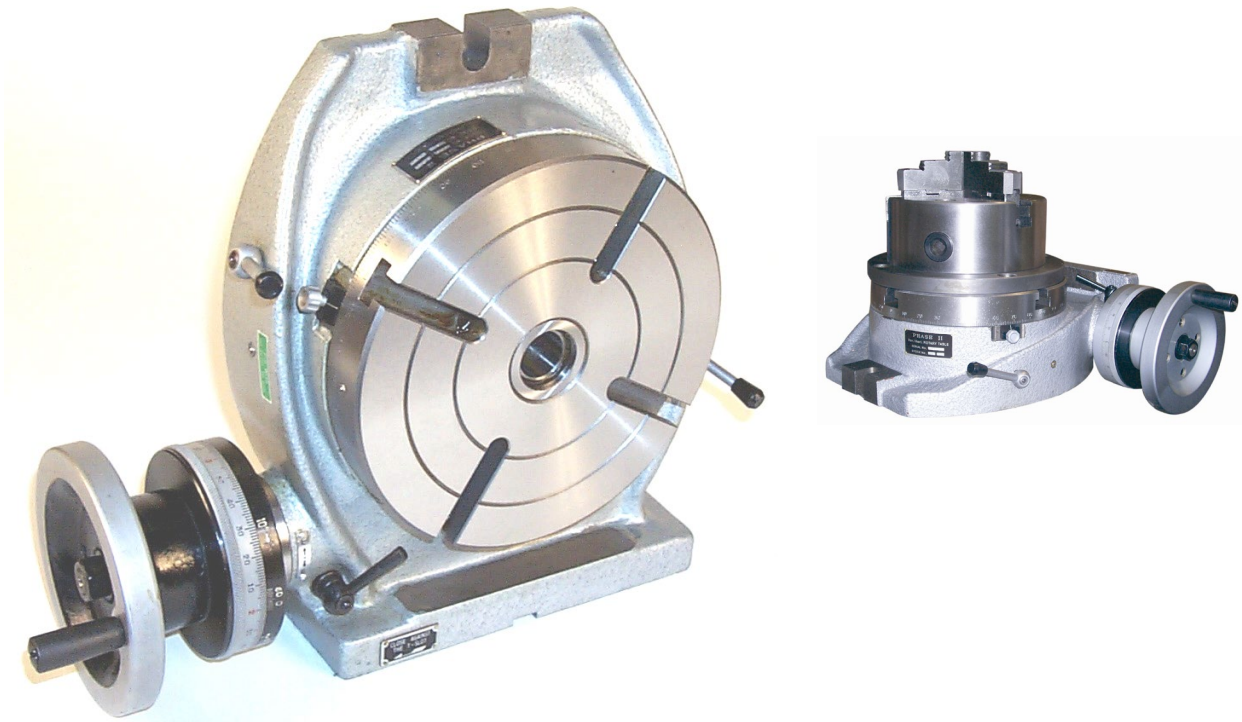


**Operation and Parts Manual**  
*221 Series Horizontal/Vertical Rotary Tables*



**\* Fill with OIL-Prior to Use \***



# Operating Instructions & Parts Manual Horizontal & Vertical Rotary Tables Dividing Plates

## Operating Instructions & Parts Manuals

*Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and or property damage! Retain instructions for future reference.*

### Description

The dual position rotary tables are for indexing, circular cutting, angle setting, boring and spot facing operations. The meehanite cast iron table is precision machined and is provided with a Morse Taper center hole. The table is graduated with a 360° scale. A micro collar graduated to one minute with a ten second accuracy vernier scale is provided. Rotary table features include lock-down handles and crank disengagement mechanism.

Worm gear and center hole taper are hardened and ground. The dividing plates accessory allows the operator to accurately divide the 360° rotation of the clamping surface into divisions of 2 through 66, and all divisibles of 2, 3 and 5 from 67-132.

### Unpacking

Check for shipping damage. If damage has occurred, a claim must be filed with carrier immediately. Check for completeness. Immediately report missing parts to dealer. Carefully remove table from crate.

**Important:** The tool has been coated with protective coating. In order to ensure proper fit and operation the coating must be removed, remove coating with mild solvents such as mineral spirits and a soft cloth. Nonflammable solvents are recommended. After cleaning, cover all exposed surfaces with a light coating of oil. Be sure to lubricate table as described in "Maintenance"

**Caution: Never use highly volatile solvents. Avoid getting cleaning solution on paint, as it may tend to deteriorate these finishes. Use soap and water on painted components.**

### Specifications

#### Dividing Plates Accessory

Possible divisions of

One rotation: .....2 thru 66, and all  
.....divisibles of 2, 3, and 5  
.....from 67-132

### Rotary Tables

Accuracy	Maximum T.I.P.
Flatness of clamping surface .....	0.0006"
Parallelism of clamping	
Surface to base .....	0.0008"
Squariness of clamping surface	
to angle face.....	0.0004"
Squariness of clamping surface	
to center slot .....	0.0008"
Concentricity of center bore.....	0.0008"
Maximum spacing error:	
6" & 8" .....	1 minute, 20 seconds
10", 12" & 16" .....	45 seconds

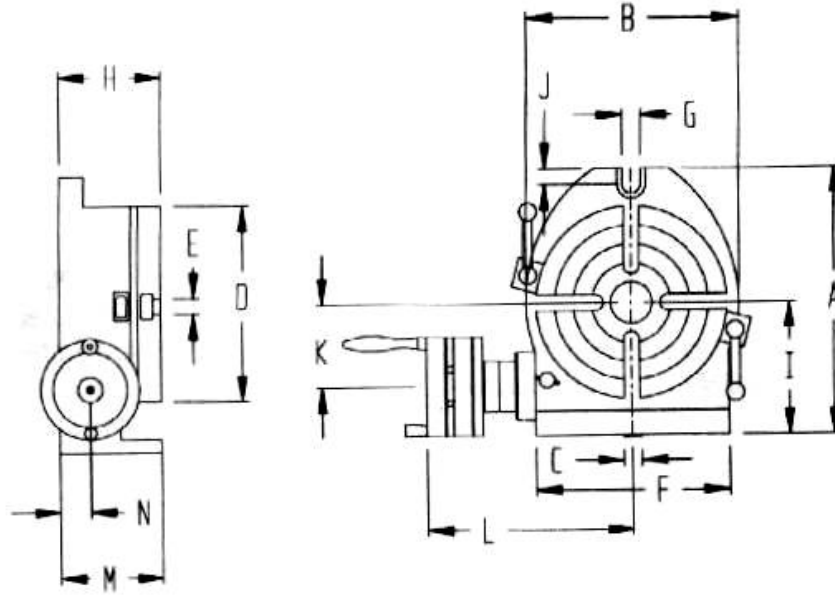
### General Safety Information

1. Read and follow all operating instruction before operating rotary table.
2. Understand and obey all safety instructions supplied with mill or other machines on which the rotary table is used.
3. Always secure rotary table to work surface or other machine.
4. Always secure workpiece to rotary table clamping surface if used.
5. Always secure face plate to rotary table clamping surface if used.
6. Always secure rotary table clamping surface with lock-down handles when possible.
7. Maintain and lubricate tool properly.

### Installation

1. Mount rotary table securely to machine work surface.
2. Use slots provided on table and be sure that table is rigidly and safely secured.
3. Table can be mounted horizontally or vertically with slots provided.
4. **Fill with any light duty oil** up to bottom of sight glass only. Table is not sealed and may leak from handle if overfilled.

# Operating Instructions & Parts Manual



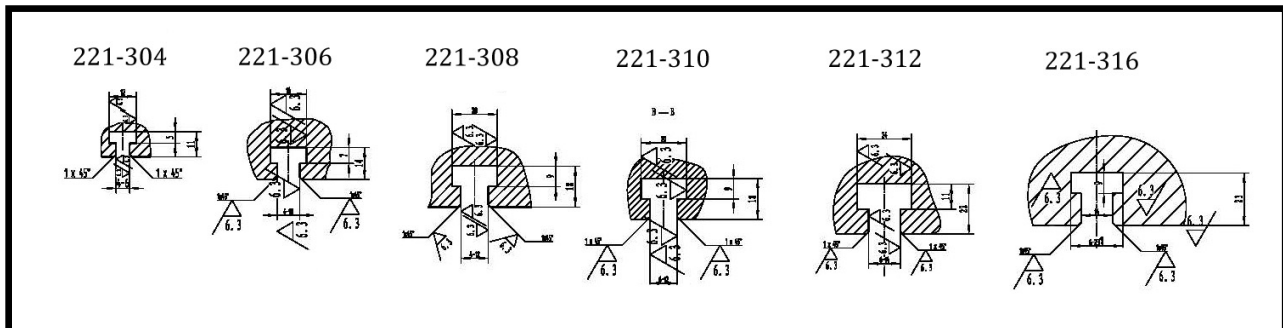
**Figure 1 - Dimensions**

**Dimensions** Refer to Figure 1.

**NOTE:** All dimensions are in inches.

	221-304	221-306	221-308	221-310	221-312	221-316
	4" Table	6" Table	8" Table	10" Table	12" Table	16" Table
A.	4.92	9.53	11.2	12.900	16.125	20.67
B.	4.92	7.72	9.400	11.300	14.250	17.72
C.	0.394	0.472	0.552	0.650	0.710	0.710
D.	3.94	6.296	7.782	9.8	12.625	15.75
E.	2MT	2MT	3MT	3MT	4MT	4MT
F.	4.92	7.32	8.204	9.960	12.625	16.75
G.	8mm Bolt	0.472	0.570	0.562	0.752	0.710
H.	2.76	3.35	3.944	4.330	4.750	5.51
I.	2.76	4.92	5.985	6.750	8.250	10.24
J.	8mm Bolt	0.47	0.610	0.630	0.990	0.63
K.	1.732	3.00	3.70	4.100	5.250	7.087
L.	4.075	5.00	7.83	8.652	10.250	13.27
M.	1.890	3.23	3.88	4.175	4.640	5.71
N.	1.181	1.46	1.90	1.90	1.90	2.76
T-Slots	0.236	0.39	0.465	0.465	0.545	0.545

### T-SLOT SIZES



## Operation

### Rotary Table

Refer to Figures 4 thru 8.

1. Always rotate handwheel (Ref.No.46) clockwise. This will eliminate any backlash in the worm gear. If handwheel is rotated past desired position, rotate handwheel one full turn counterclockwise and then rotate handwheel clockwise to desired position.
2. The worm shaft (Ref. No.31) can be disengaged from the table (Ref. No 2) so that operator can rotate table by hand. Loosen handle (Ref. No. 25) by turning it counterclockwise, loosen handle (Ref. No 39) and turn vernier collar (Ref. No 40) clockwise until it is snug. Table can now be rotated by hand. To engage worm shaft, turn back vernier collar. Secure handle ( Ref. No. 25)
3. Table is locked into position by rotating clamp handles ( Ref.No. 7) clockwise until snug. Turn handles counterclockwise to free table. Turning the handle (Ref. No. 47) after loosening handle (Ref.No. 39) rotates the table.
4. The table is provided with a scale to indicate the angle of rotation. The indicator (Ref.No. 22) can be used to verify the angle of rotation on scale. The indicator can be adjusted by loosening the knob (Ref.No.23) and moving the indicator along the slot. Secure knob after completing adjustment.
5. The center sleeve has been ground to a Morse Taper. Centers with a Morse Taper shank can be mounted to the rotary table for precision centering and measuring operations. (see dimensions in Fig. 1 for MT of ea. table.)
6. The gear ratio of the rotary table is 1:90 so that 90 rotations of the handwheel rotate exactly one full rotation. One rotation of the handwheel is equal to  $4^\circ$  rotation of the table. The micro collar is graduated into one minute increments.
7. A vernier scale is provided on the vernier collar (Ref. No. 40) for measurement of angle rotation to an accuracy of ten seconds.
8. Read the degrees and minutes from the micro collar and use the vernier collar scale to read ten seconds.

### Dividing Plate Accessory

Refer to Figures 2, 3, and 4, 5, or 6

The dividing plate accessory ( 241-101) is used to divide one  $360^\circ$  table rotation into 2-66 and all divisible by 2, 3, and 5 from 67-132 equal divisions. The gear ratio of the rotary table is 1:90 so 90 rotations of the handwheel rotate table one full rotation. Therefore for one full rotation of the table, the number of handwheel rotations per divisions "N" times the number of divisions "T" is equal to 90 rotations of the handwheel. So  $N \times T = 90$  or  $N = 90 \div T$ . The dividing chart ( page 4) was developed using this relationship.

For example if 17 divisions are required, then  $T=17$ , so  $N = 90/17 = 5^5/17 = 5^{10}/34$ .

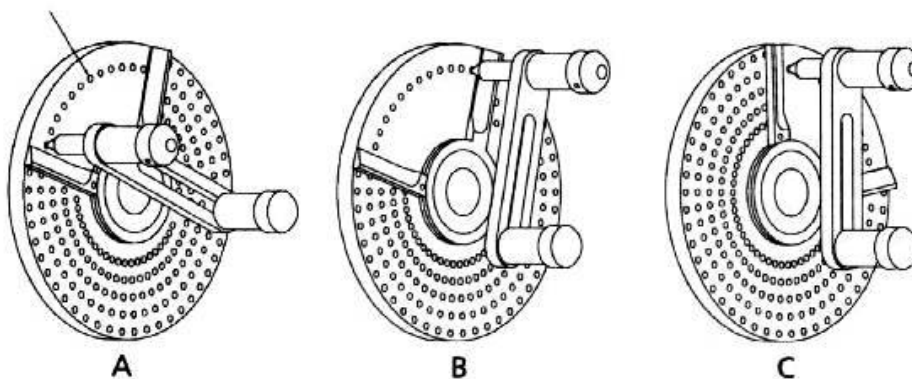
Each of the 17 divisions requires 5 full handwheel rotations and  $10/34$  of one handwheel rotation. The  $10/34$  of a handwheel rotation is obtained by using the dividing plates.

The dividing plates have been provided with annular holes permitting required number of divisions of one handwheel rotation.

There are 2 plates each with 2 faces for a total of 4 different faces with different hole combinations. In the example the plate with 34 holes drilled in a circle is required.

To obtain 17 divisions the handwheel is rotated 5 full rotations and 10 holes on the 34 hole circle for each division. The sector is used to make the 10 hole rotation quick and easy.

**NOTE: 11 Holes between sector arms on 34-hole circle**



**Figure 2-Annular holes**

To assemble the dividing plate attachment to the rotary table, remove handwheel (Ref.No.46). Bolt the required plate to the collar using 4 screws (Figure 3, Ref No. 3). Slide the sector (Figure 3, Ref. No 4) over the worm shaft and eccentric sleeve (Ref.Nos.31 and 37) with the sector screw exposed. Secure sector by sliding spring washer (Figure 3, Ref. No.5) against sector and into slot in eccentric sleeve.

Slide crank arm (Figure 3, Ref.No.7) over flats at end of worm shaft and secure with spacer and nut ( Ref. Nos. 50 and 51) .

Spread the sector arms so that exactly 11 holes on the 34 hole circle are between the arms( see Figure 2). Tighten the sector screw.

1. Rotate the sector so that the sector arm is against the plunger assembly as in Figure 2A.
2. Rotate the plunger assembly clockwise 5 full rotations and  $10/34$  of a rotation by placing the plunger assembly against the sector arm as in Figure 2B.
3. Rotate sector clockwise so that first arm is against plunger assembly as in Figure 2C.

Repeat steps 1, 2 and 3 for each division. The dividing chart (Page 4) shows that for 19 divisions the plate with 38 holes is required and each division needs 4 full rotation plus  $28/38$  of a rotation. The dividing chart shows that for 53 divisions, each division requires 1 and  $37/53$  rotations, etc. For even divisions of 90 (2, 3, 4, 5, 6, 9, 10, 15, 18, 30 and 45) simply rotate the crank arm required number of full turns using the same hole on any plate.

## Maintenance

Refer to Figure 4 thru 8.

## Worm Shaft Adjustment

To adjust for wear in the worm shaft, the lock nut ( Ref.No.35) must be adjusted.

Remove handwheel (Ref No. 46) and spacer (Ref No. 36) Tighten locknut until play is removed from engaged worm shaft and clamping surface. Do not overtighten locknut. Replace spacer and handwheel.

## Eccentric Sleeve limit screw adjustment

The threaded pin (Ref No 29) regulates the rotation at eccentric sleeve. If the worm shaft does not engage table properly when vernier collar is rotated counterclockwise, then unscrew set screw ( Ref No, 28) and adjust the threaded pin until proper engagement is achieved.

Note: For model 221-308set screw ( Ref No. 28) and threaded pin (Ref No.29) is located in lower right corner of the bottom of the base casting (Ref No. 1)

# Operating Instructions & Parts Manual

## Lubrication

Keep rotary table clean of dirt or chips.

Before putting into use, fill base cavity with oil using the oil zerts on base, table and oil plug(Ref No. 11). Unscrew oil Plug prior to lubrication. Before every shift of operation fill adequate oil through oil zerts and oil plug.

**LUBRICATE WITH LIGHT DUTY HYDRAULIC FLUID OR SPINDLE OIL. Table should be filled with oil until it is just visible in the sight glass. The table is not sealed and will leak oil if overfilled.**

Frequently check oil level using sight glass (Ref.No.8) Do not use rotary table without adequate oil.

## Dividing Chart

T	H	N	T	H	N	T	H	N	T	H	N
2	*	45	31	B-62	2 56/62	60	A-50	1 25/50	98	B-49	45/49
3	*	30	32	B-64	2 52/64	61	A-61	1 29/61	99	A-44	40/44
4	A-50	22 25/50	33	A-44	2 32/44	62	B-62	1 28/62	100	A-50	45/50
5	*	18	34	A-34	2 22/34	63	B-49	1 21/49	102	A-34	30/34
6	*	15	35	B-49	2 28/49	64	B-64	1 26/64	104	A-52	45/52
7	B-49	12 42/49	36	A-50	2 25/50	65	A-39	1 15/39	105	B-49	42/49
8	A-44	11 8/44	37	A-37	2 16/37	66	A-44	1 16/44	106	B-53	45/53
9	*	10	38	A-38	2 14/38	68	A-34	1 11/34	108	B-54	45/54
10	*	9	39	A-39	2 12/39	69	B-46	1 14/46	110	A-44	36/44
11	A-44	8 8/44	40	A-44	2 11/44	70	B-49	1 14/49	111	A-37	30/37
12	A-50	7 25/50	41	A-41	2 8/41	72	A-44	1 11/44	112	A-56	45/56
13	A-52	6 48/52	42	B-49	2 7/49	74	A-37	1 8/37	114	A-38	30/38
14	B-49	6 21/49	43	A-43	2 4/43	75	A-50	1 10/50	115	B-46	36/46
15	*	6	44	A-44	2 2/44	76	A-38	1 7/38	116	B-58	45/58
16	A-56	5 35/56	45	*	2	78	A-39	1 6/39	117	A-39	30/39
17	A-34	5 10/34	46	B-46	1 44/46	80	B-64	1 8/64	118	B-59	45/59
18	*	5	47	B-47	1 43/47	81	B-54	1 6/54	120	A-44	33/44
19	A-38	4 28/38	48	A-56	1 49/56	82	A-41	1 4/41	122	A-61	45/61
20	A-50	4 25/50	49	B-49	1 41/49	84	A-56	1 4/56	123	A-41	30/41
21	B-49	4 14/49	50	A-50	1 40/50	85	A-34	1 2/34	124	B-62	45/62
22	A-44	4 4/44	51	A-34	1 26/34	86	A-43	1 2/43	125	A-50	36/50
23	B-46	3 42/46	52	B-52	1 38/52	87	B-58	1 2/58	126	B-49	35/49
24	A-44	3 33/44	53	A-53	1 37/53	88	A-44	1 1/44	128	B-64	45/64
25	A-50	3 30/50	54	A-39	1 26/39	90	*	1	129	A-43	30/43
26	A-52	3 24/52	55	A-44	1 28/44	92	B-46	45/46	130	A-39	27/39
27	A-39	3 13/39	56	B-56	1 34/56	93	B-62	60/62	132	A-44	30/44
28	A-56	3 12/56	57	B-57	1 33/57	94	B-47	45/47			
29	B-58	3 6/58	58	B-58	1 32/58	95	A-38	36/38			
30	*	3	59	B-59	1 31/59	96	B-64	60/64			

T= Desired divisible number

N= Number of revolution of the crank handle

H= Hole number of the dividing plate

\*=using A or B plate

A= using A plate

B= using B plate

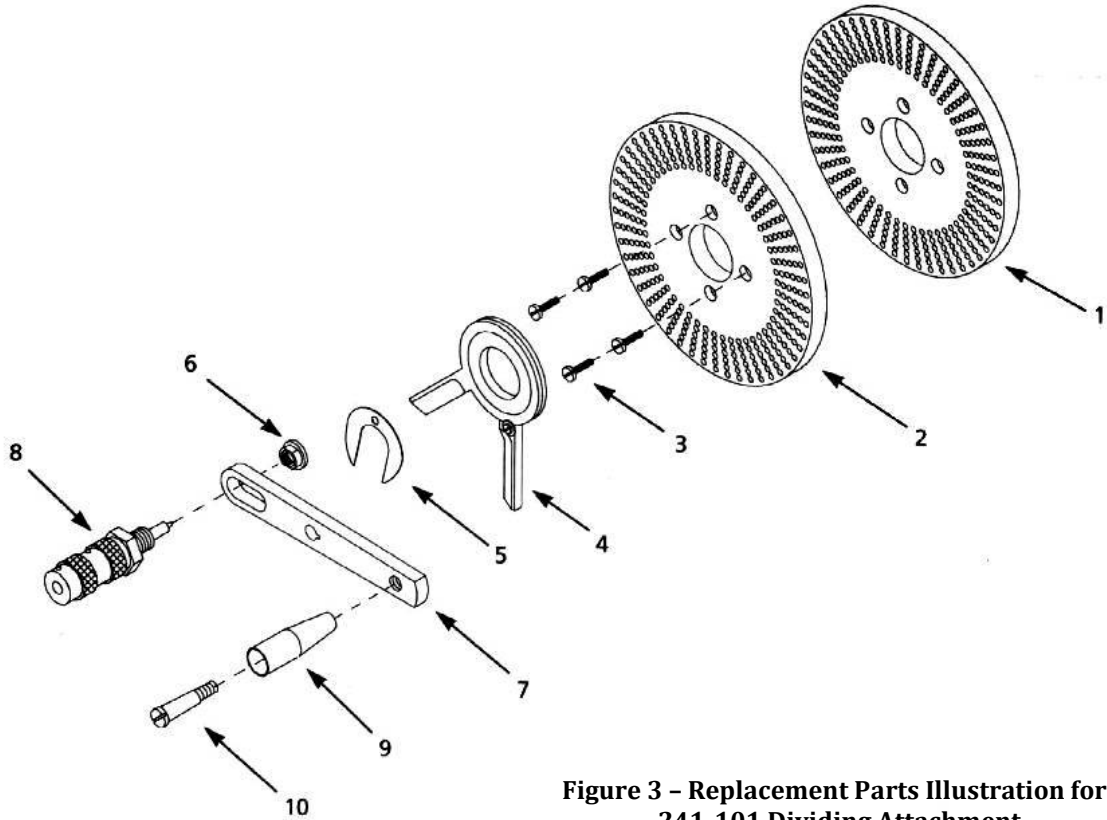
Please provide following information:

Model Number

Serial number (if any)

Part descriptions and number as shown in parts list

**Figure 3- Replacement Parts Illustration for Model 241-101**



**Figure 3 - Replacement Parts Illustration for 241-101 Dividing Attachment**

### Replacement Parts List for Dividing Attachment

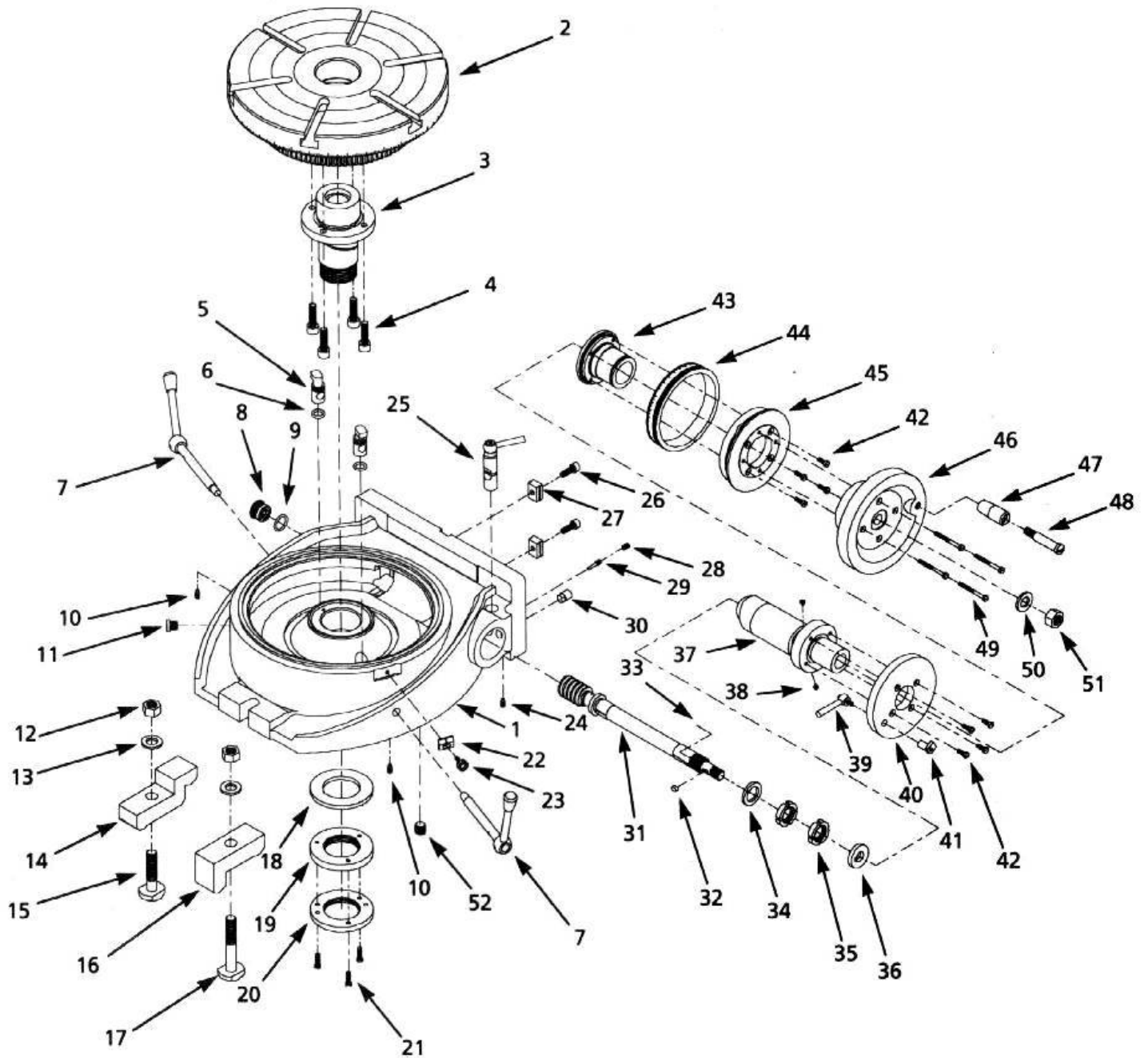
Reference No.	Description	Part No.	Qty
1	Dividing plate with 34-41 and 43-61 holes	9283	1
2	Dividing plate with 46-53 and 54-66 holes	9284	1
3	4-0.7 x 16mm Fillister head screw	9285	4
4	Sector	9286	1
5	Spring washer	9287	1
6	Spacer	9288	1
7	Crank arm	9289	1
8	Plunger Assembly	9290	1
9	Handle	9291	1
10	Handle Screw	9292	1

# Operating Instructions & Parts Manual

Please Provide following information:

Stock Number    Serial Number (if Any)

Part descriptions and number as shown in parts list



**Figure 4- Replacement Parts For  
221-306 6" Rotary Table**



# Operating Instructions & Parts Manual

## Replacement Parts for Model 221-306

Ref. No.	Description	Part No.	Qty
1	Base	9205	1
2	Table	9206	1
3	Taper Sleeve	9207	1
4	6 x 16mm Socket Head Bolt	*	4
5	Table Clamp	9208	2
6	O-Ring	9209	2
7	Handle Assembly	9210	2
8	Sight Glass	9211	1
9	O-Ring	9212	1
10	4 x 6mm Dog Point Set Screw	9229	2
11	Plug	9213	1
12	10mm Hex Nut	*	4
13	10mm Flat Washer	*	4
14	Clamp	9214	1
15	10 x 45mm T-Bolt	9215	1
16	L-clamp	9216	2
17	10 x 60mm T-bolt	9217	2
18	Ring	9218	1
19	Table Nut	9219	1
20	Retaining Plate	9220	1
21	4 x 8mm Fillister Head Screw	9307	3
22	Indicator	9221	1
23	Knob	9222	1
24	4 x 8mm Dog Point Set Screw	9223	1
25	Handle Assembly	9224	1
26	4 x 12mm Socket Head Bolt	*	2

Ref. No.	Description	Part No.	Qty
27	Locating key	9225	2
28	5 x 6mm Set Screw	*	1
29	Threaded Pin	9226	1
30	Block	9227	1
31	Worm Shaft	9228	1
32	4 x 8mm Key	3873	1
33	1.5 x 6mm Dowel Pin	9230	1
34	Spacer	9231	1
35	Lock Nut	9232	2
36	Spacer with Keyway	9233	1
37	Eccentric Sleeve	9234	1
38	3-0.6 x 3mm Fillister Head Screw	9235	2
39	Handle Assembly	9236	1
40	Vernier collar	9237	1
41	Vernier Lockdown	9238	1
42	4-0.7 x 12mm Fillister Head Screw	9239	8
43	Sleeve	9240	1
44	Micro Collar	9241	1
45	Collar	9242	1
46	Handwheel	9243	1
47	Handle	9244	1
48	Handle Screw	9245	1
49	4-0.7 x 40mm Fillister Head Screw	9246	4
50	Spacer	9247	1
51	12mm Hex Nut	*	1
52	12mm Set Screw	*	1

\*Standard Hardware item available locally.

## Exploded View Drawing of 221-308 8" Horizontal and Vertical Rotary Table

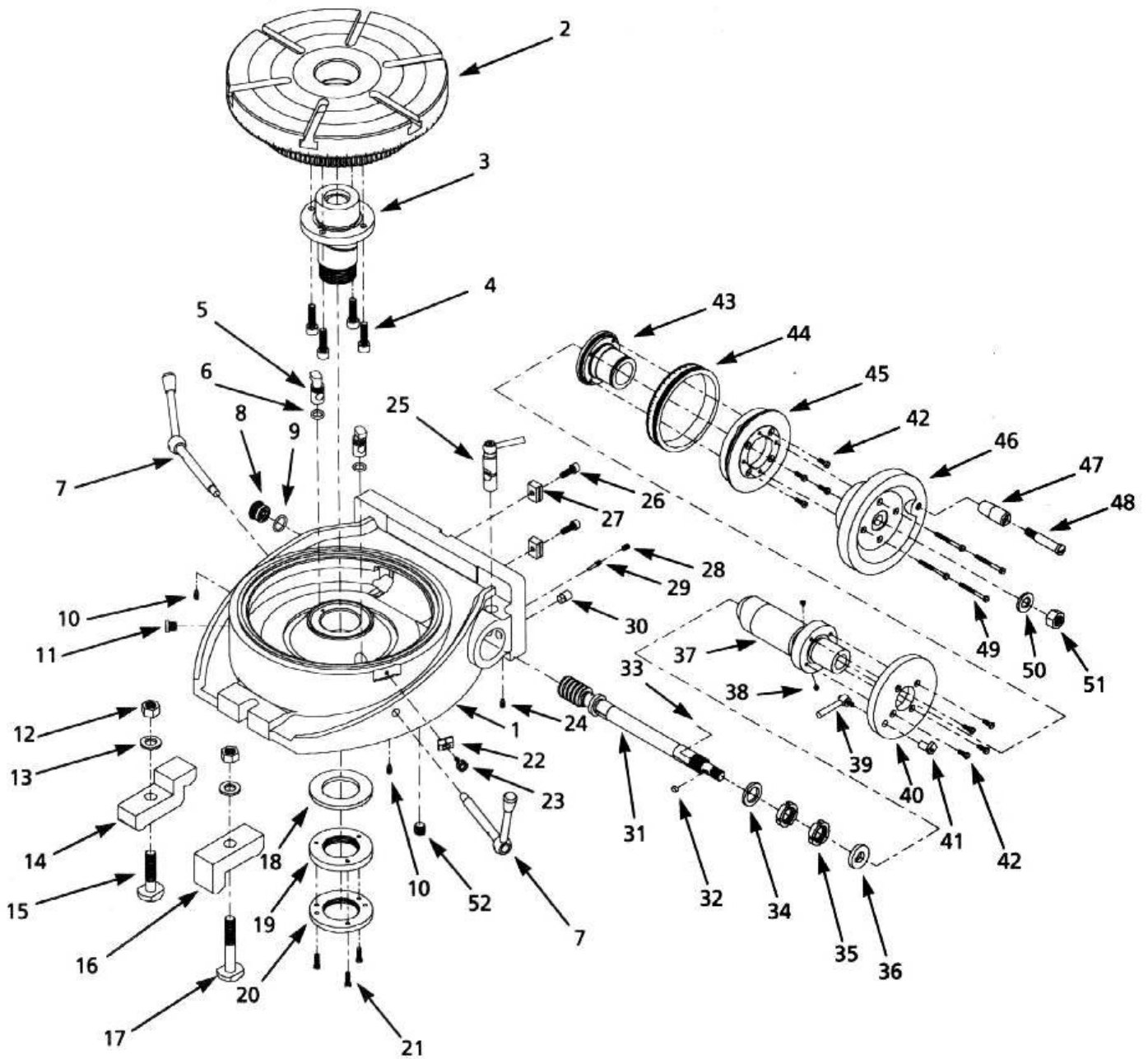


Figure 5 - Replacement Parts Illustration for 221-308 8" Rotary Table

# Operating Instructions & Parts Manual

## Replacement Parts for Model 221-308

Ref. No.	Description	Part No.	Qty
1	Base	9205	1
2	Table	9206	1
3	Taper Sleeve	9207	1
4	6-1.0x22mm Socket Head Bolt	*	4
5	Table Clamp	9208	2
6	O-Ring	9209	2
7	Handle Assembly	9210	2
8	Sight Glass	9211	1
9	O-Ring	9212	1
10	4-0.7x6mm Dog Point Set Screw	9229	2
11	Plug	9213	1
12	12-1.75mm Hex Nut	*	4
13	12mm Flat Washer	*	4
14	Clamp	9214	1
15	12-1.75x60mm T-Bolt	9215	1
16	L-Clamp	9216	2
17	12-1.75x78mm T-Bolt	9217	2
18	Ring	9218	1
19	Table Nut	9219	1
20	Retaining Plate	9220	1
21	4-0.7x10mm Fillister Head Screw	9307	3
22	Indicator	9221	1
23	Knob	9222	1
24	4-0.7x12mm Dog Point Set Screw	9223	1
25	Handle Assembly	9224	1
26	5-0.8x15mm Socket Head Bolt	*	

Ref. No.	Description	Part No.	Qty
27	Locating Key	9225	2
28	5-0.8x8mm Set Screw	*	1
29	Threaded Pin	9226	1
30	Block	9227	1
31	Worm Shaft	9228	1
32	4 X 4 X 8mm Key	3873	1
33	1-5 X 6mm Dowel Pin	9230	1
34	Spacer	9231	1
35	Lock Nut	9232	2
36	Spacer With Keyway	9233	1
37	Eccentric Sleeve	9234	1
38	3-0.6 X3mm Fillister Head Screw	9235	2
39	Handle Assembly	9236	1
40	Vernier Collar	9237	1
41	Vernier Lockdown	9238	1
42	4- 0.7 X 12mm Fillister Head Screw	9239	8
43	Sleeve	9240	1
44	Micro Collar	9241	1
45	Collar	9242	1
46	Handwheel	9243	1
47	Handle	9244	1
48	Handle Screw	9245	1
49	4-0.7 X 40mm Fillister Head Screw	9246	4
50	Spacer	9247	1
51	12mm-1.75 Hex Nut	*	1
52	12-1.75 X 10mm Set Screw	*	1

\* Standard Hardware available locally

# Operating Instructions & Parts Manual

Please Provide following information:  
Stock Number    Serial Number (if Any)  
Part descriptions and number as shown in parts list

## Exploded View Drawing of 221-310 10" Horizontal & Vertical Rotary Table

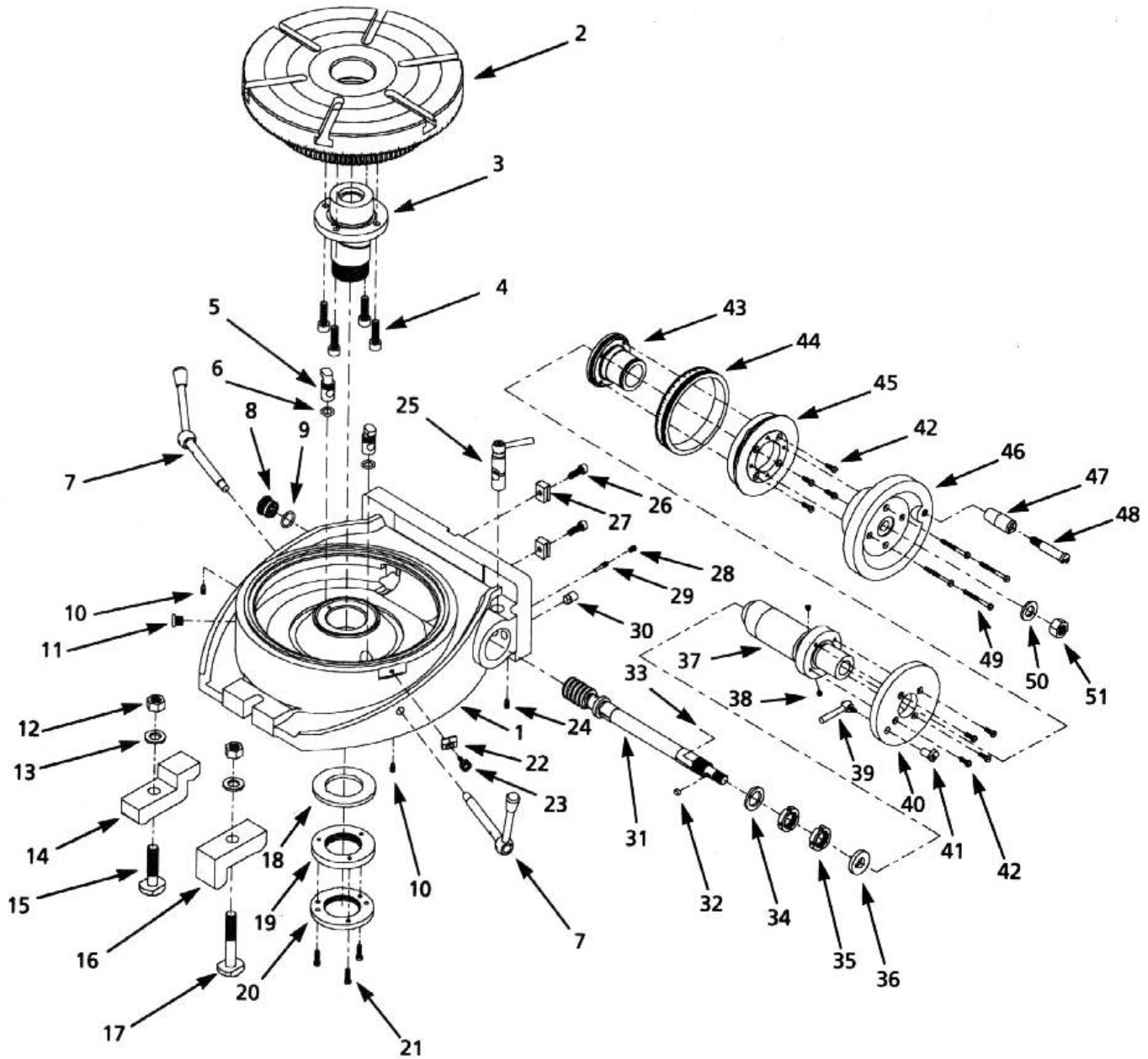


Figure 6 - Replacement Parts Illustration for 221-310 10" Rotary Table

# Operating Instructions & Parts Manual

## Replacement Parts List for Model 221-310

Ref. No.	Description	Part No.	Qty
1	Base	9248	1
2	Table	9249	1
3	Taper Sleeve	9250	1
4	6-1.0 x 22mm socket head bolt	*	4
5	Table Clamp	9251	2
6	O-Ring	9209	2
7	Handle Assembly	9253	2
8	Sight Glass	9211	1
9	O-Ring	9212	1
10	5-0.8 x 8mm dog point set screw	9306	2
11	Plug	9213	1
12	12mm-1.75 Hex nut	*	4
13	12mm Flat Washer	*	4
14	Clamp	9214	1
15	12-1.75 x 60mm T-Bolt	9215	1
16	L-Clamp	9216	2
17	12-1.75 x 78mm T-Bolt	9217	2
18	Ring	9256	1
19	Table nut	9257	1
20	Retaining plate	9258	1
21	4-0.7 x 10mm Fillister head screw	9307	3
22	Indicator	9221	1
23	Knob	9222	1
24	5-0.8 x 10mm dog point set screw	9259	1
25	Handle assembly	9260	1
26	5-0.8 x 15mm socket head bolt	*	2

Ref. No.	Description	Part No.	Qty
27	Locating Key	9225	2
28	5-0.8 x 8mm set screw	*	1
29	Threaded pin	9261	1
30	Block	9262	1
31	Worm Shaft	9263	1
32	4 x 4 x 8mm key	3873	1
33	1.5 x 6mm Dowel pin	9230	1
34	Spacer	9231	1
35	Lock nut	9232	2
36	Spacer with key	9233	1
37	Eccentric sleeve	9264	1
38	3-0.6 x 3mm Fillister head screw	9235	2
39	Handle assembly	9236	1
40	Vernier Collar	9237	1
41	Vernier lockdown	9238	1
42	4-0.7 x 12mm Fillister head screw	9239	8
43	Sleeve	9240	1
44	Micro Collar	9241	1
45	Collar	9242	1
46	Handwheel	9243	1
47	Handle	9244	1
48	Handle screw	9245	1
49	4-0.7 x 40mm Fillister head screw	9246	4
50	Spacer	9247	1
51	12mm-1.75 Hex nut	*	1

\* Standard hardware item available locally

# Operating Instructions & Parts Manual

Please Provide following information:  
Stock Number    Serial Number (if Any)  
Part descriptions and number as shown in parts list

## Exploded View Drawing of 221-312 12" Horizontal & Vertical Rotary Table

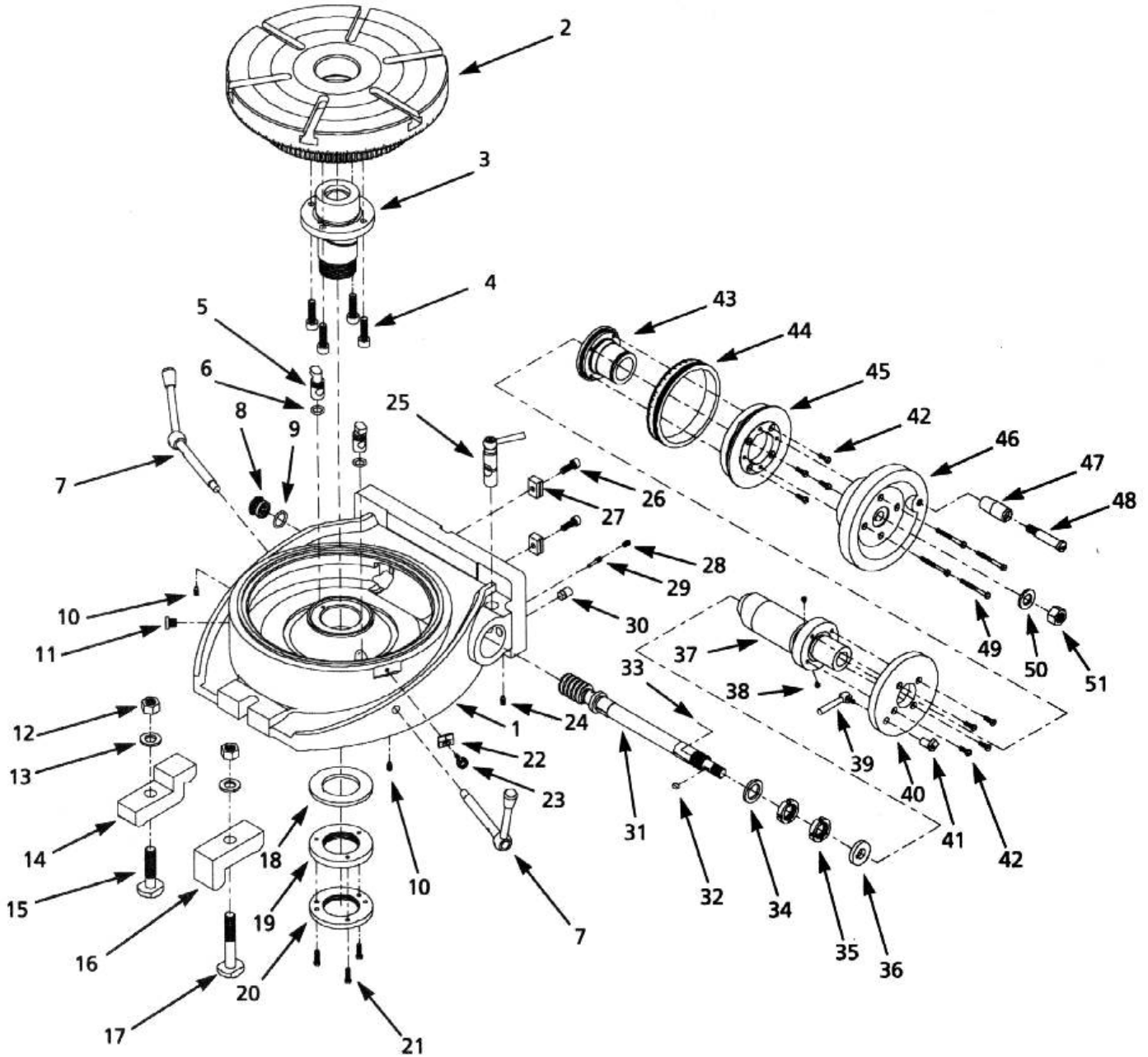


Figure 7- Replacement Parts Illustration for 221-312 12" Rotary Table

# Operating Instructions & Parts Manual

## Replacement Parts List for 221-312

Ref No.	Description	Part No.	Qty
1	Base	9265	1
2	Table	9266	1
3	Taper Sleeve	9267	1
4	8-1.25 X 28mm Socket Head Bolt	*	4
5	Table Clamp	9268	2
6	O-Ring	9252	2
7	Handle Assembly	9269	2
8	Sight Glass	9211	1
9	O-Ring	9212	1
10	5-0.8 X 8mm Dog Point Set Screw	9306	2
11	Plug	9213	1
12	16mm-2.0 Hex Nut	*	4
13	16mm Flat Washer	*	4
14	Clamp	9270	1
15	16-2.0 X 76mm T-Bolt	9271	1
16	L-Clamp	9272	2
17	16-2.0 X 100mm T-Bolt	9273	2
18	Ring	9274	1
19	Table Nut	9275	1
20	Retaining Plate	9276	1
21	5-0.8 X 12mm Fillister Head Screw	9308	3
22	Indicator	9277	1
23	Knob	9222	1
24	5-0.8 X 8mm Dog Point Set Screw	9283	1
25	Handle Assembly	9260	1
26	6-1.0 X 18mm Socket Head Screw	*	2

\* Standard hardware item available locally

Ref No.	Description	Part No.	Qty
27	Locating Key	9278	2
28	5-0.8 X 8mm Set Screw	*	1
29	Threaded Pin	9261	1
30	Block	9262	1
31	Worm Shaft	9279	1
32	4 X 4 X 8mm Key	3873	1
33	1.5 X 6mm Dowel Pin	9230	1
34	Spacer	9231	1
35	Lock Nut	9232	2
36	Spacer With Keyway	9233	1
37	Eccentric Sleeve	9280	1
38	3-0.6 X 3mm Fillister Head Screw	9235	2
39	Handle Assembly	9236	1
40	Vernier Collar	9237	1
41	Vernier Lockdown	9238	1
42	4-0.7 X 12mm Fillister Head Screw	9239	8
43	Sleeve	9240	1
44	Micro Collar	9241	1
45	Collar	9242	1
46	Handwheel	9281	1
47	Handle	9244	1
48	Handle Screw	9245	1
49	4-0.7 X 40mm Fillister Head Screw	9246	4
50	Spacer	9247	1
51	12mm-1.75 Hex Nut	*	1

# Operating Instructions & Parts Manual

## Exploded View Drawing of 221-316 16" Horizontal & Vertical Rotary Table

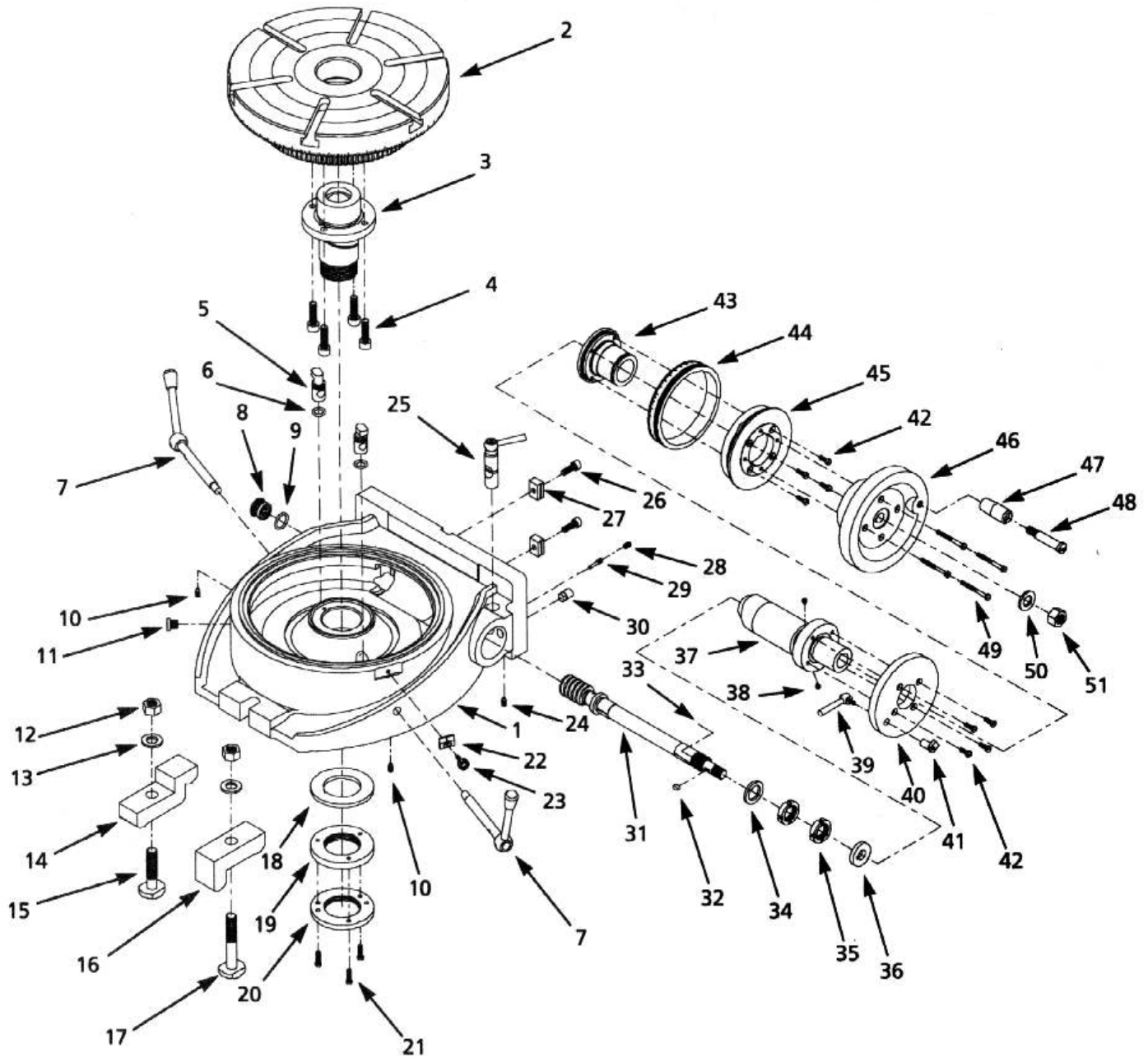


Figure 8- Replacement parts Illustration for 221-316 16" Rotary Table



# Operating Instructions & Parts Manual

## Replacement Parts List for 221-316

Ref No.	Description	Part No.	Qty
1	Base	9265	1
2	Table	9266	1
3	Taper Sleeve	9267	1
4	10 x 25mm Socket Head Bolt	*	4
5	Table Clamp	9268	2
6	O-Ring	9252	2
7	Handle Assembly	9269	2
8	Sight Glass	9211	1
9	O-Ring	9212	1
10	5 X 10mm Dog Point Set Screw	9306	2
11	Plug	9213	1
12	16mm Hex Nut	*	4
13	16mm Flat Washer	*	4
14	Clamp	9270	1
15	16-2.0 X 70mm T-Bolt	9271	1
16	L-Clamp	9272	2
17	16-2.0 X 100mm T-Bolt	9273	2
18	Ring	9274	1
19	Table Nut	9275	1
20	Retaining Plate	9276	1
21	5-0.8 X 12mm Fillister Head Screw	9308	3
22	Indicator	9277	1
23	Knob	9222	1
24	5 X 10mm Dog Point Set Screw	9283	1
25	Handle Assembly	9260	1
26	6 X 12mm Socket Head Screw	*	2

\* Standard hardware item available locally

Ref No.	Description	Part No.	Qty
27	Locating Key	9278	2
28	6 X 12mm Set Screw	*	1
29	Threaded Pin	9261	1
30	Block	9262	1
31	Worm Shaft	9279	1
32	6 X 10mm Key	3873	1
33	1.5 X 6mm Dowel Pin	9230	1
34	Spacer	9231	1
35	Lock Nut	9232	2
36	Spacer With Keyway	9233	1
37	Eccentric Sleeve	9280	1
38	3-0.6 X 3mm Fillister Head Screw	9235	2
39	Handle Assembly	9236	1
40	Vernier Collar	9237	1
41	Vernier Lockdown	9238	1
42	5 X 12mm Fillister Head Screw	9239	8
43	Sleeve	9240	1
44	Micro Collar	9241	1
45	Collar	9242	1
46	Handwheel	9281	1
47	Handle	9244	1
48	Handle Screw	9245	1
49	5 X 50mm Fillister Head Screw	9246	4
50	Spacer	9247	1
51	16mm Hex Nut	*	1

## Troubleshooting Chart

Symptom	Possible Cause(s)	Corrective Action
Handwheel rotates: Table does not rotate	1.Key(Ref.No.32) is missing	1. Insert Key
	2. Worm Shaft disengaged	2. Engage worm shaft (see operation)
Handwheel will not rotate	1. Hold-down clamps are too tight 2. Lock nut too tight (see maintenance) 3. Table need lubrication	1. Loosen hold-down clamps 2. Adjust lock nut properly 3. Lubricate properly (see Maintenance)
Worm Shaft will not engage Table	Eccentric sleeve cannot rotate properly	Properly adjust threaded pin and Set screw(see maintenance)

## **Dividing Plate Chart Revision (08/2007)**

The dividing chart shown in this operation manual was found to have a few minor errors. The charts on the following pages will rectify any errors shown previously as well as give 100% coverage of every possible division using the standard dividing plate set.

As you will see from the charts, there are many division numbers that have more than one combination. As an example, any plate could be used for an index of 4,8,12,20 and 36 equal spaces.

On page 3 of this manual, the statement “*and all divisible by 2,3 and 5 from 67-132 equal divisions*” SHOULD READ “*and all divisible by 2,3 or 5 from 68-130 and some but not all divisible by 2,3 or 5 from 132-5760 equal divisions*”. The divisions of 67 and 131 are not available with the hole circles provided. The only divisions divisible by 2,3 and 5 are 30, 60, 90 and so on.

On page 6- reference No. 2 reads “*Dividing plate with 46-53 and 54-66 holes*” SHOULD READ “*Dividing plate with 46-53 and 54-64 holes*”.

### **Plate identification:**

Plate A is having 34, 37, 38, 39 and 41 holes

Plate B is having 43, 44, 50, 52, 56 and 61 holes

Plate C is having 46, 47, 49, 51 and 53 holes

Plate D is having 54, 57, 58, 59, 62 and 64 holes.

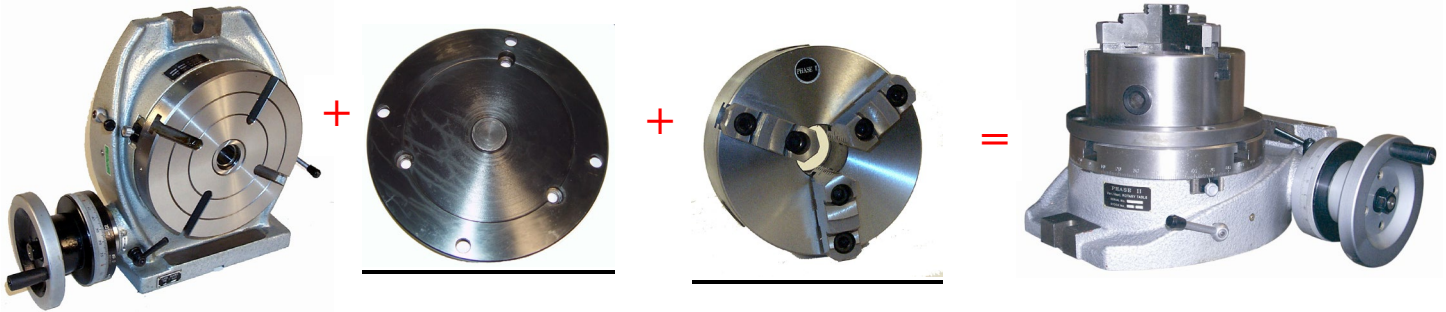
# Operating Instructions & Parts Manual

2 45	20 4 32/64	50 1 40/50	90 1	156 0 30/52
3 30	21 4 14/49	51 1 26/34	92 0 45/46	159 0 30/53
4 22 17/34	21 4 16/56	51 1 39/51	93 0 60/62	160 0 36/64
4 22 19/38	22 4 4/44	52 1 38/52	94 0 45/47	162 0 30/54
4 22 22/44	23 3 42/46	53 1 37/53	95 0 36/38	165 0 24/44
4 22 23/46	24 3 33/44	54 1 26/39	95 0 54/57	168 0 30/56
4 22 25/50	24 3 39/52	54 1 34/51	96 0 60/64	170 0 18/34
4 22 26/52	24 3 42/56	54 1 36/54	98 0 45/49	170 0 27/51
4 22 27/54	24 3 48/64	54 1 38/57	99 0 40/44	171 0 20/38
4 22 28/56	25 3 30/50	55 1 28/44	100 0 45/50	171 0 30/57
4 22 29/58	26 3 18/39	56 1 34/56	102 0 30/34	174 0 30/58
4 22 31/62	26 3 24/52	57 1 22/38	102 0 45/51	177 0 30/59
4 22 32/64	27 3 13/39	57 1 33/57	104 0 45/52	180 0 17/34
5 18	27 3 17/51	58 1 32/58	105 0 42/49	180 0 19/38
6 15	27 3 18/54	59 1 31/59	105 0 48/56	180 0 22/44
7 12 42/49	27 3 19/57	60 1 17/34	106 0 45/53	180 0 23/46
7 12 48/56	28 3 12/56	60 1 19/38	108 0 45/54	180 0 25/50
8 11 11/44	29 3 6/58	60 1 22/44	110 0 36/44	180 0 26/52
8 11 13/52	30 3	60 1 23/46	111 0 30/37	180 0 27/54
8 11 14/56	31 2 56/62	60 1 25/50	112 0 45/56	180 0 28/56
8 11 16/64	32 2 52/64	60 1 26/52	114 0 30/38	180 0 29/58
9 10	33 2 32/44	60 1 27/54	114 0 45/57	180 0 31/62
10 9	34 2 22/34	60 1 28/56	115 0 36/46	180 0 32/64
11 8 8/44	34 2 33/51	60 1 29/58	116 0 45/58	183 0 30/61
12 7 17/34	35 2 28/49	60 1 31/62	117 0 30/39	185 0 18/37
12 7 19/38	35 2 32/56	60 1 32/64	117 0 40/52	186 0 30/62
12 7 22/44	36 2 17/34	61 1 29/61	118 0 45/59	190 0 18/38
12 7 23/46	36 2 19/38	62 1 28/62	120 0 33/44	190 0 27/57
12 7 25/50	36 2 22/44	63 1 21/49	120 0 39/52	192 0 30/64
12 7 26/52	36 2 23/46	63 1 24/56	120 0 42/56	195 0 18/39
12 7 27/54	36 2 25/50	64 1 26/64	120 0 48/64	195 0 24/52
12 7 28/56	36 2 26/52	65 1 15/39	122 0 45/61	198 0 20/44
12 7 29/58	36 2 27/54	65 1 20/52	123 0 30/41	204 0 15/34
12 7 31/62	36 2 28/56	66 1 16/44	124 0 45/62	205 0 18/41
12 7 32/64	36 2 29/58	68 1 11/34	125 0 36/50	207 0 20/46
13 6 36/39	36 2 31/62	69 1 14/46	126 0 35/49	210 0 21/49
13 6 48/52	36 2 32/64	70 1 14/49	126 0 40/56	210 0 24/56
14 6 21/49	37 2 16/37	70 1 16/56	128 0 45/64	215 0 18/43
14 6 24/56	38 2 14/38	72 1 11/44	129 0 30/43	220 0 18/44
15 6	38 2 21/57	72 1 13/52	130 0 27/39	222 0 15/37
16 5 35/56	39 2 12/39	72 1 14/56	130 0 36/52	225 0 20/50
16 5 40/64	39 2 16/52	72 1 16/64	132 0 30/44	228 0 15/38
17 5 10/34	40 2 11/44	74 1 8/37	135 0 26/39	230 0 18/46
17 5 15/51	40 2 13/52	75 1 10/50	135 0 34/51	234 0 15/39
18 5	40 2 14/56	76 1 7/38	135 0 36/54	234 0 20/52
19 4 28/38	40 2 16/64	78 1 6/39	135 0 38/57	235 0 18/47
19 4 42/57	41 2 8/41	78 1 8/52	138 0 30/46	240 0 21/56
20 4 17/34	42 2 7/49	80 1 7/56	140 0 36/56	240 0 24/64
20 4 19/38	42 2 8/56	80 1 8/64	141 0 30/47	243 0 20/54
20 4 22/44	43 2 4/43	81 1 6/54	144 0 35/56	245 0 18/49
20 4 23/46	44 2 2/44	82 1 4/41	144 0 40/64	246 0 15/41
20 4 25/50	45 2	84 1 4/56	145 0 36/58	250 0 18/50
20 4 26/52	46 1 44/46	85 1 2/34	147 0 30/49	252 0 20/56
20 4 27/54	47 1 43/47	85 1 3/51	150 0 30/50	255 0 12/34
20 4 28/56	48 1 49/56	86 1 2/43	153 0 20/34	255 0 18/51
20 4 29/58	48 1 56/64	87 1 2/58	153 0 30/51	258 0 15/43
20 4 31/62	49 1 41/49	88 1 1/44	155 0 36/62	260 0 18/52

# Operating Instructions & Parts Manual

261	0	20/58	423	0	10/47	765	0	6/51	1710	0	3/57
264	0	15/44	430	0	9/43	774	0	5/43	1740	0	3/58
265	0	18/53	435	0	12/58	780	0	6/52	1755	0	2/39
270	0	13/39	440	0	9/44	792	0	5/44	1770	0	3/59
270	0	17/51	441	0	10/49	795	0	6/53	1830	0	3/61
270	0	18/54	450	0	10/50	810	0	6/54	1845	0	2/41
270	0	19/57	459	0	10/51	828	0	5/46	1860	0	3/62
276	0	15/46	460	0	9/46	840	0	6/56	1920	0	3/64
279	0	20/62	465	0	12/62	846	0	5/47	1935	0	2/43
280	0	18/56	468	0	10/52	855	0	4/38	1980	0	2/44
282	0	15/47	470	0	9/47	855	0	6/57	2070	0	2/46
285	0	12/38	477	0	10/53	870	0	6/58	2115	0	2/47
285	0	18/57	480	0	12/64	882	0	5/49	2205	0	2/49
288	0	20/64	486	0	10/54	885	0	6/59	2250	0	2/50
290	0	18/58	490	0	9/49	900	0	5/50	2295	0	2/51
294	0	15/49	495	0	8/44	915	0	6/61	2340	0	2/52
295	0	18/59	500	0	9/50	918	0	5/51	2385	0	2/53
300	0	15/50	504	0	10/56	930	0	6/62	2430	0	2/54
305	0	18/61	510	0	6/34	936	0	5/52	2520	0	2/56
306	0	10/34	510	0	9/51	954	0	5/53	2565	0	2/57
306	0	15/51	513	0	10/57	960	0	6/64	2610	0	2/58
310	0	18/62	520	0	9/52	972	0	5/54	2655	0	2/59
312	0	15/52	522	0	10/58	990	0	4/44	2745	0	2/61
315	0	14/49	530	0	9/53	1008	0	5/56	2790	0	2/62
315	0	16/56	531	0	10/59	1020	0	3/34	2880	0	2/64
318	0	15/53	540	0	9/54	1026	0	5/57	3060	0	1/34
320	0	18/64	549	0	10/61	1035	0	4/46	3330	0	1/37
324	0	15/54	555	0	6/37	1044	0	5/58	3420	0	1/38
330	0	12/44	558	0	10/62	1062	0	5/59	3510	0	1/39
333	0	10/37	560	0	9/56	1098	0	5/61	3690	0	1/41
336	0	15/56	570	0	6/38	1110	0	3/37	3870	0	1/43
340	0	9/34	570	0	9/57	1116	0	5/62	3960	0	1/44
342	0	10/38	576	0	10/64	1125	0	4/50	4140	0	1/46
342	0	15/57	580	0	9/58	1140	0	3/38	4230	0	1/47
345	0	12/46	585	0	6/39	1152	0	5/64	4410	0	1/49
348	0	15/58	585	0	8/52	1170	0	3/39	4500	0	1/50
351	0	10/39	590	0	9/59	1170	0	4/52	4590	0	1/51
354	0	15/59	610	0	9/61	1215	0	4/54	4680	0	1/52
360	0	11/44	612	0	5/34	1230	0	3/41	4770	0	1/53
360	0	13/52	615	0	6/41	1260	0	4/56	4860	0	1/54
360	0	14/56	620	0	9/62	1290	0	3/43	5040	0	1/56
360	0	16/64	630	0	7/49	1305	0	4/58	5130	0	1/57
366	0	15/61	630	0	8/56	1320	0	3/44	5220	0	1/58
369	0	10/41	640	0	9/64	1380	0	3/46	5310	0	1/59
370	0	9/37	645	0	6/43	1395	0	4/62	5490	0	1/61
372	0	15/62	660	0	6/44	1410	0	3/47	5580	0	1/62
375	0	12/50	666	0	5/37	1440	0	4/64	5760	0	1/64
380	0	9/38	684	0	5/38	1470	0	3/49			
384	0	15/64	690	0	6/46	1500	0	3/50			
387	0	10/43	702	0	5/39	1530	0	2/34			
390	0	9/39	705	0	6/47	1530	0	3/51			
390	0	12/52	720	0	7/56	1560	0	3/52			
396	0	10/44	720	0	8/64	1590	0	3/53			
405	0	12/54	735	0	6/49	1620	0	3/54			
410	0	9/41	738	0	5/41	1665	0	2/37			
414	0	10/46	750	0	6/50	1680	0	3/56			
420	0	12/56	765	0	4/34	1710	0	2/38			

## Rotary Table/Lathe Chuck Adapter Plates



<b>Table±</b>	<b>221-304</b>	<b>221-306</b>	<b>221-308</b>	<b>221-310</b>	<b>221-312</b>	<b>221-316</b>
Size	4" Table	6" Table	8" Table	10" Table	12" Table	16" Table
<b>Plate</b>	221-354	221-356	221-358	221-360	221-362	221-366
<b>Lathe Chuck</b>	559-110 3"	559-112 5"	559-113 6"	559-114 8"	559-115 10"	559-116 12"

4" Rotary Table / 4" Adapter Plate / 3" Lathe Chuck  
 6" Rotary Table / 6" Adapter Plate / 5" Lathe Chuck  
 8" Rotary Table / 8" Adapter Plate / 6" Lathe Chuck  
 10" Rotary Table / 10" Adapter Plate / 8" Lathe Chuck  
 12" Rotary Table / 12" Adapter Plate / 10" Lathe Chuck  
 16" Rotary Table / 16" Adapter Plate / 12" Lathe Chuck

### **Mounting Instructions:**

Make sure the "step" on the adapter plate goes to the back side of the lathe chuck.

Connect using mounting bolts that are supplied with the lathe chuck.

Carefully place the plate/chuck assembly on the rotary table face plate and line up the holes in the adapter plate with the T-slots on the rotary table. Connect using the T-nuts and bolts that are supplied with the adapter plate.

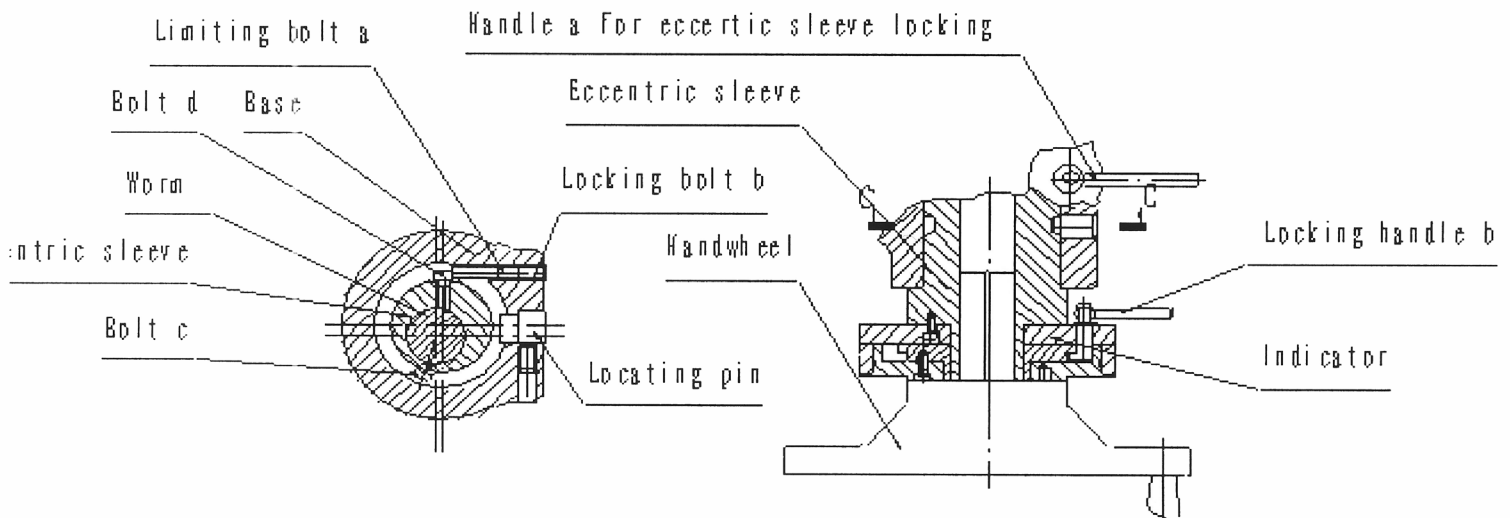
Center the plate and tighten bolts.

## Worm Gear / Eccentric Sleeve Adjustment for H/V Rotary Tables

First Loosen Handle **A** for the eccentric sleeve lock and proceed to unscrew **Bolt B**. Screw clockwise the **Limiting Bolt A** to adjust the mesh of the worm gear to the table top gear. At this time, rotate the handle wheel clockwise and counterclockwise to ensure the mesh of the worm gear is within  $6^\circ$  and then tighten the **Locking Bolt B** and then clamp the **Handle A** to lock the eccentric sleeve.

Screw counterclockwise the **Limiting Bolt A** to reduce the mesh and proceed to rotate the handwheel to ensure the mesh of the worm gear is within  $6^\circ$  and then tighten **Locking Bolt B**.

Rotate the **Indicator** counterclockwise until the **Bolt C** is touching the **Locating Pin**. This procedure has just disengaged the worm gear. Rotate the indicator clockwise until **Bolt D** is touching **Bolt A**. Now the worm gear is engaged.



# Global Connections



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