ROTTLER

MANUFACTURING

NCA

Boring Bar

OPERATIONS AND MAINTENANCE
MANUAL

MANUFACTURED BY:

ROTTLER MANUFACTURING COMPANY
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NOTE: WHEN ORDERING REPLACEMENT PARTS,
PLEASE GIVE THE MODEL AND SERIAL NUMBER.

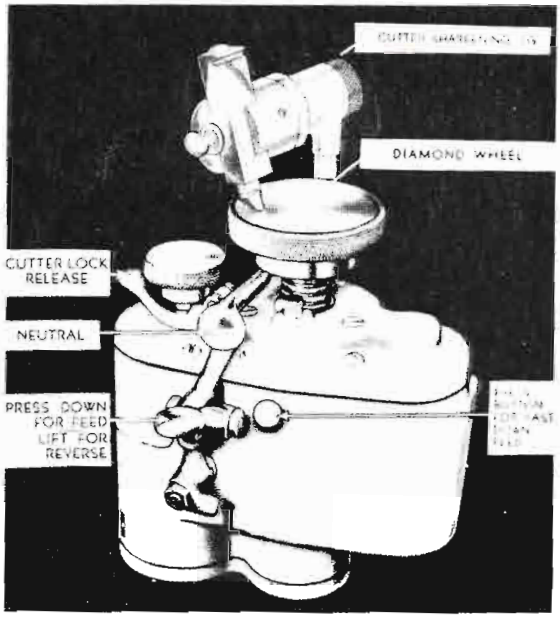
ORDER BY PART NUMBER.

THERE IS A MINIMUM ORDER OF $25.00

DESCRIPTION

The Model NCA bars are single point tool precision portable boring bars, complete with tooling necessary for standard engine reboring work. All feeds and traverses are power operated and controlled from the upper gear housing unit. Power is supplied by 3/4 H.P. constant speed AC. General Electric motor integral with the unit. Housings are aluminum alloy in order to incorporate the lightest possible weight without sacrificing rigidity.

CONTROLS



We suggest, before attempting to bore, you clamp the bar over an open area and actuate the controls to become familiar with them.

1. Cutter lock release lever is located under centering knob. Use your thumb to raise lever in order to either insert or remove tool holder.

2. Feed lever is latching lever on side of bar. Press down until lever latches to engage cutting feed. To disengage, press neutral feed release arm which will unlatch lever and allow it to return to neutral position. Lift feed lever until it latches to engage rapid return travel. Bar will automatically return to neutral upon reaching top of travel. If you wish to return bar to neutral while it is in rapid up travel, again press neutral feed release which will unlatch lever and allow it to return to neutral position.

3. The fast down travel button is located next to the feed lever. Check feed lever to make sure it is in neutral position before pressing. It is most convenient to operate fast down by extending fingers around back end of upper housing and exerting pressure on button with palm of hand. The button should be pressed in firmly and not allowed to ratchet. This control is spring loaded and will release when you release pressure.

You will note the stop rod, that is held in base casting by thumb screw, has a cone shaped end which will release cutting feed when it contacts lever. This is most conveniently raised up and locked by thumb screw in proper position on completion of first bore cut.

4. The NCA type boring bars are equipped with a manual travel that is actuated by attaching the handle to the pinned drive shaft extending from the motor drive. This travel is an auxiliary unit, and should always be left in the full up position after using.

Normal procedure is to rapid travel or feed spindle to point requiring manual travel, which might be chamfering, counter-boring, or facing sleeves, and then proceeding with the manual feed. If back feeding should be necessary, run hand travel down first and then rapid travel spindle down to where tool can be inserted.

5. A 2-speed selector is also furnished on the NCA type machines. To engage in fast spindle RPM, turn speed selector knob extending from gear pot clockwise to end of travel. Reverse procedure to engage in low. It may be necessary to rotate top feed screw knob slightly while doing this, to allow gears to mesh properly.

In general, the high speed may be used for single finish cuts to .030 oversize and up to 3½" diameter. A low speed should be used for rough sleeving cuts up to this diameter and for all cuts above 3½". We recommend taking maximum cut of .080 on low speed up to 3¼" and a maximum cut of .060 on diameter of larger bores,

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OPERATING INSTRUCTIONS

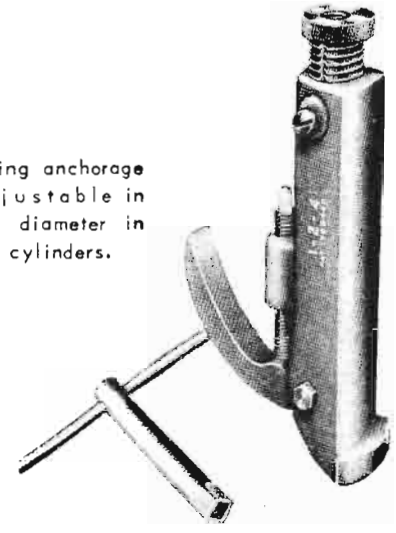
Note: When bar is shipped from factory the machined surfaces are protected with rust veto. After uncrating, use clean cloth dampened with kerosene and remove the protective oil.

We recommend, particularly for operators unfamiliar with the NCA bars, to practice on a junk block in order to become acquainted with all controls and details connected with the use of this machine. If you plan to chamfer bores, we also recommend practicing this operation (See No. 8)

1. Carefully clean and file off high spots, thread burrs, etc. on top of cylinder blocks. When using the vacuum chip remover take care to remove oil and grease film from cylinders in order to prevent eventual loading of air passages and vacuum filters.

2. Measure each cylinder. Determine the amount of metal to be removed from the measurement of cylinder which shows the most wear.

3. Insert the proper size wing in the hold down clamp for the diameter of cylinder and adjust hold down length so that 5/8" anchoring screw will have at least a 3/8" length of thread holding. After placing through bar base, reach through cylinder and make sure there is an adequate square surface where you intend to set hold down. Beware of fillets and chamfers around clamping area. In blocks which have relief, for connecting rod clearance, the hold down lug will most often straddle the relief with adequate holding surface on each corner. It is convenient to insert one of the 5/8" bolts in the hold down to hold it while expanding the wing with the T wrench. Use light tension on T wrench. Excessive tightening will result in distortion of bores and marks in finished cylinders.



Self centering anchorage device, adjustable in length and diameter in all size cylinders.

In many blocks it is possible to utilize the stud holes to anchor the bar, although cap screws to fit these holes are not furnished as standard equipment.

In any event attempt to set the hold down device so the boring bar can be pivoted to bore adjacent cylinders on either side and hold down bolt is as close to spindle as practicable.

Check also to make sure there is good contact of boring bar base and block on all sides of hold down. If this is questionable, particularly on long industrial jobs, it is advisable to use additional clamps after centering bar, such as milling machine type clamp, on the steps of the base.

Place the bar with spindle over the hole to be bored and insert the bolt in the hold down without tightening. Check to make sure tool holder is not in bar and centering fingers are not extended.

CENTERING

Start motor and press fast down button which will rapidly feed bar into cylinder for centering. It is usually desirable to locate fingers just under the ring wear ridge. Bear in mind that No. 2 and 4 centering fingers are slightly higher than others and must be under the ridge. The best method of centering when little stock is left for cleanup is to rotate spindle with top knob so that 2 fingers straddle the greatest wear under the ridge. These wear pockets generally occur in line with the block.

After locating fingers properly, extend them by turning top centering knob and exert tension on the knob while tightening hold down bolt. Do not over tighten. Approximately 25 lb. tension on 8" wrench is adequate. Before tightening hold down bolt, it is advisable to rock bar slightly to make sure fingers are making positive contact with cylinder wall.

Retract fingers back into head and return bar to up position by latching feed lever in up position.

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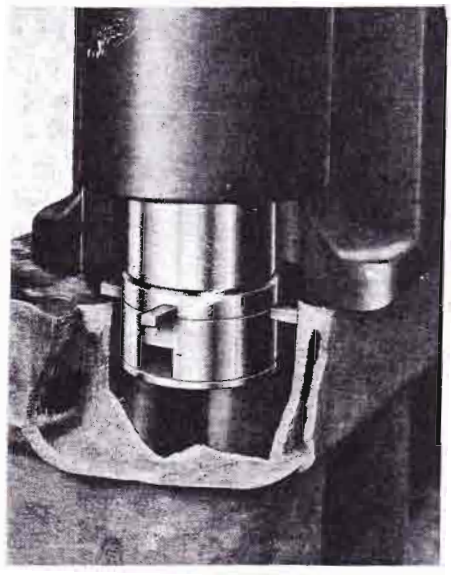
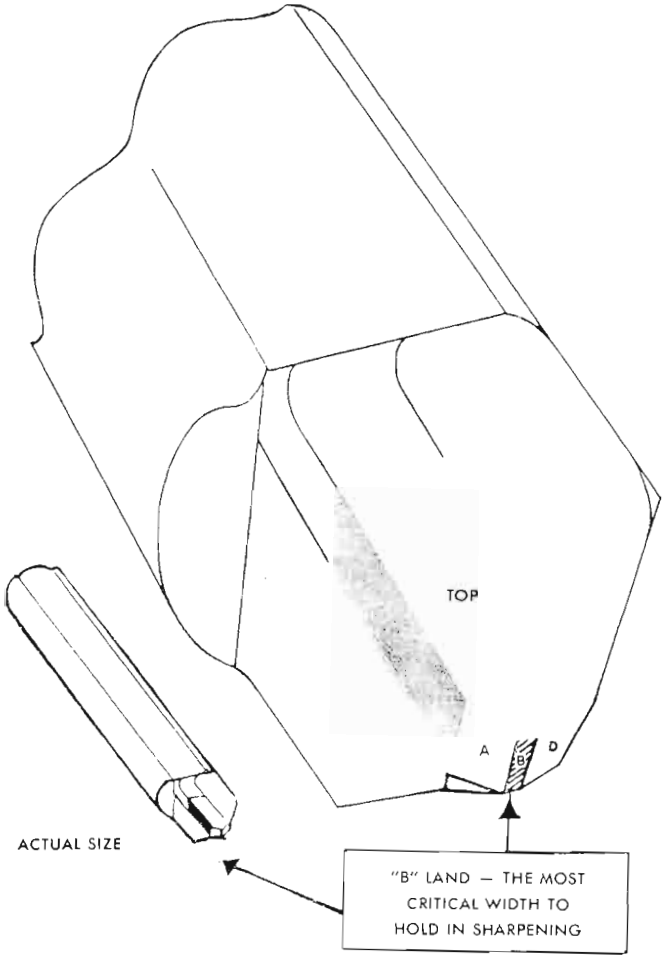


4. On NCA 00 bars, it is necessary to change fingers to accomodate the entire range. The most convenient method is to lay the bar on bench, control side up. Run the spindle down a few inches with the fast down feed, shut the motor off and run the fingers out with centering knob. Insert the other fingers in the slots being careful to match the numbers on the fingers to the numbers on the slots. Hold all fingers inward with one hand and rotate centering knob – first to right and then to left retracting them into head. Check to see that all fingers are retracted equally and return bar to up position.

SHARPENING CUTTER



5. The performance of your boring bar and quality of work it will do is almost entirely dependent on the care of the cutting tool. It is the most frequent cause of size and finish problems in boring.

Sharpening of the tool on NCA bar is done by inserting tool holder in the sharpening Jig slot. Then insert the Jig shank in the hole provided in the upper housing and sharpen bit on the small diamond wheel provided on the large knob. Always make sure you sharpen the tool on the side of the diamond that is running toward the top face of the bit. Sharpening on the wrong side can readily chip the point. (Refer to control picture)

When sharpening use very light pressure, moving the tool back and forth across the diamond wheel to improve cutting and prevent grooving of diamond.

After sharpening a number of times dress excess steel away from carbide on grinding wheel. This will facilitate use of chip remover hoods and make for quicker sharpening. Diamond wheel is designed for carbide only. Steel tends to load it.

In the accompanying sketch, letters A, B, D correspond to the letters indicated on your sharpening jig, in other words, when your jig is set in the A position it will sharpen the "A" land as shown in the sketch.

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The most critical point of this sharpening is the width of the "B" land (as indicated by the diagonal line shading). This width should be maintained at about .015 to .020 or 1/64". This width is held by cutting back the D land as required.

In the event your bar chatters or bores a rough finish at the bottom of the cylinder, it is very probable this "B" land is too wide.

The A cutting land is not critical as to width but should be maintained in good condition to obtain free cutting, particularly on heavy cuts.

The top surface of the bit is finely finished at the factory and requires no further resurfacing. This also means no honing or in any way attempting to break off the chip that sometimes seems to be apparent. The practice of doing these things will inevitably result in poor surface finish and impair the accuracy of the machine.

The frequency of sharpening the bit required will vary depending on the type of iron being bored. A six cylinder block can sometimes be bored without re-sharpening and often it is advisable to touch up the cutting tool on every hole for best results.

TOOL SETTING

6. Tool Setting. One cut is adequate to finish bores to .040 oversize. If tool is properly sharpened place cutter and proper tool holder in mike. Hold tool bit lightly against mike anvil and loosen allen screw with wing wrench. Gently let tool holder slide back to make contact with mike spindle. This procedure will prevent chipping carbide. This mike will read directly to the size you wish to bore. However, bear in mind there is .050 to a revolution rather than .025 as on conventional mikes. Set mike to size you wish and tighten set screw lightly. Back off mike and tighten set screw. Here again excessive tightening only tends to nick mike anvil and make future setting difficult. After tightening, recheck size.

BORING

7. Make sure tool holder and tool holder slot in head are free from dirt. Insert tool in slot at the same time lifting the cutter lock lever under the centering knob. Do not release lever until you are sure cutter is fully back and latched.

Start boring bar motor and latch feed lever in down position. When bar has completed boring, set stop rod so lever will be thrown into neutral position. Stop rod will then be set for the other holes on the same cylinder block.

FOR CHIP REMOVER USE ONLY

Insert proper length vacuum hood in hole provided in cutter head and press in until tool bit tip extends out of hole in hood at least .025. Insert vacuum goose-neck in ball bearing on top of centering knob. Start vacuum motor.

Latch feed lever in up position and when bar reaches top turn motor off. Remove vacuum hood and tool holder with tool puller. (always remove tool holder after boring) Loosen anchor bolt and proceed to next cylinder. (If bore is to be chamfered with bar see No. 8). This should be done before loosening anchor bolt. If vacuum is used, a cylinder block can generally be bored before emptying filter bag. Keep bag and filter clean. An oil saturated bag or filter will restrict the flow of air.

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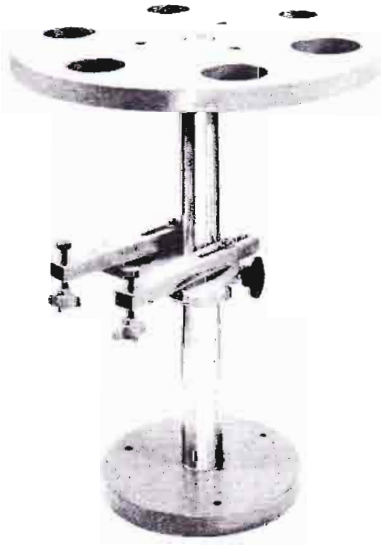
CHAMFERING

8. If chamfering is to be done at top of bore the special chamfering bit and tool holder must be used. Tool may be set by either inserting in head and approximating setting or place in mike and set approximately .100 over bore size. Insert tool in cutter head, start motor and latch feed in down position. Hold thumb on feed lever release arm and press when tool has developed adequate chamfer. You will find this can be done very quickly and with surprising consistancy after becoming familiar with it. On NCA type bars chamfering may be done with standard tool holder if hand travel is used. For most convenient chamfering, we recommend use of CH-2 chamfer tool.

INSTRUCTIONS ROTTLER SMALL ENGINE BORING STAND

(Adapter Plate 200-27)



Make sure block is clean on top mounting surface and is not sufficiently warped that it might rock after clamping to produce an inaccurate bore.

Place cylinder under clamping hole that is slightly larger than cylinder bore. Swing clamp body under cylinder so that clamp arms may be placed in position to most rigidly clamp cylinder block and adjust height. Light finger tip pressure on the two clamp screws is all that is required to hold cylinder, and clamping pressure will be further increased by locking boring bar after centering. (Over-tightening of clamp screw may damage the stand). We suggest to become familiar with clamp, operator check by attempting to slide clamped block by striking with hand.

Most cylinders that are integral with the crank case can easily be clamped by swinging clamps inside of the case.

If there is a question of adequate clamping on this type of motor or an odd shaped cylinder, use a C clamp or machinist clamp to further secure the block. (Do not over-tighten clamp screws.)

Place boring bar on plate and insert 5/8 bolt in hole provided in plate. Traverse bar down for centering and return to top. Insert sized cutting tool. Proceed with boring cycle - always remove tool after boring.

If you are boring a blind hole, measure with scale the distance from the top of the boring plate to the depth you wish the cutter to bore (Distance 'A).

Using an off set tool bit, feed spindle down until tool bit tip is level with top of adapter plate. Shut motor off and with scale measure same Distance A from top felt-retainer on base to a scribed pencil mark up the spindle. Start motor, engage feed and press feed release button when pencil mark is level with top of felt retainer. If you have more than one of these cylinders, set stop rod for automatic stop from pencil mark. Return bar to top and **always** remove tool holder.

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SERVICE and MAINTENANCE

LUBRICATION

UPPER HOUSING GEARS

After approximately 6000 bores we recommend replacing grease using Union Unoba F-1 Light. Dilute 6 parts of grease to one part oil. Do not overload. 1/4 pint should be sufficient. Lubriplate 930AAA may be substituted.

MOTOR HOUSING

Same as upper housing. Use approximately 1/8 pint of the Unoba F-1 Light and dilute 6 to 1.

OUTER SPINDLE

Occasionally apply light film of very light oil to outer spindle.

INNER SPINDLE

After 3000 holes approximately a thimble full of oil in the keyway hole of the outer spindle.

SERVICE

DRIVE PIN

A drive pin, retained by a collar, is provided in the lower end of the feed screw. This will shear, in some cases, when an extreme load is exerted on the cutter head. This pin should occasionally be replaced regardless of breakage as it tends to wear from the constant shock of intermittent cuts.

REPLACEMENT INSTRUCTIONS

1. Lift retaining collar above pin hole.

2. Hold fast down travel button in and manually rotate sharpening knob by hand to the left until bottom of screw is clear of the motor drive shaft.

3. Remove remnants of sheared pin.

4. Jog motor until pin hole in motor drive shaft lines up for convenient inserting of new pin.

5. Hold fast down travel button in and rotate sharpening knob to right until screw is fully down and drive holes line up.

6. Use pointed tool to align holes. Insert pin and force collar back down.

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DISASSEMBLY UPPER HOUSING

Should it be necessary to disassemble the upper housing use following procedure.

1. Insert tool holder in cutter head.
2. Remove sharpening and centering knobs.
3. Remove trip lever by removing 1/4 Cap Screw being careful not to lose spring retained in shift lever.
4. Take off top housing by removing (4) Round Head Screws.
5. Loosen (2) set screws on shaft collar on centering rod and force off of rod.
6. This will allow you to remove shifting lever and most of upper housing mechanism.

REASSEMBLY UPPER HOUSING

1. It is very important to reset centering rod collar properly. Make sure tool holder is in cutter head and shaft bushing and washer are under collar.
2. Hold shaft lever down so it doesn't interfere with adjustment and set collar so that there is approximately .010 – .015 clearance between collar and washer. Tighten both set screws tightly. Recheck to see if this has altered adjustment.
3. Reverse disassembly procedure. Set sharpening knob at proper height so bar will go into neutral before cutter head enters lower felt retainer. Set centering knob so that when tool holder is removed from bar, bottom of knob hub does not rub tool lock lever.

UPPER HOUSING

RAPID RETURN TRAVERSE

If the boring bar should ever fail or hesitate to return to top of travel when shift lever is lifted and latched, the following procedure may be used to adjust return traverse clutches.

1. Insert tool holder in cutter head and run bar down into hole a few inches.
2. Loosen set screw at top of upper housing. (Refer Sec. EE Part No. 300-41.)
3. This will allow you to tap rapid return tumbler assembly, (Top of shaft located on top of upper housing opposite spindle side) down slightly which will result in deeper engagement of clutches. Adjust tumbler shaft so that when shift lever is in neutral, clutches do not clatter. Clutches should engage immediately upon latching lever.
4. Tighten set screw to relock shaft. Check to see adjustment has not been changed by set screw.

INNER SPINDLE

Spindle will seldom require any adjustment. A great many holes can generally be bored before excessive clearances develop. Indications of a loose inner spindle are an inconsistent finish and an excessive amount of clamor when bar is making an intermittent cut.

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PROCEDURE TO ADJUST

1. Remove 2 screws and small cover on upper housing next to feed lever.

2. Insert pin (Diameter .180 or less) into one of the holes provided in the O.D. of take up nut. (See Sect. AA Part No. 300-33.) Hold top sharpening knob with one hand and turn take up nut to right (Clockwise). You will note the nut ratchets in notches as you take up. Take up until spindle is tight.

   On NCA bars back off 1 to 2 notches. In either case run bar after adjustment making sure there is only slight heating at bottom of spindle. If heat is excessive, back off one notch further.

3 Replace cover with (2) screws.

CENTERING FINGERS

Centering fingers are adequate to center the new bore within .002 of the centering of old bore; providing the old bore is reasonably round and if you follow operating instructions properly. Centering fingers can be lapped periodically to obtain near perfect centering. Use the following procedure in an undersize bore or junk block.

TO LAP FINGERS

1. Bore hole and remove cutter but do not **unclamp bar.**

2. Rapid traverse bar down into hole.

3. Extend fingers and exert pressure on them against cylinder wall while rotating sharpening knob to right, by hand, (Clockwise).

4. After rubbing, examine points on all fingers to make sure they are all making contact.

MICROMETER

Your boring bar micrometer, as with any other measuring tool, should be used delicately and with care to be assured of the greatest accuracy. Particular attention should be paid to inserting the tool in micrometer without allowing tool bit to snap into mike anvil. Care should be used in the method of lightly locking tool bit before tightening.

After a period of use you will note that the tool bit tip will force a depression in the micrometer anvil. This, of course, will result in inconsistent sizes, particularly after resharpening the bit. Periodically we would recommend turning the anvil slightly and finally reverse ends so that a flat surface is exposed to the tool bit tip.

SETTING MICROMETER

1. Bore a hole.

2. Remove tool holder, leaving bit locked and place in mike.

3. Adjust mike so that it reads the same size as the hole you have bored. Small variations may be made by turning the mike sleeve with spanner wrench provided. Larger changes should be made by moving the anvil.

DIAMOND WHEEL

CARE OF DIAMOND SHARPENING DISK

If the diamond disk is handled with care it will provide many years of service.

Occasionally diamond surface can load up if steel part of tool bit is not ground back as sharpening instructions indicate. To clean disk apply a small amount of solvent or thinner and rub off.

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OUTER SPINDLE ADJUSTMENT

ALL MODEL BORING BARS

These machines have tapered main spindle bearing held in a seat by a spring and adjusting nut. The tension on these bearings is normally adequate to last indefinitely under normal boring operations.

Caution should be used in adjusting these bearings in order to avoid a too tight spindle which only serves to wear out machine and load down motor. If it should be necessary to adjust bearings, proceed as follows.

The upper bearing is adjusted by turning aluminum collar at top of base. By removing (2) screws and lifting felt retainer in order to reach adjusting nut with punch. For NCA bars Ser 22100 and later.

Lower bearing is adjusted by removing lower adjusting cover and turning adjusting nut with punch. Also see below, Lower Bearing Adjustment.

1. Place and clamp bar over hole or overhang so spindle can run down. Loosen both adjusting nuts.
2. Allowing bar to run in **feed,** tighten lower adjusting nut until you detect a slight drop in motor RPM.
3. Stop motor leaving bar in feed. Pull down on upper housing by hand. You will note spindle will drop approximately 1/32" taking slack out of feed. Minimum pressure required to pull down should be about 30 lbs.
4. Start bar again, leaving in feed, and repeat above operation to adjust upper bearing. Pressure required now to drop spindle should be approximately 50 lbs.
5. Check this spindle tightness at both limits of spindle travel to make sure that spindle is not excessively tight at any point.

LOWER BEARING ADJUSTMENT

On boring bars that do not have clip at side of base, adjustment of lower bearing is made at bottom of base.
The upper main spindle bearing has a wavy spring under the take-up nut. The lower bearing has no spring and is therefore extremely sensitive to take-up.

Lower bearing take up is located at bottom of base. Remove lower bearing felt wiper to adjust. Before adjusting, back off the Allen lock screw at bottom of base. Proceed with adjustment as outlined previously, adjusting upper bearing first.

Early model NCA bars have a 3/8 Allen set screw at the lower bearing to provide a friction drag. This screw must be backed off to adjust bearing and may then be adjusted to add drag to the spindle movement. Recheck spindle adjustment to make sure it is not excessively tight at any part of travel.

Note: An over tight innerspindle adjustment will generate heat at bottom of spindle and resulting expansion will make spindle tight at top of travel.

CUTTER HEAD TOOL RETRACTION

The cutter retraction is actuated by lifting the upper housing shift lever, which in turn lifts the centering rod allowing the back of the tool holder to be raised by the tool lock spring located under the tool holder in the cutter head cap.

Should the tool holder fail to retract we suggest you inspect as follows.

1. Check to see that the tool holder slot is clean and free of dirt.
2. Check for broken tool lock spring in cutter head.
3. Run spindle up and down making sure the centering rod raises at least 1/16" when shift lever is raised from neutral to return travel. (If centering rod does not raise, see Service Upper Housing.)
4. Insert tool holder and raise tool lock lever watching tool to see that it is cocking properly. (Should tool fail to cock, recheck for broken spring and dirt in tool holder slot.)
5. If tool holder fails to cock remove (4) cutter head screws and tap off cutter head. Leave tool holder in and press button checking that tool action is working properly. Be careful to replace head so that tool slot opening is under No. 1 centering finger slot.

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NCA MOTOR CARE and SERVICE

The NCA type boring bars are equipped with a constant speed, totally enclosed type ball bearing motor, with a thermal overload. Should the machine become jammed, the motor circuit will break, but should be turned off immediately, as it will attempt to start again after thermal overload cools. This overload will also stop motor if the continuous loading from a heavy cut tends to overheat the motor.

It is important that the motor be kept as clean as possible, particularly at the cooling vent intake and exhaust.

DISASSEMBLY and ASSEMBLY of NCA MOTOR HOUSING

(See Sections B-B, F-F and G-G)

Should it be necessary to remove the motor housing or lower gear pot from the bar, do so in the following manner:

1. If upper housing is still intact, remove the feed screw drive pin and unscrew feed screw shaft clear of motor drive shaft, as outlined on Page 7.
2. To remove motor simply remove 4 motor studs, which will allow you to lift motor stator assembly off of housing.
3. To remove rotor, carefully pry up with 2 screw drivers and rotor shaft with driving pinion gear will come out of gear box.

   If further disassembly is required, the manual feed housing (700-13-1) may now be removed from the base by removing 3 hex cap screws. The actuator screw assembly, 700-13, may also be removed by backing out hex actuator screw bearing, part #700-13-3,(see section G-G). It may be necessary, in taking this out to rotate screw shaft slightly to the right as bearing is removed. (The actuator screw bearing may be removed with no other motor disassembly if this should be required).

   To remove gearing in motor transmission, remove 4 round head screws holding bearing cap (part of 700-5 assembly.)

   Now, Micarta gear #700-22, with high speed gear 700-23, on micarta gear shaft 700-22 may be removed, and feed screw gear and shaft #700-24 may be removed.

   The ball bearing 700-11 and 700-15 snap ring may then be removed out of the 700-5 housing.

   In order to remove speed change tumbler assembly, (700-6), first remove 700-8-2 speed change retainer bushing. It may be necessary to rotate the speed change knob while removing this bushing.

   Now 700-8, speed change control shaft, may be removed by rotating counter-clockwise.

   Now the 700-6 speed change tumbler assembly may be removed after snap ring 700-7 is removed.

   This process may be reversed to reassemble this unit. Care must be taken to relubricate the shaft 700-24 between the gear housing bearings, before replacement and packing of grease in lower unit.

   Set screws may be reset to determine gear back lash of tumbler assembly on reassembly, as shown in section F-F.

   When reattaching gear housing 700-5 to base, care must be taken to align feed screw properly with upper housing. This may be checked by placing a flat plane across spindle and screw, making sure that it is in reasonably close contact at four corners.

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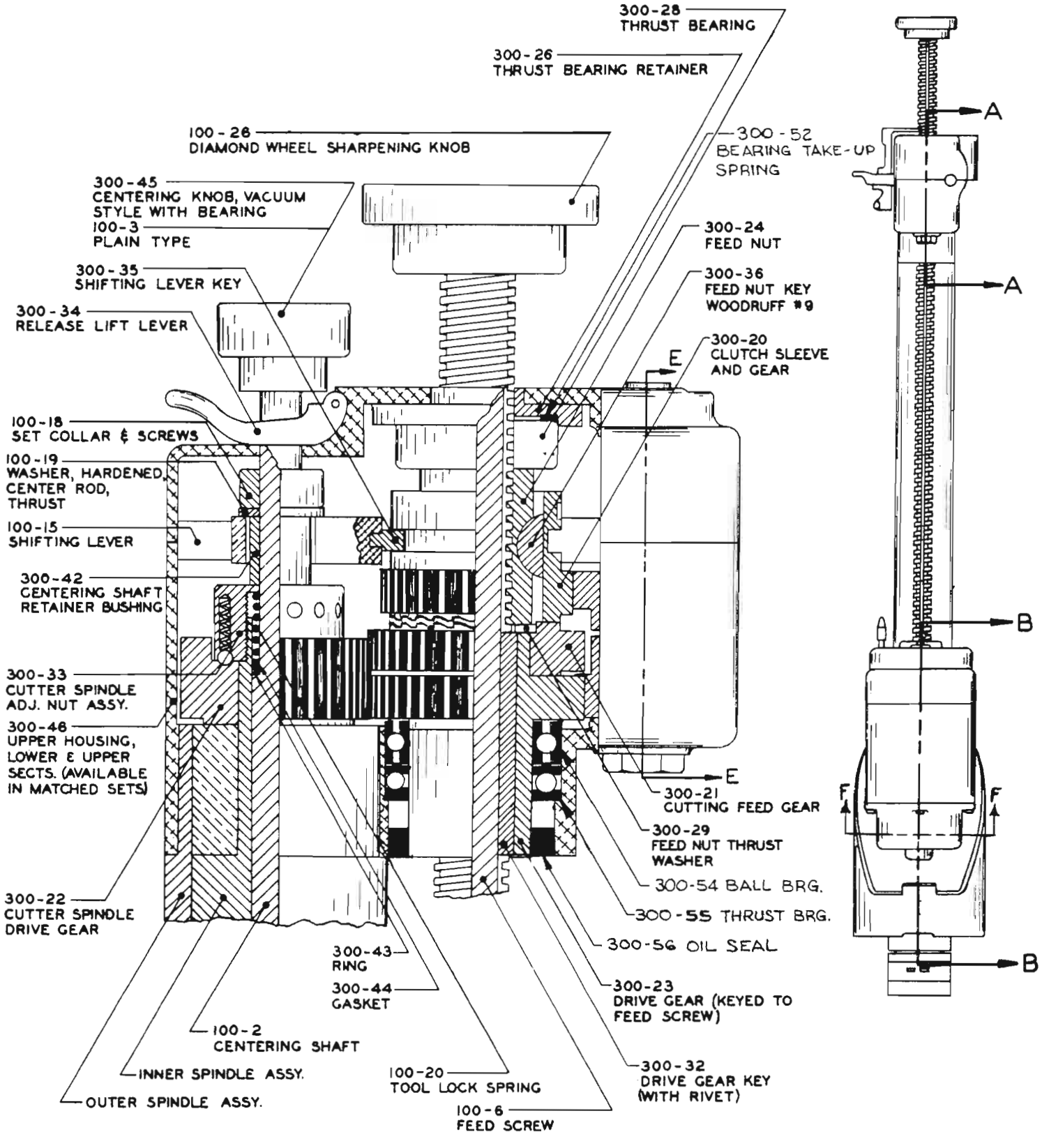
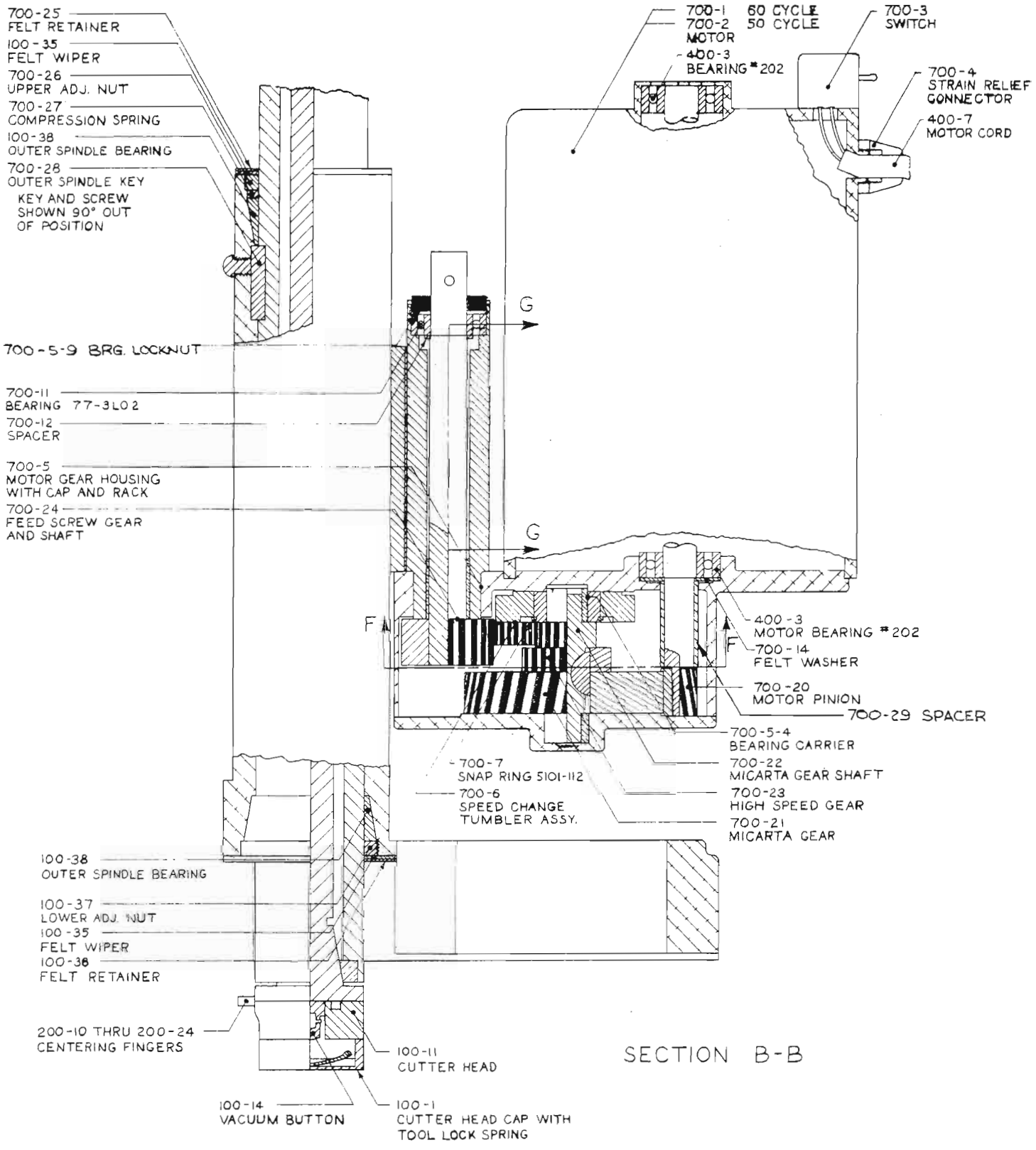


SECTION A-A

SHOWN IN NEUTRAL POSITION

IMPORTANT: To avoid shipping delays — always give Serial Number of Bar when ordering parts.



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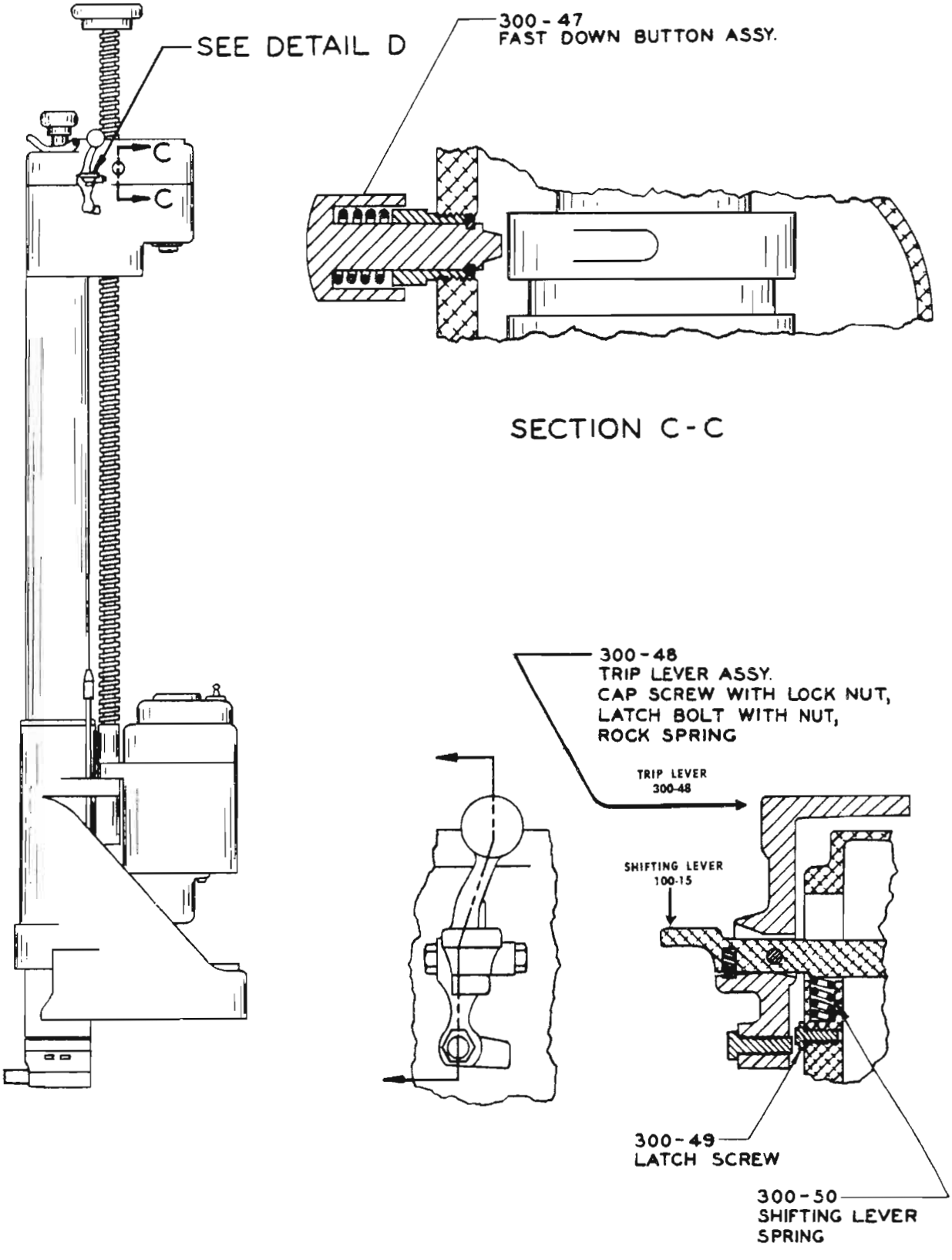
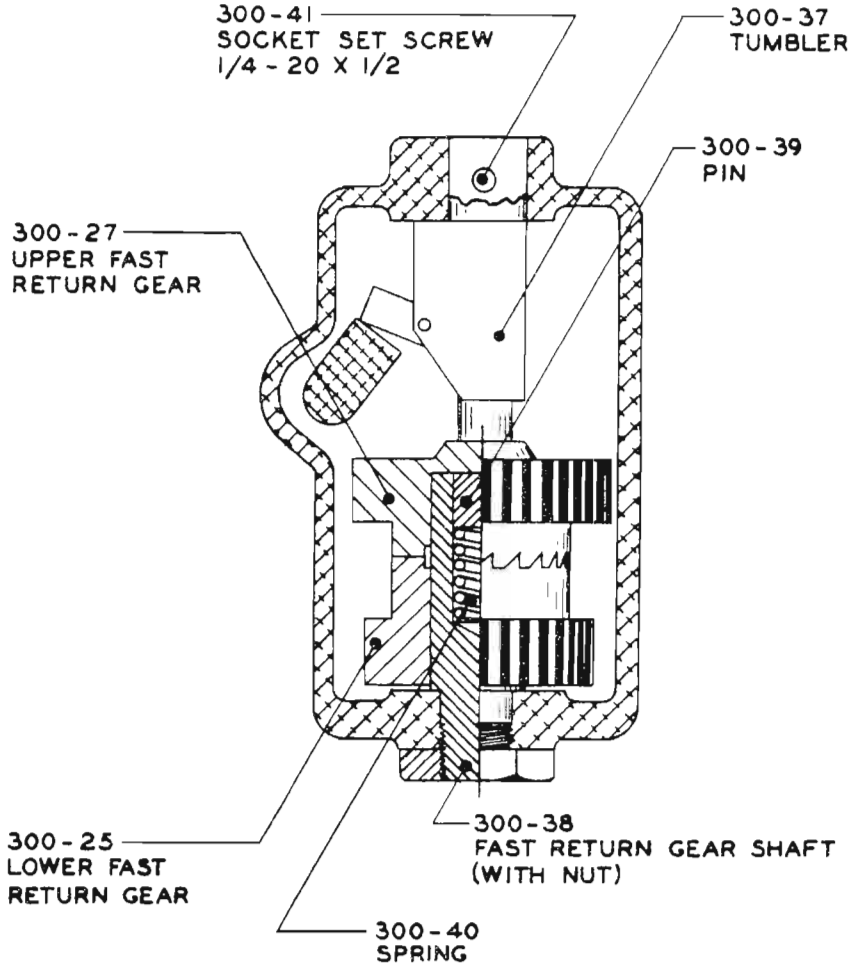


SECTION C - C

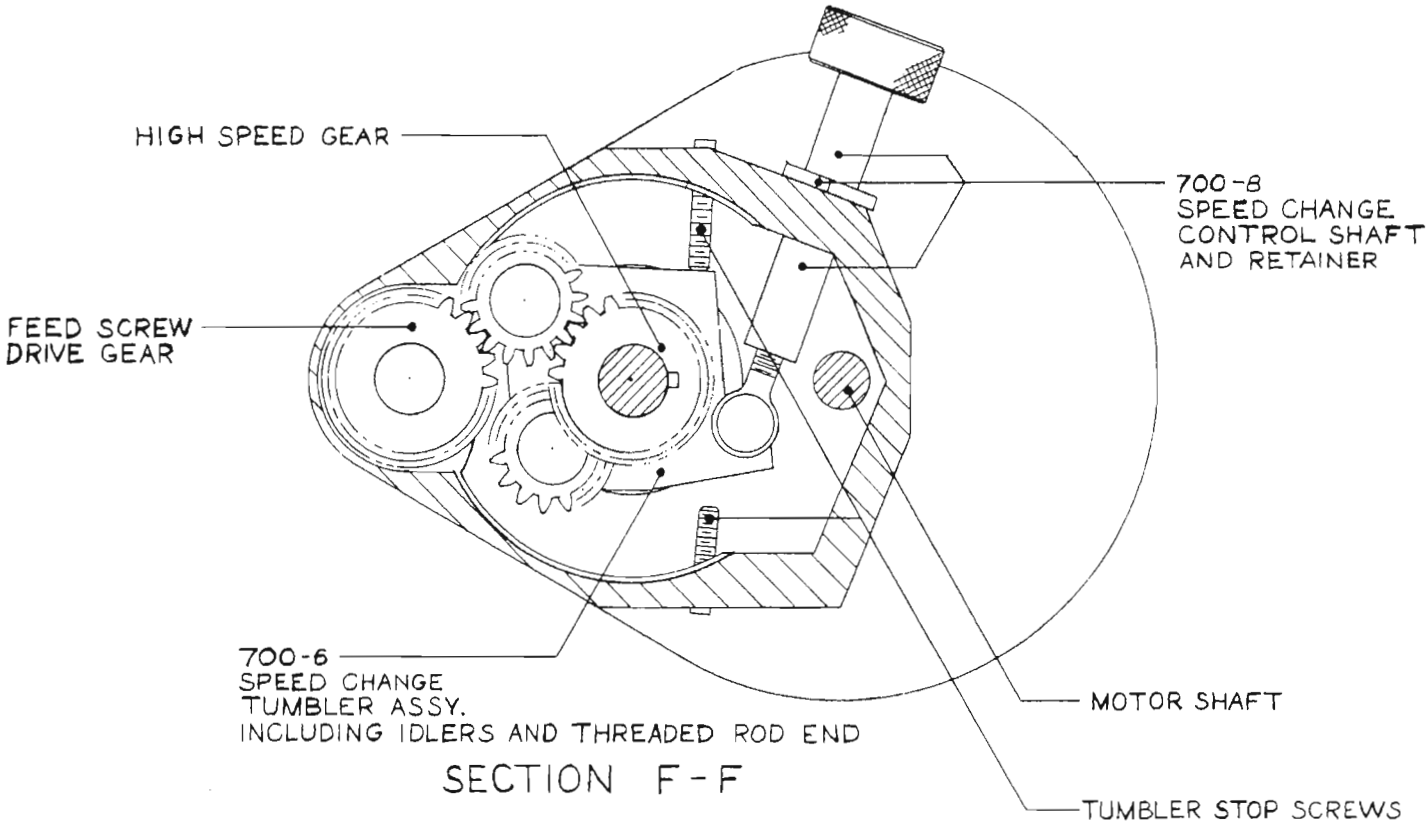
DETAIL D

IMPORTANT: To avoid shipping delays – always give Serial Number of Bar when ordering parts.

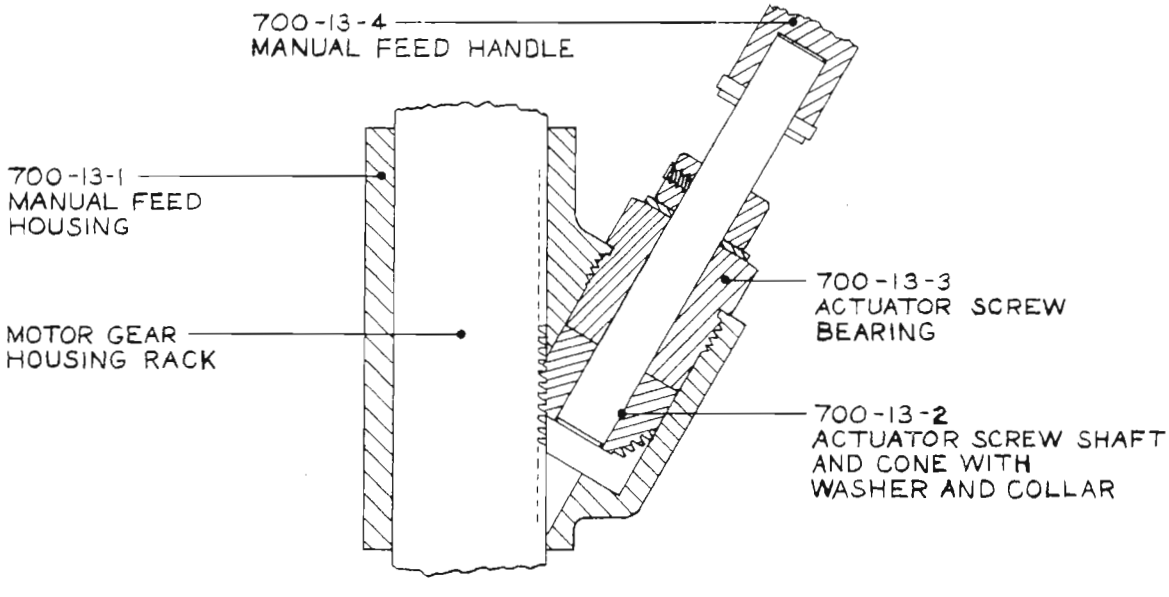


SECTION E-E
SHOWN IN RAPID
RETURN POSITION

IMPORTANT: To avoid shipping delays –
always give Serial Number of Bar when ordering parts.



SECTION F-F



SECTION G-G

IMPORTANT: To avoid shipping delays – always give Serial Number of Bar when ordering parts.