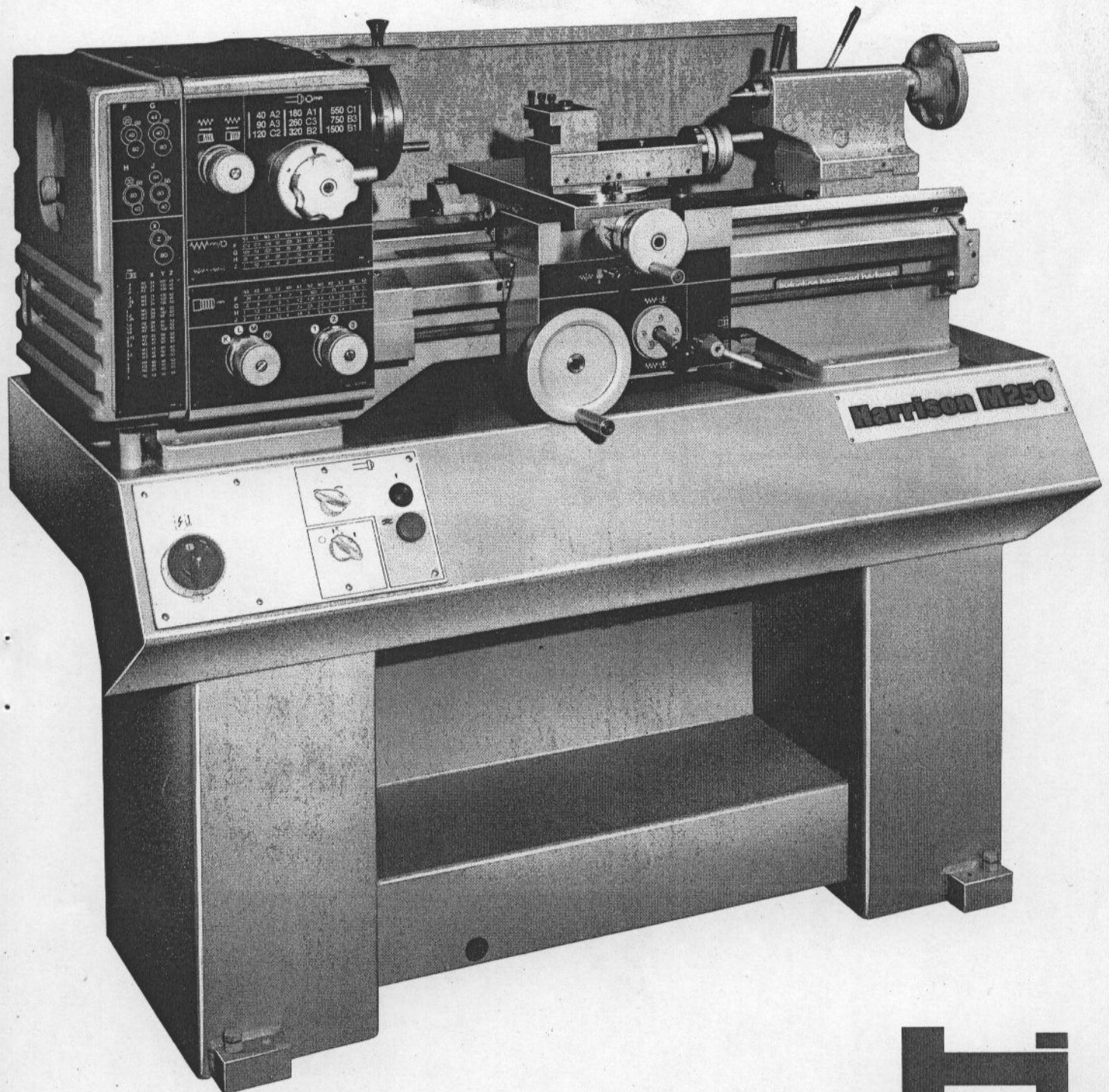


# Harrison M250

**280mm (11in)  
swing centre lathe**



**H**  
**Harrison**



# machine manual

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# Machine Specification

## 280mm (11in) swing Centre Lathe

500mm MODEL — 500mm (20 in) between centres

750mm MODEL — 750mm (30 in) between centres

This machine is manufactured to British metric standards throughout, and is available in two bed lengths

Metric or English gear boxes and drive screws (together with the appropriate micrometer dials) are optional variations.

### summarised specification

Centres	Height . . . . .	145mm (5.7 in)	English Gearbox with 4 TPI Leadscrew	Threads English Pitches (56) . . . . .	4 - 84 TPI
	Admits Between . . . . .	500mm (20 in) or . . . . . 750mm (30 in)		Metric Pitches (23) * . . . . .	0.4 - 10mm
Swing	Over Bed . . . . .	280mm (11 in)	Feeds Longitudinal (24) . . . . .	* (available by changewheels supplied as additional equipment)	
	Over Cross Slide . . . . .	178mm (7 in)		Cross (24) . . . . .	0.0006 - 0.016 in 0.0003 - 0.008 in
Spindle	Bored to Pass . . . . .	35mm (1.375 in)	Bed	Width Over Ways . . . . .	190mm (7.5 in)
	Nose . . . . .	D1-3		Depth Under Headstock . . . . .	230mm (9 in)
Morse Taper In Nose Bush . . . . .		3	Cross Slide	Width . . . . .	130mm (5.1 in)
				Travel . . . . .	165mm (6.5 in)
Speeds	Number . . . . .	9	Top Slide	Width . . . . .	76mm (3 in)
	50 Hz — Range . . . . .	40 - 1500 rpm		Travel . . . . .	92mm (3.6 in)
Machines	Motor . . . . .	0.9 kW (1.2hp)	Tailstock	Quill Diameter . . . . .	38mm (1.5 in)
	or Range . . . . .	80 - 3000 rpm		Travel . . . . .	95mm (3.7 in)
or	Motor . . . . .	1.3 kW (1.8hp)	Weight	500mm (20 in) Centres . . . . .	356 kg (785 lbs)
	or Range . . . . .	40 - 1500 rpm		750mm (30 in) Centres . . . . .	457 kg (1008 lbs)
60 Hz —	Motor (Single Phase) . . . . .	1.1 kW (1.5hp)	Shipping Data	Gross Weight . . . . .	Packing Case Dimensions
	Range . . . . .	40 - 1500 rpm			L W H
Machines	Motor . . . . .	1.5 hp	500mm (20 in) Centres	457 kg (1008 lbs) . . . . .	1574 x 838 x 1371mm (62" x 33" x 54")
	or Range . . . . .	52 - 2000 rpm		750mm (30 in) Centres	559 kg (1232 lbs) . . . . .
or	Motor . . . . .	1.5 hp		1828 x 838 x 1371mm (72" x 33" x 54")	
	Range . . . . .	52 - 2000 rpm			
Motor (Single Phase) . . . . .		1.5 hp			
Leadscrew	Diameter . . . . .	25mm (0.98 in)			
	Thread . . . . .	6mm pitch or 4 TPI			
Metric Gearbox with 6mm pitch Leadscrew	Threads Metric pitches (33) . . . . .	0.25 - 8mm			
	English Pitches (33) * . . . . .	3 - 72 TPI			
* (available by changewheels supplied as additional equipment)	Feeds Longitudinal (21) . . . . .	0.012 - 0.4mm			
	Cross (21) . . . . .	0.006 - 0.2mm			

### standard equipment

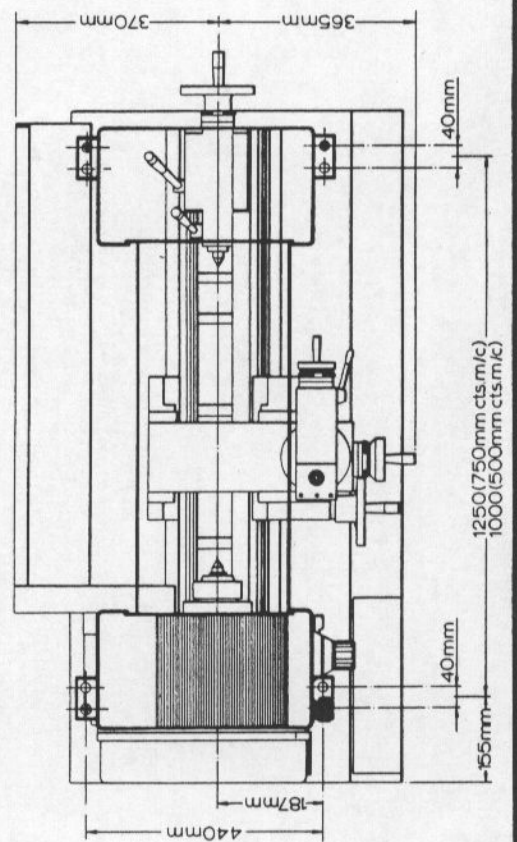
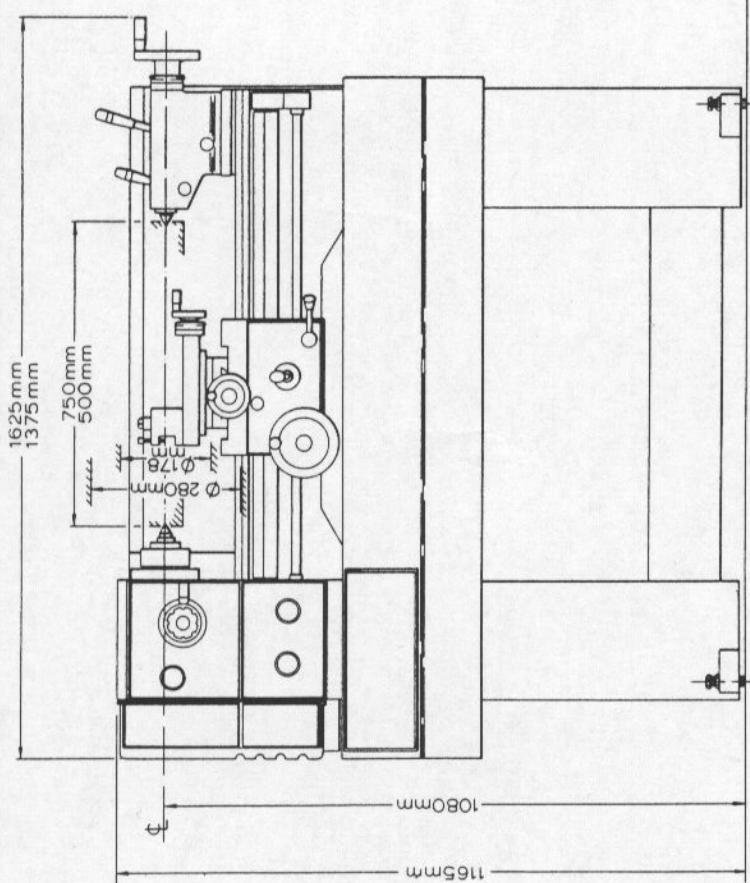
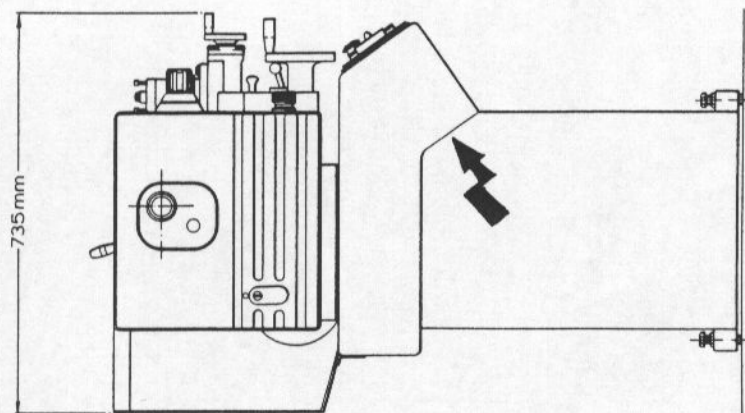
Single Toolpost  
Work Driver Plate  
No. 5/3 Morse Centre Bush  
2 No. 3 M.T. Centres

Spanners, Keys and Oil Gun  
Machine Manual  
& Standard Inspection Certificate

*Illustrated or specified data is not binding in detail: The manufacturers reserve the right to modify design, specification and price without notice.*



**Installation**



## Lifting

The approximate weights of the machine are:-

500mm Model (500 mm/20") between centres - 400 kg (880 lbs)

750mm Model (750 mm/30") between centres - 460 kg (1010 lbs)

The machine should be lifted using a rope sling looped under both ends of the swarf tray.

## Cleaning

Bright surfaces are coated with an anti-corrosive compound at despatch and this must be completely removed using White Spirit or Paraffin (Kerosene) before operating the controls or moving the slides. **DO NOT USE CELLULOSE SOLVENTS.** Oil the bright surfaces and slideways **AFTER CLEANING.** (see Lubrication diagram).

## Positioning

Locate the machine on a solid foundation allowing sufficient area for operation and maintenance access. (SEE GENERAL ARRANGEMENT AND FOUNDATION PLAN).

The lathe may be used when free standing, but for maximum performance it should be bolted down.

- (1) **Free standing.** Position the machine on its foundation and adjust each of the four levelling screws to take an equal share of the weight. Then using an engineer's precision level on the bedways make further adjustments for level conditions.
- (2) **Fixed installation.** Position the machine over four 12 mm (1/2") diameter foundation bolts, set to suit the base. (SEE GENERAL ARRANGEMENT AND FOUNDATION PLAN).

Accurately level the machine as in (1), then tighten the foundation bolts evenly to avoid distortion and finally re-check for level conditions.

## Electrical Supply

Power should be supplied through an external fused isolator - recommended fuses being 15 amp for 220 volts supply and 10 amp for 380 to 440 volts supply. External wiring should be of a permanent character and be undertaken by a competent electrician. SEE GENERAL ARRANGEMENT AND FOUNDATION DRAWING FOR CABLE ENTRY.

Line connections and a substantial earth continuity conductor should be connected to the terminal block (SEE ELECTRICAL WIRING DIAGRAM).

If main spindle rotation does not coincide with that indicated by forward/reverse switch at control station, interchange two line connections.

continued



## **Lubrication** (Refer to Lubrication diagram)

Ensure that the headstock, gearbox and apron are filled to the level of the relevant oil sight windows - and oil the cross-slide nut, dials and changewheel stud etc. through the appropriate oil nipples using the oil gun provided.

## **Running-in**

For optimum bearing life and performance it is recommended that high spindle speeds be avoided during the initial life of the machine.

Alternatively a running-in procedure should be adopted as follows: -

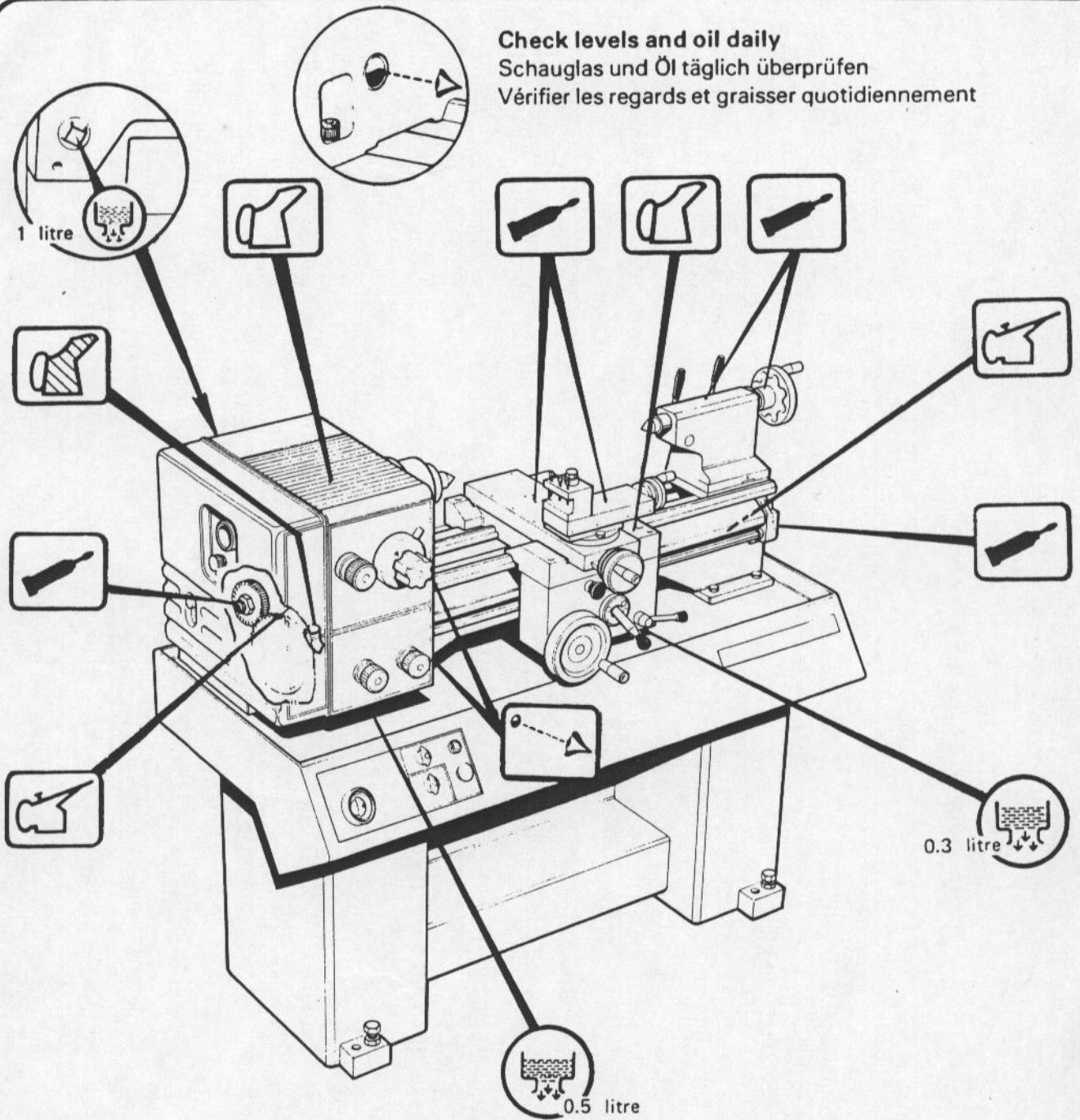
Make a low feed rate selection and run the machine light for 3 hours at 260 rpm  
then for 1 hour at 550 rpm  
then for ½ hour at 750 rpm

**Lubrication**

**Check levels and oil daily**

Schauglas und Öl täglich überprüfen

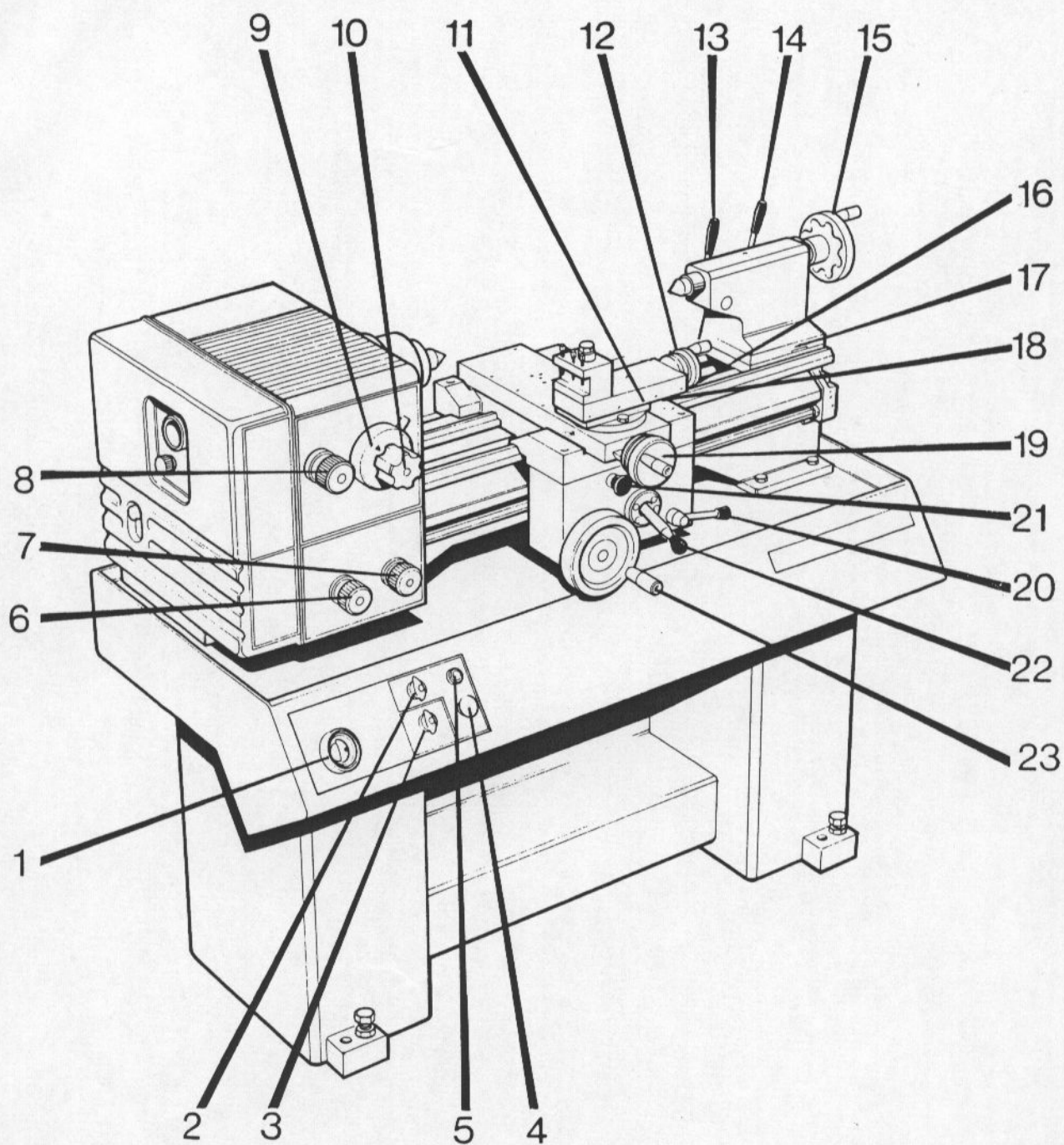
Vérifier les regards et graisser quotidiennement



Mobil	BP	Castrol	C	Esso	Shell	TEXACO
DTE OIL HEAVY MEDIUM	ENERGOL HLP 68 (ISO)	HYPIM AWS 68	P.W.L.C.	NUTO H68	TELLUS 68 OR R68	RANDO HD 68
DTE EXTRA HEAVY	ENERGOL HP 150 (ISO)	ALPHA ZN 220	WLM	NURAY 100	VITREA 220	REGAL R & O 220



**Operation**



- |                              |  |                                     |
|------------------------------|--|-------------------------------------|
| 1. MAINS ISOLATOR            | 9. SPEED SELECTOR LEVER                            | 17. TAILSTOCK SET-OVER SCREW        |
| 2. FORWARD/REVERSE SWITCH    | 10. SPEED RANGE SELECTOR DIAL                      | 18. CARRIAGE LOCK                   |
| 3. COOLANT ON/OFF SWITCH     | 11. TOP SLIDE LOCK                                 | 19. CROSS TRAVERSE HANDLE           |
| 4. EMERGENCY STOP PUSHBUTTON | 12. TOP SLIDE TRAVERSE HANDLE                      | 20. TREADCUTTING ENGAGEMENT         |
| 5. START PUSHBUTTON          | 13. QUILL LOCK                                     | 21. FEED AXIS SELECTOR              |
| 6. FEED SELECTOR             | 14. TAILSTOCK CLAMP                                | 22. FEED ENGAGE                     |
| 7. FEED SELECTOR             | 15. QUILL TRAVERSE HANDWHEEL                       | 23. LONGITUDINAL TRAVERSE HANDWHEEL |
| 8. FEED DIRECTION SELECTOR   | 16. CROSS-SLIDE LOCK (in R.H. side of cross slide) |                                     |

## Starting the Machine

1. **Ensure that lubrication has been carried out in accordance with the Lubrication diagram.**
2. **Check that the feed engage lever (22) and thread-cutting lever (20) are in the disengaged positions and that the changewheel cover is firmly secured in place.**
3. **Select - Feed Axis - i.e. cross or longitudinal by means of the apron push-pull knob (21).**  
**Select - Direction of feed - by means of the headstock lower selector (8)**  
**Select - Feed Rate - by referring to the charts on the headstock and selecting (in the sequence listed) the appropriate positions on the gearbox selectors (6) and (7). (Engagement of the feed gears may be assisted by turning the main spindle)**  
**Select \*\* Spindle speed by turning the speed range selector dial (10) to present the appropriate range i.e. A B or C, then turn the speed selector lever (9) to point to the required speed from the chart.**  
(Engagement of the drive gears may be assisted by manually turning the spindle)
4. **Switch on the electrical supply at the mains isolator (1) which is the red knob at the L.H. end of control station.**
5. **Select direction of spindle rotation by means of forward/reverse switch (2).**
6. **Start the spindle by means of start push-button (5).**
7. **Start and stop the feed motion as required by means of the feed engage lever (22)**

## Stopping the Machine

The machine may be stopped by the Emergency Stop pushbutton (4).

## Operational Notes

FACEPLATES

NOTE MAXIMUM SPEEDS:-

1500 rpm for 260 mm (12") dia.

COARSE SCREWCUTTING/  
FEED RANGE 'J'

SHOULD NOT BE USED WITH  
SPINDLE SPEEDS ABOVE 750 RPM.

### NOTES

\*\* See Installation instructions (RUNNING-IN) if starting the machine for the first time.

continued



#### Operational notes continued

Micrometer dials are direct reading (for work piece diameter reduction on the cross-slide) and are of the friction-grip type for easy index settings.

Longitudinal traverse handwheel (23) may be disengaged by pulling it away from the apron face.

**Tailstock set over adjustment** - is provided in the form of socket screws (17) mounted in each side of the tailstock body, - a similar but 'location-screw' is fitted in the rear face of the body.

Set-over adjustment is made as follows:-

- Unclamp the tailstock - (lever 14)
- Slacken the rear 'location-screw' (say one half turn)
- Then** — Alternatively slacken one set-over screw and tighten the other until the required setting is achieved.
- Tighten the rear 'location-screw'
- And** Re-clamp the tailstock.

### Leadscrew Drive

Drive to the leadscrew is obtained by first removing the torque limiter cover plate. Then slide the driving sleeve towards the gearbox so engaging the shear pin with the leadscrew shaft. When not in use it is recommended that the leadscrew be disengaged.

## MOUNTING OF CHUCKS, FACEPLATES and other SPINDLE MOUNTED ATTACHMENTS.

**Ensure** that the location faces on both nose and attachment are scrupulously clean.

**Check** that all the cams are in the release position (Fig. 1).

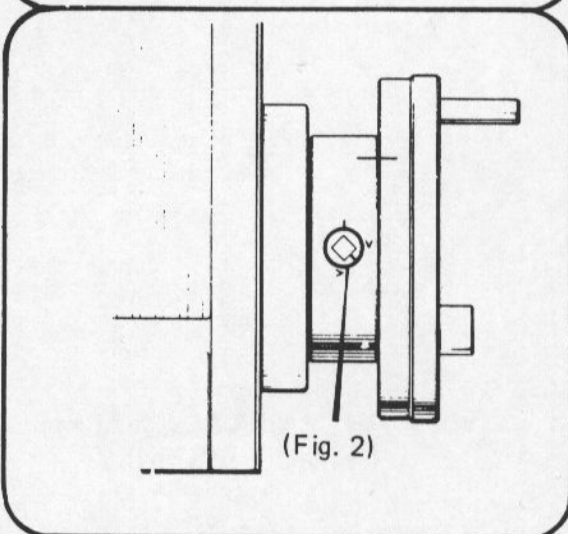
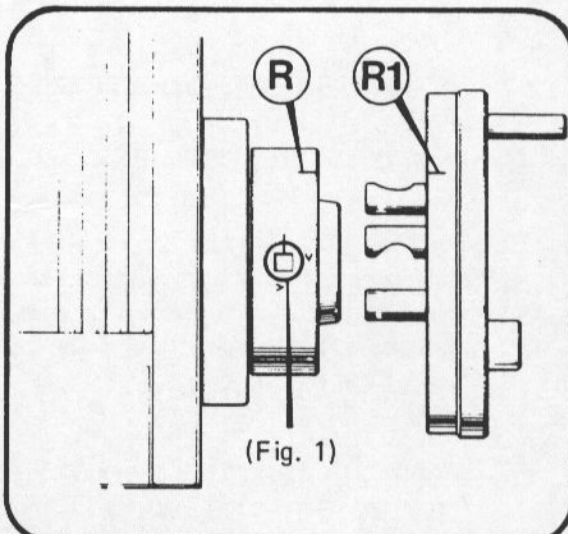
**Mount** the attachment on to the spindle nose and lock each cam by turning it clockwise using the key provided.

A reference line R1 (Fig. 1) should be scribed on each chuck or faceplate to coincide with the reference line R on the spindle nose. This assists subsequent re-mounting

### NOTE:-

For correct locking conditions each cam must tighten with its index line between the two vee marks on the nose (Fig. 2).

**DO NOT INTERCHANGE CHUCKS OR OTHER SPINDLE MOUNTING ITEMS BETWEEN LATHES WITHOUT CHECKING EACH CAM FOR CORRECT LOCKING.**



## TO ADJUST 'CAMLOCK STUDS'

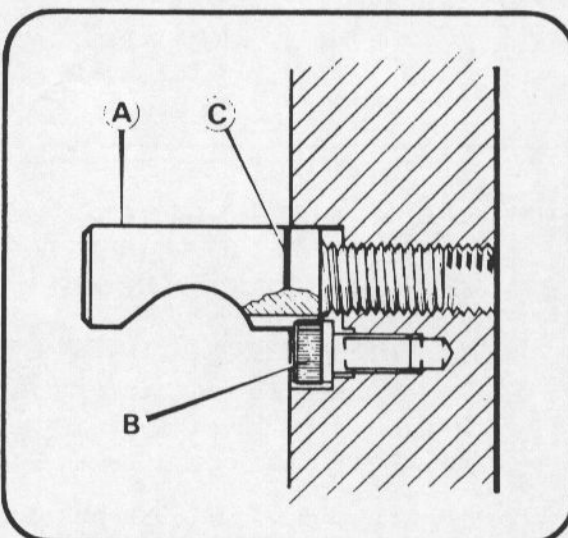
**Remove** Lockscrew (B).

**Turn** Stud (A) one full turn, in or out as required.

**Re-fit and tighten** lockscrew (B).

### NOTE:-

A datum ring (C) is marked on each stud as a guide to the original or initial setting.



# Spindle Nose

**(A) METRIC THREADS on METRIC LEADSCREW MACHINES**  
or  
**ENGLISH THREADS on ENGLISH LEADSCREW MACHINES**

For these threads it is recommended that the "thread indicator dial" be used - this allows the leadscrew nuts to be disengaged at the end of each screwcutting pass, provided that they are re-engaged in accordance with the chart mounted on the front face of the dial unit.

**METRIC LEADSCREW MACHINES**  
(METRIC THREADS ONLY)

The chart shows: -

in column 1. mm pitch to be cut.

in column 2. (★) The requisite gear of the double pinion should be arranged to mesh with the leadscrew.

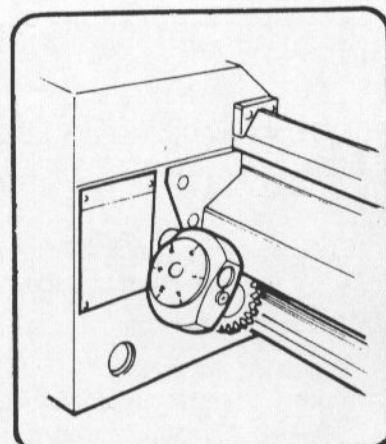
in column 3. The dial numbers at which the leadscrew nuts may be engaged.

**ENGLISH LEADSCREW MACHINES**  
(ENGLISH THREADS ONLY)

The chart shows: -

in column 1. T.P.I. to be cut.

in column 2. Dial numbers at which the leadscrew nuts may be engaged.



mm					
	★		★		
0.25	20	14	1.4	21	135
0.3	20	14	1.5	20	14
0.35	21	135	1.75	21	135
0.4	20	14	2	20	14
0.5	20	14	2.5	20	14
0.6	20	14	3	20	14
0.7	21	135	3.5	21	135
0.75	20	14	4	20	14
0.8	20	14	5	20	14
1	20	14	6	20	14
1.2	20	14	7	21	135
1.25	20	14	8	20	1

ins					
4	1-6	11	1-6	28	1-6
4½	135	12	1-6	30	1-6
5	1-6	14	1-6	32	1-6
5½	135	15	1-6	36	1-6
6	1-6	16	1-6	38	1-6
6½	135	18	1-6	40	1-6
7	1-6	19	1-6	44	1-6
7½	135	20	1-6	48	1-6
8	1-6	22	1-6	52	1-6
9	1-6	24	1-6	54	1-6
9½	135	26	1-6	56	1-6
10	1-6	27	1-6	60	1-6

**(B) ENGLISH THREADS on METRIC LEADSCREW MACHINES**  
or  
**METRIC THREADS on ENGLISH LEADSCREW MACHINES**  
or  
**ALL THREADS ON MACHINES NOT FITTED WITH THREAD INDICATOR**

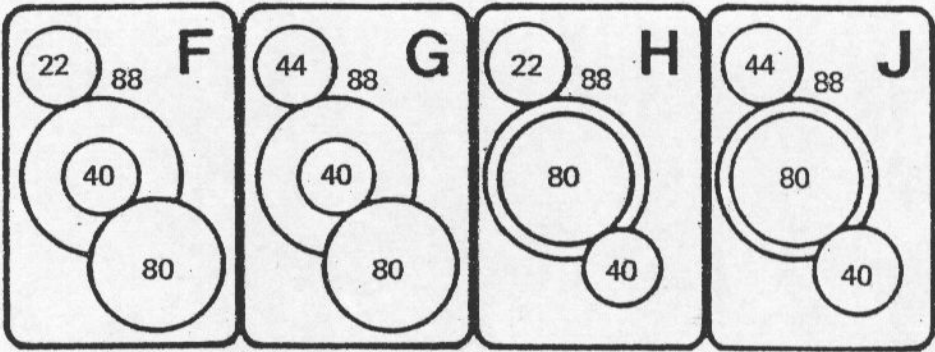
For these threads the leadscrew nuts are kept engaged throughout the cutting of any one thread. This involves reversing the whole drive by means of the reverse switch (2) at each end of the screwcutting pass whilst at the same time relieving or increasing the cut as required.

(Threads 'A' may also be cut by this method).

## Thread – cutting

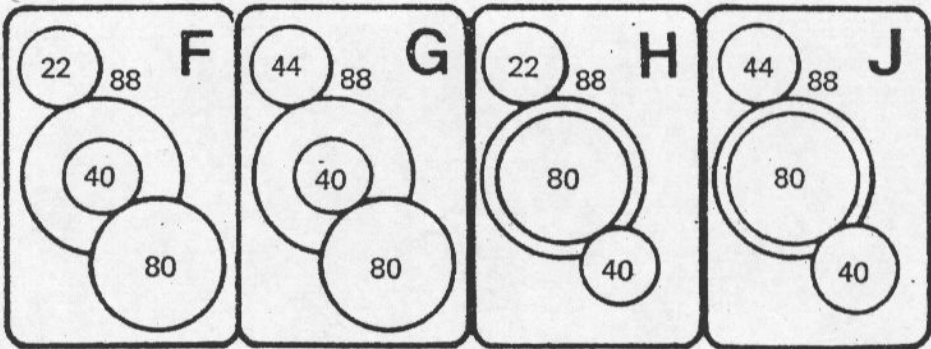


Fig. 2A for Metric Leadscrew Machines



6 mm. pitch Leadscrew

Fig. 2B for English Leadscrew Machines




4 tpi. Leadscrew




THREADCUTTING — METRIC GEARBOX

STANDARD THREADS AVAILABLE

 mm									
0.25	N3F	0.7	M1F	1.2	K1G	2	L2G	3.5	M2H
0.3	K3F		M3G		K3H		N1H	4	L2H
0.35	M3F	0.75	K2F	1.25	N2G		N3J		N1J
0.40	L3F	0.8	L1F	1.4	M1G	2.4	K1H	4.8	K1J
0.5	N1F		L3G		M3H		K3J	5	N2J
	N3G	0.875	M2F	1.5	K2G	2.5	N2H	5.6	M1J
0.6	K1F	1	L2F	1.6	L1G	2.8	M1H	6	K2J
	K3G		N1G		L3H		M3J	6.4	L1J
0.625	N2F		N3H	1.75	M2G	3	K2H	7	M2J
						3.2	L1H	8	L2J
							L3J		

THREADS AVAILABLE WITH ADDITIONAL CHANGEWHEELS

 ins					
		W	X	Y	Z
72	N3	30	81	40	84
64	N3	35	84	40	84
56	N3	40	84	40	84
48	N3	40	84	40	72
40	N3	22	88	80	63
36	N3	30	81	60	63
32	N3	35	84	60	63
28	N3	30	84	80	63
27	N3	30	81	80	63
26	N3	30	78	80	63
25	L3	22	88	80	63
24	N3	35	84	80	63
23	N3	40	92	80	63
22	N3	40	88	80	63
20	K3	35	84	80	63
19	N3	40	76	80	63
18	N3	40	72	80	63
16	N2	22	88	80	63
14	N1	30	84	80	63
13	N1	30	78	80	63
12	N1	35	84	80	63
11.5	N1	40	92	80	63
11	N1	40	88	80	63
10	K1	35	84	80	63
9	N1	40	72	80	63
8	K2	35	84	80	63
7.5	L1	35	84	80	63
7	L2	30	84	80	63
6	L2	35	84	80	63
5	K1	60	72	80	63
4.5	L2	40	72	80	63
4	K2	60	72	80	63
3	L2	60	72	80	63

993

MOD

X

Y

Z

.3	K3	22	88	56
.4	L3	22	88	56
.5	N1	22	88	56
.6	K1	22	88	56
.7	M1	22	88	56
.8	L3	44	88	56
1	N1	44	88	56
1.25	N2	44	88	56
1.5	K2	44	88	56
1.75	M2	44	88	56
2	L2	44	88	56
2.5	N2	44	88	28
3	K2	44	88	28
3.5	M2	44	88	28

DP

W

X

Y

Z

56	N3	44	98	100	63
48	N3	44	84	100	63
40	N3	55	81	72	49
36	N3	44	81	100	49
32	N3	55	56	80	63
28	N3	55	63	80	49
24	N3	55	63	80	42
22	N3	60	63	80	42
20	K3	55	63	80	42
18	N1	44	81	100	49
16	N2	44	63	80	56
14	N1	55	63	80	49
12	N1	55	63	80	42
11	N1	60	63	80	42
10	K1	55	63	80	42
9	L2	44	81	100	49
8	K2	55	63	80	42

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# Lathe Safety

Every effort has been made in the design and production of the M250 lathe to comply with statutory safety requirements and to provide a fundamentally safe machine tool. Its safety features include:-

- Covered leadscrew
- Torque limiter on Feed Shaft
- Fail-Safe** switch operates if End Guard removed.
- Shear Pin for leadscrew
- Interlock in Apron prevents simultaneous engagement of feed shaft and leadscrew.

In the further interests of safety, attention should be given to the following notes:-

## A. Machine Capacity

The dimensions of a component which can be accommodated on the M250 lathe are limited only by the physical restrictions of the machine itself but responsibility for the following points with respect to machining a component must inevitably rest with the user.

- (1) Ensuring that the operator has had suitable training and possesses the required degree of skill and experience to undertake the work.
- (2) Providing suitable work holding and/or supporting equipment, i.e. chucks, steadies, revolving centres, etc.
- (3) Ensuring that suitable tooling is provided and correctly mounted.
- (4) Ensuring that suitable feeds and speeds are selected (if in doubt select the lowest).
- (5) Providing suitable workpiece guards and ensuring that these are consistently used.

## B. Lathe Safety Rules

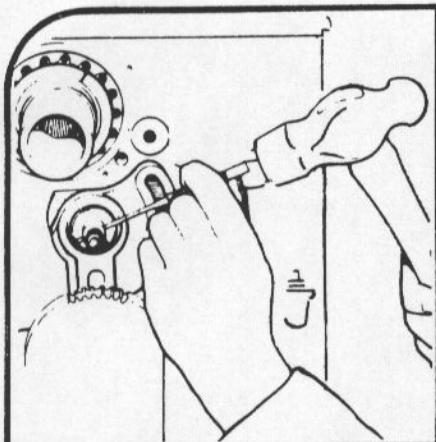
- (1) Read and understand operation notes before attempting to use the machine.
- (2) Keep lathe work areas clean.
- (3) Keep area surrounding machine tidy.
- (4) **ENSURE YOU KNOW HOW TO STOP THE MACHINE BEFORE STARTING IT.**
- (5) Do not interchange chucks or other spindle mounting items between lathes without checking for correct locking (see operational notes).
- (6) Use only 'high speed' chucks.
- (7) Note maximum permissible speeds of faceplates (see operational notes).
- (8) Remove chuck key immediately after use.
- (9) Check load capacity of revolving centres.
- (10) Ensure workpiece guards are in position before starting machine.
- (11) **Do not** use cracked or chipped tools.
- (12) Check —
  - Spindle speed selected.
  - Feed rate selected.
  - Direction of feed, and that
  - Feed & thread cutting levers are disengaged before starting the spindle.
- (13) **STOP MACHINE IMMEDIATELY ANYTHING UNEXPECTED HAPPENS.**
- (14) Do not use coarse feed range on high spindle speeds (see operational notes).
- (15) **Do not** change spindle speeds when spindle is rotating.
- (16) **Do not** touch revolving chuck, spindle, or workpiece.
- (17) **Do not** remove work from the machine without retreating the tool to a safe position.
- (18) Stop motors and switch off isolator when leaving machine unattended.

### **C. Personal Safety Rules**

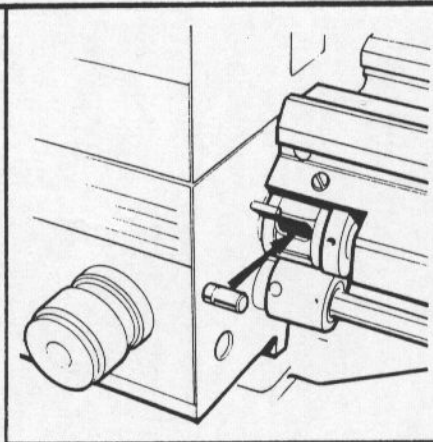
- (1) Report any accident, however small, immediately it happens.
- (2) Wear safety glasses.
- (3) Wear safety shoes.
- (4) Use barrier creams provided.
- (5) Wear your overalls buttoned up.
- (6) Roll sleeves up, or button the cuffs.
- (7) Keep hair short or wear a cap.
- (8) Use the correct size spanners at all times.
- (9) Be careful of, and remove if possible, burrs and sharp edges.
- (10) Use the correct type of sling when lifting workpieces, of the correct safe working load and ensure it is not worn or damaged.
- (11) Stand clear when lifting workpieces or equipment by crane.
- (12) Obtain assistance when mounting heavy or awkwardly shaped workpieces.
- (13) **Do not** wear rings, watches, ties, etc.
- (14) **Do not** keep tools (scribers, etc.) in overall pockets.
- (15) **Do not** remove guards unless machine is stationary.
- (16) **Do not** wash hands in coolant.
- (17) **Do not** remove swarf with bare hands, use a rake or brush.
- (18) **Do not** manually lift heavy equipment.
- (19) **Do not** use files, scrapers, etc. without handles.
- (20) **Do not** lean on the machine.
- (21) **Do not** interfere with electrical equipment.



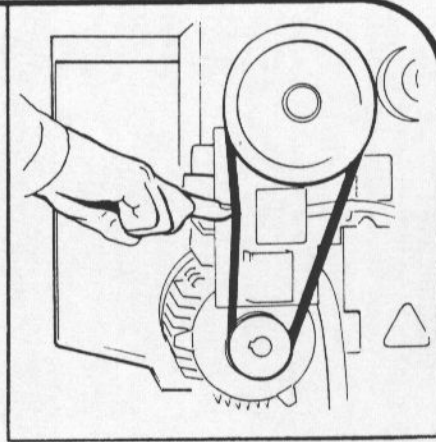
**Maintenance**



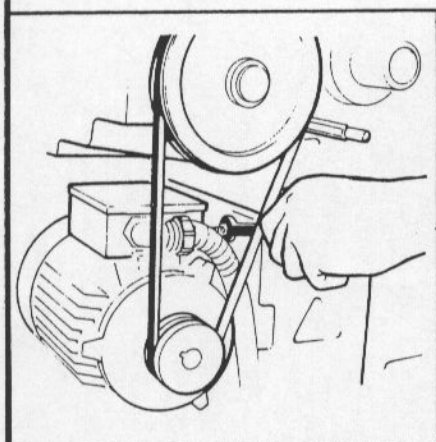
**FIG. 1**



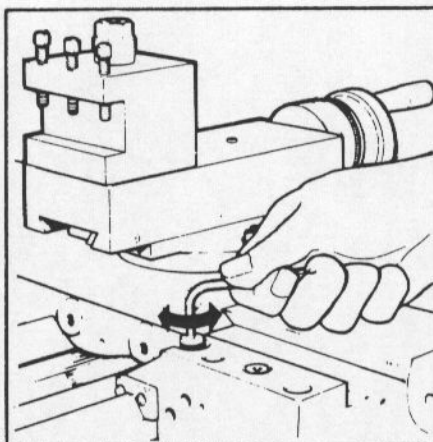
**FIG. 2**



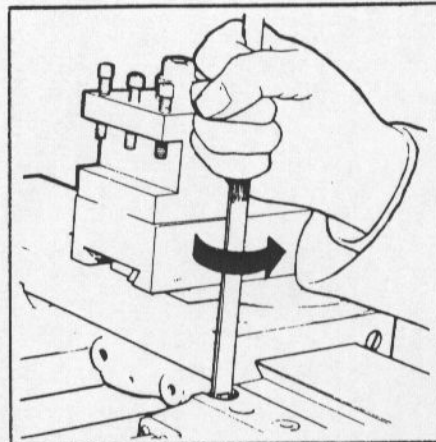
**FIG. 3**



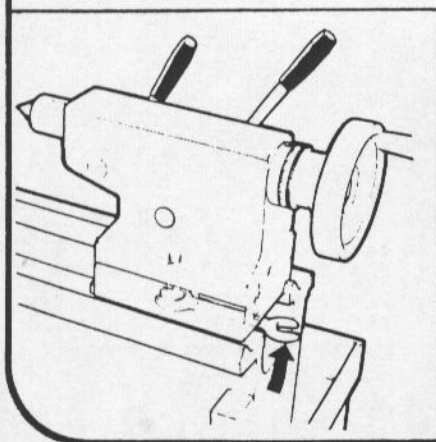
**FIG. 4**



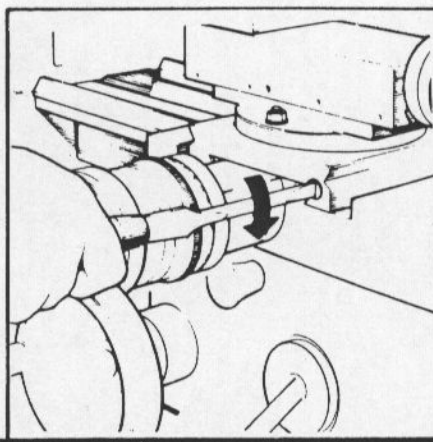
**FIG. 5**



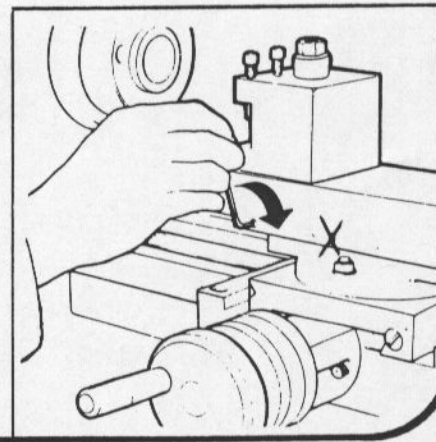
**FIG. 6**



**FIG. 7**



**FIG. 8**



**FIG. 9**

### **Changewheel Shear Pin (Fig. 1)**

A protection against accidental overload in the end gear train is provided in the form of a shear pin fitted in the splined sleeve on the top changewheel shaft. In the event of replacement being necessary a 4 mm (5/32") diameter x 20 mm (3/4") long mild steel pin should be fitted as follows:-

Remove the hexagon nut, washer and changewheel, pull off the splined sleeve and remove the broken pin parts from both sleeves and shaft. Fit new pin.

NOTE: The pin acts in single shear and will only enter the sleeve from the 'big-hole' side.

### **Leadscrew Shear Pin (Fig.2)**

A shear pin device is incorporated on the leadscrew adjacent to the gearbox, as protection against overload. Instructions for replacing the shear pin are as follows:-

Remove the torque limiter cover plate.

Disengage shear pin assembly by sliding away from gearbox face.

Rotate spring steel cover on its locating sleeve until access slot is exposed.

Release M5 dog-point set screw in sleeve and rotate sleeve and cover until shear pin is exposed through slot.

Replace shear pin as shown in illustration (2) and re-assemble ensuring that the dog point of the M5 set screw is correctly located.

### **Drive Belts (Fig. 3 and 4)**

Access to the Drive Belt is gained by removal of the moulded end guard when vee Belt tension may be assessed by applying finger pressure on the belt at a point midway between the two pulleys (fig. 3). For correct tension a deflection of about 10 mm should be possible.

To adjust the vee belt tension – release the lock nut on the adjusting screw (fig. 4) to increase tension, tighten screw against the bed until correct tension is obtained then re-tighten lock nut.

It is important that when making adjustments a straight edge be placed across the face of each pulley to ensure that correct alignment is maintained.

### **Saddle Strips (Fig. 5 and 6)**

Wear on the rear and front saddle strips may be accommodated by adjustment of the retaining sleeves located in the top face of the saddle; two for the rear and one each for the two front strips.

The procedure for adjustment is to first release the socket head screw, slightly turn the slotted head sleeve anti-clockwise and then re-clamp the cap screw. Care should be taken to avoid over adjustment; a 30° turn at the sleeve represents approximately 0.1 mm (.004") take up in the strip.

### **Tailstock Bed Clamp (Fig. 7)**

The angular lock position of the bed clamp lever is adjusted by means of the self-locking hexagon headed bolt located on the underside of the tailstock and between the bed ways.

continued



### **Cross-slide (Fig. 8)**

Wear on the taper-gib strip may be adjusted for by clockwise rotation of the slotted head screw on the front face of the cross-slide. The procedure being to first slacken the similar screw at the rear then re-tighten this after adjustment to clamp the strip in its new position.

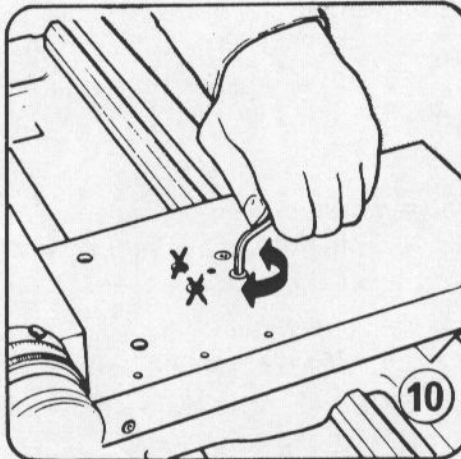
### **Top Slide (Fig. 9)**

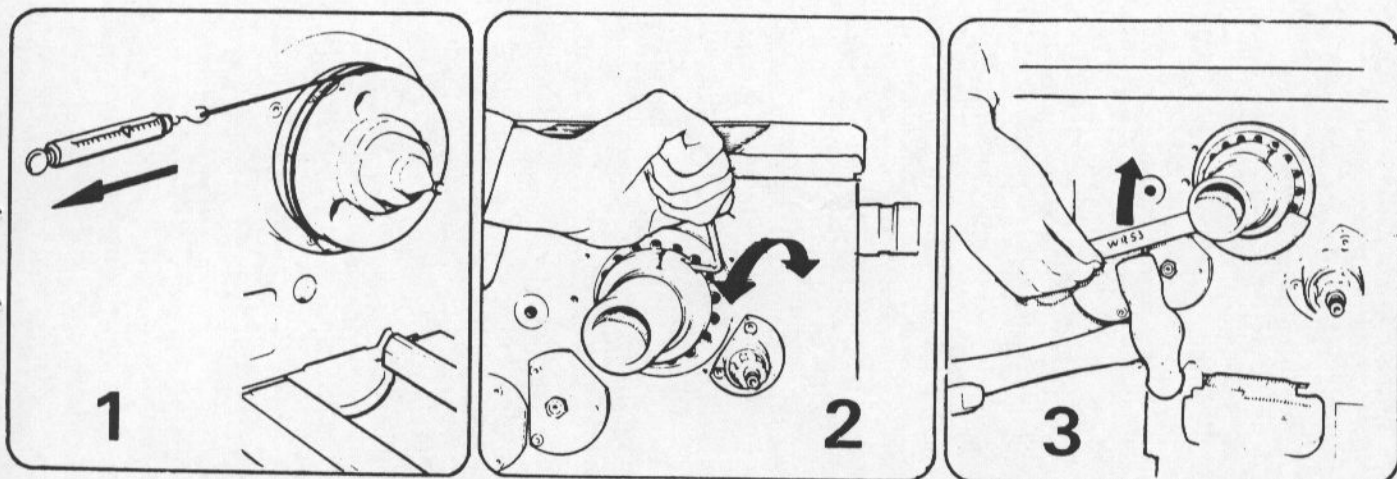
Take up for wear on the top slide strip is by means of the four (self-locking) socket set screws in the front face of the top slide casting.

### **Cross-slide Nut (Fig. 10)**

Provision is made for the elimination of backlash in the cross-slide nut, the procedure for adjustment being as follows: -

Release **only** the rear pair of socket cap head screws in the top face of the cross-slide, which allows a spring loaded device to automatically remove backlash. Re-tighten cap head screws.





The spindle bearing assembly is carefully set before despatch of the Lathe from our Works which should ensure a high standard of performance without the need for further attention.

THE USER IS ADVISED NOT TO DISTURB THIS SETTING DURING NORMAL USE OF THE MACHINE AND TO CONSULT OUR SERVICE DEPARTMENT IN THE UNLIKELY EVENT OF A BEARING PROBLEM.

WHERE ADJUSTMENT IS UNDERTAKEN THEN IT IS ESSENTIAL THAT THE FOLLOWING PROCEDURES ARE STRICTLY COMPLIED WITH.

#### TO CHECK FOR CORRECT SETTING

Checks should be carried out with the headstock in a warm condition achieved by running at a spindle speed of 800 rpm for approximately ten minutes.

The correct bearing torque setting is 0.9/1.1 Nm (8/10 in lbs) and can be determined as follows (Fig. 1):-

Wrap a length of string approximately three turns around the body of the chuck.

To the free end of the string attach a light spring balance and pull gently until spindle commences to turn, continuing to apply a steady load just sufficient to maintain the spindle in motion and noting the steady load registered on the balance.

Example: Using a 160 mm (6¼ in) chuck, the spring balance reading should be 1.14/1.36 kg (2½/3 lbs).

#### BEARING ADJUSTMENT

Remove end drive guard, changewheels, swing frame and rear bearing cover.

Release locking screw in the bearing adjusting nut, Fig. 2. With the pin-key provided adjust the nut as required - clockwise rotation to increase bearing load, Fig. 3. As over tightening will seriously impair the life of the bearings it is recommended that adjustment be made in increments not exceeding 3 mm (1/8 in) measured on the nut periphery. After each incremental adjustment, the spindle should be run for a few minutes and the bearing load re-checked, as described above.



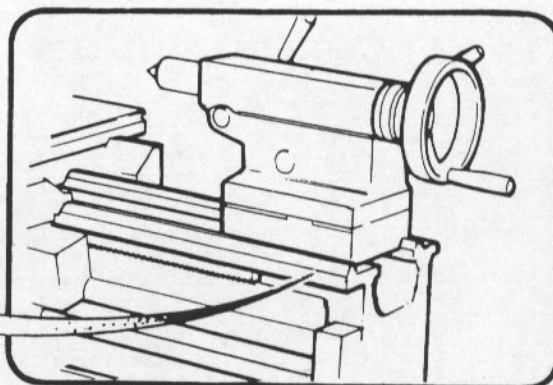


# Parts Ordering Procedure

1

**Quote:  
Machine Serial Number**

which will be found stamped into the front face of the bedways at the tailstock end



2

Refer to the appropriate assembly and

**Quote:  
Individual Part Numbers taken direct from the Illustrations**

**NOTE:** Quantity used (when other than one) is given in a circle following the Part Number itself.

Where part numbers change with machine bed length then the model number is given, vis.

500

or

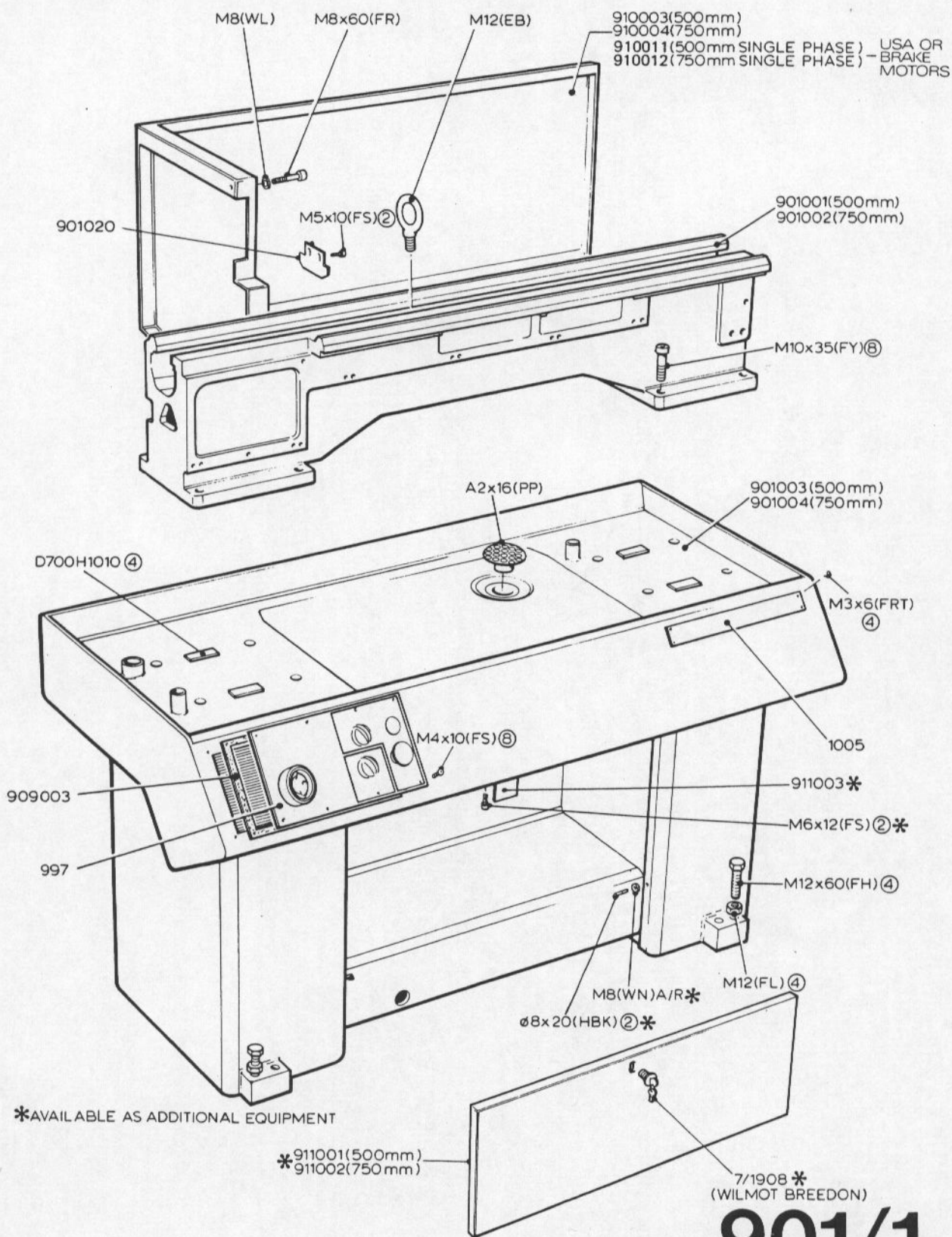
750

Standard/Proprietary Parts (i.e. items which can be purchased from local Engineering suppliers) may be identified by the "bracketed" letter code included in the Part Number, and reference to the appendix at the end of this manual will provide a full description of such items.

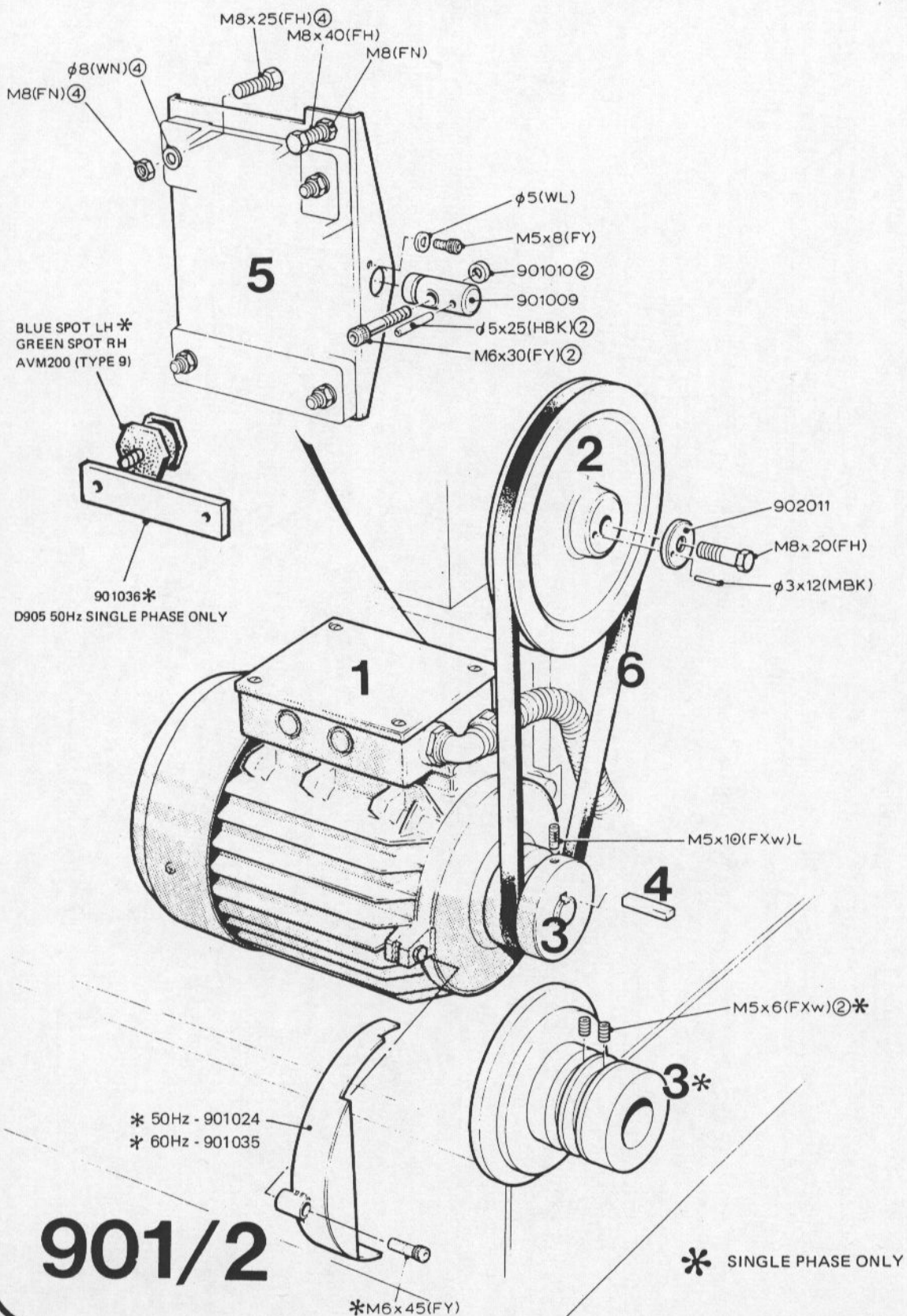
**Parts Section**

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901/2	Drive
901/3	Changewheel guard
902/1	Headstock
902/2	Headstock gears
902/3	Headstock controls
903/1	Gearbox casting and shafts
903/2	Gearbox gears and shafts (Metric)
903/3	Gearbox gears and shafts (English)
904/1	Apron casting and controls
904/2	Apron shafts
905/1	Saddle
905/2	Slides
906	Shafts, rack and bracket
907	Tailstock
908	Changewheels and swing frame
910	Standard equipment
911	Additional equipment (see section list)
912	Taper turning attachment
913	Bed capstan unit







# KEY TO DRIVE ASSEMBLY COMPONENTS (901/2)

1

2

3

4

5

6

MOTOR		TOP SPEED SPINDLE	TOP PULLEY	MOTOR PULLEY	KEY	MOUNTING BRACKET	BELTS
D80	3 PH 50Hz	1500 3000	902010	901012	6x5x40 (KR)	901007	SPZ 800
D90S	Single PH 50Hz	1500	902053	901023	8x7x32 (KR)	901037	NU-T-Z/10(40°) Brammer ②
D80	3 PH 60Hz	1500 3000	902010	901028	6x5x40 (KR)	901007	SPZ 800
LS145T	3 PH 60Hz	1500	902010	901013	3/16"x3/16"x1.3/8"(KS)	901008	SPZ 800
LS145T	3 PH 60Hz	2000	902057	901026	3/16"x3/16"x1.3/8"(KS)	901008	SPZ/3V 787
EL145T	Single PH 60Hz	2000	902061	901033	3/16"x3/16"x1.3/8"(KS)	901008	SPZ/3V 787
EL145T	Single PH 60Hz	1500	902089	901051	3/16"x3/16"x1.3/8"(KS)	901008	SPZ 800

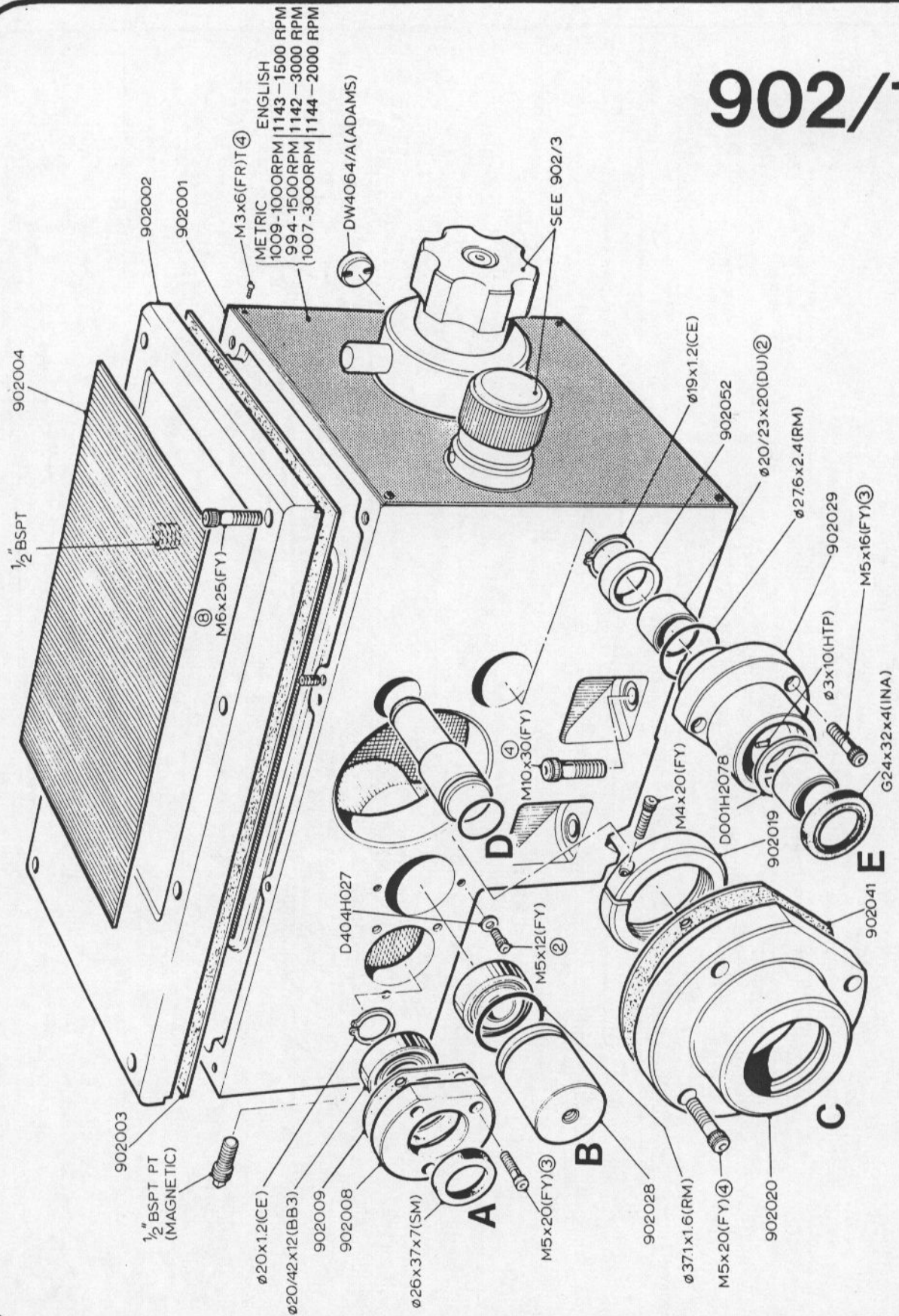




1037 (METRIC)  
1140 (ENGLISH)



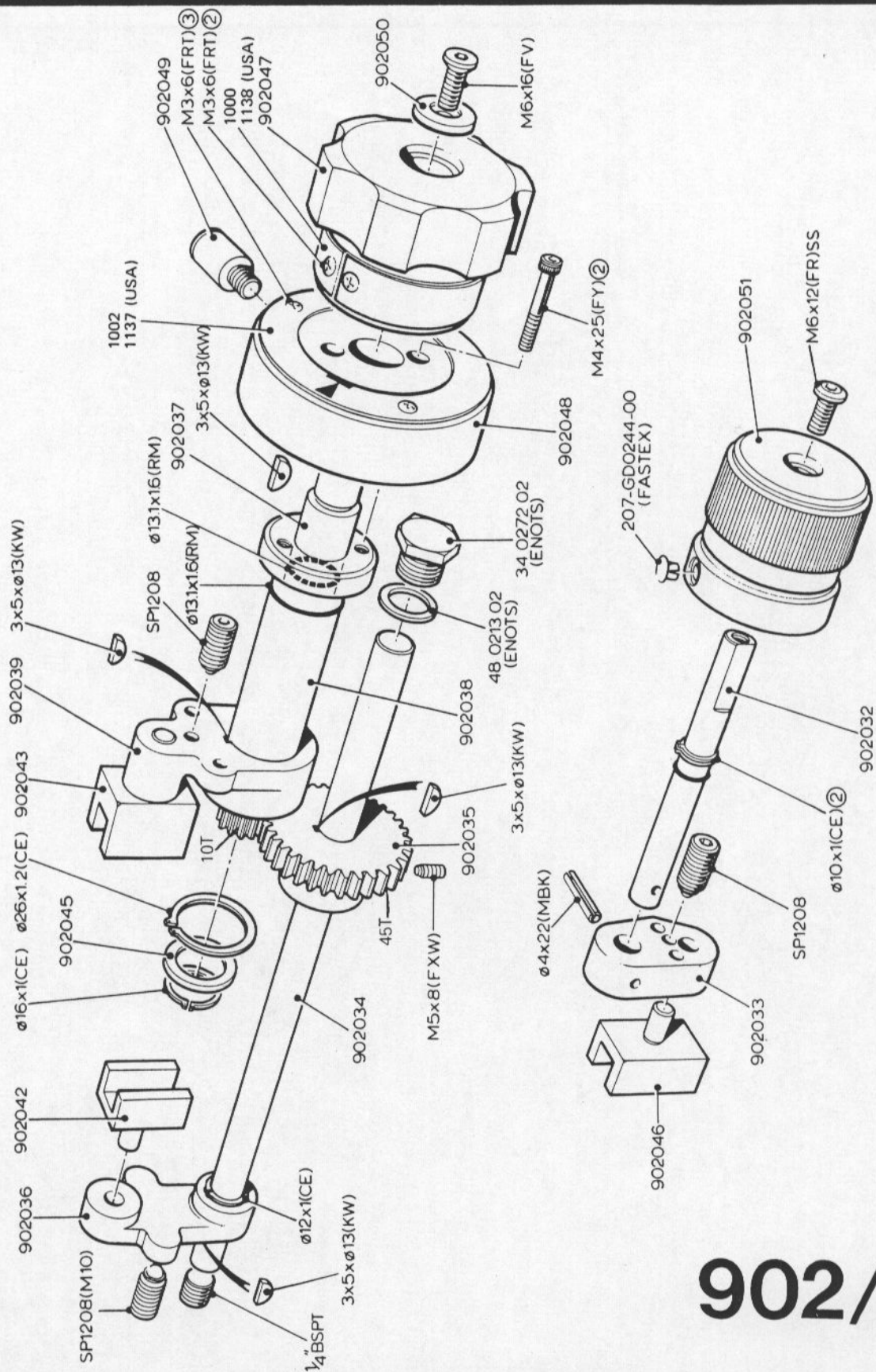
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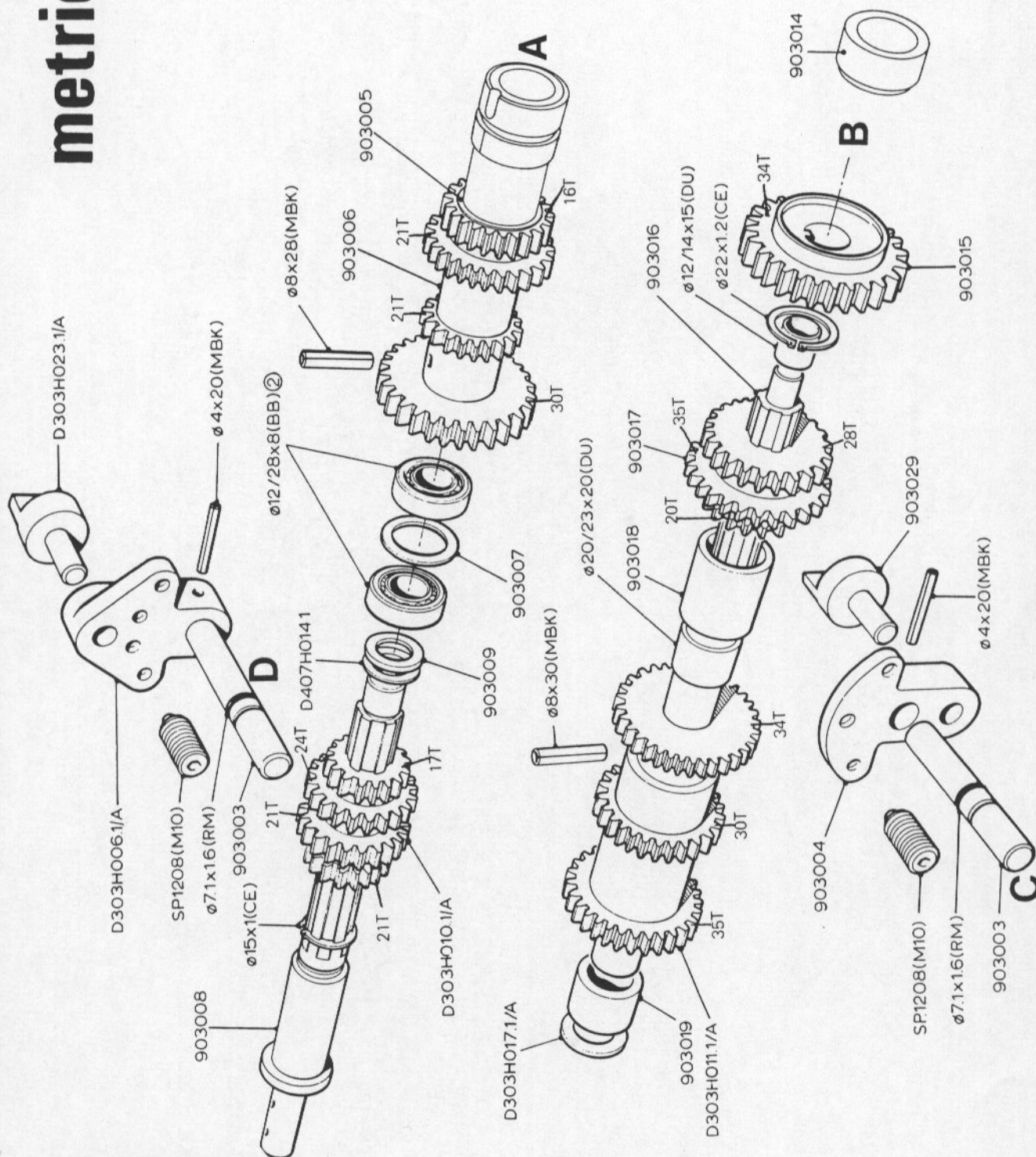


902/3





metric

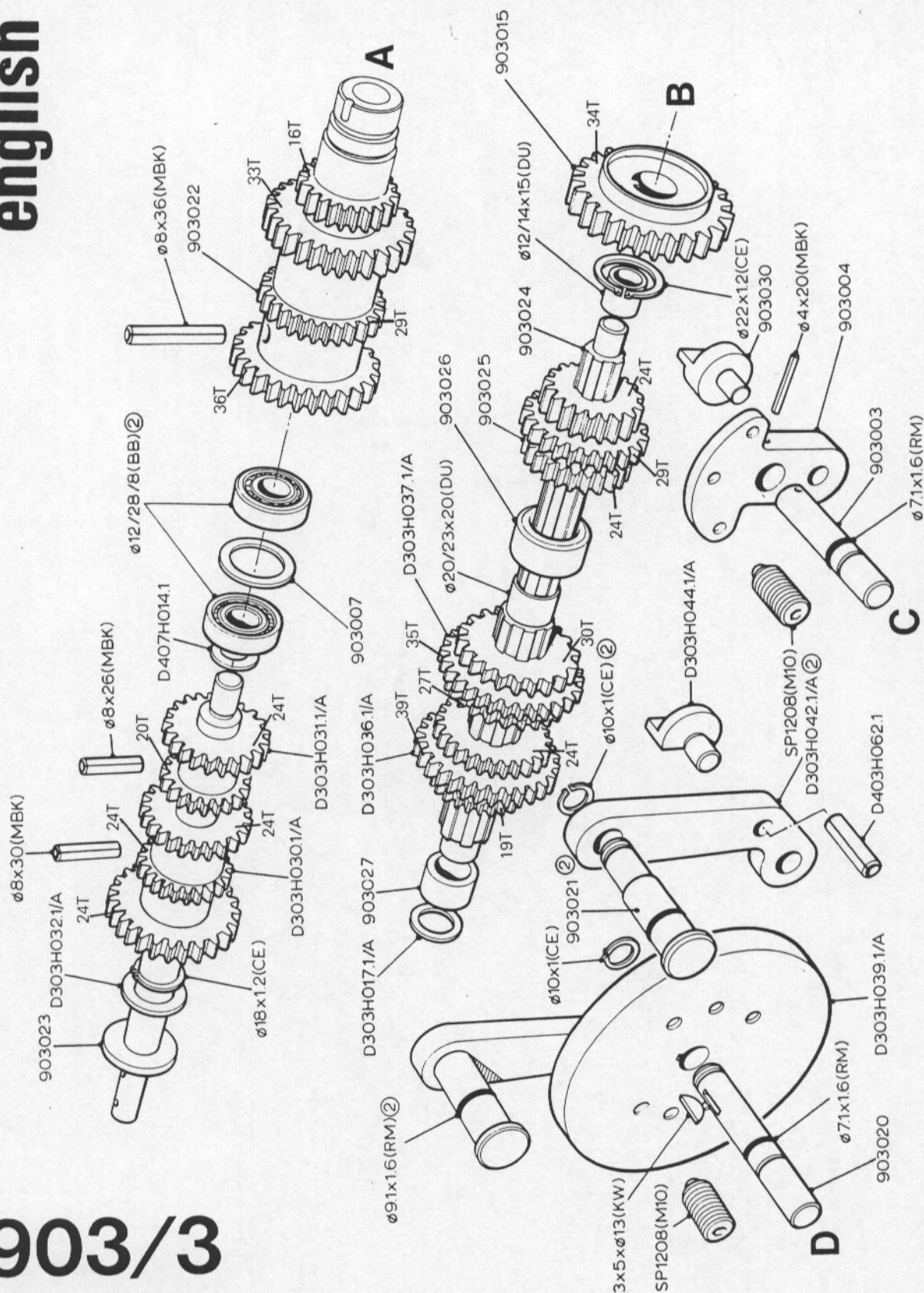


903/2

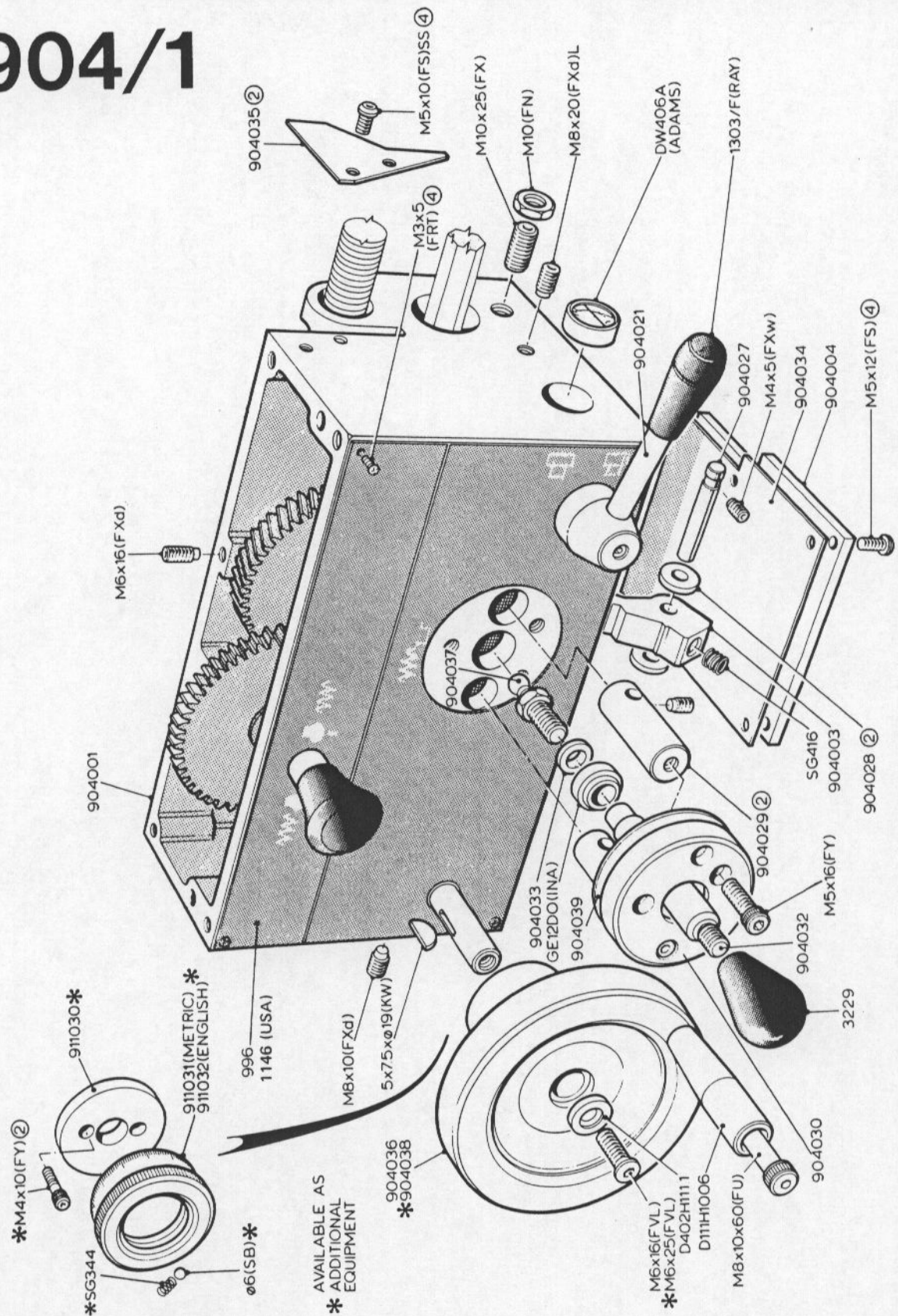


english

903/3



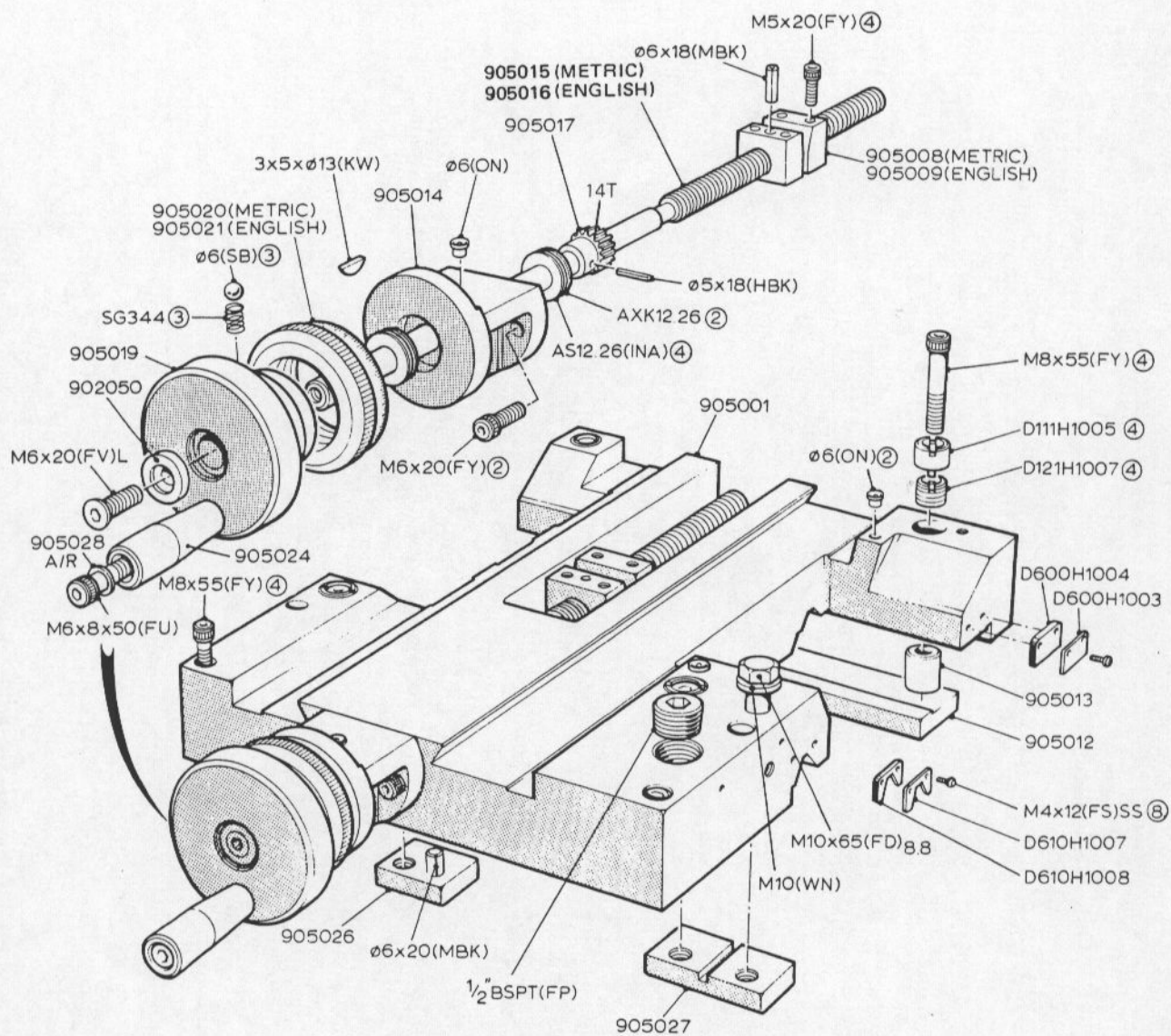
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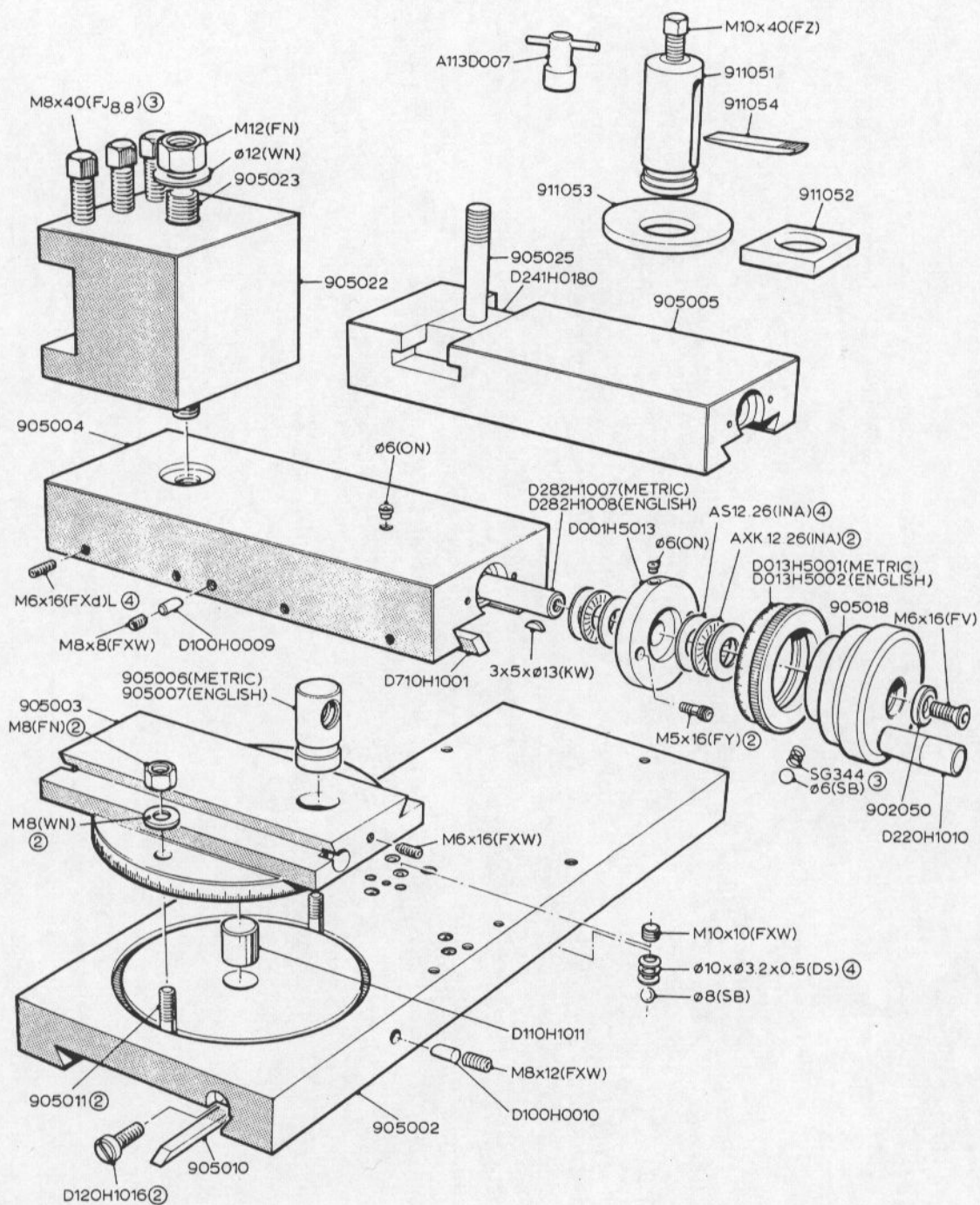








# 905/1

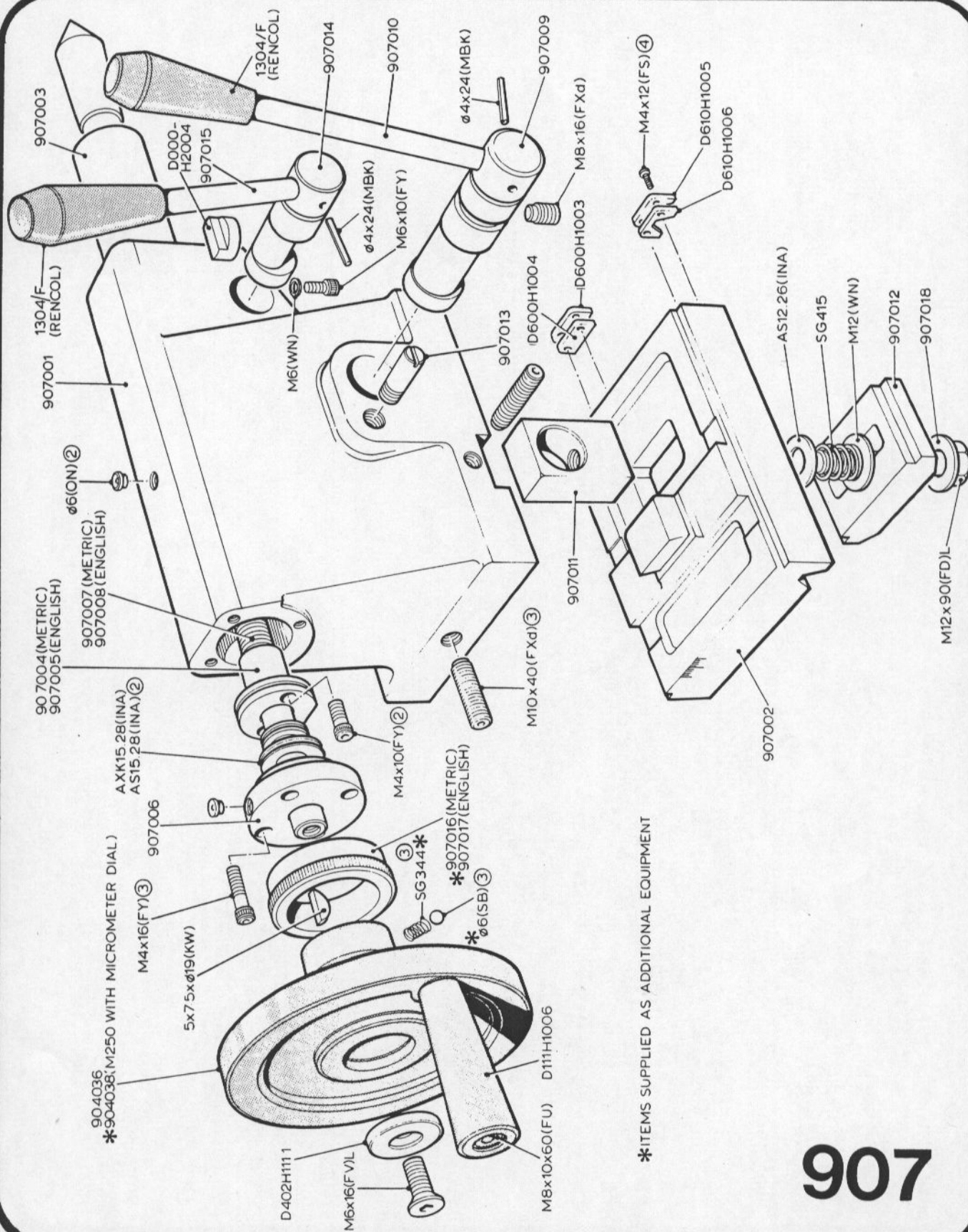


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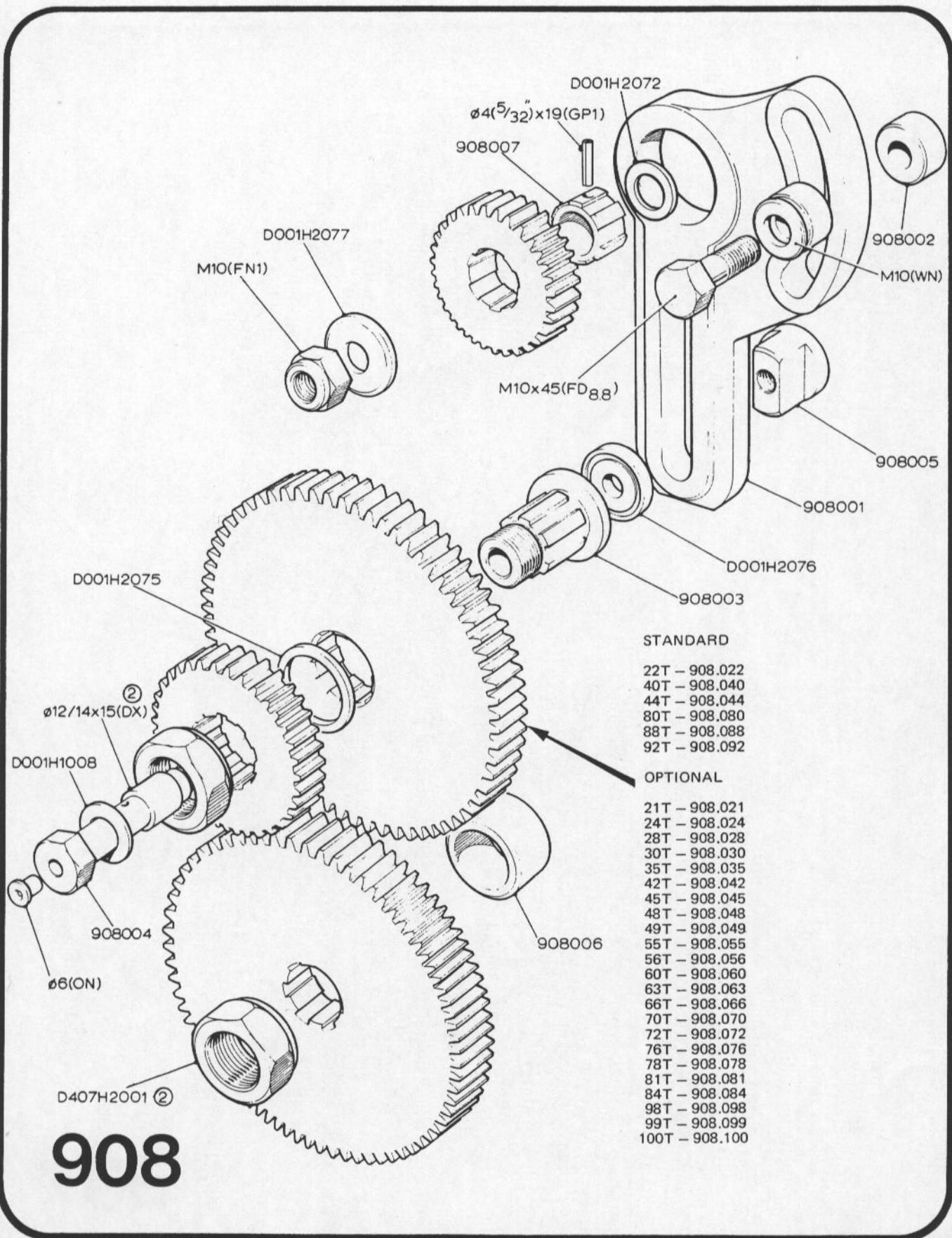


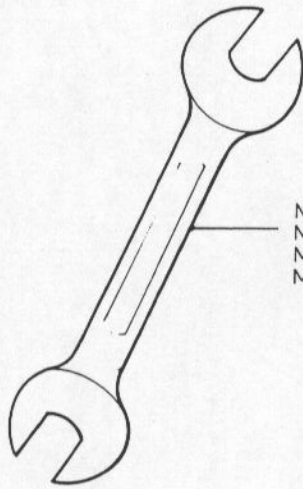




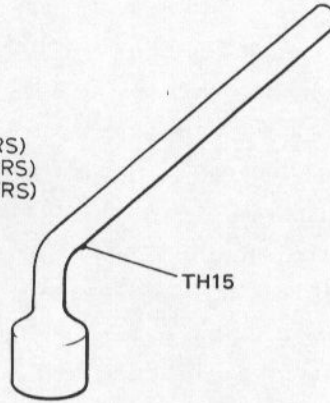
\*ITEMS SUPPLIED AS ADDITIONAL EQUIPMENT

907

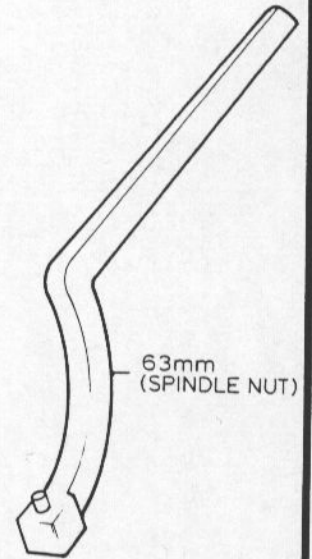




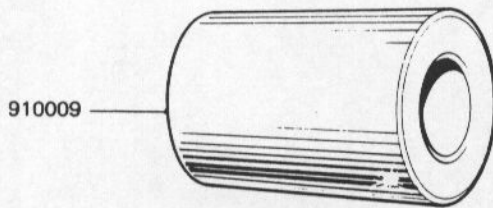
M8/13mm x 15mm (WRS)  
M10/17mm x M12/19mm (WRS)  
M14/22mm x M16/24mm (WRS)  
M18/27mm x M22/32mm (WRS)



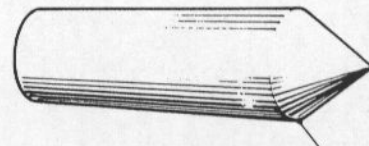
TH15



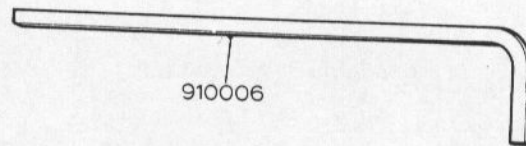
63mm  
(SPINDLE NUT)



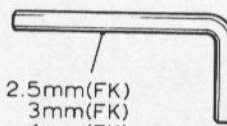
910009



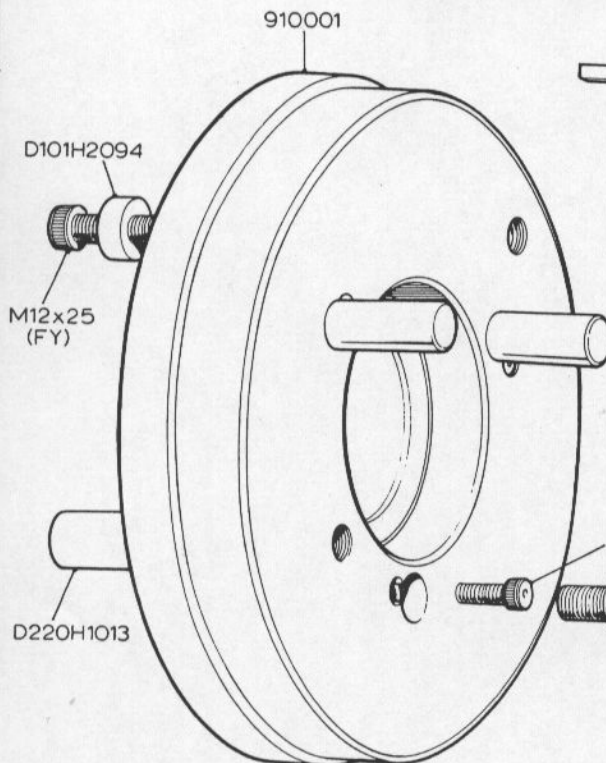
L5-585A



910006



2.5mm (FK)  
3mm (FK)  
4mm (FK)  
5mm (FK)  
6mm (FK)  
8mm (FK)



910001

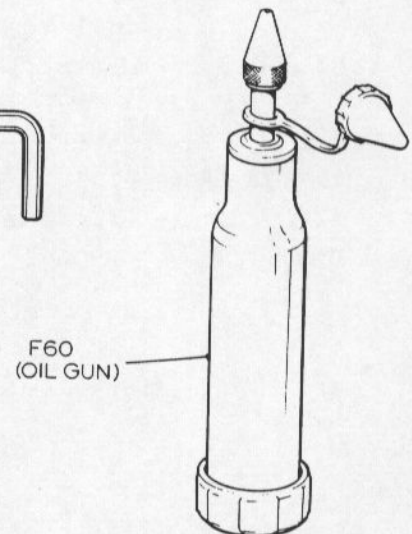
D101H2094

M12x25  
(FY)

D220H1013

M6x12 (FY) ③

910005 ③



F60  
(OIL GUN)

# 910

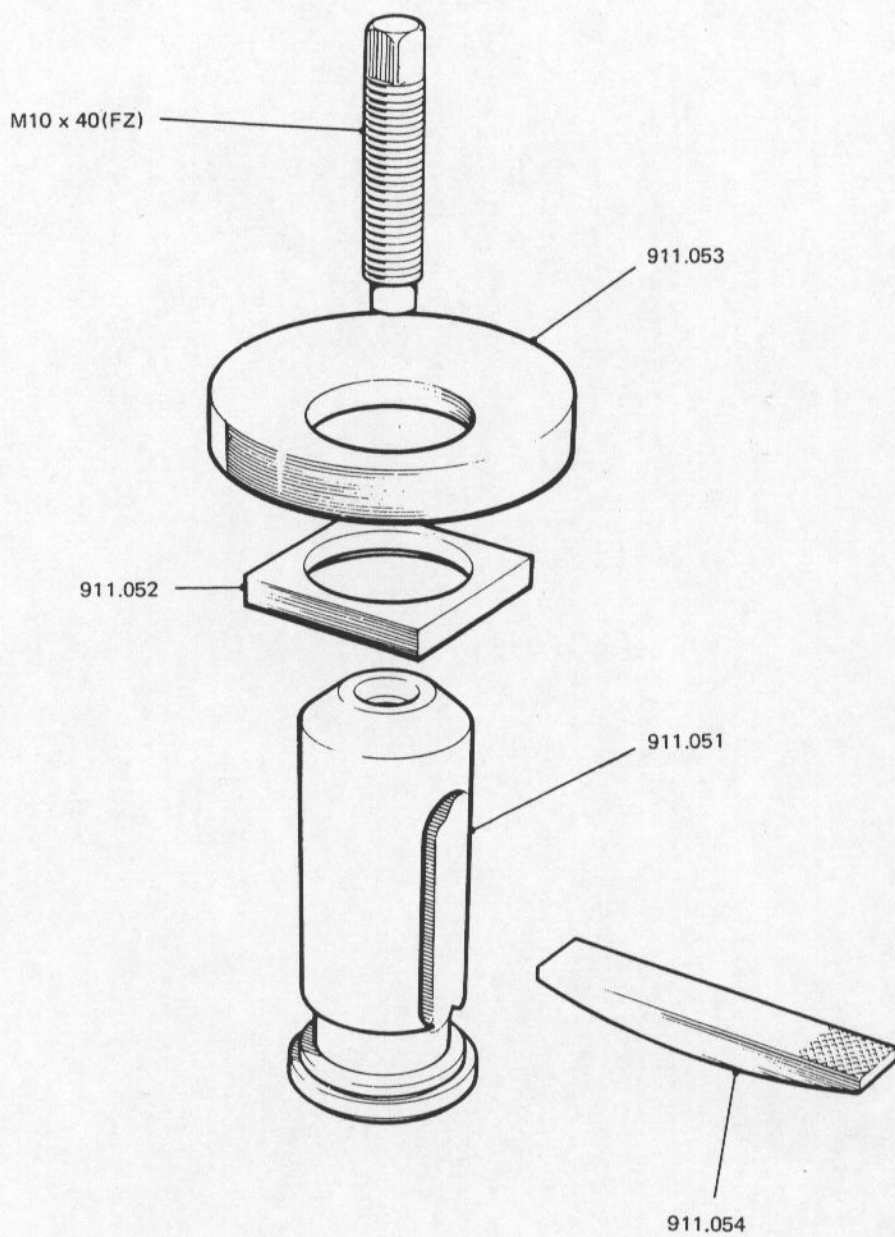


## Additional Equipment

		Page No.
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911.67	Thread dial indicator assembly	53
911.81	Emergency foot switch	54

Parts available as assemblies (not illustrated):

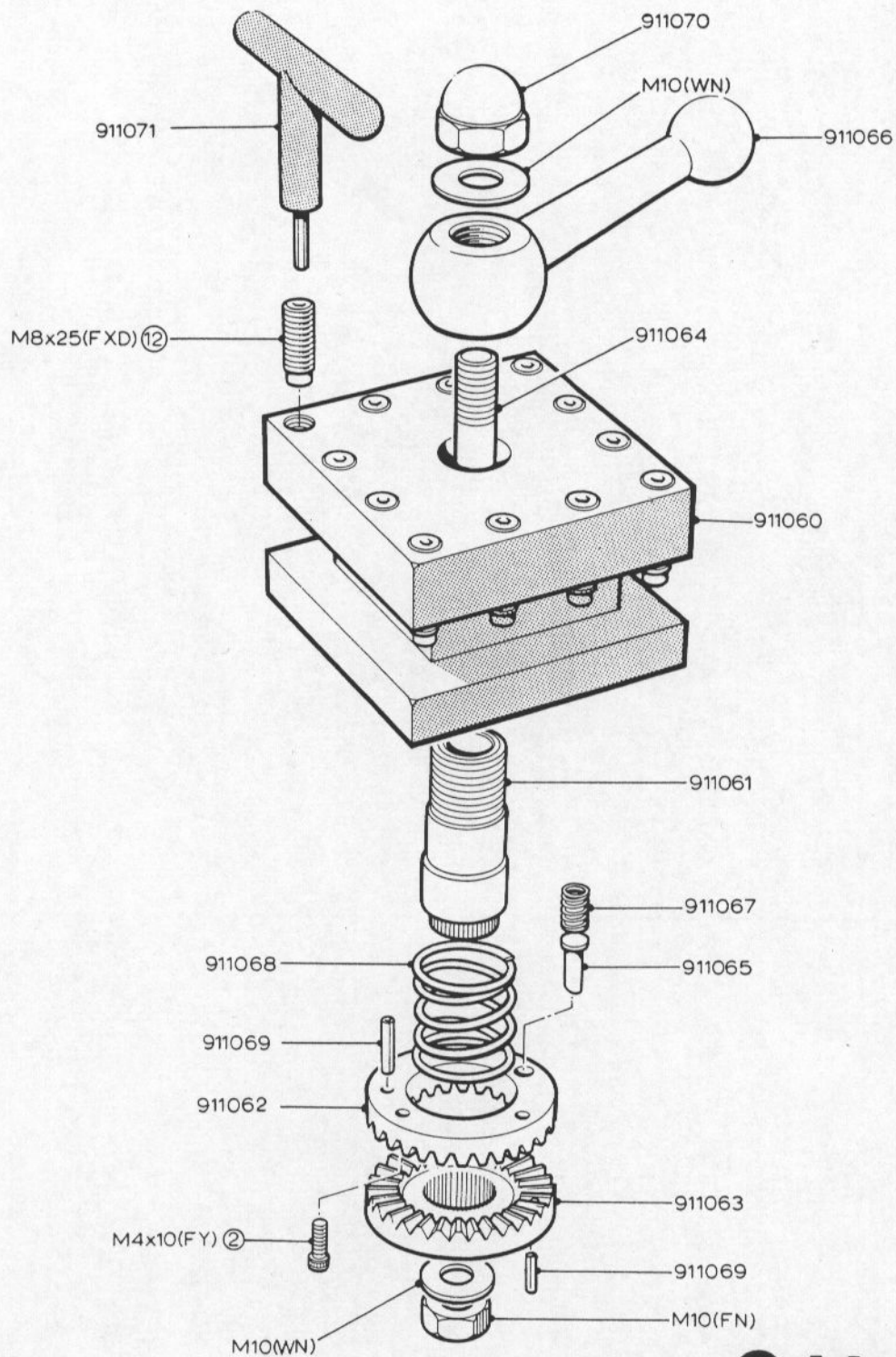
911.65	Metric/English dual reading dial - Cross-slide (English cross-slide screw and nut required)	
911.66	Metric/English dual reading dial - Topslide (English topline screw and nut required)	
911.72	Wattmeter	
1542-21601	4-jaw chuck	
1212-21305	3-jaw chuck	
D911H007.1	Faceplate	



**911/09**

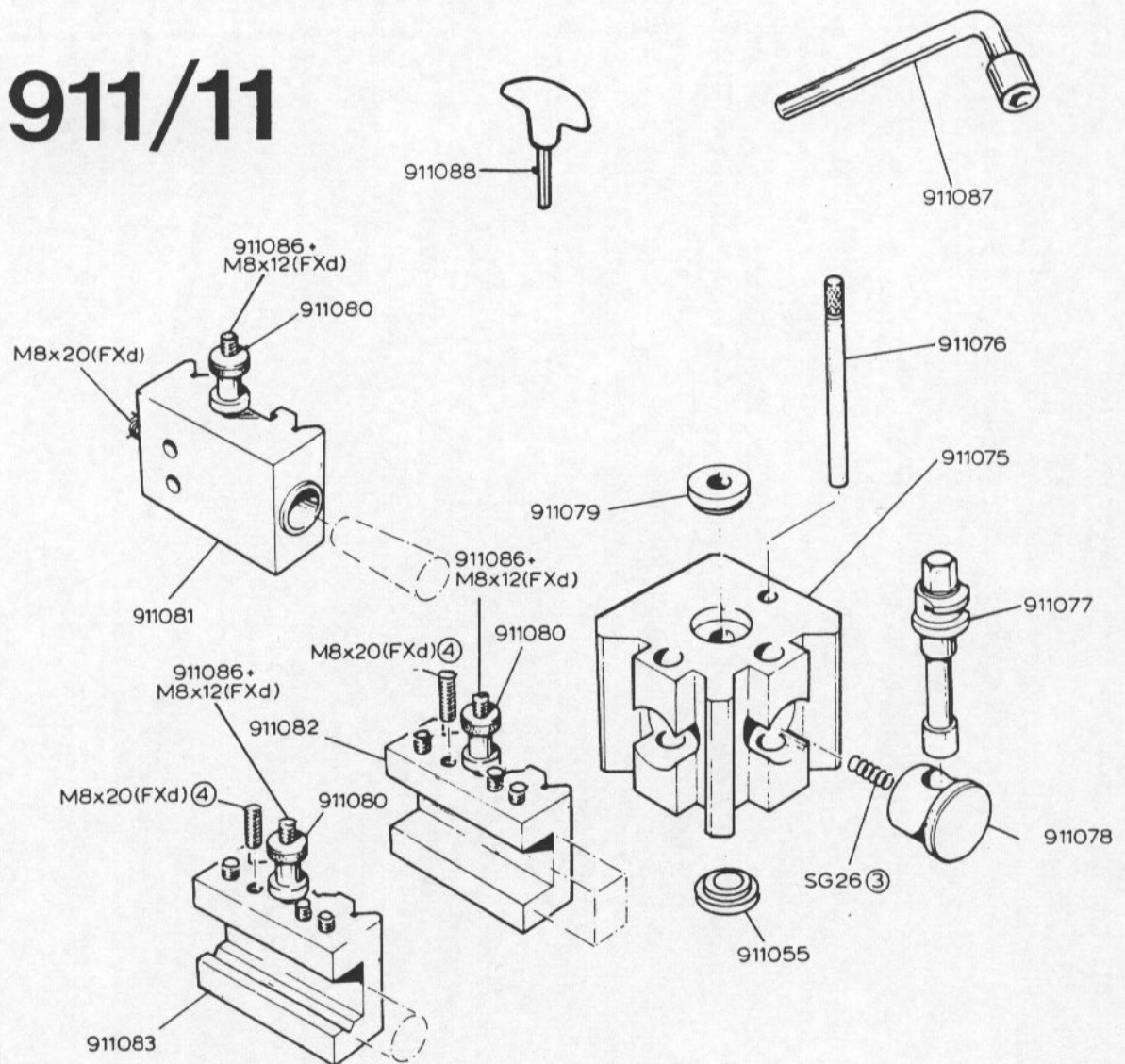




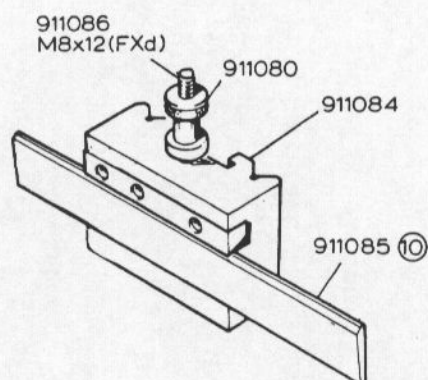


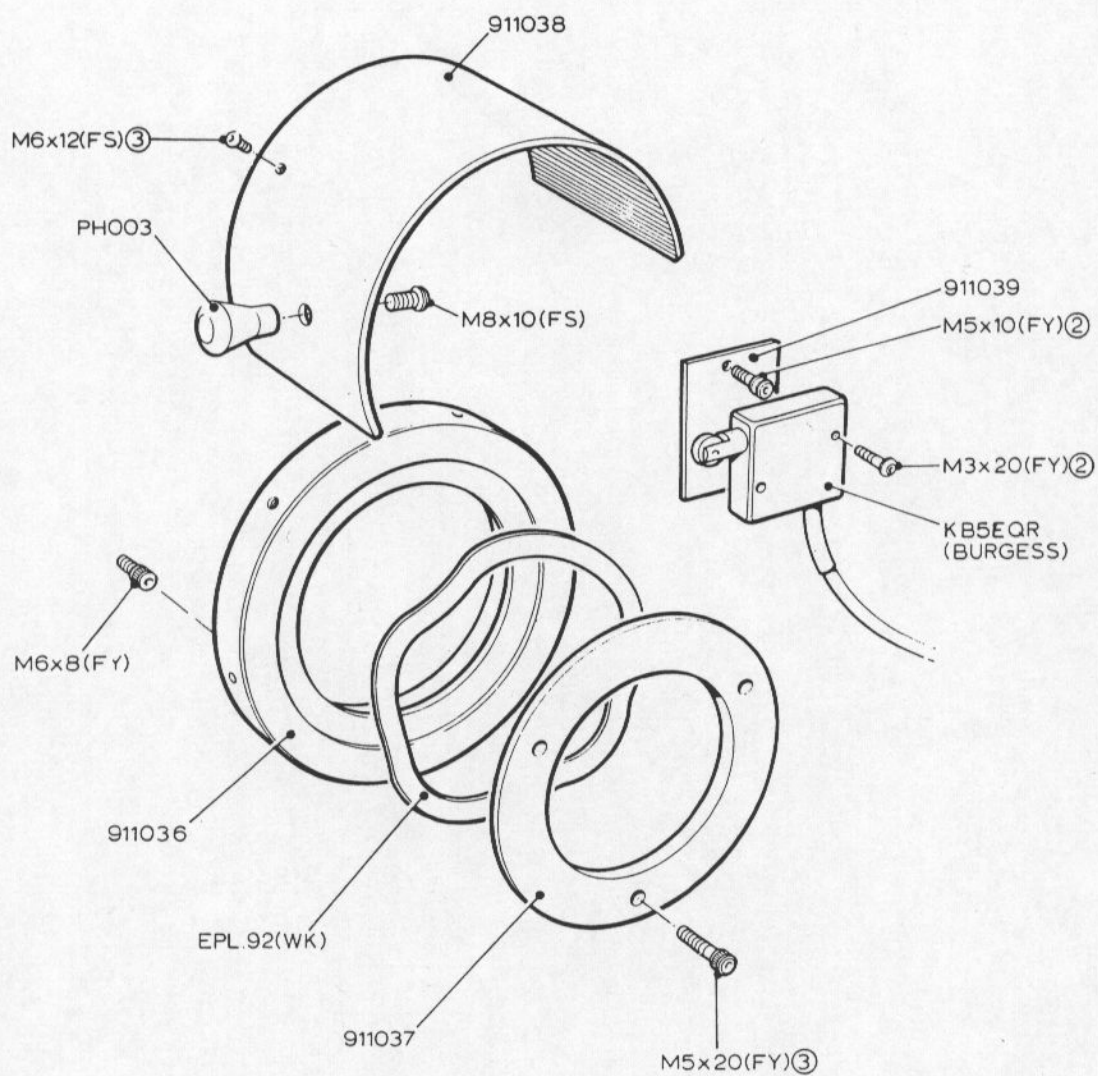
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# 911/11



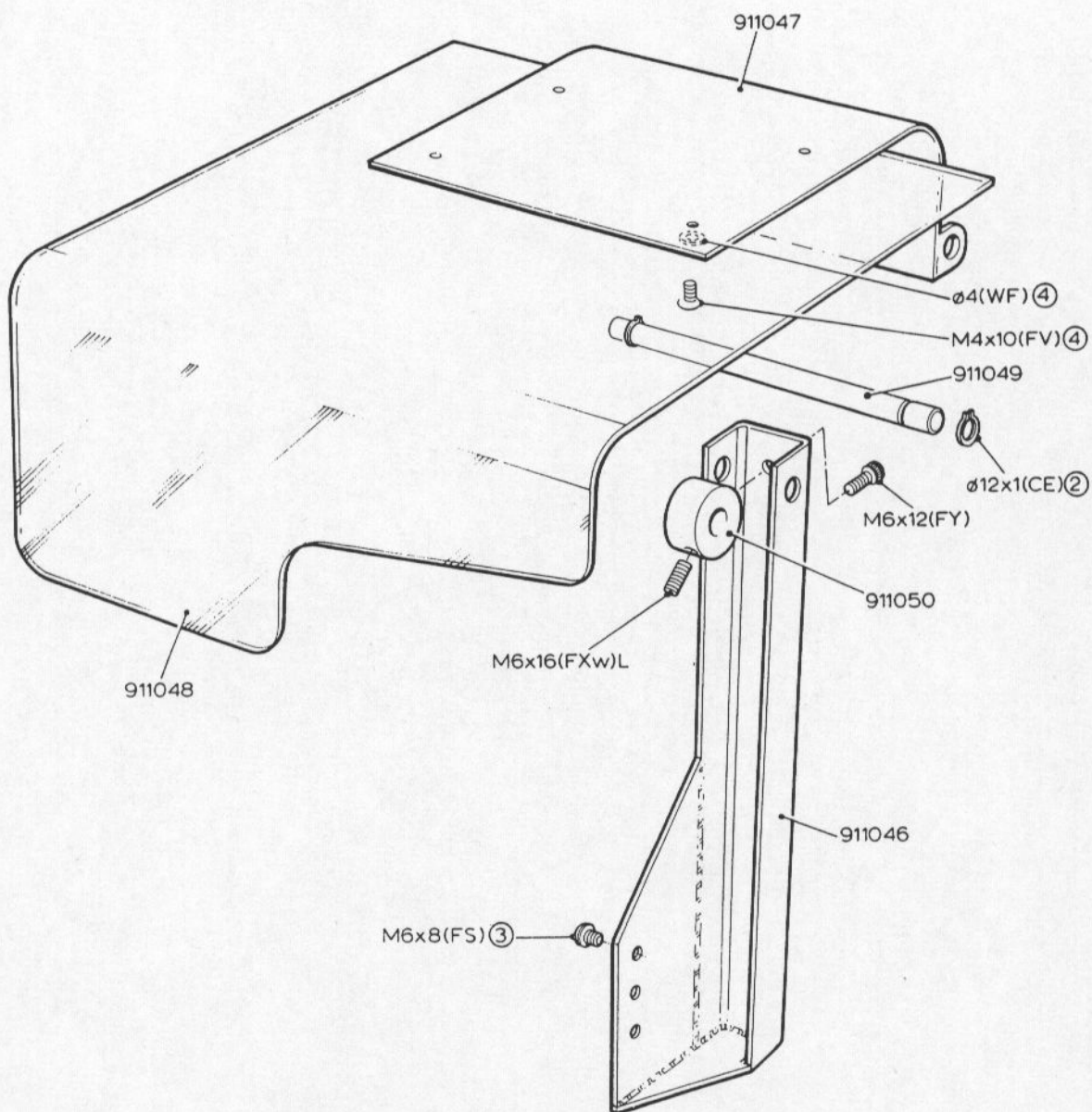
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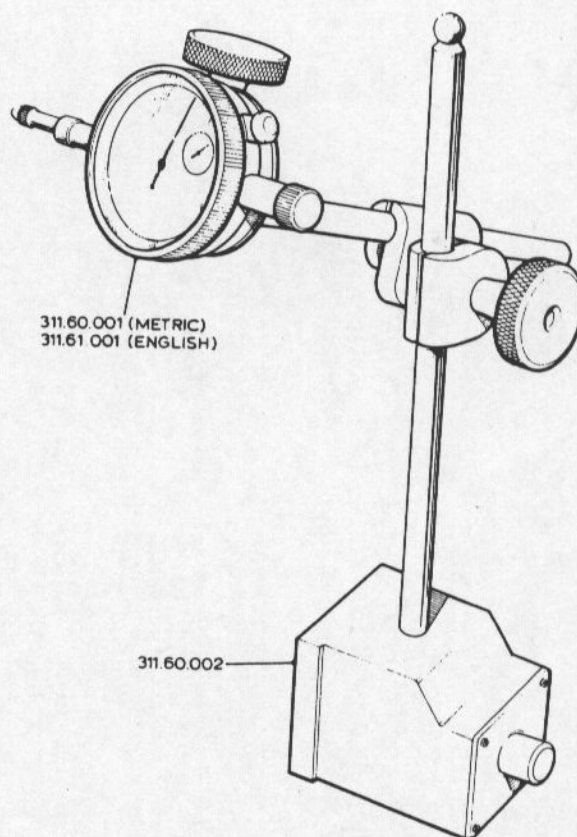
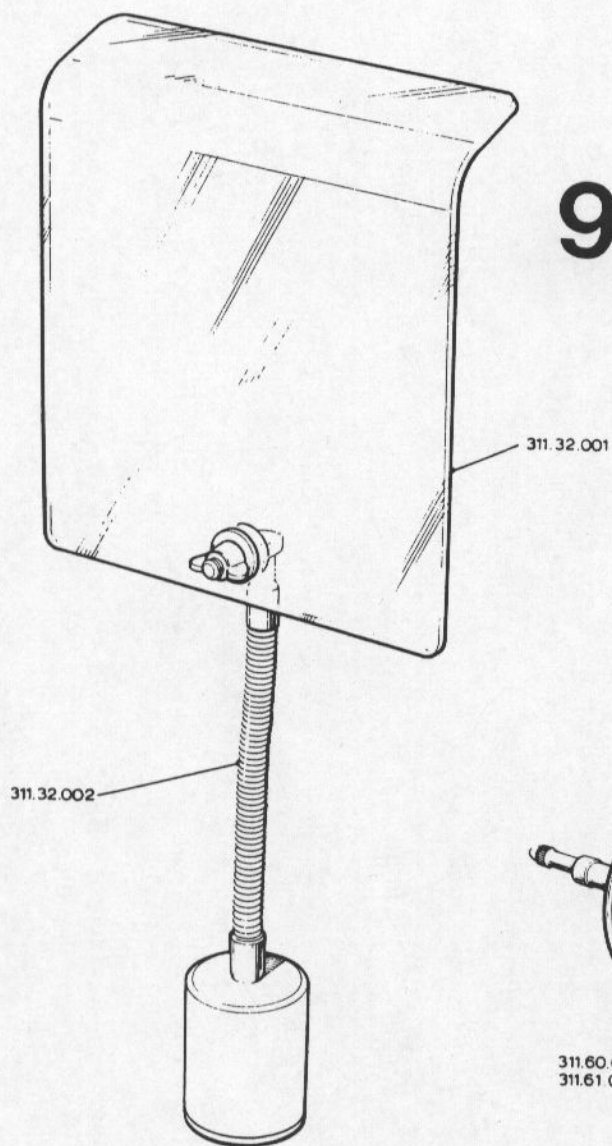
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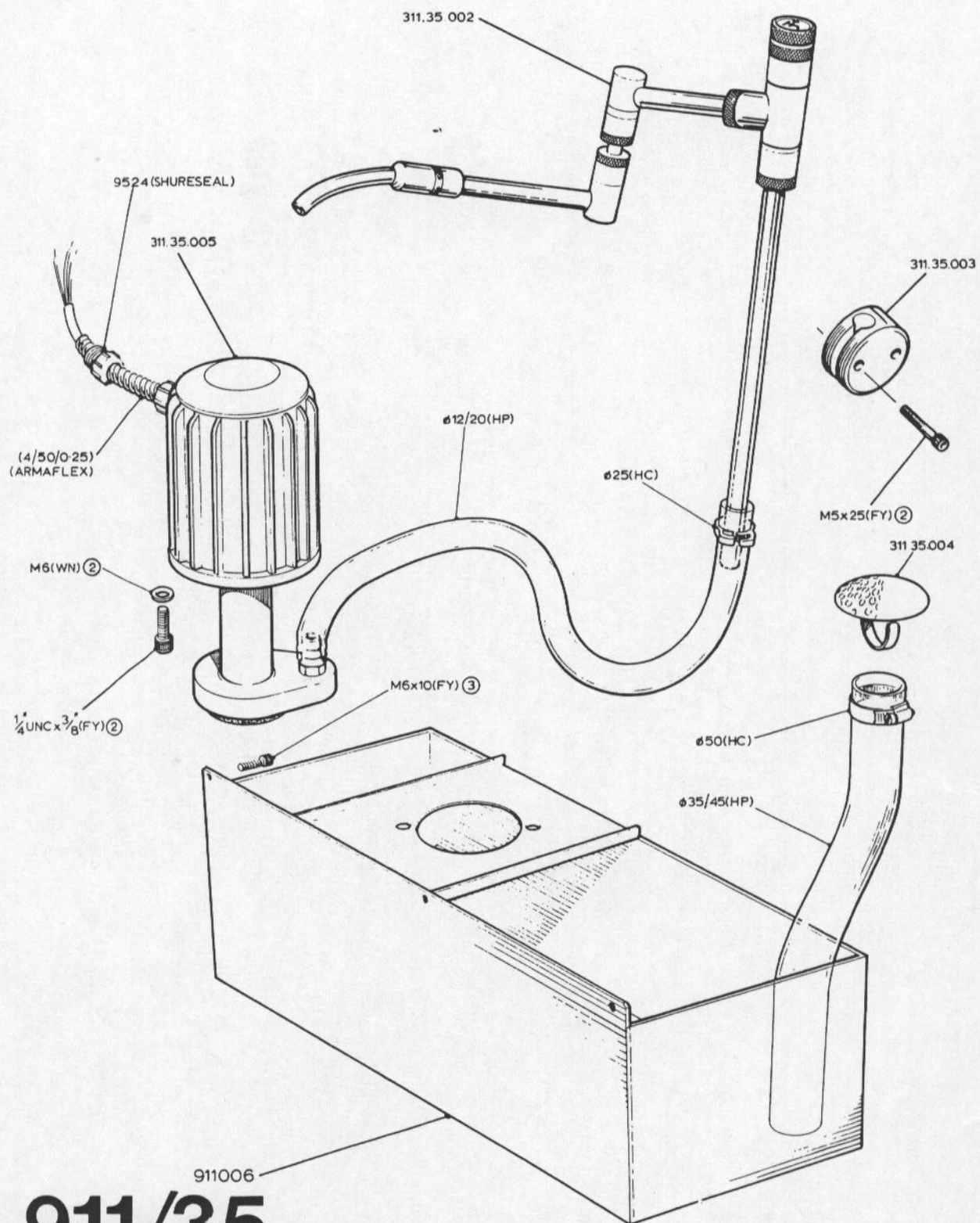


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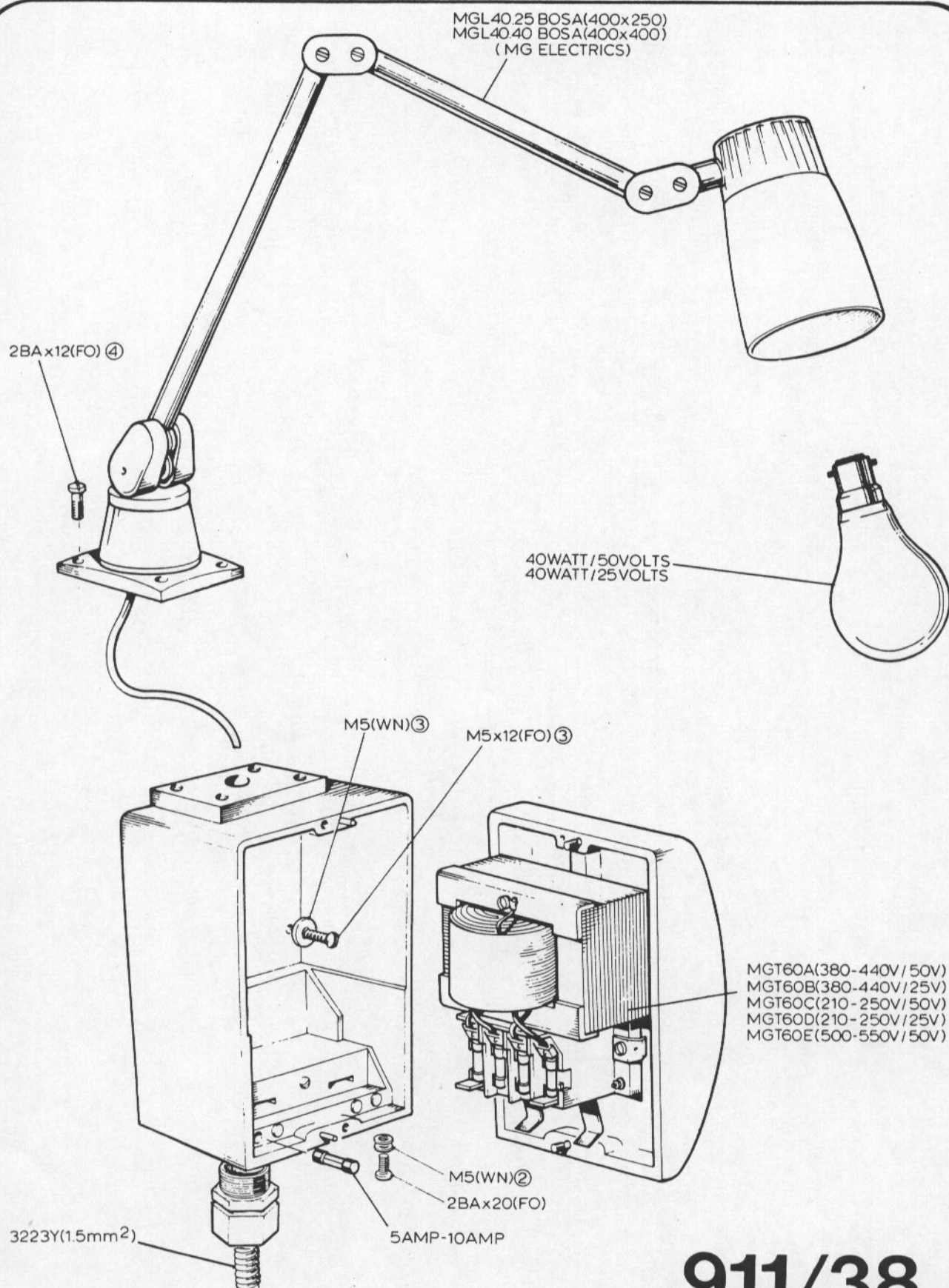


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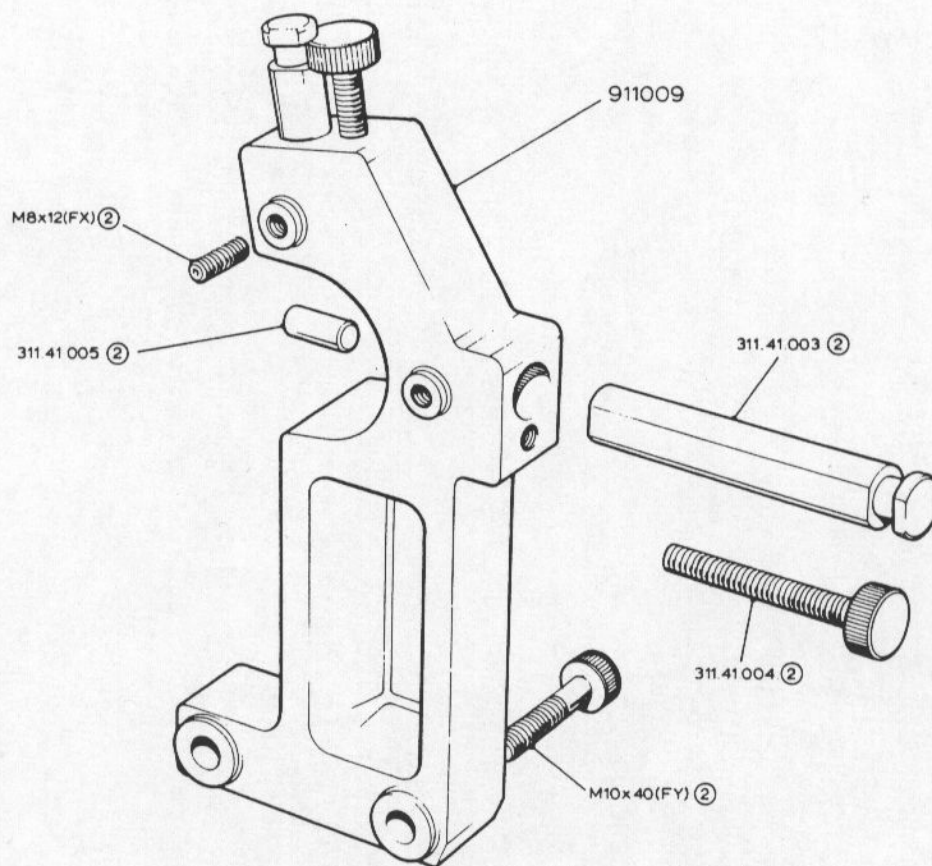


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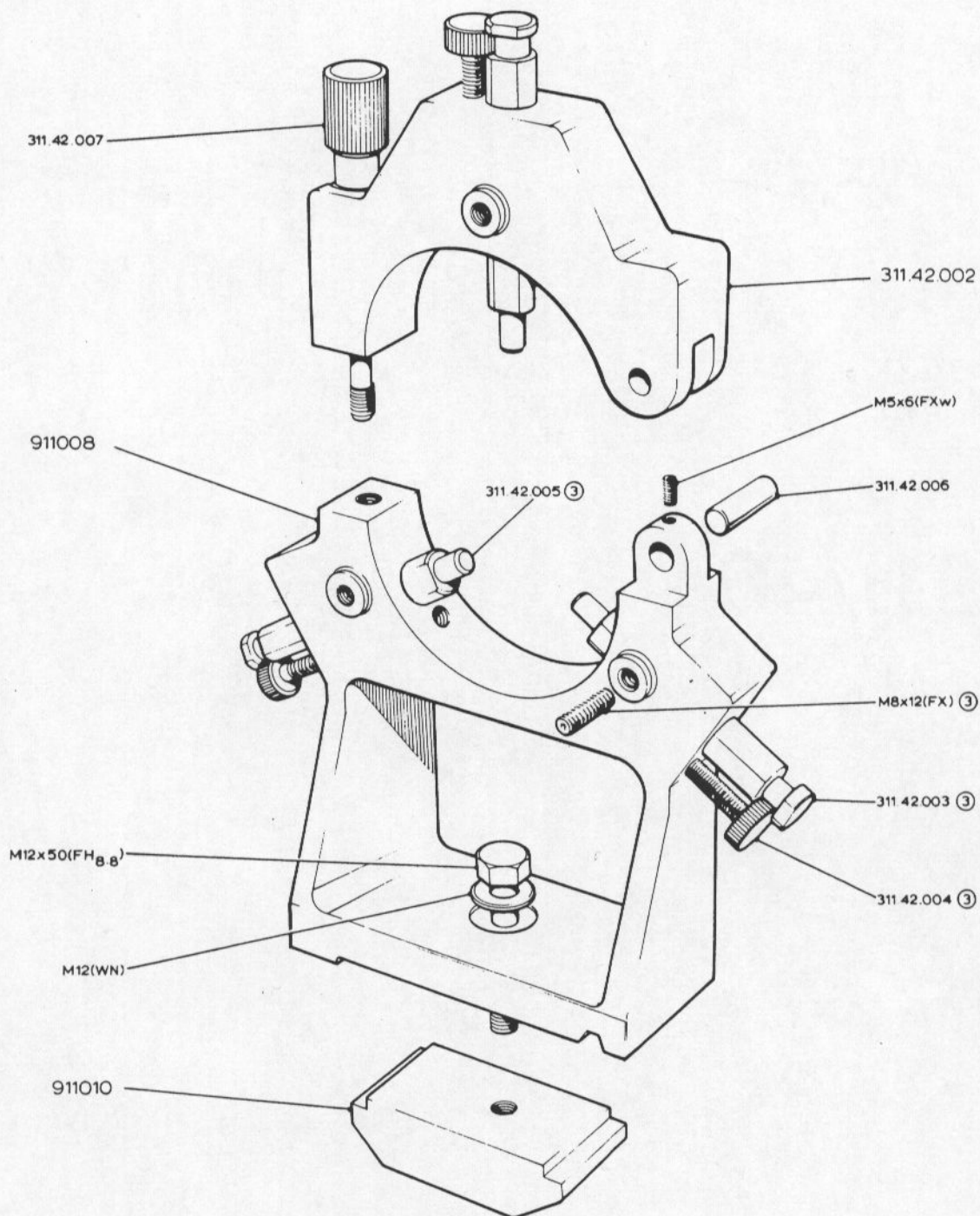




911/38

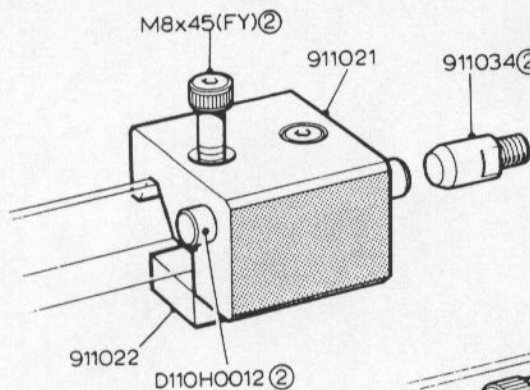


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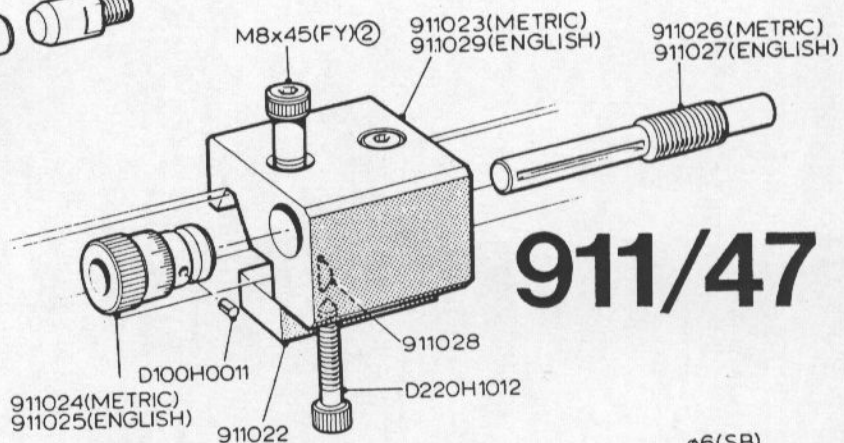


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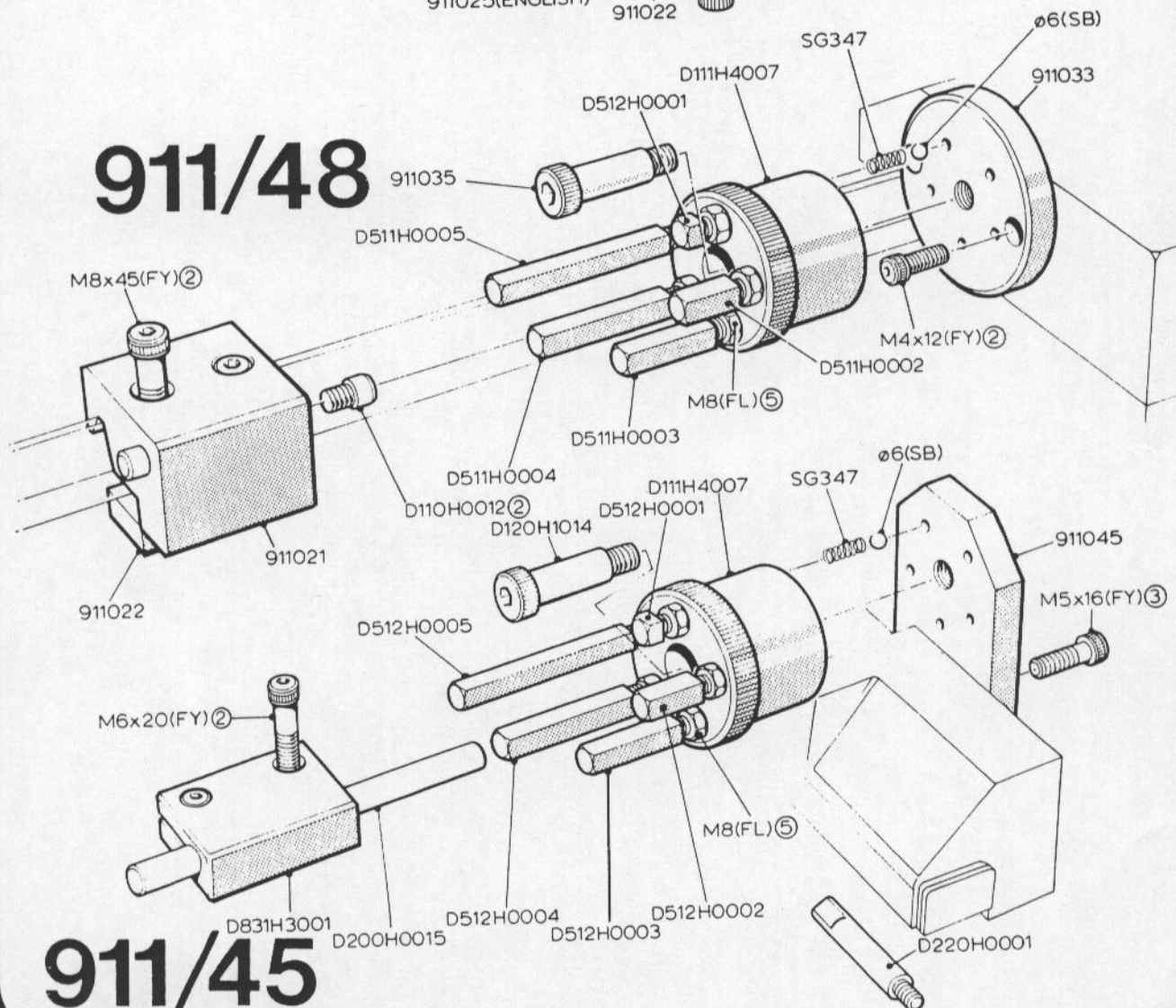


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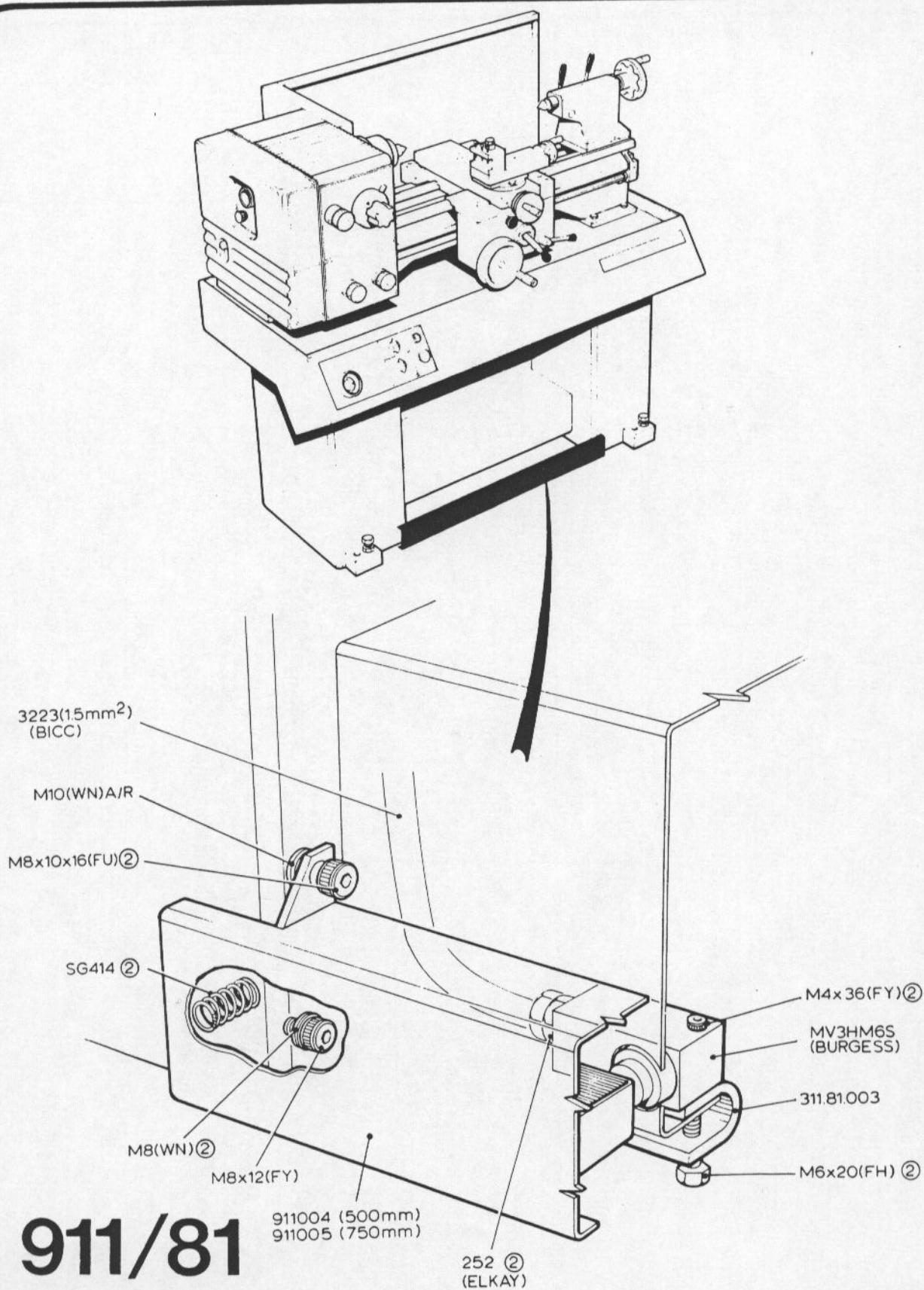
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# 911/48



# 911/45

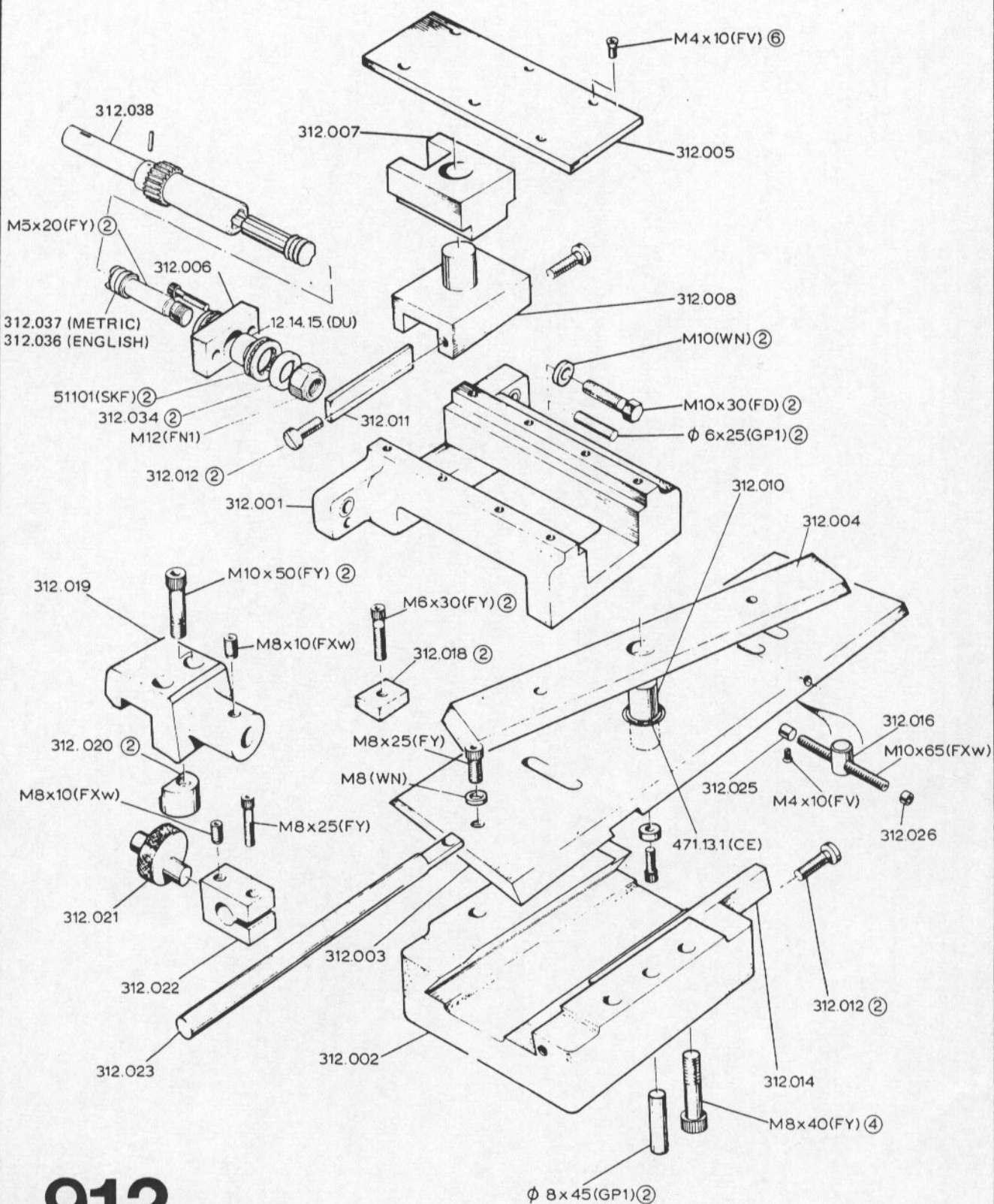






## Attachments

	Page No.
912 Taper turning attachment	56
913 Bed capstan unit	57







## Standard/Proprietary Parts

'Bracketed'

Letter Code

Component

Letter Codes

Conventional

Description Given

### Screws and Nuts

FX	Socket Set (Grub) Screw: Flat Point
FXd	" " " " Dog Point (Normal)
FXd1	" " " " Dog Point (Long)
FXc	" " " " Cone Point
FXw	" " " " Cup, knurled or 'W' Point

Thread X O/all Length

" " " "

FY	Socket Head Cap Screw
FY1	Socket Head Cap Screw (Threaded to Head)
FV	Socket Countersunk Screw
FS	Socket Button Head Screw

Thread X Length under head

" " " "

FU	Socket Shoulder Screw
----	-----------------------

Thread X Ø Shank X Shank length

FP	Socket Pressure Plug
FPS	Press Plug (Square Head)

Thread and Form

" "

FO	Slotted Set (Grub) Screw
----	--------------------------

Thread X O/all Length

FT	Slotted or Pozidriv Screw: Countersunk Head
FI	" " " " Raised C/sunk Head
FR	" " " " Pan Head
FE	" " " " Cheese Head

Thread X length under head

" " " "

Suffix 'B' for Thread Forming Type  
Suffix 'T' for Thread Cutting Type  
Suffix: 'SS' for Stainless Steel

FJ	Square Head (Toolpost) Screw
FH	hexagon Head Screw
FD	" " Bolt
FN	Standard Hexagon Nut
FL	" " " Locknut

Thread X Length under head

Thread X Length under head

" " " "

Suffix '8.8' for High Tensile Types

Suffix 'L' for 'Self-Locking' versions of the above

FZ	Hammer Drive Screw
FW	Wing Nut
DN	Domed Nut
CN	Castle of Slotted Type Nut
FN1	Nylon Ring Locking Nut

Nom Ø X Length under head

Thread details

Thread details

" "

### Thread Inserts

TI1	Press in Type Thread Insert
TI2	Coil Type Thread Insert

Thread details

" "

### Washers

WN	Bright Washer: Normal Diameter
WL	" " Large Diameter
WK	Crinkle (Wavy) Washer
WS	Spring Washer: Single Coil
WSs	" " Double Coil
WC	Folded Copper Sealing Washer
WF	Felt Washer
DS	Disc Spring (Belleville Washer)

Nominal Hole Ø

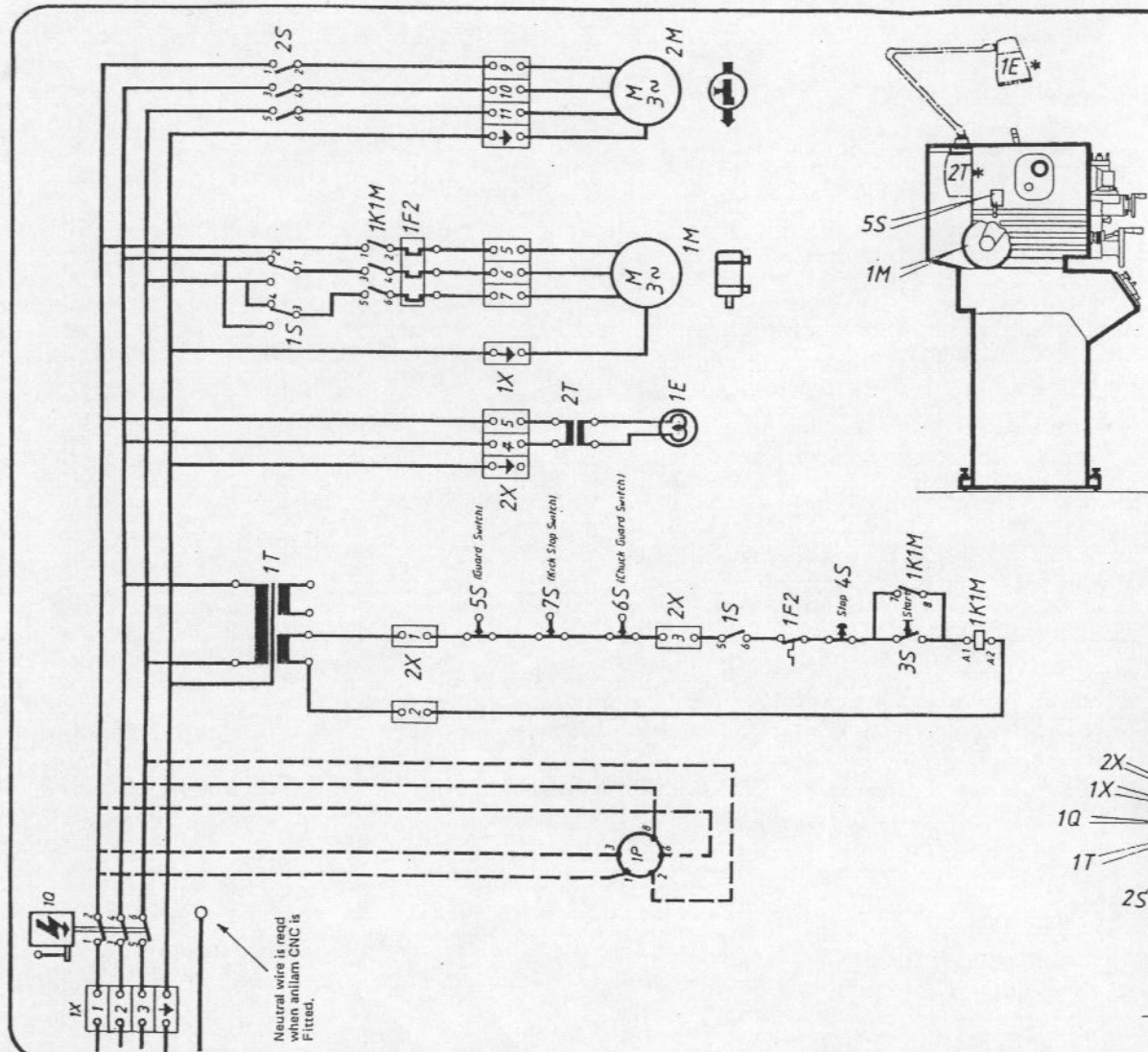
" "

Nom. Hole Ø X O.D. X thickness

'Bracketed' Letter Code      Component		Conventional Description Given
<b>Pins and Dowels</b>		
GP1	Grooved Pin: Full length groove — Tight at one end	Nom. Ø X O/all length
GP2	" " Half length groove — Tight on end	" " "
GP3	" " Full length groove — Parallel	" " "
GP4	" " Half length groove — Tight at centre	" " "
GP5	" " Centre groove	" " "
PD	Dowel Pin	Nom Ø X O/all length
PB	Brass Pin or Pad	" " "
PT	Taper Pin	Nom Ø (small end) X O/all length
PS	Split Pin	Nom Ø X O/all length
LTP	Tension Pin: Light Duty	Nom Ø X O/all length
HTP	" " Heavy Duty	" " "
<b>Keys</b>		
KS	Square Parallel Key	Width X Thickness X Length
KR	Rectangular Parallel Key	" " " "
KW	Woodruff Key	Width X Height X Diameter
<b>Circlips</b>		
CE	External Circlip: DIN 471	DIN. Ref. Nom Shaft Ø and Thickness
CE1	Round Section Circlip	Nom. Shaft Ø, Wire Ø
CE2	Inverted Retainer (Truarc)	" " "
CB	Internal Circlip: DIN 472	DIN. Ref. Nom Bore and Thickness
CR	Radial Fitting Circlip. DIN 6799	DIN Ref. Nom Ø and Thickness
CR1	Radial Retaining Clip (Spring fix)	Nom shaft Ø
CR2	Radial Fitting Circlip BS3673/3	" "
<b>Plain Bearings</b>		
DU	Composite Bearing Bush 'Glacier'	Nom Bore. O.D. and Length
DX	" " " " "	" " " "
LB	Sintered Bronze Bush	Nom Bore O.D. and Length
<b>Ball &amp; Roller Bearings</b>		
BB	Std. Ball Bearing	Nom Bore Outside Ø and Leng
BB1	Std. Ball Bearing with Shield or Seal one side	" " " " "
BB2	Std. Ball Bearing with Shield or Seal both sides	" " " " "
BB3	Std. Ball Bearing with Snap Ring	" " " " "
BBT	Angular Contact Ball Bearing	" " " " "
RB	Cylindrical Roller Bearing	" " " " "
<b>For Needle Roller Brgs, Needle Thrust Races Ball Thrust Brgs. and Taper Roller Bearings — Manufacturers Name is Quoted as Letter Code — vis.</b>		
(INA.)	(TORRINGTON)	Manufacturers Part No. Quoted
(SKF)	or (GAMET)	

'Bracketed' Letter Code	Component	Conventional Description Given
<b>Seals</b>		
SM	Standard Oil Seal	Nom Shaft Ø O.D. and Width
SF	'V' Ring Seal (FORSHEDA)	Manufacturers Part No.
RM	Standard 'O' Ring Seal	Internal Ø of Ring, and Section Ø
RM1	'Nu-Lip Ring' (Pioneer)	Manufacturers Part No.
<b>Lubrication Equipment</b>		
ON	Concave Oil Nipple: Drive in Type	Nom Hole Ø
ONI	" " " Threaded Type	Thread details
OS	Oil Sight Glass	Nom Outside Ø
OS1	Oil Level Glass	" "
OW	Oil Wick	Nom Ø X Length
For Compression and other Pipe Fitting — Manufacturers Name is quoted as Letter Code vis. (ENOTS.) or (TECALEMIT)		Manufacturers Part Number Quoted
<b>Miscellaneous Items</b>		
BJ	Ball Joint	Thread Details
SB	Steel Ball	Nom Ø
FK	Hexagon Wrench Key	Nom width across flats
HP	P.V.C. Hose	Nom Bore and O.D.
HC	Hose Clip	Max. Hose Ø
PP	Plastic Plug	Manufacturers Part Number
WRS	Standard Spanner	Std. Bolt size and width across flats
EB	Eye Bolt	Thread details
OW	Oil wick	Nom Ø X Length
CT	Copper tube	Nom outside Ø
NT1	Nylon Tube Natural	Nom Bore
NT2	Nylon Tube Blue	" "
NT3	Nylon Tube Green	" "
NT4	Nylon Tube Red	" "

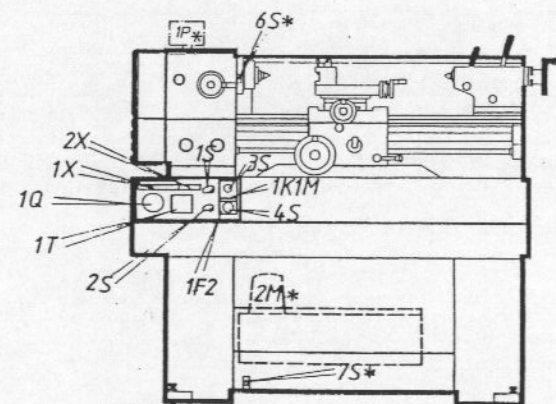




#### KEY & COMPONENT LIST

REF	ITEM	SUPPLY	MANUFACTURER	TYPE
<b>PANEL MOUNTED COMPONENTS</b>				
1Q	Mains disconnect switch (Isolator)	All	Klockner Mosler	P1-25
1K1M	Main contactor	All	Yaskawa	HE-16S
1F2	Overload relay	380V 415V 220V	Yaskawa	RH-10/3K RH-10/4K
1T	Control circuit transformer	All	Romarch or alt	220V/280V 415V-440V Primary with 110V & 12V Secondary @ VA
1S	Reverse switch	All	Klockner Mosler	T1-3-2
2S	Coolant on off switch	All	Klockner Mosler	T1-3-50
3S	Start pushbutton (main motor)	All		
4S	Stop pushbutton (main motor)	All		
1X	Terminal Block	All	Kilipon	BK-12
2X	Terminal Block	All	Kilipon	BK-12
<b>MACHINE MOUNTED COMPONENTS</b>				
1M	Main motor	To suit supply voltage	GEC	C80/0.9Kw/1.2HP 1500 RPM
5S	Guard limit switch	All	Burgess	K8 5EQR
6S	Chuck guard limit switch	All	Burgess	K8 5EQR
7S	Kick stop limit switch	All	Burgess	(M) V3HMB5
2M	Coolant pump motor	All	MG Electric	AO37Q
1E	Machine light unit 2 arm fitting	(400x250) 2 arm fitting (400x400)	MG Electric	MGL 402S BOSMA
2T	Transformer unit 50V (318/414/440) (machine light) 25V (318/414/440)	50V (318/414/440) 50V (210/230/250) 25V (210/230/250) 50V (500/550)	MG Electric	MGL 4040 BOSMA MGT 60A MGT 60B MGT 60C MGT 60D MGT 60E
1P	Wattmeter		Crompton Inst.	057-216B

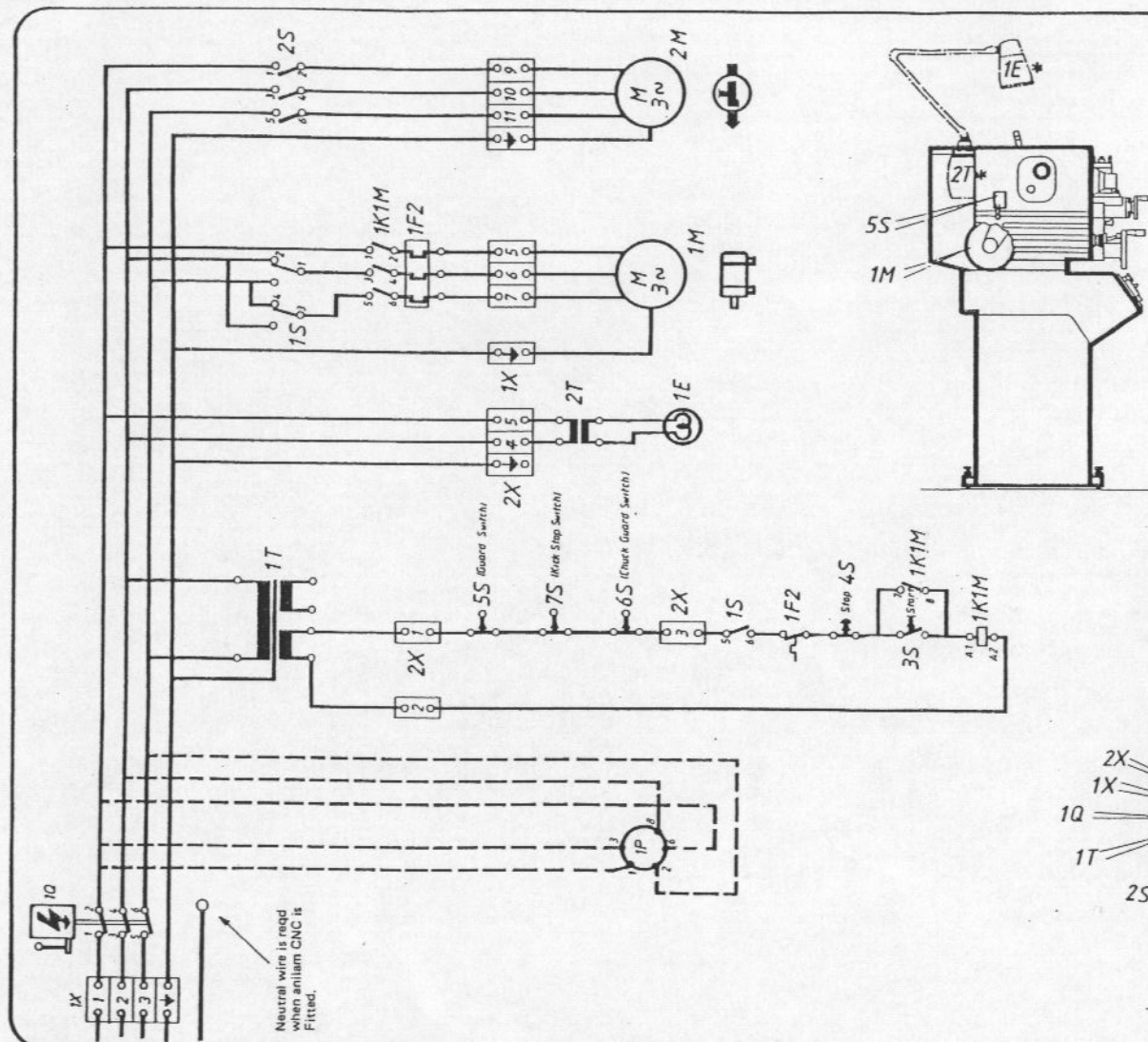
\*When fitted



EWD 901.1 Standard  
220/380/415 V 3PH 50Hz  
1500 RPM m/c / 0.9Kw Motor

## Wiring Diagram

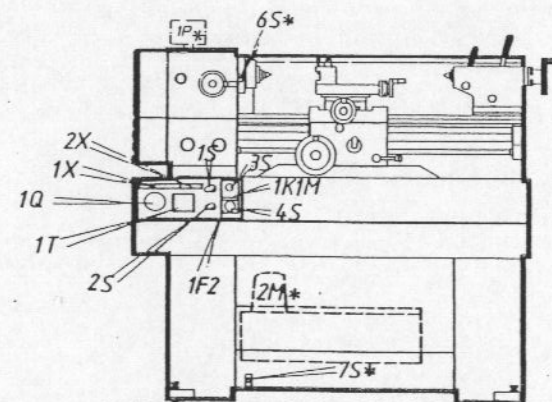




# KEY & COMPONENT LIST

REF	ITEM	SUPPLY	MANUFACTURER	TYPE
<b>PANEL MOUNTED COMPONENTS</b>				
1Q	Main disconnect switch (Isolator)	All	Klockner Moeller	P1-25
1K1M	Main contactor	All	Yaskawa	HE-16S
1F2	Overload relay	380V 415V	Yaskawa	RH-10/2K
1T	Control circuit transformer	220V	Yaskawa	RH-10/2K
		All	Rumash or alt	220V/380V 415V/440V
1S	Reverse switch	All	Klockner Moeller	T1-3-2
2S	Coolant on off switch	All	Klockner Moeller	T1-3-50
4S	Start pushbutton (main motor)	All		
1X	Terminal Block	All	Klippon	8K-12
2X	Terminal Block	All	Klippon	8K-12
<b>MACHINE MOUNTED COMPONENTS</b>				
1M	Main motor	To suit supply voltage	GEC	D90S/1.5Kw/2 HP 1500 RPM
5S	Guard limit switch	All	Burgess	KB 5EQR
6S	Chuck guard limit switch	All	Burgess	KB 5EQR
7S	Kick stop limit switch	All	Burgess	(M) V311M4S
2M	Coolant pump motor	All	MG Electric	AQ220
1E	Machine light unit 2 arm fitting (400x250)	MG Electric	MG Electric	MGL 4025 BOSA
	2 arm fitting (400x400)	MG Electric	MG Electric	MGL 4040 BOSA
2T	Transformer unit 50V (118/414/440) (machine light) 25V (118/230/250) 25V (210/230/250) 50V (500/550)	MG Electric	MG Electric	MGT 60A
		MG Electric	MG Electric	MGT 60B
		MG Electric	MG Electric	MGT 60C
		MG Electric	MG Electric	MGT 60D
		MG Electric	MG Electric	MGT 60E
1P	Wattmeter		Crompton Inst.	057-2168

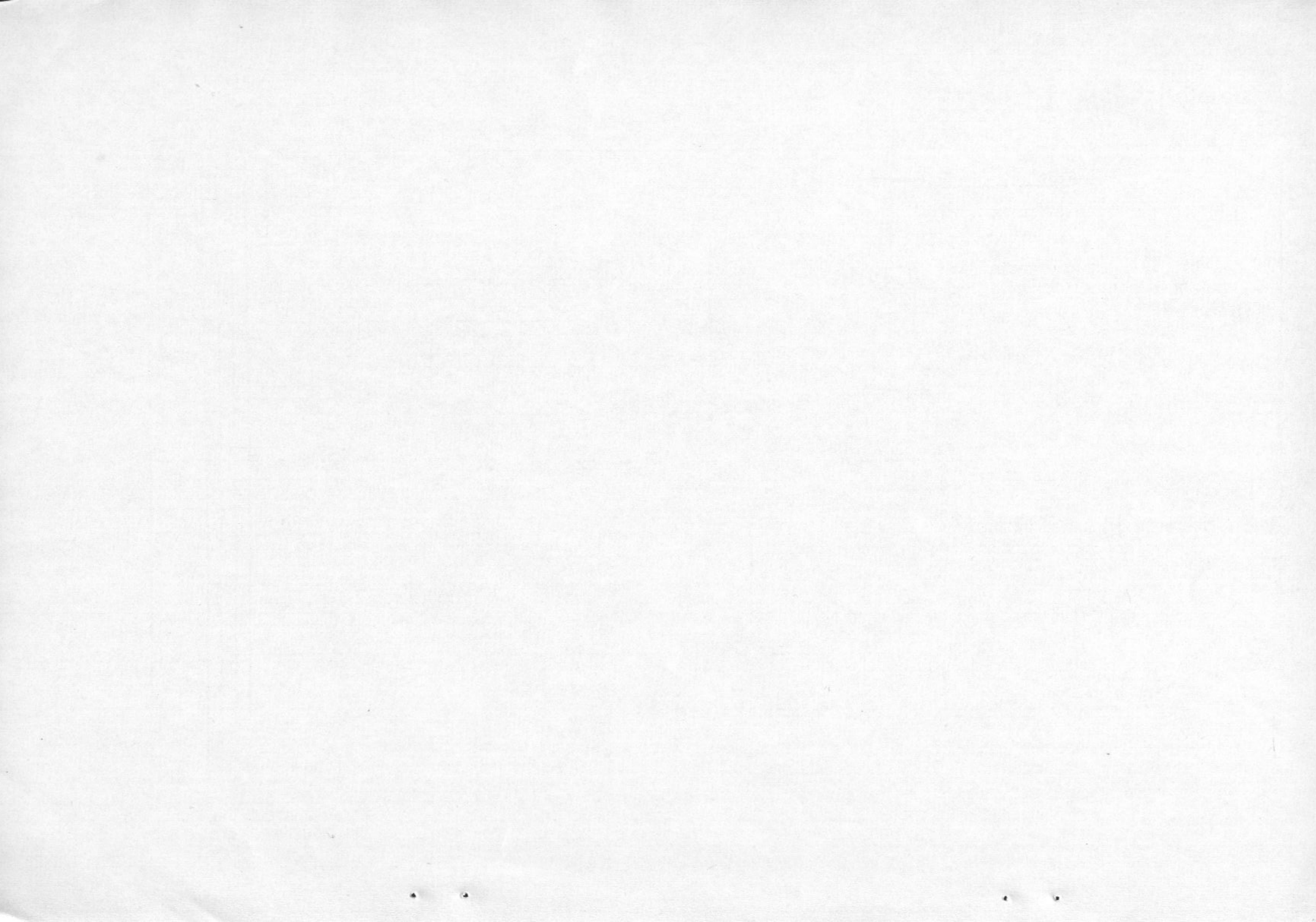
\*When fitted

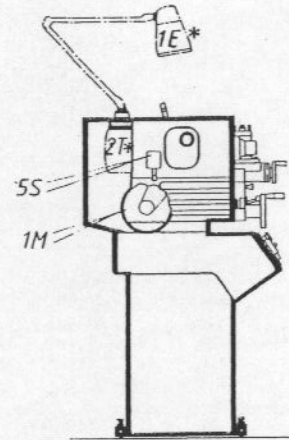
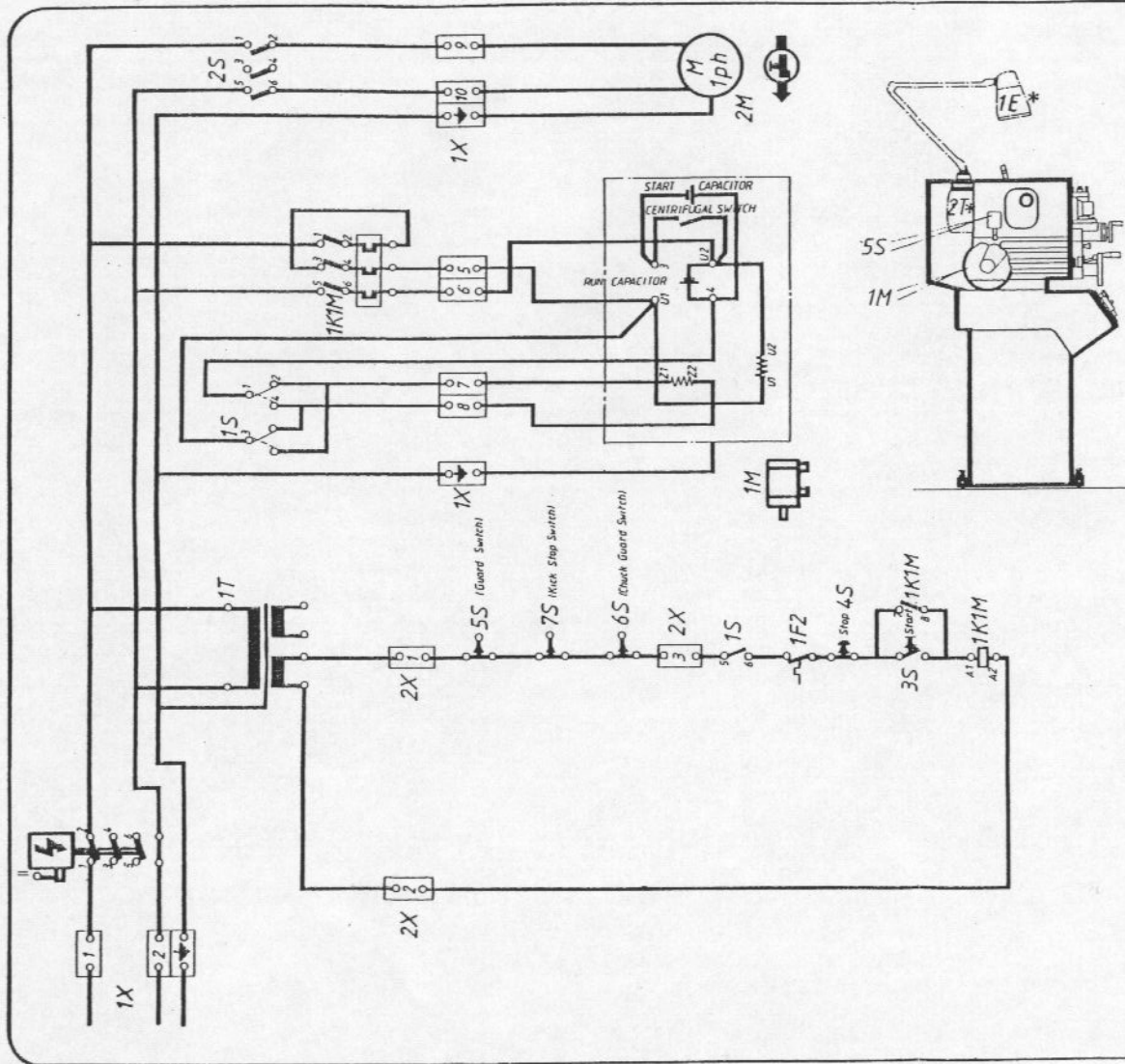


EWD 901.1A Standard  
220/380/415 V 3PH 50Hz  
2000 RPM m/c /1.5Kw motor

## Wiring Diagram





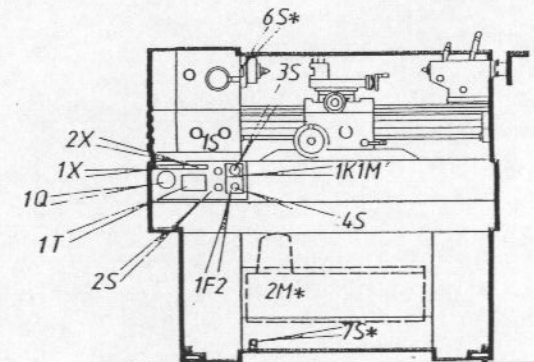


# KEY AND COMPONENT LIST

REF	ITEM	SUPPLY	MANUFACTURER	TYPE
<b>PANEL MOUNTED COMPONENTS</b>				
1Q	Mains disconnect switch (Isolator)	All	Klockner Mosler	P1-25
1K1M	Main connector	All	Yaskawa	1E-165
1F2	Overload relay	All	Yaskawa	RH-10/7K
1T	Control circuit transformer	All	Romersh or alt	240V P Primary with 110V & 12V Secondary at VA
1S	Reverse switch	All	Klockner Mosler	T1-3-2
2S	Coolant on off switch	All	Klockner Mosler	T1-3-50
3S	Start pushbutton (main motor)	All		
4S	Stop pushbutton (main motor)	All		
1X	Terminal block	All	Klippon	BK-12
2X	Terminal block	All	Klippon	BK-12
<b>MACHINE MOUNTED COMPONENTS</b>				
1M	Main motor	To suit supply voltage	GEC	D 905/1.1/1.5
5S	Guard limit switch	All	Burgess	K85 EOR
6S	Chuck guard limit switch	All	Burgess	K85 EOR
7S	Kick stop limit switch	All	Burgess	AO 3/1/E
2M	Coolant pump motor	All	MG Electrics	MGL 4025 BOSA
1E	Machine light unit 2 arm fitting (400x250)	All	MG Electrics	MGL 4040 BOSA
2T	Transformer unit 10V (machine light) 25V	All	MG Electrics	

\*When fitted

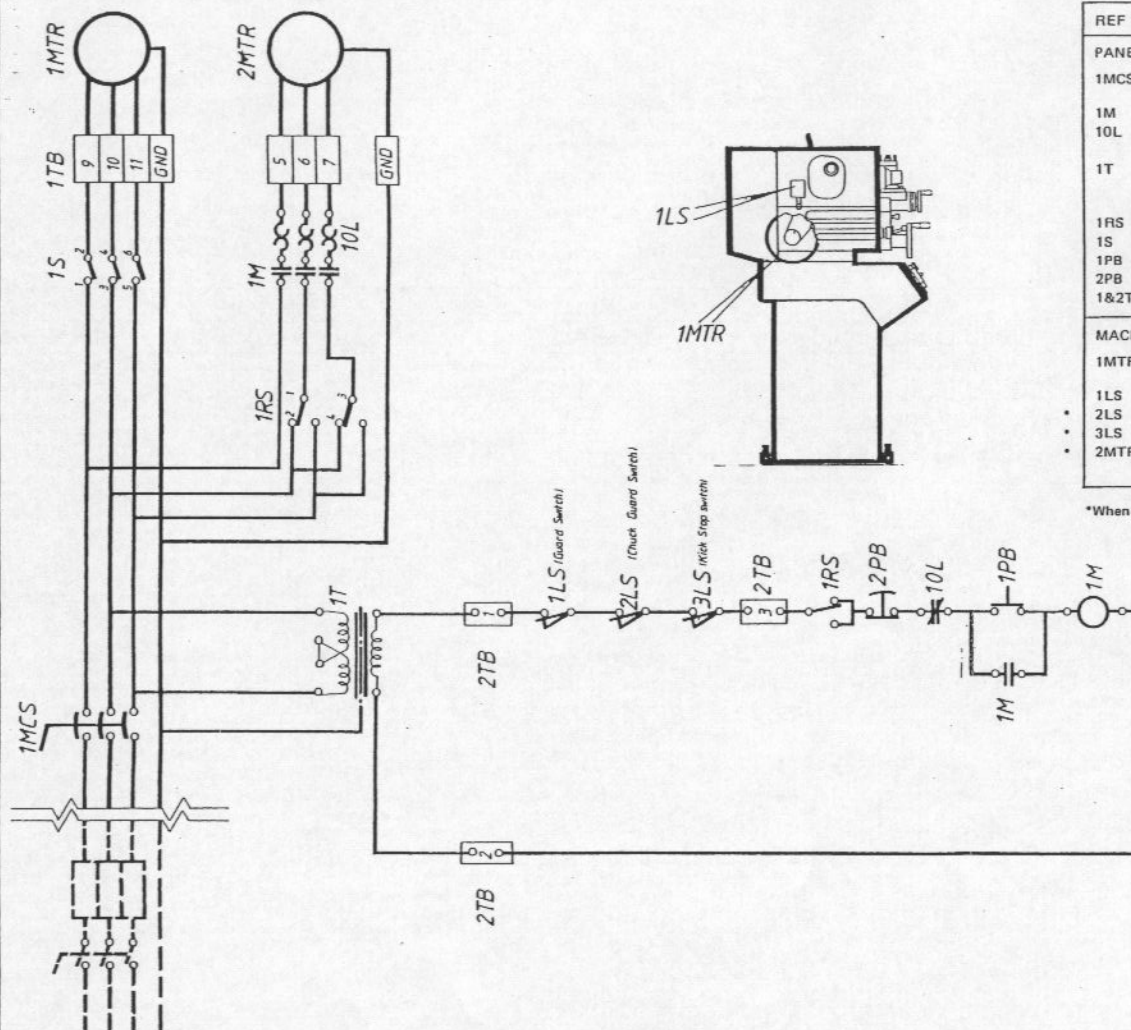
EWD 903.1 Single phase  
240V 1PH 50Hz



## Wiring Diagram



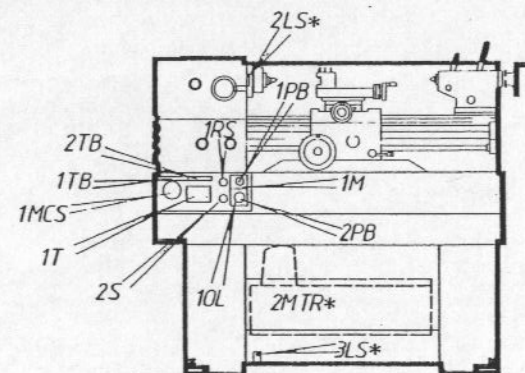




# KEY AND COMPONENT LIST

REF	ITEM	SUPPLY	MANUFACTURER	TYPE
PANEL MOUNTED COMPONENTS				
1MCS	Mains disconnect switch (Isolator)	All	Klockner Moeller	T1-2-NA
1M	Main contactor	All	Yaskawa	HE-16S
10L	Overload relay	230V	Yaskawa	RH-10/5K
		460V	Yaskawa	RH-10/3K
1T	Control circuit transformer	All	Romash or alt	ULF/UF25/3 208 230 460 575 Volt primary 115 Volt secondary at 25VA
1RS	Reverse switch	All	Klockner Moeller	T1-3-2
1S	Coolant on/off switch	All	Klockner Moeller	T1-3-50
1PB	Start pushbutton (main motor)	All	Yaskawa	
2PB	Emergency stop pushbutton	All	Yaskawa	
1&2TB	Terminal block	All	Klippon	BK 12
MACHINE MOUNTED COMPONENTS				
1MTR	Main motor	To suit supply voltage	Brook	K145T, 1 1/2 HP, 1800RPM
1LS	Guard limit switch	All	Burgess	KB5 EQR CSA/UL
2LS	Chuck guard limit switch	All	Burgess	KB5 EQR CSA/UL
3LS	Kickstop limit switch	All	Burgess	(M)V3HM6S CSA/UL
2MTR	Coolant pump motor	To suit supply voltage	MG Electric	AQ3/2

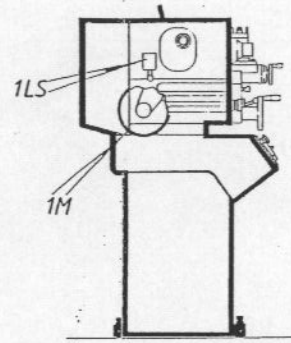
\*When fitted



EWD 905.1 U.S.A.  
230-460V 3PH 60Hz

## Wiring Diagram





REF	ITEM	SUPPLY	MANUFACTURER	TYPE
<b>PANEL MOUNTED COMPONENTS</b>				
1MCS	Maina disconnect switch (isolator)	AIR	Klockner Moeller	T1-25 NA
1M	Main connector	AIR	Yaskawa	HE-165
1OL	Overload relay	AIR	Yaskawa	R1H-10/10K
1T	Control circuit transformer	AIR	Romashor or alt	220V primary with 115V secondary
1RS	Reverse switch	AIR	Klockner Moeller	T1-3-2/NA
1S	Coolant on/off switch	AIR	Klockner Moeller	T1-3-50/NA
1PB	Start button	AIR	Yaskawa	
2PB	Stop button (mushroom headed)	AIR	Yaskawa	
1&2TB	Terminal block	AIR	Kilgopan	BK-12
<b>MACHINE MOUNTED COMPONENTS</b>				
1MTR	Main motor	AIR	Brook	K145T, 15HP 1800RPM Nema
1LS	Guard limit switch	AIR	Burgess	KBS EQR CSA/UL
2LS	Chuck guard limit switch	AIR	Burgess	KBS EQR CSA/UL
3LS	Clackstop limit switch	AIR	Burgess	IMI V3HM63 CSA/UL
2MTR	Coast pump motor	AIR	M G Electrics	AQ3/2 CSA/UL

## Wiring Diagram