

## Change Wheel Tables for Mini-Lathes

The following tables give changewheel combinations for all standard BSW, BSF, BSP, BA, UNC, UNF and Metric threads within the capacity of a mini lathe.

They use only the changewheels supplied with the lathe plus a 63-tooth gear, which allows the cutting of metric gears on an imperial machine, and vice versa. Such a gear also allows closer approximations to be made to some of the more difficult thread sizes.

There is no guarantee that the cutting of either the smallest or the largest threads is possible with a standard set-up. The ratios given will be useful to anyone wishing to employ special techniques to produce such threads.

**IMPERIAL LEADSCREW 16TPI**  
British Association threads from 0-16BA

Thread Size	Change Wheels				Wheel Set-up	Actual Pitch	Error
	A	B	C	D			
0BA	63	50	30	60	B	1.00	0.0%
1BA	63	60	35	65	B	0.90	0.3%
2BA	63	57	30	65	B	0.81	0.0%
4BA	63	55	20	55	B	0.66	-0.2%
5BA	63	57	20	60	B	0.58	0.9%
6BA	60	55	20	65	B	0.53	-0.5%
7BA	50	55	20	60	B	0.48	-0.2%
8BA	60	55	20	80	B	0.43	-0.7%
9BA	35	45	20	63	B	0.39	-0.5%
10BA	35	60	30	80	B	0.35	0.8%
11BA	63	80	20	80	B	0.31	-0.8%
12BA	20	40	20	57	B	0.28	0.5%
13BA	40	63	20	80	B	0.25	-0.8%
14BA	20	50	20	55	B	0.23	-0.4%
15BA	30	57	20	80	B	0.21	0.5%
16BA	30	63	20	80	B	0.19	0.5%

**IMPERIAL LEADSCREW 16TPI**  
Imperial Thread per Inch values from 60 to 2.5

TPI	Change Wheels				Wheel Set-up	Actual TPI	Error
	A	B	C	D			
2.5	80	20	80	50	B	2.500	0.0%
2.625	80	35	80	30	B	2.625	0.0%
2.75	80	20	80	55	B	2.750	0.0%
2.875	60	35	65	20	B	2.872	0.1%
3	40	20	80	30	B	3.000	0.0%
3.25	63	35	55	20	B	3.232	0.5%
3.5	40	20	80	35	B	3.500	0.0%
4	40	20	80	40	B	4.000	0.0%
4.5	40	20	80	45	B	4.500	0.0%
5	40	20	80	50	B	5.000	0.0%
6	80			30	A	6.000	0.0%
7	80			35	A	7.000	0.0%
8	80			40	A	8.000	0.0%
9	80			45	A	9.000	0.0%
10	80			50	A	10.000	0.0%
11	80			55	A	11.000	0.0%
12	40			30	A	12.000	0.0%
14	40			35	A	14.000	0.0%
16	80			80	A	16.000	0.0%
18	40			45	A	18.000	0.0%
19	40	50	60	57	B	19.000	0.0%
20	40			50	A	20.000	0.0%
22	40			55	A	22.000	0.0%
24	40			60	A	24.000	0.0%
26	40			65	A	26.000	0.0%
28	20			35	A	28.000	0.0%
32	20			40	A	32.000	0.0%
36	20			45	A	36.000	0.0%
40	20			50	A	40.000	0.0%
48	20			60	A	48.000	0.0%
56	20	60	30	35	B	56.000	0.0%
60	20	50	40	60	B	60.000	0.0%
64	20	40	20	40	B	64.000	0.0%
80	20	50	30	60	B	80.000	0.0%

**Standard Thread per Inch sizes**

Size	Whitworth	BS Fine	Model Engineer
60	1/16		
48	3/32		
40	1/8		1/8 - 1/2
32	5/32	1/16	5/16 - 1/2
28		7/32	
26		1/4	
24	3/16 & 7/32		
22		5/16	
20	1/4	3/8	
18	5/16	7/16	
16	3/8	1/2 & 9/16	
14	7/16	5/8	
12	1/2 & 9/16	3/4	
11	5/8	7/8	
10	3/4	1	
9	7/8		
8	1		

**IMPERIAL LEADSCREW 16TPI**  
**British Standard Metric Fasteners\* up to 6mm**

PITCH	Change Wheels				Wheel Set-up	Actual Pitch	Error
	A	B	C	D			
6mm	63	50	60	20	B	6.001	0.0%
5mm	63			20	A	5.001	0.0%
4.5mm	63	20	45	50	B	4.501	0.0%
4mm	63	50	60	30	B	4.001	0.0%
3.5mm	63	20	35	50	B	3.500	0.0%
3mm	63	40	60	50	B	3.000	0.0%
2.5mm	63	60	45	30	B	2.500	0.0%
2mm	63			50	A	2.000	0.0%
1.75mm	63	50	35	40	B	1.750	0.0%
1.5mm	63	60	45	50	B	1.500	0.0%
1.25mm	63	40	30	60	B	1.250	0.0%
1mm	63	50	30	60	B	1.000	0.0%
0.8mm	63	50	20	50	B	0.800	0.0%
0.75mm	63	50	30	80	B	0.750	0.0%
0.7mm	63	50	20	57	B	0.702	0.3%
0.6mm	65	57	20	60	B	0.603	0.6%
0.5mm	63	50	20	80	B	0.500	0.0%
0.45mm	65	57	20	80	B	0.453	0.6%
0.4mm	20			80	A	0.397	-0.8%
0.35mm	20	63	45	65	B	0.349	-0.3%
0.3mm	30	80	40	80	B	0.298	-0.8%
0.25mm	40	63	20	80	B	0.252	0.8%
0.2mm	30	60	20	80	B	0.198	-0.8%

**Standard Metric Thread Pitches**

Size	Pitch	Size	Pitch	Size	Pitch
M0.8	0.2	M2	0.4	M4.5	0.75
M1	0.25	M2.2	0.45	M5	0.8
M1.2	0.25	M2.5	0.45	M6	1
M1.4	0.3	M3	0.5	M8	1.25
M1.6	0.35	M3.5	0.6	M10	1.5
M1.8	0.35	M4	0.7	M12	1.75

### METRIC LEADSCREW 1.5mm PITCH

British Association threads from 0-16BA

Thread Size	Change Wheels				Wheel Set-up	Actual Pitch	Error
	A	B	C	D			
0BA	40			60	A	1.000	0.0%
1BA	60	35	20	57	B	0.902	-0.3%
2BA	65	57	30	63	B	0.815	-0.6%
3BA	55	35	20	65	B	0.725	0.6%
4BA	30	60	57	65	B	0.658	0.3%
5BA	40	57	45	80	B	0.592	-0.4%
6BA	30	57	40	60	B	0.526	0.7%
7BA	35	55	30	60	B	0.477	0.6%
8BA	20	50	45	63	B	0.429	0.3%
9BA	20	60	35	45	B	0.389	0.3%
10BA	40	57	20	60	B	0.351	-0.3%
11BA	20	30	20	65	B	0.308	0.7%
12BA	20	60	45	80	B	0.281	-0.4%
13BA	20	40	20	60	B	0.250	0.0%
14BA	20	40	20	65	B	0.231	-0.3%
15BA	20	45	20	63	B	0.212	-0.8%
16BA	20	63	20	50	B	0.190	-0.3%
18BA	20	50	20	80	B	0.150	0.0%

### METRIC LEADSCREW 1.5mm PITCH

Imperial Thread per Inch values from 60 to 2.5

TPI	Change Wheels				Wheel Set-up	Actual Pitch	Error
	A	B	C	D			
2.5	80	35	60	20	B	2.469	1.2%
2.75	80	35	80	30	B	2.778	-1.0%
3.25	80	20	65	50	B	3.256	-0.2%
3	80	20	63	45	B	3.024	-0.8%
3.5	80	20	60	50	B	3.528	-0.8%
4	80	20	60	57	B	4.022	-0.5%
4.5	80	20	57	60	B	4.456	1.0%
5	80	20	55	65	B	5.003	-0.1%
6	65	20	55	63	B	5.968	0.5%
7	80	30	57	63	B	7.018	-0.3%
8	80	30	50	63	B	8.001	0.0%
9	80	35	45	55	B	9.055	-0.6%
10	80	45	60	63	B	10.001	0.0%
11	80	50	55	57	B	10.968	0.3%
12	80	45	50	63	B	12.002	0.0%
14	80	60	57	63	B	14.037	-0.3%
16	50	45	60	63	B	16.002	0.0%
18	50	30	35	63	B	18.288	-1.6%
19	50	40	45	63	B	18.965	0.2%
20	60	45	40	63	B	20.003	0.0%
22	50	57	55	63	B	22.112	-0.5%
24	50	45	40	63	B	24.003	0.0%
26	45	60	55	63	B	25.862	0.5%
28	50	35	20	63	B	37.338	-33.4%
32	50	45	30	63	B	32.004	0.0%
36	50	65	40	65	B	35.772	0.6%
40	20	30	40	63	B	40.005	0.0%
48	50	45	20	63	B	48.006	0.0%
56	20	57	55	63	B	55.280	1.3%
60	30	63	30	50	B	59.267	1.2%
64	50	60	20	63	B	64.008	0.0%
80	20	60	40	63	B	80.010	0.0%

#### Standard Thread per Inch sizes

Size	Whitworth	BS Fine	Model Engineer
1/16	60		
3/32	48		
1/8	40		40
5/32	32		40
3/16	24	32	40
7/32	24	28	40
1/4	20	26	40
5/16	18	22	40 & 32
3/8	16	20	41 & 32
7/16	14	18	42 & 32
1/2	12	16	43 & 32
9/16	12	16	
5/8	11	14	
3/4	10	12	
7/8	9	11	
1	8	10	

**METRIC LEADSCREW 1.5mm PITCH**  
**British Standard Metric Fasteners\* up to 6mm**

PITCH	Change Wheels				Wheel Set-up	Actual Pitch	Error
	A	B	C	D			
6mm	60	20	40	30	A	6.000	0.0%
5mm	50	20	40	30	A	5.000	0.0%
4.5mm	45	20	40	30	A	4.500	0.0%
4mm	40	20	40	30	A	4.000	0.0%
3.5mm	35	20	40	30	A	3.500	0.0%
3mm	60			30	A	3.000	0.0%
2.5mm	50			30	A	2.500	0.0%
2mm	40			30	A	2.000	0.0%
1.75mm	35			30	A	1.750	0.0%
1.5mm	60			60	A	1.500	0.0%
1.25mm	50			60	A	1.250	0.0%
1mm	40			60	A	1.000	0.0%
0.8mm	40	30	20	50	B	0.800	0.0%
0.75mm	30			60	A	0.750	0.0%
0.7mm	35	30	20	50	B	0.700	0.0%
0.6mm	60	50	20	60	B	0.600	0.0%
0.5mm	50	50	20	60	A	0.500	0.0%
0.45mm	45	50	20	60	B	0.450	0.0%
0.4mm	40	50	20	60	B	0.400	0.0%
0.35mm	35	50	20	60	B	0.350	0.0%
0.3mm	20	50	20	40	B	0.300	0.0%
0.25mm	20	60	20	40	B	0.250	0.0%
0.2mm	20	50	20	60	B	0.200	0.0%

**Standard Metric Thread Pitches**

Size	Pitch	Size	Pitch	Size	Pitch
M0.8	0.2	M2	0.4	M4.5	0.75
M1	0.25	M2.2	0.45	M5	0.8
M1.2	0.25	M2.5	0.45	M6	1
M1.4	0.3	M3	0.5	M8	1.25
M1.6	0.35	M3.5	0.6	M10	1.5
M1.8	0.35	M4	0.7	M12	1.75

**METRIC LEADSCREW 2mm PITCH**  
Imperial Thread per Inch values from 60 to 2.5

Thread TPI	Change Wheels				Wheel Set-up	Actual Pitch	Error
	A	B	C	D			
2.5	80	20	80	63	B	2.500	0.0%
2.625	80	20	60	50	B	2.646	-0.8%
2.75	80	20	63	55	B	2.772	-0.8%
2.875	80	20	63	57	B	2.873	0.1%
3.25	80	30	80	55	B	3.274	-0.7%
3	80	20	60	57	B	3.016	-0.5%
3.5	80	20	57	63	B	3.509	-0.3%
4	80	20	50	63	B	4.001	0.0%
4.5	65	20	55	63	B	4.476	0.5%
5	80	30	60	63	B	5.001	0.0%
6	80	30	50	63	B	6.001	0.0%
7	80	35	50	63	B	7.001	0.0%
8	60	30	50	63	B	8.001	0.0%
9	80	45	50	63	B	9.001	0.0%
10	60	30	40	63	B	10.001	0.0%
11	80	55	50	63	B	11.001	0.0%
12	50	45	60	63	B	12.002	0.0%
14	50	35	40	63	B	14.002	0.0%
16	50			63	A	16.002	0.0%
18	50	45	40	63	B	18.002	0.0%
19	80	57	30	63	B	19.002	0.0%
20	40			63	A	20.003	0.0%
22	40	55	50	63	B	22.003	0.0%
24	50	45	30	63	B	24.003	0.0%
26	50	65	40	63	B	26.003	0.0%
28	50	35	20	63	B	28.004	0.0%
32	50	60	30	63	B	32.004	0.0%
36	50	45	20	63	B	36.005	0.0%
40	20			63	A	40.005	0.0%
48	50	60	20	63	B	48.006	0.0%
56	50	55	20	80	B	55.880	0.2%
60	40	60	20	63	B	60.008	0.0%
64	45	80	20	57	B	64.347	-0.5%
80	20	60	30	63	B	80.010	0.0%

**METRIC LEADSCREW 2mm PITCH**  
British Standard Metric Fasteners\* up to 6mm

Thread Size	Change Wheels				Wheel Set-up	Actual Pitch	Error
	A	B	C	D			
6mm	60			20	A	6.000	0.0%
5mm	50			20	A	5.000	0.0%
4.5mm	45			20	A	4.500	0.0%
4mm	40			20	A	4.000	0.0%
3.5mm	35			20	A	3.500	0.0%
3mm	60			40	A	3.000	0.0%
2.5mm	50			40	A	2.500	0.0%
2mm	40			40	A	2.000	0.0%
1.75mm	35			40	A	1.750	0.0%
1.5mm	30			40	A	1.500	0.0%
1.25mm	50			80	A	1.250	0.0%
1mm	30			60	A	1.000	0.0%
0.8mm	40	50	20	40	B	0.800	0.0%
0.75mm	30			80	A	0.750	0.0%
0.7mm	35	50	20	40	B	0.700	0.0%
0.6mm	60	50	20	80	B	0.600	0.0%
0.5mm	20			80	A	0.500	0.0%
0.45mm	45	50	20	80	B	0.450	0.0%
0.4mm	40	50	20	80	B	0.400	0.0%
0.35mm	35	50	20	80	B	0.350	0.0%
0.3mm	30	50	20	80	B	0.300	0.0%
0.25mm	40	80	20	80	B	0.250	0.0%
0.2mm	20	50	20	80	B	0.200	0.0%

**METRIC LEADSCREW 2mm PITCH**  
**British Association threads from 0-16BA**

Thread Size	Change Wheels				Wheel Set-up	Actual Pitch	Error
	A	B	C	D			
<b>0BA</b>	30			60	A	1.000	0.0%
<b>1BA</b>	45	35	20	57	B	0.902	-0.3%
<b>2BA</b>	55	60	20	45	B	0.815	-0.6%
<b>3BA</b>	40	35	20	63	B	0.726	0.6%
<b>4BA</b>	20	55	57	63	B	0.658	0.3%
<b>5BA</b>	30	57	45	80	B	0.592	0.4%
<b>6BA</b>	50	60	20	63	B	0.529	-0.2%
<b>7BA</b>	35	55	30	80	B	0.477	0.6%
<b>8BA</b>	20	65	35	50	B	0.431	-0.2%
<b>9BA</b>	35	65	20	55	B	0.392	-0.4%
<b>10BA</b>	30	57	20	60	B	0.351	-0.3%
<b>11BA</b>	20	40	20	65	B	0.308	0.7%
<b>12BA</b>	20	57	20	50	B	0.281	-0.3%
<b>13BA</b>	20	40	20	80	B	0.250	0.0%
<b>14BA</b>	20	55	20	63	B	0.231	-0.4%
<b>15BA</b>	20	60	20	63	B	0.212	-0.8%
<b>16BA</b>	20	65	20	65	B	0.189	0.3%