½	.540"	32½-50	5-C-102
5	.715"	0-32½	.825"	32½-50	5-C-104
6	1.140"	0-32½	1.320"	32½-50	5-C-106
7	1.740"	0-32½	2.100"	32½-50	5-C-108
8	2.000",	8½-32½	2.000"	32½-43¼	5-C-110
9	2.000"	16½-32½	2.000"	32½-39½	5-C-112
10	2.000"	22½-32½	2.000"	32½-37	5-C-114

2:1 THREADING CAMS (Formerly Brass Threading Cams)

CAM #	RISE	100ths	DROP	100ths	PART #
1	.238"	0-25	.276"	25-50	5-C-82
2	.389"	0-25	.450"	25-50	5-C-84
3	.560"	0-25	.657"	25-50	5-C-86
4	.675"	0-25	.782"	25-50	5-C-88
5	1.095"	0-25	1.265"	25-50	5-C-90
6	1.525"	0-25	1.770"	25-50	5-C-92
7	2.000"	5-25	2.000"	25-42½	5-C-94
8	2.000"	12-25	2.000"	25-37	5-C-80

LIST OF STANDARD CAMS (Usually in Stock)

FORM AND CUTOFF CAMS
Rise 0-45, Dwell 45-50, Drop 1-1/4"

1/32"	5-C-3
1/16"	5-C-5
3/32"	5-C-7
1/8 "	5-C-9
5/32"	5-C-11
3/16"	5-C-13
7/32"	5-C-15
1/4 "	5-C-17
9/32"	5-C-19
5/16"	5-C-21
11/32"	5-C-23
3/8 "	5-C-25
13/32"	5-C-27
7/16"	5-C-29

TURN AND DRILL CAMS

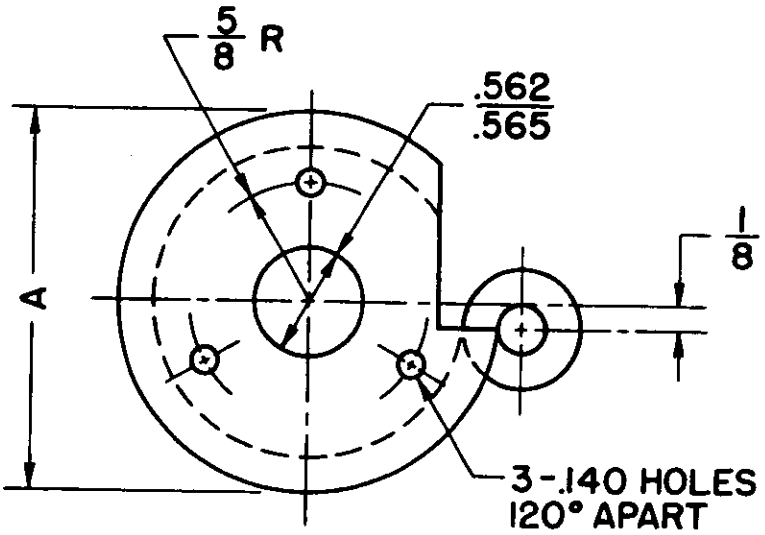
RISE	100ths	DWELL	DROP	PART #
1/8"	0-46	46-50	1-5/8"	5-C-4
1/4"	0-48	48-50	1-5/8"	5-C-6
3/8"	0-48½	48½-50	1-5/8"	5-C-8
1/2"	0-49	49-50	1-5/8"	5-C-10
5/8"	0-49	49-50	1-5/8"	5-C-12
3/4"	0-49	49-50	1-5/8"	5-C-14
7/8"	0-49	49-50	1-5/8"	5-C-16
1"	0-49½	49½-50	1-5/8"	5-C-18
1-1/8"	0-49½	49½-50	1-5/8"	5-C-20
1-1/4"	0-49½	49½-50	2-3/8"	5-C-22
1-1/2"	0-49½	49½-50	2-3/8"	5-C-24
1-3/4"	0-48½	48½-49	2-3/8"	5-C-26
2"	0-48½	48½-49	2-3/8"	5-C-28
2-1/8"	0-48½	48½-49	2-3/8"	5-C-30

STANDARD SPINDLE CHANGE GEARS	
5330-16	16 Teeth
5330-18	18 Teeth
5330-20	20 Teeth
5330-21	21 Teeth
5330-23	23 Teeth
948	24 Teeth
5330-25	25 Teeth
949	26 Teeth
5330-27	27 Teeth
950	28 Teeth
5330-29	29 Teeth
951	30 Teeth
5330-31	31 Teeth
952	32 Teeth
5330-33	33 Teeth
953	34 Teeth
5330-35	35 Teeth
954	36 Teeth
955	38 Teeth
5330-39	39 Teeth
956	40 Teeth
5330-41	41 Teeth
5330-42	42 Teeth
5330-44	44 Teeth
5330-46	46 Teeth
5330-48	48 Teeth
5330-49	49 Teeth

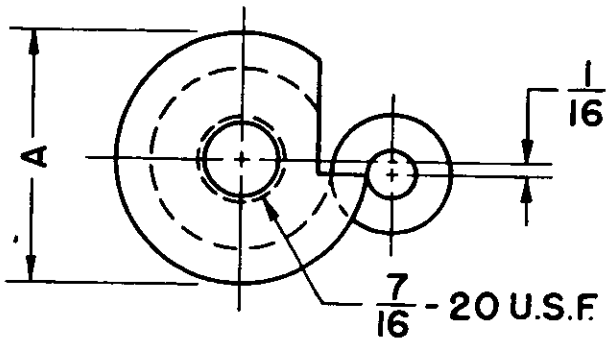
STANDARD FEED CHANGE GEARS	
5320-20	20 Teeth
5320-21	21 Teeth
5320-23	23 Teeth
5320-24	24 Teeth
5320-25	25 Teeth
5320-26	26 Teeth
5320-28	28 Teeth
5320-29	29 Teeth
5320-30	30 Teeth
5320-31	31 Teeth
5320-32	32 Teeth
5320-34	34 Teeth
5320-36	36 Teeth
5320-38	38 Teeth
5320-39	39 Teeth
5320-40	40 Teeth
5320-43	43 Teeth
5320-44	44 Teeth
5320-48	48 Teeth
5320-50	50 Teeth
5320-52	52 Teeth
5320-54	54 Teeth
5320-60	60 Teeth
5320-64	64 Teeth
5320-67	67 Teeth
5320-75	75 Teeth
5320-86	86 Teeth
5320-99	99 Teeth

DECIMAL EQUIVALENTS OF FRACTION, WIRE GAUGE, LETTER AND METRIC SIZES

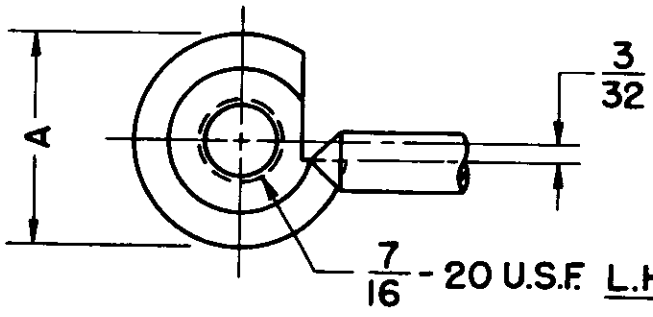
SIZE	DECIMAL INCHES	SIZE	DECIMAL INCHES	SIZE	DECIMAL INCHES	SIZE	DECIMAL INCHES	SIZE	DECIMAL INCHES	SIZE	DECIMAL INCHES
97	.0059	59	.0410	2.75mm	.1083	5mm	.1969	N	.3020	13mm	.5118
96	.0063	1.05mm	.0413	7/64	.1094	8	.1990	7.7mm	.3031	33/64	.5156
95	.0067	58	.0420	35	.1100	5.1mm	.2008	7.75mm	.3051	17/32	.5312
94	.0071	57	.0430	2.8mm	.1102	7	.2010	7.8mm	.3071	13.5mm	.5315
93	.0075	1.1mm	.0433	34	.1110	13/64	.2031	7.9mm	.3110	35/64	.5469
92	.0079	1.15mm	.0453	33	.1130	6	.2040	5/16	.3125	14mm	.5512
.2mm	.0079	56	.0465	2.9mm	.1142	5.2mm	.2047	8mm	.3150	9/16	.5625
91	.0083	3/64	.0469	32	.1160	5	.2055	0	.3160	14.5mm	.5709
90	.0087	1.2mm	.0472	3mm	.1181	5.25mm	.2067	8.1mm	.3189	37/64	.5781
.22mm	.0087	1.25mm	.0492	31	.1200	5.3mm	.2087	8.2mm	.3228	15mm	.5906
89	.0091	1.3mm	.0512	3.1mm	.1220	4	.2090	P	.3230	19/32	.5938
88	.0095	55	.0520	1/8	.1250	5.4mm	.2126	8.25mm	.3248	39/64	.6094
.25mm	.0098	1.35mm	.0531	3.2mm	.1200	3	.2130	8.3mm	.3268	15.5mm	.6102
87	.0100	54	.0550	3.25mm	.1280	5.5mm	.2165	21/64	.3281	5/8	.6250
86	.0105	1.4mm	.0551	30	.1285	7/32	.2188	8.4mm	.3307	16mm	.6299
85	.0110	1.45mm	.0571	3.3mm	.1299	5.6mm	.2205	Q	.3320	41/64	.6406
.28mm	.0110	1.5mm	.0591	3.4mm	.1339	2	.2210	8.5mm	.3346	16.5mm	.6496
84	.0115	53	.0595	29	.1360	5.7mm	.2244	8.6mm	.3386	21/32	.6562
.3mm	.0118	1.55mm	.0610	3.5mm	.1378	5.75mm	.2264	R	.3390	17mm	.6693
83	.0120	1/16	.0625	28	.1405	1	.2280	8.7mm	.3425	43/64	.6719
82	.0125	1.6mm	.0630	9/64	.1406	5.8mm	.2283	11/32	.3438	11/16	.6875
.32mm	.0126	52	.0635	3.6mm	.1417	5.9mm	.2323	8.75mm	.3445	17.5mm	.6890
81	.0130	1.65mm	.0650	27	.1440	A	.2340	8.8mm	.3465	45/64	.7031
80	.0135	1.7mm	.0669	3.7mm	.1457	15/64	.2344	S	.3480	18mm	.7087
.35mm	.0138	51	.0670	26	.1470	6mm	.2362	8.9mm	.3504	23/32	.7188
79	.0145	1.75mm	.0689	3.75mm	.1476	B	.2380	9mm	.3543	18.5mm	.7283
1/64	.0156	50	.0700	25	.1495	6.1mm	.2402	T	.3580	47/64	.7344
.4mm	.0157	1.8mm	.0709	3.8mm	.1496	C	.2420	9.1mm	.3583	19mm	.7480
78	.0160	1.85mm	.0728	24	.1520	6.2mm	.2441	23/64	.3594	3/4	.7500
.45mm	.0177	49	.0730	3.9mm	.1535	D	.2460	9.2mm	.3622	49/64	.7656
77	.0180	1.9mm	.0748	23	.1540	6.25mm	.2461	9.25mm	.3642	19.5mm	.7677
.5mm	.0197	48	.0760	5/32	.1562	6.3mm	.2480	9.3mm	.3661	25/32	.7812
76	.0200	1.95mm	.0768	22	.1570	E	.2500	U	.3680	20mm	.7874
75	.0210	5/64	.0781	4mm	.1575	1/4	.2500	9.4mm	.3701	51/64	.7969
.55mm	.0217	47	.0785	21	.1590	6.4mm	.2520	9.5mm	.3740	20.5mm	.8071
74	.0225	2mm	.0787	20	.1610	6.5mm	.2559	3/8	.3750	13/16	.8125
.6mm	.0236	2.05mm	.0807	4.1mm	.1614	F	.2570	V	.3770	21mm	.8268
73	.0240	46	.0810	4.2mm	.1654	6.6mm	.2598	9.6mm	.3780	53/64	.8281
72	.0250	45	.0820	19	.1660	G	.2610	9.7mm	.3819	27/32	.8438
.65mm	.0256	2.1mm	.0827	4.25mm	.1673	6.7mm	.2638	9.75mm	.3839	21.5mm	.8465
71	.0260	2.15mm	.0846	4.3mm	.1693	17/64	.2656	9.8mm	.3858	55/64	.8594
.7mm	.0276	44	.0860	18	.1695	6.75mm	.2657	W	.3860	22mm	.8661
70	.0280	2.2mm	.0866	11/64	.1719	H	.2660	9.9mm	.3898	7/8	.8750
69	.0292	2.25mm	.0886	17	.1730	6.8mm	.2677	25/64	.3906	22.5mm	.8858
.75mm	.0295	43	.0890	4.4mm	.1732	6.9mm	.2717	10mm	.3937	57/64	.8906
68	.0310	2.3mm	.0906	16	.1770	I	.2720	X	.3970	23mm	.9055
1/32	.0312	2.35mm	.0925	4.5mm	.1772	7mm	.2756	Y	.4040	29/32	.9062
.8mm	.0315	42	.0935	15	.1800	J	.2770	13/32	.4062	59/64	.9219
67	.0320	3/32	.0938	4.6mm	.1811	7.1mm	.2795	Z	.4130	23.5mm	.9252
66	.0330	2.4mm	.0945	14	.1820	K	.2810	10.5mm	.4134	15/64	.9375
.85mm	.0335	41	.0960	13	.1850	9/32	.2812	27/64	.4219	24mm	.9449
65	.0350	2.45mm	.0965	4.7mm	.1850	7.2mm	.2835	11mm	.4331	61/64	.9531
.9mm	.0354	40	.0980	4.75mm	.1870	7.25mm	.2854	7/16	.4375	24.5mm	.9646
64	.0360	2.5mm	.0984	3/16	.1875	7.3mm	.2874	11.5mm	.4528	31/32	.9688
63	.0370	39	.0995	4.8mm	.1890	L	.2900	29/64	.4531	25mm	.9843
.95mm	.0374	38	.1015	12	.1890	7.4mm	.2913	15/32	.4688	63/64	.9844
62	.0380	2.6mm	.1024	11	.1910	M	.2950	12mm	.4724	1	1.0000
61	.0390	37	.1040	4.9mm	.1929	7.5mm	.2953	31/64	.4844		
1mm	.0394	2.7mm	.1063	10	.1935	19/64	.2969	12.5mm	.4921		
60	.0400	36	.1065	9	.1960	7.6mm	.2992	1/2	.5000		



A- LARGEST DIAMETER OF FORM TOOL 2"
CENTER OF FORM TOOL IS 1/8" ABOVE CENTER OF WORK
TO PROVIDE PERIPHERY CLEARANCE



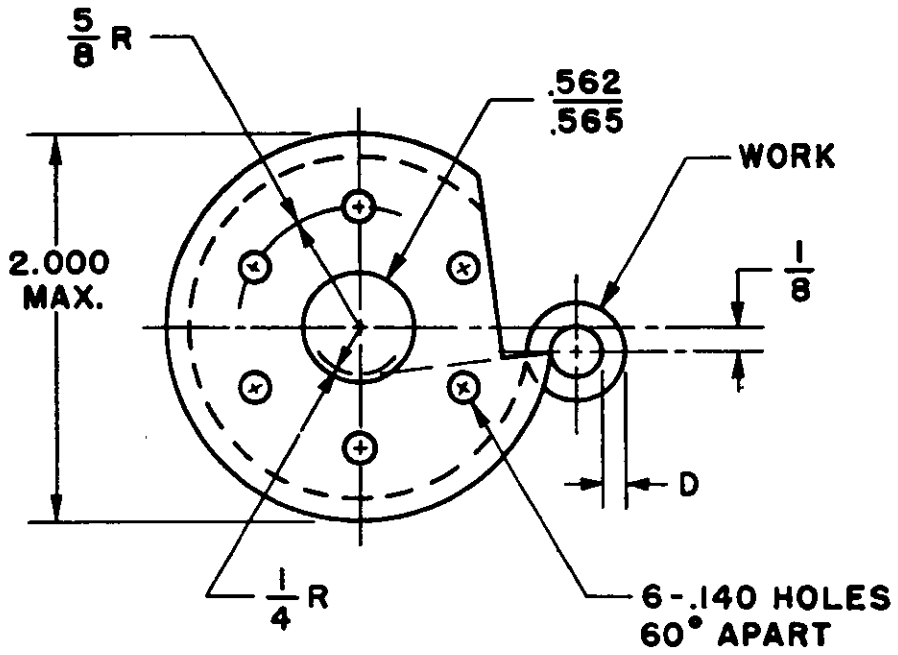
A- LARGEST POSSIBLE DIAMETER OF SIZING TOOL 1.300"
CENTER OF SIZING TOOL IS 1/16" ABOVE CENTER OF WORK
TO PROVIDE PERIPHERY CLEARANCE



A- LARGEST POSSIBLE DIAMETER OF POINTING TOOL 1 1/8"
CENTER OF POINTING TOOL IS 3/32" ABOVE CENTER OF
WORK TO PROVIDE PERIPHERY CLEARANCE

WHEN CALCULATING CORRECTED DIAMETERS OF CIRCULAR
TOOLS WE RECOMMEND THE TABLE IN MACHINERY HAND BOOK

TABLE OF CORRECTED DIAMETERS FOR 2.000″ FORM TOOLS



"D" = ½ the difference in diameter between the smallest work diameter and each succeeding work diameter.

The corrected tool diameters in this table are figured with the tool notched and cutting in the position shown in the illustration above.

The *maximum diameter* of the form tool is 2.000″.

INSTRUCTIONS

To find the other diameters of the tool for any piece to be formed, proceed as follows:

Subtract the smallest diameter of the work from that diameter of the work which is to be formed by the required tool diameter; divide the remainder by 2; locate the answer obtained in the column headed "D" and opposite this figure read off directly the corrected diameter to which the tool is to be made. For example: A piece of work to be formed has two diameters, one being .226″ and the other .500″; find the tool diameters. The maximum tool diameter is 2.000″. This will be the diameter that will form the .226″ diameter of the work. To find the other diameter, proceed according to the rule given:

.500″ minus .226″ = .274″; .274″ ÷ 2 = .137″ (D)
In the column under "D", opposite .137″ we find the required tool diameter — 1.7360″.

CUTTING OFF OR FACING END OF WORK

When the largest diameter of the tool is cutting beyond the center of the work, such as a cut off tool, double the amount the tool goes by center and add this to all other work diameters to be formed before calculating "D".

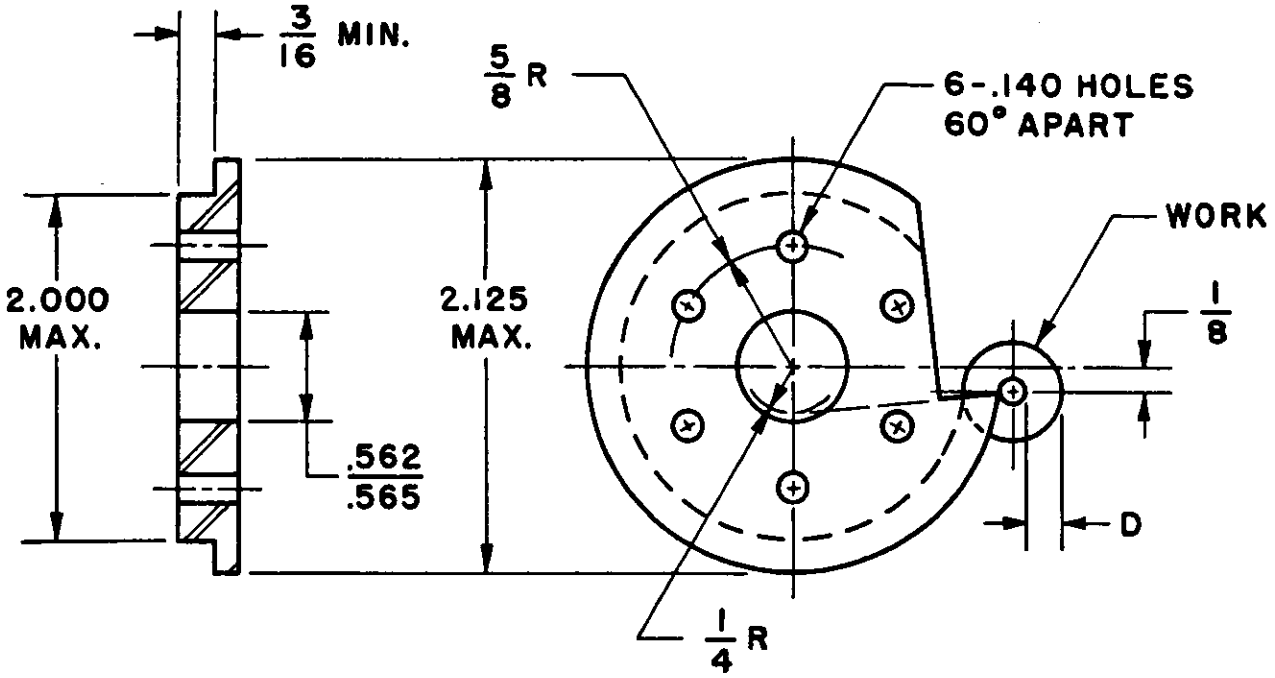
TABLE OF CORRECTED DIAMETERS FOR 2.000″ FORM TOOLS

D	Corrected Tool Dia.	D	Corrected Tool Dia.	D	Corrected Tool Dia.	D	Corrected Tool Dia.
.000″	2.000″	.054″	1.8954″	.108″	1.7916″	.162″	1.6881″
.001	1.9980	.055	1.8935	.109	1.7897	.163	1.6862
.002	1.9961	.056	1.8916	.110	1.7877	.164	1.6843
.003	1.9941	.057	1.8897	.111	1.7858	.165	1.6824
.004	1.9922	.058	1.8878	.112	1.7838	.166	1.6805
.005	1.9902	.059	1.8859	.113	1.7819	.167	1.6786
.006	1.9883	.060	1.8840	.114	1.7800	.168	1.6767
.007	1.9863	.061	1.8820	.115	1.7781	.169	1.6748
.008	1.9844	.062	1.8801	.116	1.7762	.170	1.6729
.009	1.9824	.063	1.8781	.117	1.7743	.171	1.6709
.010	1.9805	.064	1.8762	.118	1.7724	.172	1.6690
.011	1.9785	.065	1.8743	.119	1.7705	.173	1.6671
.012	1.9766	.066	1.8724	.120	1.7685	.174	1.6652
.013	1.9746	.067	1.8705	.121	1.7666	.175	1.6633
.014	1.9727	.068	1.8686	.122	1.7647	.176	1.6614
.015	1.9708	.069	1.8667	.123	1.7628	.177	1.6595
.016	1.9689	.070	1.8647	.124	1.7609	.178	1.6576
.017	1.9670	.071	1.8628	.125	1.7590	.179	1.6557
.018	1.9651	.072	1.8608	.126	1.7571	.180	1.6538
.019	1.9631	.073	1.8589	.127	1.7552	.181	1.6519
.020	1.9612	.074	1.8570	.128	1.7533	.182	1.6500
.021	1.9592	.075	1.8550	.129	1.7514	.183	1.6480
.022	1.9573	.076	1.8531	.130	1.7494	.184	1.6461
.023	1.9554	.077	1.8512	.131	1.7475	.185	1.6442
.024	1.9534	.078	1.8493	.132	1.7456	.186	1.6423
.025	1.9515	.079	1.8474	.133	1.7437	.187	1.6404
.026	1.9495	.080	1.8454	.134	1.7418	.188	1.6385
.027	1.9476	.081	1.8435	.135	1.7399	.189	1.6366
.028	1.9457	.082	1.8415	.136	1.7380	.190	1.6347
.029	1.9438	.083	1.8396	.137	1.7360	.191	1.6328
.030	1.9419	.084	1.8377	.138	1.7341	.192	1.6309
.031	1.9400	.085	1.8358	.139	1.7322	.193	1.6290
.032	1.9381	.086	1.8339	.140	1.7302	.194	1.6271
.033	1.9361	.087	1.8320	.141	1.7283	.195	1.6252
.034	1.9342	.088	1.8300	.142	1.7263	.196	1.6233
.035	1.9323	.089	1.8281	.143	1.7244	.197	1.6214
.036	1.9303	.090	1.8262	.144	1.7225	.198	1.6195
.037	1.9284	.091	1.8242	.145	1.7206	.199	1.6176
.038	1.9264	.092	1.8223	.146	1.7187	.200	1.6157
.039	1.9245	.093	1.8203	.147	1.7168	.201	1.6138
.040	1.9225	.094	1.8184	.148	1.7149	.202	1.6119
.041	1.9206	.095	1.8165	.149	1.7130	.203	1.6100
.042	1.9187	.096	1.8146	.150	1.7111	.204	1.6081
.043	1.9167	.097	1.8127	.151	1.7091	.205	1.6062
.044	1.9148	.098	1.8108	.152	1.7072	.206	1.6043
.045	1.9129	.099	1.8089	.153	1.7053	.207	1.6024
.046	1.9109	.100	1.8069	.154	1.7034	.208	1.6005
.047	1.9090	.101	1.8050	.155	1.7015	.209	1.5986
.048	1.9071	.102	1.8030	.156	1.6996	.210	1.5967
.049	1.9051	.103	1.8011	.157	1.6977	.211	1.5948
.050	1.9032	.104	1.7992	.158	1.6958	.212	1.5929
.051	1.9012	.105	1.7973	.159	1.6939	.213	1.5910
.052	1.8993	.106	1.7954	.160	1.6920	.214	1.5891
.053	1.8973	.107	1.7935	.161	1.6900	.215	1.5872

TABLE OF CORRECTED DIAMETERS FOR 2.000″ FORM TOOLS

D	Corrected Tool Dia.	D	Corrected Tool Dia.	D	Corrected Tool Dia.	D	Corrected Tool Dia.
.216″	1.5853″	.270″	1.4832″	.324″	1.3821″	.378″	1.2820″
.217	1.5834	.271	1.4813	.325	1.3802	.379	1.2801
.218	1.5815	.272	1.4794	.326	1.3784	.380	1.2782
.219	1.5796	.273	1.4776	.327	1.3765	.381	1.2764
.220	1.5777	.274	1.4758	.328	1.3746	.382	1.2746
.221	1.5758	.275	1.4739	.329	1.3727	.383	1.2728
.222	1.5739	.276	1.4720	.330	1.3708	.384	1.2710
.223	1.5720	.277	1.4701	.331	1.3690	.385	1.2691
.224	1.5701	.278	1.4682	.332	1.3672	.386	1.2672
.225	1.5682	.279	1.4663	.333	1.3653	.387	1.2654
.226	1.5663	.280	1.4644	.334	1.3634	.388	1.2636
.227	1.5644	.281	1.4626	.335	1.3616	.389	1.2618
.228	1.5626	.282	1.4608	.336	1.3598	.390	1.2599
.229	1.5607	.283	1.4589	.337	1.3579	.391	1.2580
.230	1.5588	.284	1.4570	.338	1.3560	.392	1.2562
.231	1.5569	.285	1.4551	.339	1.3541	.393	1.2544
.232	1.5550	.286	1.4532	.340	1.3522	.394	1.2526
.233	1.5531	.287	1.4513	.341	1.3504	.395	1.2508
.234	1.5512	.288	1.4494	.342	1.3486	.396	1.2490
.235	1.5493	.289	1.4475	.343	1.3468	.397	1.2471
.236	1.5474	.290	1.4456	.344	1.3449	.398	1.2452
.237	1.5455	.291	1.4438	.345	1.3430	.399	1.2434
.238	1.5436	.292	1.4419	.346	1.3412	.400	1.2415
.239	1.5417	.293	1.4400	.347	1.3393		
.240	1.5398	.294	1.4382	.348	1.3374		
.241	1.5379	.295	1.4364	.349	1.3356		
.242	1.5360	.296	1.4345	.350	1.3337		
.243	1.5341	.297	1.4326	.351	1.3318		
.244	1.5322	.298	1.4307	.352	1.3300		
.245	1.5303	.299	1.4288	.353	1.3281		
.246	1.5284	.300	1.4269	.354	1.3262		
.247	1.5265	.301	1.4250	.355	1.3244		
.248	1.5246	.302	1.4231	.356	1.3225		
.249	1.5228	.303	1.4212	.357	1.3206		
.250	1.5209	.304	1.4193	.358	1.3188		
.251	1.5190	.305	1.4174	.359	1.3170		
.252	1.5172	.306	1.4156	.360	1.3151		
.253	1.5153	.307	1.4138	.361	1.3132		
.254	1.5134	.308	1.4119	.362	1.3114		
.255	1.5115	.309	1.4100	.363	1.3096		
.256	1.5096	.310	1.4081	.364	1.3078		
.257	1.5078	.311	1.4062	.365	1.3060		
.258	1.5059	.312	1.4043	.366	1.3041		
.259	1.5040	.313	1.4024	.367	1.3022		
.260	1.5021	.314	1.4006	.368	1.3004		
.261	1.5002	.315	1.3988	.369	1.2986		
.262	1.4983	.316	1.3970	.370	1.2967		
.263	1.4964	.317	1.3952	.371	1.2949		
.264	1.4945	.318	1.3933	.372	1.2930		
.265	1.4926	.319	1.3914	.373	1.2911		
.266	1.4908	.320	1.3895	.374	1.2892		
.267	1.4889	.321	1.3876	.375	1.2874		
.268	1.4870	.322	1.3858	.376	1.2856		
.269	1.4851	.323	1.3840	.377	1.2838		

TABLE OF CORRECTED DIAMETERS FOR 2.125″ FORM TOOLS



"D" = ½ the difference in diameter between the smallest work diameter and each succeeding work diameter.

The corrected tool diameters in this table are figured with the tool notched and cutting in the position shown in the illustration above.

The *maximum diameter* of the form tool is 2.125″.

To find the other diameters of the tool for any piece to be formed, proceed according to the instructions given for 2.000″ diameter form tools.

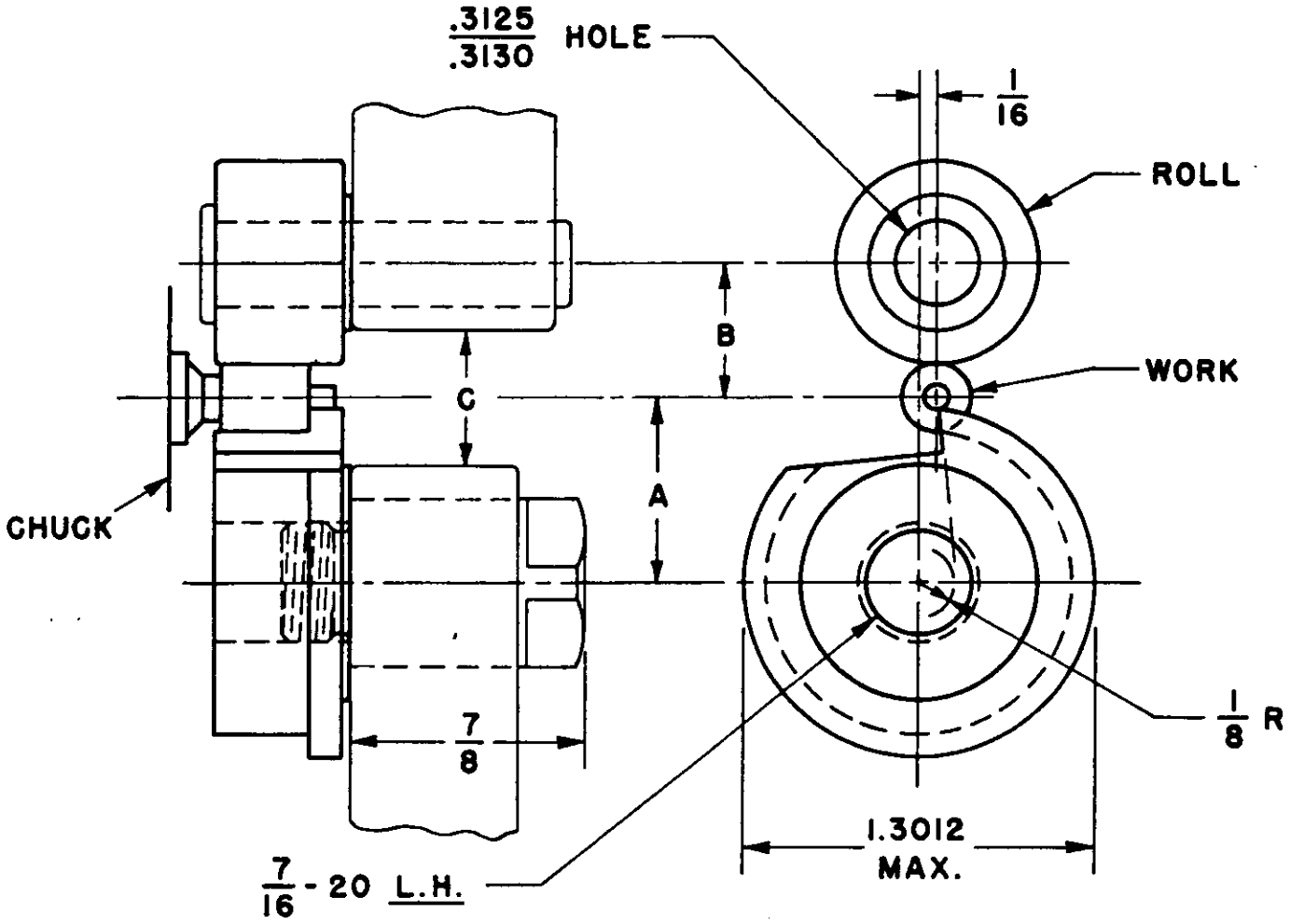
NOTE: All 2.125″ form tools must have a shoulder $\frac{3}{16}$″ wide (minimum) by 2.000″ diameter (maximum) on the side of the tool toward the chuck in order to fit the tool seats. This usually makes the inside cutting edge of the form tool $\frac{3}{16}$″ farther from the chuck than would be necessary with the 2.000″ diameter form tool. This larger diameter form tool is used to form diameters under .125″ and for cutting off on machines equipped with oversize spindles.

TABLE OF CORRECTED DIAMETERS FOR 2.125″ FORM TOOLS

D	Corrected Tool Dia.	D	Corrected Tool Dia.	D	Corrected Tool Dia.	D	Corrected Tool Dia.
.000″	2.125″	.054″	2.0203″	.108″	1.9157″	.162″	1.8117″
.001	2.1230	.055	2.0183	.109	1.9138	.163	1.8098
.002	2.1211	.056	2.0164	.110	1.9119	.164	1.8078
.003	2.1192	.057	2.0144	.111	1.9100	.165	1.8059
.004	2.1173	.058	2.0125	.112	1.9081	.166	1.8040
.005	2.1153	.059	2.0105	.113	1.9061	.167	1.8021
.006	2.1134	.060	2.0086	.114	1.9042	.168	1.8002
.007	2.1114	.061	2.0066	.115	1.9022	.169	1.7983
.008	2.1095	.062	2.0047	.116	1.9003	.170	1.7964
.009	2.1075	.063	2.0027	.117	1.8984	.171	1.7945
.010	2.1056	.064	2.0008	.118	1.8964	.172	1.7925
.011	2.1036	.065	1.9989	.119	1.8945	.173	1.7906
.012	2.1017	.066	1.9970	.120	1.8926	.174	1.7887
.013	2.0997	.067	1.9951	.121	1.8907	.175	1.7868
.014	2.0978	.068	1.9931	.122	1.8887	.176	1.7849
.015	2.0959	.069	1.9912	.123	1.8868	.177	1.7830
.016	2.0939	.070	1.9893	.124	1.8848	.178	1.7811
.017	2.0920	.071	1.9873	.125	1.8829	.179	1.7791
.018	2.0901	.072	1.9854	.126	1.8810	.180	1.7772
.019	2.0881	.073	1.9834	.127	1.8791	.181	1.7753
.020	2.0862	.074	1.9815	.128	1.8771	.182	1.7734
.021	2.0842	.075	1.9796	.129	1.8752	.183	1.7715
.022	2.0823	.076	1.9776	.130	1.8733	.184	1.7695
.023	2.0804	.077	1.9757	.131	1.8714	.185	1.7676
.024	2.0784	.078	1.9738	.132	1.8694	.186	1.7656
.025	2.0765	.079	1.9718	.133	1.8675	.187	1.7637
.026	2.0746	.080	1.9699	.134	1.8656	.188	1.7618
.027	2.0726	.081	1.9680	.135	1.8636	.189	1.7599
.028	2.0707	.082	1.9661	.136	1.8617	.190	1.7580
.029	2.0687	.083	1.9641	.137	1.8598	.191	1.7561
.030	2.0668	.084	1.9622	.138	1.8579	.192	1.7542
.031	2.0648	.085	1.9603	.139	1.8560	.193	1.7522
.032	2.0629	.086	1.9583	.140	1.8541	.194	1.7503
.033	2.0610	.087	1.9564	.141	1.8521	.195	1.7484
.034	2.0590	.088	1.9544	.142	1.8502	.196	1.7465
.035	2.0571	.089	1.9525	.143	1.8483	.197	1.7445
.036	2.0552	.090	1.9506	.144	1.8464	.198	1.7426
.037	2.0532	.091	1.9486	.145	1.8444	.199	1.7407
.038	2.0513	.092	1.9467	.146	1.8425	.200	1.7388
.039	2.0494	.093	1.9448	.147	1.8405	.201	1.7369
.040	2.0474	.094	1.9428	.148	1.8386	.202	1.7350
.041	2.0455	.095	1.9409	.149	1.8367	.203	1.7330
.042	2.0435	.096	1.9390	.150	1.8348	.204	1.7311
.043	2.0416	.097	1.9370	.151	1.8328	.205	1.7292
.044	2.0396	.098	1.9351	.152	1.8309	.206	1.7273
.045	2.0377	.099	1.9331	.153	1.8290	.207	1.7254
.046	2.0358	.100	1.9312	.154	1.8270	.208	1.7235
.047	2.0338	.101	1.9292	.155	1.8251	.209	1.7216
.048	2.0319	.102	1.9273	.156	1.8232	.210	1.7197
.049	2.0299	.103	1.9253	.157	1.8213	.211	1.7178
.050	2.0280	.104	1.9234	.158	1.8194	.212	1.7159
.051	2.0261	.105	1.9215	.159	1.8175	.213	1.7140
.052	2.0242	.106	1.9195	.160	1.8156	.214	1.7121
.053	2.0222	.107	1.9176	.161	1.8136	.215	1.7102

TABLE OF CORRECTED DIAMETERS FOR 2.125″ FORM TOOLS

D	Corrected Tool Dia.	D	Corrected Tool Dia.	D	Corrected Tool Dia.	D	Corrected Tool Dia.
.216″	1.7083″	.271″	1.6033″	.325″	1.5012″	.379″	1.3998″
.217	1.7064	.272	1.6014	.326	1.4993	.380	1.3979
.218	1.7045	.273	1.5995	.327	1.4974	.381	1.3960
.219	1.7025	.274	1.5976	.328	1.4955	.382	1.3942
.220	1.7006	.275	1.5957	.329	1.4936	.383	1.3923
.221	1.6987	.276	1.5938	.330	1.4917	.384	1.3905
.222	1.6968	.277	1.5920	.331	1.4898	.385	1.3886
.223	1.6949	.278	1.5901	.332	1.4880	.386	1.3867
.224	1.6930	.279	1.5882	.333	1.4861	.387	1.3849
.225	1.6910	.280	1.5863	.334	1.4842	.388	1.3830
.226	1.6891	.281	1.5844	.335	1.4824	.389	1.3811
.227	1.6872	.282	1.5825	.336	1.4805	.390	1.3792
.228	1.6853	.283	1.5806	.337	1.4786	.391	1.3774
.229	1.6834	.284	1.5787	.338	1.4767	.392	1.3755
.230	1.6815	.285	1.5768	.339	1.4748	.393	1.3737
.231	1.6796	.286	1.5749	.340	1.4729	.394	1.3719
.232	1.6777	.287	1.5730	.341	1.4710	.395	1.3700
.233	1.6758	.288	1.5711	.342	1.4691	.396	1.3681
.234	1.6739	.289	1.5692	.343	1.4672	.397	1.3662
.235	1.6720	.290	1.5673	.344	1.4654	.398	1.3644
.236	1.6700	.291	1.5654	.345	1.4635	.399	1.3625
.237	1.6681	.292	1.5635	.346	1.4616	.400	1.3606
.238	1.6662	.293	1.5616	.347	1.4598		
.239″	1.6643″						
.240	1.6624	.294	1.5597	.348	1.4579		
.241	1.6605	.295	1.5578	.349	1.4560		
.242	1.6586	.296	1.5559	.350	1.4541		
.243	1.6567	.297	1.5540	.351	1.4522		
.244	1.6548	.298	1.5521	.352	1.4505		
.245	1.6529	.299	1.5502	.353	1.4485		
.246	1.6510	.300	1.5483	.354	1.4466		
.247	1.6490	.301	1.5464	.355	1.4448		
.248	1.6471	.302	1.5445	.356	1.4429		
.249	1.6452	.303	1.5426	.357	1.4410		
.250	1.6433	.304	1.5407	.358	1.4391		
.251	1.6414	.305	1.5388	.359	1.4372		
.252	1.6395	.306	1.5369	.360	1.4353		
.253	1.6376	.307	1.5350	.361	1.4334		
.254	1.6357	.308	1.5332	.362	1.4315		
.255	1.6338	.309	1.5313	.363	1.4297		
.256	1.6319	.310	1.5294	.364	1.4278		
.257	1.6300	.311	1.5275	.365	1.4260		
.258	1.6281	.312	1.5256	.366	1.4241		
.259	1.6262	.313	1.5238	.367	1.4222		
.260	1.6243	.314	1.5219	.368	1.4204		
.261	1.6224	.315	1.5200	.369	1.4185		
.262	1.6205	.316	1.5181	.370	1.4166		
.263	1.6186	.317	1.5162	.371	1.4147		
.264	1.6167	.318	1.5143	.372	1.4129		
.265	1.6148	.319	1.5124	.373	1.4110		
.266	1.6129	.320	1.5105	.374	1.4092		
.267	1.6110	.321	1.5086	.375	1.4073		
.268	1.6090	.322	1.5068	.376	1.4054		
.269	1.6071	.323	1.5049	.377	1.4035		
.270	1.6052	.324	1.5030	.378	1.4017		



The illustration above shows the relative position of the work to the sizing tool and roll when using either the Regular or Oversize Holder.

The hole in the sizing tool roll and the outside diameter must be concentric within .0002″ total indicator reading.

Form 576

TABLE OF CORRECTED DIAMETERS FOR REGULAR SIZING TOOL HOLDER

A—1⅛″ Center distance
B—½″ Center distance
C—½″ Holder opening (See Note *)

The corrected diameters in this table are figured with the tool notched and cutting in the position as shown in the illustration.

The *maximum* sizing tool diameter is 1.3012″, Work Diameter capacity .000″ to .500″.

INSTRUCTIONS

The corrected tool and roll diameters can be taken directly from the table for all work diameters from *.075″* to .500″.

WHEN THE WORK DIAMETER IS UNDER .075″:

When the smallest work diameter is less than .075″, add the difference between .075″ and the smallest work diameter to be sized to all work diameters and use this new figure to locate the corrected diameters in the table. For example:

If the work diameters to be sized are .045″, .060″ and .125″, add the difference between .075″ and .045″ (.030″) to all work diameters.

TABLE

	Work Dia.	Corrected Tool Dia.
.045″ plus .030″	.075″	1.3012″
.060″ plus .030″	.090	1.2865
.125″ plus .030″	.155	1.2228

When it is necessary to compensate for the tool diameter, as explained above, always add this difference to the roll diameter that is rolling on the work. This will keep the spread of the holder (A and B) between tool and roll approximately the same and will keep the amount of adjustment in the holder constant. For example: If in the example above the roll was rolling on the .125″ diameter, add the difference of .030″ to the actual roll diameter of .875″.

.500″ (B) minus .0625″ = .4375″ x 2 = .875″ actual roll dia.
.875″ plus .030″ = .905″ roll diameter

FACING END OF WORK TO CENTER

Always use the maximum tool diameter allowed, *1.3012″*, when facing the end of a piece. Add *.085″* to all *other* work diameters before referring to table for corrected diameters.

*The holder opening (C) does not permit work from .469″ to .500″ diameter to extend from the chuck beyond the cutting tool.

TABLE OF CORRECTED DIAMETERS FOR REGULAR SIZING TOOL HOLDER

Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.
.075″	1.3012″	.925″	.129″	1.2482″	.871″	.183″	1.1954″	.817″
.076	1.3002	.924	.130	1.2473	.870	.184	1.1944	.816
.077	1.2992	.923	.131	1.2463	.869	.185	1.1935	.815
.078	1.2982	.922	.132	1.2453	.868	.186	1.1925	.814
.079	1.2972	.921	.133	1.2443	.867	.187	1.1915	.813
.080	1.2963	.920	.134	1.2433	.866	.188	1.1905	.812
.081	1.2953	.919	.135	1.2424	.865	.189	1.1895	.811
.082	1.2943	.918	.136	1.2414	.864	.190	1.1886	.810
.083	1.2933	.917	.137	1.2404	.863	.191	1.1876	.809
.084	1.2923	.916	.138	1.2394	.862	.192	1.1866	.808
.085	1.2914	.915	.139	1.2384	.861	.193	1.1856	.807
.086	1.2904	.914	.140	1.2375	.860	.194	1.1846	.806
.087	1.2894	.913	.141	1.2365	.859	.195	1.1837	.805
.088	1.2884	.912	.142	1.2355	.858	.196	1.1827	.804
.089	1.2874	.911	.143	1.2345	.857	.197	1.1817	.803
.090	1.2865	.910	.144	1.2335	.856	.198	1.1807	.802
.091	1.2855	.909	.145	1.2326	.855	.199	1.1797	.801
.092	1.2845	.908	.146	1.2316	.854	.200	1.1788	.800
.093	1.2835	.907	.147	1.2306	.853	.201	1.1778	.799
.094	1.2825	.906	.148	1.2296	.852	.202	1.1768	.798
.095	1.2816	.905	.149	1.2286	.851	.203	1.1758	.797
.096	1.2806	.904	.150	1.2277	.850	.204	1.1748	.796
.097	1.2796	.903	.151	1.2267	.849	.205	1.1739	.795
.098	1.2786	.902	.152	1.2257	.848	.206	1.1729	.794
.099	1.2776	.901	.153	1.2247	.847	.207	1.1719	.793
.100	1.2767	.900	.154	1.2237	.846	.208	1.1709	.792
.101	1.2757	.899	.155	1.2228	.845	.209	1.1699	.791
.102	1.2747	.898	.156	1.2218	.844	.210	1.1690	.790
.103	1.2737	.897	.157	1.2208	.843	.211	1.1680	.789
.104	1.2727	.896	.158	1.2198	.842	.212	1.1671	.788
.105	1.2718	.895	.159	1.2188	.841	.213	1.1661	.787
.106	1.2708	.894	.160	1.2179	.840	.214	1.1651	.786
.107	1.2698	.893	.161	1.2169	.839	.215	1.1642	.785
.108	1.2688	.892	.162	1.2159	.838	.216	1.1632	.784
.109	1.2678	.891	.163	1.2149	.837	.217	1.1622	.783
.110	1.2669	.890	.164	1.2139	.836	.218	1.1612	.782
.111	1.2659	.889	.165	1.2130	.835	.219	1.1602	.781
.112	1.2649	.888	.166	1.2120	.834	.220	1.1593	.780
.113	1.2639	.887	.167	1.2110	.833	.221	1.1583	.779
.114	1.2629	.886	.168	1.2100	.832	.222	1.1573	.778
.115	1.2620	.885	.169	1.2090	.831	.223	1.1563	.777
.116	1.2610	.884	.170	1.2081	.830	.224	1.1553	.776
.117	1.2600	.883	.171	1.2071	.829	.225	1.1544	.775
.118	1.2590	.882	.172	1.2061	.828	.226	1.1534	.774
.119	1.2580	.881	.173	1.2051	.827	.227	1.1524	.773
.120	1.2571	.880	.174	1.2041	.826	.228	1.1514	.772
.121	1.2561	.879	.175	1.2032	.825	.229	1.1504	.771
.122	1.2551	.878	.176	1.2022	.824	.230	1.1495	.770
.123	1.2541	.877	.177	1.2013	.823	.231	1.1485	.769
.124	1.2531	.876	.178	1.2003	.822	.232	1.1475	.768
.125	1.2522	.875	.179	1.1993	.821	.233	1.1465	.767
.126	1.2512	.874	.180	1.1984	.820	.234	1.1455	.766
.127	1.2502	.873	.181	1.1974	.819	.235	1.1446	.765
.128	1.2492	.872	.182	1.1964	.818	.236	1.1436	.764

TABLE OF CORRECTED DIAMETERS FOR REGULAR SIZING TOOL HOLDER

Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.
.399″	.9852″	.601″	.453″	.9331″	.547″	.507″	.8812″	
.400	.9843	.600	.454	.9321	.546	.508	.8802	
.401	.9833	.599	.455	.9312	.545	.509	.8792	
.402	.9823	.598	.456	.9302	.544	.510	.8783	
.403	.9813	.597	.457	.9293	.543	.511	.8773	
.404	.9803	.596	.458	.9283	.542	.512	.8764	
.405	.9794	.595	.459	.9273	.541	.513	.8754	
.406	.9784	.594	.460	.9264	.540	.514	.8744	
.407	.9775	.593	.461	.9254	.539	.515	.8735	
.408	.9765	.592	.462	.9244	.538	.516	.8725	
.409	.9755	.591	.463	.9234	.537	.517	.8716	
.410	.9746	.590	.464	.9224	.536	.518	.8706	
.411	.9736	.589	.465	.9215	.535	.519	.8697	
.412	.9727	.588	.466	.9205	.534	.520	.8687	
.413	.9717	.587	.467	.9196	.533	.521	.8678	
.414	.9707	.586	.468	.9186	.532	.522	.8668	
.415	.9698	.585	.469	.9176	.531	.523	.8659	
.416	.9688	.584	.470	.9167	.530	.524	.8649	
.417	.9678	.583	.471	.9157	.529	.525	.8640	
.418	.9668	.582	.472	.9148	.528	.526	.8630	
.419	.9658	.581	.473	.9138	.527	.527	.8621	
.420	.9649	.580	.474	.9128	.526	.528	.8611	
.421	.9639	.579	.475	.9119	.525	.529	.8601	
.422	.9630	.578	.476	.9109	.524	.530	.8592	
.423	.9620	.577	.477	.9100	.523	.531	.8582	
.424	.9610	.576	.478	.9090	.522	.532	.8573	
.425	.9601	.575	.479	.9080	.521	.533	.8563	
.426	.9591	.574	.480	.9071	.520	.534	.8553	
.427	.9582	.573	.481	.9061	.519	.535	.8544	
.428	.9572	.572	.482	.9052	.518	.536	.8534	
.429	.9562	.571	.483	.9042	.517	.537	.8525	
.430	.9553	.570	.484	.9032	.516	.538	.8515	
.431	.9543	.569	.485	.9023	.515	.539	.8505	
.432	.9534	.568	.486	.9013	.514	.540	.8496	
.433	.9524	.567	.487	.9004	.513	.541	.8486	
.434	.9514	.566	.488	.8994	.512	.542	.8477	
.435	.9505	.565	.489	.8984	.511	.543	.8467	
.436	.9495	.564	.490	.8975	.510	.544	.8458	
.437	.9485	.563	.491	.8965	.509	.545	.8448	
.438	.9475	.562	.492	.8956	.508	.546	.8439	
.439	.9465	.561	.493	.8946	.507	.547	.8429	
.440	.9456	.560	.494	.8936	.506	.548	.8420	
.441	.9446	.559	.495	.8927	.505	.549	.8410	
.442	.9437	.558	.496	.8917	.504	.550	.8401	
.443	.9427	.557	.497	.8908	.503	.551	.8391	
.444	.9417	.556	.498	.8898	.502	.552	.8382	
.445	.9408	.555	.499	.8888	.501	.553	.8372	
.446	.9398	.554	.500	.8879	.500	.554	.8362	
.447	.9389	.553	.501	.8869		.555	.8353	
.448	.9379	.552	.502	.8860		.556	.8343	
.449	.9369	.551	.503	.8850		.557	.8334	
.450	.9360	.550	.504	.8840		.558	.8324	
.451	.9350	.549	.505	.8831		.559	.8314	
.452	.9341	.548	.506	.8821		.560	.8305	

TABLE OF CORRECTED DIAMETERS FOR REGULAR SIZING TOOL HOLDER

Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.
.237″	1.1426″	.763″	.291″	1.0900″	.709″	.345″	1.0376″	.655″
.238	1.1416	.762	.292	1.0891	.708	.346	1.0366	.654
.239	1.1406	.761	.293	1.0881	.707	.347	1.0356	.653
.240	1.1397	.760	.294	1.0871	.706	.348	1.0346	.652
.241	1.1387	.759	.295	1.0862	.705	.349	1.0336	.651
.242	1.1378	.758	.296	1.0852	.704	.350	1.0327	.650
.243	1.1368	.757	.297	1.0842	.703	.351	1.0317	.649
.244	1.1358	.756	.298	1.0832	.702	.352	1.0308	.648
.245	1.1349	.755	.299	1.0822	.701	.353	1.0298	.647
.246	1.1339	.754	.300	1.0813	.700	.354	1.0288	.646
.247	1.1329	.753	.301	1.0803	.699	.355	1.0279	.645
.248	1.1319	.752	.302	1.0794	.698	.356	1.0269	.644
.249	1.1309	.751	.303	1.0784	.697	.357	1.0259	.643
.250	1.1300	.750	.304	1.0774	.696	.358	1.0249	.642
.251	1.1290	.749	.305	1.0765	.695	.359	1.0239	.641
.252	1.1280	.748	.306	1.0755	.694	.360	1.0230	.640
.253	1.1270	.747	.307	1.0745	.693	.361	1.0220	.639
.254	1.1260	.746	.308	1.0735	.692	.362	1.0211	.638
.255	1.1251	.745	.309	1.0725	.691	.363	1.0201	.637
.256	1.1241	.744	.310	1.0716	.690	.364	1.0191	.636
.257	1.1231	.743	.311	1.0706	.689	.365	1.0182	.635
.258	1.1221	.742	.312	1.0696	.688	.366	1.0172	.634
.259	1.1211	.741	.313	1.0686	.687	.367	1.0162	.633
.260	1.1202	.740	.314	1.0676	.686	.368	1.0152	.632
.261	1.1192	.739	.315	1.0667	.685	.369	1.0142	.631
.262	1.1183	.738	.316	1.0657	.684	.370	1.0133	.630
.263	1.1173	.737	.317	1.0647	.683	.371	1.0123	.629
.264	1.1163	.736	.318	1.0637	.682	.372	1.0114	.628
.265	1.1154	.735	.319	1.0627	.681	.373	1.0104	.627
.266	1.1144	.734	.320	1.0618	.680	.374	1.0094	.626
.267	1.1134	.733	.321	1.0608	.679	.375	1.0085	.625
.268	1.1124	.732	.322	1.0599	.678	.376	1.0075	.624
.269	1.1114	.731	.323	1.0589	.677	.377	1.0065	.623
.270	1.1105	.730	.324	1.0579	.676	.378	1.0055	.622
.271	1.1095	.729	.325	1.0570	.675	.379	1.0045	.621
.272	1.1085	.728	.326	1.0560	.674	.380	1.0036	.620
.273	1.1075	.727	.327	1.0550	.673	.381	1.0026	.619
.274	1.1065	.726	.328	1.0540	.672	.382	1.0017	.618
.275	1.1056	.725	.329	1.0530	.671	.383	1.0007	.617
.276	1.1046	.724	.330	1.0521	.670	.384	.9997	.616
.277	1.1037	.723	.331	1.0511	.669	.385	.9988	.615
.278	1.1027	.722	.332	1.0502	.668	.386	.9978	.614
.279	1.1017	.721	.333	1.0492	.667	.387	.9968	.613
.280	1.1008	.720	.334	1.0482	.666	.388	.9958	.612
.281	1.0998	.719	.335	1.0473	.665	.389	.9948	.611
.282	1.0988	.718	.336	1.0463	.664	.390	.9939	.610
.283	1.0978	.717	.337	1.0453	.663	.391	.9929	.609
.284	1.0968	.716	.338	1.0443	.662	.392	.9920	.608
.285	1.0959	.715	.339	1.0433	.661	.393	.9910	.607
.286	1.0949	.714	.340	1.0424	.660	.394	.9900	.606
.287	1.0939	.713	.341	1.0414	.659	.395	.9891	.605
.288	1.0929	.712	.342	1.0405	.658	.396	.9881	.604
.289	1.0919	.711	.343	1.0395	.657	.397	.9872	.603
.290	1.0910	710	344	1.0385	.656	.398	.9862	.602

TABLE OF CORRECTED DIAMETERS FOR REGULAR SIZING TOOL HOLDER

Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.
.561″	.8295″							
.562	.8286							
.563	.8276							
.564	.8266							
.565	.8257							
.566	.8248							
.567	.8238							
.568	.8229							
.569	.8219							
.570	.8210							
.571	.8200							
.572	.8191							
.573	.8181							
.574	.8172							
.575	.8162							
.576	.8153							
.577	.8143							
.578	.8134							
.579	.8124							
.580	.8115							
.581	.8105							
.582	.8096							
.583	.8086							
.584	.8077							
.585	.8067							

TABLE OF CORRECTED DIAMETERS FOR OVERSIZE SIZING TOOL HOLDER

A—$\frac{25}{32}$″ Center distance
B—$\frac{19}{32}$″ Center distance
C—$\frac{11}{16}$″ Holder opening (See Note *)

The corrected tool diameters in this table are figured with the tool notched and cutting in the position shown in the illustration on page 00.

The *maximum* sizing tool diameter is 1.3012″, Work Diameter Capacity .187″ to .812″.

INSTRUCTIONS

The corrected tool and roll diameters can be taken directly from the table for all work diameters from .262″ to .812″.

WHEN THE WORK DIAMETER IS UNDER .262″:

When the smallest work diameter is between .262″ and .187″, add the difference between .262″ and the smallest work diameter to be sized to all work diameters and use this new figure to locate the corrected diameters in the table. For example:

If the work diameters to be sized are .200″, .230″ and .312″, add the difference between .262″ and .200″ (.062″) to all work diameters.

TABLE

	Work Dia.	Corrected Tool Dia.
.200″ plus .062″.	.262″	1.3012″
.230″ plus .062″.	.292″	1.2718″
.312″ plus .062″.	.374″	1.1915″

When it is necessary to compensate for the tool diameter, as explained above, always add this difference to the roll diameter that is rolling on the work. This will keep the spread of the holder (A and B) between tool and roll approximately the same and will keep the amount of adjustment in the holder constant. For example: If in the example above, the roll was rolling on the .230″ diameter, add the difference of .062″ to the actual roll diameter of .958″.

.594″ (B) minus .115″ = .479″ x 2 = .958″ actual roll dia.
.958″ plus .062″ = 1.020″ roll diameter

When using the Oversize Holder, it will be impossible to face to center of the work, as .187″ is the minimum work diameter that can be sized.

*The holder opening (C) does not permit work from .656″ to .812″ diameter to extend from the chuck beyond the cutting tool.

TABLE OF CORRECTED DIAMETERS FOR OVERSIZE SIZING TOOL HOLDER

Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.
.262″	1.3012″	.925″	.316″	1.2482″	.871″	.370″	1.1954″	.817″
.263	1.3002	.924	.317	1.2473	.870	.371	1.1944	.816
.264	1.2992	.923	.318	1.2463	.869	.372	1.1935	.815
.265	1.2982	.922	.319	1.2453	.868	.373	1.1925	.814
.266	1.2972	.921	.320	1.2443	.867	.374	1.1915	.813
.267	1.2963	.920	.321	1.2433	.866	.375	1.1905	.812
.268	1.2953	.919	.322	1.2424	.865	.376	1.1895	.811
.269	1.2943	.918	.323	1.2414	.864	.377	1.1886	.810
.270	1.2933	.917	.324	1.2404	.863	.378	1.1876	.809
.271	1.2923	.916	.325	1.2394	.862	.379	1.1866	.808
.272	1.2914	.915	.326	1.2384	.861	.380	1.1856	.807
.273	1.2904	.914	.327	1.2375	.860	.381	1.1846	.806
.274	1.2894	.913	.328	1.2365	.859	.382	1.1837	.805
.275	1.2884	.912	.329	1.2355	.858	.383	1.1827	.804
.276	1.2874	.911	.330	1.2345	.857	.384	1.1817	.803
.277	1.2865	.910	.331	1.2335	.856	.385	1.1807	.802
.278	1.2855	.909	.332	1.2326	.855	.386	1.1797	.801
.279	1.2845	.908	.333	1.2316	.854	.387	1.1788	.800
.280	1.2835	.907	.334	1.2306	.853	.388	1.1778	.799
.281	1.2825	.906	.335	1.2296	.852	.389	1.1768	.798
.282	1.2816	.905	.336	1.2286	.851	.390	1.1758	.797
.283	1.2806	.904	.337	1.2277	.850	.391	1.1748	.796
.284	1.2796	.903	.338	1.2267	.849	.392	1.1739	.795
.285	1.2786	.902	.339	1.2257	.848	.393	1.1729	.794
.286	1.2776	.901	.340	1.2247	.847	.394	1.1719	.793
.287	1.2767	.900	.341	1.2237	.846	.395	1.1709	.792
.288	1.2757	.899	.342	1.2228	.845	.396	1.1699	.791
.289	1.2747	.898	.343	1.2218	.844	.397	1.1690	.790
.290	1.2737	.897	.344	1.2208	.843	.398	1.1680	.789
.291	1.2727	.896	.345	1.2198	.842	.399	1.1671	.788
.292	1.2718	.895	.346	1.2188	.841	.400	1.1661	.787
.293	1.2708	.894	.347	1.2179	.840	.401	1.1651	.786
.294	1.2698	.893	.348	1.2169	.839	.402	1.1642	.785
.295	1.2688	.892	.349	1.2159	.838	.403	1.1632	.784
.296	1.2678	.891	.350	1.2149	.837	.404	1.1622	.783
.297	1.2669	.890	.351	1.2139	.836	.405	1.1612	.782
.298	1.2659	.889	.352	1.2130	.835	.406	1.1602	.781
.299	1.2649	.888	.353	1.2120	.834	.407	1.1593	.780
.300	1.2639	.887	.354	1.2110	.833	.408	1.1583	.779
.301	1.2629	.886	.355	1.2100	.832	.409	1.1573	.778
.302	1.2620	.885	.356	1.2090	.831	.410	1.1563	.777
.303	1.2610	.884	.357	1.2081	.830	.411	1.1553	.776
.304	1.2600	.883	.358	1.2071	.829	.412	1.1544	.775
.305	1.2590	.882	.359	1.2061	.828	.413	1.1534	.774
.306	1.2580	.881	.360	1.2051	.827	.414	1.1524	.773
.307	1.2571	.880	.361	1.2041	.826	.415	1.1514	.772
.308	1.2561	.879	.362	1.2032	.825	.416	1.1504	.771
.309	1.2551	.878	.363	1.2022	.824	.417	1.1495	.770
.310	1.2541	.877	.364	1.2013	.823	.418	1.1485	.769
.311	1.2531	.876	.365	1.2003	.822	.419	1.1475	.768
.312	1.2522	.875	.366	1.1993	.821	.420	1.1465	.767
.313	1.2512	.874	.367	1.1984	.820	.421	1.1455	.766
.314	1.2502	.873	.368	1.1974	.819	.422	1.1446	.765
.315	1.2492	.872	.369	1.1964	.818	.423	1.1436	.764

TABLE OF CORRECTED DIAMETERS FOR OVERSIZE SIZING TOOL HOLDER

Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.
.424"	1.1426"	.763"	.478"	1.0900"	.709"	.532"	1.0376"	.655"
.425	1.1416	.762	.479	1.0891	.708	.533	1.0366	.654
.426	1.1406	.761	.480	1.0881	.707	.534	1.0356	.653
.427	1.1397	.760	.481	1.0871	.706	.535	1.0346	.652
.428	1.1387	.759	.482	1.0862	.705	.536	1.0336	.651
.429	1.1378	.758	.483	1.0852	.704	.537	1.0327	.650
.430	1.1368	.757	.484	1.0842	.703	.538	1.0317	.649
.431	1.1358	.756	.485	1.0832	.702	.539	1.0308	.648
.432	1.1349	.755	.486	1.0822	.701	.540	1.0298	.647
.433	1.1339	.754	.487	1.0813	.700	.541	1.0288	.646
.434	1.1329	.753	.488	1.0803	.699	.542	1.0279	.645
.435	1.1319	.752	.489	1.0794	.698	.543	1.0269	.644
.436	1.1309	.751	.490	1.0784	.697	.544	1.0259	.643
.437	1.1300	.750	.491	1.0774	.696	.545	1.0249	.642
.438	1.1290	.749	.492	1.0765	.695	.546	1.0239	.641
.439	1.1280	.748	.493	1.0755	.694	.547	1.0230	.640
.440	1.1270	.747	.494	1.0745	.693	.548	1.0220	.639
.441	1.1260	.746	.495	1.0735	.692	.549	1.0211	.638
.442	1.1251	.745	.496	1.0725	.691	.550	1.0201	.637
.443	1.1241	.744	.497	1.0716	.690	.551	1.0191	.636
.444	1.1231	.743	.498	1.0706	.689	.552	1.0182	.635
.445	1.1221	.742	.499	1.0696	.688	.553	1.0172	.634
.446	1.1211	.741	.500	1.0686	.687	.554	1.0162	.633
.447	1.1202	.740	.501	1.0676	.686	.555	1.0152	.632
.448	1.1192	.739	.502	1.0667	.685	.556	1.0142	.631
.449	1.1183	.738	.503	1.0657	.684	.557	1.0133	.630
.450	1.1173	.737	.504	1.0647	.683	.558	1.0123	.629
.451	1.1163	.736	.505	1.0637	.682	.559	1.0114	.628
.452	1.1154	.735	.506	1.0627	.681	.560	1.0104	.627
.453	1.1144	.734	.507	1.0618	.680	.561	1.0094	.626
.454	1.1134	.733	.508	1.0608	.679	.562	1.0085	.625
.455	1.1124	.732	.509	1.0599	.678	.563	1.0075	.624
.456	1.1114	.731	.510	1.0589	.677	.564	1.0065	.623
.457	1.1105	.730	.511	1.0579	.676	.565	1.0055	.622
.458	1.1095	.729	.512	1.0570	.675	.566	1.0045	.621
.459	1.1085	.728	.513	1.0560	.674	.567	1.0036	.620
.460	1.1075	.727	.514	1.0550	.673	.568	1.0026	.619
.461	1.1065	.726	.515	1.0540	.672	.569	1.0017	.618
.462	1.1056	.725	.516	1.0530	.671	.570	1.0007	.617
.463	1.1046	.724	.517	1.0521	.670	.571	.9997	.616
.464	1.1037	.723	.518	1.0511	.669	.572	.9988	.615
.465	1.1027	.722	.519	1.0502	.668	.573	.9978	.614
.466	1.1017	.721	.520	1.0492	.667	.574	.9968	.613
.467	1.1008	.720	.521	1.0482	.666	.575	.9958	.612
.468	1.0998	.719	.522	1.0473	.665	.576	.9948	.611
.469	1.0988	.718	.523	1.0463	.664	.577	.9939	.610
.470	1.0978	.717	.524	1.0453	.663	.578	.9929	.609
.471	1.0968	.716	.525	1.0443	.662	.579	.9920	.608
.472	1.0959	.715	.526	1.0433	.661	.580	.9910	.607
.473	1.0949	.714	.527	1.0424	.660	.581	.9900	.606
.474	1.0939	.713	.528	1.0414	.659	.582	.9891	.605
.475	1.0929	.712	.529	1.0405	.658	.583	.9881	.604
.476	1.0919	.711	.530	1.0395	.657	.584	.9872	.603
.477	1.0910	.710	.531	1.0385	.656	.585	.9862	.602

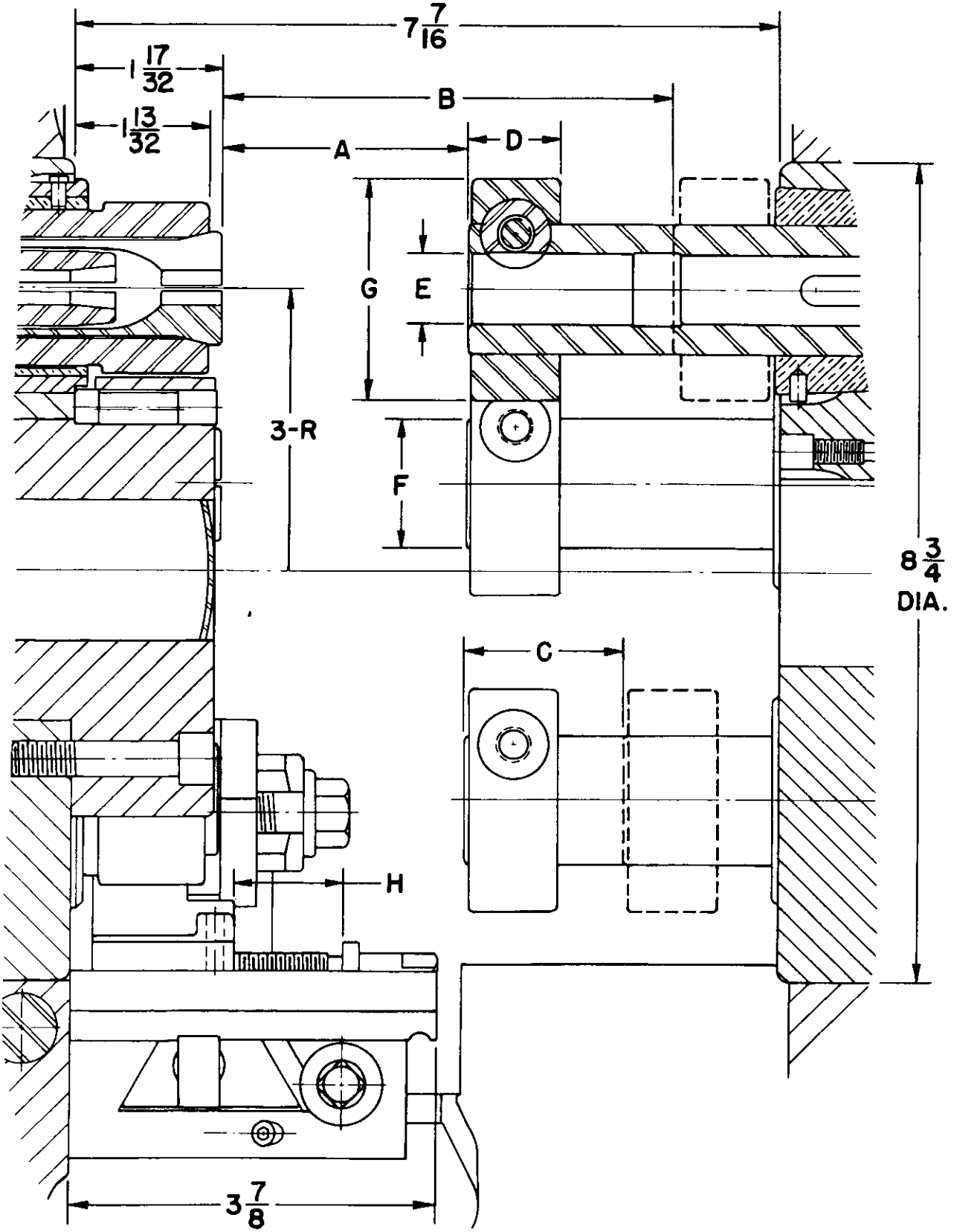
TABLE OF CORRECTED DIAMETERS FOR OVERSIZE SIZING TOOL HOLDER

Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.
.586″	.9852″	.601″	.640″	.9331″	.547″	.694″	.8812″	.500″
.587	.9843	.600	.641	.9321	.546	.695	.8802	.500
.588	.9833	.599	.642	.9312	.545	.696	.8792	.500
.589	.9823	.598	.643	.9302	.544	.697	.8783	.500
.590	.9813	.597	.644	.9293	.543	.698	.8773	.500
.591	.9803	.596	.645	.9283	.542	.699	.8764	.500
.592	.9794	.595	.646	.9273	.541	.700	.8754	.500
.593	.9784	.594	.647	.9264	.540	.701	.8744	.500
.594	.9775	.593	.648	.9254	.539	.702	.8735	.500
.595	.9765	.592	.649	.9244	.538	.703	.8725	.500
.596	.9755	.591	.650	.9234	.537	.704	.8716	.500
.597	.9746	.590	.651	.9224	.536	.705	.8706	.500
.598	.9736	.589	.652	.9215	.535	.706	.8697	.500
.599	.9727	.588	.653	.9205	.534	.707	.8687	.500
.600	.9717	.587	.654	.9196	.533	.708	.8678	.500
.601	.9707	.586	.655	.9186	.532	.709	.8668	.500
.602	.9698	.585	.656	.9176	.531	.710	.8659	.500
.603	.9688	.584	.657	.9167	.530	.711	.8649	.500
.604	.9678	.583	.658	.9157	.529	.712	.8640	.500
.605	.9668	.582	.659	.9148	.528	.713	.8630	.500
.606	.9658	.581	.660	.9138	.527	.714	.8621	.500
.607	.9649	.580	.661	.9128	.526	.715	.8611	.500
.608	.9639	.579	.662	.9119	.525	.716	.8601	.500
.609	.9630	.578	.663	.9109	.524	.717	.8592	.500
.610	.9620	.577	.664	.9100	.523	.718	.8582	.500
.611	.9610	.576	.665	.9090	.522	.719	.8573	.500
.612	.9601	.575	.666	.9080	.521	.720	.8563	.500
.613	.9591	.574	.667	.9071	.520	.721	.8553	.500
.614	.9582	.573	.668	.9061	.519	.722	.8544	.500
.615	.9572	.572	.669	.9052	.518	.723	.8534	.500
.616	.9562	.571	.670	.9042	.517	.724	.8525	.500
.617	.9553	.570	.671	.9032	.516	.725	.8515	.500
.618	.9543	.569	.672	.9023	.515	.726	.8505	.500
.619	.9534	.568	.673	.9013	.514	.727	.8496	.500
.620	.9524	.567	.674	.9004	.513	.728	.8486	.500
.621	.9514	.566	.675	.8994	.512	.729	.8477	.500
.622	.9505	.565	.676	.8984	.511	.730	.8467	.500
.623	.9495	.564	.677	.8975	.510	.731	.8458	.500
.624	.9485	.563	.678	.8965	.509	.732	.8448	.500
.625	.9475	.562	.679	.8956	.508	.733	.8439	.500
.626	.9465	.561	.680	.8946	.507	.734	.8429	.500
.627	.9456	.560	.681	.8936	.506	.735	.8420	.500
.628	.9446	.559	.682	.8927	.505	.736	.8410	.500
.629	.9437	.558	.683	.8917	.504	.737	.8401	.500
.630	.9427	.557	.684	.8908	.503	.738	.8391	.500
.631	.9417	.556	.685	.8898	.502	.739	.8382	.500
.632	.9408	.555	.686	.8888	.501	.740	.8372	.500
.633	.9398	.554	.687	.8879	.500	.741	.8362	.500
.634	.9389	.553	.688	.8869	.500	.742	.8353	.500
.635	.9379	.552	.689	.8860	.500	.743	.8343	.500
.636	.9369	.551	.690	.8850	.500	.744	.8334	.500
.637	.9360	.550	.691	.8840	.500	.745	.8324	.500
.638	.9350	.549	.692	.8831	.500	.746	.8314	.500
.639	.9341	.548	.693	.8821	.500	.747	.8305	.500

TABLE OF CORRECTED DIAMETERS FOR OVERSIZE SIZING TOOL HOLDER

Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.	Work Dia.	Corrected Tool Dia.	Roll Dia.
.748″	.8295″	.500″	.802″	.7782″	.500″			
.749	.8286	.500	.803	.7772	.500			
.750	.8276	.500	.804	.7763	.500			
.751	.8266	.500	.805	.7753	.500			
.752	.8257	.500	.806	.7744	.500			
.753	.8248	.500	.807	.7735	.500			
.754	.8238	.500	.808	.7725	.500			
.755	.8229	.500	.809	.7716	.500			
.756	.8219	.500	.810	.7706	.500			
.757	.8210	.500	.811	.7697	.500			
.758	.8200	.500	.812	.7688	.500			
.759	.8191	.500						
.760	.8181	.500						
.761	.8172	.500						
.762	.8162	.500						
.763	.8153	.500						
.764	.8143	.500						
.765	.8134	.500						
.766	.8124	.500						
.767	.8115	.500						
.768	.8105	.500						
.769	.8096	.500						
.770	.8086	.500						
.771	.8077	.500						
.772	.8067	.500						
.773	.8058	.500						
.774	.8048	.500						
.775	.8039	.500						
.776	.8029	.500						
.777	.8020	.500						
.778	.8010	.500						
.779	.8000	.500						
.780	.7991	.500						
.781	.7981	.500						
.782	.7972	.500						
.783	.7962	.500						
.784	.7953	.500						
.785	.7943	500						
.786	.7934	.500						
.787	.7925	.500						
.788	.7915	.500						
.789	.7905	.500						
.790	.7896	.500						
.791	.7886	.500						
.792	.7877	.500						
.793	.7867	.500						
.794	.7858	.500						
.795	.7848	.500						
.796	.7839	.500						
.797	.7830	.500						
.798	.7820	.500						
.799	.7810	.500						
.800	.7801	.500						
.801	.7791	.500						

NOTES


7 7/16
1 17/32
1 13/32
B
A
D
G
E
3-R
F
8 3/4
DIA.
C
H
3 7/8

PRINCIPAL DIMENSIONS

These dimensions apply to the Model B Standard Bed Machine.

A - 2-1/8" Minimum distance from chuck to end of tool spindle when on the high point of a standard Turn and Drill Cam (7-1/2" diameter) and with the turnbuckle adjustment extended.

A - 2-7/8" if a standard Form and Cutoff Cam is substituted (6" diameter).

A - 2-9/16" if an oil sleeve is being used on the tool spindle.

NOTE - A special oil sleeve can be purchased which will fit around the tool spindle between bearings and is used to force cutting oil directly through the tool spindle. This is used especially with Hollow Mills.

B - 4-13/16" Maximum distance from chuck to end of tool spindle before tool clamping collar will strike bearing.

C - 1-3/8" Maximum turnbuckle adjustment.

D - 1" End of tool spindle to end of tool clamping collar.

D - 25/32" End of threading spindle to end of tool clamping collar.

E - 3/4" Hole in all tool and threading spindles.

F - 1-3/8" Diameter of tool spindle.

F - 1/1-8" Diameter of threading spindle.

G - 2-3/8" Diameter of tool clamping collar on tool spindle.

G - 1-7/8" Diameter of tool clamping collar on threading spindle.

H - 1-1/8" Maximum side adjustment of tool post.

DAVENPORT MACHINE TOOL DIVISION DOVER CORPORATION
MODEL B MACHINE 75 CYCLE - IDLE TIME 2/5 SECOND (.4)
TABLE FOR FEED CHANGE GEARS

WORKING PORTION OF FORMING AND TURNING CAMS EQUALS .50: .05 OF THIS AMOUNT IS FOR DWELL AT THE END OF RISE TO INSURE ACCURACY AND FINISH. TABLE GIVES EFFECTIVE REVOLUTIONS OF WORK SPINDLE DURING .45.

Time in seconds to complete one piece	Gross Production Per Hour	Driver (200 R.P.M.)	Driven (Compound)	Driver (Compound)	Driven	R.P.M. SPINDLES																										
						500	587	682	750	841	900	962	1026	1125	1166	1243	1324	1409	1500	1597	1700	1810	1930	2000	2192	2340	2500	2674	3000	3300	3833	4500
.8	4500	H.S.CLUTCH				3	4	4	5	5	5	6	6	7	7	7	8	8	9	10	10	11	12	12	13	14	15	16	18	20	23	27
1.0	3600	99	30	60	80	4	5	6	7	8	8	9	9	10	10	11	12	13	14	14	15	16	17	18	20	21	23	24	27	30	34	41
1.1	3275	86	30	60	80	5	6	7	8	9	9	10	11	12	12	13	14	15	16	17	18	19	20	21	23	25	26	28	32	35	40	47
1.2	3000	75	30	60	80	6	7	8	9	10	11	12	12	14	14	15	16	17	18	19	20	22	23	24	26	28	30	32	36	40	46	54
1.3	2770	67	30	60	80	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	26	27	30	32	34	36	41	45	52	61
1.3	2770	64	30	60	80	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	26	27	30	32	34	36	41	45	52	61
1.4	2570	60	30	60	80	7	9	10	11	13	14	14	15	17	17	19	20	21	23	24	25	27	29	30	33	35	38	40	45	50	57	68
1.5	2400	54	30	60	80	8	10	11	12	14	15	16	17	19	19	21	22	23	25	26	28	30	32	33	36	39	41	44	50	54	63	74
1.6	2250	52	30	60	80	9	11	12	14	15	16	17	18	20	21	22	24	25	27	29	31	33	35	36	39	42	45	48	54	59	69	81
1.6	2250	50	30	60	80	9	11	12	14	15	16	17	18	20	21	22	24	25	27	29	31	33	35	36	39	42	45	48	54	59	69	81
1.8	2000	86	USE 60 TOOTH GEAR		80	10	12	14	16	18	19	20	22	24	24	26	28	30	32	34	36	38	41	42	46	49	53	56	63	69	80	95
2.0	1800	75			80	12	14	16	18	20	22	23	25	27	28	30	32	34	36	38	41	43	46	48	53	56	60	64	72	79	92	108
2.2	1635	67			80	13	16	18	20	23	24	26	28	30	31	34	36	38	41	43	46	49	52	54	59	63	68	72	81	89	103	122
2.3	1565	64			80	14	17	19	21	24	26	27	29	32	33	35	38	40	43	46	48	52	55	57	62	67	71	76	86	94	109	128
2.4	1500	60			80	15	18	20	23	25	27	29	31	34	35	37	40	42	45	48	51	54	58	60	66	70	75	80	90	99	115	135
2.6	1385	54			80	16	19	23	25	28	30	32	34	37	38	41	44	46	50	53	56	60	64	66	72	77	83	88	99	109	126	149
2.7	1333	52			80	17	20	24	26	29	31	33	35	39	40	43	46	49	52	55	59	62	67	69	76	81	86	92	104	114	132	155
2.8	1285	50			80	18	21	25	27	30	32	35	37	41	42	45	48	51	54	58	61	65	69	72	79	84	90	96	108	119	138	162
2.9	1240	48			80	19	22	26	28	32	34	36	38	42	44	47	50	53	56	60	64	68	72	75	82	88	94	100	113	124	144	169
3.1	1161	44			80	20	24	28	30	34	36	39	42	46	47	50	54	57	61	65	69	73	78	81	89	95	101	108	122	134	155	182
3.2	1125	43			80	21	25	29	32	35	38	40	43	47	49	52	56	59	63	67	71	76	81	84	92	98	105	112	126	138	161	189
3.4	1058	40			80	22	26	31	34	38	41	43	46	51	52	56	60	63	68	72	76	81	87	90	99	105	113	120	135	149	172	203
3.5	1028	39			80	23	27	32	35	39	42	45	48	52	54	58	62	66	70	74	79	84	90	93	102	109	116	124	140	153	178	209
3.6	1000	38			80	24	28	33	36	40	43	46	49	54	56	60	64	68	72	77	82	87	93	96	105	112	120	128	144	158	184	216
3.7	973	36			80	25	29	34	37	42	45	48	51	56	58	62	66	70	74	79	84	90	96	99	109	116	124	132	149	163	190	223
3.9	923	34			80	26	31	36	39	44	47	51	54	59	61	65	70	74	79	84	89	95	101	105	115	123	131	140	158	173	201	236
4.2	857	32			80	28	33	39	43	48	51	55	58	64	66	71	75	80	86	91	97	103	110	114	125	133	143	152	171	188	218	257
4.3	837	31			80	29	34	40	44	49	53	56	60	66	68	73	77	82	88	93	99	106	113	117	128	137	146	156	176	193	224	263
4.4	818	30			80	30	35	41	45	50	54	58	62	68	70	75	79	85	90	96	102	109	116	120	132	140	150	160	180	198	230	270

4.5	800	29			80	31	36	42	46	52	55	59	63	69	72	76	81	87	92	98	105	111	119	123	135	144	154	164	185	203	236	277
4.7	765	28			80	32	38	44	48	54	58	62	66	73	75	80	85	91	97	103	110	117	124	129	141	151	161	172	194	213	247	290
5.0	720	26			80	34	40	47	52	58	62	66	71	78	80	86	91	97	104	110	117	125	133	138	151	161	173	184	207	228	264	311
5.2	692	25			80	36	42	49	54	60	65	69	74	81	84	90	95	101	108	115	122	130	139	144	158	168	180	192	216	238	276	324
5.4	667	24			80	37	44	51	56	63	68	72	77	84	87	93	99	106	113	120	127	136	145	150	164	176	188	200	225	248	287	338
5.6	642	23			80	39	46	53	59	66	70	75	80	88	91	97	103	110	117	125	133	141	151	156	171	183	195	208	234	257	299	351
6.1	590	21			80	43	50	58	64	72	77	82	88	96	100	106	113	120	128	137	145	155	165	171	187	200	214	228	257	282	328	385
6.4	562	20			80	45	53	61	68	76	81	87	92	101	105	112	119	127	135	144	153	163	174	180	197	211	225	240	270	297	345	405
4.0	900	99	72	24	80	27	32	37	41	45	49	52	55	61	63	67	71	76	81	86	92	98	104	108	118	126	135	144	162	177	207	243
4.5	800	86	72	24	80	31	36	42	46	52	55	59	63	69	72	76	81	87	92	98	105	111	119	123	135	144	154	164	185	203	236	277
5.2	692	75	72	24	80	36	42	49	54	60	65	69	74	81	84	90	95	101	108	115	122	130	139	144	158	168	180	192	216	238	276	324
5.8	621	67	72	24	80	41	48	55	61	68	73	78	83	91	94	101	107	114	122	129	138	147	156	162	178	190	203	216	243	267	310	365
6.0	600	64	72	24	80	42	49	57	63	71	76	81	86	95	98	104	111	118	126	134	143	152	162	168	184	197	210	224	252	277	322	378
6.4	562	60	72	24	80	45	53	61	68	76	81	87	92	101	105	112	119	127	135	144	153	163	174	180	197	211	225	240	270	297	345	405
7.1	507	54	72	24	80	50	59	69	75	84	90	97	103	113	117	125	133	142	151	161	171	182	194	201	220	235	251	268	302	332	385	452
7.3	493	52	72	24	80	52	61	71	78	87	93	100	106	116	121	129	137	146	155	165	176	187	200	207	227	242	259	276	311	342	397	466
7.6	473	50	72	24	80	54	63	74	81	91	97	104	111	122	126	134	143	152	162	173	184	196	208	216	237	253	270	288	324	356	413	486
7.9	455	48	72	24	80	56	66	77	84	95	101	108	115	127	131	140	149	159	169	180	191	204	217	225	247	263	281	300	338	371	431	506
8.6	416	44	72	24	80	61	72	84	92	103	111	118	126	138	143	153	163	173	185	197	209	223	237	246	270	288	308	328	369	406	471	554
8.8	409	43	72	24	80	63	74	86	95	106	113	121	129	142	147	157	167	178	189	201	214	228	243	252	276	295	315	336	378	416	483	567
9.4	382	40	72	24	80	67	79	92	101	113	122	130	139	152	157	168	179	190	203	216	229	244	261	270	296	316	338	361	405	446	517	608
9.6	375	39	72	24	80	69	81	96	104	116	124	133	142	155	161	172	183	194	207	220	235	250	266	276	303	323	345	369	414	455	529	621
9.9	363	38	72	24	80	71	84	97	107	120	128	137	146	160	166	177	189	201	214	228	242	258	275	285	312	334	356	381	428	470	546	641
10.4	346	36	72	24	80	75	88	102	111	126	135	144	154	169	175	187	199	211	225	240	255	272	290	300	329	351	375	401	450	495	575	675
11.0	327	34	72	24	80	79	93	108	119	134	143	153	163	179	185	198	211	224	239	254	270	288	307	318	349	372	398	425	477	525	609	716
11.6	310	32	72	24	80	84	99	115	126	141	151	162	172	189	196	209	222	237	252	268	286	304	324	336	368	393	420	449	504	553	644	756
12.0	300	31	72	24	80	87	102	119	131	146	157	167	179	196	203	216	230	245	261	278	296	315	336	348	382	407	435	465	522	574	667	783
12.4	290	30	72	24	80	90	106	123	135	151	162	173	185	203	210	224	238	254	270	288	306	326	347	360	395	421	450	481	540	594	690	810
12.8	281	29	72	24	80	93	109	127	140	156	167	179	191	209	217	231	246	262	279	297	316	337	359	372	408	435	465	497	558	614	713	837
13.3	271	28	72	24	80	97	114	132	145	163	174	186	199	218	226	241	256	273	290	309	329	350	374	387	424	453	484	517	581	639	742	871
14.2	253	26	72	24	80	103	121	141	155	174	186	199	212	233	241	257	274	292	311	331	352	375	400	414	454	484	518	553	621	683	793	933
14.8	243	25	72	24	80	108	127	147	162	181	194	208	222	243	252	269	286	304	324	345	367	391	417	432	473	505	540	577	648	713	828	972
15.4	233	24	72	24	80	112	132	154	169	189	203	217	231	253	262	280	298	317	338	359	382	407	434	450	493	527	563	601	675	743	862	1013
16.0	225	23	72	24	80	117	137	160	176	197	211	225	240	263	273	291	310	330	351	374	398	424	452	468	513	548	585	625	702	772	897	1053
17.5	206	21	72	24	80	128	151	175	192	216	231	247	263	289	299	319	340	361	385	410	436	464	495	513	562	600	641	685	770	847	983	1154
18.4	196	20	72	24	80	135	158	184	203	227	243	260	277	304	315	336	358	380	405	431	459	489	521	540	592	632	675	722	810	891	1035	1215
R.P.M. OF SPINDLES						500	587	682	750	841	900	962	1026	1125	1166	1243	1324	1409	1500	1597	1700	1810	1930	2000	2192	2340	2500	2674	3000	3300	3833	4500

MODEL B MACHINE - 75 CYCLE - DRIVE SHAFT SPEED 1500 R.P.M.

TABLE FOR SELECTING STANDARD SPINDLE CHANGE GEARS WITH RESULTANT SURFACE SPEEDS

R.P.M. OF SPINDLES	DRIVING GEAR	DRIVEN GEAR	STOCK DIAMETERS IN INCHES																									
			1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	13/32	7/16	15/32	1/2	17/32	9/16	19/32	5/8	21/32	11/16	23/32	3/4	25/32	13/16	27/32	7/8
500	16	48										53	57	61	65	70	74	78	82	86	90	94	98	102	106	110	115
587	18	46								53	58	62	67	72	77	82	86	91	96	101	106	110	115	120	125	130	134
682	20	44						50	56	61	67	73	78	84	89	95	100	106	112	117	123	128	134	139	145	151	156
750	21	42						55	61	67	74	80	86	92	98	104	110	117	123	129	135	141	147	153	160	166	172
841	23	41					55	62	69	76	83	89	96	103	110	117	124	131	138	144	152	158	165	172	179	186	193
900	24	40				52	59	66	74	81	88	96	103	110	118	125	133	140	147	155	162	169	177	184	191	199	206
962	25	39				55	63	71	79	87	94	102	110	114	126	134	142	150	157	165	173	181	189	197	205	212	220
1026	26	38			50	59	67	76	84	92	101	109	118	126	134	143	151	159	168	176	185	193	201	210	218	227	235
1125	27	36			55	64	74	83	92	101	110	120	129	138	147	156	166	175	184	193	202	212	221	230	239	249	258
1166	28	36			57	67	76	86	95	105	114	124	134	143	153	162	172	181	191	200	210	219	229	238	248	258	267
1243	29	35		51	67	71	81	92	102	112	122	132	142	153	163	173	183	193	203	214	224	234	244	254	264	275	285
1324	30	34		54	65	76	87	97	108	119	130	141	152	162	173	184	195	206	217	227	238	249	260	271	282	292	303
1409	31	33		58	69	81	92	104	115	127	138	150	161	173	184	196	207	219	231	242	254	265	277	288	300	311	323
1500	32	32		61	74	86	98	110	123	135	147	160	172	184	196	209	221	233	245	258	270	282	295	307	319	331	344
1597	33	31	52	65	78	91	105	118	131	144	157	170	183	196	209	222	235	248	261	274	287	300	314	327	340	353	366
1700	34	30	56	70	83	97	111	125	139	153	167	181	195	209	223	236	250	264	278	292	306	320	334	348	362	376	389
1810	35	29	59	74	89	104	118	133	148	163	178	192	207	222	237	252	267	281	296	311	326	341	355	370	385	400	415
1930	36	28	63	79	95	111	126	142	158	174	189	205	221	239	253	268	284	300	316	332	347	363	379	395	411	426	442
2000	36	27	65	82	98	115	131	147	164	180	196	213	229	245	262	278	295	311	327	344	360	376	393	409	425	442	458
2192	38	26	72	90	108	126	143	161	179	197	215	233	251	269	287	305	323	341	359	377	395	412	430	448	466	484	502
2340	39	25	77	96	115	134	153	172	191	211	230	249	268	287	306	325	345	364	383	402	421	440	459	479	498	517	536
2500	40	24	82	102	123	143	164	184	205	225	245	266	286	307	327	348	368	389	409	430	450	470	491	511	532	552	573
2674	41	23	88	109	131	153	175	197	219	241	263	284	306	328	350	372	394	416	438	459	481	503	525	547	569	591	613
3000	42	21	98	123	147	172	196	221	245	270	295	319	344	368	393	417	442	466	491	515	540	564	589	614	638	663	687
3300	44	20	108	135	162	189	216	243	270	297	324	351	378	405	432	459	486	513	540	567	594	621	648	675	702	729	756
3833	46	18	125	157	188	219	251	282	314	344	376	408	439	470	502	533	564	596	627	659	690	721	753	784	815	847	878
4500	48	16	147	184	221	258	295	331	368	405	442	479	515	552	589	626	663	699	736	773	810	847	884	920	957	994	1031

MODEL B MACHINE - 75 CYCLE - DRIVE SHAFT SPEED 1500 R.P.M.

TABLE FOR SELECTING STANDARD SPINDLE CHANGE GEARS WITH RESULTANT SURFACE SPEEDS IN S.F.M.

SURFACE SPEED IN FEET PER MINUTE

R.P.M. OF SPINDLES	DRIVING GEAR	DRIVEN GEAR	STOCK DIAMETERS IN MILLIMETERS																		
			3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
500	16	48	15.4	20.7	25.9	30.8	36.1	41.3	46.3	51.5	56.8	61.7	66.9	72.2	77.4	82.3	87.6	92.8	97.8	103.0	108.3	113.2
587	18	46	18.0	24.0	30.2	36.1	42.3	48.2	54.5	60.4	66.6	72.5	78.7	84.6	90.6	96.8	102.7	108.9	114.8	121.1	127.0	132.9
682	20	44	21.0	28.2	35.1	42.0	49.2	56.1	63.3	70.2	77.4	84.3	91.2	98.4	105.3	112.5	119.4	126.3	133.5	140.4	147.6	154.5
750	21	42	23.3	30.8	38.7	46.3	54.1	61.7	69.6	77.4	85.0	92.8	100.4	108.3	115.8	123.7	131.2	139.1	146.7	154.5	162.4	161.9
841	23	41	25.9	34.8	43.3	51.8	60.7	69.2	78.1	86.6	95.1	104.0	112.5	121.4	129.9	138.8	147.3	155.8	164.7	173.2	182.1	190.6
900	24	40	27.9	37.1	46.3	55.8	65.0	74.1	83.3	92.8	101.7	111.2	120.4	129.9	139.1	148.3	157.5	167.0	176.2	185.4	194.6	204.1
962	25	39	29.9	39.7	49.5	59.4	69.2	79.4	89.2	99.1	108.9	118.8	128.9	138.8	148.6	158.5	168.6	178.5	188.3	198.2	208.0	218.2
1026	26	38	31.8	42.3	52.8	63.3	74.1	84.6	95.1	105.6	116.1	127.0	137.5	148.0	158.5	169.0	179.8	190.3	200.8	211.3	222.1	232.6
1125	27	36	34.8	46.3	58.1	69.6	81.0	92.8	104.3	115.8	127.6	139.1	150.6	162.4	173.9	185.4	196.9	208.7	220.1	232.0	243.4	254.9
1166	28	36	36.1	47.9	60.0	72.2	84.0	96.1	108.3	120.1	131.2	144.0	156.2	168.3	180.1	192.3	204.1	216.2	228.3	240.2	252.3	264.1
1243	29	35	38.4	51.2	64.0	76.8	89.6	102.4	115.2	128.0	140.7	153.5	166.3	179.1	191.9	204.7	217.8	230.6	243.4	256.2	269.0	281.8
1324	30	34	41.0	54.5	68.2	81.7	95.5	109.3	122.7	136.5	149.9	163.7	177.2	190.9	204.7	218.2	232.0	245.4	262.5	272.6	286.4	300.2
1409	31	33	43.6	58.1	72.5	86.9	101.7	116.1	130.6	145.0	159.8	174.2	188.6	203.1	217.8	232.3	246.7	261.2	275.9	290.4	304.8	319.2
1500	32	32	46.3	61.7	77.4	92.8	108.3	123.7	139.1	154.5	169.9	185.4	200.8	216.2	232.0	247.4	262.8	278.2	293.6	303.2	324.5	339.9
1597	33	31	49.2	65.6	82.0	98.8	115.2	131.6	148.0	164.4	181.1	197.5	213.9	230.3	246.7	263.1	279.5	296.3	312.7	329.1	345.5	361.9
1700	34	30	52.5	70.2	87.6	105.0	122.7	140.1	157.5	175.2	192.6	210.3	227.7	245.1	262.8	280.2	297.6	315.3	332.7	350.4	367.8	385.2
1810	35	29	56.1	74.5	93.2	111.9	130.6	149.3	168.0	186.4	205.1	223.8	242.5	261.2	279.5	298.2	316.9	335.6	354.3	373.0	391.7	410.1
1930	36	28	59.7	79.4	99.4	119.4	139.1	159.1	178.8	198.8	218.8	236.9	258.5	278.2	298.2	318.2	337.9	357.9	377.6	397.6	417.7	437.3
2000	36	27	61.7	82.3	103.0	123.7	144.4	164.7	185.4	206.0	226.7	247.4	267.7	288.4	309.1	329.7	350.4	370.7	391.4	412.1	432.7	453.4
2192	38	26	67.6	90.2	112.9	135.5	158.1	180.8	203.1	225.7	248.4	271.0	293.6	316.3	338.6	361.2	383.9	406.2	429.1	451.8	474.1	496.7
2340	39	25	72.2	96.5	120.4	144.7	168.6	192.9	216.9	241.1	265.1	289.4	313.3	337.6	361.5	385.8	409.8	434.1	458.0	482.3	506.2	530.2
2500	40	24	77.4	103.0	128.9	154.5	180.4	206.0	232.0	257.5	283.5	309.1	335.0	360.2	386.5	412.1	438.0	463.6	489.5	515.1	541.0	566.6
2674	41	23	82.7	110.2	137.8	165.4	192.9	220.5	248.0	275.6	303.2	330.7	358.3	385.5	413.1	440.6	468.2	495.7	523.3	550.9	578.4	606.0
3000	42	21	92.8	123.7	154.5	185.4	216.2	247.4	278.2	309.1	339.9	370.7	401.9	432.7	463.6	494.4	525.3	557.4	587.3	618.1	649.0	679.8
3300	44	20	102.0	135.8	169.9	204.1	237.9	272.0	306.1	339.9	374.0	407.8	441.9	476.1	509.8	544.0	578.1	611.9	646.0	679.8	713.9	748.0
3833	46	18	118.4	157.8	197.5	236.9	276.2	315.9	355.3	395.0	434.4	473.8	513.5	552.8	592.2	631.9	671.3	710.6	750.3	789.7	829.1	868.8
4500	48	16	138.5	185.4	232.0	278.2	324.5	370.7	417.3	463.6	509.8	556.4	602.7	649.0	695.6	741.8	788.1	834.3	880.9	927.2	973.4	1020.0

DAVENPORT MACHINE TOOL DIVISION DOVER CORPORATION
MODEL B MACHINE 60 CYCLE - IDLE TIME 1/2 SECOND (.5)
TABLE FOR FEED CHANGE GEARS

WORKING PORTION OF FORMING AND TURNING CAMS EQUALS .50: .05 OF THIS AMOUNT IS FOR DWELL AT THE END OF RISE TO INSURE ACCURACY AND FINISH. TABLE GIVES EFFECTIVE REVOLUTIONS OF WORK SPINDLE DURING .45.

TIME IN SECONDS TO COMPLETE ONE PIECE	GROSS PRODUCTION PER HOUR	DRIVER (200 R.P.M.)	DRIVEN (COMPOUND)	DRIVER (COMPOUND)	DRIVEN	R.P.M. SPINDLES 400	469	545	600	673	720	769	821	900	933	994	1058	1127	1200	1277	1360	1448	1553	1600	1753	1872	2000	2139	2400	2640	3067	3600
1.	3600	H.S. CLUTCH				3	4	4	5	5	5	6	6	7	7	7	8	8	9	10	10	11	12	12	13	14	15	16	18	20	23	27
1.26	2857	99	30	60	80	5	5	6	7	8	8	9	9	10	11	11	12	13	14	15	16	17	18	18	20	21	23	24	27	30	35	41
1.36	2647	86	30	60	80	5	6	7	8	9	9	10	11	12	12	13	14	15	15	16	18	19	20	21	23	24	26	28	31	34	40	46
1.49	2416	75	30	60	80	6	7	8	9	10	11	11	12	13	14	15	16	17	18	19	20	22	23	24	26	28	30	32	36	40	46	53
1.6	2250	67	30	60	80	7	8	9	10	11	12	13	14	15	15	16	17	19	20	21	22	24	26	26	29	31	33	35	40	44	51	59
1.65	2182	64	30	60	80	7	8	9	10	12	12	13	14	16	16	17	18	19	21	22	23	25	27	28	30	32	35	37	41	46	53	62
1.72	2093	60	30	60	80	7	9	10	11	12	13	14	15	16	17	18	19	21	22	23	25	26	28	29	32	34	37	39	44	48	56	66
1.87	1925	54	30	60	80	8	10	11	12	14	15	16	17	18	19	20	22	23	25	26	28	30	32	33	36	38	41	44	49	54	63	74
1.92	1875	52	30	60	80	9	10	12	13	14	15	16	17	19	20	21	23	24	26	27	29	31	33	34	37	40	43	46	51	56	65	77
1.98	1818	50	30	60	80	9	10	12	13	15	16	17	18	20	21	22	24	25	27	28	30	32	35	36	39	42	44	48	53	59	68	80
2.22	1622	86	USE 60 TOOTH IDLER		80	10	12	14	15	17	19	20	21	23	24	26	27	29	31	33	35	37	40	41	45	48	52	55	62	68	79	93
2.47	1457	75			80	12	14	16	18	20	21	23	24	27	28	29	31	33	35	38	40	43	46	47	52	55	59	63	71	78	91	106
2.71	1328	67			80	13	16	18	20	22	24	25	27	30	31	33	35	37	40	42	45	48	51	53	58	62	66	71	79	87	102	119
2.81	1281	64			80	14	16	19	21	23	25	27	28	32	32	34	37	39	42	44	47	50	54	55	61	65	69	74	83	91	106	125
2.96	1216	60			80	15	17	20	22	25	27	28	30	33	34	37	39	42	44	47	50	53	57	59	65	69	74	79	89	97	113	133
3.24	1111	54			80	16	19	22	25	28	30	32	34	37	38	41	43	46	49	52	56	60	64	66	72	77	82	88	99	109	126	148
3.34	1078	52			80	17	20	23	26	29	31	33	35	38	40	42	45	48	51	54	58	62	66	68	75	80	85	91	102	112	131	153
3.46	1040	50			80	18	21	24	27	30	32	34	36	40	41	44	47	50	53	57	60	64	69	71	78	83	89	95	107	117	136	160
3.58	1006	48			80	18	22	25	28	31	33	36	38	42	43	46	49	52	55	59	63	67	72	74	81	87	92	99	111	122	142	166
3.86	933	44			80	20	25	27	30	34	36	39	41	45	47	50	53	57	60	64	69	73	78	81	88	94	101	108	121	133	155	181
3.94	913	43			80	21	24	28	31	35	37	40	42	46	48	51	55	58	62	66	70	75	80	83	90	97	103	110	124	136	158	186
4.19	859	40			80	22	26	30	33	37	40	43	46	50	52	55	59	62	66	71	75	80	86	89	97	104	111	119	133	146	170	199
4.29	839	39			80	23	27	31	34	38	41	44	47	51	53	57	60	64	68	73	77	82	89	91	100	107	114	122	137	150	174	205
4.39	820	38			80	23	27	32	35	39	42	45	48	53	54	58	62	66	70	75	79	85	91	94	102	109	117	125	140	154	179	210
4.61	782	36			80	25	29	33	37	41	44	47	50	55	57	61	65	69	74	79	84	89	96	98	108	115	123	132	148	163	189	222
4.85	742	34			80	26	31	36	39	44	47	50	54	59	61	65	69	74	78	83	89	94	101	104	114	122	131	140	157	172	200	235
5.12	703	32			80	28	33	38	42	47	50	53	57	62	65	69	73	78	83	88	94	100	108	111	121	130	139	148	166	183	212	249
5.27	683	31			80	29	34	39	43	48	52	55	59	64	67	71	76	81	86	91	97	104	111	115	125	134	143	153	172	189	220	258
5.43	663	30			80	30	35	40	44	50	53	57	61	67	69	73	78	83	89	94	100	107	115	118	130	138	148	158	177	195	226	266

5.6	643	29			80	31	36	42	46	51	55	59	63	69	71	76	81	86	92	98	104	111	119	122	134	143	153	164	184	202	235	275
5.78	623	28			80	32	37	43	48	53	57	61	65	71	74	79	84	89	95	101	108	115	123	127	139	148	158	169	190	209	243	285
6.18	583	26			80	34	40	46	51	57	61	66	70	77	80	85	90	96	102	109	116	123	132	136	149	159	170	182	204	225	261	307
6.41	562	25			80	35	41	48	53	60	64	68	73	80	83	88	94	100	106	113	121	128	138	142	155	166	177	190	213	234	272	319
6.66	541	24			80	37	43	50	55	62	67	71	76	83	86	92	98	104	111	118	126	134	143	148	162	173	185	198	222	244	283	333
6.93	519	23			80	39	45	52	58	65	69	74	79	87	90	96	102	109	116	123	131	139	150	154	169	181	193	206	231	254	296	347
7.54	477	21			80	42	50	58	63	71	76	81	87	95	99	105	112	119	127	135	144	153	164	169	185	198	211	226	253	279	324	380
7.89	456	20			80	44	52	60	67	75	80	85	91	100	103	110	117	125	133	142	151	160	172	177	194	208	222	237	266	293	340	399
4.98	723	99	72	24	80	27	32	37	40	45	48	52	55	60	63	67	71	76	81	86	91	97	104	108	118	126	134	144	161	177	206	242
5.66	636	86	72	24	80	31	36	42	46	52	56	60	64	70	72	77	82	87	93	99	105	112	120	124	136	145	155	166	186	204	237	279
6.42	561	75	72	24	80	36	42	48	53	60	64	68	73	80	83	88	94	100	107	113	121	129	138	142	156	166	178	190	213	234	272	320
7.12	506	67	72	24	80	40	47	54	60	67	71	76	81	89	93	99	105	112	119	127	135	144	154	159	174	186	199	212	238	262	305	357
7.43	485	64	72	24	80	42	49	57	62	70	75	80	85	94	97	103	110	117	125	133	141	151	161	166	182	195	208	222	249	274	319	374
7.9	456	60	72	24	80	44	52	60	67	75	80	85	91	100	104	110	117	125	133	142	151	161	172	178	195	208	222	237	266	293	340	400
8.72	413	54	72	24	80	49	58	67	74	83	89	95	101	111	115	123	130	139	148	157	168	179	191	197	216	231	247	264	296	326	378	444
9.03	399	52	72	24	80	51	60	70	77	86	92	98	105	115	119	127	135	144	154	163	174	185	199	204	224	240	256	274	307	338	392	461
9.38	384	50	72	24	80	53	63	73	80	90	96	102	109	120	124	132	141	150	160	170	181	193	207	213	234	249	266	285	320	352	408	480
9.74	370	48	72	24	80	55	66	75	83	93	100	107	114	125	129	138	147	156	166	177	189	201	215	222	243	259	277	297	333	366	425	499
10.58	340	44	72	24	80	60	71	82	91	102	109	116	124	136	141	150	160	171	181	193	206	219	235	242	265	283	302	323	363	399	464	544
10.82	333	43	72	24	80	62	73	84	93	104	111	119	127	139	145	154	164	174	186	198	211	224	240	248	271	290	310	331	372	409	475	557
11.59	311	40	72	24	80	67	78	91	100	112	120	128	137	150	155	165	176	187	200	212	226	241	258	266	292	312	333	356	399	439	510	599
11.88	303	39	72	24	80	68	80	93	102	115	123	131	140	154	159	170	181	192	205	218	232	247	265	273	299	320	341	366	410	451	524	615
12.18	296	38	72	24	80	70	82	95	105	118	126	135	144	158	164	174	185	197	210	224	238	254	272	280	307	328	350	375	420	463	537	631
12.83	281	36	72	24	80	74	87	101	111	125	133	142	152	166	173	184	196	208	222	236	252	268	287	296	324	346	370	396	444	488	567	666
13.6	265	34	72	24	80	79	92	107	118	132	141	151	161	177	183	195	208	221	236	251	267	285	305	314	345	368	393	420	472	519	603	707
14.37	251	32	72	24	80	83	98	113	125	140	150	160	171	187	194	207	220	234	250	266	283	301	323	333	365	389	416	445	499	549	638	749
14.81	243	31	72	24	80	86	101	117	129	145	155	165	176	193	200	213	227	242	258	274	292	311	333	343	376	402	429	459	515	567	658	773
15.29	235	30	72	24	80	89	104	121	133	149	160	171	182	200	207	221	235	250	266	283	302	321	344	355	389	415	444	475	532	586	680	799
15.82	228	29	72	24	80	92	108	125	138	155	165	177	189	207	214	228	243	259	276	293	313	333	357	368	403	430	460	492	552	607	705	827
16.35	220	28	72	24	80	95	112	129	143	160	171	183	195	214	222	236	252	268	285	304	323	344	370	380	417	445	476	509	570	628	729	856
17.57	205	26	72	24	80	102	120	139	154	172	184	197	210	230	239	255	271	288	307	327	348	371	398	410	449	479	512	548	615	676	785	922
18.25	197	25	72	24	80	106	125	145	160	179	192	205	218	240	248	265	282	300	319	340	362	386	413	426	467	498	532	570	639	703	817	958
19.0	189	24	72	24	80	111	130	151	167	187	200	213	228	250	259	276	294	313	333	354	377	402	431	444	487	519	555	594	666	733	851	999
19.79	182	23	72	24	80	116	136	158	174	195	208	223	237	260	270	288	306	326	347	369	394	419	449	463	507	542	579	619	694	764	888	1042
21.63	166	21	72	24	80	127	149	173	190	213	228	244	260	285	296	315	335	357	380	405	431	459	492	507	556	593	634	677	761	837	972	1141
22.69	159	20	72	24	80	133	156	181	200	224	240	256	273	300	311	331	352	375	399	425	453	482	517	533	584	623	666	712	799	879	1021	1198
R.P.M. OF SPINDLES						400	469	545	600	673	720	769	821	900	933	994	1058	1127	1200	1277	1360	1448	1553	1600	1753	1872	2000	2139	2400	2640	3067	3600

MODEL B MACHINE - 60 CYCLE - DRIVE SHAFT SPEED 1200 R.P.M.

TABLE FOR SELECTING STANDARD SPINDLE CHANGE GEARS WITH RESULTANT SURFACE SPEEDS

R.P.M. OF SPINDLES	DRIVING GEAR	DRIVEN GEAR	STOCK DIAMETER IN INCHES																								
			1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	13/32	7/16	15/32	1/2	17/32	9/16	19/32	5/8	21/32	11/16	23/32	3/4	25/32	13/16	27/32	7/8
400	16	48													52	56	59	62	65	69	72	75	79	82	85	88	92
469	18	46										50	54	58	61	65	69	73	77	81	84	89	92	96	100	104	107
545	20	44									54	58	62	67	71	76	80	85	89	94	98	103	107	111	116	120	125
600	21	42								54	59	64	69	74	79	83	88	93	98	103	108	113	118	123	128	133	137
673	23	41						50	55	61	66	72	77	83	88	94	99	105	110	116	121	127	132	138	143	149	154
720	24	40						53	59	65	71	77	82	88	94	100	106	112	118	124	130	135	141	147	153	159	165
769	25	39					50	57	63	69	75	82	88	94	101	107	113	120	126	132	138	145	151	157	164	170	176
821	26	38					54	60	67	74	81	87	94	101	107	114	121	128	134	141	148	154	161	168	175	181	188
900	27	36				52	59	66	74	81	88	96	103	110	118	125	133	140	147	155	162	169	177	184	191	199	206
933	28	36				53	61	69	76	84	92	99	107	114	122	130	137	145	153	160	168	176	183	191	198	206	214
994	29	35				57	65	73	81	89	98	106	114	122	130	138	146	155	163	171	179	187	195	203	211	220	228
1058	30	34			52	61	69	78	87	95	104	113	121	130	138	147	156	164	173	182	190	199	208	216	225	234	242
1127	31	33			55	65	74	83	92	101	111	120	129	138	148	157	166	175	184	194	203	212	221	231	240	249	258
1200	32	32			59	69	79	88	98	108	118	128	137	147	157	167	177	187	196	206	216	226	236	245	255	265	275
1277	33	31		52	63	73	84	94	104	115	125	136	146	157	167	178	188	198	209	219	230	240	251	261	272	282	293
1360	34	30		56	67	78	89	100	111	122	134	145	156	167	178	189	200	211	223	234	245	256	267	278	289	300	312
1448	35	29		59	71	83	95	107	118	130	142	154	166	178	190	201	213	225	237	249	261	272	284	296	308	320	332
1543	36	28	50	63	76	88	101	114	126	139	151	164	177	189	202	215	227	240	252	265	278	290	303	316	328	341	353
1600	36	27	52	65	79	92	105	118	131	144	157	170	183	196	209	223	236	249	262	275	288	301	314	327	340	353	367
1753	38	26	57	72	86	100	115	129	143	158	172	186	201	215	229	244	258	272	287	301	316	330	344	359	373	387	402
1872	39	25	61	77	92	107	123	138	153	168	184	199	214	230	245	260	276	291	306	322	337	352	368	383	398	414	429
2000	40	24	65	82	98	115	131	147	163	180	196	213	229	245	262	278	295	311	327	344	360	376	393	409	425	442	458
2139	41	23	70	87	105	122	140	157	175	192	210	227	245	262	280	297	315	332	350	368	385	402	420	437	455	472	490
2400	42	21	79	98	118	137	157	177	196	216	236	255	275	295	314	334	353	373	393	412	432	452	471	491	511	530	550
2640	44	20	86	108	130	151	173	195	216	238	259	281	302	324	346	367	389	410	432	454	475	497	518	540	562	583	605
3067	46	18	100	125	151	176	201	226	251	276	301	326	351	376	401	427	452	477	502	527	552	577	602	627	652	677	703
3600	48	16	118	147	177	206	236	265	295	324	353	383	412	442	471	501	530	560	589	618	648	677	707	736	766	795	825

MODEL B MACHINE - 60 CYCLE - DRIVE SHAFT SPEED 1500 R.P.M.

TABLE FOR SELECTING STANDARD SPINDLE CHANGE GEARS WITH RESULTANT SURFACE SPEEDS IN S.F.M.

SURFACE SPEED IN FEET PER MINUTE

R.P.M. OF SPINDLES	DRIVING GEAR.	DRIVEN GEAR	STOCK DIAMETERS IN MILLIMETERS																		
			3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
400	16	48	12.4	16.4	20.6	24.6	28.8	32.8	37.1	41.3	45.2	49.5	53.4	57.7	61.6	65.9	70.2	74.1	78.4	82.3	86.6	90.5
469	18	46	14.4	19.4	24.3	28.9	33.8	38.7	43.6	48.2	53.1	58.1	62.7	67.6	72.5	77.4	82.0	86.9	91.9	96.8	101.4	106.3
545	20	44	16.7	22.3	28.2	33.8	39.4	44.9	50.5	56.1	61.7	67.3	72.8	78.7	84.3	89.9	95.5	101.1	106.6	112.2	117.8	123.4
600	21	42	18.7	24.6	30.8	37.1	43.3	49.5	55.4	61.7	68.0	74.1	80.4	86.6	92.8	98.8	105.0	111.2	117.5	123.7	129.9	135.8
673	23	41	20.6	27.9	34.8	41.7	48.6	55.4	62.3	69.2	76.1	83.3	90.2	97.1	104.0	110.9	117.8	124.7	131.9	138.8	145.7	152.6
720	24	40	22.3	29.5	37.1	44.6	51.8	59.4	66.6	74.1	81.7	88.9	96.5	104.0	111.2	118.8	126.0	133.5	145.7	148.3	155.8	163.1
769	25	39	23.6	31.8	39.7	47.6	55.4	63.3	71.2	79.1	87.3	95.1	103.0	110.9	118.8	126.6	134.5	142.7	150.6	158.5	166.3	174.2
821	26	38	25.3	33.8	42.3	50.9	59.1	67.6	76.1	84.6	93.2	101.4	110.0	118.4	127.0	135.2	143.7	152.2	160.8	169.3	177.5	186.0
900	27	36	27.9	37.1	46.3	55.8	65.0	74.1	83.3	92.8	102.0	111.2	120.4	129.9	139.1	148.3	157.5	167.0	176.2	185.4	194.6	204.1
933	28	36	28.9	38.4	47.9	57.7	67.3	76.8	86.6	96.1	105.6	115.5	125.0	134.5	144.0	153.9	163.4	172.9	182.7	192.3	201.8	211.6
994	29	35	30.8	41.0	51.2	61.3	71.5	82.0	92.2	102.4	112.5	123.0	133.2	143.4	153.5	163.7	174.2	184.4	194.6	204.7	214.9	225.4
1058	30	34	32.8	43.6	54.5	65.3	76.4	87.3	98.1	108.9	119.8	131.0	141.7	152.6	163.4	174.5	185.4	196.2	207.0	217.8	229.0	239.8
1127	31	33	34.8	46.6	58.1	69.6	81.4	92.8	104.3	116.1	127.6	139.1	151.0	162.4	174.2	185.7	197.5	209.0	220.5	232.3	243.8	255.6
1200	32	32	37.1	49.5	61.7	74.1	86.6	98.8	111.2	123.7	135.8	148.3	160.8	173.2	185.4	197.8	210.3	222.4	234.9	247.4	259.5	272.0
1277	33	31	39.3	52.5	65.6	79.1	92.2	105.3	118.4	131.6	144.7	157.8	170.9	184.1	197.2	210.6	223.8	236.9	250.0	263.1	276.2	289.4
1360	34	30	42.0	56.1	70.2	84.0	98.1	112.2	126.0	140.1	154.2	168.0	182.1	196.2	210.3	224.1	238.2	252.3	266.1	280.2	294.3	308.1
1448	35	29	44.6	59.7	74.5	89.6	104.3	119.4	134.2	149.3	164.0	179.1	193.9	209.0	223.8	238.5	253.6	268.4	283.5	298.2	313.3	328.1
1543	36	28	47.6	63.6	79.4	95.5	111.2	127.3	143.0	159.1	174.9	190.6	206.7	222.4	238.5	254.3	270.3	286.1	302.2	317.9	333.7	349.7
1600	36	27	49.5	65.9	82.3	98.8	115.5	131.9	148.3	164.7	182.1	197.8	214.2	230.6	247.4	263.8	280.2	296.6	313.3	329.7	346.1	362.5
1753	38	26	54.1	72.2	90.2	108.3	126.3	144.4	162.4	180.4	198.5	216.9	234.9	253.0	271.0	289.0	307.1	325.1	343.2	361.2	379.3	397.3
1872	39	25	57.7	77.1	96.5	115.8	134.8	154.2	173.6	193.0	212.3	231.3	250.6	270.0	289.4	308.4	327.8	347.1	366.5	385.8	404.9	424.2
2000	40	24	61.7	82.3	103.0	123.7	144.4	164.7	185.4	206.0	226.7	247.4	267.7	288.4	309.1	329.7	350.4	370.7	391.4	412.1	432.7	453.4
2139	41	23	65.9	88.3	110.2	132.2	154.2	176.2	198.2	220.1	242.5	264.4	286.4	308.4	330.4	352.7	374.7	396.7	418.6	440.6	462.6	484.9
2400	42	21	74.1	98.8	123.7	148.3	173.0	197.8	222.4	247.4	272.0	296.6	321.5	346.1	370.7	395.7	420.3	444.9	469.8	494.4	519.4	544.0
2640	44	20	81.7	108.9	135.8	163.1	190.3	217.5	244.8	272.0	299.2	326.4	353.7	380.9	407.8	435.0	462.3	489.5	516.7	544.0	571.2	598.4
3067	46	18	94.8	126.3	158.1	189.6	221.1	252.6	284.4	316.0	347.4	379.3	410.7	442.3	474.1	505.6	537.1	568.6	600.4	631.9	663.4	695.2
3600	48	16	111.2	148.3	185.4	222.4	259.5	296.6	333.7	370.7	407.8	444.9	482.3	519.4	556.4	593.5	630.6	667.7	704.7	741.8	778.9	815.9

DAVENPORT MACHINE TOOL DIVISION DOVER CORPORATION
MODEL B MACHINE 45 CYCLE - IDLE TIME 7/10 SECOND (.7)
TABLE FOR FEED CHANGE GEARS

WORKING PORTION OF FORMING AND TURNING CAMS EQUALS .50: .05 OF THIS AMOUNT IS FOR DWELL AT THE END OF RISE TO INSURE ACCURACY AND FINISH. TABLE GIVES EFFECTIVE REVOLUTIONS OF WORK SPINDLE DURING .45.

TIME IN SECONDS TO COMPLETE ONE PIECE	GROSS PRODUCTION PER HOUR	DRIVER	DRIVEN (COMPOUND)	DRIVER (COMPOUND)	DRIVEN	R.P.M. SPINDLES																										
						311	365	424	466	523	559	598	638	700	726	773	823	876	933	993	1057	1126	1200	1244	1364	1455	1555	1663	1866	2053	2384	2799
1.3	2769	H.S.C.CLUTCH				3	3	4	4	5	5	5	6	6	7	7	7	8	8	9	10	10	11	11	12	13	14	15	17	18	21	25
1.6	2250	99	30	60	80	4	5	6	6	7	8	8	9	9	10	10	11	12	13	13	14	15	16	17	18	20	21	22	25	28	32	38
1.8	2000	86	30	60	80	5	6	7	8	9	9	10	11	12	12	13	14	14	15	16	17	19	20	20	23	24	26	27	31	34	39	46
1.9	1895	75	30	60	80	6	7	8	8	10	10	11	12	13	13	14	15	16	17	18	19	20	22	22	25	26	28	30	34	37	43	50
2.1	1714	67	30	60	80	7	8	9	10	11	12	13	13	15	15	16	17	18	20	21	22	24	25	26	29	31	33	35	39	43	50	59
2.2	1636	64	30	60	80	7	8	10	10	12	13	13	14	16	16	17	19	20	21	22	24	25	27	28	31	33	35	37	42	46	54	63
2.3	1565	60	30	60	80	7	9	10	11	13	13	14	15	17	17	19	20	21	22	24	25	27	29	30	33	35	37	40	45	49	57	67
2.4	1500	54	30	60	80	8	9	11	12	13	14	15	16	18	18	20	21	22	24	25	27	29	31	32	35	37	40	42	48	52	61	71
2.5	1440	52	30	60	80	8	10	11	13	14	15	16	17	19	20	21	22	24	25	27	29	30	32	34	37	39	42	45	50	55	64	76
2.6	1385	50	30	60	80	9	10	12	13	15	16	17	18	20	21	22	23	25	27	28	30	32	34	35	39	41	44	47	53	59	68	80
2.9	1241	86	USE 60 TOOTH IDLER		80	10	12	14	15	17	18	20	21	23	24	25	27	29	31	33	35	37	40	41	45	48	51	55	62	68	79	92
3.2	1125	75			80	12	14	16	17	20	21	22	24	26	27	29	31	33	35	37	40	42	45	47	51	55	58	62	70	77	89	105
3.5	1028	67			80	13	15	18	20	22	23	25	27	29	31	32	35	37	39	42	44	47	50	52	57	61	65	70	78	86	100	117
3.7	973	64			80	14	16	19	21	23	25	27	29	32	33	35	37	39	42	45	48	51	54	56	61	65	70	75	84	92	107	126
3.9	923	60			80	15	17	20	22	25	27	29	31	34	35	37	40	42	45	48	51	54	58	60	65	70	75	80	90	98	114	134
4.2	857	54			80	16	19	22	24	27	29	31	34	37	38	41	43	46	49	52	55	59	63	65	72	76	82	87	98	108	125	147
4.4	818	52			80	17	20	23	26	29	31	33	36	39	40	43	46	48	52	55	59	63	67	69	76	81	86	92	104	114	132	155
4.5	800	50			80	18	21	24	27	30	32	34	36	40	41	44	47	50	53	57	60	64	68	71	78	83	89	95	106	117	136	160
4.7	765	48			80	19	22	26	28	31	34	36	38	42	44	46	49	53	56	60	63	68	72	75	82	87	93	100	112	123	143	168
5.	720	44			80	20	24	27	30	34	36	39	41	45	47	50	53	56	60	64	68	73	77	80	88	94	100	107	120	132	154	181
5.1	706	43			80	20	24	28	31	35	37	39	42	46	48	51	54	58	62	66	70	74	79	82	90	96	103	110	123	135	157	185
5.2	692	40			80	21	25	29	31	35	38	40	43	47	49	52	56	59	63	67	71	76	81	84	92	98	105	112	126	139	161	189
5.6	642	39			80	23	27	31	34	38	41	44	47	51	53	57	61	64	69	73	78	83	88	91	100	107	114	122	137	151	175	206
5.7	632	38			80	23	27	32	35	39	42	45	48	53	55	58	62	66	70	74	79	84	90	93	102	109	117	125	140	154	179	210
6.	600	36			80	25	29	34	37	42	44	48	51	56	58	61	65	70	74	79	84	90	95	99	108	116	124	132	148	163	190	223
6.3	571	34			80	26	31	36	39	44	47	50	54	59	61	65	69	74	78	83	89	95	101	104	115	122	131	140	157	172	200	235
6.7	537	32			80	28	33	38	42	47	50	54	57	63	65	70	74	79	84	89	95	101	108	112	123	131	140	150	168	185	215	252
6.9	522	31			80	29	34	39	43	49	52	56	59	65	68	72	77	82	87	92	98	105	112	116	127	135	145	155	174	191	222	260
7.1	507	30			80	30	35	41	45	50	54	57	61	67	70	74	79	84	90	95	101	108	115	119	131	140	149	160	179	197	229	269

7.3	493	29			80	31	36	42	46	52	55	59	63	69	72	77	82	87	92	98	105	111	119	123	135	144	154	165	185	203	236	277
7.5	480	28			80	32	37	43	48	53	57	61	65	71	74	79	84	89	95	101	108	115	122	127	139	148	159	170	190	209	243	286
8.1	444	26			80	35	41	47	52	58	62	66	71	78	81	86	91	97	104	110	117	125	133	138	151	161	173	185	207	228	265	311
8.4	428	25			80	36	42	49	54	60	65	69	74	81	84	89	95	101	108	115	122	130	139	144	158	168	180	192	216	237	275	323
8.7	414	24			80	37	44	51	56	63	67	72	77	84	87	93	99	104	112	119	127	135	144	149	164	175	187	200	224	246	286	336
9.	400	23			80	39	46	53	58	65	70	74	79	87	90	96	102	109	116	124	132	140	149	155	170	181	194	207	232	256	297	348
9.8	367	21			80	42	50	58	64	71	76	82	87	96	99	106	112	120	127	136	144	154	164	170	186	199	212	227	255	280	325	382
*10.3	350	20			80	45	53	61	67	75	81	86	92	101	105	111	118	126	134	143	152	162	173	179	196	209	224	239	269	296	343	403
6.5	555	99	72	24	80	27	32	37	41	46	49	52	55	61	63	67	72	76	81	86	92	98	104	108	119	127	135	145	162	179	207	244
7.4	487	86	72	24	80	31	37	43	47	53	56	60	64	70	73	78	83	88	94	100	106	113	121	125	137	146	156	167	188	206	240	281
7.7	468	75	72	24	80	33	38	45	49	55	59	63	67	73	76	81	86	92	98	104	111	118	126	131	143	153	163	175	196	216	250	294
9.3	387	67	72	24	80	40	47	55	60	67	72	77	82	90	94	100	106	113	120	128	136	145	155	160	176	188	201	215	241	265	308	361
9.7	371	64	72	24	80	42	49	57	63	71	75	81	86	95	98	104	111	118	126	134	143	152	162	168	184	196	210	225	252	277	322	378
*10.3	350	60	72	24	80	45	53	61	67	75	81	86	92	101	105	111	118	126	134	143	152	162	173	179	196	209	224	239	269	296	343	403
11.4	316	54	72	24	80	50	59	68	75	84	90	96	102	112	117	124	132	141	150	159	170	181	193	200	219	234	250	267	299	330	383	449
11.8	305	52	72	24	80	52	61	71	78	87	93	100	106	117	121	129	137	146	155	165	176	188	200	207	227	242	259	277	311	342	397	466
12.2	295	50	72	24	80	54	63	73	80	90	96	103	110	121	125	133	142	151	161	171	182	194	207	215	234	251	268	287	322	354	411	483
12.7	284	48	72	24	80	56	66	76	84	94	101	108	115	126	130	139	148	158	168	179	190	203	216	224	245	262	280	299	336	369	429	504
13.8	261	44	72	24	80	61	72	83	92	103	110	118	125	138	143	152	162	172	183	195	208	221	236	244	268	286	306	327	367	403	469	550
14.1	255	43	72	24	80	63	73	85	94	105	112	120	128	141	146	155	165	176	188	200	212	226	241	250	274	292	313	334	375	413	479	563
15.1	239	40	72	24	80	67	79	92	101	113	121	129	138	151	157	167	178	189	201	214	228	243	256	269	295	314	336	359	403	443	515	605
15.5	232	39	72	24	80	69	81	94	103	116	124	133	142	155	161	172	183	194	207	220	235	250	266	276	303	323	345	369	414	456	529	621
15.9	226	38	72	24	80	71	83	97	106	119	127	136	145	160	166	176	188	200	213	226	241	256	274	284	311	332	355	379	426	468	544	638
16.7	216	36	72	24	80	75	88	102	112	126	134	144	153	168	174	186	198	210	224	238	254	270	288	298	327	349	373	399	448	493	572	672
17.7	203	34	72	24	80	79	93	108	119	133	143	153	163	179	185	197	210	223	238	253	270	287	306	317	348	371	397	424	476	523	608	713
18.7	193	32	72	24	80	84	99	115	126	141	151	162	172	189	196	209	222	237	252	268	285	304	324	336	368	393	420	449	504	554	644	756
19.3	187	31	72	24	80	87	102	118	130	146	156	167	178	195	203	215	230	244	260	277	295	314	335	347	381	406	434	464	521	573	665	779
19.9	181	30	72	24	80	90	105	122	134	151	161	172	184	202	209	223	237	252	269	286	304	324	346	358	393	419	448	479	537	591	687	806
20.6	175	29	72	24	80	93	109	127	139	156	167	179	190	209	217	231	246	262	279	296	316	336	358	371	407	434	464	496	557	613	712	837
21.3	169	28	72	24	80	96	113	131	144	162	173	185	197	216	224	239	254	271	288	307	327	348	371	384	422	450	480	514	577	634	737	865
22.9	157	26	72	24	80	104	122	141	155	174	186	199	212	233	242	256	274	294	311	331	352	375	400	414	454	484	518	554	621	684	794	932
23.8	151	25	72	24	80	108	127	147	162	181	194	207	221	243	252	268	285	304	323	345	366	390	415	431	473	504	539	576	647	711	825	970
24.8	145	24	72	24	80	112	132	153	168	189	202	216	231	253	262	279	298	315	337	359	382	407	434	450	493	526	562	601	675	742	862	1012
25.8	140	23	72	24	80	117	137	160	175	197	211	225	240	264	273	291	310	330	350	374	398	424	452	468	514	548	586	626	702	773	898	1054
28.3	127	21	72	24	80	129	151	176	193	217	231	248	264	290	301	320	341	363	386	412	438	466	497	515	565	603	644	688	773	850	987	1159
29.6	122	20	72	24	80	135	158	184	202	227	242	259	277	303	314	335	357	380	404	430	458	488	520	539	591	631	674	721	809	890	1033	1213
R.P.M. OF SPINDLES						311	365	424	466	523	559	598	638	700	726	773	823	876	933	993	1057	1126	1200	1244	1364	1455	1555	1663	1866	2053	2384	2799

MODEL B MACHINE 45 CYCLE - DRIVE SHAFT SPEED 933 R.P.M.
TABLE FOR SELECTING STANDARD SPINDLE CHANGE GEARS WITH RESULTANT SURFACE SPEEDS

R.P.M. OF SPINDLES	DRIVING GEAR	DRIVEN GEAR	STOCK DIAMETER IN INCHES																								
			1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	13/32	7/16	15/32	1/2	17/32	9/16	19/32	5/8	21/32	11/16	23/32	3/4	25/32	13/16	27/32	7/8
311	16	48																	51	53	56	59	61	64	66	69	71
365	18	46														51	54	57	60	63	66	69	72	75	78	81	84
424	20	44												52	56	59	62	66	69	73	76	80	83	87	90	94	97
466	21	42										50	53	57	61	65	69	72	76	80	84	88	91	95	99	103	107
523	23	41									51	56	60	64	68	73	77	81	86	90	94	98	102	107	111	116	120
559	24	40								50	55	59	64	69	73	78	82	87	91	96	101	105	110	114	119	123	128
598	25	39								54	59	64	68	73	78	83	88	93	98	103	108	113	117	122	127	132	137
638	26	38							52	57	63	68	73	78	84	89	94	99	104	110	115	120	125	130	136	141	146
700	27	36						52	57	63	69	74	80	86	92	97	103	109	115	120	126	132	137	143	149	155	160
726	28	36						53	59	65	71	77	83	89	95	101	107	113	119	125	131	137	143	148	154	160	166
773	29	35					51	57	63	70	76	82	89	95	101	108	114	120	126	133	139	145	152	158	164	171	177
823	30	34					54	61	67	74	81	88	94	101	108	114	121	128	135	141	148	155	162	168	175	182	189
876	31	33				50	57	64	72	79	86	93	100	107	115	122	129	136	143	150	158	165	172	179	186	193	201
933	32	32				53	61	69	76	84	92	99	107	114	122	130	137	145	153	160	168	176	183	191	198	206	214
993	33	31				57	65	73	81	89	97	104	114	122	130	138	146	154	162	171	179	187	195	203	211	219	227
1057	34	30			52	61	69	78	86	95	104	112	121	130	139	147	156	164	173	182	190	199	208	216	225	233	242
1126	35	29			55	64	74	83	92	101	111	120	129	138	147	157	166	175	184	193	203	212	221	230	240	249	258
1200	36	28			59	69	79	88	98	108	118	128	137	147	157	167	177	187	196	206	216	226	236	245	255	265	275
1244	36	27		51	61	71	81	92	102	112	122	132	142	153	163	173	183	193	204	214	224	234	244	254	265	275	285
1364	38	26		56	67	78	89	100	112	123	134	145	156	167	179	190	201	212	223	234	245	257	268	279	290	301	312
1455	39	25		60	71	83	95	107	119	131	143	155	167	179	190	202	214	226	237	250	262	274	286	298	309	321	333
1555	40	24	51	64	76	89	102	114	127	140	153	165	178	191	204	216	229	242	254	267	280	293	305	318	331	343	356
1663	41	23	54	68	82	95	109	122	136	150	163	177	190	204	218	231	245	258	272	286	299	313	327	340	354	367	381
1866	42	21	61	76	92	107	122	137	153	168	183	198	214	229	244	260	275	290	305	321	336	351	366	382	397	412	427
2053	44	20	67	84	101	118	134	151	168	185	202	218	235	252	269	286	302	319	336	353	370	386	403	420	437	453	470
2384	46	18	78	98	117	137	156	176	195	215	234	254	273	293	312	332	351	371	390	410	429	449	468	487	507	527	546
2799	48	16	92	114	137	160	183	206	229	252	275	298	321	343	366	389	412	435	458	481	504	527	550	572	595	618	641

MODEL B MACHINE - 45 CYCLE - DRIVE SHAFT SPEED 933 R.P.M.

TABLE FOR SELECTING STANDARD SPINDLE CHANGE GEARS WITH RESULTANT SURFACE SPEEDS

R.P.M. OF SPINDLES	DRIVING GEAR	DRIVEN GEAR	SURFACE SPEED IN FEET PER MINUTE — STOCK DIAMETERS IN MILLIMETERS																		
			3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
311	16	48	9.6	12.8	16,0	19.3	22.4	25.6	28.8	32.0	35.3	38.5	41.7	44.9	48.1	51.3	54.5	57.7	60.9	64.1	67.3	70.5
365	18	46	11.3	15.1	18.8	22.6	26.3	30.2	33.9	37.6	41.2	45.1	48.9	52.7	56.4	60.2	64.0	67.7	71.5	75.3	79.0	82.8
424	20	44	13.1	17.5	21.9	26.2	30.6	35.0	39.3	43.7	48.1	52.4	56.8	61.2	65.6	69.9	74.3	78.6	83.0	87.4	91.8	96.2
466	21	42	14.4	19.2	24.0	28.8	33.6	38.4	43.2	48.0	52.8	57.6	62.4	67.2	72.1	76.8	81.7	86.4	91.3	96.1	100.9	105.7
523	23	41	16.2	21.6	27.0	32.4	37.7	43.2	48.6	54.0	59.3	64.7	70.1	75.5	80.9	86.2	91.6	97.0	102.4	107.8	113.2	118.6
559	24	40	17.3	23.0	28.8	34.6	40.3	46.0	51.9	57.6	63.4	69.1	74.9	80.7	86.4	92.1	97.9	103.7	109.5	115.3	121.0	126.8
598	25	39	18.5	24.7	30.8	37.0	43.1	49.4	55.5	61.7	67.8	74.0	80.1	86.3	92.5	98.6	104.8	110.9	117.1	123.3	129.4	135.6
638	26	38	19.7	26.3	32.9	39,5	46.0	52.6	59.1	65.8	72.3	78.9	85.8	92.1	98.7	105.2	111.8	116.3	124.9	131.6	138.1	144.7
700	27	36	21.6	28.9	36.1	43.3	50.5	57.8	64.8	72.2	79.4	86.6	93.8	101.0	108.3	115.4	122.7	129.8	137.1	144.3	151.5	158.7
726	28	36	22.4	29.9	37.4	44.8	52.4	59.8	67.2	74.8	82.3	89.8	97.3	104.8	112.3	119.7	127.2	134.6	142.1	149.7	157.1	164.6
773	29	35	23.9	31.9	39.8	47.8	55.8	63.8	71.7	79.7	87.6	95.6	103.6	111.5	119.5	127.4	135.4	143.3	151.4	159.4	167.3	175.3
823	30	34	25.4	33.9	42.4	50.9	59.4	67.8	76.2	84.8	93.3	101.8	110.3	118.8	127.3	135.7	144.2	152.6	161.2	169.7	178.1	186.6
876	31	33	27.1	36.1	45.2	54.2	63.2	72.2	81.3	90.3	99.3	108.3	117.4	126.4	135.5	144.4	153.5	162.4	171.5	180.6	189.6	198.6
933	32	32	28.8	38.5	48.1	57.7	67.3	77.0	86.4	96.2	105.8	115.4	125.0	134.6	144.3	153.8	163.5	173.0	182.7	192.4	202.0	211.6
993	33	31	30.7	40.9	51.2	61.4	71.6	81.8	92.1	102.4	112.6	122.8	133.0	143.3	153.6	163.7	174.0	184.1	194.5	204.7	215.0	225.2
1057	34	30	32.7	43.6	54.5	65.35	76.3	87.2	98.1	109.0	119.8	130.7	141.6	152.5	163.5	174.2	185.2	196.0	207.0	218.0	228.8	239.7
1126	35	29	34.8	46.4	58.0	69.7	81.2	92.8	104.4	116.1	127.7	139.3	150.9	162.5	174.1	185.6	197.3	208.8	220.5	232.2	243.7	255.3
1200	36	28	37.1	49.5	61.9	74.2	86.6	99.0	111.3	123.7	136.1	148.4	160.8	173.2	185.6	197.8	210.3	222.5	235.0	247.4	259.7	272.1
1244	36	27	38.5	51.3	64.1	77.0	89.8	102.6	115.5	128.3	141.0	153.9	166.7	179.5	192.4	205.0	218.0	230.7	243.6	256.5	269.3	282.0
1364	38	26	42.2	56.2	70.3	84.4	98.4	112.4	126.6	140.6	154.7	168.7	182.8	196.8	210.9	224.8	239.0	252.9	267.1	281.4	295.2	309.3
1455	39	25	45.0	60.0	75.0	90.0	105.0	120.0	135.0	150.0	165.0	179.9	195.0	210.0	225.0	239.8	255.0	269.8	285.0	300.0	315.0	330.0
1555	40	24	48.1	64.1	80.2	96.2	112.2	128.2	144.3	160.3	176.3	192.3	208.4	224.4	240.5	256.3	272.5	288.3	304.5	320.6	336.6	352.6
1663	41	23	51.4	68.6	85.7	102.9	120.0	137.2	154.2	171.4	188.6	205.7	222.8	240.0	257.2	274.1	291.4	308.4	325.7	342.9	360.0	377.1
1866	42	21	57.7	76.9	96.2	115.4	134.6	153.8	173.1	192.4	211.6	230.8	250.0	269.3	288.6	307.6	327.0	346.0	365.4	384.8	404.0	423.2
2053	44	20	63.5	84.7	105.8	127.0	148.1	169.4	190.5	211.7	232.8	253.9	275.1	296.3	317.5	338.4	359.7	380.7	402.0	423.3	444.4	465.6
2384	46	18	73.7	98.3	122.9	147.4	172.0	196.6	221.1	245.8	270.3	294.8	319.4	344.0	368.7	393.0	417.7	442.1	466.8	491.6	516.0	540.6
2799	48	16	86.5	115.4	144.9	173.1	202.0	230.8	259.5	288.6	317.4	346.2	375.0	404.0	432.9	461.4	490.4	519.0	548.1	577.1	606.0	634.7

THREADING SPINDLE SPEEDS FOR SELF OPENING DIE HEADS - 75 CYCLE MACHINES

Upper Figures Denote Threading Spindle Speed
Lower Figures Denote Effective Threading Spindle Speed

For Right Hand Threads Only

Spindle Speed R.P.M.	Spindle Change Gears	Using Low Side Of Threading Clutch — Threading Change Gears									Using High Side-Threading Clutch — Threading Change Gears				
		28-36	29-35	30-34	31-33	32-32	33-31	34-30	35-29	36-28	20-44	21-42	23-41	24-40	25-39
500	16-48	292 208	311 189	331 169	352 148	375 125	399 101	425 75	453 47	482 18	341 159	375 125	421 79	450 50	481 19
587	18-46	342 245	365 222	388 199	414 173	440 147	469 118	499 88	531 56	566 21	400 187	440 147	494 93	528 59	564 23
682	20-44	398 284	424 258	451 231	480 202	511 171	544 138	580 102	617 65	658 24	465 217	512 170	574 108	614 68	656 26
750	21-42	438 312	466 284	496 254	528 222	563 187	599 151	638 112	679 71	723 27	511 239	563 187	631 119	675 75	721 29
841	23-41	491 350	523 318	557 284	593 248	631 210	671 170	714 127	761 80	811 30	573 268	631 210	708 133	757 84	809 32
900	24-40	525 375	559 341	596 304	634 266	675 225	719 181	765 135	815 85	868 32	614 286	675 225	757 143	810 90	865 35
962	25-39	561 401	598 364	637 325	678 284	721 241	768 194	818 144	871 91	928 34	656 306	722 240	809 153	866 96	925 37
1026	26-38	599 427	638 388	679 347	723 303	770 256	819 207	872 154	929 97	989 37	700 326	770 256	863 163	923 103	987 39
1125	27-36	656 469	699 426	744 381	793 332	844 281	898 227	956 169	1018 107	1085 40	767 358	844 281	947 178	1013 112	1082 43
1166	28-36	680 486	725 441	772 394	821 345	874 292	931 235	991 175	1055 111	1124 42	795 371	874 292	981 185	1049 117	1121 45
1243	29-35	725 518	772 471	823 420	876 367	932 311	992 251	1057 186	1125 118	1199 44	848 395	932 311	1046 197	1119 124	1195 48
1324	30-34	772 552	823 501	876 448	933 391	993 331	1057 267	1125 199	1198 126	1277 47	903 421	993 331	1114 210	1192 132	1273 51

1409	31-33	822 587	876 533	932 477	993 416	1057 352	1125 284	1197 212	1275 134	1359 50	961 448	1057 352	1186 223	1268 141	1355 54
1500	32-32	875 625	932 568	993 507	1057 443	1125 375	1198 302	1275 225	1358 142	1446 54	1023 477	1125 375	1262 238	1350 150	1442 58
1597	33-31	932 665	992 605	1057 540	1125 472	1198 399	1275 322	1357 240	1446 151	1540 57	1089 508	1198 399	1344 253	1437 160	1536 61
1700	34-30	992 708	1056 644	1125 575	1198 502	1275 425	1357 343	1445 255	1539 161	1639 61	1159 541	1275 425	1430 270	1530 170	1635 65
1810	35-29	1056 754	1125 685	1198 612	1275 535	1357 453	1445 365	1538 272	1638 172	1745 65	1234 576	1357 453	1523 287	1629 181	1740 70
1930	36-28	1126 804	1199 731	1277 653	1360 570	1447 483	1541 389	1640 290	1747 183	1861 69	1316 614	1447 483	1624 306	1737 193	1856 74
2000	36-27	1167 833	1243 757	1324 676	1409 591	1500 500	1597 403	1700 300	1810 190	1929 71	1364 636	1500 500	1683 317	1800 200	1923 77
2192	38-26	1279 913	1362 830	1451 741	1544 648	1644 548	1750 442	1863 329	1984 208	2114 78	1495 697	1644 548	1843 349	1973 219	2108 84
2340	39-25	1365 975	1454 886	1548 792	1649 691	1755 585	1868 472	1989 351	2118 222	2256 84	1595 745	1755 585	1969 371	2106 234	2250 90
2500	40-24	1458 1042	1554 946	1654 846	1761 739	1875 625	1996 504	2125 375	2263 237	2411 89	1705 795	1875 625	2104 396	2250 250	2404 96
2674	41-23	1560 1114	1662 1012	1770 904	1884 790	2005 669	2135 539	2273 401	2420 254	2579 95	1823 851	2005 669	2250 424	2407 267	2571 103
3000	42-21	1750 1250	1864 1136	1985 1015	2114 886	2250 750	2395 605	2550 450	2716 284	2893 107	2045 955	2250 750	2524 476	2700 300	2885 115
3300	44-20	1925 1375	2051 1249	2184 1116	2325 975	2475 825	2635 665	2805 495	2987 313	3182 118	2250 1050	2475 825	2777 523	2970 330	3173 127
3833	46-18	2236 1597	2382 1451	2537 1296	2700 1133	2875 958	3060 773	3258 575	3469 364	3696 137	2613 1220	2875 958	3225 608	3450 383	3686 147
4500	48-16	2625 1875	2796 1704	2978 1522	3170 1330	3375 1125	3593 907	3825 675	4073 427	4339 161	3068 1432	3375 1125	3787 713	4050 450	4327 173
		28-36	29-35	30-34	31-33	32-32	33-31	34-30	35-29	36-28	20-44	21-42	23-41	24-40	25-39

THREADING SPINDLE SPEEDS FOR SELF OPENING DIE HEADS - 60 CYCLE MACHINES

Upper Figures Denote Threading Spindle Speed
Lower Figures Denote Effective Threading Spindle Speed

For Right Hand Threads Only

Spindle Speed R.P.M.	Spindle Change Gears	Using Low Side Of Threading Clutch — Threading Change Gears									Using High Side-Threading Clutch — Threading Change Gears				
		28-36	29-35	30-34	31-33	32-32	33-31	34-30	35-29	36-28	20-44	21-42	23-41	24-40	25-39
400	16-48	233 167	249 151	265 135	282 118	300 100	319 81	340 60	362 38	386 14	273 127	300 100	337 63	360 40	385 15
469	18-46	274 195	291 178	310 159	330 139	352 117	374 95	399 70	425 44	452 17	320 149	352 117	395 74	422 47	451 18
545	20-44	318 227	339 206	361 184	384 161	409 136	435 110	463 82	493 52	526 19	372 173	409 136	459 86	491 54	524 21
600	21-42	350 250	373 227	397 203	423 177	450 150	479 121	510 90	543 57	579 21	409 191	450 150	505 95	540 60	577 23
673	23-41	393 280	418 255	445 228	474 199	505 168	537 136	572 101	609 64	649 24	459 214	505 168	566 107	606 67	647 26
720	24-40	420 300	447 273	476 244	507 213	540 180	575 145	612 108	652 68	694 26	491 229	540 180	606 114	648 72	692 28
769	25-39	461 307	492 277	509 260	542 227	577 192	614 155	654 115	696 73	742 27	524 245	577 192	647 122	692 77	739 30
821	26-38	479 342	510 311	543 278	578 243	616 205	655 166	698 123	743 78	792 29	560 261	616 205	691 130	739 82	789 32
900	27-36	525 375	559 341	596 304	634 266	675 225	719 181	765 135	815 85	868 32	614 286	675 225	757 143	810 90	865 35
933	28-36	544 389	580 353	617 316	657 276	700 233	745 188	793 140	845 88	900 33	636 297	700 233	785 148	840 93	897 36
994	29-35	580 414	618 376	658 336	700 294	746 248	794 200	845 149	900 94	959 35	678 316	746 248	836 158	895 99	956 38
1058	30-34	617 441	657 401	700 358	745 313	794 264	845 213	899 159	958 100	1020 38	721 337	794 264	890 168	952 106	1017 41

1127	31-33	657 470	700 427	746 381	794 333	545 282	900 227	958 169	1020 107	1087 40	768 359	845 282	948 179	1014 113	1084 43
1200	32-32	700 500	746 454	794 406	845 355	900 300	958 242	1020 180	1046 114	1158 42	818 382	900 300	1010 190	1080 120	1154 46
1277	33-31	745 532	794 483	845 432	900 377	958 319	1020 257	1085 192	1156 121	1231 46	871 406	958 319	1075 202	1149 128	1228 49
1360	34-30	793 567	845 515	900 460	958 402	1020 340	1086 274	1156 204	1231 129	1311 49	927 433	1020 340	1144 216	1224 136	1308 52
1448	35-29	845 603	900 548	958 490	1020 428	1086 362	1156 292	1231 217	1311 137	1396 52	987 461	1086 362	1218 230	1303 145	1392 56
1543	36-28	900 643	959 584	1021 522	1087 456	1157 386	1232 311	1312 231	1397 146	1488 55	1052 491	1157 366	1298 245	1389 154	1484 59
1600	36-27	933 667	994 606	1059 541	1127 473	1200 400	1277 323	1360 240	1448 152	1543 57	1091 509	1200 400	1346 254	1440 160	1538 62
1753	38-26	1023 730	1089 664	1160 593	1235 518	1315 438	1400 353	1490 263	1587 166	1690 63	1195 558	1315 438	1475 278	1578 175	1686 67
1872	39-25	1092 780	1163 709	1239 633	1319 553	1404 468	1495 377	1591 281	1694 178	1805 67	1276 596	1404 468	1575 297	1685 187	1800 72
2000	40-24	1167 833	1243 757	1324 676	1409 591	1500 500	1597 403	1700 300	1810 190	1929 71	1364 636	1500 500	1683 317	1800 200	1923 77
2139	41-23	1248 891	1329 810	1416 723	1507 632	1604 535	1708 431	1818 321	1936 203	2063 76	1458 681	1604 535	1800 339	1925 214	2057 82
2400	42-21	1400 1000	1491 909	1588 812	1691 709	1800 600	1916 484	2040 360	2172 228	2314 86	1636 764	1800 600	2020 380	2160 240	2308 92
2640	44-20	1540 1100	1641 999	1747 893	1860 780	1980 660	2108 532	2244 396	2390 250	2546 94	1800 840	1980 660	2221 419	2376 264	2538 102
3067	46-18	1789 1278	1906 1161	2030 1037	2161 906	2300 767	2449 618	2607 460	2776 291	2957 110	2091 976	2300 767	2581 486	2760 307	2949 118
3600	48-16	2100 1500	2237 1363	2382 1218	2462 1138	2700 900	2874 726	3060 540	3259 341	3471 129	2455 1145	2700 900	3029 571	3240 360	3462 138
		28-36	29-35	30-34	31-33	32-32	33-31	34-30	35-29	36-28	20-44	21-42	23-41	24-40	25-39

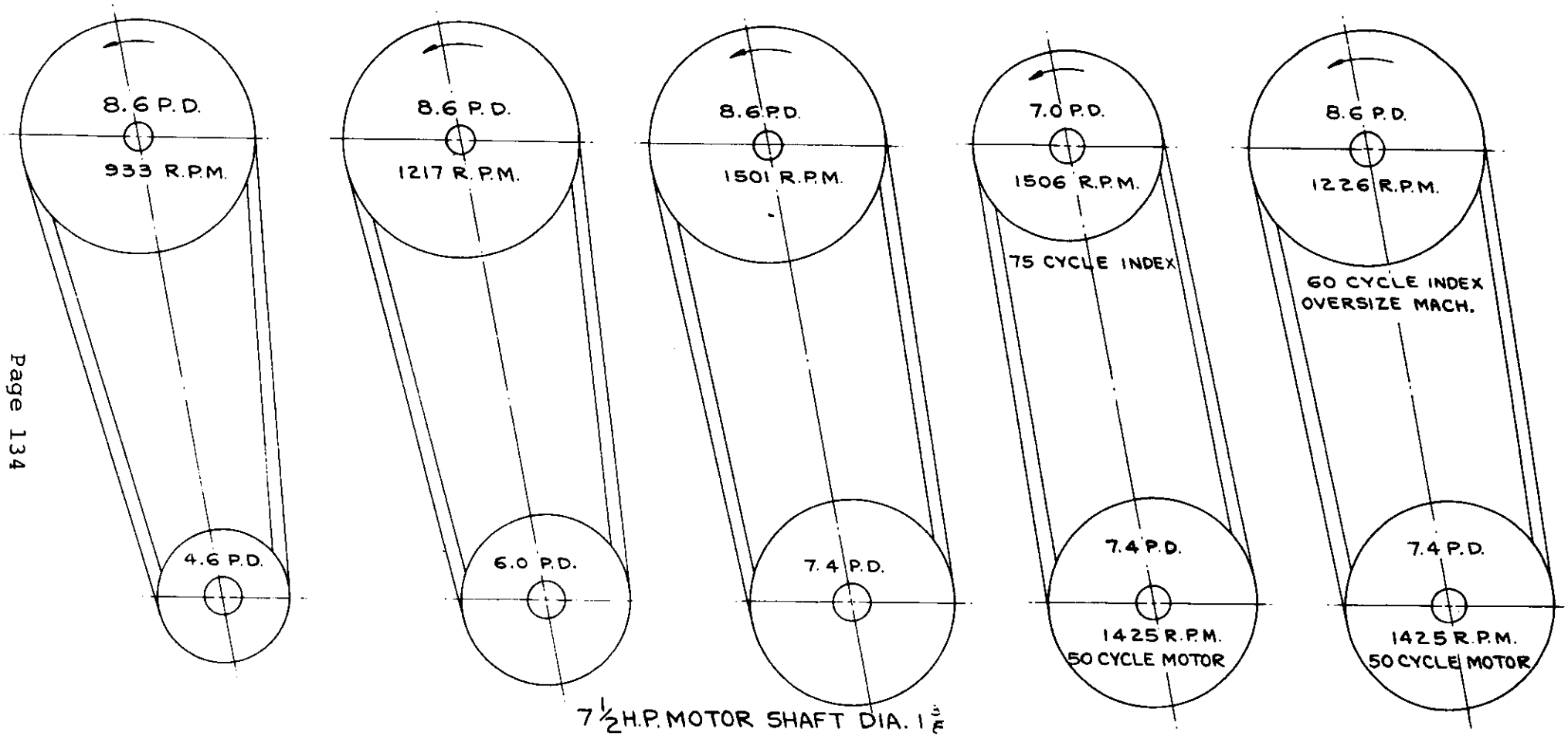
THREADING SPINDLE SPEEDS FOR SELF OPENING DIE HEADS - 45 CYCLE MACHINES

Upper Figures Denote Threading Spindle Speed
Lower Figures Denote Effective Threading Spindle Speeds

For Right Hand Threads Only

Spindle Speed R.P.M.	Spindle Change Gears	Using Low Side of Threading Clutch Threading Change Gears									Using High Side-Threading Clutch Threading Change Gears				
		28-36	29-35	30-34	31-33	32-32	33-31	34-30	35-29	36-28	20-44	21-42	23-41	24-40	25-39
311	16-48	181 130	193 118	206 105	219 92	233 78	248 63	264 47	282 29	300 11	212 99	233 78	262 49	280 31	299 12
365	18-46	213 152	227 138	242 123	257 108	274 91	291 74	310 55	330 35	352 13	249 116	274 91	307 58	329 36	351 14
424	20-44	247 177	263 161	281 143	299 125	318 106	339 85	360 64	384 40	409 15	289 135	318 106	357 67	382 42	408 16
466	21-42	272 194	290 176	308 158	328 138	350 116	372 94	396 70	422 44	449 17	318 148	350 116	392 74	419 47	448 18
523	23-41	305 218	325 198	346 177	368 155	392 131	418 105	445 78	473 50	504 19	357 166	392 131	440 83	471 52	503 20
559	24-40	326 233	347 212	370 189	394 165	419 140	446 113	475 84	506 53	539 20	381 178	419 140	470 89	503 56	538 21
598	25-39	349 249	372 226	396 202	421 177	449 149	477 121	508 90	541 57	577 21	408 190	449 149	503 95	538 60	575 23
638	26-38	372 266	396 242	422 216	450 188	479 159	509 129	542 96	578 60	615 23	435 203	479 159	537 101	574 64	613 25
700	27-36	408 292	435 265	463 237	493 207	525 175	559 141	595 105	634 66	675 25	477 223	525 175	589 111	630 70	673 27
726	28-36	424 302	451 275	480 246	512 214	545 181	580 146	617 109	657 69	700 26	495 231	545 181	611 115	653 73	698 28
773	29-35	451 322	480 293	512 261	545 228	580 193	617 156	657 116	700 73	745 28	527 246	580 193	650 123	696 77	743 30
823	30-34	480 343	511 312	545 278	580 243	617 208	657 166	700 123	745 78	794 29	561 262	617 208	693 130	741 82	791 32

876	31-33	511 365	544 332	580 296	617 259	657 219	699 177	745 131	793 83	845 31	597 279	657 219	737 139	788 88	842 34
933	32-32	544 389	580 353	617 316	657 276	700 233	745 188	793 140	845 88	900 33	636 297	700 233	785 148	840 93	897 36
993	33-31	579 413	617 375	657 336	700 293	745 248	793 200	844 149	899 94	958 35	677 316	745 248	836 157	894 99	955 38
1057	34-30	617 440	657 400	699 358	745 312	793 264	844 213	898 159	957 100	1019 38	677 380	793 264	889 168	951 106	1016 41
1126	35-29	657 469	700 426	745 381	793 333	845 281	899 227	957 169	1019 107	1086 40	768 358	845 281	947 179	1013 113	1083 43
1200	36-28	700 500	746 454	794 406	845 355	900 300	958 242	1020 180	1086 114	1157 43	818 382	900 300	1010 190	1080 120	1154 46
1244	36-27	726 518	773 471	823 421	876 368	933 311	993 251	1057 187	1126 118	1200 44	848 396	933 311	1047 197	1120 124	1196 48
1364	38-26	796 568	848 516	903 461	961 403	1023 341	1089 275	1159 205	1235 129	1315 49	930 434	1023 341	1148 216	1228 134	1312 52
1455	39-25	849 606	904 551	963 492	1025 430	1091 364	1162 293	1237 218	1317 138	1403 52	992 463	1091 364	1224 231	1310 145	1399 56
1555	40-24	907 648	966 589	1029 526	1096 459	1166 389	1241 314	1322 233	1408 147	1499 56	1060 495	1166 389	1308 247	1400 155	1495 60
1663	41-23	970 693	1033 630	1101 562	1172 491	1247 416	1328 335	1414 249	1505 158	1604 59	1134 529	1247 416	1399 264	1497 166	1599 64
1866	42-21	1089 777	1160 706	1235 631	1315 551	1400 466	1490 376	1586 280	1689 177	1799 67	1272 594	1400 466	1570 296	1679 187	1794 72
2053	44-20	1198 855	1276 777	1359 694	1446 607	1540 513	1639 414	1745 308	1858 195	1980 73	1400 653	1540 513	1728 325	1848 205	1974 79
2384	46-18	1391 993	1481 903	1578 806	1680 704	1788 596	1903 481	2026 378	2158 226	2299 85	1625 759	1788 596	2006 378	2146 238	2292 92
2799	48-16	1633 1166	1739 1060	1852 947	1972 827	2099 700	2235 564	2378 420	2534 265	2699 100	1908 891	2099 700	2355 444	2519 280	2691 108
		28-36	29-35	30-34	31-33	32-32	33-31	34-30	35-29	36-28	20-44	21-42	23-41	24-40	25-39



7½ H.P. MOTOR SHAFT DIA. 1⅜

IDLE TIME .66 SEC.
45 CYCLE

IDLE TIME .5 SEC.
60 CYCLE

IDLE TIME .4 SEC.
75 CYCLE

MOTOR ADJUSTABLE FOR BELT TENSION
BRACKET ADJUSTABLE FOR BELT LENGTHS OF VARIOUS P. DIA.'S
4 - B-60 BELTS REQ'D FOR EACH MACHINE

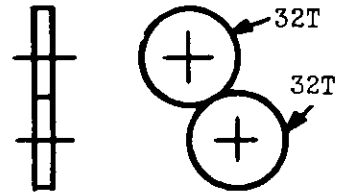
MODEL B MACHINE WITH THREADING
75 Cycle - 60 Cycle - 45 Cycle
6:1 THREADING METHOD TABLE
(Formerly Steel Threading Method)

Threading Change Gears - 32 T. Driver, 32 T. Driven

Table for selecting steel threading cam and location of block on threading cam lever for right hand threads only. Ratio of work spindles to threading spindles is 4 to 3 going on and 1 to $1\frac{1}{2}$ coming off.

Select number of effective rev's of spindle in table which is nearest number required to complete piece.

Upper figure in each square denotes number of cam to be used. Lower figure denotes position of block on threading cam lever.



Effec. rev's of Spin. per piece	No of threads that can be cut	Number of Threads Per Inch														
		12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
24	4	3 1.	3 .86	2 1.19	2 1.05	2 .95	2 .86	2 .8	1 1.2	1 1.14	1 1.06	1 1.	1 .94	1 .89	1 .84	1 .80
30	5	3 1.2	3 1.08	3 .94	3 .84	2 1.19	2 1.08	2 .99	2 .91	2 .85	2 .8	1 1.2	1 1.17	1 1.1	1 1.05	1 1.
36	6	4 .97	4 .83	3 1.13	3 1.	3 .91	3 .82	2 1.19	2 1.1	2 1.02	2 .95	2 .89	2 .84	2 .8	1 1.2	1 1.19
42	7	4 1.13	4 .97	4 .85	3 1.17	3 1.06	3 .96	3 .88	3 .81	2 1.19	2 1.1	2 1.04	2 .98	2 .92	2 .87	2 .83
48	8	5 .8	4 1.1	4 .97	4 .86	3 1.2	3 1.1	3 1.	3 .93	3 .86	3 .81	2 1.19	2 1.12	2 1.06	2 1.	2 .95
54	9	5 .9	4 1.2	4 1.09	4 .97	4 .87	3 1.2	3 1.13	3 1.04	3 .97	3 .91	3 .85	3 .8	2 1.19	2 1.13	2 1.07
60	10	5 1.	5 .85	4 1.2	4 1.08	4 .97	4 .88	3 1.2	3 1.16	3 1.08	3 1.	3 .94	3 .89	3 .84	3 .8	2 1.19
66	11	5 1.1	5 .94	5 .82	4 1.18	4 1.07	4 .97	4 .89	4 .82	3 1.19	3 1.1	3 1.04	3 .98	3 .92	3 .88	3 .83
72	12	5 1.2	5 1.03	5 .9	5 .8	4 1.16	4 1.06	4 .97	4 .89	4 .83	4 .78	3 1.13	3 1.07	3 1.	3 .96	3 .91
78	13	6 .83	5 1.1	5 .97	5 .86	5 .78	4 1.15	4 1.05	4 .97	4 .9	4 .84	3 1.2	3 1.16	3 1.09	3 1.03	3 .98
84	14	6 .89	5 1.2	5 1.05	5 .93	5 .83	4 1.2	4 1.13	4 1.04	4 .97	4 .9	4 .85	4 .8	3 1.18	3 1.1	3 1.06
90	15	6 .96	6 .82	5 1.12	5 1.	5 .89	5 .81	4 1.2	4 1.12	4 1.04	4 .97	4 .91	4 .85	4 .8	3 1.19	3 1.13
96	16	6 1.02	6 .88	5 1.2	5 1.06	5 .96	5 .87	5 .8	4 1.19	4 1.1	4 1.03	4 .97	4 .91	4 .86	4 .81	3 1.2
102	17	6 1.09	6 .93	6 .81	5 1.13	5 1.02	5 .92	5 .85	5 .78	4 1.18	4 1.1	4 1.03	4 .97	4 .91	4 .87	4 .82
108	18	6 1.15	6 .98	6 .86	5 1.2	5 1.08	5 .98	5 .89	5 .83	5 1.2	4 1.16	4 1.09	4 1.03	4 .97	4 .92	4 .87
114	19	6 1.2	6 1.04	6 .91	6 .81	5 1.14	5 1.03	5 .94	5 .87	5 .81	4 1.2	4 1.15	4 1.08	4 1.02	4 .97	4 .92
120	20	7 .83	6 1.1	6 .96	6 .85	5 1.2	5 1.09	5 .99	5 .92	5 .85	5 .8	4 1.2	4 1.14	4 1.08	4 1.02	4 .97
126	21	7 .87	6 1.15	6 1.01	6 .89	6 .81	5 1.14	5 1.04	5 .97	5 .89	5 .84	5 .78	4 1.2	4 1.13	4 1.07	4 1.01
132	22	7 .91	6 1.2	6 1.06	6 .94	6 .84	5 1.2	5 1.1	5 1.01	5 .94	5 .88	5 .82	5 .78	4 1.18	4 1.12	4 1.06
138	23	7 .96	7 .82	6 1.1	6 .98	6 .88	6 .8	5 1.15	5 1.06	5 .98	5 .92	5 .86	5 .81	5 .77	4 1.17	4 1.11

6:1 THREADING TABLE

		12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
144	24	7 1.	7 .86	6 1.15	6 1.02	6 .92	6 .84	5 1.2	5 1.1	5 1.02	5 .95	5 .89	5 .84	5 .8	4 1.2	4 1.11
150	25	7 1.04	7 .89	6 1.2	6 1.07	6 .96	6 .87	6 .8	5 1.15	5 1.07	5 1.	5 .93	5 .88	5 .83	5 .78	4 1.2
156	26	7 1.08	7 .92	7 .81	6 1.11	6 1.	6 .91	6 .83	5 1.2	5 1.11	5 1.03	5 .97	5 .91	5 .86	5 .82	5 .78
162	27	7 1.12	7 .96	7 .84	6 1.15	6 1.03	6 .94	6 .86	5 1.2	5 1.1	5 1.07	5 1.	5 .95	5 .89	5 .85	5 .81
168	28	7 1.16	7 1.	7 .87	6 1.2	6 1.07	6 .97	6 .89	6 .82	5 1.19	5 1.11	5 1.04	5 .98	5 .93	5 .88	5 .83
174	29	7 1.2	7 1.03	7 .9	6 1.2	6 1.1	6 1.	6 .93	6 .85	6 .8	5 1.16	5 1.08	5 1.02	5 .96	5 .91	5 .87
180	30	7 1.2	7 1.07	7 .94	7 .83	6 1.15	6 1.05	6 .96	6 .88	6 .82	5 1.19	5 1.12	5 1.05	5 1.	5 .94	5 .9
186	31	8 .83	7 1.1	7 .97	7 .86	6 1.19	6 1.08	6 .99	6 .91	6 .85	5 1.2	5 1.16	5 1.09	5 1.03	5 .97	5 .93
192	32	8 .86	7 1.14	7 1.	7 .89	6 1.2	6 1.1	6 1.02	6 .94	6 .88	6 .82	5 1.2	5 1.12	5 1.06	5 1.01	5 .95
198	33	8 .88	7 1.18	7 1.03	7 .92	7 .82	6 1.15	6 1.05	6 .97	6 .9	6 .84	5 1.2	5 1.16	5 1.1	5 1.04	5 .98
204	34	8 .91	7 1.2	7 1.06	7 .94	7 .85	6 1.19	6 1.09	6 1.	6 .93	6 .87	6 .81	5 1.2	5 1.13	5 1.07	5 1.01
210	35	8 .94	8 .8	7 1.09	7 .97	7 .87	6 1.2	6 1.12	6 1.03	6 .96	6 .89	6 .84	5 1.2	5 1.16	5 1.1	5 1.05
216	36	8 .97	8 .83	7 1.12	7 1.	7 .9	7 .82	6 1.15	6 1.06	6 .98	6 .92	6 .86	6 .81	5 1.2	5 1.13	5 1.07
222	37	8 .99	8 .85	7 1.15	7 1.03	7 .92	7 .84	6 1.18	6 1.09	6 1.	6 .95	6 .89	6 .83	5 1.2	5 1.16	5 1.1
228	38	8 1.02	8 .87	7 1.18	7 1.05	7 .95	7 .86	6 1.2	6 1.12	6 1.04	6 .97	6 .91	6 .86	6 .81	5 1.2	5 1.14
234	39	8 1.05	8 .9	7 1.2	7 1.08	7 .97	7 .88	7 .81	6 1.15	6 1.07	6 1.	6 .94	6 .88	6 .83	5 1.2	5 1.17
240	40	8 1.07	8 .92	8 .8	7 1.1	7 1.	7 .91	7 .83	6 1.18	6 1.09	6 1.02	6 .96	6 .9	6 .85	6 .81	5 1.2
246	41	8 1.1	8 .94	8 .82	7 1.13	7 1.02	7 .93	7 .85	6 1.2	6 1.12	6 1.05	6 .98	6 .92	6 .87	6 .83	6 .79
252	42	8 1.13	8 .97	8 .84	7 1.16	7 1.05	7 .95	7 .87	6 1.2	6 1.15	6 1.07	6 1.	6 .95	6 .9	6 .85	6 .8
258	43	8 1.15	8 .99	8 .87	7 1.19	7 1.07	7 .98	7 .89	7 .82	6 1.18	6 1.1	6 1.03	6 .97	6 .92	6 .87	6 .82
264	44	8 1.18	8 1.01	8 .89	7 1.2	7 1.1	7 1.	7 .92	7 .84	6 1.2	6 1.12	6 1.05	6 1.	6 .94	6 .89	6 .84
270	45	8 1.2	8 1.03	8 .91	8 .8	7 1.12	7 1.02	7 .94	7 .86	6 1.2	6 1.15	6 1.08	6 1.02	6 .96	6 .91	6 .86
276	46	8 1.2	8 1.06	8 .93	8 .82	7 1.15	7 1.04	7 .96	7 .88	7 .82	6 1.18	6 1.1	6 1.04	6 .98	6 .93	6 .88
282	47	9 .83	8 1.08	8 .95	8 .84	7 1.17	7 1.07	7 .98	7 .9	7 .84	6 1.2	6 1.13	6 1.06	6 1.	6 .95	6 .9
288	48	9 .85	8 1.11	8 .97	8 .86	7 1.2	7 1.09	7 1.	7 .92	7 .86	6 1.2	6 1.15	6 1.08	6 1.02	6 .97	6 .92
294	49	9 .87	8 1.13	8 .99	8 .88	7 1.2	7 1.11	7 1.02	7 .94	7 .87	7 .82	6 1.18	6 1.1	6 1.04	6 .99	6 .94

6:1 THREADING TABLE																
		12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
300	50	9 .88	8 1.15	8 1.	8 .89	8 .8	7 1.13	7 1.04	7 .96	7 .89	7 .83	6 1.2	6 1.13	6 1.06	6 1.01	6 .96
306	51	9 .9	8 1.17	8 1.02	8 .91	8 .82	7 1.16	7 1.06	7 .98	7 .91	7 .85	6 1.2	6 1.15	6 1.09	6 1.03	6 .98
312	52	9 .92	8 1.2	8 1.05	8 .93	8 .83	7 1.18	7 1.08	7 1.	7 .93	7 .87	7 .81	6 1.17	6 1.1	6 1.05	6 1.
318	53	9 .94	8 1.2	8 1.07	8 .95	8 .85	7 1.2	7 1.1	7 1.02	7 .95	7 .89	7 .83	6 1.2	6 1.13	6 1.07	6 1.02
324	54	9 .96	9 .82	8 1.09	8 .97	8 .87	7 1.2	7 1.12	7 1.04	7 .97	7 .9	7 .84	6 1.2	6 1.15	6 1.09	6 1.04
330	55	9 .97	9 .83	8 1.11	8 .98	8 .89	8 .8	7 1.14	7 1.06	7 .98	7 .92	7 .86	7 .81	6 1.17	6 1.11	6 1.06
336	56	9 .99	9 .85	8 1.13	8 1.	8 .9	8 .82	7 1.16	7 1.08	7 1.	7 .93	7 .87	7 .82	6 1.2	6 1.13	6 1.08
342	57	9 1.01	9 .86	8 1.15	8 1.02	8 .92	8 .83	7 1.18	7 1.1	7 1.02	7 .95	7 .89	7 .84	6 1.2	6 1.5	6 1.1
348	58	9 1.02	9 .88	8 1.16	8 1.04	8 .93	8 .85	7 1.2	7 1.11	7 1.03	7 .96	7 .9	7 .85	7 .80	6 1.17	6 1.11
354	59	9 1.04	9 .9	8 1.19	8 1.05	8 .95	8 .86	7 1.2	7 1.13	7 1.05	7 .98	7 .92	7 .87	7 .82	6 1.19	6 1.13
360	60	9 1.06	9 .91	8 1.2	8 1.07	8 .97	8 .88	8 .8	7 1.15	7 1.07	7 1.	7 .94	7 .88	7 .83	6 1.2	6 1.15
366	61	9 1.08	9 .92	8 1.2	8 1.09	8 .98	8 .89	8 .8	7 1.17	7 1.09	7 1.02	7 .95	7 .9	7 .85	6 1.2	6 1.17
372	62	9 1.1	9 .94	9 .82	8 1.11	8 1.	8 .91	8 .83	7 1.19	7 1.1	7 1.03	7 .97	7 .91	7 .86	7 .81	6 1.19
378	63	9 1.11	9 .95	9 .84	8 1.13	8 1.01	8 .92	8 .84	7 1.2	7 1.12	7 1.05	7 .98	7 .93	7 .87	7 .83	7 .79
384	64	9 1.13	9 .97	9 .85	8 1.14	8 1.03	8 .94	8 .86	7 1.2	7 1.14	7 1.06	7 1.	7 .94	7 .89	7 .84	7 .8
390	65	9 1.15	9 .98	9 .86	8 1.16	8 1.04	8 .95	8 .87	8 .8	7 1.16	7 1.08	7 1.1	7 .95	7 .9	7 .85	7 .81
396	66	9 1.17	9 1.	9 .87	8 1.18	8 1.06	8 .97	8 .89	8 .82	7 1.17	7 1.1	7 1.03	7 .97	7 .91	7 .87	7 .82
402	67	9 1.18	9 1.02	9 .89	8 1.2	8 1.08	8 .98	8 .9	8 .83	7 1.19	7 1.11	7 1.05	7 .98	7 .93	7 .88	7 .83
408	68	9 1.2	9 1.03	9 .9	8 1.2	8 1.09	8 1.	8 .91	8 .84	7 1.2	7 1.13	7 1.06	7 1.	7 .94	7 .89	7 .85
414	69	9 1.2	9 1.05	9 .91	8 1.2	8 1.11	8 1.01	8 .93	8 .85	8 .79	7 1.15	7 1.07	7 1.	7 .96	7 .91	7 .86
420	70	9 1.2	9 1.06	9 .93	9 .83	8 1.13	8 1.02	8 .94	8 .87	8 .8	7 1.17	7 1.09	7 1.03	7 .97	7 .92	7 .87
426	71	10 .79	9 1.07	9 .94	9 .84	8 1.14	8 1.04	8 .95	8 .88	8 .82	7 1.18	7 1.1	7 1.04	7 .98	7 .93	7 .89
432	72	10 .8	9 1.09	9 .95	9 .85	8 1.16	8 1.06	8 .97	8 .89	8 .83	7 1.2	7 1.12	7 1.06	7 1.	7 .95	7 .9
438	73	10 .81	9 1.1	9 .97	9 .86	8 1.17	8 1.07	8 .98	8 .9	8 .84	7 1.2	7 1.14	7 1.07	7 1.	7 .96	7 .91
444	74	10 .82	9 1.12	9 .98	9 .87	8 1.19	8 1.08	8 .99	8 .92	8 .85	7 1.2	7 1.15	7 1.08	7 1.02	7 .97	7 .92
450	75	10 .83	9 1.13	9 .99	9 .88	8 1.2	8 1.1	8 1.	8 .93	8 .86	8 .8	7 1.17	7 1.1	7 1.04	7 .99	7 .93

6:1 THREADING TABLE																
		12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
456	76	10 .84	9 1.15	9 1.	9 .89	8 1.2	8 1.11	8 1.02	8 .94	8 .87	8 .81	7 1.18	7 1.12	7 1.05	7 1.	7 .95
462	77	10 .85	9 1.17	9 1.02	9 .91	9 .82	8 1.13	8 1.03	8 .95	8 .88	8 .83	7 1.2	7 1.13	7 1.07	7 1.	7 .96
468	78	10 .86	9 1.18	9 1.03	9 .92	9 .83	8 1.14	8 1.04	8 .97	8 .9	8 .84	7 1.2	7 1.14	7 1.08	7 1.02	7 .97
474	79	10 .87	9 1.2	9 1.05	9 .93	9 .84	8 1.15	8 1.06	8 .98	8 .91	8 .85	8 .8	7 1.16	7 1.09	7 1.04	7 .99
480	80	10 .88	9 1.2	9 1.06	9 .94	9 .85	8 1.17	8 1.07	8 .99	8 .92	8 .86	8 .8	7 1.17	7 1.1	7 1.05	7 1.
486	81	10 .9	9 1.2	9 1.07	9 .95	9 .86	8 1.18	8 1.08	8 1.	8 .93	8 .87	8 .81	7 1.19	7 1.12	7 1.06	7 1.1
492	82	10 .91	9 1.2	9 1.09	9 .97	9 .87	8 1.2	8 1.1	8 1.01	8 .94	8 .88	8 .82	7 1.2	7 1.14	7 1.08	7 1.02
498	83	10 .92	10 .79	9 1.1	9 .98	9 .88	8 1.2	8 1.11	8 1.03	8 .95	8 .89	8 .83	7 1.2	7 1.15	7 1.09	7 1.04
504	84	10 .93	10 .8	9 1.11	9 .99	9 .89	8 1.2	8 1.13	8 1.04	8 .97	8 .9	8 .84	8 .8	7 1.16	7 1.1	7 1.05
510	85	10 .94	10 .81	9 1.13	9 1.	9 .9	9 .82	8 1.14	8 1.05	8 .98	8 .91	8 .84	8 .8	7 1.18	7 1.11	7 1.06
516	86	10 .95	10 .82	9 1.14	9 1.01	9 .91	9 .83	8 1.15	8 1.06	8 .99	8 .92	8 .86	8 .81	7 1.19	7 1.13	7 1.07
522	87	10 .96	10 .83	9 1.15	9 1.02	9 .92	9 .84	8 1.17	8 1.08	8 1.	8 .93	8 .87	8 .82	7 1.2	7 1.14	7 1.09
528	88	10 .97	10 .84	9 1.17	9 1.03	9 .93	9 .85	8 1.18	8 1.09	8 1.01	8 .94	8 .88	8 .83	7 1.2	7 1.15	7 1.1
534	89	10 .99	10 .84	9 1.18	9 1.05	9 .94	9 .86	8 1.19	8 1.1	8 1.02	8 .95	8 .89	8 .84	8 .8	7 1.17	7 1.11
540	90	10 1.	10 .85	9 1.19	9 1.06	9 .95	9 .87	8 1.2	8 1.11	8 1.03	8 .97	8 .9	8 .85	8 .8	7 1.18	7 1.12
546	91	10 1.01	10 .86	9 1.2	9 1.07	9 .96	9 .88	8 1.2	8 1.13	8 1.04	8 .98	8 .91	8 .86	8 .81	7 1.2	7 1.14
552	92	10 1.02	10 .87	9 1.2	9 1.08	9 .97	9 .89	8 1.2	8 1.14	8 1.06	8 .99	8 .93	8 .87	8 .82	7 1.2	7 1.15
558	93	10 1.03	10 .88	9 1.2	9 1.1	9 .99	9 .9	9 .82	8 1.15	8 1.07	8 1.	8 .94	8 .88	8 .83	7 1.2	7 1.16
564	94	10 1.04	10 .89	10 .78	9 1.11	9 1.	9 .9	9 .83	8 1.16	8 1.08	8 1.01	8 .95	8 .89	8 .84	7 1.2	7 1.17
570	95	10 1.05	10 .9	10 .79	9 1.12	9 1.01	9 .91	9 .84	8 1.17	8 1.09	8 1.02	8 .96	8 .90	8 .85	8 .8	7 1.18
576	96	10 1.06	10 .91	10 .8	9 1.13	9 1.02	9 .93	9 .85	8 1.19	8 1.1	8 1.03	8 .97	8 .91	8 .86	8 .81	7 1.2
582	97	10 1.07	10 .92	10 .81	9 1.14	9 1.03	9 .93	9 .86	8 1.2	8 1.11	8 1.04	8 .98	8 .92	8 .87	8 .82	8 .78
588	98	10 1.09	10 .93	10 .81	9 1.15	9 1.04	9 .94	9 .87	8 1.2	8 1.13	8 1.05	8 .99	8 .93	8 .88	8 .83	8 .79
594	99	10 1.1	10 .94	10 .82	9 1.17	9 1.05	9 .95	9 .87	8 1.2	8 1.14	8 1.06	8 1.	8 .94	8 .89	8 .84	8 .8
600	100	10 1.11	10 .95	10 .83	9 1.18	9 1.06	9 .96	9 .88	9 .82	8 1.15	8 1.07	8 1.01	8 .95	8 .89	8 .85	8 .8
606	101	10 1.12	10 .96	10 .84	9 1.19	9 1.07	9 .97	9 .89	9 .82	8 1.16	8 1.08	8 1.02	8 .95	8 .9	8 .85	8 .81

6:1 THREADING TABLE																
		12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
612	102	10 1.13	10 .97	10 .85	9 1.2	9 1.08	9 .98	9 .9	9 .83	8 1.17	8 1.1	8 1.02	8 .97	8 .91	8 .86	8 .82
618	103	10 1.14	10 .98	10 .86	9 1.2	9 1.09	9 .99	9 .91	9 .84	8 1.18	8 1.1	8 1.04	8 .97	8 .92	8 .87	8 .83
624	104	10 1.15	10 .99	10 .87	9 1.2	9 1.1	9 1.	9 .92	9 .85	8 1.2	8 1.11	8 1.05	8 .98	8 .93	8 .88	8 .84
630	105	10 1.16	10 1.	10 .87	9 1.2	9 1.12	9 1.01	9 .93	9 .86	8 1.2	8 1.13	8 1.06	8 1.	8 .94	8 .89	8 .85
636	106	10 1.17	10 1.01	10 .88	10 .78	9 1.13	9 1.02	9 .94	9 .87	8 1.2	8 1.14	8 1.07	8 1.	8 .95	8 .9	8 .85
642	107	10 1.19	10 1.02	10 .89	10 .79	9 1.13	9 1.03	9 .95	9 .87	8 1.2	8 1.15	8 1.08	8 1.01	8 .96	8 .9	8 .86
648	108	10 1.2	10 1.03	10 .9	10 .8	9 1.15	9 1.04	9 .95	9 .88	9 .82	8 1.16	8 1.09	8 1.02	8 .97	8 .91	8 .87
654	109	10 1.2	10 1.04	10 .91	10 .81	9 1.16	9 1.05	9 .96	9 .89	9 .82	8 1.17	8 1.1	8 1.03	8 .98	8 .92	8 .88
660	110	10 1.2	10 1.05	10 .92	10 .81	9 1.17	9 1.06	9 .97	9 .9	9 .83	8 1.18	8 1.11	8 1.04	8 .98	8 .93	8 .88
666	111	10 1.2	10 1.05	10 .92	10 .82	9 1.18	9 1.07	9 .98	9 .9	9 .84	8 1.19	8 1.12	8 1.05	8 .99	8 .94	8 .89
672	112	10 1.2	10 1.06	10 .93	10 .83	9 1.19	9 1.08	9 .99	9 .91	9 .85	8 1.2	8 1.13	8 1.06	8 1.	8 .95	8 .9
678	113	11 .8	10 1.07	10 .94	10 .83	9 1.2	9 1.09	9 1.	9 .92	9 .86	8 1.2	8 1.13	8 1.07	8 1.01	8 .96	8 .91
684	114	11 .8	10 1.08	10 .95	10 .84	9 1.2	9 1.1	9 1.01	9 .93	9 .86	8 1.2	8 1.15	8 1.08	8 1.02	8 .97	8 .92
690	115	11 .81	10 1.09	10 .96	10 .85	9 1.2	9 1.11	9 1.02	9 .94	9 .87	8 1.2	8 1.16	8 1.09	8 1.03	8 .97	8 .93
696	116	11 .82	10 1.1	10 .96	10 .86	9 1.2	9 1.12	9 1.03	9 .95	9 .88	9 .82	8 1.17	8 1.1	8 1.03	8 .98	8 .93
702	117	11 .82	10 1.11	10 .97	10 .86	10 .78	9 1.13	9 1.04	9 .96	9 .89	9 .83	8 1.17	8 1.11	8 1.05	8 .99	8 .94
708	118	11 .83	10 1.12	10 .98	10 .87	10 .78	9 1.14	9 1.04	9 .96	9 .89	9 .83	8 1.18	8 1.12	8 1.05	8 1.	8 .95
714	119	11 .84	10 1.13	10 .99	10 .88	10 .79	9 1.15	9 1.05	9 .97	9 .9	9 .84	8 1.19	8 1.13	8 1.06	8 1.01	8 .96
720	120	11 .85	10 1.14	10 1.	10 .89	10 .8	9 1.16	9 1.06	9 .98	9 .91	9 .85	8 1.2	8 1.13	8 1.07	8 1.02	8 .97
726	121	11 .85	10 1.15	10 1.01	10 .89	10 .8	9 1.17	9 1.07	9 .99	9 .92	9 .86	8 1.2	8 1.14	8 1.08	8 1.02	8 .97
732	122	11 .86	10 1.16	10 1.01	10 .9	10 .81	9 1.18	9 1.08	9 1.	9 .92	9 .86	8 1.2	8 1.15	8 1.09	8 1.03	8 .98
738	123	11 .87	10 1.17	10 1.02	10 .91	10 .82	9 1.19	9 1.09	9 1.	9 .93	9 .87	9 .82	8 1.16	8 1.1	8 1.04	8 .99
744	124	11 .87	10 1.18	10 1.03	10 .92	10 .82	9 1.2	9 1.1	9 1.01	9 .94	9 .88	9 .82	8 1.17	8 1.11	8 1.05	8 1.
750	125	11 .88	10 1.19	10 1.04	10 .92	10 .83	9 1.2	9 1.11	9 1.02	9 .95	9 .88	9 .83	8 1.18	8 1.12	8 1.06	8 1.01
756	126	11 .89	10 1.2	10 1.05	10 .93	10 .84	9 1.2	9 1.12	9 1.03	9 .95	9 .89	9 .83	8 1.19	8 1.13	8 1.07	8 1.02
762	127	11 .89	10 1.2	10 1.06	10 .94	10 .84	9 1.2	9 1.12	9 1.04	9 .96	9 .9	9 .84	8 1.2	8 1.14	8 1.08	8 1.03

6:1 THREADING TABLE

		12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
768	128	11 .9	10 1.2	10 1.06	10 .94	10 .85	9 1.2	9 1.13	9 1.05	9 .97	9 .9	9 .85	8 1.2	8 1.15	8 1.09	8 1.04
774	129	11 .91	10 1.2	10 1.07	10 .95	10 .86	10 .78	9 1.14	9 1.05	9 .98	9 .91	9 .85	8 1.2	8 1.16	8 1.1	8 1.05
780	130	11 .92	10 1.2	10 1.08	10 .96	10 .86	10 .79	9 1.15	9 1.06	9 .99	9 .92	9 .86	9 .81	8 1.16	8 1.1	8 1.05

RISE AND DROP OF 6:1 THREADING CAMS ARE AS FOLLOWS:

CAM NO.	RISE	HUNDREDTHS	DROP	HUNDREDTHS
1	.118"	0 to $32\frac{1}{2}$	.137"	$32\frac{1}{2}$ to 50
2	.200"	0 to $32\frac{1}{2}$	.232"	$32\frac{1}{2}$ to 50
3	.317"	0 to $32\frac{1}{2}$	.366"	$32\frac{1}{2}$ to 50
4	.452"	0 to $32\frac{1}{2}$	.540"	$32\frac{1}{2}$ to 50
5	.715"	0 to $32\frac{1}{2}$	.825"	$32\frac{1}{2}$ to 50
6	1.140"	0 to $32\frac{1}{2}$	1.320"	$32\frac{1}{2}$ to 50
7	1.740"	0 to $32\frac{1}{2}$	2.100"	$32\frac{1}{2}$ to 50
8	2.000"	$8\frac{1}{2}$ to $32\frac{1}{2}$	2.000"	$32\frac{1}{2}$ to $43\frac{1}{4}$
9	2.000"	$16\frac{1}{2}$ to $32\frac{1}{2}$	2.000"	$32\frac{1}{2}$ to $39\frac{1}{2}$
10	2.000"	$22\frac{1}{2}$ to $32\frac{1}{2}$	2.000"	$32\frac{1}{2}$ to 37
11	2.000"	27 to $32\frac{1}{2}$	2.000"	$32\frac{1}{2}$ to $35\frac{1}{4}$

To Cut Left Hand Threads using 6:1 threading method (formerly steel threading method) for 75 cycle, 60 cycle, or 45 cycle machines with 30 T. driver - 34 T. Driven threading change gears:

Formulas for figuring the number of threads that can be cut, rise of cam necessary and correct location of cam lever block, after the effective revolutions to complete one piece have been determined are as follows:

1 - Effective revolutions to complete one piece divided by 6 equals number of threads that can be cut.

2 - Number of threads that can be cut divided by number of threads per inch equals rise of cam necessary. (Adjust cam lever block to allow tap or die to pull out slightly.)

Select a threading cam from the list below, with a rise nearest to the rise of the necessary cam.

3 - Divide rise of necessary cam by actual rise on threading cam selected to obtain location of cam lever block.

For example, if the effective revolutions to complete the piece is 90 and the number of threads per inch is 32:

1 - 90 divided by 6 equals 15 threads that can be cut.

2 - 15 divided by 32 equals .468"
.468" minus 10% (.047") equals .421" rise of cam necessary.

Select a cam with a rise nearest to .421", which is a #2 cam with a rise of .389".

3 - .421 divided by .489" equals 1.08 location of cam lever block.

2:1 THREADING CAMS (Formerly Brass Threading Cams)

CAM #	RISE	100ths	DROP	100ths	PART #
1	.238"	0-25	.276"	25-50	5-C-82
2	.389"	0-25	.450"	25-50	5-C-84
3	.560	0-25	.657"	25-50	5-C-86
4	.675"	0-25	.782"	25-50	5-C-88
5	1.095"	0-25	1.265"	25-50	5-C-90
6	1.525"	0-25	1.770"	25-50	5-C-92
7	2.000"	5-25	2.000"	25-42½	5-C-94
8	2.000"	12-25	2.000"	25-37	5-C-80

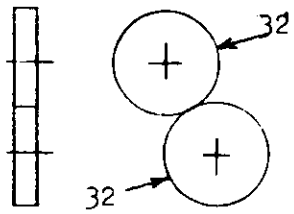
MODEL B MACHINE WITH THREADING
75 Cycle - 60 Cycle - 45 Cycle
6:1 THREADING METHOD TABLE
(Formerly Steel Threading Method)

THREADING CHANGE GEARS - 32 T. DRIVER, 32 T. DRIVEN

Table for selecting steel threading cam and location of block on threading cam lever for right hand threads only. Ratio of work spindles to threading spindles is 4 to 3 going on and 1 to 1-1/2 coming off.

Select number of effective rev's of spindle in table which is nearest number required to complete piece.

Upper figure in each square denotes number of cam to be used. Lower figure denotes position of block on threading cam lever.



Effec. rev's of spin. per piece	No of threads that can be cut	PITCH MM												
		2.50	2.00	1.75	1.50	1.25	1.00	.90	.80	.75	.70	.60	.50	.45	.40
24	4	4 .87	3 .99	3 .87	2 1.18	2 .98	1 1.2	1 1.20	1 1.07	1 1.00	1 .93	1 .80	-	-	-
30	5	4 1.09	4 .87	3 1.09	3 .93	2 1.2	2 .98	2 .89	1 1.2	1 1.2	1 1.17	1 1.00	1 .83	-	-
36	6	5 .83	4 1.04	4 .91	3 1.12	3 .93	2 1.18	2 1.06	2 .94	2 .87	2 .83	1 1.20	1 1.00	1 .90	1 .80
42	7	5 .96	4 1.2	4 1.07	4 .91	3 1.09	3 .87	2 1.2	2 1.10	2 1.03	2 .96	2 .83	1 1.17	1 1.05	1 .93
48	8	5 1.10	5 .88	4 1.2	4 1.04	4 .87	3 .99	3 .89	2 1.2	2 1.18	2 1.10	2 .94	1 1.2	1 1.20	1 1.07
54	9	5 1.2	5 .99	5 .87	4 1.18	4 .98	3 1.12	3 1.00	3 .89	3 .84	2 1.2	2 1.06	2 .89	1 1.2	1 1.20
60	10	6 .86	5 1.10	5 .96	5 .83	4 1.09	4 .87	3 1.12	3 .99	3 .93	3 .87	2 1.18	2 .98	2 .89	1 1.2
66	11	6 .95	5 1.2	5 1.06	5 .91	4 1.20	4 .96	4 .86	3 1.09	3 1.02	3 .96	3 .82	2 1.08	2 .97	2 .87
72	12	6 1.04	6 .83	5 1.16	5 .99	5 .83	4 1.04	4 .94	3 1.19	3 1.12	3 1.04	3 .89	2 1.18	2 1.06	2 .94
78	13	6 1.12	6 .90	5 1.2	5 1.07	5 .89	4 1.13	4 1.02	4 .90	4 .85	3 1.13	3 .97	3 .81	2 1.15	2 1.03
84	14	6 1.2	6 .97	6 .85	5 1.16	5 .96	4 1.2	4 1.10	4 .98	4 .91	4 .85	3 1.04	3 .87	2 1.2	2 1.10
90	15	7 .85	6 1.04	6 .91	5 1.2	5 1.03	5 .83	4 1.18	4 1.04	4 .98	4 .91	3 1.12	3 .93	3 .84	2 1.18
96	16	7 .90	6 1.10	6 .97	6 .83	5 1.10	5 .88	4 1.2	4 1.11	4 1.04	4 .98	3 1.19	3 .99	3 .89	2 1.2
102	17	7 .96	6 1.17	6 1.03	6 .88	5 1.17	5 .94	5 .84	4 1.18	4 1.11	4 1.04	4 .89	3 1.06	3 .95	3 .84
108	18	7 1.02	7 .81	6 1.09	6 .93	5 1.2	5 .99	5 .89	4 1.2	4 1.18	4 1.10	4 .94	3 1.12	3 1.00	3 .89
114	19	7 1.07	7 .86	6 1.15	6 .98	6 .82	5 1.05	5 .94	5 .84	4 1.2	4 1.16	4 .99	3 1.18	3 1.06	3 .94
120	20	7 1.13	7 .90	6 1.2	6 1.04	6 .86	5 1.10	5 .99	5 .88	5 .83	4 1.2	4 1.04	4 .87	3 1.12	3 .99
126	21	7 1.19	7 .95	7 .83	6 1.09	6 .91	5 1.16	5 1.04	5 .92	5 .87	5 .81	4 1.10	4 .91	3 1.17	3 1.04
132	22	8 .80	7 .99	7 .87	6 1.14	6 .95	5 1.2	5 1.09	5 .97	5 .91	5 .85	4 1.15	4 .96	4 .86	3 1.09
138	23	8 .84	7 1.04	7 .91	6 1.19	6 .99	5 1.2	5 1.14	5 1.01	5 .95	5 .89	4 1.2	4 1.00	4 .90	3 1.14

6:1 THREADING TABLE

		2.50	2.00	1.75	1.50	1.25	1.00	.90	.80	.75	.70	.60	.50	.45	.40
144	24	8 .87	7 1.09	7 .95	7 .81	6 1.04	6 .83	5 1.19	5 1.06	5 .99	5 .92	4 1.2	4 1.04	4 .94	3 1.19
150	25	8 .91	7 1.13	7 .99	7 .85	6 1.08	6 .86	5 1.2	5 1.10	5 1.03	5 .96	5 .82	4 1.09	4 .97	4 .87
156	26	8 .94	7 1.18	7 1.03	7 .88	6 1.12	6 .90	6 .81	5 1.14	5 1.07	5 1.00	5 .86	4 1.13	4 1.02	4 .90
162	27	8 .98	7 1.2	7 1.07	7 .92	6 1.16	6 .93	6 .84	5 1.19	5 1.11	5 1.04	5 .89	4 1.18	4 1.06	4 .94
168	28	8 1.02	8 .81	7 1.11	7 .95	6 1.2	6 .97	6 .87	5 1.2	5 1.16	5 1.08	5 .93	4 1.2	4 1.10	4 .98
174	29	8 1.05	8 .84	7 1.15	7 .98	7 .82	6 1.00	6 .90	6 .80	5 1.20	5 1.12	5 .96	4 1.2	4 1.14	4 1.01
180	30	8 1.09	8 .87	7 1.19	7 1.02	7 .85	6 1.04	6 .93	6 .83	5 1.2	5 1.16	5 .99	5 .83	4 1.18	4 1.04
186	31	8 1.13	8 .90	7 1.2	7 1.05	7 .88	6 1.07	6 .96	6 .86	6 .80	5 1.19	5 1.02	5 .85	4 1.2	4 1.08
192	32	8 1.16	8 .93	8 .81	7 1.09	7 .90	6 1.10	6 .99	6 .88	6 .83	5 1.2	5 1.06	5 .88	4 1.2	4 1.11
198	33	8 1.20	8 .96	8 .84	7 1.17	7 .93	6 1.14	6 1.02	6 .91	6 .85	5 1.2	5 1.09	5 .91	5 .82	4 1.15
204	34	9 .82	8 .99	8 .86	7 1.15	7 .96	6 1.17	6 1.06	6 .94	6 .88	6 .82	5 1.12	5 .94	5 .84	4 1.18
210	35	9 .85	8 1.02	8 .89	7 1.19	7 .99	6 1.2	6 1.09	6 .97	6 .91	6 .85	5 1.16	5 .96	5 .87	4 1.2
216	36	9 .87	8 1.05	8 .92	7 1.2	7 1.02	7 .81	6 1.12	6 .99	6 .93	6 .87	5 1.19	5 .99	5 .89	4 1.2
222	37	9 .90	8 1.08	8 .94	8 .81	7 1.05	7 .84	6 1.15	6 1.02	6 .94	6 .89	5 1.2	5 1.02	5 .92	5 .81
228	38	9 .92	8 1.10	8 .97	8 .83	7 1.07	7 .86	6 1.18	6 1.05	6 .98	6 .92	5 1.2	5 1.05	5 .94	5 .83
234	39	9 .94	8 1.13	8 .99	8 .85	7 1.10	7 .88	6 1.2	6 1.07	6 1.01	6 .94	6 .81	5 1.07	5 .97	5 .86
240	40	9 .97	8 1.16	8 1.02	8 .87	7 1.13	7 .90	7 .81	6 1.10	6 1.04	6 .97	6 .83	5 1.10	5 .99	5 .88
246	41	9 .99	8 1.19	8 1.04	8 .89	7 1.16	7 .93	7 .83	6 1.13	6 1.06	6 .99	6 .85	5 1.13	5 1.02	5 .90
252	42	9 1.02	9 .81	8 1.07	8 .92	7 1.19	7 .95	7 .86	6 1.16	6 1.09	6 1.02	6 .87	5 1.17	5 1.04	5 .92
258	43	9 1.04	9 .83	8 1.09	8 .94	7 1.20	7 .97	7 .88	6 1.19	6 1.11	6 1.04	6 .89	5 1.18	5 1.07	5 .95
264	44	9 1.07	9 .85	8 1.12	8 .96	7 1.20	7 1.00	7 .90	6 1.2	6 1.14	6 1.06	6 .91	5 1.2	5 1.09	5 .97
270	45	9 1.09	9 .87	8 1.14	8 .98	8 .82	7 1.02	7 .92	7 .81	6 1.16	6 1.09	6 .93	5 1.2	5 1.11	5 .99
276	46	9 1.11	9 .89	8 1.17	8 1.00	8 .84	7 1.04	7 .94	7 .83	6 1.19	6 1.12	6 .95	5 1.2	5 1.14	5 1.01
282	47	9 1.14	9 .91	8 1.20	8 1.02	8 .85	7 1.06	7 .96	7 .85	6 1.2	6 1.14	6 .97	6 .81	5 1.16	5 1.03
288	48	9 1.16	9 .93	9 .81	8 1.05	8 .87	7 1.09	7 .98	7 .87	7 .81	6 1.16	6 .99	6 .83	5 1.19	5 1.06
294	49	9 1.19	9 .95	9 .83	8 1.07	8 .89	7 1.11	7 1.00	7 .89	7 .83	6 1.18	6 1.02	6 .85	5 1.2	5 1.08

6:1 THREADING TABLE

		2.50	2.00	1.75	1.50	1.25	1.00	.90	.80	.75	.70	.60	.50	.45	.40
300	50	9 1.2	9 .97	9 .85	8 1.09	8 .91	7 1.13	7 1.02	7 .90	7 .85	6 1.2	6 1.04	6 .86	5 1.2	5 1.10
306	51	9 1.2	9 .99	9 .86	8 1.11	8 .93	7 1.15	7 1.04	7 .92	7 .86	7 .81	6 1.06	6 .88	5 1.2	5 1.12
312	52	9 1.2	9 1.01	9 .88	8 1.13	8 .94	7 1.18	7 1.06	7 .94	7 .88	7 .82	6 1.08	6 .90	6 .81	5 1.14
318	53	10 .80	9 1.03	9 .90	8 1.16	8 .96	7 1.20	7 1.08	7 .96	7 .90	7 .84	6 1.10	6 .92	6 .82	5 1.17
324	54	10 .82	9 1.05	9 .92	8 1.18	8 .98	7 1.2	7 1.10	7 .98	7 .92	7 .86	6 1.12	6 .93	6 .84	5 1.19
330	55	10 .83	9 1.07	9 .93	8 1.20	8 1.00	7 1.2	7 1.12	7 1.00	7 .93	7 .87	6 1.14	6 .95	6 .85	5 1.2
336	56	10 .85	9 1.08	9 .95	9 .81	8 1.02	8 .81	7 1.14	7 1.01	7 .95	7 .89	6 1.16	6 .97	6 .87	5 1.2
342	57	10 .86	9 1.10	9 .97	9 .83	8 1.04	8 .83	7 1.16	7 1.03	7 .97	7 .90	6 1.18	6 .98	6 .88	5 1.2
348	58	10 .88	9 1.12	9 .98	9 .84	8 1.05	8 .84	7 1.18	7 1.05	7 .98	7 .92	6 1.20	6 1.00	6 .90	6 .80
354	59	10 .89	9 1.14	9 1.00	9 .86	8 1.07	8 .86	7 1.20	7 1.07	7 1.00	7 .93	7 .80	6 1.02	6 .92	6 .82
360	60	10 .91	9 1.16	9 1.02	9 .87	8 1.09	8 .87	7 1.2	7 1.09	7 1.02	7 .95	7 .81	6 1.04	6 .93	6 .83
366	61	10 .92	9 1.18	9 1.03	9 .89	8 1.11	8 .89	7 1.2	7 1.10	7 1.04	7 .97	7 .83	6 1.05	6 .95	6 .84
372	62	10 .94	9 1.20	9 1.05	9 .90	8 1.13	8 .90	8 .81	7 1.12	7 1.05	7 .98	7 .84	6 1.07	6 .96	6 .86
378	63	10 .95	9 1.2	9 1.07	9 .92	8 1.14	8 .92	8 .82	7 1.14	7 1.07	7 1.00	7 .86	6 1.09	6 .98	6 .87
384	64	10 .97	9 1.2	9 1.08	9 .93	8 1.16	8 .93	8 .84	7 1.16	7 1.09	7 1.01	7 .87	6 1.10	6 .99	6 .88
390	65	10 .98	9 1.2	9 1.10	9 .94	8 1.18	8 .94	8 .85	7 1.18	7 1.10	7 1.03	7 .88	6 1.12	6 1.01	6 .90
396	66	10 1.00	9 1.2	9 1.12	9 .96	8 1.20	8 .96	8 .86	7 1.19	7 1.12	7 1.04	7 .90	6 1.14	6 1.02	6 .91
402	67	10 1.01	10 .81	9 1.14	9 .97	9 .81	8 .97	8 .88	7 1.2	7 1.14	7 1.06	7 .91	6 1.16	6 1.04	6 .92
408	68	10 1.03	10 .82	9 1.15	9 .99	9 .82	8 .99	8 .89	7 1.2	7 1.15	7 1.08	7 .92	6 1.17	6 1.06	6 .94
414	69	10 1.04	10 .84	9 1.17	9 1.0	9 .84	8 1.00	8 .90	8 .80	7 1.17	7 1.09	7 .94	6 1.19	6 1.07	6 .95
420	70	10 1.06	10 .85	9 1.19	9 1.02	9 .85	8 1.02	8 .92	8 .81	7 1.19	7 1.11	7 .95	6 1.2	6 1.09	6 .97
426	71	10 1.08	10 .86	9 1.20	9 1.03	9 .86	8 1.03	8 .93	8 .82	7 1.20	7 1.12	7 .96	7 .80	6 1.10	6 .98
432	72	10 1.09	10 .87	9 1.2	9 1.05	9 .87	8 1.05	8 .94	8 .84	7 1.2	7 1.14	7 .98	7 .81	6 1.12	6 .99
438	73	10 1.10	10 .88	9 1.2	9 1.06	9 .88	8 1.06	8 .95	8 .85	7 1.2	7 1.16	7 .99	7 .82	6 1.13	6 1.01
444	74	10 1.12	10 .90	9 1.2	9 1.08	9 .90	8 1.08	8 .97	8 .86	8 .81	7 1.17	7 1.00	7 .84	6 1.15	6 1.02
450	75	10 1.14	10 .91	9 1.2	9 1.09	9 .91	8 1.09	8 .98	8 .87	8 .82	7 1.19	7 1.02	7 .85	6 1.16	6 1.04

6:1 THREADING TABLE

		2.50	2.00	1.75	1.50	1.25	1.00	.90	.80	.75	.70	.60	.50	.45	.40
456	76	10 1.15	10 .92	10 .80	9 1.10	9 .92	8 1.10	8 .99	8 .88	8 .83	7 1.20	7 1.03	7 .86	6 1.18	6 1.05
462	77	10 1.16	10 .93	10 .82	9 1.12	9 .93	8 1.12	8 1.01	8 .90	8 .84	7 1.2	7 1.04	7 .87	6 1.20	6 1.06
468	78	10 1.18	10 .94	10 .83	9 1.13	9 .94	8 1.13	8 1.02	8 .91	8 .85	7 1.2	7 1.06	7 .88	6 1.2	6 1.08
474	79	10 1.20	10 .96	10 .84	9 1.15	9 .96	8 1.15	8 1.03	8 .92	8 .86	8 .80	7 1.07	7 .89	7 .80	6 1.09
480	80	10 1.2	10 .97	10 .85	9 1.16	9 .97	8 1.16	8 1.05	8 .93	8 .87	8 .81	7 1.09	7 .90	7 .81	6 1.10
486	81	10 1.2	10 .98	10 .86	9 1.18	9 .98	8 1.18	8 1.06	8 .94	8 .88	8 .82	7 1.10	7 .92	7 .82	6 1.12
492	82	10 1.2	10 .99	10 .87	9 1.19	9 .99	8 1.19	8 1.07	8 .95	8 .89	8 .83	7 1.11	7 .93	7 .83	6 1.13
498	83	10 1.2	10 1.00	10 .88	9 1.2	9 1.00	9 .80	8 1.08	8 .96	8 .90	8 .84	7 1.13	7 .94	7 .84	6 1.15
504	84	10 1.2	10 1.02	10 .89	9 1.2	9 1.02	9 .81	8 1.10	8 .98	8 .92	8 .85	7 1.14	7 .95	7 .86	6 1.16
510	85	10 1.2	10 1.03	10 .90	9 1.2	9 1.03	9 .82	8 1.11	8 .99	8 .93	8 .86	7 1.15	7 .96	7 .86	6 1.17
516	86	10 1.2	10 1.04	10 .91	9 1.2	9 1.04	9 .83	8 1.12	8 1.00	8 .94	8 .88	7 1.17	7 .97	7 .87	6 1.19
522	87	10 1.2	10 1.05	10 .92	9 1.2	9 1.05	9 .84	8 1.14	8 1.01	8 .95	8 .88	7 1.18	7 .98	7 .88	6 1.20
528	88	10 1.2	10 1.06	10 .93	9 1.2	9 1.07	9 .85	8 1.15	8 1.02	8 .96	8 .89	8 1.19	7 1.00	7 .90	6 1.2
534	89	10 1.2	10 1.08	10 .94	10 .81	9 1.08	9 .86	8 1.16	8 1.03	8 .97	8 .90	7 1.2	7 1.01	7 .91	7 .80
540	90	10 1.2	10 1.09	10 .95	10 .82	9 1.09	9 .87	8 1.18	8 1.05	8 .98	8 .92	7 1.2	7 1.02	7 .92	7 .81
546	91	10 1.2	10 1.10	10 .96	10 .83	9 1.10	9 .88	8 1.19	8 1.06	8 .99	8 .92	7 1.2	7 1.03	7 .93	7 .82
552	92	10 1.2	10 1.11	10 .98	10 .84	9 1.11	9 .89	8 1.20	8 1.07	8 1.00	8 .94	7 .80	7 1.04	7 .94	7 .83
558	93	10 1.2	10 1.13	10 .98	10 .84	9 1.13	9 .90	9 .81	8 1.08	8 1.01	8 .95	8 .81	7 1.05	7 .95	7 .84
564	94	10 1.2	10 1.14	10 1.00	10 .85	9 1.14	9 .91	9 .82	8 1.09	8 1.02	8 .96	8 .82	7 1.06	7 .96	7 .85
570	95	10 1.2	10 1.15	10 1.01	10 .86	9 1.15	9 .92	9 .83	8 1.10	8 1.04	8 .97	8 .83	7 1.07	7 .97	7 .86
576	96	10 1.2	10 1.16	10 1.02	10 .87	9 1.16	9 .93	9 .84	8 1.12	8 1.05	8 .98	8 .84	7 1.09	7 .98	7 .87
582	97	11 .81	10 1.18	10 1.03	10 .88	9 1.18	9 .94	9 .85	8 1.13	8 1.06	8 .99	8 .85	7 1.10	7 .99	7 .88
588	98	11 .82	10 1.19	10 1.04	10 .89	9 1.19	9 .95	9 .85	8 1.14	8 1.07	8 1.00	8 .85	7 1.11	7 1.00	7 .89
594	99	11 .82	10 1.20	10 1.05	10 .90	9 1.20	9 .96	9 .86	8 1.15	8 1.08	8 1.01	8 .86	7 1.12	7 1.01	7 .90
600	100	11 .83	10 1.2	10 1.06	10 .91	9 1.2	9 .97	9 .87	8 1.16	8 1.09	8 1.02	8 .87	7 1.13	7 1.02	7 .90
606	101	11 .84	10 1.2	10 1.07	10 .92	9 1.2	9 .98	9 .88	8 1.17	8 1.10	8 1.03	8 .88	7 1.14	7 1.03	7 .91

MODEL B OVERSIZE MACHINE - With Threading - 75 Cycle

2:1 THREADING METHOD TABLE (Formerly Brass Method)

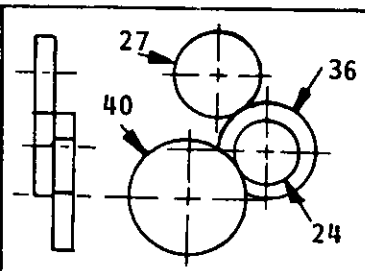
Work Spindle Speed 2500 r.p.m., Gears 40 T. Driver, 24 T. Driven

Threading Change Gears 36 T. Driver, 27 T. Driven

Table for selecting brass threading cam and location of block on threading cam lever for right and left hand threads. Threading spindle does not revolve when tap or die is running on to work, but runs twice the speed of work spindles, in the same direction, when running off (right hand threads only). Threading spindle revolves twice the speed of the work spindles, in the same directions, when tap or die is running on to work, but is stopped when running off (left hand threads only).

Select number of effective rev's of spindle in table which is nearest number required to complete piece.

Upper figure in each square denotes number of cam to be used. Lower figure denotes position of block on threading cam lever.



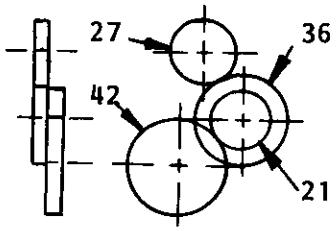
Seconds per Piece	Effec. rev's of Spin. per piece	No. of threads that can be cut	Number of Threads Per Inch														
			12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
.8	16	8	4 .98	3 1.02	3 .89	2 1.14	2 1.03	2 .93	2 .85	2 .8	1 1.2	1 1.12	1 1.05	1 .98	1 .93	1 .88	1 .84
1.0	25	12	5 .91	4 1.2	4 1.1	4 .98	4 .88	3 .97	3 .89	2 1.18	2 1.1	2 1.02	2 .96	2 .91	2 .85	2 .81	1 1.2
1.2	33	16	5 1.2	5 1.04	5 .91	5 .8	4 1.18	4 1.08	4 .98	4 .9	3 1.02	3 .95	3 .89	2 1.2	2 1.14	2 1.08	2 1.02
1.4	42	21	6 1.15	6 .98	6 .86	5 1.06	5 .96	5 .87	5 .8	4 1.19	4 1.11	4 1.04	4 .97	4 .91	3 1.04	3 .98	3 .94
1.6	50	25	7 .83	6 1.17	6 1.02	6 .91	6 .82	5 1.04	5 .95	5 .88	5 .81	4 1.2	4 1.15	4 1.08	4 1.03	4 .97	4 .92
1.8	58	29	7 .97	7 .83	6 1.18	6 1.06	6 .95	6 .86	5 1.1	5 1.02	5 .95	5 .88	5 .83	4 1.2	4 1.19	4 1.13	4 1.07
2.0	66	33	7 1.1	7 .94	7 .83	6 1.2	6 1.08	6 .98	6 .9	6 .83	5 1.08	5 1.	5 .94	5 .89	5 .84	5 .79	4 1.2
2.2	75	37	7 1.2	7 1.06	7 .92	7 .82	6 1.2	6 1.1	6 1.01	6 .93	6 .86	5 1.13	5 1.06	5 .99	5 .94	5 .89	5 .84
2.4	83	41	8 .88	7 1.17	7 1.02	7 .91	7 .82	6 1.2	6 1.12	6 1.03	6 .96	6 .9	6 .84	5 1.1	5 1.04	5 .99	5 .94
2.8	100	50	8 1.08	8 .93	8 .81	7 1.11	7 1.	7 .91	7 .83	6 1.2	6 1.17	6 1.09	6 1.02	6 .96	6 .91	6 .86	5 1.14
3.2	116	58		8 1.08	8 .94	8 .84	7 1.16	7 1.05	7 .97	7 .89	7 .83	6 1.2	6 1.18	6 1.12	6 1.06	6 1.	6 .95
3.4	125	62		8 1.15	8 1.01	8 .9	8 .81	7 1.12	7 1.03	7 .95	7 .88	7 .83	7 .77	6 1.19	6 1.12	6 1.07	6 1.02
3.9	146	73			8 1.18	8 1.05	8 .94	8 .86	7 1.2	7 1.12	7 1.04	7 .97	7 .91	7 .86	7 .81	7 .76	6 1.19
4.4	166	83				8 1.19	8 1.08	8 .98	8 .9	8 .83	7 1.19	7 1.11	7 1.04	7 .98	7 .92	7 .87	7 .83
4.7	179	89					8 1.16	8 1.05	8 .96	8 .89	8 .83	7 1.18	7 1.11	7 1.05	7 .99	7 .94	7 .89
5.6	216	108						8 1.2	8 1.17	8 1.08	8 1.	8 .94	8 .88	8 .83	7 1.2	7 1.14	7 1.08

MODEL B OVERSIZE MACHINE - With Threading - 60 Cycle
2:1 THREADING METHOD TABLE (Formerly Brass Method)
Work Spindle Speed 2400 r.p.m., Gears 42 T. Driver, 21 T. Driven
Threading Change Gears 36 T. Driver, 27 T. Driven

Table for selecting brass threading cam and location of block on threading cam lever for right and left hand threads. Threading spindle does not revolve when tap or die is running on to work, but runs twice the speed of work spindles, in the same direction, when running off (right hand threads only). Threading spindle revolves twice the speed of the work spindles, in the same directions, when tap or die is running on to work, but is stopped when running off (left hand threads only).

Select number of effective rev's of spindle in table which is nearest number required to complete piece.

Upper figure in each square denotes number of cam to be used. Lower figure denotes position of block on threading cam lever.



Seconds per Piece	Effec. rev's of Spin. per piece	No. of threads that can be cut	Number of Threads Per Inch														
			12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
1.	20	10	4 1.2	4 1.06	4 .93	4 .82	3 .89	3 .81	2 1.07	2 .99	2 .92	2 .86	2 .8	1 1.2	1 1.17	1 1.11	1 1.05
1.26	30	15	5 1.14	5 .97	5 .86	4 1.2	4 1.11	4 1.01	4 .93	4 .85	3 .95	3 .89	2 1.2	2 1.13	2 1.07	2 1.01	2 .96
1.49	40	20	6 1.09	6 .93	6 .82	5 1.01	5 .91	5 .83	4 1.2	4 1.14	4 1.06	4 .99	4 .93	4 .87	4 .82	3 .94	3 .89
1.72	49	25	7 .83	6 1.17	6 1.02	6 .91	6 .82	5 1.03	5 .95	5 .88	5 .81	4 1.2	4 1.15	4 1.08	4 1.02	3 1.17	3 1.11
1.98	59	29	7 .97	7 .83	6 1.18	6 1.05	6 .95	6 .86	6 .79	5 1.01	5 .95	5 .88	5 .83	5 .77	4 1.19	4 1.13	4 1.07
2.22	69	35	7 1.17	7 1.	7 .87	7 .77	6 1.14	6 1.04	6 .95	6 .88	6 .81	5 1.06	5 1.	5 .94	5 .88	5 .84	5 .8
2.47	79	39	8 .85	7 1.11	7 .97	7 .87	7 .78	6 1.16	6 1.06	6 .98	6 .91	6 .85	5 1.11	5 1.04	5 .99	5 .93	5 .89
2.71	88	44	8 .95	7 1.2	7 1.1	7 .98	7 .88	7 .8	6 1.2	6 1.1	6 1.03	6 .96	6 .9	6 .84	5 1.11	5 1.05	5 1.
2.96	98	49	8 1.06	8 .91	7 1.2	7 1.08	7 .98	7 .89	7 .81	6 1.2	6 1.14	6 1.07	6 1.	6 .94	6 .89	6 .84	6 .8
3.46	118	59		8 1.09	8 .96	8 .85	7 1.18	7 1.07	7 .98	7 .9	7 .84	7 .78	6 1.2	6 1.13	6 1.07	6 1.01	6 .96
3.94	138	69			8 1.12	8 .99	8 .89	8 .81	7 1.15	7 1.06	7 .98	7 .92	7 .86	7 .81	7 .76	6 1.19	6 1.13
4.39	156	78				8 1.12	8 1.01	8 .92	8 .84	7 1.2	7 1.11	7 1.04	7 .97	7 .91	7 .86	7 .82	7 .78
4.85	174	87					8 1.13	8 1.02	8 .94	8 .87	8 .8	7 1.16	7 1.08	7 1.02	7 .96	7 .91	7 .87

MODEL B OVERSIZE MACHINE - With Threading - 45 Cycle

2:1 THREADING METHOD TABLE (Formerly Brass Method)

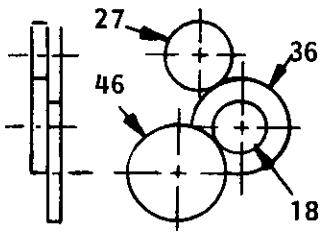
Work Spindle Speed 2384 r.p.m., Gears 46 T. Driver, 18 T. Driven

Threading Change Gears 36 T. Driver, 27 T. Driven

Table for selecting brass threading cam and location of block on threading cam lever for right and left hand threads. Threading spindle does not revolve when tap or die is running on to work, but runs twice the speed of work spindles, in the same direction, when running off (right hand threads only). Threading spindle revolves twice the speed of the work spindles, in the same directions, when tap or die is running on to work, but is stopped when running off (left hand threads only).

Select number of effective rev's of spindle in table which is nearest number required to complete piece.

Upper figure in each square denotes number of cam to be used. Lower figure denotes position of block on threading cam lever.



Seconds Per Piece	Effec. rev's of Spin. per piece	No. of threads that can be cut	Number of Threads Per Inch														
			12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
1.3	24	12	5 .91	4 1.2	4 1.11	4 .98	4 .89	3 .97	3 .89	3 .82	2 1.10	2 1.03	2 .96	2 .91	2 .86	2 .81	1 1.2
1.6	36	18	6 .98	5 1.17	5 1.03	5 .91	5 .82	4 1.2	4 1.11	4 1.02	4 .95	4 .89	3 1.0	3 .94	3 .89	2 1.2	2 1.16
1.9	48	24	7 .80	6 1.12	6 .98	6 .87	5 1.10	5 1.0	5 .91	5 .84	4 1.2	4 1.18	4 1.11	4 1.04	4 .99	4 .94	4 .89
2.2	60	30	7 1.2	7 .86	6 1.2	6 1.09	6 .98	6 .89	5 1.14	5 1.05	5 1.07	5 .91	5 .86	5 .80	4 1.2	4 1.17	4 1.11
2.5	72	36	7 1.2	7 1.03	7 .90	7 .80	6 1.18	6 1.07	6 .98	6 .91	5 1.17	5 1.10	5 1.03	5 .97	5 .91	5 .86	5 .82
2.9	88	44	8 .95	7 1.2	7 1.10	7 .98	7 .88	7 .80	6 1.2	6 1.11	6 1.03	6 .96	6 .90	5 1.18	5 1.12	5 1.06	5 1.0
3.2	100	50	8 1.08	8 .93	7 1.2	7 1.11	7 1.0	7 .91	7 .83	6 1.2	6 1.17	6 1.09	6 1.02	6 .96	6 .91	6 .86	5 1.14
3.5	112	56	8 1.2	8 1.04	8 .91	7 1.2	7 1.12	7 1.02	7 .93	7 .86	7 .80	6 1.2	6 1.15	6 1.08	6 1.02	6 .97	6 .92
3.9	128	64		8 1.19	8 1.04	8 .92	8 .83	7 1.16	7 1.07	7 .98	7 .91	7 .85	7 .80	6 1.2	6 1.16	6 1.10	6 1.05
4.2	140	70			8 1.14	8 1.01	8 .91	8 .83	7 1.17	7 1.08	7 1.0	7 .93	7 .88	7 .82	6 1.2	6 1.2	6 1.15
4.5	150	75			8 1.2	8 1.08	8 .98	8 .89	7 1.2	7 1.15	7 1.07	7 1.0	7 .94	7 .88	7 .83	6 1.2	6 1.2
4.7	158	79				8 1.14	8 1.03	8 .93	8 .86	7 1.2	7 1.13	7 1.05	7 1.0	7 .93	7 .88	7 .83	6 1.2
5.0	170	85				8 1.2	8 1.10	8 1.0	8 .92	8 .85	7 1.2	7 1.13	7 1.06	7 1.0	7 .94	7 .89	.85

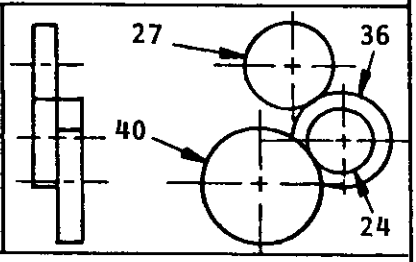
MODEL B MACHINE WITH THREADING
75 Cycle
2:1 THREADING METHOD TABLE
(Formerly Brass Threading Method)

Work Spindle Speed 2500 R.P.M., Gears 40 T. Driver, 24 T. Driven
Threading Change Gear 36 T. Driver, 27 T. Driven

Table for selecting brass threading cam and location of block on threading cam lever for right or left hand threads. Threading spindle does not revolve when tap or die is running on to work, but runs twice the speed of work spindles, in the same direction, when running off (right hand threads only). Threading spindle revolves twice the speed of work spindles, in the same direction, when tap or die is running on to work but is stopped when running off (left hand threads only).

Select number of effective rev's of spindle in table which is nearest number required to complete piece.

Upper figure in each square denotes number of cam to be used. Lower figure denotes position of block on threading cam lever.



Seconds per Piece	Effec. rev's of Spin. per piece	No. of threads that can be cut	Pitch in Millimeters													
			2.50	2.00	1.75	1.50	1.25	1.00	.90	.80	.75	.70	.60	.50	.45	.40
.8	16	8	4 1.16	4 .93	3 .98	2 1.20	2 1.01	2 .87	1 1.19	1 1.06	1 .99	1 .93	1 .80	–	–	–
1.0	22	11	5 .99	4 1.20	4 1.12	3 1.16	2 .97	2 1.12	1 1.00	2 .89	2 .83	1 1.20	1 1.09	1 .91	1 .82	–
1.2	28	14	6 .90	5 1.01	5 .88	4 1.20	4 1.02	3 .98	3 .88	2 1.14	2 1.06	2 .99	2 .85	1 1.16	1 1.04	1 .93
1.4	36	18	6 1.16	6 .92	5 1.14	5 .97	5 .81	4 1.05	4 .94	3 1.01	3 .95	3 .88	2 1.10	2 .92	2 .82	1 1.19
1.6	44	22	7 .87	6 1.14	6 .99	5 1.19	5 .99	5 1.20	4 1.16	4 1.03	4 .96	4 .90	3 .93	2 1.11	2 1.0	2 .89
1.8	52	26	7 1.02	7 .82	6 1.18	6 1.01	5 1.18	5 .93	5 .84	4 1.20	4 1.14	4 1.06	3 1.10	3 .92	2 1.19	2 1.05
2.0	60	30	7 1.18	7 .95	7 .83	6 1.16	6 .97	5 1.07	5 .97	5 .86	5 .81	4 1.20	3 1.05	3 1.05	3 .95	3 .85
2.2	66	33	8 .81	7 1.04	7 .91	6 1.20	6 1.06	5 1.19	5 1.06	5 .95	5 .89	5 .83	4 1.16	4 .96	3 1.04	3 .93
2.4	74	37	8 .91	7 1.18	7 1.02	7 .88	6 1.19	6 .96	6 .86	5 1.08	5 1.00	5 .93	5 .80	4 1.08	4 .97	3 1.04
2.8	90	45	8 1.11	8 .88	7 1.20	7 1.06	7 .88	6 1.16	6 1.04	5 .93	5 1.20	5 1.14	5 .97	5 .81	4 1.18	4 1.05
3.2	104	52		8 1.02	8 .86	7 1.20	7 1.02	7 .82	6 1.20	6 1.08	6 1.01	6 .94	5 1.12	5 .93	5 .84	4 1.20
3.4	112	56		8 1.10	8 .96	8 .83	7 1.10	7 .88	7 .80	6 1.16	6 1.09	6 1.01	6 .87	5 1.01	5 .91	5 .80
3.9	130	65			8 1.12	8 .96	8 .83	7 1.02	7 .92	7 .83	6 1.20	6 1.18	6 1.01	6 .84	5 1.05	5 .93
4.4	150	75				8 1.11	8 .93	7 1.19	7 1.06	7 .94	7 .88	7 .83	6 1.16	6 .97	5 1.20	5 1.07
4.7	160	80				8 1.18	8 .98	7 1.20	7 1.14	7 1.01	7 .94	7 .88	6 1.20	6 1.03	6 .93	5 1.16
5.6	1.94	97					8 1.20	8 .96	8 .86	7 1.20	7 1.15	7 1.06	7 .92	6 1.20	6 1.12	6 1.0

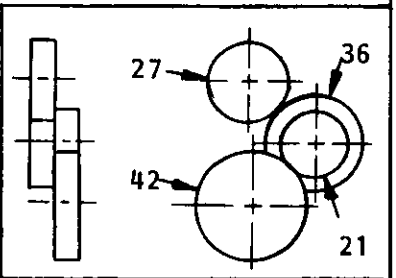
MODEL B MACHINE WITH THREADING
60 Cycle
2:1 Threading Method Table
(Formerly Brass Threading Method)

Work Spindle Speed 2400 R.P.M., Gears 42 T. Driver, 21 T. Driven
Threading Change Gears 36 T. Driver, 27 T. Driven

Table for selecting brass threading cam and location of block on threading cam lever for right and left hand threads. Threading spindle does not revolve when tap or die is running on to work, but runs twice the speed of work spindles, in the same direction, when running off (right hand threads only). Threading spindle revolves twice the speed of the work spindles, in the same direction, when tap or die is running on to work, but is stopped when running off (left hand threads only).

Select number of effective rev's of spindle in table which is nearest number required to complete piece.

Upper figure in each square denotes number of cam to be used. Lower figure denotes position of block on threading cam lever.



Seconds Per Piece	Effec. Rev's of Spin. Per Piece	No of Threads That Can Be Cut	Pitch in Millimeters													
			2.50	2.00	1.75	1.50	1.25	1.00	.90	.80	.75	.70	.60	.50	.45	.40
1.00	18	9	5 .81	4 1.05	3 1.11	3 .94	2 1.14	2 .91	2 .82	1 1.19	1 1.12	1 1.04	1 .89	-	-	-
1.25	26	13	5 1.17	5 .93	5 .82	4 1.14	3 1.14	3 .91	2 1.18	2 1.05	2 .99	2 .92	1 1.20	1 1.07	1 .97	1 .86
1.50	36	18	6 1.16	6 .93	5 1.13	5 .97	5 .81	4 1.05	3 1.14	3 1.01	3 .95	3 .88	2 1.09	2 .91	2 .82	1 1.19
1.75	44	22	7 .87	6 1.14	6 .99	5 1.19	5 .99	4 1.20	4 1.15	4 1.03	3 1.16	3 1.08	3 .93	2 1.11	2 1.00	2 .89
2.00	54	27	7 1.06	7 .85	6 1.20	6 1.04	6 .87	5 .97	5 .87	4 1.20	4 1.18	4 1.10	4 .94	3 .95	3 .85	2 1.09
2.25	62	31	7 1.20	7 .98	7 .85	6 1.20	6 1.00	5 1.11	5 1.00	5 .89	5 .84	4 1.20	4 1.08	3 1.09	3 .98	3 .87
2.50	72	36	8 .88	7 1.13	7 .99	7 .85	6 1.16	6 .93	5 1.16	5 1.04	5 .97	5 .91	4 1.20	4 1.05	3 1.14	3 1.01
2.75	80	40	8 .98	7 1.20	7 1.10	7 .94	6 1.20	6 1.03	6 .93	5 1.15	5 1.08	5 1.01	5 .86	4 1.17	4 1.05	3 1.12
3.00	90	45	8 1.11	8 .88	7 1.20	7 1.06	7 .88	6 1.16	6 1.04	6 .93	5 .87	5 1.13	5 .97	5 .81	4 1.18	4 1.05
3.50	108	54		8 1.06	8 .93	8 .80	7 1.06	7 .85	6 1.20	6 1.11	6 1.04	6 .98	5 1.16	5 .97	5 .87	4 1.20
4.00	126	63		8 1.20	8 1.08	8 .93	7 1.20	7 .99	7 .89	6 1.20	6 1.20	6 1.14	6 .97	5 1.13	5 1.02	5 .91
4.50	144	72			8 1.20	8 1.06	8 .89	7 1.13	7 1.02	7 .91	7 .85	6 1.20	6 1.12	6 .93	5 1.16	5 1.04
5.00	162	81				8 1.20	8 1.00	8 .80	7 1.15	7 1.02	7 .96	7 .89	6 1.20	6 1.04	6 .94	5 1.16

MODEL B OVERSIZE MACHINE - With Threading 45 Cycle

(2:1 THREADING METHOD TABLE (Formerly Brass Method)

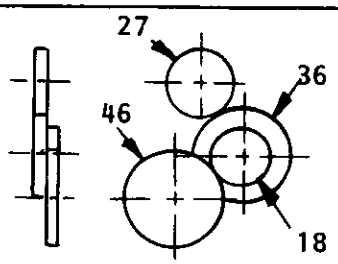
Work Spindle Speed 2384 r.p.m., Gears 46 T. Driver, 18 T. Driven

Threading Change Gears 36 T. Driver, 27 T. Driven

Table for selecting brass threading cam and location of block on threading cam lever for right and left hand threads. Threading spindle does not revolve when tap or die is running on to work, but runs twice the speed of work spindles, in the same direction, when running off (right hand threads only). Threading spindle revolves twice the speed of the work spindles, in the same directions, when tap or die is running on to work, but is stopped when running off (left hand threads only).

Select number of effective rev's of spindle in table which is nearest number required to complete piece.

Upper figure in each square denotes number of cam to be used. Lower figure denotes position of block on threading cam lever.



Seconds Per Piece	Effec. rev's of Spin. per piece	No. of threads that can be cut	Pitch in Millimeters													
			2.5	2.0	1.75	1.5	1.25	1.0	.9	.8	.75	.7	.6	.5	.45	.4
1.3	24	12	5 1.08	5 .86	4 1.2	4 1.05	3 1.05	3 .84	2 1.09	2 .97	2 .91	2 .85	1 1.19	1 1.0	1 .89	1 .79
1.6	36	18	6 1.16	6 .93	5 1.13	5 .97	5 .81	4 1.05	4 .94	3 1.01	3 .95	3 .89	2 1.09	2 .91	2 .82	1 1.19
1.9	48	24	7 .94	6 1.2	6 1.08	6 .93	5 1.08	5 .86	4 1.2	4 1.12	4 1.05	4 .98	3 1.01	2 1.2	2 1.09	2 .97
2.2	60	30	7 1.18	7 .94	7 .83	6 1.16	6 .97	5 1.08	5 .97	5 .86	5 .81	4 1.2	4 1.05	3 1.05	3 .95	2 1.2
2.5	72	36	8 .92	7 1.13	7 1.0	7 .85	6 1.16	6 .93	5 1.16	5 1.04	5 .97	5 .91	4 1.2	4 1.05	3 1.14	3 1.01
2.9	88	44	8 1.13	8 .90	7 1.2	7 1.04	7 .87	6 1.14	6 1.02	6 .91	5 1.19	5 1.11	5 .95	4 1.2	4 1.15	4 1.03
3.2	100	50		8 1.02	8 .90	7 1.18	7 .98	6 1.2	6 1.16	6 1.03	6 .97	5 1.2	5 1.08	5 .90	5 .81	4 1.17
3.5	112	56		8 1.15	8 1.0	8 .86	7 1.10	7 .88	6 1.2	6 1.16	6 1.08	6 1.01	6 .87	5 1.0	5 .91	5 .80
3.9	128	64			8 1.15	8 .98	7 1.2	7 1.0	7 .91	7 .81	6 1.2	6 1.16	6 1.0	5 1.15	5 1.04	5 .92
4.2	140	70			8 1.2	8 1.08	8 .90	7 1.10	7 1.0	7 .88	7 .83	6 1.2	6 1.08	6 .90	5 1.13	5 1.0
4.5	150	75				8 1.15	8 .96	7 1.18	7 1.06	7 .94	7 .88	7 .83	6 1.16	6 .97	6 .87	5 1.08
4.7	158	79				8 1.2	8 1.01	7 1.2	7 1.12	7 1.0	7 .93	7 .87	6 1.2	6 1.02	6 .92	5 1.14
5.0	170	85					8 1.09	8 .87	7 1.2	7 1.07	7 1.0	7 .94	7 .80	6 1.10	6 1.0	5 1.2

6:1 THREADING CAMS (Formerly Steel)

CAM #	RISE			DROP			
	INCH	MM	100ths	INCH	MM	100ths	PART #
1	.118	2.9972	0-32.5	.137	3.3798	32.5-50	5-C-118
2	.200	5.0800	0-32.5	.232	5.8928	32.5-50	5-C-98
3	.317	8.0518	0-32.5	.366	9.2964	32-5-50	5-C-100
4	.452	11.4808	0-32.5	.540	13.7160	32.5-50	5-C-102
5	.715	18.1610	0-32.5	.825	20.9550	32.5-50	5-C-104
6	1.140	28.9560	0-32.5	1.320	33.5280	32.5-50	5-C-106
7	1.740	44.1960	0-32.5	2.100	53.3400	32.5-50	5-C-108
8	2.000	50.8000	8.5-32.5	2.000	50.8000	32.5-43.25	5-C-110
9	2.000	50.8000	16.5-32.5	2.000	50.8000	32.5-39.5	5-C-112
10	2.000	50.8000	22.5-32.5	2.000	50.8000	32.5-37	5-C-114
11	2.000	50.8000	27-32.5	2.000	50.8000	32.5-35.25	5-C-116

2:1 THREADING CAMS (Formerly Brass)

CAM #	RISE			DROP			
	INCH	MM	100ths	INCH	MM	100ths	PART #
1	.238	6.0452	0-25	.276	7.0104	25-50	5-C-82
2	.389	9.8806	0-25	.450	11.4300	25-50	5-C-84
3	.560	14.2240	0-25	.657	16.6878	25-50	5-C-86
4	.675	17.1450	0-25	.782	19.8628	25-50	5-C-88
5	1.095	27.8130	0-25	1.265	32.1310	25-50	5-C-90
6	1.525	38.735	0-25	1.770	44.9580	25-50	5-C-92
7	2.000	50.8000	5-25	2.000	50.8000	25-42.5	5-C-94
8	2.000	50.8000	12-25	2.000	50.8000	25-37	5-C-80

TROUBLE SHOOTING

1 - When Form Tool Diameter Changes Size, Varies or Chatters.
- a. Check for maximum rigidity in tool set-up and head locking.
  - 1a. Check for sloppy tool or work spindle bearings.
  - 2a. Check for proper hook in tool and on center.
  - 3a. Proper work support if necessary.
- b. Check for loose slide or tool arm bushing.
- c. See if all bolts are tight.
- d. Check stop screw pressure (.005 pressure would be .010 on diameter of piece, this should be enough.)
- e. Dull tool.

2 - When the hole gets big.
- a. Head locking properly.
- b. Sloppy spindles.
- c. Center drill, chipped or off center.
- d. Check if drill is dull or loaded.
- e. Check drill alignment and spindle alignment.

3 - When threads come out stripped.
- a. See if proper cam is used.
- b. Check block location for proper rises.
- c. Check proper clutch shifting.
- d. Check for excess wobble in tap or die.
- e. Check threading clutch torque.
- f. Check if hole or body size is correct.
- g. Spindle is out of line.
- h. Dull, loaded up, tap or die.

4 - Variation in length.
- a. Check head thrust and thrust bearings end play.
- b. Worm or sloppy bearings in spindle.
- c. Dull end working tools pushing work back into collets, such as drills, broaches, and etc.
- d. Loose, worn, or dirty collets.
- e. Check for equal feed finger pressure.
- f. Check for clean cutoff on bar end.
- g. Stock stop should be tight, highly polished, and proper length of stop plate.
- h. Check for worn rolls and pins on end working cam lever.

5 - When parts have burr on cutoff.
- a. Check for proper pressure on stop collar (1263-101-14-1) on the burring spindle.
- b. Check timing of closing dogs so burring chuck is closing at proper time.
- c. Check rolls and pins on cam levers.
- d. Cutoff above or below center.

6 - When box tool dimension is rough or varies in size.
- a. Check for proper grind on box tool.
- b. Check for proper feed.
- c. Check rollers for proper tension.

7 - When hollow mill dimension is rough or varies in size.
   a. Check for proper grind.
   b. Worn or loaded cutting edges.
   c. Check for proper alignment (work piece to mill).
   d. Check for proper feed.

8 - When improper step or shoulder appears.
   a. Check form tools for alignment.
   b. Check box tools for alignment or distance of travel.
   c. Check if drills are of proper depth and sharpness.
   d. Check for loose tool holders.

9 - If rolled threads are out of form or flaky (scissor type).
   a. Check feed or penetration of work.
   b. Check proper blank size.
   c. Check blank for taper.
   d. Check when on high point of cam that rolls and work are on this same center.
   e. Check for proper roll synchronization.
   f. Check for nicks.

10- If reamer chatters.
   a. Too much clearance on sprial relief.
   b. All reamers should be able to float, but tension on float should be controlled. Therefore, check for proper alignment and float tension.
   c. Make sure feed is right for size of reamer.
   d. Check for low cutting edges.

11- If tap trouble.
   a. If tap is cutting under size, low cutting edges (flute out tap) after tapping part, part should be able to be threaded on tap by hand.
   b. Check timing on the threading clutch shifting.
   c. Check radial torque on threading clutch (use torque wrench) See MB-226-SA - Sheet #3.
   d. When checking torque make sure you can feel the chatter (If not it is possible the key in the clutch body may be sheared).

12- If knurl is out of form or flaky.
   a. Make sure blank is correct size.
   b. Check feed of penetration of work.
   c. Check blank for taper.
   d. Examine knurl pins and knurls for wear.

PREVENTIVE MAINTENANCE

This is only a guide. Actual production conditions may require more or less preventive maintenance. A good maintenance program requires the cooperation of all. Preventive maintenance can save cost by reducing "down time", rejected parts, and other small problems.

Operators Care of the Machine:

1 - Check lube oil in sight glass at beginning of shift. Fill if necessary.
2 - Oil all oil fittings with oil gun every shift.
3 - At the beginning of each shift, check to be sure there is adequate coolant flow to all tooling cutting edges and coolant flow is directed away from the work spindles.
4 - Wipe the bars clean of dirt and grit before loading them into the machine. Wipe with oily rag to reduce noise and load on feeding mechanism.
5 - Be sure both ends of all bars are chamfered before loading them into the machine for easier entry into pushers and collets (chucks).
6 - At the end of each shift, turn power to the machine to "Jog Off". Wipe or brush all chips and grit away from slides, gibs, and tool holders. Do Not use an air hose. High pressure air is dangerous and drives grit into the slides, gibs and other mechanisms; which prevents proper operation.
7 - Do not operate machine with improperly adjusted clutches. Notify your supervisor.
8 - NEVER ATTEMPT TO FORCE THE MACHINE TO OPERATE. In case of hang up, twisted cam shaft, or any other malfunction, turn machine off and notify your supervisor.
9 - Check collet (chuck) adjustment when loading new bars and re-adjust if necessary.
10 - Check condition of cam rolls and pins each time cams are changed.
11 - Keep machine and floor area around the machine free from accumulated oil, dirt and debris.

Daily Maintenance

Check:
1 - Lubricating oil level in main reservoir.
2 - Coolant level in pan reservoir.
3 - Coolant intake pipe (or Pump) screen; clean if necessary.
4 - Condition and alignment of stock reel and stock reel support. (This should be lagged to floor).
5 - Lubricating oil delivery to spindle bearings.
6 - Brake adjustment.

Bi-Weekly Maintenance

1 - Visually inspect and hand feel high speed and starting clutches.
2 - Check radial torque on threading clutch. (Use torque wrench). See MB-226-SA, sheet #3. Also check for neutral approximately 1/4" of play.
3 - Check locking nuts on spindle change gear shafts.
4 - Check revolving head for end play and adjust thrust ring if necessary.

Monthly Maintenance

Remove the following items from the revolving head, clean throughly, inspect and replace:

1 - Collets (chucks)
2 - Inner Spindle
3 - Feed Fingers
4 - Feed Tubes

Inspect condition of:
1 - Outer spindle and clean internally with boiler brush
2 - Stop Screws
3 - Cross Slide and Gib Adjustment

Inspect wear and/or damage condition of:
1 - Stock Reel
2 - Stock Reel Stand
3 - Locating Lever (to assure it is locking correctly and roll is turning)
4 - Chuck Slide, Roll, and Pin

Check wear and/or damage of:
1 - Spanner Nuts
2 - Bearings
3 - Rollaway Clutch
4 - Gears (tooth wear and mounting)
5 - Shafts
6 - Chuck and Feed Cam Shaft

Check for:
1 - Twisted Front Cam Shaft (the locating lever must clear the locating blocks (724-1) on index and make contact on the angle side first when locking with approximately .012 push back.)

Quarterly Maintenance

1 - Remove coolant from the pan and throughly clean pan of sediment and fine chips. Add new coolant.
2 - On long runs, where the cams are seldom changed, remove cross slides and clean, then check cross slide gib adjustments.
3 - Plugs at the bottom of the worm housing should be removed and the housing flushed out with an OSHA approved solvent. Replace the plugs and fill with fresh oil.

Semi-Annual Maintenance

1 - Drain, clean, flush, and refill main lube oil reservoir. Check condition of filter.
2 - Check for excessive end play of revolving head.
3 - Check for excessive looseness of work spindles.
4 - Check for excessive looseness of tool spindles.
5 - Check for excessive end play of thrust bearings.
6 - Check condition of electrical controls: switches, solenoid valves, wiring, panel box, and motors. NOTE - ELECTRICAL MAINTENANCE SHOULD BE BY AUTHORIZED PERSONNEL ONLY.
7 - Check main drive belt tension.

Annual Maintenance

1 - On the roll clutch, inspect rolls, spring and rolling surfaces. Replace any worn parts. Clean, lubricate, and reassemble.
2 - Check attachment for alignment with work spindles.
3 - Check for broken cross slides.
4 - Check condition of all levers, rolls and pins.
5 - Check condition of stock stop.
6 - Check condition of chip conveyor.
7 - Check condition of lubricating and coolant systems:
    1 - Lubricating Pump and Drive Belt
    2 - Coolant Pump and Drive Chain
    3 - Lubricating Lines and Meter Units
    4 - Filter in Coolant Tank
8 - Inspect condition of attachments:
    1 - Threading Attachments
    2 - Stationary Head Burring Attachment
    3 - Center Drive Attachment
    4 - Any other special Attachments.