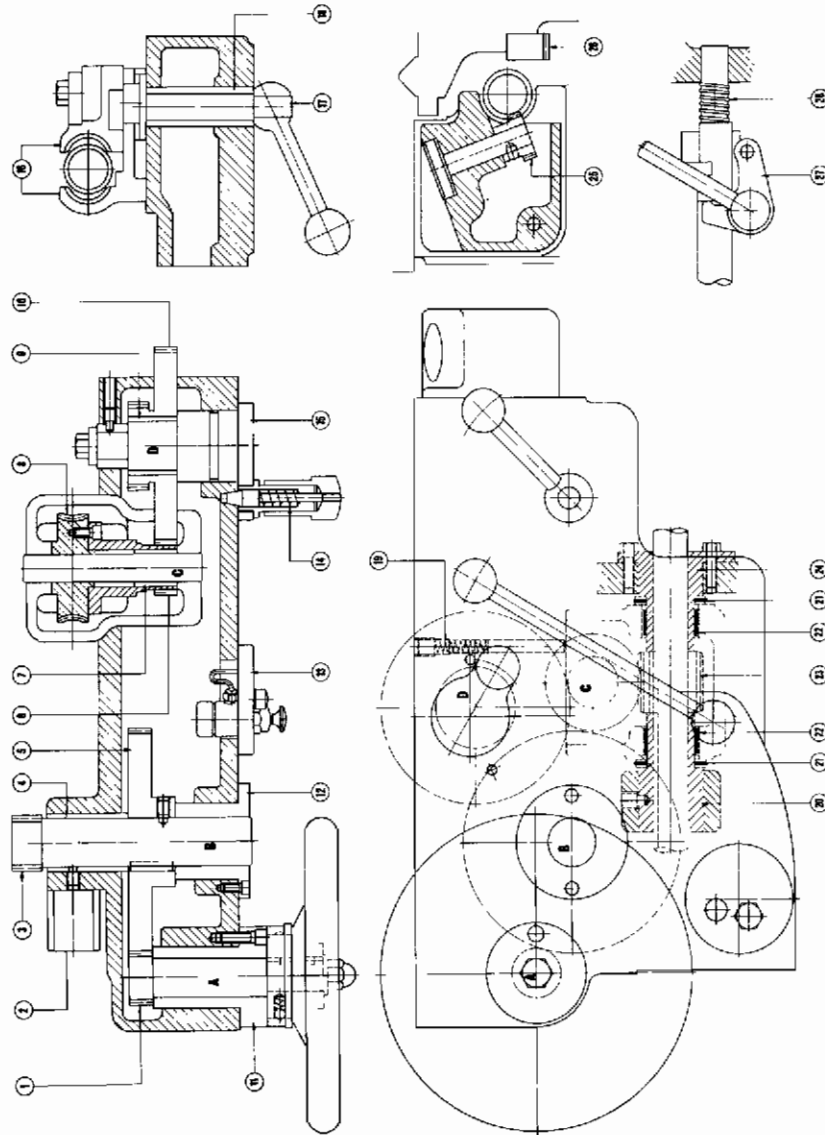


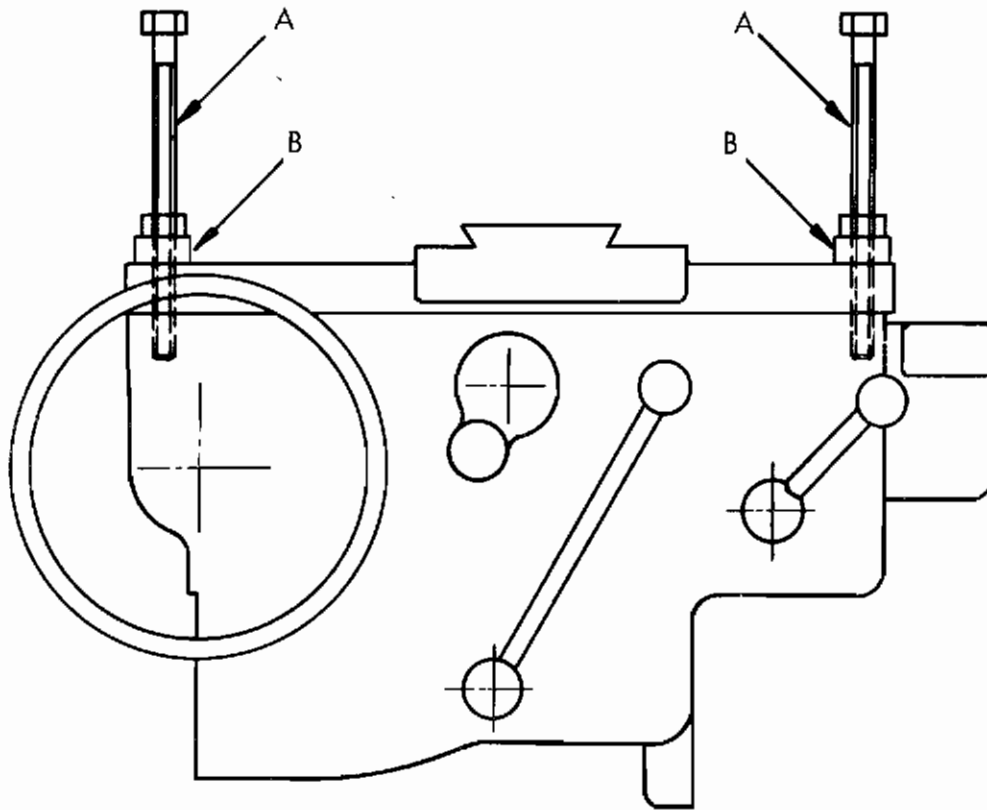
PLEASE STATE MACHINE SERIAL NUMBER, SHEET NUMBER AND ITEM NUMBER.



1. Hand Racking Shaft.
2. Leadscrew Support Bracket.
3. Rack Pinion Shaft.
4. " " Bush.
5. 88T Gear on Rack Pinion Shaft.
6. 22T Gear on Worm Wheel.
7. Bush in 22T Gear.
8. Worm Wheel.
9. Bush in Double Gear.
10. Double Gear.
11. Handwheel Bearing Bush.
12. Rack Pinion Bearing Bush.
13. 'Bijur' Oil Pump.
14. Eccentric Shaft Plunger spring.
15. Eccentric Shaft.
16. Leadscrew Nuts.
17. Leadscrew Nut operating Shaft.
18. Bush for Nut Operating Shaft.
19. Worm Box Operating Spring.
20. L.H. Feed Shaft Support Bush.
21. Torrington Thrust Brg. NTA 2233
Thrust Race JD 24295 .
22. Torrington Needle Brg. GB 2212
23. Worm.
24. R.H. Feed Shaft Support Bush.
25. Screwcutting Dial Wheel.
26. Rack.
27. Worm Box operating lever.
28. Spring on Trip Shaft.

ALL FIXING SCREWS ARE STD. WHITWORTH OR B. S. F. THREAD.

11.51 APRON ASSEMBLY



INSTRUCTIONS FOR LOWERING THE APRON.

Remove the tail end bracket.

Disconnect the leadscrew, the feed shaft and the clutch operating shaft and withdraw the shafts toward the tailstock.

To disconnect the leadscrew remove the spring pin connecting the leadscrew and socket (part No. 19. Section 11.31), remove the gearbox lid and release the allen fixing screw on the end of the leadscrew. Should difficulty be encountered in withdrawing the leadscrew from the socket, engage the leadscrew nuts and hand traverse the apron along the bed. To disconnect the feed shaft, remove the spring pin from the right hand side of the slip coupling. Section 1.3 Item 26.

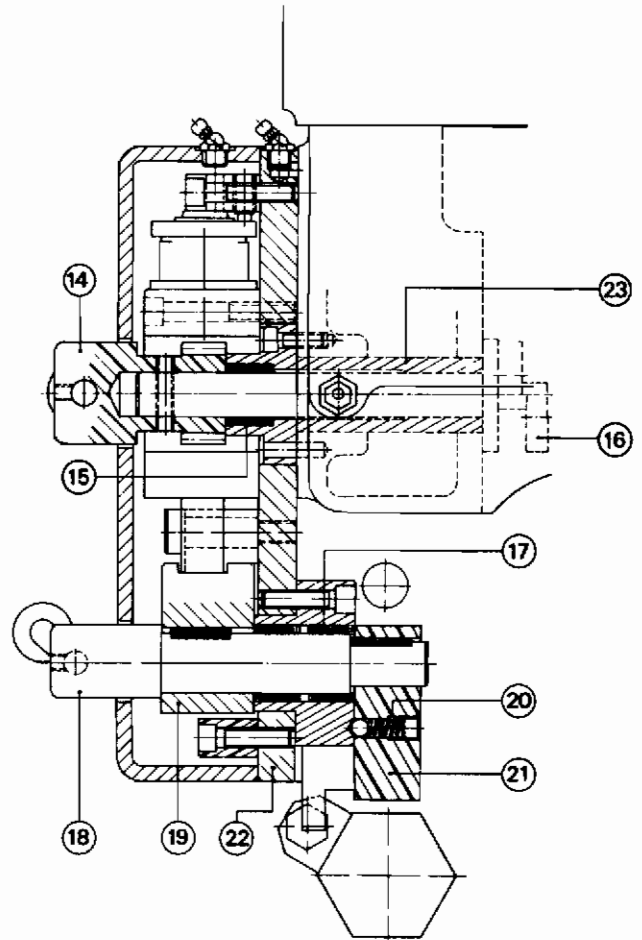
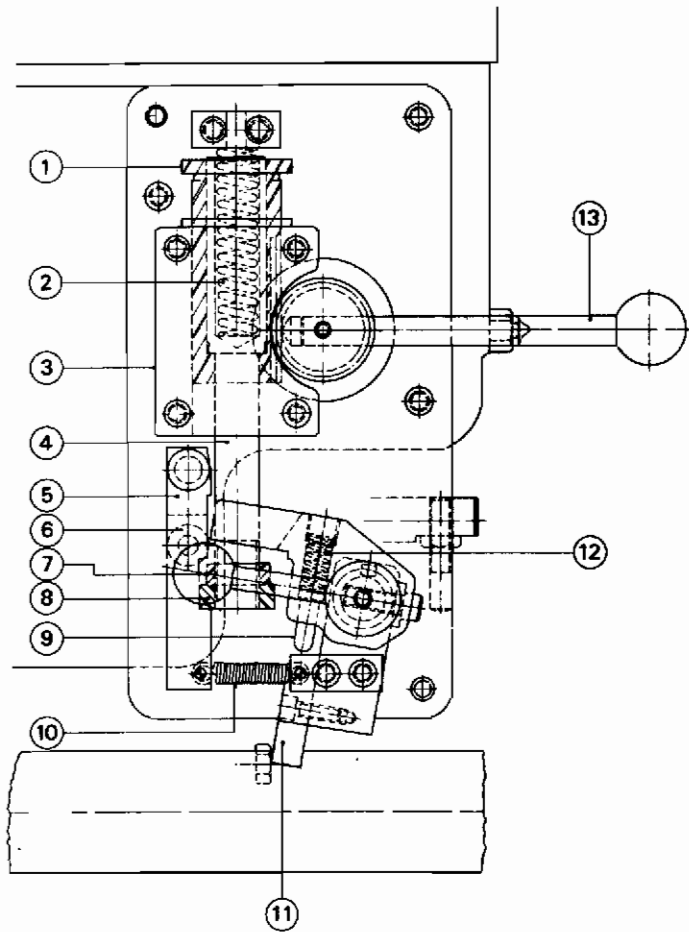
Remove the two extreme fixing screws and fit two $\frac{1}{2}$ " whit. jacking screws 'A' as shown, the two remaining fixing screws may now be removed.

The apron can then be lowered by means of the hexagon nuts on the jacking screws, the load being taken by the thrust races 'B'. It is advisable to lower the apron onto blocks placed in the lathe trough.

To replace the apron, the above procedure is reversed.

When replacing the feed shaft care must be taken to align the keyway in the shaft with the key in the worm.

11.52 SPARE PARTS LIST FOR APRON
continued
AUTO-NUT TRIPPING

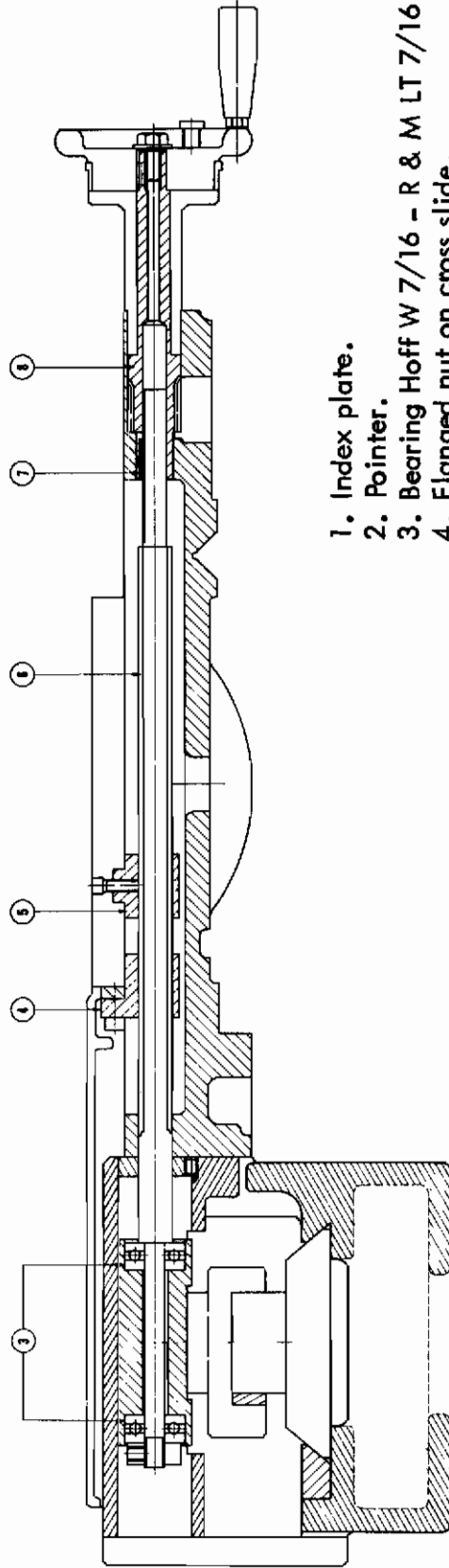
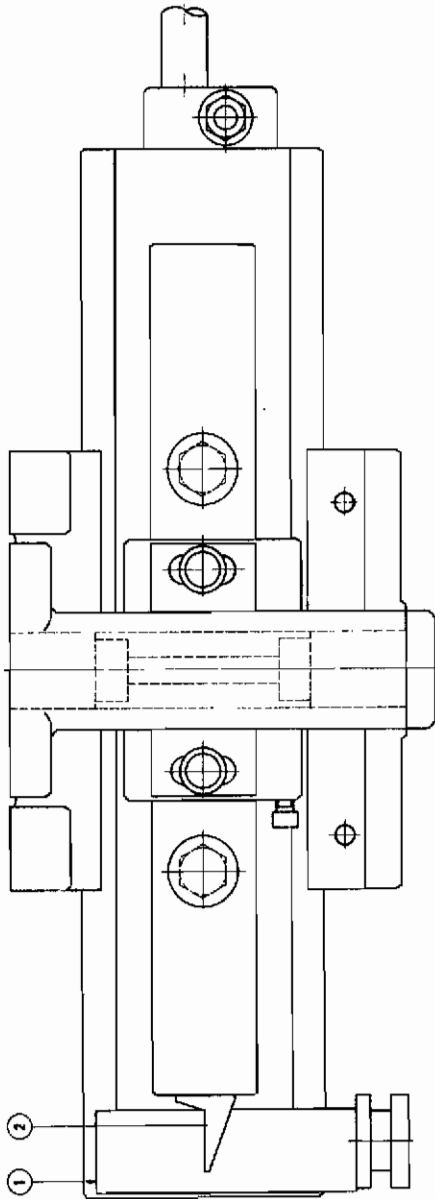


- | | |
|--------------------------------------|----------------------------------|
| 1. Sleeve | 13. Operating handle |
| 2. Spring No.156 | 14. Operating pinion |
| 3. Plunger block | 15. Torrington bearing B.1212 |
| 4. Trip rod. | 16. Nut operating shaft |
| 5. Latch | 17. Torrington bearing B.1612 |
| 6. Release roller | 18. Trip block shaft |
| 7. Hex. Nut N.33 | 19. Trip am |
| 8. Hex. Nut N.34 Hardened and ground | 20. Spring No.9 & 5/16" Dia ball |
| 9. Plunger | 21. Trip block |
| 10. Spring No.157 | 22. Baseplate |
| 11. Trip arm | 23. Eccentric bush |
| 12. Spring No.20 | |

ALL FIXING SCREWS ARE STD. WHITWORTH OR B. S. F. THREAD

PLEASE STATE MACHINE SERIAL NUMBER, SHEET NUMBER AND ITEM NUMBER

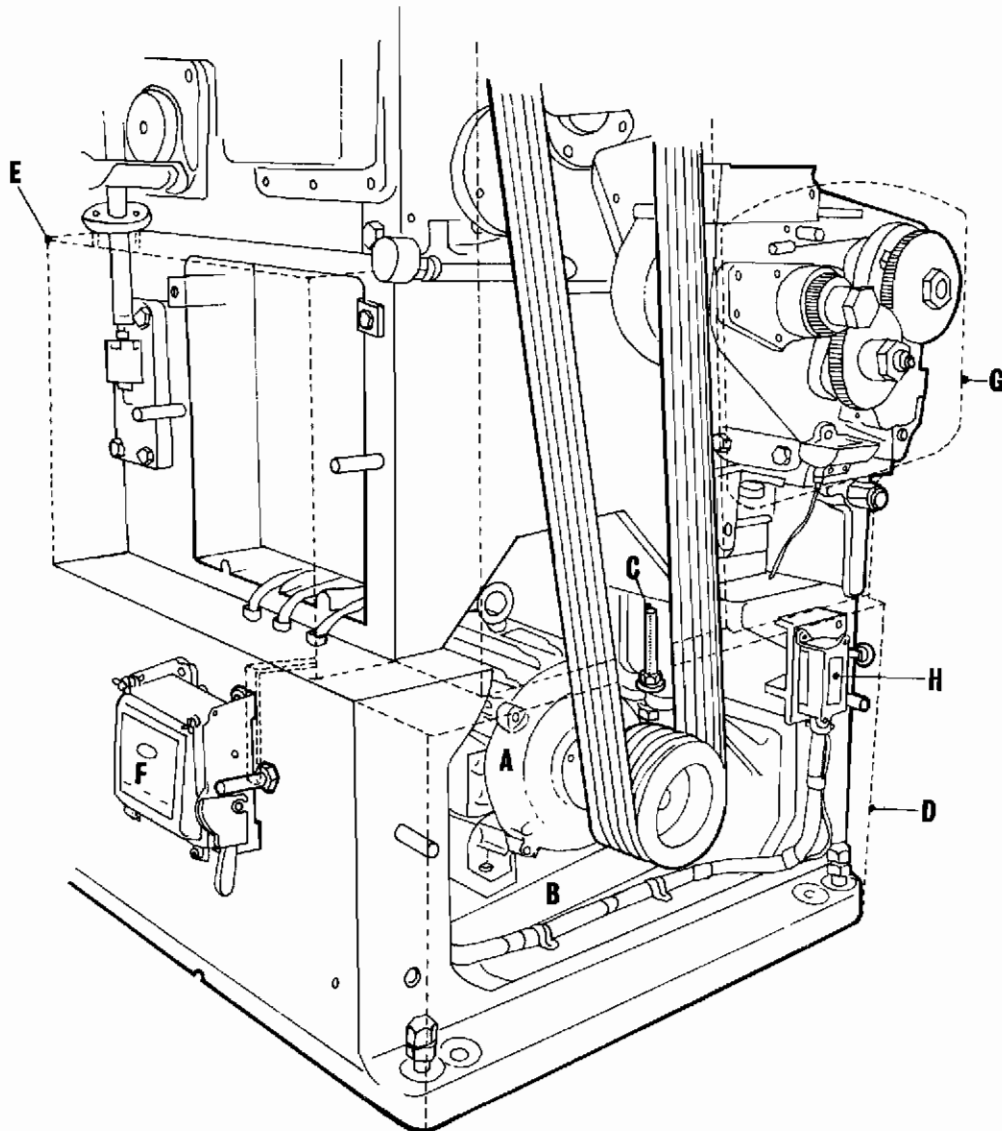
PLEASE STATE MACHINE SERIAL NUMBER, SHEET NUMBER AND ITEM NUMBER



1. Index plate.
2. Pointer.
3. Bearing Hoff W 7/16 - R & M LT 7/16.
4. Flanged nut on cross slide.
5. Tongued nut on cross slide.
6. Cross slide screw for Taper Turning.
7. Stem key.
8. Pinion shaft.

ALL FIXING SCREWS ARE STD. WHITWORTH OR B.S.F. THREAD

12.1 ELECTRICS & MOTOR DRIVE



The machine is delivered completely wired in accordance with the wiring diagrams (section 12.2 or 12.3) & is ready for connection to the mains supply as previously described (section 2.6). The whole of the electrical equipment conforms to the B.S.I. requirements for machine tools No. BS 2771 1956.

The main drive motor is a totally enclosed type with ball bearings & requires no attention apart from cleaning & maintenance according to the manufacturers recommendations.

The drive motor 'A' is mounted on an anti-vibration hinged baseplate 'B' & is housed under the headstock in the base of the machine. The drive is transmitted from the motor to the headstock by vee belts, belt tensioning being obtained by means of the adjusting screw 'C'. Access to the motor & hinged baseplate is by removal of cover 'D'.

The automatic contactor control panel is housed in the rear of the bed. For access to the panel, first isolate the mains supply, which releases the interlock between cover 'E' & isolator switch 'F'. The cover can then be removed.

The change gear cover 'G' is fitted with an electrical interlock 'H' which on removal isolates the motor drive. On replacing the cover the motor drive can then be re-started.

13.1 TABLE OF CUTTING SPEEDS

Dia. in inches	FEET PER MINUTE																			Dia. in inches
	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	1000		
	REVOLUTIONS PER MINUTE																			
1/4	307	384	461	538	615	692	769	846	923	1153	1538	1923	2307	2692	3076	3461			1/4	
1/2	154	192	232	271	310	350	389	428	467	564	728	923	1153	1383	1612	1841			1/2	
3/4	102	128	153	178	203	228	253	278	303	364	471	595	743	915	1111	1333			3/4	
7/8	88	110	131	152	173	194	215	236	257	311	395	500	625	771	938	1127			7/8	
1	76	96	115	135	154	174	193	213	232	281	355	450	564	698	853	1029			1	
1 1/8	68	85	102	119	136	153	170	187	204	248	311	395	500	625	771	938			1 1/8	
1 1/4	62	77	92	107	123	138	153	168	183	224	281	355	450	564	698	853			1 1/4	
1 1/2	56	70	84	98	112	126	140	154	168	205	258	328	412	515	638	781			1 1/2	
1 3/4	52	64	77	90	103	116	129	142	155	188	237	298	372	465	578	711			1 3/4	
1 7/8	44	55	66	78	90	102	114	126	138	168	212	268	338	422	525	648			1 7/8	
2	38	48	57	66	76	85	94	103	112	138	175	222	281	350	434	537			2	
2 1/2	31	38	46	54	62	70	78	86	94	116	147	188	237	296	365	449			2 1/2	
3	25	32	38	45	52	59	66	73	80	99	125	161	201	250	310	380			3	
3 1/2	22	27	33	39	45	51	57	63	69	84	105	136	172	215	268	330			3 1/2	
4	19	24	29	34	39	44	49	54	59	71	88	113	143	179	224	278			4	
4 1/2	17	21	25	30	34	38	42	46	50	60	74	94	119	149	188	234			4 1/2	
5	15	18	23	27	31	35	39	43	47	56	68	85	107	133	165	203			5	
5 1/2	14	17	21	25	29	33	37	41	45	53	64	79	99	123	153	188			5 1/2	
6	13	15	19	23	27	31	35	39	43	51	61	75	94	116	143	175			6	
7	11	14	17	21	25	29	33	37	41	48	57	70	87	107	131	161			7	
8	10	12	14	17	20	23	27	30	34	41	49	60	75	93	114	138			8	
9	9	11	13	15	18	21	24	27	30	36	43	53	65	81	100	121			9	
10	8	10	11	13	15	18	21	24	27	32	39	48	59	73	90	109			10	
11	7	9	10	12	14	17	20	23	26	31	37	46	56	69	85	102			11	
12	6	8	9	11	13	15	18	21	24	29	35	43	52	64	79	95			12	
13	5	7	8	10	12	14	17	20	23	28	34	41	50	61	75	90			13	
14																			14	
15																			15	
16																			16	
18																			18	
20																			20	
22																			22	
24																			24	

13.2 METRIC CONVERSION TABLES

1 METRE = 39.370113 INCHES

INCHES TO MILLIMETRES

FRACTIONS

Inch				M/m.	Inch				M/m.	Inch				M/m.
1/16	1/32	1/64	015625	3969	1/8	1/16	3/32	-34375	8.7312	1/4	3/16	5/32	671875	17.0656
				-7937					9.1281					6875
1/8	3/64	3/128	-046875	1.1906	3/16	1/4	5/64	-359375	9.5250	1/2	1/2	3/4	-703125	17.8594
			-0625	1.5875				-390625	9.9219				-71875	18.2562
3/16	1/16	1/32	-078125	1.9844	1/4	3/8	1/8	-40625	10.3187	3/8	5/16	3/8	-734375	18.6531
			09375	2.3812				-421875	10.7156				-75	19.0500
1/4	1/8	1/16	-109375	2.7781	1/2	5/8	3/4	-4375	11.1125	1	1	1	-765625	19.4469
			-125	3.1750				-453125	11.5094				-78125	19.8437
5/16	3/16	1/8	-140625	3.5719	3/4	7/8	1	-46875	11.9062	1	1	1	-796875	20.2406
			-15625	3.9687				-484375	12.3031				-8125	20.6375
3/8	1/4	1/8	-171875	4.3656	1	1	1	-5	12.7000	1	1	1	-828125	21.0344
			-1875	4.7625				-515625	13.0969				-84375	21.4312
7/16	3/8	1/4	-203125	5.1594	1	1	1	-53125	13.4937	1	1	1	-859375	21.8281
			-21875	5.5562				-546875	13.8906				-875	22.2250
1/2	5/16	3/8	-234375	5.9531	1	1	1	-5625	14.2875	1	1	1	-890625	22.6219
			-25	6.3500				-578125	14.6844				-90625	23.0187
5/8	3/4	7/8	-265625	6.7469	1	1	1	-59375	15.0812	1	1	1	-921875	23.4156
			-28125	7.1437				-609375	15.4781				-9375	23.8125
3/4	7/8	1	-296875	7.5406	1	1	1	-625	15.8750	1	1	1	-953125	24.2094
			-3125	7.9375				-640625	16.2719				-96875	24.6062
1	1	1	-328125	8.3344	1	1	1	-65625	16.6687	1	1	1	-984375	25.0031

UNITS

Inches		10	20	30	40	50	60	70	80	90	100
0		254.0	508.0	762.0	1016.0	1270.0	1524.0	1778.0	2032.0	2286.0	2540.0
1	25.4	279.4	533.4	787.4	1041.4	1295.4	1549.4	1803.4	2057.4	2311.4	2565.4
2	50.8	304.8	558.8	812.8	1066.8	1320.8	1574.8	1828.8	2082.8	2336.8	2590.8
3	76.2	330.2	584.2	838.2	1092.2	1346.2	1600.2	1854.2	2108.2	2362.2	2616.2
4	101.6	355.6	609.6	863.6	1117.6	1371.6	1625.6	1879.6	2133.6	2387.6	2641.6
5	127.0	381.0	635.0	889.0	1143.0	1397.0	1651.0	1905.0	2159.0	2413.0	2667.0
6	152.4	406.4	660.4	914.4	1168.4	1422.4	1676.4	1930.4	2184.4	2438.4	2692.4
7	177.8	431.8	685.8	939.8	1193.8	1447.8	1701.8	1955.8	2209.8	2463.8	2717.8
8	203.2	457.2	711.2	965.2	1219.2	1473.2	1727.2	1981.2	2235.2	2489.2	2743.2
9	228.6	482.6	736.6	990.6	1244.6	1498.6	1752.6	2006.6	2260.6	2514.6	2768.6

MILLIMETRES TO INCHES

UNITS

M/m.		10	20	30	40	50	60	70	80	90
0		39370	78740	118110	157480	196851	236221	275591	314961	354331
1	0.03937	43307	82677	122047	161417	200788	240158	279528	318898	358268
2	0.07874	47244	86614	125984	165354	204725	244095	283465	322835	362205
3	0.11811	51181	90551	129921	169291	208662	248032	287402	326772	366142
4	0.15748	55118	94488	133858	173228	212599	251969	291339	330709	370079
5	0.19685	59055	98425	137795	177165	216536	255906	295276	334646	374016
6	0.23622	62992	102362	141732	181103	220473	259843	299213	338583	377953
7	0.27559	66929	106299	145669	185040	224410	263780	303150	342520	381890
8	0.31496	70866	110236	149606	188977	228347	267717	307087	346457	385827
9	0.35433	74803	114173	153543	192914	232284	271654	311024	350394	389764

M/m.		100	200	300	400	500	600	700	800	900
0		3.93701	7.87402	11.8110	15.7480	19.6851	23.6221	27.5591	31.4961	35.4331
10	0.39370	4.33071	8.26772	12.2047	16.1417	20.0788	24.0158	27.9528	31.8898	35.8268
20	0.78740	4.72441	8.66142	12.5984	16.5354	20.4725	24.4095	28.3465	32.2835	36.2205
30	1.18110	5.11811	9.05513	12.9921	16.9291	20.8662	24.8032	28.7402	32.6772	36.6142
40	1.57480	5.51181	9.44883	13.3858	17.3228	21.2599	25.1969	29.1339	33.0709	37.0079
50	1.96851	5.90552	9.84252	13.7795	17.7165	21.6536	25.5906	29.5276	33.4646	37.4016
60	2.36221	6.29922	10.2362	14.1732	18.1103	22.0473	25.9843	29.9213	33.8583	37.7953
70	2.75591	6.69292	10.6299	14.5669	18.5040	22.4410	26.3780	30.3150	34.2520	38.1890
80	3.14961	7.08662	11.0236	14.9606	18.8977	22.8347	26.7717	30.7087	34.6457	38.5827
90	3.54331	7.48032	11.4173	15.3543	19.2914	23.2284	27.1654	31.1024	35.0394	38.9764

14.1 HYDRAULIC COPYING UNIT INSTALLING & COMMISSIONING

The pump set is a free standing assembly and should be placed at the tailstock end of the lathe with the switch facing the front. Electrical connections are made by engaging the plug in the socket on the bed foot at the tailstock end of the lathe.

The flexible pressure hoses protected by the flexible conduit should be connected to pump and unit. Each hose is fitted with connections of different diameters so that incorrect assembly is impossible. Clean all connections carefully before assembly, to prevent dust or other matter entering the valve unit.

Machines packed for export do not include oil for the Hydraulic System and the tank should be filled to the oil level indicator with approximately 10 gallons of Shell Tellus 33 Hydraulic Oil or its equivalent.

On starting up the following simple checks should be made:

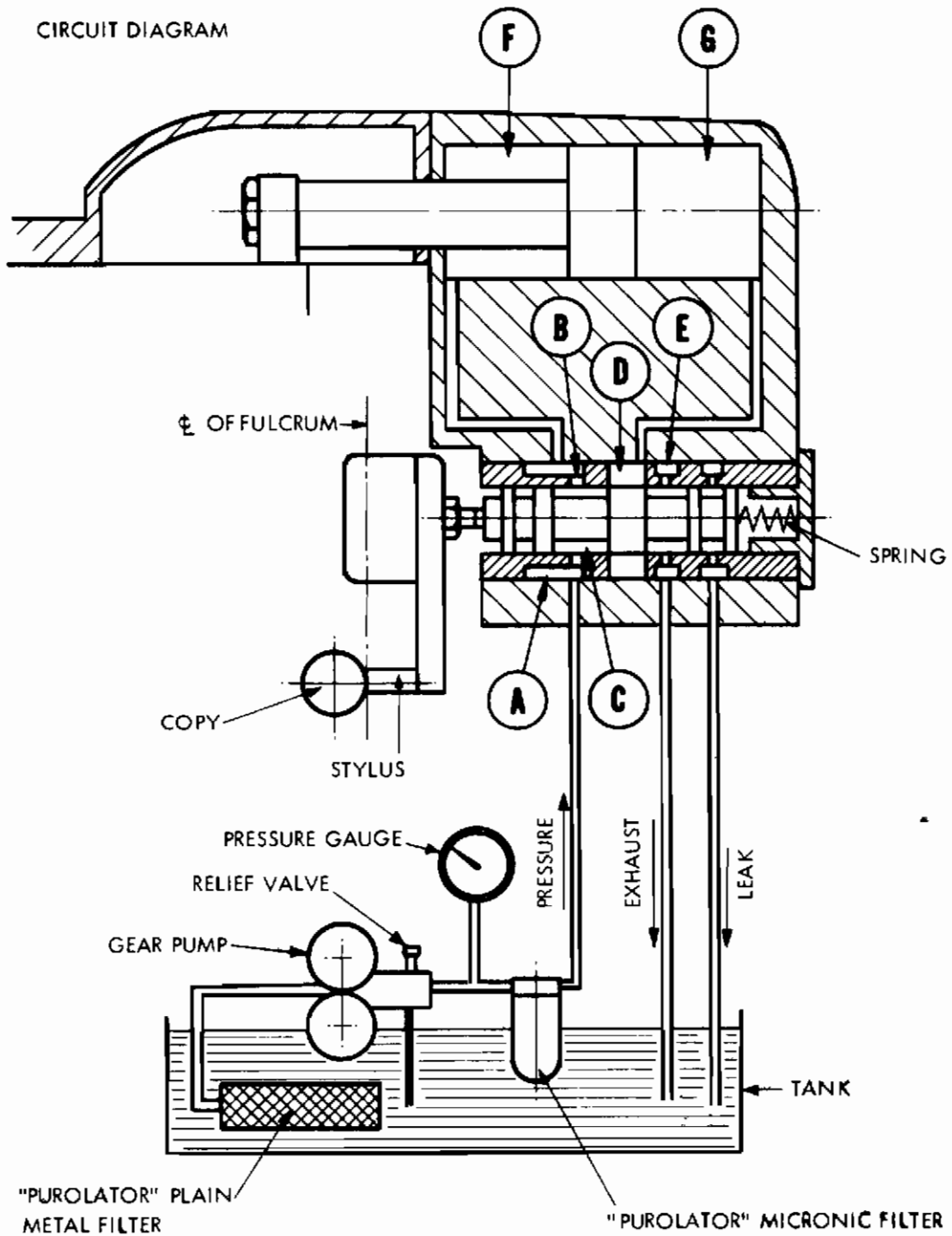
Position the Copying Unit, towards the rear of the saddle and away from the headstock and tailstock. Start motor and pump set. Check that the unit retracts and advances by movement of retraction lever (M) FIG 1 Section 14.3.

Whilst it is unlikely that any difficulty will be encountered at this check it should be noted that this function is related to the position of the valve spool and is set and locked on assembly. A tappet screw on the inward extension on the retractor lever controls the movement of the valve and should the unit fail to retract this screw should be adjusted. Access to the screw is obtained by removing the complete cover at the foot of the unit below the piston rod.

Advance and retraction of the unit will at this stage tend to be erratic due to air trapped in the hydraulic circuit. Bleeding of the system is obtained through the two vent plugs situated at the top of the hydraulic cylinder. Bleed as instructions Section 14.7. Operate unit several times between each bleeding until no more air is present and unit moves smoothly. Finally ensure that both plugs are tight.

NOTE: When longitudinal copying, unit should be traversed from right to left only, always retract stylus from copy when traversing towards tailstock.

14.2 HYDRAULIC COPYING UNIT HYDRAULIC CIRCUIT



14.21 HYDRAULIC COPYING UNIT HYDRAULIC CIRCUIT continued

The pump set and control circuit are shown diagrammatically section 14.2. The pump set is a self-contained tank incorporating a motorised pump with a capacity of 1 gallon per minute. This pump is provided with an inbuilt relief valve which is set to 300 P.S.I.

A wire mesh suction filter, pressure gauge and micronic pressure line filter are assembled in the piping which is taken through the lid by means of an adaptor casting. Fittings for the flexible pipes are arranged within the diameter of an armoured pipe conduit. The complete assembly of motor, pump, filters and piping may be withdrawn from the tank in one piece. A visible oil level gauge is provided.

The pushbutton starter is built into the pump set, and the electrical installation complies with the C.S.A. standards.

Pressure oil from the pump passes through the relief valve, micronic filter and in flexible pipe to the valve at annulus 'A' and on to the cylinder at 'F'. Additionally the pressure oil from annulus 'A' passes through ports 'B' into the valve spool chamber 'C' and into annulus 'D' through the first restriction formed by the valve spool and the liner end and on through the second restriction into the valve spool chamber 'E' which is connected to tank. Annulus 'D' is connected to the cylinder at 'G'.

The pressure oil, is therefore, passing to tank through two variable restrictions and longitudinal deflection of the valve spool, away from the valve spring increases the pressure drop from chamber 'C' to chamber 'D'. Conversely valve deflection towards the spring increases the pressure drop.

It will be seen that a position of valve spool can be achieved when the pressure drop is equal across each restriction and at this position pressure in chamber 'D' is half supply pressure.

The piston is arranged so that the area of the ramshaft end 'F' is half that of end 'G' and since supply is operating on half the area of the cylinder at 'F' and half supply pressure is operating on full area at 'G', the forces on the piston are equal and opposite and the cylinder is at rest.

Consider the unit maintained in this balanced condition by the lever mounted stylus, bearing on the copy. It will be seen that a deflection of the valve can be obtained by an increase in the copy diameter encountered during longitudinal feed. This deflection will produce a cylinder movement to the right on the diagram and will take with it the lever fulcrum, thus enabling the valve spring to restore the balanced condition at a new diameter. Similarly a decrease of copy diameter will permit the valve to deflect away from the spring, and the cylinder movement produced will restore balanced condition at a new reduced diameter.

Retraction of the unit is obtained by deflecting manually the valve spool towards the spring, thus moving the cylinder away from the work to the limit of the cylinder stroke.