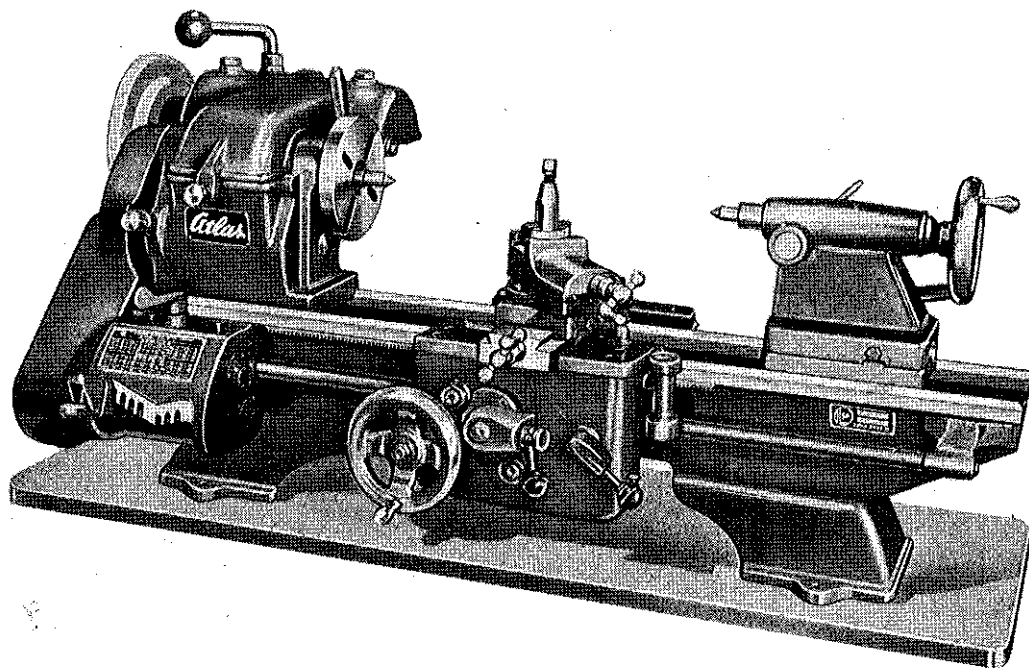




INSTRUCTIONS AND REPAIR PARTS

No. 4800 SERIES 12" LATHES



CLAUSING
DIVISION
ATLAS PRESS COMPANY
KALAMAZOO, MICHIGAN, U. S. A.

Do Not Operate The Lathe Until . . .

- it is properly mounted and leveled. Clousing lathes pass rigid inspection and operating tests before shipment - to maintain its built-in accuracy it must be properly installed.
- you are acquainted with the lathe and understand all the controls and their functions.
- you have oiled the lathe.
- you have carefully read all the instructions.

Then operate the lathe in back gear - get the "feel" of the controls - set up different threads and feeds - engage the power feeds - get acquainted with the lathe before starting a job - doing that will save time and produce better work.

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INSTRUCTIONS FOR ORDERING REPAIR PARTS

IMPORTANT: The following information must be furnished on all repair part orders:

1. Model Number and Serial Number of your lathe. This is found on the plate attached to the bed.
2. Part Number and Name of part.
3. Quantity required.

Parts shown coded are standard parts and should be purchased locally.

Parts price will be quoted on request.

We reserve the right to make changes in design and specifications without notice.

Instructions For Mounting and Leveling The Lathe

IT IS YOUR RESPONSIBILITY to properly level the lathe - it is the first essential for accurate work and long service life. Satisfactory performance is impossible if the lathe bed is out of level as little as one thousandth of an inch.

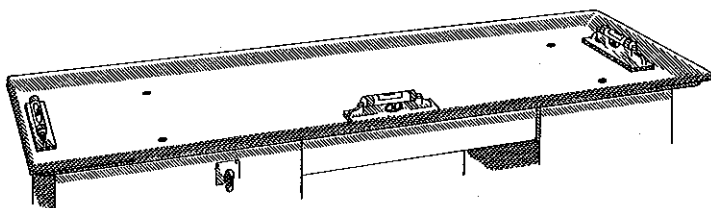
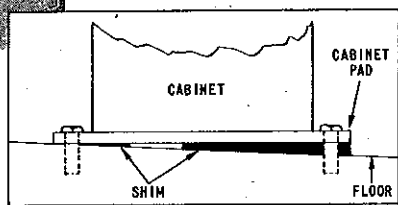
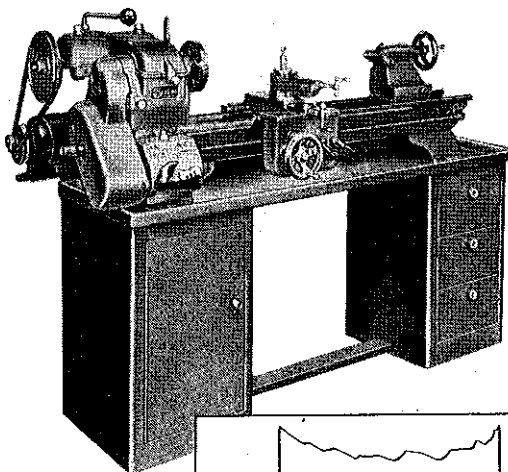
TO DO IT RIGHT-

- First bolt cabinet or bench to the floor
- Next level the cabinet or bench
- Then level the lathe

METAL CABINET INSTALLATION

1. Mount cabinet on a concrete floor or base whenever possible - if a wood floor is used, it should be well braced, capable of absorbing vibration and withstanding the load. Make sure cabinet rests solidly on the floor.

2. Fasten cabinet to concrete floor by marking location of mounting holes and drilling holes large enough to receive



1 (Above) Lathe mounted on steel cabinet. (Center) Use shims as shown to level cabinet. (Below) Positions for checking level readings on cabinet or bench top.

expansion bolts, or set studs or bolts in melted lead. Use lag screws or bolts to fasten cabinet to a wood floor.

Cabinet must be bolted to floor, otherwise vibration will result.

3. Level the cabinet - use a precision machinists level. Place shims as required between cabinet pads and floor, to accurately level the top. Shims should be of hardwood or metal and bear under at least 75% of the cabinet pad as shown in insert Figure 1.

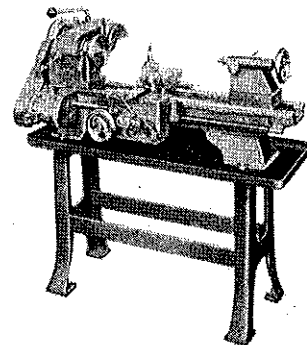
Don't use the lathe bedways to level the cabinet. Place level on cabinet top in the positions shown in sketch, Figure 1.

4. Loosen the four mounting bolts that hold lathe to cabinet. Lathe may now be leveled - see instructions on page 5.

BE SURE YOU HAVE FOLLOWED THESE INSTRUCTIONS COMPLETELY BEFORE LEVELING THE LATHE.

LATHE BENCH INSTALLATION

1. Mount bench on a concrete floor or base whenever possible - if a wood floor is used, it should be well braced, capable of absorbing vibration and withstanding the load. Make sure bench rests solidly on the floor.



2 Lathe mounted on lathe bench with chip pan

2. Fasten bench to concrete floor by marking location of mounting holes and drilling holes large enough to receive expansion bolts, or set studs or bolts in melted lead. Use lag screws or bolts to fasten bench to a wood floor.

3. Level the bench - use a precision machinists level. Place shims as required between bench legs and floor to accurately level the top.

4. Mount the lathe. Bolt lathe to bench using 3/8" dia. bolts - they may be inserted from either top or underneath side. Do not tighten bolts securely.

BE SURE YOU HAVE FOLLOWED THESE INSTRUCTIONS COMPLETELY BEFORE LEVELING THE LATHE.

WOOD BENCH REQUIREMENTS and INSTALLATION

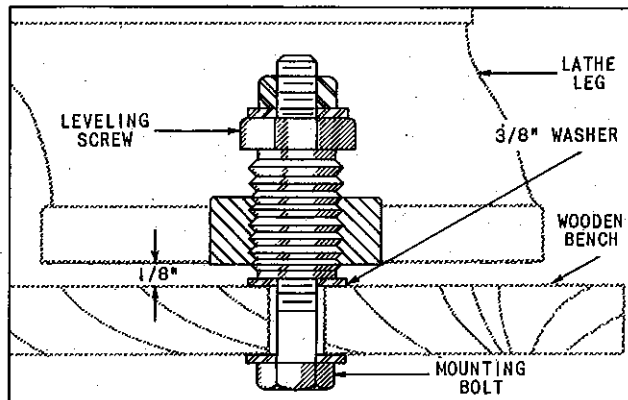
1. Bench top must be semi-hard or hard wood at least 1 5/8" thick, cleated or well doweled to form a rigid table. **DO NOT USE SOFTWOODS OR BOARDS NOT CLEATED TOGETHER.**

2. Legs should be of heavy construction - preferably 4" x 4" lumber, provided with lugs for bolting bench to floor. overall height of bench should be about 28".

3. Mount bench on a concrete floor or base if possible - if a wood floor is used, it should be well braced, capable of absorbing vibration and withstanding the load. Make sure stand rests solidly on the floor.

4. Fasten stand to concrete by marking location of mounting holes and drilling holes large enough to receive expansion bolts, or set studs or bolts in melted lead. Use lag screws or bolts to fasten bench to a wood floor.

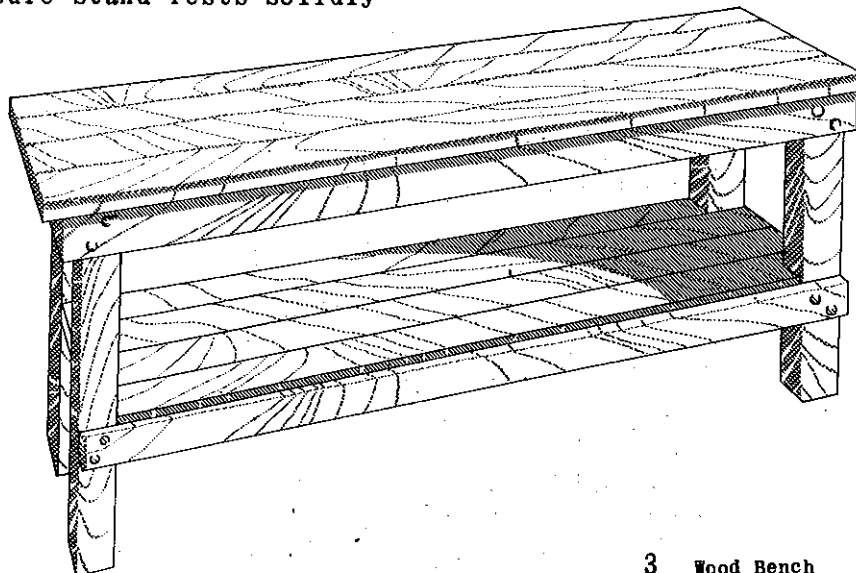
5. Level bench before mounting lathe - use a precision machinists level. Place shims as required between leg pads and floor to accurately level the top.



4 Make sure a metal washer is placed between leveling screw and top when using a wood bench.

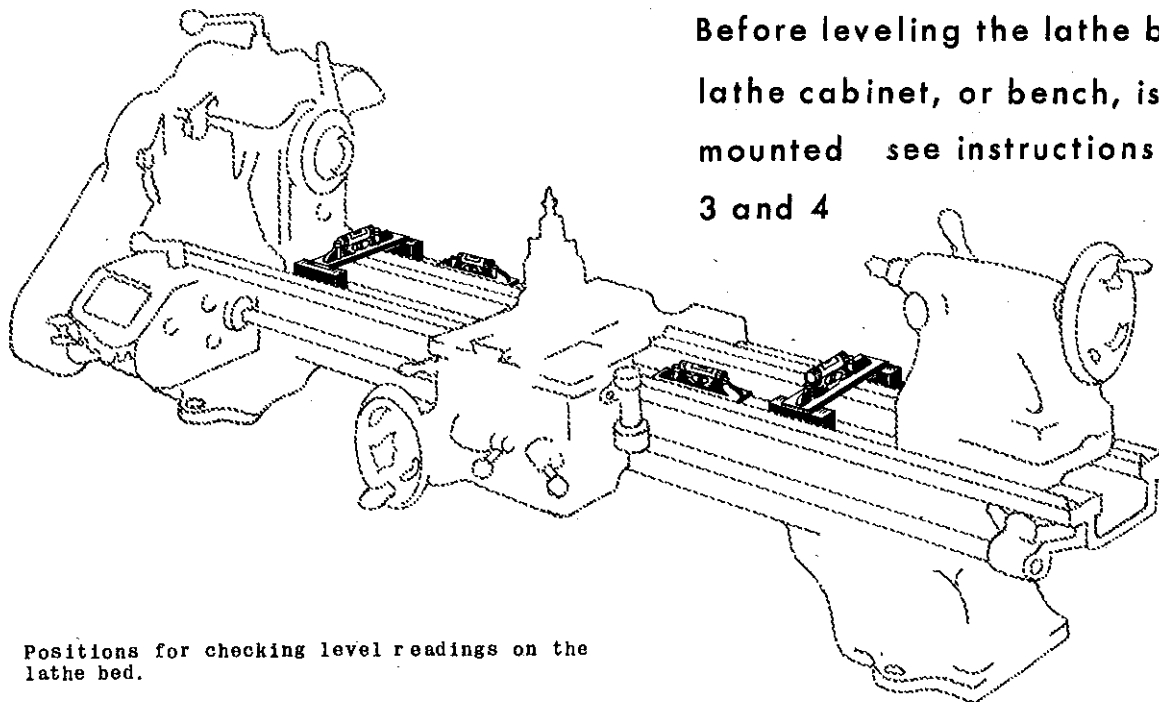
6. Mount the lathe. Mark and drill four 7/16" dia. holes in bench top under corresponding holes in lathe legs. Bolt lathe to top using 3/8" dia. bolts, placing a 5/16" washer between lathe leg and bench top - see Figure 4. Bolts may be inserted from either top or underneath side. Do not tighten bolts securely.

BE SURE YOU HAVE FOLLOWED THESE INSTRUCTIONS COMPLETELY BEFORE LEVELING THE LATHE.



3 Wood Bench

Before leveling the lathe be sure the lathe cabinet, or bench, is properly mounted - see instructions on pages 3 and 4



5 Positions for checking level readings on the lathe bed.

Leveling The Lathe

1. Screw down the four leveling screws, raising the lathe so that lathe legs at no point touch cabinet top - approximately $1/8''$ clearance is sufficient - see figure 6.

2. Use a precision machinists spirit level to level the lathe. A VERY SENSITIVE LEVEL SHOULD BE USED. Level should be at least 6" long and should show a distinct bubble movement when a $.003''$ shim is placed under one end of the level.

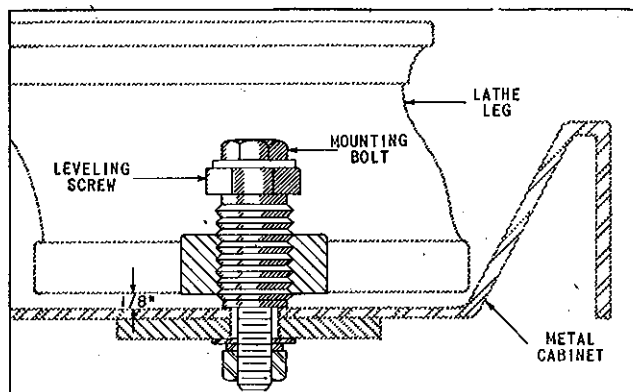
3. Both ends of the lathe bed - the headstock end and the tailstock end - should be checked with a level placed parallel and at right angles to the

lathe bed - see Figure 5. Check level readings at right angles to lathe bed with parallel bars or two metal blocks of exact equal thickness. Bars must be placed on the flat ways and must be wide enough to clear the V ways.

4. Level readings in the four positions must be identical. Compensate variations of bubble readings by turning the leveling screws until lathe is level - see Figure 6.

5. Now tighten the four mounting bolts securely.

6. Again check the level of the lathe with the level. Tightening the bolts may have pulled lathe bed out of level. If further adjustment is necessary, hold bolt head with wrench while adjusting leveling screws.

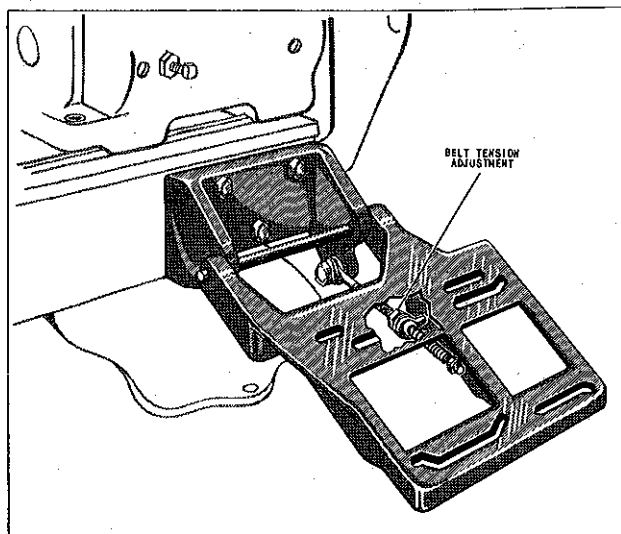


6 Illustration of leveling screw - the four screws furnished with lathe will quickly and accurately level the lathe.

CHECK THE LEVEL OF THE LATHE AT FREQUENT INTERVALS to assure accurate turning. If the lathe is not properly leveled, it will twist the bed resulting in misalignment of the headstock and tailstock with the ways, causing lathe to chatter - turn taper - uneven wear - bore taper - face convex or concave - ruin spindle bearings and make carriage bind.

MOUNTING THE MOTOR

1. Mount motor base assembly to the lathe bed with the three screws furnished.
2. Slide pulley on motor with large step next to motor.
3. Mount motor on motor base and fasten in place with the four bolts furnished.
4. Place belt over pulleys and shift motor until pulleys are aligned and belt is straight, then tighten motor mounting bolts.
5. Adjust spring to obtain proper belt tension - see Figure 7. Belt should be just tight enough to prevent slipping.



7 Motor base mounted to lathe bed. Adjust spring for proper belt tension.

Oiling The Lathe

Apron To fill oil reservoir in apron remove one of the screws that hold apron to carriage and use hole for supplying oil. Fill apron to level of oil cup on side of apron. Maintain this oil level at all times. Use S.A.E. No. 20 machine oil.

Use the lubrication chart furnished with the lathe as a guide for locating the oiling positions.

Gear Train Lubrication points can be reached through holes in guard. Fill oil cup on quadrant and on reverse handle - add oil daily. Oil holes on ends of reverse gear studs and sliding gear handle require daily lubrication. Fill zerk fitting monthly with a light grease for quadrant gear lubrication.

Gear Box Apply oil frequently thru oil cups on top of gear box for general lubrication of all moving parts. Gear Box bearings are sealed-for-life ball bearings and do not require lubrication.

Lubricate points in headstock and countershaft by raising hood.

Headstock Lubricate the spindle bearings thru the two oil cups on both ends of headstock. Lubricate back gear bearings thru oil hole in back gear shaft quill. To oil spindle pulley bearing, remove set screw in spindle drive pulley. Oil these bearings once a week.

Countershaft Lubricate the countershaft bearings once a week through oil holes in each bearing housing. Remove set screw in pulley to lubricate pulley bearings. Slip ring of clutch closer should be oiled weekly.

Other parts to oil occasionally are:

1. Right lead screw bearing
2. Tailstock ram
3. Tailstock Screw
4. Carriage handwheel shaft
5. Leadscrew
6. Carriage and compound dovetail ways
7. Lathe bed ways
8. Felt wipers on carriage saddle
9. Rim of threading dial.

KEEP YOUR LATHE CLEAN - Oil and dirt form an abrasive compound which can easily damage carefully fitted bearing surfaces. Wipe the bed and all polished parts with a clean oily rag at frequent intervals. Use a brush to clean spindle threads, gear teeth, lead screw threads, etc.

Maintenance and Controls

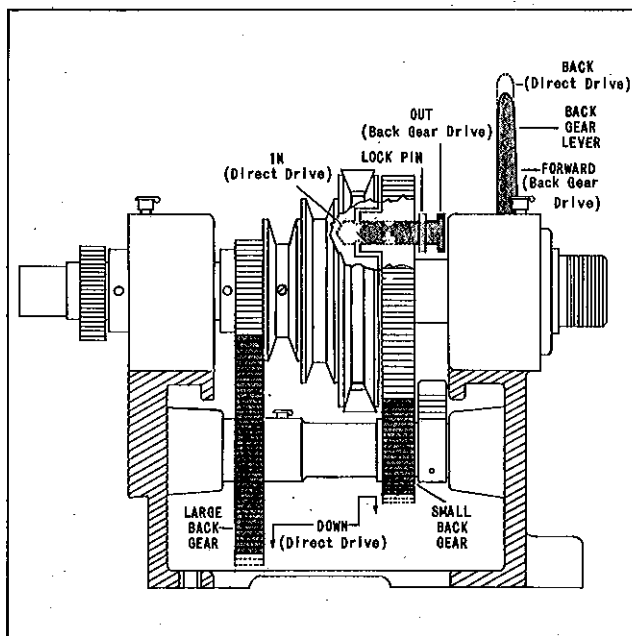
DO NOT OPERATE THE LATHE - until you are thoroughly familiar with all the controls and their functions (read carefully the instructions MAINTENANCE AND CONTROLS). Then operate the lathe in back gear - get the "feel" of the controls - set up different threads and feeds - engage the power feeds - get acquainted with the lathe before you start a job - it will save time and produce better work.

SPINDLE DRIVE, See Figure 8

FOR DIRECT DRIVE - turn pulley until lock pin can be reached and engage lock pin with the pulley, locking pulley to the bull gear and spindle. Place back gear lever in the disengaged position, or away from headstock. Lathe is now in direct drive.

FOR BACK GEAR DRIVE - pull out lock pin, disengaging bull gear from pulley. Shift back-gear lever to the forward position, meshing back gears with spindle gears - it may be necessary to rotate spindle pulley to mesh gears.

CAUTION - Always stop motor before changing from one drive to another.

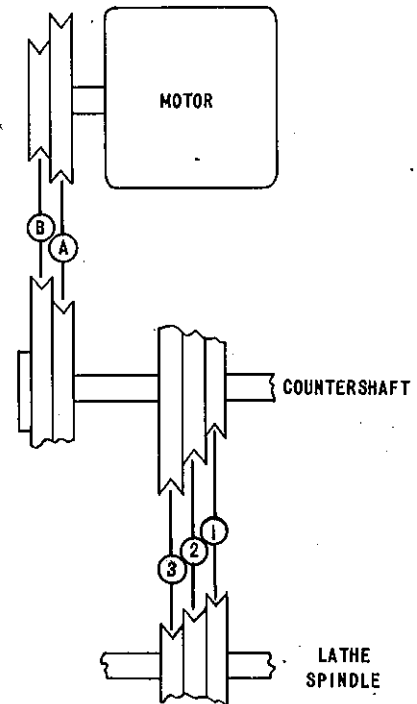


8 Position of back gears, lever and lock pin for spindle drive in "back gear" (shaded) and in "direct drive" (broken line).

LATHE COUNTERSHAFT

Countershaft has friction clutch and brake for instant starting and stopping the spindle without stopping the motor. Moving clutch lever to right engages spindle drive - to the left disengages it. Moving lever to extreme left tightens the brake band stopping the spindle.

Speed changes are made by raising the guard which slacks the drive belt for easy belt changes. The chart, Figure 9, lists the speeds available and shows how they are obtained.

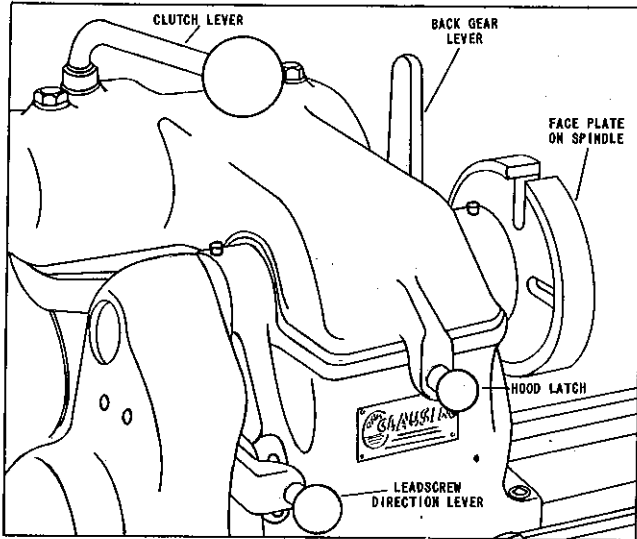


BACK GEAR DRIVE				DIRECT CONE DRIVE			
MOTOR BELT POSITION	SPINDLE BELT POS.			MOTOR BELT POSITION	SPINDLE BELT POS.		
	1	2	3		1	2	3
A	43	73	120	A	265	440	715
B	140	235	380	B	850	1400	2270

9 Spindle Speed Chart

FEED REVERSE LEVER

The feed reverse lever, or lead screw direction lever, is located on left side of headstock, Figure 10. Lever has three positions. Center position is neutral and disengages gear train. Upper position moves carriage toward tailstock. Lower position moves carriage toward headstock. This lever should not be moved while lathe is operating at high speeds - it may strip the gears or result in serious damage to the lathe. It is possible to quickly reverse lead screw at lower speeds if desired.



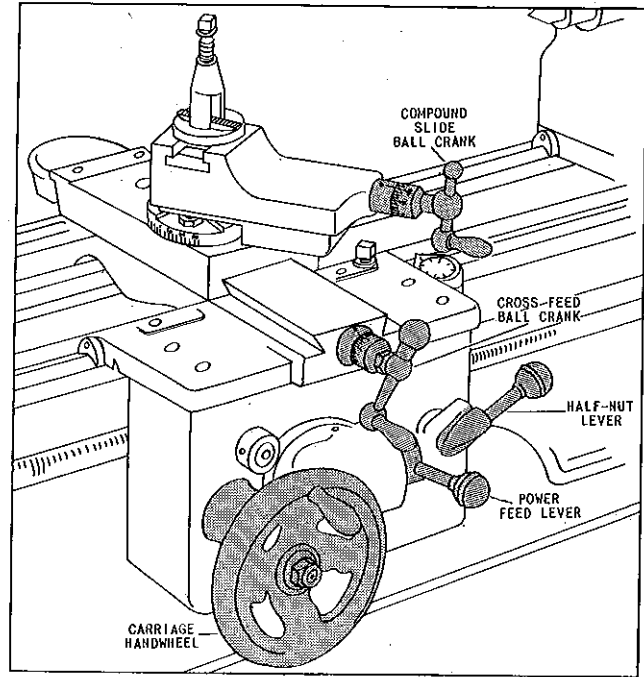
10 Lathe headstock showing location of feed reverse lever.

AUTOMATIC APRON

Figure 11 gives the names and positions of the carriage controls. The carriage handwheel moves the carriage along the

lathe bed. The cross feed and compound slide ball cranks move the carriage slide and tool rest in and out.

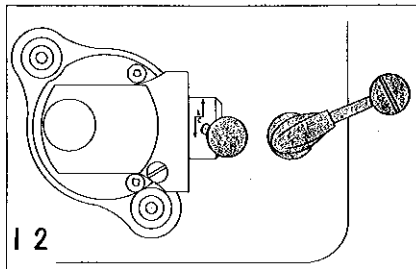
The carriage lock screw is used to lock the carriage to the bed - use it for facing or cut-off operations only.



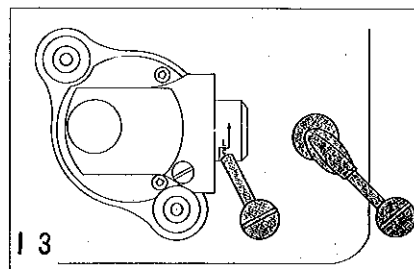
11 Controls on the lathe carriage

IMPORTANT - Use the half-nut lever for threading only - never for feeds. It will prolong the life of the lead screw, and preserve its accuracy for threading operations.

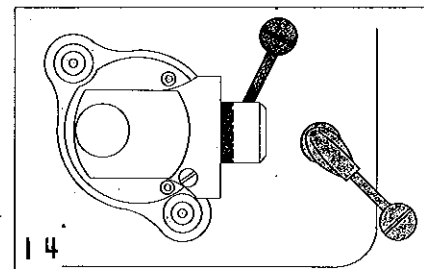
The power feed lever controls the operation of both power longitudinal and power cross feeds - the half-nut lever engages the half-nuts with the lead screw. When one of these levers is en-



THREADING - place feed lever at the horizontal position. Shift split-nut lever upwards to engage split-nuts with lead screw. Use the split-nuts for threading only - not for feeds.



POWER CROSS FEED - To engage power cross feed, place split-nut lever in the down position - the feed handle cannot be moved until split-nut lever is in this position. Move feed handle downward to the vertical position.



LONGITUDINAL FEED - To engage longitudinal feed, first make sure split-nut lever is in the down position. Shift feed lever sideways to the right about 1/4", and then upwards to the vertical position.

gaged, the other is locked and cannot be moved - DO NOT FORCE. The positions of the levers to obtain a thread or feed are illustrated in Figure 12, 13 and 14. The direction of feed is controlled by the reverse lever on front of headstock.

SELECTION OF THREADS AND FEEDS

Study the chart on the gear box - it lists the threads and feeds available and indicates the position of the controls for thread or feed desired. Figure 15 illustrates and names these controls.

NOTE: The gear chart shows only the carriage longitudinal feeds that are commonly used. Many other feeds can be obtained - these are shown in the table, Figure 16, along with the cross feeds available. To obtain one of these longitudinal or cross feeds, set up the lathe gear box for the equivalent thread as shown in the table. FOR EXAMPLE - To obtain a carriage longitudinal feed of .0033", set up the controls to cut 44 threads.

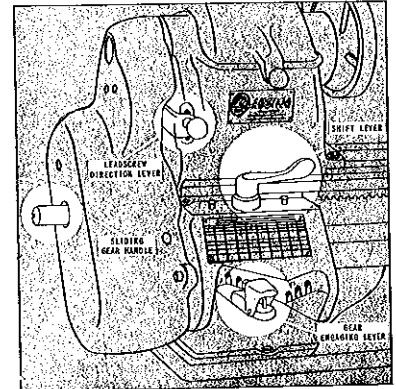
Sequence of engaging controls for threads or feed are outlined below:

1. Disengage the carriage feed controls
3. Move sliding gear handle "In" or "Out" as indicated on chart for thread or feed desired.
3. Release and lower gear engaging lever.
4. To make sure gears in the quick-change gear box will engage, first start motor. Now move gear engaging lever to the slot directly below thread or feed desired. Raise lever and snap plunger into position.
5. Next, check the chart for position of the shift lever. There are three positions - center, left and right. Shift the lever to position indicated on chart. (It may take a few seconds for the dog gears to engage if lathe is in back gear or turning slowly.) Lathe is now ready to cut thread or feed.

The threading dial is used in thread cutting and indicates the proper time to engage the half-nut lever so that

the cutting tool will enter the same groove of the thread for each cut.

When cutting even numbered threads engage the half-nut lever at any one of the markings on the threading dial for each cut of the thread. When cutting odd numbered threads, engage the half-nut lever for the first cut and all successive cuts at either the 1 or 2 positions on the dial. When cutting half-numbered threads, engage the half-nut lever at the same mark on the threading dial for each cut of the thread.



15 Name and location of controls used to obtain a thread or feed.

CARRIAGE FEED CHART

Thds. Per Inch	Carriage Long Feed	Thds. Per Inch	Thds. Per Inch	Carriage Long Feed	Thds. Per Inch
4	.0367	.00917	32	.0046	.0011
4.5	.0326	.0081	36	.0041	.0010
5	.0293	.0073	40	.0036	.0009
5.5	.0267	.0066	44	.0033	.0008
5.75	.0255	.0063	46	.0031	.00079
6	.0244	.0061	48	.0030	.00076
6.5	.0226	.0056	52	.0028	.00070
7	.0209	.0052	56	.0026	.00065
8	.0183	.0045	64	.0022	.00057
9	.0163	.0040	72	.0020	.00052
10	.0147	.0036	80	.0018	.00045
11	.0134	.0033	88	.0017	.00041
11.5	.0127	.0032	92	.0016	.00039
12	.0122	.0030	96	.0015	.00038
13	.0113	.0028	104	.0014	.00035
14	.0105	.0026	112	.0013	.000325
16	.0092	.0023	128	.0011	.00027
18	.0081	.0020	144	.00094	.000235
20	.0073	.0018	160	.00092	.000225
22	.0066	.00166	176	.00083	.00020
23	.0063	.00159	184	.00079	.000197
24	.0061	.00152	192	.00076	.000190
26	.0056	.0014	208	.00070	.000175
28	.0052	.0013	224	.00065	.00016

16 Chart listing available threads per inch with equivalent carriage, longitudinal and power cross feeds.

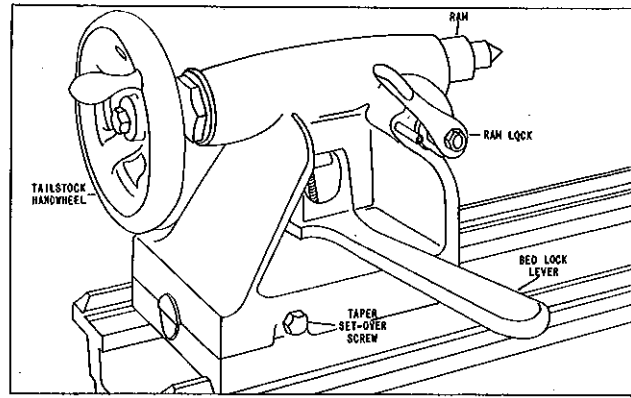
TAILSTOCK

Tailstock is securely locked to the bed with the lever-controlled bed lock located on the rear of the tailstock. Graduations on the ram simplify accurate boring and drilling. Ram is locked in place with the lock handle located on top of tailstock. Before inserting the center in the tailstock ram, clean both tapers thoroughly with a dry cloth.

Tailstock can be set over 1" for taper turning, by first loosening the bed clamp and then adjusting the screws on front and back of tailstock base.

MOUNTING CHUCKS AND FACE PLATES

1. Carefully wipe face of chuck hub and threads (or face plate) clean of dirt and chips.
2. Carefully wipe spindle threads and shoulder clean of any dirt and chips.
3. Oil lathe spindle threads with a light film of clean oil - chuck or face plate will thread more freely on spindle.
4. Tighten belt, or place lathe in back gear to hold spindle firmly in position.
5. Screw chuck or face plate on spindle, turning it rapidly as it nears spindle shoulder so it will seat firmly against spindle shoulder face. Make sure threads are not crossed - chuck or face plate should thread on spindle easily.



17 Controls on the lathe tailstock.

TO REMOVE CHUCK OR FACE PLATE

1. To remove chuck, rotate chuck until wrench hole is on top. Lock spindle by engaging back gears without pulling out lock pin. Now place chuck wrench in chuck and pull. If chuck doesn't release, tap **BASE OF WRENCH** lightly with a mallet. Remove chuck carefully so as not to damage spindle threads.
2. To remove face plate, lock spindle by engaging back gears without pulling out lock pin, tap slot in face plate with a lead or brass hammer in a counterclockwise direction. Remove face plate carefully so as not to damage spindle threads.
3. Disengage back gears.

CAUTION - Do not turn power on with the spindle locked - never remove chuck or face plate while lathe is running.

Adjustments

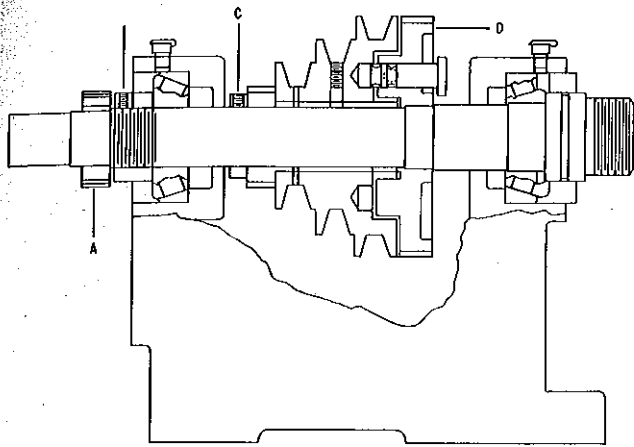
SPINDLE BEARING ADJUSTMENT

If the spindle turns too freely, or if play is noticeable when spindle is pushed back and forth, adjust the bearings as follows:

1. Loosen lock screw in take-up collar "B" (Figure 18) and tighten collar until all spindle play has been removed.

CAUTION - Do not tighten collar too tightly - spindle should rotate freely.

2. Now advance take-up collar about 1/16" to provide correct bearing pre-load.
3. Tighten lock screw in collar "B".



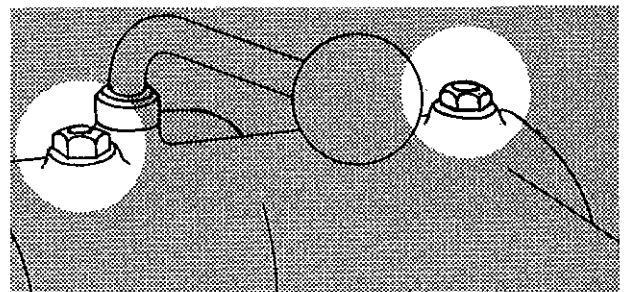
18 Spindle bearing adjustment locations.

HOW TO REMOVE HEADSTOCK SPINDLE

1. Remove gear train guard.
2. Lower the gear quadrant by loosening the lock screw at bottom of quadrant and remove screw that holds top end of quadrant to headstock.
3. Slide feed reverse lever assembly from headstock to prevent possible damage to the gears when spindle is being removed.
4. Remove spindle gear "A" from spindle by tapping gear with a block of wood and hammer until there's enough clearance between gear and take-up collar to use a pulley puller to remove gear.
5. Remove key from spindle with pliers.
6. Loosen lock screw in take-up collar "B" and remove collar by turning counterclockwise.
7. Loosen set screw in collar "C".
8. Wedge two pieces of wood between headstock and large spindle gear "D" on both sides of spindle. Then, with a wood hammer drive spindle out of the headstock. Remove the rear spindle bearing cone when it is released from the spindle.
9. Remove belt from countershaft by removing the two hanger holt nuts located on top of countershaft hood, see Figure 19, at the same time hold the countershaft spindle assembly to prevent its falling.

RE-ASSEMBLY

1. Lightly file all burrs, if any, from the spindle.
2. Clean all parts thoroughly, including the bearings.
3. Place new belt, or bearings, in position and replace spindle. *CAUTION - Use the palm of the hand as much as possible when replacing the spindle - it will avoid damaging the precision surfaces of the spindle nose. Slide large spindle gear against the spindle shoulder. Then slide on the pulley until pulley bushing is against the gear.*
4. Tighten collar "C" against small gear with just enough clearance to permit pulley to turn freely but with no play.
5. Carefully tap rear spindle bearing cone in place using a brass rod and hammer.
6. Replace take-up collar "B" and tighten until all play has been removed from the spindle - check by tapping spindle back and forth with the hand. Do not tighten collar too tightly - spindle should rotate freely. Advance take-up collar about 1/16" to provide correct bearing pre-load. Now tighten set screw.
7. Replace Woodruff key and spindle gear.



19 Remove these two nuts to disassemble countershaft and remove belt.

HOW TO REMOVE BACKGEARS

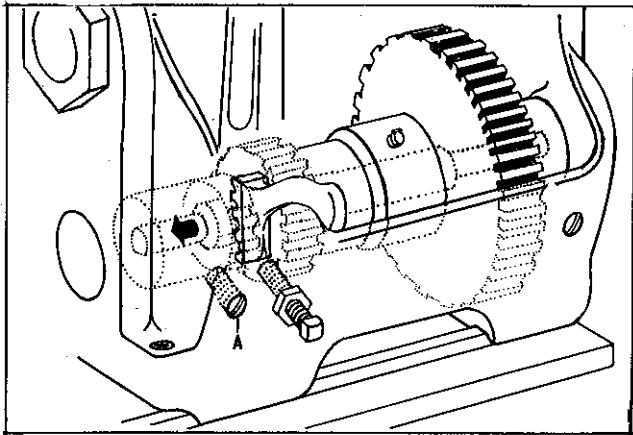
1. Remove headstock spindle - see instructions "HOW TO REMOVE HEADSTOCK SPINDLE", above.

(Continued on Page 12)

2. Loosen lock screw "A", see Figure 20.

3. Now drive out back gear shaft in the direction indicated by the arrow, Figure 20.

4. Remove back gears from the headstock.



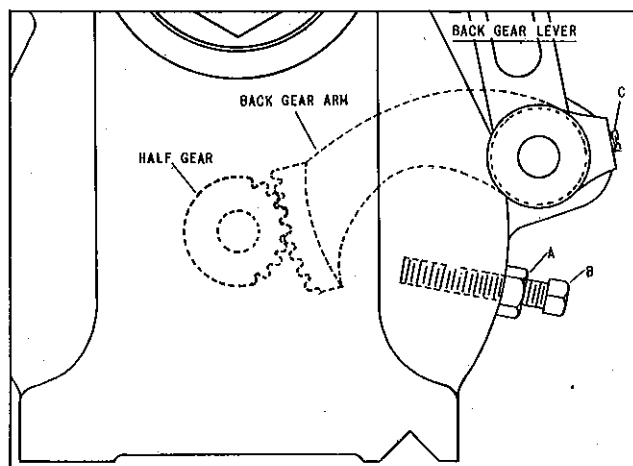
20 Adjusting and removing spindle back gears.

RE-ASSEMBLING THE BACKGEARS

1. Move back gear lever to the forward, or back gear drive position.

2. Place back gears in headstock and replace back gear shaft. The teeth of the half gear on the shaft must slip into mesh with the teeth on the back gear arm in only one position - see Figure 21. This is necessary so that the full travel of the back gears is obtained.

3. Replace sleeve and plug. Lock sleeve in position with lock screw "A", Figure 20.



21 Correct mesh of back gear arm with half gear and location of adjustment nuts.

BACKGEAR ADJUSTMENTS

TO ADJUST GEAR MESH, or gear play, between back gears and spindle gears; first place back gear lever in the forward position. Then loosen lock nut "A", Figure 21, and turn adjusting screw "B" until gears properly mesh. Tighten lock nut "A".

TO PREVENT GEARS FROM JUMPING OUT OF MESH tighten screw "C", see Figure 21,

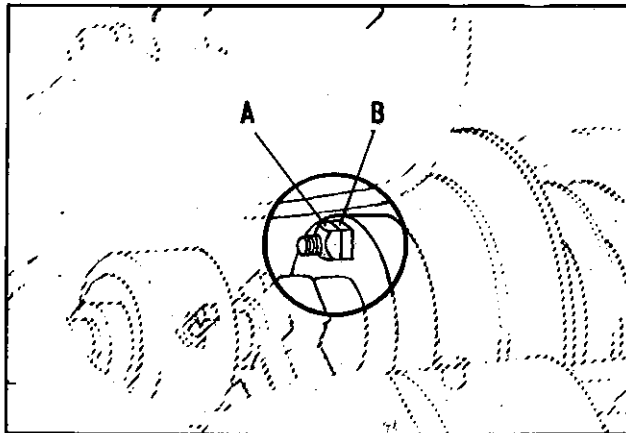
CLUTCH COUNTERSHAFT ADJUSTMENT

If the countershaft clutch slips when the spindle drive is engaged, adjust as follows:

1. Loosen lock nut "A", see Figure 22.

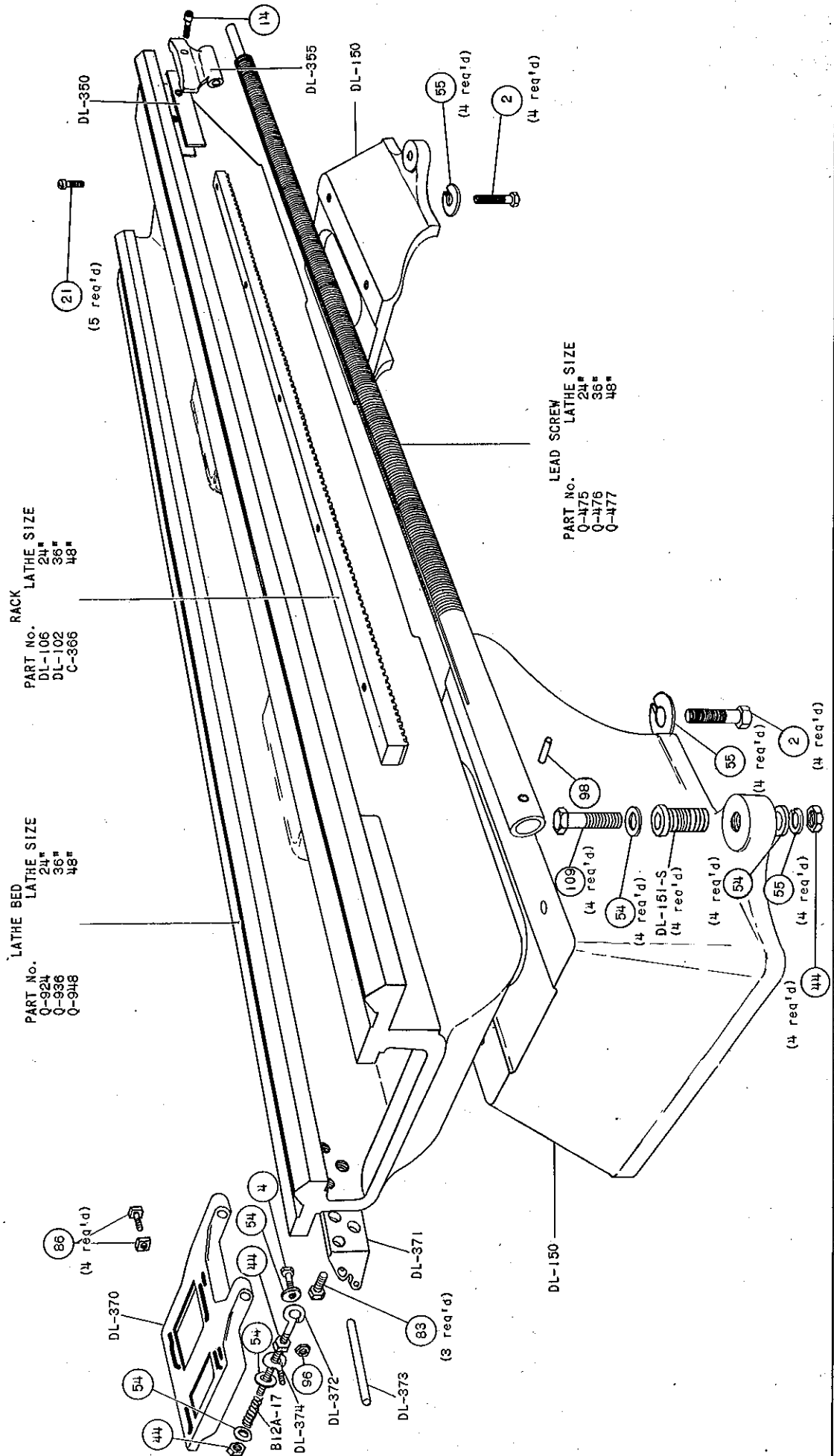
2. Tighten adjusting nut "B" just enough to take up slippage. **IMPORTANT:** Do not tighten nut too tight - spindle drive will not disengage when clutch lever is moved to the left if nut is too tight.

3. Tighten lock nut "A".

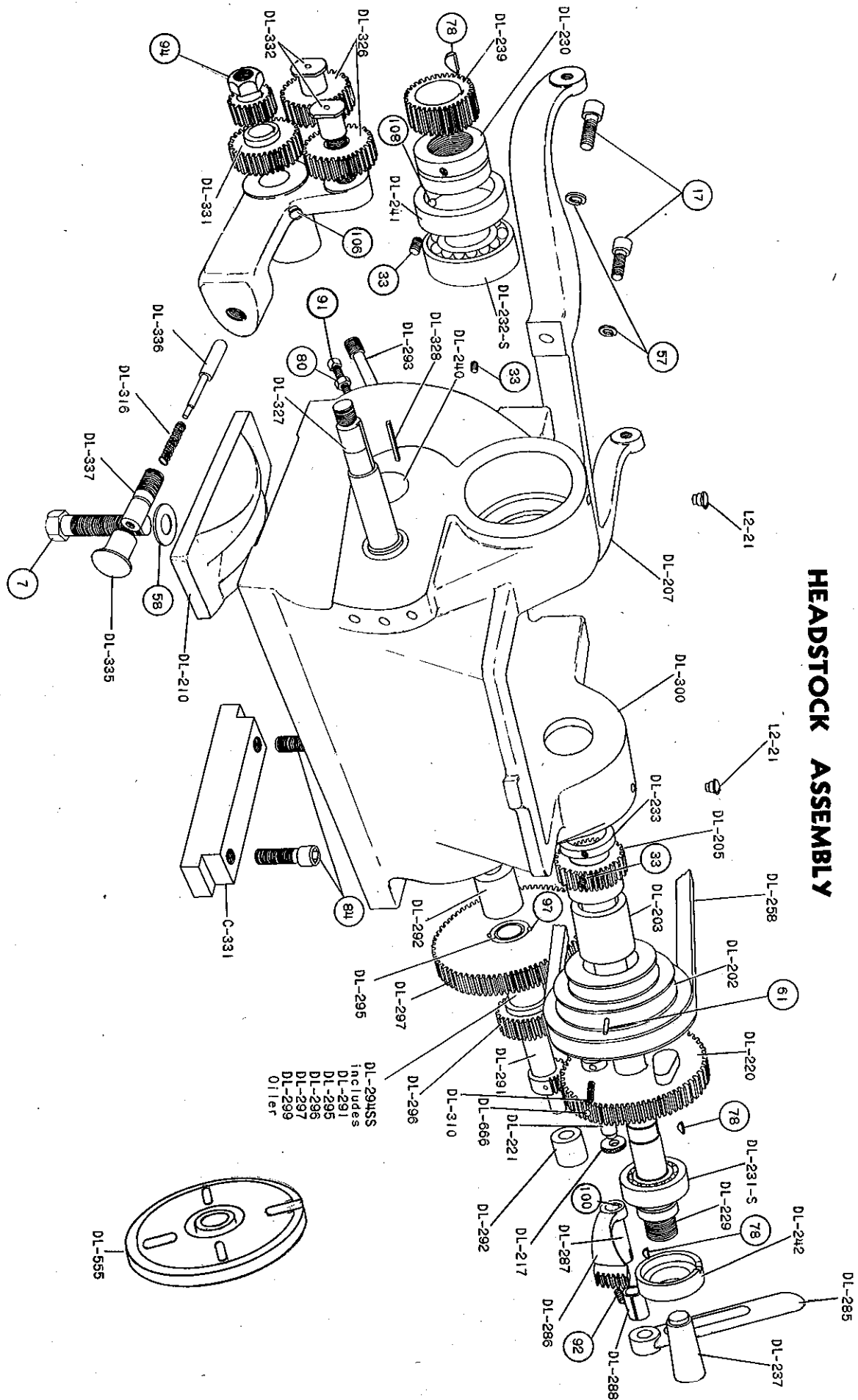


22 Location of lock nut and adjusting nut on clutch countershaft.

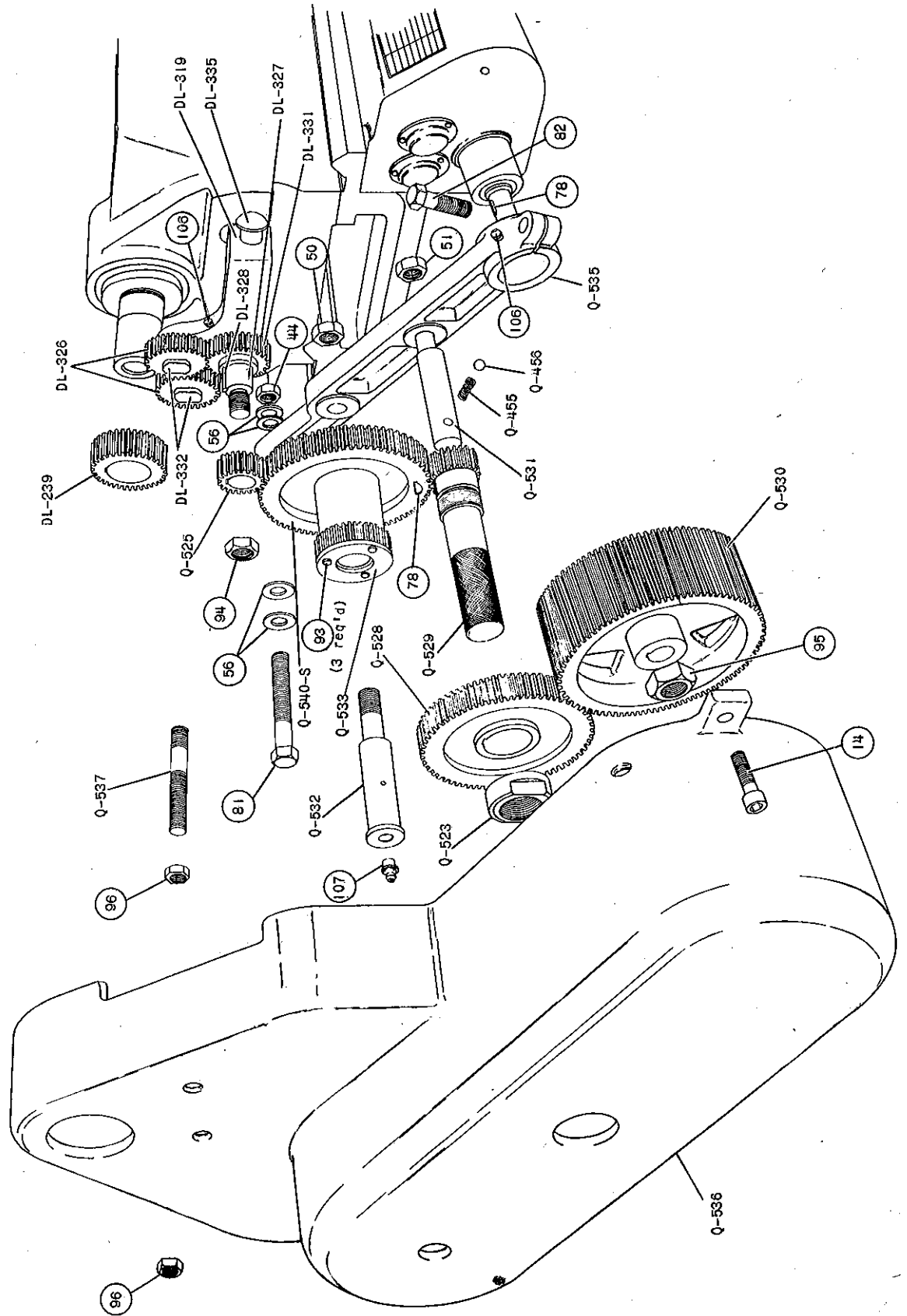
BED AND LEADSCREW ASSEMBLY



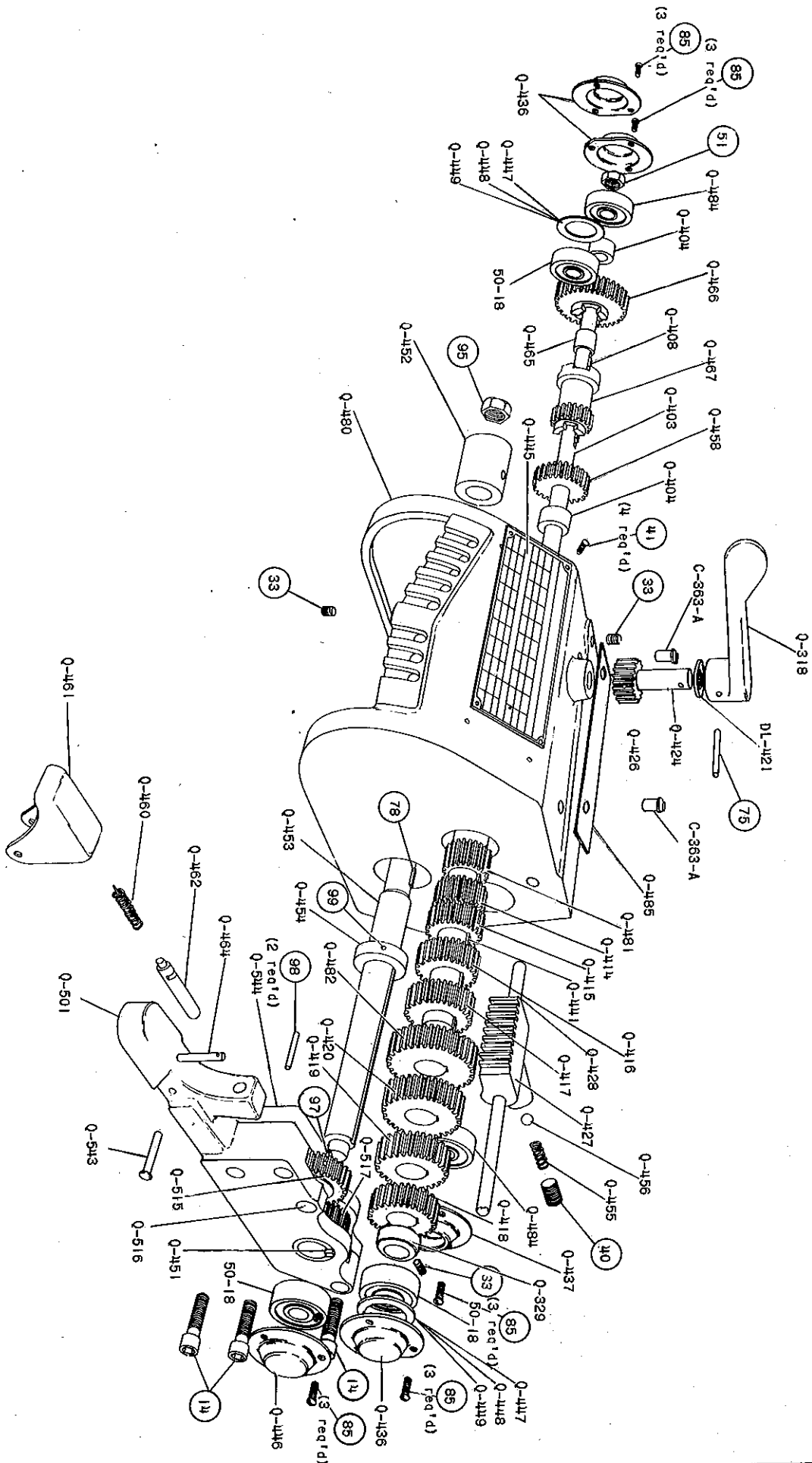
HEADSTOCK ASSEMBLY



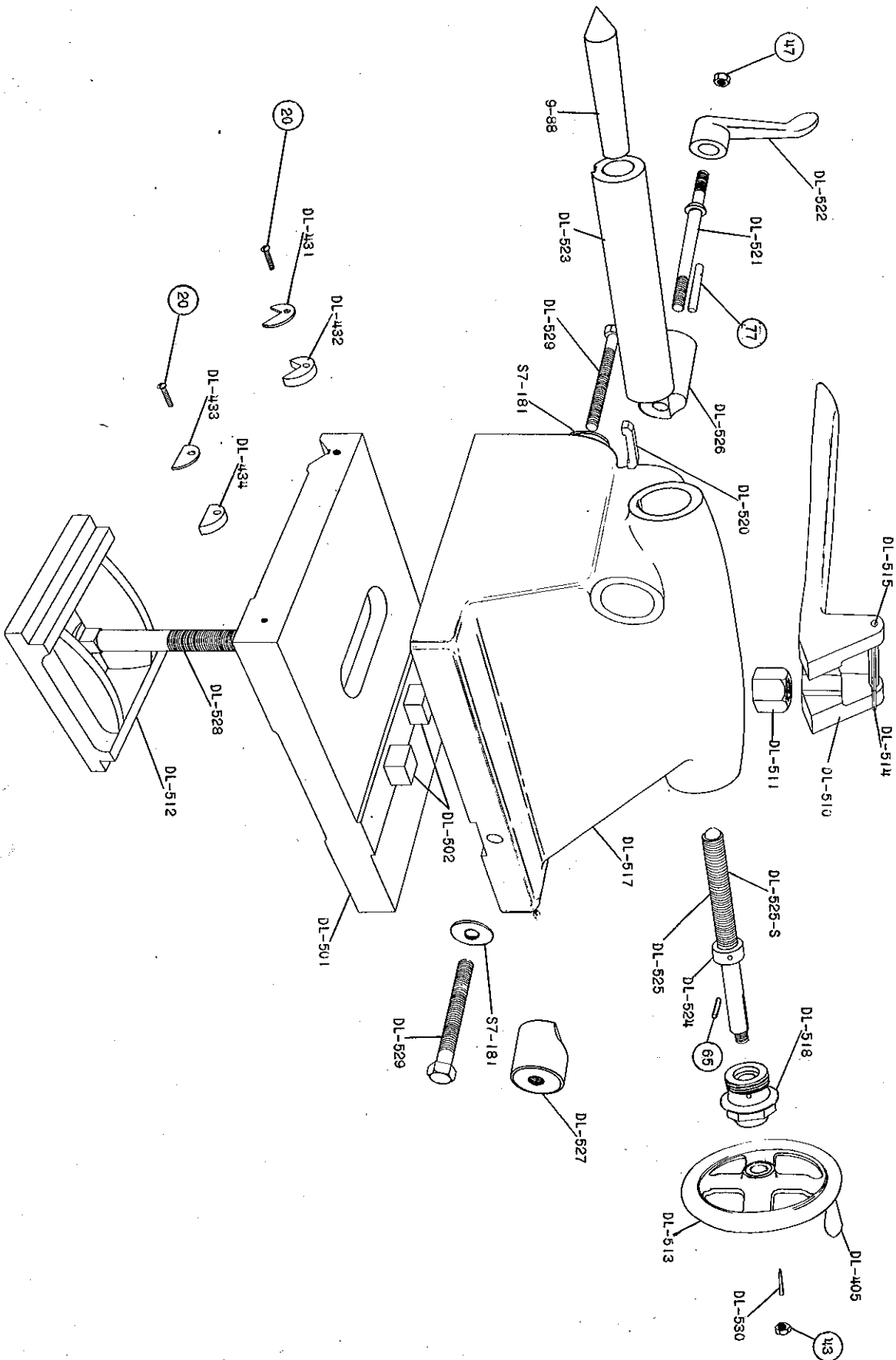
QUICK CHANGE GEAR TRAIN



GEAR BOX ASSEMBLY



TAILSTOCK ASSEMBLY



NUMERICAL PARTS LIST

For No. 4800 SERIES 12-inch LATHES

ORDER NG INFORMATION

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2	5/16"-18 x 1 1/4" Hex Cap Screw	56	3/8"- Plain Washers
3	5/16"-18 x 1 1/2" Hex Cap Screw	57	3/8"- Lock Washers
4	3/8"-16 x 1 1/4" Hex Cap Screw	58	1/2"- Plain Washers
5	3/8"-16 x 1 3/4" Hex Cap Screw	59	5/8"- Lock Washers
6	1/2"-13 x 1 3/4" Hex Cap Screw	60	3/32" x 3/4" Cotter Pin
7	1/2"-13 x 2" Hex Cap Screw	61	1/8" x 3/8" Groov Pins, T-1
8	No. 10-32 x 3/8" Allen Cap Screw	63	1/8" x 1/2" Groov Pins, T-4
9	No. 10-24 x 1/2" Allen Cap Screw	64	1/8" x 1/2" Groov Pins, T-6
10	1/4"-20 x 7/16" Allen Cap Screw	65	1/8" x 3/4" Groov Pins, T-5
11	1/4"-20 x 3/4" Allen Cap Screw	67	1/8" x 1" Groov Pins, T-1
12	5/16"-18 x 3/4" Allen Cap Screw	68	3/16" x 5/8" Groov Pins, T-1
13	5/16"-18 x 7/8" Allen Cap Screw	69	1/4" x 3/4" Groov Pins, T-2
14	5/16"-18 x 1" Allen Cap Screw	70	1/4" x 7/8 Groov Pins, T-1
15	5/16"-18 x 1 1/4" Allen Cap Screw	71	1/4" x 1 1/4" Groov Pins, T-1
16	3/8"-16 x 3/4" Allen Cap Screw	72	1/4" x 1 1/2" Groov Pins
17	3/8"-16 x 1" Allen Cap Screw	73	3/8" x 3/4" Groov Pins, T-4
18	3/8"-16 x 1 5/8" Allen Cap Screw	75	1/8" x 1/2" Roll Pin
19	5/16"-18 x 7/8" Fill. Cap Screw	76	1/4" x 1 1/2" Roll Pin
20	No. 8 - 32 x 1/2" Rd.Hd.Mach. Screw	77	1/4" x 1 3/4" Roll Pin
21	No.10 - 24 x 1/2" Fill.Hd.Mach.Scr.	78	No.3 (1/8" x 1/2") Woodruff Key
24	No.10 - 24 x 1/2" Flat Hd.Mach.Scr.	79	No.61 (3/16" x 5/8") Woodruff Key
25	1/4"-20 x 1/2" Flat Hd.Mach.Screw	80	3/8"-16 x 1/2" Hex Cap Screw
27	5/16"-18 x 1 1/4" Carriage Bolt	81	3/8"-16 x 2 1/4" Hex Cap Screw
28	No. 10-24 x 3/16" Hdless Set Screw	82	7/16"-14 x 2" Hex Cap Screw
29	1/4"-20 x 1/2" Hdless Set Screw	83	1/2"-13 x 1 1/4" Hex Cap Screw
30	1/4"-20 x 3/4" Hdless Set Screw	84	3/8"-16 x 1 1/2" Allen Cap Screw
31	5/16"-18 x 1/2" Hdless Set Screw	85	No.10-24 x 3/8" Rd.Hd.Mach.Scr.
32	3/8"-16 x 1 1/4" Sq.Hd.Set Screw	86	5/16"-18 x 1 3/4" Sq.Hd.Mach.Bolt
33	1/4"-20 x 1/4" Allen Set Screw	87	3/8"-16 x 3" Sq.Hd.Mach.Bolt
34	1/4"-20 x 5/16" Allen Set Screw	89	5/16"-18 x 1" Sq.Hd. Set Screw
35	1/4"-20 x 1 5/16" Allen Set Scr.	91	5/16"-18 x 1 3/4" Sq.Hd. Set Screw
36	5/16"-18 x 1/4" Allen Set Screw	92	5/16"-18 x 3/4" Allen Set Screw
37	5/16"-18 x 5/16" Allen Set Screw	93	No.6 x 5/16" Parker-Kalon Dr. Scr.
38	5/16"-18 x 3/8" Allen Set Screw	94	1/2"-13 Hex Nut
39	5/16"-18 x 1/2" Allen Set Screw	95	5/8"-18 Hex Nut
40	3/8"-16 x 1/2" Allen Set Screw	96	3/8"-16 Jam Nut
41	No.2 x 3/16" Parker-Kalon Dr. Scr.	97	1/8" x 1/2" Groov Pin
43	5/16"-18 Hex Nuts	98	1/8" x 7/8" Groov Pin
44	3/8"-16 Hex Nuts	99	1/8" x 1 1/4" Groov Pin
45	3/8"-24 Hex Nuts	100	3/16" x 1/2" Groov Pin
46	1/4"-20 Jam Nut	102	1/4" x 5/8" Groov Pin
47	5/16"-18 Jam Nut	103	5/16" x 1 3/4" Groov Pin
48	7/16"-14 Jam Nut	104	3/32" x 1/4" Roll Pin
49	3/8"-24 Jam Nut	105	3/32" x 5/16" Roll Pin
50	1/2"-13 Jam Nut	106	1/4" Oiler
51	1/2"-20 Jam Nut	107	5/16" Zerk
52	5/8"-18 Jam Nut	108	BB Lead Shot (.180 dia)
53	5/16"-18 Sq. Nuts	109	3/8"-16 x 2 1/2" Hex Cap Screw
54	5/16"- Plain Washers		