TECHNICAL MANUAL
OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS LIST FOR LATHE, ENGINE MODEL B-40 (MC ILVANIE MACHINE WORKS) (NSN 3416-00-725-3508)

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1981

Technical Manual
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HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, *22 May 1981*

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), direct to: Commander, US Army Armament Materiel Readiness Command, ATTN: DRSAR-MAS, Rock bland, IL 61299. A reply will be furnished directly to you.

NOTE

This manual is published for the purpose of identifying an authorized commercial manual for the use of the personnel to whom this engine lathe is issued.

Manufactured by: Mcllvanie Machine Works
12 S. 6th Avenue
Yakima, WA 98907

Procured under Contract No. DAAA09-76-C-6250

This technical manual is an authentication of the manufacturers' commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

INSTRUCTIONS FOR REQUISTIONING PARTS
NOT IDENTIFIED BY NSN

When requisitioning parts not identified by National Stock Number, it is mandatory that the following information be furnished the supply officer.

1 - Manufacturer's Federal Supply Code Number - 82016

2 - Manufacturer's Part Number exactly as listed herein.

3 - Nomenclature exactly as listed herein, including dimensions, if necessary.

4 - Manufacturer's Model Number - B-40

5 - Manufacturer's Serial Number (End Item)

6 - Any other information such as Type, Frame Number, and Electrical Characteristics, if applicable.

7 - If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field in accordance with AR 725-5o.

Complete Form as Follows:

(a) In blocks 4, 5, 6, list manufacturer's Federal Supply Code Number - 82016 followed by a colon and manufacturer's Part Number for the repair part.

(b) Complete Remarks field as follows:
Noun: (nomenclature of repair part)
For: MSN: 3416-00-725-3508
Manufacturer: McIlvanie Machine Works

Model: B-40
Serial: (of end item)

Any other pertinent information such as Frame Number, Type. Dimensions, etc.

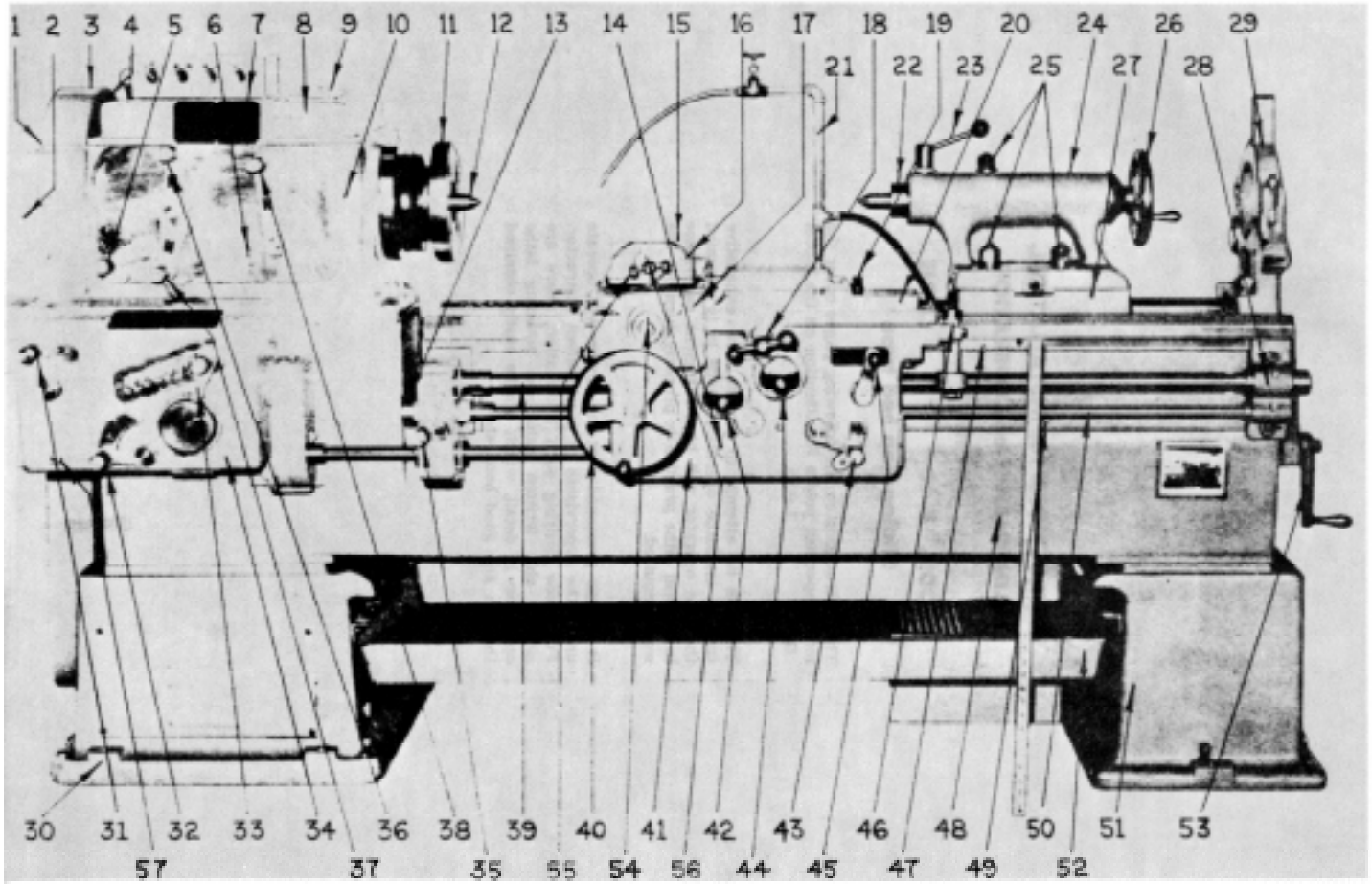
PART I

INSTRUCTIONS for INSTALLATION, MAINTENANCE and OPERATION of the MODEL B-40 LATHE Sliding gap bed type

The instructions on the following pages cover the most Important points for attention on the Model B40 Lathe.

There is no attempt to provide an exhaustive treatise on lathe operation, since it is assumed that the operator will have sufficient experience in general lathe practice to properly turn out the work required.

It is also presumed that the novice will operate under the supervision of a competent instructor. For those desiring such information, there are several ably written handbooks covering lathe operation in detail, which can be easily obtained through any good book store.



LATHE CHART MDL-R-40 G.B.

FIGURE 1

LATHE COAT DESIGNATION (Fig. 1)

1. Main Spindle
2. Gear Guard
3. Belt Guard
4. Drive Pulley
5. Feed Reverse Lever
6. Oil Gage
7. Spindle Speed Chart
8. Headstock Cover
9. Inspection Plate and 01l Filler
10. Headstock Case
11. Dog Plate
12. Spindle Nose Sleeve with No. 4 Morse Center
13. Feed Overload Clutch
14. Apron Oil Gage
15. Tool Post Support
16. Compound Rest
17. Cross Slide
18. Cross Feed Handle
19. Carriage Clamp Screw
20. Carriage
21. Coolant Pipes
22. Tailstock Spindle
23. Tailstock Spindle Clamp
24. Tailstock Housing
25. Tailstock Clamp Screws
26. Tailstock Hand Wheel
27. Tailstock Base
28. Leadscrew and Feed Rod Bearing
29. Steady Rest
30. Motor Pedestal
31 Ratio Control Lever
32. Secondary Speed Control Lever
33. Tumbler Gear Arm
34. Quick Change Gear Case
35. Transfer Box and Rod Control Lever
36. Hi-Speed Gear Shift Lever
37. Intermediate Gear Shift Lever
38. Hi-Low Gear Shift Iever
39. lead Screw
40. Apron Hand Wheel
41. Apron Housing
42. Snap Levers for Longitudinal Feed
43. Feed Reverse Iever
44. Snap never for Creed
45. Half Nut Control Lever
46. Threading Dial
47. Carriage Control Rack
48. Main Lathe Bed
49. Secondary Bed
50. Feed Rod
51. Rear Pedestal
52. Drain Pan
53. Handwheel for Secondary Bed
54. Cross feed Dial
55. Compound Feed Handle
56. Compound Dial
57. Quick Change Gear Box o01 Gage

The lathe is a precison tool Many years of practical experience and engineering skill are combined to make this lathe accurate, dependable and easy to operate. Its rigid construction, accurately fitted parts and bearing surfaces insure many years of trouble free service and maximum output Like all other precision tools the most critical period in the life of the lathe is the first few weeks in your plant. Proper installation, care and skillful operation are the factors which determine the period of its successful and accurate operation.

We suggest that you read carefully the instructions contained herein before starting to use your lathe. Strict observance of these instructions means years of trouble free service and maximum efficiency.

UNPACKING AND CLEANING

After removing the crating and packing materials from the lathe, clean it thoroughly with kerosene or some other suitable solvent. Make sure that all the grease or slushing compound, which was used to protect the finished parts and surfaces during shipment, is carefully and thoroughly removed. Particular attention should be given to the way surfaces on the bed and cross slide. Do not under any circumstances move the carriage, compound rest, or tailstock until these way surfaces are thoroughly cleaned and oiled with a good quality lubricating oil. Also thoroughly clean and oil the lead screw, feed rod and control rods. It is quite obvious that this protective covering may collect considerable dirt and grit during shipment and unless it is carefully removed badly scratched or damaged surfaces will result.

Do not remove the skids until the lathe has been placed in the approximate operating location in your plant. When removing the skids do not drop or twist the lathe bed. Failure to observe this point may result in serious impairment of the accuracy of your lathe.

INSTALLATION

Place your lathe on a solid foundation, such as cement flooring, cement pillars through wood flooring, good wood floors, or other modern factory floors are satisfactory.

LEVELING

To properly level your lathe use only a precision level. The ordinary types of commercial levels, carpenter's levels, etc., are not sufficiently accurate. The correct leveling of your lathe is the most important step in its installation, in fact it is the very essence of its accuracy.

First set your lathe in its operating position placing flat steel plates (about 4" x 4" x 1/8") under each of the two leveling screws of the front and rear pedestals. Place parallel or raising blocks of equal thickness on the two flat way surfaces of sufficient height to hold the level above the V's; place the level on these parallels and test alternately at the headstock and tailstock ends of bed and on long beds over center leg and make necessary adjustment with leveling screws.

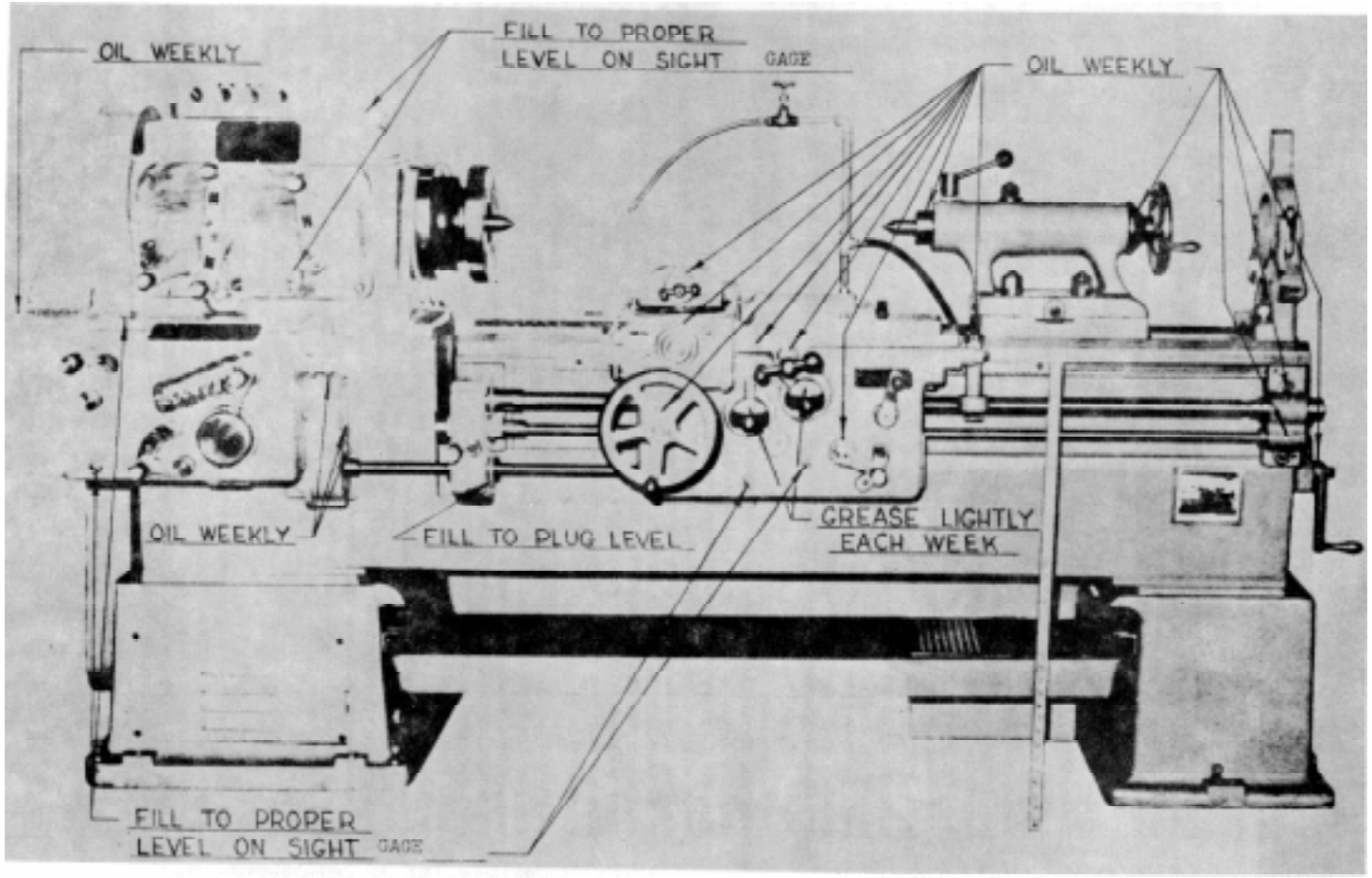
It is not necessary that the lathe be dead level but it is important that the level readings be the same in both positions to0.001inch. The level of your lathe should be checked every week or so for the first six months after installation. After this period a checkup two or three times a year should be sufficient.

It is not recommended that the lathe be lagged tightly to the floor. In most cases it is not necessary.

ELECTRICAL CONNECTIONS

Connections to your power service should be made strictly in accordance with your local electrical code.

All lathes are wired in our factory according to the National Code. When local or state codes differ from this, advise our factory immediately. Be sure the lathe is properly grounded. After the electrical connection has been made, check the drive pulley to make sure the motor has the proper direction of rotation.



LUBRICATION CHART

FIGURE 2

LUBRICATION

Do not run your lathe until it is thoroughly oiled and lubricated in accordance with the instructions on the lubrication chart (Fig. 2).

A good quality oil having SAE 30 rating is recommended for all lubrication on your lathe. Do not use inferior grades of oil and be sure the oil is free from acid. The use of a high grade oil will be found the most economical in the long run.

HEADSTOCK

The headstock of the Model B-40 Lathe is oil tight and is lubricated by a gear type oil pump which delivers a continuous supply of oil to all bearings. The oil is pumped through a filter located on the back of the headstock. The cartridge (C-1110PB) should be replaced once each year. All gears in the headstock are generously flooded with oil by a splash system as soon as the lathe is started.

Sufficient oil should be placed in the headstock to bring the level to a height of 1/2" on the sight gage located on the front of the headstock The headstock may be filled by removing the inspection plate in the cover and pouring the oil through this opening.

It is recommended that the oil be drained and the headstock flushed with some suitable solvent after 4000 hours of operation. To make a thorough job of this the cover should be removed and the oil and flushing solvent drained out through the drain pipe located underneath the front end of the headstock. Be sure to see than any sediment which may have accumulated in the bottom of the headstock is carefully flushed out. Change filter cartridge and refill with fresh oil to the proper level.

GEAR BOX

The gear box is oil tight and is lubricated by a ram operated pump. The reservoir is located in the bottom of the box and should be filled to the proper level as indicated by the sight gage on the front of the box. A 1/2" pipe plug is located on the top of the box for filling purposes. The gear box should be drained and flushed after 4000 hours of operation. A 1/2" pipe plug drain is located on the bottom of the box. An oil hole is located in the idler gear hub at the end of the lathe. There are also two flush type oil fittings and one cup type oil fitting at the right end of the gear box. A few drops of oil at these points weekly is sufficient.

APRON

The apron is oil tight and all gears and the bearings for the main shafts are lubricated by a cam operated pump. The reservoir is located in the bottom of the apron and should be filled to the proper level as indicated by the sight gage on the front of the apron. A 1/2" pipe plug is located on the front of the apron for fitting purposes. The apron should be drained and flushed with a suitable solvent after 4000 hours of operation. Do not move carriage hand wheel while flushing. A 3/4" pipe plug drain is located at the bottom of the apron. There are also two flush type oilers on the front of the apron which require a few drops of oil weekly. The feed clutches have zerk fittings and should be greased lightly with a good grade of grease weekly.

CARRIAGE

The carriage cross slide, bed ways, gears and bearings for the main shaft are lubricated by the pump located in the apron.

On the front of the carriage almost directly underneath the crossfeed screw Is a stud which carries the intermediate gear connecting to the crossfeed screw. There is an oil hole in the end of this stud, through which the intermediate gear is lubricated. Oil this bearing weekly.

Flush type oilers are provided for lubricating the bearings of the cross feed and compound rest screws. The crossfeed bracket at the back of the carriage has a flush type oil fitting to oil the thrust bearings. There is also a flush type oiler in the hexagon head of the screw which connects the cross slide to the crossfeed screw nut; this oiler lubricates the crossfeed screw and nut A few drops of oil weekly at these points is sufficient.

TRANSFER CASE

The feed transfer case is oil tight and is lubricated by a splash system. The reservoir is in the bottom of the case. The oil level should be checked and filled through the 1/2" pipe plug on the right side of the case.

TAILSTOCK

The tailstock screw bearing is oiled through a flush type oiler in the cap on the back end of the tailstock. There is also a flush type oiler on top of the tailstock through which the spindle and screw are lubricated. A few drops of oil each week is sufficient at these points.

Every two or three weeks the tailstock spindle should be screwed forward exposing the greater part of its length. In this position it should be wiped clean, carefully oiled and then drawn back into its bearing. Before sliding the tailstock either forward or backward be sure to thoroughly clean and oil the way surfaces of the lathe bed. Failure of the operator to follow this procedure may result in damage to the lathe bed as well as to the bearing surfaces of the tailstock There is a flush type oil fitting located on the bed moving hand wheel bracket and two on the end bearing support for the feed rod and lead-screw. There are also two flush type oil fittings in the upper bed; one on the front side and one on the back. These supply oil to the slide between the upper and lower beds. A few drops of oil weekly at these points is sufficient.

HEADSTOCK (Figure 1)

The Model B-40 Lathe is a single pulley drive, however, a positive clutch can be added to transmit power from drive pulley through the headstock gears to the main spindle. This clutch is compactly located in a clutch housing on the end of the machine and its operating lever is conveniently located on the front of the machine easily accessible to the operator. The Model B40 headstock is arranged for twelve speed changes, controlled by three levers 36, 37 and 38 (see Fig. 1) arranged at side of the headstock housing. Lever 36 is the high speed gear shift lever, 37 is the intermediate gear shift lever and 38 is the high to low gear shift lever. Do not attempt to shift any of these levers while the motor is running. Failure to observe this point may result in damage to gears or clutch. If the gears or clutch do not readily engage simply jog the motor by pushing the switch to the on and off positions at the same time maintaining a steady even pressure on the levers in the desired direction. Do not clash gears when shifting. The positions of these levers for the various speed changes are clearly indicated on the spindle speed chart, (item 7, Fig. 1).

QUICK CHANGE GEAR BOX (Figure 1)

Forty-nine (49) changes of feeds and threads are provided In the conventional type quick change gear box.

The positions of the tumbler and ratio levers are clearly indicated on the index plate mounted on top of the box. When changing threads or feeds, the apron power feeds should be disengaged. This will make the gear box easier to operate. When changing to coarse feeds or threads the motor should be stopped and the changes made while the lathe is coasting to a stop, or the motor can be jogged by pushing the switch quickly to the on and off positions.

By means of a simple sliding gear and tooth. clutch arrangement , the feed rod and lead screw cannot be engaged or operated simultaneously. When the shift lever , item 35, is in the left hand position the feed rod is in action and the lead screw is idle. By shifting this lever to the right hand position, the lead screw is engaged and the feed rod will be idle. With the lathe running on one of the slow speeds ,this lever can be easily shifted by exerting a firm even pressure in the direction desired. Do not shift this lever when the lathe is running on the high or fast spindle speeds. It is also advisable to set the reverse lever item 43,on the front of the apron to the neutral or central position, thus relieving the load on the feed rod before making the shift as outlined above.

For the first two weeks or until such time as your lathe is well run in, we suggest that you disengage the tumbler gear lever item 33, when shifting the ratio gear lever item 31 to either the letter D or E positions. When cutting threads of two or three pitch, run your lathe very slowly and carefully for the first five or six months. A reverse lever item 5, on the front of the headstock provides means for obtaining right or left hand threads.

APRON (Figure 1)

The apron is provided with a positive interlocking device which prevents the simultaneous engagement of the feed rod and lead screw. When the apron reverse lever, item 43 , is in either the extreme upper or lower position the feed gears are engaged and the lead screw half nuts are locked out. To engage the half nuts on the lead screw the reverse lever, item 43, must be placed in its central or neutral position, thus disengaging the feed gears and unlocking the half nuts which are opened and closed by shifting the control lever 45. When the lead screw is in use be sure to release the feed clutches on both the longitudinal and cross feed. On the Model B Lathe the feed clutches are controlled by turning the conventional snap lever. To release the clutches turn the knobs to the left, to engage them turn to the right. The snap lever, item 42, controls the longitudinal feed while nap lever, item 4L, controls the cross feed.

TAPER ATTACHMENT (Figure 1)

Taper attachment furnished is of the precision telescopic type which is bolted to the back end of carriage. The end of taper attachment is graduated in degrees and inches per foot. To use this attachment it is only necessary to adjust this taper attachment to the angle or inches per foot required. Then by locking clamp on bed, your machine is ready for turning your tapers. Use your cross slide for regulating your different amounts of cuts on your compound rest. It is always best, in taking an extra cut, to go by your work at least 1" to 1i" to avoid any back lash that might be caused due to wear over a period of years.

GENERAL INSTBUCTIONS

Lathe breakdowns are frequently traceable to three causes: first, insufficient lubrication; second, the use of unsuitable lubricant; and third, failure on the part of the operator to keep his lathe clean and free from chips and dirt. Particular attention should be given to the way surfaces, lead screw or any other moving parts where chips or grit may lodge. Clean your lathe thoroughly each day.

Damage is frequently caused by thoughtless operators constantly dropping work, chucks or face plates on the slides; using the bed for straightening shafts; leaving tools to be trapped between the carriage and headstock or tailstock, and the unnecessary use of force by using a length of pipe on a wrench or chuck key.

Unless a suitable hoist is provided to handle large chucks or face plates, wood blocks should be made to protect the lathe bed. These blocks should be 4" thick and long enough to cover the width of the bed. The bottom of the blocks should be shaped to fit the bed. The top may be sawed or turned to fit the outside diameter of the chuck or face plate. When finished, the blocks must be the proper height to bring the center of the chuck or face plate in line with the center of the lathe spindle. The use of these blocks under the chucks or face plates when putting them on or taking them off will prevent damaging the bed as well as the spindle.

DISASSEMBLING AND ASSEMBLING LATHES

HEADSTOCK

Spindle removal is accomplished by removing adjusting collar from back end of spindle, then remove center nut on spindle bearing. Remove oil seal (rear) and oil seal sleeve, then remove woodruff key and set screw and key in double feed drive gear No. B-38A. Remove front oil seal plate Then drive spindle out with large wooden block.

To remove long spline shaft, remove rear cap and nut under on shaft and drive spline shaft toward operator's end of lathe up til large clutch gear FIG. 4 No. 1515 can be lifted out. Then remove smaller gear FIG. 4 No. 1512 lit., same way. Then return shaft back toward the end of lathe to lift back gears, FIG. 4 No. B-32 and No. B-31.

Remove pulley housing and it should be readily seen how to remove pulley drive and small intermediate drive shaft.

To reassemble, the operations are merely placed in the reverse.

QUICK CHANGE GEAR BOX

Directions are given as viewed from front operating position

1-Disconnect transfer rod by driving out taper pin first and remove four 1/2" capscrews and take box off machine and remove top cover plate.

2-Remove upper shaft by removing bearing cap at right end of box which is held in place by a 5/16" socket head locking screw. Then remove drive gear from left end of box. Shift Lever D-E to E position and tap input shaft to right which will drive upper shaft through and out right end. Remove inner left end ball bearing from shaft and remove shaft.

3-Remove cap from left end and remove input shaft. The order of steps 2 and 3 may be reversed.

4-Remove lead screw or output shaft. Remove 5/8" shift fork support shaft by removing snap ring from groove and sliding shaft out left end of box. Remove link from back side of shift fork e and remove shift fork from box. Remove transfer case from right end of box which is attached by two 3/8" socket head capscrews and one 3/8" hex. head capscrew. Drive out lead screw shaft.

5-Remove counter shaft in left end compartment. Remove three 5/16"capscrews from cap at left end of box and remove along with shaft. Remove reduction gear through opening at back.

6--Remove cluster gear shaft. Move shaft assembly to left and remove bearing from left end of cluster gear shaft and remove cluster gear assembly from opening at rear.

7--Reassemble in reverse order. If pump is removed be sure it is placed in box first with oil lines attached.

APRON

Remove tailstock and drive carriage toward end of bed. Then remove back bearings on lead screw and rod feed. Take care in not losing 1/4" set screw that is in end of lead screw that keeps collar from turning. Remove pins in lead screw and rod feed drive at opposite end. Remove 5/8"capscrews on ends of apron and small screws on and wheel bracket. Then slide rod feed and lead screw shaft. out of drive and lower apron from carriage. Take care in not bending shaft.

Apron is disassembled from the rear. Remove snap lever nuts on front of lathe to remove these two clutches. Be sure to oil well before reassembling.

Adjust snap lever nuts so a light force from thumb will engage clutch. When reassembling to carriage, turn crossfeed

screw as apron is coming up so gears will mesh Into carriage gears.

CARRIAGE
Carriage Is removed by removing gibs on front and In back. To take up slack In drive from crossfeed handle to dial, turn screw driver slotted pin In front of carriage to the left of crossfeed handle slightly. Then, retighten setscrew on top of carriage over pin. Do not loosen over 1/2 turn on setscrew as this locates pin. When taking up slack on crossfeed screw, leave 1/2" capscrew tight and loosen other 1/2" screw, then tighten slightly, small capscrew in center. This will take up loss motion in thread.

DO'S AND DON'TS

HEADSTOCK
1-When putting chuck on lathe rotate spindle so driving key is at top and center. Be sure tapers are absolutely clean.

2-When tightening ring nut on spindle, use spanner wrench and see that wrench Is In the center of nut. Do not drive nut up with hammer or punch 3-top to shift, do not engage gears while running. If gears don't engage, rock spindle by hand to align gear teeth.

QUICK CHANGE GEAR BOX
4--When using coarse feeds and threads, run lathe at slow speeds until lathe is well run in. Always run slowly when cutting coarser than 8 threads per Inch.

5-Do not shift D and E levers while lathe is running. Shift A , B, C levers only when operating at moderate feeds and speeds. Same applies to tumbler gear, item 33.

CARRIAGE
6-When taking large heavy cuts, take gibs of crosslide No. 270,Fig8a, and compound rest No. 275,Fig. 8a, up so noticeable friction can be felt when operating these two units. Be sure to loosen gib on cross slide when using taper attachment so attachment operates freely without causing cross slide to move Irregularly.

7-Do not clamp chips under tool post ring No. 289, Fig. 8a ,as this deforms compound rest.

8-Wipe clean and KEEP ALL WAYS WELL OILED.

9-Make certain that enough travel is available for all machining operations before engaging power feeds or before cutting threads. Also check travel of taper attachment when machining tapers. These precautions may be accomplished by manually operating the slides before engaging the power feeds or threads if any doubt exists about adequate clearance.

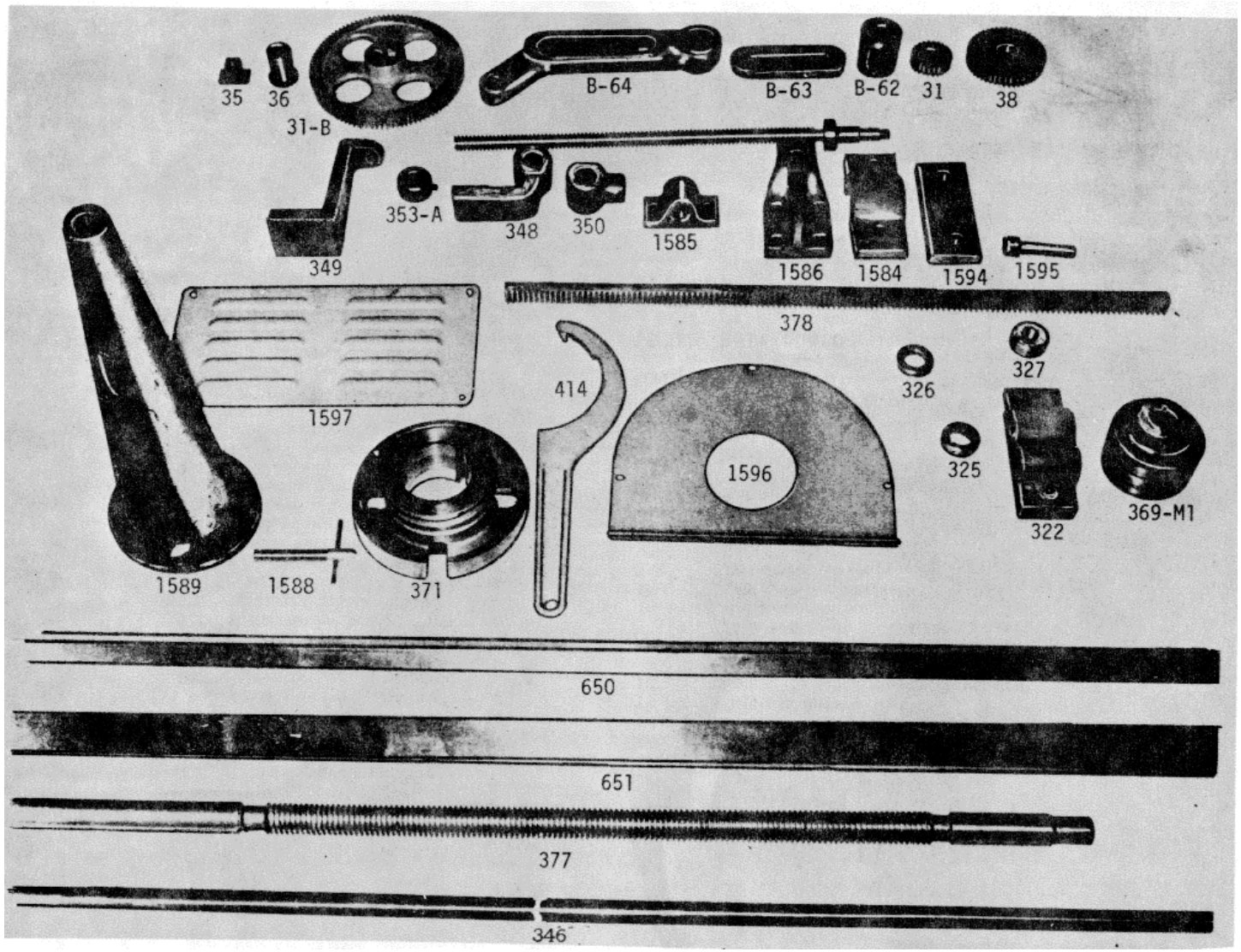
TAILSTOCK
10-Keep spindle outside and inside clean at all times. Keep spindle well oiled as this is a honed fit.

11-Do not tighten excessively lateral adjusting screws on tailstock as this can cause lugs to break off from base and also deforms base so it does not fit properly to bed ways. Further, this does not increase rigidity of location as this is determined only by the diameter of the adjusting screws. KEEP TAILSTOCK WAYS CLEAN AND WELL OILED.

SAFETY RELEASES
12-There is a safety release on side of transfer selector box(item 35, Fig. 1),or Part No. 1564, Fig. 6.. This has a setscrew over spring that releases rod feed in case operator runs apron up against this box. This is adjusted so it will release. Do not screw in farther or it will not release. To the left of this on 1" drive shaft is a brass shear pin in case operator does the same thing when cutting threads.

PART II
PARTS LIST

When ordering repair parts be sure to give the serial number of the lathe. The serial number is stamped on the right front end of the bed. Give size of lathe, viz., the swing and length of bed. Give part number and figure number of each item required See following page for further instructions.

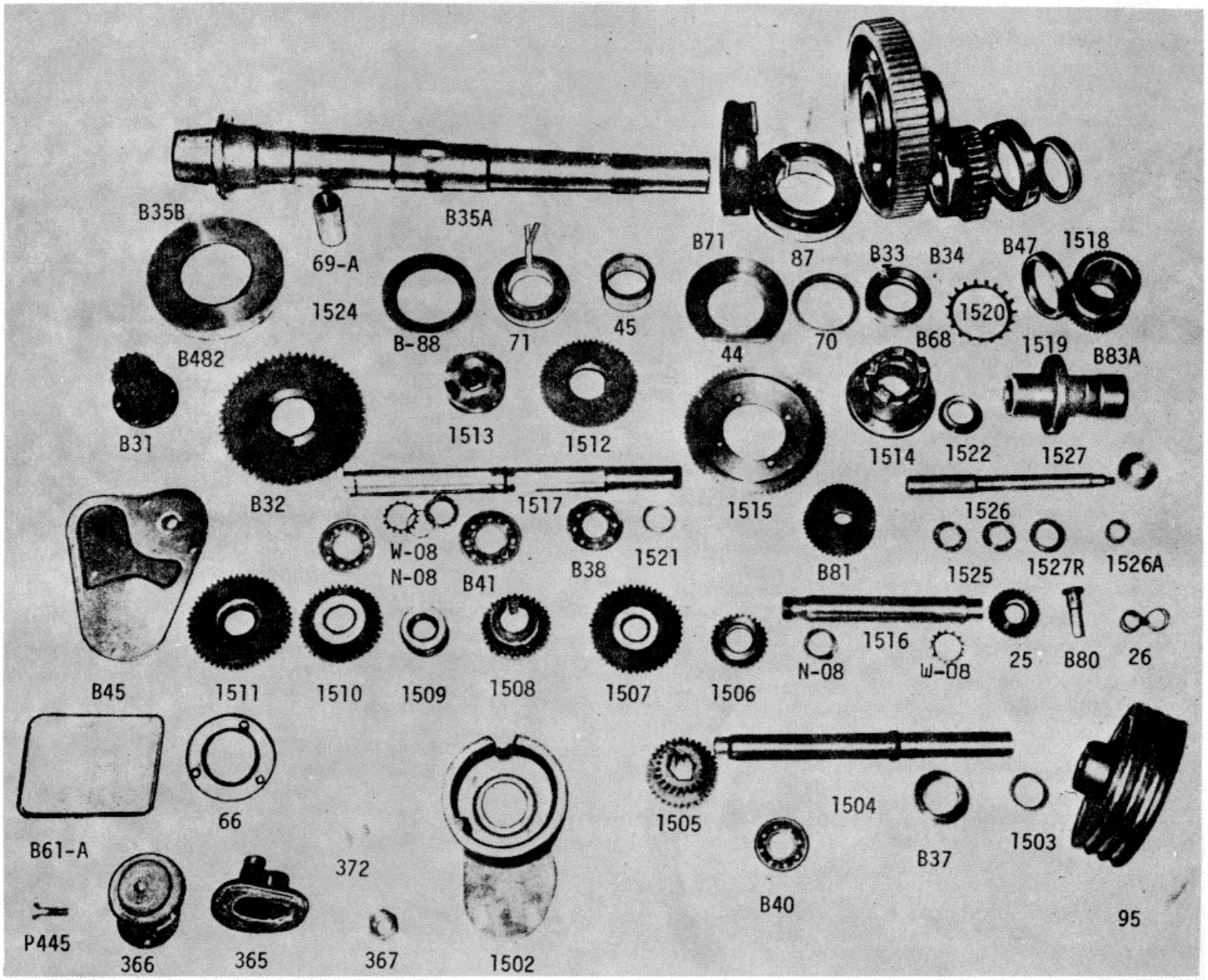


FEED DRIVE AND MISCELANEOUS

FIGURE 3

FEED DRIVE AND MISCELLANEOUS (Fig. 3)

31	2nd gear on stud 36-T
31-B	Gear tooth 9)0-T
35	"T" slot nut
36	Bearing support
38	Gear on box, tooth 36-T
B62	Spacer
B63	Link
B64	Gear; Quadrant support
322-5	Leadscrew bearing support
325	Thrust collars
326	Ball thrust
327	Nut-leadscrew thrust
346	Rod feed shaft
348	Motor brackets
349	Motor bracket
350	Motor support
351	Bolt support
353	Motor support shafts
353-A	Set collar
369-M1	Pulley
369-A	"V" Belts-B100
371	Dog plate
377	Leadscrew
378	Rack
414	Spindle spanner
P442	Coolant pan
P443	Drip pan angle-long
P443-A	Drip pan angle-short
B478	Spacer on quick change drive shaft
650	Hardened bed way "V'
651	Hardened flat bed way
1584	Rear bed clamp
1585	Bed extension nut
1586	Bed extension bracket
1587	Bed extension screw
1588	Jack
1589	Jack screw
1590	Lathe bed-lower
i591	Lather bed-upper
1592	Motor pedestal
1593	Rear pedestal
1594	Bed Clamp 3 req.
1595	Bed bolts
1596	Cover for motor pedestal
1597	Louvre
1598	Face plate-28"
1500	Belt guard

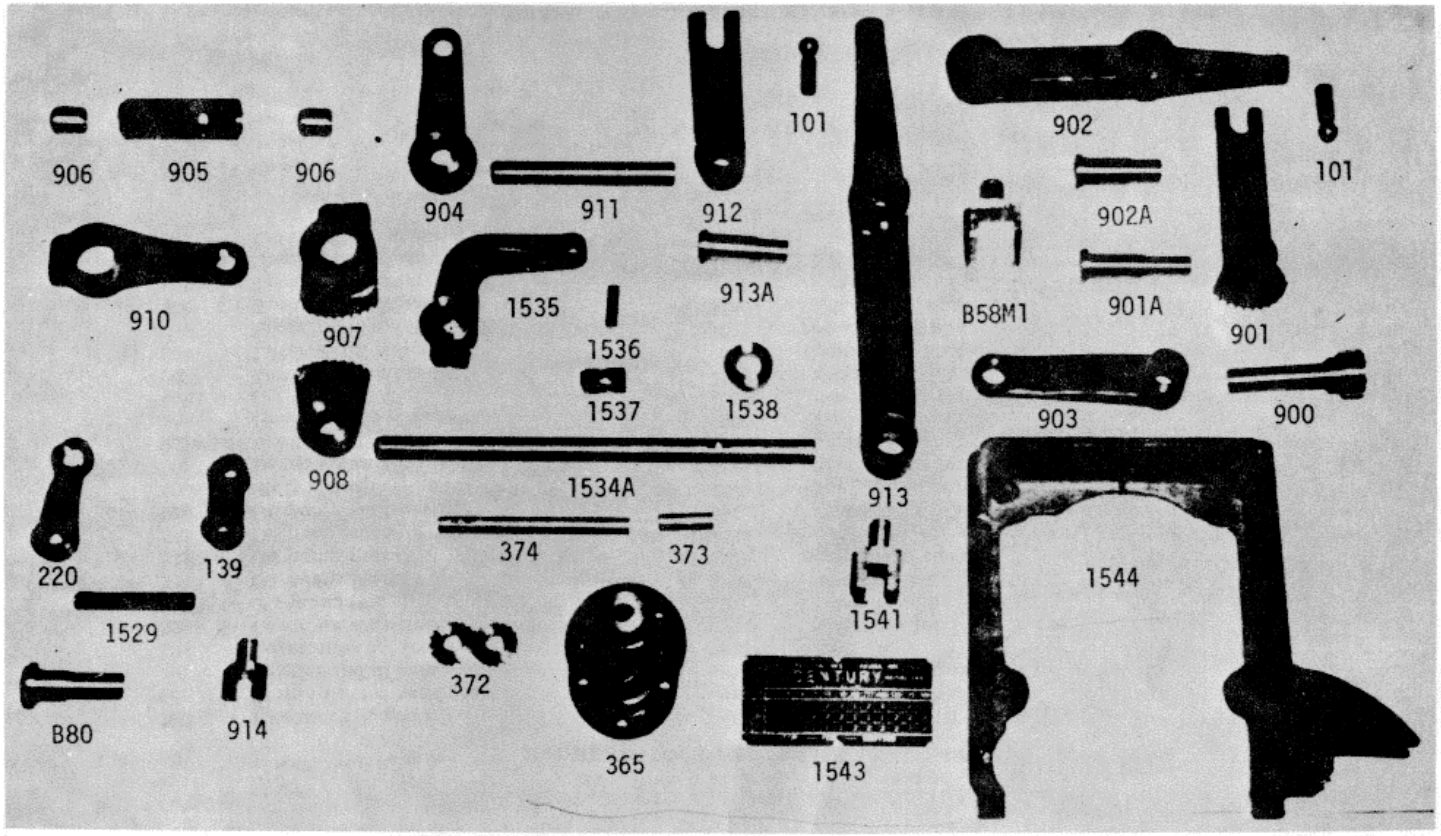


HEADSTOCK PARTS

FIGURE 4

B40 HEADSTOCH PARTS LIST (Fig. 4)

9-S	Pulley
25	Pinion--reverse
26	Hyatt bearing for 25
B31	15-T back gear pinion
B32	54-T high speed drive gear
B33	75-T back gear
B34	36-T high speed spindle gear
B35-A	Main spindle
B35-B	Spindle nose key
B37	Ball bearing drive shaft
B-38	Ball bearing for 1516 and 1517
B40	Ball bearing drive shaft
B41	Ball bearing center on 1517
44	Rear oil seal plate
B45	Triangular front plate
45	Oil seal sleeve
B-61-A	Headstock inspection plate
B47	Center bearing (ball)
66	Bearing cap
BG68	Nut, spindle, adjusting
69-A	Spindle taper sleeve
71	Rear Timken bearing
B71	Spindle nose retainer nut
B80	Reverse pinion shaft
181	Feed shaft cluster gear
B83-A	Spindle double feed gear
365	Oil pump
366	Oil pump base)
87	Front Timken bearing
367	Oil pump packing nut
372	Oil pump gears
P445	Pump mount screw
B482	Container-front oil seal
1502	Cover plate for drive shaft
1503	Oil seal-drive shaft
1504	Drive shaft
1505	Cluster gear-drive shaft
1506	Gear 27 teeth 2nd shaft
1507	Gear 56 teeth-2nd shaft
1508	Gear 34 teeth-2nd shaft
1509	Spacer-2nd shaft
1510	Gear 40 teeth 2nd shaft
1511	Gear 49 teeth 2nd shaft
1512	Gear 50 teeth 3rd shaft
1513	Hub-splined for 1512 on 3rd shaft
1514	Hub-Idler for 3rd shaft
1515	Gear 72 teeth 3rd shaft
1516	Shaft-2nd jack
1517	Shaft3rd jack
1518	Spacer-center bearing on spindle
1519	Nut-ball bearing No. N08
1520	Washer-ball bearing No. W08
1521	Spacer-bearing
1522	Bearing-Timken Cone 15890, cup 1520
1524	Center sleeve
1525	Ball bearing feed shaft
1526	Feed shaft
1526A	Sleeve-oil seal on feed shaft
1527	Housing-feed shaft
1527A	Oil seal-feed shaft

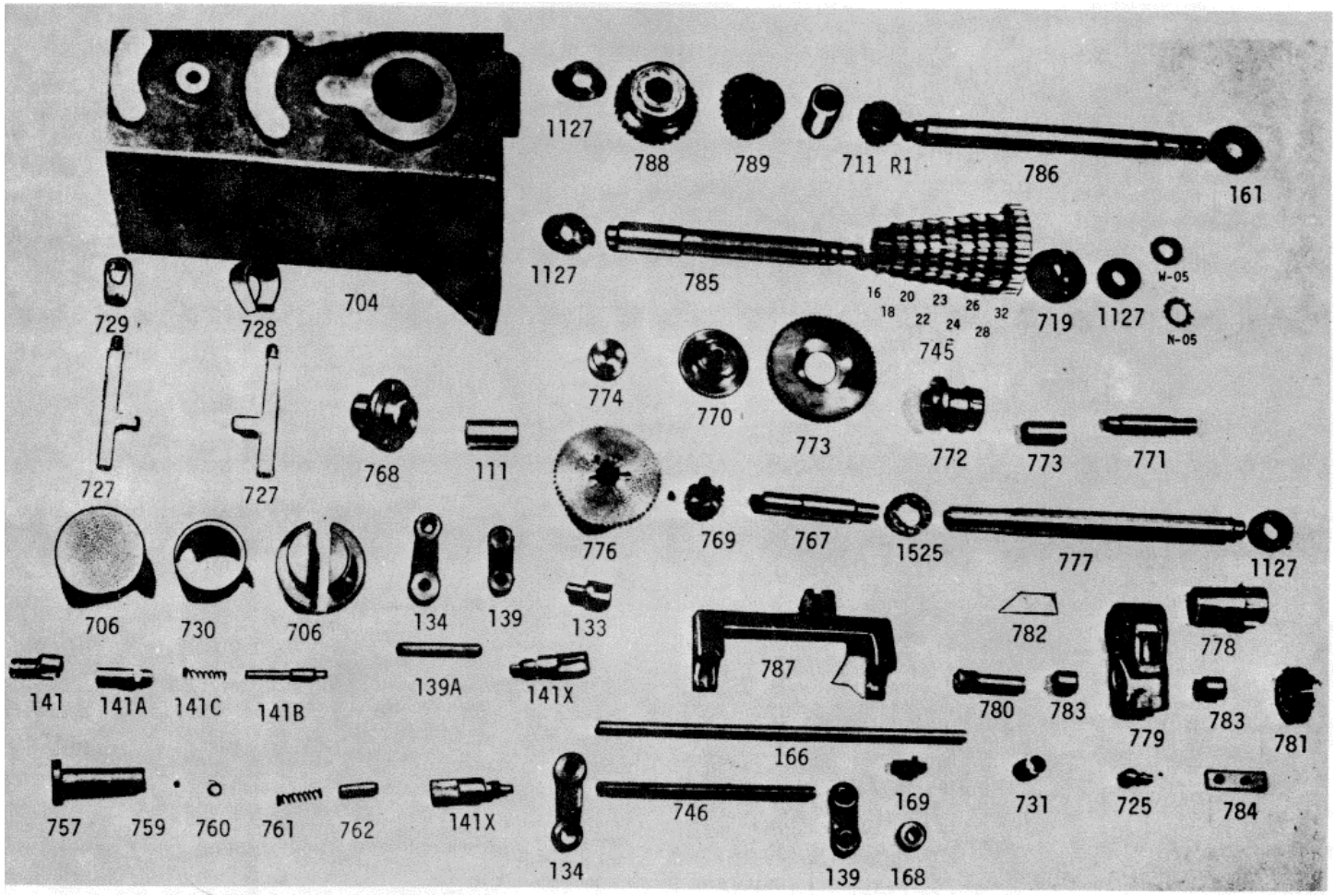


HEADSTOCK PARTS

FIGURE 4A

B-40 HEDBTOCK PABTS LIST (Fig. 4a)

B49A	Headstock housing
B58M1	Shift yoke for back gear
101	Ball for end of arm
139	Lever, internal feed reverse
220	Lever, external feed reverse
365	Oil pump
366	Oil pump base
372	Oil pump gears
373	Oil pump shaft
374	Oil pump shaft
900	Shift pinion for C shift
901	Lever, sector for C shift
901A	Pivot pin
902	Horiz. overhead C lever
902A	
903	Lever, ext. for C shift
904	Lever, ext. for B shift
905	Shaft, tubular for B shift
906	Bushing for 905 313 GP
907	Lever, sector gear for 905
908	Lever, sector gear on B shaft
910	Lever, ext. lever for A shift
911	"A" shift shaft
912	Lever, shift fork
913	Lever, horiz. overhead for
913A	Shift pin
914	Shift fork for feed reverse
915	Lever bushing
1500	Belt guard
1501	Belt guard closure
1523	Headstock cover
1528	Key 5/16" x 3-5/8
1529	Shaft-feed reverse shift
1534A	Shaft-shift for lever B
1535	Lever-internal for 1534
1536	Pin-shift for 1534
1537	Block-shift for 1534
1538	Set collar-7/8
1541	Shift block for drive shaft
1543	Speed chart
1544	Gear guard spacer
1545	Gear guard
1546	Switch bracket

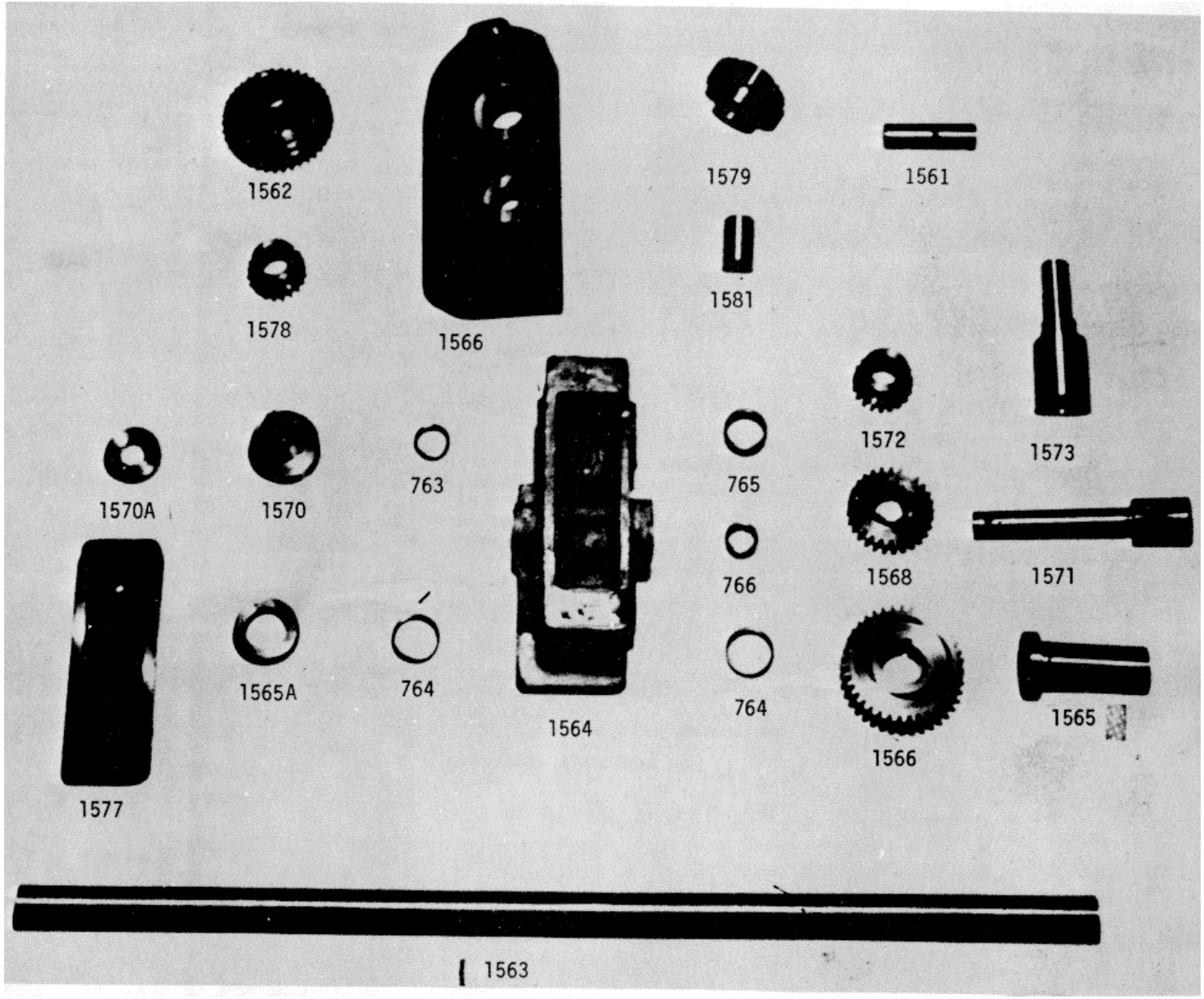


QUICK CHANGE GEAR BOX

FIGURE 5

QUICK CHANGE GEAR BOX PARTS LST (Fig 5)

109B-1	Quick change gear box cover
111	Bushing
133A	Shift fork
134	outer shifting arm
139	inner shifting arm
139A	5/8 pin
141X	Handle assy
141	Gear shift handle sleeve
141A	Gear shift handle bushing
141B	Plunger
141C	Spring
158	Bushing
161	SKF 6206 J ball bearing
166	Shift yoke shaft
169	Shifter key
704	Gear box
706	Gear shift hub
711 R1	16 T clutch gear
719	Spacing collar and oil pump cam
725	Ball stud
727	Shifter rod
728	Shifter rod end
729	Shifter rod end
730	Spacer
731	Socket
745-16	Tooth cluster gear
745-18	Tooth cluster gear
745-20	Tooth cluster gear
745-22	Tooth cluster gear
745-23	Tooth cluster gear
745-24	Tooth cluster gear
74526	Tooth cluster gear
745-28	Tooth cluster gear
745-32	Tooth cluster gear
746	A. B. C. Shaft
757	Oil pump body
758	Check valve
759	3/8 ball
760	Washer, spring seat
761	Spring
762	Plunger
767	Shaft-input
768	Bearing, flanged input
769	Gear 20-T clutched
770	Bearing flanged
771	Counter shaft
772	Gear-24-T
773	Gear-64-T
774	Bushing, keyed
775	Bushing, for 772
776	Gear--T Clutched
777	Shaft tumbler
778	Gear, sliding tumbler
779	Housing-tumbler
780	Pin-idler
781	Gear-tumbler
782	Keeper
783	Bushing for 779
784	Ball plate
785	Cluster shaft
786	Leadscrew shaft
787	Shift fork
788	Gear--32T
789	Gear-24-T
790	Bearing cap
791	Index plate
792	Shift fork
1127	Ball Bearing
1525	Ball bearing
1277	Guide plate
	N-05 nut
	W-05 washer

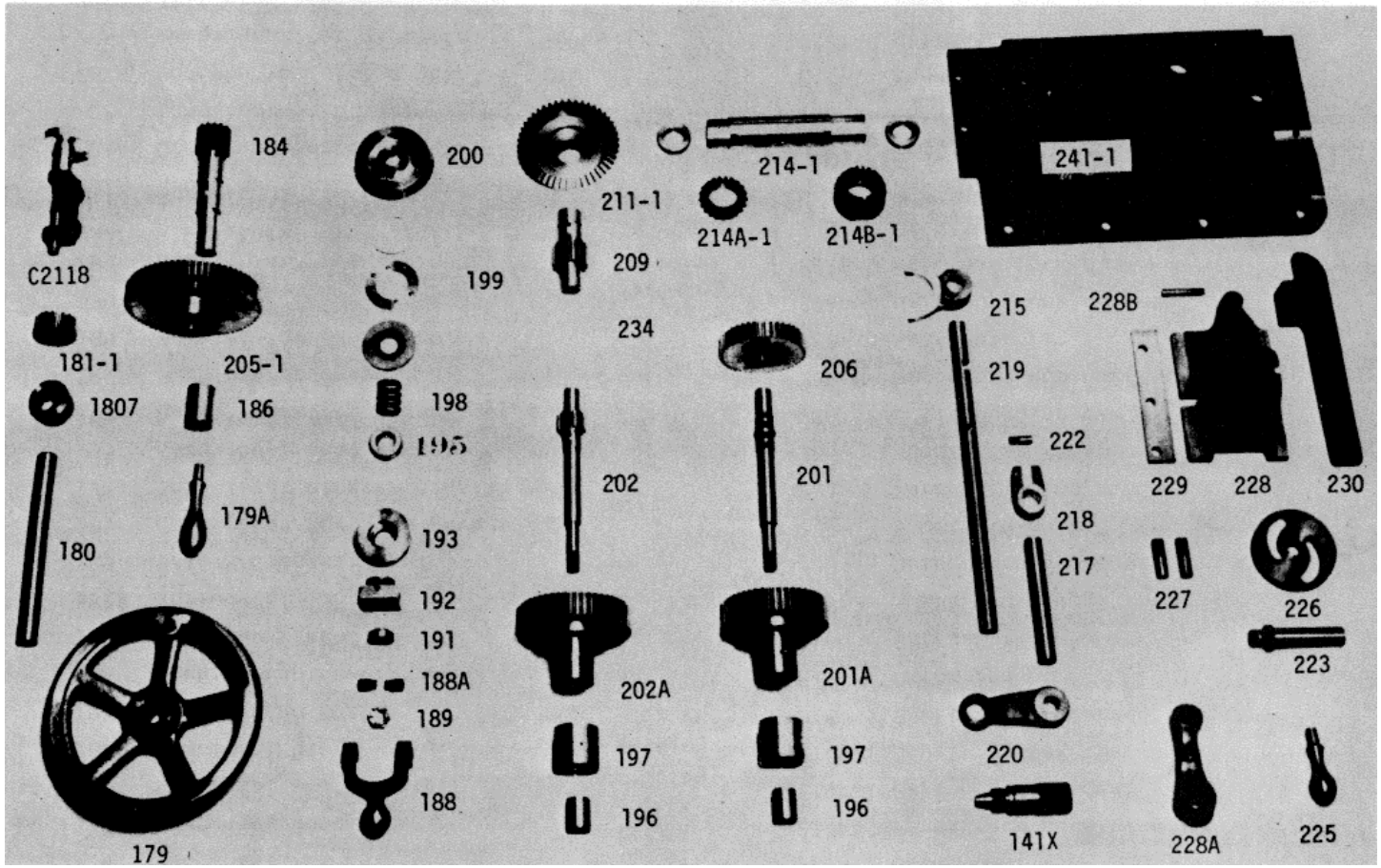


TRANSFER BOX PARTS

FIGURE 6

TRANSFER BOX PARTS LIST (Fig. 6)

1560	Transfer box to quick change gear box
1561	Idler shaft
1562	Drive gear transfer shaft
1563	Transfer rod
1564	Selecter box
1565	Transfer shaft sleeve
1565A	Set collar
1566	Gear on sleeve
1568	Feed rod clutch gear
1570	Clutched bushing
1570A	Bronze dutch
1571	Feed Rod coupling shaft
1572	Lead screw gear
1573	Lead screw coupling shaft
1577	Lead screw-feed box selecter cover
1578	Gear output shaft, quick change gear box
1579	Idler gear transfer case
1580	bearing No. B-228
1581	Bronze bushing for 1579, No. 143GP
763	bearing
764	bearing
765	bearing
766	bearing

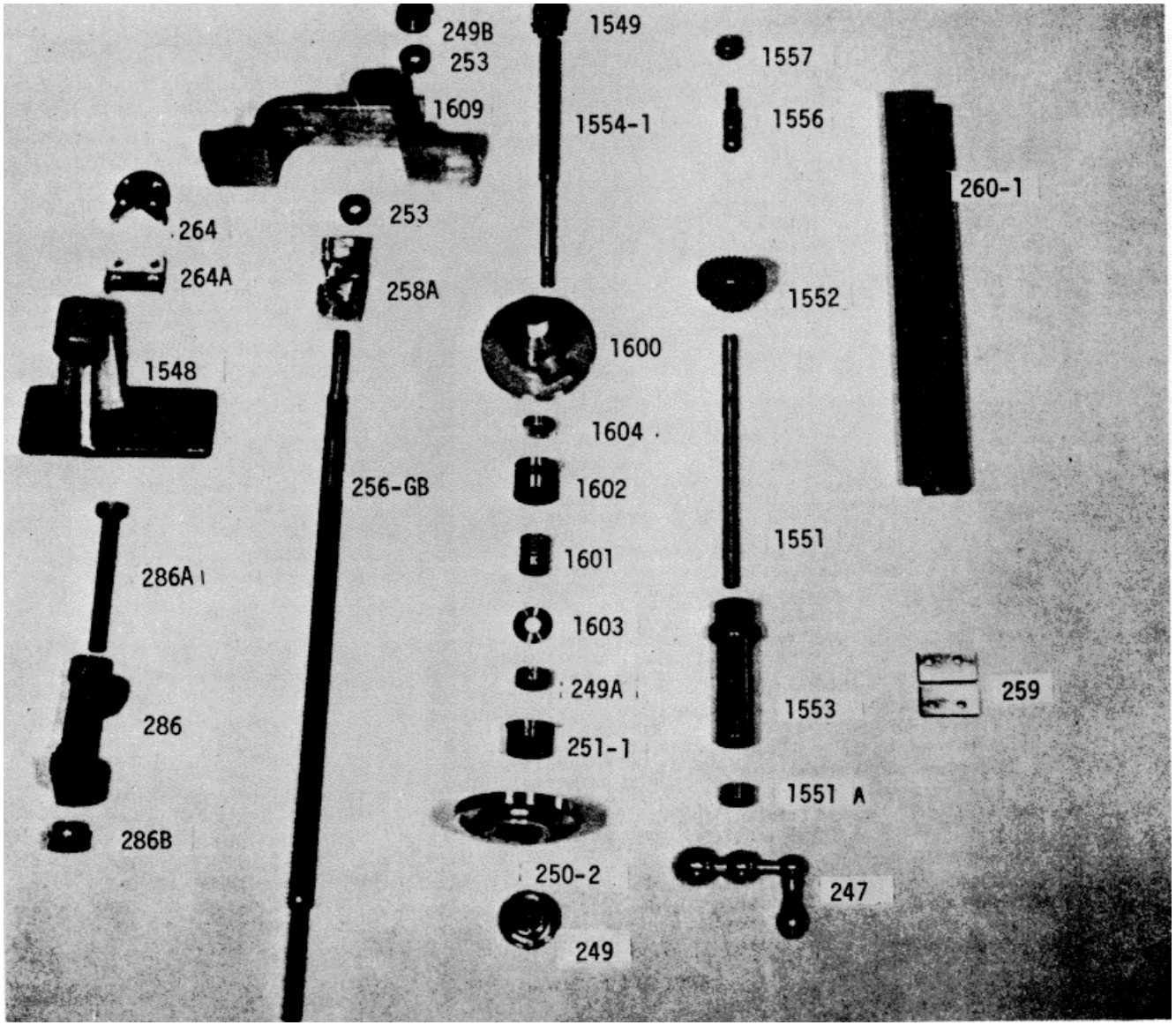


APRON.

FIGURE 7

A P R O N (Fig. 7)

141X	Plunger handle
179	Handwheel
179A	Handwheel handle
180	Handwheel shaft
181-1	Handwheel gear
184	Rack pinion shaft
186	Bronze bushing for 184
188	Snap lever handles
188A	Screws for 188
189	9/16 SAE special nut
191	Cone races for snap levers
192	Snap lever square thrusts
193	Snap lever seat rings
195	Ball thrust for end of gears
196	Bushing for gears 1.0.
197	Bushing for gears 0.0.
198	Spring
199	Ball thrust for spring
200	Cone friction clutch
201	Crossfeed friction shaft w/o gear
201A	Crossfeed large gear 51-teeth
202	Longitudinal friction feed shaft w/gear
202A	Longitudinal large gear 55-teeth
205-1	Large gear for rack pinion shaft
206	38-T crossfeed gear on 201
209	Bevel gear shaft
211-1	Bevel gear
214-1	Bevel reverse sleeve
214A-1	Bevel reverse gear - plain
214B-1	Bevel reverse gear - grooved
215	Shift fork for reverse gears
217	Shift rod
218	Shift fork
219	Shift rod (long)
220	Outside shift handle
222	Short pin on 219
223	Thread closing pin
225	Handle for 228A
226	C.I. engaging cam
227	Large pin for half nut
228	Half nut
228A	Half nut handle
2288	Half nut lock pin
229	Steel gib for 228
230	C.I. Gib for 228
234	1/8" bronze thrust washer for 211-1
240	Outer wall
241-1	Inner wall
C2118	Oil pump
1807	Oil pump cam

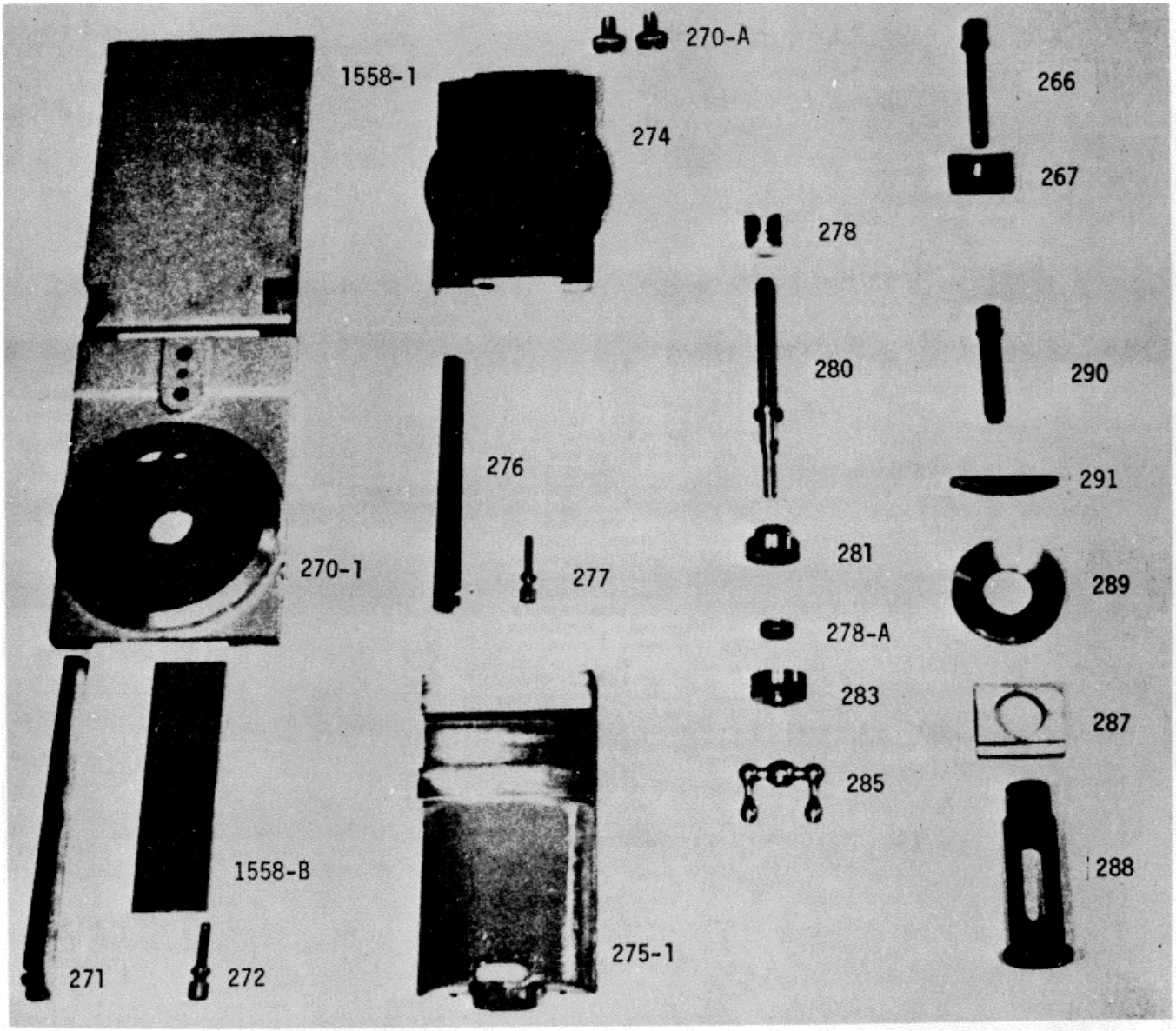


CARRIAGE PARTS LIST.

FIGURE 8

CARRIAGE PARTS LIST (Fig. 8)

247	Cross feed handle
249	Threaded ring
249-A	Adjusting collar
249-B	T. A. Adjusting collar
250-2	Calibrated dial
251-1	Body piece keyed to shaft
253	Ball thrust
256GB	Crossfeed screw
258A	Crossfeed nut 3-pc for T. A.
258	Crossfeed nut plain
259	Front steel gib
260-1	Back cast iron gib 3" wide
264	V-wiper
264-A	Flat way wiper
286	Thread dial housing
28-A	Thread dial housing shaft
28-B	Thread dial housing gear
1548	Bracket for handwheel shaft
1549	Sprocket for 1554
1550	Carriage-not shown-see item 20 fig. 1
1551	Crossfeed handle shaft
1551-A	Collar
1552	Gear - sprocket cluster
1553	Bearing for crossfeed shaft
1554-1	Telescopic crossfeed shaft
1556	Eccentric pin
1557	Idler sprocket
1600	Thread stop housing
1601	Groove sleeve
1602	Stop bushing
1603	1/8" washer
1604	Spacer
1609	Bearing bracket



CARRIAGE PARTS LIST.

FIGURE 8a (con't)

CARRIAGE PARTS LIST, Cont (Fig. 8a)

266	Clamping screw
267	Clamping plate
270(1	Crossfeed slide
270-A	Compound T-slot bolt
271	Crossfeed gib
272	Crossfeed gib screw
274	Compound calibrated slide
275-1	Compound rest
276	Compound gib
277	Compound gib screw
278	Compound screw nut
278A	Adjusting nut
280	Compound screw
281	Compound threaded bearing support
283	Compound dial
285	Compound handle
287	Tool post block
288	Tool post
289	Tool post clamping surface
290	Tool post bolt
291	Tool post rocking shim
1558-1	Cover for cross slide
1558B	Telescopic cover

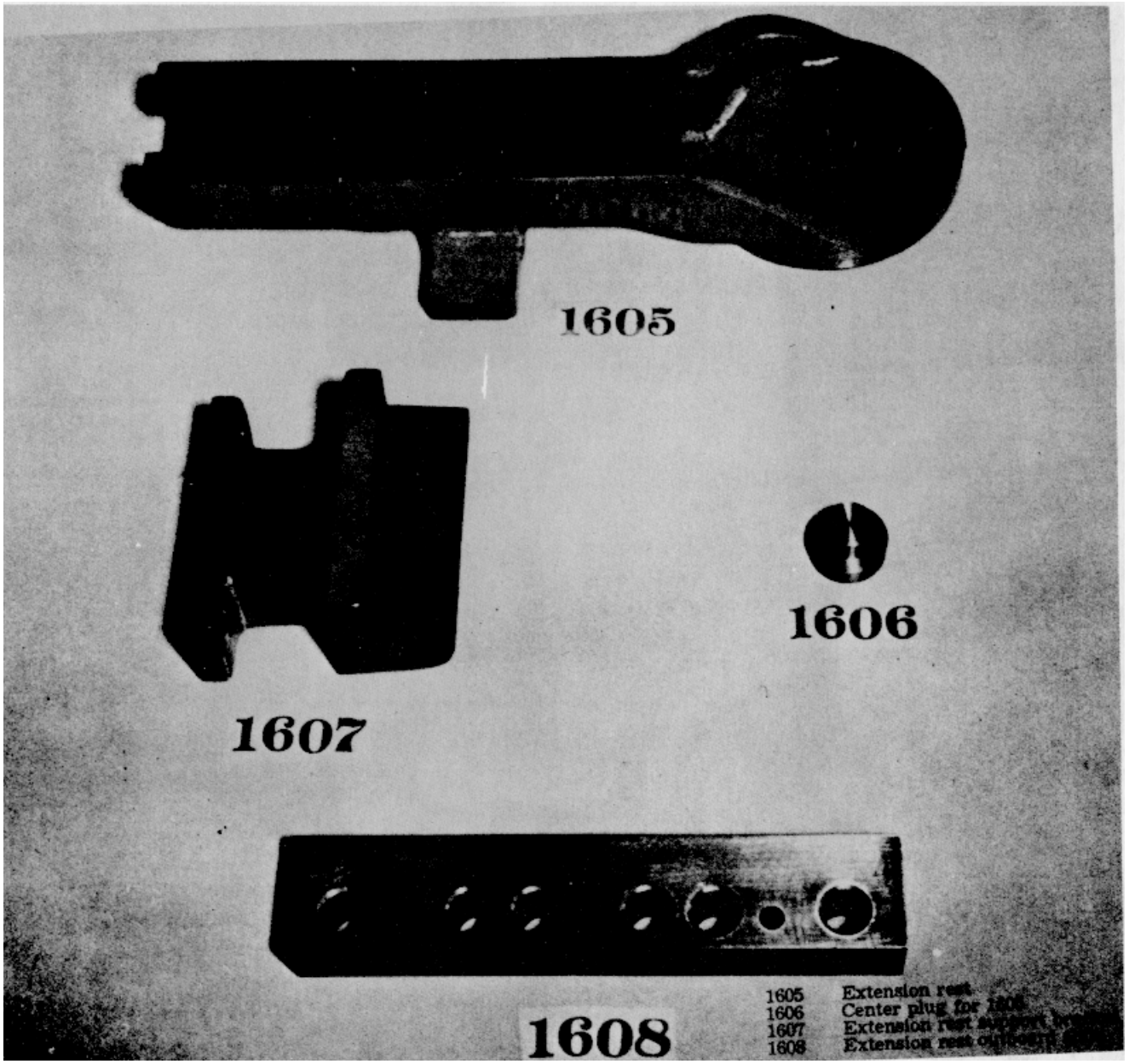

1605
1606
1607
1608
1605 Extension rest.
1606 Center plug for
1607 Extension rest
1608 Extension rest

FIGURE 9

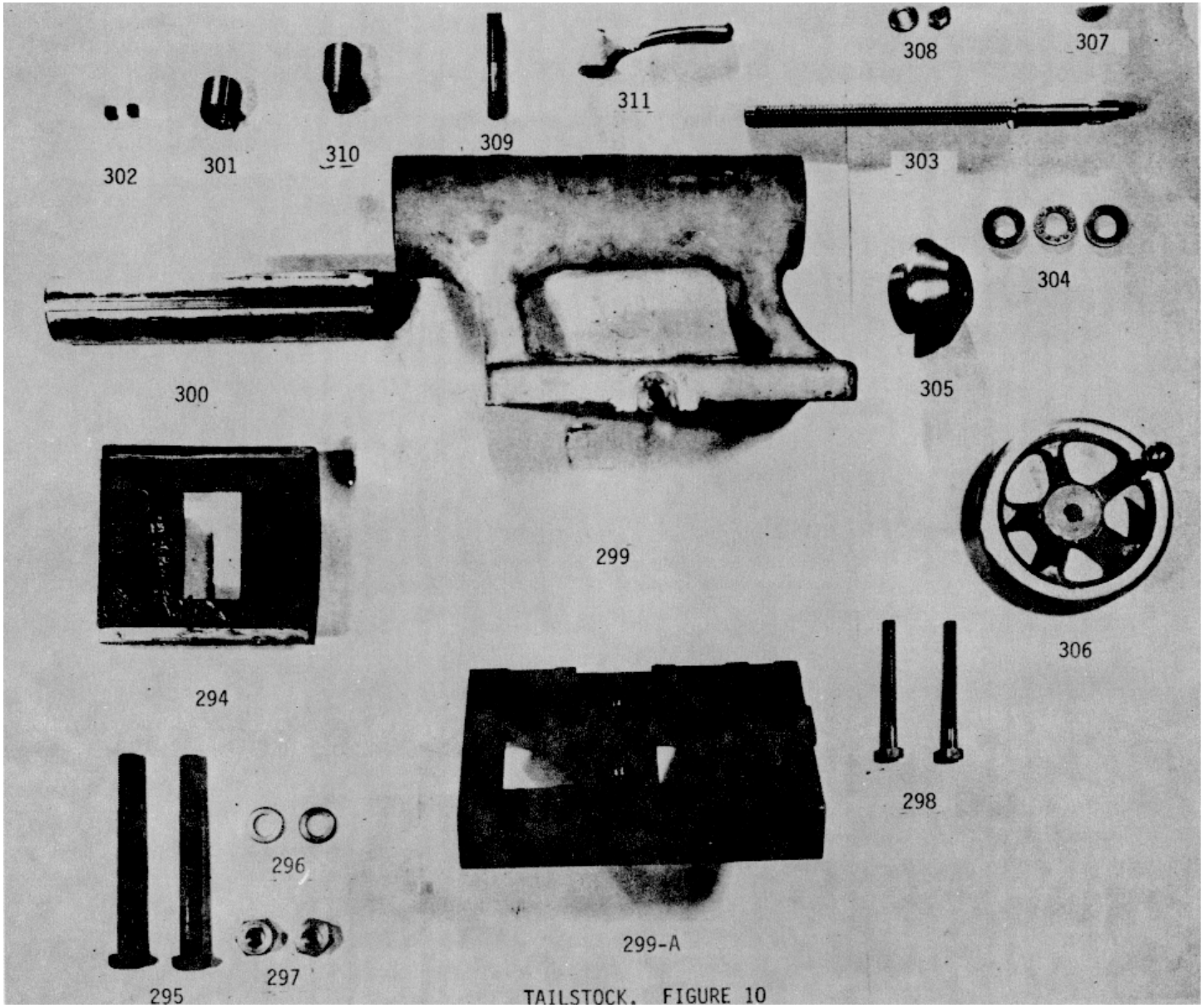

302
301
310
309
311
308
307
303
304
300
305
299
306
294
298
296
299-A
295
297
TAILSTOCK. FIGURE 10

FIGURE 10

T A I L S T 0 C K (Fig. 10)

294	Tailstock clamping block
295	7/8" x 7" bolts for clamp
296	7/8" washers for No. 295
297	7/8" finished nuts for No. 295
298	1/2 x 5" cap screws for tailstock adj.
299	Tailstock casting
299-A	Tailstock base
300	Tailstock spindle
301	Screw block for spindle
302	3/8" H.H. set screws
303	Tailstock screw
304	Tailstock ball thrust
305	Tailstock cast bearing
306	Tailstock hand wheel
307	3/16" woodruff key
308	1/2" finished nut and washer for 303
309	5/8" x 4-3/8" stud for clamping handle
310	Clamping plug for spindle
311	Clamping handle

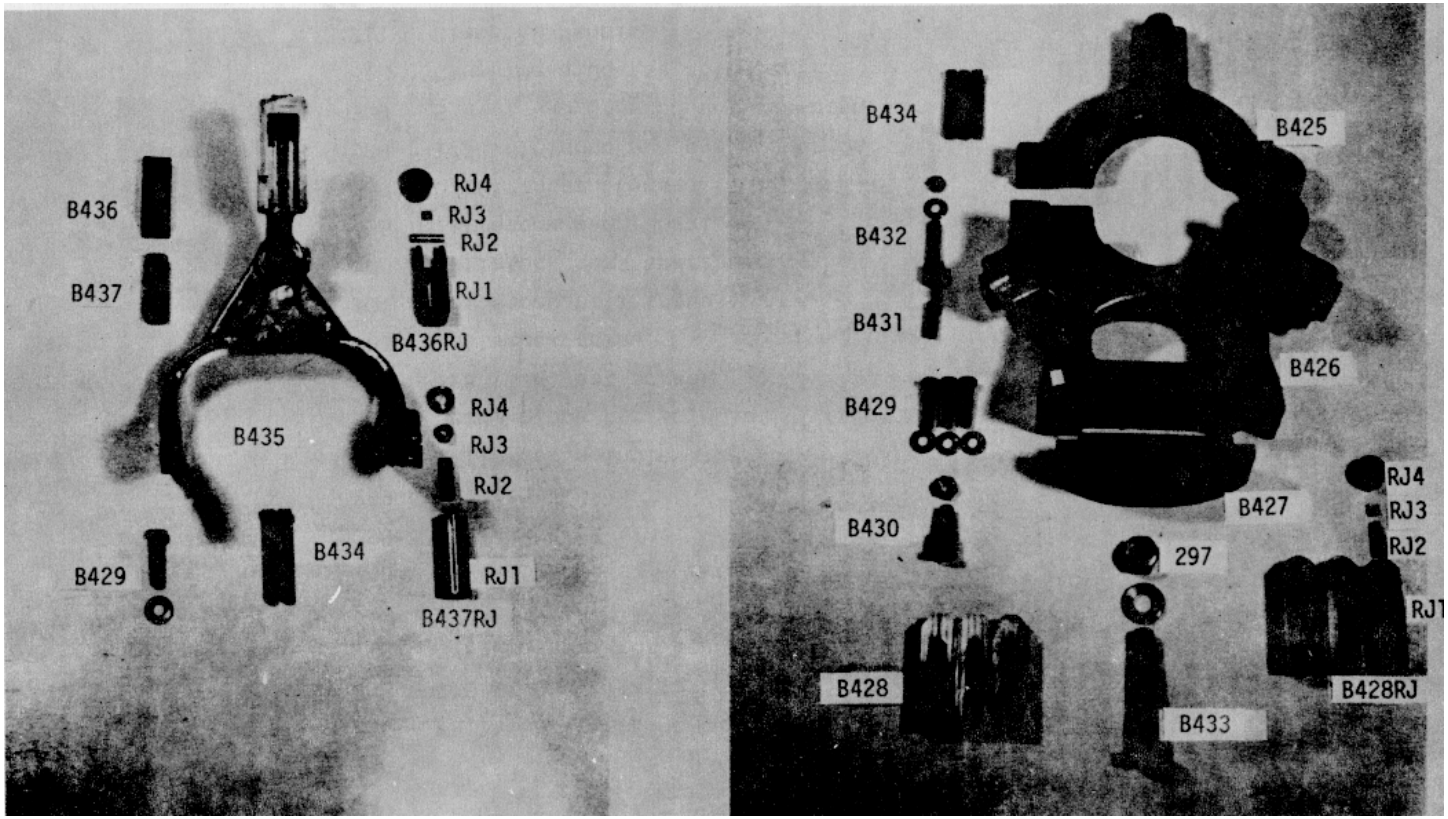
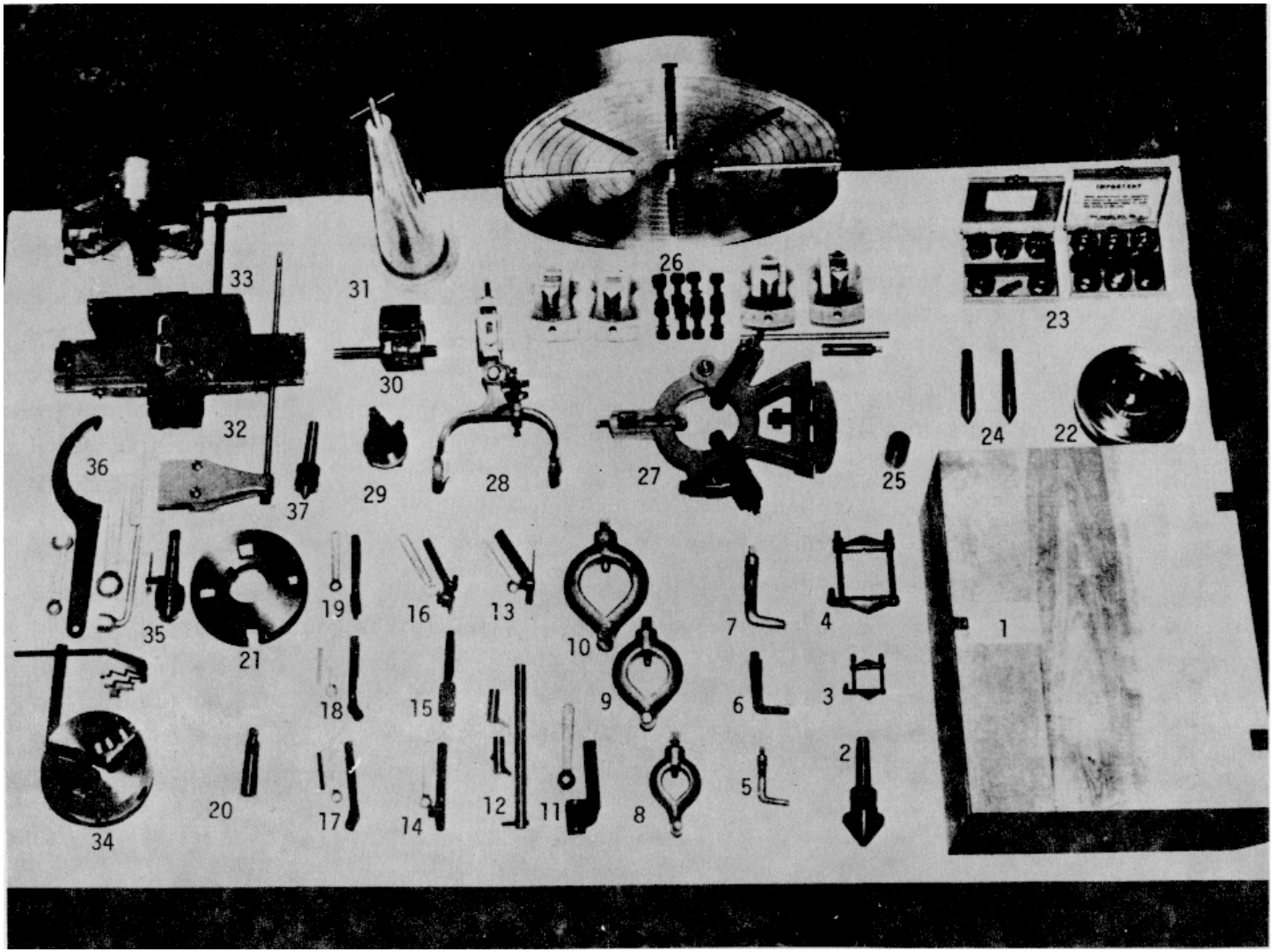

B436
B437
B435
B429
B434
RJ4
RJ3
RJ2
RJ1
B436RJ
RJ4
RJ3
RJ2
RJ1
B437RJ
B434
B425
B432
B431
B429
B426
B430
B427
297
RJ4
RJ3
RJ2
RJ1
B428
B433
B428RJ

FIGURE 11

(Fig. 11)
FOLLOW REST STEADY REST

B-429	Adjusting screw
B-434	Adjusting screw
B-435	Follow rest frame
B-436	Follow rest vertical jaw
B-437	Follow rest horizontal jaw
B-436-RJ	Roller jaw
B-436-RJ-1	Jaw
B-436-RJ-2	Pin
B-436-RJ-3	key
B-436-RJ-4	Bearing
B-437-RJ	Roller jaw
B-437-RJ-1	Jaw
B-437-RJ-2	Pin
B-437-RJ-3	Bearing
B-437-RJ-4	Roller
B-428-RJ-4	Roller
297	7/8" finished nut
B-425	Steady rest top
8-426	Steady rest base
B-427	Clamping block
B-428	Steady rest jaws
B-429	Adjusting screws
B-430	Swivel pin
B-431	Pin for locking nut
B-432	Locking bolt
B-433	Clamp bolt
B 434	Adjusting screw
B-428-RJ	Roller jaw
B-428-RJ-1	Jaw
B-428-RJ-2	Pin
B-428-RJ-3	Key

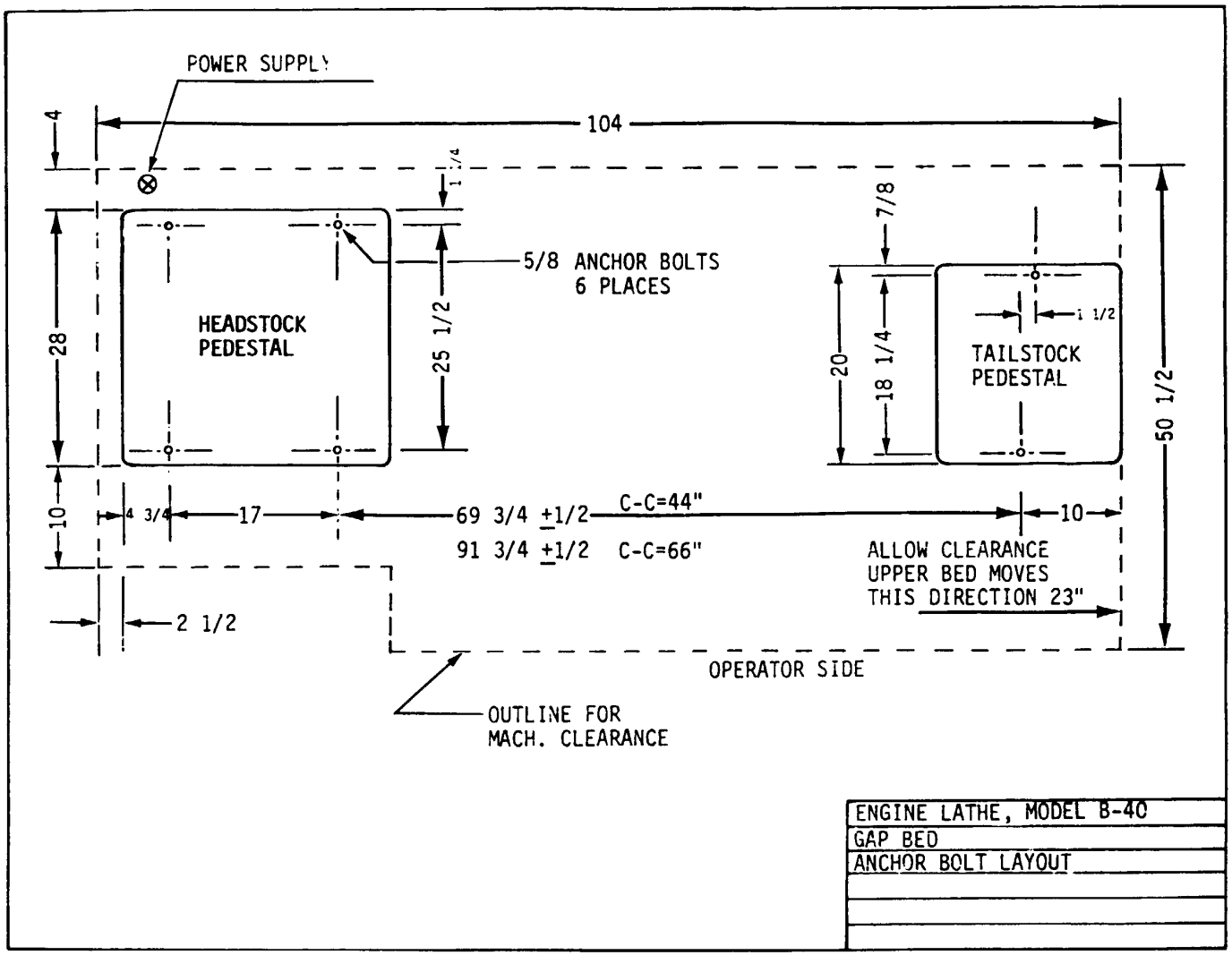


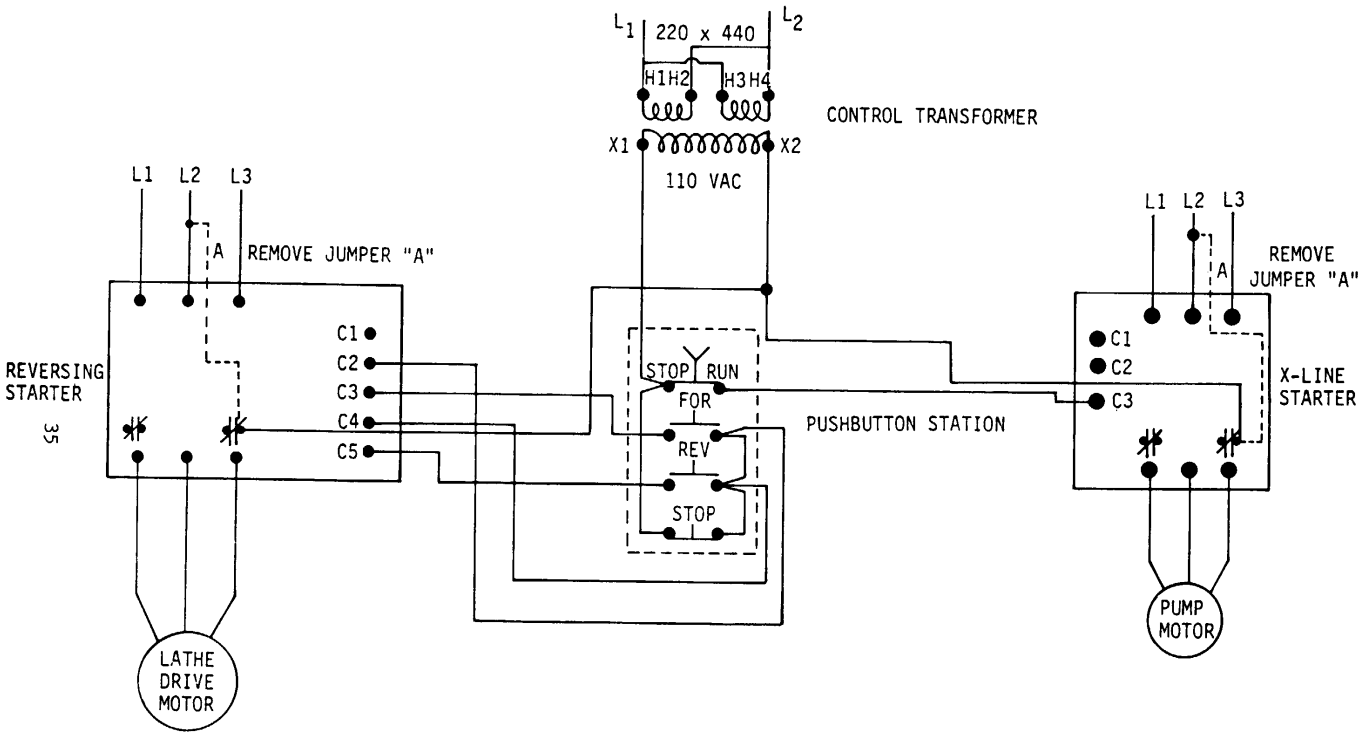
MISCELLANEOUS TOOLS AND EQUIPMENT.

FIGURE 12

MISCELLANEOUS TOOLS AND EQUIPMENT (Fig. 12)

X-1	Box, Accessory	X-22	Spindle nose collet chuck
X-2	Center, lathe, pipe, ball bearing	X-23	Set of 11 collets
X-3	Dog, lathe, clamp, 1-3/4" capacity	X-24	Lathe centers
X-4	Dog, lathe, clamp 3-1/2" capacity	X-25	Center sleeve
X-5	Dog, lathe, 1/2" capacity	X-26	Face plate large, four adjustable jaws
X-6	Dog, lathe, 1" capacity	X-27	Steady rest
X-7	Dog, lathe, 1-1/2" capacity	X-28	Follow rest
X-8	Dog, lathe, 2" capacity	X-29	Tool post
X-9	Dog, lathe, 3" capacity	X-30	Micrometer carriage stop
X-10	Dog, lathe, 4" capacity	X-31	Jack
X-11	Holder, boring bar	X-32	Taper attachment
X-12	Bar, boring, 15/16" diam. cap type	X-33	Chuck 4-jaw
X-13	Holder, cut-off R.H. Offset	X-34	Chuck 3-jaw
X-14	Holder, cut-off, straight	X-35	Drill chuck
X-15	Holder, knurling, revolving head	X-36	Wrenches - #293 tool post wrench
X-16	Holder, threading tool		#414 spindle spanner
X-17	Holder, turning, L.H. offset		#380 tailstock wrench
X-18	Holder, turning, R.H. offset		#381 spindle adj. spanner
X-19	Holder, turning straight		#382 bed clamp wrench
X-20	Socket, drill reducing	X-37	Center, ball bearing
X-21	Face plate lathe, dog driver		


POWER SUPPLY
4
104
1 1/4
7/8
5/8 ANCHOR BOLTS
6 PLACES
HEADSTOCK
PEDESTAL
28
25 1/2
20
18 1/4
TAILSTOCK
PEDESTAL
1 1/2
50 1/2
10
4 3/4
17
69 3/4 ±1/2
C-C=44"
91 3/4 ±1/2
C-C=66"
10
ALLOW CLEARANCE
UPPER BED MOVES
THIS DIRECTION 23"
2 1/2
OPERATOR SIDE
OUTLINE FOR
MACH. CLEARANCE
ENGINE LATHE, MODEL B-40
GAP BED
ANCHOR BOLT LAYOUT



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