

Introduction:

The charts here are an attempt to relate the threading charts from the 9" and 10K model A South Bend lathes to the calculations which were used to create them. Each spreadsheet starts with data taken directly from an SBL gearing chart (shown in yellow). Then the center columns display the corresponding gear ratios, and finally the rightmost columns show the rotation rates of the various parts, ending with the calculated feed rates.

Definitions:

Stud Gear- Outer gear of the pair driven by the Reversing Assembly, which rotates at the spindle rate. May be changed to alter the threading pitch. In the Model A English chart the Stud Gear is always 20T, except for the coarsest threads, where 40T is required.

Gear 1- idler gear driven by the Stud Gear and which drives the Screw Gear. It is 80T for cutting English threads or a 100/127 compound pair for metric.

Screw Gear- (or Gearbox Gear on the Model A) The Gear which drives the Lead Screw in Models B & C or the QC Gearbox in the model A. - May be changed to alter the threading pitch. This is always 56T in the model A with the English Lead Screw.

QC Gearbox- The Quick-Change Gearbox is found only on the model A. Its ratio from the Screw Gear to the Lead Screw is the product of the LH Tumbler and RH tumbler ratios.

LH Plunger- Has 5 positions, labeled A to E. Selects the ratio for the LH Tumbler.

RH Plunger- Has 8 positions numbered from 1 to 8. Selects the ratio for the RH Tumbler.

Lead Screw- Has 1/8" pitch. Drives the Carriage directly when the half-nuts are engaged for threading. When using power feeds (with the Apron Clutch engaged), the Lead Screw turns the apron gearing.

Cross-Feed Screw: Has 1/10" pitch and a 12T driving gear. When using power cross feed (with the Apron Clutch engaged), the Cross Feed Screw drives the Compound Base.

Apron Gearing:

In the Models A & B, the Apron gears are used when the apron clutch is engaged and the Selector Lever is set for power feeding.

When using the Power Feeds, the leadscrew merely acts as a drive shaft to rotate a worm, which in turn, drives a 36T worm gear in the apron.

Power longitudinal feed is achieved by the Apron Pinion gear which meshes with a Rack gear on the lathe bed. The pinion gear has a D.P. of 14, which means that the rack pitch will be $\text{Pi}/14$ inches.

Power longitudinal feed rates are determined by the apron gearing. The feed rate is obtained by multiplying the Lead Screw rate $\times \frac{1}{36} \times \frac{21}{43}$ to get the pinion gear rate, then $\times 14 \times \frac{\pi}{14}$ for the feed rate in inches.

Power cross-feed rates are calculated similarly:

The cross-feed rate is the Lead Screw rate $\times \frac{1}{36} \times \frac{21}{22} \times \frac{57}{12} \times 0.1$ "

Accuracy:

The longitudinal feed numbers from the chart are generally within 0.0001" of the computed values. However, the power cross feed is stated to be 0.3 x the corresponding longitudinal feed. In fact, the ratio is $\frac{2451}{2640} \pi = 0.2955$, or about 1.5% lower than the indicated 0.3. In general, it appears that SBL was not trying for extreme accuracy with their power feed rates.

Thread Pitches - 9 or 10K Model A - English QC Gear Box & 1/8" pitch Lead Screw

SBL Chart					Gear 1		QC Gearbox		Rev / Spindle Rev				Spindle Rev./ in.
Thread TPI	Stud Gear	Screw Gear	LH Plunger	RH Plunger	In	Out	LH Tumbler	RH Tumbler	Stud Gear	Gear 1	Screw Gear	Lead Screw	Carriage
4	40	56	A	1	80	80	16/5	14/16	1	0.5	0.7143	2.0000	4.0
4 1/2	40	56	A	2	80	80	16/5	14/18	1	0.5	0.7143	1.7778	4.5
5	40	56	A	3	80	80	16/5	14/20	1	0.5	0.7143	1.6000	5.0
5 1/2	40	56	A	4	80	80	16/5	14/22	1	0.5	0.7143	1.4545	5.5
5 3/4	40	56	A	5	80	80	16/5	14/23	1	0.5	0.7143	1.4545	5.5
6	40	56	A	6	80	80	16/5	14/24	1	0.5	0.7143	1.3333	6.0
6 1/2	40	56	A	7	80	80	16/5	14/26	1	0.5	0.7143	1.2308	6.5
7	40	56	A	8	80	80	16/5	14/28	1	0.5	0.7143	1.1429	7.0
8	20	56	A	1	80	80	16/5	14/16	1	0.25	0.3571	1.0000	8.0
9	20	56	A	2	80	80	16/5	14/18	1	0.25	0.3571	0.8889	9.0
10	20	56	A	3	80	80	16/5	14/20	1	0.25	0.3571	0.8000	10.0
11	20	56	A	4	80	80	16/5	14/22	1	0.25	0.3571	0.7273	11.0
11 1/2	20	56	A	5	80	80	16/5	14/23	1	0.25	0.3571	0.6957	11.5
12	20	56	A	6	80	80	16/5	14/24	1	0.25	0.3571	0.6667	12.0
13	20	56	A	7	80	80	16/5	14/26	1	0.25	0.3571	0.6154	13.0
14	20	56	A	8	80	80	16/5	14/28	1	0.25	0.3571	0.5714	14.0
16	20	56	B	1	80	80	8/5	14/16	1	0.25	0.3571	0.5000	16.0
18	20	56	B	2	80	80	8/5	14/18	1	0.25	0.3571	0.4444	18.0
20	20	56	B	3	80	80	8/5	14/20	1	0.25	0.3571	0.4000	20.0
22	20	56	B	4	80	80	8/5	14/22	1	0.25	0.3571	0.3636	22.0
23	20	56	B	5	80	80	8/5	14/23	1	0.25	0.3571	0.3478	23.0
24	20	56	B	6	80	80	8/5	14/24	1	0.25	0.3571	0.3333	24.0
26	20	56	B	7	80	80	8/5	14/26	1	0.25	0.3571	0.3077	26.0
28	20	56	B	8	80	80	8/5	14/28	1	0.25	0.3571	0.2857	28.0
32	20	56	C	1	80	80	4/5	14/16	1	0.25	0.3571	0.2500	32.0
36	20	56	C	2	80	80	4/5	14/18	1	0.25	0.3571	0.2222	36.0
40	20	56	C	3	80	80	4/5	14/20	1	0.25	0.3571	0.2000	40.0
44	20	56	C	4	80	80	4/5	14/22	1	0.25	0.3571	0.1818	44.0
46	20	56	C	5	80	80	4/5	14/23	1	0.25	0.3571	0.1739	46.0
48	20	56	C	6	80	80	4/5	14/24	1	0.25	0.3571	0.1667	48.0
52	20	56	C	7	80	80	4/5	14/26	1	0.25	0.3571	0.1538	52.0
56	20	56	C	8	80	80	4/5	14/28	1	0.25	0.3571	0.1429	56.0
64	20	56	D	1	80	80	2/5	14/16	1	0.25	0.3571	0.1250	64.0
72	20	56	D	2	80	80	2/5	14/18	1	0.25	0.3571	0.1111	72.0
80	20	56	D	3	80	80	2/5	14/20	1	0.25	0.3571	0.1000	80.0
88	20	56	D	4	80	80	2/5	14/22	1	0.25	0.3571	0.0909	88.0
92	20	56	D	5	80	80	2/5	14/23	1	0.25	0.3571	0.0870	92.0
96	20	56	D	6	80	80	2/5	14/24	1	0.25	0.3571	0.0833	96.0
104	20	56	D	7	80	80	2/5	14/26	1	0.25	0.3571	0.0769	104.0
112	20	56	D	8	80	80	2/5	14/28	1	0.25	0.3571	0.0714	112.0

Thread Pitches - 9 or 10K Model A - English QC Gear Box & 1/8" pitch Lead Screw

SBL Chart					Gear 1		QC Gearbox		Rev / Spindle Rev				Spindle Rev./ in.
Thread TPI	Stud Gear	Screw Gear	LH Plunger	RH Plunger	In	Out	LH Tumbler	RH Tumbler	Stud Gear	Gear 1	Screw Gear	Lead Screw	Carriage
128	20	56	E	1	80	80	1/5	14/16	1	0.25	0.3571	0.0625	128.0
144	20	56	E	2	80	80	1/5	14/18	1	0.25	0.3571	0.0556	144.0
160	20	56	E	3	80	80	1/5	14/20	1	0.25	0.3571	0.0500	160.0
176	20	56	E	4	80	80	1/5	14/22	1	0.25	0.3571	0.0455	176.0
184	20	56	E	5	80	80	1/5	14/23	1	0.25	0.3571	0.0435	184.0
192	20	56	E	6	80	80	1/5	14/24	1	0.25	0.3571	0.0417	192.0
208	20	56	E	7	80	80	1/5	14/26	1	0.25	0.3571	0.0385	208.0
224	20	56	E	8	80	80	1/5	14/28	1	0.25	0.3571	0.0357	224.0

Item	Rev. per Spindle Rev.	Example - Rev. per Spindle Rev. @ 4 TPI
Stud Gear	Spindle x 1	= 1
Gear 1	Stud Gear x $N_{\text{Stud}} / N_{1\text{in}}$	$1 \times 40 / 80 = 0.50$
Screw Gear	Gear 1 x $N_{1\text{out}} / N_{\text{ScrG}}$	$0.50 \times 80 / 56 = 0.7143\dots$
Lead Screw	Screw Gear x $N_{\text{LH}} \times N_{\text{RH}}$	$0.7143\dots \times 16/5 \times 14/16 = 2.000$
Motion of Carriage	Spindle Rev. / Inch	Spindle Rev. / Inch
	1 / Lead Screw x 8 TPI	$1 / 2.000 \times 8 = 4.0 \text{ TPI}$

Gear Set	
20	
40	
56	
80	Idler

9 or 10K Model A - English Lead Screw (1/8" pitch) - With Metric Transposing Gear

SBL Chart							QC Gearbox		Rev / Spindle Rev				Spindle Rev. / in.	M/M / Spindle Rev.
M/M Pitch	Stud Gear	Screw Gear	Plunger Hole	Plunger Hole	Gear 1		LH Tumbler	RH Tumbler	Stud Gear	Gear 1	Screw Gear	Lead Screw		
					In	Out								
6.00	48	56	A	1	127	100	16/5	14/16	1	0.3780	0.6749	1.8898	4.2333	6.00
5.50	44	56	A	1	127	100	16/5	14/16	1	0.3465	0.6187	1.7323	4.6182	5.50
5.00	40	56	A	1	127	100	16/5	14/16	1	0.3150	0.5624	1.5748	5.0800	5.00
4.50	36	56	A	1	127	100	16/5	14/16	1	0.2835	0.5062	1.4173	5.6444	4.50
4.00	32	56	A	1	127	100	16/5	14/16	1	0.2520	0.4499	1.2598	6.3500	4.00
3.50	28	56	A	1	127	100	16/5	14/16	1	0.2205	0.3937	1.1024	7.2571	3.50
3.00	48	56	B	1	127	100	8/5	14/16	1	0.3780	0.6749	0.9449	8.4667	3.00
2.75	44	56	B	1	127	100	8/5	14/16	1	0.3465	0.6187	0.8661	9.2364	2.75
2.50	40	56	B	1	127	100	8/5	14/16	1	0.3150	0.5624	0.7874	10.1600	2.50
2.25	36	56	B	1	127	100	8/5	14/16	1	0.2835	0.5062	0.7087	11.2889	2.25
2.00	32	56	B	1	127	100	8/5	14/16	1	0.2520	0.4499	0.6299	12.7000	2.00
1.75	28	56	B	1	127	100	8/5	14/16	1	0.2205	0.3937	0.5512	14.5143	1.75
1.50	48	56	C	1	127	100	4/5	14/16	1	0.3780	0.6749	0.4724	16.9333	1.50
1.40	28	56	B	3	127	100	8/5	14/20	1	0.2205	0.3937	0.4409	18.1429	1.40
1.30	26	56	B	3	127	100	8/5	14/20	1	0.2047	0.3656	0.4094	19.5385	1.30
1.25	40	56	C	1	127	100	4/5	14/16	1	0.3150	0.5624	0.3937	20.3200	1.25
1.20	48	56	C	3	127	100	4/5	14/20	1	0.3780	0.6749	0.3780	21.1667	1.20
1.10	44	56	C	3	127	100	4/5	14/20	1	0.3465	0.6187	0.3465	23.0909	1.10
1.00	32	56	C	1	127	100	4/5	14/16	1	0.2520	0.4499	0.3150	25.4000	1.00
0.90	36	56	C	3	127	100	4/5	14/20	1	0.2835	0.5062	0.2835	28.2222	0.90
0.80	32	56	C	3	127	100	4/5	14/20	1	0.2520	0.4499	0.2520	31.7500	0.80
0.75	48	56	D	1	127	100	2/5	14/16	1	0.3780	0.6749	0.2362	33.8667	0.75
0.70	28	56	C	3	127	100	4/5	14/20	1	0.2205	0.3937	0.2205	36.2857	0.70
0.65	26	56	C	3	127	100	4/5	14/20	1	0.2047	0.3656	0.2047	39.0769	0.65
0.60	48	56	D	3	127	100	2/5	14/20	1	0.3780	0.6749	0.1890	42.3333	0.60
0.55	44	56	D	3	127	100	2/5	14/20	1	0.3465	0.6187	0.1732	46.1818	0.55
0.50	32	56	D	1	127	100	2/5	14/16	1	0.2520	0.4499	0.1575	50.8000	0.50
0.45	36	56	D	3	127	100	2/5	14/20	1	0.2835	0.5062	0.1417	56.4444	0.45
0.40	32	56	D	3	127	100	2/5	14/20	1	0.2520	0.4499	0.1260	63.5000	0.40
0.35	28	56	D	3	127	100	2/5	14/20	1	0.2205	0.3937	0.1102	72.5714	0.35
0.30	48	56	E	3	127	100	1/5	14/20	1	0.3780	0.6749	0.0945	84.6667	0.30
0.25	32	56	E	1	127	100	1/5	14/16	1	0.2520	0.4499	0.0787	101.6000	0.25
0.20	32	56	E	3	127	100	1/5	14/20	1	0.2520	0.4499	0.0630	127.0000	0.20

9 or 10K Model A - English Lead Screw (1/8" pitch) - With Metric Transposing Gear

Item	Rev. per Spindle Rev.	Example - Rev. per Spindle Rev. @ 6 M/M
Stud Gear	Spindle x 1	= 1
Gear 1	Stud Gear x N_{Stud} / N_{1in}	1 x 48 / 127 = 0.3780...
Screw Gear	Gear 1 x N_{1out} / N_{ScrG}	0.3780... x 100 / 56 = 0.6749...
Lead Screw	Screw Gear x $N_{LH} \times N_{RH}$	0.6749... x 16/5 x 14/16 = 1.8898...
Motion of Carriage	Spindle Rev. / Inch or M/M / Rev.	Spindle Rev. / Inch or M/M / Rev.
	Rev./In. = 1 / Lead Screw x 8	1 / 1.8898... x 8 = 4.2333... Rev./In.
	M/M / Rev. = 25.4 / (Rev./In.)	25.4 / 4.2333... = 6.00 M/M / Rev.

Gear Set	
26	
28	
32	
36	
40	
44	
48	
56	
100/127	Compound

Power Longitudinal Feed Rates - 9 or 10K Model A - English QC Gear Box

SBL Chart					Gear 1		QC Gearbox		Rev / Spindle Rev					Inches / Spindle Rev.
Feeds Inches	Stud Gear	Screw Gear	LH Plunger	RH Plunger	In	Out	LH Tumbler	RH Tumbler	Stud Gear	Gear 1	Screw Gear	Lead Screw	Pinion Gear	Carriage
0.0853	40	56	A	1	80	80	16/5	14/16	1	0.5	0.7143	2.0000	0.02713	0.08524
0.0758	40	56	A	2	80	80	16/5	14/18	1	0.5	0.7143	1.7778	0.02412	0.07577
0.0683	40	56	A	3	80	80	16/5	14/20	1	0.5	0.7143	1.6000	0.02171	0.06819
0.0621	40	56	A	4	80	80	16/5	14/22	1	0.5	0.7143	1.4545	0.01973	0.06199
0.0594	40	56	A	5	80	80	16/5	14/23	1	0.5	0.7143	1.3913	0.01887	0.05930
0.0569	40	56	A	6	80	80	16/5	14/24	1	0.5	0.7143	1.3333	0.01809	0.05682
0.0525	40	56	A	7	80	80	16/5	14/26	1	0.5	0.7143	1.2308	0.01670	0.05245
0.0488	40	56	A	8	80	80	16/5	14/28	1	0.5	0.7143	1.1429	0.01550	0.04871
0.0427	20	56	A	1	80	80	16/5	14/16	1	0.25	0.3571	1.0000	0.01357	0.04262
0.0379	20	56	A	2	80	80	16/5	14/18	1	0.25	0.3571	0.8889	0.01206	0.03788
0.0341	20	56	A	3	80	80	16/5	14/20	1	0.25	0.3571	0.8000	0.01085	0.03409
0.0310	20	56	A	4	80	80	16/5	14/22	1	0.25	0.3571	0.7273	0.00987	0.03100
0.0297	20	56	A	5	80	80	16/5	14/23	1	0.25	0.3571	0.6957	0.00944	0.02965
0.0284	20	56	A	6	80	80	16/5	14/24	1	0.25	0.3571	0.6667	0.00904	0.02841
0.0263	20	56	A	7	80	80	16/5	14/26	1	0.25	0.3571	0.6154	0.00835	0.02623
0.0244	20	56	A	8	80	80	16/5	14/28	1	0.25	0.3571	0.5714	0.00775	0.02435
0.0213	20	56	B	1	80	80	8/5	14/16	1	0.25	0.3571	0.5000	0.00678	0.02131
0.0190	20	56	B	2	80	80	8/5	14/18	1	0.25	0.3571	0.4444	0.00603	0.01894
0.0171	20	56	B	3	80	80	8/5	14/20	1	0.25	0.3571	0.4000	0.00543	0.01705
0.0155	20	56	B	4	80	80	8/5	14/22	1	0.25	0.3571	0.3636	0.00493	0.01550
0.0148	20	56	B	5	80	80	8/5	14/23	1	0.25	0.3571	0.3478	0.00472	0.01482
0.0142	20	56	B	6	80	80	8/5	14/24	1	0.25	0.3571	0.3333	0.00452	0.01421
0.0131	20	56	B	7	80	80	8/5	14/26	1	0.25	0.3571	0.3077	0.00417	0.01311
0.0122	20	56	B	8	80	80	8/5	14/28	1	0.25	0.3571	0.2857	0.00388	0.01218
0.0107	20	56	C	1	80	80	4/5	14/16	1	0.25	0.3571	0.2500	0.00339	0.01065
0.0095	20	56	C	2	80	80	4/5	14/18	1	0.25	0.3571	0.2222	0.00301	0.00947
0.0085	20	56	C	3	80	80	4/5	14/20	1	0.25	0.3571	0.2000	0.00271	0.00852
0.0078	20	56	C	4	80	80	4/5	14/22	1	0.25	0.3571	0.1818	0.00247	0.00775
0.0074	20	56	C	5	80	80	4/5	14/23	1	0.25	0.3571	0.1739	0.00236	0.00741
0.0071	20	56	C	6	80	80	4/5	14/24	1	0.25	0.3571	0.1667	0.00226	0.00710
0.0066	20	56	C	7	80	80	4/5	14/26	1	0.25	0.3571	0.1538	0.00209	0.00656
0.0061	20	56	C	8	80	80	4/5	14/28	1	0.25	0.3571	0.1429	0.00194	0.00609

Power Longitudinal Feed Rates - 9 or 10K Model A - English QC Gear Box

SBL Chart					Gear 1		QC Gearbox		Rev / Spindle Rev					Inches / Spindle Rev.
Feeds Inches	Stud Gear	Screw Gear	LH Plunger	RH Plunger	In	Out	LH Tumbler	RH Tumbler	Stud Gear	Gear 1	Screw Gear	Lead Screw	Pinion Gear	Carriage
0.0053	20	56	D	1	80	80	2/5	14/16	1	0.25	0.3571	0.1250	0.00170	0.00533
0.0047	20	56	D	2	80	80	2/5	14/18	1	0.25	0.3571	0.1111	0.00151	0.00474
0.0043	20	56	D	3	80	80	2/5	14/20	1	0.25	0.3571	0.1000	0.00136	0.00426
0.0039	20	56	D	4	80	80	2/5	14/22	1	0.25	0.3571	0.0909	0.00123	0.00387
0.0037	20	56	D	5	80	80	2/5	14/23	1	0.25	0.3571	0.0870	0.00118	0.00371
0.0036	20	56	D	6	80	80	2/5	14/24	1	0.25	0.3571	0.0833	0.00113	0.00355
0.0033	20	56	D	7	80	80	2/5	14/26	1	0.25	0.3571	0.0769	0.00104	0.00328
0.0030	20	56	D	8	80	80	2/5	14/28	1	0.25	0.3571	0.0714	0.00097	0.00304
0.0027	20	56	E	1	80	80	1/5	14/16	1	0.25	0.3571	0.0625	0.00085	0.00266
0.0024	20	56	E	2	80	80	1/5	14/18	1	0.25	0.3571	0.0556	0.00075	0.00237
0.0021	20	56	E	3	80	80	1/5	14/20	1	0.25	0.3571	0.0500	0.00068	0.00213
0.0019	20	56	E	4	80	80	1/5	14/22	1	0.25	0.3571	0.0455	0.00062	0.00194
0.0019	20	56	E	5	80	80	1/5	14/23	1	0.25	0.3571	0.0435	0.00059	0.00185
0.0018	20	56	E	6	80	80	1/5	14/24	1	0.25	0.3571	0.0417	0.00057	0.00178
0.0016	20	56	E	7	80	80	1/5	14/26	1	0.25	0.3571	0.0385	0.00052	0.00164
0.0015	20	56	E	8	80	80	1/5	14/28	1	0.25	0.3571	0.0357	0.00048	0.00152

Item	Rev. per Spindle Rev.	Example - Rev. per Spindle Rev. @ 4 TPI
Stud Gear	= 1	= 1
Gear 1	$(\text{Stud Gear}) \times N_{\text{Stud}} / N_{1_{\text{in}}}$	$1 \times 40 / 80 = 0.50$
Screw Gear	$(\text{Gear 1}) \times N_{1_{\text{out}}} / N_{\text{ScrG}}$	$0.50 \times 80 / 56 = 0.7143...$
Lead Screw	$(\text{Screw Gear}) \times N_{\text{LH}} \times N_{\text{RH}}$	$0.7143... \times 16/5 \times 14/16 = 2.000$
Pinion Gear	$(\text{Lead Screw}) / 36 \times 21/43$	$2.000 / 36 \times 21/43 = 0.02713...$
Motion of Carriage	Inches / Spindle Rev.	Inches / Spindle Rev.
	$(\text{Pinion Gear}) \times 14 \times \text{Pi} / 14$	$0.02713... \times 14 \times \text{Pi} / 14 = 0.08524...$

Gear Set	
20	
40	
56	
80	Idler

Power Cross Feed Rates - 9 or 10K Model A - English QC Gear Box & 1/10" pitch Cross Feed Screw

As Implied by SBL Chart (= 0.3 x Corresponding Long. Feed)					Gear 1		QC Gearbox		Rev. / Spindle Rev.					Inches / Spindle Rev.
Feeds Inches	Stud Gear	Screw Gear	LH Plunger	RH Plunger	In	Out	LH Tumbler	RH Tumbler	Stud Gear	Gear 1	Screw Gear	Lead Screw	Cross Feed Screw	Compound Rest
0.0256	40	56	A	1	80	80	16/5	14/16	1	0.5	0.7143	2.0000	0.2519	0.02519
0.0227	40	56	A	2	80	80	16/5	14/18	1	0.5	0.7143	1.7778	0.2239	0.02239
0.0205	40	56	A	3	80	80	16/5	14/20	1	0.5	0.7143	1.6000	0.2015	0.02015
0.0186	40	56	A	4	80	80	16/5	14/22	1	0.5	0.7143	1.4545	0.1832	0.01832
0.0178	40	56	A	5	80	80	16/5	14/23	1	0.5	0.7143	1.3913	0.1752	0.01752
0.0171	40	56	A	6	80	80	16/5	14/24	1	0.5	0.7143	1.3333	0.1679	0.01679
0.0158	40	56	A	7	80	80	16/5	14/26	1	0.5	0.7143	1.2308	0.1550	0.01550
0.0147	40	56	A	8	80	80	16/5	14/28	1	0.5	0.7143	1.1429	0.1439	0.01439
0.0128	20	56	A	1	80	80	16/5	14/16	1	0.25	0.3571	1.0000	0.1259	0.01259
0.0114	20	56	A	2	80	80	16/5	14/18	1	0.25	0.3571	0.8889	0.1120	0.01120
0.0102	20	56	A	3	80	80	16/5	14/20	1	0.25	0.3571	0.8000	0.1008	0.01008
0.0093	20	56	A	4	80	80	16/5	14/22	1	0.25	0.3571	0.7273	0.0916	0.00916
0.0089	20	56	A	5	80	80	16/5	14/23	1	0.25	0.3571	0.6957	0.0876	0.00876
0.0085	20	56	A	6	80	80	16/5	14/24	1	0.25	0.3571	0.6667	0.0840	0.00840
0.0079	20	56	A	7	80	80	16/5	14/26	1	0.25	0.3571	0.6154	0.0775	0.00775
0.0073	20	56	A	8	80	80	16/5	14/28	1	0.25	0.3571	0.5714	0.0720	0.00720
0.0064	20	56	B	1	80	80	8/5	14/16	1	0.25	0.3571	0.5000	0.0630	0.00630
0.0057	20	56	B	2	80	80	8/5	14/18	1	0.25	0.3571	0.4444	0.0560	0.00560
0.0051	20	56	B	3	80	80	8/5	14/20	1	0.25	0.3571	0.4000	0.0504	0.00504
0.0047	20	56	B	4	80	80	8/5	14/22	1	0.25	0.3571	0.3636	0.0458	0.00458
0.0044	20	56	B	5	80	80	8/5	14/23	1	0.25	0.3571	0.3478	0.0438	0.00438
0.0043	20	56	B	6	80	80	8/5	14/24	1	0.25	0.3571	0.3333	0.0420	0.00420
0.0039	20	56	B	7	80	80	8/5	14/26	1	0.25	0.3571	0.3077	0.0388	0.00388
0.0037	20	56	B	8	80	80	8/5	14/28	1	0.25	0.3571	0.2857	0.0360	0.00360
0.0032	20	56	C	1	80	80	4/5	14/16	1	0.25	0.3571	0.2500	0.0315	0.00315
0.0029	20	56	C	2	80	80	4/5	14/18	1	0.25	0.3571	0.2222	0.0280	0.00280
0.0026	20	56	C	3	80	80	4/5	14/20	1	0.25	0.3571	0.2000	0.0252	0.00252
0.0023	20	56	C	4	80	80	4/5	14/22	1	0.25	0.3571	0.1818	0.0229	0.00229
0.0022	20	56	C	5	80	80	4/5	14/23	1	0.25	0.3571	0.1739	0.0219	0.00219
0.0021	20	56	C	6	80	80	4/5	14/24	1	0.25	0.3571	0.1667	0.0210	0.00210
0.0020	20	56	C	7	80	80	4/5	14/26	1	0.25	0.3571	0.1538	0.0194	0.00194
0.0018	20	56	C	8	80	80	4/5	14/28	1	0.25	0.3571	0.1429	0.0180	0.00180

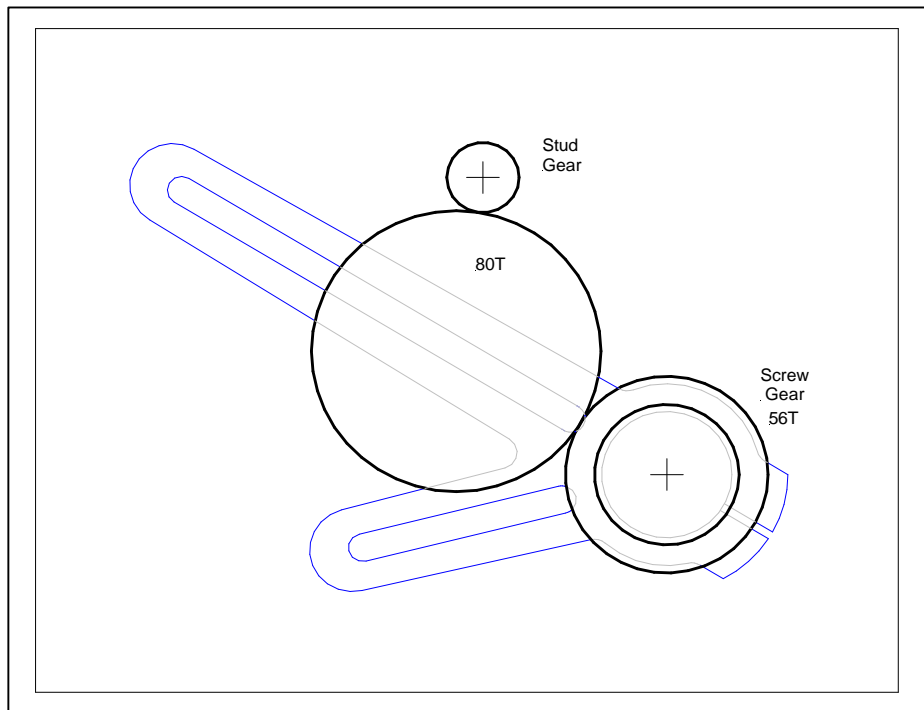
Power Cross Feed Rates - 9 or 10K Model A - English QC Gear Box & 1/10" pitch Cross Feed Screw

As Implied by SBL Chart (= 0.3 x Corresponding Long. Feed)					Gear 1		QC Gearbox		Rev. / Spindle Rev.					Inches / Spindle Rev.
Feeds Inches	Stud Gear	Screw Gear	LH Plunger	RH Plunger	In	Out	LH Tumbler	RH Tumbler	Stud Gear	Gear 1	Screw Gear	Lead Screw	Cross Feed Screw	Compound Rest
0.0016	20	56	D	1	80	80	2/5	14/16	1	0.25	0.3571	0.1250	0.0157	0.00157
0.0014	20	56	D	2	80	80	2/5	14/18	1	0.25	0.3571	0.1111	0.0140	0.00140
0.0013	20	56	D	3	80	80	2/5	14/20	1	0.25	0.3571	0.1000	0.0126	0.00126
0.0012	20	56	D	4	80	80	2/5	14/22	1	0.25	0.3571	0.0909	0.0114	0.00114
0.0011	20	56	D	5	80	80	2/5	14/23	1	0.25	0.3571	0.0870	0.0110	0.00110
0.0011	20	56	D	6	80	80	2/5	14/24	1	0.25	0.3571	0.0833	0.0105	0.00105
0.0010	20	56	D	7	80	80	2/5	14/26	1	0.25	0.3571	0.0769	0.0097	0.00097
0.0009	20	56	D	8	80	80	2/5	14/28	1	0.25	0.3571	0.0714	0.0090	0.00090
0.0008	20	56	E	1	80	80	1/5	14/16	1	0.25	0.3571	0.0625	0.0079	0.00079
0.0007	20	56	E	2	80	80	1/5	14/18	1	0.25	0.3571	0.0556	0.0070	0.00070
0.0006	20	56	E	3	80	80	1/5	14/20	1	0.25	0.3571	0.0500	0.0063	0.00063
0.0006	20	56	E	4	80	80	1/5	14/22	1	0.25	0.3571	0.0455	0.0057	0.00057
0.0006	20	56	E	5	80	80	1/5	14/23	1	0.25	0.3571	0.0435	0.0055	0.00055
0.0005	20	56	E	6	80	80	1/5	14/24	1	0.25	0.3571	0.0417	0.0052	0.00052
0.0005	20	56	E	7	80	80	1/5	14/26	1	0.25	0.3571	0.0385	0.0048	0.00048
0.0005	20	56	E	8	80	80	1/5	14/28	1	0.25	0.3571	0.0357	0.0045	0.00045

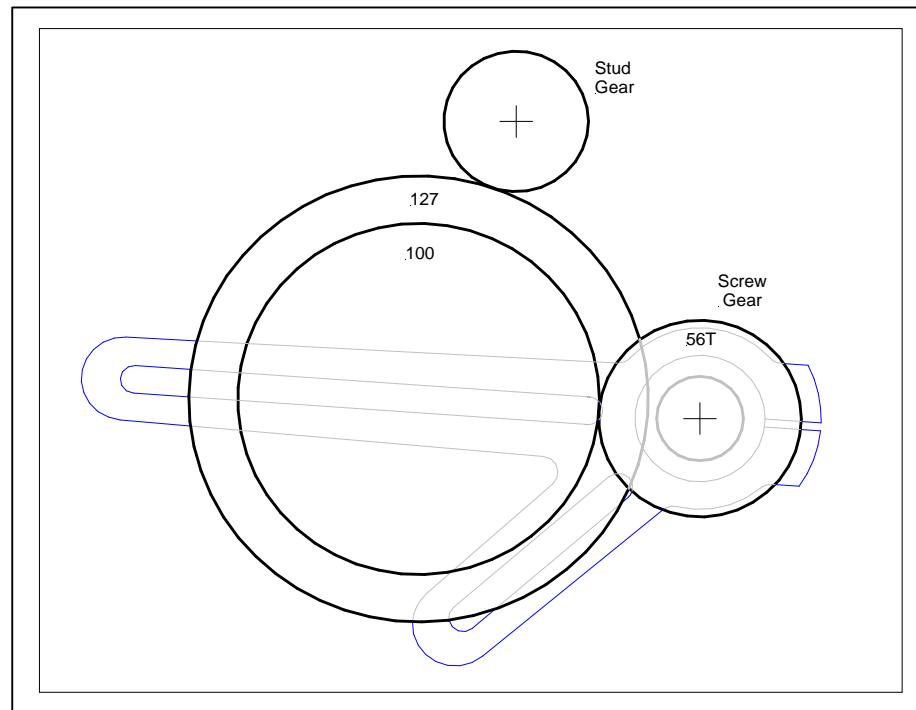
Item	Rev. per Spindle Rev.	Example - Rev. per Spindle Rev. @ 4 TPI
Stud Gear	= 1	= 1
Gear 1	$(\text{Stud Gear}) \times N_{\text{Stud}} / N_{1\text{in}}$	$1 \times 40 / 80 = 0.50$
Screw Gear	$(\text{Gear 1}) \times N_{1\text{out}} / N_{\text{ScrG}}$	$0.50 \times 80 / 56 = 0.7143...$
Lead Screw	$(\text{Screw Gear}) \times N_{\text{LH}} \times N_{\text{RH}}$	$0.7143... \times 16/5 \times 14/16 = 2.000$
Cross Feed Screw	$(\text{Lead Screw}) / 36 \times 21/22 \times 57/12$	$2.000 / 36 \times 21/22 \times 57/12 = 0.2519...$
Cross Feed Motion	Inches / Spindle Rev.	Inches / Spindle Rev.
	$(\text{Cross Feed Screw}) \times 0.1$	$0.2519... \times 0.1 = 0.0252...$

Gear Set	
20	
40	
56	
80	Idler

9 or 10K Model A - English QC Gear Box

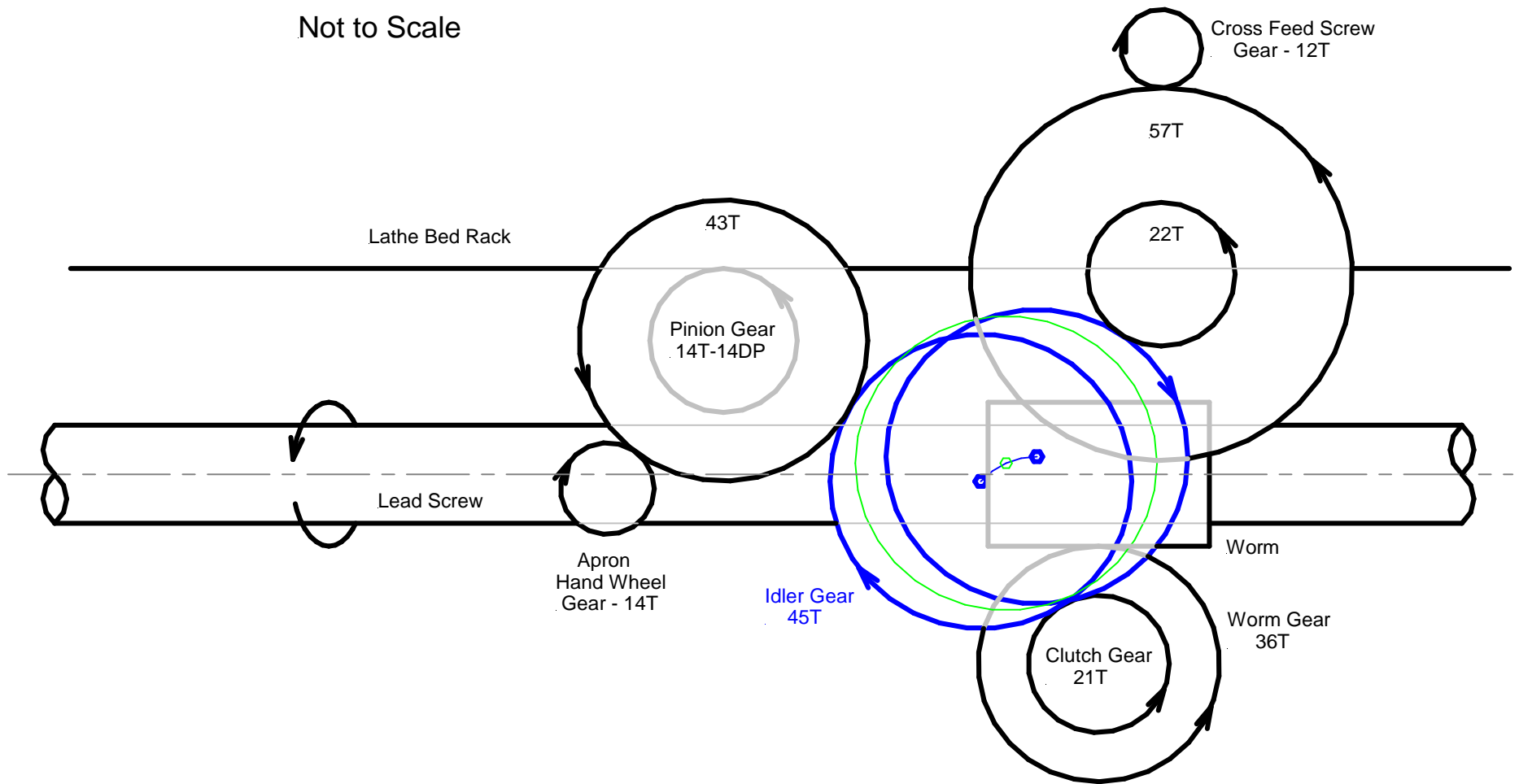


9 or 10K Model A - English - With Metric Transposing Gear



Apron Gearing for all South Bend 9" & 10K Models A & B

Not to Scale



Note: All gears are drawn as 22 Dia. Pitch., except for the Pinion Gear which is 14.