

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.

# Phase II+ 6" and 10" Horizontal Rotary Tables

# Phase II+ Dividing Plates

## Description

The 6" and 10" horizontal 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 Morse Taper 2 (6" Table), Morse Taper 3 (10" Table) 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 a 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"
Squareness of clamping surface to angle face.....	0.0004"
Squareness of clamping surface to center slot.....	0.0008"
Concentricity of center bore....	0.0008"
Maximum spacing error	
220-006.....	1 minute, 20 seconds
.....	45 seconds

220-010

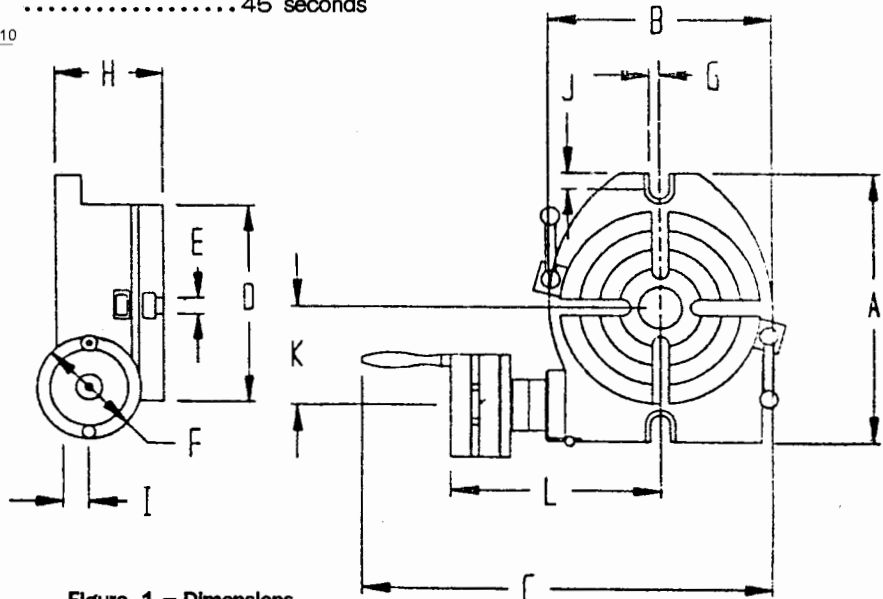


Figure 1 - Dimensions

## DIMENSIONS

Refer to Figure 1.

NOTE: All dimensions are in inches.

	6" Table	10" Table
A.	10 1/4	13
B.	7 3/4	11 1/4
C.	13 1/16	16 5/8
D.	6 19/64	9 15/16
E.	2MT	3MT
F.	4 15/16	4 15/16
G.	0.244	9/32
H.	3	3 11/16
I.	1	1
J.	45/64	13/16
K.	3	4
L.	87/64	9 1/2
T - Slots	.390	.465

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## General Safety Information

1. Read and follow all operating instructions 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.
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

Mount rotary table securely to work surface.

Use slots provided on table and be sure that table is rigidly and safely secured. Table can be mounted horizontally with slots provided.

## Operation

### ROTARY TABLE

Refer to Figure 4.

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 counter clockwise 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. 26) 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. 26)

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. 21) and moving the indicator along the slot. Secure knob after completing adjustment.
5. The center sleeve has been ground for a Morse Taper No. 2 (6" Table), Morse Taper 3 (10" Table). Centers with a 2MT (6" Table) or 3MT (10" Table) shank can be mounted to the rotary table for precision centering and measuring operations.
6. The gear ratio of the rotary table is 1:90 so that 90 rotations of the handwheel will rotate the table exactly one full rotation. One rotation of the handwheel is equal to 4° 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 to ten seconds.

## DIVIDING PLATE ACCESSORY

Refer to Figures 2, 3, and 4.

The dividing plate accessory is used to divide one 360° 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  $N = 90/17 = 55/17 = 510/34$ .

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 each 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.

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# phase II+ Dividing Plates

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

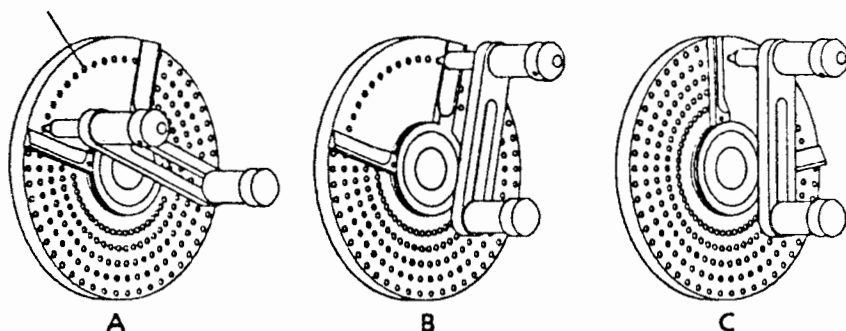


Figure 2 - Annular holes

## Operation (Continued)

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  $\frac{10}{34}$  of a rotation by placing the plunger assembly against the sector arms 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 rotations plus  $\frac{28}{38}$  of a rotation. The dividing chart shows that for 53 divisions, each division requires 1 and  $\frac{37}{53}$  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.

### WORM SHAFT ADJUSTMENT

To adjust for wear in the worm shaft, the locknut (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 over tighten locknut. Replace spacer and handwheel.

### ECCENTRIC SLEEVE LIMIT SCREW ADJUSTMENT

The threaded pin (Ref. No. 28) 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. 27) and adjust the threaded pin until proper engagement is achieved.

### 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. 25). Unscrew oil plug prior to lubrication. Before every shift of operation fill adequate oil through oil zerts and oil plug.

Frequently check oil level using sight glass (Ref. No. 23). Do not use rotary table without adequate oil.

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# Phase II+ Dividing Plates

## 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 25/60	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 25/60	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	45/62
7	B-49	12 42/49	36	A-50	2 25/60	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 18/44	106	B-53	45/63
9	※	10	38	A-38	2 14/38	68	A-34	1 11/34	108	B-54	45/64
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 25/60	41	A-41	2 8/41	72	A-44	1 11/44	112	A-56	45/66
13	A-52	6 48/62	42	B-49	2 7/49	74	A-37	1 9/37	114	A-38	30/38
14	B-49	6 21/49	43	A-43	2 4/43	75	A-50	1 10/60	115	B-46	36/46
15	※	6	44	A-44	2 2/44	76	A-38	1 7/38	116	B-58	45/68
16	A-56	5 35/66	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	45/69
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 49/66	82	A-41	1 4/41	122	A-61	45/61
20	A-50	4 25/60	49	B-49	1 41/49	84	A-56	1 4/66	123	A-41	30/41
21	B-49	4 14/49	50	A-50	1 40/60	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	36/60
23	B-46	3 42/46	52	A-52	1 38/62	87	B-58	1 2/68	126	B-49	35/49
24	A-44	3 33/44	53	B-53	1 37/63	88	A-44	1 1/44	128	B-64	45/64
25	A-50	3 30/60	54	A-39	1 26/39	90	※	1	129	A-43	30/43
26	A-52	3 24/62	55	A-44	1 28/44	92	B-46	45/46	130	A-39	27/39
27	A-39	3 13/39	56	A-56	1 34/66	93	B-62	60/62	132	A-44	30/44
28	A-56	3 12/66	57	B-57	1 33/67	94	B-47	45/47			
29	B-58	3 6/68	58	B-58	1 32/68	95	A-38	36/38			
30	※	3	59	B-59	1 31/69	96	B-64	60/64			

T = Desired dividial 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

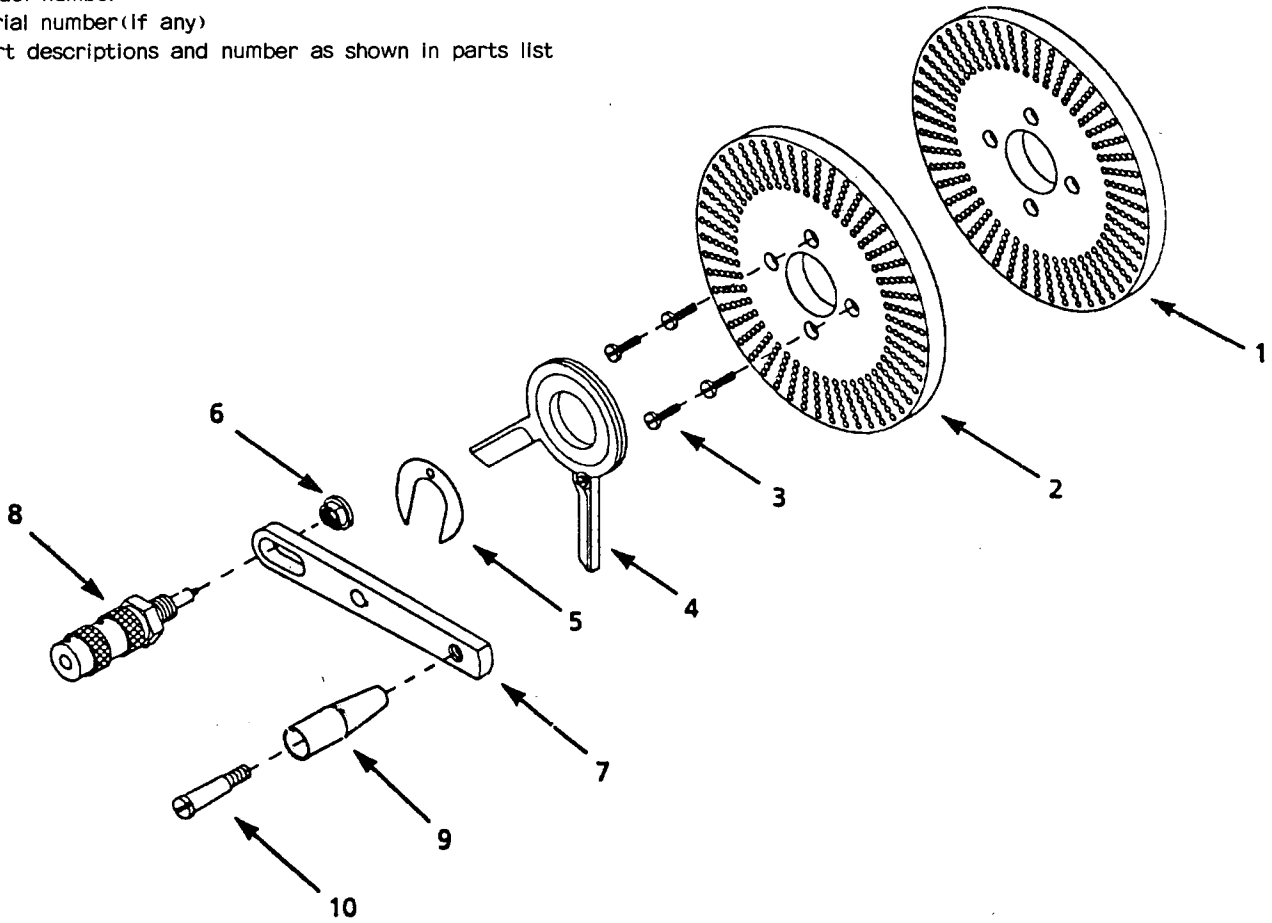


Figure 3 - Replacement Parts Illustration

Replacement Parts List for Dividing Attachment

Reference Number	Description	Part Number	Quantity
1	Dividing plate with 34 - 41 and 43 - 61 holes	9283.00	1
2	Dividing plate with 46 - 53 and 54 - 64 holes	9284.00	1
3	4 - 0.7 x 16mm Fillister head screw	9285.00	4
4	Sector	9286.00	1
5	Spring washer	9287.00	1
6	Spacer	9288.00	1
7	Crank arm	9289.00	1
8	Plunger assembly	9290.00	1
9	Handle	9291.00	1
10	Handle screw	9292.00	1

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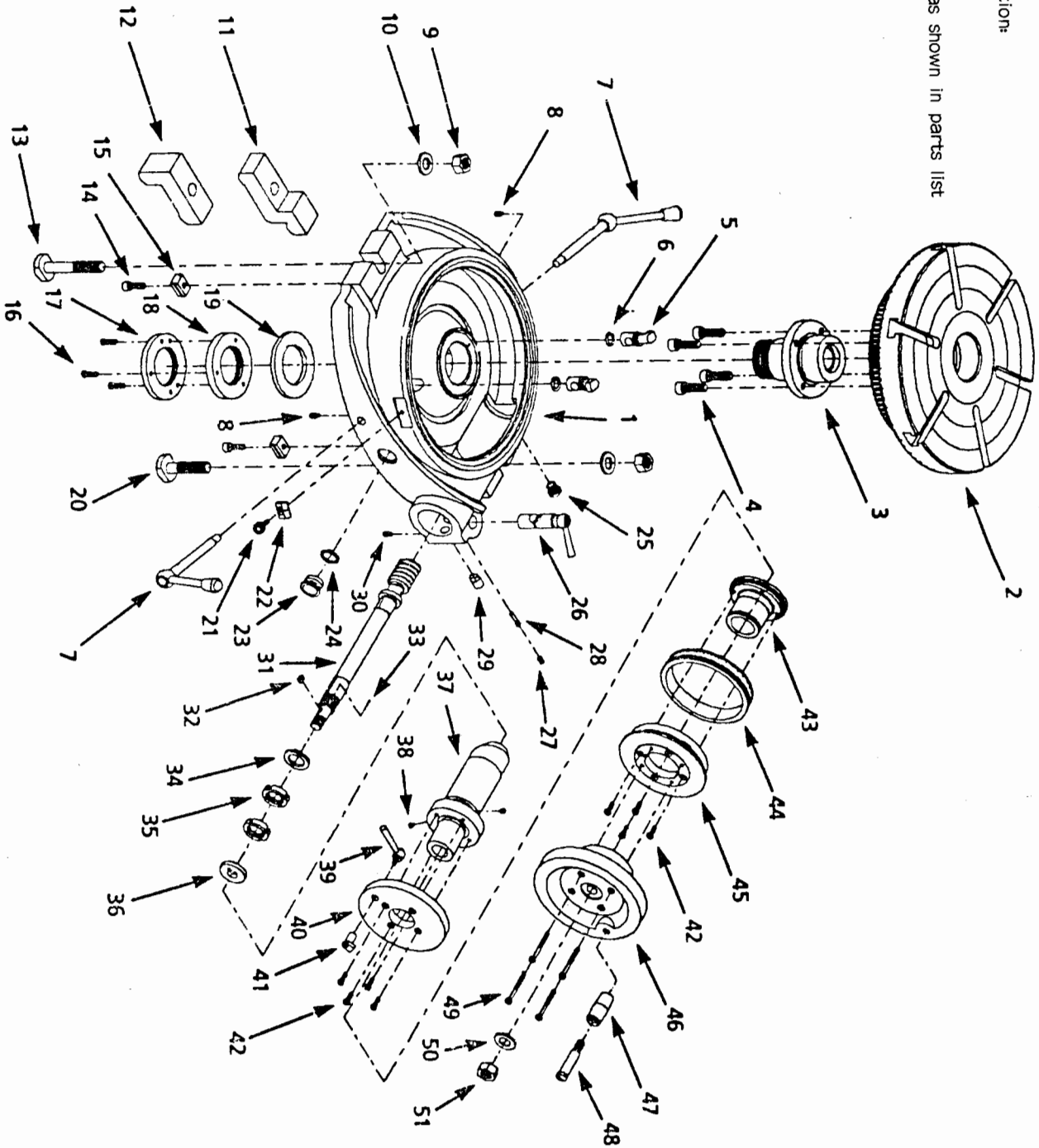


Figure 4 - Replacement Parts Illustration for Rotary Tables

## Replacement Parts List

Reference		Part Number for Models:		Reference		Part Number for Models:	
Number	Description	Qty.		Number	Description	Qty.	
1	Base	1	9309.00	23	Sight glass	1	9211.00
2	Table	1	9310.00	24	O-ring	1	9212.00
3	Taper sleeve	1	9325.00	25	Plug	1	9213.00
4	5-0.8x18mm Socket head bolt	4	*	26	Handle Assembly	1	9321.00
4	6-1.0x22mm Socket head bolt	4	*	27	5-0.8 x 8mm Set screw	1	*
5	Table Clamp	2	9251.00	28	Threaded pin	1	9226.00
6	O-ring	2	9209.00	29	Block	1	9227.00
7	Handle assembly	2	9253.00	30	4-0.7 x 6mm Dog point	1	9229.00
8	4-0.7x6mm Dog point	2	-	30	setscrew	1	-
8	set screw	2	-	30	5-0.8 x8mm Dog point	1	9306.00
8	5-0.8x8mm Dog point	2	9306.00	31	setscrew	1	9322.00
9	set screw	2	-	31	Worm shaft	1	9263.00
9	10mm-1.5 Hex nut	2	*	32	4x4x8mm Key	1	3873.00
9	12mm-1.75 Hex nut	4	*	33	1.5x6mm Dowel pin	1	9230.00
10	10mm Washer	2	*	34	Spacer	1	9231.00
10	12mm Washer	4	*	35	Locknut	2	9232.00
11	Clamp	1	9214.00	36	Spacer with keyway	1	9233.00
12	L-Clamp	1	9216.00	37	Eccentric sleeve	1	9323.00
13	12-1.75 x 78mm T-Bolt	2	9217.00	38	3-0.6x3mm Fillister	2	9235.00
14	4-0.7 x 14mm Fillister	2	9314.00	39	head screw	1	9236.00
14	head screw	2	-	40	Handle assembly	1	9237.00
14	5-0.8 x 15MM socket	2	*	41	Vernier collar	1	9238.00
15	Locating key	2	9315.00	42	Vernier lockdown	8	9239.00
16	4-0.7 x8mm Fillister	3	9316.00	43	4-0.7x12mm Fillister	1	9240.00
16	head screw	3	-	44	Sleeve	1	9241.00
17	head screw	1	9317.00	45	Micro collar	1	9242.00
18	Retaining plate	1	9318.00	46	Collar	1	9243.00
19	Table nut	1	9319.00	47	Handwheel	1	9244.00
19	Ring	2	9320.00	48	Handle	1	9245.00
20	10-1.5 x52mm T-bolt	2	-	49	Handle screw	4	9246.00
20	12-1.75 x60mm T-bolt	2	9215.00	50	head screw	1	9247.00
21	Knob	1	9222.00	51	Spacer	1	*
22	Indicator	1	9221.00	51	12mm-1.75 Hex nut	1	*

(\*)Standard hardware item available locally.

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## 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	1. Loosen hold-down clamps
	2. Locknut too tight (see "Maintenance")	2. Adjust locknut properly
	3. Table needs lubrication	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")



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