

4444556

# SERVICE MANUAL AND PARTS LIST CATALOG



**Nos. 2-3-4 DIAL TYPE  
MILLING MACHINES**

★  
Identification No. 4A-LM  
Publication No. M-1948



### WHEN ORDERING REPAIR PARTS

- 1. Give complete Serial Number of Machine.
- 2. Give Part Number and Name.
- 3. Give Amount Required.

**UNLESS THE ABOVE DATA IS INCLUDED WE CANNOT FILL YOUR ORDER**

**This booklet should be filed in Tool Crib and issued by Tool Check only**

**THE CINCINNATI MILLING MACHINE CO**  
CINCINNATI 9, OHIO, U. S. A.

**SERVICE MANUAL  
AND  
PARTS LIST CATALOG  
FOR**

*Cincinnati*

**2-3-4 DIAL TYPE MILLING MACHINES**

**MODEL LD**



This catalog was prepared for two primary reasons. First to expedite the ordering of repair parts for your CINCINNATI<sup>®</sup> Dial Type Milling Machines; secondly, to present to maintenance personnel the correct method of servicing these machines.

Due to continual improvements in design, it is possible that some information or the appearance of component parts to be found in this catalog may vary slightly from the machine delivered to you. This merely indicates that the mechanism has been improved to better fulfill your requirements.

**THE CINCINNATI MILLING MACHINE CO.  
CINCINNATI 9, OHIO, U.S.A.**

THIS CATALOG TO BE USED ONLY FOR MACHINES  
WHOSE SERIAL NUMBER BEGINS WITH 4A

INDEX

SERVICE MANUAL

1. ADJUSTMENTS	Page
To Adjust Arbor Support Bushings .....	20
" " Backlash Eliminator .....	20
" " Column and Knee Hydraulic Oil Pressure .....	19
" " Cross Feed Screw Bearing .....	18
" " Dynapoise Overarm .....	20
" " Front Elevating Screw Bearing .....	18
" " Gibs .....	17
" " Main Drive Clutch .....	20
" " Main Drive V-Belts .....	17
" " Relationship Between Feed Trip Plunger and Control Plunger .....	22
" " Spindle Bearings .....	21
" " Table Lead Screw Bearings .....	18
" " Vertical Screw Brake .....	19
2. CONVERSION CHART (Inches to Millimeters) .....	13
3. DIAGRAMS AND ILLUSTRATIONS	
Dimensional Drawings .....	10, 11, 12
Functional Illustrations .....	6, 7, 8, 9
Lubrication Diagram .....	14
4. DISMANTLING INSTRUCTIONS	
To Dismantle Knee - Removal and General Information .....	33, 34
Bracket -Under- Saddle .....	33, 34
Cam Reversing Mechanism .....	35
Control - Levers - and shafts .....	35
Elevating Screw and Drive .....	37, 38
Feed Dial Assembly .....	36

## INDEX—Continued

	Page
To Dismantle Knee - continued	
Feed Motor Drive .....	38
Feed Motor Bracket .....	38
Geared Pump .....	38
Geared Pump Shaft .....	39
No. 6 Shaft and Gearing .....	38
Rapid Feed Valve Body .....	39
Rapid Traverse Clutch .....	38
Rear Control Bracket .....	30
Selector Valve .....	36
Sliding Covers .....	38
Spline Shaft .....	38
To Dismantle Vertical Head Transmission Housing .....	27
To Remove Bracket Under Saddle .....	33
"    " Column Gearing From Vertical Machine .....	26
"    " Housing and Saddle From Universal Machine .....	32
"    " Knee From Column .....	33
"    " Main Drive Motor .....	39
"    " Saddle from Plain and Vertical Machine .....	32
"    " Spindle - No. 2 Vertical Machine .....	27
"    " Spindle - Nos. 3 and 4, Vertical Machines .....	27
"    " Spindle - Plain and Universal Machines .....	25
"    " Vertical Head and Bevel Drive Gear .....	25
"    " Table and Lead Screw .....	32
"    " Vertical Head and Spiral Gear .....	25
"    " Vertical Head Elevating Screw and Brake .....	28
"    " and Dismantle Feed Box .....	30
"    "    "    " Front Bracket .....	28
"    "    "    " Power Feed to Vertical Head .....	28
"    "    "    " Pulley Bracket .....	23
"    "    "    " Shifter Bracket .....	24

## INDEX-Continued

	Page
5. INSTALLATION INSTRUCTIONS.....	16
6. LUBRICATION INSTRUCTIONS AND SPECIFICATIONS.....	14, 15
CMMCO. Recommended Lubricants .....	174
7. MAINTENANCE HINTS	
Excessive Vibration .....	41
Faulty Operation of Main Clutch and Brake .....	41
Feed or Speed Variation from Actual Dial Reading .....	40
Knee or Table Movements do not Agree With Movement Indicated on Micrometer Dials .....	41
Low Hydraulic Oil Pressure .....	40
Speed Gears Shift Erratically or Fail to Shift .....	40
Table, Vertical or Cross Feeds Do Not Function .....	42

## PARTS LIST

8. PARTS NUMBERS LOCATION INDEX .....	42, 43, 44
9. HOW TO ORDER REPAIR PARTS .....	45
10. COOLANT PUMP AND PIPING - UNIT 4AP .....	164-165
11. COLUMN - UNIT 4AC .....	58-81
12. FEED BOX - UNIT 4AF .....	134-137
13. FRONT BRACKET - UNIT 4ACY .....	126-133
14. KNEE - UNIT 4AK .....	138-163
15. MACHINE INSTRUCTION PLATES .....	168-171
16. MOTOR DRIVE - UNIT 4AN .....	56-57
17. PULLEY BRACKET - UNIT 4AJ .....	46-49
18. POWER FEED TO VERTICAL HEAD - UNIT 4AAJ .....	96-101
19. SADDLE TABLE - UNIT 4AH .....	102-125
20. SHIFTER BRACKET - UNIT 4AS .....	50-55
21. TURRET STOP - UNIT 4AAR .....	166-167
22. VERTICAL HEAD - UNIT 4ADV .....	82-95
23. ELECTRICAL CONTROL CABINET - UNIT 4AM .....	172-173

As a reference aid, figure numbers are the same as the page numbers on which they appear. Figure 22A and 22B appear on page 22.

The design and specifications of these machines and attachments illustrated and described herein are subject to change without notice.

**PATENT NOTICE** - Machines and attachments illustrated and described in this book are manufactured under and protected by issued and pending United States and Foreign Patents.

# FUNCTIONAL DIAGRAM

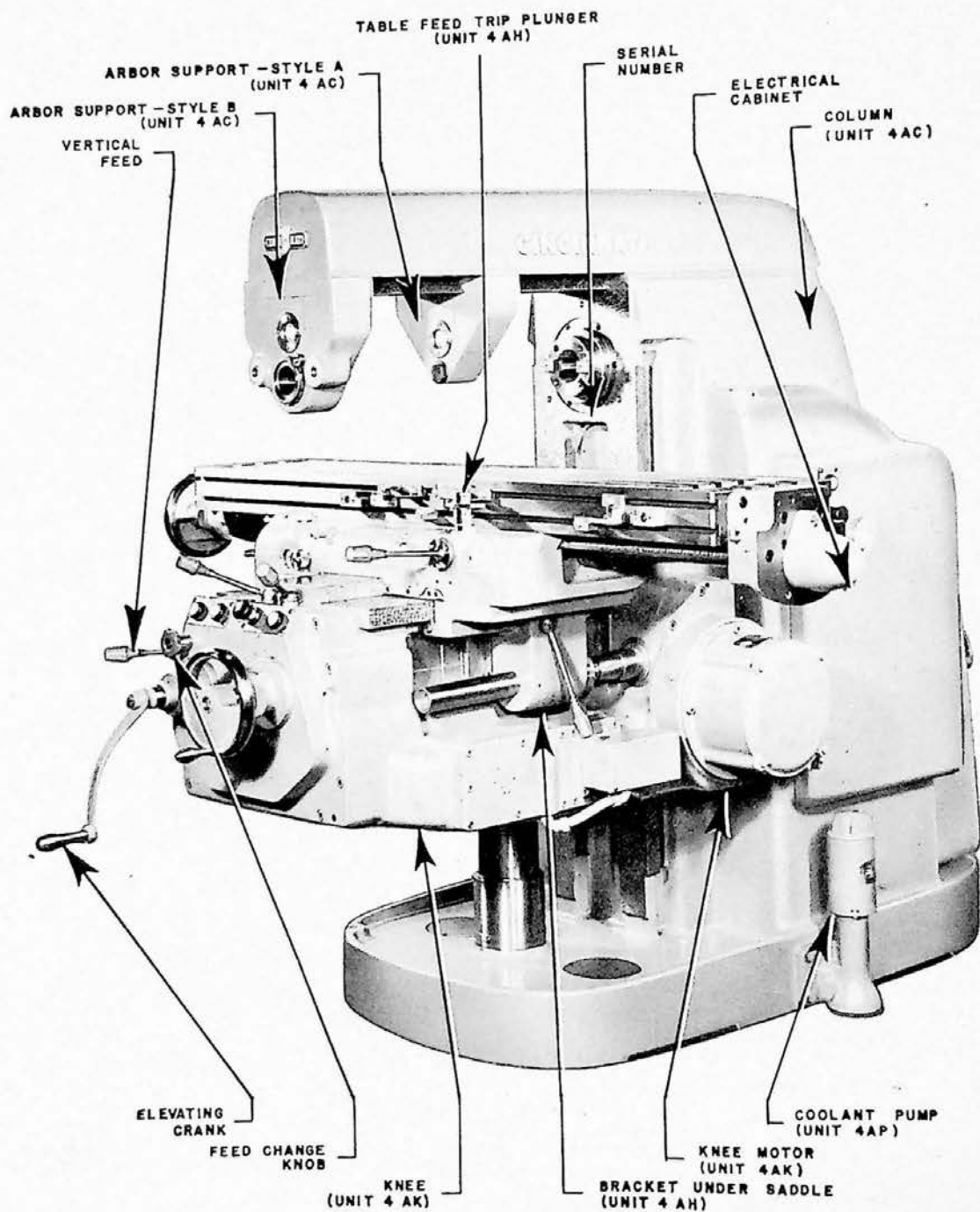


FIGURE 6  
No. 2 Plain Machines

# FUNCTIONAL DIAGRAM

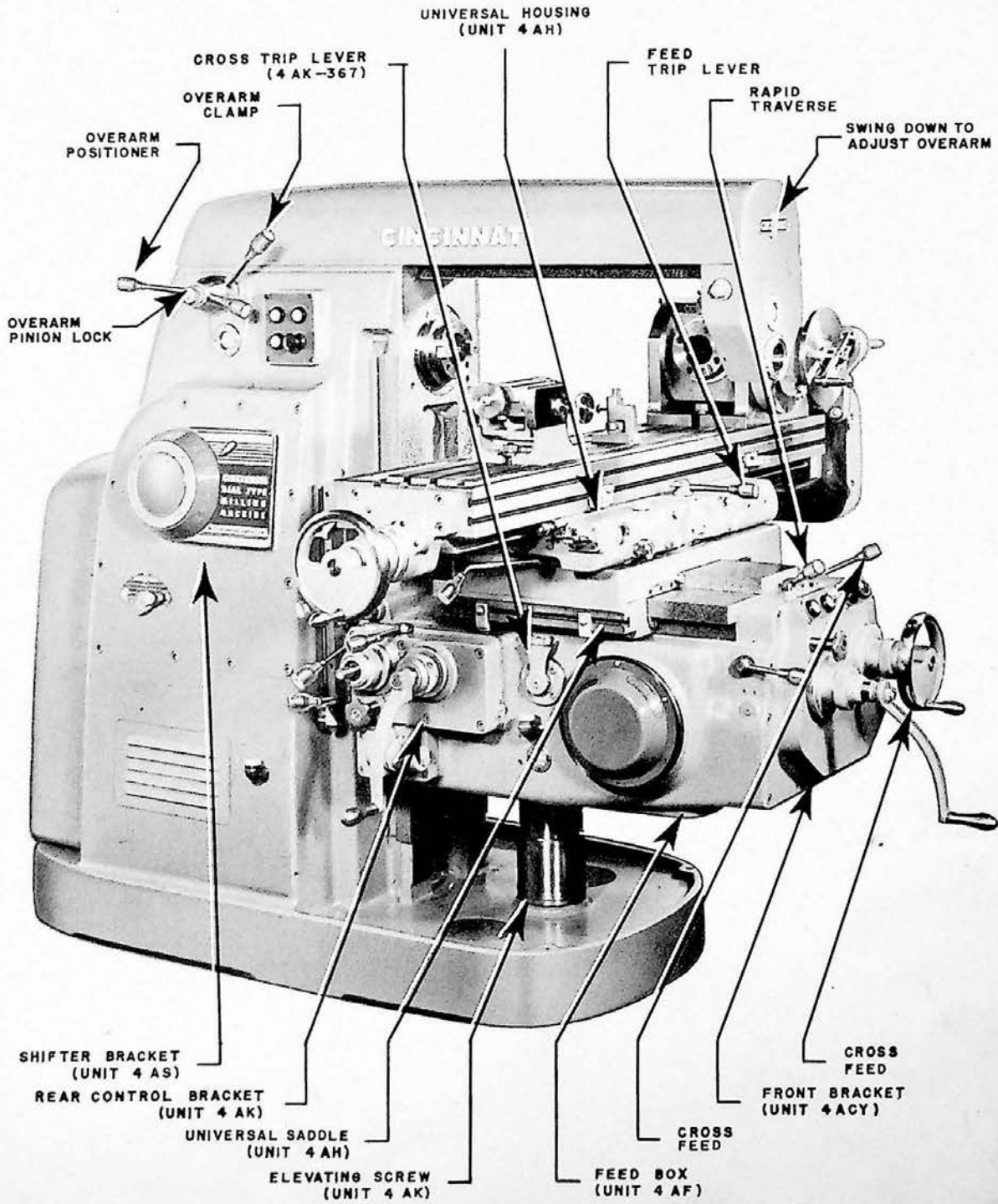


FIGURE 7  
No. 2 Universal Machine



# FUNCTIONAL DIAGRAM

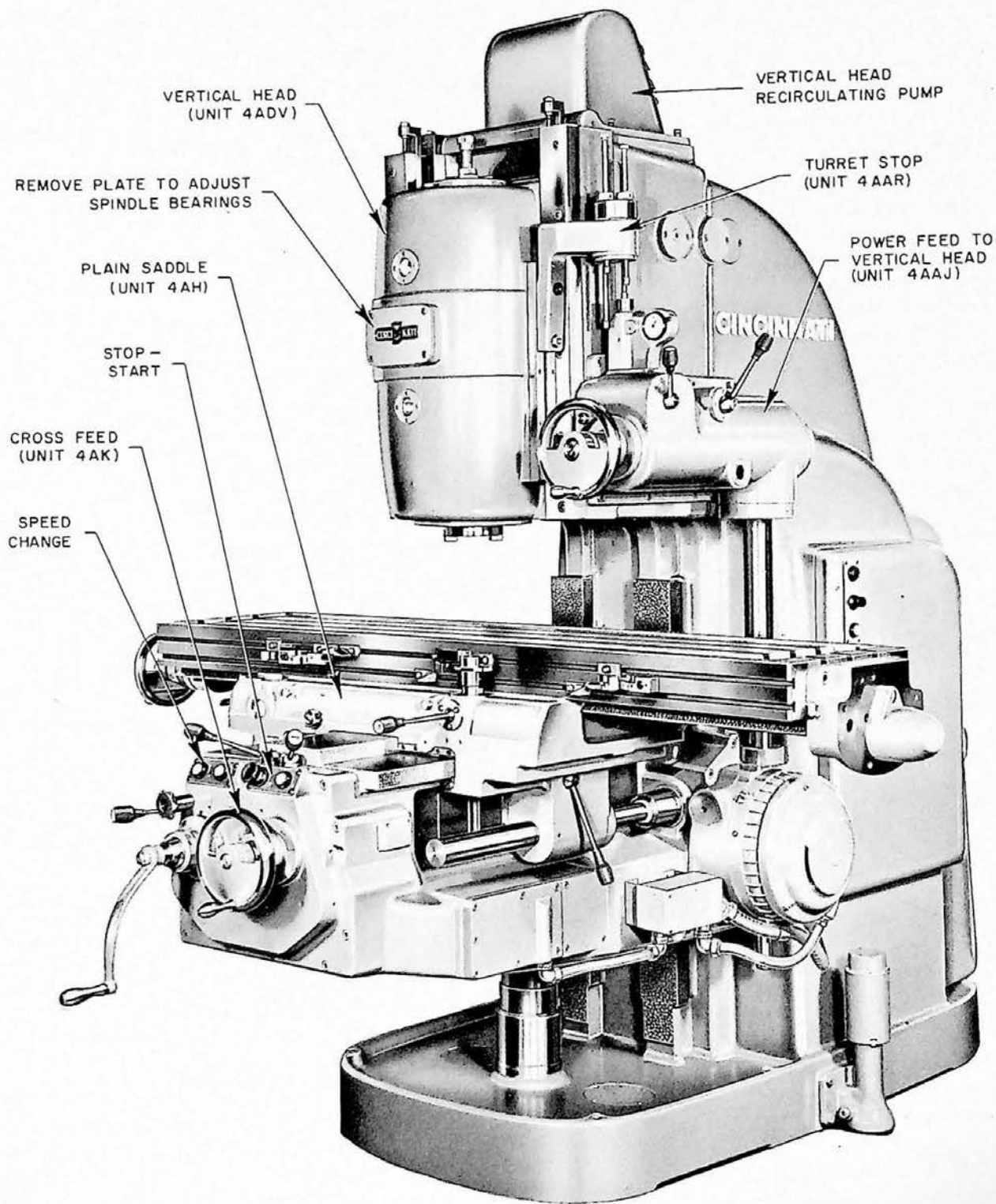


FIGURE 8  
No. 3 Vertical Machine

## FUNCTIONAL DIAGRAM

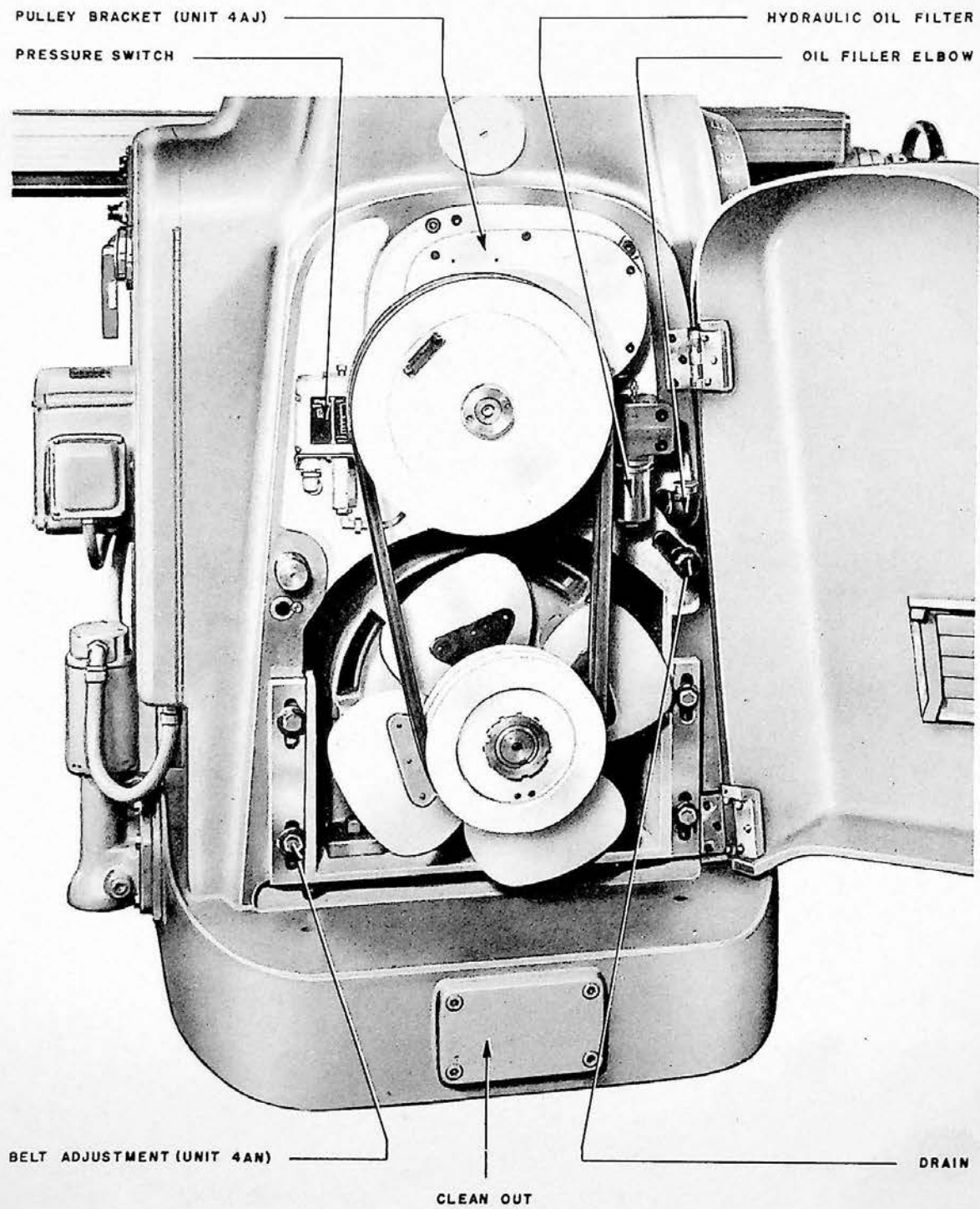
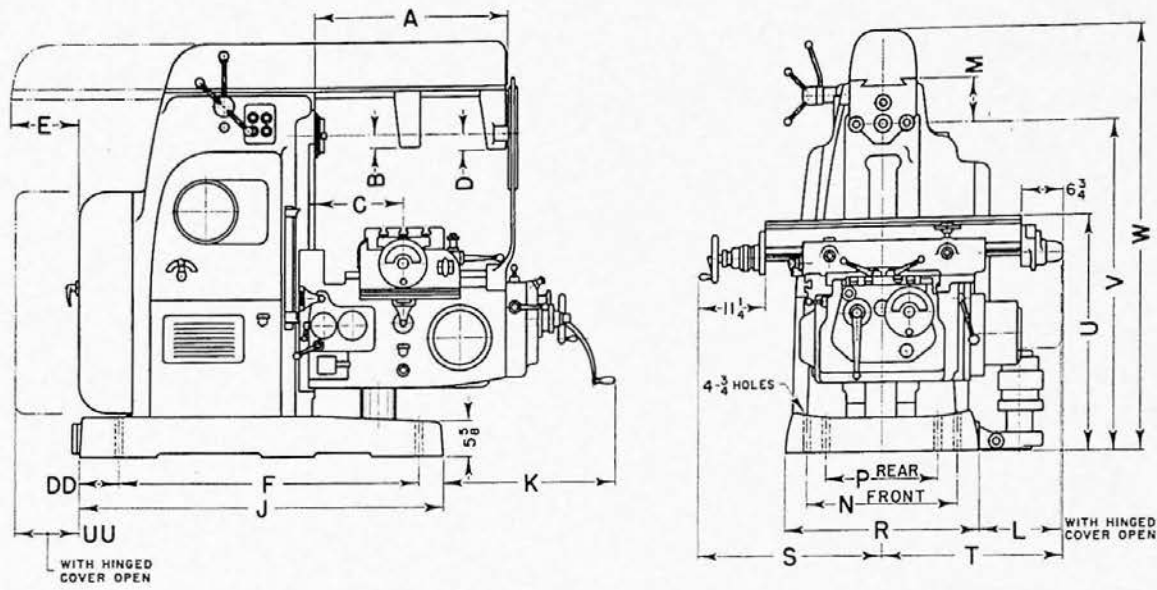


FIGURE 9  
Rear of Machine

# DIMENSIONAL DRAWING



SHADED AREA INDICATES  
MAXIMUM CUTTING AREA

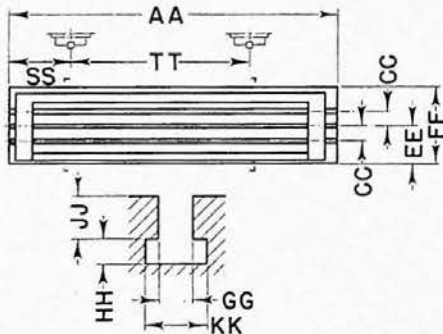
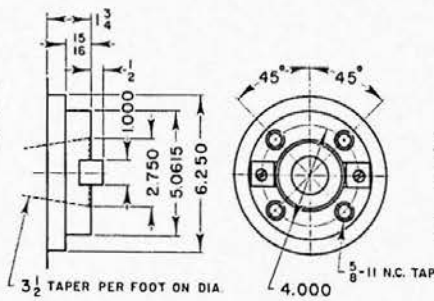
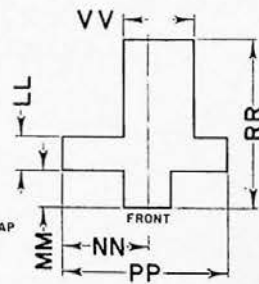


TABLE & TEE SLOT



SPINDLE NOSE

STANDARD FLANGED END  
WITH NO. 50 SERIES TAPER



FLOOR PLAN

PG-5024

ALL DIMENSIONS ARE IN INCHES

Size of Machine	A	B	*C		D	E	F	J	K	L	M	N	P	R	S		T		Size of Machine
			Min.	Max.											Min.	Max.	Min.	Max.	
No. 2 Universal	31	7/8	9 3/4	19 3/4	2 1/2	16 1/4	45 3/4	59 1/2	27 3/4	13 3/4	6 3/4	27	18	31 1/2	26 1/4	55 3/4	22 1/4	50 1/4	No. 2 Universal
No. 3 Universal	34 3/4	1 1/4	11 3/4	23 3/4	2 1/2	19 3/4	56 3/4	68	26 3/4	20 3/4	7 3/4	28	21	34	27 1/2	62	24 1/2	59	No. 3 Universal
No. 4 Universal	39	1 3/4	12	26	2 1/2	24	56 3/4	68	31 1/2	20 3/4	7 3/4	28	21	34	27 1/2	70	27 3/4	70 3/4	No. 4 Universal

Size of Machine	U		V	W	AA	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	RR	SS	TT	UU	Size of Machine
	Min.	Max.																				
No. 2 Universal	33 3/4	51 1/4	51 1/4	66 1/4	59 3/4	2 3/4	6 3/4	6	12 1/4	1 3/4	3 1/4	3/4	1 1/4	23	23	55 3/4	105 3/4	104 3/4	15 3/4	28	17 1/2	No. 2 Universal
No. 3 Universal	35 3/4	54 3/4	54 3/4	71 3/4	68 1/2	3 3/4	5 3/4	7 1/2	15 3/4	1 3/4	3/4	1	1 1/2	27 1/2	22 3/4	62	121	114 1/4	16 3/4	34	18 3/4	No. 3 Universal
No. 4 Universal	35 3/4	54 3/4	54 3/4	71 3/4	79 3/4	3 3/4	5 3/4	8	16 3/4	1 3/4	3/4	1	1 1/2	30 3/4	23 3/4	70	140 3/4	123 1/2	16 3/4	42	18 3/4	No. 4 Universal

Note: \*Maximum dimension C is without overarm brace.

# DIMENSIONAL DRAWING.

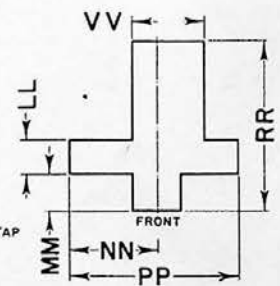
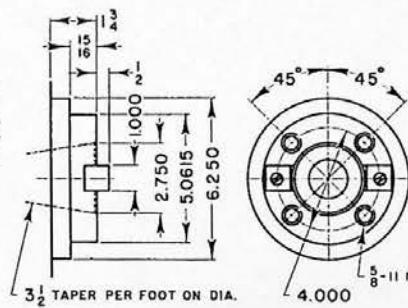
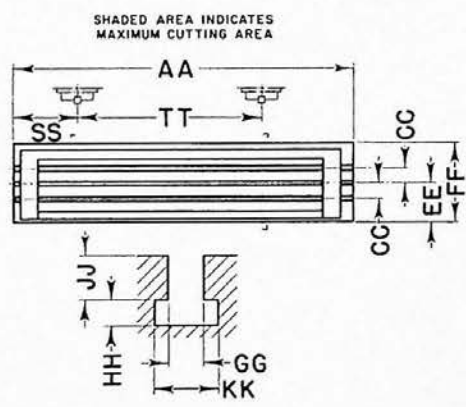
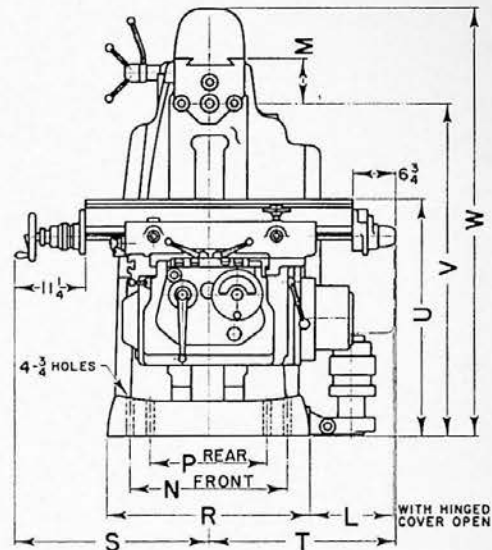
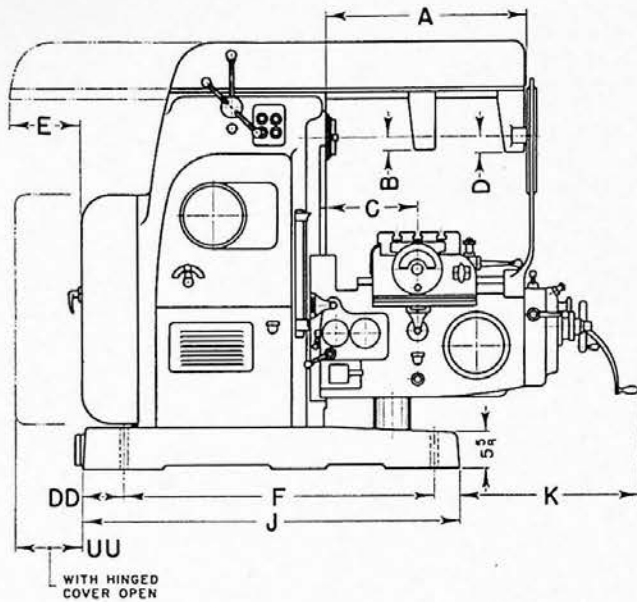


TABLE & TEE SLOT

SPINDLE NOSE

FLOOR PLAN

PC-5034

STANDARD FLANGED END WITH NO. 50 SERIES TAPER

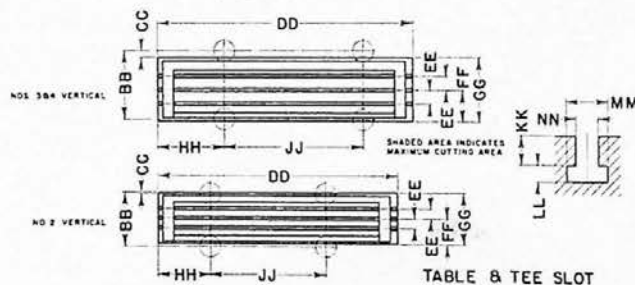
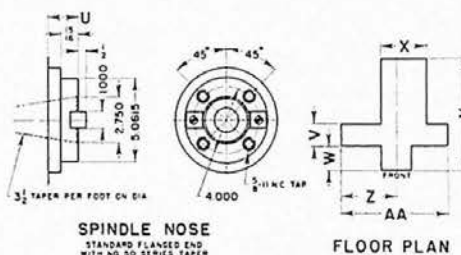
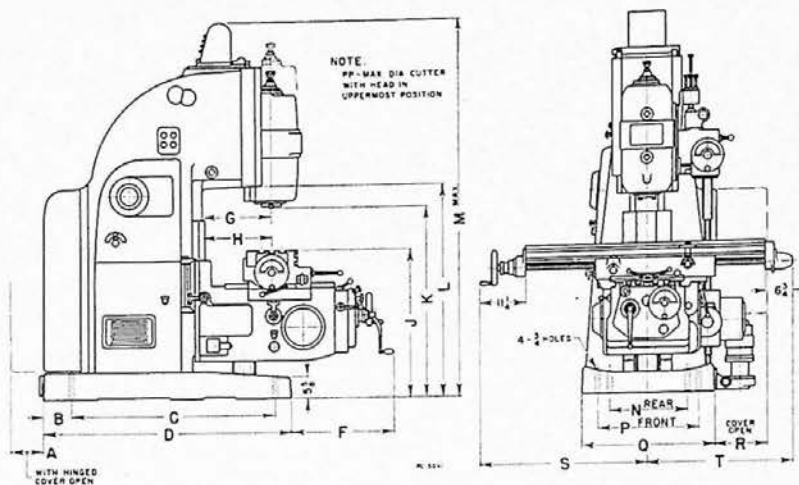
ALL DIMENSIONS ARE IN INCHES

Size Machine	A	B	*C		D	E	F	J	K	L	M	N	P	R	S		T		Size of Machine
			Min.	Max.											Min.	Max.			
No. 2 Plain	31	7/8	9 3/4	19 3/4	2 1/2	16 3/4	45 3/4	59 1/2	27 3/4	13 3/4	6 3/4	27	18	31 1/2	24 1/4	52 1/4	24 1/4	53 3/4	No. 2 Plain
No. 3 Plain	34 3/4	1 1/4	11 1/4	23 1/4	2 1/2	19 1/4	56 1/4	68	26 3/4	20 3/4	7 3/4	28	21	34	27 1/2	62	24 1/2	59	No. 3 Plain
No. 4 Plain	39	1 3/8	11 1/2	25 1/2	2 1/2	24	56 1/4	68	31 1/2	20 3/4	7 3/4	28	21	34	27 1/2	70	27 3/4	70 1/4	No. 4 Plain

Size of Machine	U		V	W	AA	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	RR	SS	TT	UU	Size of Machine
	Min.	Max.																				
No. 2 Plain	32 3/4	51 3/4	51 3/4	66 3/4	59 3/4	2 3/4	6 3/4	6	12 3/4	1 3/4	2 3/4	3/4	1 1/4	23	23	52 3/4	105 3/4	104 3/4	12 3/4	28	17 1/2	No. 2 Plain
No. 3 Plain	34	54 3/4	54 3/4	71 3/4	68 1/2	3 3/4	5 3/4	7 1/2	15 3/4	1 3/4	3/4	1	1 1/2	27 1/2	22 3/4	62	121	114	16 3/4	34	18 3/4	No. 3 Plain
No. 4 Plain	34	54 3/4	54 3/4	71 3/4	79 3/4	3 3/4	5 3/4	8	16 3/4	1 3/4	3/4	1	1 1/2	30 3/4	23 3/4	70	140 3/4	123 1/2	16 3/4	42	18 3/4	No. 4 Plain

Note \*Dimension C is without overarm brace.

# DIMENSIONAL DRAWING



ALL DIMENSIONS ARE IN INCHES

Size of Machine	A	B	C	D	F	G	H		J		K		L	M	N	P	Q	R	S		T		Size of Machine
							Min.	Max.	Min.	Max.	Min.	Max.							Min.	Max.	Min.	Max.	
No. 2 Vertical	17 1/2	6 1/8	45 7/8	59 1/2	27 3/8	16	9 3/4	21 3/4	31 3/8	44 3/8	45 1/4	51 1/2	50	88 3/8	18	27	31 1/2	13 3/8	24 3/8	52 3/8	24 1/8	52 1/8	No. 2 Vertical
No. 3 Vertical	18 3/4	5 7/8	56 1/4	68	31 1/2	18	11 3/8	27 3/8	33 1/2	49 1/2	49 1/2	55 3/4	54 1/4	98	21	28	34	20 3/8	27 3/4	61 1/4	24 3/4	58 3/4	No. 3 Vertical
No. 4 Vertical	18 3/4	5 7/8	56 1/4	68	31 1/2	18	11 1/2	27 1/2	33 1/2	49 1/2	49 1/2	55 3/4	54 1/4	98	21	28	34	20 3/8	27 3/4	69 3/4	28	70	No. 4 Vertical

Size of Machine	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP*	Size of Machine
No. 2 Vertical	1 1/2	25	21	45 3/8	104 3/8	52 3/8	105 3/4	12 3/8	3/4	59 1/4	2 3/8	6	12 1/4	13 3/8	28	7/8	3 3/4	1 1/4	1 1/8	10	No. 2 Vertical
No. 3 Vertical	1 3/8	31 1/2	23 3/8	54 3/8	118 3/4	62	121	16	1 3/8	68 1/2	3 1/4	7 1/2	15 1/4	16 1/2	34	1	5/8	1 1/2	1 3/8	10 1/2	No. 3 Vertical
No. 4 Vertical	1 3/8	32 1/2	21 3/8	54 3/8	118 3/4	70	140 1/4	16	1 1/4	79 3/4	3 1/4	8	16 1/4	16 1/2	42	1	5/8	1 1/2	1 3/8	10 1/2	No. 4 Vertical

\*PP Is Maximum Dia. Cutter With Head in Uppermost Position.

# CONVERSION CHART

(Based on 25.4mm = 1")

Inches into Millimeters

Inches	M/M	Inches	M/M	Inches	M/M	Inches	M/M	Inches	M/M		
1/64	.0156	0.3969	49/64	.7656	19.4469	34	863.600	82	2082.80	130	3302.00
1/32	.0313	0.7937	25/32	.7813	19.8437	35	889.000	83	2108.20	131	3327.40
3/64	.0469	1.1906	51/64	.7969	20.2406	36	914.400	84	2133.60	132	3352.80
1/16	.0625	1.5875	13/16	.8125	20.6375	37	939.800	85	2159.00	133	3378.20
5/64	.0781	1.9844	53/64	.8281	21.0344	38	965.200	86	2184.40	134	3403.60
3/32	.0938	2.3812	27/32	.8438	21.4312	39	990.600	87	2209.80	135	3429.00
7/64	.1094	2.7781	55/64	.8594	21.8281	40	1016.00	88	2235.20	136	3454.40
1/8	.1250	3.1750	7/8	.8750	22.2250	41	1041.40	89	2260.60	137	3479.80
9/64	.1406	3.5719	57/64	.8906	22.6219	42	1066.80	90	2286.00	138	3505.20
5/32	.1563	3.9687	29/32	.9063	23.0187	43	1092.20	91	2311.40	139	3530.60
11/64	.1719	4.3656	59/64	.9219	23.4156	44	1117.60	92	2336.80	140	3556.00
3/16	.1875	4.7625	15/16	.9375	23.8125	45	1143.00	93	2362.20	141	3581.40
13/64	.2031	5.1594	61/64	.9531	24.2094	46	1168.40	94	2387.60	142	3606.80
7/32	.2188	5.5562	31/32	.9688	24.6062	47	1193.80	95	2413.00	143	3632.20
15/64	.2344	5.9531	63/64	.9844	25.0031	48	1219.20	96	2438.40	144	3657.60
1/4	.2500	6.3500	1		25.4000	49	1244.60	97	2463.80	145	3683.00
17/64	.2656	6.7469	2		50.800	50	1270.00	98	2489.20	146	3708.40
9/32	.2813	7.1437	3		76.200	51	1295.40	99	2514.60	147	3733.80
19/64	.2969	7.5406	4		101.600	52	1320.80	100	2540.00	148	3759.20
5/16	.3125	7.9375	5		127.000	53	1346.20	101	2565.40	149	3784.60
21/64	.3281	8.3344	6		152.400	54	1371.60	102	2590.80	150	3810.00
11/32	.3438	8.7312	7		177.800	55	1397.00	103	2616.20	151	3835.40
23/64	.3594	9.1281	8		203.200	56	1422.00	104	2641.60	152	3860.80
3/8	.3750	9.5250	9		228.600	57	1447.80	105	2667.00	153	3886.20
25/64	.3906	9.9219	10		254.000	58	1473.20	106	2692.40	154	3911.60
13/32	.4063	10.3187	11		279.400	59	1498.60	107	2717.80	155	3937.00
27/64	.4219	10.7156	12		304.800	60	1524.00	108	2743.20	156	3962.40
7/16	.4375	11.1125	13		330.200	61	1549.40	109	2768.60	157	3987.80
29/64	.4531	11.5094	14		355.600	62	1574.80	110	2794.00	158	4013.20
15/32	.4688	11.9062	15		381.000	63	1600.20	111	2819.40	159	4038.60
31/64	.4844	12.3031	16		406.400	64	1625.60	112	2844.80	160	4064.00
1/2	.5000	12.7000	17		431.800	65	1651.00	113	2870.20	161	4089.40
33/64	.5156	13.0969	18		457.200	66	1676.40	114	2895.60	162	4114.80
17/32	.5313	13.4937	19		482.600	67	1701.80	115	2921.00	163	4140.20
35/64	.5469	13.8906	20		508.000	68	1727.20	116	2946.40	164	4165.60
9/16	.5625	14.2875	21		533.400	69	1752.60	117	2971.80	165	4191.00
37/64	.5781	14.6844	22		558.800	70	1778.00	118	2997.20	166	4216.40
19/32	.5938	15.0812	23		584.200	71	1803.40	119	3022.60	167	4241.80
39/64	.6094	15.4781	24		609.600	72	1828.80	120	3048.00	168	4267.20
5/8	.6250	15.8750	25		635.000	73	1854.20	121	3073.40	169	4292.60
41/64	.6406	16.2719	26		660.400	74	1879.60	122	3098.80	170	4318.00
21/32	.6563	16.6687	27		685.800	75	1905.00	123	3124.20	171	4343.40
43/64	.6719	17.0656	28		711.200	76	1930.40	124	3149.60	172	4368.80
11/16	.6875	17.4625	29		736.600	77	1955.80	125	3175.00	173	4394.20
45/64	.7031	17.8594	30		762.000	78	1981.20	126	3200.40	174	4419.60
23/32	.7188	18.2562	31		787.400	79	2006.60	127	3225.80	175	4445.00
47/64	.7344	18.6531	32		812.800	80	2032.00	128	3251.20		
3/4	.7500	19.0500	33		838.200	81	2057.40	129	3276.60		

0.001" = .0254 mm

0.01 mm = 0.0004"

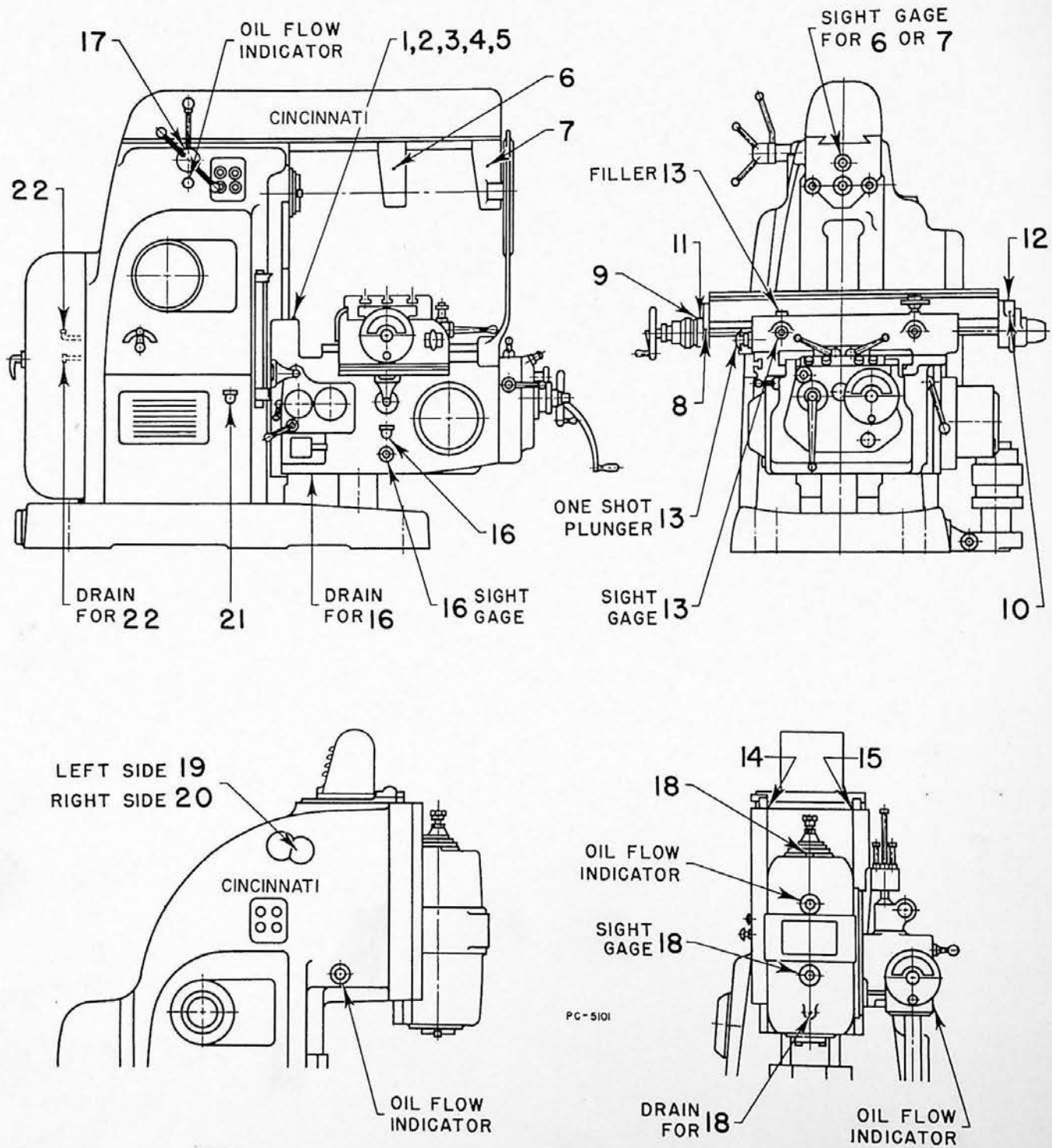


FIGURE 14  
Lubrication Diagram

# LUBRICATION INSTRUCTIONS and SPECIFICATIONS

(See diagrams, opposite page)

Thoroughly oil all moving parts as they are installed, then lubricate all principal points as listed below before starting motor. Periodic and thorough lubrication with correct lubricant, as specified, will help to maintain the long life and accuracy built into each machine. The intervals listed are based on a normal 8 hour day.

## PURCHASE LUBRICANTS FROM RELIABLE DEALERS

Interval	Station No. and Part Lubricated	Lubricating Instructions		Lubricant Specifications	
Daily (8 hours)	1, 2, 3, 4, 5	Knee-Column Vertical Ways		CMMCo. No. P-55 Rust and oxidation inhibited parafin base oil.  Viscosity 200-220 SUS at 100°F.	
	9, 10	Table Leadscrew Bearings			
	14, 15	Column-Vertical Headways			
	8	Handwheel knockout shaft bearing			
	11, 12	Auxiliary drive shaft bearings (when shaft used)			
	13	Table-Saddle ways, saddle- knee ways, under saddle bracket, crossfeed screw	Cap. 1 quart		Check daily. Maintain oil level near high limit. Pull plunger fully out 6 times daily and allow it to return itself.
	6, 7	Arbor support bearings	Cap. 1 - 2 pts. Check daily		Maintain oil level near high limit
Weekly (48 hours)	16	Knee gears and bearings	Cap. Notes 2 & 3 Check weekly		
	18	Vertical head gears and bearings	Cap. 1-1/2 gal. Check weekly		
	17	Pilotwheel bearing	A few drops of oil in oiler		
	22	Column gears and bearings	Cap. Notes 1 & 3 Check weekly	Keep filled to threads on elbow	
	19, 20	Counterweight sprocket shaft bearings	Apply 1 or 2 shots with a hand gun		
	21	Knee elevating screw	Cap. Plain & Universal - 5 pts. Cap. Vertical - - - - - 6 pts. Check weekly. Keep filled to threads on elbow.	CMMCo. No. P-53 Hydraulic-Slideway oil Viscosity 155-165 SUS at 100°F.	
Periodically	Electric motors	Lubricate to motor manufacturer's instructions. DO NOT OVER LUBRICATE.			

Note 1. Station No. 16 Capacities: No. 2 Machine - 6 gals. (23L); No. 3 Machine - 8 gals. (30L); No. 4 Machine - 10 gals. (38L). Drain after 30 days and each 6 months thereafter.

Note 2. Station No. 22 Capacities: Plain and Universal Machines - 2 gals. (7-1/2L); Vertical Machines - 10 gals. (38L). Drain after 30 days and each 6 months thereafter. If machine is operated continuously at a high speed range and column heats excessively use CMMCo. No. P38 oil (Viscosity 148-255 SUS at 100°F.) in column.

Note 3. The oil filters on knee and pulley bracket should be changed every two months. They are Skinner Purifier Elements No. AN 6235-3; CMMCo. No. 121486. Unscrew cylindrical housing, remove filter element and replace with a new one.

Approximate Coolant Tank Capacities: No. 2 - 15 gals., Nos. 3 & 4 - 20 gals. (57 and 76 liters).

See page 174 for recommended lubricants.



## INSTALLATION INSTRUCTIONS

### Foundation

Foundation requirements depend upon so many factors, such as speed of machine, rate of metal removal, etc., that it is not feasible to specify exact requirements to fit each condition.

We recommend a reinforced concrete slab foundation at least 6" thick and extending approximately 6" outside machine base. If the ground floor is of timber construction and the distance from solid ground to floor line is not too great, best practice is to cut a hole through wood floor and install a reinforced concrete base from ground to floor line. If floor is concrete covered with wood blocks or other insulating material, the usual practice is to remove this material and fill in with concrete to floor line.

If machine is to be located on an upper floor, place it directly over a supporting beam or girder. Such placing minimizes possibility of vibrations being transmitted to it from other machines.

We also recommend the use of grouted in hold down bolts. Fill pipes around bolts with dry sand before grouting-in bolt. Anchoring a machine helps maintain accurate alignment and level. (Figure 16A)

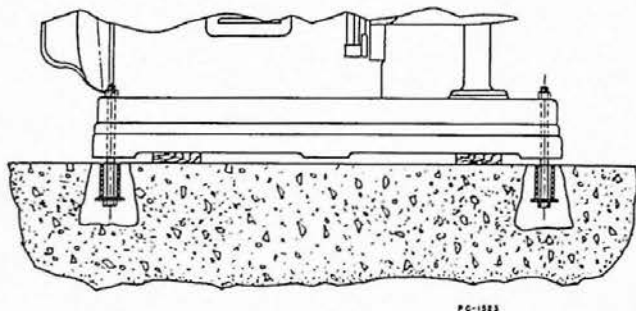


FIGURE 16A  
Bolting to Concrete Floor

### Lifting Machines

The plain or universal machine may be lifted with a rope or cable sling around the overarm. (Maximum weights of machines are as follows: No. 2 - 9,000 lbs; No. 3 - 11,500 lbs; No. 4 - 12,500 lbs.) The vertical machine should be lifted with a sling around column, back of vertical head.

Tighten overarm clamping bolts before lifting. If a cable is used, protect dovetails with a leather strap or wood blocks.

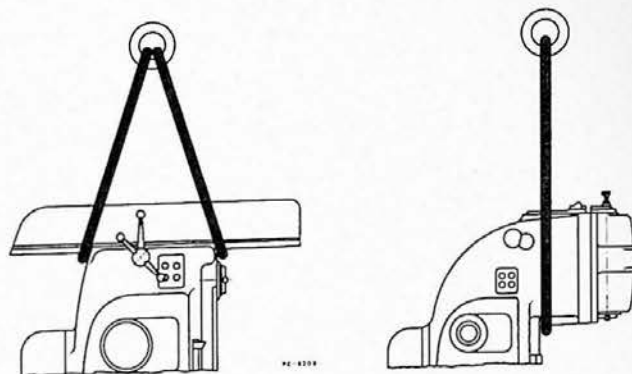


FIGURE 16B  
Lifting Plain and Vertical Machines

### Leveling

For leveling machine tools, a sensitive, graduated tube spirit level, reading to 10 seconds per graduation (0.005" per foot) and provided with screw adjustment, is required. A carpenter's level or the bulb in a machinist's combination square is not good enough. Length of a level frame has no bearing on its accuracy. The glass tube alone determines its sensitiveness. A short level with a long arced tube is best.

Insert laminated shims under corners of base until table is level in all directions. Then place additional shims under base to distribute machine weight evenly, and recheck for level. Machine table and spirit level must be absolutely clean to obtain accurate results.

Do not try to level machine that has just been brought into a shop. Give it 24 hours to take on room temperature. Do not expect a machine to remain level permanently. Buildings settle and floors warp. A periodic check-up is necessary to maintain utmost precision.

### Cleaning

Do not move any machine slides before cleaning thoroughly and oiling. Use a good grease solvent. Do not use an air hose for cleaning as it will drive grit and dirt into holes and under bearings. Use a stiff bristle brush to get into corners. When machine is thoroughly clean, rub machine oil over all ways and make sure there is no grit left. Prevent formation of permanent stain by periodic cleaning after installation.

## ADJUSTMENT

### To Adjust Gibs (Figures 17A and 17B)

Gibs are placed between sliding surfaces to provide adjustment for wear as it occurs. They should be tight enough to keep sliding members snug and in good alignment; but, not so tight that they cause extra wear along points of contact. Loose gibs will produce inaccurate milling. Tight gibs keep oil from lubricating sliding surfaces.

This machine has two types of gibs; head type gibs (Figure 17A) and headless gibs (Figure 17B). If gibs are removed, mark each gib so it will be replaced in its original position.

Adjustment of either type gib is the same except; lock nut must be loosened before adjusting screw in head type gib can be turned. Use a large hand-screw-driver for adjusting gibs.

1. To adjust table gib; center table in saddle, loosen lock nut and tighten gib adjusting screw until table drags considerably when moved from side to side with handwheel. (Do not tighten gib to point where table is locked and cannot be moved with handwheel.) Loosen gib slightly -- about a half turn of the adjusting screw -- and move table (with handwheel) to determine amount of drag induced by gib. Continue to loosen gib -- a small amount each trial -- until drag, produced by gib, is slight. Tighten lock nut. A torque of 75 inch-pounds is the correct force necessary to keep table leadscrew turning, once it has been set in motion.
2. To adjust knee gibs; raise knee to upper limit. Loosen knee gibs. Tighten inner gib (4AK-652, page 158). Lower and raise knee with handcrank to determine amount of drag set up by gib. Loosen gib slightly and check drag on handcrank again. Continue to loosen gib until only a slight drag is present. Adjust top left gib and then top right gib (663, 670) in same manner. Adjust bottom gibs (684, 686) last. Maintain equal handwheel drag from first to last gib adjustment. A torque of 300 inch-pounds is the correct turning force for keeping elevating shaft in motion as knee is being raised.
3. Saddle gibs are adjusted as outlined in preceding paragraph. Adjust center gib first, right gib next and left gib last. A torque of 100 inch-pounds is correct turning force for keeping cross screw shaft in motion.
4. Three head type gibs are used between vertical head and column. Before starting an adjustment, be certain all three are loose and have head near topmost position. Push center gib (4AC-451, page 72) into place with fingers, while winding head down with handwheel, until gib is tight. Wind head

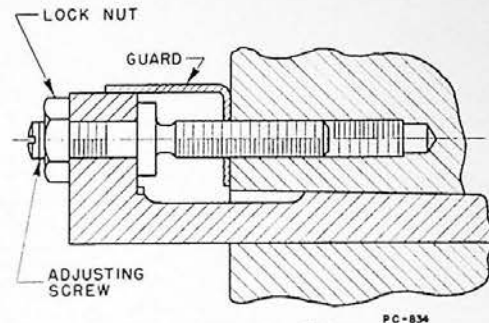


FIGURE 17A  
Section Through Head Type Gib

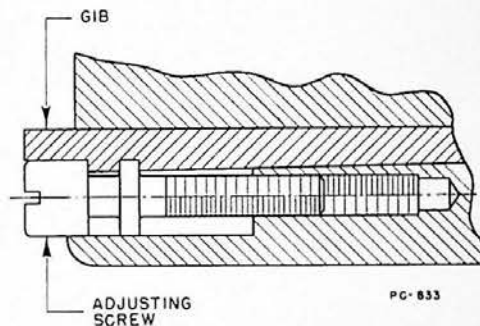


FIGURE 17B  
Section Through Headless Type Gib

up and loosen gib screw slightly. If gib is set correctly it will be possible to further loosen gib screw 1/8 turn with a 10" screw-driver, while head is at rest. Set right gib (457) and then left gib (453) in a similar manner.

With head stationary make certain that gib can be moved upward 1/8 turn of screw, then move back an equal amount. Mount a true arbor in spindle and indicate at front and then side of arbor while head is lowered and raised. There should be no more than .001" variation from top to bottom. (Make certain that left gib (453) does not bind - a 1/8 to 1/4 turn looseness in gib screw is preferable).

### To Adjust Main Drive V-Belts (Figure 9)

V-Belts used on this machine are of sufficient size and number to deliver maximum horsepower when used with the recommended motor and sheaves. Keep sheaves and belts clean. Use no belt dressing and wipe off oil or grease if any is spilled on belts.

When replacing belts, always replace the complete set and order "Matched" belts. ("Matched" belts are sized to assure they are all the same length -- so that some won't be loose and others tight.)

To adjust belts; open motor compartment door, loosen 4 motor mount clamping bolts and allow motor to settle in position from its own weight. Tighten clamping bolts and close door.

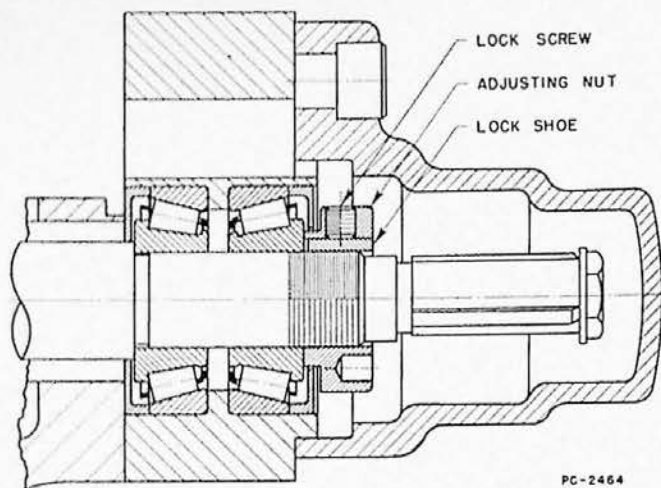


FIGURE 18A  
Right Table Apron

### To Adjust Table Leadscrew Bearing (Figure 18A and page 102)

The normal amount of "play" or lost motion in the leadscrew mechanism (with table gib adjusted correctly) is .005 inches of handwheel movement as measured on the graduated micrometer scale.

Excessive play should be removed as follows:

1. Remove bell-shaped cover from right end of table. Loosen lock screw in adjusting nut (4AH-40, page 102), tap screw to free locking shoe beneath it. Turn adjusting nut (40) counter-clockwise to be sure it is free; then turn clockwise until it is tight. Loosen adjusting nut about 1/16 of a turn. Tighten adjusting nut lock screw.
2. Place a rag over leadscrew (to protect your hand) and turn leadscrew by hand. Determine, by feel, if bearing has been adjusted correctly. Any indication of binding means the bearing is too tight; loosen adjusting nut another 1/16 turn and turn leadscrew again to determine feel of adjustment.
3. For general purpose work, play should not exceed .004 inches. If excessive play is present after a correct adjustment of nut (40), replace adjusting nut.
4. Replace bell-shaped cover when bearing is properly adjusted.

### To Adjust Cross Feed Screw Bearing (Figure 18B and page 128)

The cross feed screw is supported by a pair of roller bearings near its front end. The normal amount of "play" or lost motion is .005 inches as measured

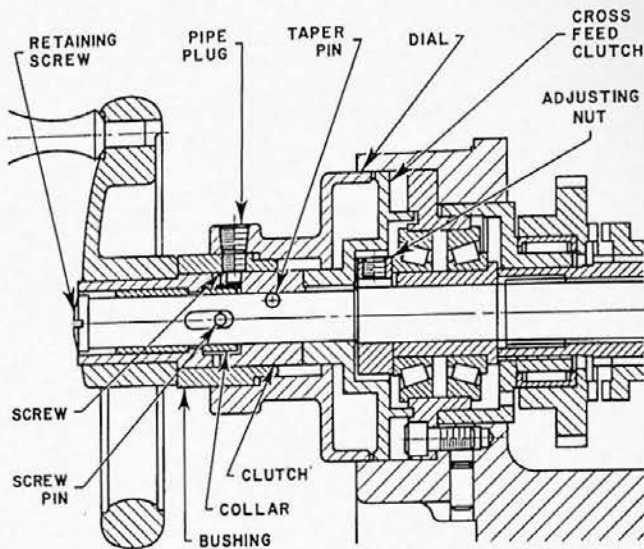


FIGURE 18B  
Cross Feed Screw Bearings

on the graduated micrometer dial. When more play develops, it should be removed as follows:

1. Remove retaining screw from end of cross feed shaft and lift off handwheel. Remove pipe plug from dial and rotate dial until set screw in spring retaining bushing is accessible. Remove set screw. Slide handwheel clutch, bushing, spring and cross feed dial off end of shaft. Remove pins from small collar and front clutch and remove from shaft. Use plug puller (Figure 23B) to remove cross feed clutch or use jack screws through face of clutch.
2. Loosen set screw in adjusting nut (4ACY-122), tap screw to release lock shoe beneath it. Use a spanner wrench to turn adjusting nut. Tighten nut and then loosen 1/20 turn. Turn cross feed shaft, by hand, to determine feel of adjustment. If binding is noticed, loosen nut 1/20 turn each trial until shaft turns freely and with no more than .005 inches of play. Tighten adjusting nut set screw when bearing adjustment is correct.
3. Replace dial clutch, front clutch and small collar. Slide dial spring and spring retainer on shaft and lock retainer with set screw. Replace pipe plug in dial, handwheel clutch and handwheel on shaft.

### To Adjust Front Elevating Screw Bearing (Figure 19A and page 126)

The front end of elevating shaft is supported by two tapered roller bearings. With knee gibs correctly adjusted, normal "play" in this shaft is .005 inches as measured on graduated micrometer dial. Excessive play should be removed as follows:

1. Remove front bracket, see page 28.

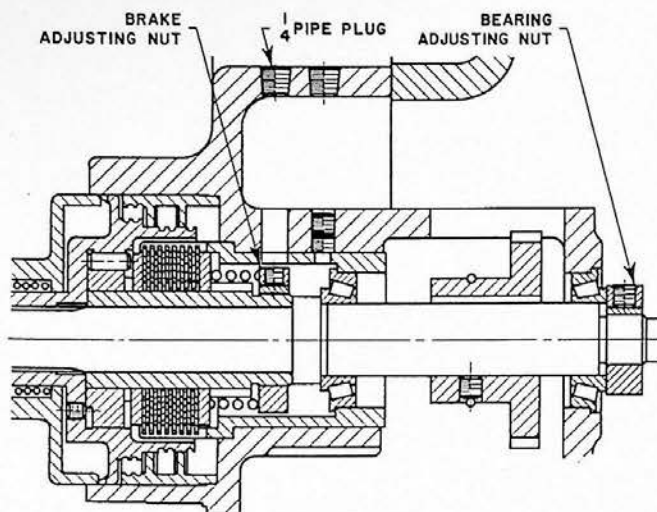


FIGURE 19A  
Knee Elevating Shaft

2. Loosen set screw in adjusting nut (4ACY-31, page 126) and tap screw to release locking shoe beneath it. Turn adjusting nut clockwise (as seen from rear of bracket) to tighten. Then loosen nut 1/20 turn. Turn elevating crank to determine feel of adjustment. If binding is noticed, loosen nut 1/20 turn each trial until shaft turns freely and with no more than .005 inches of play. Tighten adjusting nut set screw when bearing adjustment is correct.
3. Apply sealer to mating surface of front bracket and replace bracket in knee. Replace oil in knee.

### To Adjust Vertical Screw Brake (Figure 19A and page 126)

The vertical screw brake is a multiple plate disc type mounted on front end of elevating shaft. It operates through an over-running device which allows the brake to be inactive while the knee is being raised. Adjustment of brake is correct when knee does not coast more than ten divisions on dial after release from rapid traverse. If brake adjustment is needed, proceed as follows:

1. Remove 1/4 inch pipe plug (Figure 19A) from left side of front bracket. Align set screw in brake adjusting nut (53) with pipe plug hole and insert a hexagon key in set screw. Loosen set screw and tap to loosen locking shoe beneath it. Leave key in set screw and rotate elevating shaft slightly counter-clockwise to insure freedom of locking shoe. Turn shaft clockwise about one turn. Tighten set screw and remove hexagon key.
2. Hook a spring scale over handle of elevating crank and pull handle counter-clockwise to lower knee. On a nine inch crank arm, the scale should register about a 20 lb. pull if brake is set correctly.

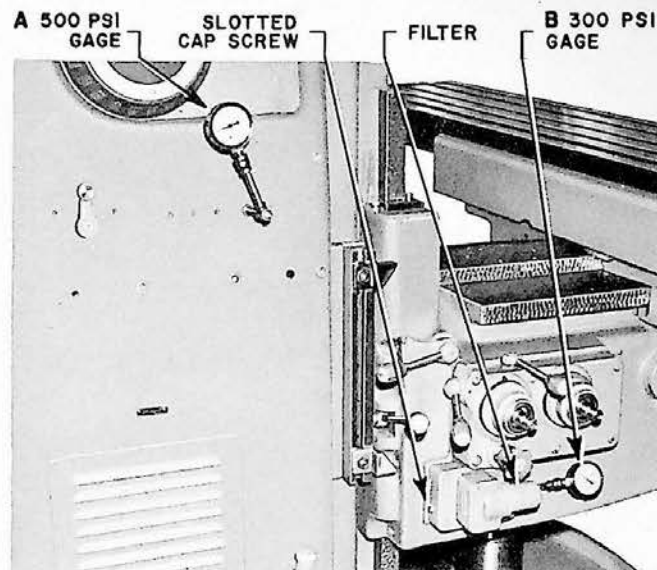


FIGURE 19B  
Knee and Column Oil Pressure Gages

Change brake adjustment, as necessary, until a torque of 180 inch-pounds will keep handle moving. Tighten set screw in adjusting nut when satisfactory adjustment is obtained. Replace pipe plug (11).

### To Adjust Column and Knee Hydraulic Oil Pressure (Figure 19B; pages 46 and 154)

This machine has two hydraulic systems operating independently of each other. Hydraulic oil pressure in the column changes spindle speeds and maintains pressure on the clutch and brake. Hydraulic oil pressure in the knee changes table, saddle and knee feeds and shifts gears for rapid traverse movement. If one of these actions is slow, sluggish or jumpy, it may be due to hydraulic pressure being far below normal. Therefore, low pressure is usually detected quickly because the machine fails to run smoothly. High pressure does not effect the operation of the machine. However, it generally causes hydraulic leaks and above normal pressure should be suspected if leaks occur.

Hydraulic pressure should be checked each time a filter is changed; every two months, under average conditions.

1. Run machine until oil is warm. Stop machine and set reversing lever in neutral (center position). Insert a 500 psi gage in place of 1/4" pipe plug A (Figure 19B) to obtain column pressure or a 300 psi gage in place of pipe plug B nearest filter (Figure 19B) to obtain knee pressure.
2. For column hydraulic pressure, remove slotted screw (4AJ-69) and lock screw (67); turn adjust-

ing screw clockwise to increase pressure, turn counter-clockwise to decrease. Start motor and note reading on gage. Make additional adjustments, if necessary, until gage reads about 280 psi. Turn off machine. Replace lock screw and cap. Remove gage and replace plug.

3. For knee hydraulic pressure, remove slotted screw (4AK-571) and lock screw (569); turn adjusting screw clockwise to increase pressure, turn counter-clockwise to decrease. Start motor and note reading on gage. Make additional adjustments, if necessary, until pressure gage reads 100 psi. Turn off machine. Replace lock screw and cap. Remove gage and replace plug.

### To Adjust Main Drive Clutch and Brake (Page 48)

The main drive clutch and brake are self-adjusting if column hydraulic pressure is maintained at 280 psi. Clutch and brake are engaged by a hydraulically operated piston. As clutch or brake plates wear, piston follows up until plates are completely worn out.

Any sign of faulty clutch or brake functioning is an indication of low hydraulic pressure or worn out plates. See "To Adjust Column Hydraulic Pressure" on page 19 or, "To Remove and Dismantle Pulley Bracket (Unit No. 4AJ)" on page 23.

### To Adjust Dynapoise Overarm (Figure 7 and page 58)

A dynapoise element in the overarm dampens most vibrations set up when taking a cut. Under severe conditions it may be necessary to re-adjust this element to obtain maximum smoothness of operation.

Before changing Dynapoise setting, make certain gibs, clamps, fixtures and leadscrew bearing are set correctly. Also see that speeds, feeds and cutters are correct for the cut -- sometimes a heavier chip per tooth will help.

1. Remove screw from name plate at front of overarm. Swing plate down on opposite pin. Remove lock key from collar (4AC-7, page 58).
2. While machine is running in cut, tighten or loosen central screw until chatter disappears. Turn adjusting screw left or right to lineup a lock key slot. Replace key and name plate.

**CAUTION:** Never leave adjusting screw locked tightly against internal compression spring. Screw must be free to rotate a few turns in either direction.

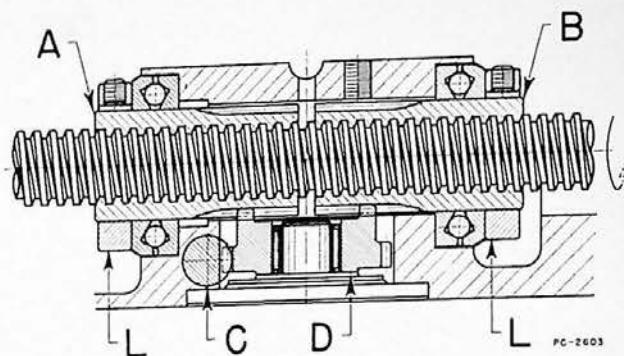


FIGURE 20  
Backlash Eliminator Nuts

### To Adjust Arbor Support Bushings (Figure 6 and page 58)

If arbor support bushing is loose, it could cause a rough or uneven surface on the work piece. A loose bushing may also result in chatter. When the bushing is too tight, arbor support becomes hot.

Arbor support bushing fits in a tapered hole. Tightening adjusting nut draws bushing into taper and causes it to close around arbor.

1. Check oil supply in arbor reservoir. Start machine and stop spindle. Select highest spindle speed then set spindle reversing lever in neutral (center) position.
2. Stop machine and rotate arbor by hand to determine torque required to turn arbor. Remove lock roller (4AC-52) from adjusting nut (61). While turning arbor by hand, tighten or loosen adjusting nut until a slight drag is felt. Replace lock roller in nearest serration of adjusting nut.

### To Adjust Backlash Eliminator (Figure 20 and page 104)

Normally, this mechanism is self-compensating for wear and should not require adjustment for many months. Any need for adjustment will be indicated by:

- (a) Jumpy table movements while climb milling
- (b) Stiff turning of knurled actuating knob
- (c) Difficult manual operation of table

The knurled actuating knob at front of saddle should turn easily (approximately 5 turns) from fully engaged to fully disengaged. From fully "IN", knob will turn from 2-1/2 to 2-3/4 turns before moving rack.

1. Remove bell-shaped cover at right end of table. Loosen lock screw, tap to free lock shoe and remove bearing adjusting nut.
2. Remove left table apron from table. (See page 32). Scribe mark location of table gib (for ease

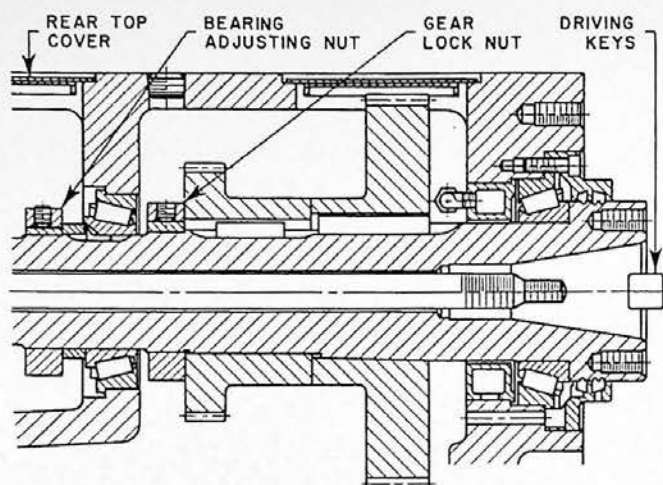


FIGURE 21A  
Section Through Horizontal Spindle

in resetting), loosen gib and slide table to right until backlash nuts are uncovered. Support outer end of table as it is being moved to right.

3. Set knurled actuating knob (at front of saddle) in disengaged position -- fully out.
4. Loosen set screw, tap to loosen lock shoe on both backlash nuts L. Tighten backlash nuts until they are tight against their thrust bearings. Tighten lock screws. With a rag around lead screw, it should be possible to rotate screw by hand. When knurled knob is turned in 2-1/2 to 2-3/4 turns, it should be impossible to rotate lead screw by hand but, it should be possible to turn knurled knob in another 2-1/4 to 2-1/2 turns to make backlash fully effective.
5. Slide table back into position, mount left table apron, adjust table lead screw bearing and re-set table gib.

### To Adjust Spindle Bearings (Figure 21A and 21B)

Spindle bearings are too loose if spindle "run out" is more than .0008 inches (measured at a point on the arbor 6 inches from spindle nose). If bearing temperatures exceed 145°F. after four hours of continuous running at high speed, then bearings are too tight.

Steps between successive cuts (when slab milling on plain or universal machines or, when face milling on a vertical machine) could mean the spindle bearings are loose. But, do not tighten spindle bearings until these points have been checked:

- (a) gibs are set correctly;
- (b) cutter is sharp and true;
- (c) arbor taper is clean and free of burrs;
- (d) arbor is true;
- (e) spindle "run out" exceeds .0008 inches.

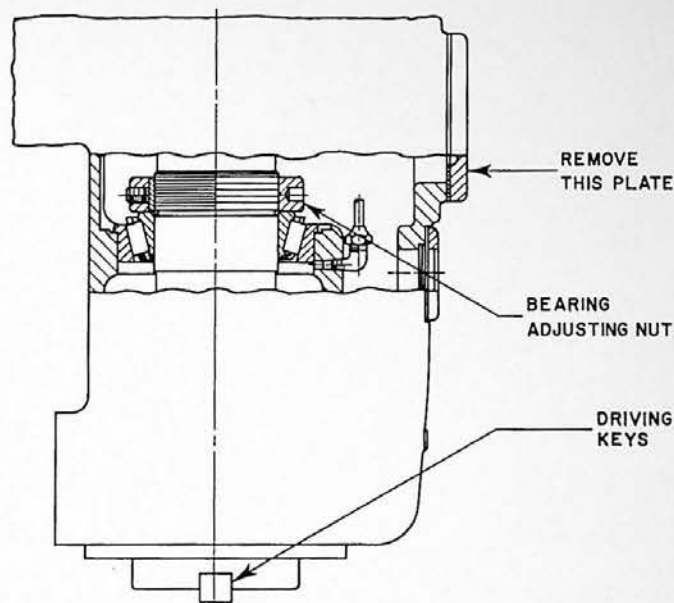


FIGURE 21B  
Section Through Vertical Spindle

Check spindle bearing temperature with a dial type thermometer. Remove oil retaining ring cap screw from front spindle cap (plain and universal machines) or, from bottom of head (vertical machines). Insert thermometer in cap screw hole to obtain a reading.

If spindle bearings need adjusting, proceed as follows:

1. Start machine and run spindle at any speed above 500 rpm. Stop spindle and place reversing lever in neutral (center) position. Stop machine.
2. Remove both driving keys from spindle nose and clamp a 1 inch square bar, 12 inches long, into driving key slots. On plain and universal machines, slide overarm forward enough to remove rear cover plate located between overarm guide-ways. On vertical machines, remove cover plate from front of vertical head. Loosen adjusting nut locking screw with a long handle wrench and tap wrench to free locking shoe beneath it. Place a 3/8 inch rod in adjusting nut wrench hole. Turn spindle nose counter-clockwise to loosen adjusting nut. Loosen nut about one full turn, then tighten adjusting nut until bearing is drawn up snug.
3. Remove steel rod from adjusting nut and turn spindle nose a few turns to be sure bearing is seated properly. Check "run out". Tighten or loosen adjusting nut until "run out" is correct. Then tighten lock screw in adjusting nut.
4. Replace driving keys in spindle nose and replace column cover or vertical head cover plate. Check temperature to be sure bearing has not been set too tight.

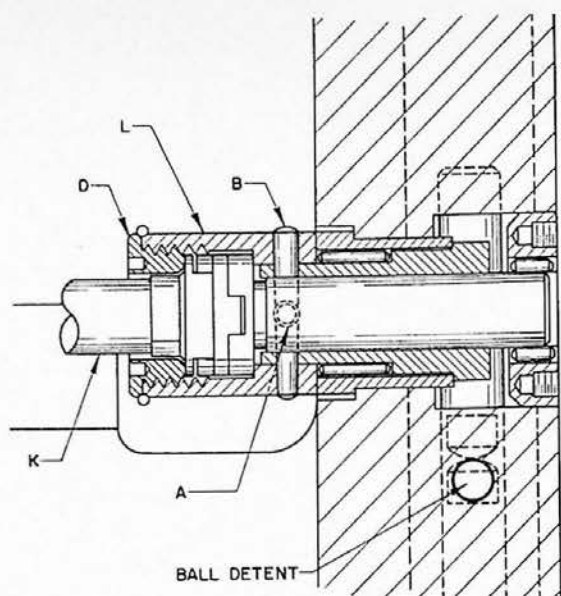


FIGURE 22A  
Horizontal Control Shaft Coupling

### To Adjust Relationship Between Feed Trip Plunger and Control Plunger (Plain and Vertical Machines) (See Figures 22A, 22B and pages 118, 152)

This adjustment would normally be necessary only if a new control valve (4AK-480, page 152) or connecting linkage between it and feed trip plunger (4AH-525 or 539, page 118) were installed. If a new control valve is to be installed, we recommend replacing the extension shaft (4AK-493), coupling sleeve (498) and extension shaft bushing (491), also.

1. Have machine running and saddle forward on knee. Loosen nut D enough so that horizontal coupling shaft K can be pulled forward sufficiently to disengage it from coupling. (If original parts are being re-used, it is first necessary to remove taper pin.)
2. Clamp a steel bar 1/4 inch by 3/4 inch by 12 inches onto coupling sleeve L so that it forms an angle of 30° counter-clockwise from a vertical position. (See Figure 22B).
3. With machine running, slowly push bar counter-clockwise (depressing control valve plunger 4AK-480) until ball detent snaps over rise in valve and valve is ready to fire into rapid traverse position. (At this point, bar jumps slightly and would continue on down if not held.) Pencil mark rear face of knee in line with top of bar. Repeat a few times to make certain that position is correct. Continue moving bar slowly in same direction until you hear rapid traverse clutch engage. Again mark

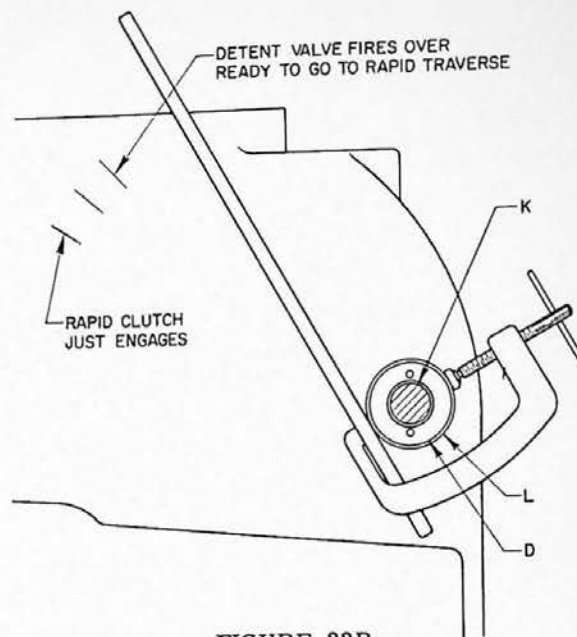


FIGURE 22B  
Marking Face of Knee

knee in line with bar. Repeat a few times to check location of this last mark. Pencil mark an intermediate line on face of knee 1/4 inch to 3/8 inch above (clockwise from) the last rapid traverse engaging mark.

4. Shut off machine. Set table feed trip lever (4AH-525, page 118) at front of saddle -- down into a feed left or right position. Move coupling counter-clockwise with clamp bar until top of bar is in line with intermediate mark. Hold bar, push back horizontal coupling shaft (4AK-495) and re-connect coupling.
5. Set feed control trip lever in neutral and loosen screw A (Figure 22A) in coupling sleeve L. Set feed control trip lever into a rapid traverse right or left position. Slowly slide the left table reverse dog into contact with feed trip plunger so wing of plunger is resting on lead edge of reverse dog shelf. Retighten screw A in coupling sleeve. Make certain that feed trip plunger -- if new -- has vertical clearance under left hand reverse dog on table.
6. Start machine. With saddle forward on knee, run table right and left so dogs trip feed trip plunger at lowest table feed. Try this test at a few intermediate feeds and then at highest feed rate. Move saddle to back of knee and repeat this test of table reversing action. If movements are smooth throughout, drill and ream coupling and insert taper pin B. The setting should be such that as shelf of dog passes out from under wing of feed trip plunger this plunger will have been rotated enough to engage feed clutch in opposite direction and as it drops it will shift control valve into

rapid traverse position. If rapid traverse occurs too soon, loosen set screw A in coupling and rotate coupling sleeve a few degrees in a clockwise direction, then retighten screw A. While turning coupling sleeve it is necessary to hold coupling

shaft so it won't turn. If table reverses in feed -- not in rapid traverse -- loosen screw A and rotate coupling sleeve counter-clockwise a few degrees, then retighten screw A. Never move coupling more than a few degrees at a time.

## DISMANTLING INSTRUCTIONS

Parenthetical numbers refer to key numbers of parts list section.

On all shoe type lock nuts - loosen radial set screw and tap screw to loosen lock shoe under it before unscrewing nut.

To remove blind sealing plugs, valve plungers, etc., use a plug puller similar to Figure 23B.



FIGURE 23A  
Removing Pulley Bracket

### To Remove and Dismantle Pulley Bracket, (4AJ-26) (Figures 23A, 24A, and pages 46 through 49)

If shifter bracket is to be removed also, start machine and run spindle (for a few seconds) at any speed

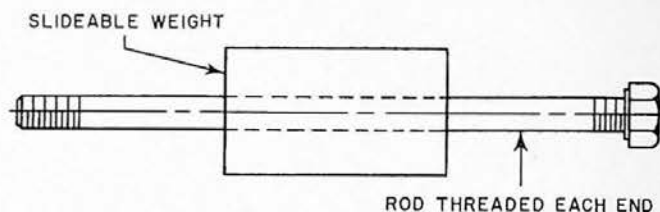


FIGURE 23B  
Typical Plug Puller

above 500 rpm. (Omit this step if shifter bracket is not being removed.)

1. Loosen 4 motor mount screws, raise motor and blockup. Remove V-belts. Remove 3/4 inch pipe cap (Figure 14) and drain column oil. Remove pipe plug from top of bracket and replace with a 1/2 inch eyebolt. Connect hoist to eyebolt and take a slight strain on lifting cable. Remove 8 cap screws (4AJ-85, page 46), tap completely around flange of pulley bracket to break seal and move bracket straight out from column. Clean and seal mating surfaces of column and bracket before assembling. Be sure to refill column with oil.
2. Oil filter head (76) can be removed while pulley bracket is attached to column. To remove oil filter head, disconnect tubing from compression elbows (84, 71), remove 4 screws (56) and lift head off bracket.
3. To remove oil pump (50), loosen set screw in lock nut (102) tap screw to release locking shoe beneath it, and remove lock nut from shaft. Tap sheave, to loosen, and remove sheave from shaft. Remove 9 cap screws (38), tap cover to break seal and remove cover. Loosen set screw in lock nut (20), tap screw to release locking shoe beneath it and remove lock nut. Tap shaft (101) out back of casting and remove cluster gear (22) as it comes off shaft. Remove 3 screws (49) from oil pump body. (To reach 2 screws on upper part of pump body turn gear (33) until screws are accessible through holes in gear). Lift pump out of bracket.
4. For easiest removal of clutch and brake shaft (119), remove plug (115), insert a long screw driver into shaft of clutch drive pulley gear (116) and remove choke plug (118). Pass a threaded rod through pulley gear (116) and screw it in place of choke plug. Place a washer and nut on exposed end of threaded rod and run nut up snug.



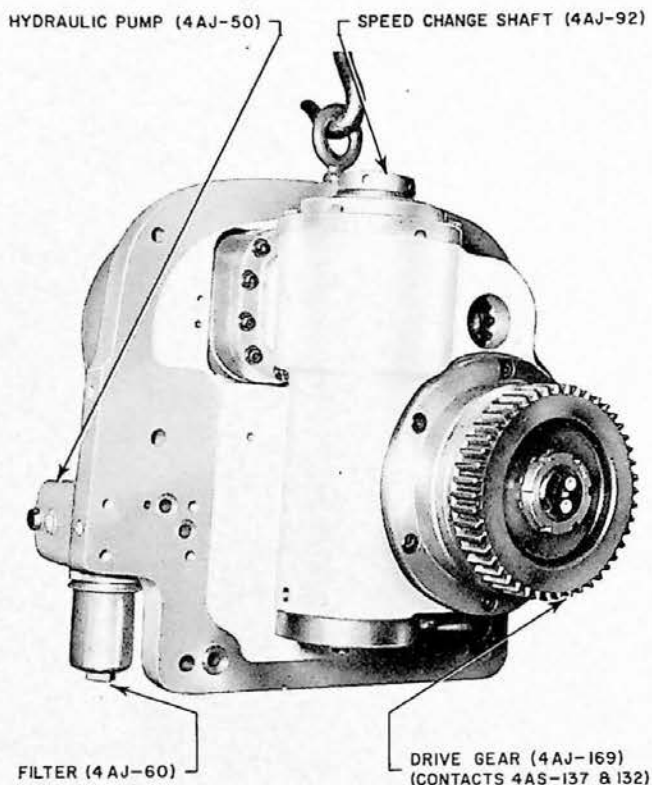


FIGURE 24A  
Rear of Pulley Bracket

This rod will hold shafts (116, 119) together (as an assembly) while they are being removed. Remove driven pulley cap (104). Loosen set screw in lock nut (105), tap screw to release locking shoe beneath it and remove nut from shaft. Disconnect tubing from 2 fittings (163). Remove 6 screws from retainer (161) and remove clutch and brake shaft (with all assembled parts) from back of casting.

5. To remove speed change shaft (92); disconnect tubing from fitting (79), then remove fitting. Remove 2 screws holding distributor collar (98) to casting and remove collar. Loosen set screw in lock nut (95), tap screw to release locking shoe beneath it and remove lock nut from shaft. Remove 4 cap screws (7) and lift speed change shaft, with all assembled parts, out of casting.
6. Clean and seal pulley cap (104) and pulley bracket cover (39) before assembling.  
NOTE: Distributor collar (98) floats on screws (80), even when screws are tight.

### To Remove and Dismantle Shifter Bracket, (4AS-19) (Figures 24B, 25 and pages 50 thru 55)

1. Remove pulley bracket, see page 23.
2. Replace screw (20) with a 1/2 inch eyebolt. Attach hoist to eyebolt and take slack out of cable.

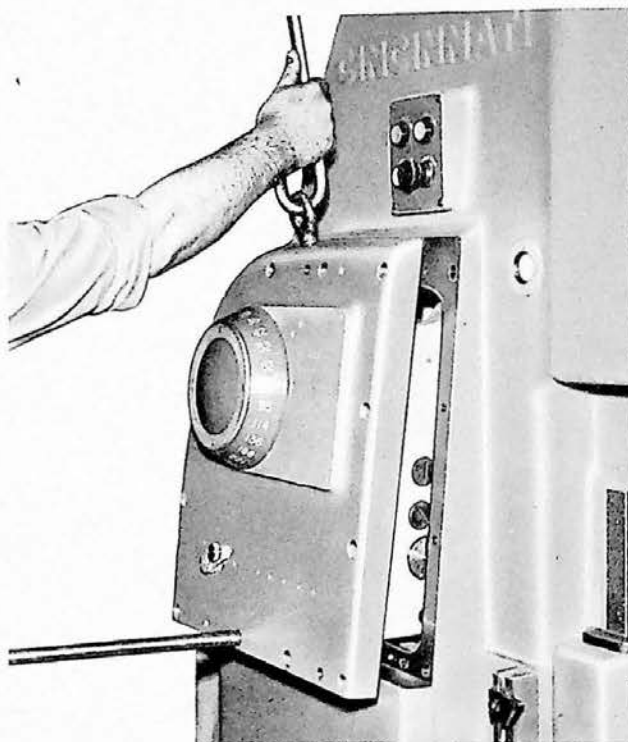


FIGURE 24B  
Removing Shifter Bracket

Remove 11 screws (45) and tap casting to break seal. Insert a 5/8" x 3' rod in any bolt hole at bottom of bracket and pry bracket loose from column. Keep rod in bottom bolt hole (to help guide bracket) and move shifter bracket straight out from column.

When replacing shifter bracket, move gear (4AC-147, page 62) toward front of machine and move Shifter bracket fork (4AS-66) to extreme right of bracket, so these parts will line up properly as shifter bracket enters column. (Horizontal machines)

After replacing shifter bracket, actual spindle speed may not agree with speed indicated on shifter bracket dial. To correct this, set spindle for highest speed, loosen 4 cap screws (1), turn dial until highest speed reading is opposite pointer on column and tighten cap screws.

3. It will be easier to re-assemble shifter bracket if all parts are tagged as they are removed. Mark tubing as it is removed and leave fittings in place where ever possible. Loosen set screw in lock nut (115), tap screw to release locking shoe beneath it and remove nut from shaft. Remove lock nut (110) the same way and tap "B" shaft (135) out left side of casting (as viewed from rear).
4. Loosen set screw in lock nut (112), tap screw to release locking shoe beneath it and remove lock nut from shaft. Spread retaining ring (106) and remove from shaft. Tap "C" shaft (129) to right and remove from casting.

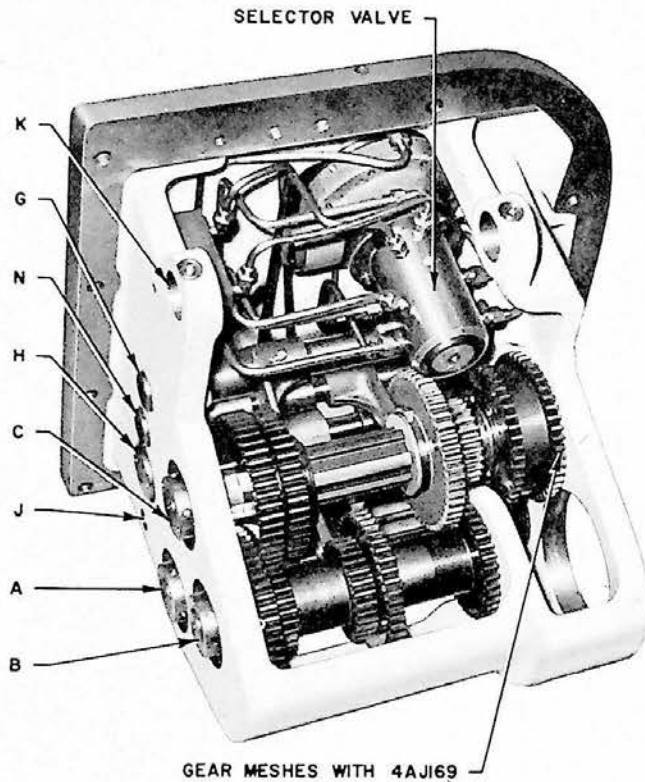


FIGURE 25  
Shifter Bracket

5. Loosen set screw in lock nut (122), tap screw to release locking shoe beneath it and remove lock nut from shaft. Tap "A" shaft (121) to right to remove from casting. "C" shaft idler gear (132) can now be removed by taking off retaining ring (130), removing screws (104) and driving gear housing out of casting from the inside.
6. To remove piston and fork from "K", "G", "N" or "H" cylinders; remove cotter pin, in-gear-pin and cap from either cylinder. Slide piston out open end of cylinder and remove fork as it clears end of piston. (Ordinarily, there is no need to remove cylinders. However, if they are removed, be sure to replace them in their original positions.)
7. Set screw (30) fits into groove in pinion (42). Loosen this screw to remove pinion. After pinion is removed, "J" reversing shaft can be removed by loosening set screw (128), removing in-gear-pin (98) and sliding shaft out right side of shifter bracket, as viewed from the rear.
8. Hydraulic motor assembly is removed from dial side of shifter bracket. Remove dial and dial screw (14). Lift dial flange (15) out of cover (8). Disconnect tubing from fittings in motor sleeve (26). Support motor and remove 6 screws (6). Lift motor assembly out of bracket.

**CAUTION:** Don't change speeds when spindle reverse lever is in neutral - thus bypassing synchromesh - as clashing gears may result.

### To Remove Spindle from Plain and Universal Machines (4AC-69) (Pages 58 thru 62)

1. Remove pulley bracket (page 23) and shifter bracket (page 24).
2. Use plug puller (Figure 23B) to remove drive plug (162, page 62). Loosen set screw in lock nut (163), tap screw to release locking shoe beneath it and remove lock nut from shaft. Tap "D" shaft (159) out front of machine with roller bearing (160) attached.
3. Pull bearing cap (151) from front of machine. Loosen set screw in lock nut (144), tap screw to release locking shoe beneath it and remove nut from shaft. Support cluster gear (147) and tap cluster gear shaft (150) out front of column.
4. Loosen gib clamp and remove overarm (4AC-10, page 58) from top of column. Support overarm as it is withdrawn from column guides. Remove column cover plates (85, 87), arbor draw-in bolt, spindle keys (74), spindle cap (77) and spindle bearing cap (97). Place a 1 inch square bar in spindle key slots to keep spindle from turning. Loosen set screw in lock nut (98), tap screw to release locking shoe beneath it and remove nut from shaft. Loosen lock nuts (128, 132) in the same manner. Turn flywheel until the keyway in spindle is pointing straight up and insert a 1/2" eyebolt into hole of flywheel rim and support flywheel with a bar across top of column. Support bull gear from a crane by means of a clamp. Tap spindle shaft forward slightly, then back and remove bearing key (71).

Unscrew lock nuts on spindle, tap spindle forward. Tap flywheel as well as bull gear to rear, off tapers, until spindle can be removed from front of machine.

### To Remove Vertical Head (4ADV-11 or 229) and Spiral Gear (4AC-377) (Figures 26A and 26B; pages 82 thru 89, 68 thru 72)

1. Drain oil from vertical head. Loosen gear shifter cap plug (4AC-409, page 70), remove 3 screws (4AC-413) and run vertical head down slightly to free cap (407) with its two pins from under head. Unscrew plug (409) and remove cap with cylinder housing (389).
2. At top, right corner of vertical head cover, remove screw (4AC-433) and loosen screw (434). Roller curtain spring stud (422) will spin - due to

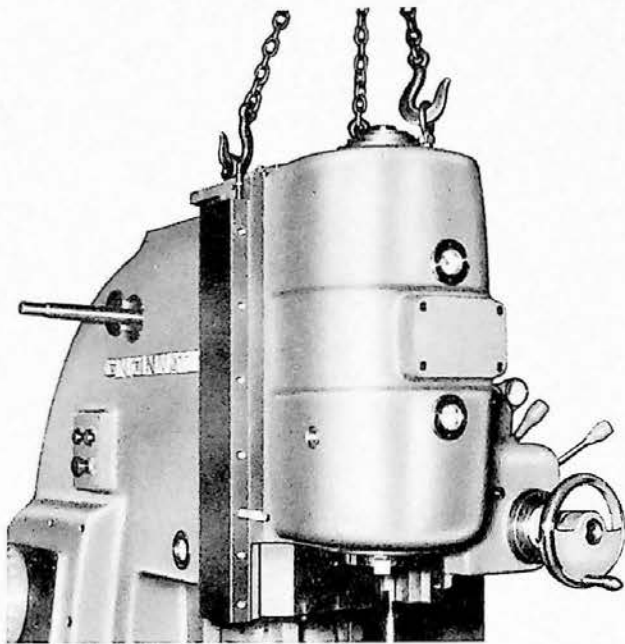


FIGURE 26A  
Installing No. 2 Vertical Head

spring tension - as screw is loosened. (When assembling, put tension in spring by turning stud and locking in position with set screw.) After tension is taken off curtain spring, remove screws (444) and curtain clamp (443); this disconnects curtain from column. Release tension in counter-balance springs by easing off nuts (565, 568 or equivalent) under cover (460). Remove screws (415 or 438) and lift off top column cover. On No. 2 machines only it is also necessary to partially drive spring lever shaft (506) out side of column to further release spring levers (487, 494) so they clear vertical head (Figure 26B). When replacing shaft be careful not to damage needle bearings in spring levers.

3. Attach a three-point suspension sling to vertical head and transmission housing. (Remove 3/8" pipe plug (4ADV-12, page 82) and insert a 3/8" pipe reducing bushing, whose I.D. has been tapped 3/8-16 to take an eyebolt, for one point. The other two points would be to 3/8" eyebolts in cap screw holes at back of straight portion of transmission housing.) Maintain a slight strain on sling as vertical head elevating handwheel is rotated to bring elevating screw up and clear out of its housing. Remove turret housing (4AAR-12, page 166).
4. Loosen and remove center gib (451) without changing gib screw setting. Check to see that hoisting sling is properly rigged with equal strain on lines. Mark gibs (so they'll be replaced in their original position) and remove left and right clamp rails (4AC-461, 462 - page 72). Left and right gibs will come off with clamp rails.

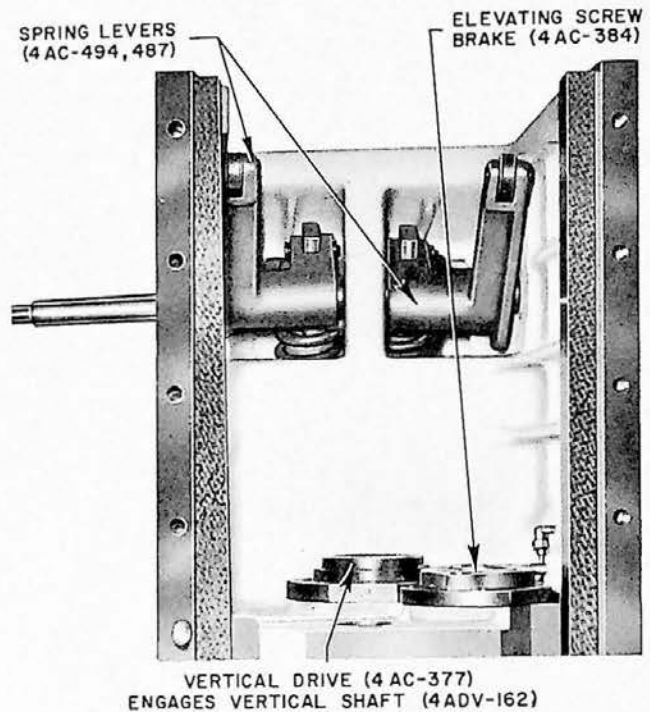


FIGURE 26B  
No. 2 Column Without Vertical Head

5. Raise head until spline shaft (4ADV-162, page 86) is clear of column. Push gear shifter piston (145) high enough to clear casting and move vertical head forward out of column.

Place vertical head on wood blocks and block up beneath transmission housing or leave hoisting sling attached.

NOTE: In the upright position, the vertical head is off balance and will topple if not properly blocked up.

6. When replacing vertical head, remove column cover plate and further release tension on counter-balance springs before positioning head in column. Set compression of springs, after gibs have been adjusted but with machine shut off, to counter-balance weight of vertical head.
7. Remove plug (4AC-406, page 70) from underside of column casting. Remove 6 screws (371) and tap bevel drive gear (377) assembly out of column from beneath.

### To Remove Column Gearing from Vertical Machines (4AC-367, 350) (Page 68)

1. Remove pulley bracket (page 23) and shifter bracket (page 24). Raise vertical head to upper limit and remove drive plug (369) from front of column.

Loosen set screw in lock nut (368), tap screw to release locking shoe beneath it and remove nut from shaft. Remove lock nut (356) in the same manner. Loosen set screw in lock nut (361), tap screw to release locking shoe beneath it and loosen nut until it is clear of threads on shaft (367). Tap speed change shaft (367) out front of column and gear(s) as shaft is removed.

2. Remove vertical head and bevel drive gear (page 25). Loosen set screw in lock nut (351), tap screw to release locking shoe beneath it and remove lock nut from shaft. Loosen set screw in lock nut (354), tap screw to release locking shoe beneath it. Tap shaft forward about 1/2 inch. Loosen lock nut (354) two turns and tap shaft forward until back of shaft clears web in column casting. Remove lock nut, tap gear (355) to loosen and remove gear from spiral bevel gear shaft (350). Remove shaft through front of column.

When assembling, replace spiral bevel gear shaft first; then replace speed change shaft.

### To Remove Spindle—No. 2 Vertical Machine (4ADV-56) (Pages 82 and 84)

1. Remove vertical head (page 25). Remove front and rear cover plates (40, 29) and transmission housing cover (1). Loosen set screw in lock nut (117), tap screw to release locking shoe beneath it and remove nut from shaft. Block up within a half inch of vertical shaft (162) and tap shaft down on to blocks. Loosen set screw in lock nut (163), tap screw to release locking shoe beneath it and unscrew nut until it is clear of threads on shaft. Support shaft from splined end, remove blocks and tap shaft down slowly until it is clear of casting. Gear (164) can be picked out of transmission housing after shaft is removed.
2. Reach in through back of transmission housing and remove screw (106). Loosen set screw (105) and pull limit pin (107) from gear. Rotate gear a half turn and remove limit pin (99) in the same manner. Gear shifter cylinder assembly 128 through 133, 135 through 138 and 141 through 145 can now be removed. Block up within 1/2" of shaft (150). Loosen set screw in lock nut (114), tap screw to release locking shoe beneath it and remove nut from shaft. Remove seal housing (139). Tap shaft down onto blocks. Support shaft, remove blocks and remove shaft from underside of casting.
3. Remove split ring (3) and spindle caps (4 and 6). Loosen set screw in lock nut (8), tap screw to release locking shoe beneath it and remove nut from top of spindle shaft. Turn vertical head upside down. Reach in through opening in front of vertical head and loosen set screw in lock nut (20), tap screw to release locking shoe beneath it and unscrew nut until it is clear of threads on shaft.

Remove driving keys from spindle nose and replace with eyebolts. Attach hoisting sling to eyebolts and lift spindle (56) slightly and then tap it back to release bearing key (55). Pick out bearing key and hoist spindle out of vertical head.

### To Remove Spindle—Nos. 3, 4 Vertical Machines (4ADV-177, Page 88)

1. Remove vertical head (page 25). Lower head solidly onto wood blocks and remove transmission housing cover (194) and screw (197). (Also see page 94). Remove split ring (187), spindle caps (188 and 190) and retaining ring (191). Replace lifting sling, lower hoist until head is face down on blocks. Remove sling and eyebolts. Place 2 eyebolts in bottom of vertical head, attach hoisting sling and raise off blocks. Lower head onto blocks in upside down position. Disconnect 1/4 inch oil tubing (271, page 90 or 92). Remove screws (216) and tap casting to separate transmission housing from vertical head.
2. Remove arbor driving keys (179) and oil retainer (181). Loosen set screw in lock nut (235), tap screw to release locking shoe beneath it. Place a 1/2 inch square bar in arbor driving slots and loosen lock nut (233). Loosen lock nut (235) in the same manner. Screw eyebolt into spindle nose (replacing either of screws 178) and attach hoist to eyebolt. Raise spindle slightly then tap it back to release bearing key (176). Lift out key. Tap spindle gear (234) to release it from taper as spindle is lifted out of vertical head.

### To Dismantle Vertical Head Transmission Housing (Nos. 3 and 4) (4ADV-215) (Page 84)

1. Remove vertical head from column (page 25) and separate transmission housing from vertical head per instructions above.
2. Remove screws (104, 106), loosen set screws (105) and remove limit pins (99, 107). Remove plugs (102, 111) and springs (103, 112). Balls (101, 113) are resting in groove on sliding shaft (150). These balls will keep shaft from being withdrawn until spring tension is removed and balls can slide back into spur cluster gear.
3. Loosen set screw in lock nut (114), tap screw to release locking shoe beneath it and remove lock nut from shaft. Remove seal housing (139) and tap shaft out of casting.
4. Remove oil pump plungers (98, 158) if so equipped. Loosen set screw in lock nut (117), tap screw to release locking shoe beneath it and remove lock nut from shaft. Tap shaft down about 1 inch

(onto wood blocks), loosen set screw in lock nut (163), tap screw to release locking shoe beneath it and loosen nut until it is clear of threads on shaft. Tap shaft out of casting.

### To Remove Vertical Head Elevating Screw (4AC-384 and Brake) (4AC-387) (Page 70)

1. Proceed as per instructions, "To Remove Vertical Head", on page 25. Elevating screw (384) is attached to right side of vertical head transmission housing and is removed with vertical head. The elevating screw is held in place by a castellated nut.
2. Remove screw brake (387) as follows: remove bottom bearing cap (404), loosen set screw in lock nut (402), tap screw to release locking shoe beneath it and remove nut from bottom of elevating screw housing. Tap housing up and out of casting. Remove shoulder screw (394), work screw brake from side to side to loosen pin (386) and pull screw brake from dust cover (388).

### To Remove and Dismantle Power Feed to Vertical Head (4AAJ-30) (Pages 96 thru 100)

1. Unscrew upper telescopic tube (111) from bottom of cap (105) and lower tubes onto feed motor bracket. Hold vertical drive shaft (110) and remove lower taper pin (108) from shaft coupling. Lower shaft, slowly, into feed motor bracket. Remove throwout clutch dog (4ADV-9, page 167) and turret stop housing (4AAR-12). Remove 2 screws holding indicator housing (4AAR-30), to power feed unit. Wrap a rope sling around gear box (4AAJ-30, page 96) and remove 8 screws (27). Move gear box straight out from side of column and place it on wood blocks on work bench.
2. Remove access plate (88), 6 screws (107), tap bottom cap (105) to break seal and lift bevel gear (96) assembly from underside of casting.
3. Use plug puller and remove plug (23). Remove 6 screws (71) from bevel gear housing, pull housing out of casting, with bevel gear (66) assembly.
4. Remove clamp lever (117). Remove 4 screws (129) and pull interlock rack bearing housing (127) from gear box. Draw shaft (124) out front of gear box. Remove screws (118, 119), nut (112) and set screw (113). Use a plug puller and remove drive plug (114). Remove plug, spring and ball (132). Lift interlock rack (121) straight up and out of gear box.
5. To remove power feed to head shaft (45); remove slotted screw (49) and handwheel (50), unscrew

collar pin (51) and slip collar (50) off shaft. Remove pipe plug (54) and turn feed dial (53) until set screw (52) is accessible. Remove screw and slide dial clutch (61) and power feed dial off shaft. Remove 6 screws and slide front bearing cover (64) off shaft. Loosen set screw in lock nut (55), tap screw to release locking shoe beneath it and loosen lock nut about 3 full turns. Reach through rectangular opening in rear of gear box and loosen lock nut (40) in the same manner. Remove 6 screws and lift off horizontal shaft cap (10).

6. Remove taper pin and lever (162). Remove screws (122, 123) and screw (160) in face of detent shaft cap (159). Use jack screws or a plug puller to remove cap. On back of casting, remove screw (136) and use plug puller to remove plug (137). Through (137) plug hole, tap end of shifter shaft (143) and drive this shaft, with all assembled parts, out front of casting. Loosen nut (16) and tap to loosen wedge bolt (5) in shifter fork (6). Draw head feed trip rack (44) out of casting and remove clutch shifter fork as rack is removed. Tap shaft forward (to left) and lift spacer (17) over splines on shaft and remove spacer. Draw head shaft (45) out of gear box.

### To Remove and Dismantle Front Bracket (4ACY-14) (Figures 28 and 29; pages 126 thru 132)

1. Raise knee to upper limit and drain oil by removing pipe plug (4AK-690) on page 158. If knee is equipped with rear control bracket, place vertical control lever in neutral position and wire lever so it will remain in neutral. Use 3/8" threaded plug puller and remove plugs, (4ACY-98, 107) from front face of bracket. Remove slotted

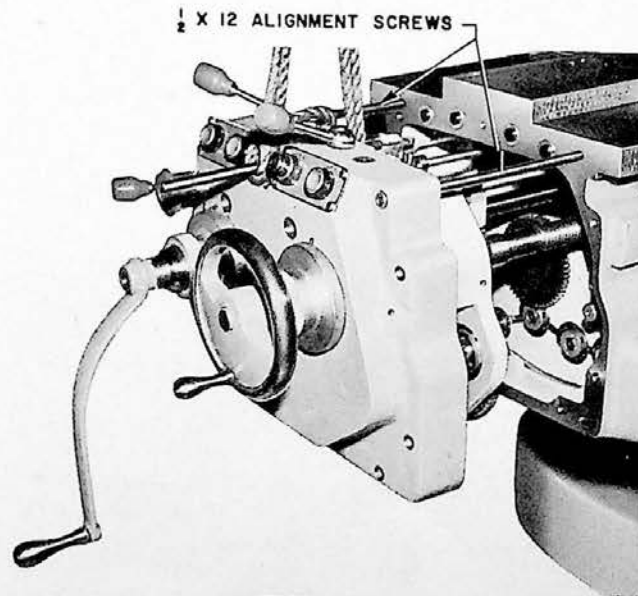


FIGURE 28  
Installing Front Bracket

nuts (251, 261) with a screwdriver through (98, 107) plug holes. Replace plug (93) with a half inch eyebolt. Attach hoist to eyebolt and take slack out of cable. Remove 7 screws (126), tap around entire edge of front bracket (where it mates with knee) to break seal. Turn cross screw handwheel counter-clockwise as front bracket is drawn out of knee. Sway bracket slightly, if necessary, to release control rods that may be caught in notches of links and levers.

2. When replacing bracket, clean and seal mating surfaces of bracket and knee. Screw a 1/2 x 12 inch threaded rod into each top corner of knee (See figure 28) and start front bracket onto these rods. (Threaded rods will guide bracket straight into knee. Keep hoist attached to bracket until bracket is securely screwed to knee). Pull saddle forward on knee. Turn cross screw handwheel as cross screw enters bracket-under-saddle. Continue to turn handwheel and bracket will be drawn into knee. Turn elevating handcrank to help splined shaft enter elevating gear inside knee. Sway bracket, as necessary, to make internal control rod connections.

3. Front bracket shafts must be removed in this order; safety gear shaft (196); reverse gear shaft (158); sleeve coupling (175); cross screw (145); power elevating shaft (40); hand elevating shaft (44).

4. Use 1/2" plug puller and remove plug (170) from front of bracket. Loosen set screw in shoe type lock nut (171), tap screw to release locking shoe beneath it and remove lock nut.

NOTE: On all shoe type lock nuts, release locking shoe by tapping loosened radial set screw before attempting to loosen and remove nut.

Remove shoe type lock nut (209) and slide safety gear (205) assembly off shaft. Draw shaft (196) out of casting with overdrive feed clutch gear (181) with clutch assembly attached.

5. Replace 3/8" screw (156) with plug puller and remove plug (157). Remove slotted lock screw (167) from back of bracket casting. Tap shaft (158) from front of bracket and lift off reverse gear (151) as shaft is removed from bracket.

6. With a 1/2" plug puller, remove swivel housing plug (160). Loosen set screw in lock nut (161), tap screw to loosen lock shoe under it and remove lock nut and bearing (162). Remove set screw (154). Loosen set screw (155), tap coupling shaft (175) from front and remove spline shaft gear (149) as shaft is drawn out back of casting. (Bearing (177), bearing spacer and retaining ring (179) do not have to be taken off to remove sleeve coupling (175).

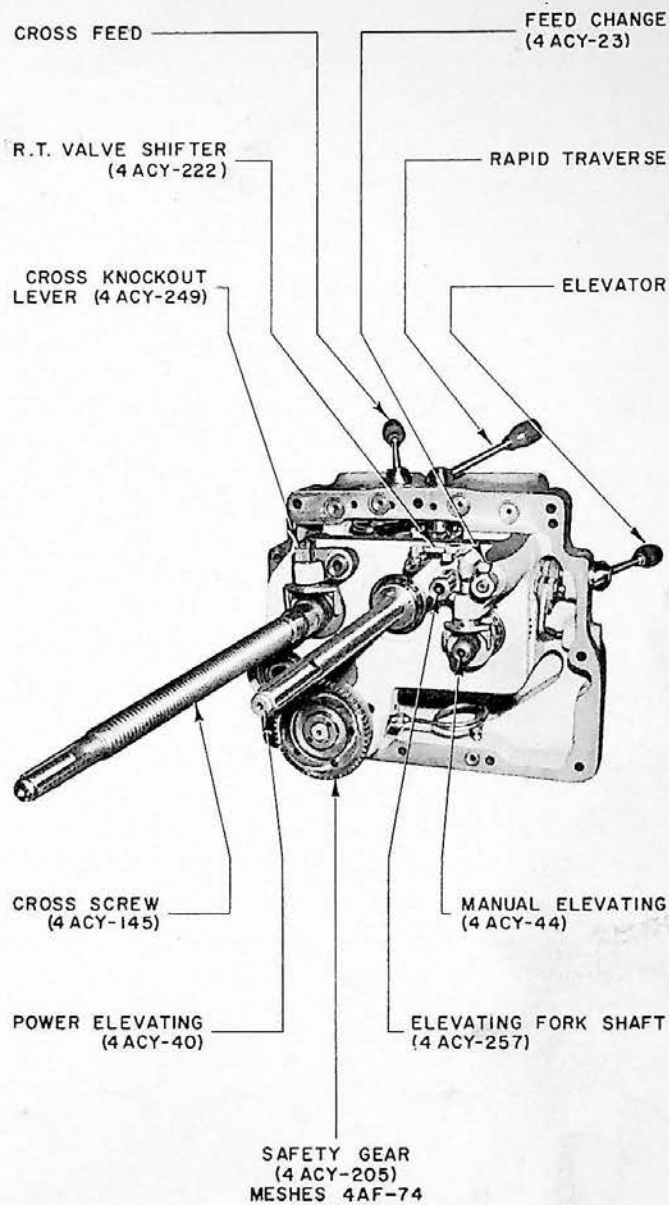


FIGURE 29  
Rear of Front Bracket

7. Remove screw (135) and take off handwheel. Remove pipe plug (125) from cross feed dial (120). Turn dial until set screw (140) can be removed through tapped hole in dial. Slide clutch and spring retainer off end of shaft. Tap pins (142, 117) out of small collar (141) and clutch (118).

Slide small collar, clutch, spring and dial off end of shaft. Tap cross feed clutch (121) to loosen from key and remove clutch from shaft. Remove spring ring (134) and pin (124) from cross knockout sleeve. Remove shoe type lock nut (122), bearing (103) and pull cross screw (145) out back of bracket.

8. With a 1/2" plug puller, remove swivel housing plug (34). Remove shoe type lock nut (35) and bearing (37). Draw power elevating shaft (40) out back of bracket and remove feed clutch assembly as shaft is withdrawn.
9. Remove spring ring from groove and loosen set screw (17). Remove spring ring from groove and tap pin (24) out of knockout sleeve. Loosen set screw in lock nut (31), tap screw to release lock shoe under it and remove nut. Remove screw (57) and take handcrank off shaft. Remove pipe plug (60) and turn dial until set screw (59) can be removed. Remove pin from small collar (66). Slide collar, sleeve, spring and dial (69) off shaft. Loosen set screw (71) and remove screw (61) from dial clutch. Use plug puller in tapped hole on front of dial (70) to remove dial from oil retainer (46). Draw shaft (with clutch assembly) out front of bracket and remove bearing, shoe type lock nut and knockout sleeve (24) from back of casting as hand elevating shaft (44) is removed.
10. Disconnect spring from cross lever (270). Drive taper pin out of lever (218), tap cross feed shaft (278) from top and force it down through bushing (228).
11. Drive taper pin out of vertical feed lever (213) and remove spring from detent lever (235). Tap vertical trip shaft (231) out of its bushing and remove detent (223) as it comes clear of shaft. Loosen nut (236), tap it to release wedge bolt (238) and hold vertical feed clutch fork (247) as elevating fork shaft (257) is removed from casting.
12. Drive taper pin out of rapid traverse lever (210) and tap rapid traverse shaft (272) out of its bushing. Remove rapid traverse shaft (256) from back of casting after loosening nut (245) and tapping it to release wedge bolt (253).
3. Remove pipe plug (423) from cross dial (424) and through this hole loosen dog point set screw (448) and remove spring/retainer bushing (454), spring (425) and cross dial (424). Remove pin (447) from small collar and slip small collar off shaft. Remove taper pin (446) and clutch (445). Tap cross shaft (371) at front to loosen, and remove shaft from back of casting. Elevating shaft (368) can be removed similarly.
4. Remove dog point set screw (449), taper pin (451), feed change knob (444). Pull feed selector shaft (441) and bushing (443) out of casting.  
NOTE: If feed selector valve plunger (387) is to be removed, take shaft (441) out of casting, first.
5. Remove set screw (431), loosen dog point set screw (430) and pull rapid traverse shaft (428) out of casting.  
NOTE: If rapid traverse valve plunger (393) and bushing (394) are to be removed, remove shaft (428), first.

### To Remove and Dismantle Feed Box (4AF-48) (Figures 31A and 31B, pages 134 and 136)

NOTE: On all shoe type lock nuts, release locking shoe by tapping loosened radial set screw before attempting to loosen and remove nut.

1. Raise knee to upper limit and drain oil by removing pipe plug (4AF-55). Turn 2 hex head taper pins (52) either direction to loosen, and draw them out of feed box. Feed box is held in place by 11 screws (47). Leave center front and rear screws in place. Remove the other 9 screws. Loosen front and rear screws one full turn - no more - and tap casting to break seal. Place two 2 x 4's on edge on column base, directly below feed box, and lower knee with handcrank until feed box is resting on 2 x 4's. Remove front and rear center screws and raise knee slowly. Feed box will remain on 2 x 4's as knee is raised. Continue to raise knee until it is well clear of feed box and move feed box to work bench.

Before replacing feed box, clean mating surfaces of knee and feed box and apply sealer. Lower knee, slowly, onto feed box and shift feed box, as necessary, to obtain proper alignment of feed box and knee. Insert taper pins before replacing flange screws.

Fill knee with clean oil; see page 15.

If feed speed does not agree with marking on feed dial, select highest feed speed, remove feed dial cover (4AK-40, page 138) and loosen nut (39). Turn feed dial to proper position, tighten nut and replace cover.

### To Remove and Dismantle Rear Control Bracket (4AK-398) (Page 150)

1. Wire rear control levers in neutral position. Drain oil from knee by removing pipe plug (4AF-55, page 134) and (4AK-690, page 158). Remove 6 cap screws (412, page 150) tap casting to break seal and move bracket straight out from knee.

When replacing bracket, clean and seal mating surfaces of bracket and knee. Turn elevating and cross shafts to help gain alignment of shafts as they enter gears.

2. Remove taper pin (384) and plug (469). Tap shaft of bevel gear (468) from above and drive shaft down out of lever (385) and bushing (395).

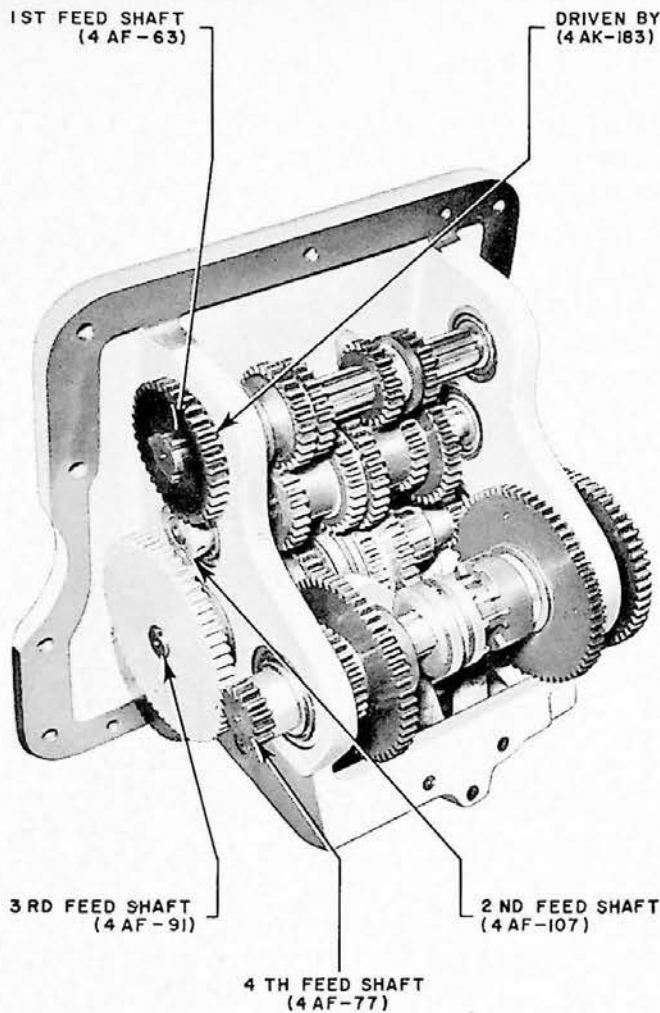


FIGURE 31A  
Feed Box - Gear Side

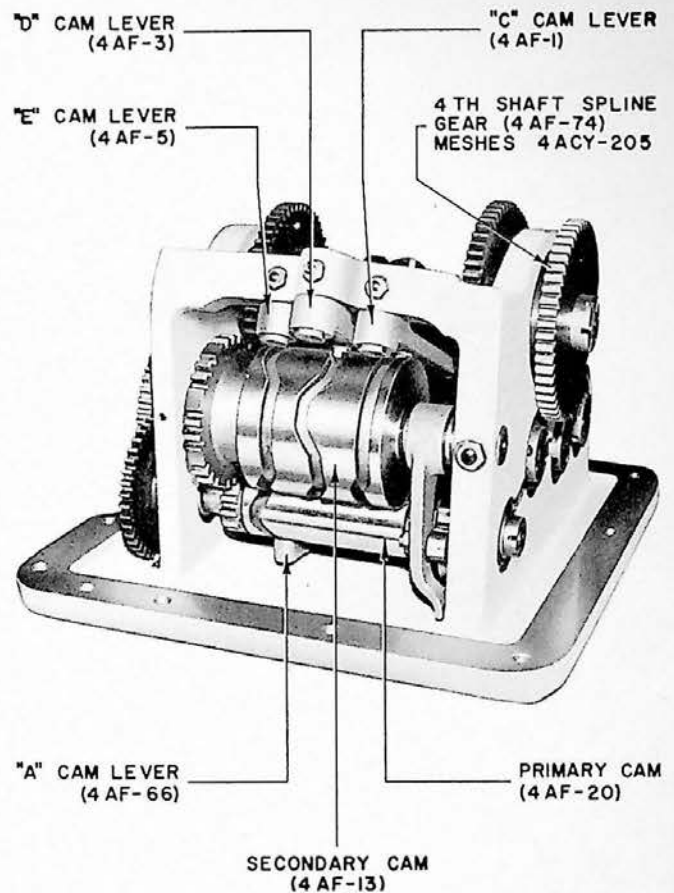


FIGURE 31B  
Feed Box - Cam Side

2. For complete disassembly of feed box, remove parts in this order; secondary cam shaft (29); cam levers (1, 3, 5); 4th feed shaft (77); 3rd feed shaft (91); cam levers (65, 66); primary cam shaft (42); 1st feed shaft (63); 2nd feed shaft (107).
3. Disconnect spring at clutch pin (23). Loosen shoe type lock nut (16) a few turns. Remove set screws (32 and 33). Loosen nut (31) and set screw (30). Tap shaft (29) to left and unscrew lock nut (16) until it is clear of threads on shaft. Pull secondary cam shaft (29) out of casting.
4. Mark casting along each flat side of lever studs (1, 3, 5) so they will be replaced in their original positions. Loosen three lock nuts and screws (27, 28), tap studs out of casting and lift off cam levers as studs are withdrawn.
5. Remove slotted nut (69), thrust bearing and spline gear (74). Remove cotter pin and clutch pin (79). Draw 4th feed shaft (77) out of casting.

Spread retaining ring (93) and lift from end of shaft (91). Tap driver gear (96) and bearing (95) off shaft. Remove 3rd feed shaft (91) from left side of casting and remove gears (84, 86) as they clear end of shaft.

6. Turn casting up on edge so that nuts (54, 56) can be removed from studs (64, 67). Tap lever studs loose and lift off cam levers (65, 66) as studs are removed from casting.
7. Remove slotted nut (35) and loosen slotted nut (24). Remove cam detent (26) and primary cam (20) as primary cam shaft (42) is pulled out of feed box casting while nut (24) is unscrewed. Remove shoe type lock nut (44). Tap 1st feed shaft (63) and lift off large and small sliding gears (58, 59) as shaft is removed. Driven gear (62) can be taken off shaft after it is completely out of feed box.

Bend ear of special lock washer from slot in lock nut (103); loosen lock nut. Remove shoe type lock nut (100). Start 2nd feed shaft (107) out right side of casting and continue to turn lock nut (103) until it is clear of threads on shaft. Remove 2nd feed shaft from feed box.



8. Re-assemble feed box in reverse order. Check to see that lock nuts are snug (but not binding), cam followers move freely in their grooves and sliding gears move easily from side to side. Be sure set screws enter drilled spots in cam studs; this will assure proper clearance between cam follower and cam groove.

### To Remove Table (4AH-8) and Leadscrew (4AH-27) and (Pages 102 thru 114)

1. Remove bell shaped cover (42) from right end of table and remove screw (41) from end of lead-screw. Loosen lock screw, tap to free lock shoe beneath it, and remove bearing adjusting nut (40). Remove 4 screws, tap apron (34) to break sealed joint and lift off end of table with two double diameter pins. Clean faces and seal when assembling apron to table.

2. Remove slotted center screw (45), slip handwheel (57) with outer clutch (48) from left end of lead-screw. Remove pipe plug (53) from dial (61) and rotate dial until set screw (49) can be unscrewed. Remove bushing (58), spring and dial (61). Drive out two pins and remove inner clutch (54). Remove 4 screws (9), tap apron to break sealed joint and slide apron (20), with its two double diameter dowel pins and leadscrew bushing, off leadscrew.

3. Remove table gib (599, page 118) from plain or vertical machines; gib (288, page 110) from universal machine. Fasten a "U"-clamp to center slot of table, relieve weight of table with a hoist and slide it out of saddle "V"-ways. Pencil mark gib at edge of table to facilitate resetting when assembling. Turn backlash eliminator knob, at front of saddle, to disengaged position. Remove pins (25, 50) and slip off small collar (59) and knock out disc (29).

4. Run leadscrew out of nuts from left to right. It is best to wind out leadscrew by hand and support it as it emerges. Lock nuts (4AH-379, 386) plain and vertical machines; and lock nuts (171, 178) on universal machines, are punch marked at the top after backlash has been properly set. When assembling, hold both locknuts so the punch marks are on top while inserting leadscrew from left to right. (If backlash had required re-adjustment, the original punch marks would not be on top. Re-mark the top of lock nuts before removing leadscrew so they can be returned to same positions when re-assembling.) Run leadscrew into nuts until it bottoms against shoulder, back off and lock with nut at right end so there will be .005 inches rotary play on handwheel dial at left end.

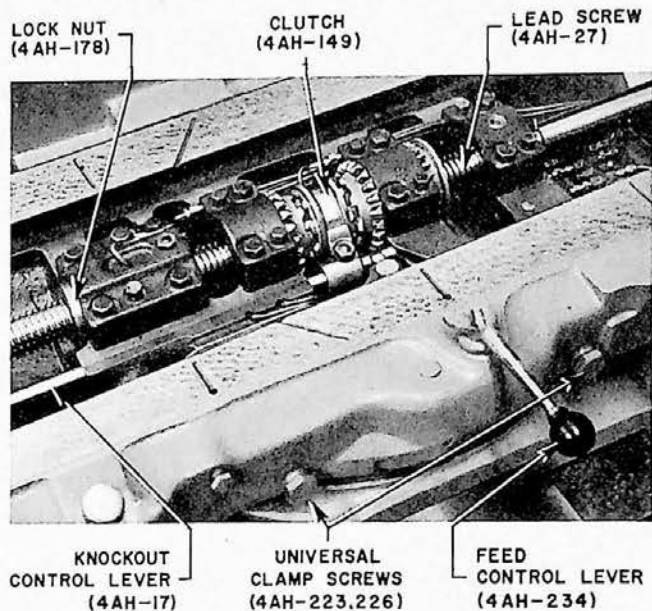


FIGURE 32

Universal Housing On Saddle - Table Removed

### To Remove Saddle from Plain and Vertical Machines (4AH-436) (Pages 114 and 116)

1. When removing saddle and table, rig hoisting sling around ends of table. Be sure table is centered on saddle to obtain good balance while lifting.

When removing saddle without table, insert a long 1 inch rod through lead screw passage and place hoisting sling around rod.

2. If machine is equipped with automatic table cycle, unscrew plug (4AK-497, page 152) from coupling sleeve (498) and push shaft (495) back into saddle. Pencil mark gibs to reduce work of setting when reassembling and remove three gibs (4AH-464, 447, 494). Remove six screws (492, 493) from bracket-under-saddle. (This bracket will remain on side of knee because it is still attached to cross screw and spline shaft). Remove screws (463) from left saddle guide (459) and lower guide onto wood blocks. With hoist or crane, raise saddle (or saddle and table) straight up to separate it from knee. Lower saddle onto wood blocks to protect machined surfaces.

### To Remove Housing (4AH-215) and Saddle (4AH-293) from Universal Machines (Figures 32 and 33, pages 108 thru 112)

Saddle, universal housing and table can be removed together or separately in a manner similar to that for the plain machines.

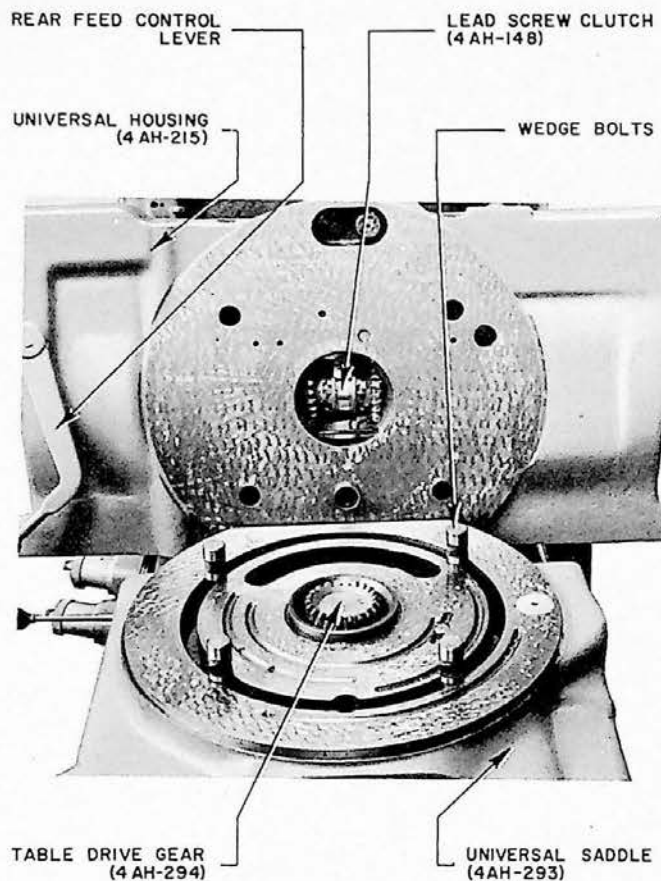


FIGURE 33  
Universal Housing and Saddle

1. If so equipped, unscrew plug (4AK-497, page 152) and push shaft (495) into saddle. Pencil mark gibs to reduce work of setting when reassembling and remove three gibs (4AH-307, 320, 344, page 112). Remove cap screws (337) from underside of left guide and lower guide onto wood blocks.

Remove cap screws (340, 341) from bracket-under-saddle. Attach hoisting sling as described above, and lift saddle and universal housing straight up to separate it from knee. (Bracket-under-saddle will remain on knee because it is still attached to cross screw and spline shaft.) Lower saddle onto wood blocks and leave hoisting sling in place.

2. Remove 4 clamp screws (223, 226, 257, 259). Remove front wedges (224, 225) and rear wedges (256, 260). Lift universal housing straight up to separate it from saddle. When assembling housing and saddle, be sure to position wedge bolts carefully in "Tee" slots. Clearance between bolts and holes in housing is small and alignment of wedge bolts is important.

### To Remove Bracket-Under-Saddle (Pages 112 and 116) (4AH-338, 479)

Unscrew spline shaft guard (4AH-785 or 496) from cover cap (4AH-482, page 116, plain and vertical machines) or from cover cap (350) universal machines. Disconnect sliding covers (4AK-704, 712, page 160) from bracket-under-saddle, see figure , page . Remove front bracket; see page 29. Remove coolant tube (4AH-361, 503). Remove screws (4AH-492, 493) plain and vertical machines or screws (340, 341) on universal machines. Lower bracket onto wood blocks.

### To Remove Knee (4AK-1) from Column (Pages 156 and 158)

The knee of this machine can be removed from the column with saddle and table in place. If knee is being removed for access to back of knee, saddle and table can be left on but, should be centered to provide good balance. With saddle and table attached to knee, total weight will run between 2-1/2 tons and 3 tons -- depending on machine size.

If knee is being removed for extensive dismantling, remove saddle and table first. Without saddle and table, knee will weigh between 1-1/4 tons and 1-3/4 tons -- depending on machine size.

1. On plain and universal machines, move overarm back until it is flush with face of column. This places overarm in a position where it will not be in the way of a hoisting sling. On vertical machines, raise vertical head to its upper limit. Unscrew upper telescopic tube (4AAJ-111, page 98) from bottom of power feed to vertical head box. Remove lower taper pin (4AAJ-108) from coupling and lower vertical drive shaft (110) into feed motor bracket on right side of knee.
2. Raise knee and drain oil by removing pipe plug (4AF-55, page 134). Disconnect flexible electric cable between knee and column. Position knee about half way in its travel. Tighten top center gib (4AK-652, page 158) between knee and column. Attach hoisting sling to table or knee. Disconnect elevating screw housing from column base by removing 3 screws (650, page 156). Rap housing to break seal at base. Turn elevating crank to draw housing and telescopic tubing into recess on underside of knee. Remove wipers (654, 657, 660, 668). Loosen and remove upper gibs (670, 663). Block up both knee guides and remove screws (672, 683, 656, 681). Loosen top center gib and move knee straight out from column. If saddle and table have been removed, turn knee upside down and place on steel horses that have wood strips or blocks on cross rails.

## KNEE, GENERAL INFORMATION - UNIT NO. 4AK

On all shoe type lock nuts - loosen radial set screw and tap screw to loosen lock shoe under it before unscrewing nut. Practically all repairs can be made while the knee is on the column. Access to internal (knee) parts is easily gained by removing front bracket, rear control bracket (or cover), feed box or other assemblies.

The following list can be used to save time and the unnecessary removal of outer parts.

To Gain Access to:

First Remove -

### CONTROL LEVERS AND SHAFTS (4AK, page 148)

Cross Control Rod (314) .....	Feed Box and Front Bracket
Cross Interlock Trip (330) .....	Rear Control Bracket or Cover
Cross Powerfeed Trip (344) .....	Feed Box and Front Bracket
Cross Trip Lever Shaft (357) .....	Feed Box and Front Bracket
Rear Cross Trip Shaft (358) .....	Feed Box and Front Bracket
Vertical Trip Shaft (317) .....	Rear Control and Front Brackets

### CAM REVERSING MECHANISM (4AK, page 140)

Bevel Reversing Gear (71) .....	Rear Control and Front Brackets
Reverse Clutch Shaft (83) .....	Feed Box and Front Bracket
Cylinder Piston (62) .....	Hydraulic Pump and Rear Control
Shifter Fork (65) .....	Rear Control and Front Brackets

### ELEVATING SCREW ASSEMBLY (4AK, page 156)

Bevel Gear (606) .....	Comes out independently
Bevel Gear (624) .....	Rear Control Bracket
Bevel Vertical Pinion (610) .....	Comes out independently
Elevating Screw (608) .....	Comes out independently
Gear (618) .....	Rear Control Bracket
Sleeve (602) .....	Comes out independently

### FEED DIAL ASSEMBLY (4AK, page 138)

Feed Dial Gear (46) .....	Front Bracket
Feed Dial Shaft (35) .....	Feed Box
Spiral Driven Gear (43) .....	Feed Box
Spiral Driver Gear (48) .....	Front Bracket
Spiral Gear Shaft (50) .....	Front Bracket

### FEED DRIVE SHAFT (4AK-228, page 144) .....

Feed Motor Bracket (287) and Knee

### SPLINE SHAFT AND GEARING (4AK, page 142)

Hypoid Gears (123, 130) .....	Feed Motor, Rear Bracket and Knee
No. 6 Shaft (110) .....	Front Bracket and Knee
No. 6 Shaft Gears .....	Front Bracket and Knee
Spline Shaft (109) .....	Feed Motor Bracket and Knee
Spline Shaft Gears .....	Feed Motor Bracket and Knee

### To Dismantle Cam Reversing Mechanism (4AK-91) (Figure 37; pages 138 and 140)

1. Remove front bracket, page 29; feed box, page 31; rear control bracket or cover, page 30.

2. Feed dial gear (4AK-46), page 138, must be removed to provide space for removing cam reversing clutch and shaft assembly. To remove feed dial gear, raise spring ring out of groove in spiral gear (48) and loosen set screw (55). Pull spiral gear shaft (50) toward front of knee until feed

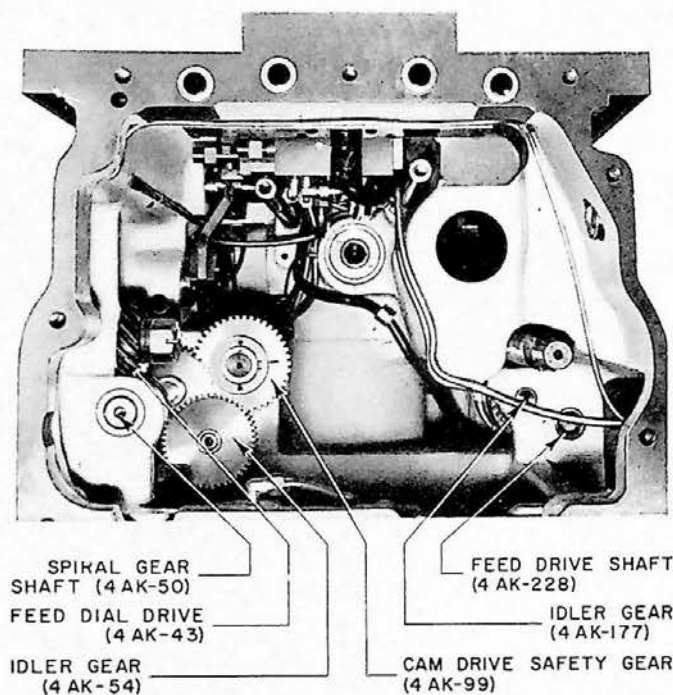


FIGURE 35A

Knee - Without Front Bracket or Feed Box

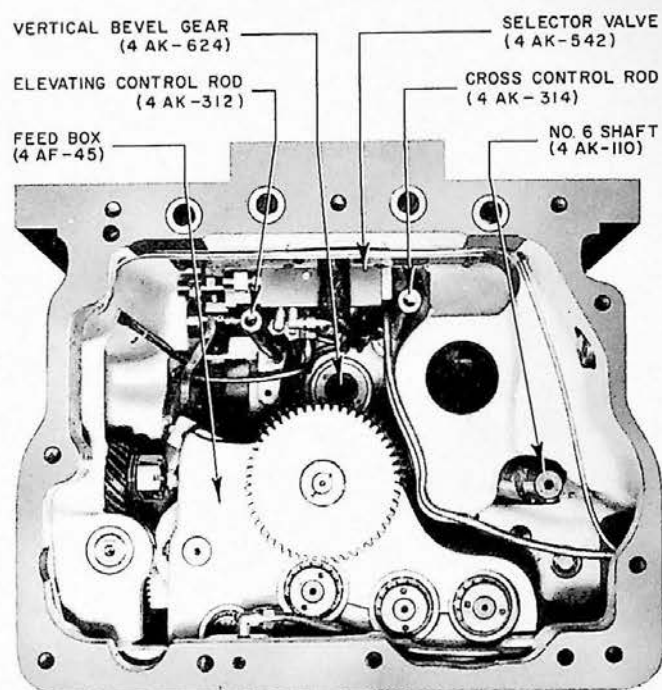


FIGURE 35B

Knee - Without Front Bracket

dial gear (46) can be slipped off end of shaft. Pull cam reverse clutch shaft (83) out front of knee with clutch assembly on shaft.

3. Cam reverse shifter fork (65) and cylinder piston (62) can be removed independently of the clutch shaft. Disconnect hydraulic fitting and remove valve plug (58). Remove top or bottom cotter pin (64) and shaft locating pin (63). Disconnect hydraulic fitting entering cam reverse cylinder bearing (67) and apply a few spurts of compressed air to move piston toward front of knee. Work piston to left until fork is free and can be lifted out of knee. To remove piston, draw it out left end of cylinder through opening formed by removal of valve plug.
4. Bevel reversing gear (71) can be removed as follows: Remove cam reversing clutch shaft as instructed above, lift out both clutch bevel gears (90, 93), clutch (91) and sleeve (92). Remove plug (87 or 88) and loosen lock nut and set screw (81). Drive gear and bushing out of casting from beneath knee. When replacing gear and bushing, position bushing in casting so set screw (81) will fit into drilled spot on side of bushing.
5. To remove cam reverse cylinder bearing (67): remove knee from column, see page 33; remove rear control bracket or cover plate (475), see page 30. Disconnect hydraulic tubing directly above bearing and remove fitting (4AK-745, page 162). Remove 3 screws (66) from rear of knee and draw bearing out of knee.

6. To remove worm wheel support sleeve (73), remove knee from column, see page 33. Remove bearing plate closure (80) plug (79) and 3 screws (74). Use plug puller to draw support sleeve from knee casting.

### To Dismantle Knee Control Levers and Shafts (4AK-312, 314) Figure 35B; pages 148 and 158)

1. All control levers and shaft shown on page 148 can be removed without removing knee from column. Elevating controls must be removed in this order: vertical trip shaft (317); elevating interlock trip (322); elevating control rod (312). Cross controls must be removed in this order; cross interlock trip (330); rear cross trip (332); long bevel gear (336); rear cross trip shaft (358); cross power-feed trip (344); cross control rod (314); trip lever shaft (357).
2. Insert allen head wrench into tapped hole in back of left knee guide (4AK-666) and remove set screw (679). Loosen dog point set screw (678). Pull vertical trip shaft (317) straight out from knee.
3. To remove elevating interlock trip (322), remove rear control bracket (see page 30). Screw plug puller into elevating interlock stud (323) and pull stud from casting. Elevating control rod (312) can be removed after front bracket is taken off knee, see page 29.

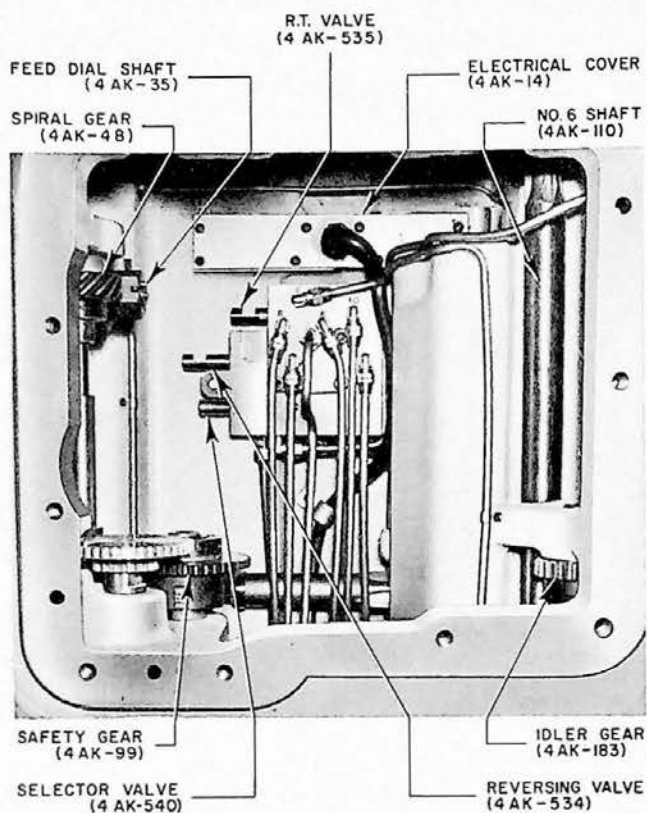


FIGURE 36A  
Knee - Thru Feed Box Opening

4. To remove cross controls, remove rear control bracket (4AK-398) or cover plate (475), see page 30. Reach through opening and remove cotter pin (328). Loosen and remove slotted nut (329) and tap end of shaft to loosen keys. Remove cross interlock trip (330), spacer (331) and rear cross trip (332). Draw long bevel gear (336) out left side of knee casting. Rear cross trip shaft (358) is free to be removed from knee after front bracket is removed, see page 29.
5. To remove cross powerfeed trip (344), remove screw (347) and long bushing (345). Remove front bracket (see page 29), reach into knee and remove nut (341) and lock washer. Tap lock pin (338) to loosen and tap cross powerfeed trip to left until lock pin (338) is in line with recess in trip shaft. Draw lock pin out of cross feed trip lever. Continue to tap cross powerfeed trip (344) to left until it is clear out of knee. Cross control rod (314) can now be drawn out front of knee.
6. To remove cross trip lever shaft (357), remove front bracket (see page 29). Loosen nut (356) tap it to loosen lock pin (338) and remove 4 cap screws (360). Tap shaft to left until it is clear out of casting. Elevating cross trip lever and bushing will come out with shaft.

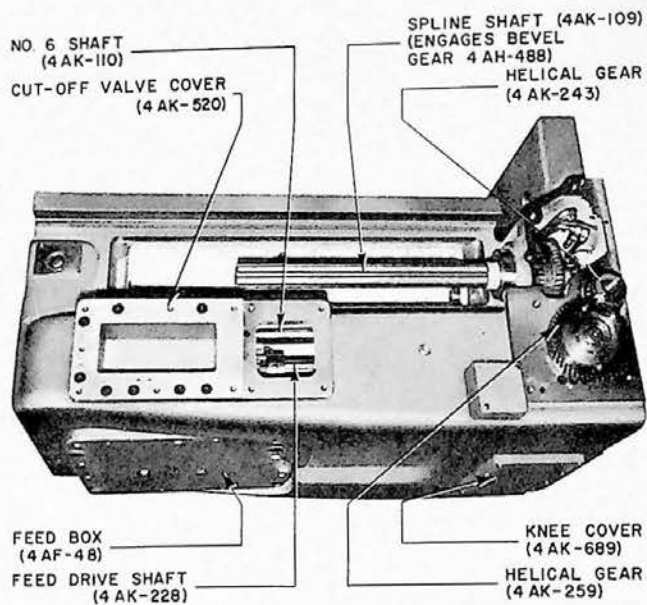


FIGURE 36B  
Right Side of Knee

### To Dismantle Feed Dial Assembly (4AK-36, 50) (Figures 35A and 36A; page 138)

1. Remove front bracket (see page 29) and feed box (see page 31). Remove cotter pin (44) and nut (42). Slide spiral driven gear (43) off shaft. Lift spring ring out of groove and loosen set screw (55). Draw shaft (50) out of casting and remove feed dial gear (46) and spiral driver gear (48) as shaft is removed. Compound idler gear (54) can be removed after feed box has been removed.
2. After removal and replacement of feed box (or repairs within knee), feed speed may not agree with speed indicated on feed dial. To correct this condition, start machine and change feed speeds (using feed change knob) until highest speed is obtained. Remove feed dial cover (40) and cover flange (37), loosen nut (39) and turn feed dial (36) to position where it will indicate highest speed when cover is replaced. Lock dial in position selected by tightening nut. Replace cover flange and cover.

### To Remove Selector Valve (4AK-542) (Figures 35B and 36A; page 154)

Remove front bracket (see page 29). Disconnect all tubing leading into selector valve. Remove 4 screws (544) and lift valve out of casting.

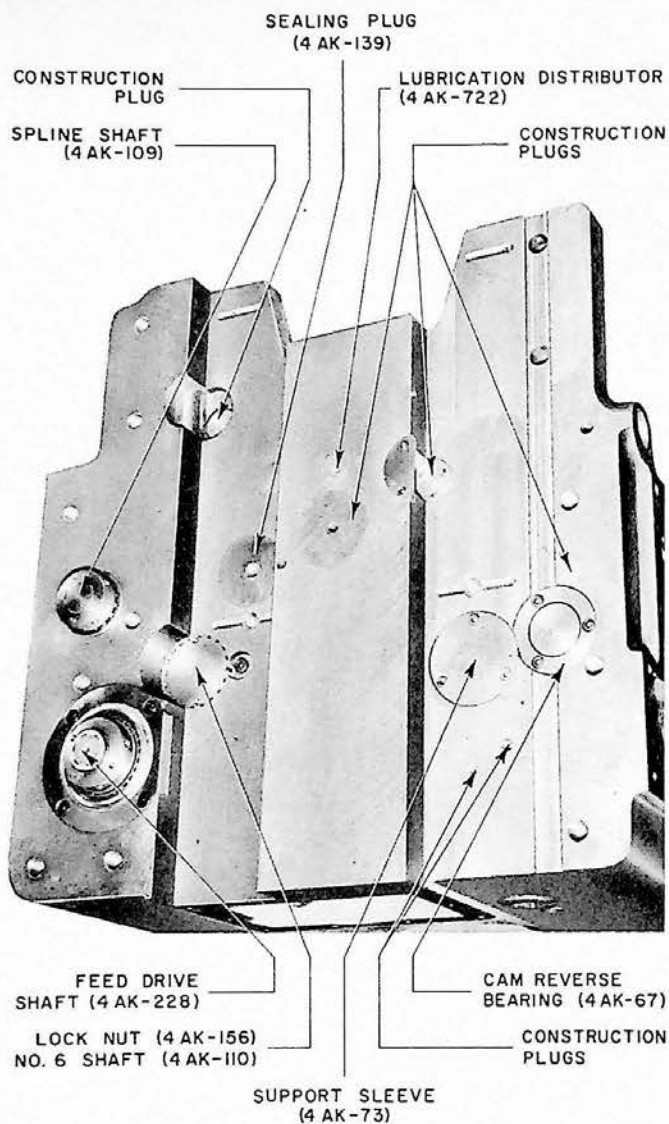


FIGURE 37  
Rear of Knee - Before Scraping

### To Remove Cut-Off Valve from Knee (4AK-503) (Figure 36B; page 152)

Remove 7 screws (504), tap casting to break seal and move cut-off valve out from knee, slowly. If valve is to be moved to a work bench for further dismantling, disconnect electric wires leading into solenoid valve (507).

### To Remove Knee Elevating Screw (4AK-608) and Telescopic Tubing (4AK-641) (Figure 7; page 156)

1. Raise knee to within two inches of topmost position, clamp and block up under knee. Move saddle to extreme front. Remove screws through

front and back of 6th telescopic tube (638), rap tube to break seal around housing (649) and raise off housing. Remove three screws (650) from housing, rap housing to break seal at base and rotate elevating crank to left housing, with its dowel pins, off base. (Clean base, housing and 6th telescopic tube and reseal before assembling).

2. Remove three 1/4-20 socket head cap screws from tube support sleeve (637) and drop outer telescopic tubes onto housing. Remove three 1/4-20 screws from flanges of telescopic tube sleeve (630). When assembling, use a long screw through flanges of 630 sleeve to pull it up into knee so standard screw can be installed.
3. Remove screws (595) rap cover (596) smartly to raise it off top of knee and remove cover. (Gasket under plate is sealed to knee). Run elevating screw housing all the way up on screw and place a block within about 4 inches of bottom. Remove lock nut (605) from elevating screw. With a brass bar, drive screw and housing down out of knee onto wood block. Lower assembly and pull forward out of knee.
4. When assembling, place assembly in position on base and run screw up until key is ready to enter keyway in bevel gear. If a crane is available, lower knee onto screw.

### To Dismantle Elevating Screw Drive (4AK-606, 610, 620) (Page 156)

1. To remove elevating screw bevel gear (606), move saddle to extreme front of knee. Position knee about 1/3 up from bottom. Clamp knee and block up.
2. Remove screw (595), rap cover (596) smartly to raise it off top of knee and remove. (Gasket under plate is sealed to knee.) Remove lock nut (605). Rotate elevating shaft counter-clockwise and pull elevating screw (608) down out of bevel gear (606). Rap top of screw, if necessary, with a brass rod while lowering screw. When assembling, it is best to suspend knee from a crane and lower it onto elevating screw.
3. Unscrew two set screws (614, 615) and remove adjustment locking nut (598). Loosen screw (617), rap roller bearing sleeve to loosen brass plug (616) and unscrew roller bearing sleeve (602) assembly in which bevel gear (606) is mounted.
4. Remove front bracket (see page 29). Loosen set screw in shoe type lock nut (629), tap screw to release locking shoe beneath it and remove lock nut. Tap splined end of bevel gear (610) toward back of knee. Reach into elevating screw access at top of knee and lift gear out of knee.

5. Remove rear control bracket, see page 30. Reach through opening and remove screws (626, 625). Pull gears (618, 624), roller bearings and bushing (623) out of knee in one assembled group. When replacing, drive in as an assembled group. Align bushing with casting so set screw (625) will fit back into drilled spot on side of bushing.

### To Remove Feed Motor Drive (4AK-238) (Figure 6 and page 146)

Disconnect electric wires leading into motor. Remove plug (4AF-55, page 134) and drain oil from knee. Remove 4 motor mounting screws (265), tap motor casting to break seal and lift motor straight out from knee.

### To Remove Feed Motor Brackets (4AK-236, 287) (Page 146)

1. Bracket (236) is used on all plain and universal machines. Remove motor (238) as per instructions above. Remove screws (262) from flange portion of bracket and lift bracket straight out from knee.
2. Bracket (287) is used on all vertical machines. Remove motor (238) as per instructions above. Unscrew upper telescopic tube (4AAJ-111, page 98) from vertical head gear box. Remove lower taper pin (4AAJ-108) and lower shaft into feed motor bracket. Remove screws (4AK-301) from flange portion of motor bracket, lift bracket straight out from knee casting, with spline shaft and telescopic tubes in bracket. After bracket is clear of machine, lift spline shaft out of bracket. Remove telescopic tubes by unscrewing bottom telescopic tube from cover (267).

### To Remove Feed Drive Shaft (4AK-228) (Figures 35A, 36B, 37; pages 142 and 144)

1. Remove knee, page 33, and feed motor bracket above.
2. Remove cover plate (4AK-145), reach into opening and lift spring ring and pin out of collar (198). Reach through feed motor bracket opening on right side of knee casting and remove screw (189); loosen screw (190). Draw feed drive shaft (228) out of knee.

### To Remove Sliding Covers (4AK-715, 700) (Page 160)

Position saddle about half way in its travel. Remove 2 screws (720) from sliding plate bracket (705). Remove 2 screws (713) from sliding plate bracket (706).

Front and rear plates are now disconnected from bracket-under-saddle and can be telescoped to front and rear for access into knee. If these plates are to be removed completely, remove 4 screws (708) and 4 screws (714). Lift off front and rear plates in two (assembled) sets.

### To Remove No. 6 Shaft (4AK-110) and Gearing (Figures 36B and 37; page 142)

Remove feed motor bracket (above); remove front bracket (see page 29); remove knee from column (see page 33). Remove nut (156). Loosen set screw in shoe type lock nut (155), tap screw to release locking shoe beneath it and remove lock nut. Reach through feed motor opening and lift snap ring out of groove in gear (150, 161 - depending on size of machine). Loosen set screw holding gear to shaft. Pull shaft (110) out front of knee and remove gear from shaft as it is withdrawn.

### To Remove Spline Shaft (4AK-109) (Figures 36B and 37; page 142)

1. Remove bracket-under-saddle (see page 34); remove feed motor bracket (above); remove knee from column (see page 33).
2. Loosen set screw in shoe type lock nut (173), tap screw to release locking shoe beneath it and remove lock nut. Reach through feed motor opening and loosen set screw in gear (162, 175). Draw shaft toward front of knee and remove gear as it comes clear of shaft.

### To Remove Rapid Traverse Clutch Assembly (4AK-213) (Figure 37 and Page 144)

Remove feed drive shaft (4AK-228) per instructions above. Loosen set screw in shoe type lock nut (219), tap screw to release locking shoe beneath it and remove lock nut. Pull gear (218) from splined end of rapid traverse housing (213). Remove manifold locating pins (185, 187). Move rapid traverse housing (213) and clutch assembly toward front of knee until it is clear of inner casting wall, then lift assembly from knee through feed motor opening.

### To Remove Geared Pump (4AK-568) (Page 154)

1. Drain oil from knee by removing pipe plug (4AF-55), page 134). Remove 6 screws (577), tap casting to break seal and lift pump body straight out from knee. When replacing pump, use a new seal ring (557). Clean and seal mating surfaces of pump and knee, before replacing pump.

2. If oil filter head (566) is removed from pump body, replace both seal rings (562) before re-assembling head to body.

### **To Remove Geared Pump Shaft (4AK-584) (Pages 154 and 158)**

Remove geared pump as per instructions in preceding paragraphs. Remove cover plate (4AK-689, page 158) from underside of knee. Reach in through opening and loosen set screw in shoe type lock nut (592), tap screw to release locking shoe beneath it and turn lock nut until it is clear of threads on shaft. Remove spring ring and bearing (585). Turn shaft counter-clockwise until it is clear of mating worm gear and draw shaft out of knee.

### **To Remove Rapid Feed Valve Body (4AK-482) (Pages 152 and 162)**

If machine has automatic table cycle, it will also have a rapid feed valve. To remove valve, remove screw (499) spring (500), pin (501) and ball (502) from right side of knee casting. Remove feed motor bracket, page 38 and remove fittings (4AK-748, 754)

page 162 from body (4AK-482). Unscrew screw plug (497) to release coupling. Remove plug screw (476) insert a 5/16" plug puller into plunger (480) remove plunger with spacer (477) and top bushing (478). Insert a 3/8" plug puller into screw (485) and pull out valve body (482). When plunger is replaced in valve body it will be necessary to guide detent of lever (489) into groove of plunger.

### **To Remove Main Drive Motor (4AN-13) (Figure 9 and page 56)**

Remove motor opening cover (4AC-308) page (66) by prying cover from side of column with screwdriver. Remove cover from motor terminal box and disconnect wires to motor. Open rear motor cover and loosen 4 cap screws (4AN-24), page 56. Raise motor and block up with 2 x 4's that extend about 3 ft. beyond rear of column base. Block up between floor and free ends of 2 x 4's to provide a solid platform for motor. Remove belts (3). Insert eyebolt in top of motor. Remove 4 cap screws and washers (23). Place rope sling around motor pulley and attach to a hoist. Raise pulley end of motor a few inches and pull motor out of column. Change sling from pulley to eyebolt in top of motor and lift motor off wood platform.



## MAINTENANCE HINTS

1. Make certain that all stations are kept properly lubricated in accordance with lubricating instructions.
2. Keep your machine as clean as possible; it pays. Use a brush to remove chips rather than compressed air. An air blast may drive dirt into bearings to cause needless wear. Also, flying chips can be dangerous to fellow works.
3. Safety dogs are provided to disengage power drive to all sliding units. **DO NOT** remove these dogs in an effort to obtain more travel. Serious damage to the machine may result if a unit is being power driven when it strikes another unit.
4. The electrical compartment door should never be opened except by an experienced electrician.
5. Manual handwheels and cranks are provided with springs and positive knockouts to disengage dog clutches during power feed. **DO NOT** tamper with disengaging mechanisms in order to keep handwheel in engagement, as it may result in serious injury to operator or fellow worker.
6. **DO NOT** try to reverse the direction of spindle rotation while it is in motion.
7. Check oil supply in arbor support before using. When storing away, invert arbor support and place on a non-metallic surface. If stored, or placed on back of overarm, in an upright position, the oil in reservoir continues to seep out.

Below in capital letters are listed problems that may be encountered. Under each are listed - in italics - probable causes and, below, the corrections.

### LOW HYDRAULIC OIL PRESSURE

— a —

#### *Oil level too low*

Fill and maintain oil level.

— b —

#### *Incorrect relief valve setting in column*

See instructions on page 19 and adjust pressure to 300 to 325 psi.

— c —

#### *Clogged suction line strainer*

Drain column, remove pulley bracket per instructions on page 23, clean strainer and replace.

— d —

#### *Worn pump gears or broken housing*

Remove pump per instructions on page 23 or 58 and renew necessary parts.

### FEED OR SPEED VARIATION FROM ACTUAL DIAL READING

— a —

#### *Low hydraulic oil pressure*

See instructions above under Low Hydraulic Oil Pressure.

— b —

#### *Dial loose on drum*

Start machine and run spindle at lowest rpm and table at lowest feed. (Lowest and highest speeds and feeds are adjacent on dials.) Loosen spanner type lock nut and turn dial until it indicates actual speed or feed. Tighten nut.

### SPEED GEARS SHIFT ERRATICALLY OR FAILS TO SHIFT

— a —

#### *Low hydraulic oil pressure*

See instructions on page 19 for setting correct pressure.

— b —

*Dirt in oil, or a poor grade of oil, that in breaking down, has lodged under or gummed relief valve in shifter bracket and caused it to stick open*

Remove 1/8" pipe plug from rear lower corner of gear shifter bracket (plug removed when testing column hydraulic pressure) and direct a strong blast of air into hole to blow out dirt. If this does not clear obstruction, take off shifter bracket per instructions on page 24, remove relief valve and clean.

Flush column and lines, then keep column reservoir filled only with oil of specifications listed on page 15.

— c —

*Machine has been running for too long a period of time at the same speed. Oil has gummed around selector valve so badly it will not rotate to produce other speeds. Operating pistons may also be stuck for the same reason.*

Remove shifter bracket per instructions on page 24, dismantle and clean selector valve. Such a condition can be prevented by running machine through its range of speeds every few days.

## FAULTY OPERATION OF MAIN CLUTCH AND BRAKE

— a —

Driving belts worn out and slipping.

Raise main motor on its hinged base plate so belts can be lifted out of sheaves and replace with a new set of matched belts.

Adjust belts per instructions on page 17.

Check tension on new belts frequently until they are run in, then periodically.

## KNEE OR TABLE MOVEMENTS DO NOT AGREE WITH MOVEMENT INDICATED ON MICROMETER DIALS

*Gib setting too tight*

Set gibs per instructions on page 17.

## EXCESSIVE VIBRATION

It would be well to investigate the following numbered items before checking the following lettered possible causes:

1. Reducing length of cutting edge in contact with work; reducing cutting speed; reducing clearance angle to minimum required for the job will reduce chatter. (Cutter speed can be reduced by lowering spindle speed or reducing size of cutter.)
2. Check with cutter manufacturer in regard to number of teeth in cutter, speed, shape, etc. Many times the substitution of a spiral milling cutter in place of straight cutter will reduce chatter. The addition of a .002" - .003" circular land at edge of tooth after grinding primary land will often help reduce chatter. The substitution of a cutter with less teeth will many times eliminate chatter, particularly if close to maximum horsepower of machine is being used.
3. When milling with a gage of cutters and extended overarm where overarm braces are used it might help to tighten or slightly loosen in various combinations the knee, saddle, table or overarm brace clamping screws.

— a —

*Loose table aprons or lead screw bearings*

Tighten aprons, then proceed per instructions on page 18, and adjust table lead screw bearings.

— b —

*Loose cross feed screw bearings*

Proceed per instructions on page 18, and adjust table lead screw bearings.

— c —

*Loose gibs*

Proceed per instructions on page 17, and adjust gibs. (Do not tighten gibs more than a normal amount in an effort to eliminate vibrations.)

— d —

*Incorrect setting of dynapoise overarm*

Proceed per instructions on page 20, and adjust dynapoise overarm.

— e —

*Loose spindle bearings*

Proceed per instructions on page 21, and adjust spindle bearings. (Check all other causes of chatter before readjusting these bearings.)

**TABLE, VERTICAL OR CROSS FEEDS  
DO NOT FUNCTION**

— a —

*Loose shifter forks or broken taper pins in actuating mechanism*

Shifter forks are accessible after removal of front bracket. (See pages 28 and 35.) Relocate forks so clutches are midway between gears when neutral.

It may be necessary to remove knee to replace

some broken taper pins in shafts. See instructions to remove and dismantle knee on page 33. Whenever knee is opened or removed use the opportunity to flush and clean inside.

— b —

*Safety clutch in feed box slipping*

Remove feed box from knee per instructions on page 30, dismantle safety clutch and check setting. On No. 2 machine it should withstand 120 inch pounds of torque without slipping; on Nos. 3 and 4 machines 160 inch pounds of torque.

**KEY NUMBER INDEX**

UNIT NAME	DRAWING NAME	KEY No.	PAGE No.	KEY NUMBERS OF OTHER UNITS
PULLEY BRACKET UNIT 4AJ	Bracket and Speed Charge Shaft	1-101	47	
	Clutch and Brake Shaft	102-171	49	
SHIFTER BRACKET UNIT 4AS	Speed Selector Valve - Shifter Bracket	1-53	51	
	Gearing and Shifter Cylinders	54-141	53	
	Shifter Bracket Tubing	142-184	55	
MOTOR DRIVE UNIT 4AN	Main Drive Motor	1-27	57	
COLUMN - UNIT 4AC	Damper - Overarm - Arbor Supports	1-68	59	
	Spindle Shaft - Overarm Clamp	69-134	61	
	"D" Shaft - Cluster Gear - "E" Shaft	135-173	63	
	Solenoid - Interlock Valves	174-269	65	4AM-185, 199, 215
	Column Dogs and Covers	270-335	67	4AM-294
	Speed Change - Spiral Bevel Gear Shafts	336-369	69	
	Elevating Screw Shaft - Brake	370-414	71	
	Gibs - Curtain Roller Cover	415-472	73	
	Spring Counterbalance - No. 2 Vert.	473-514	75	
	Spring Counterbalance - No. 3, 4 Vert.	515-586	77	
	Oil System - Plain & Universal	587-650	79	
	Oil System - Vertical	651-716	81	

## KEY NUMBER INDEX - Continued

UNIT NAME	DRAWING NAME	KEY No.	PAGE No.	KEY NUMBERS OF OTHER UNITS
VERTICAL HEAD UNIT 4ADY	Vertical Head - Spindle	1-93 384-386	83	
	Sliding Gear - "F" Shafts	94-130	85	
	Sliding Gear - "F" Shafts	131-170	87	
	Vertical Spindle	171-236 276-278	89	
	Lubrication Tubing	237-272	91	
	Lubrication Tubing	279-318	93	
	Vane Type Scavenger Pump	319-374 717-720	95	
POWER FEED TO VERTICAL HEAD UNIT 4AAJ	Power Feed to Head Shaft	1-65	97	
	Vertical Drive - Bevel Gear Shafts	66-111	99	
	Shifter Shafts	112-164	101	
SADDLE-TABLE UNIT 4AH	Table - Lead Screw - Aprons	1-64	103	
	Backlash Eliminator - Table Dogs	65-106	105	
	Backlash Eliminator - Table Dogs	107-144	107	
	Universal Saddle Housing	145-228	109	
	Feed Trip Linkage	229-292	111	
	Univ. Saddle - Guide - Bracket-Under-Saddle	293-373	113	4AK-785, 786
	Saddle - Plain and Vertical	374-438	115	
	L.H. Guide - Bracket-Under-Saddle	439-510	117	4AK-496, 787
	Feed Trip Linkage	511-600	119	
	Automatic Spindle Stop	601-615	121	
	Lubrication - Tubing - Universal	616-672	123	
	Lubrication - Plain - Vertical	673-718	125	
	FRONT BRACKET UNIT 4ACY	Front Elevating - Feed Change Shafts	1-71	127
Cross Shaft and Push Buttons		74-145	129	4AM-72, 73, 79
Reverse - Safety Gear Shafts		146-209	131	
Cross - R.T. Control Levers		210-278	133	4AK-795, 796
FEED BOX - UNIT 4AF	Feed Cams and Levers	1-67	135	
	Feed Gearing	68-110	137	

## KEY NUMBER INDEX - Continued

UNIT NAME	DRAWING NAME	KEY No.	PAGE No.	KEY NUMBERS OF OTHER UNITS
KNEE - UNIT 4AK	Knee Casting - Feed Dial	1-56	139	
	Cam Reverse Clutch Shaft	57-108	141	
	Spline Shaft and Gearing	109-176	143	
	R.T. Clutch - Feed Drive Shaft	177-235 765-771	145	
	Feed Motor Drive	236-305	147	
	Knee Control Levers and Shafts	306-361	149	
	Rear Control Bracket	362-475	151	
	Rapid Feed - Cut-off Valves	476-524	153	
	Selector Valve - Geared Pump	525-594	155	
	Elevating Screw	595-650	157	
	Knee Gibs - Guides - Wipers	651-696 772-774	159	
	Sliding Covers - Lubrication Lines	697-737	161	
	Hydraulic Lines	738-779	163	
COOLANT PUMP AND PIPING - UNIT 4AP	Coolant Pump and Piping	1-55	165	4AC-19, 50 4AN-29, 30, 56, 57
TURRET STOP UNIT - 4AAR	Turret Stop	1-40	167	4ADV-7, 9, 21, 22
	Machine Instruction Plates	1-20 21-28	169 171	

## HOW TO ORDER REPAIR PARTS

You will receive quicker and better service when ordering repair parts if you will adhere to the following instructions when ordering such replacements.

These four requirements are essential:

1. State amount wanted.
2. Give catalog key number, part number and name of part. If ordering parts by part number, please advise where the number was obtained. (See paragraph A, below.)
3. Give complete serial number of machine. (*This number will be found stamped on face of column either directly above or below front spindle bearings and on right front edge of table. See Figure 6*).
4. Specify how and where to ship. (See paragraph B, below.)

### Paragraph A

When ordering parts by number, kindly advise how the number was obtained, namely:

Number stamped on part.

Prior Invoice.

Parts List Catalog. (Give identification and publication numbers on front cover.)

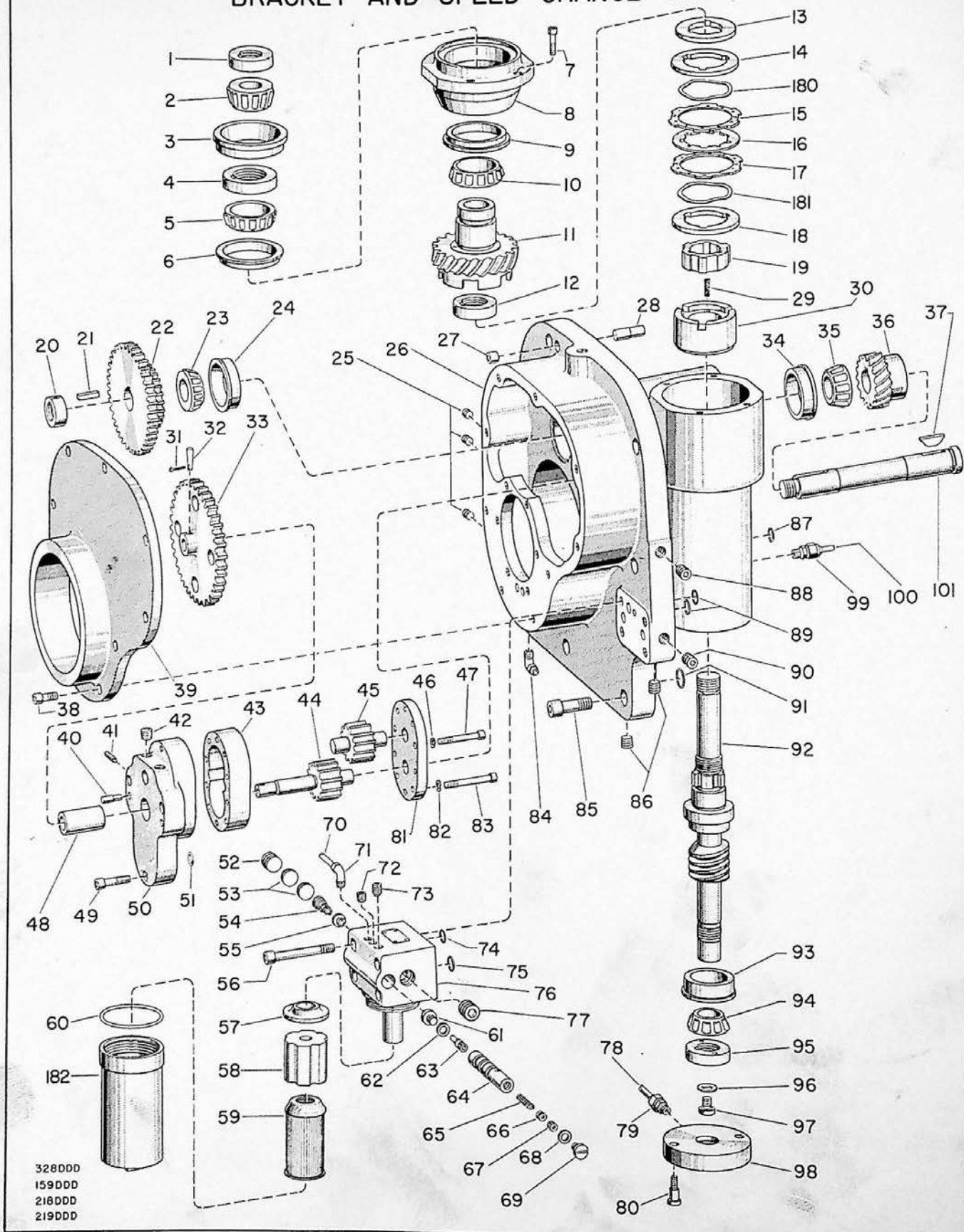
### Paragraph B

Do not say, "Ship quickest way." Be definite and state agency desired, that is—Air Mail, Parcel Post (Special Delivery), Parcel Post (Regular), Express, Motor Freight, Rail Freight, etc.

Specify each individual piece that is required in the order. If only certain parts of a unit are required, never use the word "complete"; it always raises a question as to how much of a unit to supply.

However, in some cases, due to the nature of the part, it will be necessary and less costly to you, for us to supply additional related pieces, especially if part wanted is obsolete.

BRACKET AND SPEED CHANGE SHAFT



3280DD  
1590DD  
2180DD  
2190DD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

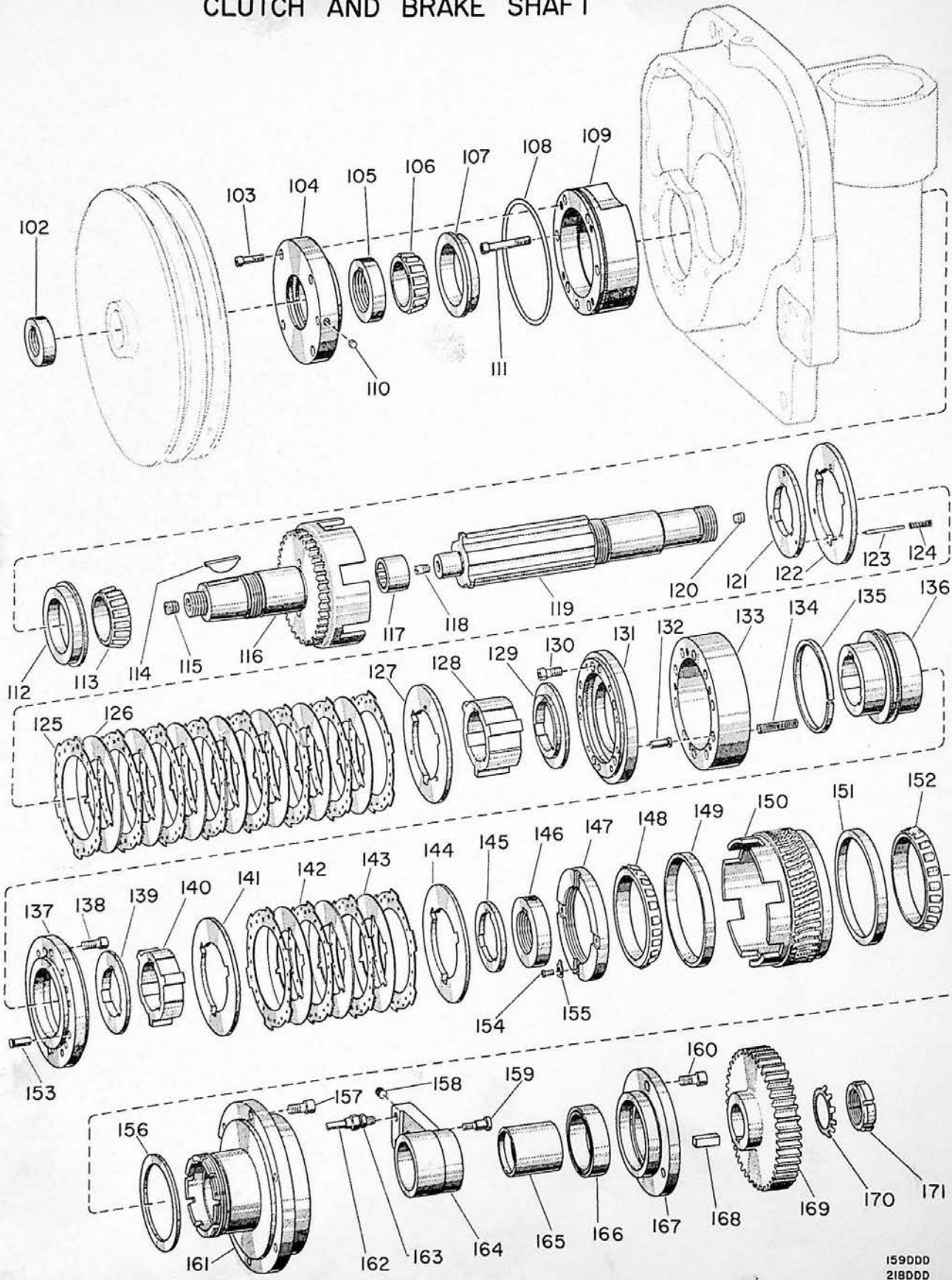
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

PULLEY BRACKET-UNIT No. 4AJ  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AJ-1	4187	Nut - Lock	1	4AJ-51	24316	Ring - "O"	2
4AJ-2	63695	Cone - Roller Bearing	1	4AJ-52	220784	Plug - Pipe	1
4AJ-3	143949	Bearing - Cup	1	4AJ-53	125182	Screw - Lock	2
4AJ-4	4191	Nut - Lock	1	4AJ-54	121484	Spring - Head Valve	1
4AJ-5	144439	Cone - Bearing	1	4AJ-55	121483	Valve - Head	1
4AJ-6	144440	Cup - Bearing	1	4AJ-56	2302	Screw	4
4AJ-7	3227	Screw	4	4AJ-57	163012	Collar	1
4AJ-8	143926	Cap - Bearing Retainer	1	4AJ-58	163011	Magnet	1
4AJ-9	144440	Cup - Bearing	1	4AJ-59	121486	Element - Assembly	1
4AJ-10	144439	Cone - Bearing	1	4AJ-60	251924	Gasket - Bowl	1
4AJ-11	143927	Gear - Spiral	1	4AJ-182	163010	Cover - Filter	1
4AJ-12	4188	Nut - Lock	1	4AJ-61	42235	Screw - Lock for Clutch Shifter	1
4AJ-13	143951	Spacer - Clutch	1	4AJ-62	224645	Gasket - Needle Valve Nut	1
4AJ-14	143952	Plate - Pressure	1	4AJ-63	151625	Valve - Relief	1
4AJ-180	166155	Spring - Separator	1	4AJ-64	151624	Bushing - Relief Valve	1
4AJ-15	121451	Plate - Driving Clutch	1	4AJ-65	96734	Spring - Relief Valve	1
4AJ-16	117207	Plate - Driven	1	4AJ-66	2301	Screw	1
4AJ-17	121451	Plate - Driving Clutch	1	4AJ-67	2356	Screw	1
4AJ-181	166155	Spring - Separator	1	4AJ-68	224645	Gasket - Needle Valve Nut	1
4AJ-18	143952	Plate - Pressure	1	4AJ-69	42235	Screw - Lock for Clutch Shifter	1
4AJ-19	143953	Driver - Clutch Worm Shaft	1	4AJ-70	150547	Tubing - Oil	1
4AJ-20	4185	Nut - Lock	1	4AJ-71	4016	Elbow - Compression	1
4AJ-21	3307	Key	1	4AJ-72	76644	Plug - Pipe	1
4AJ-22	143924	Gear - Cluster	1	4AJ-73	2345	Screw	1
4AJ-23	72197	Cone - Roller Bearing	1	4AJ-74	130178	Ring - "O"	1
4AJ-24	72196	Cup - Roller Bearing	1	4AJ-75	243716	Ring - "O"	2
4AJ-25	76644	Plug - Pipe	3	4AJ-76	163013	Head - Oil Filter	1
4AJ-26	150545	Pulley - Bracket	1	4AJ-77	220784	Plug - Pipe	1
4AJ-27	3529	Plug	2	4AJ-78	150547	Tubing - Oil	1
4AJ-28	1429	Pin	2	4AJ-79	89866	Connector - Male	1
4AJ-29	159067	Spring - Trip	3	4AJ-80	143906	Screw	2
4AJ-30	143928	Cylinder - Hydraulic	1	4AJ-81	143903	Cap - Oil Pump	1
4AJ-31	3329	Pin - Cotter	1	4AJ-82	2123	Washer	8
4AJ-32	94385	Pin - Taper	1	4AJ-83	3398	Screw	8
4AJ-33	143923	Gear - Driven Pump	1	4AJ-84	4016	Elbow - Compression	1
4AJ-34	72196	Cup - Roller Bearing	1	4AJ-85	3404	Screw	8
4AJ-35	72197	Cone - Roller Bearing	1	4AJ-86	76645	Plug	2
4AJ-36	143929	Gear - Spiral	1	4AJ-87	130178	Ring - "O"	3
4AJ-37	3281	Key	1	4AJ-88	76645	Plug	1
4AJ-38	2320	Screw	9	4AJ-89	243716	Ring - "O"	2
4AJ-39	150546	Cover - Pulley Bracket	1	4AJ-90	76645	Plug	1
4AJ-40	1421	Pin	2	4AJ-91	129871	Ring - "O"	1
4AJ-41	3165	Screw	1	4AJ-92	143920	Shaft - Speed Change	1
4AJ-42	76645	Plug	1	4AJ-93	108004	Cup - Roller Bearing	1
4AJ-43	121402	Spacer - Pump	1	4AJ-94	72197	Cone - Roller Bearing	1
4AJ-44	143959	Pinion - Driver Pump	1	4AJ-95	4187	Nut - Lock	1
4AJ-45	105224	Pinion - Driven Pump	1	4AJ-96	223037	Gasket - Bleeder Valve	1
4AJ-46	2123	Washer	2	4AJ-97	143946	Screw	1
4AJ-47	108501	Screw - Body Pump	2	4AJ-98	143904	Distributor - Collar	1
4AJ-48	143958	Bushing - Pump Pinion	1	4AJ-99	89866	Connector - Male	3
4AJ-49	2322	Screw	3	4AJ-100	150547	Tubing	3
4AJ-50	143909	Body - Oil Pump	1	4AJ-101	143925	Shaft	1



### CLUTCH AND BRAKE SHAFT

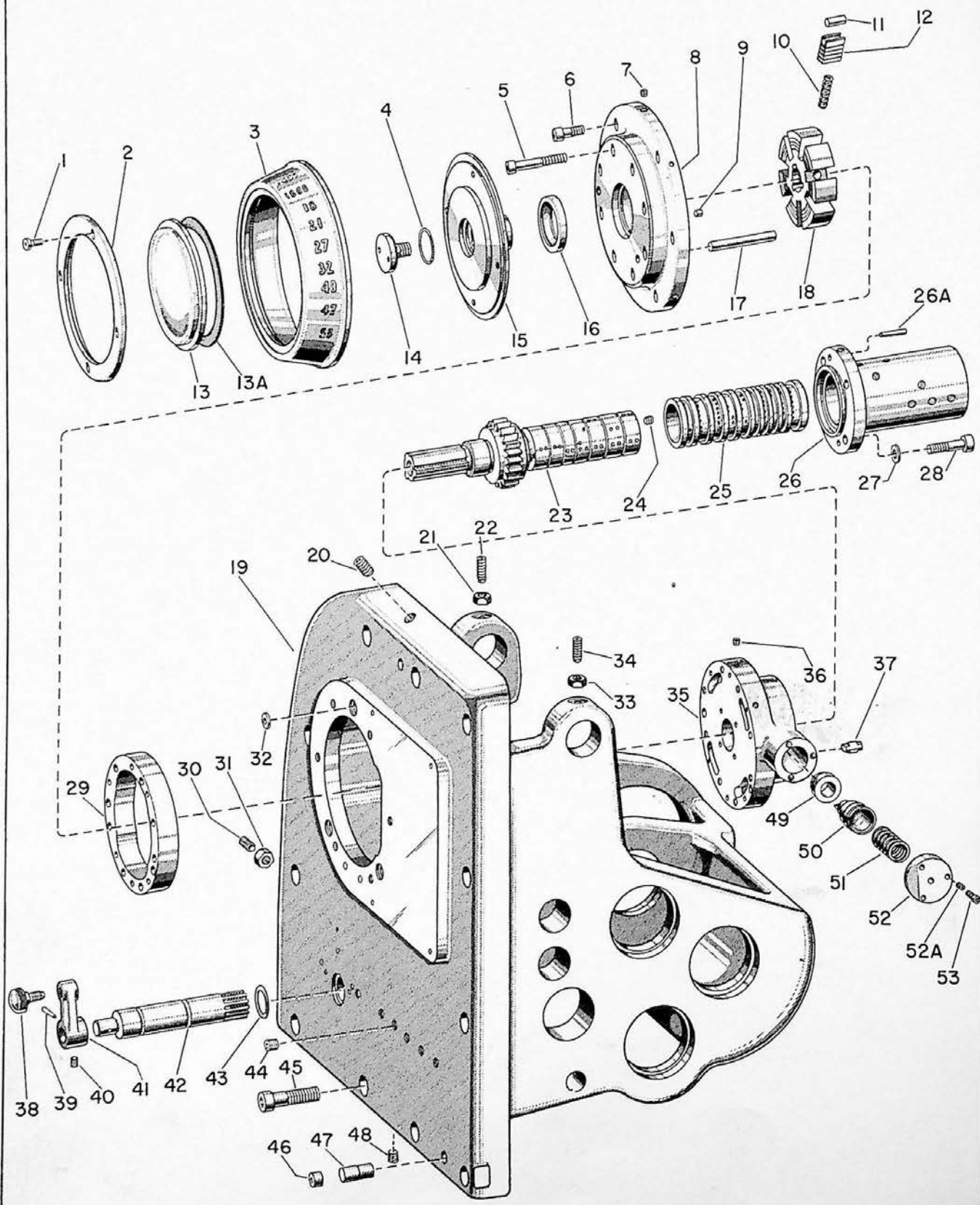


159000  
218000  
219000

PULLEY BRACKET-UNIT No. 4AJ (Concluded)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AJ-102	4245	Nut - Lock . . . . .	1	4AJ-137	152508	Cap - Cylinder Brake . . . . .	1
4AJ-103	3227	Screw . . . . .	4	4AJ-138	2320	Screw . . . . .	5
4AJ-104	143907	Cap - Driven Pulley . . . . .	1	4AJ-139	143942	Spacer . . . . .	1
4AJ-105	4250	Nut - Lock . . . . .	1	4AJ-140	156257	Collar - Brake Driving . . . . .	1
4AJ-106	110589	Cone - Roller Bearing . . . . .	1	4AJ-141	143954	Plate - Brake Backing . . . . .	1
4AJ-107	108024	Cup - Roller Bearing . . . . .	1	4AJ-142	143940	Plate - Driving Clutch . . . . .	4
4AJ-108	251228	Ring - "O" . . . . .	1	4AJ-143	143960	Plate - Driven . . . . .	3
4AJ-109	143916	Sleeve - Bearing . . . . .	1	4AJ-144	143954	Plate - Brake Backing . . . . .	1
4AJ-110	2268	Plug . . . . .	1	4AJ-145	143961	Spacer . . . . .	1
4AJ-111	2325	Screw . . . . .	6	4AJ-146	4194	Nut - Lock . . . . .	1
4AJ-112	108024	Cup - Roller Bearing . . . . .	1	4AJ-147	143941	Nut - Lock . . . . .	1
4AJ-113	110589	Cone - Roller Bearing . . . . .	1	4AJ-148	143948	Cone . . . . .	1
4AJ-114	3287	Key . . . . .	1	4AJ-149	143947	Cup . . . . .	1
4AJ-115	76645	Plug . . . . .	1	4AJ-150	143921	Wheel . . . . .	1
4AJ-116	147130	Gear - Clutch Drive Pulley . . . . .	1	4AJ-151	143947	Cup . . . . .	1
4AJ-117	231004	Bearing - Roller . . . . .	1	4AJ-152	143948	Cone . . . . .	1
4AJ-118	150845	Plug - Choke . . . . .	1	4AJ-153	143905	Pin - Clutch Spring . . . . .	10
4AJ-119	161968	Shaft - Clutch & Brake . . . . .	1	4AJ-154	3198	Screw . . . . .	4
4AJ-120	76644	Plug - Pipe . . . . .	2	4AJ-155	103050	Key - Nut Adjusting . . . . .	4
4AJ-121	143932	Stop - Collar . . . . .	1	4AJ-156	143950	Washer . . . . .	1
4AJ-122	143930	Plate - Clutch Backing . . . . .	1	4AJ-157	3399	Screw . . . . .	6
4AJ-123	143956	Pin - Clutch . . . . .	3	4AJ-158	76644	Plug - Pipe . . . . .	2
4AJ-124	143955	Spring - Clutch Disc . . . . .	3	4AJ-159	143906	Screw . . . . .	1
4AJ-125	143940	Plate - Driving Clutch . . . . .	8	4AJ-160	3399	Screw . . . . .	3
4AJ-126	143960	Plate - Driven . . . . .	7	4AJ-161	143919	Retainer . . . . .	1
4AJ-127	143930	Plate - Clutch Backing . . . . .	1	4AJ-162	150547	Tubing - Oil . . . . .	1
4AJ-128	156256	Collar - Clutch Driving . . . . .	1	4AJ-163	89866	Connector - Male . . . . .	2
4AJ-129	143942	Spacer . . . . .	1	4AJ-164	143917	Distributor - Arm . . . . .	1
4AJ-130	2320	Screw . . . . .	5	4AJ-165	161967	Bushing - Distributor . . . . .	1
4AJ-131	143935	Cap - Cylinder Clutch . . . . .	1	4AJ-166	73751	Bearing . . . . .	1
4AJ-132	143905	Pin - Clutch Spring . . . . .	10	4AJ-167	143933	Housing - Bearing . . . . .	1
4AJ-133	143934	Cylinder . . . . .	1	4AJ-168	152298	Key . . . . .	1
4AJ-134	143957	Spring - Clutch & Brake . . . . .	10	4AJ-169	143922	Gear - Drive . . . . .	1
4AJ-135	222159	Ring - Piston . . . . .	1	4AJ-170	3803	Washer - Lock . . . . .	1
4AJ-136	152509	Piston . . . . .	1	4AJ-171	3804	Nut - Lock . . . . .	1

# SPEED SELECTOR VALVE AND SHIFTER BRACKET



196DD  
198DD

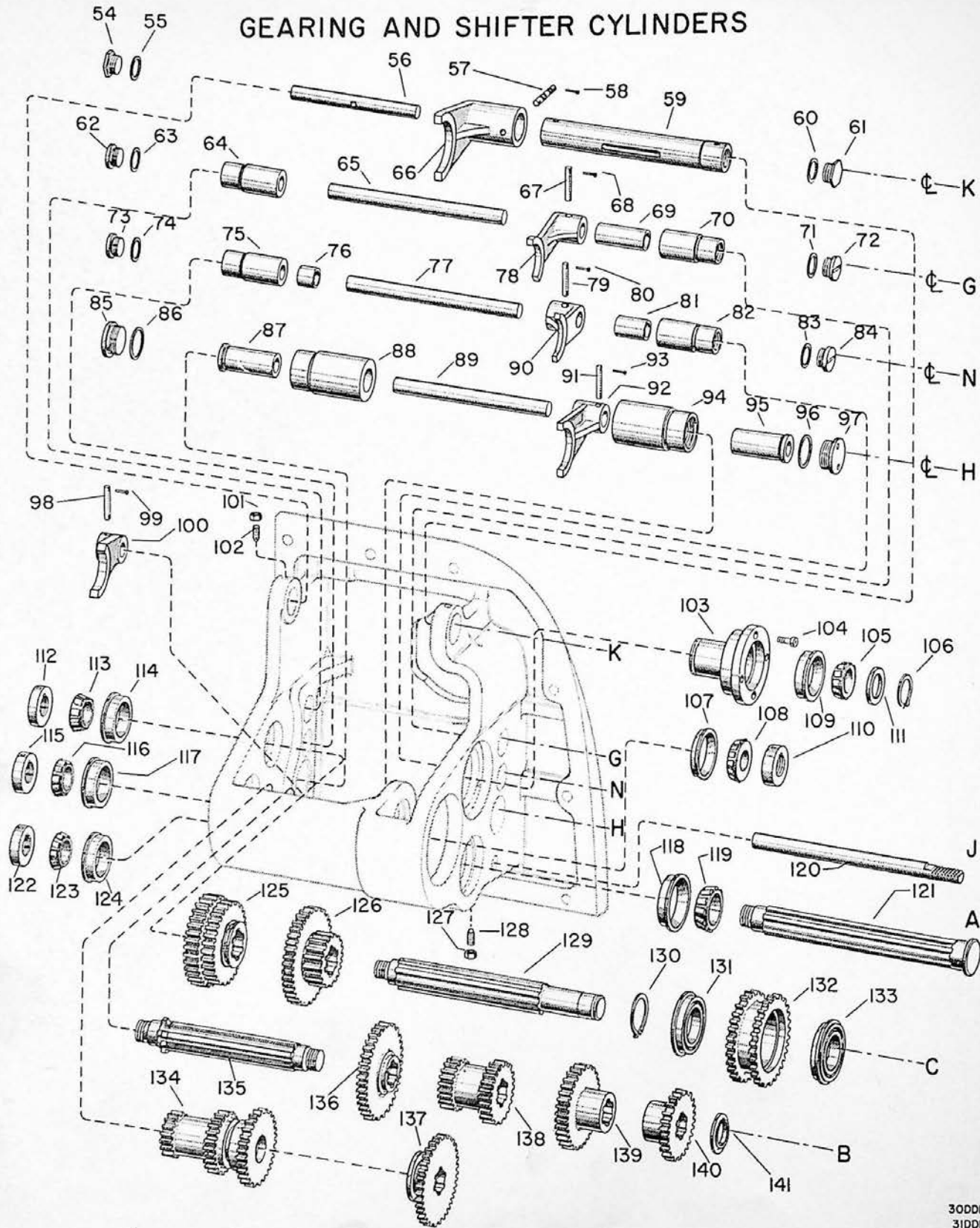
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SHIFTER BRACKET-UNIT No. 4AS  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AS-1	150554	Screw - Plated . . . . .	4	4AS-26A	3304	Pin - Taper . . . . .	2
4AS-2	150474	Ring - Speed Dial . . . . .	1	4AS-27	246088	Washer - Spring Thrust . . . . .	4
4AS-3		Dial - Speed . . . . .		4AS-28	3400	Screw . . . . .	4
	147317	No. 2 Machines . . . . .	1	4AS-29	150501	Cam - 7 Vane Motor . . . . .	1
	147420	Nos. 3 & 4 Machines . . . . .	1	4AS-30	3236	Screw . . . . .	1
4AS-4	244151	Ring - "O" . . . . .	1	4AS-31	3473	Nut . . . . .	1
4AS-5	2327	Screw . . . . .	8	4AS-32	130178	Ring - "O" . . . . .	3
4AS-6	3266	Screw . . . . .	6	4AS-33	3473	Nut . . . . .	1
4AS-7	4236	Plug . . . . .	12	4AS-34	3234	Screw . . . . .	1
4AS-8	150499	Cover - Bracket . . . . .	1	4AS-35	150505	Cover - Rear 7 Vane Motor . . . . .	1
4AS-9	1844	Plug . . . . .	2	4AS-36	4236	Plug . . . . .	8
4AS-10	203247	Spring - Compression . . . . .	7	4AS-37	157547	Pin . . . . .	1
4AS-11	150504	Roller Vane . . . . .	7	4AS-38	121967	Screw - Thumb . . . . .	1
4AS-12	150503	Vane - Hyd. Motor . . . . .	7	4AS-39	663	Pin . . . . .	1
4AS-13	150887	Cap - Dial . . . . .	1	4AS-40	2322	Screw . . . . .	1
4AS-13A	161012	Gasket . . . . .	1	4AS-41	144092	Lever - Reverse . . . . .	1
4AS-14	165808	Screw - Dial . . . . .	1	4AS-42	144062	Pinion . . . . .	1
4AS-15	165809	Flange - Dial . . . . .	1	4AS-43	127945	Ring - "O" . . . . .	1
4AS-16	147129	Seal - Oil . . . . .	1	4AS-44	76645	Plug . . . . .	6
4AS-17	214301	Shaft - Pump Lever Rocker . . . . .	2	4AS-45	1925	Screw . . . . .	11
4AS-18	150500	Rotor . . . . .	1	4AS-46	3530	Plug . . . . .	2
4AS-19	150480	Bracket - Shifter . . . . .	1	4AS-47	1430	Pin . . . . .	2
4AS-20	2145	Screw . . . . .	1	4AS-48	76644	Plug . . . . .	6
4AS-21	3473	Nut . . . . .	1	4AS-49	154496	Bushing - Detent . . . . .	1
4AS-22	3234	Screw . . . . .	1	4AS-50	150526	Plunger - Detent . . . . .	1
4AS-23	150496	Valve . . . . .	1	4AS-51	116970	Spring - Friction . . . . .	1
4AS-24	4236	Plug . . . . .	2	4AS-52	150527	Cap - Spring Detent . . . . .	1
4AS-25	150497	Bushing - Selector Valve . . . . .	1	4AS-52A	101782	Screw - Cup Point . . . . .	1
4AS-26	150498	Sleeve - Outer Selector Valve . . . . .	1	4AS-53	3218	Screw . . . . .	3

# GEARING AND SHIFTER CYLINDERS



30DDD  
 31DDD  
 57DDD  
 170DDD  
 46GGG  
 47GGG  
 88GGG  
 107GGG

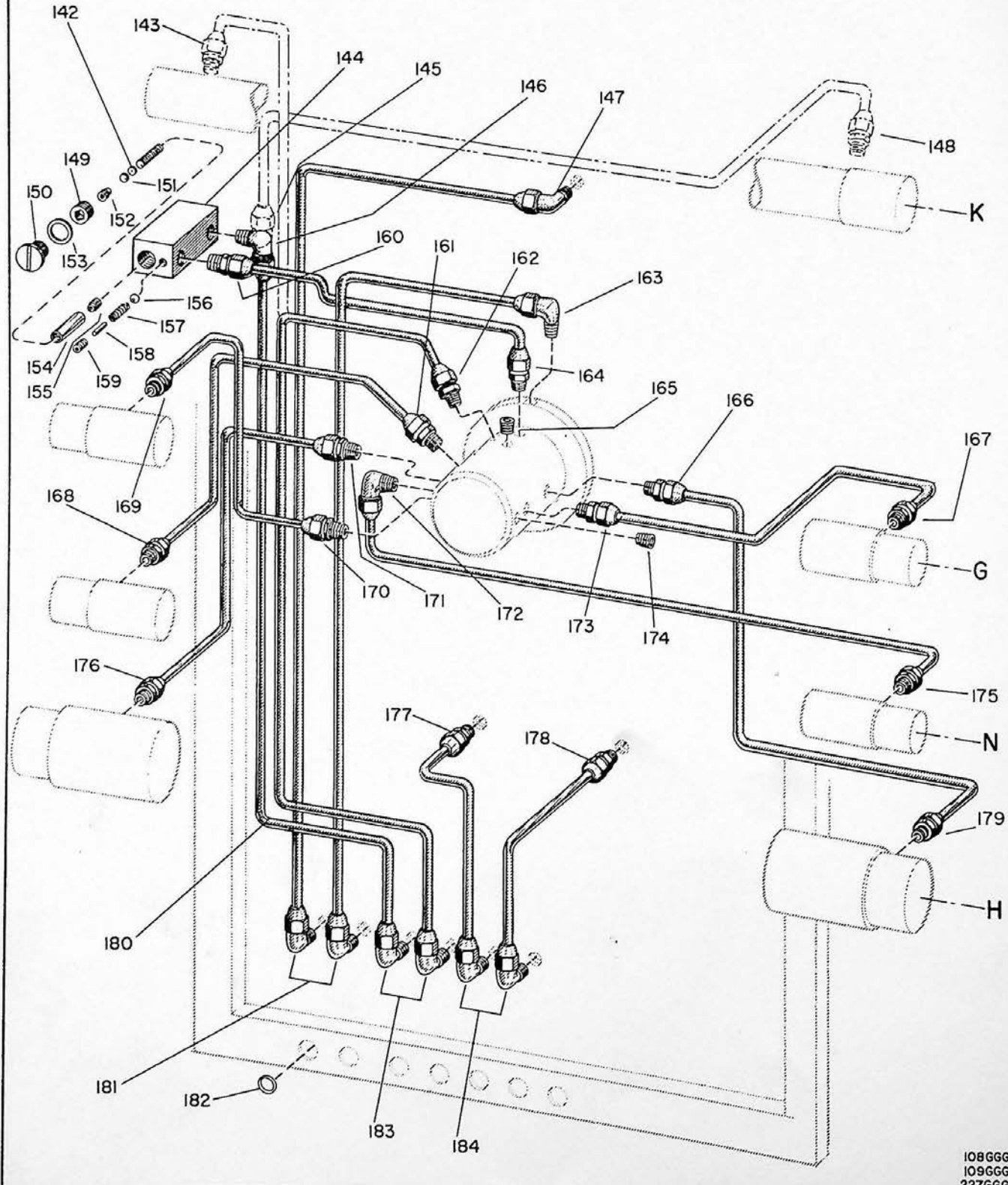
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SHIFTER BRACKET-UNIT No. 4AS (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AS-54		Cap		4AS-91	159736	Pin - In Gear . . . . .	1
	70142	No. 2 Plain & Universal Machines . . . . .	1	4AS-92	144035	Fork - "H" Shaft . . . . .	1
	125474	Nos. 3 & 4 Plain & Universal Machines . . . . .	1	4AS-93	2095	Pin - Cotter . . . . .	2
4AS-55	79093	Gasket		4AS-94	144081	Cylinder - "H" Shaft . . . . .	1
		Plain & Universal Machines . . . . .	1	4AS-95	144085	Sleeve - "H" Shaft . . . . .	1
4AS-56		Piston - "K" Shaft		4AS-96	121587	Gasket . . . . .	1
	144071	No. 2 Plain & Universal Machines . . . . .	1	4AS-97	211760	Cap . . . . .	1
	147522	Nos. 3 & 4 Plain & Universal Machines . . . . .	1	4AS-98	159736	Pin - In Gear . . . . .	1
4AS-57	147623	Pin		4AS-99	2095	Pin - Cotter . . . . .	2
		Nos. 2, 3 & 4 Plain & Universal		4AS-100	144034	Fork - "J" Shaft . . . . .	1
		Machines . . . . .	1	4AS-101	3473	Nut . . . . .	2
4AS-58	2095	Pin - Cotter		4AS-102	3234	Screw . . . . .	2
		Plain & Universal Machines . . . . .	2	4AS-103	146074	Housing - Bearing - "C" Shaft . . . . .	1
4AS-59		Cylinder - "K" Shaft		4AS-104	3399	Screw . . . . .	4
	144050	No. 2 Plain & Universal Machines . . . . .	1	4AS-105	212670	Cone - Roller Bearing . . . . .	1
	147520	Nos. 3 & 4 Plain & Universal Machines . . . . .	1	4AS-106	146072	Ring - Retaining . . . . .	1
4AS-60	79093	Gasket		4AS-107	108370	Cup - Roller Bearing . . . . .	1
		Plain & Universal Machines . . . . .	1	4AS-108	108369	Cone - Roller Bearing . . . . .	1
4AS-61		Cap		4AS-109	212669	Cup - Roller Bearing . . . . .	1
	70142	No. 2 Plain & Universal Machines . . . . .	1	4AS-110	4246	Nut - Lock . . . . .	1
	125474	Nos. 3 & 4 Plain & Universal Machines . . . . .	1	4AS-111	146071	Spacer . . . . .	1
4AS-62	70142	Cap . . . . .	1	4AS-112	4246	Nut - Lock . . . . .	1
4AS-63	79093	Gasket . . . . .	1	4AS-113	212670	Cone - Roller Bearing . . . . .	1
4AS-64	144082	Cylinder - "G" Shaft . . . . .	1	4AS-114	212669	Cup - Roller Bearing . . . . .	1
4AS-65	144069	Piston - "G" Shaft . . . . .	1	4AS-115	4246	Nut - Lock . . . . .	1
4AS-66		Fork - "K" Shaft		4AS-116	212670	Cone - Roller Bearing . . . . .	1
	144032	No. 2 Plain & Universal Machines . . . . .	1	4AS-117	212669	Cup - Roller Bearing . . . . .	1
	147521	Nos. 3 & 4 Plain & Universal Machines . . . . .	1	4AS-118	108024	Cup - Roller Bearing . . . . .	1
4AS-67	159736	Pin - In Gear . . . . .	1	4AS-119	110589	Cone - Roller Bearing . . . . .	1
4AS-68	2095	Pin - Cotter . . . . .	2	4AS-120	144051	Shaft - "J" Reverse Shifting Fork . . . . .	1
4AS-69	144073	Spacer - "G" Shaft . . . . .	1	4AS-121	144049	Shaft - "A" . . . . .	1
4AS-70	144082	Cylinder - "G" Shaft . . . . .	1	4AS-122	4246	Nut - Lock . . . . .	1
4AS-71	79093	Gasket . . . . .	1	4AS-123	212670	Cone - Roller Bearing . . . . .	1
4AS-72	70142	Cap . . . . .	1	4AS-124	212669	Cup - Roller Bearing . . . . .	1
4AS-73	70142	Cap . . . . .	1	4AS-125	144040	Gear - 46T and 43T - "C" Shaft . . . . .	1
4AS-74	79093	Gasket . . . . .	1	4AS-126	144041	Gear - 25T and 49T - "C" Shaft . . . . .	1
4AS-75	144082	Cylinder - "N" Shaft . . . . .	1	4AS-127	3473	Nut . . . . .	1
4AS-76	144067	Spacer - Shifter Fork - "N" Shaft . . . . .	1	4AS-128	3234	Screw . . . . .	1
4AS-77	144070	Piston - "N" Shaft . . . . .	1	4AS-129	146075	Shaft - Spline "C" . . . . .	1
4AS-78	144033	Fork - "G" Shaft . . . . .	1	4AS-130	126615	Ring - Retaining . . . . .	1
4AS-79	159736	Pin - In Gear . . . . .	1	4AS-131	144091	Bearing - Ball . . . . .	1
4AS-80	2095	Pin - Cotter . . . . .	2	4AS-132	146073	Gear - "C" Shaft Idler . . . . .	1
4AS-81	144074	Spacer - Shifter Fork - "N" Shaft . . . . .	1	4AS-133	144091	Bearing - Ball . . . . .	1
4AS-82	144082	Cylinder - "N" Shaft . . . . .	1	4AS-134	144044	Gear - "A" Shaft . . . . .	1
4AS-83	79093	Gasket . . . . .	1	4AS-135	144045	Shaft - "B" . . . . .	1
4AS-84	70142	Cap . . . . .	1	4AS-136	144038	Gear - 50T - "B" Shaft . . . . .	1
4AS-85	211760	Cap . . . . .	1	4AS-137	144042	Gear - 46T - "A" Shaft . . . . .	1
4AS-86	121587	Gasket . . . . .	1	4AS-138	144037	Gear - 29T - "B" Shaft . . . . .	1
4AS-87	144085	Sleeve - "H" Shaft . . . . .	1	4AS-139	144043	Gear - 43T - "B" Shaft . . . . .	1
4AS-88	144081	Cylinder - "H" Shaft . . . . .	1	4AS-140	144036	Gear - 46T - "B" Shaft . . . . .	1
4AS-89	144083	Piston - "H" Shaft . . . . .	1	4AS-141	144068	Washer - Spacer - "B" Shaft . . . . .	1
4AS-90	144033	Fork - "N" Shaft . . . . .	1				

# SHIFTER BRACKET TUBING



108GGG  
109GGG  
227GGG

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

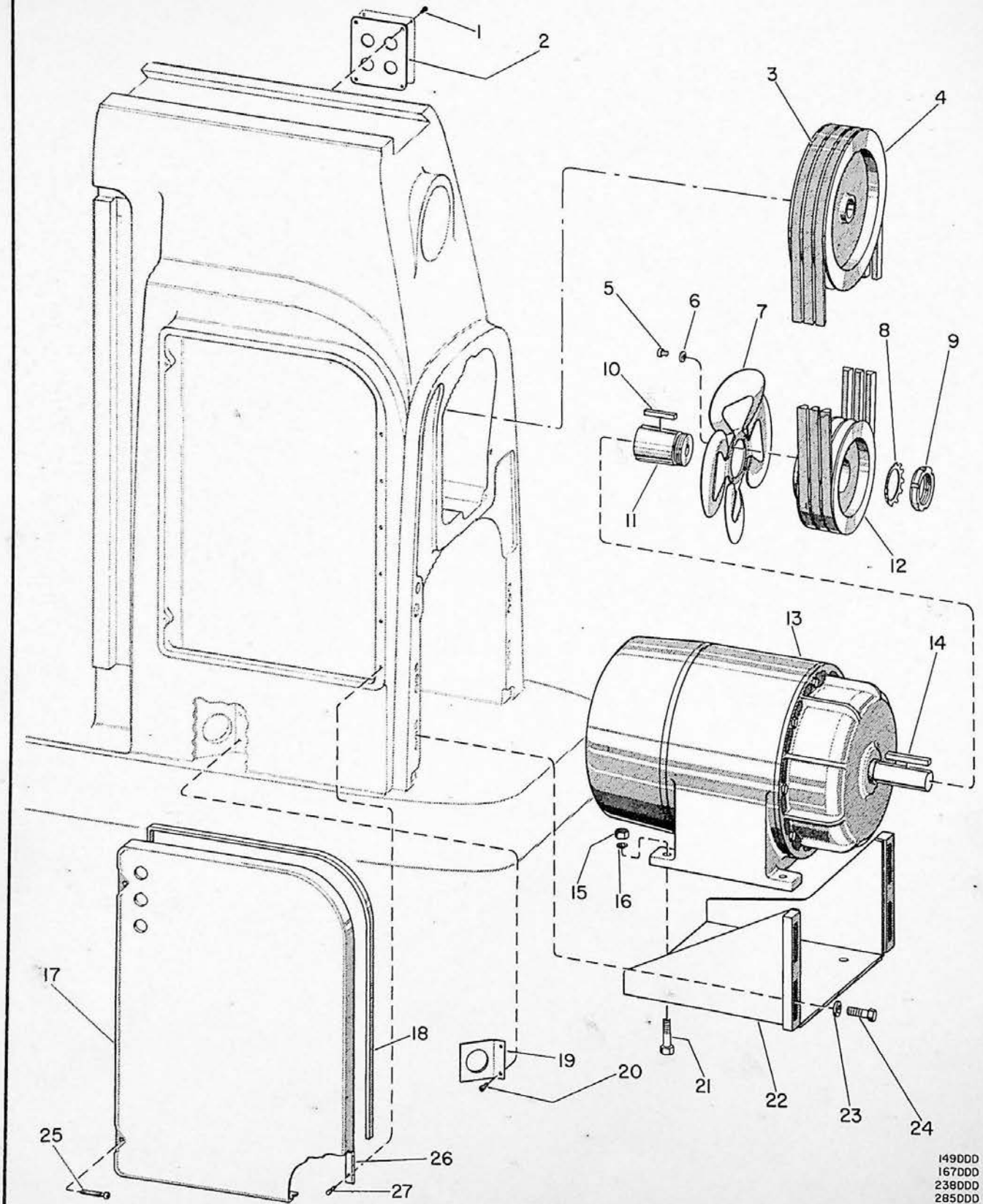
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SHIFTER BRACKET-UNIT No. 4AS (Concluded)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AS-142	160153	Disc - Dynamic Resistor . . . . .	7	4AS-165	76644	Plug - Pipe . . . . .	1
4AS-143	70382	Fitting - Compression Plain & Universal Machines . . . . .	1	4AS-166	70382	Fitting - Compression . . . . .	1
4AS-144	160183	Body - Meter . . . . .	1	4AS-167	70382	Fitting - Compression . . . . .	1
4AS-145	70382	Fitting - Compression Plain & Universal Machines . . . . .	1	4AS-168	70382	Fitting - Compression . . . . .	1
4AS-146	4013	Elbow . . . . .	1	4AS-169	70382	Fitting - Compression . . . . .	1
4AS-147	4013	Elbow . . . . .	1	4AS-170	70382	Fitting - Compression . . . . .	1
4AS-148	70382	Fitting - Compression Plain & Universal Machines . . . . .	1	4AS-171	70382	Fitting - Compression . . . . .	1
4AS-149	160155	Screw . . . . .	1	4AS-172	4013	Elbow . . . . .	1
4AS-150	76449	Plug - Screw . . . . .	1	4AS-173	70382	Fitting - Compression . . . . .	1
4AS-151	160154	Disc - Dynamic Resistor . . . . .	7	4AS-174	76644	Plug - Pipe . . . . .	1
4AS-152	2356	Screw . . . . .	1	4AS-175	70382	Fitting - Compression . . . . .	1
4AS-153	222490	Gasket . . . . .	1	4AS-176	70382	Fitting - Compression . . . . .	1
4AS-154	159292	Case - Dynamic Resistor . . . . .	1	4AS-177	70382	Fitting - Compression . . . . .	1
4AS-155	2356	Screw . . . . .	1	4AS-178	70382	Fitting - Compression . . . . .	1
4AS-156	218832	Ball . . . . .	1	4AS-179	70382	Fitting - Compression . . . . .	1
4AS-157	238130	Spring . . . . .	1	4AS-180		Tubing - List	
4AS-158	3540	Pin . . . . .	1		150540	Nos. 2, 3 & 4 Plain & Universal Machines . . . . .	1
4AS-159	4236	Plug - Pipe . . . . .	1	4AS-181	151001	Nos. 2, 3 & 4 Vertical Machines . . . . .	1
4AS-160	70382	Fitting - Compression . . . . .	1	4AS-182	4013	Elbow . . . . .	2
4AS-161	70382	Fitting - Compression . . . . .	1		247090	Ring - "O" Plain & Universal Machines . . . . .	4
4AS-162	70382	Fitting - Compression . . . . .	1		247090	Vertical Machines . . . . .	6
4AS-163	4013	Elbow . . . . .	1	4AS-183	4013	Elbow . . . . .	
4AS-164	70382	Fitting - Compression . . . . .	1	4AS-184	4013	Vertical Machines Only . . . . .	2
						Elbow . . . . .	2



MAIN DRIVE MOTOR



1490DD  
1670DD  
2380DD  
2850DD  
46GG  
50GG  
115GG

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

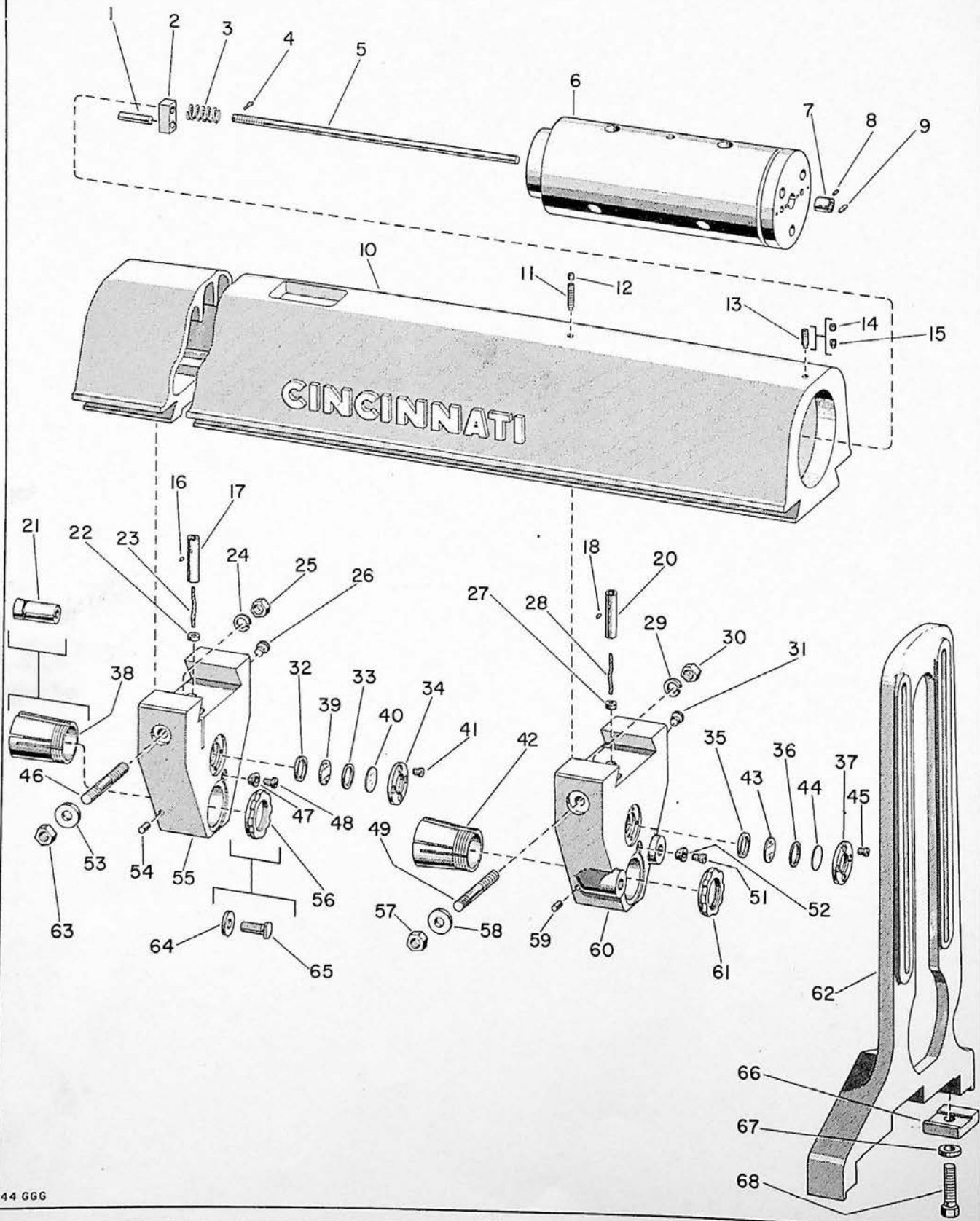
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

MOTOR DRIVE-UNIT No. 4AN  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AN-1	150554	Screw . . . . .	4		144549	No. 2 Machines - 1800 R. P. M. . . . .	1
4AN-2	154428	Plate - Rear Mounting . . . . .	1		162722	No. 2 Machines - 1500 R. P. M. . . . .	1
4AN-3		Belt - Vee			147552	Nos. 3 & 4 Machines - 1800 R. P. M. . . . .	1
	144545	No. 2 Plain & Universal Machines . . . . .	2		162906	Nos. 3 & 4 Machines - 1500 R. P. M. . . . .	1
	144327	No. 2 Vertical Machines . . . . .	2	4AN-13	Example	*Motor - Main Drive (Specify H. P., Frame Size, Voltage & Cycle) . . . . .	1
	133909	Nos. 3 & 4 Plain & Universal Machines . . . . .	3			*Key - (Supplied by Motor Manufacturer) . . . . .	1
	133910	Nos. 3 & 4 Vertical Machines . . . . .	3	4AN-14	Example	Nut . . . . .	4
4AN-4		Sheave - Driven		4AN-15	3480	Washer . . . . .	4
	147978	No. 2 Machines - 1800 R. P. M. . . . .	1	4AN-16	2118	Cover - Electrical Compartment	
	162721	No. 2 Machines - 1500 R. P. M. . . . .	1	4AN-17		No. 2 Machines . . . . .	1
	147551	Nos. 3 & 4 Machines - 1800 R. P. M. . . . .	1		151628	Nos. 3 & 4 Machines . . . . .	1
	162905	Nos. 3 & 4 Machines - 1500 R. P. M. . . . .	1	4AN-18		Cover - Gasket Material	
4AN-5	3399	Screw . . . . .	4		148342	Strip Felt - 72" - No. 2 Machines . . . . .	1
4AN-6	2135	Washer . . . . .	4		134209	Strip Felt - 23" - No. 2 Machines . . . . .	1
4AN-7		Fan			134209	Strip Felt - 78" - Nos. 3 & 4 Machines . . . . .	1
	148145	Open Frame Motor . . . . .	1		134209	Strip Felt - 23-1/2" Nos. 3 & 4 Machines . . . . .	1
	144548	Totally Enclosed Fan . . . . .	1	4AN-19		Plate - Conduit Mounting	
4AN-8		Washer			151087	No. 2 Machines . . . . .	1
	3643	No. 2 Machines . . . . .	1		148340	Nos. 3 & 4 Machines . . . . .	1
	3797	Nos. 3 & 4 Machines . . . . .	1	4AN-20	3202	Screw - Conduit Mounting Plate . . . . .	2
4AN-9		Nut - Lock		4AN-21	111	Screw - Motor Anchor . . . . .	4
	3813	No. 2 Machines . . . . .	1	4AN-22		Bracket - Motor Support	
	3798	Nos. 3 & 4 Machines . . . . .	1		159335	No. 2 Machines . . . . .	1
4AN-10		Key			159336	Nos. 3 & 4 Machines . . . . .	1
	1799	No. 2 Machines . . . . .	1	4AN-23	1040	Washer - Motor Bracket Adjustment . . . . .	4
	1800	Nos. 3 & 4 Machines . . . . .	1	4AN-24	111	Screw - Motor Bracket Adjustment . . . . .	4
4AN-11		Sleeve		4AN-25	144538	Screw - Electrical Compartment Cover . . . . .	2
	93057	No. 2 Machines - 324 Frame . . . . .	1	4AN-26	4220	Hinge . . . . .	1
	159334	No. 2 Machines - 256U Frame . . . . .	1	4AN-27		Screw - Hinge	
	93069	Nos. 3 & 4 Machines - 364 Frame . . . . .	1		3202	No. 2 Machines . . . . .	5
	93061	Nos. 3 & 4 Machines 326, 284U, 286L Frames . . . . .	1		3202	Nos. 3 & 4 Machines . . . . .	6
4AN-12		Sheave - Motor					

\* State serial number of machine when ordering parts by name and key number.

### DAMPER - OVERARM - ARBOR SUPPORTS



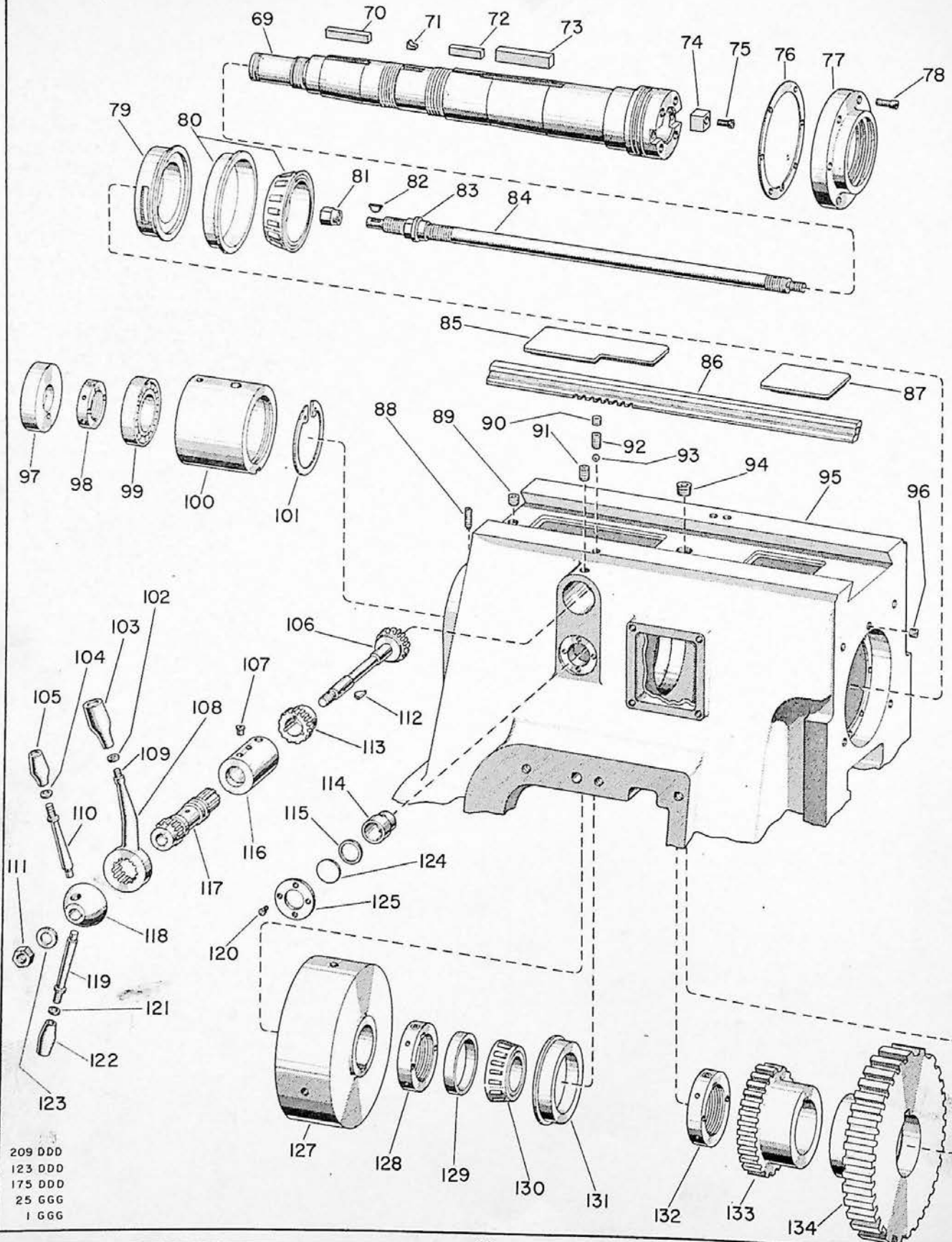
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

COLUMN-UNIT No. 4AC  
Nos. 2, 3, AND 4 PLAIN AND UNIVERSAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-1	3863	Pin . . . . .	1	4AC-41	3213	Screw . . . . .	4
4AC-2	131862	Nut - Tension . . . . .	1	4AC-42	3697	Bushing - Arbor Support . . . . .	1
4AC-3	116970	Spring . . . . .	1	4AC-43	3851	Dial - Oil Gage . . . . .	1
4AC-4	703	Pin - Cotter . . . . .	1	4AC-44	3849	Disc - Oil Gage . . . . .	1
4AC-5		Rod - Dampener Adjusting		4AC-45	3213	Screw . . . . .	4
	138382	No. 2 Machines . . . . .	1	4AC-46	144558	Stud - Arbor Support . . . . .	1
	138384	Nos. 3 & 4 Machines . . . . .	1	4AC-47		Roller - Lock	
4AC-6		Dampener - Vibration			3974	No. 2 Machines - Style "B" - On Demand	1
	152257	No. 2 Machines . . . . .	1		3974	Nos. 3 & 4 Machines - Style "B" -	
	152276	Nos. 3 & 4 Machines . . . . .	1			Regular . . . . .	1
4AC-7	128297	Collar - Dampener Rod . . . . .	1	4AC-48		Screw	
4AC-8	140	Pin . . . . .	1		3484	No. 2 Machines - Style "B" - On Demand	1
4AC-9	128589	Key - Dampener . . . . .	1		3484	Nos. 3 & 4 Machines - Style "B" -	
4AC-10		Arm - Over				Regular . . . . .	1
	144210	No. 2 Machines . . . . .	1	4AC-49	144558	Stud - Arbor Support . . . . .	1
	148404	No. 3 Machines . . . . .	1	4AC-51	3484	Screw . . . . .	1
	148403	No. 4 Machines . . . . .	1	4AC-52	3974	Roller - Lock . . . . .	1
4AC-11		Screw		4AC-53	764	Washer . . . . .	1
	3236	No. 2 Machines . . . . .	1	4AC-54		Pin	
	3237	Nos. 3 & 4 Machines . . . . .	1		3544	No. 2 Machines - Style "B" - On Demand	1
4AC-12		Screw			3543	No. 2 Machines - Style "A" - Regular . . . . .	1
	1911	No. 2 Machines . . . . .	1		3543	Nos. 3 & 4 Machines - Style "B" -	
	2356	Nos. 3 & 4 Machines . . . . .	1			Regular . . . . .	1
4AC-13		Screw			3431	Nos. 3 & 4 Machines - Style "A" -	
	3233	Nos. 3 & 4 Machines . . . . .	1			On Demand . . . . .	1
4AC-14	1911	Screw		4AC-55		Support - Arbor	
		No. 2 Machines Only . . . . .	1		144557	No. 2 Machines - Style "A" - Regular . . . . .	1
4AC-15	3232	Screw			144559	No. 2 Machines - Style "B" - On Demand	1
		No. 2 Machines Only . . . . .	1		148328	Nos. 3 & 4 Machines - Style "B" -	
4AC-16	3539	Pin . . . . .	1			Regular . . . . .	1
4AC-17	66344	Tube - Oil . . . . .	1		148329	Nos. 3 & 4 Machines - Style "A" -	
4AC-18	3539	Pin . . . . .	1			On Demand . . . . .	1
4AC-20	66344	Tube - Oil . . . . .	1	4AC-56		Nut - Adjusting	
4AC-21		Bushing - Arbor Support			3972	No. 3 Machines - Style "B" - On Demand	1
	3695	No. 2 Machines - Style "A" - Regular . . . . .	1		3972	Nos. 3 & 4 Machines - Style "B" -	
	3695	Nos. 3 & 4 Machines - Style "A" -				Regular . . . . .	1
		On Demand . . . . .	1	4AC-57	3481	Nut . . . . .	1
4AC-22	63561	Plug - Oil Tube . . . . .	1	4AC-58	764	Washer . . . . .	1
4AC-23	61417	Wick . . . . .	1	4AC-59	3543	Pin . . . . .	1
4AC-24	2265	Washer . . . . .	1	4AC-60		Support - Arbor	
4AC-25	666	Nut . . . . .	1		144556	No. 2 Machines . . . . .	1
4AC-26	67608	Plug - 3/8" Pipe . . . . .	1		148327	Nos. 3 & 4 Machines . . . . .	1
4AC-27	63561	Plug - Oil Tube . . . . .	1	4AC-61	3972	Nut . . . . .	1
4AC-28	61417	Wick . . . . .	1	4AC-62		Brace - Arbor Support	
4AC-29	2265	Washer . . . . .	1		144555	No. 2 Machines . . . . .	1
4AC-30	666	Nut . . . . .	1		148339	Nos. 3 & 4 Machines . . . . .	1
4AC-31	67608	Plug - 3/8" Pipe . . . . .	1	4AC-63	3481	Nut . . . . .	1
4AC-32	4086	Gasket . . . . .	1	4AC-64		Screw	
4AC-33	3850	Gasket . . . . .	1		128	No. 2 Machines - Style "A" - Regular . . . . .	1
4AC-34	4075	Cover - Oil Gage . . . . .	1		128	Nos. 3 & 4 Machines - Style "A" -	
4AC-35	4086	Gasket . . . . .	1			On Demand . . . . .	1
4AC-36	3850	Gasket . . . . .	1	4AC-65		Screw	
4AC-37	4075	Cover - Oil Gage . . . . .	1		3692	No. 2 Machines - Style "A" - Regular . . . . .	1
4AC-38		Bushing - Arbor Support			3692	Nos. 3 & 4 Machines - Style "A" -	
	3697	No. 2 Machines - Style "B" - On Demand	1			On Demand . . . . .	1
	3697	Nos. 3 & 4 Machines - Style "B" -		4AC-66	145084	Clamp - Overarm . . . . .	2
		Regular . . . . .	1	4AC-67	764	Washer . . . . .	2
4AC-39	3851	Dial - Oil Gage . . . . .	1	4AC-68	223539	Screw . . . . .	2
4AC-40	3849	Disc - Oil Gage . . . . .	1				

### SPINDLE SHAFT AND OVERARM CLAMP



209 DDD  
 123 DDD  
 175 DDD  
 25 GGG  
 1 GGG

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

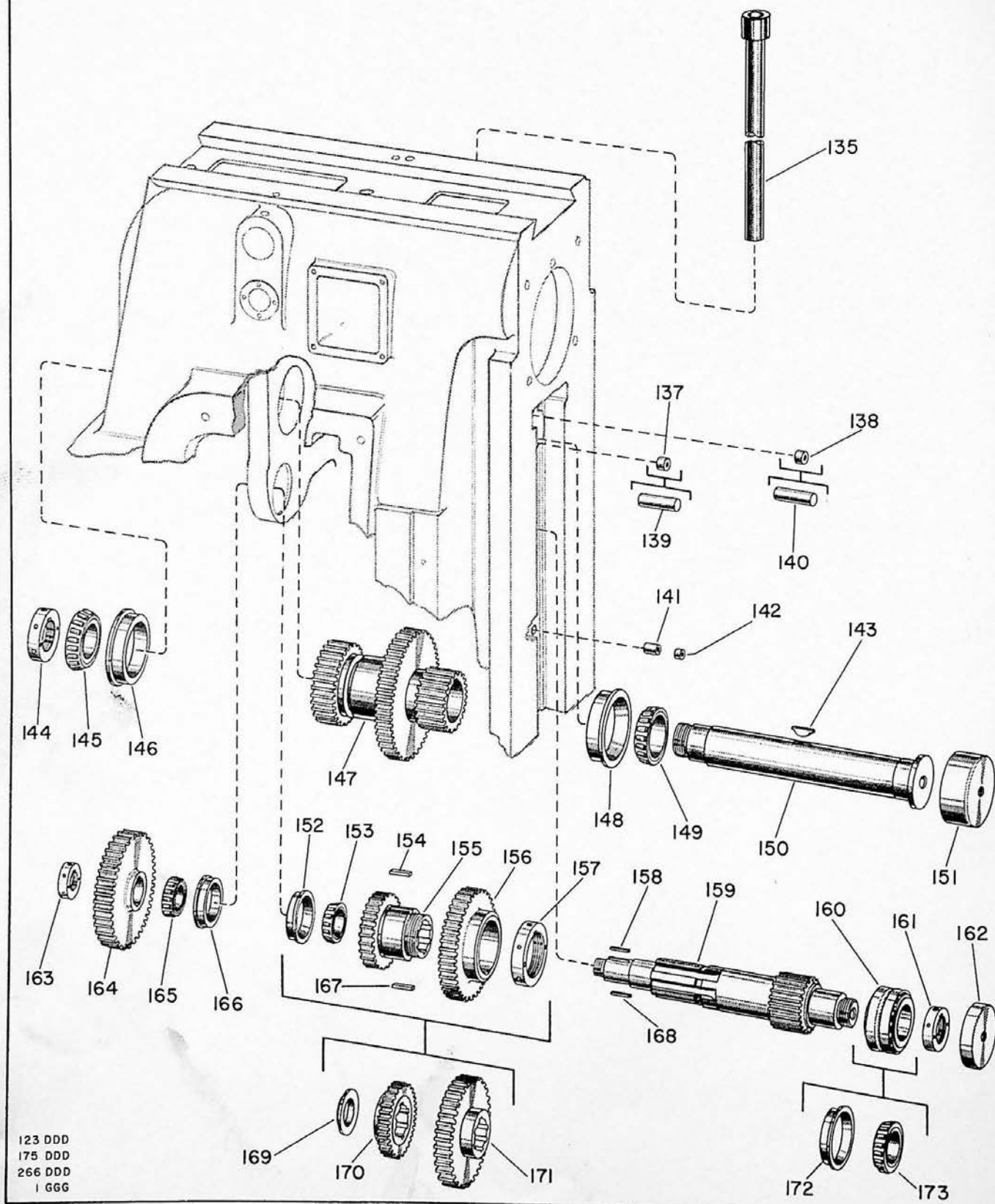
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

COLUMN-UNIT No. 4AC (Continued)

Nos. 2, 3, AND 4 PLAIN AND UNIVERSAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-69	147379	Spindle		4AC-98		Nut - Lock	
	146939	No. 2 Machines . . . . .	1	4269		No. 2 Machines . . . . .	1
	3435	Nos. 3 & 4 Machines . . . . .	1	4253		Nos. 3 & 4 Machines . . . . .	1
4AC-70	3435	Key . . . . .	1	4AC-99		Bearing - Roller	
4AC-71	4004	Key . . . . .	1	156855		No. 2 Machines . . . . .	1
4AC-72		Key . . . . .		145727		Nos. 3 & 4 Machines . . . . .	1
	3452	No. 2 Machines . . . . .	1	4AC-100		Retainer - Bearing	
	1808	Nos. 3 & 4 Machines . . . . .	1	147974		No. 2 Machines . . . . .	1
4AC-73		Key - Dovetail		146946		Nos. 3 & 4 Machines . . . . .	1
	3435	No. 2 Machines . . . . .	1	4AC-101		Ring - Retaining	
	110253	Nos. 3 & 4 Machines . . . . .	1	147246		No. 2 Machines . . . . .	1
4AC-74	3687	Key . . . . .	2	146018		Nos. 3 & 4 Machines . . . . .	1
4AC-75	1158	Screw . . . . .	2	4AC-102		Washer - Knob . . . . .	1
4AC-76		Gasket - Spindle Cap		4AC-103		Knob - Lever . . . . .	1
	114643	No. 2 Machines . . . . .	1	4AC-104		Washer . . . . .	1
	146964	Nos. 3 & 4 Machines . . . . .	1	4AC-105		Knob - Lever . . . . .	1
4AC-77		Cap - Spindle Front		4AC-106		Gear - Overarm Traverse . . . . .	1
	114644	No. 2 Machines . . . . .	1	4AC-107		Oiler . . . . .	1
	146963	Nos. 3 & 4 Machines . . . . .	1	4AC-108		Lever - Gib Locking . . . . .	1
4AC-78		Screw . . . . .		4AC-109		Stud - Lever . . . . .	1
	114794	No. 2 Machines . . . . .	6	4AC-110		Lever - Overarm Positioning . . . . .	1
	83484	Nos. 3 & 4 Machines . . . . .	6	4AC-111		Nut . . . . .	1
4AC-79		Radiator - Oil		4AC-112		Key . . . . .	1
	143882	No. 2 Machines . . . . .	1	4AC-113		Gear - Gib Clamp . . . . .	1
	146962	Nos. 3 & 4 Machines . . . . .	1	4AC-114		Body - Oil Sight Gage . . . . .	1
4AC-80		Bearing		4AC-115		Gasket . . . . .	1
	143880	No. 2 Machines . . . . .	1	4AC-116		Bushing - Pinion Clamp . . . . .	1
	146960	Nos. 3 & 4 Machines . . . . .	1	4AC-117		Bushing - Shaft Gib Clamp . . . . .	1
4AC-81	3639	Head - Arbor Drawin Bolt	1	4AC-118		Pilot - Wheel . . . . .	1
4AC-82	3280	Key . . . . .	1	4AC-119		Lever - Overarm Positioning . . . . .	1
4AC-83	3641	Nut - Arbor Drawin Bolt	1	4AC-120		Screw . . . . .	4
4AC-84		Bolt - Arbor Drawin		4AC-121		Washer - Knob . . . . .	1
	120437	No. 2 Machines . . . . .	1	4AC-122		Knob - Lever . . . . .	1
	121177	Nos. 3 & 4 Machines . . . . .	1	4AC-123		Washer . . . . .	1
4AC-85		Cover - Column Top Rear		4AC-124		Disc - Oil Gage . . . . .	1
	154440	No. 2 Machines . . . . .	1	4AC-125		Cover - Oil Gage . . . . .	1
	147553	Nos. 3 & 4 Machines . . . . .	1	4AC-127		Flywheel - Spindle	
4AC-86		Gib - Overarm Clamp		147378		No. 2 Machines . . . . .	1
	144626	No. 2 Machines . . . . .	1	146948		Nos. 3 & 4 Machines . . . . .	1
	151701	Nos. 3 & 4 Machines . . . . .	1	4AC-128		Nut - Lock	
4AC-87		Cover - Column Top		157076		No. 2 Machines . . . . .	1
	144567	Nos. 2, 3 & 4 Machines . . . . .	1	4274		Nos. 3 & 4 Machines . . . . .	1
4AC-88		Screw . . . . .		4AC-129		Spacer - Bearing Spindle	
	3236	No. 2 Machines . . . . .	1	143855		No. 2 Machines . . . . .	1
	3235	Nos. 3 & 4 Machines . . . . .	1	146944		Nos. 3 & 4 Machines . . . . .	1
4AC-89		Plug - Pipe		4AC-130		Cone - Bearing	
	216607	Nos. 3 & 4 Machines . . . . .	1	57927		No. 2 Machines . . . . .	1
4AC-90	45668	Screw . . . . .	1	57231		Nos. 3 & 4 Machines . . . . .	1
4AC-91	3238	Screw . . . . .	1	4AC-131		Cup - Bearing	
4AC-92	3238	Screw . . . . .	1	60232		No. 2 Machines . . . . .	1
4AC-93	30154	Ball - Steel . . . . .	1	57891		Nos. 3 & 4 Machines . . . . .	1
4AC-94	221981	Plug - Pipe . . . . .	1	4AC-132		Nut - Lock	
4AC-95		Column		4274		No. 2 Machines . . . . .	1
	149611	No. 2 Machines . . . . .	1	4275		Nos. 3 & 4 Machines . . . . .	1
	148405	Nos. 3 & 4 Machines . . . . .	1	4AC-133		Gear - On Spindle	
4AC-96		Screw . . . . .		143878		No. 2 Machines . . . . .	1
	1203	No. 2 Machines . . . . .	3	146947		Nos. 3 & 4 Machines . . . . .	1
	1203	Nos. 3 & 4 Machines . . . . .	5	4AC-134		Gear - Bull Spindle	
4AC-97		Cap - Spindle Bearing		147380		No. 2 Machines . . . . .	1
	154439	No. 2 Machines . . . . .	1	146949		Nos. 3 & 4 Machines . . . . .	1
	146953	Nos. 3 & 4 Machines . . . . .	1				

"D" SHAFT AND CLUSTER GEAR "E" SHAFT



CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

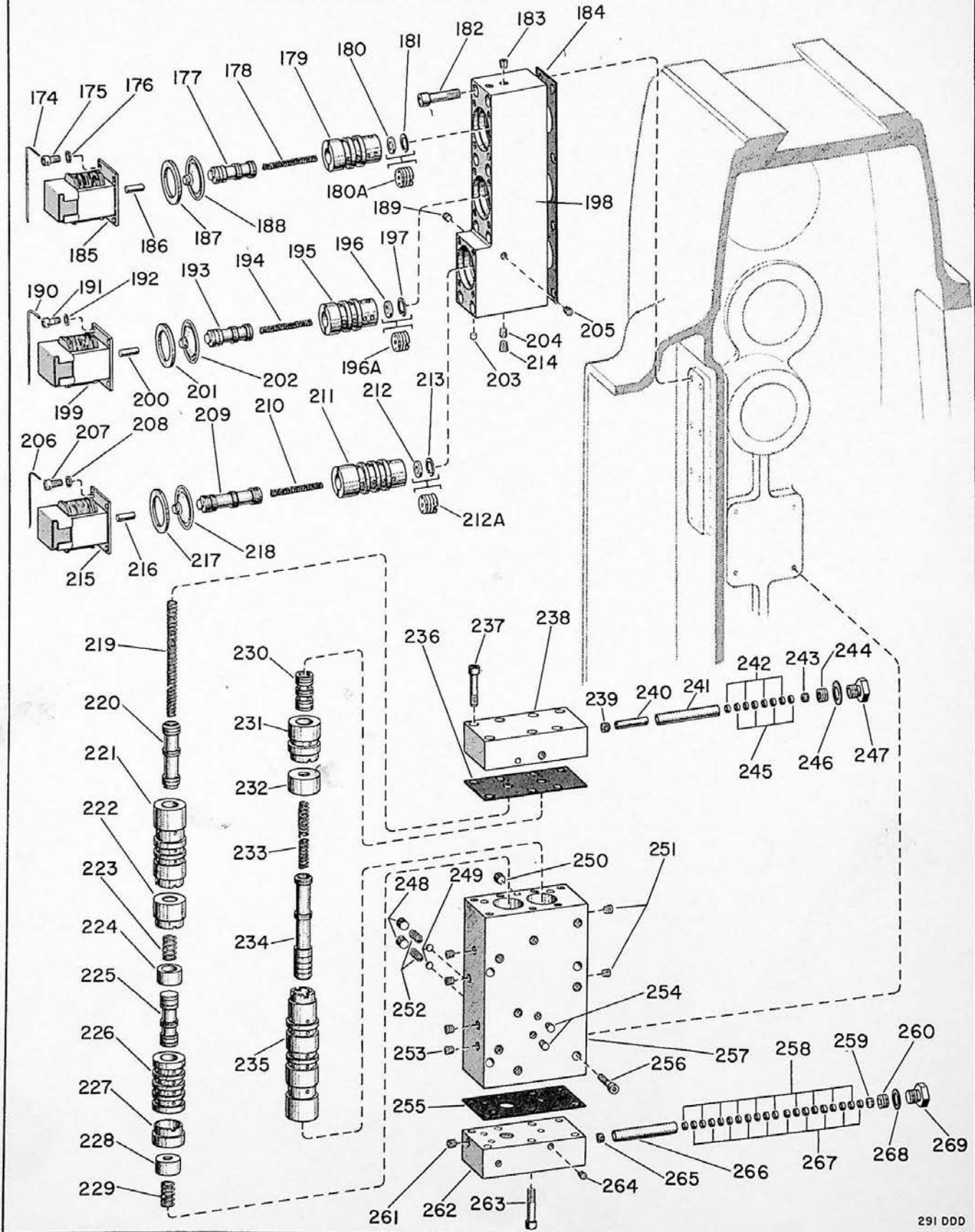
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

COLUMN-UNIT No. 4AC (Continued)  
Nos. 2, 3, AND 4 PLAIN AND UNIVERSAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-135	151092	Tube - Splash Coolant No. 2 Machines Only . . . . .	1	4AC-154	157633	Key Nos. 3 & 4 Machines . . . . .	1
4AC-137	3549	Plug Nos. 3 & 4 Plain Machines Only . . . . .	1	4AC-155	159235	Gear - "D" Shaft Nos. 3 & 4 Machines . . . . .	1
4AC-138	3549	Plug Universal Machines Only . . . . .	1	4AC-156	159236	Gear - "D" Shaft Nos. 3 & 4 Machines . . . . .	1
4AC-139	75081	Pin - Stop Nos. 3 & 4 Universal Machines Only . . . . .	1	4AC-157	4258	Nut - Lock Nos. 3 & 4 Machines . . . . .	1
4AC-140	75081	Pin - Stop Plain Machines Only . . . . .	1	4AC-158	157628	Key Nos. 2, 3 & 4 Machines . . . . .	1
4AC-141	149849	Adapter - Valve Mounting . . . . .	4	4AC-159	159228	Shaft - Gear "D" No. 2 Machines . . . . .	1
4AC-142	3529	Plug . . . . .	4	4AC-159	159237	Nos. 3 & 4 Machines . . . . .	1
4AC-143	3287	Key . . . . .	1	4AC-160	144830	Bearing - Roller Nos. 3 & 4 Machines . . . . .	1
4AC-144	4249	Nut - Lock No. 2 Machines . . . . .	1	4AC-161	4247	Nut - Lock No. 2 Machines . . . . .	1
	4251	Nos. 3 & 4 Machines . . . . .	1	4AC-161	4250	Nos. 3 & 4 Machines . . . . .	1
4AC-145	58012	Cone - Bearing No. 2 Machines . . . . .	1	4AC-162	104810	Plug - Drive No. 2 Machines . . . . .	1
	146958	Nos. 3 & 4 Machines . . . . .	1	4AC-162	108706	Nos. 3 & 4 Machines . . . . .	1
4AC-146	108700	Cup - Bearing No. 2 Machines . . . . .	1	4AC-163	4245	Nut - Lock . . . . .	1
	144248	Nos. 3 & 4 Machines . . . . .	1	4AC-164	159229	Gear - "D" Shaft . . . . .	1
4AC-147	143887	Gear - Cluster No. 2 Machines . . . . .	1	4AC-165	143894	Cone - Bearing No. 2 Machines . . . . .	1
	146940	Nos. 3 & 4 Machines . . . . .	1	4AC-165	108365	Nos. 3 & 4 Machines . . . . .	1
4AC-148	74152	Cup - Bearing No. 2 Machines . . . . .	1	4AC-166	113517	Cup - Bearing No. 2 Machines . . . . .	1
	144248	Nos. 3 & 4 Machines . . . . .	1	4AC-166	108366	Nos. 3 & 4 Machines . . . . .	1
4AC-149	113838	Cone - Bearing No. 2 Machines . . . . .	1	4AC-167	157633	Key Nos. 3 & 4 Machines . . . . .	1
	144249	Nos. 3 & 4 Machines . . . . .	1	4AC-168	157628	Key . . . . .	1
4AC-150	143886	Shaft - Cluster Gear No. 2 Machines . . . . .	1	4AC-169	159225	Spacer - Shaft "D" No. 2 Machines . . . . .	1
	146941	Nos. 3 & 4 Machines . . . . .	1	4AC-170	159227	Gear - "D" Shaft No. 2 Machines . . . . .	1
4AC-151	143888	Cap - Bearing No. 2 Plain Machines . . . . .	1	4AC-171	159226	Gear - "D" Shaft No. 2 Machines . . . . .	1
	151014	No. 2 Universal Machines . . . . .	1	4AC-172	108024	Cup - Bearing No. 2 Machines . . . . .	1
	149668	Nos. 3 & 4 Machines . . . . .	1	4AC-173	110589	Cone - Bearing No. 2 Machines . . . . .	1
4AC-152	108366	Cup - Bearing Nos. 3 & 4 Machines . . . . .	1				
4AC-153	108365	Cone - Bearing Nos. 3 & 4 Machines . . . . .	1				



SOLENOID AND INTERLOCK VALVES



291 DDD  
290000

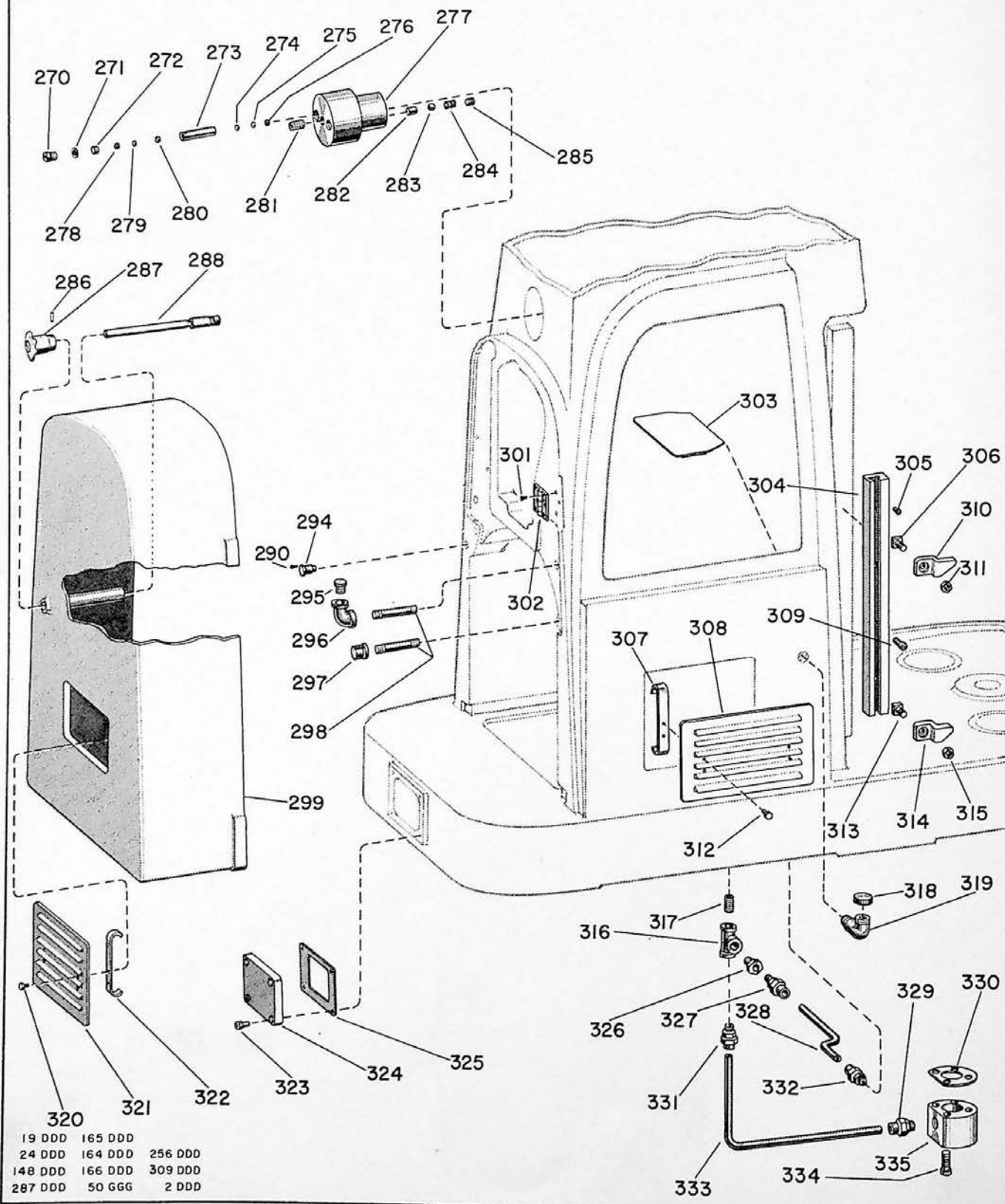
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

COLUMN-UNIT No. 4AC (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-174	259879	Wire - Safety . . . . .	1	4AC-218	152649	Seal - Oil . . . . .	1
4AC-175	254454	Screw - Cap . . . . .	4	4AC-219	152749	Spring . . . . .	1
4AC-176	2123	Washer . . . . .	4	4AC-220	152738	Plunger . . . . .	1
4AC-177	161464	Plunger - Speed Change Valve . . . . .	1	4AC-221	152737	Bushing - Plunger . . . . .	1
4AC-178	161934	Spring - Compression . . . . .	1	4AC-222	156748	Spacer . . . . .	1
4AC-179		Bushing - Plunger		4AC-223	152729	Spring . . . . .	1
	152838	Early Design . . . . .	1	4AC-224	152732	Retainer - Spring . . . . .	1
	169084	Late Design . . . . .	1	4AC-225	152734	Plunger . . . . .	1
4AC-180	152837	Retainer - Spring (Early Design) . . . . .	1	4AC-226	152736	Bushing - Plunger . . . . .	1
4AC-180A	169082	Retainer - Spring (Late Design) . . . . .	1	4AC-227	152733	Bushing - Spring Retainer . . . . .	1
4AC-181	125313	Ring - Retainer . . . . .	1	4AC-228	152732	Retainer - Spring . . . . .	1
4AC-182	3251	Screw . . . . .	8	4AC-229	152729	Spring . . . . .	1
4AC-183	4236	Plug . . . . .	2	4AC-230	152763	Plunger . . . . .	1
4AC-184	152831	Gasket . . . . .	1	4AC-231	152762	Bushing - Plunger . . . . .	1
4AM-185	161932	Solenoid . . . . .	1	4AC-232	156856	Spacer . . . . .	1
4AC-186	161463	Plunger - Solenoid . . . . .	1	4AC-233	160165	Spring . . . . .	1
4AC-187	152834	Washer - Fitting . . . . .	1	4AC-234	152756	Plunger . . . . .	1
4AC-188	152649	Seal - Oil . . . . .	1	4AC-235	152753	Bushing - Plunger . . . . .	1
4AC-189	4236	Plug . . . . .	3	4AC-236	152730	Gasket . . . . .	1
4AC-190	259879	Wire - Safety . . . . .	1	4AC-237	2323	Screw . . . . .	7
4AC-191	254454	Screw - Cap . . . . .	4	4AC-238	160193	Cover - Interlock Valve Top . . . . .	1
4AC-192	2123	Washer . . . . .	4	4AC-239	2356	Screw . . . . .	1
4AC-193	161464	Plunger - Speed Change Valve . . . . .	1	4AC-240	159291	Spacer . . . . .	1
4AC-194	161934	Spring - Compression . . . . .	1	4AC-241	159293	Case - Dynamic Resistor . . . . .	1
4AC-195		Bushing - Plunger		4AC-242	249724	Disc - Dynamic Resistance . . . . .	4
	152838	Early Design . . . . .	1	4AC-243	2356	Screw . . . . .	1
	169084	Late Design . . . . .	1	4AC-244	160155	Screw - Lock . . . . .	1
4AC-196	152837	Retainer - Spring (Early Design) . . . . .	1	4AC-245	249725	Disc - Dynamic Resistance . . . . .	4
4AC-196A	169082	Retainer - Spring (Late Design) . . . . .	1	4AC-246	222490	Gasket . . . . .	1
4AC-197	125313	Ring - Retainer . . . . .	1	4AC-247	160182	Plug - Screw . . . . .	1
4AC-198	152811	Body - Solenoid Valve . . . . .	1	4AC-248	76644	Plug - Pipe . . . . .	2
4AM-199	161932	Solenoid . . . . .	1	4AC-249	13665	Ball . . . . .	2
4AC-200	161463	Plunger - Solenoid . . . . .	1	4AC-250	76644	Plug - Pipe . . . . .	1
4AC-201	152834	Washer - Fitting . . . . .	1	4AC-251	4236	Plug . . . . .	2
4AC-202	152649	Seal - Oil . . . . .	1	4AC-252	230010	Spring . . . . .	2
4AC-203	2008	Plug . . . . .	1	4AC-253	4236	Plug . . . . .	4
4AC-204	4236	Plug . . . . .	1	4AC-254	4236	Plug . . . . .	2
4AC-205	4236	Plug . . . . .	1	4AC-255	152731	Gasket . . . . .	1
4AC-206	259879	Wire - Safety . . . . .	1	4AC-256	3217	Screw . . . . .	4
4AC-207	254454	Screw - Cap . . . . .	4	4AC-257	152727	Body - Valve Interlock . . . . .	1
4AC-208	2123	Washer . . . . .	4	4AC-258	160282	Disc - Dynamic Resistance . . . . .	12
4AC-209	161462	Plunger - Start-Stop Valve . . . . .	1	4AC-259	2356	Screw . . . . .	1
4AC-210	161934	Spring - Compression . . . . .	1	4AC-260	160155	Screw - Lock . . . . .	1
4AC-211		Bushing - Plunger		4AC-261	4236	Plug . . . . .	2
	152832	Early Design . . . . .	1	4AC-262	160194	Cover - Interlock Valve Bottom . . . . .	1
	169083	Late Design . . . . .	1	4AC-263	2323	Screw . . . . .	7
4AC-212	152837	Retainer - Spring (Early Design) . . . . .	1	4AC-264	4236	Plug . . . . .	1
4AC-212A	169082	Retainer - Spring (Late Design) . . . . .	1	4AC-265	2356	Screw . . . . .	1
4AC-213	125313	Ring - Retainer . . . . .	1	4AC-266	159293	Case - Dynamic Resistor . . . . .	1
4AC-214	76644	Plug - Pipe . . . . .	1	4AC-267	160281	Disc - Dynamic Resistance . . . . .	12
4AM-215	161932	Solenoid . . . . .	1	4AC-268	222490	Gasket . . . . .	1
4AC-216	161463	Plunger - Solenoid . . . . .	1	4AC-269	63047	Plug - Screw . . . . .	1
4AC-217	152834	Washer - Fitting . . . . .	1				

### COLUMN DOGS AND COVERS



19 DDD	165 DDD	
24 DDD	164 DDD	256 DDD
148 DDD	166 DDD	309 DDD
287 DDD	50 GGG	2 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

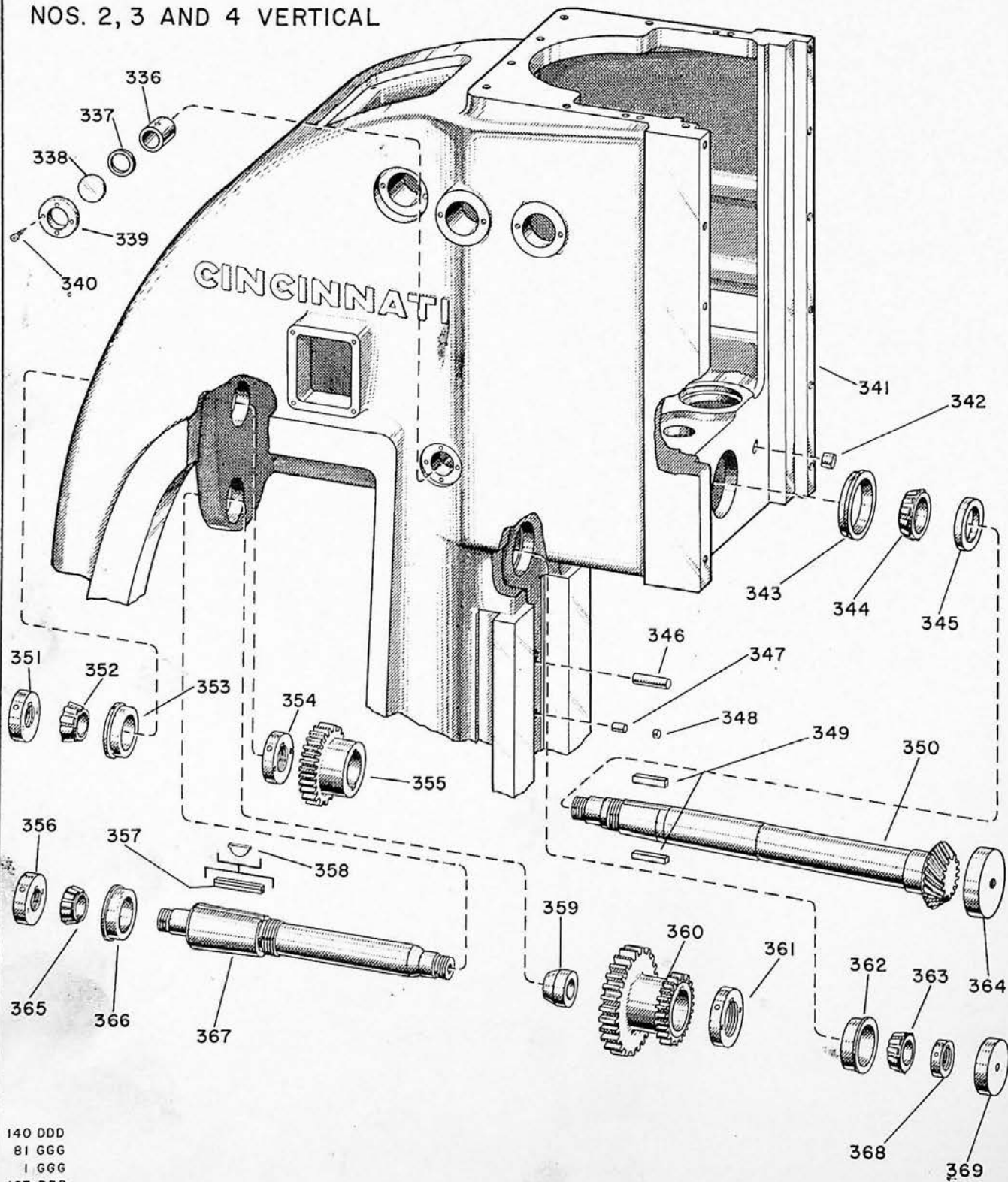
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

COLUMN-UNIT No. 4AC (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-270	76449	Plug - Screw . . . . .	2	4AC-307		Spring - Cover	
4AC-271	222490	Gasket . . . . .	2	157281		No. 2 Machines . . . . .	2
4AC-272	160155	Screw . . . . .	2	157280		Nos. 3 & 4 Machines . . . . .	2
4AC-273	159293	Case . . . . .	2	4AC-308		Cover - Motor Opening	
4AC-274	160157	Disc - Dynamic Resistance . . . . .	2	143980		No. 2 Machines . . . . .	1
4AC-275	160156	Disc - Dynamic Resistance . . . . .	2	146267		Nos. 3 & 4 Machines . . . . .	1
4AC-276	2356	Screw . . . . .	2	4AC-309		Screw	
4AC-277		Body - Dial Regulator		2322		Plain & Universal Machines . . . . .	4
	160159	No. 2 Plain & Universal Machines . . . . .	1	2322		Vertical Machines . . . . .	3
	160160	No. 2 Vertical Machines . . . . .	1	4AC-310		Dog - Upper Column	
	160161	Nos. 3 & 4 Plain & Universal Machines . . . . .	1	144561		No. 2 Machines . . . . .	1
	160162	Nos. 3 & 4 Vertical Machines . . . . .	1	146262		Nos. 3 & 4 Machines . . . . .	1
4AC-278	2356	Screw . . . . .	2	4AC-311	2057	Nut . . . . .	1
4AC-279	160156	Disc - Dynamic Resistance . . . . .	2	4AC-312	4295	Rivet . . . . .	4
4AC-280	160157	Disc - Dynamic Resistance . . . . .	2	4AC-313	3361	Bolt . . . . .	1
4AC-281	2248	Plug . . . . .	1	4AC-314		Dog - Lower Column	
4AC-282	257472	Seat - Ball . . . . .	2	144562		No. 2 Machines . . . . .	1
4AC-283	30154	Ball - Steel . . . . .	2	144266		Nos. 3 & 4 Machines . . . . .	1
4AC-284	258842	Spring . . . . .	2	4AC-315	2057	Nut . . . . .	1
4AC-285	76645	Plug - Pipe . . . . .	2	4AC-316	89879	Tee . . . . .	1
4AC-286	663	Pin . . . . .	1	4AC-317	24815	Nipple . . . . .	1
4AC-287	153411	Knob . . . . .	1	4AC-318	3986	Cap . . . . .	1
4AC-288		Stud - Knob		4AC-319	211167	Elbow - Oil Filler . . . . .	1
	164005	No. 2 Machines . . . . .	1	4AC-320	4295	Rivet . . . . .	4
	164004	Nos. 3 & 4 Machines . . . . .	1	4AC-321		Cover - Motor Opening	
4AC-290	1650	Screw . . . . .	1	143980		No. 2 Machines . . . . .	1
4AM-294	106991	Safety-Switch . . . . .	1	146267		Nos. 3 & 4 Machines . . . . .	1
4AC-295	3987	Cap - Oil Filler . . . . .	1	4AC-322		Spring - Cover	
4AC-296	12814	Elbow - 3/4" . . . . .	1	157281		No. 2 Machines . . . . .	2
4AC-297	200786	Cap - 3/4" Pipe . . . . .	1	157280		Nos. 3 & 4 Machines . . . . .	2
4AC-298	144624	Pipe - List . . . . .	1	4AC-323	3403	Screw . . . . .	4
4AC-299		Cover - Rear Motor		4AC-324	100026	Cover - On Base Reservoir . . . . .	1
	147980	No. 2 Plain & Universal Machines . . . . .	1	4AC-325	219931	Gasket . . . . .	1
	147979	No. 2 Vertical Machines . . . . .	1	4AC-326	89138	Bushing - Reducing . . . . .	1
	147550	Nos. 3 & 4 Plain & Universal Machines . . . . .	1	4AC-327	79729	Fitting - Straight . . . . .	1
	152678	Nos. 3 & 4 Vertical Machines . . . . .	1	4AC-328		Tubing - Oil Filler	
4AC-301	3218	Screw . . . . .	12	151076		No. 2 Machines . . . . .	1
4AC-302	128759	Hinge - Motor Cover . . . . .	2	147527		Nos. 3 & 4 Machines . . . . .	1
4AC-303		Cover - Oil Pocket		4AC-329	79730	Fitting - Straight . . . . .	1
	151077	No. 2 Machines . . . . .	1	4AC-330	108729	Gasket - Sump Elevating Screw . . . . .	1
	147518	Nos. 3 & 4 Machines . . . . .	1	4AC-331	79730	Fitting - Straight . . . . .	1
4AC-304		Guide - Column Vertical		4AC-332	79729	Fitting - Straight . . . . .	1
	144560	No. 2 Plain & Universal Machines . . . . .	1	4AC-333		Tubing - Sump	
	144814	No. 2 Vertical Machines . . . . .	1	151075		No. 2 Machines . . . . .	1
	147584	Nos. 3 & 4 Plain & Universal Machines . . . . .	1	147510		Nos. 3 & 4 Machines . . . . .	1
	147585	Nos. 3 & 4 Vertical Machines . . . . .	1	4AC-334	3404	Screw . . . . .	4
4AC-305	3486	Screw . . . . .	2	4AC-335	108725	Sump - Elevating Screw . . . . .	1
4AC-306	3361	Bolt . . . . .	1				

# SPEED CHANGE AND SPIRAL BEVEL GEAR SHAFTS

NOS. 2, 3 AND 4 VERTICAL



- 140 DDD
- 81 GGG
- 1 GGG
- 187 DDD
- 86 GGG
- 213 DDD

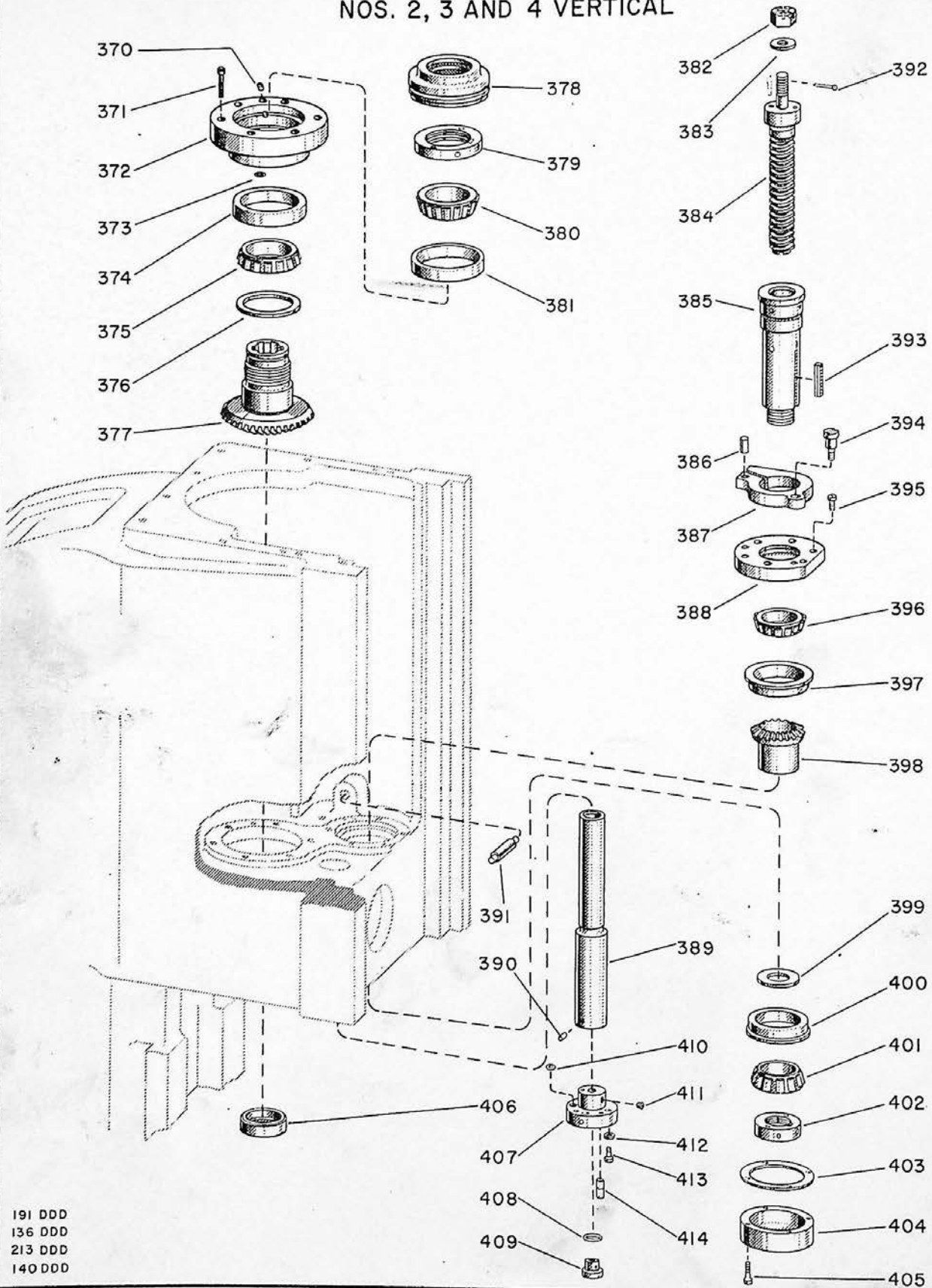
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

COLUMN-UNIT No. 4AC (Continued)  
Nos. 2, 3, AND 4 VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-336	108762	Body - Oil Sight Gage . . . . .	1	4AC-355		Gear - Spiral Bevel	
4AC-337	3850	Gasket - Oil Gage . . . . .	1	159233		No. 2 Machines . . . . .	1
4AC-338	3849	Disc - Oil Gage . . . . .	1	149680		Nos. 3 & 4 Machines . . . . .	1
4AC-339	4075	Cover - Oil Gage . . . . .	1	4AC-356	4247	Nut - Lock . . . . .	1
4AC-340	3213	Screw . . . . .	4	4AC-357		Key	
4AC-341		Column		3436		Nos. 3 & 4 Machines . . . . .	1
	151695	No. 2 Machines . . . . .	1	4AC-358	3287	Key	
	151095	Nos. 3 & 4 Machines . . . . .	1			No. 2 Machines Only . . . . .	1
4AC-342	3551	Plug . . . . .	1	4AC-359	159230	Spacer - Bearing	
4AC-343		Cup - Bearing				No. 2 Machines Only . . . . .	1
	75973	No. 2 Machines . . . . .	1	4AC-360		Gear - Shaft	
	151723	Nos. 3 & 4 Machines . . . . .	1	159231		No. 2 Machines . . . . .	1
4AC-344		Cone - Bearing		149679		Nos. 3 & 4 Machines . . . . .	1
	75972	No. 2 Machines . . . . .	1	4AC-361	4256	Nut - Lock	
	151722	Nos. 3 & 4 Machines . . . . .	1			Nos. 3 & 4 Machines Only . . . . .	1
4AC-345		Spacer - Bearing		4AC-362		Cup - Bearing	
	144294	No. 2 Machines . . . . .	1		108024	No. 2 Machines . . . . .	1
	151726	Nos. 3 & 4 Machines . . . . .	1	72721		Nos. 3 & 4 Machines . . . . .	1
4AC-346	75081	Pin . . . . .	1	4AC-363		Cone - Bearing	
4AC-347	149849	Adapter - Valve Mounting . . . . .	4	110589		No. 2 Machines . . . . .	1
4AC-348	3529	Plug . . . . .	4	72722		Nos. 3 & 4 Machines . . . . .	1
4AC-349		Key		4AC-364		Plug	
	157631	No. 2 Machines . . . . .	2	3561		No. 2 Machines . . . . .	1
	157632	Nos. 3 & 4 Machines . . . . .	2	149668		Nos. 3 & 4 Machines . . . . .	1
4AC-350		Shaft - Spiral Bevel Gear		4AC-365		Cone - Bearing	
	159234	No. 2 Machines . . . . .	1		114385	No. 2 Machines . . . . .	1
	149618	Nos. 3 & 4 Machines . . . . .	1	72722		Nos. 3 & 4 Machines . . . . .	1
4AC-351		Nut - Lock		4AC-366		Cup - Bearing	
	4247	Nos. 2, 3 & 4 Machines . . . . .	1		113517	No. 2 Machines . . . . .	1
4AC-352		Cone - Bearing		72721		Nos. 3 & 4 Machines . . . . .	1
	144385	No. 2 Machines . . . . .	1	4AC-367		Shaft - Speed Change	
	72721	Nos. 3 & 4 Machines . . . . .	1		159232	No. 2 Machines . . . . .	1
4AC-353		Cup - Bearing		149619		Nos. 3 & 4 Machines . . . . .	1
	113517	No. 2 Machines . . . . .	1	4AC-368	4247	Nut - Lock . . . . .	1
	72721	Nos. 3 & 4 Machines . . . . .	1	4AC-369		Plug - Drive	
4AC-354		Nut - Lock			104810	No. 2 Machines . . . . .	1
	4248	No. 2 Machines . . . . .	1	3560		Nos. 3 & 4 Machines . . . . .	1
	4251	Nos. 3 & 4 Machines . . . . .	1				

# ELEVATING SCREW SHAFT AND BRAKE NOS. 2, 3 AND 4 VERTICAL



191 DDD  
136 DDD  
213 DDD  
140 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

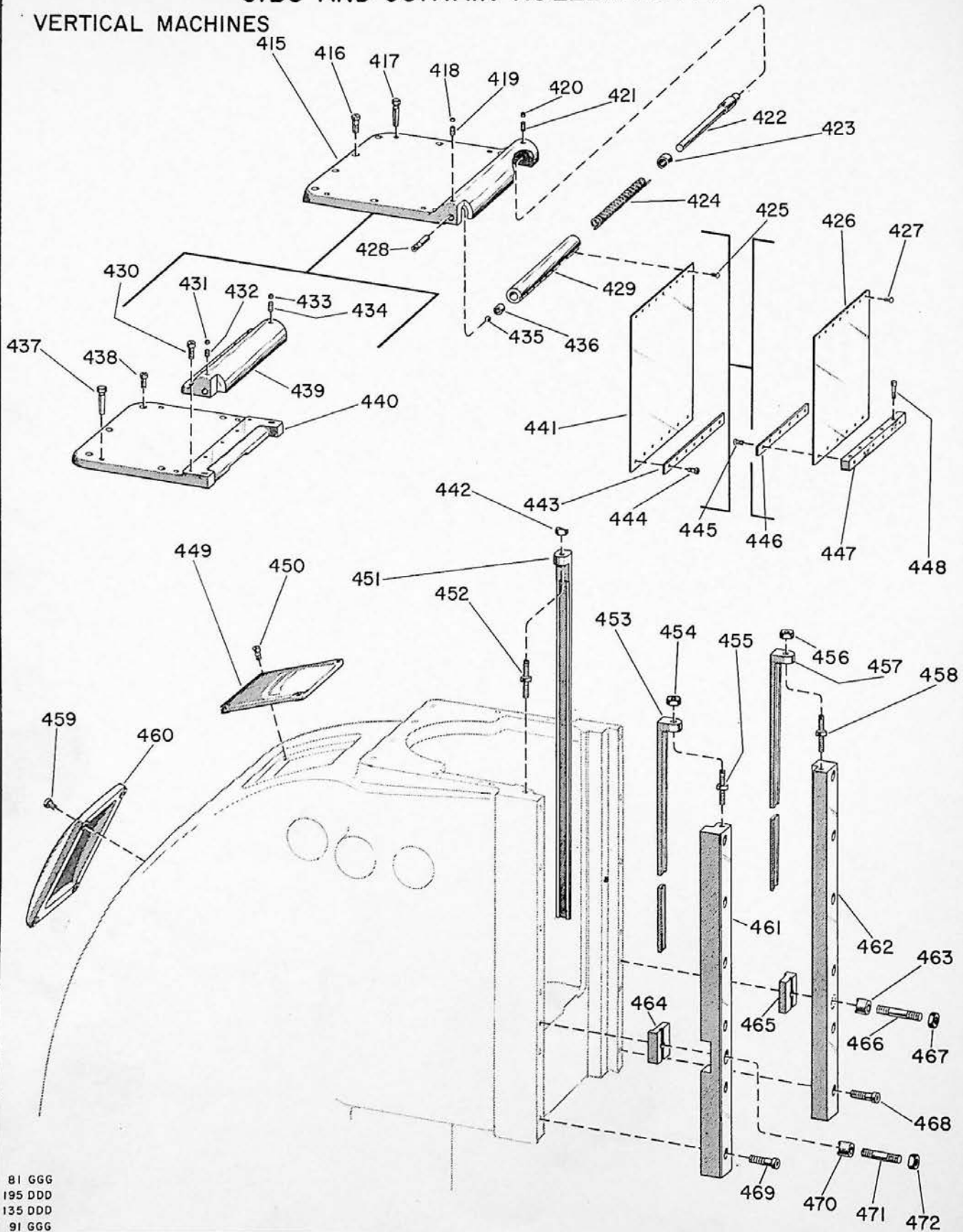
COLUMN-UNIT No. 4AC (Continued)  
Nos. 2, 3, AND 4 VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-370	4236	Plug . . . . .	1	4AC-388		Cover - Dust	
4AC-371		Screw		149640		No. 2 Machines . . . . .	1
	3266	No. 2 Machines . . . . .	6	151002		Nos. 3 & 4 Machines . . . . .	1
	3401	Nos. 3 & 4 Machines . . . . .	6	4AC-389		Housing - Cylinder	
4AC-372		Housing - Bearing		154646		No. 2 Machines . . . . .	1
	149626	No. 2 Machines . . . . .	1	149665		Nos. 3 & 4 Machines . . . . .	1
	149622	Nos. 3 & 4 Machines . . . . .	1	4AC-390	153100	Pin . . . . .	1
4AC-373	243780	Ring - "O" . . . . .	1	4AC-391	150541	Rod - Brake Shoe . . . . .	1
4AC-374		Cup - Bearing		4AC-392	1987	Pin - Cotter . . . . .	1
	144343	No. 2 Machines . . . . .	1	4AC-393	1780	Key . . . . .	1
	151725	Nos. 3 & 4 Machines . . . . .	1	4AC-394	153137	Screw - Shoulder . . . . .	1
4AC-375		Cone - Bearing		4AC-395		Screw	
	144344	No. 2 Machines . . . . .	1	2321		No. 2 Machines . . . . .	4
	151724	Nos. 3 & 4 Machines . . . . .	1	3266		Nos. 3 & 4 Machines . . . . .	6
4AC-376		Spacer - Bearing		4AC-396	108810	Cone - Bearing . . . . .	1
	144297	No. 2 Machines . . . . .	1	4AC-397	108811	Cup - Bearing . . . . .	1
	151727	Nos. 3 & 4 Machines . . . . .	1	4AC-398	149639	Gear - Bevel Elevating Screw . . . . .	1
4AC-377		Gear - Spiral		4AC-399	144291	Spacer - Bearing . . . . .	1
	157099	No. 2 Machines . . . . .	1	4AC-400		Cup - Bearing	
	151727	Nos. 3 & 4 Machines . . . . .	1	108811		No. 2 Machines . . . . .	1
4AC-378		Cap - Bearing		152711		Nos. 3 & 4 Machines . . . . .	1
	149627	No. 2 Machines . . . . .	1	4AC-401		Cone - Bearing	
	144295	Nos. 3 & 4 Machines . . . . .	1	146429		No. 2 Machines . . . . .	1
4AC-379	4261	Nut - Lock . . . . .	1	152712		Nos. 3 & 4 Machines . . . . .	1
4AC-380		Cone - Bearing		4AC-402	4251	Nut - Lock . . . . .	1
	144344	No. 2 Machines . . . . .	1	4AC-403		Gasket - Bottom Bearing Cup	
	151724	Nos. 3 & 4 Machines . . . . .	1	144241		No. 2 Machines . . . . .	1
4AC-381		Cup - Bearing		153117		Nos. 3 & 4 Machines . . . . .	1
	144343	No. 2 Machines . . . . .	1	4AC-404		Cap - Bearing Bottom	
	151725	Nos. 3 & 4 Machines . . . . .	1	144292		No. 2 Machines . . . . .	1
4AC-382	2021	Nut . . . . .	1	153116		Nos. 3 & 4 Machines . . . . .	1
4AC-383	764	Washer . . . . .	1	4AC-405		Screw	
4AC-384		Screw - Elevating		3400		No. 2 Machines . . . . .	3
	149661	No. 2 Machines - English . . . . .	1	2323		Nos. 3 & 4 Machines . . . . .	4
	149662	No. 2 Machines - Metric . . . . .	1	4AC-406		Plug	
	150530	Nos. 3 & 4 Machines - English . . . . .	1	144298		No. 2 Machines . . . . .	1
	150531	Nos. 3 & 4 Machines - Metric . . . . .	1	3559		Nos. 3 & 4 Machines . . . . .	1
4AC-385		Housing - Elevating Screw		4AC-407	144347	Cap - Gear Shifter . . . . .	1
	149642	No. 2 Machines - English . . . . .	1	4AC-408	79664	Gasket . . . . .	1
	149643	No. 2 Machines - Metric . . . . .	1	4AC-409	144345	Plug - Gear Shifter Cap . . . . .	1
	150535	Nos. 3 & 4 Machines - English . . . . .	1	4AC-410	243780	Ring - "O" . . . . .	2
	150536	Nos. 3 & 4 Machines - Metric . . . . .	1	4AC-411	4236	Plug . . . . .	4
4AC-386	1899	Pin . . . . .	1	4AC-412	224645	Gasket . . . . .	1
4AC-387		Brake - Elevating Screw		4AC-413	3266	Screw . . . . .	3
	151096	No. 2 Machines . . . . .	1	4AC-414	89032	Pin . . . . .	2
	150539	Nos. 3 & 4 Machines . . . . .	1				



GIBS AND CURTAIN ROLLER COVER

VERTICAL MACHINES



81 GGG  
 195 DDD  
 135 DDD  
 91 GGG

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

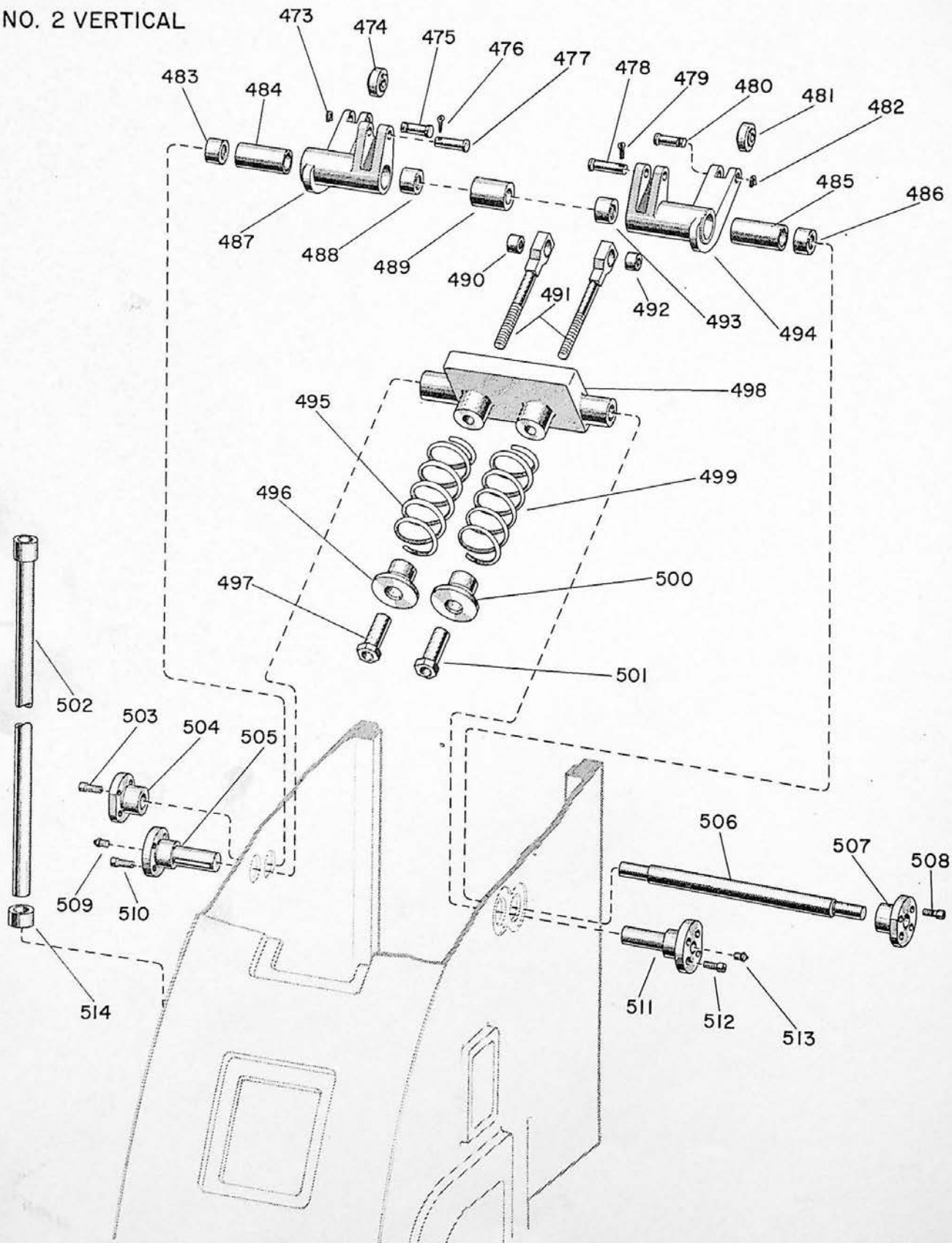
COLUMN-UNIT No. 4AC (Continued)  
Nos. 2, 3, AND 4 VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-415	150404	*Cover - Top Column		4AC-448	3227	Screw	
		Nos. 3 & 4 Machines . . . . .	1			No. 2 Machines . . . . .	5
4AC-416	3343	Screw		4AC-449		Cover - Upper Column Small	
		Nos. 3 & 4 Machines . . . . .	8		151526	No. 2 Machines . . . . .	1
4AC-417	2239	Pin			153118	Nos. 3 & 4 Machines . . . . .	1
		Nos. 3 & 4 Machines . . . . .	4	4AC-450		Screw	
4AC-418	2332	Screw			3399	No. 2 Machines . . . . .	2
		Nos. 3 & 4 Machines . . . . .	1		3399	Nos. 3 & 4 Machines . . . . .	4
4AC-419	2333	Screw		4AC-451		Gib - Vertical Head	
		Nos. 3 & 4 Machines . . . . .	1		144811	No. 2 Machines . . . . .	1
4AC-420	2323	Screw			150409	Nos. 3 & 4 Machines . . . . .	1
		Nos. 3 & 4 Machines . . . . .	1	4AC-452	3997	Screw - Gib . . . . .	1
4AC-421	3230	Screw		4AC-453		Gib - Rail Clamp	
		Nos. 3 & 4 Machines . . . . .	1		144812	No. 2 Machines . . . . .	1
4AC-422		Stud - Curtain Roller Spring			150408	Nos. 3 & 4 Machines . . . . .	1
	144783	No. 2 Machines . . . . .	1	4AC-454		Nut	
	150415	Nos. 3 & 4 Machines . . . . .	1		3473	No. 2 Machines . . . . .	1
4AC-423	79762	Bearing - Roller . . . . .	1		3474	Nos. 3 & 4 Machines . . . . .	1
4AC-424		Spring - Tension Curtain Roller		4AC-455		Screw - Gib	
	144871	No. 2 Machines . . . . .	1		3989	No. 2 Machines . . . . .	1
	150414	Nos. 3 & 4 Machines . . . . .	1		3997	Nos. 3 & 4 Machines . . . . .	1
4AC-425	3178	Screw		4AC-456		Nut	
		Nos. 3 & 4 Machines . . . . .	9		3473	No. 2 Machines . . . . .	1
4AC-426	144874	Curtain			3474	Nos. 3 & 4 Machines . . . . .	1
		No. 2 Machines . . . . .	1	4AC-457		Gib - Rail Clamp	
4AC-427	3178	Screw			144812	No. 2 Machines . . . . .	1
		No. 2 Machines . . . . .	8		150408	Nos. 3 & 4 Machines . . . . .	1
4AC-428	144870	Stud - Curtain Roller . . . . .	1	4AC-458		Screw - Gib	
4AC-429		Roller - Curtain			3989	No. 2 Machines . . . . .	1
	144872	No. 2 Machines . . . . .	1		3997	Nos. 3 & 4 Machines . . . . .	1
	150412	Nos. 3 & 4 Machines . . . . .	1	4AC-459		Screw	
4AC-430	3266	Screw			3399	No. 2 Machines . . . . .	2
		No. 2 Machines . . . . .	5		3399	Nos. 3 & 4 Machines . . . . .	4
4AC-431	2354	Screw		4AC-460		Cover - Upper Column Large	
		No. 2 Machines . . . . .	1		151526	No. 2 Machines . . . . .	1
4AC-432	2333	Screw			153119	Nos. 3 & 4 Machines . . . . .	1
		No. 2 Machines . . . . .	1	4AC-461		Rail - Clamp, L. H.	
4AC-433	2354	Screw			146284	No. 2 Machines . . . . .	1
		No. 2 Machines . . . . .	1		150406	Nos. 3 & 4 Machines . . . . .	1
4AC-434	3230	Screw		4AC-462		Rail - Clamp, R. H.	
		No. 2 Machines . . . . .	1		146283	No. 2 Machines . . . . .	1
4AC-435	30154	Ball - Steel . . . . .	1		150407	Nos. 3 & 4 Machines . . . . .	1
4AC-436	76357	Bearing - Roller . . . . .	1	4AC-463	146286	Sleeve - Gib Clamp	
4AC-437	2239	Pin				No. 2 Machines . . . . .	1
		No. 2 Machines . . . . .	4	4AC-464		Clamp - Gib, L. H.	
4AC-438	3403	Screw			146285	No. 2 Machines . . . . .	1
		No. 2 Machines . . . . .	7		150413	Nos. 3 & 4 Machines . . . . .	1
4AC-439	144876	Bracket - Curtain		4AC-465	146288	Clamp - Gib, R. H.	
		No. 2 Machines . . . . .	1			No. 2 Machines . . . . .	1
4AC-440	144877	*Cover - Top Column		4AC-466	146287	Stud - Gib Clamp	
		No. 2 Machines . . . . .	1			No. 2 Machines . . . . .	1
4AC-441		Curtain - Colum to Head		4AC-467	3480	Nut	
	150410	Nos. 3 & 4 Machines . . . . .	1			No. 2 Machines . . . . .	1
4AC-442	3474	Nut . . . . .	1	4AC-468		Screw	
4AC-443	150411	Clamp - Curtain			3268	No. 2 Machines . . . . .	6
		Nos. 3 & 4 Machines . . . . .	1		1925	Nos. 3 & 4 Machines . . . . .	6
4AC-444	3199	Screw		4AC-469		Screw	
		Nos. 3 & 4 Machines . . . . .	9		3268	No. 2 Machines . . . . .	6
4AC-445	3462	Screw			1925	Nos. 3 & 4 Machines . . . . .	6
		No. 2 Machines . . . . .	6	4AC-470	146286	Sleeve - Gib Clamp . . . . .	1
4AC-446	166378	Clamp - Curtain		4AC-471		Stud - Gib Clamp	
		No. 2 Machines . . . . .	1		146287	No. 2 Machines . . . . .	1
4AC-447	146281	Cleat - Curtain			95187	Nos. 3 & 4 Machines . . . . .	1
		No. 2 Machines . . . . .	1	4AC-472	3480	Nut . . . . .	1

\* For Machines With Plunger Type Scavenger Pump.  
See Page 95 For Vane Type Pump.

### SPRING COUNTERBALANCE

NO. 2 VERTICAL



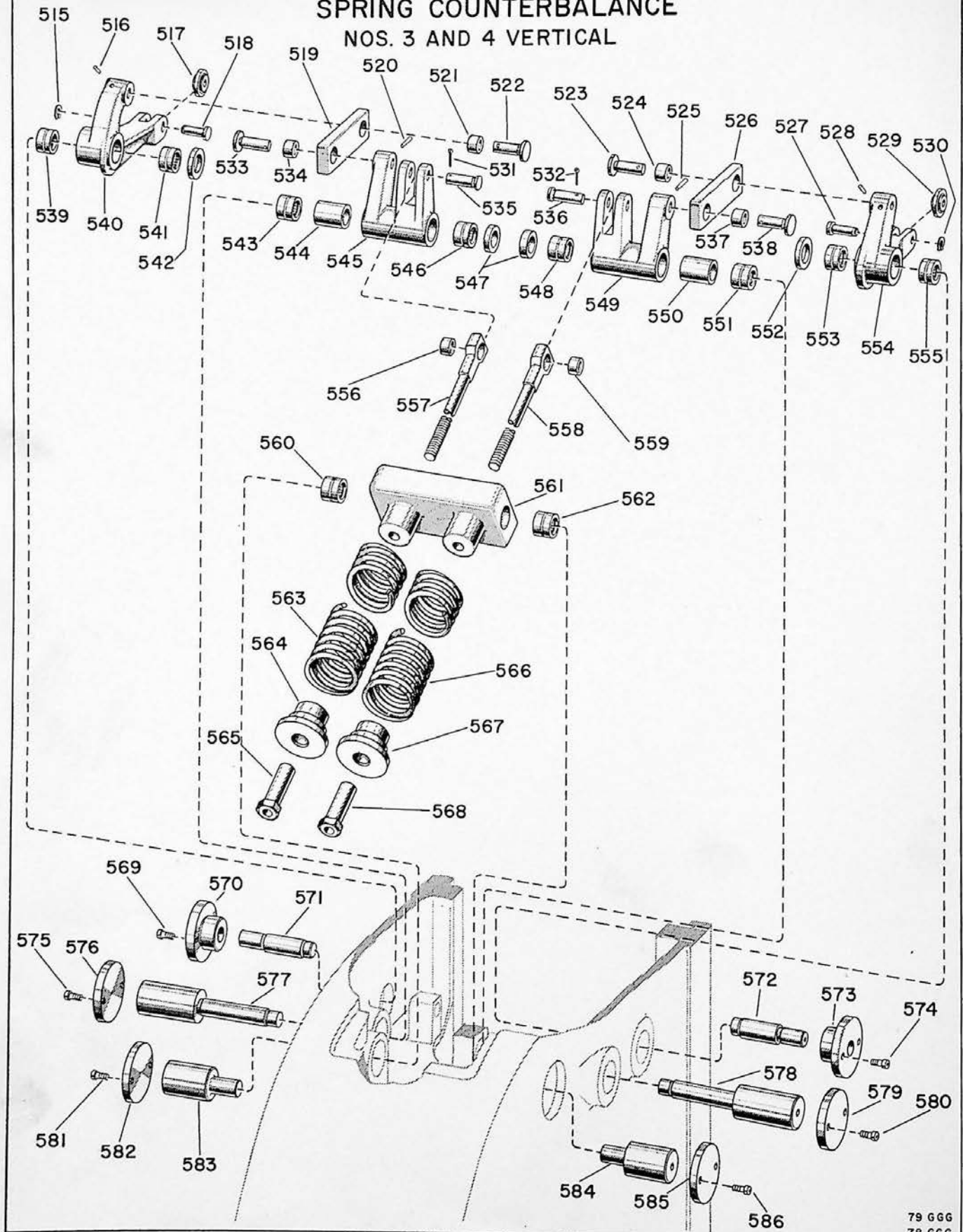
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

COLUMN-UNIT No. 4AC (Continued)  
No. 2 VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-473	144894	Ring - Retaining . . . . .	1	4AC-494	144209	Lever - Spring, L. H. . . . .	1
4AC-474	146290	Bearing - Ball . . . . .	1	4AC-495	146280	Spring - Compression . . . . .	1
4AC-475	143995	Pin - Roller Bearing . . . . .	1	4AC-496	144124	Sleeve - Spring . . . . .	1
4AC-476	1959	Pin - Cotter . . . . .	1	4AC-497	143997	Nut - Spring Adjusting . . . . .	1
4AC-477	143991	Pin - Spring Eye Bolt . . . . .	1	4AC-498	144289	Cradle . . . . .	1
4AC-478	143991	Pin - Spring Eye Bolt . . . . .	1	4AC-499	146280	Spring - Compression . . . . .	1
4AC-479	1959	Pin - Cotter . . . . .	1	4AC-500	144124	Sleeve - Spring . . . . .	1
4AC-480	143995	Pin - Roller Bearing . . . . .	1	4AC-501	143997	Nut - Spring Adjusting . . . . .	1
4AC-481	146290	Bearing - Ball . . . . .	1	4AC-502	151719	Tube - Splash Coolant . . . . .	1
4AC-482	144894	Ring - Retaining . . . . .	1	4AC-503	3399	Screw . . . . .	4
4AC-483	146024	Bearing - Needle . . . . .	1	4AC-504	143996	Housing - Spring Lever Shaft . . . . .	1
4AC-484	144808	Spacer - Bearing . . . . .	1	4AC-505	144206	Trunion - Spring Cradle . . . . .	1
4AC-485	144808	Spacer - Bearing . . . . .	1	4AC-506	143998	Shaft - Spring Lever . . . . .	1
4AC-486	146024	Bearing - Needle . . . . .	1	4AC-507	143996	Housing - Spring Lever Shaft . . . . .	1
4AC-487	144208	Lever - Spring, R. H. . . . .	1	4AC-508	3399	Screw . . . . .	4
4AC-488	146024	Bearing - Needle . . . . .	1	4AC-509	3342	Fitting . . . . .	1
4AC-489	144355	Spacer - Spring Lever . . . . .	1	4AC-510	3399	Screw . . . . .	4
4AC-490	146289	Bearing - Needle . . . . .	1	4AC-511	144206	Trunion - Spring Cradle . . . . .	1
4AC-491	144207	Bolt - Eye Spring . . . . .	2	4AC-512	3399	Screw . . . . .	4
4AC-492	146289	Bearing - Needle . . . . .	1	4AC-513	3342	Fitting . . . . .	1
4AC-493	146024	Bearing - Needle . . . . .	1	4AC-514	152292	Hose . . . . .	1

**SPRING COUNTERBALANCE  
NOS. 3 AND 4 VERTICAL**



79 666  
78 666

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

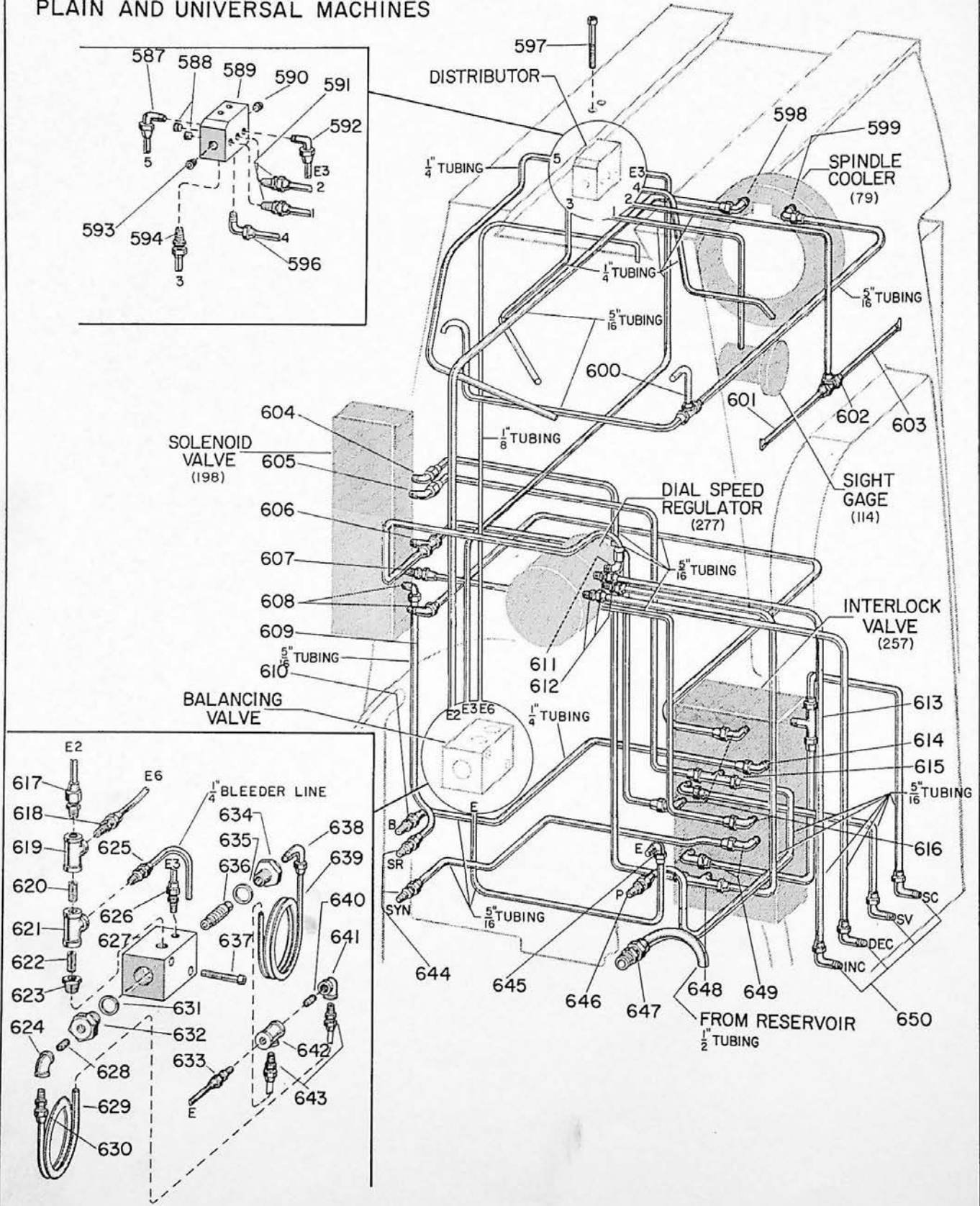
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

COLUMN-UNIT No. 4AC (Continued)  
Nos. 3 AND 4 VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-515	144894	Ring - Retaining	1	4AC-551	149746	Bearing - Needle	1
4AC-516	642	Pin	1	4AC-552	149749	Spacer - Arm Roller	1
4AC-517	146290	Bearing - Ball	1	4AC-553	135591	Bearing - Roller	1
4AC-518	143995	Pin - Roller Bearing	1	4AC-554	149713	Arm - Roller, L. H.	1
4AC-519	149745	Link - Arm Roller	1	4AC-555	135591	Bearing - Roller	1
4AC-520	642	Pin	1	4AC-556	146289	Bearing - Needle	1
4AC-521	146289	Bearing - Needle	1	4AC-557	149734	Bolt - Eye Spring	1
4AC-522	149750	Pin - Link	1	4AC-558	149734	Bolt - Eye Spring	1
4AC-523	149750	Pin - Link	1	4AC-559	146289	Bearing - Needle	1
4AC-524	146289	Bearing - Needle	1	4AC-560	149746	Bearing - Needle	1
4AC-525	642	Pin	1	4AC-561	149726	Cradle - Spring	1
4AC-526	149745	Link - Arm Roller	1	4AC-562	149746	Bearing - Needle	1
4AC-527	143995	Pin - Roller Bearing	1	4AC-563	149738	Spring	1
4AC-528	642	Pin	1	4AC-564	150400	Sleeve - Spring	1
4AC-529	146290	Bearing - Ball	1	4AC-565	143997	Nut - Spring Adjusting	1
4AC-530	144894	Ring - Retaining	1	4AC-566	149738	Spring	1
4AC-531	1959	Pin - Cotter	1	4AC-567	150400	Sleeve - Spring	1
4AC-532	1959	Pin - Cotter	1	4AC-568	143997	Nut - Spring Adjusting	1
4AC-533	149750	Pin - Link	1	4AC-569	3399	Screw	2
4AC-534	146289	Bearing - Needle	1	4AC-570	167554	Housing - Shaft	1
4AC-535	143991	Pin - Spring Eye Bolt	1	4AC-571	165777	Shaft - Counterbalance	1
4AC-536	143991	Pin - Spring Eye Bolt	1	4AC-572	165777	Shaft - Counterbalance	1
4AC-537	146289	Bearing - Needle	1	4AC-573	167554	Housing - Shaft	1
4AC-538	149750	Pin - Link	1	4AC-574	3399	Screw	2
4AC-539	135591	Bearing - Roller	1	4AC-575	3399	Screw	2
4AC-540	149714	Arm - Roller, R. H.	1	4AC-576	149741	Cap - Trunion	1
4AC-541	135591	Bearing - Roller	1	4AC-577	149740	Shaft - Trunion Lever	1
4AC-542	149749	Spacer - Arm Roller	1	4AC-578	149740	Shaft - Trunion Lever	1
4AC-543	149746	Bearing - Needle	1	4AC-579	149741	Cap - Trunion	1
4AC-544	149747	Spacer - Bearing	1	4AC-580	3399	Screw	2
4AC-545	149725	Lever - Trunion, R. H.	1	4AC-581	3399	Screw	2
4AC-546	149746	Bearing - Needle	1	4AC-582	149741	Cap - Trunion	1
4AC-547	149748	Spacer - Trunion	2	4AC-583	149752	Trunion	1
4AC-548	149746	Bearing - Needle	1	4AC-584	149752	Trunion	1
4AC-549	149724	Lever - Trunion, L. H.	1	4AC-585	149741	Cap - Trunion	1
4AC-550	149747	Spacer - Bearing	1	4AC-586	3399	Screw	2

# OIL SYSTEM

## PLAIN AND UNIVERSAL MACHINES



CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

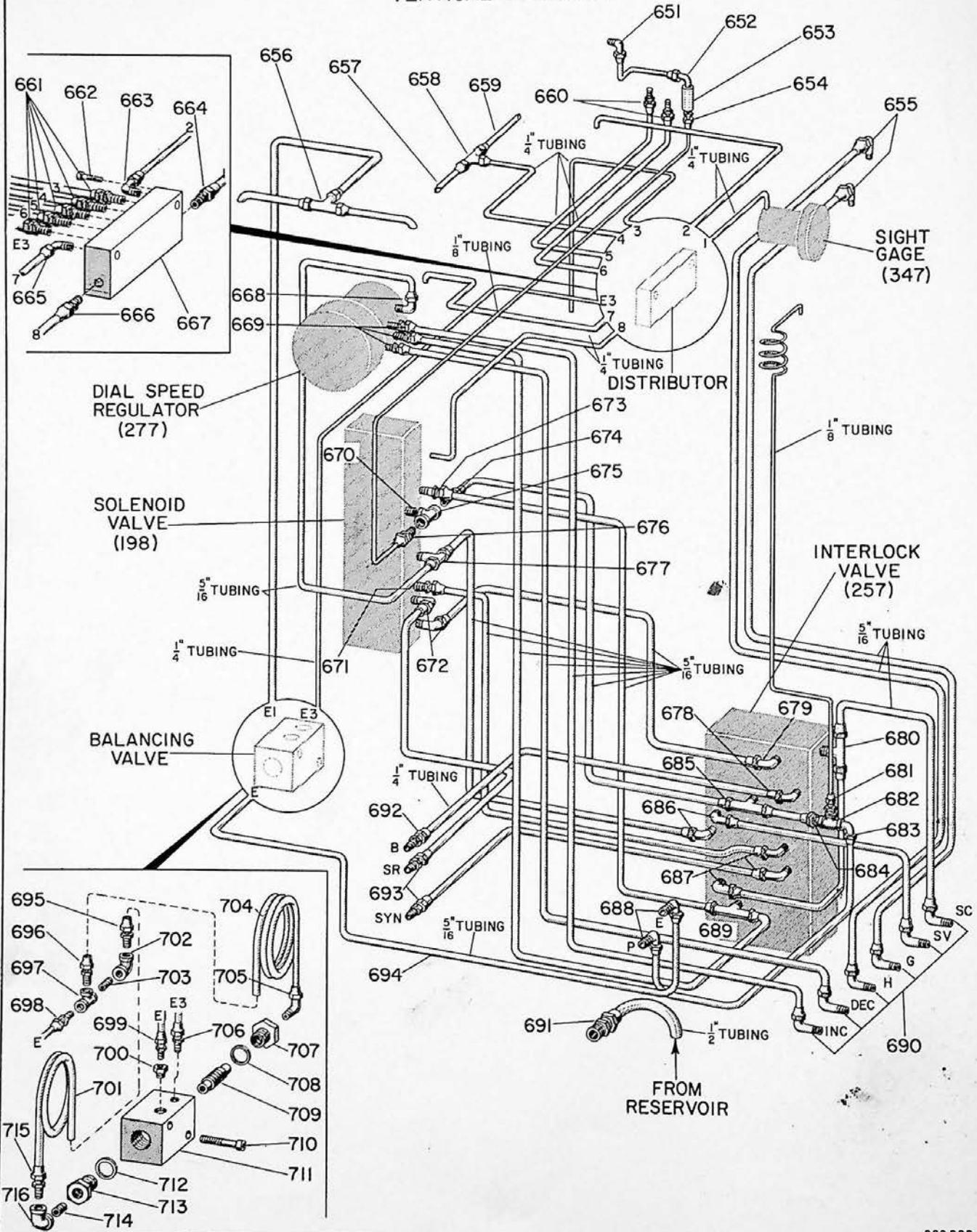
COLUMN-UNIT No. 4AC (Continued)

Nos. 2, 3, AND 4, PLAIN AND UNIVERSAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-587	58152	Fitting - Elbow . . . . .	1	4AC-619	58435	Tee . . . . .	1
4AC-588	76644	Plug - Pipe . . . . .	2	4AC-620	14006	Nipple . . . . .	1
4AC-589	144627	Distributor . . . . .	1	4AC-621	58435	Tee . . . . .	1
4AC-590	76644	Plug - Pipe . . . . .	1	4AC-622	14006	Nipple . . . . .	1
4AC-591	89866	Fitting - Straight . . . . .	2	4AC-623	58197	Bushing - Reducing . . . . .	1
4AC-592	58152	Fitting - Elbow . . . . .	1	4AC-624	13711	Elbow . . . . .	1
4AC-593	76644	Plug - Pipe . . . . .	1	4AC-625	89866	Fitting - Straight . . . . .	1
4AC-594	89866	Fitting - Straight . . . . .	1	4AC-626	89866	Fitting - Straight . . . . .	1
4AC-596	58152	Fitting - Elbow . . . . .	1	4AC-627	133906	Body - Balancing Valve . . . . .	1
4AC-597	3157	Screw . . . . .	2	4AC-628	14006	Nipple . . . . .	1
4AC-598	4013	Fitting - Elbow . . . . .	1	4AC-629	133908	Coil - Exhaust Resistance . . . . .	1
4AC-599	4013	Fitting - Elbow . . . . .	1	4AC-630	70382	Fitting - Straight . . . . .	1
4AC-600	72235	Fitting - Tee . . . . .	1	4AC-631	79111	Gasket . . . . .	1
4AC-601	152033	Spray - Tube Shifter Bracket . . . . .	1	4AC-632	129858	Plug - Screw . . . . .	1
4AC-602	64509	Fitting - Tee . . . . .	1	4AC-633	89866	Fitting - Straight . . . . .	1
4AC-603	152033	Spray - Tube Shifter Bracket . . . . .	1	4AC-634	129858	Plug - Screw . . . . .	1
4AC-604	4013	Elbow . . . . .	1	4AC-635	79111	Gasket . . . . .	1
4AC-605	4013	Elbow . . . . .	1	4AC-636	133905	Plunger - Balancing Valve . . . . .	1
4AC-606	218928	Fitting - Tee . . . . .	1	4AC-637	3398	Screw . . . . .	2
4AC-607	70382	Fitting - Straight . . . . .	1	4AC-638	58152	Fitting - Elbow . . . . .	1
4AC-608	4013	Elbow . . . . .	2	4AC-639	133907	Coil - Spray Resistance . . . . .	1
4AC-609		Tubing - List . . . . .		4AC-640	14006	Nipple . . . . .	1
	165549	No. 2 Machine . . . . .	1	4AC-641	13711	Elbow . . . . .	1
	165950	Nos. 3 & 4 Machines . . . . .	1	4AC-642	58435	Tee . . . . .	1
4AC-610	89866	Fitting - Straight . . . . .	1	4AC-643	70382	Fitting - Straight . . . . .	2
4AC-611	4013	Fitting - Elbow . . . . .	1	4AC-644	70382	Fitting - Straight . . . . .	2
4AC-612	70382	Fitting - Straight . . . . .	3	4AC-645	4013	Fitting - Elbow . . . . .	1
4AC-613	218928	Fitting - Tee . . . . .	1	4AC-646	70382	Fitting - Straight . . . . .	1
4AC-614	58125	Fitting - Elbow . . . . .	1	4AC-647	79728	Fitting - Straight . . . . .	1
4AC-615	218928	Fitting - Tee . . . . .	1	4AC-648	218928	Fitting - Tee . . . . .	1
4AC-616	4013	Fitting - Elbow . . . . .	4	4AC-649	4013	Fitting - Elbow . . . . .	2
4AC-617	70382	Fitting - Straight . . . . .	1	4AC-650	4013	Fitting - Elbow . . . . .	4
4AC-618	69531	Fitting - Straight . . . . .	1				



OIL SYSTEM  
VERTICAL MACHINES



289 000

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

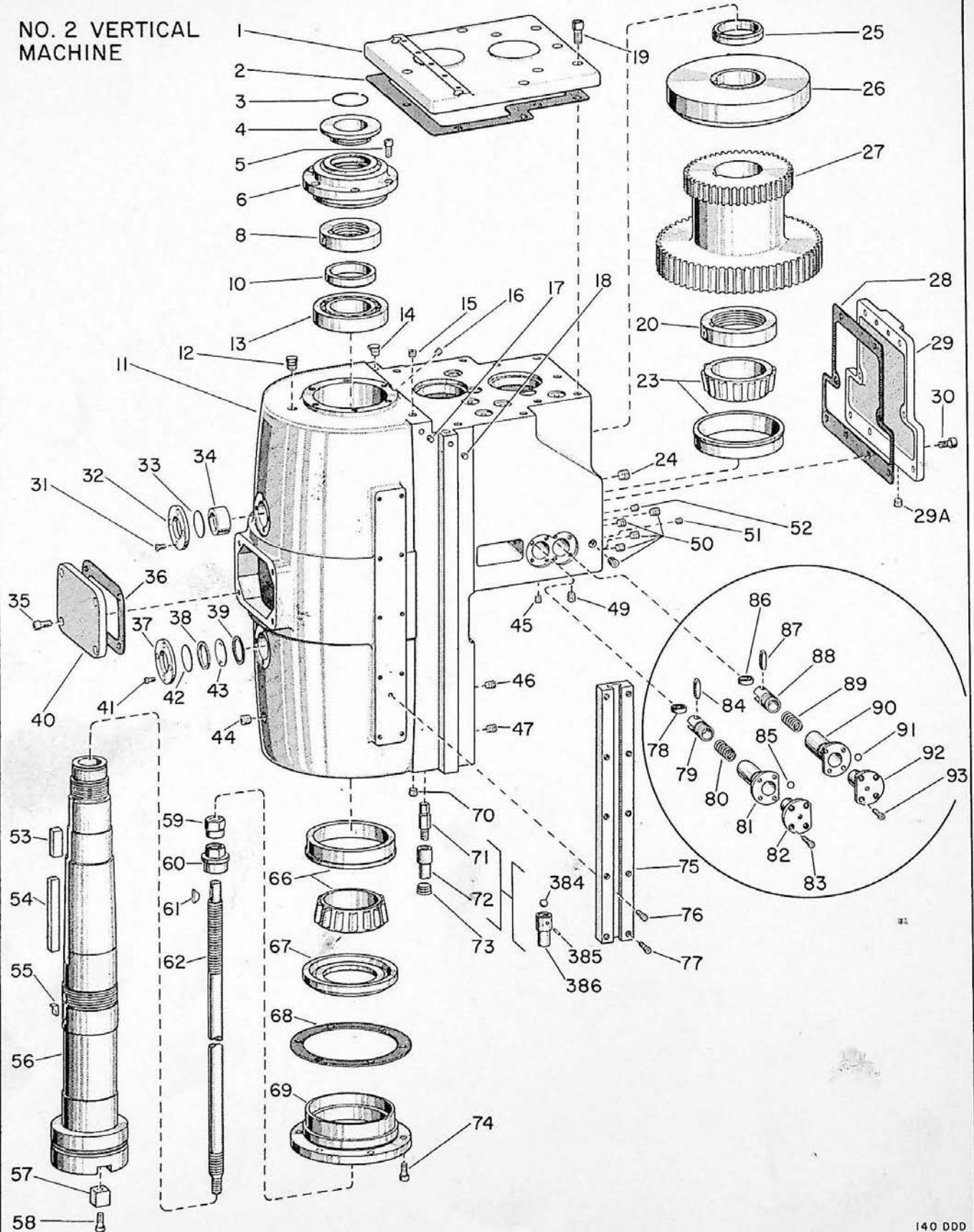
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

COLUMN-UNIT No. 4AC (Concluded)  
Nos. 2, 3, AND 4 VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AC-651	58152	Fitting - Elbow . . . . .	1	4AC-685	218928	Fitting - Tee . . . . .	1
4AC-652	58152	Fitting - Elbow . . . . .	1	4AC-686	4013	Fitting - Elbow . . . . .	2
4AC-653	225585	Coupling - Pipe . . . . .	1	4AC-687	4013	Fitting - Elbow . . . . .	3
4AC-654	69531	Fitting - Tubing . . . . .	1	4AC-688	4013	Fitting - Elbow . . . . .	2
4AC-655	4013	Fitting - Elbow . . . . .	2	4AC-689	218928	Fitting - Tee . . . . .	1
4AC-656	72235	Fitting - Tee . . . . .	1	4AC-690	4013	Fitting - Elbow . . . . .	6
4AC-657	152033	Tube - Spray . . . . .	1	4AC-691	79728	Fitting - Tubing . . . . .	1
4AC-658	64509	Fitting - Tee . . . . .	1	4AC-692	89866	Fitting - Tubing . . . . .	1
4AC-659	152033	Tube - Spray . . . . .	1	4AC-693	70382	Fitting - Tubing . . . . .	2
4AC-660	89866	Fitting - Tubing . . . . .	1	4AC-694		Tubing List	
4AC-661	89866	Fitting - Tubing . . . . .	5		167029	No. 2 Machines . . . . .	1
4AC-662	3397	Screw . . . . .	2		167030	Nos. 3 & 4 Machines . . . . .	1
4AC-663	58152	Fitting - Elbow . . . . .	1	4AC-695	70382	Fitting - Tubing . . . . .	1
4AC-664	89866	Fitting - Tubing . . . . .	1	4AC-696	89866	Fitting - Tubing . . . . .	1
4AC-665	58152	Fitting - Elbow . . . . .	1	4AC-697	58435	Tee - Pipe . . . . .	1
4AC-666	89866	Fitting - Tubing . . . . .	1	4AC-698	70382	Fitting - Tubing . . . . .	1
4AC-667	167031	Block - Distributor . . . . .	1	4AC-699	70382	Fitting - Tubing . . . . .	1
4AC-668	4013	Fitting - Elbow . . . . .	1	4AC-700	58197	Bushing - Reducing . . . . .	1
4AC-669	70382	Fitting - Tubing . . . . .	3	4AC-701	133908	Coil - Exhaust Resistance . . . . .	1
4AC-670	14006	Nipple - Pipe . . . . .	1	4AC-702	13711	Elbow - Pipe . . . . .	1
4AC-671	70382	Fitting - Tubing . . . . .	1	4AC-703	14006	Nipple - Pipe . . . . .	1
4AC-672	4013	Fitting - Elbow . . . . .	2	4AC-704	133907	Coil - Spray Resistance . . . . .	1
4AC-673	70382	Fitting - Tubing . . . . .	1	4AC-705	58152	Fitting - Elbow . . . . .	1
4AC-674	70382	Fitting - Tubing . . . . .	1	4AC-706	89866	Fitting - Tubing . . . . .	1
4AC-675	58435	Tee - Pipe . . . . .	1	4AC-707	129858	Plug - Screw . . . . .	1
4AC-676	69531	Fitting - Tubing . . . . .	1	4AC-708	79111	Gasket . . . . .	1
4AC-677	218928	Fitting - Tee . . . . .	1	4AC-709	133905	Plunger - Balancing Valve . . . . .	1
4AC-678	58152	Fitting - Elbow . . . . .	1	4AC-710	3398	Screw . . . . .	1
4AC-679	4013	Fitting - Elbow . . . . .	1	4AC-711	133906	Body - Balancing Valve . . . . .	1
4AC-680	218928	Fitting - Tee . . . . .	1	4AC-712	79111	Gasket . . . . .	1
4AC-681	69531	Fitting - Tubing . . . . .	1	4AC-713	129858	Plug - Screw . . . . .	1
4AC-682	58435	Tee - Pipe . . . . .	1	4AC-714	14006	Nipple - Pipe . . . . .	1
4AC-683	4013	Fitting - Elbow . . . . .	1	4AC-715	70382	Fitting - Tubing . . . . .	1
4AC-684	70382	Fitting - Tubing . . . . .	1	4AC-716	13711	Elbow - Pipe . . . . .	1

### VERTICAL HEAD AND SPINDLE SHAFT

NO. 2 VERTICAL MACHINE



140 DDD  
142 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

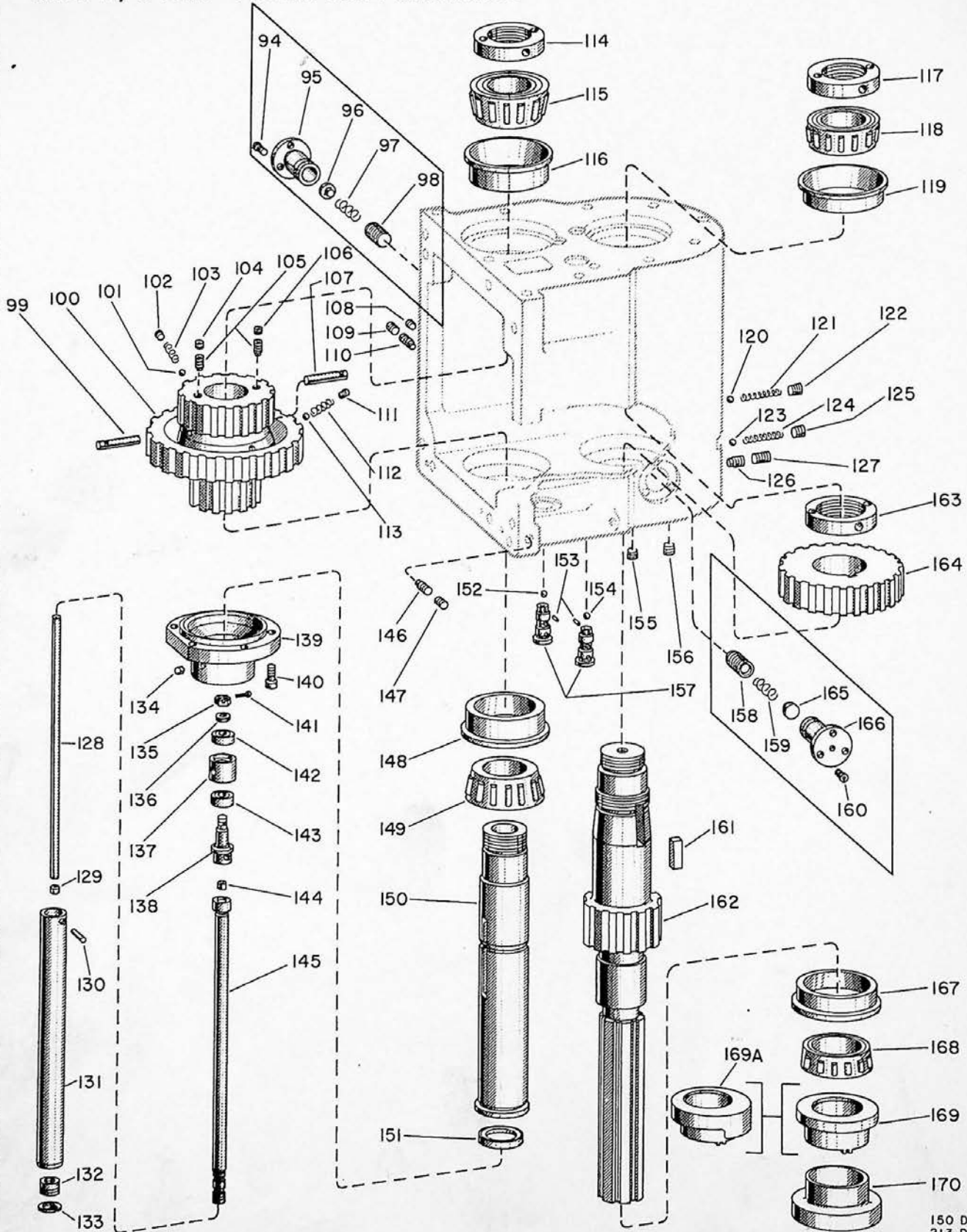
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

VERTICAL HEAD-UNIT No. 4ADV  
No. 2 VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4ADV-1	144232	* Cover - Vertical Head . . . . .	1	4ADV-45	76644	Plug . . . . .	1
4ADV-2	144233	* Gasket - Cover Vertical Head . . . . .	1	4ADV-46	76645	Plug . . . . .	1
4ADV-3	210560	Ring - Retainer . . . . .	1	4ADV-47	76645	Plug . . . . .	1
4ADV-4	114882	Cap - Spindle . . . . .	1	4ADV-49	76645	Plug . . . . .	2
4ADV-5	3399	Screw . . . . .	6	4ADV-50	76645	Plug . . . . .	5
4ADV-6	149688	Cap - Spindle . . . . .	1	4ADV-51	76644	Plug . . . . .	1
4ADV-8	217691	Nut - Lock . . . . .	1	4ADV-52	76644	Plug . . . . .	3
4ADV-10	144225	Spacer - Bearing . . . . .	1	4ADV-53	2288	Key . . . . .	1
4ADV-11		Head - Vertical . . . . .		4ADV-54	3297	Key . . . . .	1
	149681	with Plunger Type Pump . . . . .	1	4ADV-55	4004	Key - Lock Bearing . . . . .	1
	165310	with Vane Type Pump . . . . .	1	4ADV-56	149690	Spindle - Vertical . . . . .	1
4ADV-12	64929	Plug - Pipe . . . . .	1	4ADV-57	3687	Key - Arbor Driving . . . . .	2
4ADV-13	161361	Bearing - Roller . . . . .	1	4ADV-58	1158	Screw . . . . .	2
4ADV-14	83512	Oiler - 1/2" . . . . .	2	4ADV-59	3639	Head - Arbor Drawin Bolt . . . . .	1
4ADV-15	76645	Plug . . . . .	1	4ADV-60	3641	Nut - Arbor Drawin Bolt . . . . .	1
4ADV-16	76644	Plug . . . . .	1	4ADV-61	3280	Key . . . . .	1
4ADV-17	1962	Plug . . . . .	1	4ADV-62	58547	Bolt - Arbor Drawin . . . . .	1
4ADV-18	2268	Plug . . . . .	2	4ADV-66	107716	Bearing - Roller . . . . .	1
4ADV-19	3403	Screw . . . . .	10	4ADV-67	113869	Slinger . . . . .	1
4ADV-20	4275	Nut - Shoe . . . . .	1	4ADV-68	113871	Gasket - Bottom of Spindle . . . . .	1
4ADV-23	116692	Bearing - Precision . . . . .	1	4ADV-69	113870	Retainer - Oil in Spindle . . . . .	1
4ADV-24	216607	Plug - Pipe . . . . .	1	4ADV-70	76645	Plug . . . . .	1
4ADV-25	144225	Spacer - Bearing . . . . .	1	4ADV-71	144234	* Valve - Check . . . . .	1
4ADV-26	149687	Wheel - Fly . . . . .	1	4ADV-72	144214	* Sleeve - Check Valve . . . . .	1
4ADV-27	149686	Gear - Spindle . . . . .	1	4ADV-73	221981	Plug - Pipe . . . . .	1
4ADV-28		Gasket - Cover . . . . .	1	4ADV-74	3399	Screw . . . . .	6
	144231	with Plunger Type Pump . . . . .	1	4ADV-75	144328	Bar - Tee Slot . . . . .	1
	165074	with Vane Type Pump . . . . .	1	4ADV-76	3396	Screw . . . . .	1
4ADV-29		Cover . . . . .		4ADV-77	3485	Screw . . . . .	10
	144230	with Plunger Type Pump . . . . .	1	4ADV-78	144235	* Bearing - Ball . . . . .	1
	165073	with Vane Type Pump . . . . .	1	4ADV-79	144239	* Plunger - Oil Pump . . . . .	1
4ADV-29A	76644	Plug - Pipe, with Vane Type Pump . . . . .	1	4ADV-80	115256	* Spring . . . . .	1
4ADV-30	3399	Screw . . . . .	4	4ADV-81	144246	* Sleeve - Sump Pump . . . . .	1
4ADV-31	3213	Screw . . . . .	1	4ADV-82	144247	* Valve - Lube Pump . . . . .	1
4ADV-32	4075	Cover - Oil Gage . . . . .	1	4ADV-83	3204	* Screw . . . . .	4
4ADV-33	3849	Disc - Oil Gage . . . . .	1	4ADV-84	144236	* Pin - Bearing Retainer . . . . .	1
4ADV-34	131986	Body - Oil Sight . . . . .	1	4ADV-85	30154	* Ball . . . . .	2
4ADV-35	3399	Screw . . . . .	4	4ADV-86	144235	* Bearing - Ball . . . . .	1
4ADV-36	151632	Gasket . . . . .	1	4ADV-87	144236	* Pin - Bearing Retainer . . . . .	1
4ADV-37	4075	Cover - Oil Gage . . . . .	1	4ADV-88	144239	* Plunger - Oil Pump . . . . .	1
4ADV-38	4086	Gasket - Oil Gage . . . . .	1	4ADV-89	115256	* Spring . . . . .	1
4ADV-39	3850	Gasket . . . . .	1	4ADV-90	144237	* Sleeve - Lube Pump . . . . .	1
4ADV-40	151631	Cover - Front . . . . .	1	4ADV-91	30154	* Ball . . . . .	2
4ADV-41	3213	Screw . . . . .	4	4ADV-92	144238	* Valve - Oil Pump . . . . .	1
4ADV-42	3849	Disc - Oil Gage . . . . .	1	4ADV-93	3204	* Screw . . . . .	4
4ADV-43	60956	Dial - Oil Gage . . . . .	1	4ADV-384	30154	Ball - Steel . . . . .	1
4ADV-44	216607	* Plug - Pipe . . . . .	1	4ADV-385	3540	Pin . . . . .	1
				4ADV-386	165174	Check - Ball . . . . .	1

\* For Machines with Plunger Type Scavenger Pump. See Page 95 for Vane Type Pump

SLIDING GEAR AND "F" SHAFTS  
 NOS. 2, 3 AND 4 VERTICAL MACHINES



150 DDD  
 213 DDD  
 194 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

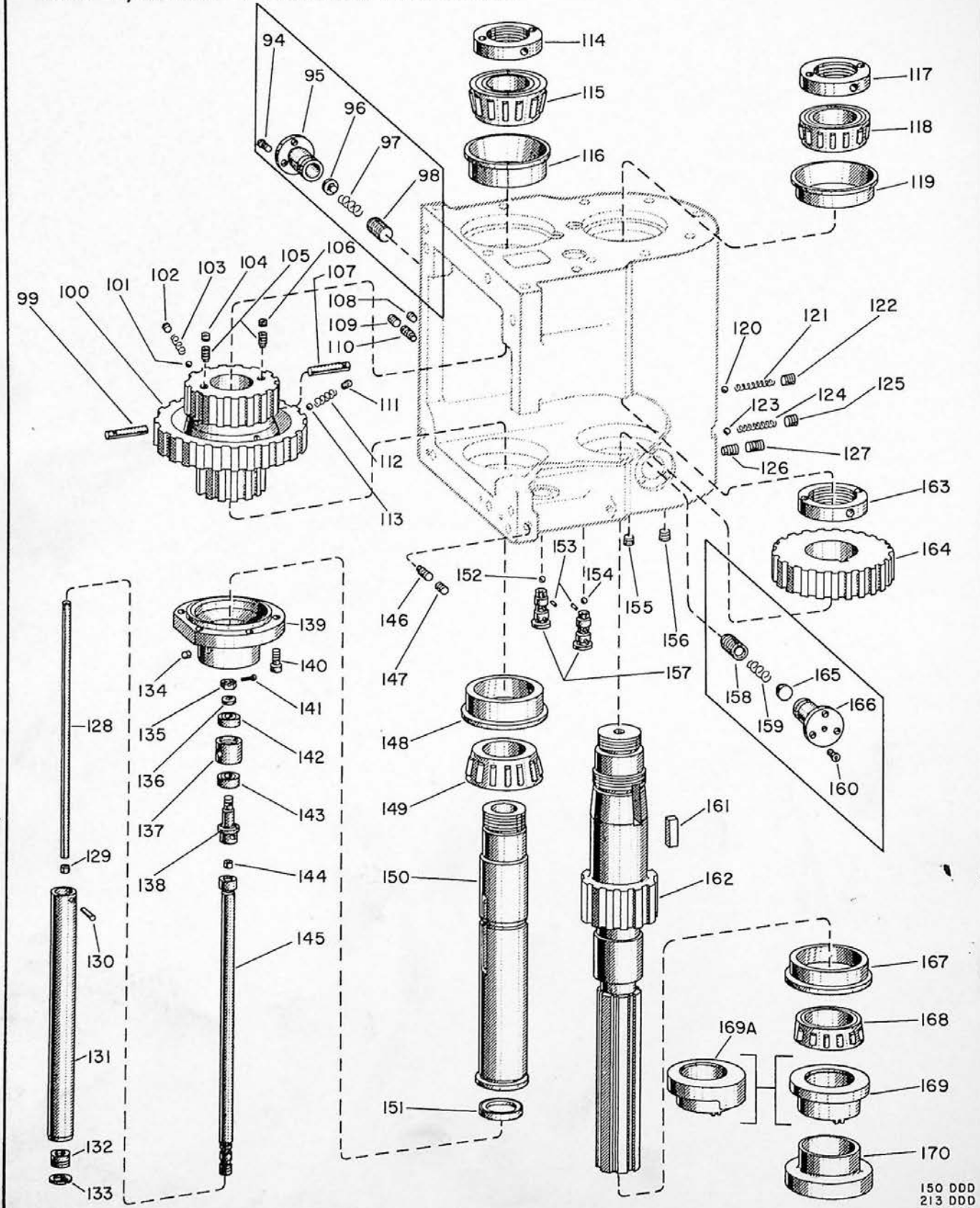
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

VERTICAL HEAD-UNIT No. 4ADV (Continued)  
ALL VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4ADV-94	3203	*Screw . . . . .	3	4ADV-114		Nut - Lock	
		Nos. 3 & 4 Machines Only			4249	No. 2 Machines . . . . .	1
4ADV-95	150416	*Sleeve - Plunger . . . . .	1		4255	Nos. 3 & 4 Machines . . . . .	1
		Nos. 3 & 4 Machines Only		4ADV-115		Cone - Bearing	
4ADV-96	157982	*Button . . . . .	1		119431	No. 2 Machines . . . . .	1
		Nos. 3 & 4 Machines Only			147492	Nos. 3 & 4 Machines . . . . .	1
4ADV-97	125147	*Spring - Oil Pump . . . . .	1	4ADV-116		Cup - Bearing	
		Nos. 3 & 4 Machines Only			104806	No. 2 Machines . . . . .	1
4ADV-98	140192	Plunger - Oil Pump . . . . .	1		147491	Nos. 3 & 4 Machines . . . . .	1
		Nos. 3 & 4 Machines Only		4ADV-117		Nut - Lock	
4ADV-99		Pin - Limit			4249	No. 2 Machines . . . . .	1
	146441	No. 2 Machines . . . . .	1		4255	Nos. 3 & 4 Machines . . . . .	1
	149669	Nos. 3 & 4 Machines . . . . .	1	4ADV-118		Cone - Bearing	
4ADV-100		Gear - Spur Cluster			119431	No. 2 Machines . . . . .	1
	144219	No. 2 Machines . . . . .	1		144249	Nos. 3 & 4 Machines . . . . .	1
	149718	Nos. 3 & 4 Machines . . . . .	1	4ADV-119		Cup - Bearing	
4ADV-101	253222	Ball . . . . .	1		104806	No. 2 Machines . . . . .	1
		Nos. 3 & 4 Machines Only			144248	Nos. 3 & 4 Machines . . . . .	1
4ADV-102	76644	Plug . . . . .	1	4ADV-120	30154	*Ball . . . . .	1
		Nos. 3 & 4 Machines Only				Nos. 3 & 4 Machines Only	
4ADV-103	157616	Spring . . . . .	1	4ADV-121	139405	*Spring - Ball Check . . . . .	1
		Nos. 3 & 4 Machines Only				Nos. 3 & 4 Machines Only	
4ADV-104	2333	Screw . . . . .	1	4ADV-122	76645	Plug . . . . .	1
4ADV-105	2342	Screw . . . . .	2			Nos. 3 & 4 Machines Only	
4ADV-106	2333	Screw . . . . .	1	4ADV-123	30154	*Ball . . . . .	1
4ADV-107		Pin - Limit				Nos. 3 & 4 Machines Only	
	146441	No. 2 Machines . . . . .	1	4ADV-124	139405	*Spring - Ball Check . . . . .	1
	149669	Nos. 3 & 4 Machines . . . . .	1			Nos. 3 & 4 Machines Only	
4ADV-108	4236	Plug . . . . .	1	4ADV-125	76645	Plug . . . . .	1
		Nos. 3 & 4 Machines Only				Nos. 3 & 4 Machines Only	
4ADV-109	3211	Screw . . . . .	1	4ADV-126	3233	Screw . . . . .	1
		Nos. 3 & 4 Machines Only		4ADV-127		Screw . . . . .	
4ADV-110	3235	Screw . . . . .	1		2356	No. 2 Machines . . . . .	1
		Nos. 3 & 4 Machines Only			3211	Nos. 3 & 4 Machines . . . . .	1
4ADV-111	76644	Plug . . . . .	1	4ADV-128		Tube . . . . .	
		Nos. 3 & 4 Machines Only			157960	No. 2 Machines . . . . .	1
4ADV-112	157616	Spring . . . . .	1		157956	Nos. 3 & 4 Machines . . . . .	1
		Nos. 3 & 4 Machines Only		4ADV-129	2190	Bushing . . . . .	1
4ADV-113	253222	Ball . . . . .	1	4ADV-130	663	Pin - Taper . . . . .	1
		Nos. 3 & 4 Machines Only					

\* For Machine With Plunger Type Scavenger Pumps.  
See Page 95 for Vane Type Pump.

### SLIDING GEAR AND "F" SHAFTS NOS. 2, 3 AND 4 VERTICAL MACHINES



150 DDD  
213 DDD  
194 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

VERTICAL HEAD-UNIT No. 4ADV(Continued)  
ALL VERTICAL MACHINES

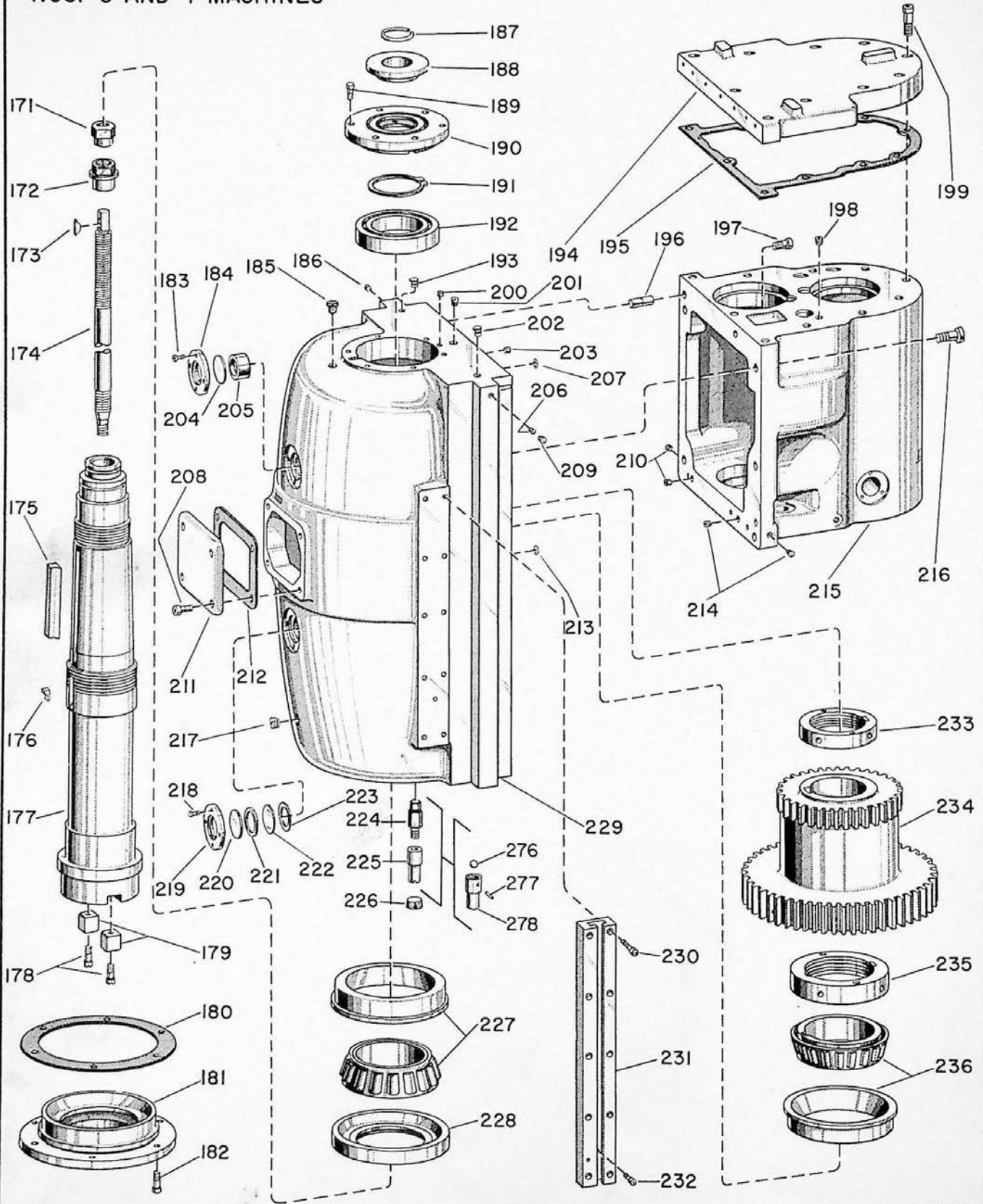
KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4ADV-131	144391	Cylinder - Gear Shifter		4ADV-154	30154	*Ball . . . . .	1
	149664	No. 2 Machines . . . . .	1			Nos. 3 & 4 Machines Only	
		Nos. 3 & 4 Machines . . . . .	1	4ADV-155	76644	Plug . . . . .	1
4ADV-132	144390	Sleeve - Cylinder . . . . .	1			Nos. 3 & 4 Machines Only	
4ADV-133	144387	Ring - Retaining . . . . .	1	4ADV-156	76645	Plug . . . . .	1
4ADV-134	2268	Plug . . . . .	1			Nos. 3 & 4 Machines Only	
		No. 2 Machines Only		4ADV-157	150417	*Valve - Check . . . . .	2
4ADV-135	144393	Nut - Slotted Hex . . . . .	1			Nos. 3 & 4 Machines Only	
4ADV-136	3441	Washer - Bearing . . . . .	1	4ADV-158	140192	*Plunger - Oil Pump . . . . .	1
4ADV-137	167744	Housing - Bearing . . . . .	1			Nos. 3 & 4 Machines Only	
4ADV-138	167143	Plug - Cylinder . . . . .	1	4ADV-159	125147	*Spring - Oil Pump . . . . .	1
4ADV-139		Housing - Seal				Nos. 3 & 4 Machines Only	
	149685	No. 2 Machines . . . . .	1	4ADV-160	3203	*Screw . . . . .	3
	149666	Nos. 3 & 4 Machines . . . . .	1			Nos. 3 & 4 Machines Only	
4ADV-140		Screw		4ADV-161		Key	
	4093	No. 2 Machines . . . . .	6		3448	No. 2 Machines . . . . .	1
	2320	Nos. 3 & 4 Machines . . . . .	6		3298	Nos. 3 & 4 Machines . . . . .	1
4ADV-141	3329	Pin - Cotter . . . . .	1	4ADV-162		Shaft - Vertical "F"	
4ADV-142	167142	Bearing - Ball . . . . .	1		144212	No. 2 Machines . . . . .	1
4ADV-143	167142	Bearing - Ball . . . . .	1		149617	Nos. 3 & 4 Machines . . . . .	1
4ADV-144	2190	Bushing . . . . .	1	4ADV-163		Nut - Lock	
4ADV-145		Piston - Gear Shifter			4254	No. 2 Machines . . . . .	1
	157959	No. 2 Machines . . . . .	1		4257	Nos. 3 & 4 Machines . . . . .	1
	157957	Nos. 3 & 4 Machines . . . . .	1	4ADV-164		Gear - 55T - Shaft	
4ADV-146	3235	Screw . . . . .	1		144213	No. 2 Machines . . . . .	1
		Nos. 3 & 4 Machines Only			149682	Nos. 3 & 4 Machines . . . . .	1
4ADV-147	3211	Screw . . . . .	1	4ADV-165	157982	*Button . . . . .	1
		Nos. 3 & 4 Machines Only				Nos. 3 & 4 Machines Only	
4ADV-148		Cup - Bearing		4ADV-166	150416	*Sleeve - Plunger . . . . .	1
	144248	No. 2 Machines . . . . .	1			Nos. 3 & 4 Machines Only	
	147492	Nos. 3 & 4 Machines . . . . .	1	4ADV-167		Cup - Bearing	
4ADV-149		Cone - Bearing			144248	No. 2 Machines . . . . .	1
	144249	No. 2 Machines . . . . .	1		151646	Nos. 3 & 4 Machines . . . . .	1
	147493	Nos. 3 & 4 Machines . . . . .	1	4ADV-168		Cone - Bearing	
4ADV-150		Shaft - Sliding Gear			144249	No. 2 Machines . . . . .	1
	144218	No. 2 Machines . . . . .	1		63169	Nos. 3 & 4 Machines . . . . .	1
	144628	Nos. 3 & 4 Machines . . . . .	1	4ADV-169	165198	Slinger - Oil, with Vane Pump . . . . .	1
4ADV-151	147129	Seal - Garlock Oil . . . . .	1	4ADV-169A	144215	*Eccentric - Oil Pump . . . . .	1
4ADV-152	30154	*Ball . . . . .	1	4ADV-170	144216	Cover - Dust . . . . .	1
		Nos. 3 & 4 Machines Only					
4ADV-153		*Pin . . . . .	2				
	3270	Nos. 3 & 4 Machines Only					

\* For Machines With Plunger Type Scavenger Pumps.  
See Page 95 for Vane Type Pump.



### VERTICAL SPINDLE SHAFT

NOS. 3 AND 4 MACHINES



81 GGG  
187 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

VERTICAL HEAD-UNIT No. 4ADV (Continued)  
Nos. 3 AND 4 VERTICAL MACHINES

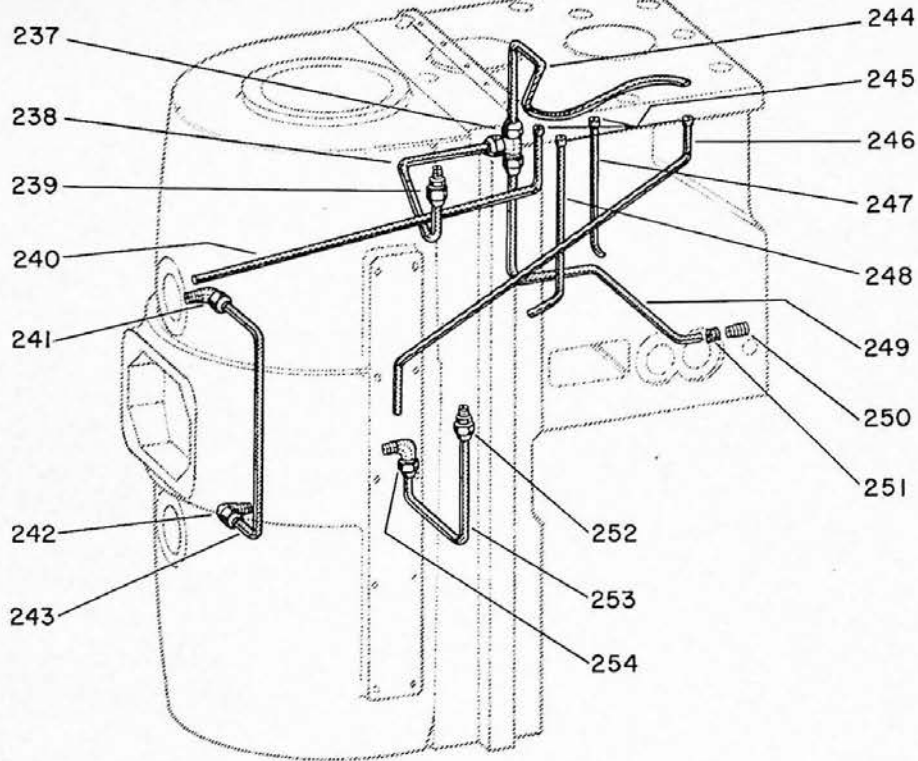
KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4ADV-171	3639	Bolt - Head . . . . .	1	4ADV-208	3399	Screw . . . . .	4
4ADV-172	3641	Nut . . . . .	1	4ADV-209	76644	Plug . . . . .	1
4ADV-173	3280	Key . . . . .	1	4ADV-210	76644	Plug . . . . .	2
4ADV-174	151643	Bolt - Arbor Drawin . . . . .	1	4ADV-211	151631	Cover - Front	
4ADV-175	144834	Key - Square . . . . .	1			Nos. 3 & 4 Machines . . . . .	1
4ADV-176	4004	Key - Lock Bearing . . . . .	1	4ADV-212	151632	Gasket - Front Cover	
4ADV-177	149678	Spindle - Vertical . . . . .	1			Nos. 3 & 4 Machines . . . . .	1
4ADV-178	1158	Screw . . . . .	2	4ADV-213	127468	Ring - "O" . . . . .	1
4ADV-179	3687	Key - Arbor Driving . . . . .	2	4ADV-214	76644	Plug - Pipe . . . . .	2
4ADV-180	147456	Gasket - Bottom of Spindle . . . . .	1	4ADV-215		Housing - Transmission	
4ADV-181	147464	Retainer - Oil . . . . .	1			With Plunger Type Pump . . . . .	1
4ADV-182	3266	Screw . . . . .	6			With Vane Type Pump . . . . .	1
4ADV-183	3213	Screw . . . . .	4	4ADV-216	3408	Screw . . . . .	5
4ADV-184	4075	Cover - Oil Gage . . . . .	1	4ADV-217	216607	Plug - Pipe . . . . .	1
4ADV-185	64929	Plug - Pipe . . . . .	1	4ADV-218	3214	Screw . . . . .	4
4ADV-186	2245	Plug . . . . .	1	4ADV-219	4075	Cover - Oil Gage . . . . .	1
4ADV-187	210560	Ring - Retainer . . . . .	1	4ADV-220	3849	Disc - Oil Gage . . . . .	1
4ADV-188	114882	Cap - Spindle . . . . .	1	4ADV-221	4086	Gasket - Oil Gage . . . . .	1
4ADV-189	3399	Screw . . . . .	6	4ADV-222	60956	Dial - Oil Gage . . . . .	1
4ADV-190	147458	Cap - Spindle . . . . .	1	4ADV-223	3850	Gasket - Oil Gage . . . . .	1
4ADV-191	238199	Ring - Retaining . . . . .	1	4ADV-224	144234	* Valve - Check . . . . .	1
4ADV-192	161372	Bearing - Roller . . . . .	1	4ADV-225	144214	* Sleeve - Check Valve . . . . .	1
4ADV-193	83512	Oiler . . . . .	1	4ADV-226	221981	Plug . . . . .	1
4ADV-194	150403	* Cover - Housing Transmission . . . . .	1	4ADV-227	145722	Bearing - Roller . . . . .	1
4ADV-195	150405	* Gasket - Cover Housing . . . . .	1	4ADV-228	147463	Slinger - Oil . . . . .	1
4ADV-196	1430	Pin . . . . .	2	4ADV-229	150401	Body - Vertical Head . . . . .	1
4ADV-197	3343	Screw . . . . .	1	4ADV-230	3485	Screw . . . . .	10
4ADV-198	76645	Plug - Pipe . . . . .	1	4ADV-231	144328	Bar - Tee Slot . . . . .	1
4ADV-199	3404	Screw . . . . .	10	4ADV-232	3396	Screw . . . . .	1
4ADV-200	1844	Plug - Brass . . . . .	1	4ADV-233	4275	Nut - Lock . . . . .	1
4ADV-201	76645	Plug - Pipe . . . . .	1	4ADV-234	149623	Gear - On Spindle . . . . .	1
4ADV-202	83512	Oiler . . . . .	1	4ADV-235	149843	Nut - Lock . . . . .	1
4ADV-203	4236	Plug . . . . .	1	4ADV-236	157463	Bearing - Roller . . . . .	1
4ADV-204	3849	Disc - Oil Gage . . . . .	1	4ADV-276	30154	Ball - Steel . . . . .	1
4ADV-205	131986	Body - Oil Sight Gage . . . . .	1	4ADV-277	3540	Pin . . . . .	1
4ADV-206	4236	Plug . . . . .	1	4ADV-278	165174	Check - Ball . . . . .	1
4ADV-207	247090	Ring - "O" . . . . .	1				

\* For Machines With Plunger Type Scavenger Pump.  
See Page 95 for Vane Type Pumps.

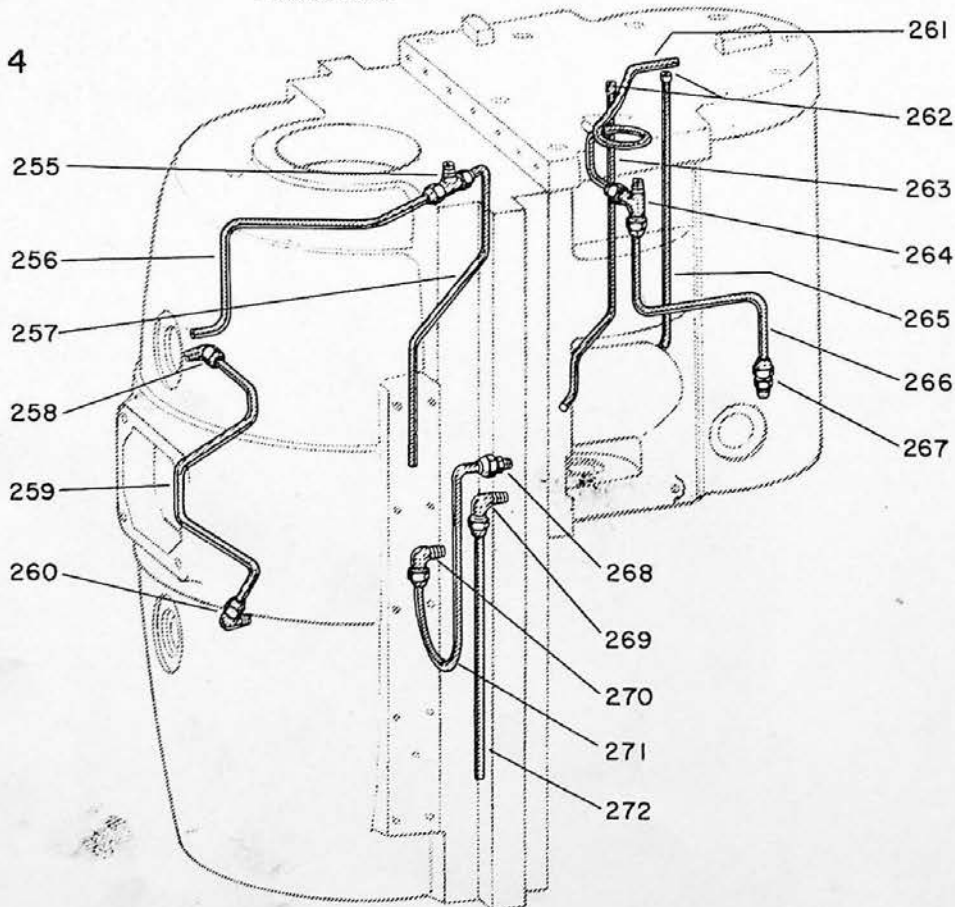
### LUBRICATION

#### NO. 2 MACHINE

#### WITH PLUNGER TYPE PUMP



#### NOS. 3 AND 4 MACHINES



339 DDD  
344 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

VERTICAL HEAD-UNIT No. 4ADV (Continued)  
No. 2 VERTICAL MACHINES

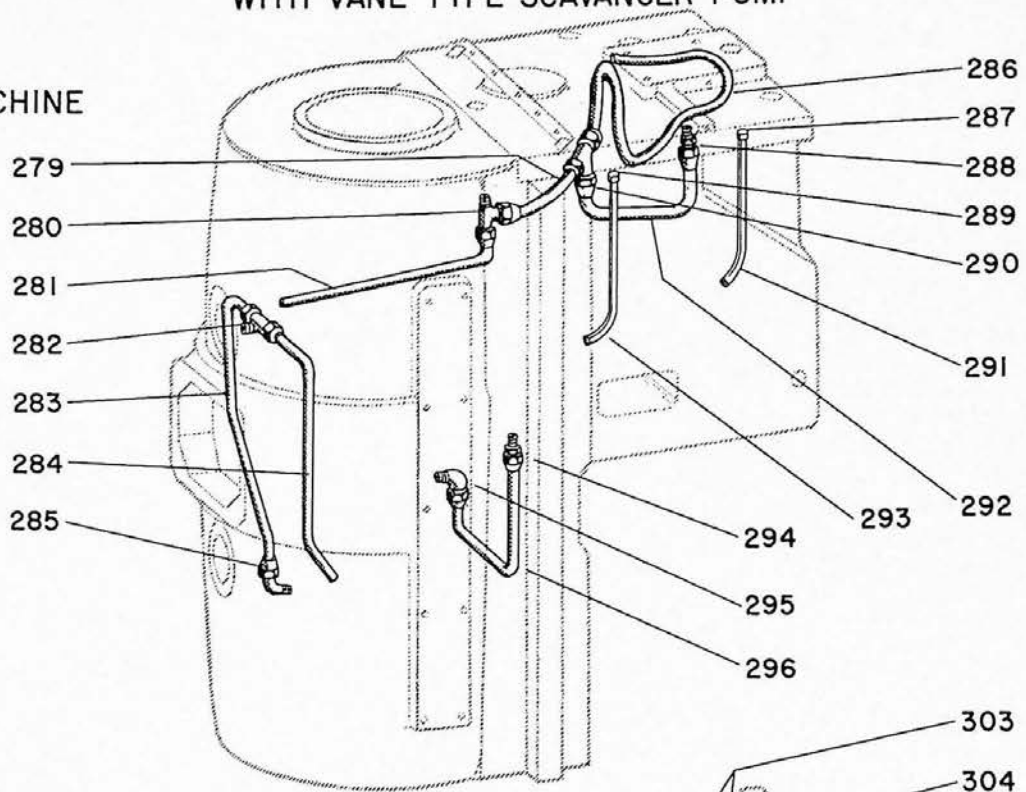
KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4ADV-237	64509	Tee . . . . .	1	4ADV-246	Example	Tubing - Oil, 3/16" . . . . .	1
4ADV-238	Example	Tubing - Oil, 1/4" . . . . .	1	4ADV-247	Example	Tubing - Oil, 3/16" . . . . .	1
4ADV-239	89866	Fitting - Compression . . . . .	1	4ADV-248	Example	Tubing - Oil, 3/16" . . . . .	1
4ADV-240	Example	Tubing - Oil, 3/16" . . . . .	1	4ADV-249	Example	Tubing - Oil, 1/4" . . . . .	1
4ADV-241	58152	Elbow . . . . .	1	4ADV-250	231639	Screw - Hex Socket . . . . .	1
4ADV-242	58152	Elbow . . . . .	1	4ADV-251	231723	Screw - Slotted . . . . .	1
4ADV-243	Example	Tubing - Oil, 1/4" . . . . .	1	4ADV-252	89866	Fitting - Compression . . . . .	1
4ADV-244	Example	Tube - Spray, 1/4" . . . . .	1	4ADV-253	Example	Tubing - Oil, 1/4" . . . . .	1
4ADV-245	2237	Bushing - Oil Tube . . . . .	4	4ADV-254	58152	Elbow . . . . .	1

Nos. 3 AND 4 VERTICAL MACHINES

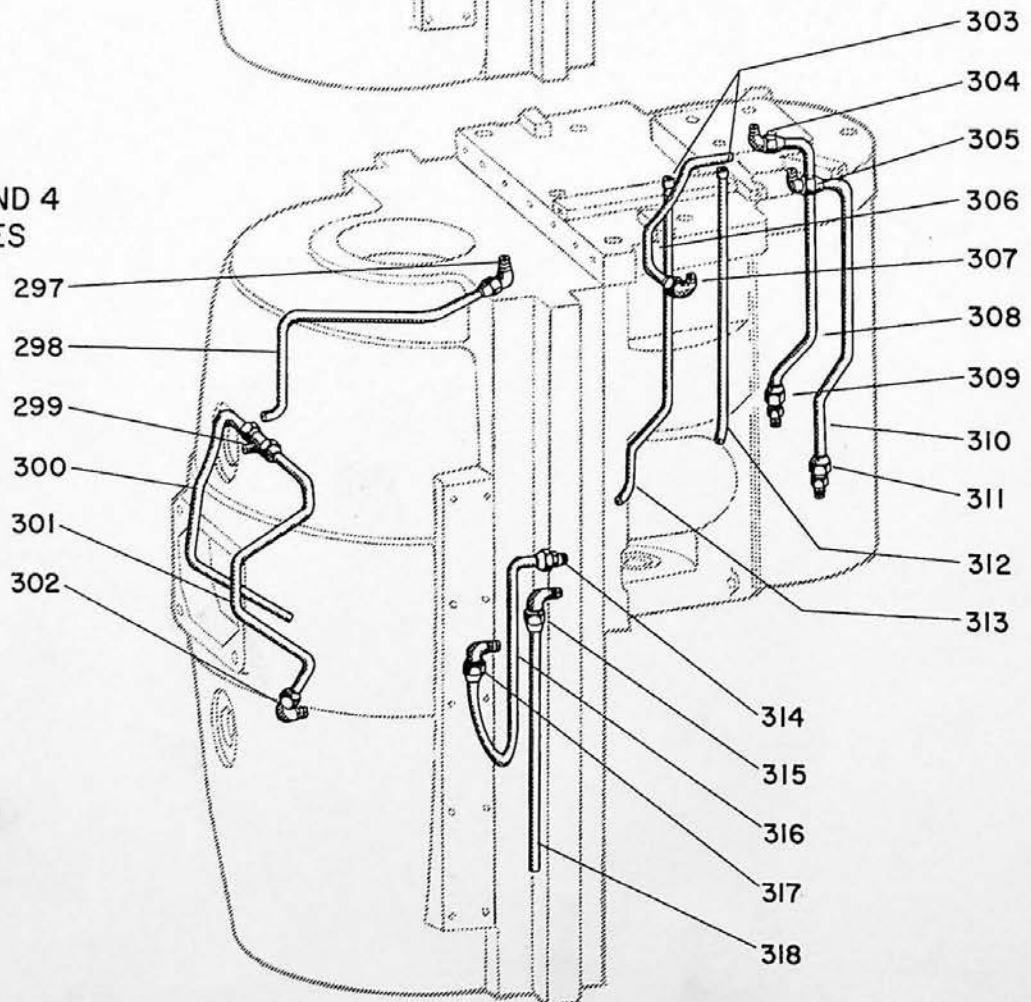
4ADV-255	70250	Tee . . . . .	1	4ADV-264	61742	Tee . . . . .	1
4ADV-256	Example	Tubing - Oil, 3/16" . . . . .	1	4ADV-265	Example	Tubing - Oil, 3/16" . . . . .	1
4ADV-257	Example	Tubing - Oil, 3/16" . . . . .	1	4ADV-266	Example	Tubing - Oil, 1/4" . . . . .	1
4ADV-258	58152	Elbow . . . . .	1	4ADV-267	89866	Fitting - Compression . . . . .	1
4ADV-259	Example	Tubing - Oil, 1/4" . . . . .	1	4ADV-268	89866	Fitting - Compression . . . . .	1
4ADV-260	58152	Elbow . . . . .	1	4ADV-269	57286	Elbow . . . . .	1
4ADV-261	Example	Tube - Spray, 1/4" . . . . .	1	4ADV-270	58152	Elbow . . . . .	1
4ADV-262	2237	Bushing - Oil Tube . . . . .	2	4ADV-271	Example	Tubing - Oil, 1/4" . . . . .	1
4ADV-263	Example	Tubing - Oil, 3/16" . . . . .	1	4ADV-272	Example	Tubing - Oil, 3/16" . . . . .	1

LUBRICATION  
WITH VANE TYPE SCAVANGER PUMP

NO. 2 MACHINE



NOS. 3 AND 4  
MACHINES



339 ODD  
344 ODD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

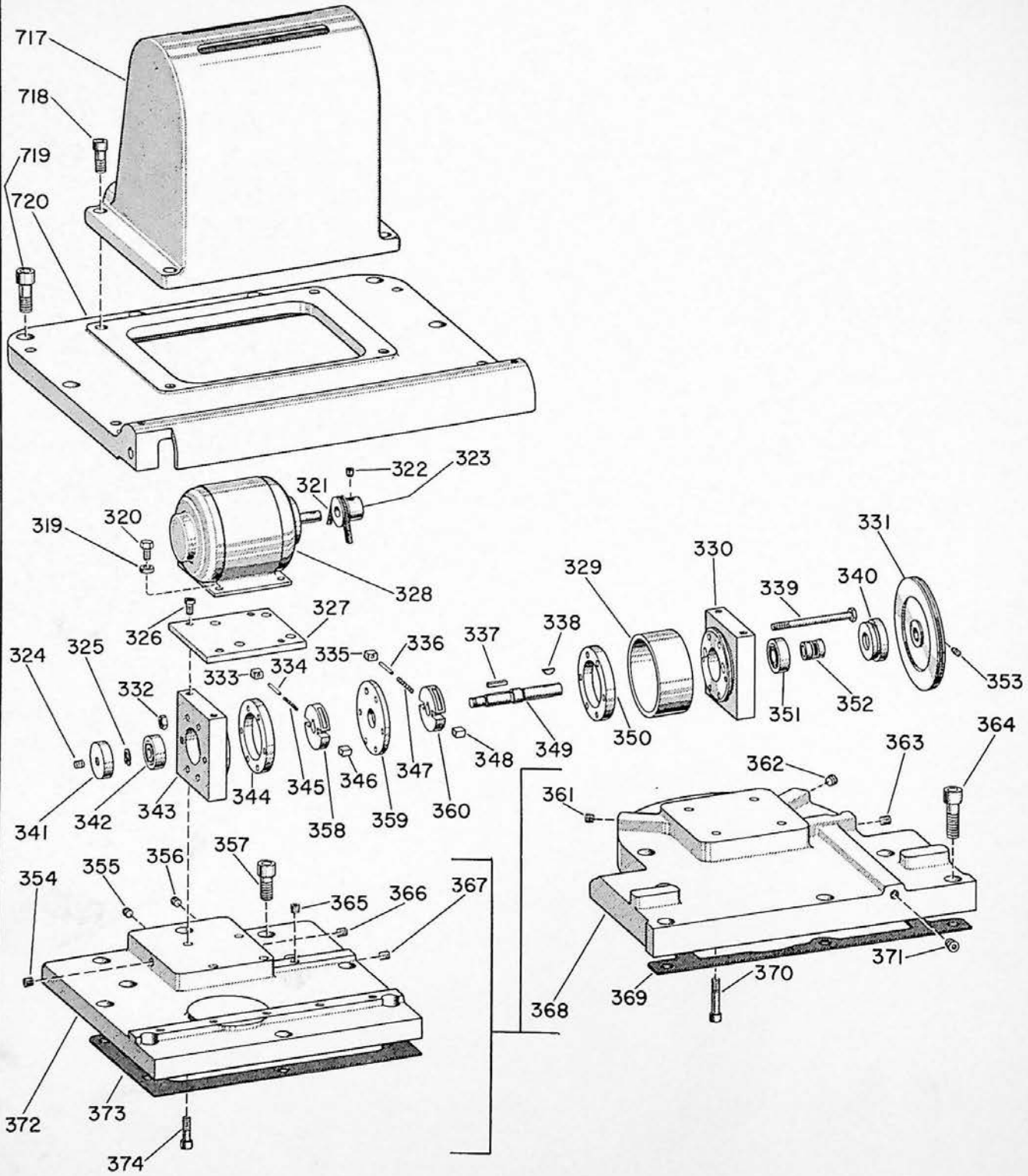
VERTICAL HEAD-UNIT No. 4ADV (Continued)  
No. 2 VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4ADV-279	Example	Tubing - Oil 1/4"	1	4ADV-288	89866	Fitting - Compression	1
4ADV-280	61742	Fitting - Service Tee	1	4ADV-289	2237	Bush - Oil Tube	1
4ADV-281	Example	Tubing - Oil 1/4"	1	4ADV-290	64509	Fitting - Tee	1
4ADV-282	70250	Fitting - Tee	1	4ADV-291	Example	Tubing - Oil 3/16"	1
4ADV-283	Example	Tubing - Oil 3/16"	1	4ADV-292	Example	Tubing - Oil 1/4"	1
4ADV-284	Example	Tubing - Oil 3/16"	1	4ADV-293	Example	Tubing - Oil 3/16"	1
4ADV-285	4015	Fitting - Elbow	1	4ADV-294	57287	Fitting - Compression	1
4ADV-286	164948	Tube - Oil Distributor	1	4ADV-295	57286	Fitting - Elbow	1
4ADV-287	2237	Bush - Oil Tube	1	4ADV-296	Example	Tubing - Oil 3/8"	1

Nos. 3 AND 4 VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4ADV-297	4015	Fitting - Elbow	1	4ADV-308	Example	Tubing - Oil 1/4"	1
4ADV-298	Example	Tubing - Oil 3/16"	1	4ADV-309	89866	Fitting - Compression	1
4ADV-299	70250	Fitting - Tee	1	4ADV-310	Example	Tubing - Oil 1/4"	1
4ADV-300	Example	Tubing - Oil 3/16"	1	4ADV-311	89866	Fitting - Compression	1
4ADV-301	Example	Tubing - Oil 3/16"	1	4ADV-312	Example	Tubing - Oil 1/4"	1
4ADV-302	4015	Fitting - Elbow	1	4ADV-313	Example	Tubing - Oil 1/4"	1
4ADV-303	2190	Bush - Oil Tube	2	4ADV-314	57287	Fitting - Compression	1
4ADV-304	58152	Fitting - Elbow	1	4ADV-315	57286	Fitting - Elbow	1
4ADV-305	58152	Fitting - Elbow	1	4ADV-316	Example	Tubing - Oil 3/8"	1
4ADV-306	Example	Spray Tube 1/4"	1	4ADV-317	57286	Fitting - Elbow	1
4ADV-307	58152	Fitting - Elbow	1	4ADV-318	Example	Tubing - Oil 3/8"	1

VERTICAL HEAD VANE PUMP



337 DDD  
 338 DDD  
 125 GGG  
 714 HH

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

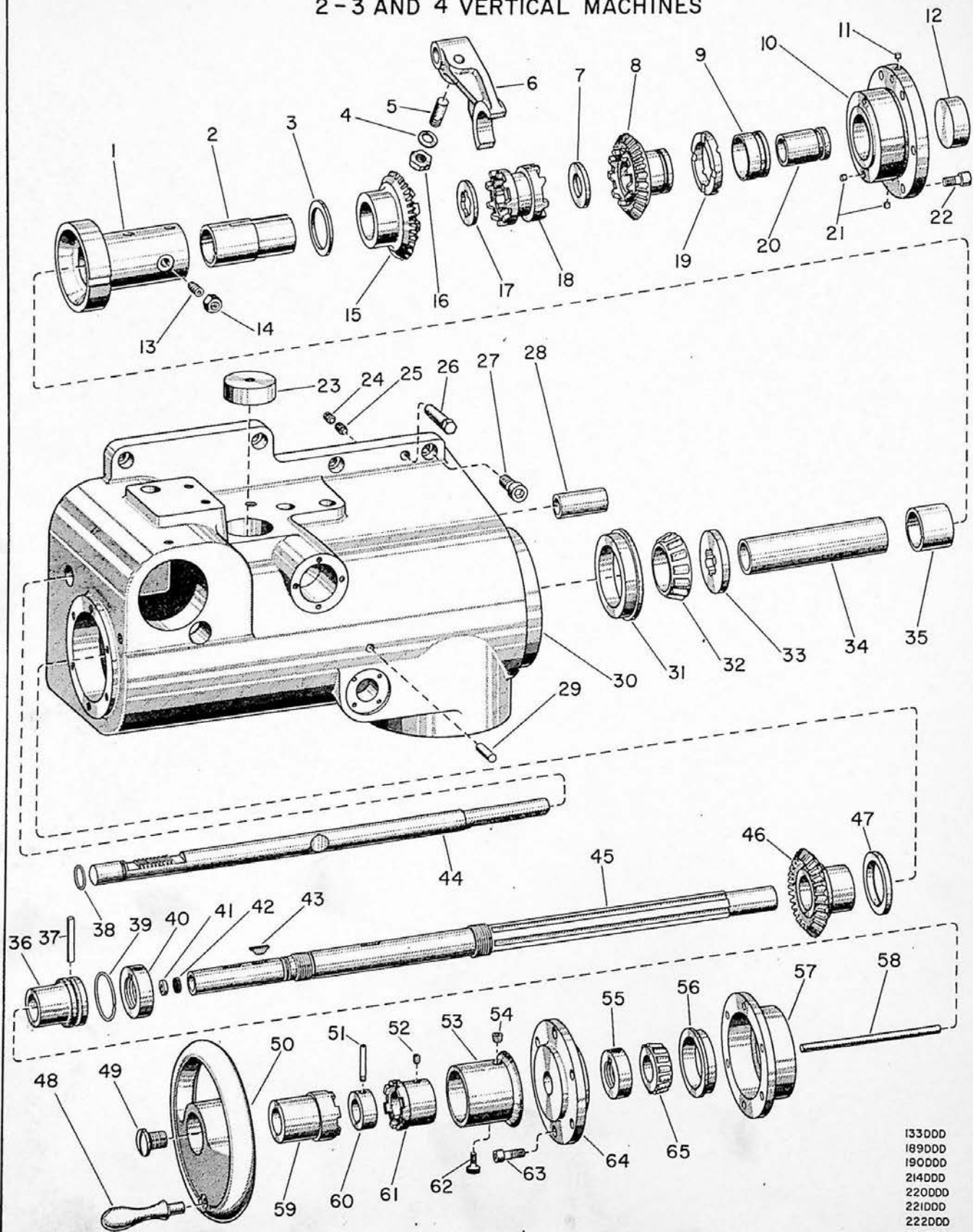
VERTICAL HEAD-UNIT No. 4ADV (Concluded)  
Nos. 2, 3, AND 4, VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4ADV-319	111851	Washer . . . . .	4	4ADV-353	3229	Screw . . . . .	1
4ADV-320	Example*	Screw . . . . .	4	4ADV-354	4236	Plug - Pipe - No. 2 Machine Only . . . . .	1
4ADV-321	169040	Belt - Vee . . . . .	1	4ADV-355	4236	Plug - Pipe - No. 2 Machine Only . . . . .	1
4ADV-322	3229	Screw . . . . .	1	4ADV-356	4236	Plug - Pipe - No. 2 Machine Only . . . . .	1
4ADV-323	168895	Sheave - Motor . . . . .	1	4ADV-357	3403	Screw - No. 2 Machine Only . . . . .	10
4ADV-324	2332	Screw . . . . .	1	4ADV-358	167413	Rotor - Pump . . . . .	1
4ADV-325	236873	Ring - Truarc . . . . .	1	4ADV-359	162231	Spacer-Stator . . . . .	1
4ADV-326	3203	Screw . . . . .	4	4ADV-360	167414	Rotor - Pump Scavenger . . . . .	1
4ADV-327	164484	Plate - Motor . . . . .	1	4ADV-361	4236	Plug - Pipe - No. 3 & 4 Machines Only . . . . .	1
4ADV-328	Example*	Motor . . . . .	1	4ADV-362	4236	Plug - Pipe - No. 3 & 4 Machines Only . . . . .	1
4ADV-329	162225	Liner - Pump . . . . .	1	4ADV-363	4236	Plug - Pipe - No. 3 & 4 Machines Only . . . . .	1
4ADV-330	164477	Header - Pump . . . . .	1	4ADV-364	3404	Screw - No. 3 & 4 Machines Only . . . . .	10
4ADV-331	168896	Sheave - Pump . . . . .	1	4ADV-365	4236	Plug - Pipe - No. 2 Machine Only . . . . .	1
4ADV-332	3477	Nut . . . . .	6	4ADV-366	4236	Plug - Pipe - No. 2 Machine Only . . . . .	1
4ADV-333	162233	Vane - Pump . . . . .	1	4ADV-367	4236	Plug - Pipe - No. 2 Machine Only . . . . .	1
4ADV-334	163452	Pin - Spring Support . . . . .	1	4ADV-368	165302	Cover - Housing - Transmission No. 3 & 4 Machines Only . . . . .	1
4ADV-335	162233	Vane - Pump . . . . .	1	4ADV-369	165303	Gasket - Housing Cover No. 3 & 4 Machines Only . . . . .	1
4ADV-336	163452	Pin - Spring Support . . . . .	1	4ADV-370	2323	Screw - No. 3 & 4 Machines Only . . . . .	4
4ADV-337	864	Key . . . . .	1	4ADV-371	76644	Plug - Pipe - No. 3 & 4 Machines Only . . . . .	1
4ADV-338	3279	Key . . . . .	1	4ADV-372	165071	Cover - Vertical - Head No. 2 Machine Only . . . . .	1
4ADV-339	162247	Screw . . . . .	6	4ADV-373	165072	Gasket - Cover - Vertical Head No. 2 Machine Only . . . . .	1
4ADV-340	164472	Plug - Front . . . . .	1	4ADV-374	2321	Screw - No. 2 Machine Only . . . . .	4
4ADV-341	164476	Plug - Rear . . . . .	1	4AC-717	165069	Cover - Pump Unit . . . . .	1
4ADV-342	164475	Bearing - Ball . . . . .	1	4AC-718	3266	Screw . . . . .	4
4ADV-343	164477	Header - Pump . . . . .	1	4AC-719		Screw . . . . .	
4ADV-344	167422	Stator Pump . . . . .	1	3403		No. 2 Machines . . . . .	7
4ADV-345	162230	Spring - Vane . . . . .	1	3343		Nos. 3 and 4 Machines . . . . .	8
4ADV-346	169271	Vane - Pump . . . . .	4	4AC-720		Cover - Top Column . . . . .	
4ADV-347	162230	Spring - Vane . . . . .	1	165070		No. 2 Machines . . . . .	1
4ADV-348	169272	Vane - Pump Scavenger . . . . .	4	165301		Nos. 3 and 4 Machines . . . . .	1
4ADV-349	167383	Shaft - Pump . . . . .	1				
4ADV-350	167423	Stator - Pump Scavenger . . . . .	1				
4ADV-351	72391	Bearing - Ball . . . . .	1				
4ADV-352	164473	Slinger - Oil . . . . .	1				

\* State Serial Number of Machine When Ordering Parts by Name and Key Number.



POWER FEED TO HEAD SHAFT  
2-3 AND 4 VERTICAL MACHINES



133DDD  
189DDD  
190DDD  
214DDD  
220DDD  
221DDD  
222DDD  
224DDD

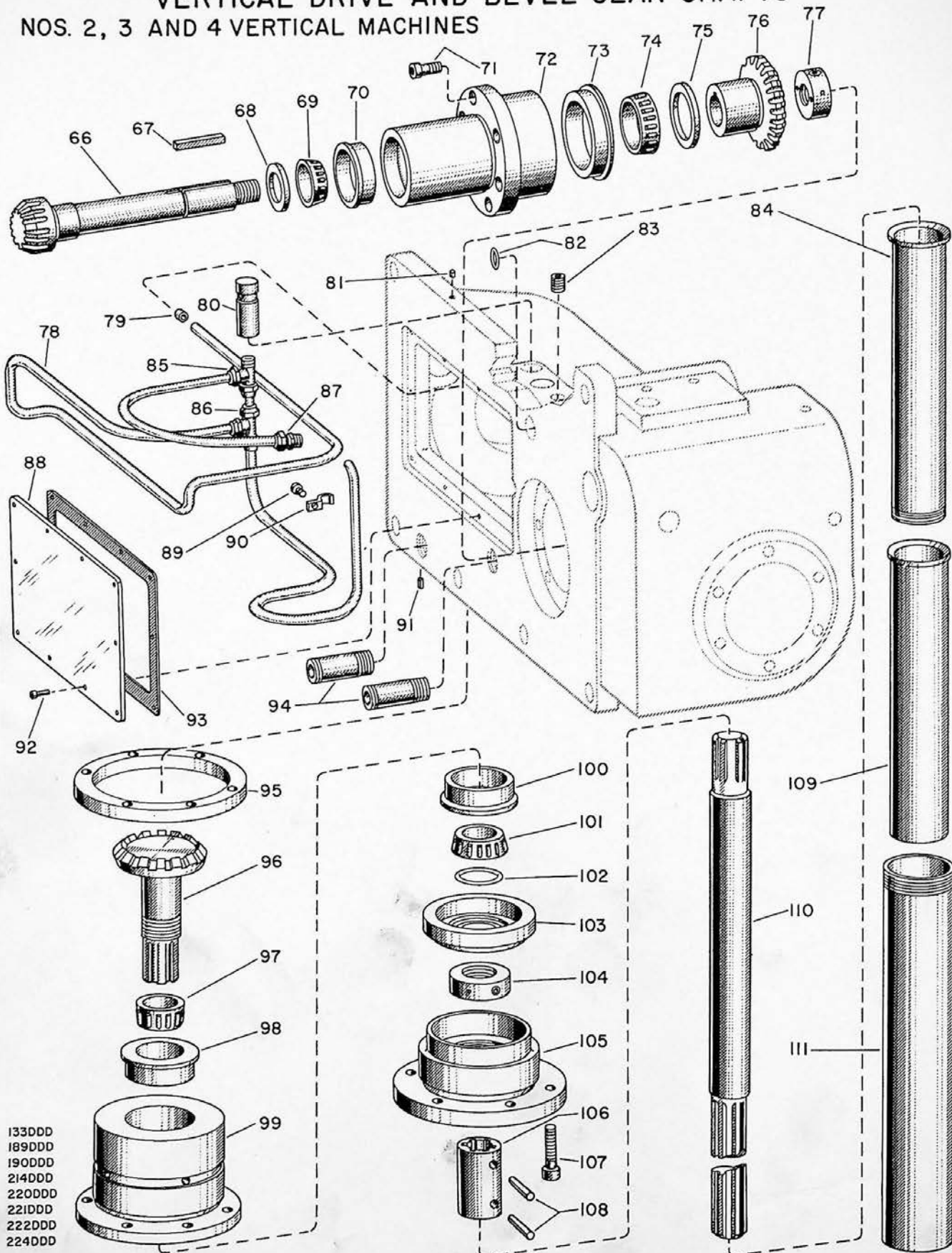
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

POWER FEED TO VERTICAL HEAD-UNIT No. 4AAJ  
ALL VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AAJ-1	161350	Sleeve - Clutch Gear		4AAJ-35		Bushing - L. H. Clutch Gear	
	161144	No. 2 Machines . . . . .	1		161142	Nos. 3 & 4 Machines Only . . . . .	1
4AAJ-2	161143	Bushing - Clutch Gear . . . . .	1	4AAJ-36	144099	Sleeve - Knockout . . . . .	1
4AAJ-3	161141	Washer - Clutch Gear . . . . .	1	4AAJ-37	216603	Pin . . . . .	1
4AAJ-4	2038	Washer . . . . .	1	4AAJ-38	129871	Ring - "O" . . . . .	1
4AAJ-5	43466	Pin - Lock . . . . .	1	4AAJ-39	113871	Spring - Wire Ring . . . . .	1
4AAJ-6	149649	Fork - Clutch Shifter . . . . .	1	4AAJ-40	4246	Nut - Lock . . . . .	1
4AAJ-7	144305	Spacer - Bevel Gear - L. H. . . . .	1	4AAJ-41	144817	Ring - Rod . . . . .	1
4AAJ-8	144306	Gear - Clutch Bevel - R. H. . . . .	1	4AAJ-42	144816	Seal - Oil . . . . .	1
4AAJ-9	144309	Bushing - Horizontal Shaft Cap . . . . .	1	4AAJ-43	3280	Key . . . . .	1
4AAJ-10	144310	Cap - Horizontal Shaft . . . . .	1	4AAJ-44		Rack - Head Feed Trip	
4AAJ-11	1844	Plug . . . . .	1		149648	No. 2 Machines . . . . .	1
4AAJ-12	3556	Plug . . . . .	1		151011	Nos. 3 & 4 Machines . . . . .	1
4AAJ-13	3233	Screw . . . . .	1	4AAJ-45		Shaft - Power Feed to Head	
4AAJ-14	3478	Nut . . . . .	1		149646	No. 2 Machines . . . . .	1
4AAJ-15	161145	Gear - Clutch Bevel . . . . .	1		150538	Nos. 3 & 4 Machines . . . . .	1
4AAJ-16	3474	Nut . . . . .	1	4AAJ-46	149645	Gear - Bevel . . . . .	1
4AAJ-17	144302	Spacer - Bevel Gear - L. H. . . . .	1	4AAJ-47	144315	Spacer - Bearing . . . . .	1
4AAJ-18	144303	Clutch - Reverse . . . . .	1	4AAJ-48	3502	Handle - Large . . . . .	1
4AAJ-19	144307	Washer - Bevel Gear - R. H. . . . .	1	4AAJ-49	110755	Screw - Handwheel . . . . .	1
4AAJ-20	144308	Bushing - Horizontal Shaft . . . . .	1	4AAJ-50	150882	Handwheel . . . . .	1
4AAJ-21	1844	Plug . . . . .	2	4AAJ-51	121549	Pin - Collar . . . . .	1
4AAJ-22	3399	Screw . . . . .	6	4AAJ-52	3228	Screw . . . . .	1
4AAJ-23	108493	Plug . . . . .	1	4AAJ-53		Dial - Power Feed	
4AAJ-24	1911	Screw . . . . .	1		110757	English . . . . .	1
4AAJ-25	3232	Screw . . . . .	1		110758	Metric . . . . .	1
4AAJ-26	2239	Pin - Taper . . . . .	1	4AAJ-54	76644	Plug - Pipe . . . . .	1
4AAJ-27	3343	Screw . . . . .	8	4AAJ-55	4245	Nut - Lock . . . . .	1
4AAJ-28	149684	Bushing - Head Feed Trip . . . . .	1	4AAJ-56	93686	Cup - Bearing . . . . .	1
4AAJ-29	1384	Pin . . . . .	1	4AAJ-57	144098	Retainer - Front Bearing . . . . .	1
4AAJ-30		Box - Gear		4AAJ-58	144096	Rod - Knockout . . . . .	1
	149644	No. 2 Machines . . . . .	1	4AAJ-59	144319	Clutch - Handwheel . . . . .	1
	151004	Nos. 3 & 4 Machines . . . . .	1	4AAJ-60	110756	Collar - Knockout . . . . .	1
4AAJ-31	75973	Cup - Bearing . . . . .	1	4AAJ-61	110750	Clutch - Dial . . . . .	1
4AAJ-32	234083	Cone - Bearing . . . . .	1	4AAJ-62	2253	Screw . . . . .	1
4AAJ-33	161459	Washer - Bevel Gear - L. H. . . . .	1	4AAJ-63	2321	Screw . . . . .	6
4AAJ-34		Sleeve - Splined (L. H. Gear)		4AAJ-64	144097	Cover - Front Bearing . . . . .	1
	144324	No. 2 Machines . . . . .	1	4AAJ-65	237572	Cone - Bearing . . . . .	1
	150542	Nos. 3 & 4 Machines . . . . .	1				

**VERTICAL DRIVE AND BEVEL GEAR SHAFTS**  
**NOS. 2, 3 AND 4 VERTICAL MACHINES**



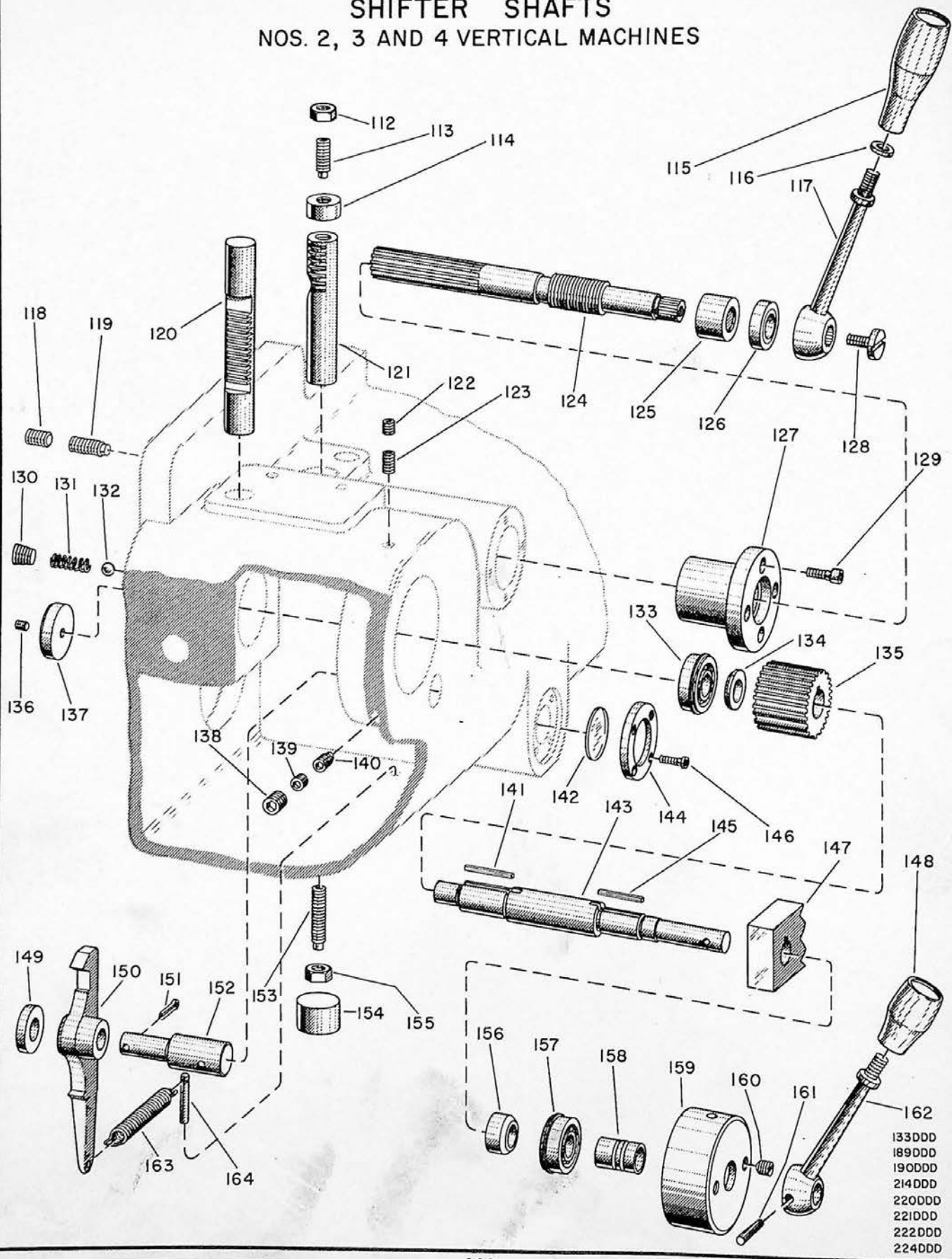
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

POWER FEED TO VERTICAL HEAD-UNIT No. 4AAJ (Continued)  
Nos. 2, 3, AND 4 VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AAJ-66	149635	Shaft - Bevel Gear . . . . .	1	4AAJ-89	3198	Screw . . . . .	1
4AAJ-67	965	Key . . . . .	1	4AAJ-90	4001	Clamp - Oil Tube . . . . .	1
4AAJ-68	149636	Spacer - Bearing . . . . .	1	4AAJ-91		Plug . . . . .	
4AAJ-69	95585	Cone - Bearing . . . . .	1		2008	No. 2 Machines Only . . . . .	1
4AAJ-70	95586	Cup - Bearing . . . . .	1	4AAJ-92	3199	Screw . . . . .	10
4AAJ-71	3399	Screw . . . . .	6	4AAJ-93		Gasket - Access Plate . . . . .	
4AAJ-72		Housing - Bevel Gear . . . . .			149693	No. 2 Machines . . . . .	1
	149634	No. 2 Machines . . . . .	1		151009	Nos. 3 & 4 Machines . . . . .	1
	150528	Nos. 3 & 4 Machines . . . . .	1	4AAJ-94	67432	Pipe - Oil Drain . . . . .	2
4AAJ-73	108366	Cup - Bearing . . . . .	1	4AAJ-95	144312	Washer - Vertical Shaft Fitting . . . . .	1
4AAJ-74	108365	Cone - Bearing . . . . .	1	4AAJ-96	144339	Gear - Bevel - Vertical . . . . .	1
4AAJ-75	149638	Spacer - Bearing . . . . .	1	4AAJ-97	212507	Cone - Bearing . . . . .	1
4AAJ-76	149637	Gear - Intermediate Bevel . . . . .	1	4AAJ-98	93686	Cup - Bearing . . . . .	1
4AAJ-77	4241	Nut - Lock . . . . .	1	4AAJ-99	144313	Support - Bearing Vertical Shaft . . . . .	1
4AAJ-78		Tubing - List . . . . .		4AAJ-100	93686	Cup - Bearing . . . . .	1
	149691	No. 2 Machines . . . . .	1	4AAJ-101	212507	Cone - Bearing . . . . .	1
	151012	Nos. 3 & 4 Machines . . . . .	1	4AAJ-102	127901	Ring - "O" . . . . .	1
4AAJ-79	2237	Bushing . . . . .	1	4AAJ-103	144311	Slinger - Oil . . . . .	1
4AAJ-80	110776	Plug - Oiling . . . . .	1	4AAJ-104	4246	Nut - Lock . . . . .	1
4AAJ-81		Plug . . . . .		4AAJ-105	144314	Cap - Bottom Vertical Shaft . . . . .	1
	1844	No. 2 Machines Only . . . . .	1	4AAJ-106	144250	Coupling - Vertical Drive Shaft . . . . .	1
4AAJ-82	127468	Ring - "O" Packing . . . . .	1	4AAJ-107	3251	Screw . . . . .	6
4AAJ-83	2248	Screw . . . . .	1	4AAJ-108	83800	Pin - Taper . . . . .	2
4AAJ-84	149655	Tube - Bottom Telescopic . . . . .	1	4AAJ-109	149654	Tube - Middle Telescopic . . . . .	1
4AAJ-85	95188	Fitting . . . . .	1	4AAJ-110		Shaft - Vertical Drive . . . . .	
4AAJ-86	100312	Fitting - Compression . . . . .	1		149656	No. 2 Machines . . . . .	1
4AAJ-87	4014	Fitting - Compression . . . . .	1		150455	Nos. 3 & 4 Machines . . . . .	1
4AAJ-88		Plate - Access . . . . .		4AAJ-111		Tube - Upper Telescopic . . . . .	
	149692	No. 2 Machines . . . . .	1		149653	No. 2 Machines . . . . .	1
	151008	Nos. 3 & 4 Machines . . . . .	1		150452	Nos. 3 & 4 Machines . . . . .	1

SHIFTER SHAFTS  
NOS. 2, 3 AND 4 VERTICAL MACHINES



- 133DDD
- 189DDD
- 190DDD
- 214DDD
- 220DDD
- 221DDD
- 222DDD
- 224DDD

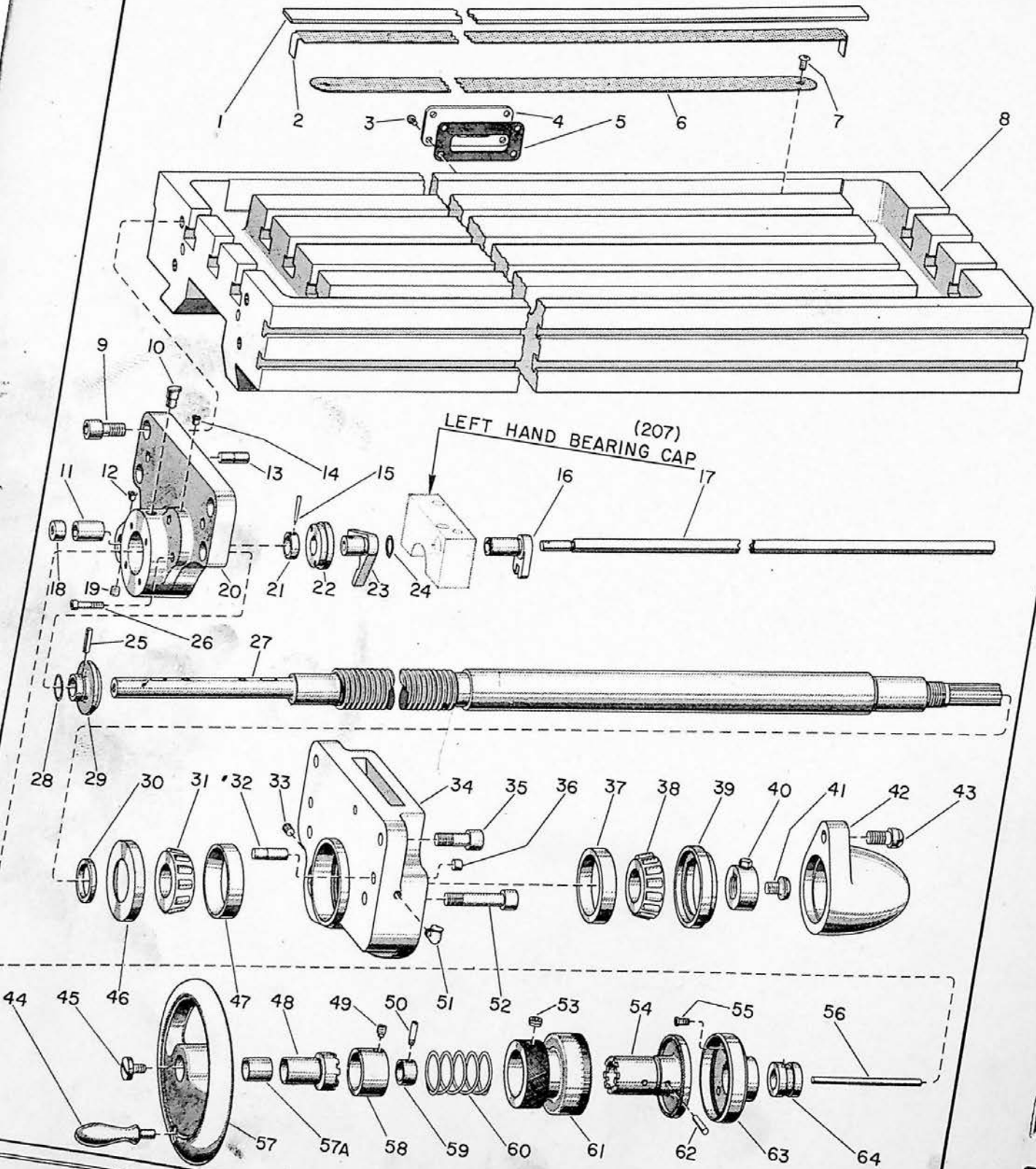
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

POWER FEED TO VERTICAL HEAD-UNIT No. 4AAJ (Continued)  
Nos. 2, 3, AND 4 VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AAJ-112	3473	Nut . . . . .	1	4AAJ-137	144340	Plug - Bearing . . . . .	1
4AAJ-113	3234	Screw . . . . .	1	4AAJ-138	2248	Screw . . . . .	1
4AAJ-114	161458	Plug - Drive . . . . .	1	4AAJ-139	2356	Screw . . . . .	1
4AAJ-115	4325	Knob - Lever . . . . .	1	4AAJ-140	3233	Screw . . . . .	1
4AAJ-116	4329	Collar . . . . .	1	4AAJ-141	1632	Key . . . . .	1
4AAJ-117	112835	Lever - Saddle Clamp . . . . .	1	4AAJ-142	4078	Disc - Oil Gage . . . . .	1
4AAJ-118	1917	Screw . . . . .	1	4AAJ-143	149650	Shaft - Shifter . . . . .	1
4AAJ-119	3234	Screw . . . . .	1	4AAJ-144	4076	Cover - Oil Gage . . . . .	1
4AAJ-120	144325	Rack - Trip Short . . . . .	1	4AAJ-145	3447	Key . . . . .	1
4AAJ-121		Rack - Interlock . . . . .	1	4AAJ-146	3197	Screw . . . . .	4
	151078	No. 2 Machines . . . . .	1	4AAJ-147	144332	Detent - Control Rods . . . . .	1
	150511	Nos. 3 & 4 Machines . . . . .	1	4AAJ-148	4326	Knob - Lever . . . . .	1
4AAJ-122	2301	Screw . . . . .	1	4AAJ-149	1040	Washer . . . . .	1
4AAJ-123	3232	Screw . . . . .	1	4AAJ-150	144805	Pawl - Detent . . . . .	1
4AAJ-124	150537	Shaft - Shifter . . . . .	1	4AAJ-151	3496	Pin . . . . .	1
4AAJ-125	237109	Bearing . . . . .	1	4AAJ-152	144326	Shaft - Pawl . . . . .	1
4AAJ-126	147413	Seal - Shifter Shaft . . . . .	1	4AAJ-153	3237	Screw . . . . .	1
4AAJ-127	147409	Housing - Interlock Rack Bearing . . . . .	1	4AAJ-154	3552	Plug . . . . .	1
4AAJ-128	147062	Screw - Large Head . . . . .	1	4AAJ-155	3473	Nut . . . . .	1
4AAJ-129	3396	Screw . . . . .	4	4AAJ-156	149652	Spacer - Bearing . . . . .	1
4AAJ-130	76645	Plug . . . . .	1	4AAJ-157	95776	Bearing - Ball . . . . .	1
4AAJ-131		Spring . . . . .	1	4AAJ-158	149651	Sleeve - Detent Shaft . . . . .	1
	102462	No. 2 Machines . . . . .	1	4AAJ-159	144329	Cap - Detent Shaft . . . . .	1
	2175	Nos. 3 & 4 Machines . . . . .	1	4AAJ-160	1215	Screw . . . . .	2
4AAJ-132	30154	Ball . . . . .	1	4AAJ-161	642	Pin . . . . .	1
4AAJ-133	95776	Bearing - Ball . . . . .	1	4AAJ-162	112867	Lever . . . . .	1
4AAJ-134	144335	Spacer - Detent Shaft Bearing . . . . .	1	4AAJ-163	127439	Spring . . . . .	1
4AAJ-135	144334	Pinion - Detent Shaft . . . . .	1	4AAJ-164	98826	Pin - Spring . . . . .	1
4AAJ-136	2332	Screw . . . . .	1				

# TABLE-LEAD SCREW AND APRONS



CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

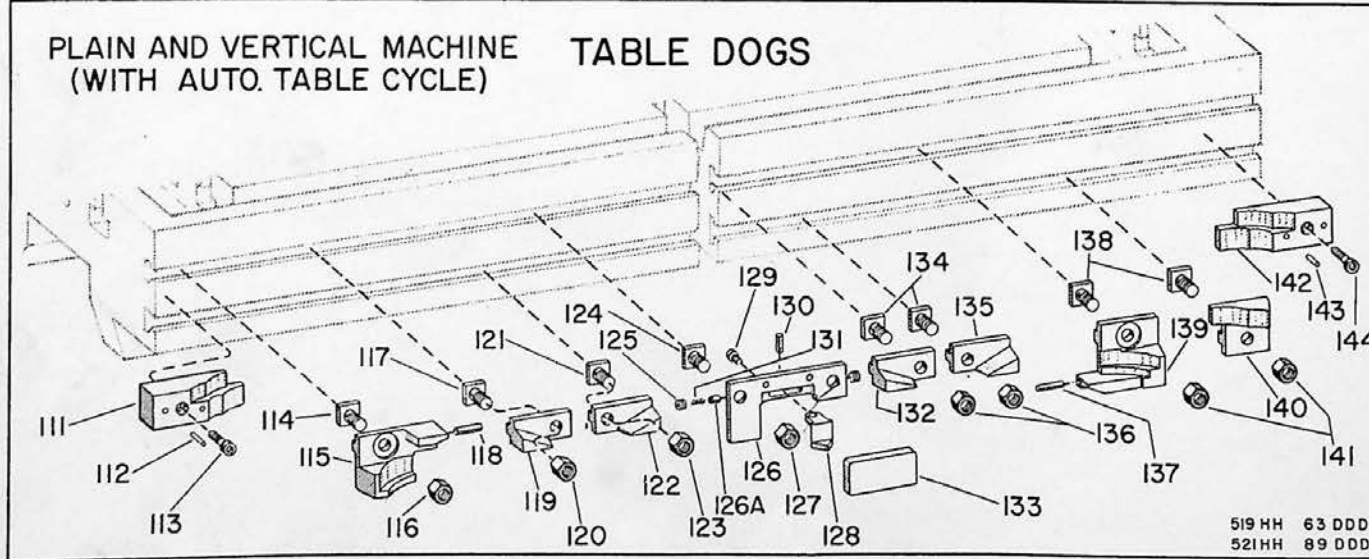
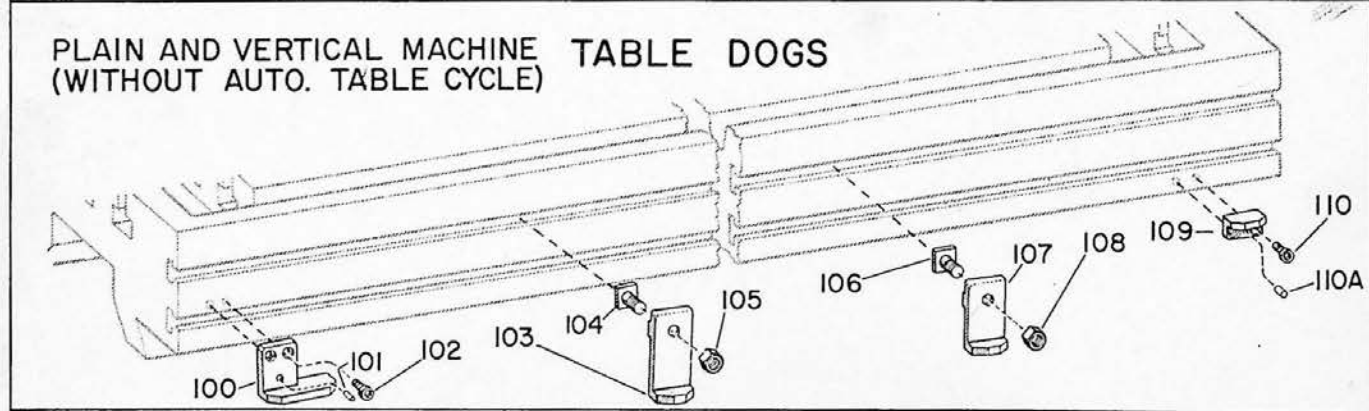
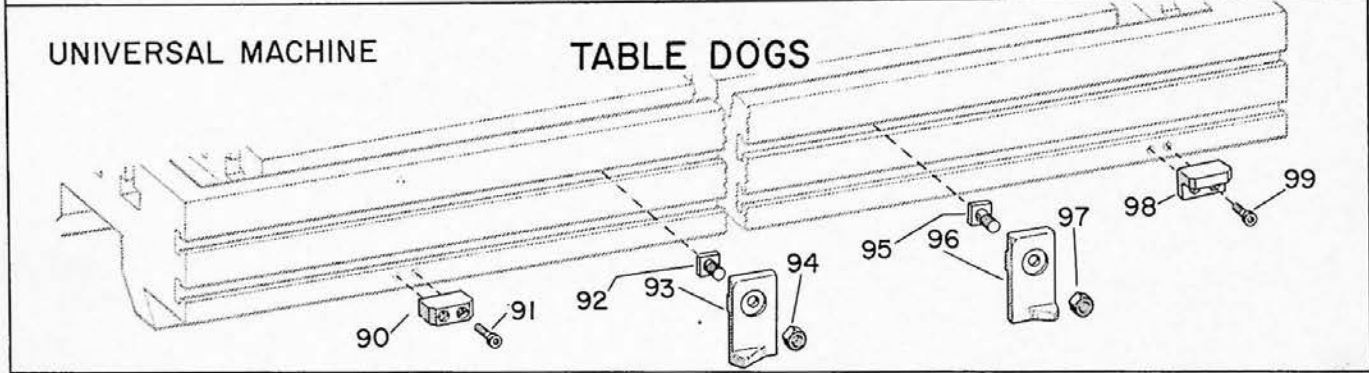
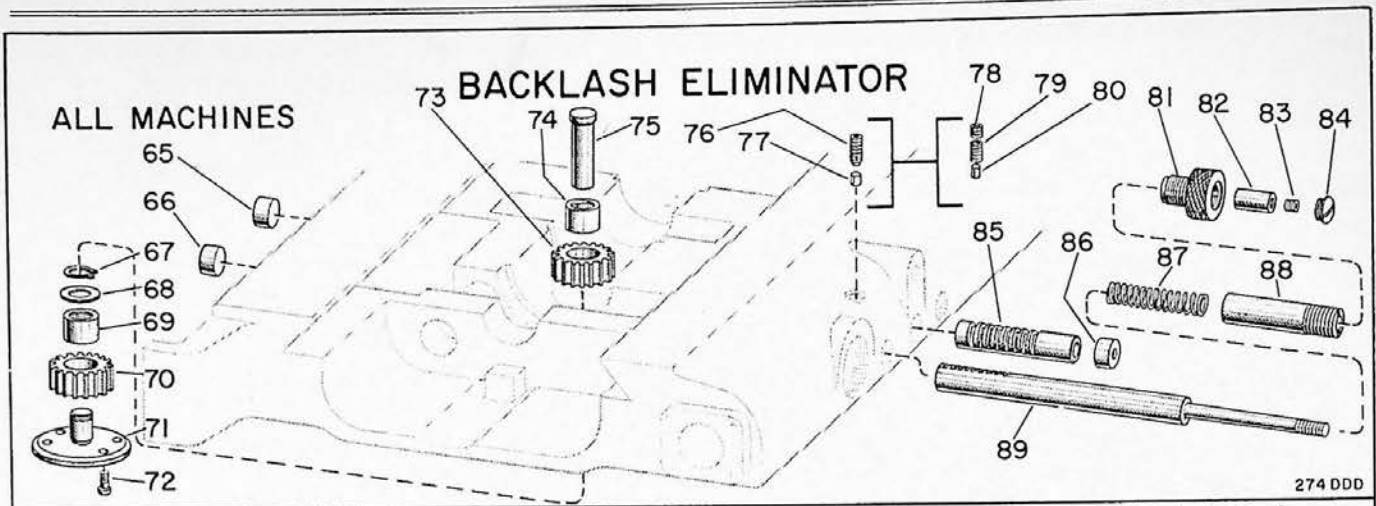
SADDLE TABLE-UNIT No. 4AH

ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AH-1	158704	Cover - Strainer			159084	No. 2 Machines - Metric . . . . .	1
	158367	No. 2 Machines . . . . .	1		161429	No. 2 Machines - Metric With 34" Travel . . . . .	1
	149674	No. 3 Machines . . . . .	1		148383	No. 3 Machines - English . . . . .	1
	159073	No. 3 Machines - With 42" Travel . . . . .	1		159078	No. 3 Machines - English With 42" Travel . . . . .	1
	149697	No. 4 Machines . . . . .	1		148384	No. 3 Machines - Metric . . . . .	1
	161879	No. 4 Machines - With 50" Travel . . . . .	1		161537	No. 3 Machines - Metric With 42" Travel . . . . .	1
4AH-2		Strainer			149712	No. 4 Machines - English . . . . .	1
	158705	No. 2 Machines . . . . .	1		161546	No. 4 Machines - English With 50" Travel . . . . .	1
	158368	No. 2 Machines - With 34" Travel . . . . .	1		149711	No. 4 Machines - Metric . . . . .	1
	149675	No. 3 Machines . . . . .	1		161547	No. 4 Machines - Metric With 50" Travel . . . . .	1
	159704	No. 3 Machines - With 42" Travel . . . . .	1				
	149696	No. 4 Machines . . . . .	1	4AH-28	117339	Spring - Lock . . . . .	1
	161878	No. 4 Machines - With 50" Travel . . . . .	1	4AH-29	144165	Disc - Knockout . . . . .	1
4AH-3	3203	Screw . . . . .	4	4AH-30	110461	Washer - Thrust . . . . .	1
4AH-4	109826	Spout - Lubrication Return . . . . .	1	4AH-31	110464	Cone - Bearing . . . . .	1
4AH-5	66466	Gasket . . . . .	1	4AH-32		Pin - Straight	
4AH-6		Strainer			1429	No. 2 Machines . . . . .	2
	63789	No. 2 Machines . . . . .	1		1629	Nos. 3 & 4 Machines . . . . .	2
	63849	Nos. 3 & 4 Machines . . . . .	1	4AH-33	76644	Plug . . . . .	1
4AH-7	1681	Screw . . . . .	1	4AH-34		Apron - Back	
4AH-8		Table			144126	No. 2 Machines . . . . .	1
	157919	*No. 2 Machines - Without A. T. C. . . . .	1		148385	No. 3 Universal Machines . . . . .	1
	158360	*No. 2 Machines - With 34" Travel Without A. T. C. . . . .	1		148388	Nos. 3 & 4 Plain & Vertical, No. 4 Universal Machines . . . . .	1
	149723	*No. 3 Machines - Without A. T. C. . . . .	1	4AH-35		Screw	
	159072	*No. 3 Machines - With 42" Travel Without A. T. C. . . . .	1		3343	No. 2 Machines . . . . .	2
	149701	*No. 4 Machines - Without A. T. C. . . . .	1		3408	Nos. 3 & 4 Machines . . . . .	2
	161544	*No. 4 Machines - With 50" Travel Without A. T. C. . . . .	1	4AH-36	3529	Plug . . . . .	
	157918	*No. 2 Machines - With A. T. C. . . . .	1			Nos. 3 & 4 Machines Only . . . . .	2
	161427	*No. 2 Machines - With 34" Travel With A. T. C. . . . .	1	4AH-37	110465	Cup - Bearing . . . . .	1
	148358	*No. 3 Machines - With A. T. C. . . . .	1	4AH-38	110464	Cone - Bearing . . . . .	1
	161535	*No. 3 Machines - With 42" Travel With A. T. C. . . . .	1	4AH-39	110463	Retainer . . . . .	1
	149702	*No. 4 Machines - With A. T. C. . . . .	1	4AH-40	100573	Nut - Lock . . . . .	1
	161545	*No. 4 Machines - With 50" Travel With A. T. C. . . . .	1	4AH-41	2054	Screw . . . . .	1
4AH-9		Screw		4AH-42	144363	Cover - Back Apron . . . . .	1
	3543	No. 2 Machines . . . . .	1	4AH-43	3417	Screw . . . . .	1
	3408	Nos. 3 & 4 Machines . . . . .	1	4AH-44	3502	Handle . . . . .	1
4AH-10	51737	Cup - Oil . . . . .	1	4AH-45	3514	Screw . . . . .	1
4AH-11	3936	Bushing . . . . .	1	4AH-46	110462	Retainer . . . . .	1
4AH-12	60062	Oiler . . . . .	1	4AH-47	110465	Cup - Bearing . . . . .	1
4AH-13	1429	Pin . . . . .	2	4AH-48	161096	Clutch . . . . .	1
4AH-14	60062	Oiler . . . . .	1	4AH-49	3232	Screw . . . . .	1
4AH-15	143	Pin - Taper . . . . .	1	4AH-50	66254	Pin . . . . .	1
4AH-16	146400	Lever - Knockout Shaft . . . . .	1	4AH-51		Oiler	
4AH-17		Shaft - Knockout Control			124593	No. 2 Machines . . . . .	1
	146403	No. 2 Machines . . . . .	1		44979	Nos. 3 & 4 Machines . . . . .	1
	148374	No. 2 Machines - With 34" Travel . . . . .	1	4AH-52	117729	Screw . . . . .	2
	148374	No. 3 Machines . . . . .	1	4AH-53	102852	Screw . . . . .	1
	149709	No. 3 Machines - With 42" Travel . . . . .	1	4AH-54		Clutch - Cross Feed Dial	
	149709	No. 4 Machines . . . . .	1		144192	English . . . . .	1
	146992	No. 4 Machines - With 50" Travel . . . . .	1		144191	Metric . . . . .	1
4AH-18	3550	Plug . . . . .	1	4AH-55	3203	Screw . . . . .	4
4AH-19	1911	Screw - Set . . . . .	1	4AH-56		Pin - Lead Screw	
4AH-20		Apron - Front			144174	No. 2 Machines . . . . .	1
	144203	No. 2 Machines . . . . .	1		148369	Nos. 3 & 4 Machines . . . . .	1
	148387	No. 3 & 4 Machines . . . . .	1	4AH-57	161095	Handwheel . . . . .	1
4AH-21	146402	Collar . . . . .	1	4AH-57A	233820	Bushing . . . . .	1
4AH-22	144167	Support - Spline Shaft . . . . .	1	4AH-58	151512	Bushing . . . . .	1
4AH-23	146401	Fork - Knockout . . . . .	1	4AH-59	66249	Collar - Small . . . . .	1
4AH-24	248065	Ring - Truarc . . . . .	1	4AH-60	102083	Spring . . . . .	1
4AH-25	68433	Pin - Straight . . . . .	1	4AH-61		Dial - Cross Feed	
4AH-26	3397	Screw . . . . .	2		144189	English . . . . .	1
4AH-27		Screw - Lead			144188	Metric . . . . .	1
	159085	No. 2 Machines - English . . . . .	1	4AH-62	151515	Pin . . . . .	2
	158363	No. 2 Machines - English With 34" Travel . . . . .	1	4AH-63	144186	Housing - Dial Clutch . . . . .	1
				4AH-64	144197	Bushing . . . . .	1

\* A. T. C. Automatic Table Cycle





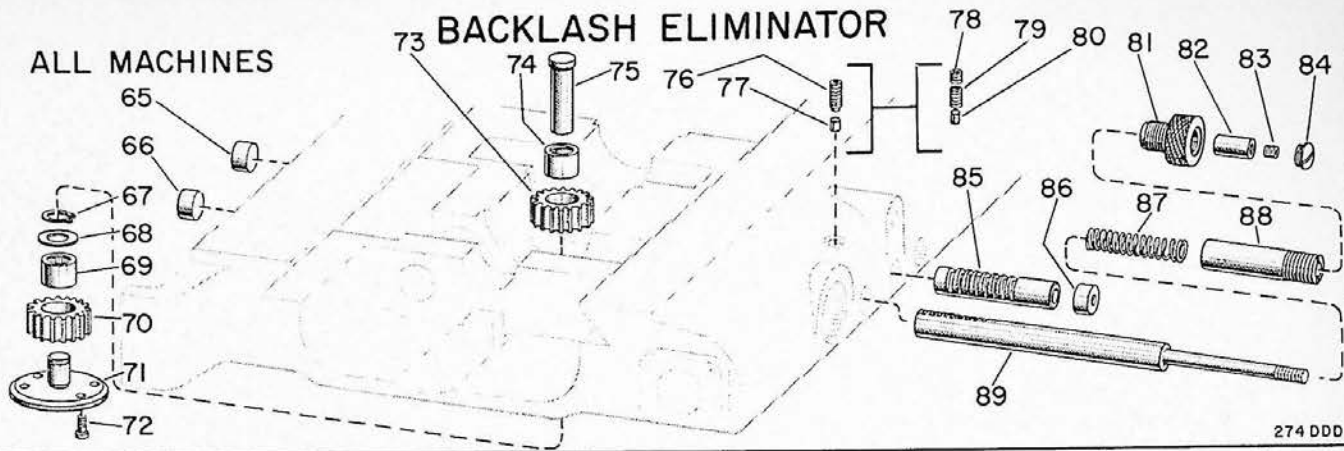
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SADDLE TABLE-UNIT No. 4AH (Continued)  
ALL MACHINES

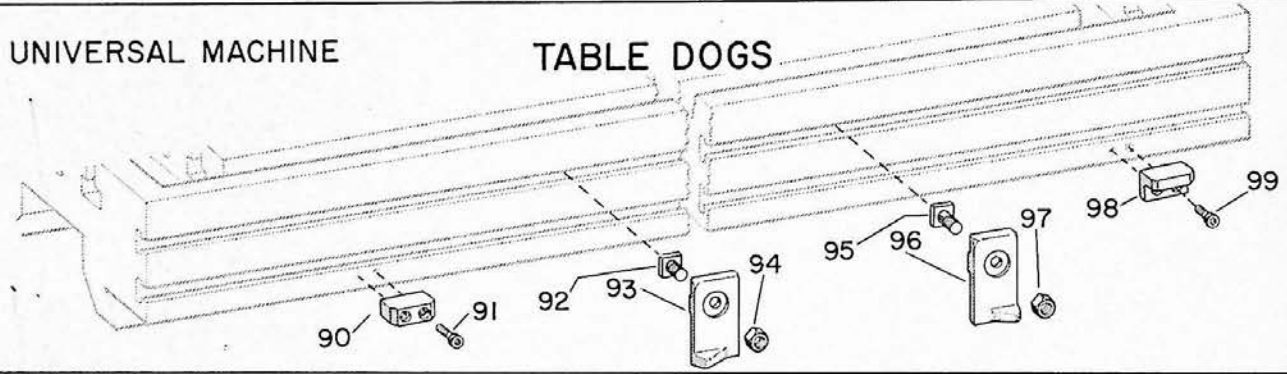
KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AH-65	99953	Plug . . . . .	1	4AH-89		Rack - Backlash Eliminator	
4AH-66	3551	Plug . . . . .	1		144143	No. 2 Machines . . . . .	1
4AH-67	237432	Ring - Retaining Universal Machines Only . . . . .	1		148372	No. 3 Machines . . . . .	1
4AH-68	144802	Retainer - Bearing Universal Machines Only . . . . .	1		149716	No. 4 Plain & Vertical Machines . . . . .	1
4AH-69	128137	Bearing - Roller Universal Machines Only . . . . .	1	4AH-90	148372	No. 4 Universal Machines . . . . .	1
4AH-70	128136	Gear - Backlash Eliminator Universal Machines Only . . . . .	1		163451	Dog - Table, Positive Stop, R. H. Universal Machines Only . . . . .	1
4AH-71	144373	Support - Bearing Universal Machines Only . . . . .	1	4AH-91	3397	Screw Universal Machines Only . . . . .	2
4AH-72	3203	Screw Universal Machines Only . . . . .	4	4AH-92	3220	Bolt Universal Machines Only . . . . .	1
4AH-73	128136	Gear - Backlash Eliminator Plain & Vertical Machines Only . . . . .	1	4AH-93	163248	Dog - Feed, R. H. Universal Machines Only . . . . .	1
4AH-74	128137	Bearing - Roller Plain & Vertical Machines Only . . . . .	1	4AH-94	664	Nut Universal Machines Only . . . . .	1
4AH-75	144175	Shaft - Backlash Eliminator Plain & Vertical Machines Only . . . . .	1	4AH-95	3220	Bolt Universal Machines Only . . . . .	1
4AH-76	3233	Screw Plain & Vertical Machines Only . . . . .	1	4AH-96	163249	Dog - Feed, L. H. Universal Machines Only . . . . .	1
4AH-77	1962	Plug Plain & Vertical Machines Only . . . . .	1	4AH-97	664	Nut Universal Machines Only . . . . .	1
4AH-78	2356	Screw Universal Machines Only . . . . .	1	4AH-98	163450	Dog - Table, Positive Stop, L. H. Universal Machines Only . . . . .	1
4AH-79	1911	Screw Universal Machines Only . . . . .	1	4AH-99	3397	Screw Universal Machines Only . . . . .	2
4AH-80	2268	Plug Universal Machines Only . . . . .	1	4AH-100	164535	*Dog - L. H. Positive Stop Plain & Vertical Machines Only . . . . .	1
4AH-81	108353	Knob . . . . .	1	4AH-101	3636	Pin . . . . .	1
4AH-82	104242	Stop - Housing Backlash Eliminator . . . . .	1	4AH-102	3203	*Screw Plain & Vertical Machines Only . . . . .	2
4AH-83	1911	Screw . . . . .	1	4AH-103	164534	*Dog - Feed L. H. Plain & Vertical Machines Only . . . . .	1
4AH-84	902	Screw . . . . .	1	4AH-104	3220	*Bolt Plain & Vertical Machine Only . . . . .	1
4AH-85	144177	Rack . . . . .	1	4AH-105	664	*Nut Plain & Vertical Machines Only . . . . .	1
4AH-86	3551	Plug . . . . .	1	4AH-106	3220	*Bolt Plain & Vertical Machines Only . . . . .	1
4AH-87	131172	Spring - Compression . . . . .	1				
4AH-88	133107	Cage - Spring . . . . .	1				

\* Without Automatic Table Cycle



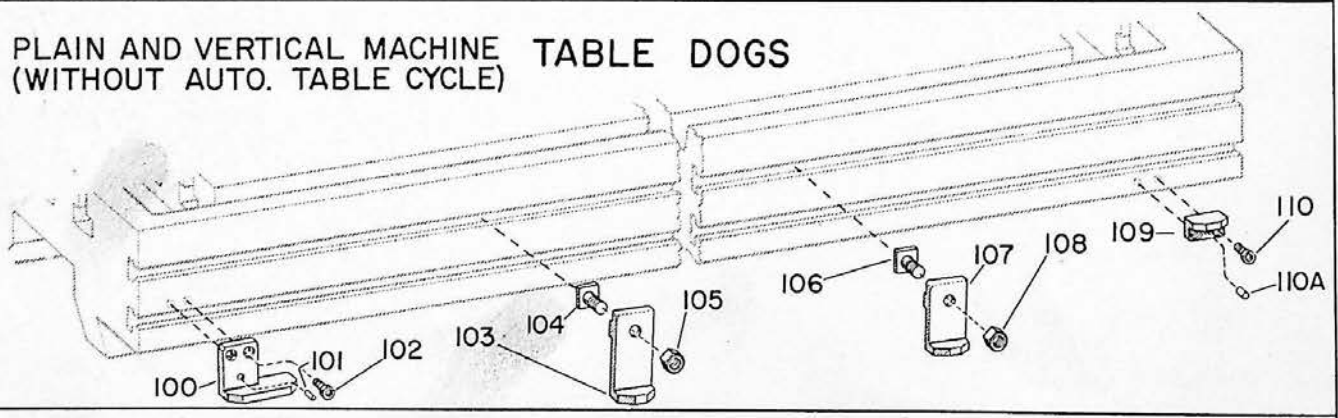
**UNIVERSAL MACHINE**

**TABLE DOGS**



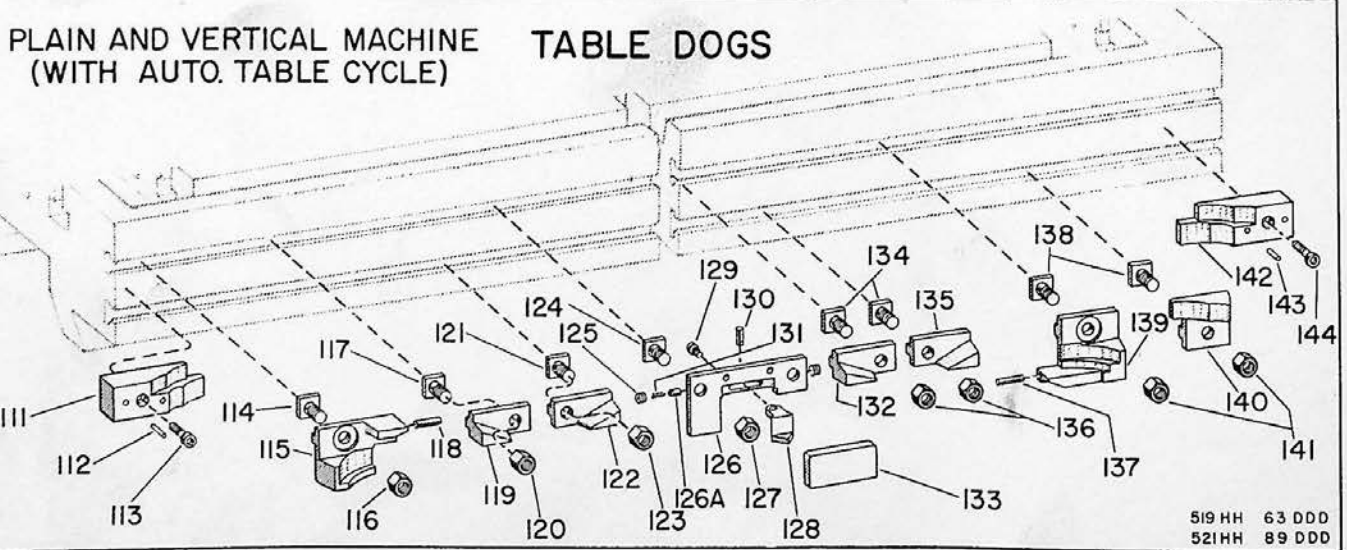
**PLAIN AND VERTICAL MACHINE  
(WITHOUT AUTO. TABLE CYCLE)**

**TABLE DOGS**



**PLAIN AND VERTICAL MACHINE  
(WITH AUTO. TABLE CYCLE)**

**TABLE DOGS**



519 HH 63 DDD  
521 HH 89 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

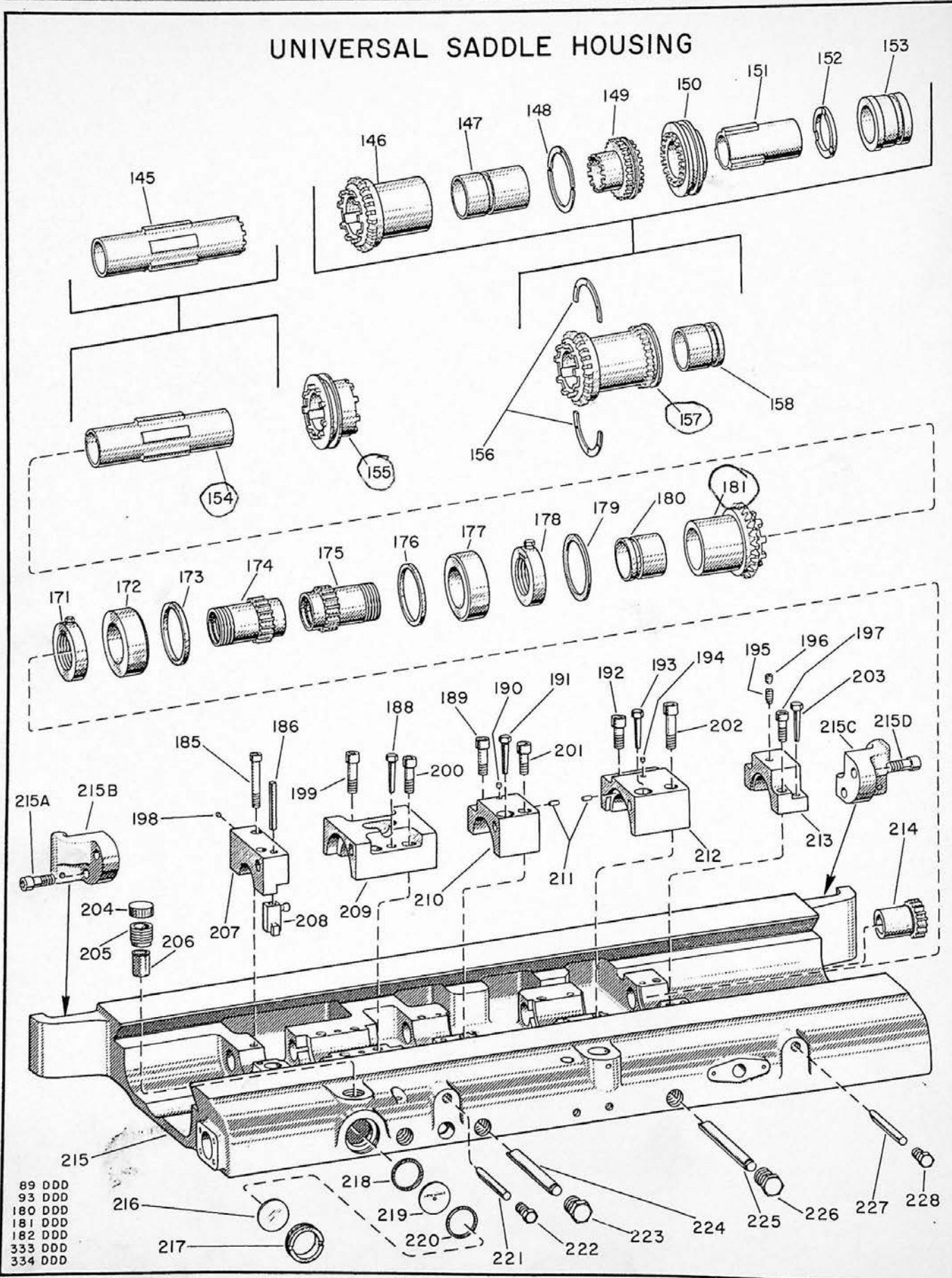
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SADDLE TABLE-UNIT No. 4AH (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AH-107	164533	*Dog - Feed R. H. Plain & Vertical Machines Only . . .	1	4AH-126	140935	**Body - Inter Stop Dog Plain & Vertical Machines Only . . .	1
4AH-108	664	*Nut Plain & Vertical Machines Only . . .	1	4AH-126A	140933	Sleeve Plain & Vertical Machines Only . . .	2
4AH-109	111371	*Dog - Positive Stop R. H. Plain & Vertical Machines Only . . .	1	4AH-127	664	**Nut Plain & Vertical Machines Only . . .	2
4AH-110	3203	*Screw Plain & Vertical Machines Only . . .	2	4AH-128	158877	**Dog - Stop Flipper Plain & Vertical Machines Only . . .	1
4AH-110A	3636	*Pin Plain & Vertical Machines Only . . .	1	4AH-129	234042	**Screw Plain & Vertical Machines Only . . .	2
4AH-111	128109	**Dog - Safety, L. H. Plain & Vertical Machines Only . . .	1	4AH-130	3636	**Pin Plain & Vertical Machines Only . . .	1
4AH-112	3162	**Pin Plain & Vertical Machines Only . . .	2	4AH-131	236340	Spring Plain & Vertical Machines Only . . .	2
4AH-113	3400	**Screw Plain & Vertical Machines Only . . .	1	4AH-132	108533	**Dog - R. H. Plain & Vertical Machines Only . . .	1
4AH-114	3220	**Bolt Plain & Vertical Machines Only . . .	1	4AH-133	141036	**Cover - Flipper Dog Plain & Vertical Machines Only . . .	1
4AH-115	162504	**Dog - Reverse Rate, L. H. Plain & Vertical Machines Only . . .	1	4AH-134	3220	**Bolt Plain & Vertical Machines Only . . .	2
4AH-116	664	**Nut Plain & Vertical Machines Only . . .	1	4AH-135	108532	**Dog - L. H. Plain & Vertical Machines Only . . .	1
4AH-117	3220	**Bolt Plain & Vertical Machines Only . . .	1	4AH-136	664	**Nut Plain & Vertical Machines Only . . .	2
4AH-118	3285	**Pin Plain & Vertical Machines Only . . .	1	4AH-137	3285	**Pin Plain & Vertical Machines Only . . .	1
4AH-119	108533	**Dog - R. H. Plain & Vertical Machines Only . . .	1	4AH-138	3220	**Bolt Plain & Vertical Machines Only . . .	2
4AH-120	664	**Nut Plain & Vertical Machines Only . . .	1	4AH-139	162505	**Dog - Reverse Rate, R. H. Plain & Vertical Machines Only . . .	1
4AH-121	3220	**Bolt Plain & Vertical Machines Only . . .	1	4AH-140	157991	**Dog - Stop Plain & Vertical Machines Only . . .	1
4AH-122	108532	**Dog - L. H. Plain & Vertical Machines Only . . .	1	4AH-141	664	**Nut Plain & Vertical Machines Only . . .	2
4AH-123	664	**Nut Plain & Vertical Machines Only . . .	1	4AH-142	128110	**Dog - Safety, R. H. Plain & Vertical Machines Only . . .	1
4AH-124	3220	**Bolt Plain & Vertical Machines Only . . .	2	4AH-143	3162	**Pin Plain & Vertical Machines Only . . .	2
4AH-125	1213	**Screw Plain & Vertical Machines Only . . .	2	4AH-144	3400	**Screw Plain & Vertical Machines Only . . .	1

- \* Without Automatic Table Cycle
- \*\* With Automatic Table Cycle

# UNIVERSAL SADDLE HOUSING



- 89 DDD
- 93 DDD
- 180 DDD
- 181 DDD
- 182 DDD
- 333 DDD
- 334 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

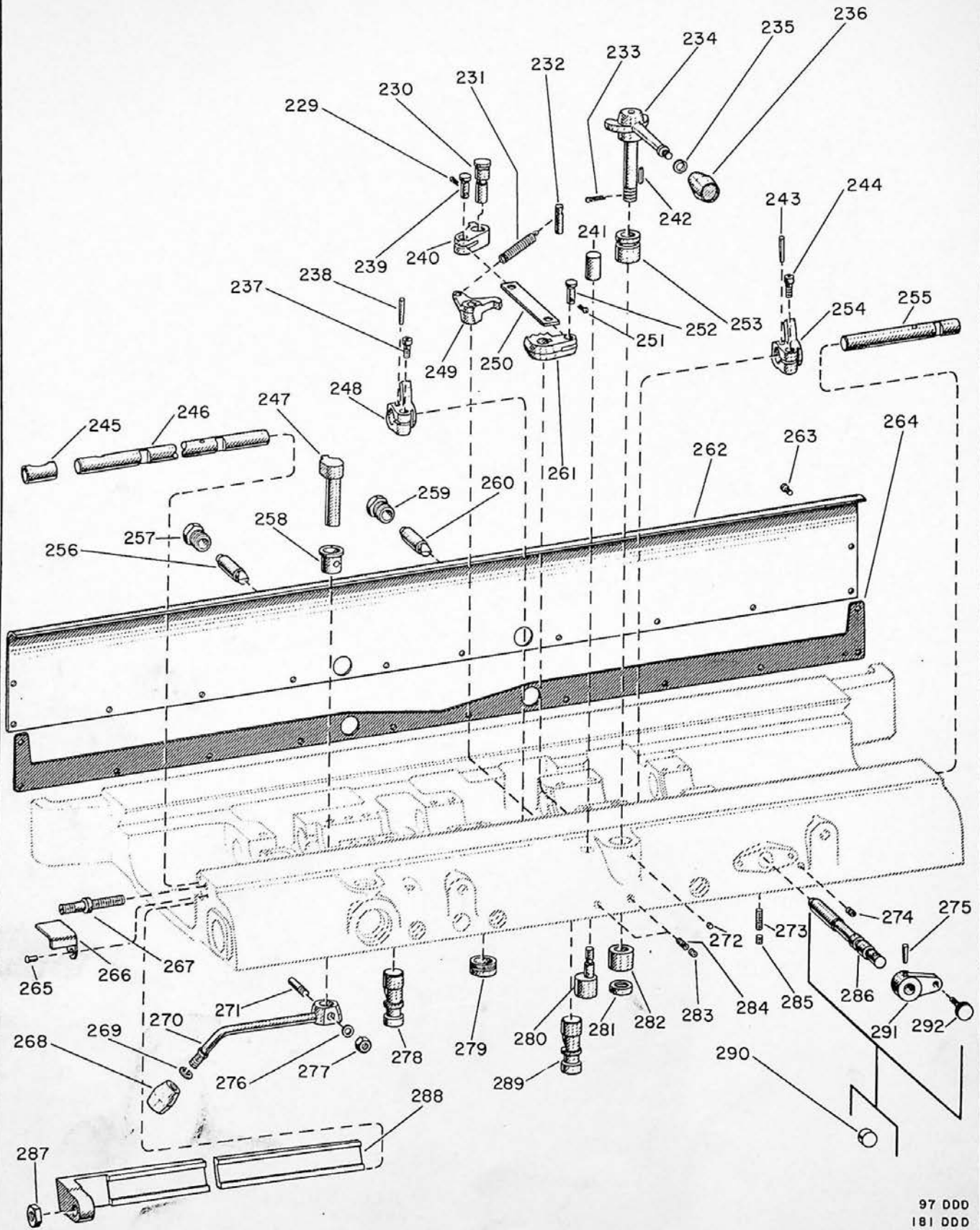
SADDLE TABLE-UNIT No. 4AH (Continued)

Nos. 2, 3, AND 4 UNIVERSAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AH-145	164530	*Sleeve - Leadscrew Drive . . . . .	1	4AH-206	65114	Screen - Oil . . . . .	1
4AH-146	164531	*Gear - Bevel . . . . .	1	4AH-207	148353	Cap - Bearing, Left . . . . .	1
4AH-147	164529	*Bushing . . . . .	1	4AH-208	152651	Lever - Knockout . . . . .	1
4AH-148	142386	*Washer - Thrust, R.H. . . . .	1	4AH-209	146933	Cap - Lead Screw Nut . . . . .	1
4AH-149	144354	*Gear - Attachment Driving . . . . .	1	4AH-210	148401	Cap - Bevel Gear Bearing, L.H. . . . .	1
4AH-150	148417	*Clutch - Lead Screw Sleeve . . . . .	1	4AH-211	3636	Pin . . . . .	2
4AH-151	144364	*Sleeve - Lead Screw . . . . .	1	4AH-212	146981	Cap - Bevel Gear Bearing, R.H. . . . .	1
4AH-152	147038	*Washer - Thrust . . . . .	1	4AH-213	144367	Cap - Bearing, R.H. . . . .	1
4AH-153	151709	*Bushing - Lead Screw Sleeve . . . . .	1	4AH-214	144176	Gear - Attachment Drive . . . . .	1
4AH-154	163962	Sleeve - Lead Screw Drive . . . . .	1	4AH-215		Housing	
4AH-155	164491	Clutch . . . . .	1		158736	No. 2 Machines . . . . .	1
4AH-156	142386	Washer - Thrust, R.H. . . . .	1		158364	No. 2 Machines - With 34" Travel . . . . .	1
4AH-157	164492	Gear - Bevel . . . . .	1		157339	No. 3 Machines . . . . .	1
4AH-158	163960	Bushing . . . . .	1		161543	No. 3 Machines - With 42" Travel . . . . .	1
4AH-171	110454	Nut - Lock . . . . .	1		157338	No. 4 Machines . . . . .	1
4AH-172	147280	Bearing - Ball Thrust . . . . .	1		161885	No. 4 Machines - With 50" Travel . . . . .	1
4AH-173	121218	Spacer - Roller Bearing . . . . .	1	4AH-215-A		Screw . . . . .	1
4AH-174		Nut - Lead Screw		4AH-215-B		Extension - Water Trough - L.H.	
	144144	English . . . . .	1		158362	No. 2 Machines - With 34" Travel . . . . .	1
	144145	Metric . . . . .	1		161539	No. 3 Machines - With 42" Travel . . . . .	1
4AH-175		Nut - Lead Screw			161881	No. 4 Machines - With 50" Travel . . . . .	1
	144144	English . . . . .	1	4AH-215-C		Screw . . . . .	1
	144145	Metric . . . . .	1	4AH-215-D		Extension - Water Trough - R.H.	
4AH-176	121218	Spacer - Roller Bearing . . . . .	1		158361	No. 2 Machines - With 34" Travel . . . . .	1
4AH-177	147280	Bearing - Ball Thrust . . . . .	1		161540	No. 3 Machines - With 42" Travel . . . . .	1
4AH-178	110454	Nut - Lock . . . . .	1		161882	No. 4 Machines - With 50" Travel . . . . .	1
4AH-179	142385	Washer - Thrust, L.H. . . . .	1	4AH-216	3849	Disc - Oil Gage . . . . .	1
4AH-180	163960	Bushing . . . . .	1	4AH-217	63937	Cover - Oil Gage . . . . .	1
4AH-181	164490	Gear - Bevel . . . . .	1	4AH-218	3850	Gasket - Oil Gage . . . . .	1
4AH-185	3192	Screw . . . . .	2	4AH-219	60742	Dial - Oil Gage . . . . .	1
4AH-186	144204	Pin - Feed Clutch Lever . . . . .	1	4AH-220	4086	Gasket - Oil Gage . . . . .	1
4AH-188	83432	Pin - Taper . . . . .	2	4AH-221		Shoe - Gib Clamp	
4AH-189	3404	Screw . . . . .	1		149676	No. 2 Machines . . . . .	1
4AH-190	1550	Plug . . . . .	1		137957	No. 3 Machines . . . . .	1
4AH-191	83432	Pin - Taper . . . . .	2		149733	No. 4 Machines . . . . .	1
4AH-192	3343	Screw . . . . .	1	4AH-222	650	Screw . . . . .	1
4AH-193	83432	Pin - Taper . . . . .	2	4AH-223	65076	Screw - Clamp . . . . .	1
4AH-194	1550	Plug . . . . .	1	4AH-224		Wedge - Front	
4AH-195	3233	*Screw . . . . .	1		144379	No. 2 Machines . . . . .	1
4AH-196	1911	*Screw . . . . .	1		148421	Nos. 3 & 4 Machines . . . . .	1
4AH-197	3400	Screw . . . . .	2	4AH-225		Wedge - Front	
4AH-198	1550	Plug . . . . .	1		144379	No. 2 Machines . . . . .	1
4AH-199	3248	Screw . . . . .	2		148421	Nos. 3 & 4 Machines . . . . .	1
4AH-200	3404	Screw . . . . .	2	4AH-226	65076	Screw - Clamp . . . . .	1
4AH-201	3343	Screw . . . . .	1	4AH-227		Shoe - Gib Clamping	
4AH-202	3405	Screw . . . . .	1		119420	No. 2 Machines . . . . .	1
4AH-203	83432	Pin - Taper . . . . .	1		149732	No. 3 Machines . . . . .	1
4AH-204	3986	Cap . . . . .	1		161926	No. 4 Machines . . . . .	1
4AH-205	3912	Nipple - Oil Filler . . . . .	1	4AH-228	650	Screw . . . . .	1

\* With Long and Short Lead

FEED TRIP LINKAGE



97 DDD  
 181 DDD  
 182 DDD  
 273 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

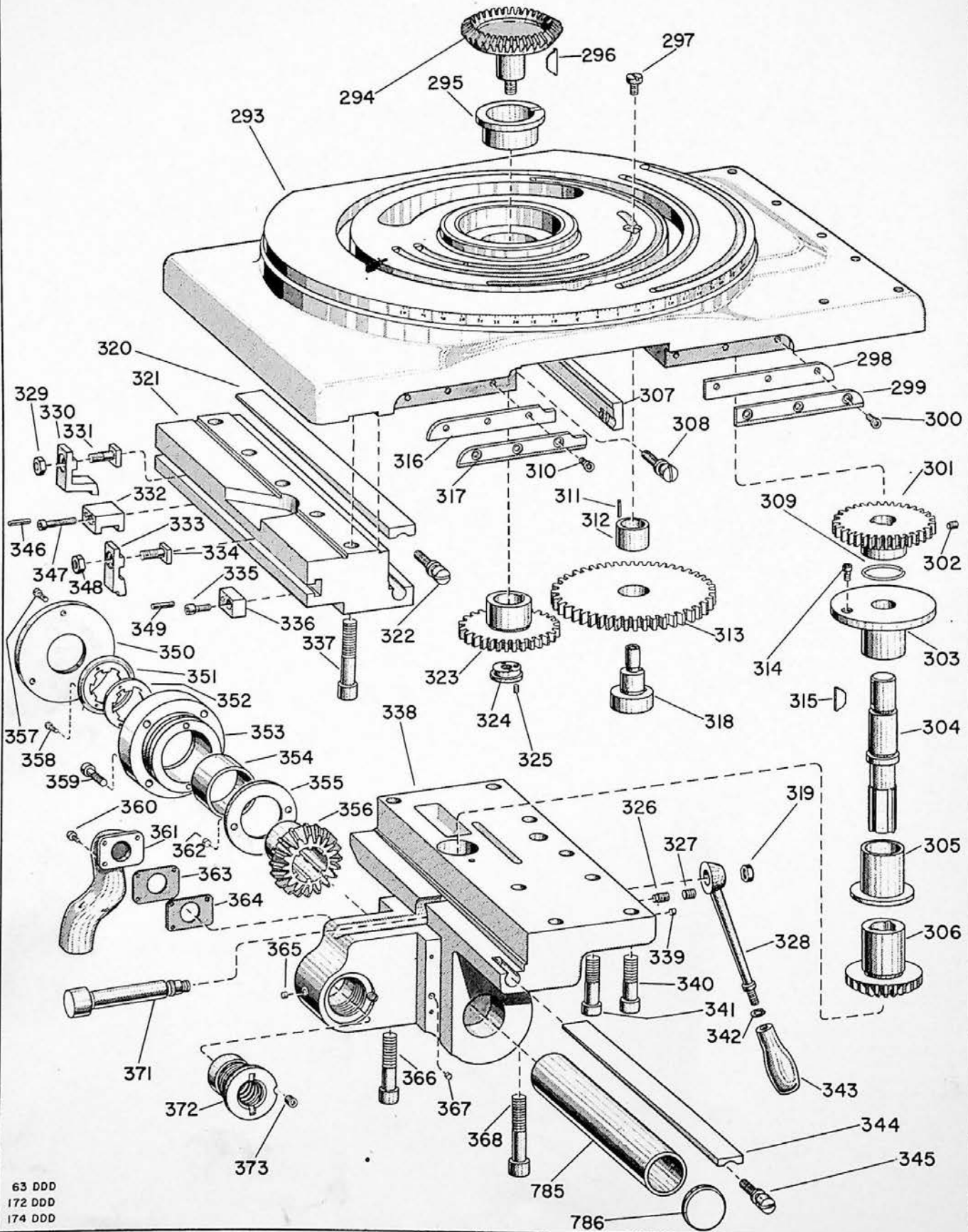
SADDLE TABLE-UNIT No. 4AH (Continued)  
Nos. 2, 3, AND 4 UNIVERSAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AH-229	703	Pin . . . . .	1	4AH-262		Guard - Water	
4AH-230		Stud - Lever Feed Control			159092	No. 2 Machines . . . . .	1
	144371	No. 2 Machines . . . . .	1		158365	No. 2 Machines - With 34" Travel . . . . .	1
	63493	Nos. 3 & 4 Machines . . . . .	1		161947	No. 3 Machines . . . . .	1
4AH-231		Spring			161541	No. 3 Machines - With 42" Travel . . . . .	1
	65119	No. 2 Machines . . . . .	1		149700	No. 4 Machines . . . . .	1
	34333	Nos. 3 & 4 Machines . . . . .	1		161883	No. 4 Machines - With 50" Travel . . . . .	1
4AH-232	3382	Pin . . . . .	1	4AH-263		Screw	
4AH-233	1959	Pin . . . . .	1		3203	No. 2 Machines . . . . .	10
4AH-234	99990	Lever - Table Feed Trip . . . . .	1		3203	Nos. 3 & 4 Machines . . . . .	12
4AH-235	2135	Washer . . . . .	1	4AH-264		Gasket - Water Guard	
4AH-236	4326	Knob - Lever . . . . .	1		159095	No. 2 Machines . . . . .	1
4AH-237	3396	Screw . . . . .	1		158366	No. 2 Machines - With 34" Travel . . . . .	1
4AH-238	14556	Pin . . . . .	1		161948	No. 3 Machines . . . . .	1
4AH-239	63494	Pin - Table Feed Control . . . . .	1		161542	No. 3 Machines - With 42" Travel . . . . .	1
4AH-240	63512	Lever - Front Table Feed . . . . .	1		149705	No. 4 Machines . . . . .	1
4AH-241	144806	Bushing - Eccentric Stud . . . . .	1		161884	No. 4 Machines - With 50" Travel . . . . .	1
4AH-242	3293	Key . . . . .	1	4AH-265	2209	Screw . . . . .	2
4AH-243	14556	*Pin - Taper . . . . .	1	4AH-266	67741	Guard - Table Gib . . . . .	1
4AH-244	3396	*Screw . . . . .	1	4AH-267	3997	Screw . . . . .	1
4AH-245	144172	Bushing - Clutch Shaft . . . . .	1	4AH-268	4326	Knob - Lever . . . . .	1
4AH-246		Shaft - Control		4AH-269	2135	Washer . . . . .	1
	144365	No. 2 Machines . . . . .	1	4AH-270	159599	Lever - Rear Table . . . . .	1
	148415	Nos. 3 & 4 Machines . . . . .	1	4AH-271	104558	Pin - Taper . . . . .	1
4AH-247		Shaft - Lever Pilot		4AH-272	94476	Plug . . . . .	1
	157904	No. 2 Machines . . . . .	1	4AH-273	2346	Screw . . . . .	1
	158272	Nos. 3 & 4 Machines . . . . .	1	4AH-274	76644	Plug . . . . .	1
4AH-248	148371	Fork - Clutch . . . . .	1	4AH-275	143	*Pin - Taper . . . . .	1
4AH-249	127598	Lever - Detent . . . . .	1	4AH-276	3267	Washer . . . . .	1
4AH-250		Link - Table Feed Control		4AH-277	3473	Nut . . . . .	1
	146982	No. 2 Machines . . . . .	1	4AH-278	65075	Bolt - Wedge . . . . .	1
	149698	No. 3 Machines . . . . .	1	4AH-279	66994	Nipple . . . . .	1
	149612	No. 4 Machines . . . . .	1	4AH-280	67019	Stud - Eccentric . . . . .	1
4AH-251	703	Pin . . . . .	1	4AH-281	41319	Nut - Plunger Feed Trip . . . . .	1
4AH-252	63494	Pin - Table Feed Control . . . . .	1	4AH-282	63511	Bushing - Lower Control Lever . . . . .	1
4AH-253	149695	Bushing - Upper Control Lever . . . . .	1	4AH-283	2356	Screw . . . . .	2
4AH-254	148371	*Fork - Clutch . . . . .	1	4AH-284	3233	Screw . . . . .	2
4AH-255	148416	*Rod - Clutch Fork . . . . .	1	4AH-285	2356	Screw . . . . .	1
4AH-256		Wedge - Back		4AH-286		*Shaft - Eccentric	
	144370	No. 2 Machines . . . . .	1		144361	No. 2 Machines . . . . .	1
	148422	No. 3 Machines . . . . .	1		149631	Nos. 3 & 4 Machines . . . . .	1
	149630	No. 4 Machines . . . . .	1	4AH-287	3474	Nut . . . . .	1
4AH-257	65076	Screw - Clamp . . . . .	1	4AH-288		Gib - Table	
4AH-258	144800	Bushing - Pivot Shaft			144159	No. 2 Machines . . . . .	1
		No. 2 Machines Only . . . . .	1		148375	No. 3 Machines . . . . .	1
4AH-259	65076	Screw - Clamp . . . . .	1		149613	No. 4 Machines . . . . .	1
4AH-260		Wedge - Back		4AH-289	65075	Bolt - Wedge . . . . .	1
	144370	No. 2 Machines . . . . .	1	4AH-290	3549	Plug . . . . .	1
	148422	No. 3 Machines . . . . .	1	4AH-291	76745	*Lever - Eccentric Shaft . . . . .	1
	149630	No. 4 Machines . . . . .	1	4AH-292	75393	*Screw - Change . . . . .	1
4AH-261	63502	Detent - Trip Feed Lever . . . . .	1				

\* With Long & Short Lead



UNIVERSAL SADDLE - GUIDE AND BRACKET UNDER SADDLE



63 DDD  
 172 DDD  
 174 DDD

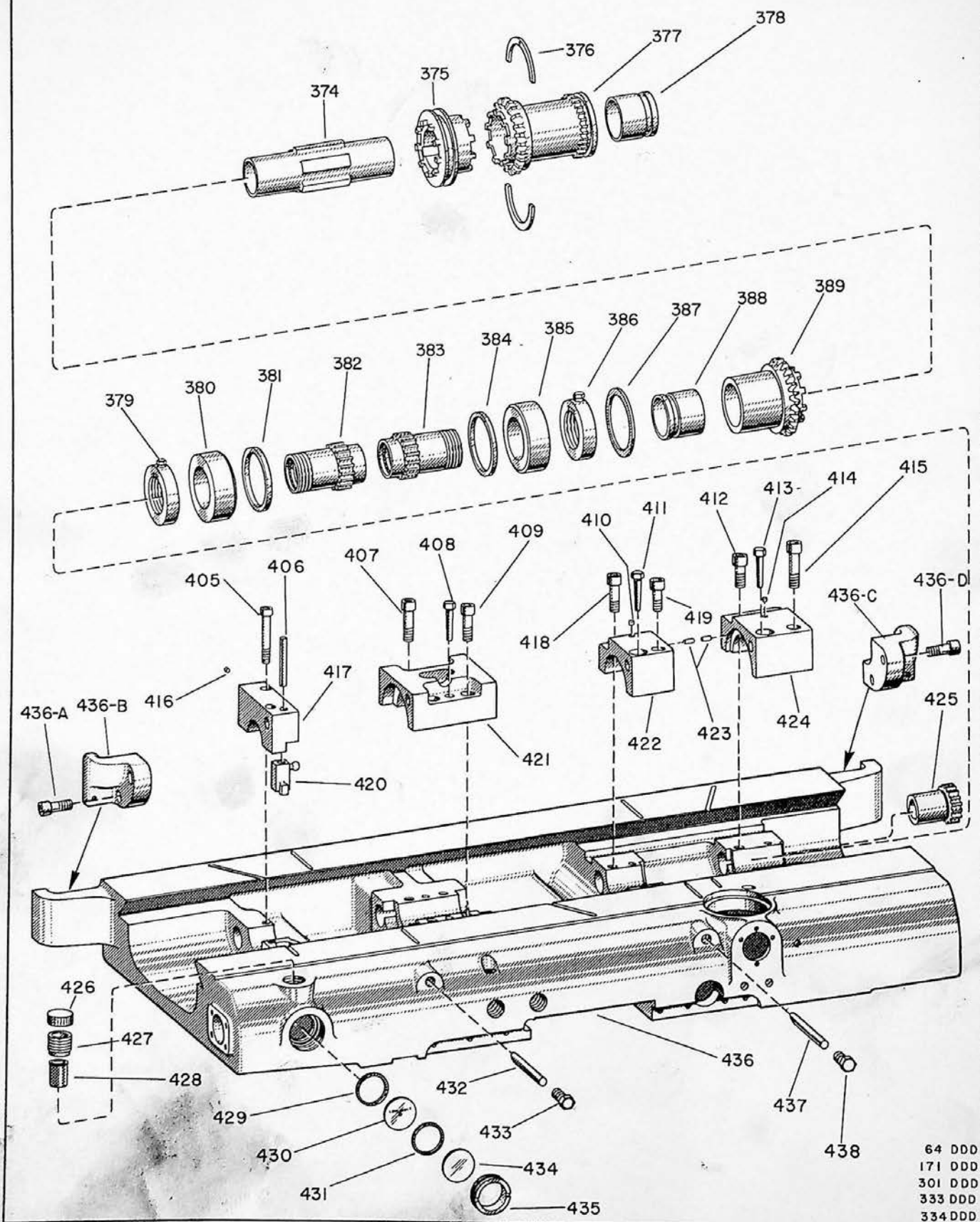
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SADDLE TABLE-UNIT No. 4AH (Continued)  
Nos. 2, 3, AND 4 UNIVERSAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AH-293		Saddle		4AH-338		Bracket - Under Saddle	
	158735	No. 2 Machines . . . . .	1		158737	No. 2 Machines . . . . .	1
	149703	Nos. 3 & 4 Machines . . . . .	1		148359	Nos. 3 & 4 Machines . . . . .	1
4AH-294	144358	Gear - Bevel Stem . . . . .	1	4AH-339	1844	Plug . . . . .	2
4AH-295	144376	Bushing - Spur Gear . . . . .	1	4AH-340	108219	Screw . . . . .	2
4AH-296	3281	Key . . . . .	1	4AH-341		Screw . . . . .	
4AH-297	124200	Screw . . . . .	1		1929	No. 2 Machines . . . . .	4
4AH-298		Wiper - Front, R. H.			3408	Nos. 3 & 4 Machines . . . . .	3
	144368	No. 2 Machines . . . . .	1	4AH-342	4329	Washer . . . . .	1
	148419	Nos. 3 & 4 Machines . . . . .	1	4AH-343	4326	Knob - Lever . . . . .	1
4AH-299		Clamp - Wiper, R. H. Front		4AH-344		Gib - Saddle Lower	
	144377	No. 2 Machines . . . . .	1		144356	No. 2 Machines . . . . .	1
	148418	Nos. 3 & 4 Machines . . . . .	1		148377	Nos. 3 & 4 Machines . . . . .	1
4AH-300	3204	Screw . . . . .	3	4AH-345	63606	Screw - Gib Adjusting . . . . .	1
4AH-301		Gear - Vertical - Spline Shaft		4AH-346	3162	Pin . . . . .	1
	144359	No. 2 Machines . . . . .	1	4AH-347	3217	Screw . . . . .	1
	148389	Nos. 3 & 4 Machines . . . . .	1	4AH-348	3478	Nut . . . . .	1
4AH-302	2343	Screw . . . . .	1	4AH-349	3162	Pin . . . . .	1
4AH-303	146115	Bushing - Stem Bevel Gear . . . . .	1	4AH-350		Cap - Cover	
4AH-304	144357	Shaft - Vertical Spline . . . . .	1		161496	No. 2 Machines . . . . .	1
4AH-305	151705	Bushing . . . . .	1		161483	Nos. 3 & 4 Machines . . . . .	1
4AH-306		Gear - Bracket Under Saddle		4AH-351		Packing - Washer	
	144137	No. 2 Machines . . . . .	1		161492	No. 2 Machines . . . . .	1
	146895	Nos. 3 & 4 Machines . . . . .	1		161009	Nos. 3 & 4 Machines . . . . .	1
4AH-307		Gib - Saddle Upper Left		4AH-352		Packing - Spline Shaft	
	144161	No. 2 Machines . . . . .	1		161493	No. 2 Machines . . . . .	1
	148376	Nos. 3 & 4 Machines . . . . .	1		161007	Nos. 3 & 4 Machines . . . . .	1
4AH-308	63606	Screw - Gib Adjusting . . . . .	1	4AH-353		Cap - Bracket Under Saddle	
4AH-309	114823	Ring - Snap . . . . .	1		161497	No. 2 Machines . . . . .	1
4AH-310	3204	Screw . . . . .	3		161491	Nos. 3 & 4 Machines . . . . .	1
4AH-311	3541	Pin . . . . .	1	4AH-354		Bushing - Gear	
4AH-312	144803	Bushing - Gear . . . . .	1		161494	No. 2 Machines . . . . .	1
4AH-313	144360	Gear - Idler Table Drive . . . . .	1		161018	Nos. 3 & 4 Machines . . . . .	1
4AH-314	3203	Screw . . . . .	1	4AH-355		Washer - Thrust	
4AH-315	3281	Key . . . . .	1		161495	No. 2 Machines . . . . .	1
4AH-316		Wiper - L. H. Front			161482	Nos. 3 & 4 Machines . . . . .	1
	149621	No. 2 Machines . . . . .	1	4AH-356		Gear - Bracket - Under Saddle	
	148360	Nos. 3 & 4 Machines . . . . .	1		161498	No. 2 Machines . . . . .	1
4AH-317		Clamp - Wiper Front, L. H.			161490	Nos. 3 & 4 Machines . . . . .	1
	149620	No. 2 Machines . . . . .	1	4AH-357	3203	Screw . . . . .	3
	148363	Nos. 3 & 4 Machines . . . . .	1	4AH-358	3199	Screw . . . . .	3
4AH-318	144369	Pin - Gear Retainer . . . . .	1	4AH-359		Screw . . . . .	
4AH-319	3474	Nut . . . . .	1		3400	No. 2 Machines . . . . .	3
4AH-320		Gib - Saddle Lower			3400	Nos. 3 & 4 Machines . . . . .	4
	144356	No. 2 Machines . . . . .	1	4AH-360	3396	Screw . . . . .	3
	148377	Nos. 3 & 4 Machines . . . . .	1	4AH-361	144146	Tube . . . . .	1
4AH-321		Guide - Saddle, L. H.		4AH-362	3383	Pin . . . . .	1
	144351	No. 2 Machines . . . . .	1	4AH-363	146097	Gasket . . . . .	1
	148381	Nos. 3 & 4 Machines . . . . .	1	4AH-364	146421	Spacer . . . . .	1
4AH-322	63606	Screw - Gib Adjusting . . . . .	1	4AH-365	1844	Plug . . . . .	1
4AH-323		Gear - Spur		4AH-366	1930	Screw . . . . .	1
	144353	No. 2 Machines . . . . .	1	4AH-367	1844	Plug . . . . .	1
	149629	Nos. 3 & 4 Machines . . . . .	1	4AH-368		Screw . . . . .	
4AH-324	149608	Nut - Bevel Gear . . . . .	1		3268	No. 2 Machines . . . . .	1
4AH-325	3228	Screw . . . . .	1		1952	Nos. 3 & 4 Machines . . . . .	2
4AH-326	3232	Screw . . . . .	1	4AK-785		Cover - Spline Shaft	
4AH-327	1917	Screw . . . . .	1		144692	No. 2 Machines . . . . .	1
4AH-328	161082	Lever - Clamp Eccentric . . . . .	1		146358	No. 3 Machines . . . . .	1
4AH-329	3478	Nut . . . . .	1		146359	No. 4 Machines . . . . .	1
4AH-330	144170	Dog - Saddle Table . . . . .	1	4AK-786		Plug . . . . .	
4AH-331	3220	Bolt . . . . .	1		132594	No. 2 Machines . . . . .	1
4AH-332	144178	Dog . . . . .	1		146221	Nos. 3 & 4 Machines . . . . .	1
4AH-333	144169	Dog - Saddle Table Cross Rear . . . . .	1	4AH-371		Shaft - Eccentric Saddle Clamp	
4AH-334	3220	Bolt . . . . .	1		161080	Nos. 2, 3 & 4 Machines . . . . .	1
4AH-335	3396	Screw . . . . .	1	4AH-372		Nut - Bracket - Under Saddle	
4AH-336	144164	Dog - Positive Stop Front . . . . .	1		119351	English . . . . .	1
4AH-337		Screw . . . . .			119352	Metric . . . . .	1
	117729	No. 2 Machines . . . . .	5	4AH-373	3211	Screw . . . . .	1
	1952	Nos. 3 & 4 Machines . . . . .	5				

SADDLE - PLAIN AND VERTICAL



64 DDD  
 171 DDD  
 301 DDD  
 333 DDD  
 334 DDD

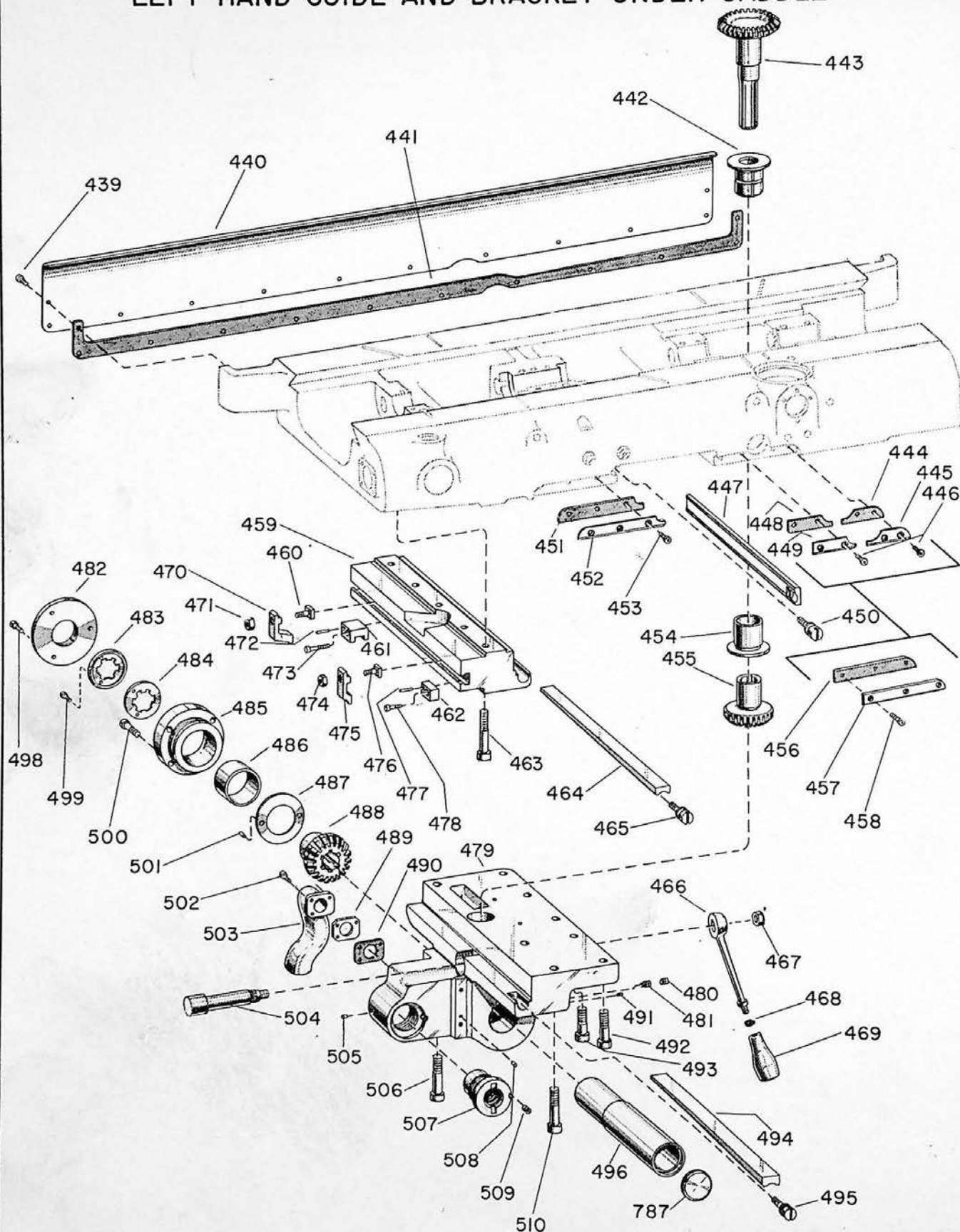
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SADDLE TABLE-UNIT No. 4AH (Continued)  
Nos. 2, 3, AND 4 PLAIN AND VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AH-374	163962	Sleeve . . . . .	1	4AH-423	3636	Pin . . . . .	2
4AH-375	164491	Clutch . . . . .	1	4AH-424	146981	Cap - Bevel Gear Bearing . . . . .	1
4AH-376	142386	Washer - Thrust. R. H. . . . .	1	4AH-425	144176	Gear - Attachment Drive . . . . .	1
4AH-377	164492	Gear - Bevel . . . . .	1	4AH-426	3986	Cap . . . . .	1
4AH-378	163960	Bushing . . . . .	1	4AH-427	3912	Nipple - Oil Filler . . . . .	1
4AH-379	110454	Nut - Lock . . . . .	1	4AH-428	65114	Screen - Oil . . . . .	1
4AH-380	147280	Bearing - Ball Thrust . . . . .	1	4AH-429	3850	Gasket - Oil Gage . . . . .	1
4AH-381	121218	Spacer - Bearing . . . . .	1	4AH-430	60742	Dial - Oil Gage . . . . .	1
4AH-382		Nut - Lead Screw . . . . .		4AH-431	4086	Gasket - Oil Gage . . . . .	1
	144144	English . . . . .	1	4AH-432		Shoe - Gib Clamp . . . . .	
	144145	Metric . . . . .	1		161923	No. 2 Machines . . . . .	1
4AH-383		Nut - Lead Screw . . . . .			149676	No. 3 Machines . . . . .	1
	144144	English . . . . .	1		149733	No. 4 Machines . . . . .	1
	144145	Metric . . . . .	1	4AH-433	2260	Screw . . . . .	1
4AH-384	121218	Spacer - Bearing . . . . .	1	4AH-434	3849	Disc - Oil Gage . . . . .	1
4AH-385	147280	Bearing - Ball Thrust . . . . .	1	4AH-435	63937	Cover - Oil Gage . . . . .	1
4AH-386	110454	Nut - Lock . . . . .	1	4AH-436		Saddle . . . . .	
4AH-387	142385	Washer - Thrust. L. H. . . . .	1		158738	No. 2 Machines . . . . .	1
4AH-388	163960	Bushing . . . . .	1		161008	No. 2 Machines - With 34" Travel . . . . .	1
4AH-389	164490	Gear - Bevel . . . . .	1		148390	No. 3 Machines . . . . .	1
4AH-405	3192	Screw . . . . .	2		159080	No. 3 Machines - With 42" Travel . . . . .	1
4AH-406	144204	Pin - Feed Clutch Lever . . . . .	1		149708	No. 4 Machines . . . . .	1
4AH-407	3248	Screw . . . . .	2		161880	No. 4 Machines - With 50" Travel . . . . .	1
4AH-408	83432	Pin - Taper . . . . .	2	4AH-436A	3343	Screw . . . . .	2
4AH-409	3404	Screw . . . . .	2	4AH-436B		Extension - Water Trough, L. H. . . . .	
4AH-410	1550	Plug . . . . .	1		161003	No. 2 Machines - With 34" Travel . . . . .	1
4AH-411	83432	Pin - Taper . . . . .	2		159076	No. 3 Machines - With 42" Travel . . . . .	1
4AH-412	3343	Screw . . . . .	1		161549	No. 4 Machines - With 50" Travel . . . . .	1
4AH-413	83432	Pin - Taper . . . . .	2	4AH-436C		Extension - Water Trough, R. H. . . . .	
4AH-414	1550	Plug . . . . .	1		161004	No. 2 Machines - With 34" Travel . . . . .	1
4AH-415	3405	Screw . . . . .	1		159075	No. 3 Machines - With 42" Travel . . . . .	1
4AH-416	1550	Plug . . . . .	1		161875	No. 4 Machines - With 50" Travel . . . . .	1
4AH-417	148353	Cap - Bearing Left . . . . .	1	4AH-436D	3343	Screw . . . . .	2
4AH-418	3404	Screw . . . . .	1	4AH-437		Shoe - Gib Clamp . . . . .	
4AH-419	3343	Screw . . . . .	1		161930	No. 2 Machines . . . . .	1
4AH-420	152651	Lever - Knockout . . . . .	1		149673	No. 3 Machines . . . . .	1
4AH-421	146933	Cap - Lead Screw Nut . . . . .	1		149732	No. 4 Machines . . . . .	1
4AH-422	148401	Cap - Bevel Gear Bearing . . . . .	1	4AH-438	2260	Screw . . . . .	1

# LEFT HAND GUIDE AND BRACKET UNDER SADDLE



CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

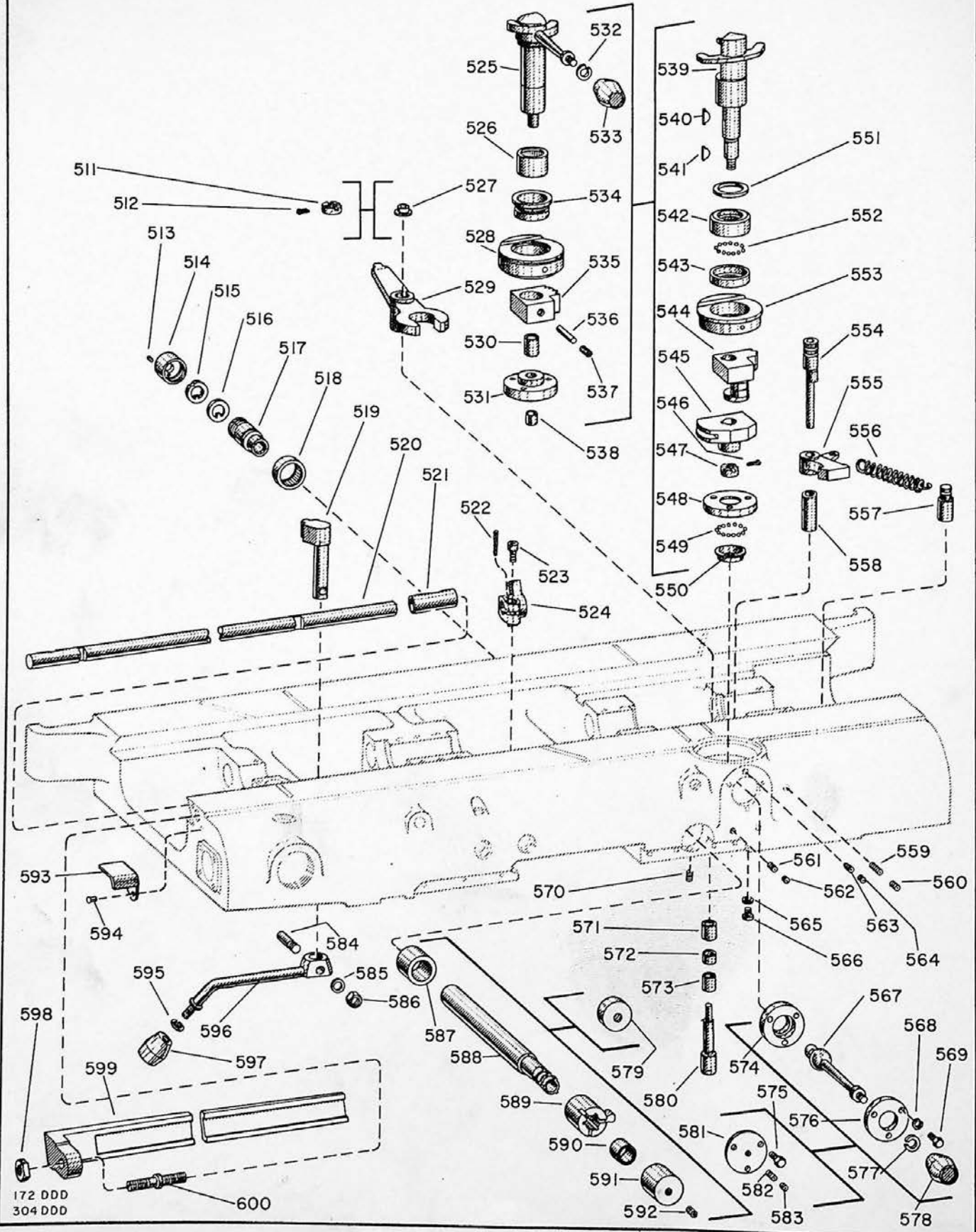
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SADDLE TABLE-UNIT No. 4AH (Concluded)

Nos. 2, 3, AND 4 PLAIN AND VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED	
4AH-439	3203	Screw		4AH-469	4326	Knob - Lever	1	
	3203	No. 2 Machines	10	4AH-470	144170	Dog - Saddle Table	1	
	3203	No. 3 Machines	11	4AH-471	3478	Nut	1	
4AH-440	3203	No. 4 Machines	12	4AH-472	3162	Pin	1	
	147014	Guard - Water		4AH-473	3217	Screw	1	
	161005	No. 2 Machines	1	4AH-474	3478	Nut	1	
	148386	No. 2 Machines - With 34" Travel	1	4AH-475	144169	Dog - Saddle Table Cross Rear	1	
	159079	No. 3 Machines	1	4AH-476	3220	Bolt	1	
	149729	No. 3 Machines - With 42" Travel	1	4AH-477	3162	Pin	1	
	161876	No. 4 Machines	1	4AH-478	3396	Screw	1	
4AH-441		No. 4 Machines - With 50" Travel	1	4AH-479		Bracket - Under Saddle		
	147015	Gasket - Water Guard			158737	No. 2 Machines	1	
	161006	No. 2 Machines	1		148359	No. 3 Machines	1	
	148385	No. 2 Machines - With 34" Travel	1		149727	No. 4 Machines	1	
	159077	No. 3 Machines	1	4AH-480	1917	Screw	1	
	149728	No. 3 Machines - With 42" Travel	1	4AH-481	3232	Screw	1	
	161877	No. 4 Machines	1	4AH-482		Cap - Cover		
4AH-442	145045	No. 4 Machines - With 50" Travel	1		161496	No. 2 Machines	1	
4AH-443	144149	Bushing - Stem Bevel Gear	1		161483	Nos. 3 & 4 Machines	1	
4AH-444	148361	Gear - Bevel Stem	1	4AH-483		Packing - Washer		
		Wiper - Front, Right			161492	No. 2 Machines	1	
		Nos. 3 & 4 Machines	1		161009	Nos. 3 & 4 Machines	1	
4AH-445	148365	Clamp - Wiper Right Front		4AH-484		Packing - Spline Shaft		
		Nos. 3 & 4 Machines	1		161493	No. 2 Machines	1	
4AH-446	3204	Screw			161007	Nos. 3 & 4 Machines	1	
		Nos. 3 & 4 Machines	4	4AH-485		Cap - Bracket Under Saddle		
4AH-447		Gib - Saddle Upper Left			161497	No. 2 Machines	1	
	144161	No. 2 Machines	1		161491	Nos. 3 & 4 Machines	1	
	148376	No. 3 Machines	1	4AH-486		Bushing - Gear - Bracket Under Saddle		
	149731	No. 4 Machines	1		161494	No. 2 Machines	1	
4AH-448	148632	Wiper - Right Front			161018	Nos. 3 & 4 Machines	1	
		Nos. 3 & 4 Machines	1	4AH-487		Washer - Thrust		
4AH-449	160478	Clamp - Wiper Right Front			161495	No. 2 Machines	1	
		Nos. 3 & 4 Machines	1		161482	Nos. 3 & 4 Machines	1	
4AH-450	63606	Screw - Gib Adjusting	1	4AH-488		Gear - Bracket - Under Saddle		
4AH-451		Wiper - Left Front			161498	No. 2 Machines	1	
	149621	No. 2 Machines	1		161490	Nos. 3 & 4 Machines	1	
	148360	Nos. 3 & 4 Machines	1	4AH-489	146097	Gasket	1	
4AH-452		Clamp - Wiper Left Front			4AH-490	Spacer	1	
	149620	No. 2 Machines	1		146421			
	148363	Nos. 3 & 4 Machines	1		4AH-491	1844	Plug	2
4AH-453	3204	Screw	3		4AH-492	108219	Screw	2
4AH-454	151705	Bushing	1		4AH-493		Screw	
4AH-455		Gear - Bracket Under Saddle				1929	No. 2 Machines	4
	144137	No. 2 Machines	1			3408	Nos. 3 & 4 Machines	3
	146895	Nos. 3 & 4 Machines	1	4AH-494		Gib - Saddle Lower Right		
4AH-456	144368	Wiper - Right Front			144162	No. 2 Machines	1	
		No. 2 Machines	1		148377	No. 3 Machines	1	
4AH-457	144377	Clamp - Wiper Right Front			149730	No. 4 Machines	1	
		No. 2 Machines	1	4AH-495	63606	Screw - Gib Adjusting	1	
4AH-458	3204	Screw		4AK-496		Cover - Spline Shaft		
		No. 2 Machines	3		144692	No. 2 Machines	1	
4AH-459		Guide - Saddle Left Hand			146358	No. 3 Plain Machines	1	
	144133	No. 2 Machines	1		146359	No. 4 Plain Machines	1	
	148381	No. 3 Machines	1		146357	Nos. 3 & 4 Vertical Machines	1	
	149707	No. 4 Machines	1	4AK-787		Plug - Cover Spline Shaft		
4AH-460	3220	Bolt	1		132594	No. 2 Machines	1	
4AH-461		Dog			146221	Nos. 3 & 4 Machines	1	
	144178	No. 2 Machines	1	4AH-498	3203	Screw	3	
	144178	Nos. 3 & 4 Plain Machines	1	4AH-499	3199	Screw	3	
	161037	Nos. 3 & 4 Vertical Machines	1	4AH-500		Screw		
4AH-462		Dog - Positive Stop			3400	No. 2 Machines	3	
	144164	No. 2 Machines	1		3400	Nos. 3 & 4 Machines	4	
	144164	Nos. 3 & 4 Plain Machines	1	4AH-501	3383	Pin	1	
	161036	Nos. 3 & 4 Vertical Machines	1	4AH-502	3396	Screw	3	
4AH-463		Screw		4AH-503	144146	Tube	1	
	1952	No. 2 Machines	4	4AH-504	161080	Shaft - Eccentric Saddle Clamp	1	
	1952	Nos. 3 & 4 Machines	5	4AH-505	1844	Plug	1	
4AH-464		Gib - Saddle Lower Left		4AH-506	1930	Screw	1	
	144160	No. 2 Machines	1	4AH-507		Nut - Bracket - Under Saddle		
	148377	No. 3 Machines	1		119351	English	1	
	149730	No. 4 Machines	1		119352	Metric	1	
4AH-465	63606	Screw - Gib Adjusting	1	4AH-508	1844	Plug	1	
4AH-466	161082	Lever - Clamp Eccentric	1	4AH-509	3211	Screw	1	
4AH-467	3474	Nut	1	4AH-510		Screw		
4AH-468	4329	Washer	1		3268	No. 2 Machines	1	
					1952	Nos. 3 & 4 Machines	2	

### FEED TRIP LINKAGE



172 DDD  
304 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SADDLE TABLE-UNIT No. 4AH (Continued)  
Nos. 2, 3, AND 4 PLAIN AND VERTICAL MACHINES

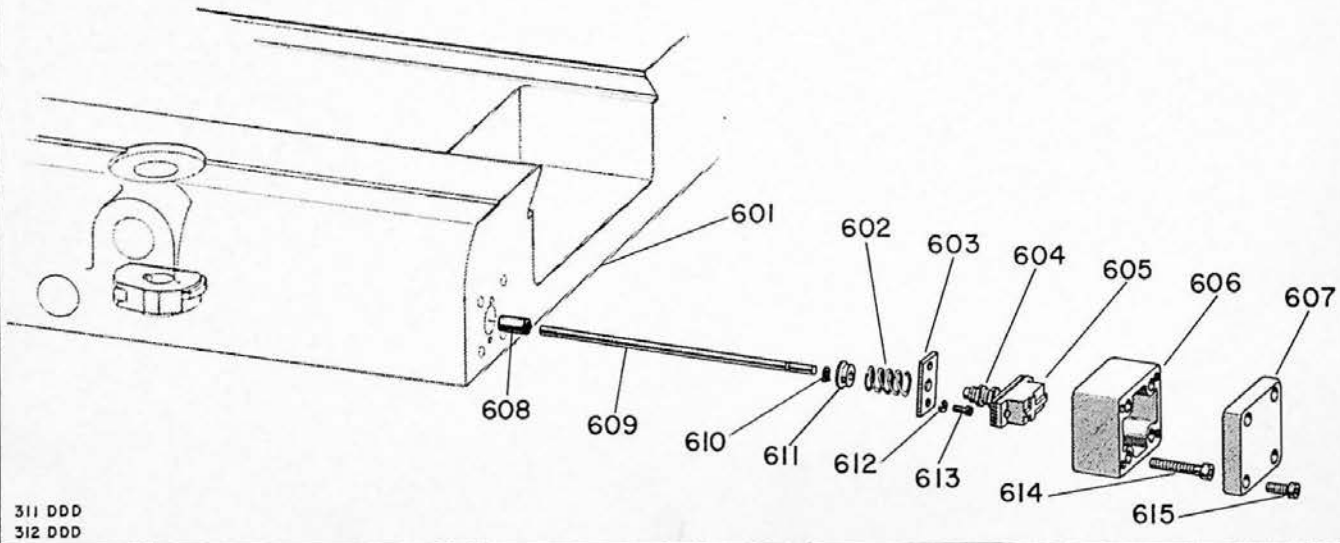
KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AH-511	141312	Nut - Lock No. 2 Machines . . . . .	1	4AH-555	144155	Lever - Detent . . . . .	1
4AH-512	3496	Screw No. 2 Machines . . . . .	1	4AH-556	131694	Spring - Detent Lever . . . . .	1
4AH-513	3229	*Screw . . . . .	1	4AH-557	118176	Pin - Spring . . . . .	1
4AH-514	108328	*Cap - Retainer . . . . .	1	4AH-558	141309	Sleeve . . . . .	1
4AH-515	108323	*Retainer - Wiper Control Shaft . . . . .	1	4AH-559	3235	Screw . . . . .	1
4AH-516	108322	*Wiper - Control Shaft . . . . .	1	4AH-560	1911	Screw . . . . .	1
4AH-517	151715	*Driver - Trip Plunger Sleeve . . . . .	1	4AH-561	3233	Screw . . . . .	2
4AH-518	118177	*Bearing - Needle . . . . .	1	4AH-562	2356	Screw . . . . .	2
4AH-519		Shaft - Lever Pilot No. 2 Machines . . . . .	1	4AH-563		Screw No. 2 Machines . . . . .	1
	157903	Nos. 3 & 4 Machines . . . . .	1		2344	Nos. 3 & 4 Machines . . . . .	1
4AH-520	157902	Shaft - Control No. 2 Machines . . . . .	1	4AH-564	2355	Screw . . . . .	1
	152665	Nos. 3 & 4 Machines . . . . .	1	4AH-565	936	Washer . . . . .	3
4AH-521	148379	Bushing - Control Shaft . . . . .	1	4AH-566	3203	Screw . . . . .	3
4AH-522	144172	Pin . . . . .	1	4AH-567	118235	*Lever - Table Feed Trip . . . . .	1
4AH-523	14556	Screw . . . . .	1	4AH-568	2123	*Washer . . . . .	3
4AH-524	3396	Fork - Clutch . . . . .	1	4AH-569	3378	*Screw . . . . .	3
4AH-525	148371	Lever - Table Feed Trip No. 2 Machines . . . . .	1	4AH-570	3232	Screw . . . . .	1
	158709	No. 3 Machines . . . . .	1	4AH-571	94978	Bearing . . . . .	1
	158700	No. 4 Machines . . . . .	1	4AH-572		Spacer - Needle Bearing No. 2 Machines . . . . .	1
4AH-526	79763	Bearing - Needle . . . . .	1		141311	Nos. 3 & 4 Machines . . . . .	1
4AH-527	148367	Spacer - Shifter Fork No. 3 & 4 Machines . . . . .	1	4AH-573	94978	Bearing . . . . .	1
4AH-528	158706	Plug - Upper Bearing Trip Lever . . . . .	1	4AH-574	147125	*Socket - Ball Handle . . . . .	1
4AH-529		Fork - Trip Lever No. 2 Machines . . . . .	1	4AH-575	3219	Screw . . . . .	3
	158708	*No. 2 Machines . . . . .	1	4AH-576	33321	*Plate - Ball Handle . . . . .	1
	144128	No. 3 Machines . . . . .	1	4AH-577	2123	*Washer . . . . .	3
	158701	*No. 3 Machines . . . . .	1	4AH-578	4326	*Knob - Lever . . . . .	1
	148380	No. 4 Machines . . . . .	1	4AH-579	161149	Plug Stud - Shifter Fork No. 2 Machines . . . . .	1
	158703	*No. 4 Machines . . . . .	1		144201	Nos. 3 & 4 Machines . . . . .	1
	149658	Bearing - Needle . . . . .	1	4AH-581	148366	Cover - Control Handle . . . . .	1
4AH-530	76357	Bushing - Table Feed Trip Lever . . . . .	1	4AH-582	158702	Screw . . . . .	1
4AH-531	158707	Washer . . . . .	1	4AH-583	3233	Screw . . . . .	1
4AH-532	2135	Knob - Lever . . . . .	1	4AH-584	2301	Pin - Taper . . . . .	1
4AH-533	4326	Bushing - Upper Table Feed Lever . . . . .	1	4AH-585	104558	Washer . . . . .	1
4AH-534	142425	Detent . . . . .	1	4AH-586	3267	Nut . . . . .	1
4AH-535	142434	Pin . . . . .	1	4AH-587	3473	*Spacer - Trip Plunger Sleeve No. 2 Machines . . . . .	1
4AH-536	647	Screw . . . . .	1		151714	No. 3 & 4 Machines . . . . .	1
4AH-537	1911	Sleeve - Bearing Retainer . . . . .	1	4AH-588	152663	*Sleeve - Trip Plunger Shaft No. 2 Machines . . . . .	1
4AH-538	142587	*Plunger - Feed Trip . . . . .	1		151079	No. 3 Machines . . . . .	1
4AH-539	142660	*Key . . . . .	1		152660	No. 4 Machines . . . . .	1
4AH-540	3280	*Bushing - Upper Feed Trip Plunger . . . . .	1	4AH-589	152661	*Lever . . . . .	1
4AH-541	3280	*Rotainer - Ball Bearing . . . . .	1	4AH-590	152666	*Bushing . . . . .	1
4AH-542	119893	*Eccentric . . . . .	1	4AH-591	151728	*Bushing - Trip Plunger Shaft No. 2 Machines . . . . .	1
4AH-543	119894	*Lever - Plunger Shifter Without Automatic Spindle Stop . . . . .	1		151731	Nos. 3 & 4 Machines . . . . .	1
4AH-544	144138	With Automatic Spindle Stop . . . . .	1	4AH-592	1911	*Screw . . . . .	1
4AH-545	147321	*Pin . . . . .	1	4AH-593	67741	Guard - Table Gib . . . . .	1
	160395	*Nut - Feed Trip Plunger . . . . .	1	4AH-594	2209	Screw . . . . .	2
4AH-546	2095	*Race - Ball Lower Trip Plunger . . . . .	1	4AH-595	2135	Washer . . . . .	1
4AH-547	141344	*Ball . . . . .	17	4AH-596	159599	Lever - Rear Table Control . . . . .	1
4AH-548	147322	*Bushing . . . . .	1	4AH-597	4326	Knob - Lever . . . . .	1
4AH-549	30060	*Ring - Felt Trip Plunger . . . . .	1	4AH-598	3474	Nut . . . . .	1
4AH-550	141303	*Ball . . . . .	1	4AH-599		Gib - Table No. 2 Machines . . . . .	1
4AH-551	118175	*Plug - Upper Bearing Trip Plunger . . . . .	1		144159	No. 3 Machines . . . . .	1
4AH-552	2290	Stud - Detent Lever . . . . .	1		148375	No. 4 Machines . . . . .	1
4AH-553	141301		30		149613	Screw - Gib . . . . .	1
4AH-554	141308		1	4AH-600	3997		1

\* With Automatic Table Cycle



### AUTOMATIC SPINDLE STOP

NOS. 2, 3 AND 4 MACHINES



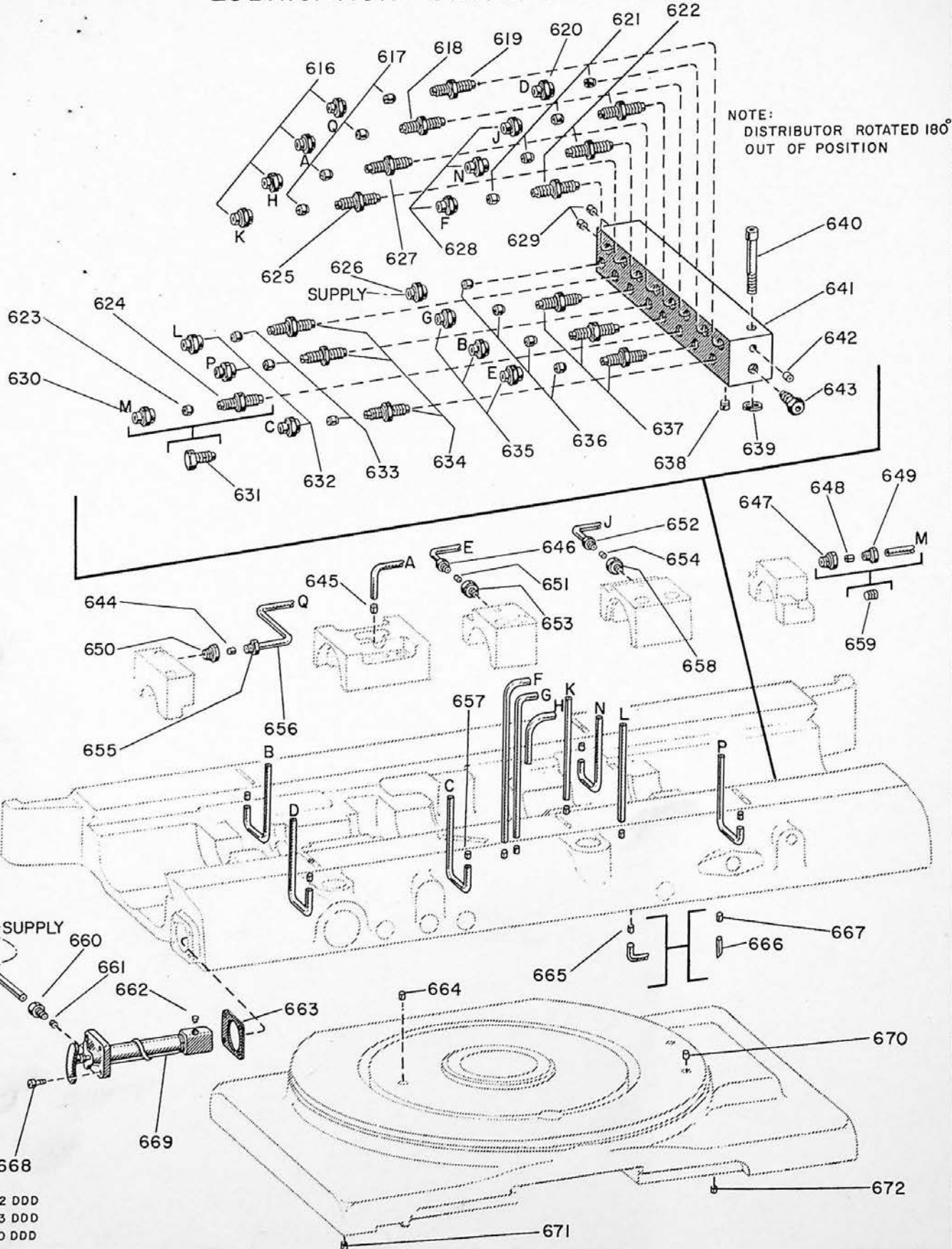
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SADDLE TABLE-UNIT No. 4AH (Continued)  
Nos. 2, 3, AND 4, PLAIN AND VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AH-601	160413	Saddle - Alteration		4AH-609	160412	Follower - Cam	
	160400	No. 2 Machines . . . . .	1		160399	No. 2 Machines . . . . .	1
	160408	No. 3 Machines . . . . .	1		160414	No. 3 Machines . . . . .	1
		No. 4 Machines . . . . .	1			No. 4 Machines . . . . .	1
4AH-602	160397	Spring - Switch . . . . .	1	4AH-610	244098	Ring - Truarc . . . . .	1
4AH-603	160394	Plate - Switch Mounting . . . . .	1	4AH-611	160396	Seat - Spring . . . . .	1
4AH-604	249816	Actuator . . . . .	1	4AH-612	205678	Washer - Lock . . . . .	2
4AH-605	249474	Switch - Limit . . . . .	1	4AH-613	3246	Screw . . . . .	2
4AH-606	160392	Case - Switch . . . . .	1	4AH-614	2325	Screw . . . . .	4
4AH-607	160393	Cover - Case - Switch . . . . .	1	4AH-615	2320	Screw . . . . .	4
4AH-608	160398	Bushing					
		Nos. 3 & 4 Machines Only . . . . .	1				

# LUBRICATION - UNIVERSAL MACHINE



92 DDD  
93 DDD  
180 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

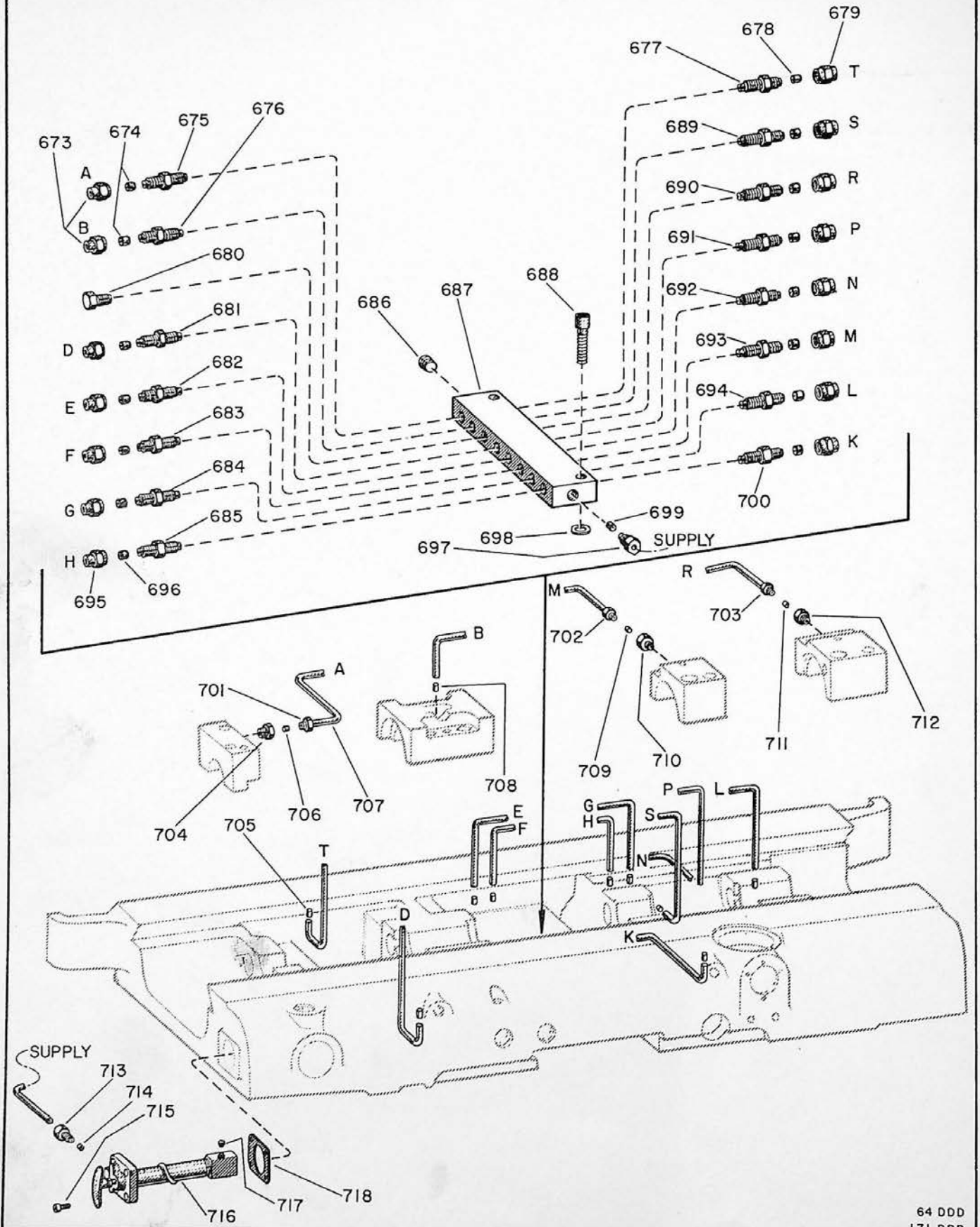
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SADDLE TABLE-UNIT No. 4AH (Continued)  
Nos. 2, 3, AND 4 UNIVERSAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AH-616	214294	Nut - Compression . . . . .	4	4AH-652	214300	Fitting . . . . .	1
4AH-617	214304	Fitting . . . . .	4	4AH-653	214303	Fitting . . . . .	1
4AH-618	220003	Fitting . . . . .	1	4AH-654	214304	Fitting . . . . .	1
4AH-619	220004	Fitting . . . . .	1	4AH-655	214300	Fitting . . . . .	1
4AH-620	214300	Fitting . . . . .	1	4AH-656		Tubing - Oil	
4AH-621	214304	Fitting . . . . .	4		144815	*No. 2 Machines . . . . .	1
4AH-622	77196	Fitting . . . . .	3		146317	No. 2 Machines . . . . .	1
4AH-623	214304	*Fitting . . . . .	1		149744	*No. 3 Machines . . . . .	1
4AH-624	77196	*Fitting . . . . .	1		149743	No. 3 Machines . . . . .	1
4AH-625	77196	Fitting . . . . .	1		148631	*No. 4 Machines . . . . .	1
4AH-626	214300	Fitting . . . . .	1		149717	No. 4 Machines . . . . .	1
4AH-627	220004	Fitting . . . . .	1	4AH-657	77197	Bushing - Oil Tube	9
4AH-628	214294	Fitting . . . . .	3	4AH-658	214303	Fitting . . . . .	1
4AH-629	1994	Plug . . . . .	2	4AH-659	76644	Plug . . . . .	1
4AH-630	214294	*Fitting . . . . .	1	4AH-660	214300	Fitting . . . . .	1
4AH-631	77411	Plug . . . . .	1	4AH-661	214304	Fitting . . . . .	1
4AH-632	214294	Fitting . . . . .	3	4AH-662	96267	Plug . . . . .	1
4AH-633	214304	Fitting . . . . .	3	4AH-663	96084	Gasket . . . . .	1
4AH-634	77196	Fitting . . . . .	3	4AH-664	2237	Bushing - Oil Tube	
4AH-635	214294	Fitting . . . . .	3			Nos. 3 & 4 Machines . . . . .	1
4AH-636	214304	Fitting . . . . .	4	4AH-665	77197	Bushing - Oil Tube	
4AH-637	77196	Fitting . . . . .	3			No. 2 Machines . . . . .	1
4AH-638	1994	Plug . . . . .	1	4AH-666	149706	Tubing - Oil	
4AH-639	230934	Washer . . . . .	2			Nos. 3 & 4 Machines . . . . .	1
4AH-640	2323	Screw . . . . .	2	4AH-667	2237	Bushing - Oil Tube	
4AH-641	144366	Distributor - Lubrication Oil . . . . .	1			Nos. 3 & 4 Machines . . . . .	1
4AH-642	1994	Plug . . . . .	1	4AH-668	3218	Screw . . . . .	4
4AH-643	77411	Plug . . . . .	1	4AH-669	96257	Pump - Lubrication . . . . .	1
4AH-644	214304	Fitting . . . . .	1	4AH-670		Bushing - Oil Tube	
4AH-645	77197	Bushing - Oil Tube . . . . .	1		77197	No. 2 Machines . . . . .	1
4AH-646	214300	Fitting . . . . .	1		2237	Nos. 3 & 4 Machines . . . . .	1
4AH-647	214303	*Fitting . . . . .	1	4AH-671	2237	Bushing - Oil Tube	
4AH-648	214304	*Fitting . . . . .	1			Nos. 3 & 4 Machines . . . . .	1
4AH-649	214300	*Fitting . . . . .	1	4AH-672		Bushing - Oil Tube	
4AH-650	214303	Fitting . . . . .	1		77197	No. 2 Machines . . . . .	1
4AH-651	214304	Fitting . . . . .	1		2237	Nos. 3 & 4 Machines . . . . .	1

\* With Long and Short Lead

LUBRICATION - PLAIN AND VERTICAL



64 DDD  
171 DDD

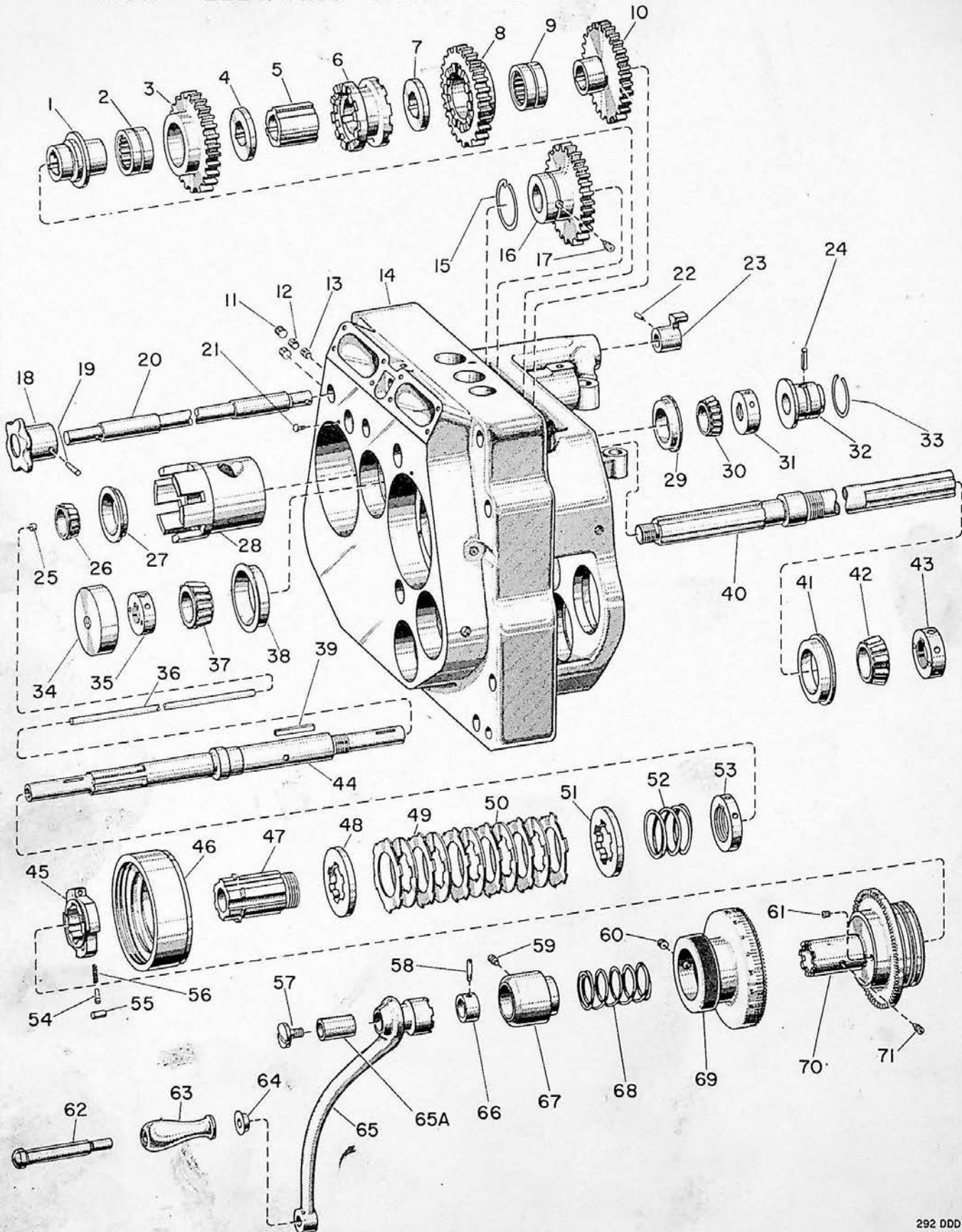
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

SADDLE TABLE-UNIT No. 4AH (Concluded)  
Nos. 2, 3, AND 4 PLAIN AND VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AH-673	214294	Nut - Compression . . . . .	2	4AH-698	230934	Washer . . . . .	2
4AH-674	214304	Fitting . . . . .	2	4AH-699	214304	Fitting . . . . .	1
4AH-675	77196	Fitting . . . . .	1	4AH-700	77196	Fitting . . . . .	1
4AH-676	220003	Fitting . . . . .	1	4AH-701	214300	Fitting . . . . .	1
4AH-677	77196	Fitting . . . . .	1	4AH-702	214300	Fitting . . . . .	1
4AH-678	214304	Fitting . . . . .	8	4AH-703	214300	Fitting . . . . .	1
4AH-679	214294	Nut - Compression . . . . .	8	4AH-704	214303	Fitting . . . . .	1
4AH-680	77411	Plug - Closure . . . . .	1	4AH-705	77197	Bushing - Oil Tube . . . . .	9
4AH-681	77196	Fitting . . . . .	1	4AH-706	214304	Fitting . . . . .	1
4AH-682	220004	Fitting . . . . .	1	4AH-707		Tubing - List	
4AH-683	220004	Fitting . . . . .	1		147028	No. 2 Machines . . . . .	1
4AH-684	220004	Fitting . . . . .	1		148370	No. 3 Machines . . . . .	1
4AH-685	220004	Fitting . . . . .	1		149751	No. 4 Machines . . . . .	1
4AH-686	76644	Plug - Pipe . . . . .	1	4AH-708	77197	Bushing - Oil Tube . . . . .	1
4AH-687	144154	Distributor - Lubrication Oil . . . . .	1	4AH-709	214304	Fitting . . . . .	1
4AH-688	2321	Screw . . . . .	2	4AH-710	214303	Fitting . . . . .	1
4AH-689	77196	Fitting . . . . .	1	4AH-711	214304	Fitting . . . . .	1
4AH-690	220003	Fitting . . . . .	1	4AH-712	214303	Fitting . . . . .	1
4AH-691	220004	Fitting . . . . .	1	4AH-713	214300	Fitting . . . . .	1
4AH-692	220004	Fitting . . . . .	1	4AH-714	214304	Fitting . . . . .	1
4AH-693	77196	Fitting . . . . .	1	4AH-715	3218	Screw . . . . .	1
4AH-694	220003	Fitting . . . . .	1	4AH-716	96257	Pump - Lubrication . . . . .	4
4AH-695	214294	Nut - Compression . . . . .	5	4AH-717	96267	Plug - Lubrication Pump . . . . .	1
4AH-696	214304	Fitting . . . . .	5	4AH-718	96084	Gasket . . . . .	1
4AH-697	214300	Fitting . . . . .	1				

FRONT ELEVATING SHAFT AND FEED CHANGE SHAFT



292 DDD  
297 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

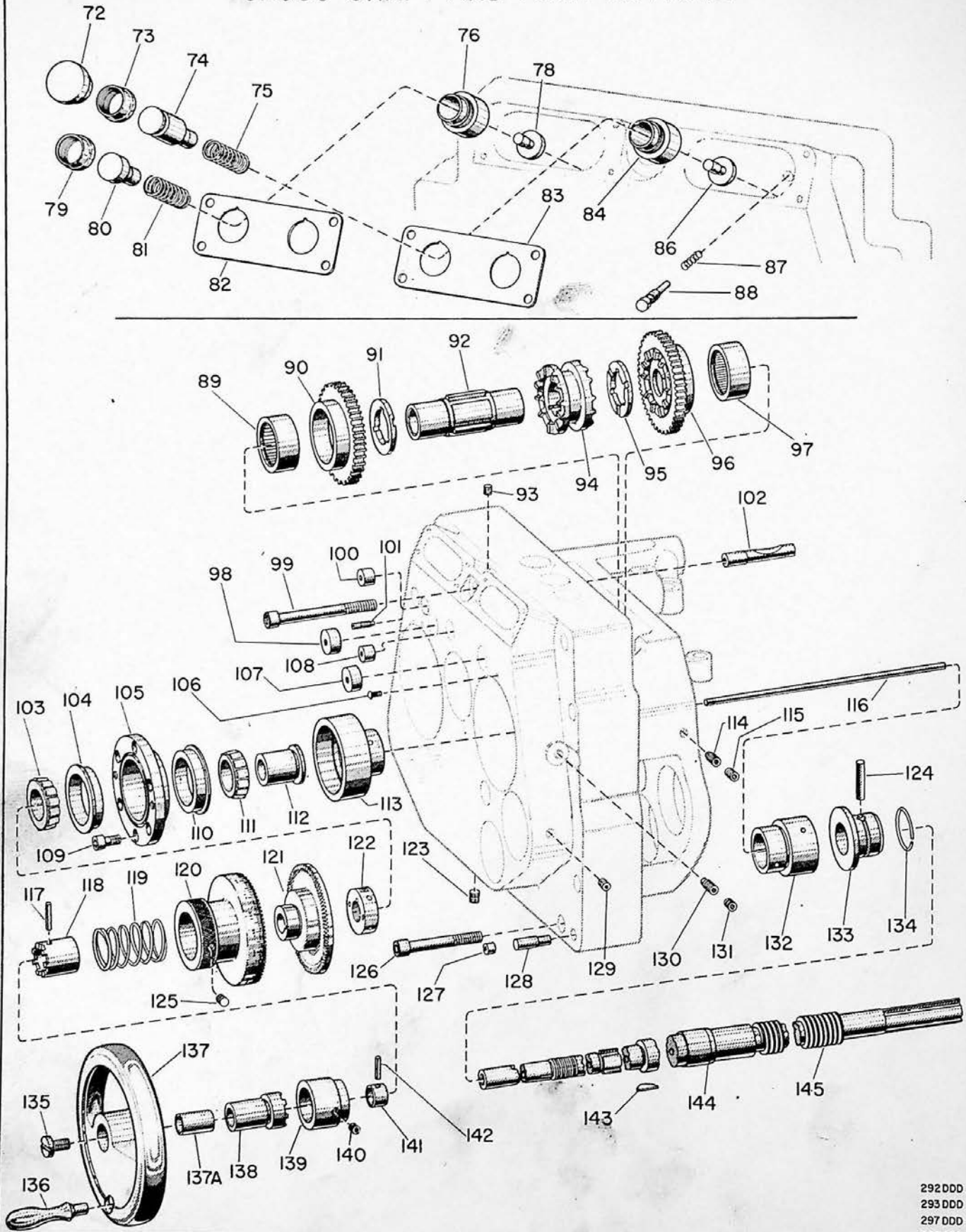
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

FRONT BRACKET-UNIT No. 4ACY  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4ACY-1	151010	Bushing - Roller Bearing Elevating	1	4ACY-38	74199	Cup - Roller Bearing	1
4ACY-2	231379	Bearing - Cyclops	1	4ACY-39	965	Key	1
4ACY-3	144119	Gear - Clutch Elevating Shaft	1	4ACY-40		Shaft - Front Power Elevating	
4ACY-4	108280	Washer - Pinion Shaft	1		151085	No. 2 Machines	1
4ACY-5	108281	Spacer	1		146370	No. 3 Plain & Universal Machines	1
4ACY-6	144117	Clutch - Elevating Feed	1		146369	No. 3 Vertical Machines	1
4ACY-7	108280	Washer - Pinion Shaft	1		146369	No. 4 Machines	1
4ACY-8	144119	Gear - Clutch Elevating Shaft	1	4ACY-41	4199	Cup - Roller Bearing	1
4ACY-9	231379	Bearing - Cyclops	1	4ACY-42	78418	Cone - Roller Bearing	1
4ACY-10		Gear - Elevating Shaft - 44 T		4ACY-43	4245	Nut - Lock	1
	161071	English	1	4ACY-44	154478	Shaft - Front Elevating	1
	162757	Metric	1	4ACY-45	108457	Coupling - Elevating Brake	1
4ACY-11	76645	Plug	2	4ACY-46	144606	Retainer - Oil	1
4ACY-12	1911	Screw	1	4ACY-47	112658	Bushing	1
4ACY-13	3232	Screw	1	4ACY-48	112657	Washer - Brake Clutch	1
4ACY-14	160693	Bracket - Front	1	4ACY-49	64515	Plate - Driving Clutch	6
4ACY-15	62693	Spring - Ring	1	4ACY-50	64516	Plate - Friction	5
4ACY-16		Gear - Vertical Shaft		4ACY-51	112657	Washer - Brake Clutch	1
	161072	English	1	4ACY-52	112656	Spring - Safety Clutch	1
	162758	Metric	1	4ACY-53	4191	Nut - Lock	1
4ACY-17	3232	Screw	1	4ACY-54	108263	Plunger - Brake Roller	4
4ACY-18	153411	Knob - Feed Change	1	4ACY-55	108265	Roller - Clutch	4
4ACY-19	663	Pin	1	4ACY-56	222941	Spring	4
4ACY-20	153695	Shaft - Feed Change Front	1	4ACY-57	3514	Screw - Handwheel	1
4ACY-21	115480	Button - Zero Line	1	4ACY-58	66254	Pin - In Collar Short	1
4ACY-22	141	Pin	1	4ACY-59	3232	Screw	1
4ACY-23	143963	Lever - Feed Change Front	1	4ACY-60	70434	Plug - Check & Pass Valve	1
4ACY-24	144601	Pin - Vertical Knockout	1	4ACY-61	224107	Plug - Pipe	1
4ACY-25	2268	Plug	1	4ACY-62	3503	Stud - Spool Handle	1
4ACY-26	95585	Cone - Bearing Roller	1	4ACY-63	3505	Handle - Spool	1
4ACY-27	95586	Cup - Bearing Roller	1	4ACY-64	3504	Collar - Handle	1
4ACY-28	144113	Retainer - Friction Ring	1	4ACY-65	162756	Crank - Elevating Front	1
4ACY-29	95586	Cup - Bearing Roller	1	4ACY-65A	158874	Bushing	1
4ACY-30	95585	Cone - Bearing Roller	1	4ACY-66	66249	Collar - Small	1
4ACY-31	4242	Nut - Lock	1	4ACY-67	144603	Sleeve - Elevating Crank	1
4ACY-32	158127	Sleeve - Vertical Knockout	1	4ACY-68	164879	Spring	1
4ACY-33	149821	Spring - Ring	1	4ACY-69		Dial - Vertical Feed	
4ACY-34	93642	Plug - Swivel Housing	1		161069	English	1
4ACY-35	4242	Nut - Lock	1		162092	Metric	1
4ACY-36	154479	Rod - Vertical Knockout	1	4ACY-70	161070	Clutch Vertical Dial	1
4ACY-37	78418	Cone - Roller Bearing	1	4ACY-71	3232	Screw	1



CROSS SHAFT AND PUSH BUTTONS



292000  
293000  
297000  
325000

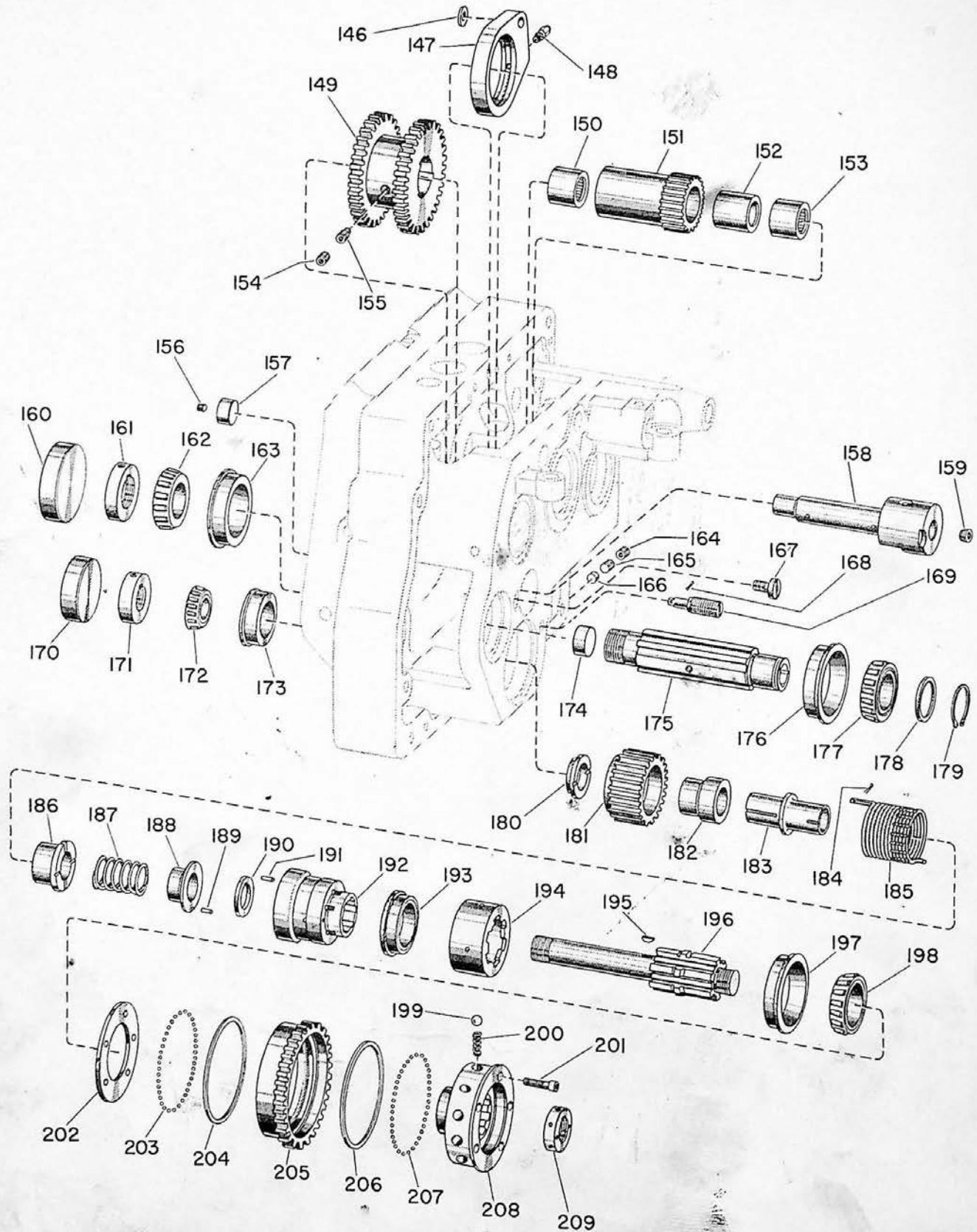
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

FRONT BRACKET-UNIT No. 4ACY (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AM-72	154451	Button - Mushroom . . . . .	1	4ACY-118	144602	Clutch - Cross Feed Shaft Front . . . . .	1
4AM-73	157701-B	Ring - Button . . . . .	1	4ACY-119	164879	Spring . . . . .	1
4ACY-74	159717	Button - Push, Long . . . . .	1	4ACY-120		Dial - Cross Feed	
4ACY-75	257050	Spring - Plunger . . . . .	2		144596	English . . . . .	1
4ACY-76	165776	Sleeve - Push Button . . . . .	2		145634	Metric . . . . .	1
4ACY-78	157543	Tail - Push Button . . . . .	2	4ACY-121		Clutch - Cross Feed	
4AM-79	157701-A	Ring - Button . . . . .	3		144107	English . . . . .	1
4ACY-80	159589	Button - Push, Short . . . . .	3		145633	Metric . . . . .	1
4ACY-81	257050	Spring - Plunger . . . . .	2	4ACY-122	4243	Nut - Lock . . . . .	1
4ACY-82	154427	Plate - Front Mounting . . . . .	1	4ACY-123	76645	Plug . . . . .	1
4ACY-83	154427	Plate - Front Mounting . . . . .	1	4ACY-124	144600	Pin - Cross Knockout . . . . .	1
4ACY-84	165776	Sleeve - Push Button . . . . .	2	4ACY-125	70434	Plug - Check & Pass Valve . . . . .	1
4ACY-86	157543	Tail - Push Button . . . . .	2	4ACY-126	3321	Screw . . . . .	7
4ACY-87	203247	Spring . . . . .	4	4ACY-127	3529	Plug . . . . .	2
4ACY-88	166170	Pin - Push Button . . . . .	4	4ACY-128	1629	Pin . . . . .	2
4ACY-89	108279	Bearing - Needle . . . . .	1	4ACY-129	76645	Plug . . . . .	1
4ACY-90	144123	Gear - Clutch Cross Feed . . . . .	1	4ACY-130	3234	Screw . . . . .	1
4ACY-91	131980	Washer - Cross Screw . . . . .	1	4ACY-131	3211	Screw . . . . .	1
4ACY-92	144121	Sleeve - Cross Screw . . . . .	1	4ACY-132	144057	Bushing - Roller Bearing Cross . . . . .	1
4ACY-93	76644	Plug . . . . .	1	4ACY-133	158126	Sleeve - Cross Knockout . . . . .	1
4ACY-94	144118	Clutch - Cross Feed . . . . .	1	4ACY-134	137326	Spring - Ring . . . . .	1
4ACY-95	131980	Washer - Cross Screw . . . . .	1	4ACY-135	3514	Screw - Handwheel . . . . .	1
4ACY-96	144123	Gear - Clutch Cross Feed . . . . .	1	4ACY-136	3502	Handle - Large . . . . .	1
4ACY-97	108279	Bearing - Needle . . . . .	1	4ACY-137	161095	Handwheel . . . . .	1
4ACY-98	73411	Plug . . . . .	1	4ACY-137A	233820	Bushing . . . . .	1
4ACY-99	3319	Screw . . . . .	1	4ACY-138	161092	Clutch - Handwheel . . . . .	1
4ACY-100	3549	Plug . . . . .	1	4ACY-139	109957	Bushing - Retaining Spring . . . . .	1
4ACY-101	3234	Screw . . . . .	1	4ACY-140	3232	Screw . . . . .	1
4ACY-102	160000	Trough - Oil . . . . .	1	4ACY-141	66249	Collar - Small . . . . .	1
4ACY-103	108535	Cone - Roller Bearing . . . . .	1	4ACY-142	66254	Pin - In Collar Short . . . . .	1
4ACY-104	72213	Cup - Roller Bearing . . . . .	1	4ACY-143	3280	Key . . . . .	1
4ACY-105	144106	Housing - Bearing . . . . .	1	4ACY-144	152548	Collar - Cross Screw . . . . .	1
4ACY-106	115480	Button - Zero Line . . . . .	1	4ACY-145		Screw - Cross	
4ACY-107	73411	Plug . . . . .	1		144611	No. 2 Machines - English . . . . .	1
4ACY-108	3549	Plug . . . . .	1		145635	No. 2 Machines - Metric . . . . .	1
4ACY-109	3399	Screw . . . . .	6		146366	No. 3 Plain & Universal Machines English . . . . .	1
4ACY-110	72213	Cup - Roller Bearing . . . . .	1		146367	No. 3 Plain & Universal Machines Metric . . . . .	1
4ACY-111	108535	Cone - Roller Bearing . . . . .	1		146364	No. 3 Vertical Machines - English . . . . .	1
4ACY-112	144108	Bushing - Roller Bearing Cross . . . . .	1		146363	No. 3 Vertical Machines - Metric . . . . .	1
4ACY-113	144120	Bushing - Roller Bearing Cross . . . . .	1		146364	No. 4 Machines - English . . . . .	1
4ACY-114	3234	Screw . . . . .	1		146363	No. 4 Machines - Metric . . . . .	1
4ACY-115	3211	Screw . . . . .	1		146364		
4ACY-116	144598	Rod - Cross Knockout . . . . .	1		146363		
4ACY-117	663	Pin . . . . .	1				

# REVERSE AND SAFETY GEAR SHAFTS



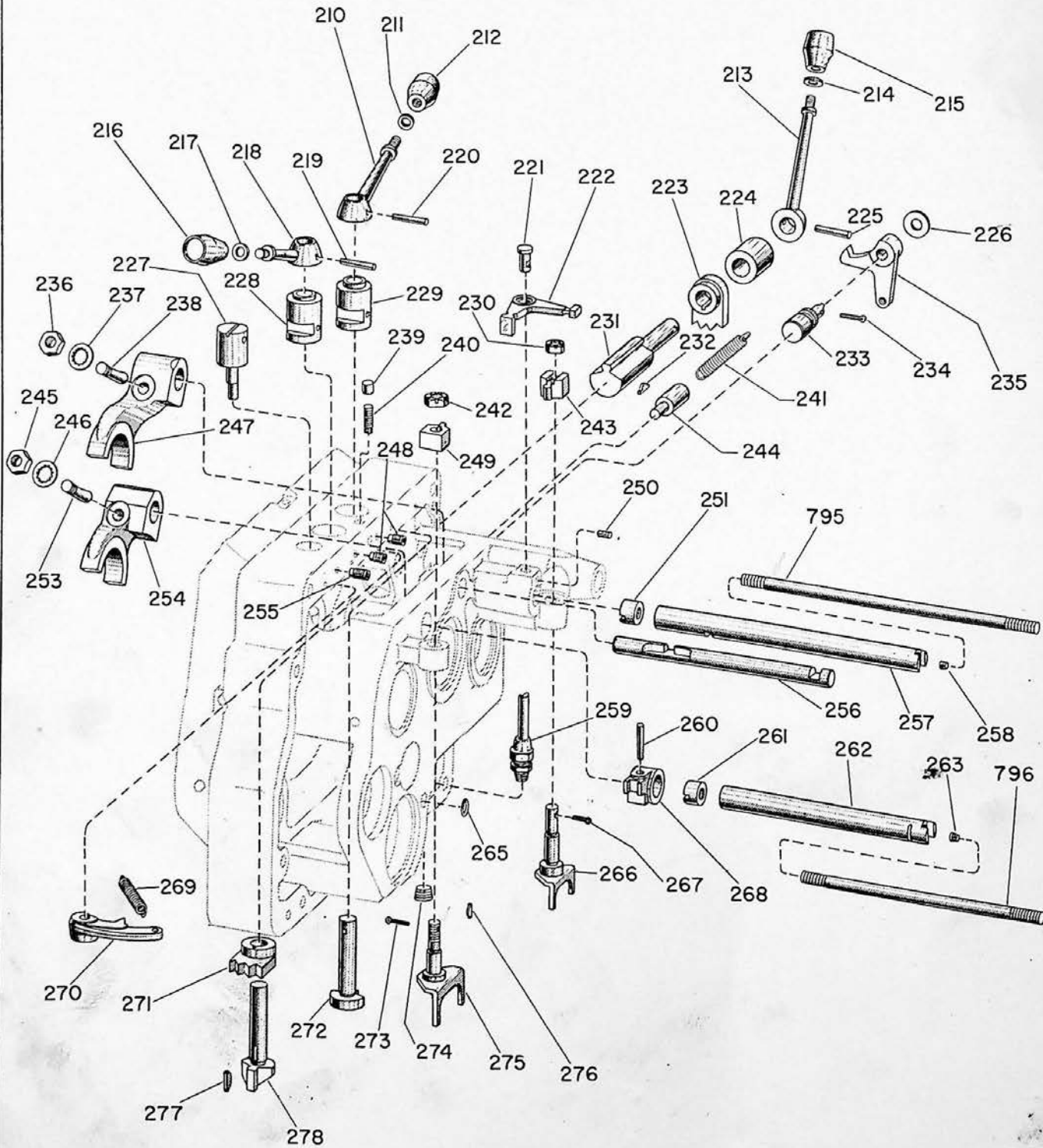
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

FRONT BRACKET-UNIT No. 4ACY (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4ACY-146	3441	Washer . . . . .	1	4ACY-178	144768	Washer - Bearing Spacer . . . . .	1
4ACY-147	149459	Arm - Distributor . . . . .	1	4ACY-179	237431	Ring - Retaining . . . . .	1
4ACY-148	89866	Coupling - Fitting . . . . .	1	4ACY-180	144774	Spacer - Clutch Shaft . . . . .	1
4ACY-149	144777	Gear - Spline Shaft . . . . .	1	4ACY-181	144782	Gear - Overdrive Feed Clutch . . . . .	1
4ACY-150	108529	Bearing - Needle . . . . .	1	4ACY-182	152540	Sleeve - Feed Clutch . . . . .	1
4ACY-151	144776	Gear - Reverse . . . . .	1	4ACY-183	152539	Bushing - Feed Clutch . . . . .	1
4ACY-152	144767	Collar - Spacer . . . . .	1	4ACY-184	3329	Pin . . . . .	1
4ACY-153	108529	Bearing - Needle . . . . .	1	4ACY-185	144779	Spring - Clutch . . . . .	1
4ACY-154	1911	Screw . . . . .	1	4ACY-186	152541	Collar - Coupling . . . . .	1
4ACY-155	3232	Screw . . . . .	1	4ACY-187	149463	Spring . . . . .	1
4ACY-156	2301	Screw . . . . .	1	4ACY-188	152542	Washer - Thrust . . . . .	1
4ACY-157	99953	Plug - Drive . . . . .	1	4ACY-189	3383	Pin . . . . .	1
4ACY-158	144778	Shaft - Reverse Gear . . . . .	1	4ACY-190	149456	Washer - Clamping . . . . .	1
4ACY-159	76644	Plug . . . . .	1	4ACY-191	149452	Pin - Pressure . . . . .	6
4ACY-160	93642	Plug - Swivel Housing . . . . .	1	4ACY-192	149460	Hub - Clutch Driving . . . . .	1
4ACY-161	4247	Nut - Lock . . . . .	1	4ACY-193	149458	Piston - Feed Clutch . . . . .	1
4ACY-162	78418	Cone - Roller Bearing . . . . .	1	4ACY-194	149455	Cylinder - Feed Clutch . . . . .	1
4ACY-163	74199	Cup - Roller Bearing . . . . .	1	4ACY-195	3279	Key . . . . .	1
4ACY-164	2356	Screw . . . . .	1	4ACY-196	149454	Shaft - Safety Gear . . . . .	1
4ACY-165	1911	Screw . . . . .	1	4ACY-197	97897	Cup - Roller Bearing . . . . .	1
4ACY-166	2268	Plug . . . . .	1	4ACY-198	93673	Cone - Roller Bearing . . . . .	1
4ACY-167	104202	Screw - Bevel Gear Shaft . . . . .	1	4ACY-199	36147	Ball . . . . .	10
4ACY-168	2095	Pin - Cotter . . . . .	1	4ACY-200	144765	Spring - Safety Gear . . . . .	10
4ACY-169	149451	Stud - Screw . . . . .	1	4ACY-201	3397	Screw . . . . .	5
4ACY-170	3947	Plug . . . . .	1	4ACY-202	108446	Retainer - Safety Gear . . . . .	1
4ACY-171	4243	Nut - Lock . . . . .	1	4ACY-203	2290	Ball . . . . .	73
4ACY-172	90367	Cone - Roller Bearing . . . . .	1	4ACY-204	108445	Ring - Safety Gear Spacer . . . . .	1
4ACY-173	72196	Cup - Roller Bearing . . . . .	1	4ACY-205	157313	Gear - Safety . . . . .	1
4ACY-174	3552	Plug . . . . .	1	4ACY-206	108445	Ring - Safety Gear Spacer . . . . .	1
4ACY-175	144775	Sleeve - Coupling . . . . .	1	4ACY-207	2290	Ball . . . . .	73
4ACY-176	74199	Cup - Roller Bearing . . . . .	1	4ACY-208	157314	Hub - Safety Gear . . . . .	1
4ACY-177	78418	Cone - Roller Bearing . . . . .	1	4ACY-209	4186	Nut - Lock . . . . .	1

CROSS AND RAPID TRAVERSE CONTROL LEVERS



37 DDD  
61 DDD  
292 DDD  
297 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

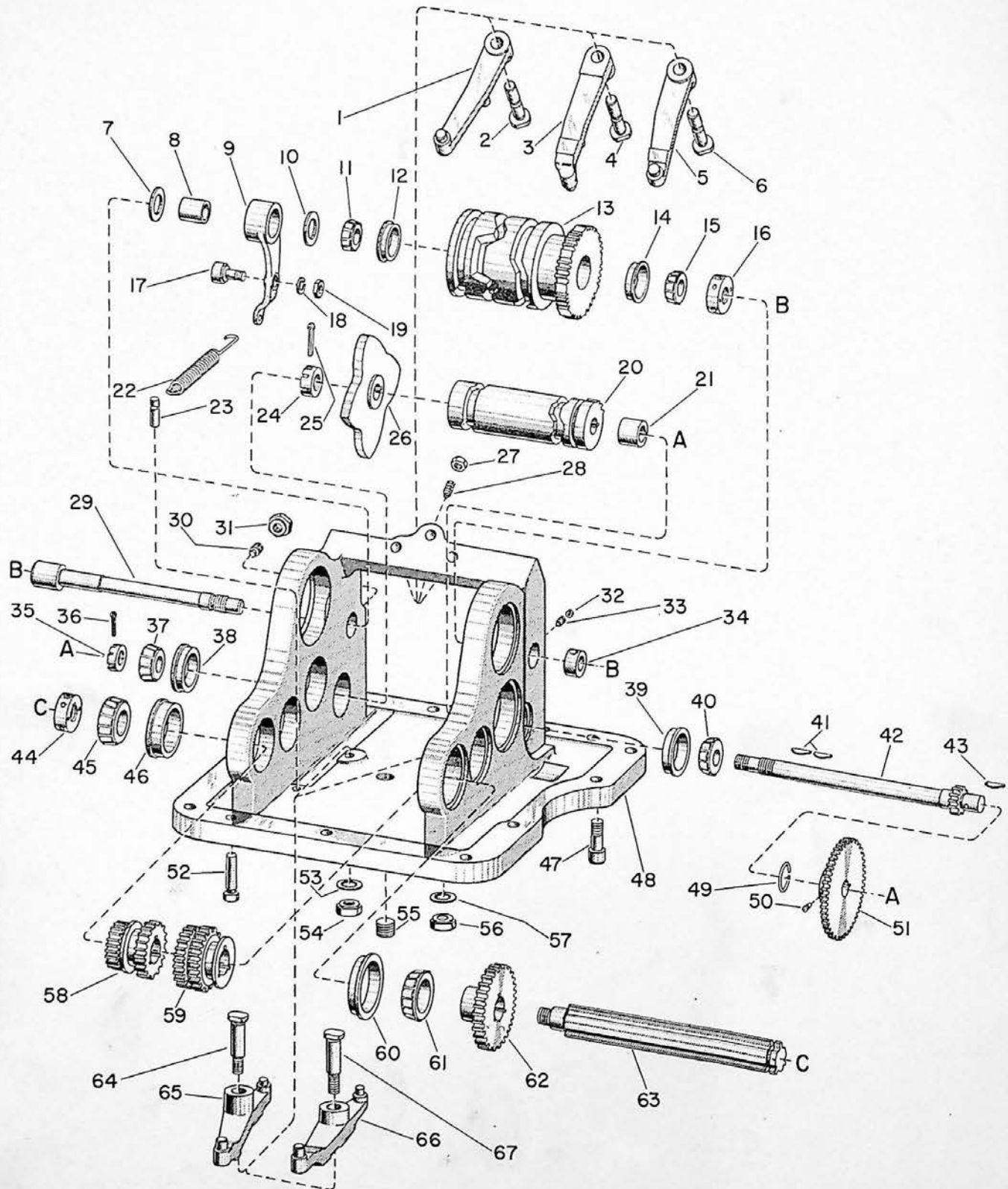
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

FRONT BRACKET-UNIT No. 4ACY (Concluded)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4ACY-210	144000	Lever - Front . . . . .	1	4ACY-245	3474	Nut . . . . .	1
4ACY-211	4328	Washer . . . . .	1	4ACY-246	3257	Washer . . . . .	1
4ACY-212	4326	Knob - Lever . . . . .	1	4ACY-247	144112	Fork - Vertical Feed Clutch . . . . .	1
4ACY-213	99905	Lever - Vertical Feed Rear . . . . .	1	4ACY-248	3232	Screw . . . . .	2
4ACY-214	4328	Washer . . . . .	1	4ACY-249	144025	Lever - Knockout Cross . . . . .	1
4ACY-215	4326	Knob - Lever . . . . .	1	4ACY-250	2333	Screw . . . . .	1
4ACY-216	4326	Knob - Lever . . . . .	1	4ACY-251	159393	Nut . . . . .	1
4ACY-217	4328	Washer . . . . .	1	4AK-795	159391	Stud - Elevating . . . . .	1
4ACY-218	144000	Lever - Front . . . . .	1	4ACY-253	48073	Pin - Lock . . . . .	1
4ACY-219	642	Pin . . . . .	1	4ACY-254	144111	Fork - Cross Feed Clutch . . . . .	1
4ACY-220	642	Pin . . . . .	1	4ACY-255	3232	Screw . . . . .	1
4ACY-221	153985	Stud - Valve Shifter . . . . .	1	4ACY-256	153974	Shaft - Rapid Traverse Front . . . . .	1
4ACY-222	144105	Arm - Rapid Traverse Valve Shifter . . . . .	1	4ACY-257	153972	Shaft - Elevating Fork . . . . .	1
4ACY-223	143964	Detent - Elevating & Cross . . . . .	1	4ACY-258	4236	Plug - Pipe . . . . .	1
4ACY-224	143966	Bushing - Elevating Front . . . . .	1	4ACY-259	89866	Coupling - Male . . . . .	1
4ACY-225	642	Pin . . . . .	1	4ACY-260	642	Pin . . . . .	1
4ACY-226	3442	Washer . . . . .	1	4ACY-261	159393	Nut . . . . .	1
4ACY-227	143999	Stud - Eccentric . . . . .	1	4ACY-262	144110	Fork - Shaft Cross . . . . .	1
4ACY-228	160686	Bushing - Cross Feed Front . . . . .	1	4ACY-263	4236	Plug - Pipe . . . . .	1
4ACY-229	154425	Bushing - Rapid Traverse Front . . . . .	1	4AK-796	159392	Stud - Cross . . . . .	1
4ACY-230	3345	Nut . . . . .	1	4ACY-265	127468	Gasket - "O" Ring . . . . .	1
4ACY-231	144114	Shaft - Vertical Trip Front . . . . .	1	4ACY-266	149485	Cam - Vertical Knockout . . . . .	1
4ACY-232	3280	Key . . . . .	1	4ACY-267	703	Pin . . . . .	1
4ACY-233	145986	Stud - Elevating Detent . . . . .	1	4ACY-268	153986	Arm - Knockout Cross . . . . .	1
4ACY-234	3379	Pin - Cotter . . . . .	1	4ACY-269	3967	Spring . . . . .	1
4ACY-235	127596	Lever - Detent . . . . .	1	4ACY-270	160685	Lever - Cross . . . . .	1
4ACY-236	3474	Nut . . . . .	1	4ACY-271	143964	Detent - Elevating & Cross . . . . .	1
4ACY-237	3257	Washer . . . . .	1	4ACY-272	154049	Shaft - Rapid Traverse Front . . . . .	1
4ACY-238	48073	Pin - Lock . . . . .	1	4ACY-273	1959	Pin . . . . .	1
4ACY-239	2257	Plug . . . . .	1	4ACY-274	76645	Plug . . . . .	1
4ACY-240	107565	Screw - Spring Anchor . . . . .	1	4ACY-275	149489	Cam - Cross Knockout . . . . .	1
4ACY-241	146609	Spring - Extension . . . . .	1	4ACY-276	3279	Key . . . . .	1
4ACY-242	79859	Nut . . . . .	1	4ACY-277	3280	Key . . . . .	1
4ACY-243	144056	Lever - Knockout Vertical . . . . .	1	4ACY-278	154429	Shaft - Cross Feed Front . . . . .	1
4ACY-244	143965	Pin - Spring - Elevating . . . . .	1				



FEED CAMS AND LEVERS



46 DDD  
48 DDD  
49 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

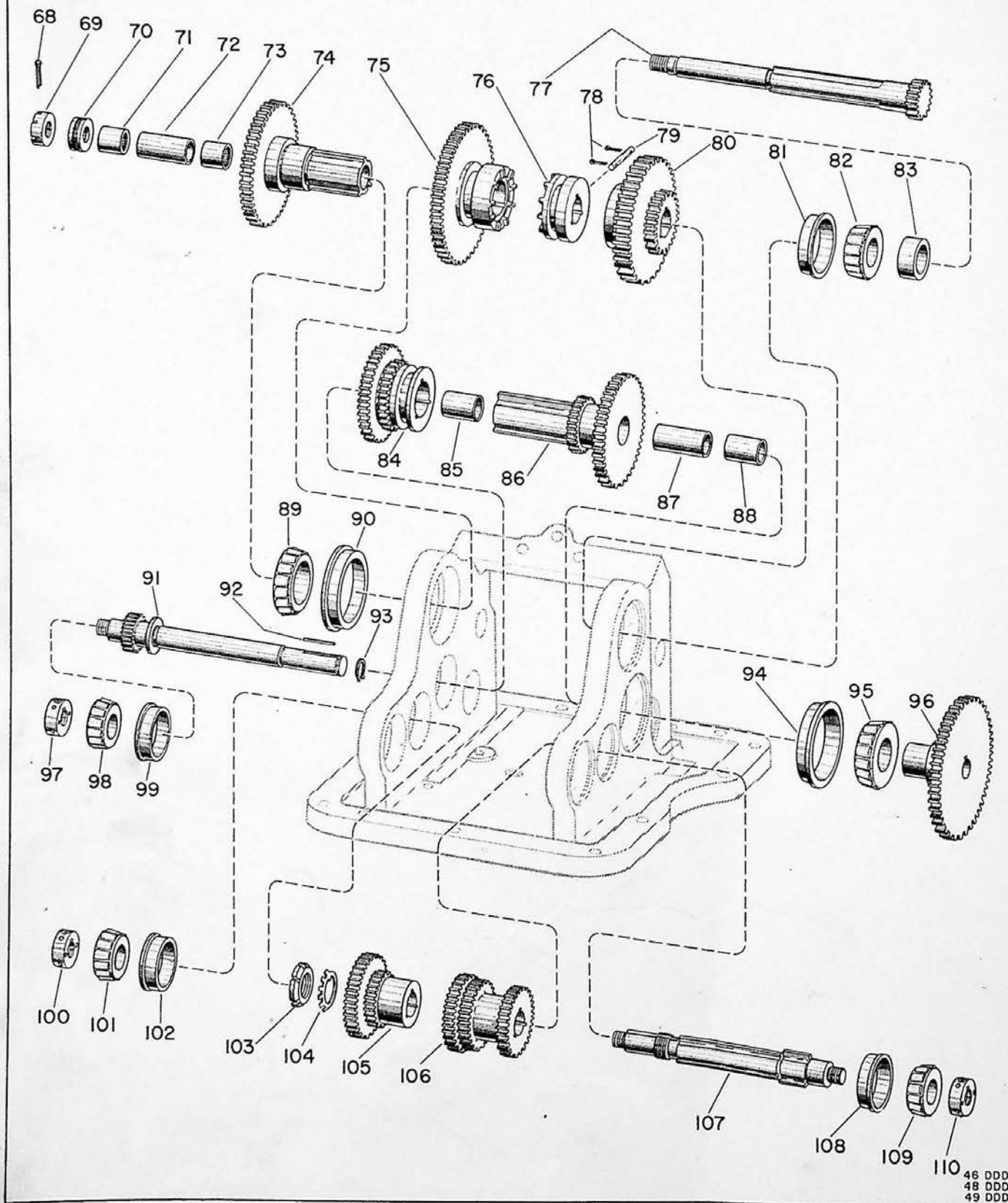
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

FEED BOX-UNIT No. 4AF  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AF-1	144009	Lever - "C" Cam . . . . .	1	4AF-35	111025	Nut - Slotted . . . . .	1
4AF-2	114666	Stud - Lever . . . . .	1	4AF-36	1959	Pin - Cotter . . . . .	1
4AF-3	144010	Lever - "D" Cam . . . . .	1	4AF-37	96613	Cone - Bearing Roller . . . . .	1
4AF-4	144666	Stud - Lever . . . . .	1	4AF-38	78732	Cup - Bearing Roller . . . . .	1
4AF-5	144011	Lever - "E" Cam . . . . .	1	4AF-39	78732	Cup - Bearing Roller . . . . .	1
4AF-6	114666	Stud - Lever . . . . .	1	4AF-40	212731	Cone - Bearing Roller . . . . .	1
4AF-7	114669	Washer - Special Cam Shaft . . . . .	1	4AF-41	3280	Key - Hypro . . . . .	2
4AF-8	132968	Bushing - Detent Lever . . . . .	1	4AF-42	144017	Shaft - Primary Cam . . . . .	1
4AF-9	144012	Lever - Detent . . . . .	1	4AF-43	3280	Key - Hypro . . . . .	1
4AF-10	114669	Washer - Special Cam Shaft . . . . .	1	4AF-44	4184	Nut - Lock . . . . .	1
4AF-11	77264	Cone - Bearing Roller . . . . .	1	4AF-45	90367	Cone - Bearing Roller . . . . .	1
4AF-12	72141	Cup - Bearing Roller . . . . .	1	4AF-46	108004	Cup - Bearing Roller . . . . .	1
4AF-13	144002	Cam - Secondary . . . . .	1	4AF-47	3343	Screw . . . . .	11
4AF-14	72141	Cup - Bearing Roller . . . . .	1	4AF-48	147370	Box - Feed . . . . .	1
4AF-15	77264	Cone - Bearing Roller . . . . .	1	4AF-49	30926	Ring - Spring . . . . .	1
4AF-16	4184	Nut - Lock . . . . .	1	4AF-50	3228	Screw . . . . .	1
4AF-17	114667	Roller - Cam Follower . . . . .	1	4AF-51	144006	Gear - Driven Primary Cam Shaft . . . . .	1
4AF-18	2135	Washer - Lock . . . . .	1	4AF-52	11643	Pin - Taper . . . . .	2
4AF-19	2284	Nut . . . . .	1	4AF-53	3257	Washer - Lock . . . . .	1
4AF-20	144003	Cam - Primary . . . . .	1	4AF-54	3474	Nut . . . . .	1
4AF-21	144019	Spacer - Primary Cam . . . . .	1	4AF-55	220784	Plug - Pipe . . . . .	1
4AF-22	120174	Spring - Detent . . . . .	1	4AF-56	3474	Nut . . . . .	1
4AF-23	95282	Pin - Clutch . . . . .	1	4AF-57	3257	Washer - Lock . . . . .	1
4AF-24	144018	Nut - Lock . . . . .	1	4AF-58	154630	Gear - Sliding - Small - 1st Feed Shaft . . . . .	1
4AF-25	1987	Pin - Cotter . . . . .	1	4AF-59	154631	Gear - Sliding - Large - 1st Feed Shaft . . . . .	1
4AF-26	144004	Detent - Cam . . . . .	1	4AF-60	108271	Cup - Bearing Roller . . . . .	1
4AF-27	3477	Nut . . . . .	3	4AF-61	69189	Cone - Bearing Roller . . . . .	1
4AF-28	3165	Screw . . . . .	3	4AF-62	144020	Gear - Driven 1st Feed Shaft . . . . .	1
4AF-29	144015	Shaft - Secondary Cam . . . . .	1	4AF-63	144016	Shaft - 1st Feed . . . . .	1
4AF-30	3234	Screw . . . . .	1	4AF-64	108042	Stud - Lever . . . . .	1
4AF-31	3473	Nut . . . . .	1	4AF-65	144007	Lever - "A" Cam . . . . .	1
4AF-32	2354	Screw . . . . .	1	4AF-66	144008	Lever - "B" Cam . . . . .	1
4AF-33	3229	Screw . . . . .	1	4AF-67	108042	Stud - Lever . . . . .	1
4AF-34	149848	Bushing - Shaft "B" . . . . .	1				



FEED GEARING



46 DDD  
48 DDD  
49 DDD

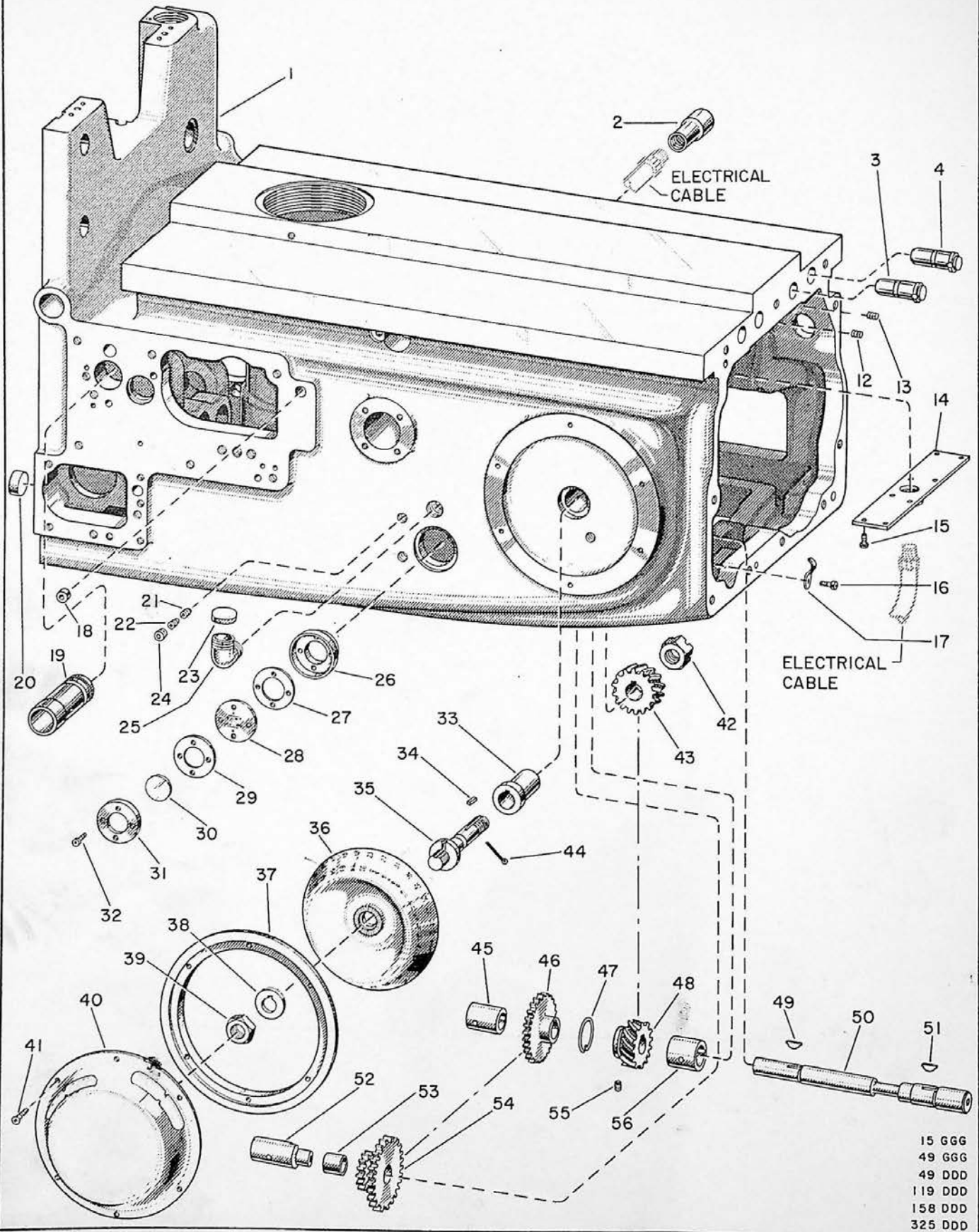
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

FEED BOX-UNIT No. 4AF (Concluded)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AF-68	3379	Pin - Cotter . . . . .	1	4AF-90	108024	Cup - Bearing Roller . . . . .	1
4AF-69	111135	Nut - Slotted . . . . .	1	4AF-91	147371	Shaft - 3rd Feed . . . . .	1
4AF-70	89134	Bearing - Thrust Ball . . . . .	1	4AF-92	1632	Key . . . . .	1
4AF-71	98840	Bearing - Roller . . . . .	1	4AF-93	113079	Ring - Retaining . . . . .	1
4AF-72	119827	Spacer - Bearing, 4th Drive Shaft . . . . .	1	4AF-94	74199	Cup - Bearing Roller . . . . .	1
4AF-73	98840	Bearing - Roller . . . . .	1	4AF-95	78418	Cone - Bearing Roller . . . . .	1
4AF-74	147367	Gear - Spline, 4th Feed Shaft . . . . .	1	4AF-96	144005	Gear - Driver, 3rd Feed Shaft . . . . .	1
4AF-75	114673	Gear - Clutch, 4th Feed Shaft . . . . .	1	4AF-97	4184	Nut - Lock . . . . .	1
4AF-76	113780	Clutch - 4th Shaft . . . . .	1	4AF-98	90367	Cone - Bearing Roller . . . . .	1
4AF-77	144021	Shaft - 4th Feed . . . . .	1	4AF-99	72196	Cup - Bearing Roller . . . . .	1
4AF-78	3329	Pin - Cotter . . . . .	1	4AF-100	4184	Nut - Lock . . . . .	1
4AF-79	113779	Pin - Clutch, 4th Shaft . . . . .	1	4AF-101	90367	Cone - Bearing Roller . . . . .	1
4AF-80	108026	Gear - Sliding, 4th Feed Shaft . . . . .	1	4AF-102	72196	Cup - Bearing Roller . . . . .	1
4AF-81	74199	Cup - Bearing Roller . . . . .	1	4AF-103	3810	Nut - Lock . . . . .	1
4AF-82	108022	Cone - Bearing Roller . . . . .	1	4AF-104	3809	Washer - Special Lock . . . . .	1
4AF-83	150380	Spacer - Bearing . . . . .	1	4AF-105	154633	Gear - Large, 2nd Feed Shaft . . . . .	1
4AF-84	108019	Gear - Sliding, 3rd Feed Shaft . . . . .	1	4AF-106	154632	Gear - Small, 2nd Feed Shaft . . . . .	1
4AF-85	108020	Bushing - Gear, 3rd Feed Shaft . . . . .	1	4AF-107	144013	Shaft - 2nd Feed . . . . .	1
4AF-86	108018	Gear - Spline, 3rd Feed Shaft . . . . .	1	4AF-108	108004	Cup - Bearing Roller . . . . .	1
4AF-87	119827	Spacer - Bearing, 4th Drive Shaft . . . . .	1	4AF-109	90367	Cone - Bearing Roller . . . . .	1
4AF-88	108020	Bushing - Gear, 3rd Feed Shaft . . . . .	1	4AF-110	4184	Nut - Lock . . . . .	1
4AF-89	104803	Cone - Bearing Roller . . . . .	1				

KNEE CASTING AND FEED DIAL



- 15 GGG
- 49 GGG
- 49 DDD
- 119 DDD
- 158 DDD
- 325 DDD

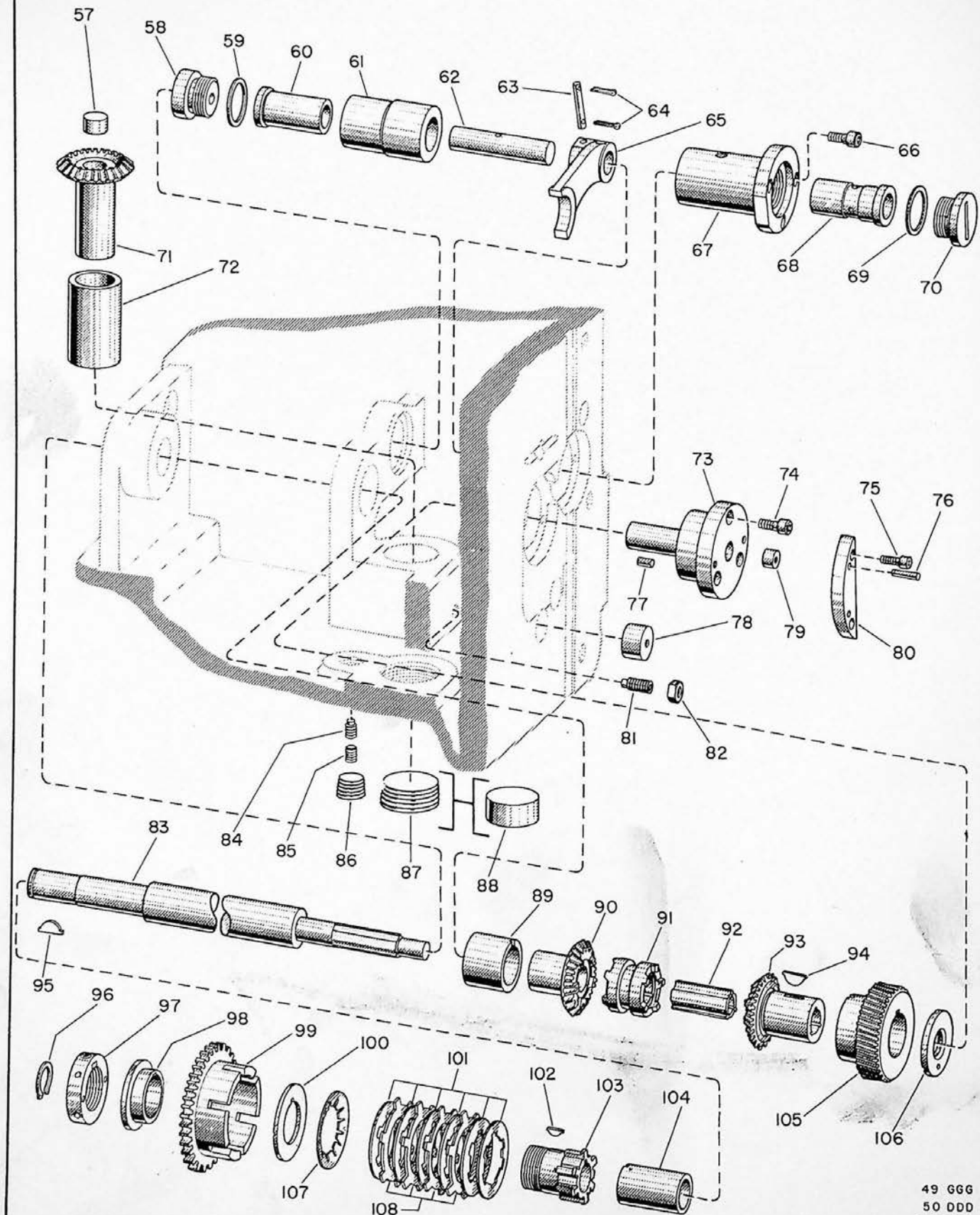
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

KNEE-UNIT No 4AK  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-1		Knee		4AK-32	3197	Screw . . . . .	4
	160688	No. 2 Machines . . . . .	1	4AK-33	146208	Bushing - Feed Dial Shaft . . . . .	1
	160689	No. 3 Plain & Universal Machines . . . . .	1	4AK-34	3447	Key - Square . . . . .	1
	160690	No. 3 Vertical & No. 4 Machines . . . . .	1	4AK-35	146209	Shaft - Feed Dial . . . . .	1
4AK-3	159208	Switch - Push Button . . . . .	1	4AK-36		Dial - Feed	
4AK-4	106991	Switch - Push Button . . . . .	3		145073	English . . . . .	1
4AK-2	159322	Adapter - Cable . . . . .	1		145626	Metric . . . . .	1
4AK-12	2316	Screw . . . . .	1	4AK-37	110945	Flange - Feed Dial Cover . . . . .	1
4AK-13	2316	Screw . . . . .	1	4AK-38	108465	Washer . . . . .	1
4AK-14	160687	Cover - Electrical Connection . . . . .	1	4AK-39	3351	Nut . . . . .	1
4AK-15	2368	Screw . . . . .	8	4AK-40	144650	Cover - Feed Dial . . . . .	1
4AK-16	3203	Screw . . . . .	1	4AK-41	149320	Screw - Self Tapping . . . . .	6
4AK-17	3990	Clamp - Tube . . . . .	1	4AK-42	79557	Nut - Slotted . . . . .	1
4AK-18	3530	Plug . . . . .	1	4AK-43	144579	Gear - Spiral Driven . . . . .	1
4AK-19	161425	Guard - Rear Cross . . . . .	1	4AK-44	2022	Pin - Cotter . . . . .	1
4AK-20	3827	Plug . . . . .	1	4AK-45	144586	Bushing - Spiral Gear Shaft . . . . .	1
4AK-21	1917	Screw . . . . .	3	4AK-46	144582	Gear - Feed Dial . . . . .	1
4AK-22	3232	Screw . . . . .	3	4AK-47	67620	Spring - Ring . . . . .	1
4AK-23	74312	Cap - Oil Filler . . . . .	1	4AK-48	144580	Gear - Spiral Driver . . . . .	1
4AK-24	76645	Plug - Pipe . . . . .	3	4AK-49	3280	Key - Hi-Pro . . . . .	1
4AK-25	211167	Elbow - Oil Filler . . . . .	1	4AK-50	144581	Shaft - Spiral Gear . . . . .	1
4AK-26	156853	Body - Oil Sight Gage . . . . .	1	4AK-51	3280	Key - Hi-Pro . . . . .	1
4AK-27	4077	Gasket - Oil Gage . . . . .	1	4AK-52	144585	Stud - Idler Gear . . . . .	1
4AK-28	229188	Dial - Oil Gage . . . . .	1	4AK-53	144584	Bushing . . . . .	1
4AK-29	4087	Gasket - Oil Gage . . . . .	1	4AK-54	144583	Gear - Compound Idler . . . . .	1
4AK-30	4078	Disc - Oil Gage . . . . .	1	4AK-55	3453	Screw . . . . .	1
4AK-31	4076	Cover - Oil Gage . . . . .	1	4AK-56	108452	Bushing - Spiral Gear . . . . .	1

### CAM REVERSE CLUTCH SHAFT



49 GGG  
50 DDD  
176 DDD

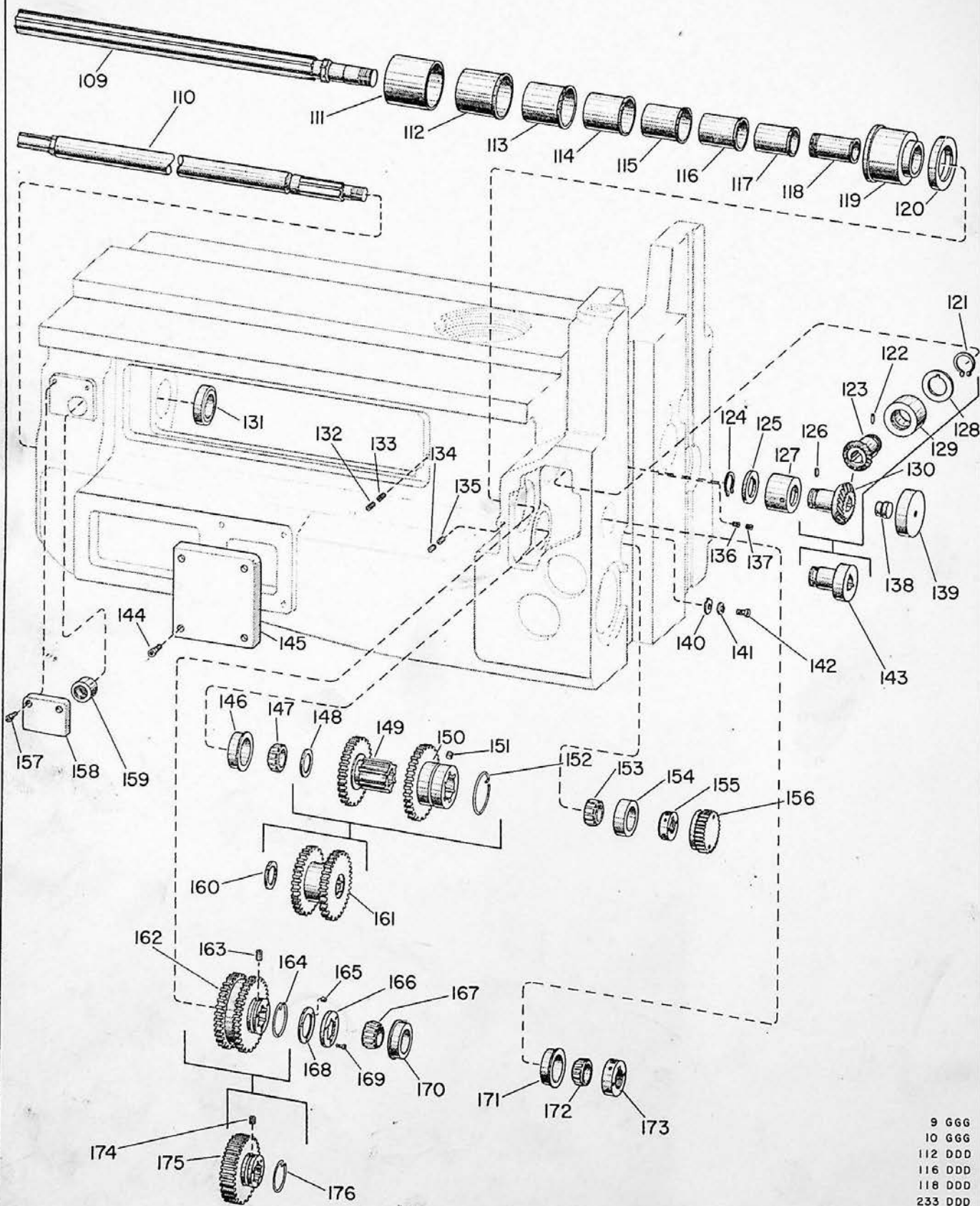
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

KNEE-UNIT No. 4AK (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-57	3550	Plug . . . . .	1	4AK-84	3232	Screw - Set . . . . .	1
4AK-58	145046	Plug - Valve . . . . .	1	4AK-85	1917	Screw - Set . . . . .	1
4AK-59	66920	Gasket . . . . .	1	4AK-86	221981	Plug - Pipe . . . . .	1
4AK-60	108573	Bushing - Cam Reversing Cylinder . . . . .	1	4AK-87		Plug - Pipe	
4AK-61	149840	Cylinder - Cam Reversing . . . . .	1		221752	Nos. 3 & 4 Machines . . . . .	1
4AK-62	108544	Piston - Cam Reversing Cylinder . . . . .	1	4AK-88	3562	Plug - No. 2 Machines . . . . .	1
4AK-63	108421	Pin - Shaft Locating . . . . .	1	4AK-89	108440	Bushing - Clutch Shaft Large . . . . .	1
4AK-64	3329	Pin - Cotter . . . . .	2	4AK-90	110664	Gear - Clutch Bevel, R. H. . . . .	1
4AK-65	127084	Fork - Reverse Cam Shifter . . . . .	1	4AK-91	112665	Clutch - Cam Reversing . . . . .	1
4AK-66	2320	Screw . . . . .	3	4AK-92	108438	Sleeve - Clutch . . . . .	1
4AK-67	144593	Bearing - Cam Reverse Cylinder . . . . .	1	4AK-93	110663	Gear - Clutch Bevel, L. H. . . . .	1
4AK-68	128773	Bushing - Cam Reverse Cylinder . . . . .	1	4AK-94	3280	Key - Hi-Pro . . . . .	1
4AK-69	66920	Gasket . . . . .	1	4AK-95	3280	Key - Hi-Pro . . . . .	1
4AK-70	149839	Plug - Valve . . . . .	1	4AK-96	251540	Ring - Truarc . . . . .	1
4AK-71	108437	Gear - Bevel Reversing . . . . .	1	4AK-97	4191	Nut - Lock . . . . .	1
4AK-72	108439	Bushing - Reversing Gear . . . . .	1	4AK-98	144590	Bushing - Safety Gear . . . . .	1
4AK-73	149841	Sleeve - Worm Wheel Support . . . . .	1	4AK-99	144592	Gear - Safety Cam Drive . . . . .	1
4AK-74	2320	Screw . . . . .	3	4AK-100	108049	Collar - Thrust Safety Gear . . . . .	1
4AK-75	3396	Screw . . . . .	2	4AK-101	64516	Plate - Driven . . . . .	6
4AK-76	141	Pin - Taper . . . . .	2	4AK-102	3279	Key - Hi-Pro . . . . .	1
4AK-77	3636	Pin - Straight . . . . .	1	4AK-103	108051	Hub - Safety Gear . . . . .	1
4AK-78	3552	Plug . . . . .	2	4AK-104	144591	Bushing - Clutch Shaft . . . . .	1
4AK-79	3530	Plug . . . . .	1	4AK-105	132451	Wheel - Worm . . . . .	1
4AK-80	160151	Plate - Bearing Closure . . . . .	1	4AK-106	108456	Washer - Worm Wheel Thrust . . . . .	1
4AK-81	3234	Screw - Set . . . . .	1	4AK-107	108050	Spring - Safety Clutch . . . . .	1
4AK-82	3473	Nut . . . . .	1	4AK-108	110885	Plate - Clutch Driving . . . . .	4
4AK-83		Shaft - Cam - Reverse Clutch					
	144589	No. 2 Machines . . . . .	1				
	147582	No. 3 Plain & Universal Machines . . . . .	1				
	147582	No. 3 Vertical & No. 4 Machines . . . . .	1				

### SPLINE SHAFT AND GEARING



- 9 GGG
- 10 GGG
- 112 DDD
- 116 DDD
- 118 DDD
- 233 DDD
- 253 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

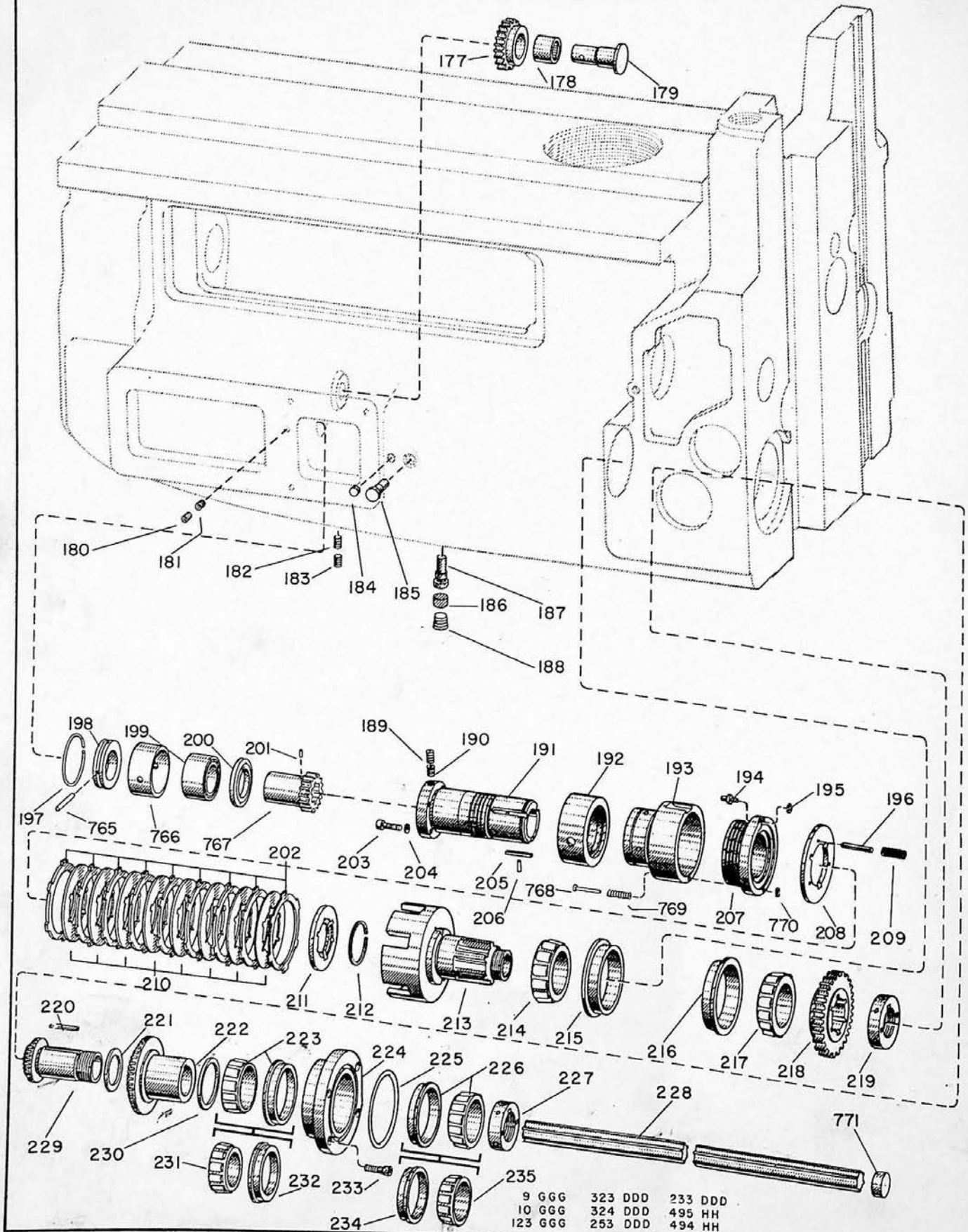
KNEE-UNIT No. 4AK (Continued)

ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-109	151065	Shaft - Spline		4AK-143	145629	Adapter - Cross Screw (Without Rear Control)	1
	146361	No. 2 Machines . . . . .	1	4AK-144	3400	Screw . . . . .	4
	146360	No. 3 Plain & Universal Machines . . . . .	1	4AK-145	157282	Cover . . . . .	1
	146362	No. 4 Plain & Universal Machines . . . . .	1	4AK-146	139421	Cup - Bearing . . . . .	1
4AK-110		Nos. 3 & 4 Vertical Machines . . . . .	1	4AK-147	139420	Cone - Bearing . . . . .	1
		Shaft - No. 6		4AK-148	146877	Spacer - 6th Shaft Nos. 3 & 4 Machines . . . . .	1
	144687	No. 2 Machines . . . . .	1	4AK-149	146880	Gear - Spur Nos. 3 & 4 Machines . . . . .	1
	146878	No. 3 Plain & Universal Machines . . . . .	1	4AK-150	146883	Gear - Spur Nos. 3 & 4 Machines . . . . .	1
	146879	No. 4 Plain & Universal Machines . . . . .	1	4AK-151	3232	Screw - Dog Point Set . . . . .	1
	146879	Nos. 3 & 4 Vertical Machines . . . . .	1	4AK-152	161955	Spring - Ring Nos. 3 & 4 Machines . . . . .	1
4AK-111		Guard - Spline Shaft 7th Nos. 3 & 4 Machines . . . . .	1	4AK-153	144680	Cone - Bearing . . . . .	1
4AK-112	147582	Guard - Spline Shaft 6th Nos. 3 & 4 Machines . . . . .	1	4AK-154	90364	Cup - Bearing . . . . .	1
4AK-113	147581	Guard - Spline Shaft 5th Nos. 3 & 4 Machines . . . . .	1	4AK-155	144679	Nut - Lock . . . . .	1
	144698	No. 2 Machines . . . . .	1	4AK-156	144678	Nut . . . . .	1
	147580	Nos. 3 & 4 Machines . . . . .	1	4AK-157	133396	Screw . . . . .	2
4AK-114		Guard - Spline Shaft 4th Nos. 3 & 4 Machines . . . . .	1	4AK-158	138976	Cover - Air Vent . . . . .	1
	144697	No. 2 Machines . . . . .	1	4AK-159	157941	Sleeve - Air Vent . . . . .	1
4AK-115		Nos. 3 & 4 Machines . . . . .	1	4AK-160	157241	Spacer - 6th Shaft No. 2 Machines . . . . .	1
	144696	Guard - Spline Shaft 3rd Nos. 3 & 4 Machines . . . . .	1	4AK-161	144686	Gear - 6th Shaft No. 2 Machines . . . . .	1
	147578	No. 2 Machines . . . . .	1	4AK-162	159714	Gear - 4T Nos. 3 & 4 Machines . . . . .	1
4AK-116		Guard - Spline Shaft 2nd Nos. 3 & 4 Machines . . . . .	1	4AK-163	3232	Screw - Dog Point Set Nos. 3 & 4 Machines . . . . .	1
	144695	No. 2 Machines . . . . .	1	4AK-164	161956	Spring - Ring Nos. 3 & 4 Machines . . . . .	1
	147577	Nos. 3 & 4 Machines . . . . .	1	4AK-165	161915	Sleeve - Packing . . . . .	3
4AK-117		Guard - Spline Shaft 1st Nos. 3 & 4 Machines . . . . .	1	4AK-166		Washer - Packing No. 2 Machines . . . . .	1
	144694	No. 2 Machines . . . . .	1		161476	Nos. 3 & 4 Machines . . . . .	1
	147576	Nos. 3 & 4 Machines . . . . .	1	4AK-167	161478	Cone - Roller Bearing No. 2 Machines . . . . .	1
4AK-118		Guard - Spline Shaft Inside Nos. 3 & 4 Machines . . . . .	1		72797	Nos. 3 & 4 Machines . . . . .	1
	144693	No. 2 Machines . . . . .	1		139420	Packing No. 2 Machines . . . . .	1
	147575	Nos. 3 & 4 Machines . . . . .	1	4AK-168		Nos. 3 & 4 Machines . . . . .	1
4AK-119		Guard - Spline Shaft Outside Nos. 3 & 4 Machines . . . . .	1		161477	Screw . . . . .	3
	144699	No. 2 Machines . . . . .	1	4AK-169	3203	Cup - Bearing No. 2 Machines . . . . .	1
	159713	Nos. 3 & 4 Machines . . . . .	1	4AK-170		Nos. 3 & 4 Machines . . . . .	1
4AK-120		Seal - Oil No. 2 Machines . . . . .	1		108004	Cup - Bearing Nos. 3 & 4 Machines . . . . .	1
	225117	Nos. 3 & 4 Machines . . . . .	1		139421	Cup - Bearing No. 2 Machines . . . . .	1
	97732	Ring - Retaining (With Rear Control) . . . . .	1	4AK-171		Nos. 3 & 4 Machines . . . . .	1
4AK-121	120294	Pin - (with Rear Control) . . . . .	1		108004	Cone - Roller Bearing No. 2 Machines . . . . .	1
4AK-122	63067	Gear - Hypoid, R. H. (With Rear Control) . . . . .	1		139421	Nos. 3 & 4 Machines . . . . .	1
4AK-123	143914	Ring - Retaining . . . . .	1	4AK-172		Cone - Roller Bearing No. 2 Machines . . . . .	1
4AK-124	120294	Spacer - Hypoid Gear . . . . .	1		72797	Nos. 3 & 4 Machines . . . . .	1
4AK-125	144728	Pin - (With Rear Control) . . . . .	1		139420	Nut - Lock No. 2 Machines . . . . .	1
4AK-126	63067	Bushing - Hypoid Gear . . . . .	1	4AK-173		Nos. 3 & 4 Machines . . . . .	1
4AK-127	144725	Spacer - Hypoid Gear (With Rear Control) . . . . .	1		4244	Screw . . . . .	3
4AK-128	144728	Bushing - Hypoid Gear (With Rear Control) . . . . .	1		4245	Cup - Bearing No. 2 Machines . . . . .	1
4AK-129	144725	Pinion - Hypoid, L. H. (With Rear Control) . . . . .	1	4AK-174	3232	Screw - Dog Point Set No. 2 Machines . . . . .	1
4AK-130	143913	Seal - Oil Nos. 3 & 4 Machines . . . . .	1	4AK-175	151064	Gear - 4T No. 2 Machines . . . . .	1
4AK-131	225928	Screw - Dog Point Set . . . . .	1	4AK-176	62693	Spring - Ring No. 2 Machines . . . . .	1
4AK-132	3232	Screw - Set . . . . .	1				
4AK-133	1917	Screw - Dog Point Set . . . . .	1				
4AK-134	3232	Screw - Set . . . . .	1				
4AK-135	1911	Screw - Set (With Rear Control) . . . . .	1				
4AK-136	1917	Screw - Dog Point Set (with Rear Control) . . . . .	1				
4AK-137	3232	Plug - Drive . . . . .	1				
4AK-138	147113	Plug . . . . .	1				
4AK-139	3559	Washer . . . . .	1				
4AK-140	3445	Washer - Lock . . . . .	1				
4AK-141	2135	Screw . . . . .	1				
4AK-142	3210						



# RAPID TRAVERSE CLUTCH AND FEED DRIVE SHAFT



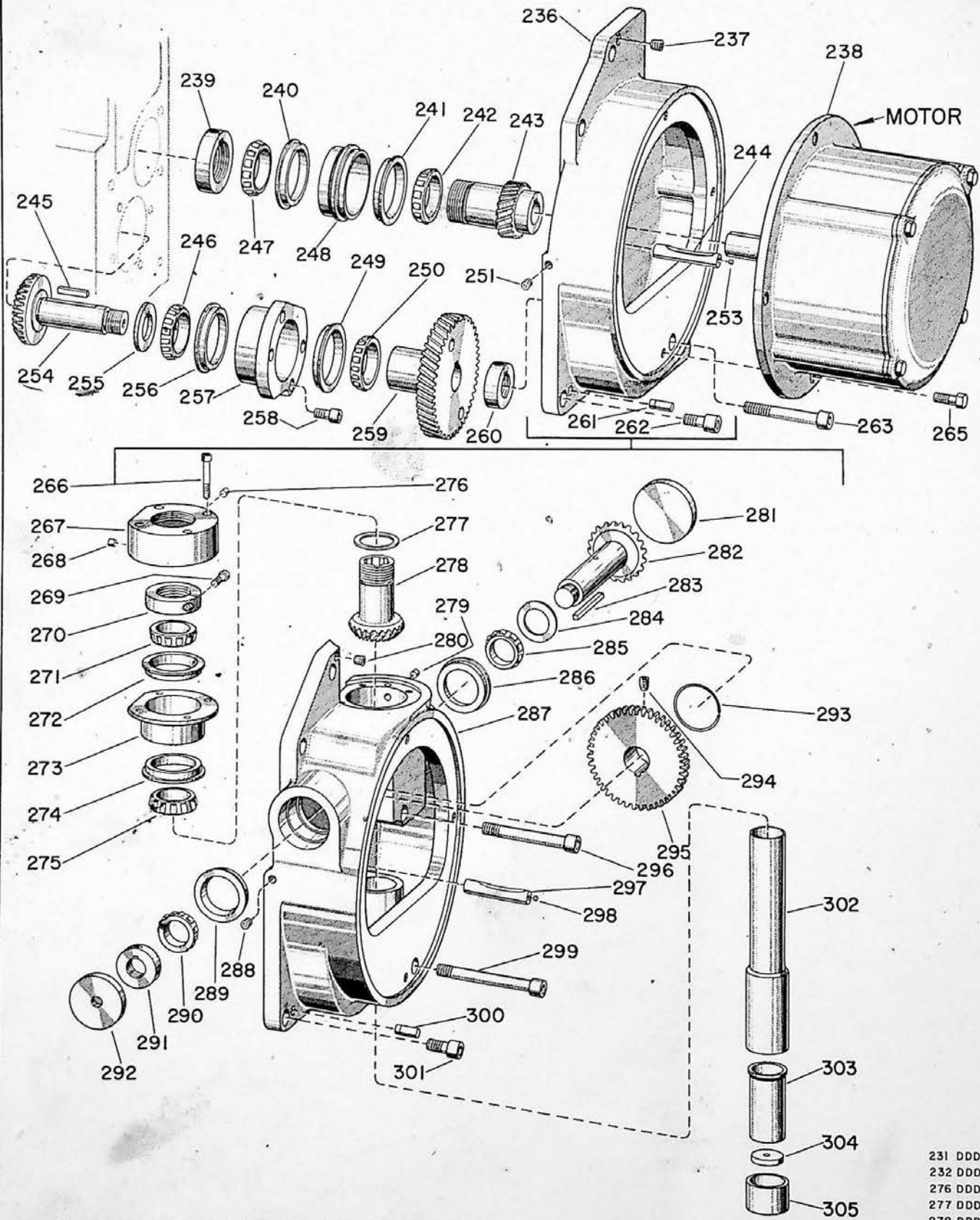
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

KNEE-UNIT No. 4AK (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-177	144683	Gear - Idler . . . . .	1	4AK-215		Cup - Bearing	
4AK-178	111077	Bearing - Roller . . . . .	1	97897		No. 2 Machines . . . . .	1
4AK-179	144684	Stud . . . . .	1	75973		Nos. 3 & 4 Machines . . . . .	1
4AK-180	1917	Screw - Set . . . . .	1	4AK-216		Cup - Bearing	
4AK-181	3233	Screw - Dog Point Set . . . . .	1	97897		No. 2 Machines . . . . .	1
4AK-182	3232	Screw - Dog Point Set . . . . .	1	75973		Nos. 3 & 4 Machines . . . . .	1
4AK-183	1917	Screw - Set . . . . .	1	4AK-217		Cone - Roller Bearing	
4AK-184	3529	Plug . . . . .	1	93673		No. 2 Machines . . . . .	1
		Nos. 3 & 4 Machines . . . . .	1	75972		Nos. 3 & 4 Machines . . . . .	1
4AK-185	146251	Pin - Manifold Locating . . . . .	1	4AK-218		Gear - Feed Drive Shaft	
		Nos. 3 & 4 Machines . . . . .	1	144688		No. 2 Machines . . . . .	1
4AK-186	2200	Plug - Felt . . . . .	1	146882		Nos. 3 & 4 Machines . . . . .	1
		No. 2 Machines . . . . .	1	4AK-219		Nut - Lock	
4AK-187	154643	Pin - Manifold Locating . . . . .	1	4191		No. 2 Machines . . . . .	1
4AK-188	221981	Plug - Pipe . . . . .	1	4250		Nos. 3 & 4 Machines . . . . .	1
		No. 2 Machines . . . . .	1	4AK-220		Key - Square . . . . .	1
4AK-189	1911	Screw - Set . . . . .	1	4AK-221		Washer	
4AK-190	3232	Screw - Dog Point Set . . . . .	1	164285		No. 2 Machines . . . . .	1
4AK-191		Sleeve - Clutch Rapid Traverse . . . . .	1	164287		Nos. 3 & 4 Machines . . . . .	1
	164512	No. 2 Machines . . . . .	1	4AK-222		Gear - Spiral Bevel	
	164513	Nos. 3 & 4 Machines . . . . .	1	164522		No. 2 Machines . . . . .	1
4AK-192		Manifold . . . . .	1	164523		Nos. 3 & 4 Machines . . . . .	1
	164501	No. 2 Machines . . . . .	1	4AK-223		Bearing - Roller	
	136326	Nos. 3 & 4 Machines . . . . .	1	250265		Nos. 3 & 4 Machines . . . . .	1
4AK-193		Bushing - Manifold . . . . .	1	4AK-224		Housing - Bearing	
	162152	No. 2 Machines . . . . .	1	164293		No. 2 Machines . . . . .	1
	164517	Nos. 3 & 4 Machines . . . . .	1	159244		Nos. 3 & 4 Machines . . . . .	1
4AK-194	164291	Pin . . . . .	1	4AK-225		Ring - "O"	
		Nos. 3 & 4 Machines . . . . .	1	251230		No. 2 Machines . . . . .	1
4AK-195	244098	Ring - Truarc . . . . .	1	141256		Nos. 3 & 4 Machines . . . . .	1
		Nos. 3 & 4 Machines . . . . .	1	4AK-226		Bearing - Roller	
4AK-196	136945	Pin - Guide for Spring . . . . .	3	250264		Nos. 3 & 4 Machines . . . . .	1
4AK-197	57412	Bearing - Needle . . . . .	1	4AK-227		Nut - Lock	
		Nos. 2, 3 & 4 Machines . . . . .	1	4247		No. 2 Machines . . . . .	1
4AK-198	164505	Collar . . . . .	1	4248		Nos. 3 & 4 Machines . . . . .	1
4AK-199	234971	Bearing - Needle . . . . .	1	4AK-228		Shaft - Spline Feed Drive	
4AK-200	164500	Spacer . . . . .	1	164511		No. 2 Machines . . . . .	1
4AK-201	3383	Pin . . . . .	1	164508		No. 3 Plain & Universal Machines . . . . .	1
4AK-202		Plate - Driving . . . . .	9	164509		No. 3 Vertical, No. 4 Machines . . . . .	1
	136863	No. 2 Machines . . . . .	9	4AK-229		Pinion - Bevel	
	136849	Nos. 3 & 4 Machines . . . . .	9	164524		No. 2 Machines . . . . .	1
4AK-203	130644	Screw - Socket Head Cap . . . . .	4	164292		Nos. 3 & 4 Machines . . . . .	1
4AK-204	108161	Washer - Lock . . . . .	4	4AK-230		Washer	
4AK-205	164502	Key - Square . . . . .	3	164295		No. 2 Machines . . . . .	1
4AK-206		Pin . . . . .	3	164286		Nos. 3 & 4 Machines . . . . .	1
	3539	No. 2 Machines . . . . .	3	4AK-231		Cone - Roller Bearing	
	3270	Nos. 3 & 4 Machines . . . . .	3	151640		No. 2 Machines . . . . .	1
4AK-207		Piston - Rapid Traverse Clutch . . . . .	1	4AK-232		Cup - Bearing	
	162153	No. 2 Machines . . . . .	1	151639		No. 2 Machines . . . . .	1
	164519	Nos. 3 & 4 Machines . . . . .	1	4AK-233		Screw . . . . .	4
4AK-208		Plate - Lock . . . . .	1	4AK-234		Cup - Bearing	
	136865	No. 2 Machines . . . . .	1	151639		No. 2 Machines . . . . .	1
	136850	Nos. 3 & 4 Machines . . . . .	1	4AK-235		Cone - Roller Bearing	
4AK-209	167560	Spring . . . . .	3	151640		No. 2 Machines . . . . .	1
4AK-210		Plate - Driven . . . . .	8	4AK-765		Pin . . . . .	1
	136862	No. 2 Machines . . . . .	8	4AK-766		Bushing . . . . .	1
	136847	Nos. 3 & 4 Machines . . . . .	8	4AK-767		Gear . . . . .	1
4AK-211		Plate - Back Clamping . . . . .	1	164510		No. 2 Machines . . . . .	1
	136864	No. 2 Machines . . . . .	1	164507		Nos. 3 & 4 Machines . . . . .	1
	136848	Nos. 3 & 4 Machines . . . . .	1	4AK-768		Pin . . . . .	3
4AK-212		Ring - Spring Lock . . . . .	1	4AK-769		Spring . . . . .	3
	136866	No. 2 Machines . . . . .	1	164288		Ring - Retaining . . . . .	3
	136846	Nos. 3 & 4 Machines . . . . .	1	4AK-770		Plug . . . . .	1
4AK-213		Housing - Rapid Traverse . . . . .	1	4AK-771		No. 2 Machines . . . . .	1
	164514	No. 2 Machines . . . . .	1	40226		Nos. 3 & 4 Machines . . . . .	1
	164515	Nos. 3 & 4 Machines . . . . .	1	62581			
4AK-214		Cone - Roller Bearing . . . . .	1				
	93673	No. 2 Machines . . . . .	1				
	75972	Nos. 3 & 4 Machines . . . . .	1				

FEED MOTOR DRIVE



- 231 DDD
- 232 DDD
- 276 DDD
- 277 DDD
- 278 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

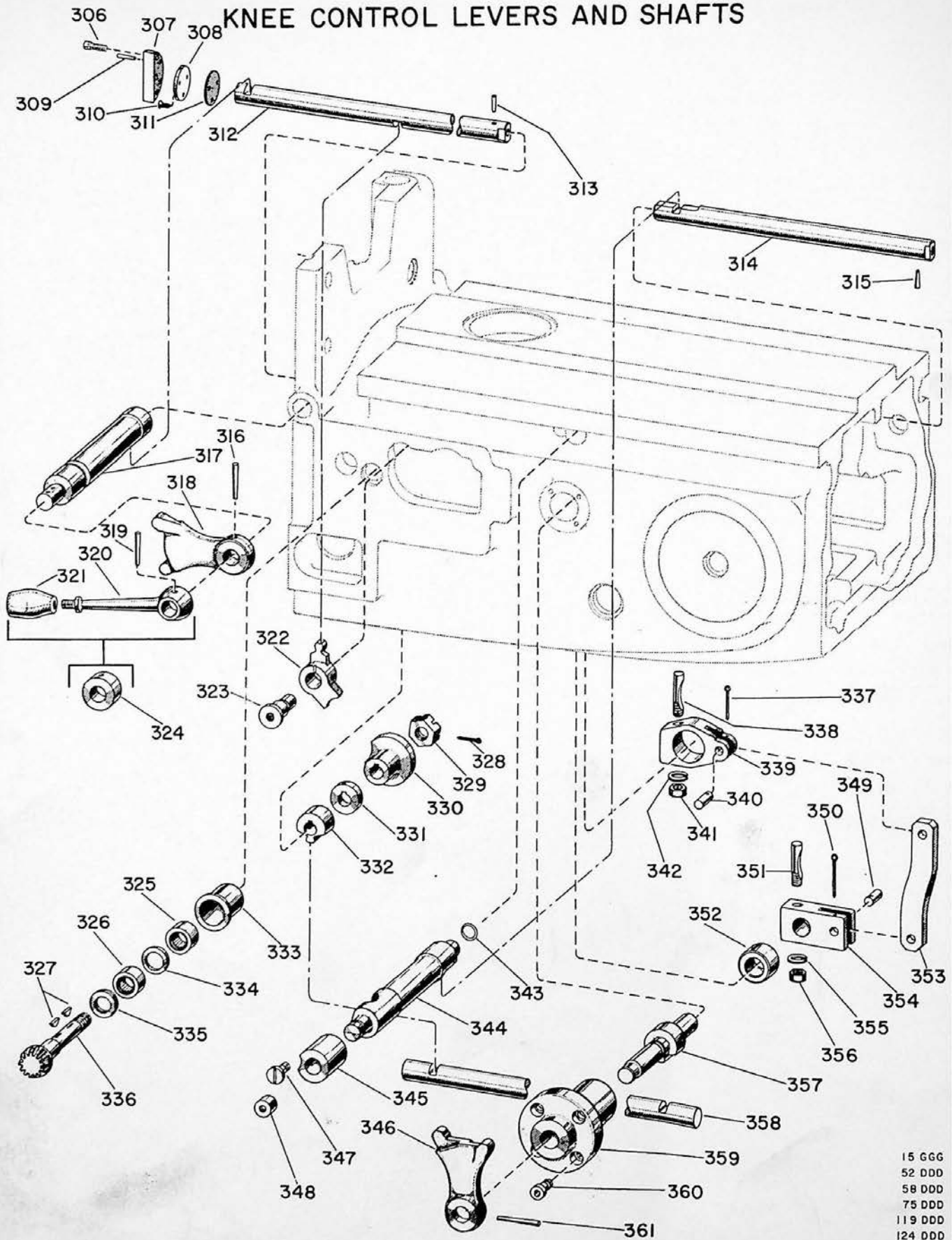
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

KNEE-UNIT No. 4AK (Continued)

ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-236	151066	Bracket - Motor Nos. 2, 3 & 4 Plain & Universal Machines . . . . .	1	4AK-274	108350	Cup - Roller Bearing Vertical Machines . . . . .	1
4AK-237	76645	Plug - Pipe . . . . .	1	4AK-275	108349	Cone - Roller Bearing Vertical Machines . . . . .	1
4AK-238	Example	Motor . . . . .	1	4AK-276	1844	Plug . . . . .	1
4AK-239	4249	Nut - Lock . . . . .	1	4AK-277	144442	Washer - Fitting Vertical Machines . . . . .	1
4AK-240	144440	Cup - Roller Bearing . . . . .	1	4AK-278	144265	Gear - Spiral Bevel Vertical Machines . . . . .	1
4AK-241	144440	Cup - Roller Bearing . . . . .	1	4AK-279	1844	Plug . . . . .	1
4AK-242	144439	Cone - Roller Bearing . . . . .	1	4AK-280	76645	Plug - Pipe . . . . .	1
4AK-243		Gear - Helical 1800 R. P. M. . . . .	1	4AK-281	3558	Plug Vertical Machines . . . . .	1
	151013	1500 R. P. M. . . . .	1	4AK-282	151067	Gear - Spiral Bevel Vertical Machines . . . . .	1
4AK-244	159249	Trough - Oil . . . . .	1	4AK-283	1331	Key - Square . . . . .	1
4AK-245	963	Key - Square . . . . .	1	4AK-284	144263	Washer - Fitting Vertical Machines . . . . .	1
4AK-246	144439	Cone - Roller Bearing . . . . .	1	4AK-285	95585	Cone - Roller Bearing Vertical Machines . . . . .	1
4AK-247	144439	Cone - Roller Bearing . . . . .	1	4AK-286	95586	Cup - Roller Bearing Vertical Machines . . . . .	1
4AK-248	151070	Spacer - Bearing Sleeve . . . . .	1	4AK-287	151018	Bracket - Motor Mounting Vertical Machines . . . . .	1
4AK-249	144440	Cup - Roller Bearing . . . . .	1	4AK-288	76644	Plug - Pipe . . . . .	1
4AK-250	144439	Cone - Roller Bearing . . . . .	1	4AK-289	95586	Cup - Roller Bearing Vertical Machines . . . . .	1
4AK-251	76644	Plug - Pipe . . . . .	1	4AK-290	95585	Cone - Roller Bearing Vertical Machines . . . . .	1
4AK-253	1844	Plug . . . . .	1	4AK-291	4242	Nut - Lock Vertical Machines . . . . .	1
4AK-254		Gear - Spiral Bevel No. 2 Machines . . . . .	1	4AK-292	3947	Plug . . . . .	1
	151016	Nos. 3 & 4 Machines . . . . .	1	4AK-293	62693	Ring - Spring Vertical Machines . . . . .	1
4AK-255	148352	Washer - Fitting . . . . .	1	4AK-294	3232	Screw - Dog Point Set Gear	1
4AK-256	144440	Cup - Roller Bearing . . . . .	1	4AK-295		No. 2 Vertical Machines . . . . .	1
4AK-257		Housing - Bearing No. 2 Machines . . . . .	1		144266	Nos. 3 & 4 Vertical Machines . . . . .	1
	151080	Nos. 3 & 4 Machines . . . . .	1	4AK-296	151697	Screw Vertical Machines . . . . .	1
4AK-258	3399	Screw . . . . .	4	4AK-297	3407	Trough - Oil Vertical Machines . . . . .	1
4AK-259		Gear - Helical No. 2 Machines - 1800 R. P. M. . . . .	1	4AK-298	1844	Plug . . . . .	1
	151061	No. 2 Machines - 1500 R. P. M. . . . .	1	4AK-299	79849	Screw Vertical Machines . . . . .	1
	160324	Nos. 3 & 4 Machines - 1800 R. P. M. . . . .	1	4AK-300	75665	Pin Vertical Machines . . . . .	1
	151099	Nos. 3 & 4 Machines - 1500 R. P. M. . . . .	1	4AK-301	3403	Screw Vertical Machines . . . . .	5
	160694	Nos. 3 & 4 Machines - 1800 R. P. M. . . . .	1	4AK-302	151072	Guard - Spline Shaft Vertical Machines . . . . .	1
4AK-260	4244	Nut - Lock . . . . .	1	4AK-303		Guard - Spline Shaft Inside No. 2 Vertical Machines . . . . .	1
4AK-261	75665	Pin Plain & Universal Machines . . . . .	1		151073	Nos. 3 & 4 Vertical Machines . . . . .	1
4AK-262	3403	Screw Plain & Universal Machines . . . . .	5	4AK-304	151696	Plug - Guard Vertical Machines . . . . .	1
4AK-263	3321	Screw Plain & Universal Machines . . . . .	1	4AK-304	151074	Vertical Machines . . . . .	1
4AK-265	Example	Screw - Motor Mounting . . . . .	4	4AK-305	151071	Retainer Guard Vertical Machines . . . . .	1
4AK-266	3158	Screw Vertical Machines . . . . .	4				
4AK-267	151068	Cover Vertical Machines . . . . .	1				
4AK-268	1844	Plug . . . . .	1				
4AK-269	2321	Screw Vertical Machines . . . . .	1				
4AK-270	144259	Nut - Lock Vertical Machines . . . . .	1				
4AK-271	108349	Cone - Roller Bearing Vertical Machines . . . . .	1				
4AK-272	108350	Cup - Roller Bearing Vertical Machines . . . . .	1				
4AK-273	151069	Sleeve - Bearing Vertical Machines . . . . .	1				

KNEE CONTROL LEVERS AND SHAFTS



- 15 GGG
- 52 DDD
- 58 DDD
- 75 DDD
- 119 DDD
- 124 DDD
- 125 DDD

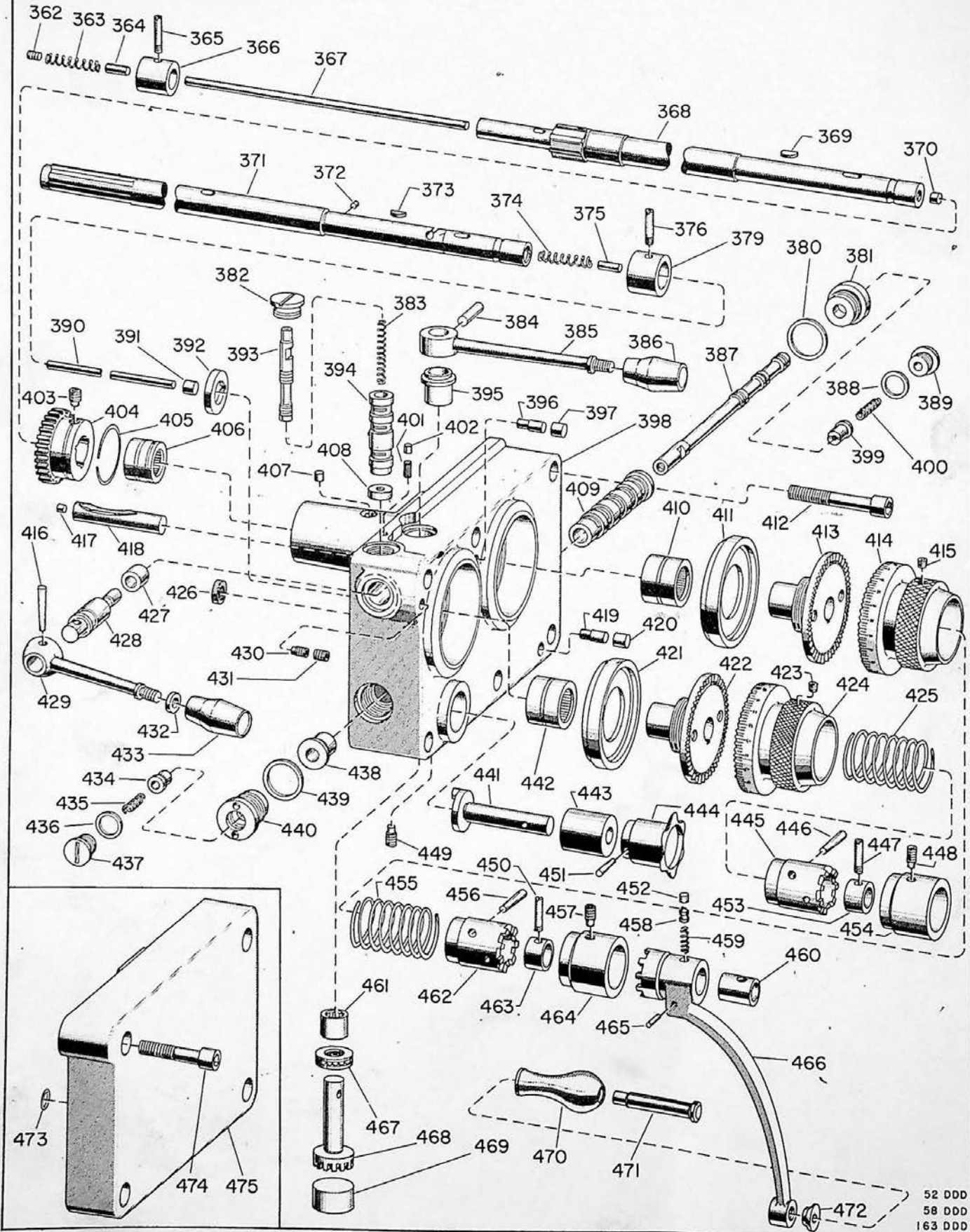
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

KNEE-UNIT No. 4AK (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-306	3396	Screw . . . . .	3	4AK-333	148100	Bushing - Long Bevel Gear (With Rear Control) . . . . .	1
4AK-307	159865	Plate - Bearing Closure Nos. 3 & 4 Machines . . . . .	1	4AK-334	160466	Spacer - Rear Control Bracket (With Rear Control) . . . . .	1
4AK-308	144703	Cover - Vertical Trip Rod . . . . .	1	4AK-335	222979	Bearing - Ball Thrust (With Rear Control) . . . . .	1
4AK-309	141	Pin - Taper . . . . .	2	4AK-336	144737	Gear - Bevel Long (With Rear Control) . . . . .	1
4AK-310	149322	Screw . . . . .	3	4AK-337	2036	Pin - Cotter . . . . .	1
4AK-311	144704	Gasket - Vertical Trip Rod Cover . . . . .	1	4AK-338	48073	Pin - Lock . . . . .	1
4AK-312		Rod - Elevating Control No. 2 Machines . . . . .	1	4AK-339	144706	Lever - Cross Feed Trip . . . . .	1
	153987	No. 3 Plain & Universal Machines . . . . .	1	4AK-340	144707	Pin - Link . . . . .	1
	146890	No. 3 Vertical Machines . . . . .	1	4AK-341	2143	Nut . . . . .	1
	153982	No. 4 Machines . . . . .	1	4AK-342	2038	Washer - Lock . . . . .	1
4AK-313	140	Pin - Taper . . . . .	1	4AK-343	127468	Packing - "O" Ring . . . . .	1
4AK-314		Rod - Cross Control No. 2 Machines . . . . .	1	4AK-344	147104	Shaft - Cross Powerfeed . . . . .	1
	160699	No. 3 Plain & Universal Machines . . . . .	1	4AK-345		Bushing - Long No. 2 Machines . . . . .	1
	161000	No. 3 Vertical Machines . . . . .	1		144709	Nos. 3 & 4 Machines . . . . .	1
	161001	No. 4 Machines . . . . .	1		146945	Lever - Elevating Cross Trip . . . . .	1
4AK-315	140	Pin - Taper . . . . .	1		144702	Screw . . . . .	1
4AK-316	645	Pin - Taper . . . . .	1	4AK-346	144702	Plug Nos. 3 & 4 Machines . . . . .	1
4AK-317	147105	Shaft - Vertical Trip . . . . .	1	4AK-347	104202	Pin - Link . . . . .	1
4AK-318	144702	Lever - Elevating Cross Trip . . . . .	1	4AK-348	3549	Pin - Cotter . . . . .	1
4AK-319	642	Pip - Taper . . . . .	1			Pin - Lock . . . . .	1
4AK-320	99905	Lever - Vertical Feed Rear (With Rear Control) . . . . .	1	4AK-349	144707	Spacer - Short . . . . .	1
4AK-321	4326	Knob - Lever (With Rear Control) . . . . .	1	4AK-350	2250	Link - Between Levers . . . . .	1
4AK-322	144664	Trip - Elevating Interlock . . . . .	1	4AK-351	48073	Lever - Cross Feed Bottom Trip . . . . .	1
4AK-323	144666	Stud - Elevating Interlock . . . . .	1	4AK-352	144710	Washer - Lock . . . . .	1
4AK-324	3815	Collar (Without Rear Control) . . . . .	1	4AK-353	147103	Nut . . . . .	1
4AK-325	146289	Bearing - Needle (With Rear Control) . . . . .	1	4AK-354	144705	Shaft - Cross Trip Lever No. 2 Machines . . . . .	1
4AK-326	146289	Bearing - Needle (With Rear Control) . . . . .	1	4AK-355	2038	Nos. 3 & 4 Machines . . . . .	1
4AK-327	3279	Key - Hi-Pro (With Rear Control) . . . . .	2	4AK-356	2143	Shaft - Trip Rear Cross No. 2 Machines . . . . .	1
4AK-328	1959	Pin - Cotter (With Rear Control) . . . . .	1	4AK-357		No. 3 Plain & Universal Machines . . . . .	1
4AK-329	2010	Nut - Slotted (With Rear Control) . . . . .	1		144736	No. 3 Vertical Machines . . . . .	1
4AK-330	144733	Trip - Cross Interlock (With Rear Control) . . . . .	1		146889	No. 4 Machines . . . . .	1
4AK-331	147361	Spacer - Cross Interlock (With Rear Control) . . . . .	1	4AK-359	148423	Bushing - Lever No. 2 Machines . . . . .	1
4AK-332	144723	Trip - Rear Cross (With Rear Control) . . . . .	1		148223	Nos. 3 & 4 Machines . . . . .	1
					148423	Screw . . . . .	4
					144713	Pin - Taper . . . . .	1
					144714		
					3399		
					4AK-361		
					645		

# REAR CONTROL BRACKET



52 000  
58 000  
163 000

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

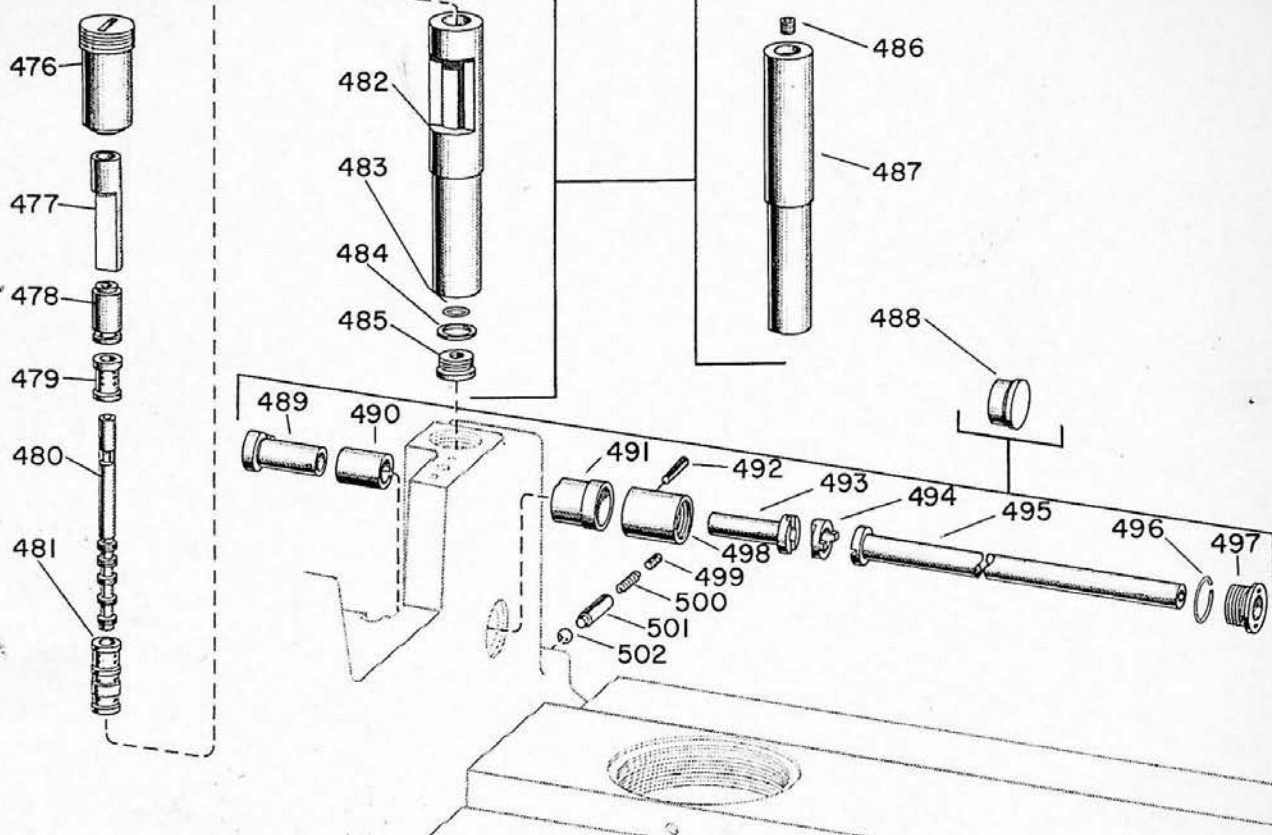
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

KNEE-UNIT No. 4AK (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-362	76644	Plug - Pipe	1	4AK-420	23173	Plug	1
4AK-363	203507	Spring	1	4AK-421	110952	Retainer - Oil	1
4AK-364	83237	Pin	1	4AK-422		Clutch - Rear Cross	
4AK-365	144665	Pin - In Collar	1		110956	English	1
4AK-366	144667	Collar - Rear Elevating Shaft	1		110957	Metric	1
4AK-367	144661	Rod - Elevating Handle Knockout	1	4AK-423	70434	Plug	1
4AK-368	144672	Shaft - Rear Elevating Bracket	1	4AK-424		Dial - Rear Cross	
4AK-369	3280	Key - Hi-Pro	1		144721	English	1
4AK-370	63070	Plug	1		144720	Metric	1
4AK-371	144739	Shaft - Rear Cross	1	4AK-425	102083	Spring - Dial Front	1
4AK-372	217555	Pin	1	4AK-426	116170	Seal - Vickers	5
4AK-373	3280	Key - Hi-Pro	1	4AK-427	144717	Bushing - Rear Rapid Traverse Shaft	1
4AK-374	203507	Spring	1	4AK-428	144718	Shaft - Rear Rapid Traverse	1
4AK-375	83237	Pin	1	4AK-429	115036	Lever - Control Rear	1
4AK-376	144730	Pin - In Collar	1	4AK-430	3232	Screw - Dog Point Set	1
4AK-379	144732	Collar - Rear Cross Shaft	1	4AK-431	1911	Screw - Set	1
4AK-380	79093	Gasket	1	4AK-432	4328	Collar - Red	1
4AK-381	108055	Screw - Large Rear Control	1	4AK-433	4326	Knob - Lever	1
4AK-382	253254	Plug - Screw	1	4AK-434	108062	Bushing - Valve Centering	1
4AK-383	108146	Spring - Rapid Traverse Rear Control	1	4AK-435	144866	Spring	1
4AK-384	642	Pin - Taper	1	4AK-436	69203	Gasket	1
4AK-385	159598	Lever - Rear Cross	1	4AK-437	154464	Screw - Small Rear Control	1
4AK-386	4326	Knob - Lever	1	4AK-438	144714	Bushing - Selector Valve Plunger	1
4AK-387	146436	Plunger - Rear Feed Selector Valve	1	4AK-439	79093	Gasket	1
4AK-388	69203	Gasket	1	4AK-440	108055	Screw - Large Rear Control Selector	1
4AK-389	154464	Screw - Small Rear Control	1	4AK-441	153964	Shaft - Rear Feed	1
4AK-390	144731	Rod - Rear Cross Knockout	1	4AK-442	231380	Bearing - Needle	1
4AK-391	3529	Plug	1	4AK-443	144719	Bushing - Rear Feed Shaft	1
4AK-392	144729	Spacer - Rear Cross Shaft	1	4AK-444	153411	Knob - Feed Change	1
4AK-393	144716	Plunger - Rear Rapid Traverse Valve	1	4AK-445	98788	Clutch	1
4AK-394	144715	Bushing - Rear Rapid Traverse Valve	1	4AK-446	642	Pin - Taper	1
4AK-395	144734	Bushing - Rear Control Cross	1	4AK-447	66254	Pin - In Collar Short	1
4AK-396	1966	Pin	1	4AK-448	3232	Screw - Dog Point Set	1
4AK-397	23173	Plug	1	4AK-449	3232	Screw - Dog Point Set	1
4AK-398	146439	Bracket - Rear	1	4AK-450	66254	Pin - In Collar Short	1
4AK-399	108062	Bushing - Valve Centering	1	4AK-451	663	Pin - Taper	1
4AK-400	114866	Spring	1	4AK-452	63070	Plug	1
4AK-401	97577	Plug - Felt	1	4AK-453	66249	Collar - Small	1
4AK-402	1844	Plug	1	4AK-454	109957	Bushing - Retainer Spring	1
4AK-403	3232	Screw - Dog Point Set	1	4AK-455	102083	Spring - Dial Front	1
4AK-404		Gear - Spur		4AK-456	642	Pin - Taper	1
	161065	English	1	4AK-457	3232	Screw - Dog Point Set	1
	162764	Metric	1	4AK-458	63068	Plunger - In Crank	1
4AK-405	62693	Ring - Spring Lock	1	4AK-459	1349	Spring	1
4AK-406	108368	Bearing - Needle	1	4AK-460	161098	Bushing - Crank	1
4AK-407	1936	Plug	1	4AK-461	79762	Bearing - Needle	1
4AK-408	144722	Spacer - Rear Rapid Traverse Valve	1	4AK-462	98788	Clutch	1
4AK-409	146437	Bushing - Rear Feed Selector Valve	1	4AK-463	66249	Collar - Small	1
4AK-410	231380	Bearing - Needle	1	4AK-464	109957	Bushing - Retainer Spring	1
4AK-411	110952	Retainer - Oil	1	4AK-465	3540	Pin - Straight	1
4AK-412	3406	Screw	6	4AK-466	161097	Crank - Rear	1
4AK-413	161068	Clutch - Rear Elevating	1	4AK-467	222979	Bearing - Thrust	1
4AK-414		Dial - Rear Elevating		4AK-468	144727	Gear - Bevel	1
	161067	English	1	4AK-469	3553	Plug	1
	162043	Metric	1	4AK-470	3505	Handle - Spool	1
4AK-415	70434	Plug	1	4AK-471	3503	Stud - Spool Handle	1
4AK-416	642	Pin - Taper	1	4AK-472	3504	Collar - Spool Handle	1
4AK-417	1844	Plug	1	4AK-473	127468	Ring - "O"	2
4AK-418	144663	Trough - Oil Rear Cross	1	4AK-474	3163	Screw	4
4AK-419	1966	Pin	1	4AK-475	146438	Cover - (Without Rear Control)	1

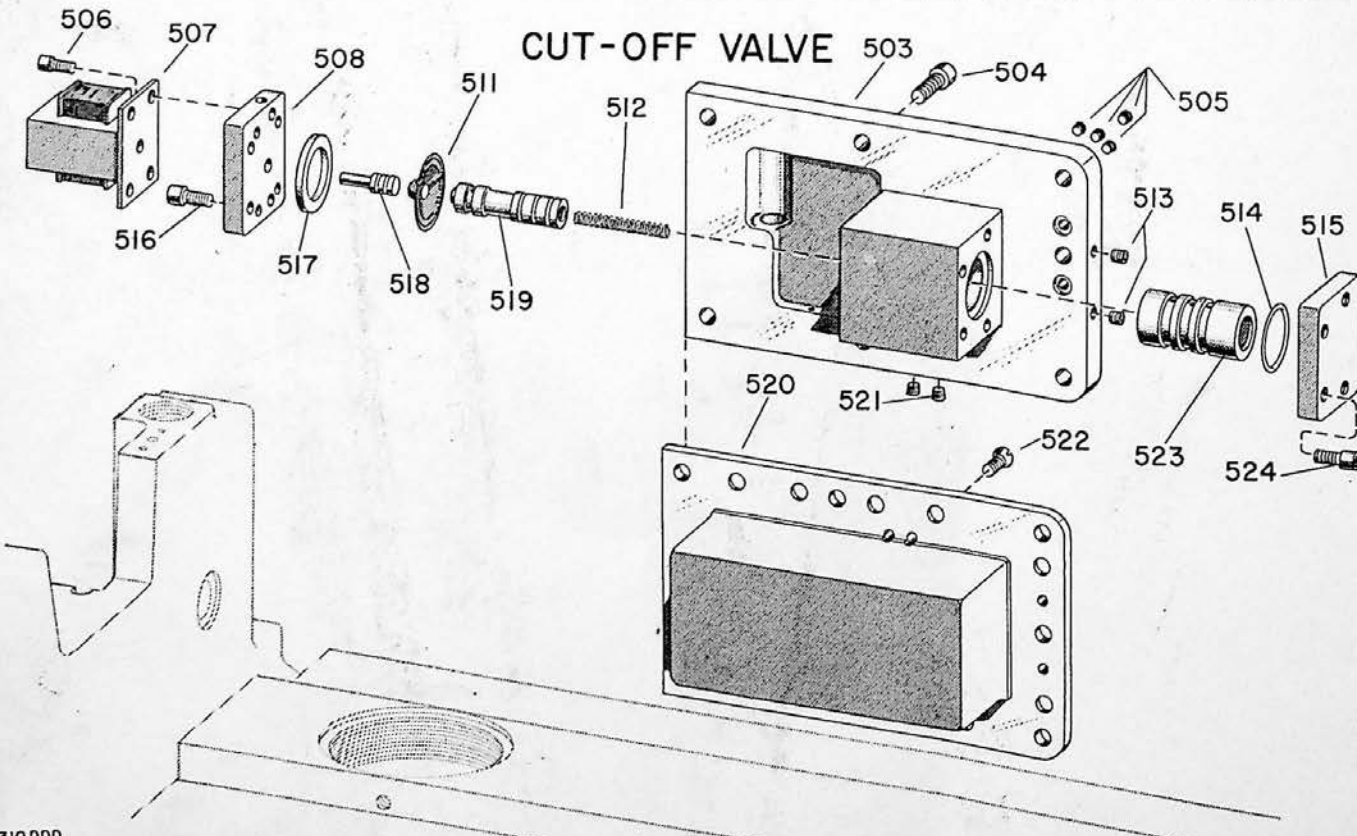


RAPID FEED VALVE



103 GGG  
239 DDD  
240 DDD

CUT-OFF VALVE



310 DDD

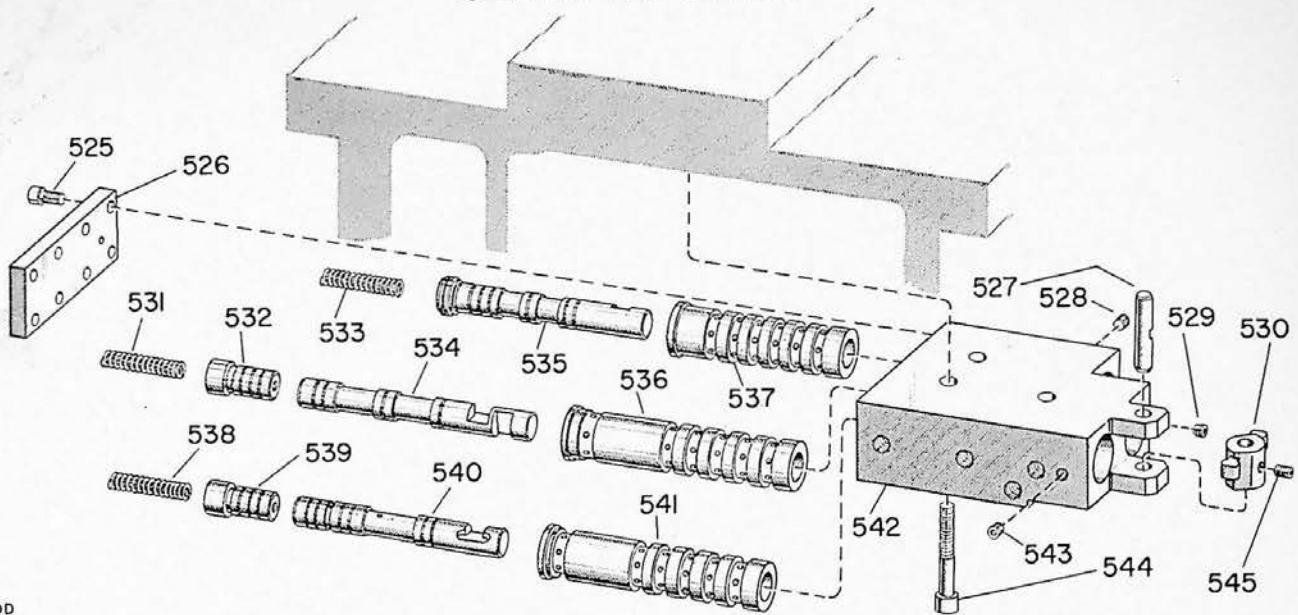
SERVICE MANUAL AND PARTS LIST CATALOG

KNEE-UNIT No. 4AK (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-476	151237	*Screw - Plug		4AK-497	67109	*Plug - Screw . . . . .	1
	150945	No. 2 Machines . . . . .	1	4AK-498	114911	*Sleeve - Coupling . . . . .	1
4AK-477	150243	*Spacer - Feed Rapid Valve . . . . .	1	4AK-499		*Screw - Set	
4AK-478	160491	*Bushing - Top . . . . .	1		1917	No. 2 Plain & Vertical Machines . . . . .	1
4AK-479	160492	*Bushing - Central . . . . .	1		3211	Nos. 3 & 4 Plain & Vertical Machines . . . . .	1
4AK-480		*Plunger - Feed Rapid Valve		4AK-500	203507	*Spring . . . . .	1
	151238	Nos. 2, 3 & 4 Plain & Vertical Machines . . . . .	1	4AK-501		*Pin - Detent Plunger	
4AK-481	150239	*Bushing - Bottom . . . . .	1		144194	No. 2 Plain & Vertical Machines . . . . .	1
4AK-482	150245	*Body - Rapid Feed Valve . . . . .	1		146854	Nos. 3 & 4 Plain & Vertical Machines . . . . .	1
4AK-483	129367	*Ring - "O" . . . . .	1	4AK-502	13665	Ball - Steel . . . . .	1
4AK-484	78777	*Gasket . . . . .	1	4AK-503	160296	Body - Cut Off Valve . . . . .	1
4AK-485	150240	*Screw . . . . .	1	4AK-504	3400	Screw . . . . .	7
4AK-486	76644	Plug - Pipe		4AK-505	4236	Plug - Pipe . . . . .	4
		(Without Automatic Cycle) . . . . .	1	4AK-506	3218	Screw . . . . .	4
4AK-487	150374	Body - Junction		4AM-507	136302	Valve - Solenoid . . . . .	1
		(Without Automatic Cycle) . . . . .	1	4AK-508	160293	Cover - Valve Body, R. H. . . . .	1
4AK-488	121299	Plug - Rapid Traverse		4AK-511	152649	Seal - Oil . . . . .	1
		(Without Automatic Cycle) . . . . .	1	4AK-512	161934	Spring . . . . .	1
4AK-489	146856	*Lever - Control Valve . . . . .	1	4AK-513	4236	Plug - Pipe . . . . .	2
4AK-490	229967	*Bearing - Oilite . . . . .	1	4AK-514	244151	Ring - "O" . . . . .	1
4AK-491	159715	*Bushing - Extension Shaft . . . . .	1	4AK-515	160295	Cover - Valve Body, L. H. . . . .	1
4AK-492	645	*Pin - Taper . . . . .	1	4AK-516	4093	Screw . . . . .	4
4AK-493	146857	*Shaft - Extension . . . . .	1	4AK-517	152834	Washer - Fitting . . . . .	1
4AK-494	67108	*Coupling . . . . .	1	4AK-518	152603	Plunger - Solenoid . . . . .	1
4AK-495		*Shaft - Coupling Horizontal		4AK-519	161919	Plunger - Feed Cut Off . . . . .	1
	144153	No. 2 Plain & Vertical Machines . . . . .	1	4AK-520	160297	Cover - Cut Off Valve . . . . .	1
	148373	Nos. 3 & 4 Plain & Vertical Machines . . . . .	1	4AK-521	4236	Plug - Pipe . . . . .	1
4AK-496	67620	*Spring - Ring . . . . .	1	4AK-522	672	Screw - Flat Head . . . . .	8
				4AK-523	160294	Bushing - Plunger . . . . .	1
				4AK-524	4093	Screw . . . . .	4

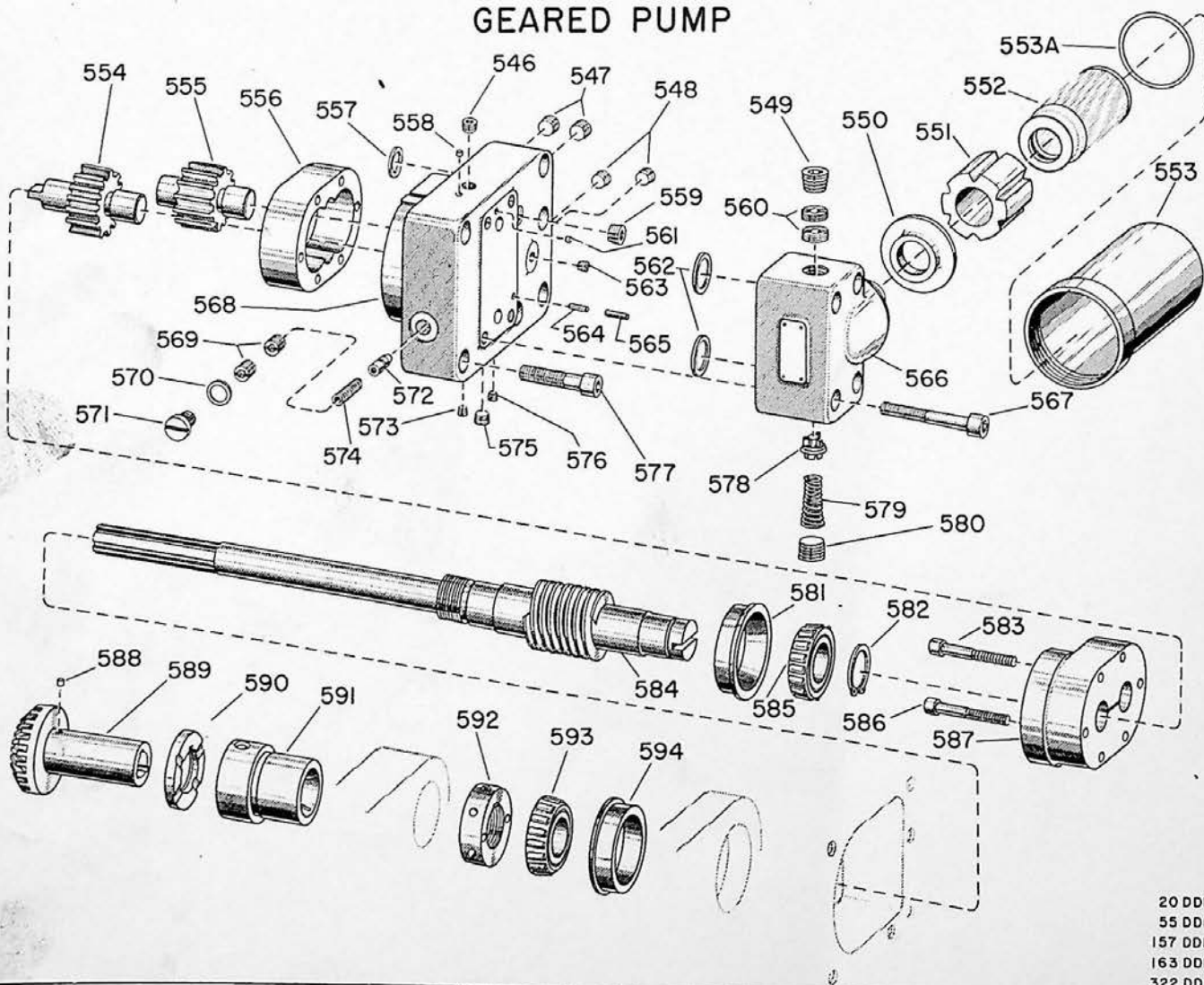
\* Used With Automatic Table Cycle

### SELECTOR VALVE



42 DDD

### GEARED PUMP



20 DDD  
55 DDD  
157 DDD  
163 DDD  
322 DDD

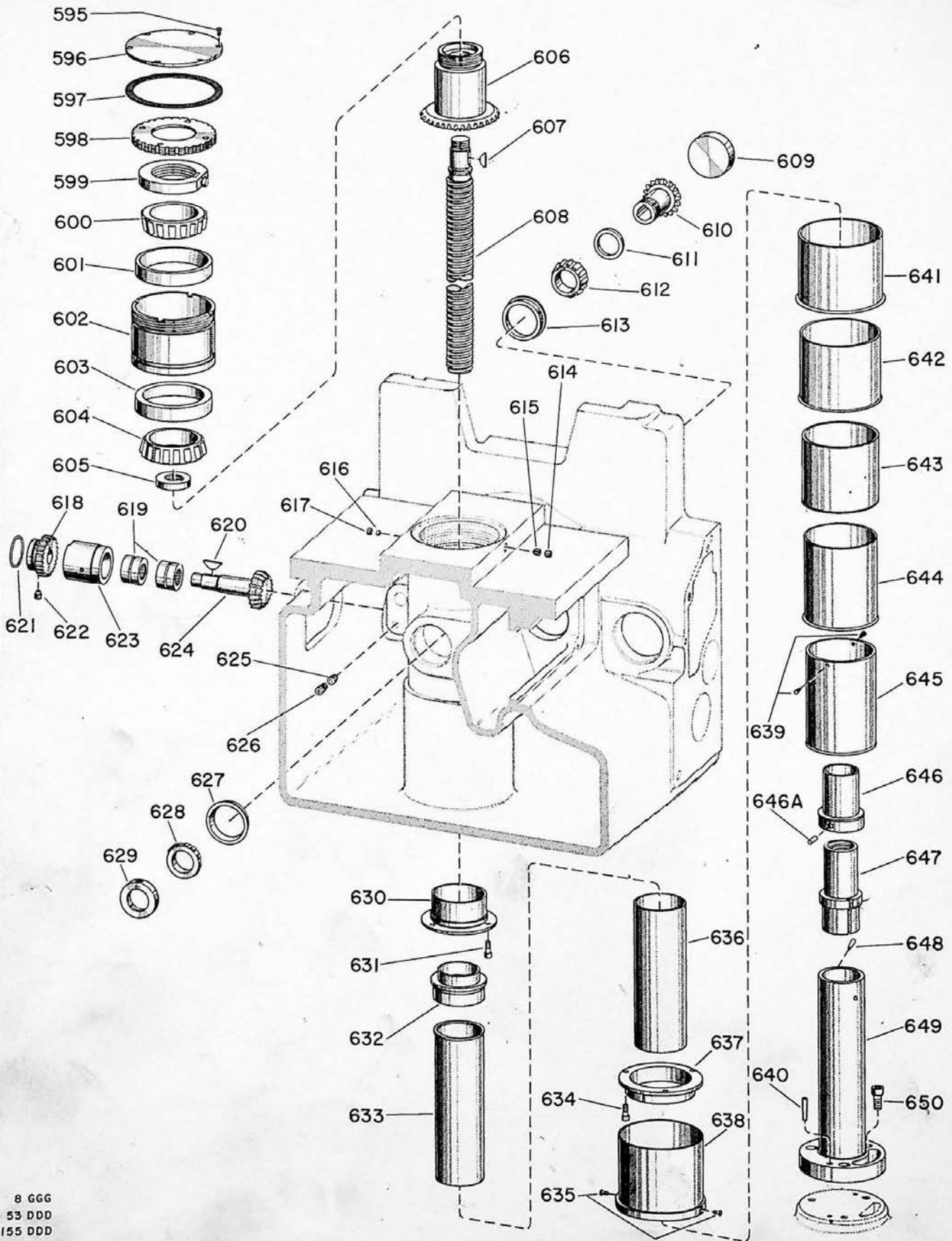
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

KNEE-UNIT No. 4AK (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-525	3218	Screw . . . . .	8	4AK-561	1550	Plug . . . . .	1
4AK-526	144571	Cover - Selector Valve . . . . .	1	4AK-562	116470	Seal - Ring . . . . .	2
4AK-527	144570	Pin - Selector Valve Lever . . . . .	1	4AK-563	4236	Plug - Pipe . . . . .	1
4AK-528	4236	Plug - Pipe . . . . .	1	4AK-564	84132	Pin . . . . .	1
4AK-529	4236	Plug - Pipe . . . . .	1	4AK-565	84131	Pin . . . . .	1
4AK-530	144569	Lever - Selector Valve . . . . .	1	4AK-566	163009	Head - Oil Filter . . . . .	1
4AK-531	245237	Spring - Cross Detent . . . . .	1	4AK-567	3262	Screw . . . . .	4
4AK-532	144572	Plunger - Centralizing . . . . .	1	4AK-568	136921	Body - Pump . . . . .	1
4AK-533	245237	Spring - Cross Detent . . . . .	1	4AK-569	1911	Screw - Set . . . . .	2
4AK-534	144575	Plunger - Reversing Valve . . . . .	1	4AK-570	224645	Gasket . . . . .	1
4AK-535	144577	Plunger - Rapid Traverse Valve . . . . .	1	4AK-571	205910	Screw - Spindle Bearing . . . . .	1
4AK-536	144576	Bushing - Reverse Valve . . . . .	1	4AK-572	65913	Valve - Relief . . . . .	1
4AK-537	144578	Bushing - Rapid Traverse Valve . . . . .	1	4AK-573	4236	Plug - Pipe . . . . .	1
4AK-538	245237	Spring - Cross Detent . . . . .	1	4AK-574	70407	Spring . . . . .	1
4AK-539	144572	Plunger - Centralizing . . . . .	1	4AK-575	76644	Plug - Pipe . . . . .	1
4AK-540	144573	Plunger - Selector Valve . . . . .	1	4AK-576	4236	Plug - Pipe . . . . .	1
4AK-541	144574	Bushing - Selector Valve . . . . .	1	4AK-577	3401	Screw . . . . .	6
4AK-542	144568	Body . . . . .	1	4AK-578	121483	Valve - Head . . . . .	1
4AK-543	4236	Plug - Pipe . . . . .	1	4AK-579	121484	Spring . . . . .	1
4AK-544	3402	Screw . . . . .	4	4AK-580	220784	Plug - Pipe . . . . .	1
4AK-545	78600	Screw - Set . . . . .	1	4AK-581	98776	Cup - Roller Bearing . . . . .	1
4AK-546	76644	Plug - Pipe . . . . .	1	4AK-582	239553	Ring - Retainer . . . . .	1
4AK-547	76645	Plug - Pipe . . . . .	2	4AK-583	3398	Screw . . . . .	4
4AK-548	76644	Plug - Pipe . . . . .	2	4AK-584	144617	Shaft - Worm . . . . .	1
4AK-549	220784	Plug - Pipe . . . . .	1	4AK-585	111030	Cone - Roller Bearing . . . . .	1
4AK-550	163012	Collar - Filter . . . . .	1	4AK-586	108501	Screw . . . . .	2
4AK-551	163011	Magnet . . . . .	1	4AK-587	108415	Cover - Pump . . . . .	1
4AK-552	121486	Element - Assembly . . . . .	1	4AK-588	217555	Pin . . . . .	1
4AK-553	163010	Cover . . . . .	1	4AK-589		Gear - Bevel Worm Shaft	
4AK-553A	251924	Ring - "O" . . . . .	1		147336	No. 2 Machines . . . . .	1
4AK-554	108499	Gear - Pump Driver . . . . .	1		146226	Nos. 3 & 4 Machines . . . . .	1
4AK-555	105224	Pinion - Driven Pump . . . . .	1	4AK-590	144615	Spacer - Bevel Gear . . . . .	1
4AK-556	108498	Spacer - Pump . . . . .	1	4AK-591	147225	Bushing - Bevel Gear . . . . .	1
4AK-557	103660	Seal - Ring . . . . .	1	4AK-592	4244	Nut - Lock . . . . .	1
4AK-558	1550	Plug . . . . .	1	4AK-593	111030	Cone - Roller Bearing . . . . .	1
4AK-559	76645	Plug - Pipe . . . . .	1	4AK-594	98776	Cup - Roller Bearing . . . . .	1
4AK-560	125182	Screw - Lock . . . . .	2				

ELEVATING SCREW



8 GGG  
53 DDD  
155 DDD

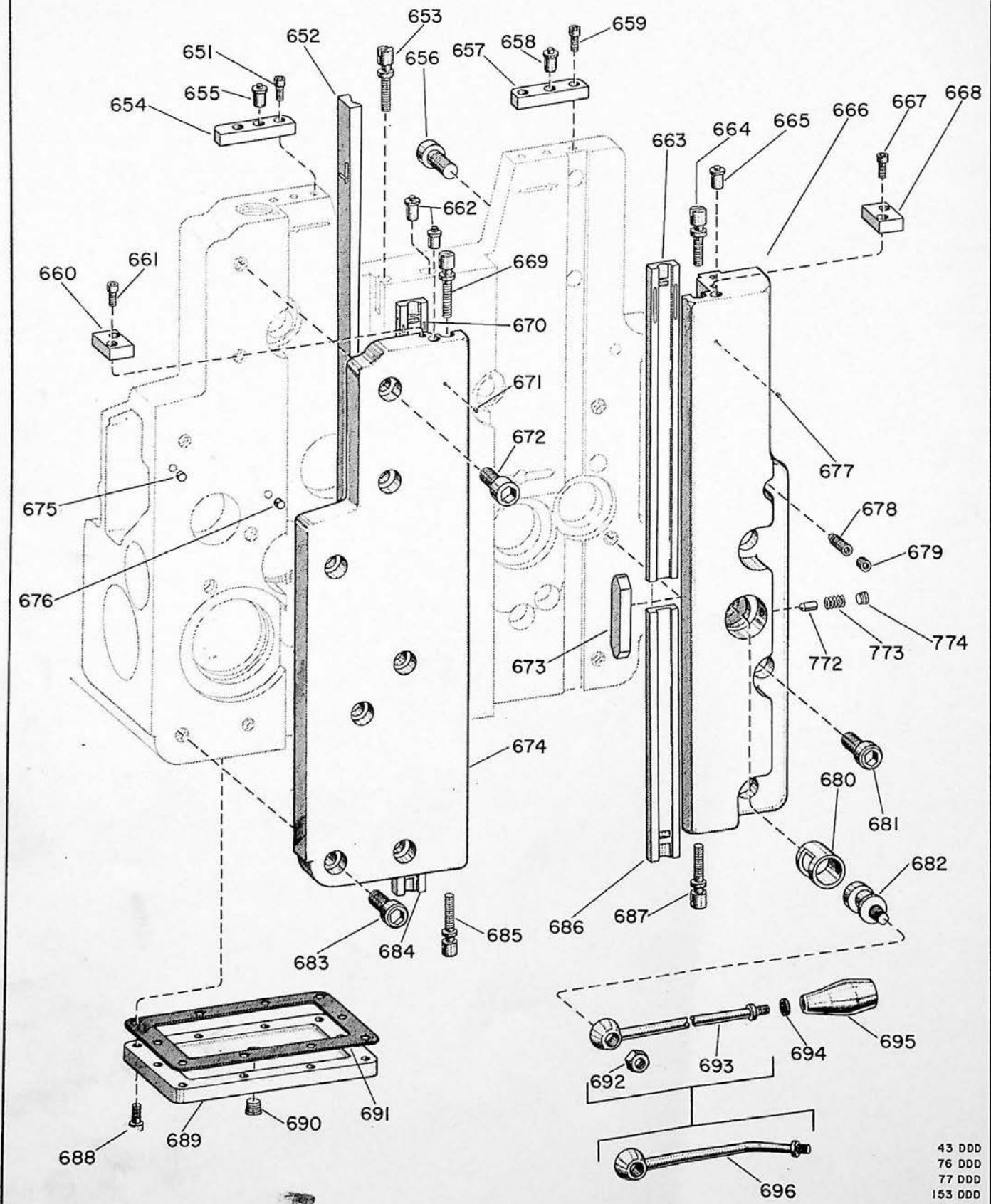
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

KNEE-UNIT No. 4AK (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-595	149322	Screw . . . . .	6	4AK-627	72213	Cup - Roller Bearing . . . . .	1
4AK-596	108165	Cover - Elevating Screw . . . . .	1	4AK-628	69189	Cone - Roller Bearing . . . . .	1
4AK-597	108164	Gasket . . . . .	1	4AK-629	4247	Nut - Lock . . . . .	1
4AK-598	149819	Nut - Adjusting . . . . .	1	4AK-630	149820	Sleeve - Telescopic Tube #2 . . . . .	1
4AK-599	218508	Nut - Lock . . . . .	1	4AK-631	2320	Screw . . . . .	3
4AK-600	108163	Cone - Roller Bearing . . . . .	1	4AK-632	160336	Sleeve - Telescopic Tube . . . . .	1
4AK-601	75980	Cup - Roller Bearing . . . . .	1	4AK-633		Tube - Telescopic #1 . . . . .	
4AK-602	144652	Sleeve - Roller Bearing . . . . .	1		108170	No. 2 Machines . . . . .	1
4AK-603	75980	Cup - Roller Bearing . . . . .	1		146202	Nos. 3 & 4 Machines . . . . .	1
4AK-604	108163	Cone - Roller Bearing . . . . .	1	4AK-634	2320	Screw . . . . .	3
4AK-605	63165	Nut - Lock . . . . .	1	4AK-635	70198	Screw . . . . .	2
4AK-606	144651	Gear - Bevel . . . . .	1	4AK-636	147385	Tube - Telescopic #2 . . . . .	1
4AK-607	3281	Key - Hi-Pro . . . . .	1	4AK-637	146296	Sleeve - Telescopic Tubing Support . . . . .	1
4AK-608		Screw - Elevating . . . . .	1	4AK-638	144659	Tube - 6th Telescopic . . . . .	1
	145623	No. 2 Machines - English . . . . .	1	4AK-639	70198	Screw . . . . .	2
	145624	No. 2 Machines - Metric . . . . .	1	4AK-640	645	Pin - Taper . . . . .	1
	147567	Nos. 3 & 4 Machines - English . . . . .	1	4AK-641	144658	Tube - 5th Telescopic . . . . .	1
	146898	Nos. 3 & 4 Machines - Metric . . . . .	1	4AK-642	144657	Tube - 4th Telescopic . . . . .	1
4AK-609	145034	Plug - Drive . . . . .	1	4AK-643	144656	Tube - 3rd Telescopic . . . . .	1
4AK-610	144742	Pinion - Bevel Vertical . . . . .	1	4AK-644		Tube - 2nd Telescopic . . . . .	
4AK-611	144741	Spacer - Vertical Feed Pinion . . . . .	1		144655	No. 2 Machines . . . . .	1
4AK-612	69189	Cone - Roller Bearing . . . . .	1		146204	Nos. 3, 4 Machines . . . . .	1
4AK-613	72213	Cup - Roller Bearing . . . . .	1	4AK-645		Tube - 1st Telescopic . . . . .	
4AK-614	2355	Screw - Set . . . . .	1		144654	No. 2 Machines . . . . .	1
4AK-615	2343	Screw - Dog Point Set . . . . .	1		147566	Nos. 3 & 4 Machines . . . . .	1
4AK-616	2268	Plug . . . . .	1	4AK-646	161111	Sleeve . . . . .	1
4AK-617	2301	Screw - Set . . . . .	1	4AK-646A	3383	Pin . . . . .	1
4AK-618		Gear . . . . .	1	4AK-647		Nut - Elevating Screw . . . . .	
	161066	English . . . . .	1		161113	English . . . . .	1
	162763	Metric . . . . .	1		161114	Metric . . . . .	1
4AK-619	108526	Bearing - Needle . . . . .	2	4AK-648	642	Pin - Taper . . . . .	2
4AK-620	3281	Key - Hi-Pro . . . . .	1	4AK-649		Housing - Elevating Screw . . . . .	
4AK-621	217598	Ring - Spring . . . . .	1		113642	No. 2 Plain Machines . . . . .	1
4AK-622	3232	Screw - Dog Point Set . . . . .	1		113643	No. 2 Universal & Vertical Machines . . . . .	1
4AK-623	144662	Bushing - Elevating Bevel Gear . . . . .	1		147571	Nos. 3 & 4 Plain Machines . . . . .	1
4AK-624	144671	Gear - Bevel . . . . .	1		147572	Nos. 3 & 4 Universal & Vertical . . . . .	
4AK-625	1917	Screw - Set . . . . .	1			Machines . . . . .	1
4AK-626	3232	Screw - Dog Point Set . . . . .	1	4AK-650	3343	Screw . . . . .	3

KNEE GIBS - GUIDES AND WIPERS



43 DDD  
 76 DDD  
 77 DDD  
 153 DDD  
 184 DDD

CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

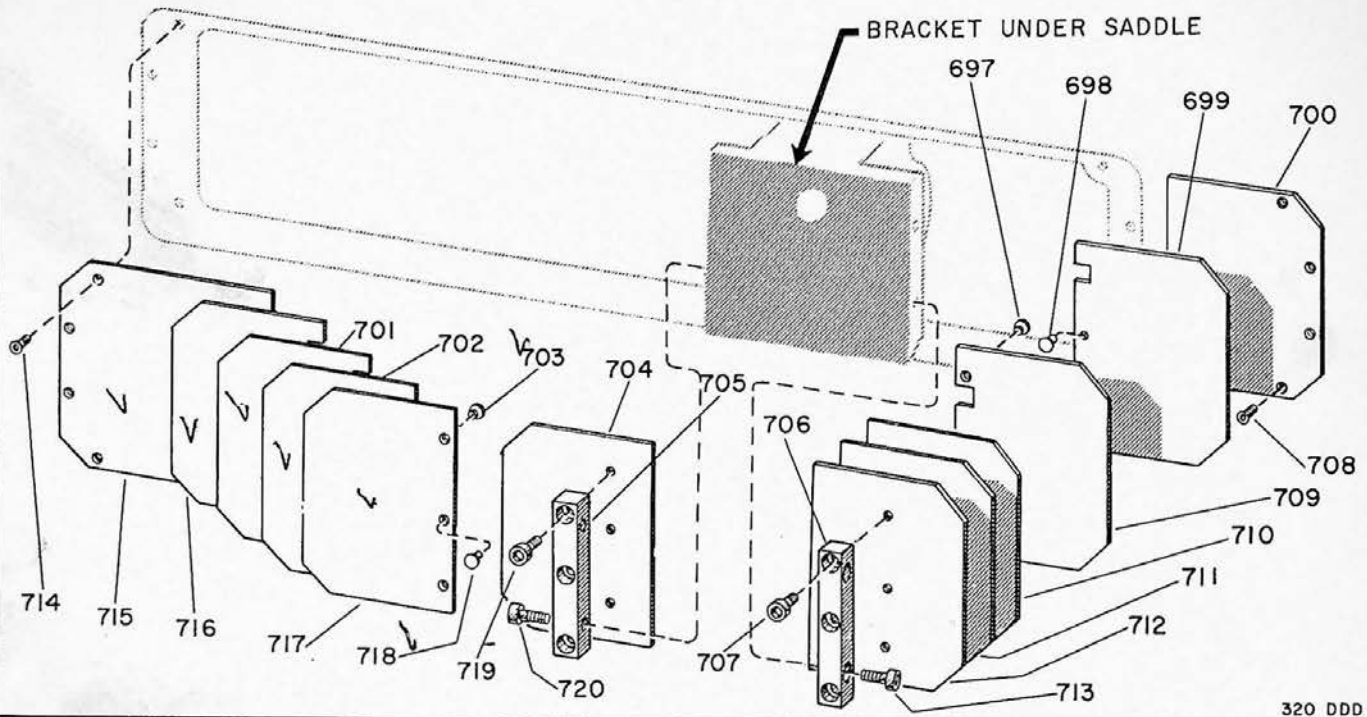
WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

KNEE-UNIT No. 4AK (Continued)  
ALL MACHINES

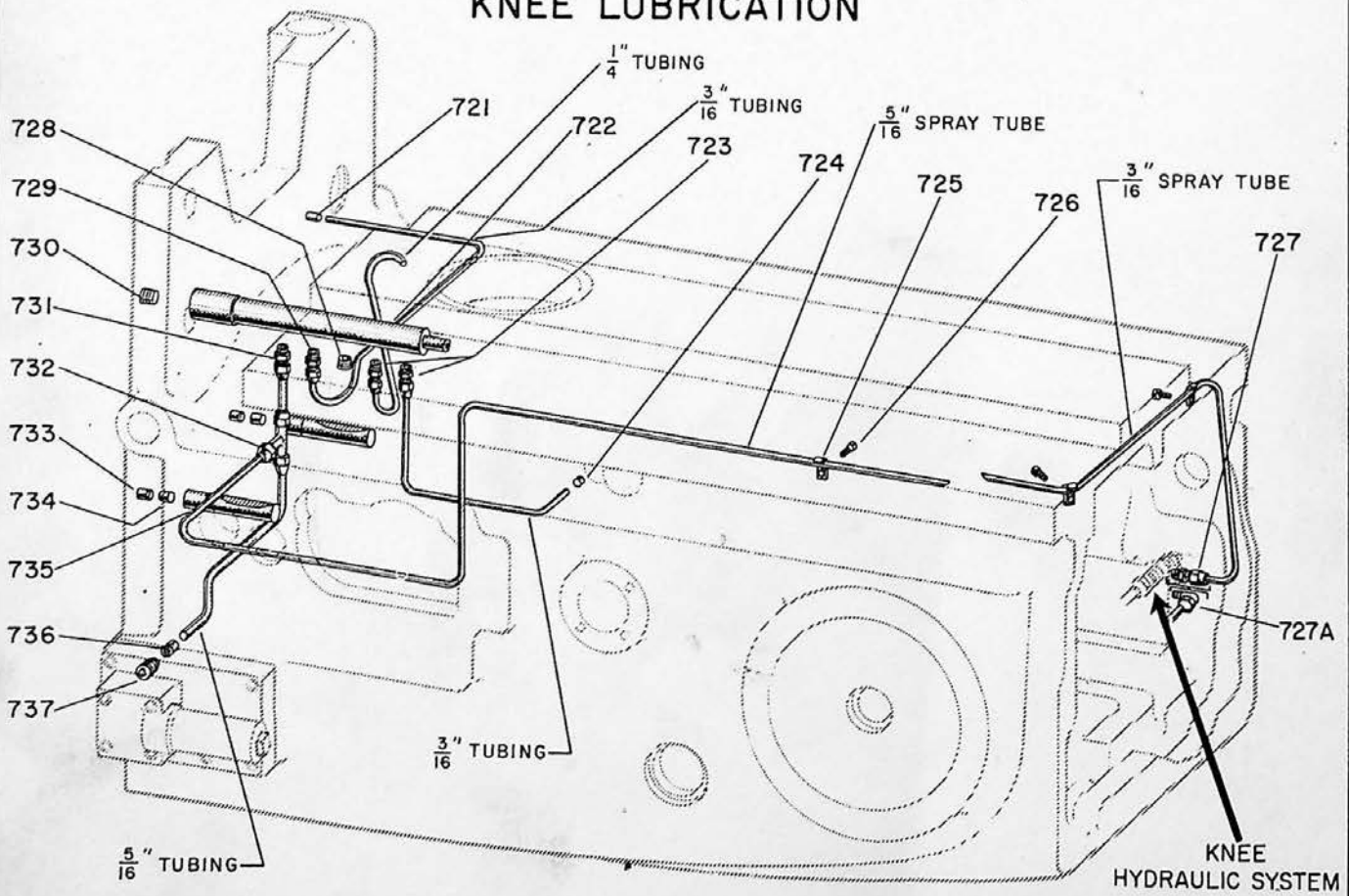
KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-651	2320	Screw . . . . .	2	4AK-673		Block - Knee Clamp	
4AK-652		Gib - Knee Center		144677		No. 2 Machines . . . . .	1
	151630	No. 2 Machines . . . . .	1	146336		Nos. 3 & 4 Machines . . . . .	1
	147516	Nos. 3 & 4 Machines . . . . .	1	4AK-674		Guide - Knee, R. H.	
4AK-653	63603	Screw - Gib . . . . .	1	151637		No. 2 Machines . . . . .	1
4AK-654		Wiper - Knee Bearing, R. H.		148391		Nos. 3 & 4 Machines . . . . .	1
	144642	No. 2 Machines . . . . .	1	4AK-675	2268	Plug . . . . .	1
	147570	Nos. 3 & 4 Machines . . . . .	1	4AK-676	1962	Plug . . . . .	1
4AK-655	891	Oiler . . . . .	1	4AK-677	2008	Plug . . . . .	1
4AK-656	3409	Screw . . . . .	2	4AK-678	3241	Screw - Dog Point Set . . . . .	1
4AK-657		Wiper - Knee Bearing, L. H.		4AK-679	2248	Screw - Set . . . . .	1
	144643	No. 2 Machines . . . . .	1	4AK-680	144676	Bushing - Knee Clamp . . . . .	1
	147568	Nos. 3 & 4 Machines . . . . .	1	4AK-681		Screw	
4AK-658	891	Oiler . . . . .	1	3409		No. 2 Machines . . . . .	3
4AK-659	2320	Screw . . . . .	2	141261		Nos. 3 & 4 Machines . . . . .	3
4AK-660		Wiper - Bearing		4AK-682	148786	Shaft - Eccentric . . . . .	1
	151633	No. 2 Machines . . . . .	1	4AK-683	141261	Screw . . . . .	6
	147569	Nos. 3 & 4 Machines . . . . .	1	4AK-684		Gib - Knee Lower	
4AK-661	2320	Screw . . . . .	2	144647		No. 2 Machines . . . . .	1
4AK-662	891	Oiler . . . . .	2	147564		Nos. 3 & 4 Machines . . . . .	1
4AK-663		Gib - Knee Upper		4AK-685	63606	Screw - Gib . . . . .	1
	144646	No. 2 Machines . . . . .	1	4AK-686	144674	Lever - Clamp	
	147565	Nos. 3 & 4 Machines . . . . .	1	4AK-687	63606	No. 2 Machines . . . . .	1
4AK-664	63605	Screw - Gib . . . . .	1	4AK-688	3399	Screw - Gib . . . . .	1
4AK-665	891	Oiler . . . . .	1	4AK-688	3399	Screw . . . . .	10
4AK-666		Guide - Knee, L. H.		4AK-689	144619	Cover - Knee . . . . .	1
	144673	No. 2 Machines . . . . .	1	4AK-690	216607	Plug - Pipe . . . . .	1
	147573	Nos. 3 & 4 Machines . . . . .	1	4AK-691	144620	Gasket - Knee . . . . .	1
4AK-667	2320	Screw . . . . .	2	4AK-692	3474	Nut - Hex . . . . .	1
4AK-668		Wiper - Bearing		4AK-693	146335	Lever - Knee Clamp	
	151633	No. 2 Machines . . . . .	1	4AK-694	4329	Nos. 3 & 4 Machines . . . . .	1
	147569	Nos. 3 & 4 Machines . . . . .	1	4AK-695	4325	Washer - Knob . . . . .	1
4AK-669	63606	Screw - Big . . . . .	1	4AK-696	144674	Knob - Lever . . . . .	1
4AK-670		Gib - Knee Upper		4AK-696	144674	Lever - Clamp	
	144646	No. 2 Machines . . . . .	1	4AK-772	165163	No. 2 Machines . . . . .	1
	147565	Nos. 3 & 4 Machines . . . . .	1	4AK-773	165162	Detent . . . . .	1
4AK-671	2008	Plug . . . . .	1	4AK-774	76644	Spring . . . . .	1
4AK-672	3276	Screw . . . . .	1			Plug - Pipe . . . . .	1



### KNEE SLIDING COVERS



### KNEE LUBRICATION



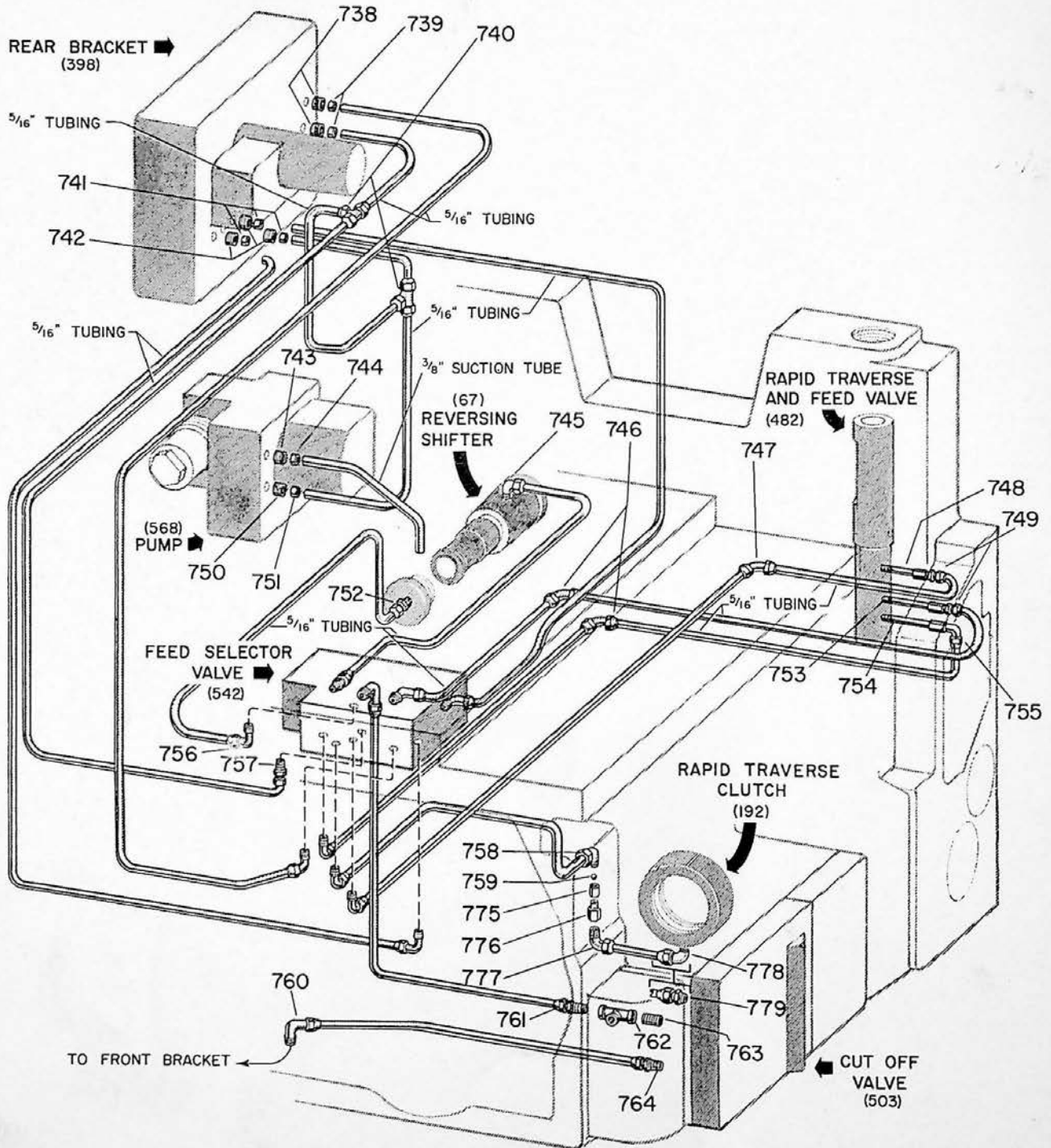
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

KNEE-UNIT No. 4AK (Continued)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-697	118309	Pin - Stop . . . . .	6	4AK-712		Plate - Bracket Mounting	
4AK-698	116383	Pin - Guide . . . . .	5	146435		No. 2 Machines . . . . .	1
4AK-699		Plate - 4th Sliding		147478		No. 3 Plain & Universal Machines . . . . .	1
	144746	No. 2 Machines . . . . .	1	147500		No. 3 Vertical Machines . . . . .	1
	147473	No. 3 Plain & Universal Machines . . . . .	1	147500		No. 4 Machines . . . . .	1
	147504	No. 3 Vertical Machines . . . . .	1	4AK-713	3396	Screw . . . . .	2
	147504	No. 4 Machines . . . . .	1	4AK-714	149322	Screw . . . . .	4
4AK-700		Plate - Fixed		4AK-715		Plate - Fixed Front	
	144750	No. 2 Plain & Vertical Machines . . . . .	1	167579		No. 2 Plain & Universal Machines . . . . .	1
	146116	No. 2 Universal Machines . . . . .	1	167575		No. 2 Vertical Machines . . . . .	1
	147511	No. 3 Plain Machines . . . . .	1	147511		No. 3 Plain & Universal Machines . . . . .	1
	147513	No. 3 Universal Machines . . . . .	1	167577		No. 4 Plain Machines . . . . .	1
	147503	No. 3 Vertical, No. 4 Plain & Vertical Machines . . . . .	1	167578		No. 4 Universal Machines . . . . .	1
	147501	No. 4 Universal Machines . . . . .	1	167576		Nos. 3 & 4 Vertical Machines . . . . .	1
4AK-701		Plate - 3rd Sliding		4AK-716		Plate - 4th Sliding	
	144747	No. 2 Machines . . . . .	1	144746		No. 2 Machines . . . . .	1
	147474	No. 3 Plain & Universal Machines . . . . .	1	147473		No. 3 Plain & Universal Machines . . . . .	1
	147505	No. 3 Vertical Machines . . . . .	1	147504		No. 3 Vertical Machines . . . . .	1
	147505	No. 4 Machines . . . . .	1	147504		No. 4 Machines . . . . .	1
4AK-702		Plate - 2nd Sliding		4AK-717		Plate - 1st Sliding	
	144748	No. 2 Machines . . . . .	1	144749		No. 2 Machines . . . . .	1
	147475	No. 3 Plain & Universal Machines . . . . .	1	147476		No. 3 Plain & Universal Machines . . . . .	1
	147506	No. 3 Vertical Machines . . . . .	1	147507		No. 3 Vertical Machines . . . . .	1
	147506	No. 4 Machines . . . . .	1	147507		No. 4 Machines . . . . .	1
4AK-703	118309	Pin - Stop . . . . .	6	4AK-718	116383	Pin - Guide . . . . .	5
4AK-704		Plate - Bracket Mounting		4AK-719	3218	Screw . . . . .	3
	146434	No. 2 Machines . . . . .	1	4AK-720	3396	Screw . . . . .	2
	147477	No. 3 Plain & Universal Machines . . . . .	1	4AK-721	2237	Bushing - Tubing	
	147508	No. 3 Vertical Machines . . . . .	1			Nos. 3 & 4 Machines . . . . .	1
	147508	No. 4 Machines . . . . .	1	4AK-722		Distributor - Knee Lubrication	
4AK-705	144743	Bracket - Sliding Plate . . . . .	1	144763		No. 2 Machines . . . . .	1
4AK-706	144743	Bracket - Sliding Plate . . . . .	1	149492		Nos. 3 & 4 Machines . . . . .	1
4AK-707	3218	Screw . . . . .	3	4AK-723	4014	Fitting - Straight, 3/16" . . . . .	2
4AK-708	149322	Screw . . . . .	4	4AK-724	2237	Bushing - Tubing . . . . .	1
4AK-709		Plate - 3rd Sliding		4AK-725	4001	Clamp - Tubing . . . . .	3
	144747	No. 2 Machines . . . . .	1	4AK-726	3460	Screw . . . . .	3
	147474	No. 3 Plain & Universal Machines . . . . .	1	4AK-727	4014	Fitting - Straight, 3/16" . . . . .	1
	147505	No. 3 Vertical Machines . . . . .	1	4AK-727A		Fitting - Elbow . . . . .	
	147505	No. 4 Machines . . . . .	1	4015		Nos. 3 & 4 Machines only . . . . .	1
4AK-710		Plate - 2nd Sliding		4AK-728	76644	Plug - Pipe . . . . .	1
	144748	No. 2 Machines . . . . .	1	4AK-729	89866	Fitting - Straight, 1/4" . . . . .	1
	147475	No. 3 Plain & Universal Machines . . . . .	1	4AK-730	76645	Plug - Pipe . . . . .	1
	147506	No. 3 Vertical Machines . . . . .	1	4AK-731	70382	Fitting - Straight, 5/16" . . . . .	1
	147506	No. 4 Machines . . . . .	1	4AK-732	72235	Tee . . . . .	1
4AK-711		Plate - 1st Sliding		4AK-733	167199	Plug . . . . .	2
	144749	No. 2 Machines . . . . .	1	4AK-734	3306	Plug . . . . .	2
	147476	No. 3 Plain & Universal Machines . . . . .	1	4AK-735	144752	Trough - Oil . . . . .	2
	147507	No. 3 Vertical Machines . . . . .	1	4AK-736	96259	Cone - Compression Fitting . . . . .	1
	147507	No. 4 Machines . . . . .	1	4AK-737	115869	Screw - Tube Connection . . . . .	1

### KNEE HYDRAULIC SYSTEM



378 DDD

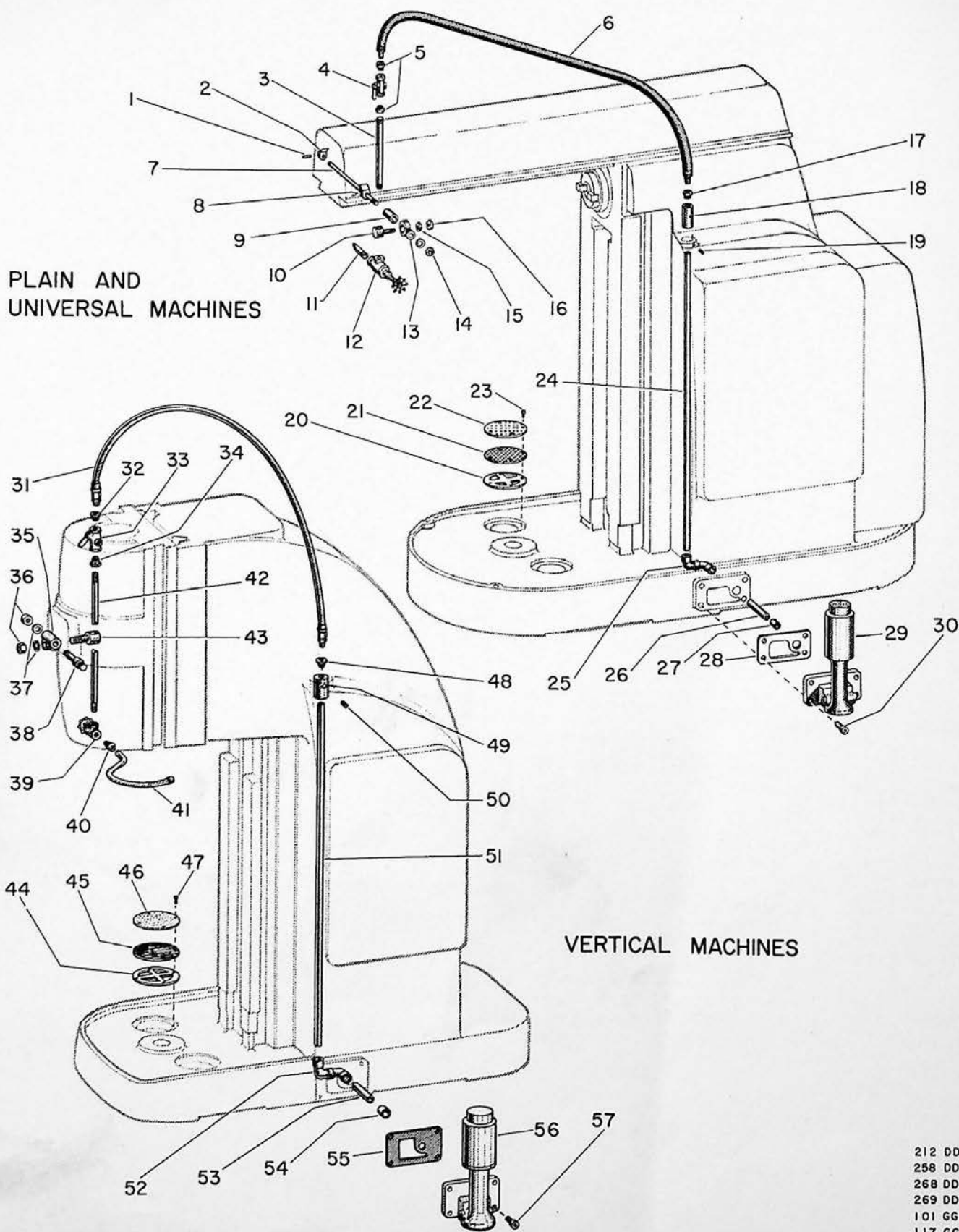
SERVICE MANUAL AND PARTS LIST CATALOG

KNEE-UNIT No. 4AK (Concluded)  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AK-738	115864	Screw - Tube Connection . . . . .	2	4AK-754		Adapter - Fitting	
4AK-739	96259	Cone - Compression Fitting . . . . .	2		154640	Nos. 3 & 4 Machines . . . . .	1
4AK-740	72235	Tee . . . . .	2	4AK-755	4013	Elbow - 90° Compression . . . . .	1
4AK-741	96259	Cone - Compression Fitting . . . . .	3	4AK-756	4013	Elbow - 90° Compression . . . . .	9
4AK-742	115869	Screw - Tube Compression . . . . .	3	4AK-757	70382	Fitting - Straight . . . . .	2
4AK-743	119000	Screw . . . . .	1	4AK-758	166668	Elbow - Slotted . . . . .	1
4AK-744	98340	Sleeve . . . . .	1	4AK-759	98596	Ball - Steel . . . . .	1
4AK-745	4013	Fitting - Elbow . . . . .	1	4AK-760	4013	Elbow - 90° Compression . . . . .	1
4AK-746	95187	Elbow - 90° . . . . .	2	4AK-761	70382	Fitting - Straight . . . . .	1
4AK-747	95187	Elbow - 90° . . . . .	1	4AK-762	58435	Tee - Pipe . . . . .	1
4AK-748		Adapter - Fitting		4AK-763	14006	Nipple . . . . .	1
	150241	Nos. 3 & 4 Machines . . . . .	1	4AK-764	70382	Fitting - Straight . . . . .	1
4AK-749	70382	Fitting - Straight . . . . .	2	4AK-775	4063	Coupling - Pipe . . . . .	1
4AK-750	115869	Screw - Tube Connection . . . . .	1	4AK-776	168351	Body - R. T. Choke . . . . .	1
4AK-751	96259	Cone - Compression Fitting . . . . .	1	4AK-777	4013	Fitting - Elbow . . . . .	1
4AK-752	70382	Fitting - Straight . . . . .	1	4AK-778	4013	Fitting - Elbow, No. 2 Machine . . . . .	1
4AK-753		Adapter - Fitting		4AK-779	70382	Fitting - Straight,	
	150241	Nos. 3 & 4 Machines . . . . .	1			Nos. 3 & 4 Machines . . . . .	1

### COOLANT PUMP AND PIPING

PLAIN AND  
UNIVERSAL MACHINES



VERTICAL MACHINES

212 DDD  
258 DDD  
268 DDD  
269 DDD  
101 GGG  
117 GGG

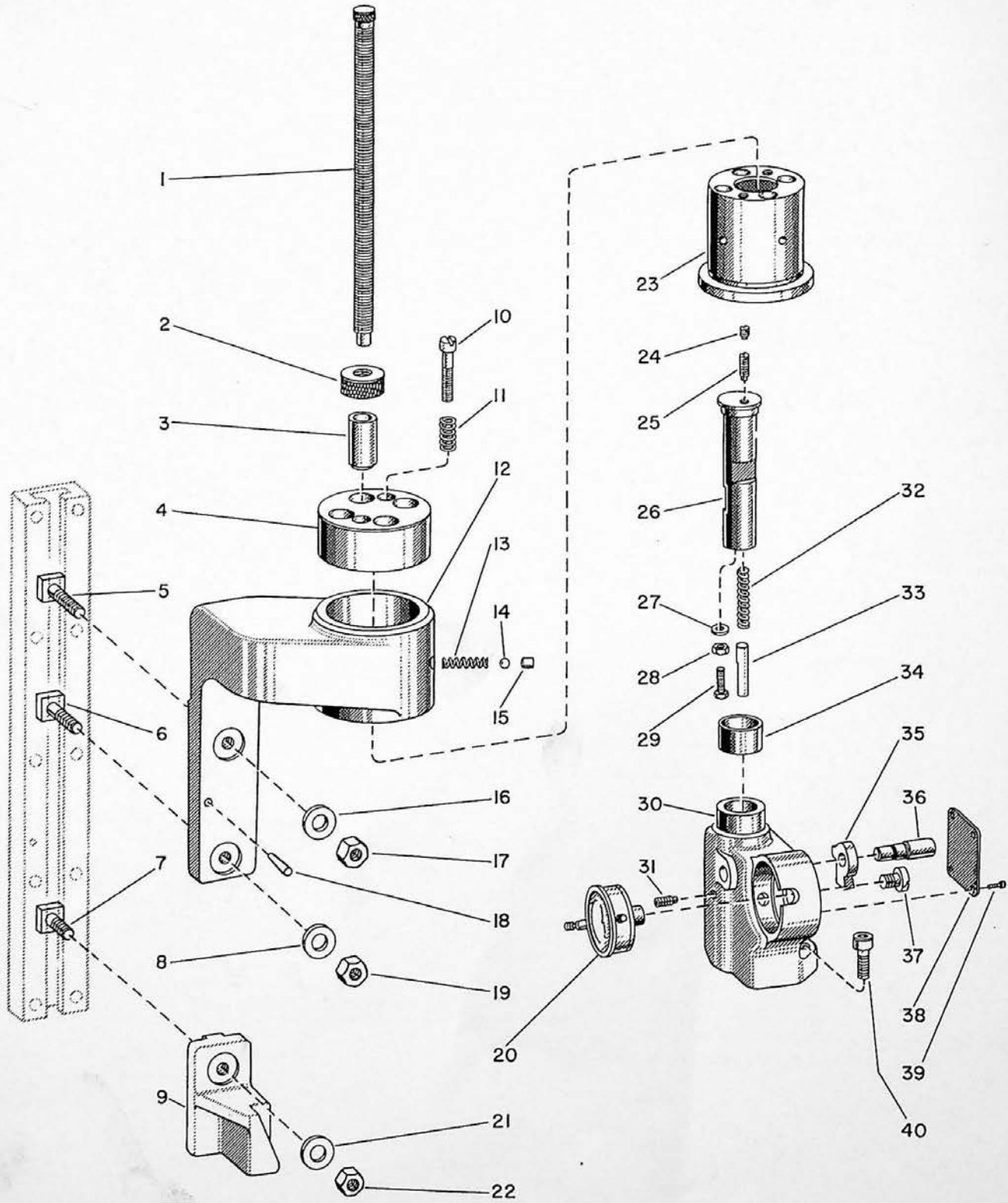
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

COOLANT PUMP AND PIPING—UNIT No. 4AP  
ALL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AP-1	663	Pin . . . . .	1	4AP-26		Pipe - Supply Coolant	
4AP-2		Clamp - Overarm		151093		No. 2 Plain & Universal Machines . . .	1
	100083	Nos. 2, 3 & 4 Plain & Universal Machines . . . . .	1	149610		Nos. 3 & 4 Plain & Universal Machines . . .	1
4AP-3		Pipe - Supply Valve		4AP-27	144103	Bushing - Coolant Supply . . . . .	1
	100454	No. 2 Plain & Universal Machines . . . . .	1	4AP-28	144104	Gasket - Coolant Pump . . . . .	1
	108190	Nos. 3 & 4 Plain Machines . . . . .	1	4AN-29		Pump - Coolant	
	108190	Nos. 3 & 4 Universal Machines . . . . .	1	153999		Fairbanks Morse . . . . .	1
4AP-4	103779	Valve - Air Cock . . . . .	1	156429		Pioneer . . . . .	1
4AP-5		Bushing - Reducing		3404		Screw . . . . .	4
	213032	No. 2 Plain & Universal Machines . . . . .	1	4AP-31		Hose - Pressure	
4AP-6		Hose - Coolant		240552		No. 2 Vertical Machines . . . . .	1
	133121	No. 2 Plain & Universal Machines . . . . .	1	152655		Nos. 3 & 4 Vertical Machines . . . . .	1
	146319	Nos. 3 & 4 Plain Machines . . . . .	1	4AP-32	213032	Bushing - Reducing . . . . .	1
	146319	Nos. 3 & 4 Universal Machines . . . . .	1	4AP-33	103779	Valve - Air Cock . . . . .	1
4AP-7		Stud - Clamp Overarm		4AP-34	213032	Bushing - Reducing . . . . .	1
	108187	No. 2 Plain & Universal Machines . . . . .	1	4AP-35	100620	Clamp - Supply Pipe . . . . .	1
	110967	Nos. 3 & 4 Plain Machines . . . . .	1	4AP-36	3480	Nut . . . . .	2
	110967	Nos. 3 & 4 Universal Machines . . . . .	1	4AP-37	1040	Washer . . . . .	1
4AP-8		Clamp - Overarm		4AP-38		Stud - Pipe Holder Clamp	
	100083	Nos. 2, 3 & 4 Plain & Universal Machines . . . . .	1	152656		Nos. 2, 3 & 4 Vertical Machines . . . . .	1
4AP-9		Spacer - Clamp Stud		4AP-39	100450	Valve - Angle	
	108188	No. 2 Plain & Universal Machines . . . . .	1	4AP-40		Nos. 2, 3 & 4 Vertical Machines . . . . .	1
	110970	Nos. 3 & 4 Plain Machines . . . . .	1	4AP-41	79278	Union	
	110970	Nos. 3 & 4 Universal Machines . . . . .	1		151736	Nos. 2, 3 & 4 Vertical Machines . . . . .	1
4AP-10		Holder - Supply Pipe			151737	Spray - Coolant	
	100622	No. 2 Plain & Universal Machines . . . . .	1		152657	No. 2 Vertical Machines - Large . . . . .	1
	110221	Nos. 3 & 4 Plain Machines . . . . .	1		152657	No. 2 Vertical Machines - Small . . . . .	1
	110221	Nos. 3 & 4 Universal Machines . . . . .	1	4AP-42	152658	Nos. 3 & 4 Vertical Machines - Large . . . . .	1
4AP-11		Nozzle - Coolant Supply			152658	Nos. 3 & 4 Vertical Machines - Small . . . . .	1
	100455	No. 2 Plain & Universal Machines . . . . .	1		100671	Pipe - List	
	108191	Nos. 3 & 4 Plain Machines . . . . .	1	4AP-43	149607	No. 2 Vertical Machines . . . . .	1
	108191	Nos. 3 & 4 Universal Machines . . . . .	1	4AP-44	100622	Nos. 3 & 4 Vertical Machines . . . . .	1
4AP-12		Valve - Angle		4AP-45	95671	Holder - Supply Pipe . . . . .	1
	100450	No. 2 Plain & Universal Machines . . . . .	1	4AP-46	95672	Frame - Strainer . . . . .	1
	108194	Nos. 3 & 4 Plain Machines . . . . .	1	4AP-47	95673	Screen - Fine Mesh . . . . .	1
	108194	Nos. 3 & 4 Universal Machines . . . . .	1	4AP-48	3198	Screen - Coarse Mesh . . . . .	1
4AP-13	100620	Clamp - Supply Pipe . . . . .	1	4AP-49	213032	Screw . . . . .	4
4AP-14	3480	Nut . . . . .	1	4AP-50	108192	Bushing - Reducing . . . . .	1
4AP-15	1040	Washer . . . . .	2	4AP-51	3233	Coupling - Coolant Supply . . . . .	1
4AP-16	3480	Nut . . . . .	1		151735	Screw . . . . .	1
4AP-17		Bushing - Reducing			152654	Pipe - Discharge Coolant	
	213032	No. 2 Plain & Universal Machines . . . . .	1	4AP-52	151094	No. 2 Vertical Machines . . . . .	1
4AP-18	108192	Coupling - Supply Pipe . . . . .	1	4AP-53		Nos. 3 & 4 Vertical Machines . . . . .	1
4AC-19	3234	Screw . . . . .	1		151093	Assembly - Coolant Elbow . . . . .	1
4AP-20	95671	Frame - Strainer . . . . .	1		152653	Pipe - Supply Coolant	
4AP-21	95672	Screen - Fine Mesh . . . . .	1	4AP-54	144103	No. 2 Vertical Machines . . . . .	1
4AP-22	95673	Screen - Coarse Mesh . . . . .	1	4AP-55	144104	Nos. 3 & 4 Vertical Machines . . . . .	1
4AP-23	3198	Screw . . . . .	4	4AN-56		Bushing - Coolant Supply . . . . .	1
4AP-24		Pipe - Discharge Coolant			153999	Gasket - Coolant Pump . . . . .	1
	151091	No. 2 Plain & Universal Machines . . . . .	1		156429	Pump - Coolant . . . . .	
	147586	Nos. 3 & 4 Plain & Universal Machines . . . . .	1	4AN-57	3404	Fairbanks Morse . . . . .	1
4AP-25	151094	Assembly - Coolant Elbow . . . . .	1			Pioneer . . . . .	1
						Screw . . . . .	4

TURRET STOP  
 NOS. 2, 3 AND 4 VERTICAL MACHINES



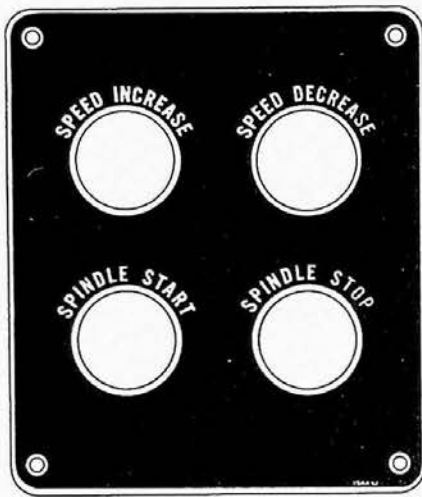
CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

TURRET STOP-UNIT No. 4AAR  
ALL VERTICAL MACHINES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
4AAR-1	122713	Screw - Adjusting Stop . . . . .	4	4ADV-21	3442	Washer . . . . .	1
4AAR-2	70320	Nut - Adjusting Screw Lock . . . . .	4	4ADV-22	3479	Nut . . . . .	1
4AAR-3	70319	Spacer . . . . .	4	4AAR-23	70311	Turret . . . . .	1
4AAR-4	70312	Housing - Stop Screw . . . . .	1	4AAR-24	1205	Screw . . . . .	1
4AAR-5	3274	Bolt - Tee . . . . .	1	4AAR-25	1709	Screw . . . . .	1
4AAR-6	3311	Bolt - Tee . . . . .	1	4AAR-26	79294	Plunger . . . . .	1
4ADV-7	3292	Bolt - Tee . . . . .	1	4AAR-27	2123	Washer . . . . .	1
4AAR-8	3442	Washer . . . . .	1	4AAR-28	3472	Nut . . . . .	1
4ADV-9	149659	Dog - Throwout Clutch . . . . .	1	4AAR-29	216863	Screw - Servo Valve Adjusting . . . . .	1
4AAR-10	3288	Screw . . . . .	2	4AAR-30	144868	Housing - Indicator . . . . .	1
4AAR-11	70321	Spring - Compression . . . . .	2	4AAR-31	3453	Screw . . . . .	1
4AAR-12	149657	Housing - Turret Stop . . . . .	1	4AAR-32	263	Spring . . . . .	1
4AAR-13	3942	Spring - Compression . . . . .	1	4AAR-33	70315	Pin - Plunger . . . . .	1
4AAR-14	30154	Ball . . . . .	1	4AAR-34	70316	Cover - Plunger . . . . .	1
4AAR-15	2257	Plug . . . . .	1	4AAR-35	70317	Lever - Indicator Operating . . . . .	1
4AAR-16	3442	Washer . . . . .	1	4AAR-36	70318	Pin - Lever . . . . .	1
4AAR-17	3479	Nut . . . . .	1	4AAR-37	68271	Screw - Indicator Fastening . . . . .	1
4AAR-18	645	Pin . . . . .	1	4AAR-38	128853	Cover - Housing Indicator . . . . .	1
4AAR-19	3479	Nut . . . . .	1	4AAR-39	3198	Screw . . . . .	4
4AAR-20		Dial - Indicator		4AAR-40	3266	Screw . . . . .	2
	143155	English . . . . .	1				
	143156	Metric . . . . .	1				





FEEDS FOR HEAD  
ARE 0.5 OF THOSE  
SHOWN ON FEED DIAL

DANGER KEEP DOOR CLOSED

**ELECTRICAL CONTROL**

VOLTS POWER AC \_\_\_\_\_ PH \_\_\_\_\_ DC \_\_\_\_\_

VOLTS CONTROL \_\_\_\_\_ CY \_\_\_\_\_ FLI \_\_\_\_\_

MACHINE SERIAL NO. \_\_\_\_\_

WIRING DIAGRAM NO. \_\_\_\_\_

THE CINCINNATI MILLING MACHINE CO. 128

11

12

13

14

15

16

17

18

19

20

TABLE

CLAMP

CROSS

VERTICAL

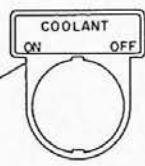
RAPID TRAVERSE

FEED SELECTOR

HEAD FEED



2



3

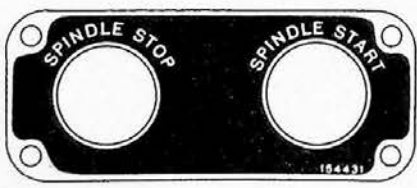
4

PRESSURE SHOULD  
BE SET AT 100 LBS.  
WITH OIL WARM

5

COLUMN PUMP PRESSURE  
TO BE SET AT  
280 LBS.  
WITH OIL WARM

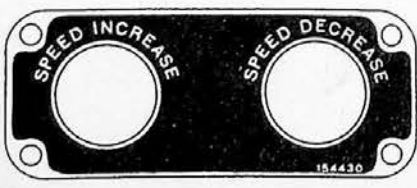
6



8



9



10

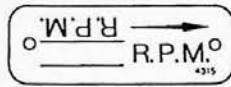


CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

MACHINE INSTRUCTION PLATES

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
1	154432	Plate - Spindle . . . . .	1	11	156769	Plate - Instruction, Feed . . . . .	1
2	118025D	Ring - Tag, Stop . . . . .	1	12	4318	Plate - Electrical . . . . .	1
3	157713A	Ring - Tag, Coolant . . . . .	1	13	4336	Plate - Name, Knob - Table . . . . .	2
4	118025C	Ring - Tag, Start . . . . .	1	14	4331	Plate - Blank . . . . .	1
5	158108	Plate - Instruction . . . . .	1	15	4334	Plate - Name, Knob - Vertical . . . . .	2
6	156772	Plate . . . . .	1	16	4339	Plate - Name, Knob - Feed Selector . . . . .	2
7	157713E	Ring - Tag, Automatic Spindle Stop . . . . .	1	17	4333	Plate - Name, Knob - Clamp . . . . .	3
8	154431	Plate - Spindle Start-Stop . . . . .	1	18	4335	Plate - Name, Knob - Cross . . . . .	2
9	158035	Plate - Name . . . . .	1	19	4332	Plate - Name, Knob - Rapid Traverse . . . . .	2
10	154430	Plate - Spindle Increase - Decrease . . . . .	1	20	4338	Plate - Name, Knob - Head Feed . . . . .	1



21

UP MILLING  
TURN KNOB OUT UNTIL TIGHT  
DOWN MILLING  
TURN KNOB IN UNTIL TIGHT

22



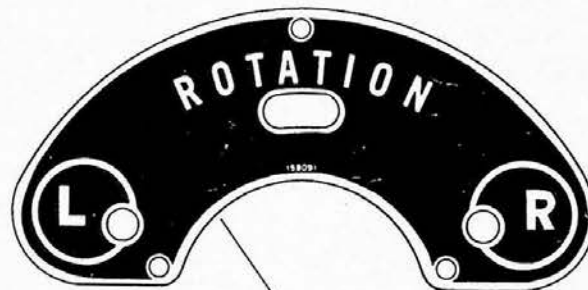
23

WHEN USING "TURRET STOP",  
DO NOT TRIP OUT  
WITH QUICK TRAVERSE

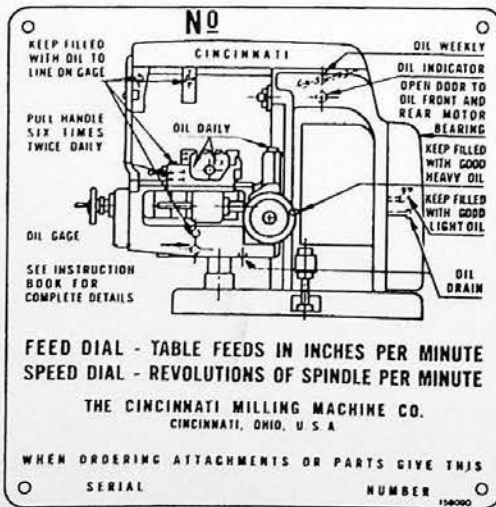
24

LOOSEN HEAD CLAMP  
BEFORE ENGAGING FEED

25

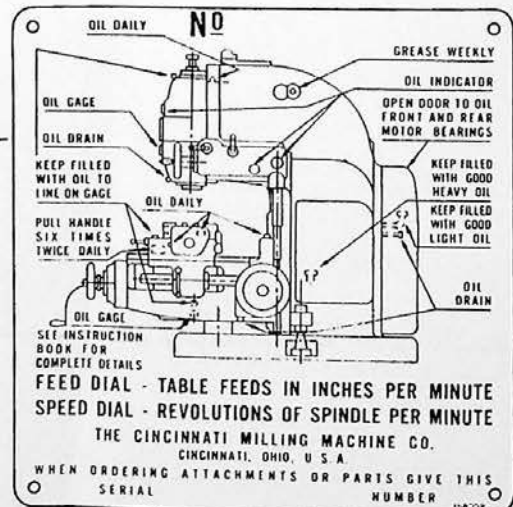


26



27

28

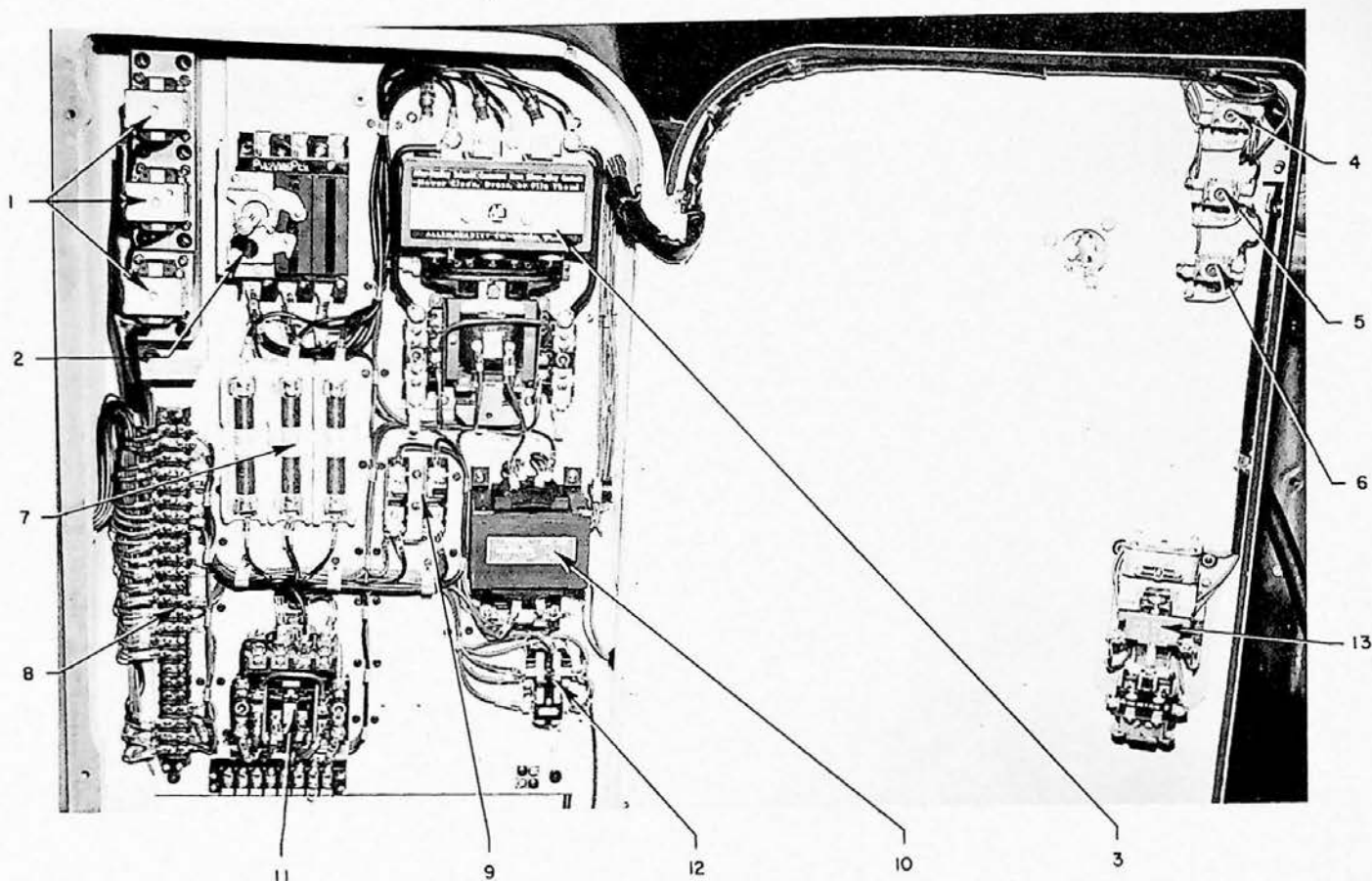


CINCINNATI NOS. 2, 3 and 4 DIAL TYPE MILLING MACHINES

WHEN ORDERING PARTS, give key number, part name and part number. Be sure to give complete serial number for your machine. For complete instructions, see Page 41, "How to Order Repair Parts."

MACHINE INSTRUCTION PLATES (Concluded)

KEY NO.	PART NO.	PART NAME	AMT. USED	KEY NO.	PART NO.	PART NAME	AMT. USED
21	4315	Plate - R. P. M. Instruction . . . . .	1	25	156768	Plate - Instruction . . . . .	1
22	156761	Plate - Instruction . . . . .	1	26	158091	Plate - Instruction . . . . .	1
23	156767	Plate - Instruction . . . . .	1	27	158098	Plate - Instruction Oiling . . . . .	1
24	156762	Plate - Instruction . . . . .	1	28	158090	Plate - Instruction Oiling . . . . .	1



### ELECTRAL-UNIT 4 AM

- |  |  |
|--|--|
| <p>1. Solenoid - 3 CMMCo. No. 161932-Specify voltage<br/>Trombetta Solenoid Corp. - Milwaukee<br/>or National Acme Co. - Cleveland</p> <p>2. Circuit Breaker 3 pole, 70 amp., 600 volt (Type E)<br/>CMMCo. No. 157634-B<br/>Westinghouse Electric Corp. 1420086 with 55B7077<br/>or CMMCo. No. 157712-C<br/>Westinghouse Electric Corp. 1222076 with 33B3450</p> <p>3. Main Drive Motor Starter (LEA) Open Magnetic<br/>CMMCo. No. 107691-over 220V (Size 2)<br/>CMMCo. No. 107692-over 220V (Size 3)<br/>Specify voltage, power contacts, cycles, enclosure.<br/>Allen Bradley Bul. 709<br/>Clark Bul. 6013<br/>Cutler Hammer Bul. 9586<br/>G.E. CR7006<br/>Square D Class 8536<br/>Westinghouse Class 11-200</p> <p>4. Push Button - Start (Low Button)<br/>CMMCo. No. 141513A<br/>G.E. Cat. No. CR-2940-UA-2023</p> <p>5. Push Button-Stop (Mushroom Button)<br/>CMMCo. No. 141513-J<br/>G.E. Cat. No. CR-2940-UK-202C</p> <p>6. Selector Switch<br/>CMMCo. No. 141505A<br/>G.E. Cat. No. CR-2940-UB202-A</p> | <p>7. Fuse Block and Fusetron (0-30 amps.) Specify Amperage<br/>CMMCo. No. 137579 (Block)<br/>CMMCo. No. 137580 (Fusetron)</p> <p>8. Terminal Block (Specify number of terminals)<br/>CMMCo. No. 164932<br/>Marathon Cat. No. M-319</p> <p>9. Thermal Overload Relay<br/>CMMCo. No. 225272<br/>G.E. No. CR-2824-41L</p> <p>10. Control Transformer (94-110 volts, 250-350 VA)</p> <p>11. Starter-Coolant (Size 1-J.I.C.) - Open<br/>CMMCo. No. 107690-X<br/>Allen Bradley Bul. 709<br/>Clark Bul. 6013<br/>Cutler Hammer Bul. 9586<br/>General Electric CR-7006<br/>Square D Class 8536<br/>Westinghouse Class 11-200</p> <p>12. Control Relay - (1CR)<br/>Allen Bradley Bul. 700-Type C-100<br/>Clark WEE C Code A-73-67534A<br/>General Electric CR-2790-E100-AZ<br/>Square D Class 8501 DO-22</p> <p>13. Timer<br/>Allen Bradley Bul. 845 Style EACT<br/>Square D Class 9050 A01E</p> |
|--|--|

NOTES

## CMM. CO. RECOMMENDED LUBRICANTS

The following lubricants have been tested by The Cincinnati Milling Machine Co., and are recommended for use in their machines:

Supplier	P-38	Lubricant
British-American Oil Co., Ltd. ....		Britex R & O Oil 44
Cities Service Oil Co. ....		Pacemaker #1
Cities Service Oil Co. ....		Pacemaker #150-T
Esso Standard Oil Co. ....		Esstic 42
Fiske Refining Co. ....		Lubriplate Hydraulic Oil HO-OC
Gulf Oil Co. ....		{ Gulfcrest 44
		{ Gulf Harmony 44
Mid-Continent Oil Co. ....		DX-Cherokee Oil "L" (R & O)
Penzoil Co., The ....		Turbine Oil Light
Pure Oil Co. ....		Puroturbine, Light
Shell Oil Co. ....		Tellus 27
Socony-Mobil Oil Co. ....		D.T.E. Light
Standard Oil Co. (Ind.) ....		Stanoil Industrial Oil #15
Standard Oil Co. (Ohio) ....		Sohivis 43
Sun Oil Co. ....		Sunvis 916
Texas Oil Co. ....		Regal Oil "A" R & O
Tidewater Assoc. Oil Co. ....		Tycol Aturbrio 50
P-43		
Esso Standard Oil Co. ....		Andok M-275
Gulf Oil Co. ....		Precision Grease #2
Gulf Oil Co. ....		Gulflex "A"
Pure Oil Co. ....		Poco Sponge Grease #1
Shell Oil Co. ....		Alvania #2
Socony-Mobil Oil Co. ....		Gargoyle B R B #1
Standard Oil Co. (Ind.) ....		Stanolith 42
Standard Oil Co. (Ind.) ....		Stanobar 5
Sun Oil Co. ....		#844 Roller Bearing Grease #2
Texas Oil Co. ....		Multifak-2
P-53		
Esso Standard Oil Co. ....		WS-2018 Hydraulic Oil
Gulf Refining Co. ....		Way Oil X-5864-K
Pure Oil Co. ....		Blend 53-217
Shell Oil Co. ....		Tonna #27
Socony-Mobil Oil Co. ....		Vactra #1 & Vacuoline 1405
Standard Oil Co. (Ind.) ....		Stanway Industrial Oil #15-H
Sun Oil Co. ....		Lubeway Oil 150
Tidewater Assoc. Oil Co. ....		Tycol Afton 6
P-55		
Cities Service Oil Co. ....		Pacemaker #2
Cities Service Oil Co. ....		Pacemaker #200-T
Esso Standard Oil Co. ....		Esstic 45
Gulf Oil Co. ....		{ Gulfcrest 47
		{ Gulf Harmony '47
Mid-Continent Oil Co. ....		DX-Cherokee Oil "M" (R & O)
Pennzoil Co., The ....		Pennzoil Turbine Oil Med.
Shell Oil Co. ....		Tellus 29
Socony-Mobil Oil Co. ....		D.T.E. Medium
Standard Oil Co. (Calif.) ....		Calol O.C. Turbine Oil 11
Standard Oil Co. (Ind.) ....		Stanoil Industrial Oil #21
Standard Oil Co. (Ohio) ....		Sohivis 47
Standard Oil Co. (Ohio) ....		Limax 47
Sun Oil Co. ....		Sunvis 921
Texas Oil Co. ....		Regal Oil "B" (R & O Type)
Tidewater Assoc. Oil Co. ....		Tycol Aturbrio 58



MILLING MACHINES



DIE SINKING MACHINES



BROACHING MACHINES



CUTTER SHARPENING MACHINES



OPTICAL PROJECTION GRINDERS



FLAME HARDENING MACHINES



METAL FORMING MACHINES



CUTTING FLUIDS



PRECISION GRINDING WHEELS



Products of The Cincinnati Milling Machine Co. are listed and symbolized here. Products of their associate company, Cincinnati Grinders Incorporated, include a complete line of Centertype, Centerless, and Roll Grinding Machines

The products of The Cincinnati Milling Machine Co. and of Cincinnati Grinders Incorporated are sold by Cincinnati Milling and Grinding Machines, Inc.

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO, U.S.A.