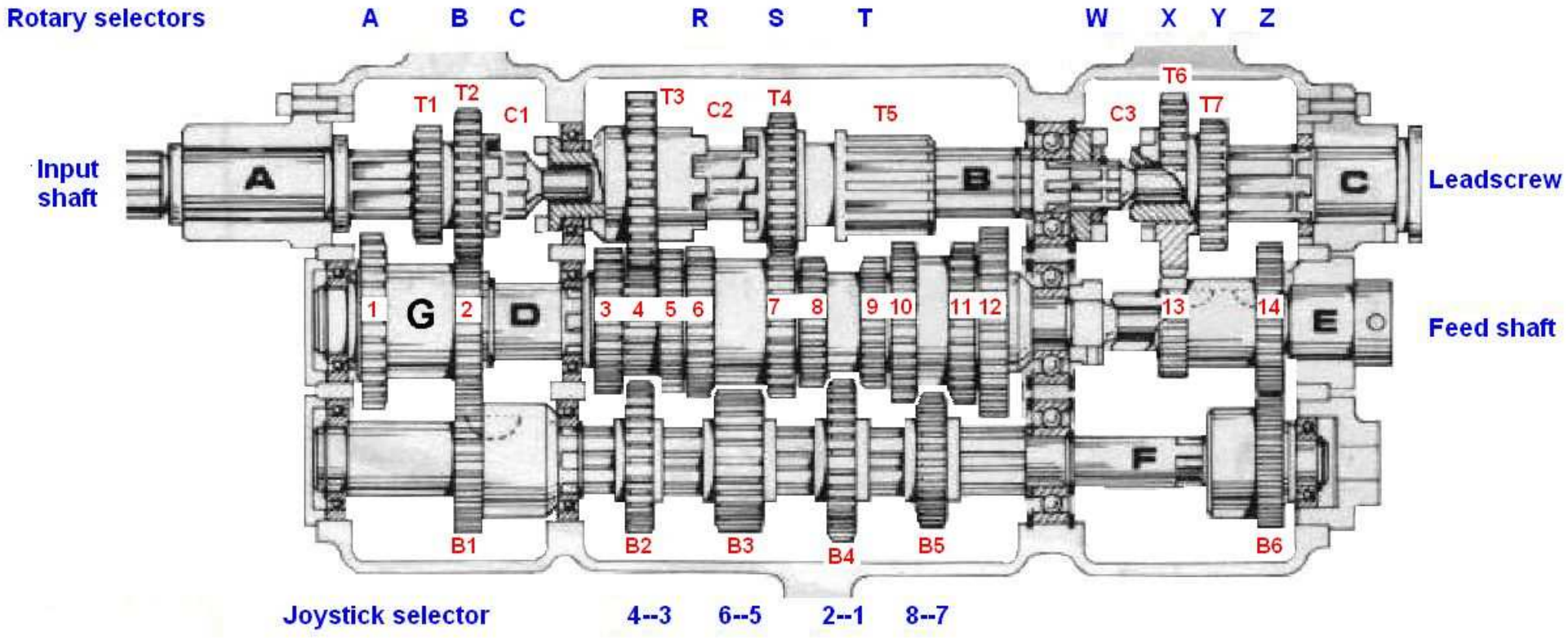
Colchester Triumph 2000 gearbox

With notes on variations for Students 1800 & 3100, Master 2500, Mascott 1600 and Mastiff 1400



Number of teeth on gears														
Gear number on level	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Top level – prefixed T	19	19	32	23	16	35	35							
Middle level – no prefix	30	20	22	16	20	24	23	27	24	28	26	32	18	45
Bottom level – prefixed B	22	22	22	33	22	36								

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Please send any comments or corrections to bob@chainganger.co.uk

Input to the gearbox
The input shaft, A, of the gearbox is driven from an output shaft in the headstock (labelled B in the parts section of the Colchester manual) via gears mounted on the swing frame. That shaft rotates 0.5 revs per main spindle rev with the LR selector in the L position or 2 revs per spindle rev in the H position. It can reversed, for left hand threading, by the control lever immediately below the LR selector.
The standard gears supplied with the lathe for mounting on the swing frame can be configured either for screwcutting and feeds or DP and Mod
The gear arrangements of the metric leadscrew machines differ from those of the imperial model so that the same gearbox can but used by both types of leadscrew.

Mode	Imperial leadscrew machine			Metric leadscrew machine		
	Swing frame gears	H/L selector	Shaft A:Spindle	Swing frame gears	H/L selector	Shaft A:Spindle
Screwcutting & feeding	(24x56)/(56x57)	H	0.8421:1	(28x55)/(64x54)	H	0.8912:1
		L	0.2105:1		L	0.2228:1
Mod & DP	(24x44)/(56x57)	H	0.6617:1	(22x55)/(64x54)	H	0.7002:1
		L	0.1654:1		L	0.1751:1

There are 6 independent shafts in the gearbox labelled A to F as shown in the diagram.
C is coupled to the leadscrew using a shear pin
E drives the feed shaft

With the following exceptions all gears are splined or keywayed to their shafts.
Exception 1. Gear T3 and left element of clutch C2 is free to run on shaft B.
Exception 2 The cluster comprising Gears 1 & 2 (labelled G) is free to run on shaft D.

Constant mesh gears.
T3(32t) and 4(16t) D = 2xB
2(20t) and B1(22t) F = 0.9091xG
B6(36t) and 14(45t) E = 0.8xG
Also see Note 1.

Selector ABC
Slides cluster comprising gears T1 and T2 and left element of clutch C1 on shaft A.
Position A: T1(19t) meshes with 1(30t) G = 0.6333xA F = 0..9091xG so F = 0.5758xA and E = 0.4605xA
Position B: T2(19t) meshes with 2(19t) G = 0.95xA so F = 0.8636xA and E = 0.6909xA
Position C: Clutch C1 engaged B = A

Selector RST
Slides cluster comprising right element of clutch C2 and gears T4 & T5 on shaft B – See note 1.
Position R: C2 engaged D = 2xA
Position S: T4(23t) meshes with 7(23t) D = A
Position T; T5(16t) meshes with 12(32t) D = 0.5xA

Selector WXYZ
Slides cluster comprising right element of clutch C3 and gears T6 & T7 on shaft C.
Position W: C3 engaged. C = B
Position X: T6(35t) meshes with 13(18t) C = 0.5143xE so C = 0.4114xF
Position Y: No engagement (leadscrew is undriven)
Position Z: T7(35t) meshes with 14(45t) C = 1.2587xE so C = 1.2086xF

8 speed joystick (Gate selector)
The mechanism moves one of the splined gears B2, B3, B4 or B5 on shaft F. For odd numbered speed positions the relevant gear is slid to the right and for evens to the left.

Position	Gear on shaft D	Gear on shaft F	Ratio F:D	Ratio relative to position 1
1	9(24t)	B4(33t)	0.7273	1
2	8(27t)	B4(33t)	0.8182	1.125
3	5(20t)	B2(22t)	0.9091	1.250
4	3(22t)	B2(22t)	1.0000	1.375
5	7(23t)	B3(22t)	1.0455	1.4375
6	6(24t)	B3(22t)	1.0909	1.5
7	11(26t)	B5(22t)	1.1818	1.625
8	10(28t)	B5(22t)	1.2727	1.75

Note that gears on shaft F drive those on shaft D for Imperial and feed modes but D drives F in metric mode.

Leadscrew. Pitch is 0.25” for the Imperial version or 6mm for the metric model.

Feed travels

Saddle travel (sliding) is 0.025” per rev of the feed shaft for the imperial version and, as far as I am aware, that also applies to metric models.
Cross slide travel (surfacing) is half of saddle travel.

Note 1. I have two manuals for the T2000. For both of them the page titled GEARBOX : GEARS is from serial no. 00001 but there is a difference in the arrangement of gears T4 and T5. In the one described above T4 & T5 are a sliding cluster. In the other manual T4 and T5 engage each other with an additional dog clutch and T5 is fixed to the right on shaft B and is in permanent engagement with gear 12. They are functionally identical in terms of gear ratios.

Metric screwcuting and Mod

The path through the gearbox is the same for both: the only difference between them is the arrangement of the gears on the swing frame.

Selector ABC is always in the C position so shaft B rotates with shaft A.
Shaft D is driven from shaft B (and A) by gear pairs T3 & 4, T4 & 7 or T5 &12 as selected by lever RST.
Shaft F is driven from shaft D by one pair of gears selected by the joystick.
Shaft E (and the feed shaft) is driven by shaft F via the constant mesh gears B6 & 14.
Shaft C and the leadscrew are driven from shaft E by gear pair 13 & T6 when the WXYZ selector is in the X position or gear 14 & T7 in the Z position.
Cluster G is driven from shaft F but doesn’t perform any drive function.

Imperial screwcuting and D.P.

The path through the gearbox is the same for both: the only difference between them is the arrangement of the gears on the swing frame.

Selector WXYZ is always in the W position so shaft C is directly coupled to shaft B by clutch C3.

19TPI & D.P. of 19 are a special case. In this instance selector ABC is in the C position engaging clutch C1 so output shaft C is driven directly by the input shaft: all other elements are idlers.
For all other pitches :-
Cluster G is driven from shaft A by gear pair T1 & 1 when the ABC selector is in the A position or T2 & 2 when in the B position.
Shaft F is driven from cluster G by the constant mesh pair 2 & G1.
Although shaft E (and the feed shaft) is driven by constant mesh pair B6 & 14 it performs no intended function as the gears on it are not engaged with those on shaft C as selector WXYZ is always in the W position.
Shaft D is driven from shaft F by one pair of gears selected by the joystick.
Shaft B, shaft C and the leadscrew are driven from shaft D by gear pairs T3 & 4, T4 & 7 or T5 &12 as selected by lever RST.

Screwcutting tables

The following two pages list the screwcutting pitches in mm and TPI for all combinations of the selector settings using the standard gears on the swing frame.
Table 1 is applies with the normal arrangement of gears on the swing frame and table 2 covers the gears arranged for the DP/MOD setting.
The first character is 'H' or 'L' is for the position of the H/L selector.
The second is 'A', 'B' or 'C', the third is 'R', 'S' or 'T' and the fourth is 'W', 'X', 'Y' or 'Z' for the respectively marked controls.
The final character is for the position of the joystick. Where shown as 0, the joystick should be in the neutral position but no damage will occur if is in any numbered position.
Some pitches have alternate control settings. These are listed in case you want to avoid using a particular gear.

PLEASE DO A DRY RUN BEFORE CUTTING METAL TO CHECK IF THE TABLE DATA IS CORRECT

Screwcutting pitch errors

Because of the lack of a 127 tooth gear in the train, there is a constant, but trivial, error in metric pitches on imperial leadscrew machine or imperial pitches on metric models.
Metric pitches on an imperial machine are 0.0027% oversize e.g. an error of 0.004mm on 150mm of screwed length.
Imperial pitches are 0.0027% undersize e.g. an error of 0.00016" on 6" screwed length.

Students 1800 &3100, Master 2500, Mascott 1600 and Mastiff 1400

It seems very probable that their gearboxes function in much the same manner as the T2000 except that the Students and Master have a 5 position selector labelled VWXYZ instead of the 4 position lever of the T2000. The three larger machines have an additional headstock control, labelled H/L, either concentric (Mascot & Mastiff) with the LH/RH thread selector or just below it for the Triumph. In the H position the gearbox input shaft is driven at 4 times the speed of that when in the L position. In the case of the S1800 (and probably the S3100 & M2500) similar H & L functions are achieved by changing gears on the swing frame.

Screwcutting table page 1 (With normal gears fitted to swing frame)

TPI	Selectors	mm	TPI	Selectors	mm	TPI	Selectors	mm	TPI	Selectors	Mm	TPI	Selectors	Mm
127.0	LCTX1	0.200	34.50	LASW5	0.736	18.14	LCRX8	1.400	10.50	HASW8	2.419	5.347	HBRZ0	4.750
112.9	LCTX2	0.225	33.87	LCTZ6	0.750	18.14	HCTX8	1.400	10.16	HCTZ3	2.500	5.292	HCRX6	4.800
101.6	LCTX3	0.250	33.00	LASW4	0.770	18.00	LATW6	1.411	10.16	LCRZ3	2.500	5.250	HATW8	4.838
92.36	LCTX4	0.275	32.08	LARZ0	0.792	18.00	HARW6	1.411	10.00	LBTW3	2.540	5.080	HCSZ3	5.000
88.35	LCTX5	0.287	32.00	LBRW1	0.794	18.00	LBSW2	1.411	10.00	HBRW3	2.540	5.000	HBSW3	5.080
84.66	LCTX6	0.300	31.75	HCTX1	0.800	17.67	LCSZ5	1.437	9.769	HCSX7	2.600	4.884	HCRX7	5.201
84.00	LARW8	0.302	31.75	LCRX1	0.800	17.25	LATW5	1.472	9.750	HASW7	2.605	4.875	HATW7	5.210
80.21	LARX0	0.317	31.26	LCTZ7	0.813	17.25	HARW5	1.472	9.236	HCTZ4	2.750	4.750	HCSW8	5.348
78.15	LCTX7	0.325	30.00	LASW3	0.847	16.93	LCSZ6	1.500	9.236	LCRZ4	2.750	4.618	HCSZ4	5.500
78.00	LARW7	0.326	29.03	LCTZ8	0.875	16.50	LATW4	1.539	9.071	HCSX8	2.800	4.536	HCRX8	5.600
72.57	LCTX8	0.350	28.22	LCRX2	0.900	16.50	HARW4	1.539	9.000	HBRW2	2.822	4.500	HBSW2	5.644
72.00	LARW6	0.353	28.22	HCTX2	0.900	16.00	LBSW1	1.587	9.000	HASW6	2.822	4.500	HATW6	5.644
69.00	LARW5	0.368	28.00	LBSW8	0.907	15.87	HCSX1	1.601	9.000	LBTW2	2.822	4.417	HCSZ5	5.751
66.00	LARW4	0.385	27.00	LASW2	0.941	15.63	LCSZ7	1.625	8.835	LCRZ5	2.875	4.313	HATW5	5.889
63.50	LCSX1	0.400	26.00	LBSW7	0.977	15.00	HARW3	1.693	8.835	HCTZ5	2.875	4.233	HCSZ6	6.000
60.00	LARW3	0.423	25.40	HCTX3	1.000	15.00	LATW3	1.693	8.625	HASW5	2.945	4.125	HATW4	6.158
56.44	LCSX2	0.450	25.40	LCSZ1	1.000	14.51	LCSZ8	1.751	8.466	LCRZ6	3.000	4.000	HBSW1	6.350
56.00	LBRW8	0.454	25.40	LCRX3	1.000	14.11	HCSX2	1.800	8.466	HCTZ6	3.000	3.908	HCSZ7	6.500
54.00	LARW2	0.470	24.00	LBSW6	1.058	14.00	HBRW8	1.814	8.250	HASW4	3.079	3.750	HATW3	6.773
53.47	LBRX0	0.475	24.00	LASW1	1.058	14.00	LBTW8	1.814	8.021	HARZ0	3.167	3.628	HCSZ8	7.001
52.00	LBRW7	0.488	23.09	LCRX4	1.100	13.50	LATW2	1.881	8.000	LBTW1	3.175	3.500	HBTW8	7.257
50.80	LCTZ1	0.500	23.09	HCTX4	1.100	13.50	HARW2	1.881	8.000	HBRW1	3.175	3.375	HATW2	7.526
50.80	LCSX3	0.500	23.00	LBSW5	1.104	13.37	HBRX0	1.900	7.937	HCRX1	3.200	3.250	HBTW7	7.815
48.00	LARW1	0.529	22.58	LCSZ2	1.125	13.00	HBRW7	1.954	7.815	HCTZ7	3.250	3.175	HCRZ1	8.000
48.00	LBRW6	0.529	22.09	HCTX5	1.150	13.00	LBTW7	1.954	7.815	LCRZ7	3.250	3.000	HATW1	8.467
46.18	LCSX4	0.550	22.09	LCRX5	1.150	12.70	HCSX3	2.000	7.500	HASW3	3.387	3.000	HBTW6	8.467
46.00	LBRW5	0.552	22.00	LBSW4	1.155	12.70	HCTZ1	2.000	7.257	HCTZ8	3.500	2.875	HBTW5	8.835
45.15	LCTZ2	0.563	21.39	LBRZ0	1.187	12.70	LCRZ1	2.000	7.257	LCRZ8	3.500	2.822	HCRZ2	9.001
44.17	LCSX5	0.575	21.17	HCTX6	1.200	12.00	HBRW6	2.117	7.055	HCRX2	3.600	2.750	HBTW4	9.236
44.00	LBRW4	0.577	21.17	LCRX6	1.200	12.00	HARW1	2.117	7.000	HBSW8	3.629	2.540	HCRZ3	10.00
42.33	LCSX6	0.600	21.00	HARW8	1.210	12.00	LBTW6	2.117	6.750	HASW2	3.763	2.500	HBTW3	10.16
42.00	LASW8	0.605	21.00	LATW8	1.210	12.00	LATW1	2.117	6.500	HBSW7	3.908	2.309	HCRZ4	11.00
40.64	LCTZ3	0.625	20.32	LCSZ3	1.250	11.55	HCSX4	2.199	6.350	HCSZ1	4.000	2.250	HBTW2	11.29
40.00	LBRW3	0.635	20.05	HARX0	1.267	11.50	LBTW5	2.209	6.350	HCRX3	4.000	2.209	HCRZ5	11.50
39.08	LCSX7	0.650	20.00	LBSW3	1.270	11.50	HBRW5	2.209	6.000	HBSW6	4.233	2.117	HCRZ6	12.00
39.00	LASW7	0.651	19.54	LCRX7	1.300	11.29	LCRZ2	2.250	6.000	HASW1	4.233	2.000	HBTW1	12.70
36.94	LCTZ4	0.688	19.54	HCTX7	1.300	11.29	HCTZ2	2.250	5.773	HCRX4	4.400	1.954	HCRZ7	13.00
36.28	LCSX8	0.700	19.50	LATW7	1.303	11.04	HCSX5	2.301	5.750	HBSW5	4.417	1.814	HCRZ8	14.00
36.00	LASW6	0.706	19.50	HARW7	1.303	11.00	HBRW4	2.309	5.644	HCSZ2	4.500			
36.00	LBRW2	0.706	19.00	LCSW8	1.337	11.00	LBTW4	2.309	5.522	HCRX5	4.600			
35.34	LCTZ5	0.719	18.47	LCSZ4	1.375	10.58	HCSX6	2.401	5.500	HBSW4	4.618			

Standard TPI pitches (i.e. those on the faceplate) are red and standard metric pitches are magenta

Screwcutting table page 2 (With MOD/DP gears fitted to swing frame)

TPI	Selectors	mm	TPI	Selectors	mm	TPI	Selectors	mm	TPI	Selectors	Mm	TPI	Selectors	Mm
161.6	LCTX1	0.157	43.91	LASW5	0.578	23.09	HCTX8	1.100	13.36	HASW8	1.901	6.806	HBRZ0	3.732
143.7	LCTX2	0.177	43.10	LCTZ6	0.589	23.09	LCRX8	1.100	12.93	LCRZ3	1.964	6.735	HCRX6	3.771
129.3	LCTX3	0.196	42.00	LASW4	0.605	22.91	LBSW2	1.109	12.93	HCTZ3	1.964	6.682	HATW8	3.801
117.6	LCTX4	0.216	40.83	LARZ0	0.622	22.91	LATW6	1.109	12.73	HBRW3	1.995	6.465	HCSZ3	3.929
112.4	LCTX5	0.226	40.73	LBRW1	0.624	22.91	HARW6	1.109	12.73	LBTW3	1.995	6.364	HBSW3	3.991
107.8	LCTX6	0.236	40.41	LCRX1	0.629	22.49	LCSZ5	1.129	12.43	HCSX7	2.043	6.217	HCRX7	4.086
106.9	LARW8	0.238	40.41	HCTX1	0.629	21.95	HARW5	1.157	12.41	HASW7	2.047	6.205	HATW7	4.093
102.1	LARX0	0.249	39.79	LCTZ7	0.638	21.95	LATW5	1.157	11.76	LCRZ4	2.160	6.045	HCSW8	4.200
99.47	LCTX7	0.255	38.18	LASW3	0.665	21.55	LCSZ6	1.179	11.76	HCTZ4	2.160	5.878	HCSZ4	4.321
99.27	LARW7	0.256	36.94	LCTZ8	0.688	21.00	HARW4	1.210	11.55	HCSX8	2.199	5.773	HCRX8	4.400
92.36	LCTX8	0.275	35.92	HCTX2	0.707	21.00	LATW4	1.210	11.45	LBTW2	2.218	5.727	HATW6	4.435
91.64	LARW6	0.277	35.92	LCRX2	0.707	20.36	LBSW1	1.248	11.45	HBRW2	2.218	5.727	HBSW2	4.435
87.82	LARW5	0.289	35.64	LBSW8	0.713	20.20	HCSX1	1.257	11.45	HASW6	2.218	5.622	HCSZ5	4.518
84.00	LARW4	0.302	34.36	LASW2	0.739	19.89	LCSZ7	1.277	11.24	HCTZ5	2.260	5.489	HATW5	4.627
80.82	LCSX1	0.314	33.09	LBSW7	0.768	19.09	LATW3	1.331	11.24	LCRZ5	2.260	5.388	HCSZ6	4.714
76.36	LARW3	0.333	32.33	HCTX3	0.786	19.09	HARW3	1.331	10.98	HASW5	2.313	5.250	HATW4	4.838
71.84	LCSX2	0.354	32.33	LCRX3	0.786	18.47	LCSZ8	1.375	10.78	LCRZ6	2.356	5.091	HBSW1	4.989
71.27	LBRW8	0.356	32.33	LCSZ1	0.786	17.96	HCSX2	1.414	10.78	HCTZ6	2.356	4.973	HCSZ7	5.108
68.73	LARW2	0.370	30.55	LBSW6	0.831	17.82	LBTW8	1.425	10.50	HASW4	2.419	4.773	HATW3	5.322
68.06	LBRX0	0.373	30.55	LASW1	0.831	17.82	HBRW8	1.425	10.21	HARZ0	2.488	4.618	HCSZ8	5.500
66.18	LBRW7	0.384	29.39	HCTX4	0.864	17.18	HARW2	1.478	10.18	HBRW1	2.495	4.455	HBTW8	5.701
64.65	LCTZ1	0.393	29.39	LCRX4	0.864	17.18	LATW2	1.478	10.18	LBTW1	2.495	4.295	HATW2	5.914
64.65	LCSX3	0.393	29.27	LBSW5	0.868	17.01	HBRX0	1.493	10.10	HCRX1	2.515	4.136	HBTW7	6.141
61.09	LARW1	0.416	28.73	LCSZ2	0.884	16.55	LBTW7	1.535	9.947	LCRZ7	2.554	4.041	HCRZ1	6.286
61.09	LBRW6	0.416	28.11	HCTX5	0.904	16.55	HBRW7	1.535	9.947	HCTZ7	2.554	3.818	HBTW6	6.653
58.78	LCSX4	0.432	28.11	LCRX5	0.904	16.16	HCSX3	1.572	9.545	HASW3	2.661	3.818	HATW1	6.653
58.55	LBRW5	0.434	28.00	LBSW4	0.907	16.16	LCRZ1	1.572	9.236	HCTZ8	2.750	3.659	HBTW5	6.942
57.47	LCTZ2	0.442	27.22	LBRZ0	0.933	16.16	HCTZ1	1.572	9.236	LCRZ8	2.750	3.592	HCRZ2	7.071
56.22	LCSX5	0.452	26.94	HCTX6	0.943	15.27	HBRW6	1.663	8.980	HCRX2	2.829	3.500	HBTW4	7.257
56.00	LBRW4	0.454	26.94	LCRX6	0.943	15.27	LBTW6	1.663	8.909	HBSW8	2.851	3.233	HCRZ3	7.856
53.88	LCSX6	0.471	26.73	LATW8	0.950	15.27	HARW1	1.663	8.591	HASW2	2.957	3.182	HBTW3	7.982
53.45	LASW8	0.475	26.73	HARW8	0.950	15.27	LATW1	1.663	8.273	HBSW7	3.070	2.939	HCRZ4	8.642
51.72	LCTZ3	0.491	25.86	LCSZ3	0.982	14.69	HCSX4	1.729	8.082	HCSZ1	3.143	2.864	HBTW2	8.869
50.91	LBRW3	0.499	25.52	HARX0	0.995	14.64	LBTW5	1.735	8.082	HCRX3	3.143	2.811	HCRZ5	9.036
49.73	LCSX7	0.511	25.45	LBSW3	0.998	14.64	HBRW5	1.735	7.636	HBSW6	3.326	2.694	HCRZ6	9.428
49.64	LASW7	0.512	24.87	LCRX7	1.021	14.37	HCTZ2	1.768	7.636	HASW1	3.326	2.545	HBTW1	9.980
47.02	LCTZ4	0.540	24.87	HCTX7	1.021	14.37	LCRZ2	1.768	7.347	HCRX4	3.457	2.487	HCRZ7	10.21
46.18	LCSX8	0.550	24.82	HARW7	1.023	14.05	HCSX5	1.808	7.318	HBSW5	3.471	2.309	HCRZ8	11.00
45.82	LASW6	0.554	24.82	LATW7	1.023	14.00	LBTW4	1.814	7.184	HCSZ2	3.536			
45.82	LBRW2	0.554				14.00	HBRW4	1.814	7.027	HCRX5	3.615			
44.98	LCTZ5	0.565	23.51	LCSZ4	1.080	13.47	HCSX6	1.886	7.000	HBSW4	3.629			

Feeds

Selector WXYZ is always in the Y position so there is no engagement between shaft C and any other shaft. i.e. the leadscrew is undriven.
Selector ABC is always in the C position engaging clutch C1 coupling shaft B to shaft A.
Shaft D is driven from shaft B (and A) by gear pairs T3 & 4, T4 & 7 or T5 &12 as selected by lever RST.
Shaft F is driven from shaft D by one pair of gears selected by the joystick.
Shaft E and the feed shaft are driven by shaft F via the constant mesh gears B6 & 14.

The following table shows all the available feed rates when the swing frame is fitted with the normal gear arrangement. Feeds will be reduced by about 21% of tabulated values when the swing frame is set up for DP/MOD.

The greyed out settings, with the H/L control set to H, should not be used as the H position should not be used when the spindle speed is greater than 625 rpm.

Feed table for imperial models					
mm	Y	Ins	mm	Y	ins
0.039	LCT1	0.0015	0.156	HCT1	0.0061
0.044	LCT2	0.0017	0.175	HCT2	0.0069
0.049	LCT3	0.0019	0.194	HCT3	0.0077
0.053	LCT4	0.0021	0.214	HCT4	0.0084
0.056	LCT5	0.0022	0.224	HCT5	0.0088
0.058	LCT6	0.0023	0.233	HCT6	0.0092
0.063	LCT7	0.0025	0.253	HCT7	0.0100
0.068	LCT8	0.0027	0.272	HCT8	0.0107
0.078	LCS1	0.0031	0.311	HCS1	0.0122
0.087	LCS2	0.0034	0.350	HCS2	0.0138
0.097	LCS3	0.0038	0.389	HCS3	0.0153
0.107	LCS4	0.0042	0.428	HCS4	0.0168
0.112	LCS5	0.0044	0.447	HCS5	0.0176
0.117	LCS6	0.0046	0.467	HCS6	0.0184
0.126	LCS7	0.0050	0.506	HCS7	0.0199
0.136	LCS8	0.0054	0.544	HCS8	0.0214
0.156	LCR1	0.0061	0.622	HCR1	0.0245
0.175	LCR2	0.0069	0.700	HCR2	0.0276
0.194	LCR3	0.0077	0.778	HCR3	0.0306
0.214	LCR4	0.0084	0.856	HCR4	0.0337
0.224	LCR5	0.0088	0.895	HCR5	0.0352
0.233	LCR6	0.0092	0.933	HCR6	0.0367
0.253	LCR7	0.0100	1.011	HCR7	0.0398
0.272	LCR8	0.0107	1.089	HCR8	0.0429

It is probable that feeds for metric models are about 5% greater than those shown above.