

HOW TO USE THE TOOLMASTER 3" ROTARY TABLE.

By Gwyn Kemp

The table is fairly simple to use if you bear in mind a few rules. The Toolmaster 3" table has a 36-1 ratio. This means that 1 rotation of the handle advances the table 10degrees. So any angle exceeding 10 degrees must be preceded by at least 1 rotation of the table.

Example: Suppose you wished to divide a piece into 12 divisions, then each division would be: 360 divided by 12 = 30degrees; or 3 complete rotations of the handle: $10 \times 3 = 30$.

Now that's OK if the number of divisions is easily and exactly divisible. However life is not that easy, because many divisions entail using fractions of millimeters as well as whole ones. So what do we do then? Well the first thing we do is to get a pencil and paper and reach for a calculator.

First examine the plates. You will see that each row of holes has a number engraved alongside it equal to the number of holes in that row. Make a list down the page of the numbers found on the plates, smallest at the top, largest at the bottom. Now divide each number by 10. (this representing 10degrees,) and record the result alongside that number. Do this for all the numbers. These numbers represent how much movement as a fraction of 10 degrees, each group of holes advance.

This is necessary because you need this information to be able to estimate how many extra holes of any group you need to employ, in order to advance the table the correct amount for each division. If this seems complicated, don't worry all will become clear in due course. Below is an example of how your list should look, when your calculations are complete.

Plate no	Degs.	Plate no	Degs.	Plate no	Degs.
15	.6666	21	.4761	37	.2702
16	.625	23	.4347	39	.2564
17	.5882	27	.3703	41	.2439
18	.5555	29	.3448	43	.2325
19	.5263	31	.3225	47	.2127
20	.5	33	.3030	49	.2040

Now let's take an example, so you can see how the above figures relate to one another. Suppose you wish to divide a plate into 14 divisions.

14 divisions = 360 degs. Divide by 14 = 25.7142 degs.

To get this division you need 2 whole turns = 20 degs.

Then you divide the remainder, 5.7142 so it divides equally into one of the above fractions.

Example: divide 5.7142 by 28 = .2040. So this corresponds to hole 49.

Now let's put all this information together.

We know that we want to make 14 divisions and that equals 25.7142 degs.

We know we can achieve this by firstly 2 complete rotations = 20 degs.

We know the rest, 5.7142 degs, Can be obtained by selecting holes number 49 x 28.

Now put all this together.

Division =14. Disc hole = 49. Number of rotations = 2. Added holes = 28.

Now the next thing to do is to translate that onto the table itself. To take the example just cited. Start by selecting the plate with 49 holes and mount it onto the table. Then place the brass quadrant arms in place and finally secure the handle in place on the axle by means of the grub screw. (The whole thing should look like Fig. 7.)

Now make sure that the handle is located in the hole between number 49 top centre. The table should be set to zero degrees. Lock the handle screws to prevent the handle moving during use. Place the left-hand quadrant arm next to the left-hand side of the handle, where it enters the plate hole.

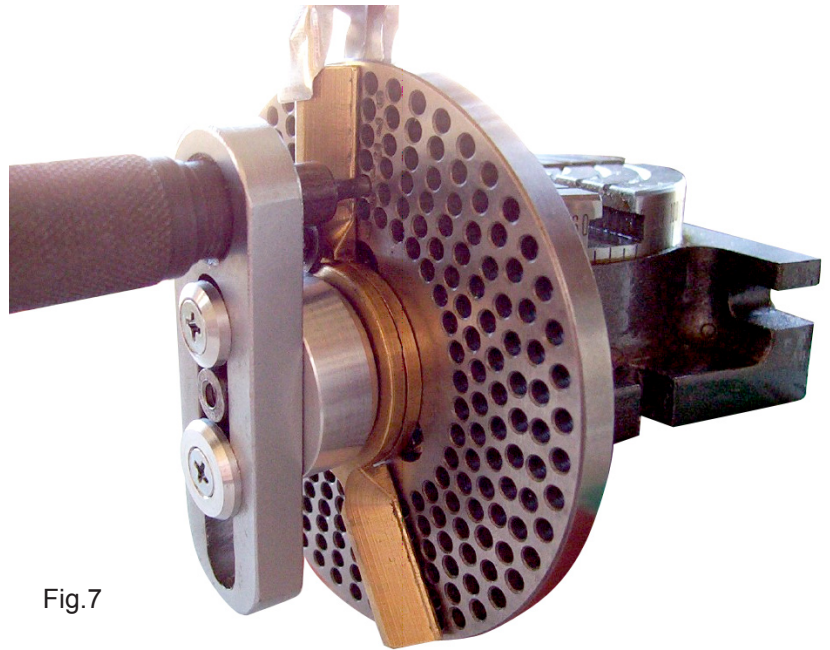


Fig.7

Loosen slightly the locking screw on the quadrant arms, and spread the right-hand one till the inner, bevelled edge is adjacent to the 28th hole on row 49. Now lock it so that it can't move. Now you are all set to go!

Pull out the spring-loaded handle from the hole, and rotate it in a clockwise direction 2 complete turns. Then on the second turn, continue on to the 28th hole and lock the handle pin in it. This should be next to the right-hand quadrant arm you have set previously. The arms are there to save you counting every time you advance to the next division. I will just mention that in order to prevent a tendency for the quadrant arms to slip round the dial as you are advancing the handle, I employ a small spring clamp to clip one of the arms to the plate.

When you wish to advance on to the next division, you simply un-clamp the arm and swivel it around again in a clockwise direction, until it once again comes in contact with the handle pin, clamp the arm in place and continue to advance the handle in the same way as before. Repeat this till all the divisions have been completed.

Well that's the basic theory of it all, but again, if you don't want to end up in a psychiatric clinic, just go to the tables at the end of this article, where I have worked it all out for you. Just follow these and all should be well. Just one thing to bear in mind. You will note that in some cases, an asterisk has been inserted in several of the degree between divisions boxes, followed by a minus and number. This means that for that number of divisions I could not find an exact equivalent and the closest I could come was say minus 2 degrees etc. However don't despair, you can still get the divisions fairly close, by moving your table or cutter a thou or so to one side when you are machining. In any case, it's good to first pace out the divisions to see if they work out before committing the work to the cutter.

Well I hope now you will feel confident to have a go at converting a small and useful rotary table, to have the added feature of being able to be used with the indexing plates. I must stress here, that I am not sure how you would go with any other make of plates. But certainly if you used the above calculations, you could come up with a new set of tables to suit whatever plates were used; the principle is the same regardless of the plates used.

No of divisions	Disc Hole	No of rotations	Added Holes.	Deg bet divisions
3	0	12	0	120
4	0	9	0	90
5	20	7	4	72
6	0	6	0	60
7	15	5	2	51.4285
8	15	4	8	45
9	15	4	0	40
10	16	3	10	36
11	16	3	5	32.727
12	0	3	0	30
13	39	2	30	27.6923
14	49	2	28	25.7142
15	20	2	8	24
16	39	2	10	22.5
17	43	2	5	21.1764
18	0	2	0	20
19	18	1	16	18.9473
20	15	1	12	18
21	21	1	15	17.1428
22	27	1	17	16.3636
23	21	1	12	15.6521
24	49	1	25	15
25	37	1	16	14.4

No of divisions	Disc Hole	No of rotations	Added Holes	Deg bet divisions
26	29	1	11	13.8461
27	33	1	11	13.3333
28	49	1	14	12.8571
29	41	1	10	12.4137
30	39	1	8	12
31	43	1	7	11.6129
32	39	1	5	11.25
33	33	1	3	10.9090
34	17	1	1	10.5882
35	37	1	1	10.2857
36	36	1	0	10
37	37	0	36	9.7297
38	37	0	35	9.4736
39	39	0	36	9.2307
40	20	0	18	9
41	17	0	15	8.7804
42	49	0	42	8.5714
43	18	0	16	8.3720
44	23	0	19	8.1818
45	15	0	12	8
46	43	0	34	7.8260
47	47	0	36	7.6595
48	20	0	15	7.5
49	19	0	14	7.3469
50	49	0	36	7.2

No of division	Disc Hole	No of rotations	Added Holes	Deg bet divisions
51	17	0	12	7.0588
52	39	0	27	6.9230
53	47	0	32	6.7924
54	15	0	10	6.6666
55	29	0	19	6.5454
56	31	0	20	6.4285
57	19	0	12	6.3157
58	29	0	18	6.2068
59	41	0	25	6.1016
60	15	0	9	6
61	39	0	23	5.9016
62	31	0	18	5.8064
63	21	0	12	5.7142
64	16	0	9	5.625
65	18	0	10	5.5384
66	33	0	18	5.4545
67	43	0	23	5.3731
68	17	0	9	5.2941
69	23	0	12	5.2173
70	37	0	19	5.1428
71	47	0	24	5.0704
72	20	0	10	5
73	49	0	24	4.9315 * - 3
74	37	0	18	4.8648
75	33	0	16	4.8

No of divisions	Disc Hole	No of rotations	Added Holes	Deg bet divisions
76	49	0	23	4.7368 * - 4
77	43	0	20	4.6753 * - 2.5
78	39	0	18	4.6153
79	33	0	15	4.5569
80	20	0	9	4.5
81	18	0	8	4.4444
82	41	0	18	4.3902
83	23	0	10	4.3373
84	49	0	21	4.2857
85	33	0	14	4.2352
86	43	0	18	4.1860
87	29	0	12	4.1379
88	17	0	7	4.0909
89	47	0	19	4.0449
90	15	0	6	4
91	43	0	17	3.9960
92	23	0	9	3.9130
93	31	0	12	3.8709
94	39	0	15	3.8297 * - 2
95	37	0	14	3.7894
96	16	0	6	3.75
97	43	0	17	3.7113
98	49	0	18	3.6734
99	33	0	12	3.6363
100	39	0	14	3.6