

Harrison M250
280mm – 11in swing centre lathe

machine manual



machine manual

Contents

	Page No.
Summarised Specifications	2
Installation	
1) General arrangement and foundation plan	4
2) Installation instructions	5
3) Lubrication diagram	8
Operation	
1) Lathe operator safety	10
2) Controls diagram	11
3) Operating instructions	12
Maintenance	
1) Maintenance instructions	18
Parts Section	
1) Parts ordering procedure	23
2) Illustration contents list	24
3) Spare parts illustrations	25
4) Standard/ Proprietary parts code list	58
Electrical Wiring Diagram	61

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

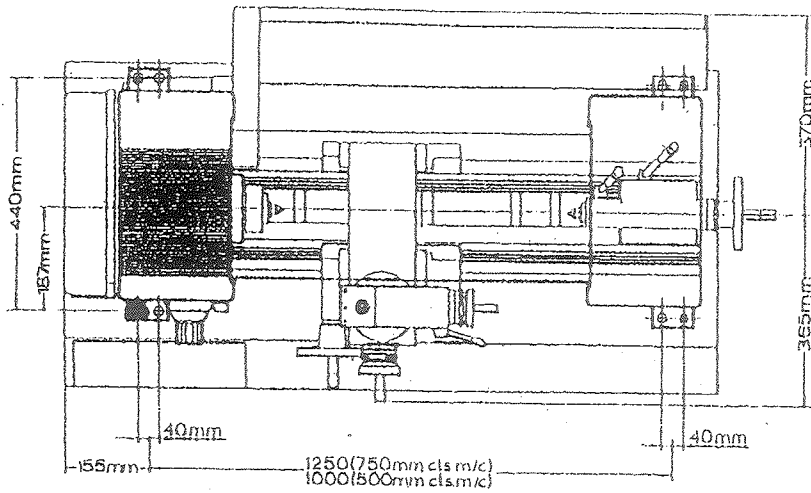
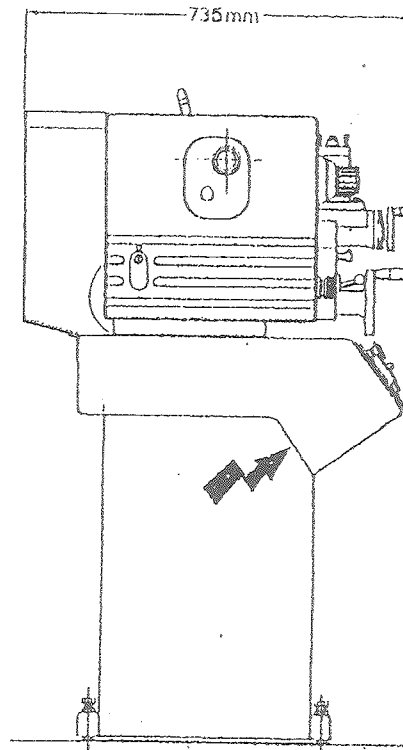
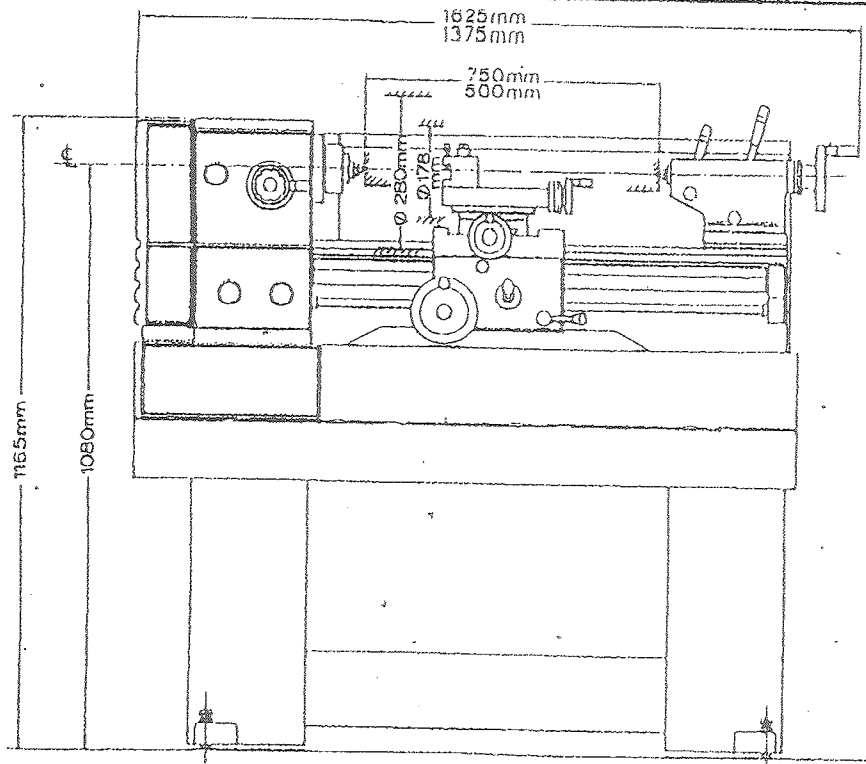
Centres	Height	145mm (5.7 in)	English Gearbox with 4 TPI Leadscrew	Threads English Pitches (56)	4 - 84 TPI	
	Admits Between	500mm (20 in)		Metric Pitches (23)*	0.4 - 10mm	
	or	750mm (30 in)		* (available by changewheels supplied as additional equipment)		
Swing	Over Bed	280mm (11 in)	Feeds Longitudinal (24)	0.0006 - 0.016 in		
	Over Cross Slide	178mm (7 in)	Cross (24)	0.0003 - 0.008 in		
Spindle	Bored to Pass	35mm (1.375 in)	Bed	Width Over Ways	190mm (7.5 in)	
	Nose	Ø1-3		Depth Under Headstock	230mm (9 in)	
	Morse Taper In Nose Bush	3		Cross Slide	Width	130mm (5.1 in)
Speeds	Number	9	Travel		165mm (6.5 in)	
50 Hz Machines	Range	40 - 1500 rpm	Top Slide	Width	76mm (3 in)	
	Motor	0.9 kW (1.2hp)		Travel	92mm (3.6 in)	
	or	Range	80 - 3000 rpm	Tailstock	Quill Diameter	38mm (1.5 in)
	Motor	1.3 kW (1.8hp)	Travel		95mm (3.7 in)	
or	Range	40 - 1500 rpm	Weight	500mm (20 in) Centres	356 kg (785 lbs)	
Motor (Single Phase)	1.1 kW (1.5hp)	750mm (30 in) Centres		457 kg (1008 lbs)		
60 Hz Machines	Range	40 - 1500 rpm	Shipping Data	Gross Weight	Packing Case Dimensions	
	Motor	1.5 hp				L
	or	Range	52 - 2000 rpm	500mm (20 in) Centres	457 kg (1008 lbs)	
	Motor	1.5 hp	750mm (30 in) Centres			559 kg (1232 lbs)
or	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 - 3mm				
	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	Spanners, Keys and Oil Gun
Work Driver Plate	Machine Manual
No. 5/3 Morse Centre Bush	& Standard Inspection Certificate
2 No. 3 M.T. Centres	

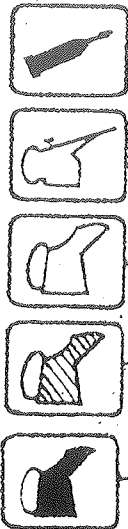
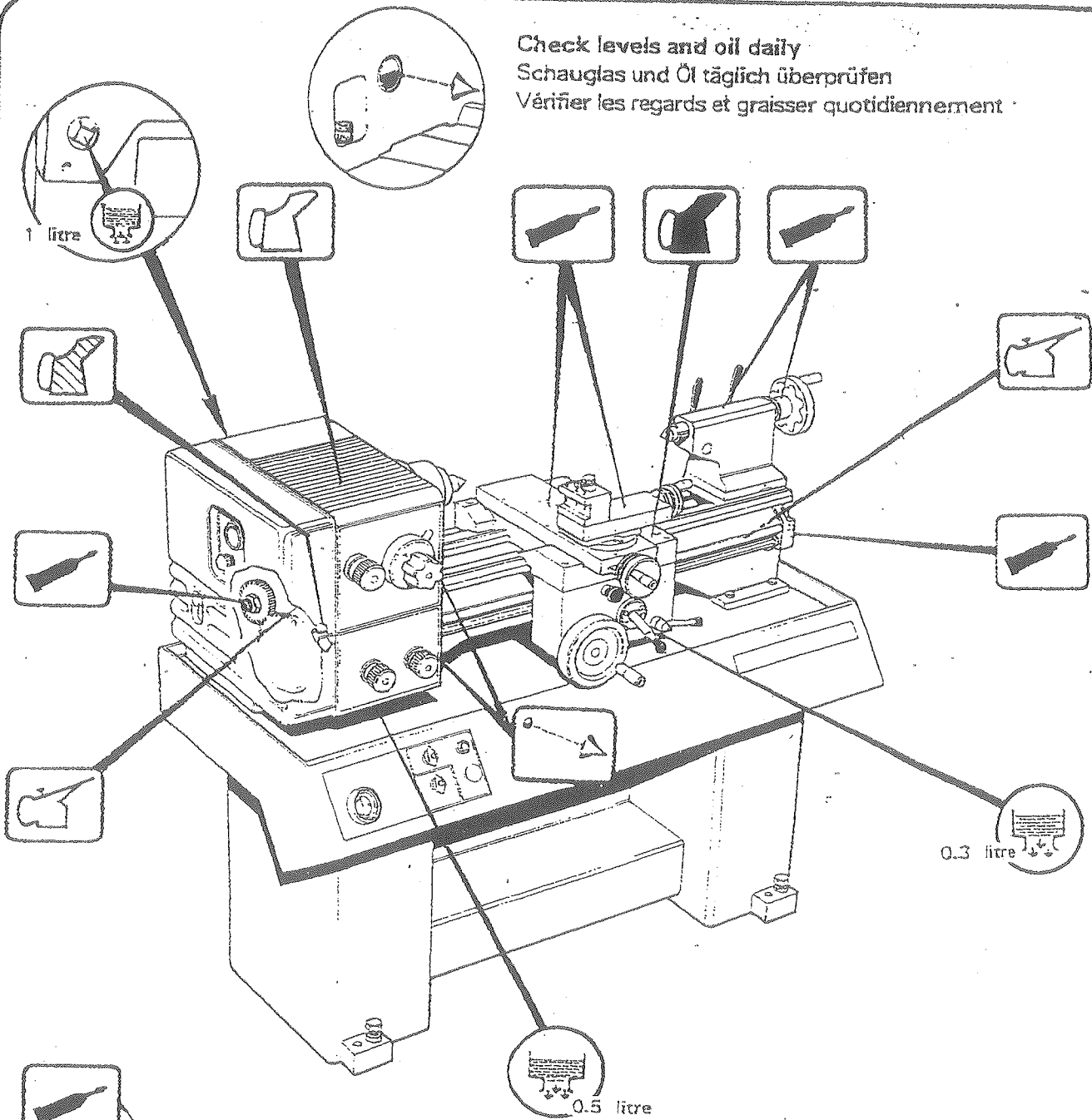
Illustrated or specified data is not binding in detail. The manufacturers reserve the right to modify design, specification and price without notice.

Installation



Lubrication

Check levels and oil daily
 Schauglas und Öl täglich überprüfen
 Vérifier les regards et graisser quotidiennement



Mobil	BP	Casol	C	ESSO	Shell	TEXACO
DTE OIL HEAVY MEDIUM	ENERGOL HLP 68 (ISO)	HYSPIN AWS 68	P.W.L.C.	NUTO H68	TELLUS 68 OR R68	RANDO HD68
DTE EXTRA HEAVY	ENERGOL HP 150 (ISO)	ALPHA ZN 220	WLM	NURAY 220	VITREA 220	REGAL R&O 220
VACTREA No. 2	MACCURAT 68	MAGNA BOX68	CHEVIOT CX	FEBIS K68	TONNA TX68	WAYLUBE X68

Operation

Please read the following safety notes and the 'Operation' section of this manual before attempting to operate your Lathe - they are provided for your benefit.

MACHINES WITH CAMLOCK SPINDLE NOSE

ENSURE THAT CHUCKS, FACEPLATES OR ANY OTHER "CAMLOCK" SPINDLE MOUNTED EQUIPMENT IS ADJUSTED TO GIVE CORRECT LOCKING ON EACH CAM WHEN MOUNTED ON THE SPINDLE, IN ACCORDANCE WITH THE OPERATIONAL INSTRUCTION PROVIDED IN THIS MANUAL.

LATHE OPERATOR SAFETY

Modern Centre Lathes are fast, powerful machines which can be dangerous if used under improper circumstances. Please read and observe the following Health and Safety Guidance Notes before and during the use of the machine.

HEALTH AND SAFETY

This manual contains the necessary information to ensure that the lathe can be operated properly and with safety. It is assumed that the operator has been properly trained, has the requisite skill and is authorised to operate the machine, or, if undergoing training, is under the close supervision of a skilled and authorised person.

STATUTORY REGULATIONS

Attention is drawn to the importance of compliance with the various statutory regulations which may be applicable, such as "The Protection of Eyes Regulations" and that suitable working clothes should be worn by the operator. It is further stressed that good housekeeping, common sense and the maintenance of sound work shop practices are essential for safe lathe operation.

MACHINE SERVICING

Adequate information is also provided to enable the machine to be properly serviced and maintained by persons with the necessary skills and authority.

MACHINE CAPACITY AND USER RESPONSIBILITY

The dimensions of a component which can be accommodated on the 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.

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

IMPORTANT SAFETY NOTE

BAR STOCK MUST NOT UNDER ANY CIRCUMSTANCES BE ALLOWED TO EXTEND BEYOND THE TAIL END OF THE HEADSTOCK SPINDLE WITHOUT THE USE OF SUITABLE GUARDING AND ADEQUATE SUPPORT, SINCE THE POSSIBILITY OF BODILY CONTACT WITH SUCH A BAR WHEN ROTATING, AND THE RISK OF SUCH A BAR WHIPPING, ESPECIALLY AT HIGH SPEEDS, AND WHERE SMALL SECTION STOCK IS INVOLVED, CAN BE EXTREMELY DANGEROUS.

1.0 PERSONAL LATHE SAFETY

- 1.1 Always wear suitable working clothes when operating your lathe, e.g. overalls and safety shoes are strongly recommended and safety glasses (or a face visor) are essential.

Never operate your lathe with loose long hair, wear a suitable safety cap, with hair net if necessary, wear your overalls buttoned up and roll up the sleeves or button the cuffs. You should not wear rings, watches, a tie, or anything which might become caught in the rotating or moving parts of the machine, and you should not keep tools or other items in your pockets, which might fall out and onto the machine.

- 1.2 Keep your workplace clean and tidy, and never put anything on or near your lathe which could be caught by or foul the rotating or moving parts when it is started.
- 1.3 Keep the lathe handles, handwheels and controls, and any hand tools you may be using, clean and free from oil or grease.
- 1.4 Hand protection in the form of barrier cream is highly recommended and any unnecessary or prolonged skin contact with oils or machine cutting fluids (coolant) should be avoided.

Thoroughly wash your hands after work, but never in machine coolant and do not wear clothing which has become soaked or contaminated with oil or coolant.

Neat cutting oils are not recommended for centre lathe work.

- 1.5 Do not try to hold a conversation or fool about whilst operating your lathe but keep your mind on the job in hand and never rush or hurry your work.
- 1.6 Do not lean on or against your machine, you may accidentally activate the controls.
- 1.7 Never touch a rotating workpiece or workholding device or any other rotating part of your lathe, such as the tail end of the headstock spindle or the leadscrew or feedshaft.
- 1.8 Never try to operate your lathe without the end-drive guard in place, or with an open chuck guard and never try to defeat the electrical guard interlocks.
- 1.9 Never handle swarf with your bare hands, use a rake or brush and protective gloves are advisable.
- 1.10 Never use chipped, blunt or cracked cutting tools and never use workholding or any other lathe equipment which is not in good condition, or may have suffered damage. If you have any doubts at all, remember it is better to be safe than sorry.
- 1.11 Report any accident or personal injury, however minor, immediately it happens.

2.0 LATHE WORKPIECES

- 2.1 **Maximum Dimensions** - are limited only by the physical restrictions of the machine itself but appropriate workholding and work-support equipment must be used, i.e. chucks and/or faceplates, work steadies and/or rotating tailstock centres must be suitable for the workpiece involved and suitable spindle speeds, feed rates and cutting tools must be selected. If in doubt, seek qualified advice but always start with a low spindle speed.
- 2.2 **Workpiece Burrs** - ensure that workpieces are thoroughly de-burred before handling them for loading the lathe and beware of any sharp corners or burrs produced during the turning process. If possible, arrange for any such sharp corners to be removed in the turning cycle but Never use hand tools such as files or scrapers on a rotating workpiece.
- 2.3 Hand polishing on a centre lathe is not recommended.
- 2.4 **Handling Heavy or Awkwardly Shaped Workpieces** - always switch off the machine at the electrical isolator if there is a need to reach across or support yourself on the machine whilst loading a workpiece. Arrange for someone to help you if there is the slightest difficulty and use the appropriate lifting slings and equipment. Seek qualified advice if you have any doubts. Do not leave lifting equipment in a position which may interfere with your access to, or operation of the lathe.

3.0 CHUCKS AND OTHER WORKHOLDING EQUIPMENT

- 3.1 Use only chucks and workholding equipment supplied by or recommended by ourselves.

Always follow any instructions related to or supplied with the equipment and particularly so with respect to maximum permissible RPM.

- 3.2 Observe and note maximum permissible speeds specified for each chuck or faceplate and check (and maintain) the permissible speed marking on each individual item.

- 3.3 We recommend that only "high speed type" chucks are used.

- 3.4 **LIMITATIONS OF THE INFORMATION GIVEN WITH WORKHOLDING EQUIPMENT**
- In the interests of safety it is important to note that the maximum permissible RPM figures quoted by workholding equipment manufacturers apply only to devices which are properly maintained and are in sound condition - chucks which have been damaged or are in poor condition are potentially dangerous and it is vital to regularly carry out the manufacturer's lubrication instructions.

It should also be remembered that the gripping pressure applied to a static workpiece will, in general, be reduced (by centrifugal forces) when a chuck or other workholding device is rotating at speed. Some other factors which make it impossible for a manufacturer to give guarantees about specific applications are:

The effect of 'out of balance' conditions, flimsy components which limit gripping pressure, the magnitude of the cutting forces involved, the radius at which the gripping pressure is applied, whether gripping is internal or external, type and proportions of gripping register, length of workpiece standout and whether it is supported by a steady or tailstock centre.

If in doubt, seek qualified advice and/or consult the equipment manufacturer.

4.0 OPERATIONAL SAFETY

- 4.1 Do not try to operate your lathe on a trial and error basis, instead first read and understand the Operational Notes section of this manual. It is provided for your benefit.
- 4.2 If possible, arrange for a demonstration of the machine functions and controls by someone who is familiar with the lathe and qualified to give you instruction.
- 4.3 **Know Your Lathe Controls** - Make sure you know how to stop the machine before starting it and know the spindle speed setting, and in which direction it will rotate before running it. If in doubt, use the lowest speed setting. Know in which direction the slides will move when you engage the traverse or thread cutting levers.
- 4.4 Retract the tool slide to a safe position using the apron and cross slide handwheels before starting the spindle.
- 4.5 **ALWAYS REMOVE THE CHUCK KEY FROM THE CHUCK IMMEDIATELY AFTER USE.** We recommend only spring loaded safety chuck keys.
- 4.6 Close the chuck guard and adjust any chip guards, i.e. magnetic based chip guard or saddle mounted chip guard (supplied as optional equipment) before and not whilst the spindle is running.
- 4.7 Stop your machine immediately anything unexpected happens.
- 4.8 Never allow your machine to run unattended. Always switch off the power supply at the electrical isolator when leaving your machine.

CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS (C.O.S.H.H.)

Substances with which users of Lathes are likely to come into contact are Cutting Fluids and Lubricating Oils.

CUTTING FLUIDS

Users should refer to the cutting fluid manufacturer's own Safety Data Sheet for the particular fluid to be used.

NOTE: We do not recommend Neat Cutting Oils for centre lathe work.

LUBRICATING OILS

The lubricants recommended on the Machine Lubrication Diagram are highly refined mineral oils with multi-functional additives and "Not Classified" under the Classification, Packaging and Labelling of Dangerous Substances Regulations.

In normal use, with care and a good standard of personal hygiene, they are unlikely to cause harm.

Detailed Safety Information for lubricating oils may be obtained from the manufacturer or supplier.

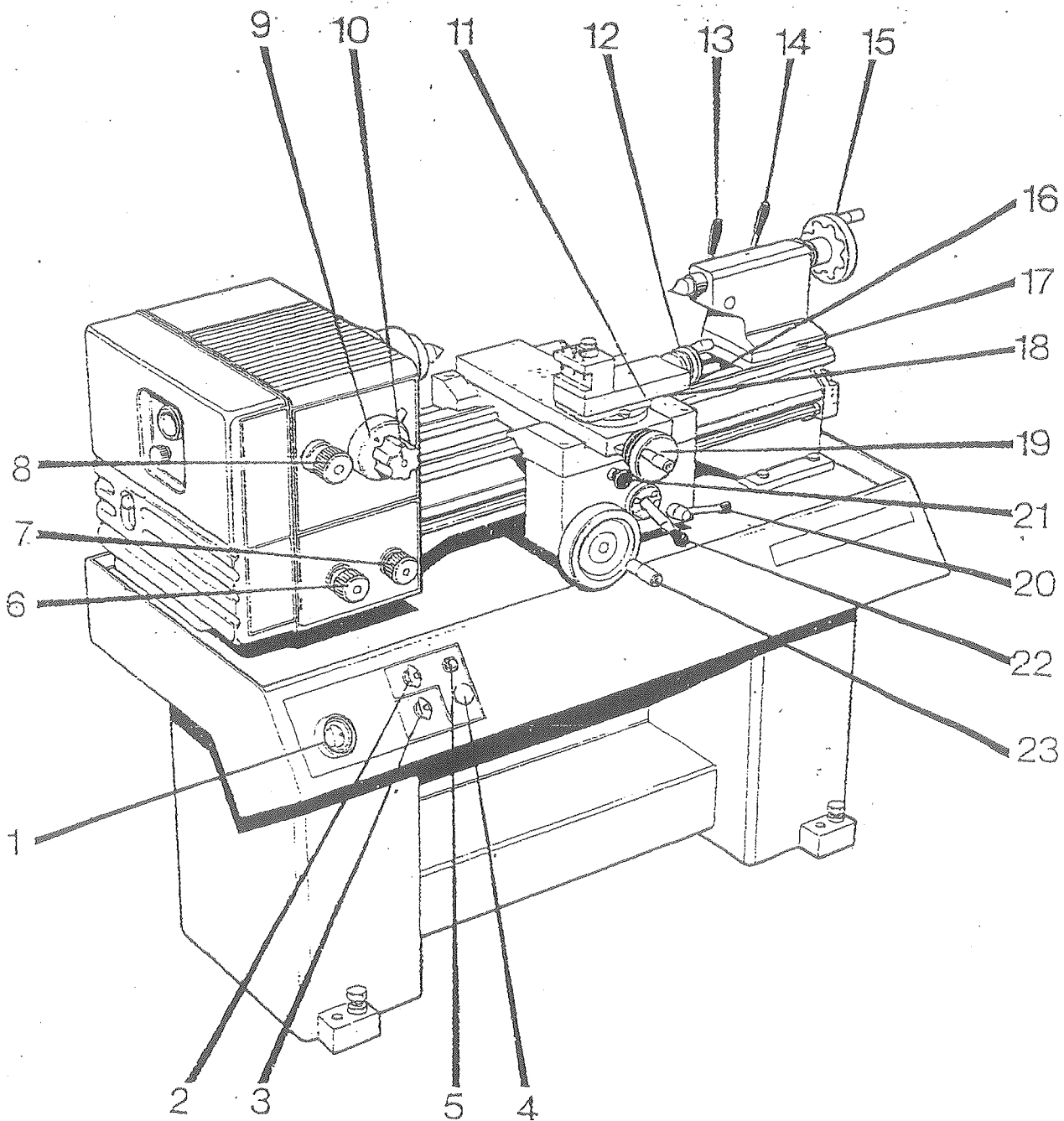
General recommendations for lubricating oils are as follows:

- | | |
|--------------------|--|
| Eyes | Eye protection should be worn if splashing is likely to occur as contact could cause discomfort. In this case, flush the eyes with plenty of clean water for at least 15 minutes. If irritation persists, seek medical advice. |
| Skin | No acute health hazard with normal use but repeated contact could defat the skin, cause slight irritation and in extreme cases cause dermatitis. Avoid any unnecessary or prolonged skin contact and practice a good standard of personal hygiene. After contact wash with soap (or skin cleanser) and water, and remove heavily contaminated clothing. If rashes or other abnormalities occur, seek medical advice. |
| Respiratory | Precautions are not normally required unless oil mist is generated, but if discomfort is experienced, remove to fresh air. If effects persist, obtain medical advice. |
| Ingestion | If accidentally swallowed, the main hazard is aspiration into the lungs during vomiting.

Do NOT induce vomiting. Milk or water to drink may be beneficial. Send to hospital. |

PERSONAL HYGIENE

Use barrier cream hand protection and wash hands with soap (or skin cleaner) and water before meal breaks, before going to the toilet and when finishing work.



- | | | |
|------------------------------|--|-------------------------------------|
| 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).

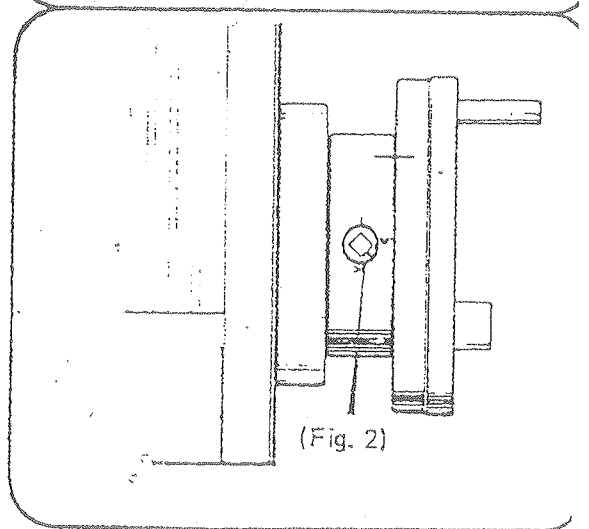
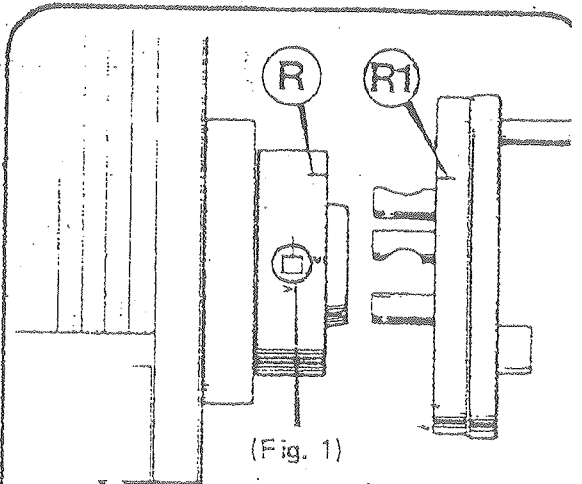
Mount the attachment on to the spindle nose and lock each cam by turning it clockwise using the key provided.

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'

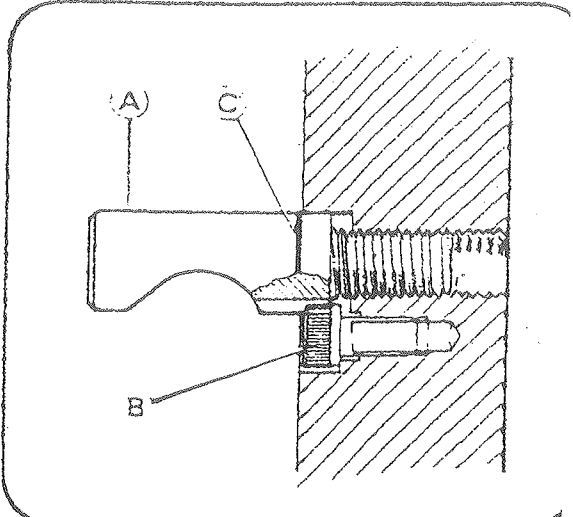
Remove Lockscrew (B).

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

Re-fit and tighten lockscrew (B).

NOTE:-

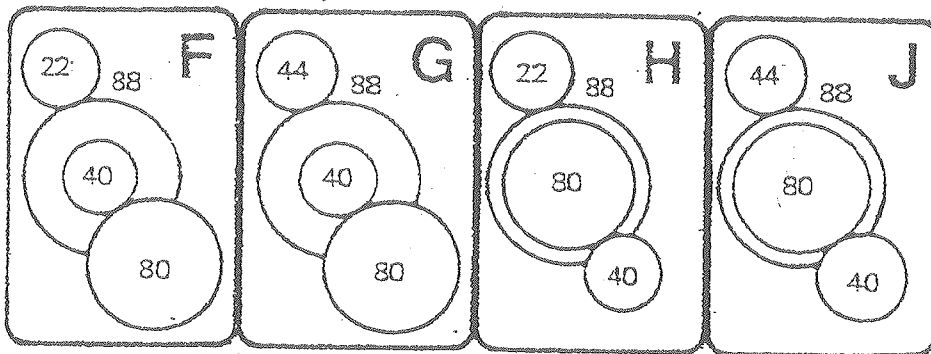
A datum ring (C) is marked on each stud as a guide to the original or initial setting.



Spindle Nose

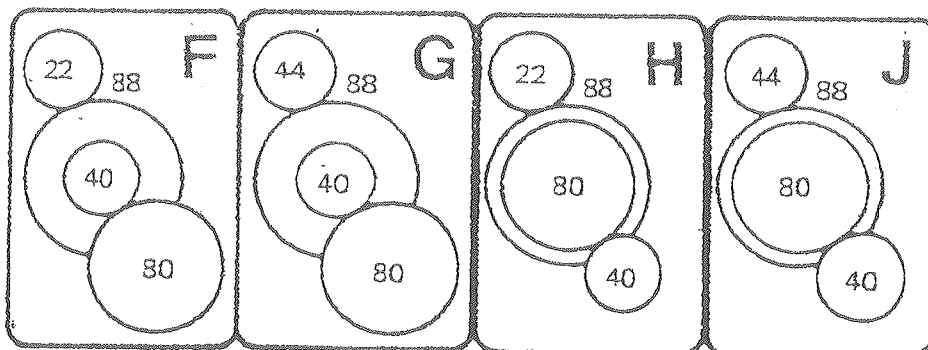
Changewheel Combinations

Fig. 2A for Metric Leadscrew Machines



6 mm. pitch Leadscrew


Fig. 2B for English Leadscrew Machines



4 tpi. Leadscrew

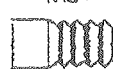
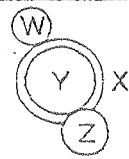
Thread-cutting

THREADCUTTING — METRIC GEARBOX
STANDARD THREADS AVAILABLE.




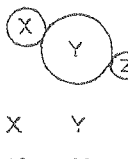
0.25	N3F	0.7	M1F	1.2	K1G	2	L2G	3.5	M2H
0.3	K3F		M3G		K3H		N1H	4	L2H
0.35	M3F	0.75	K2F	1.25	N2G		N3J		N1J
0.40	L3F	0.8	L1F	1.4	M1G	2.4	K1H	4.8	K1J
0.5	N1F		L3G		M3H		K3J	5	N2J
	N3G	0.875	M2F	1.5	K2G	2.5	N2H	5.6	M1J
0.6	K1F	1	L2F	1.6	L1G	2.8	M1H	6	K2J
	K3G		N1G		L3H		M3J	6.4	L1J
0.625	N2F		N3H	1.75	M2G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

THREADS AVAILABLE WITH ADDITIONAL CHANGEWHEELS


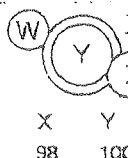



		W	X	Y	Z
72	N3	30	81	40	84
64	N3	35	84	40	84
56	N3	40	84	40	84
48	N3	40	84	40	72
40	N3	22	88	80	63
36	N3	30	81	60	63
32	N3	35	84	60	63
28	N3	30	84	80	63
27	N3	30	81	80	63
26	N3	30	78	80	63
25	L3	22	88	80	63
24	N3	35	84	80	63
23	N3	40	92	80	63
22	N3	40	88	80	63
20	K3	35	84	80	63
19	N3	40	76	80	63
18	N3	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	50	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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THREADCUTTING — ENGLISH GEARBOX


STANDARD THREADS AVAILABLE

 ins									
3.1/16	K2J	8	M2H	13.3/4	R1H	25.1/3	K2F	44	M1F
4	M2J	8.71	K1H	14	S2H	26	L2G	48	M3F
4.25	K1J	8.15/16	L1J	15	R3H	27	T3G	49.1/2	T1F
4.1/2	T2J	9	T2H	16	M2G	27.1/2	R1G	52	L2F
4.3/4	K3J	9.1/2	K3H	17.42	K1G	28	S2G	54	T3F
5	R2J	9.5/8	S1J	17.7/8	L1H	30	R3G	55	R1F
5.1/2	M1J	9.3/4	L3J	18	T2G	32	M2F	56	S2F
6	M3J	10	R2H	19	K3G	34.83	K1F	60	R3F
6.3/16	T1J	10.1/2	S3J	19.1/4	S1H	35.3/4	L1G	71.1/2	L1F
6.1/3	K2H	11	M1H	19.1/2	L3H	36	T2F	77	S1F
6.1/2	L2J	12	M3H	20	R2G	38	K3F	78	L3G
6.3/4	T3J	12.3/8	T1H	21	S3H	38.1/2	S1G	84	S3F
6.7/8	R1J	12.2/3	K2G	22	M1G	39	L3G		
7	S2J	13	L2H	24	M3G	40	R2F		
7.1/2	R3J	13.1/2	T3H	24.3/4	T1G	42	S3G		

THREADS AVAILABLE WITH ADDITIONAL CHANGEWHEELS

 ins 11 1/4 M1				
 mm				
		X	Y	Z
.4	R3	21	100	45
.5	M3	21	100	45
.5	R2	21	100	45
.7	M3	21	100	63
.75	M2	21	100	45
.8	M3	24	100	63
1	M3	24	80	63
1.2	M2	24	100	63
1.25	M2	22	88	63
1.4	R2	28	80	63
1.5	M2	24	80	63
1.6	R2	40	100	63
1.75	M2	28	80	63
1.8	R2	45	100	63
2	R2	40	80	63
2.2	R2	44	80	63
2.25	M2	45	100	63
2.4	R2	48	80	63
2.5	M2	40	80	63
2.75	M2	44	80	63
2.8	R2	42	60	63
3	M2	48	80	63
3.2	R2	48	60	63
3.5	M2	42	60	63
3.75	M2	45	60	63
4	M2	48	60	63
5	R2	60	48	63
6	R2	60	40	63
6.25	M2	60	48	63
7	R2	63	40	70
7.5	M2	60	40	63
8	R2	63	40	80
10	M2	63	40	80

				
DP		X	Y	Z
56	S2	22	88	56
48	M3	22	88	56
40	R2	22	88	56
36	T2	22	88	56
32	M2	22	88	56
28	S2	44	88	56
24	M3	44	88	56
22	M1	44	88	56
20	R2	44	88	56
18	T2	44	88	56
16	M2	44	88	56
14	S2	44	88	28
13	L2	44	88	28
12	M3	44	88	28
11	M1	44	88	28
10	R2	44	88	28
9	T2	44	88	28
8	M2	44	88	28

					
MOQ		W	X	Y	Z
.4	R3	45	100	66	80
.5	M3	45	100	66	80
.5	R2	45	100	66	80
.7	M3	63	100	66	80
.8	R3	30	100	99	40
1	M3	30	100	99	40
1.25	M2	30	100	99	48
1.5	M2	30	100	99	40
1.75	M2	42	100	99	48
2	R2	44	88	99	40
2.25	M2	45	100	99	40
2.5	M2	44	88	99	40
2.75	M2	44	80	99	40
3	M2	48	80	99	40
3.5	M2	56	80	99	40

(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.

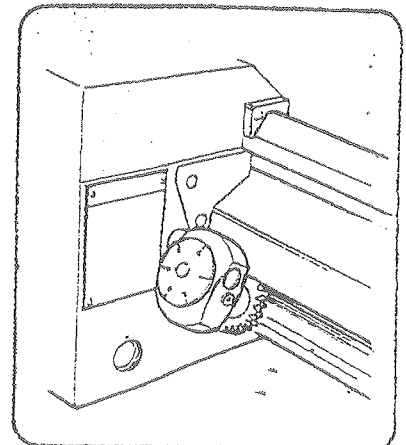
in column 3. The dial numbers at which the leadscrew nuts may be engaged.

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
0.5	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	14

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).



Maintenance

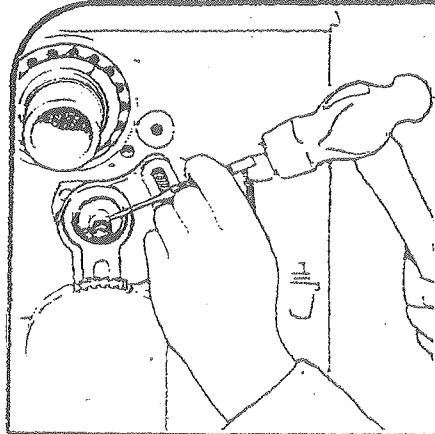


FIG. 1

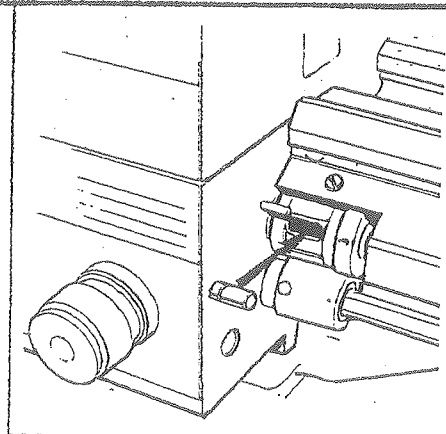


FIG. 2

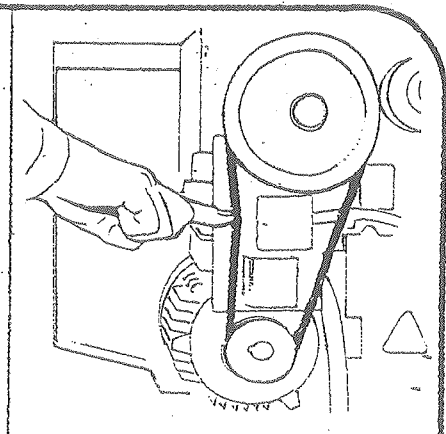


FIG. 3

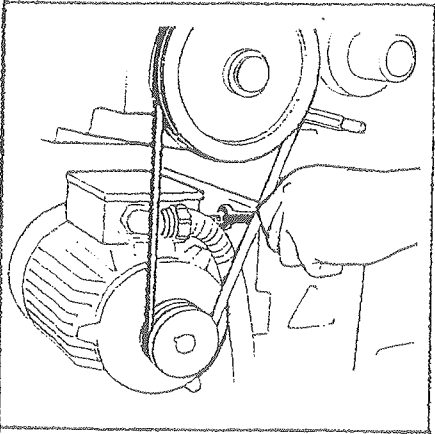


FIG. 4

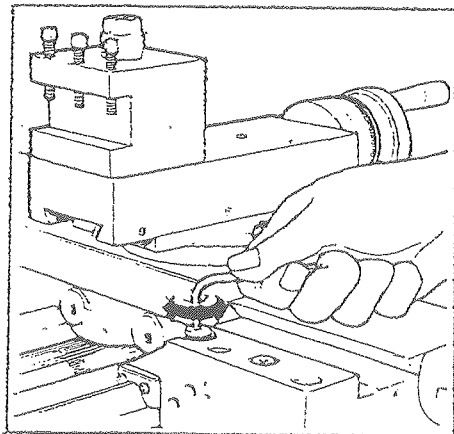


FIG. 5

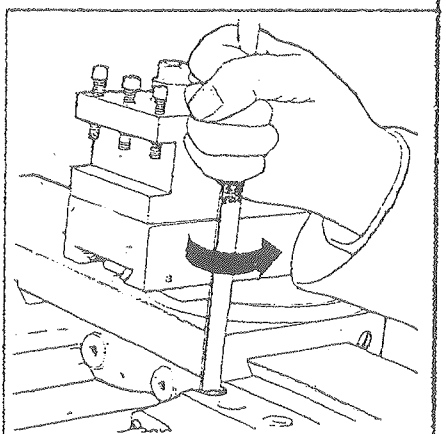


FIG. 6

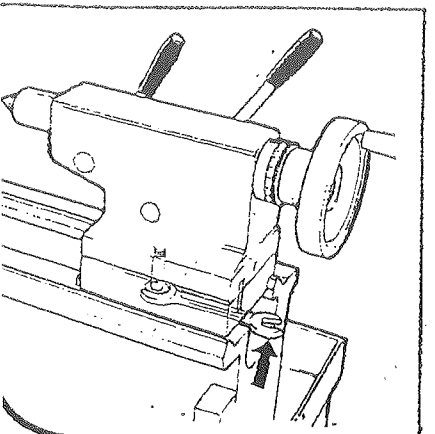


FIG. 7

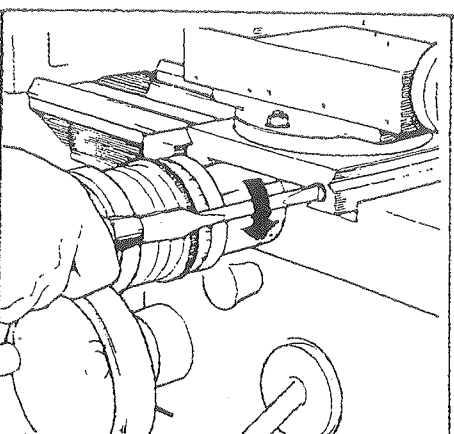


FIG. 8

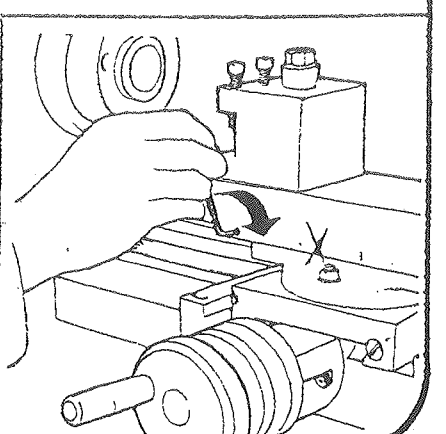


FIG. 9

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.

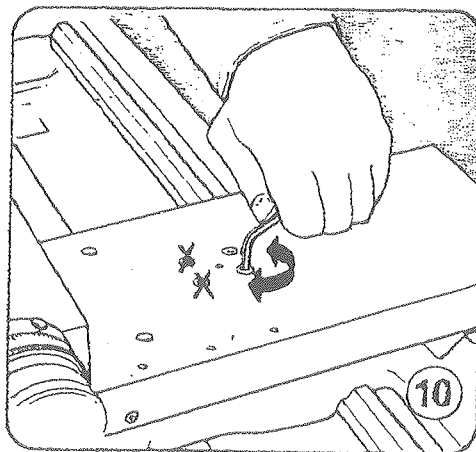
Top Slide (Fig. 9)

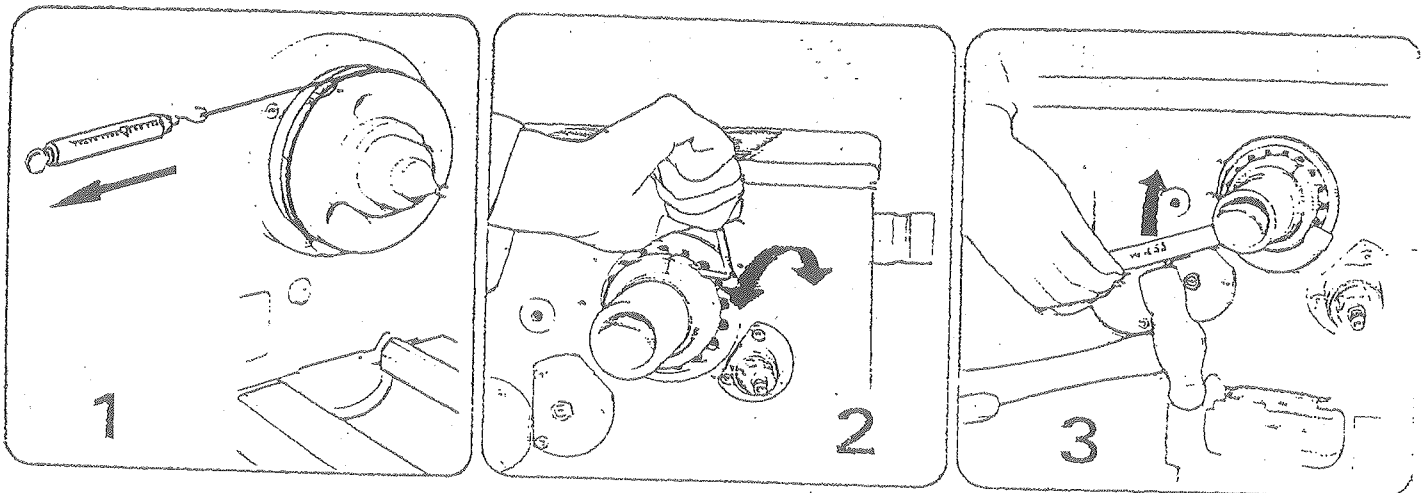
Take up for wear on the top slide strip is by means of the four (self-locking) socket set screws in the front face of the top slide casting.

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 a pin key, 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.

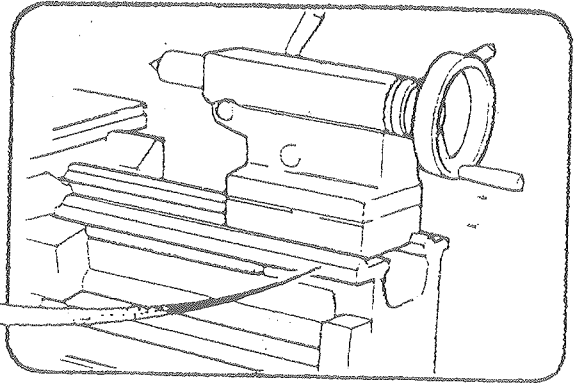


Parts Ordering Procedure

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

Contents List

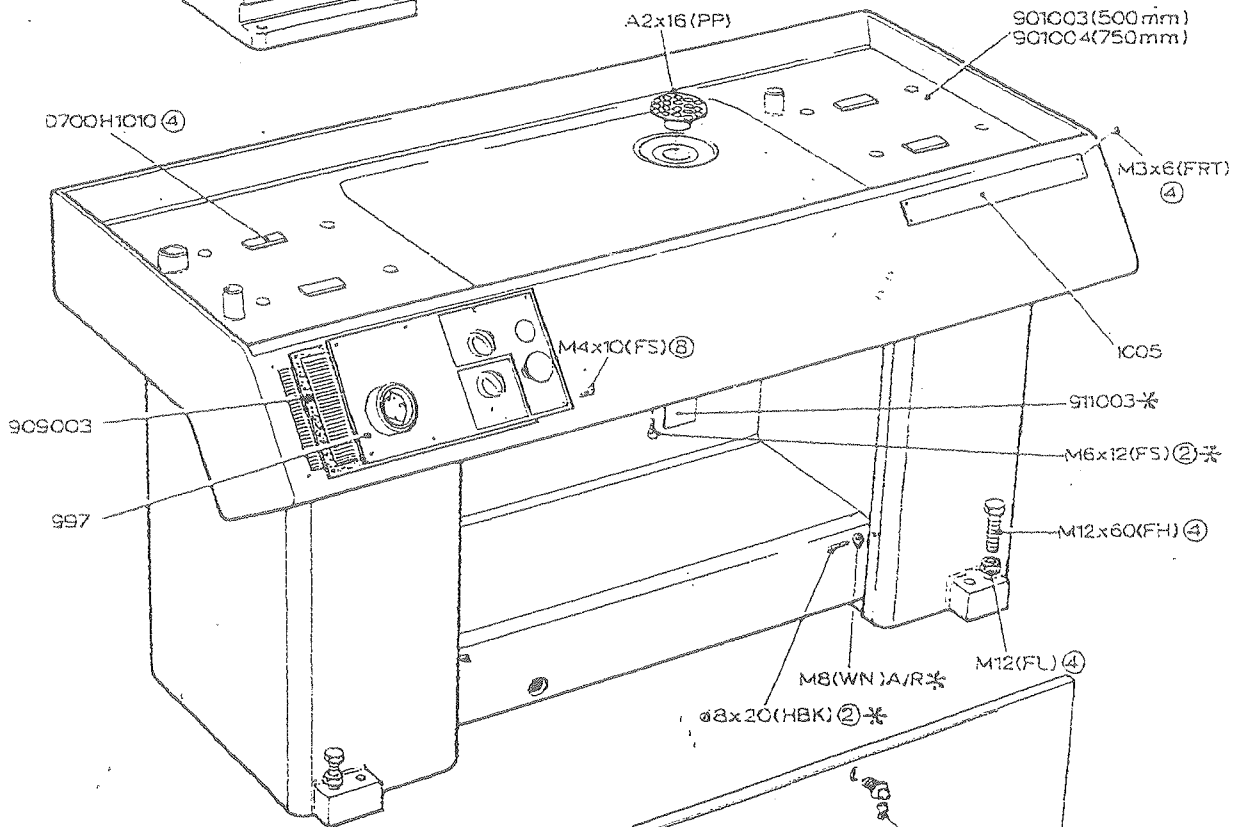
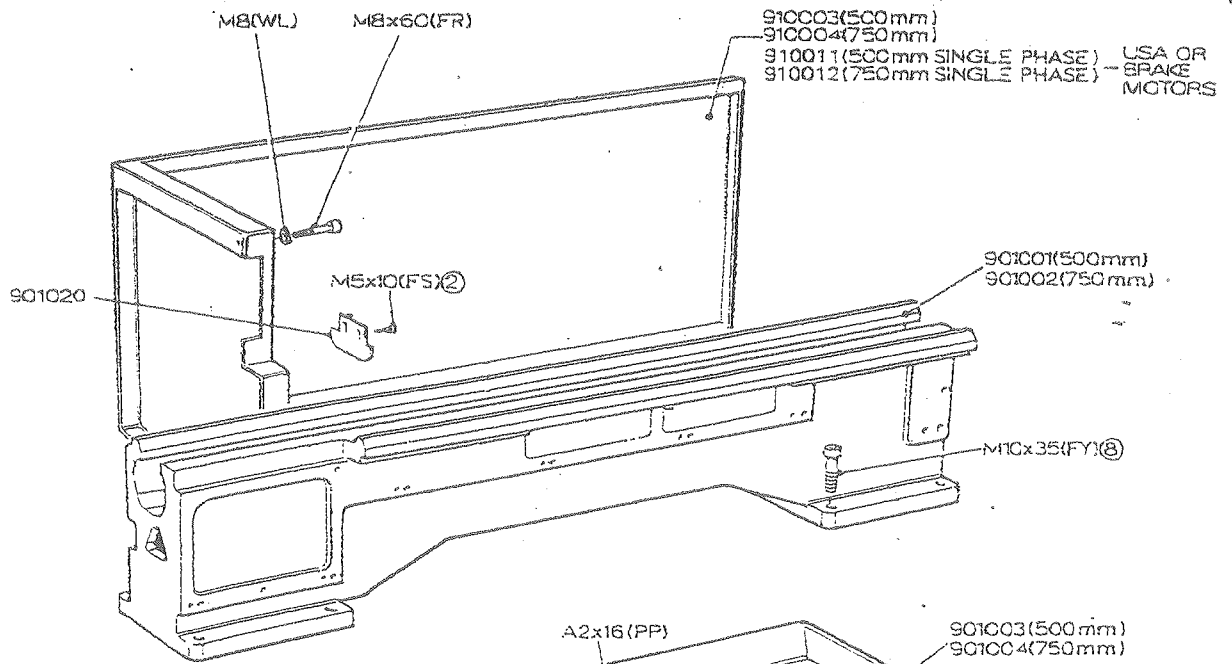
		Page No.
901/1	Bed and cabinet	25
901/2	Drive	26
901/3	Changewheel guard	27
902/1	Headstock	28
902/2	Headstock gears	29
902/3	Headstock controls	30
903/1	Gearbox casting and shafts	31
903/2	Gearbox gears and shafts (Metric)	32
903/3	Gearbox gears and shafts (English)	33
904/1	Apron casting and controls	34
904/2	Apron shafts	35
905/1	Saddle	36
905/2	Slides	37
906	Shafts, rack and bracket	38
907	Tailstock	39
908	Changewheels and swing frame	40
910	Standard equipment	41
911	Additional equipment (see section list)	42
912	Taper turning attachment	56
913	Bed capstan unit	57

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 <i>Single</i>	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

3 PH 50Hz D90S 4022.1 2000 RPM Twin V

Twin 6275. Vx - 0360

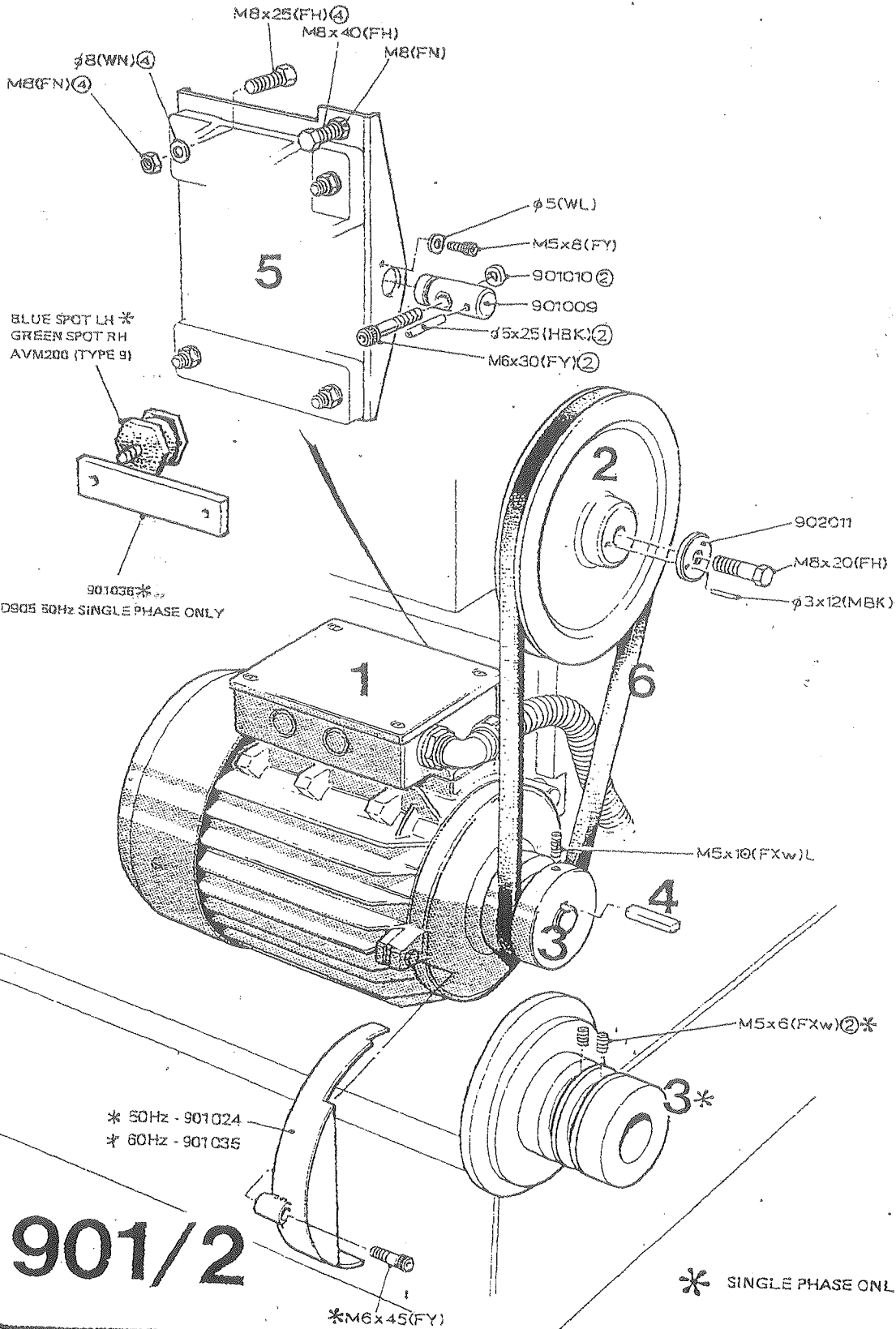


*AVAILABLE AS ADDITIONAL EQUIPMENT

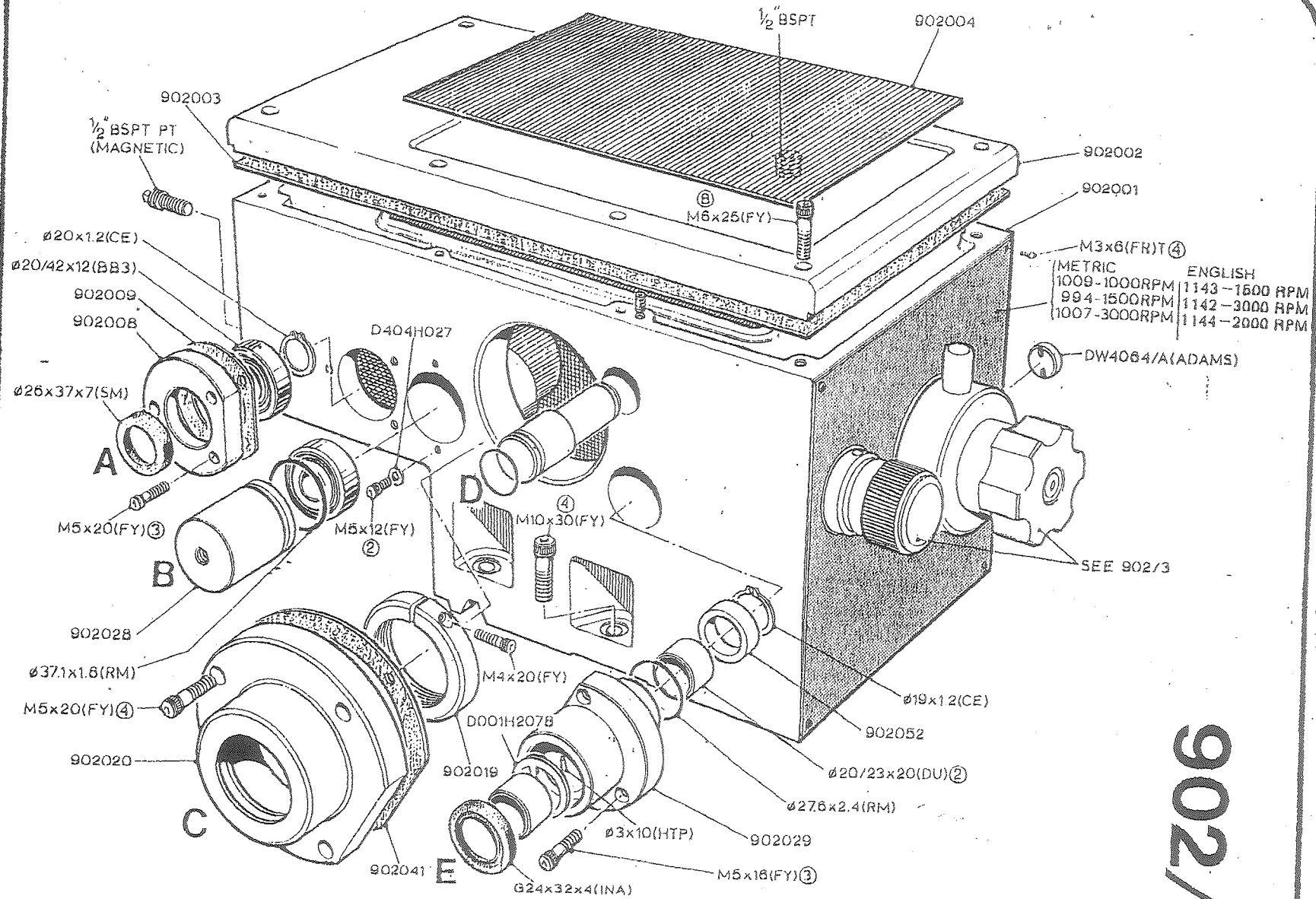
* 911001(500mm)
 * 911002(750mm)

7/1908*
 (WILMOT BREEDON)

901/1

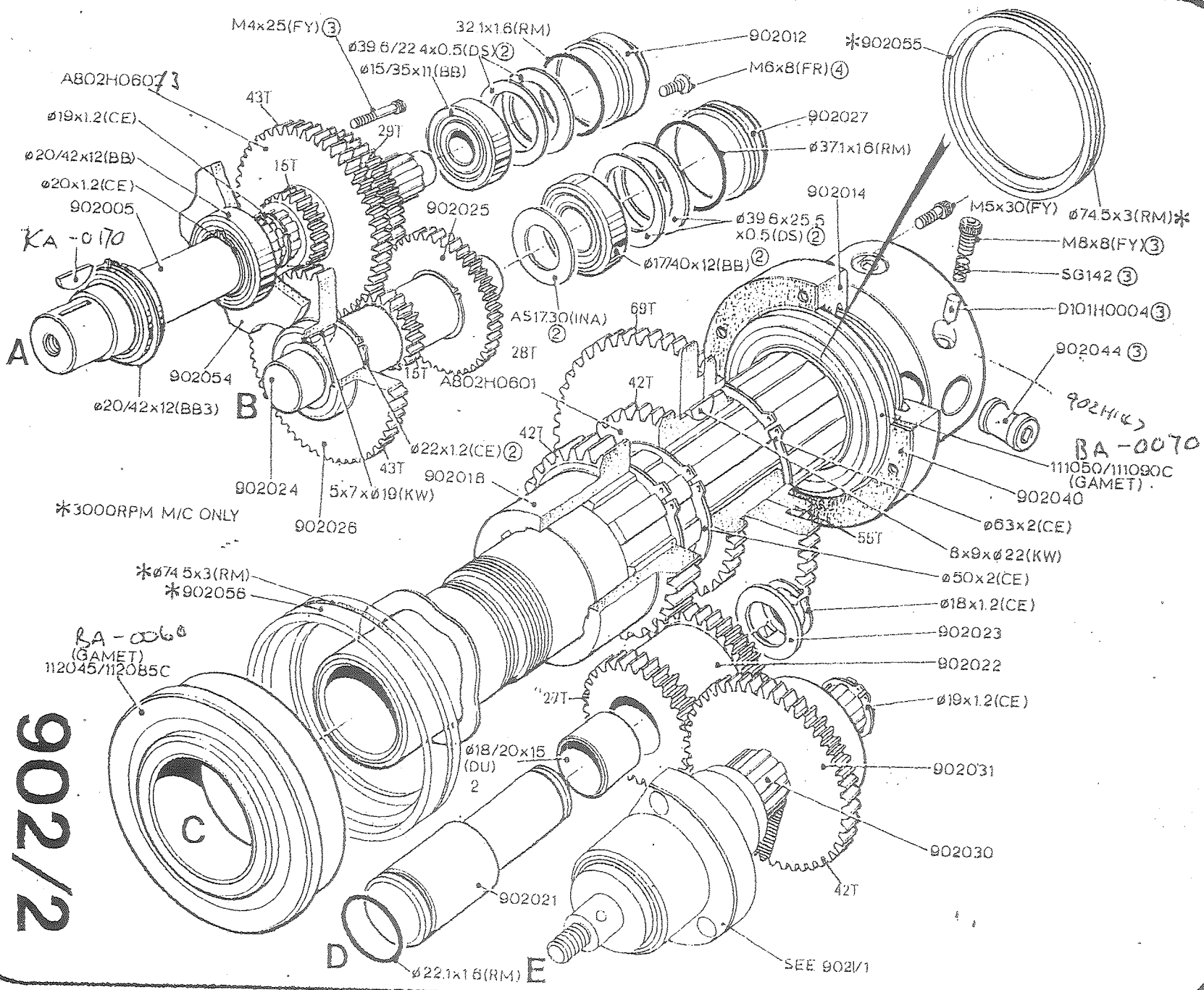


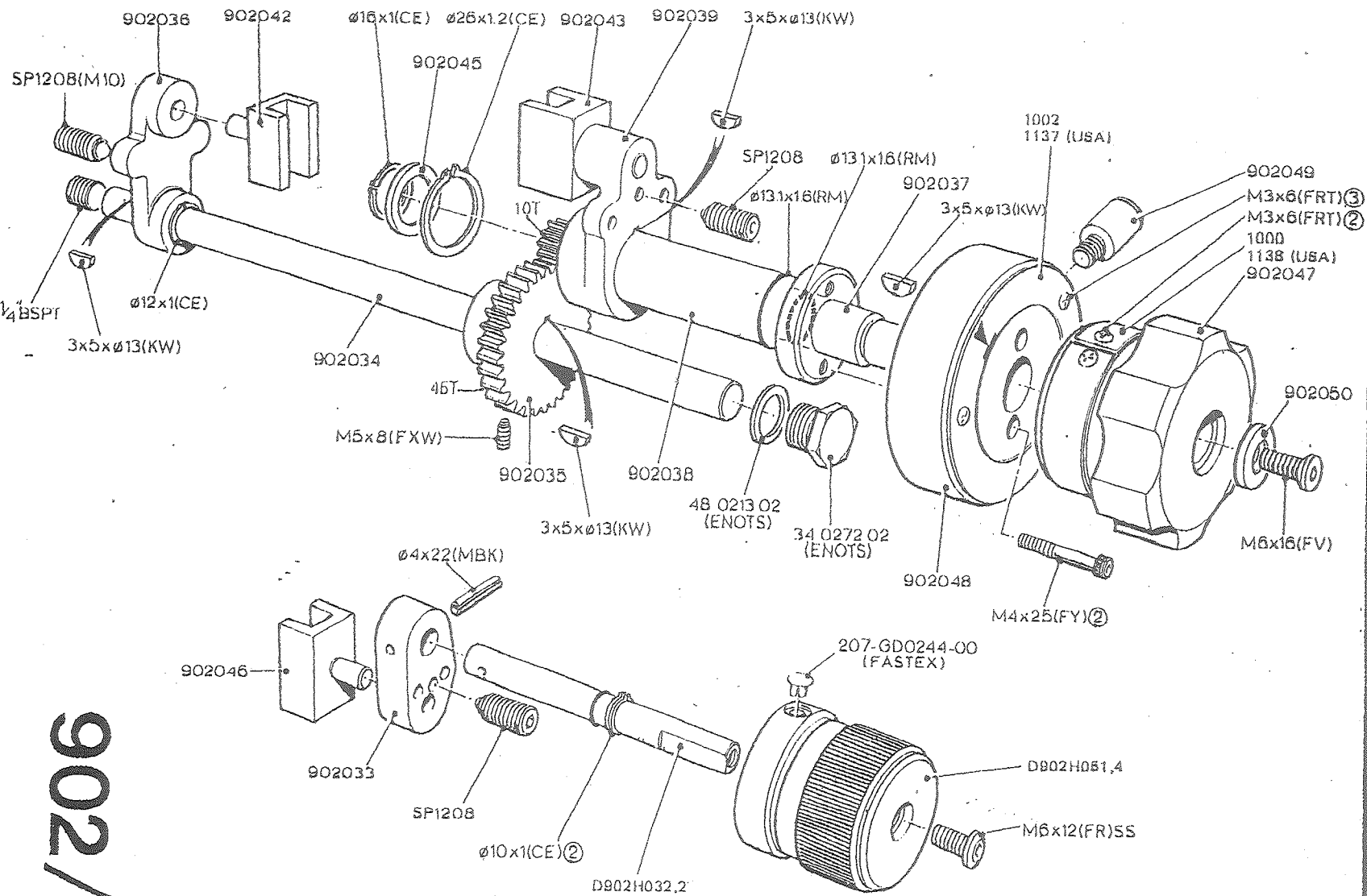
901/2



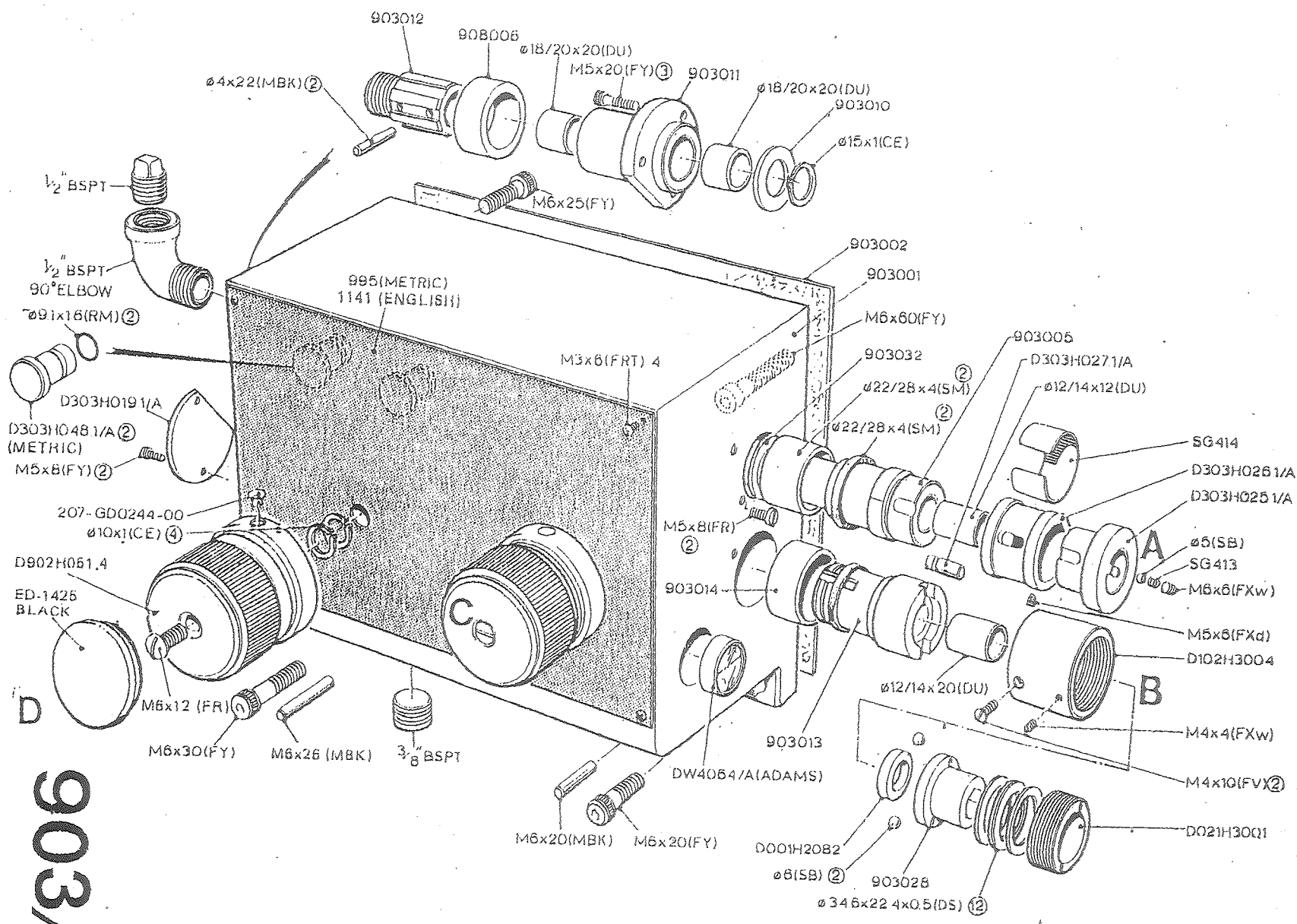
902/1

902/2





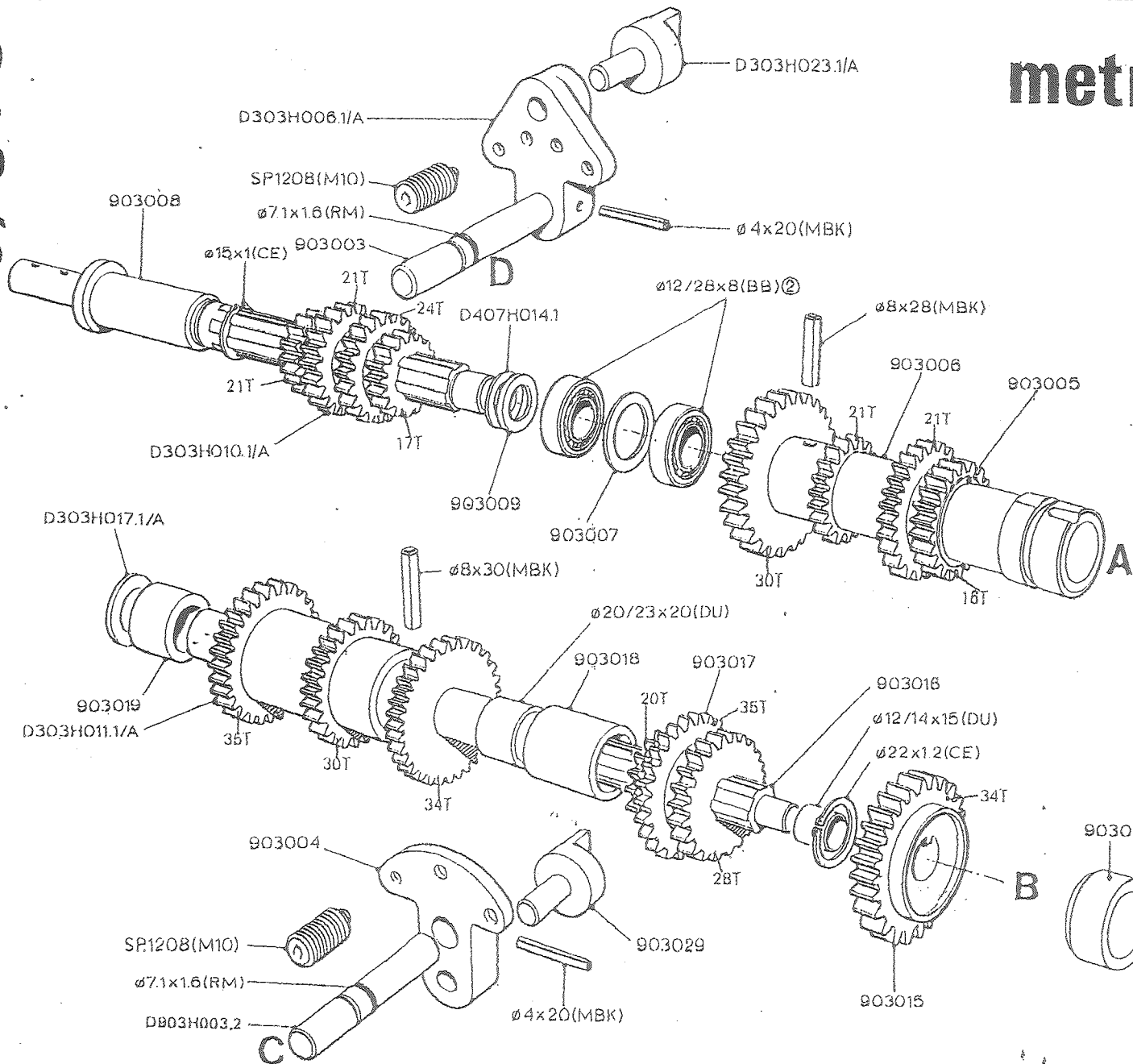
902/3



903/1

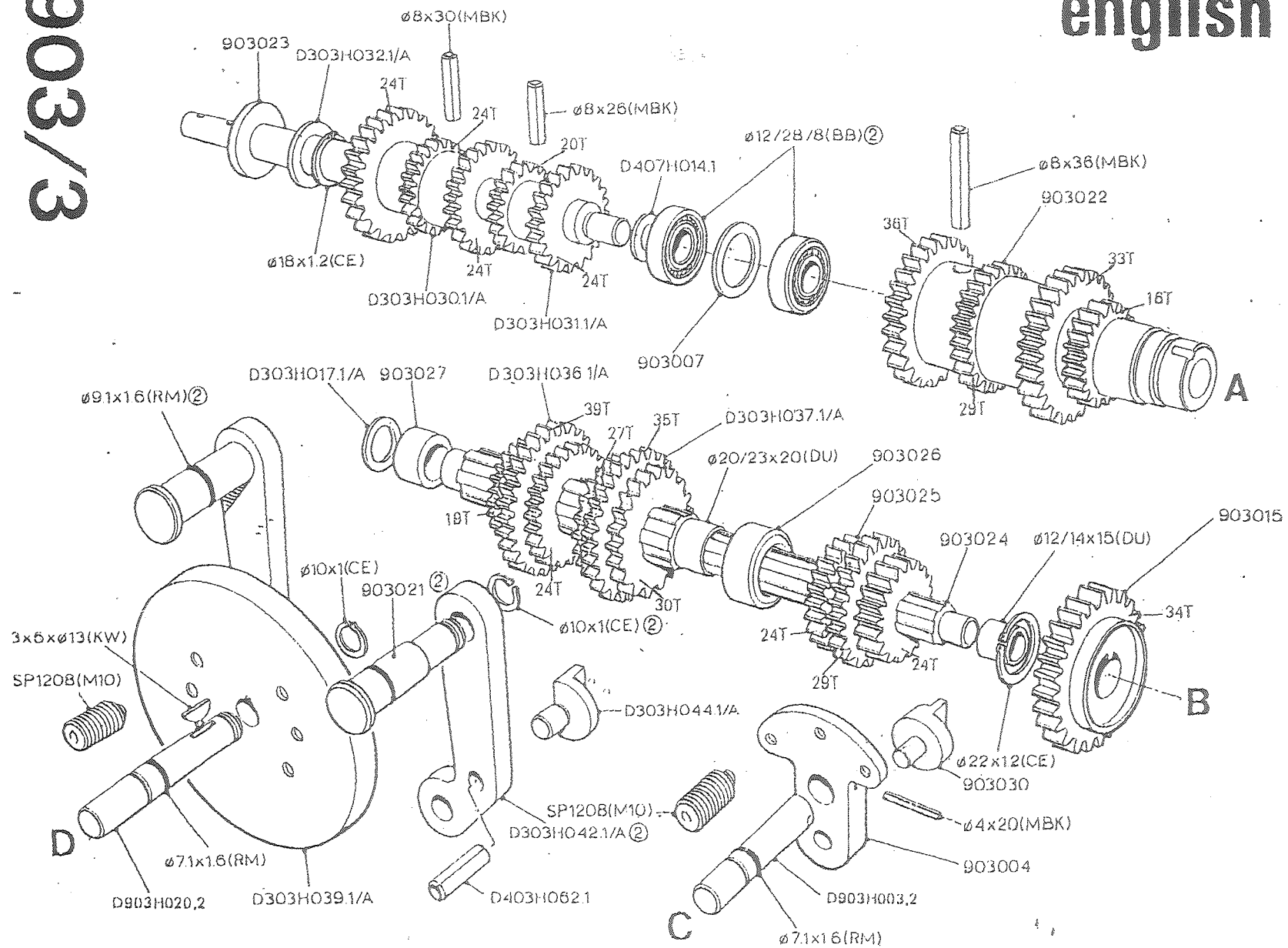
903/2

metric

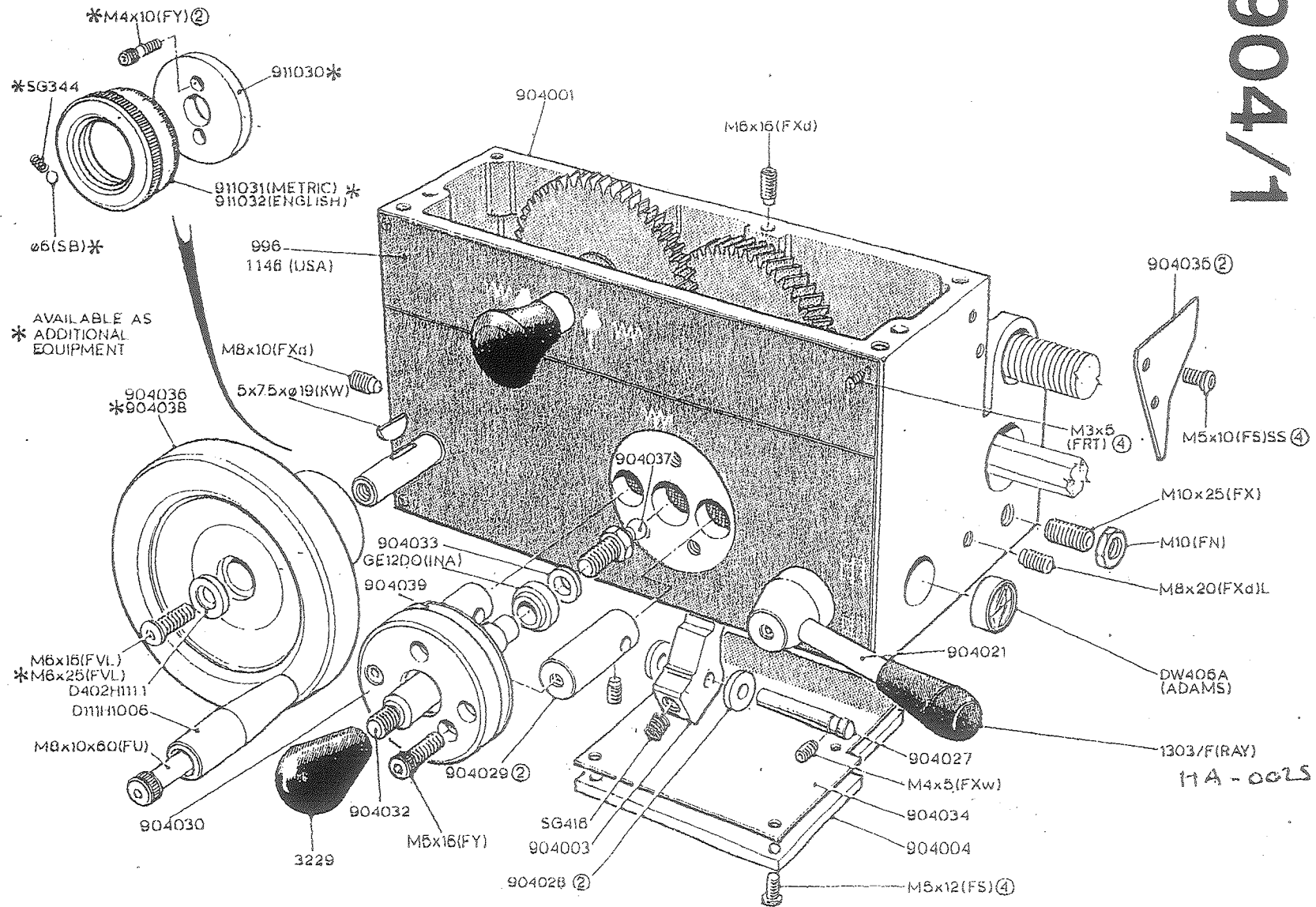


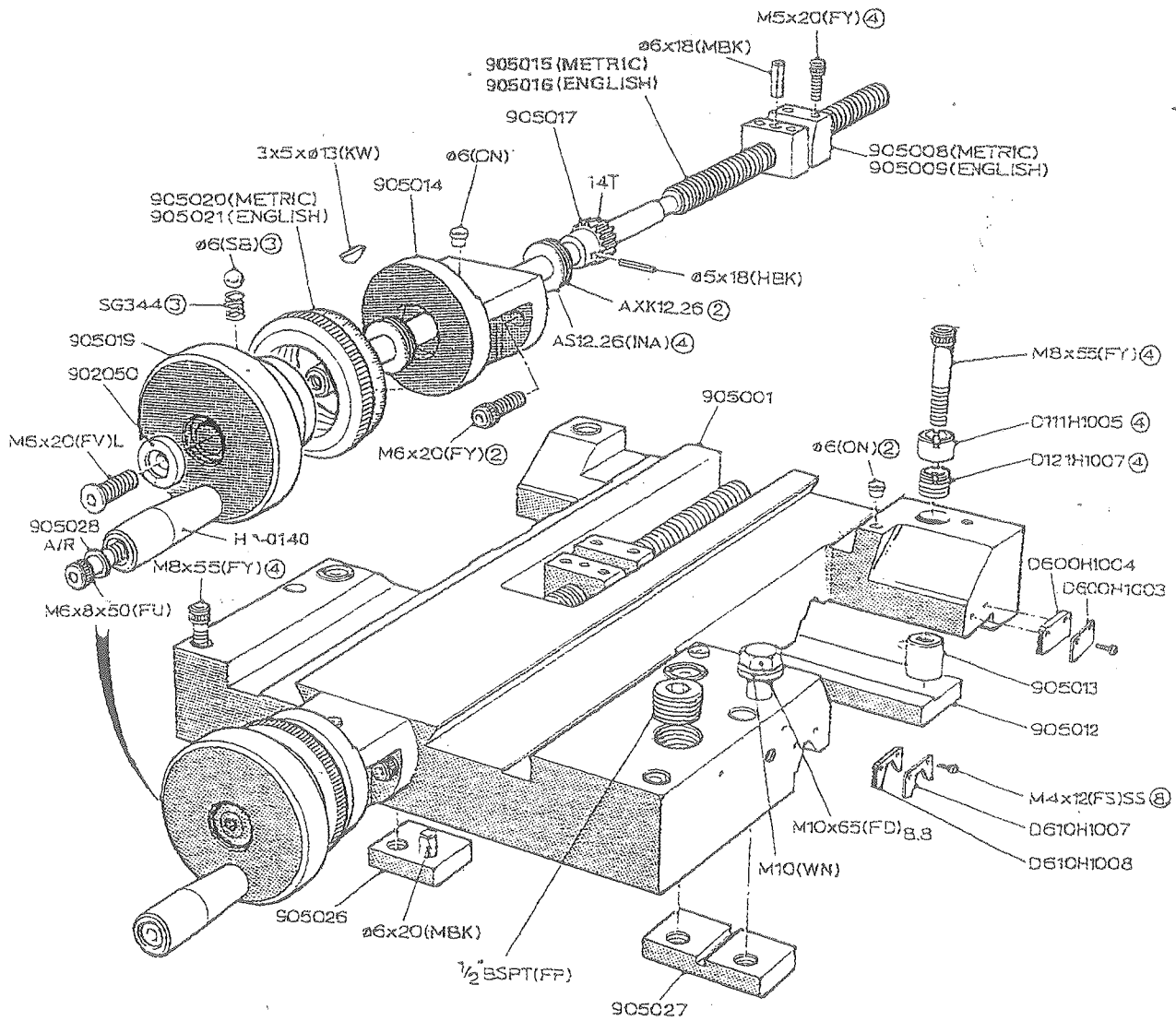
903/3

english

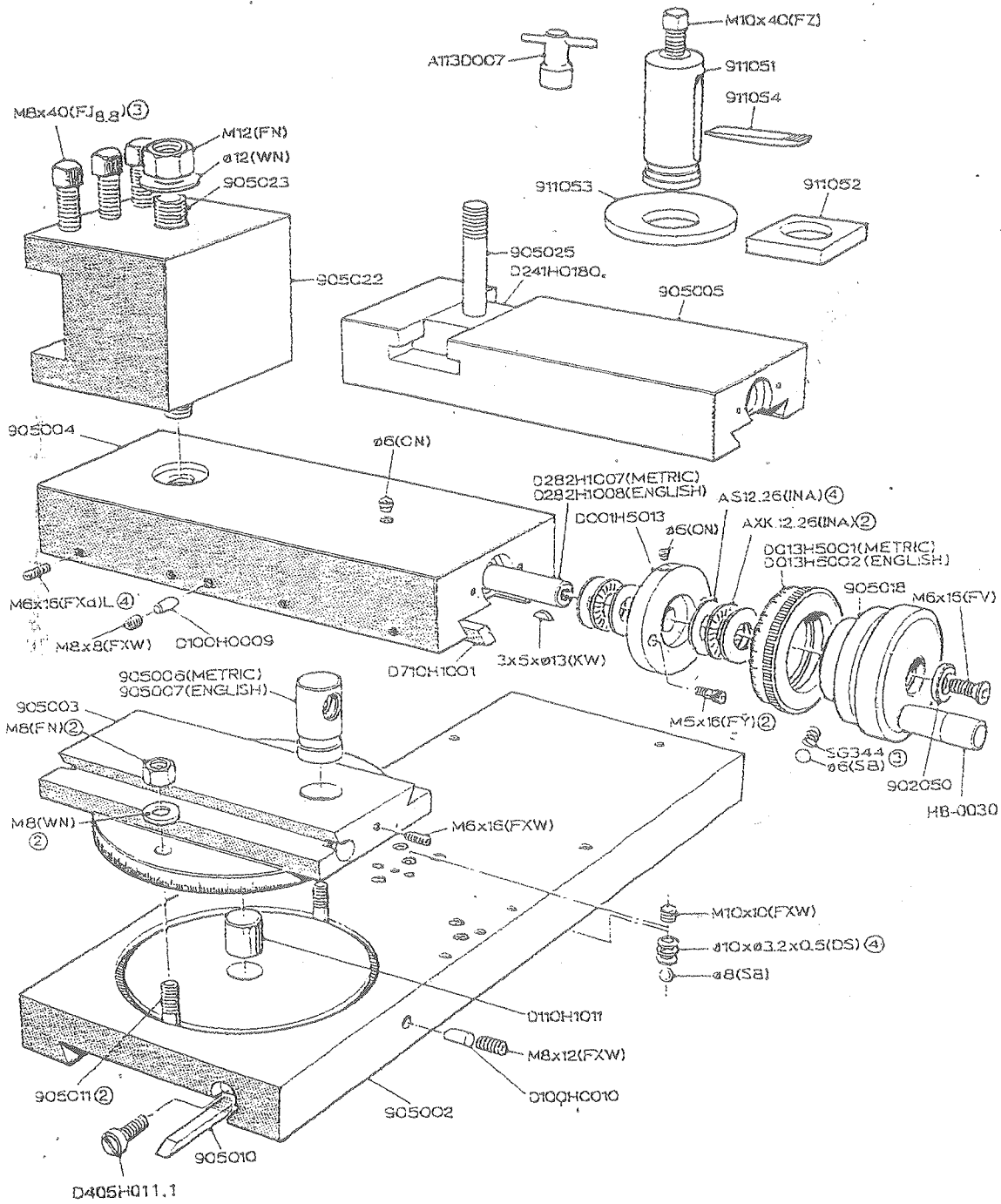


904/1

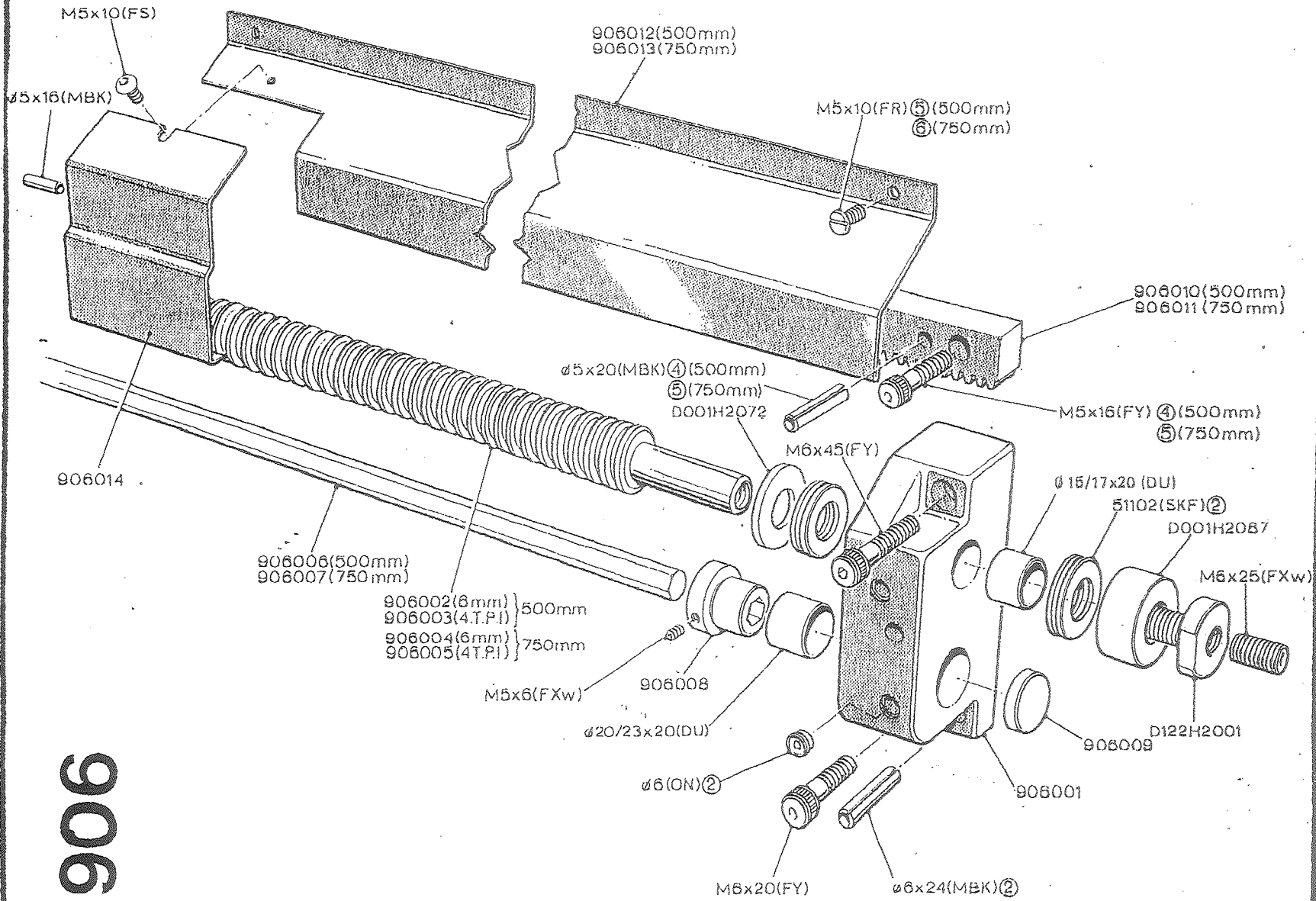




905/1

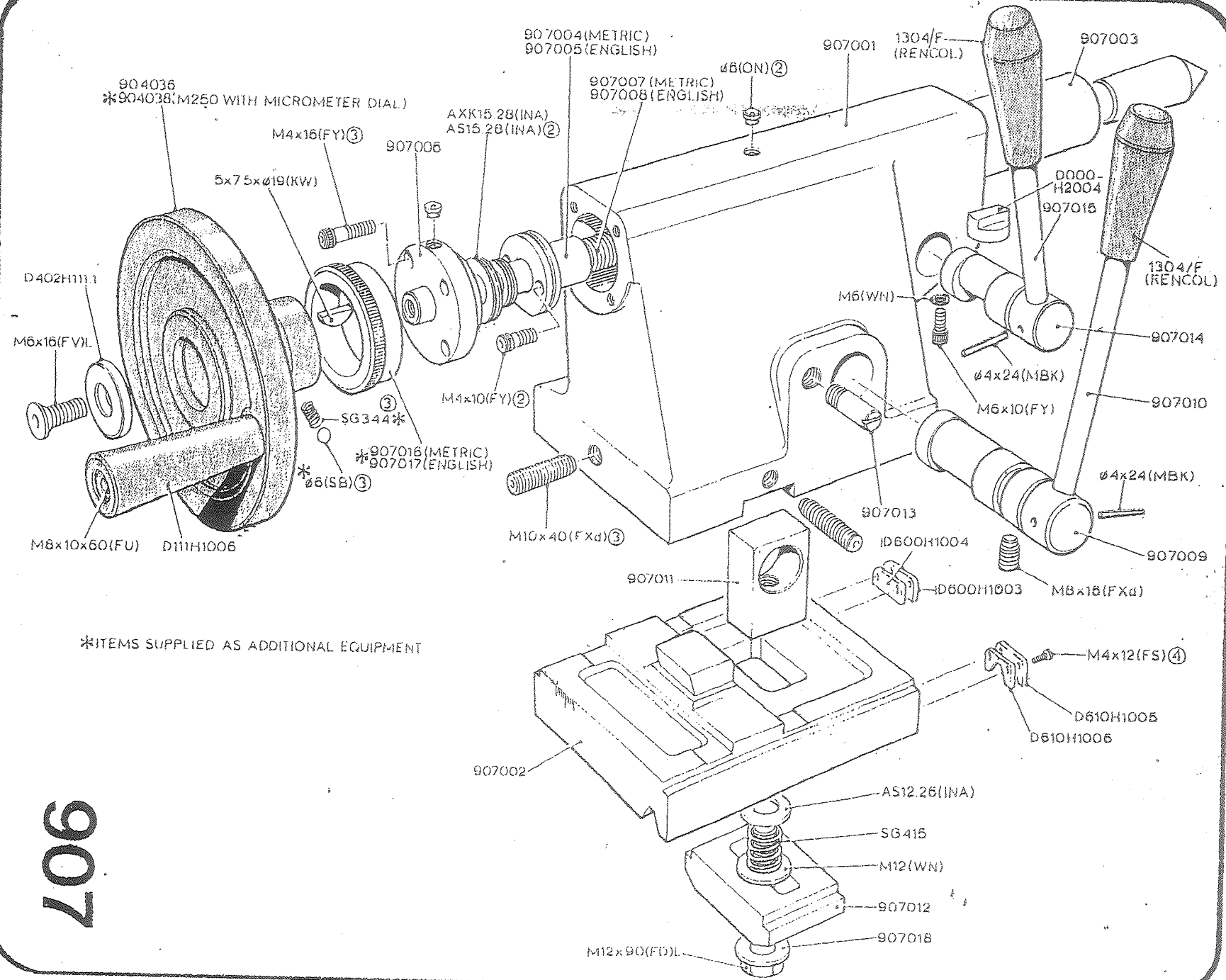


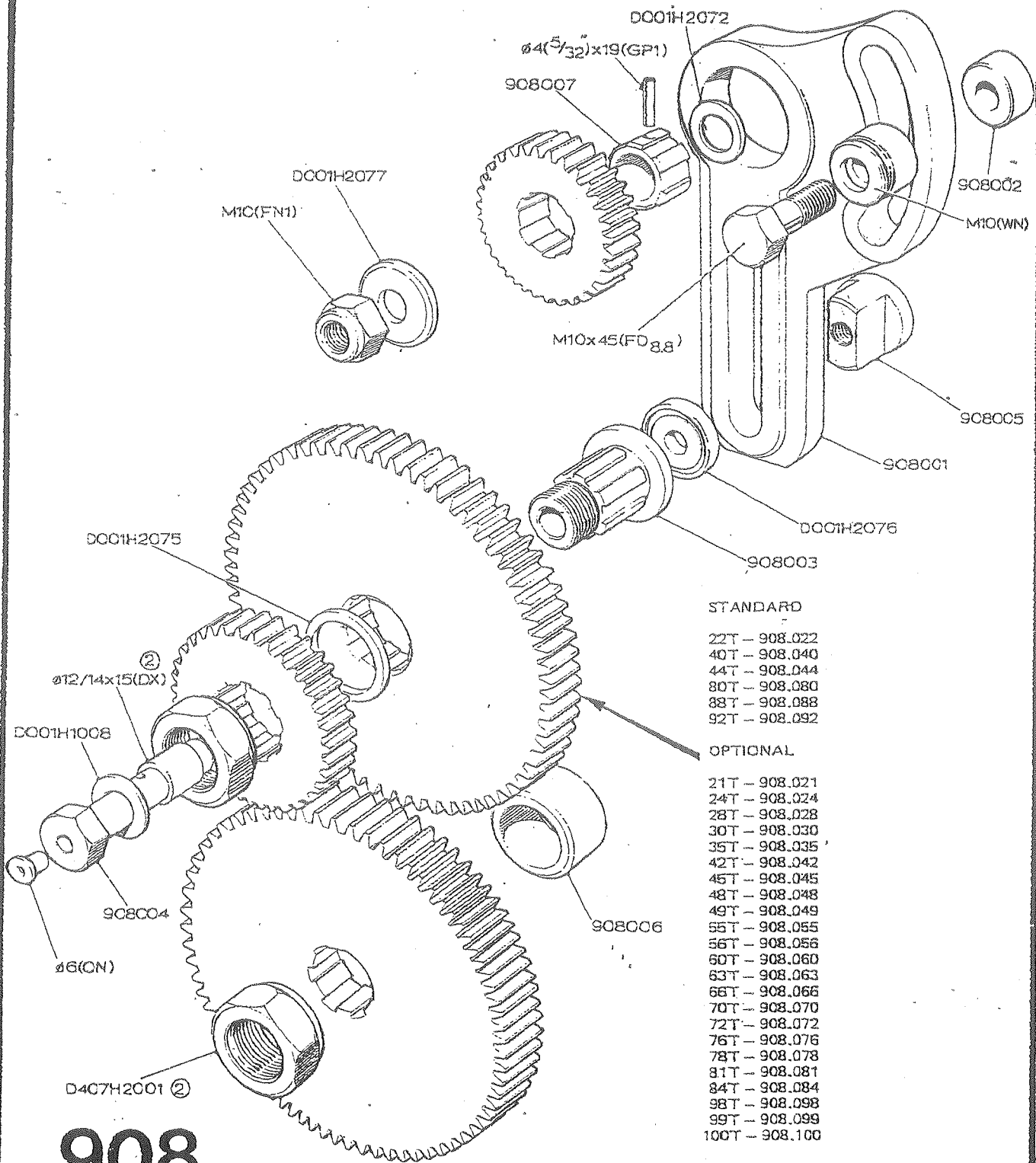
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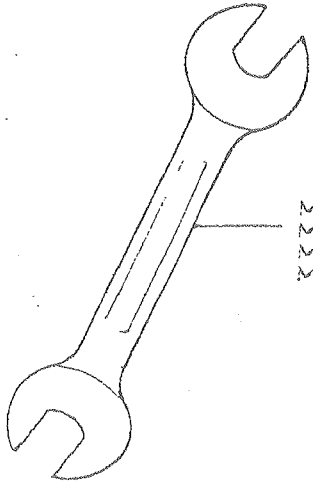
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907

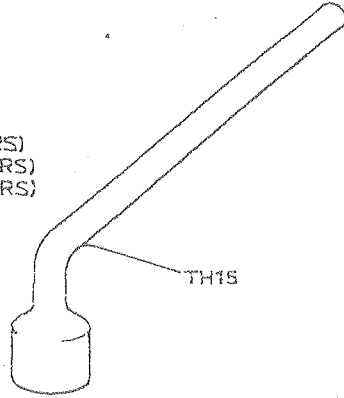




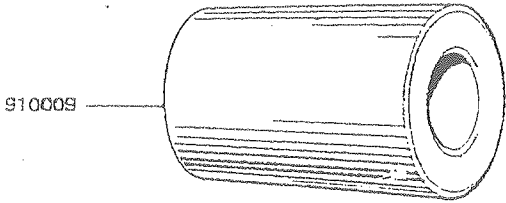
908



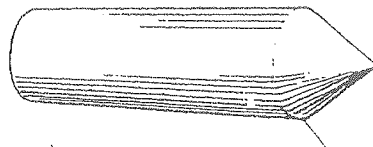
M8/13mm x 15mm (WRS)
 M10/17mm x M12/19mm (WRS)
 M14/22mm x M16/24mm (WRS)
 M18/27mm x M22/32mm (WRS)



TH15

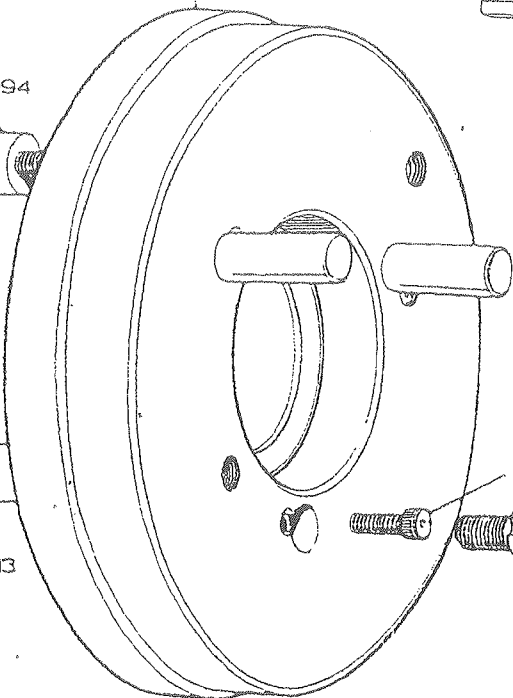


910009



LS-585A

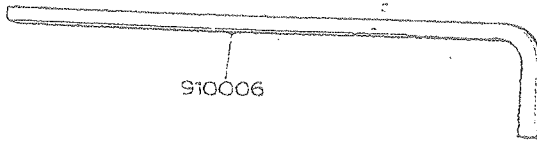
910001



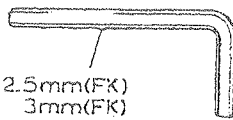
D101H2094

M12x25 (FY)

D220H1013



910006



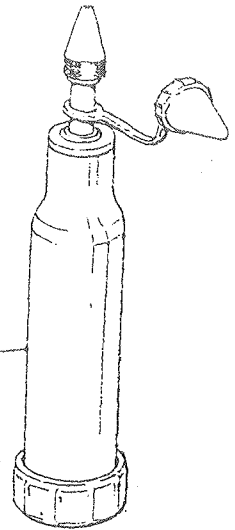
2.5mm (FK)
 3mm (FK)
 4mm (FK)
 5mm (FK)
 6mm (FK)
 8mm (FK)

M6x12 (FY) (3)



910005 (3)

F60 (OIL GUN)



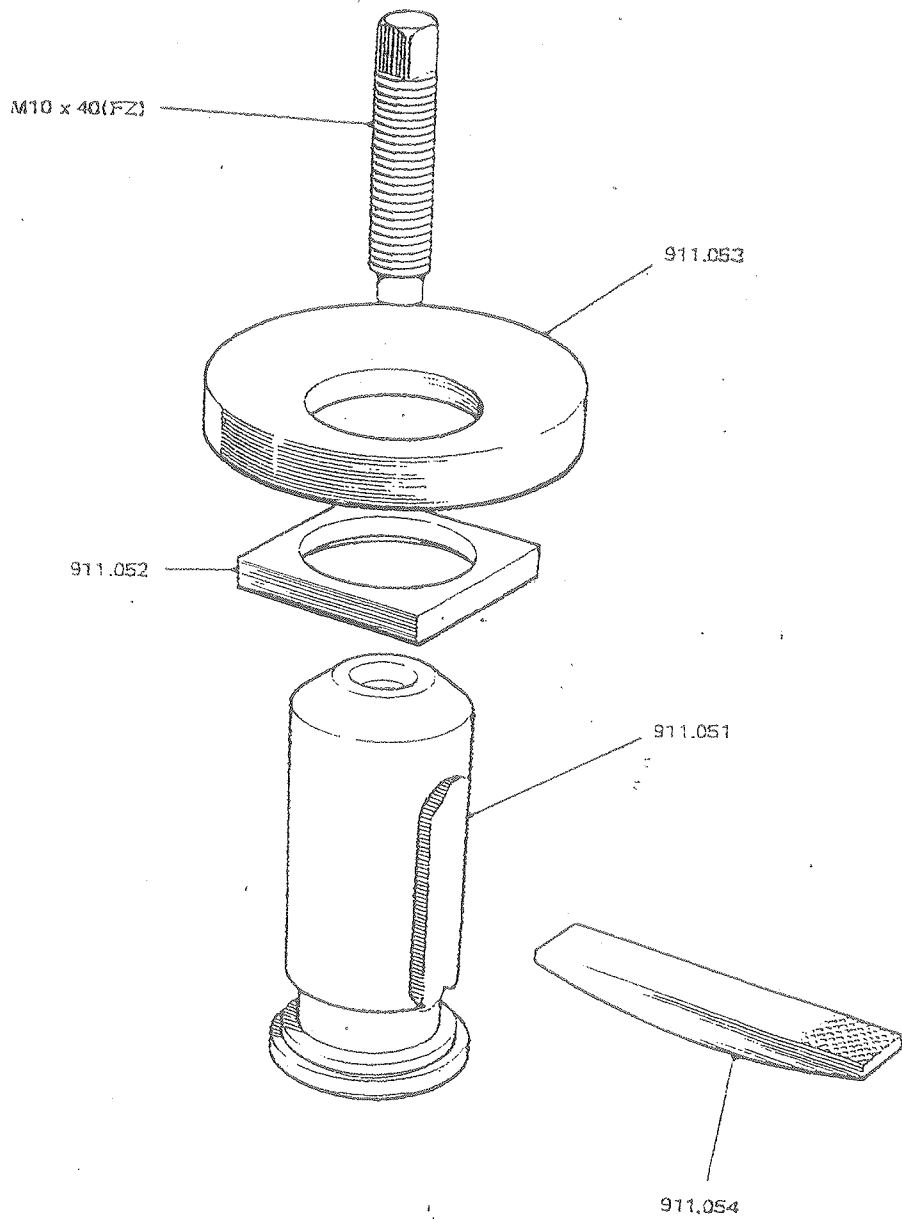
910

Additional Equipment

		Page No.
911.09	American Toolpost	42a
911.10	4-way hard-indexing toolpost	43
911.11	Quick-change toolpost	44
911.12	Quick-change parting off toolholder	44
911.14	Chuck guard assembly	45
911.31	Saddle mounted chip guard	46
911.32	Perspex chip guard-magnetic base	47
911.35	Coolant pump tank and fittings	48
911.38	Low-voltage machine light	49
911.41	Travelling steady	50
911.42	Stationary steady	51
911.45	5-position stop-cross-slide traverse	52
911.46	Single stop - saddle traverse	52
911.47	Micrometer stop - saddle traverse	52
911.48	5-position stop - saddle traverse	52
911.60	Magnetic based dial indicator - Metric graduations	47
911.61	Magnetic based dial indicator - English graduations	47
911.67	Thread dial indicator assembly	53
911.81	Emergency foot switch	54

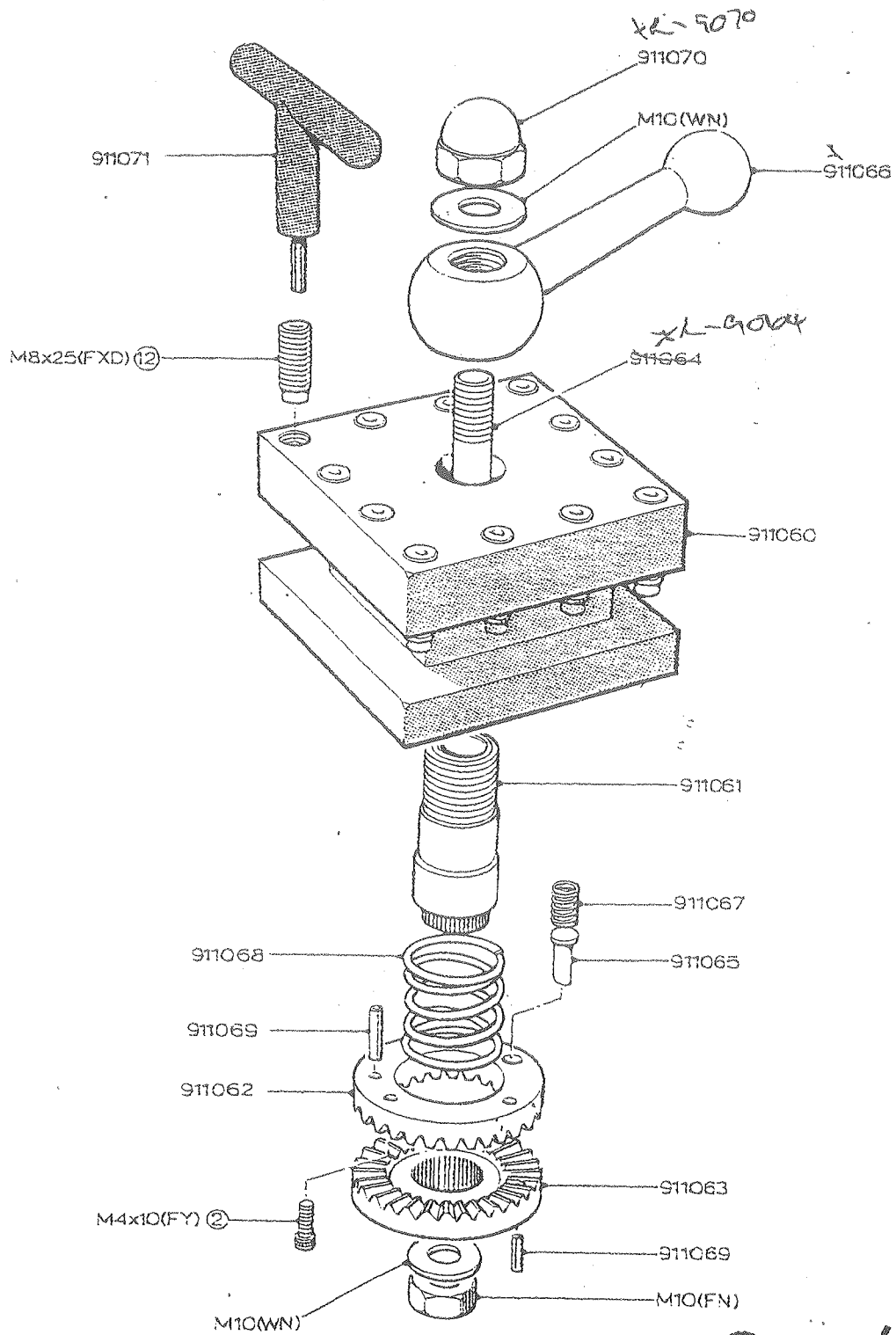
Parts available as assemblies (not illustrated):

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 topslide screw and nut required)
911.72	Wattmeter
1542-21601	4-jaw chuck
1212-21305	3-jaw chuck
D911H007.1	Faceplate



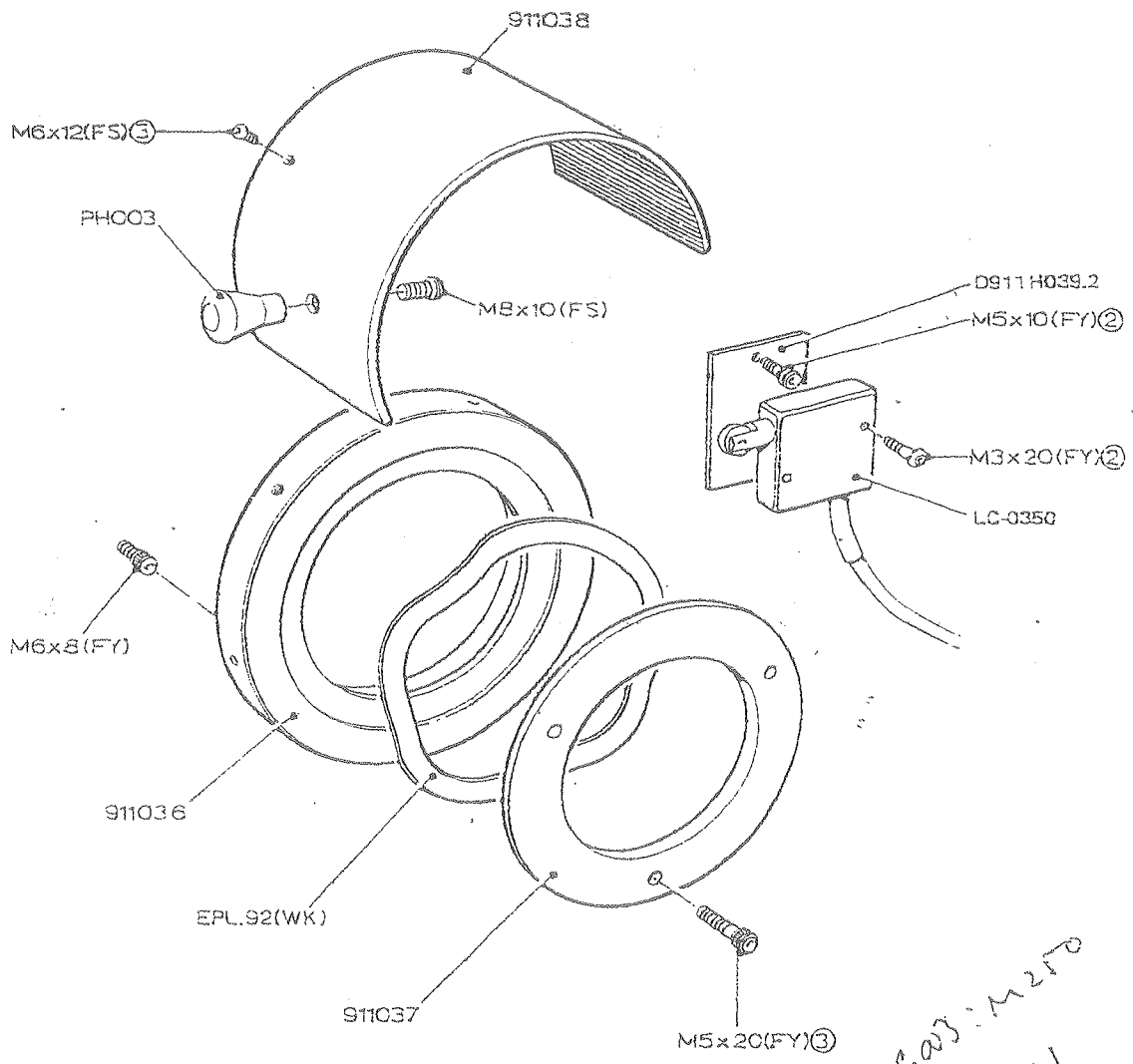
911/09





911/10

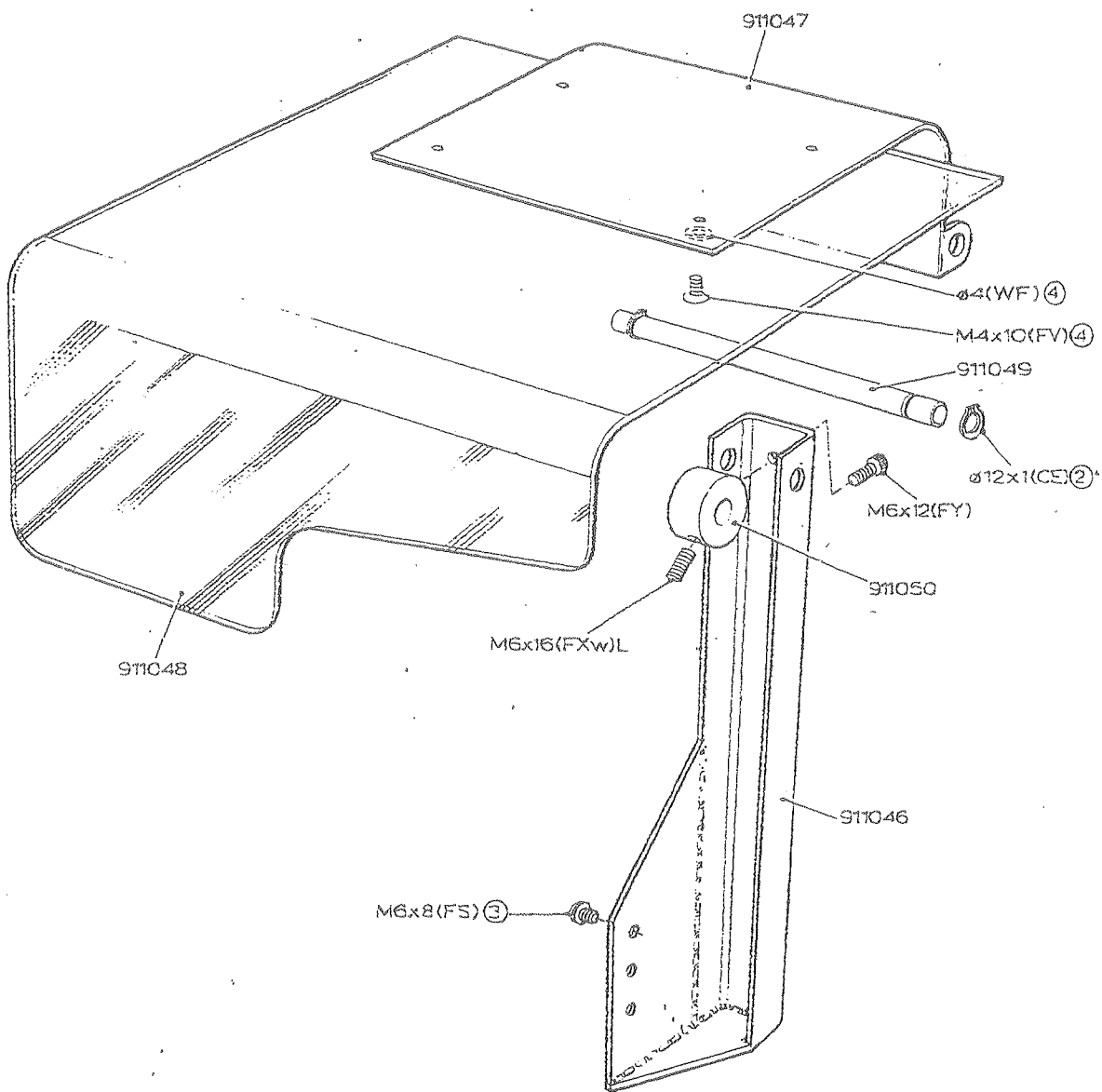
1500



NON INTELLOX 903: M250
INTELLOX X9-9211

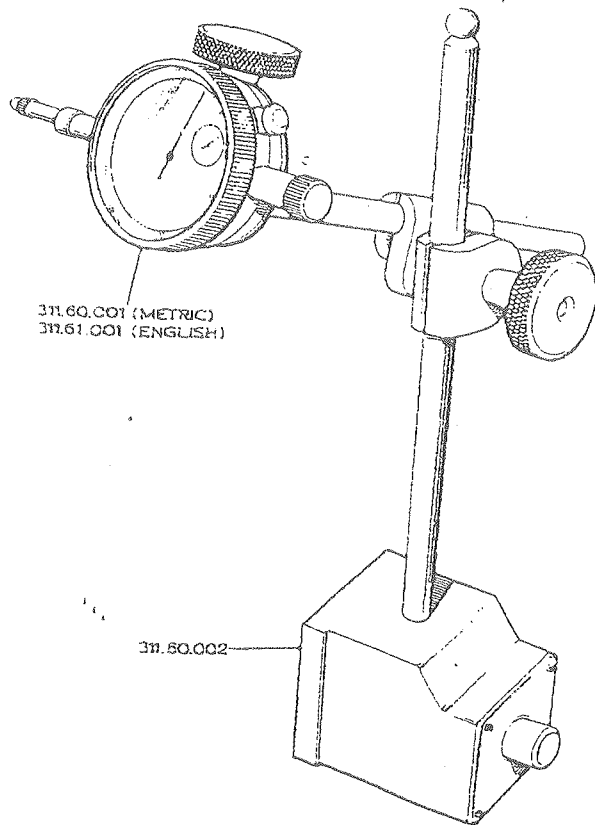
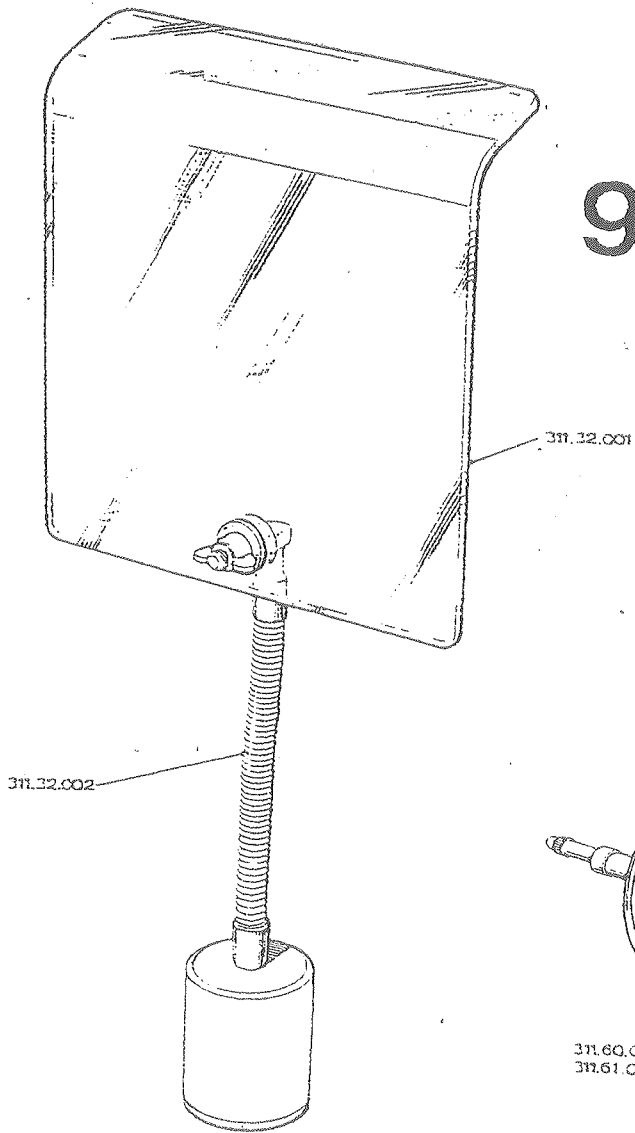
911/14

A1-0060



911/31

911/32



911/60-61

MGL40.25 BOSA(400x250)
MGL40.40 BOSA(400x400)
(MG ELECTRICS)

25Ax12(FO) ④

40WATT/50VOLTS
40WATT/25VOLTS

M5(WN)③

M5x12(FO) ③

MGT60A(380-440V/50V)
MGT60B(380-440V/25V)
MGT60C(210-250V/50V)
MGT60D(210-250V/25V)
MGT60E(500-550V/50V)

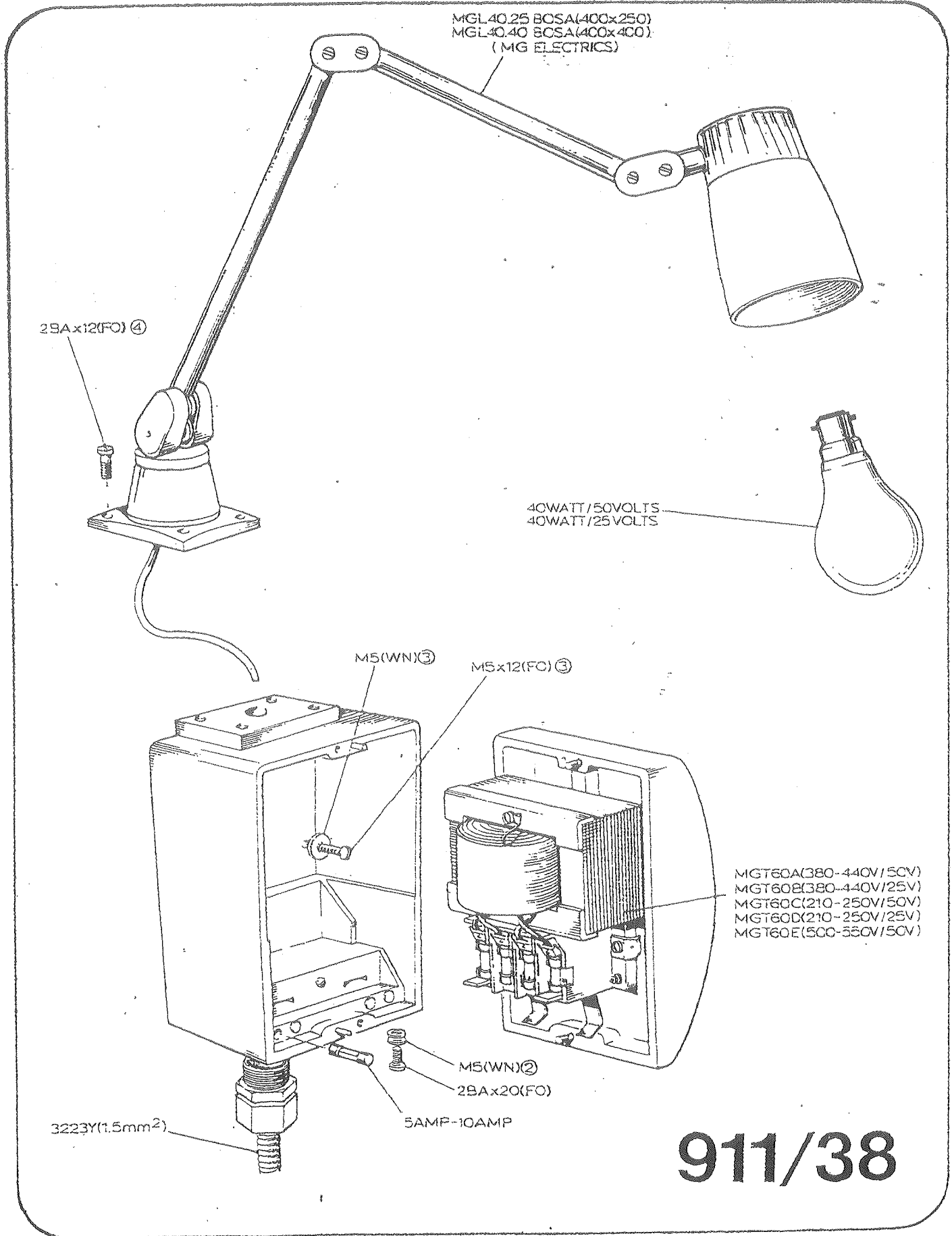
M5(WN)②

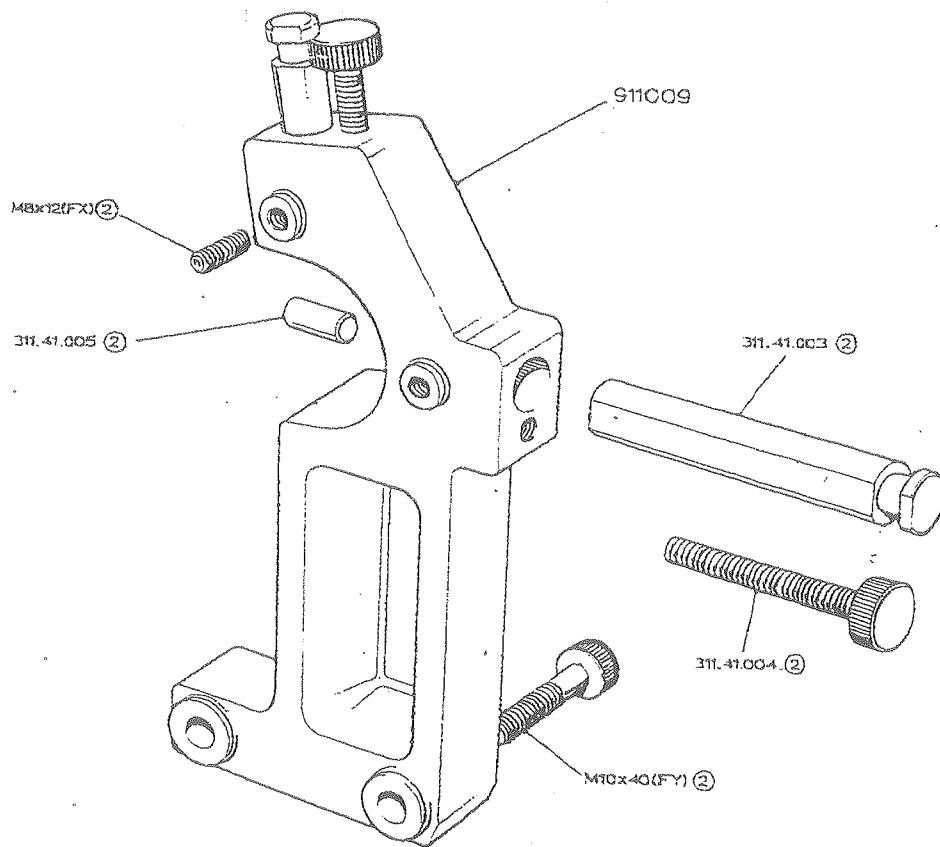
25Ax20(FO)

3223Y(1.5mm²)

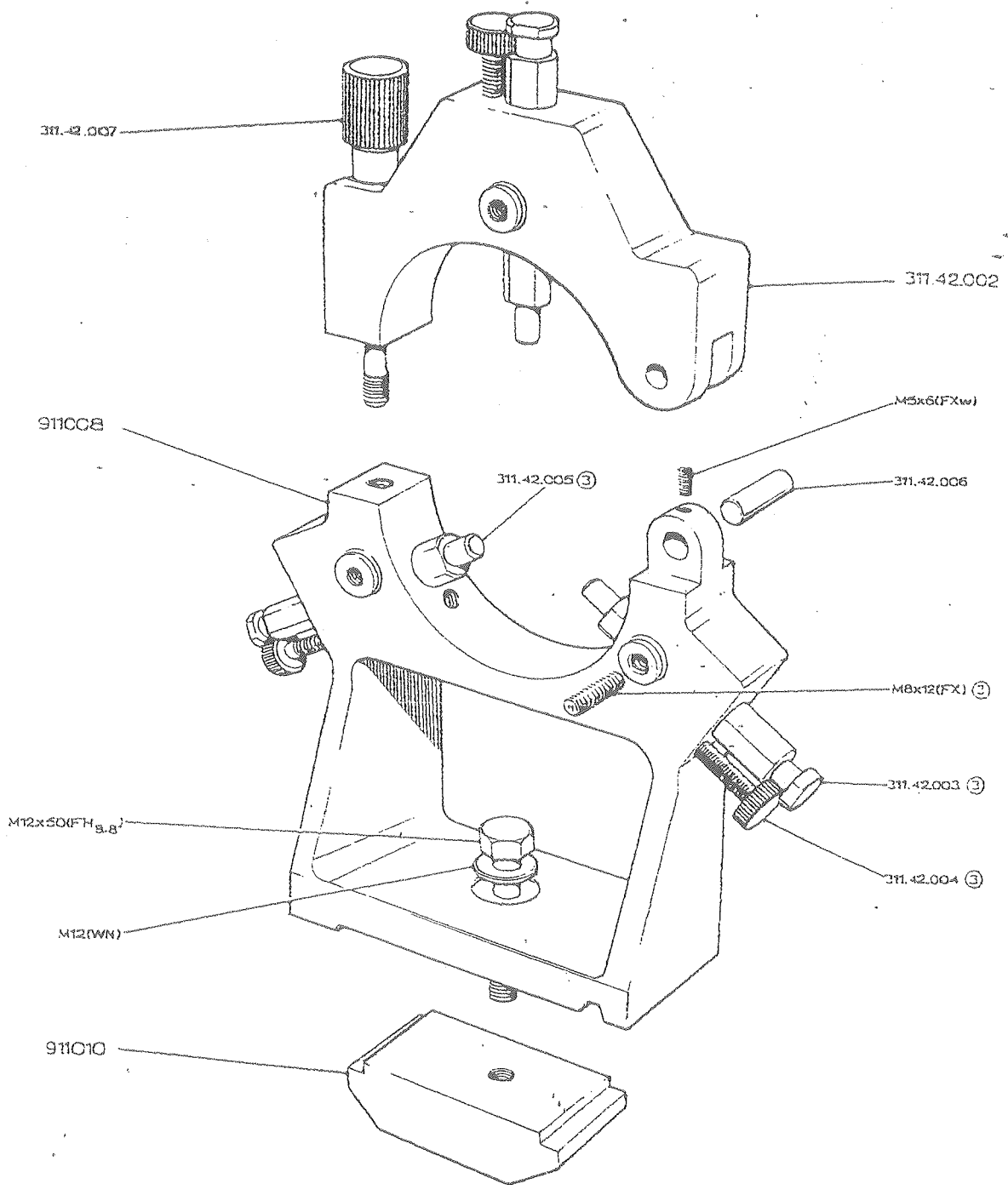
5AMP-10AMP

911/38



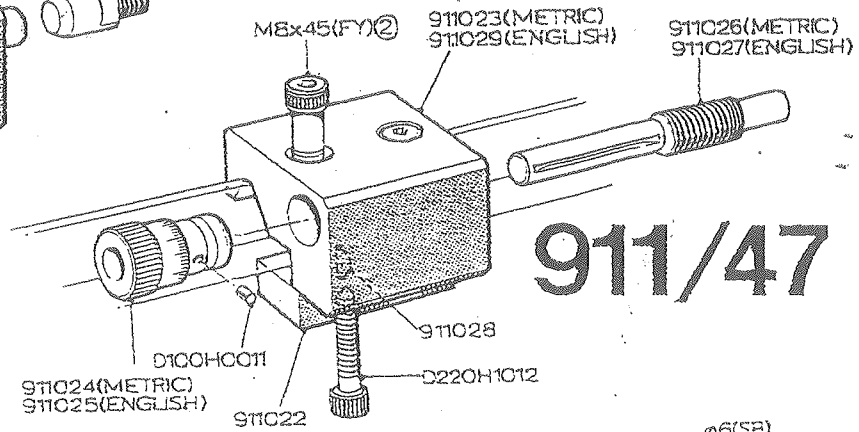
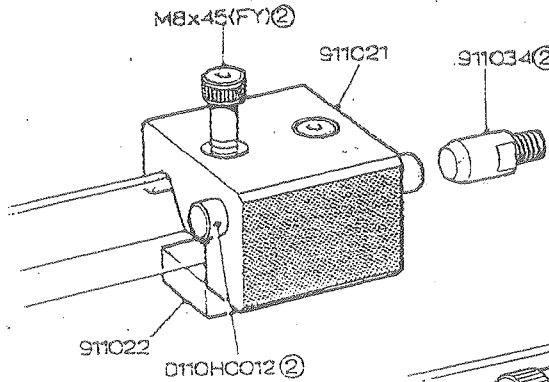


911/41



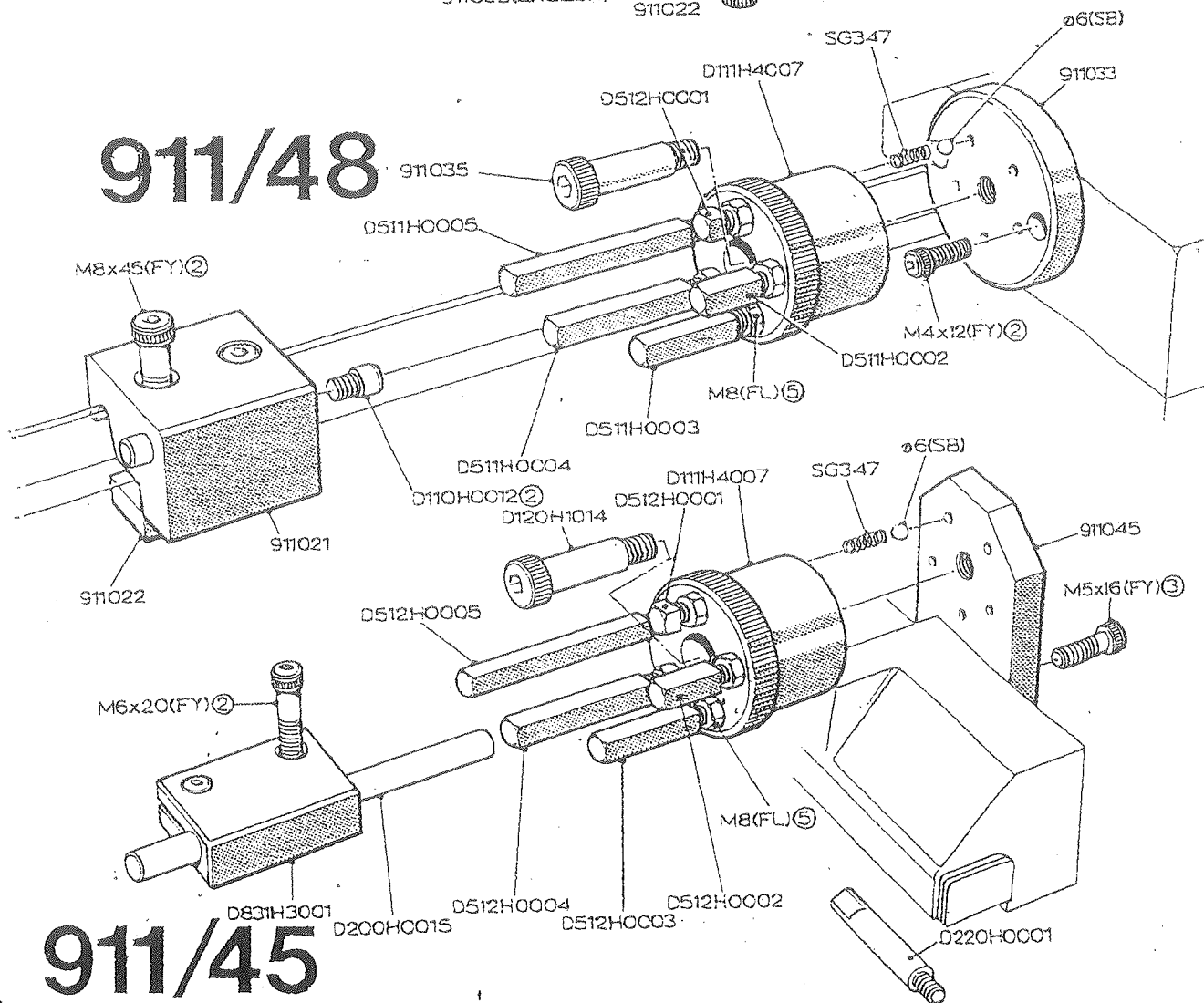
911/42

911/46

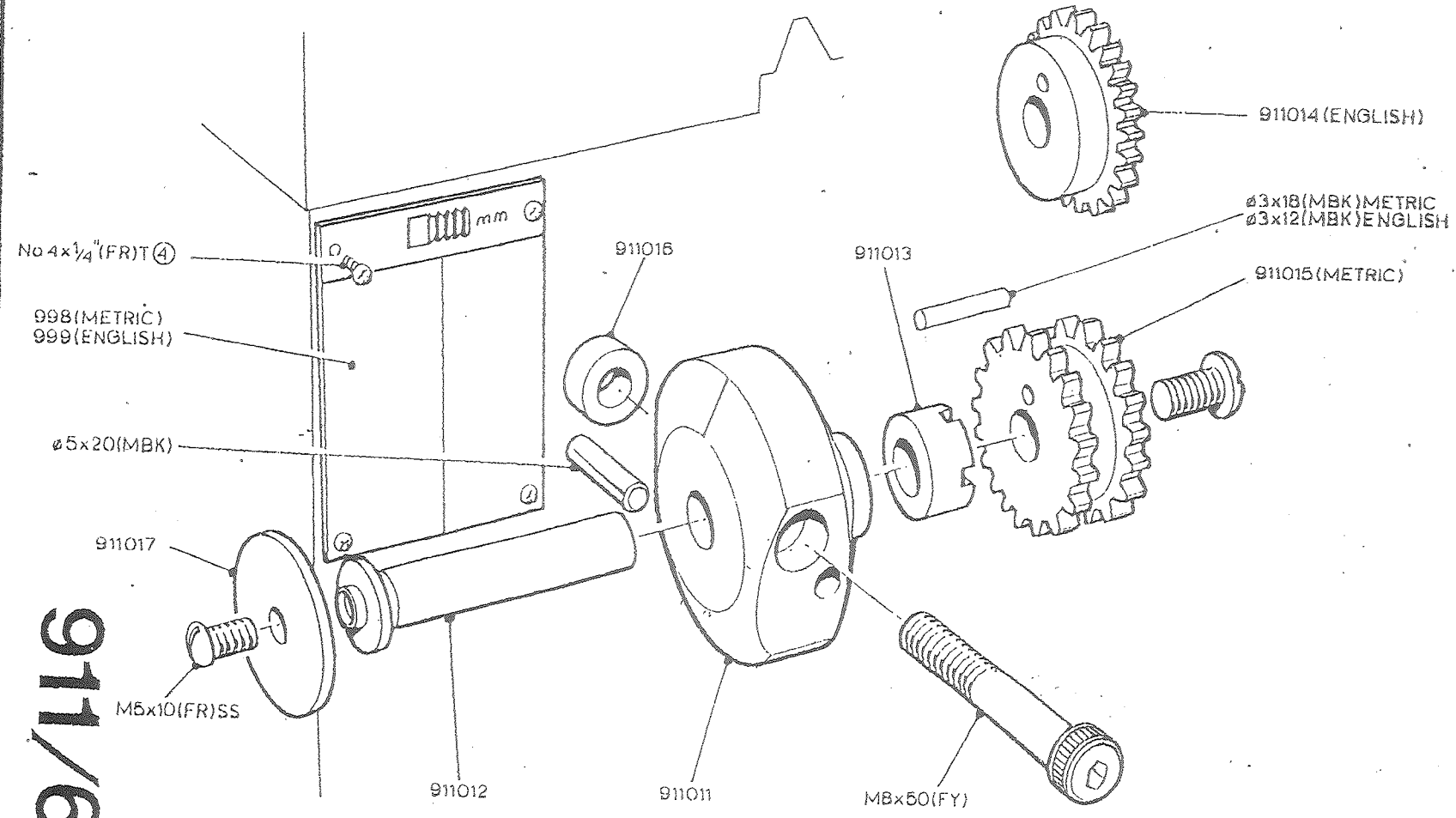


911/47

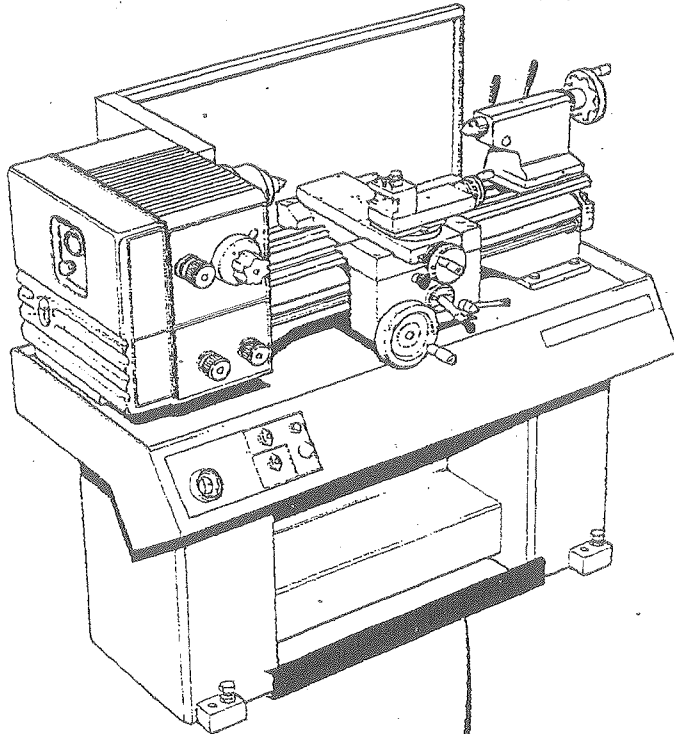
911/48



911/45



911/67



3223(1.5mm²)
(BICC)

M10(WN)A/R

M8x10x16(FU)②

SG414 ②

M8(WN)②

M8x12(FY)

911004 (500mm)
911005 (750mm)

252 ②
(ELKAY)

M4x36(FY)②

MV3HM6S
(BURGESS)

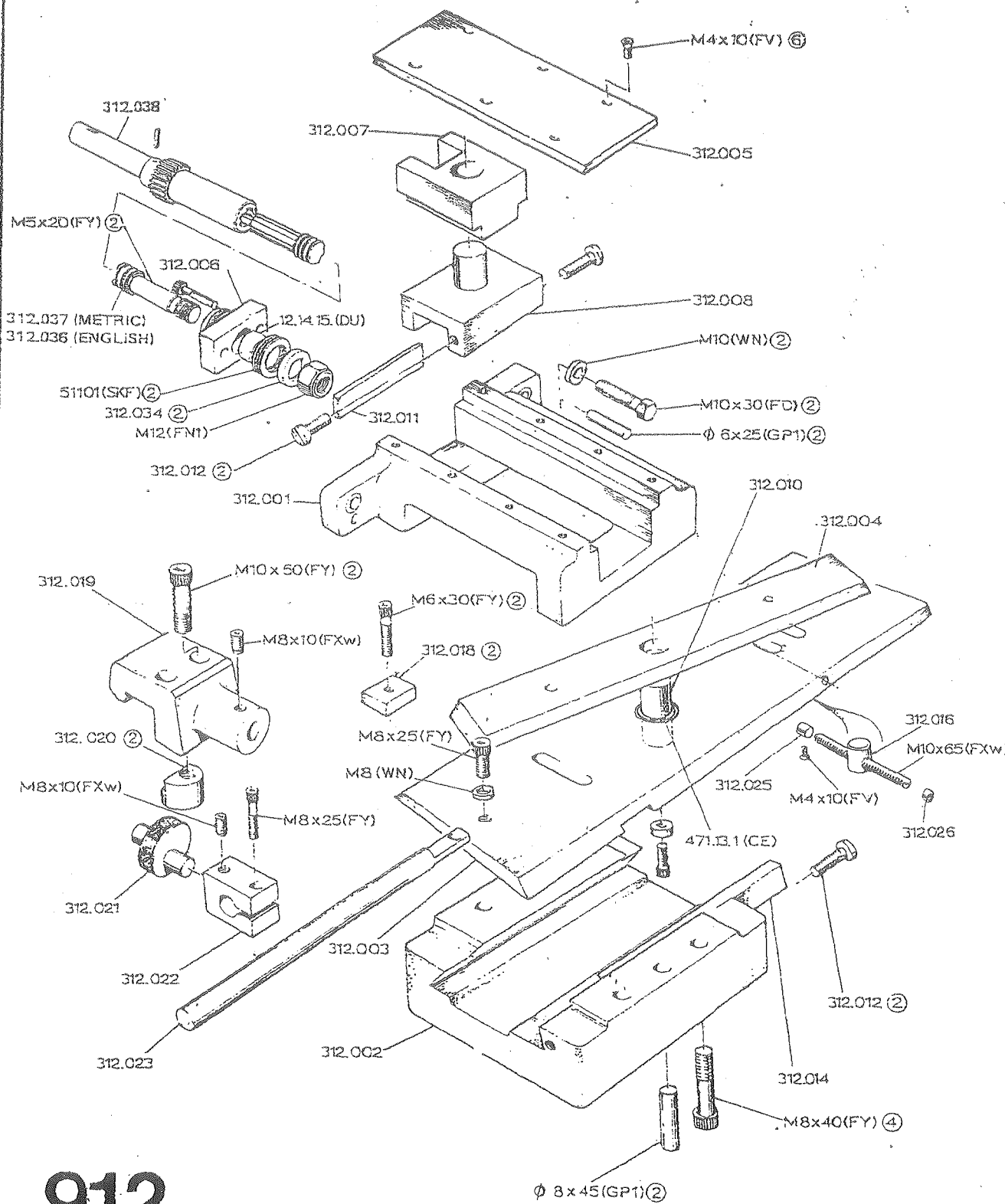
311.81.003

M6x20(FH) ②

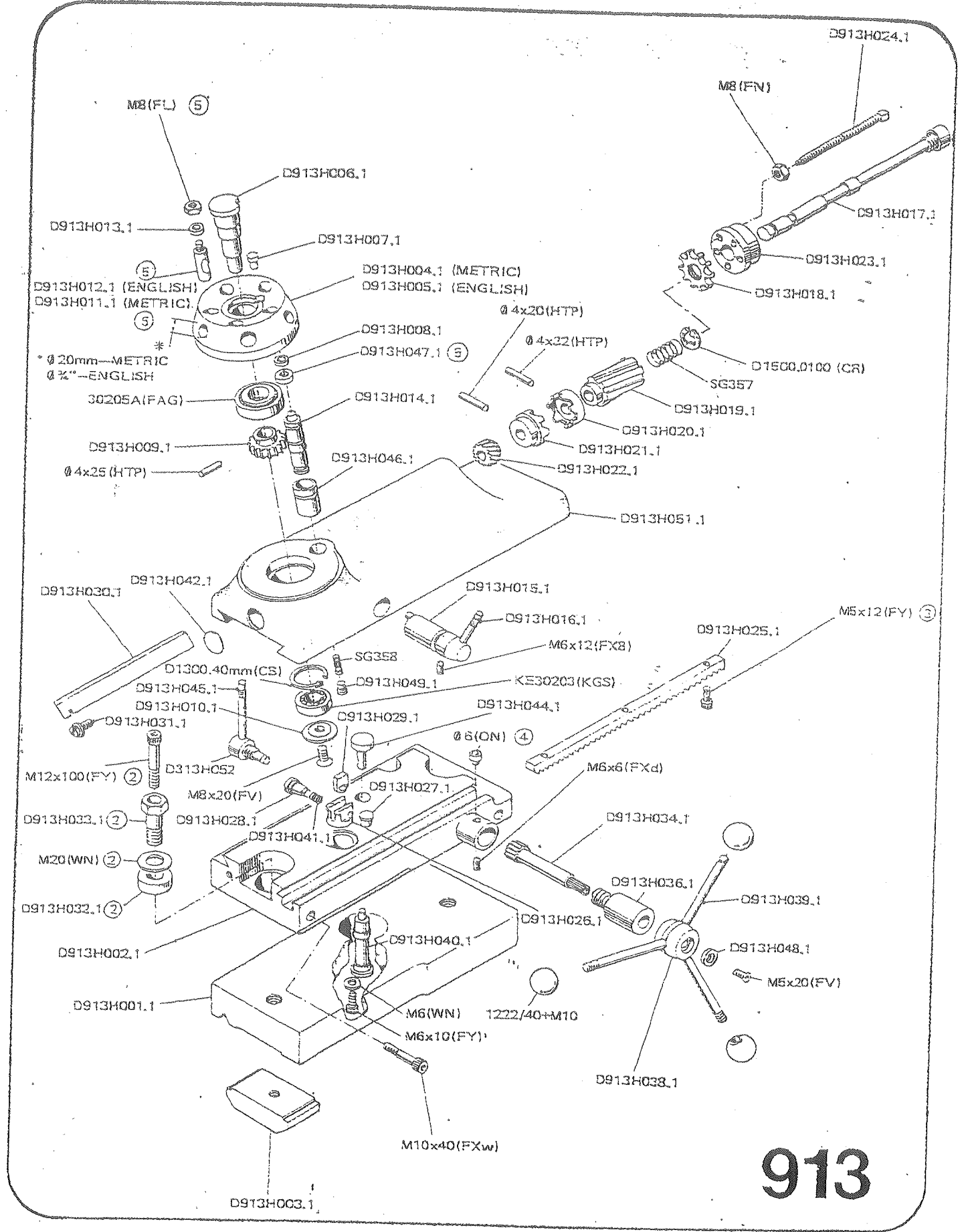
911/81

Attachments

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



912



913

Standard/Proprietary Parts

"Bracketed"
Letter Code

Component

Letter Codes

Conventional
Description Given

Screws and Nuts

FX	Socket Set (Grub) Screw: Flat Point	Thread X O/all Length
FXd	" " " " Dog Point (Normal)	" " " "
FXd1	" " " " Dog Point (Long)	" " " "
FXc	" " " " Cone Point	" " " "
FXw	" " " " Cup, knurled or "W" Point	" " " "
FY	Socket Head Cap Screw	Thread X Length under head
FY1	Socket Head Cap Screw (Threaded to Head)	" " " "
FV	Socket Countersunk Screw	" " " "
FS	Socket Burton Head Screw	" " " "
FU	Socket Shoulder Screw	Thread X Ø Shank X Shank length
FP	Socket Pressure Plug	Thread and Form
FPS	Press Plug (Square Head)	" "
FO	Slotted Set (Grub) Screw	Thread X O/all Length
FT	Slotted or Pozidriv Screw: Countersunk Head	Thread X length under head
FI	" " " " Raised C/sunk Head	" " " "
FR	" " " " Pan Head	" " " "
FE	" " " " Cheese Head	" " " "
	Suffix 'B' for Thread Forming Type	
	Suffix 'T' for Thread Cutting Type	
	Suffi: 'SS' for Stainless Steel	
FJ	Square Head (Toolpost) Screw	Thread X Length under head
FH	hexagon Head Screw	Thread X Length under head
FD	" " Bolt	" " " "
FN	Standard Hexagon Nut	" " " "
FL	" " " Locknut	" " " "
	Suffix '8.8' for High Tensile Types	
	Suffix 'L' for 'Self-Locking' versions of the above	
FZ	Hammer Drive Screw	Nom Ø X Length under head
FW	Wing Nut	Thread details
DN	Domed Nut	Thread details
CN	Castle or Slotted Type Nut	" "
FN1	Nylon Ring Locking Nut	" "

Thread Inserts

TI1	Press in Type Thread Insert	Thread details
TI2	Coil Type Thread Insert	" "

Washers

WN	Bright Washer: Normal Diameter	Nominal Hole Ø
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)	Nom. Hole Ø X O.D. X thickness

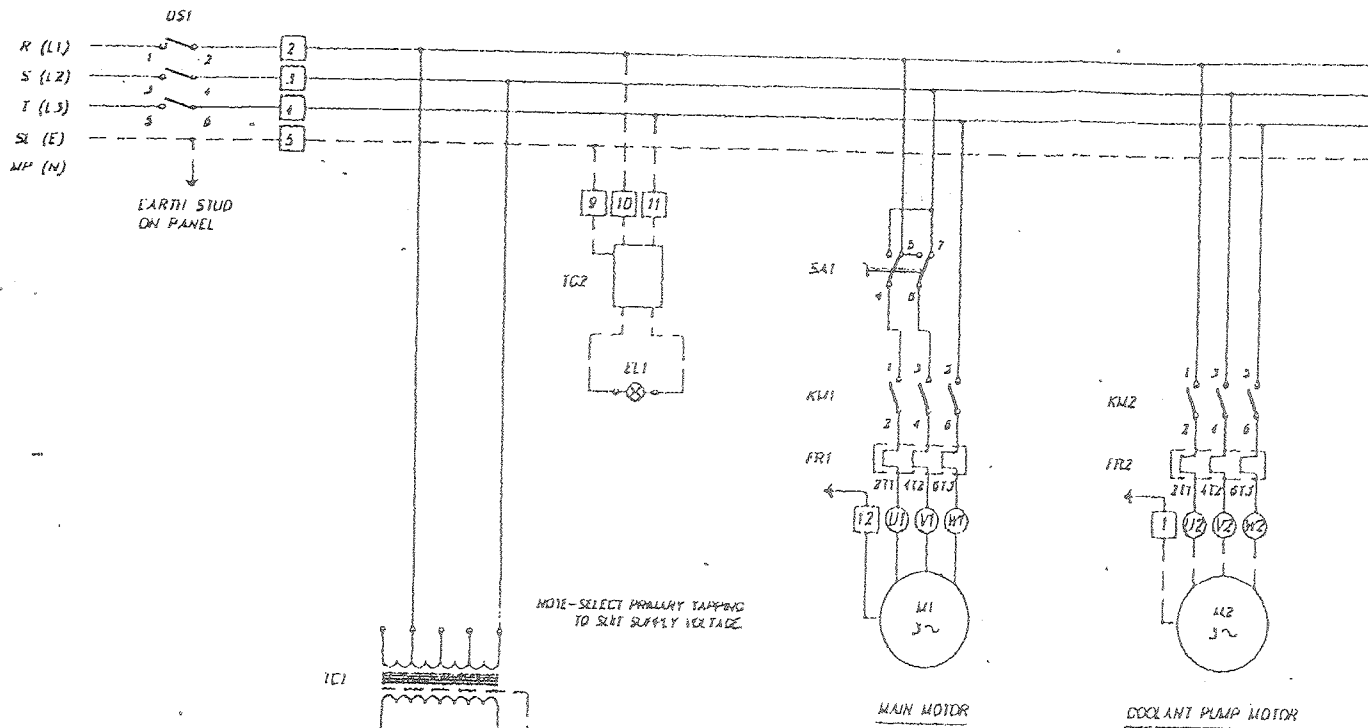
ELECTRICAL SECTION

MACHINE STANDARD PARTS

ITEM	PART NUMBER	DESCRIPTION	QTY
1	A909H015.1	STD. MAIN MOTOR HARNESS	1
2	A909H020.1	KICK BAR LIMIT SWITCH ASSY	1
3	A909H021.1	MAINS DISCONNECT SWITCH ASSY	1
4	A909H022.1	END GUARD SWITCH HARNESS	1
5	LA-0950	ELECT. PANEL 380-440/3/50	1
6	MA-0560	MOTOR 1.3KW (1.8HP) 220-240/380-415v.3ph.50hz	1

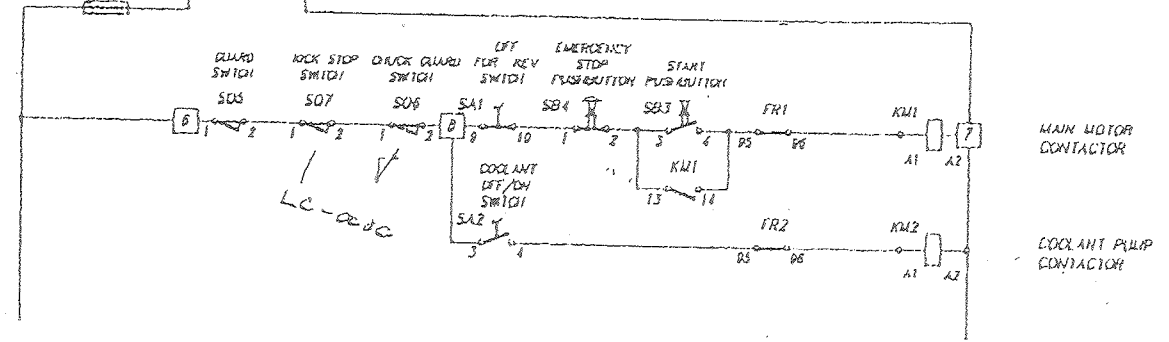
LA-0950 ELECTRICAL PANEL 380-440v.3ph.50hz

ITEM	REF	PART NUMBER	DESCRIPTION	QTY
1	FR1	LF-2070	THERMAL O/LOAD RELAY LR3-E008	1
2	FR2	LF-2080	THERMAL O/LOAD RELAY LR3-E001	1
3	FU1	CN-2219	FUSE 20MM 3.15A	1
4	KM1/2	LF-2060	3-POLE CONTACTOR LC1-EC03F	2
5	SA1	LF-1230	REVERSING SWITCH TO-3-8401 EZOFS	1
6	SA2	LD-0580	2-POS.S/SWITCH OPERATOR ZA2-BD2	1
7	SB3	LD-0570	P/BUTTON OPERATOR ZA2-BA3	1
8	SA2/ SB3	LD-0590	N/C CONTACT BLOCK ZA2-BZ101	2
9	SB4	LD-0560	MUSHROOM OPERATOR ZA2-BS54	1
10	SB4	LD-0600	N/C CONTACT BLOCK ZA2-BZ102	1
11	TB1	LF-1960	TERMINAL BLOCK BK12	1
12	TC1	<i>XD-0005</i> AJ-0630	TRANSFORMER 55VA. BX1	1



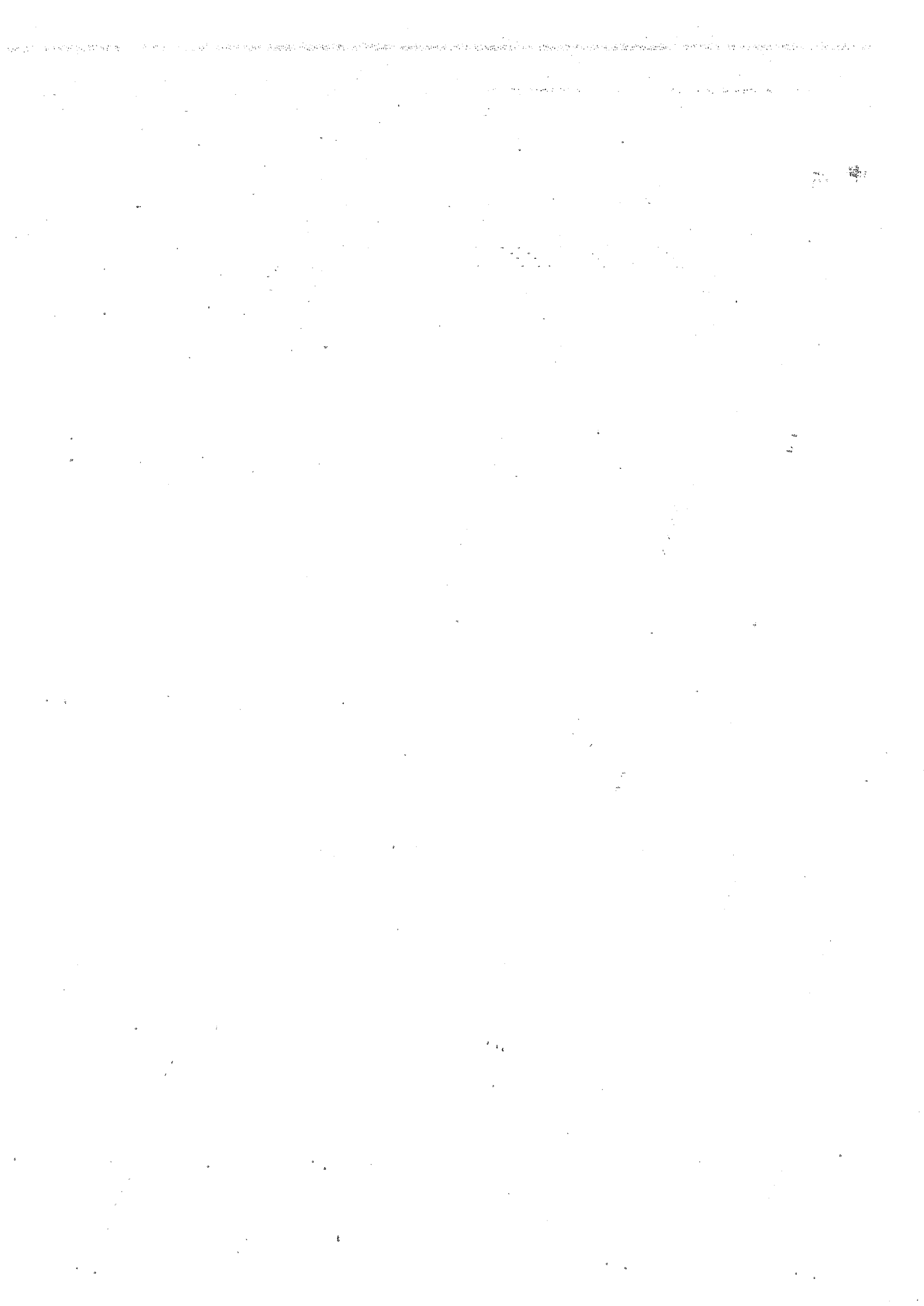
SWITCH CONNECTIONS

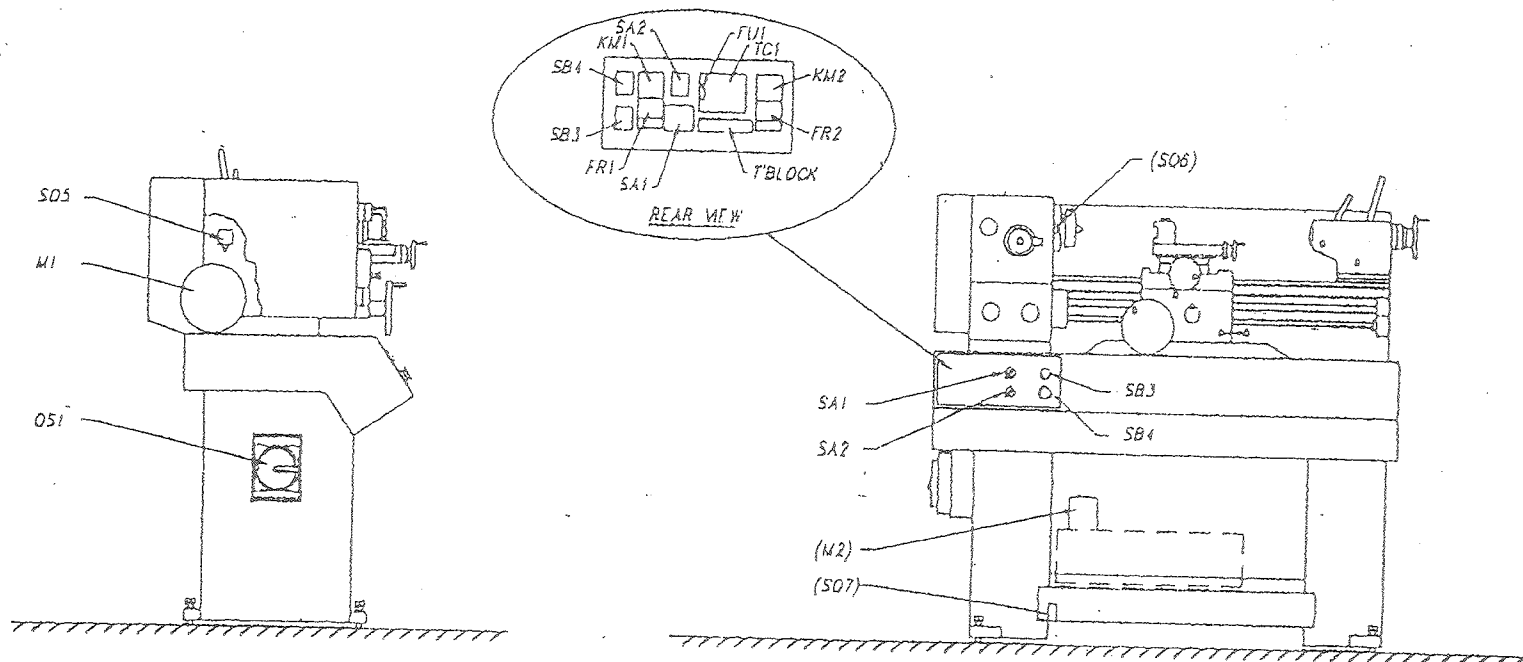
SWITCH REFERENCE	SWITCH TERMINAL REFERENCE		
	INCOMING	OUTGOING	INTERNAL LINKS
MAIN MOTOR FOR/OFF/REV SA1	5	4	2-4
	7	8	6-8
	9	10	1-3
			3-7



- KEY
- - PANEL MOUNTED TERMINALS
 - - MOTOR TERMINALS

EWD 018.1





KEY LIST REF.

<u>KEY LIST REF.</u>	<u>DESCRIPTION</u>
FU1	CONTROL CIRCUIT FUSE
FR1	MAIN MOTOR OVERLOAD
FR2	COOLANT PUMP OVERLOAD
KM1	MAIN MOTOR CONTACTOR
KM2	COOLANT PUMP CONTACTOR
M1	MAIN MOTOR
(M2)	COOLANT PUMP MOTOR
OS1	MACHINE ISOLATOR
SA1	FORWARD/REVERSE SWITCH
SA2	COOLANT OFF/ON SWITCH

KEY LIST REF.

<u>KEY LIST REF.</u>	<u>DESCRIPTION</u>
SB3	START PUSHBUTTON (MAIN MOTOR)
SB4	EMERGENCY STOP PUSHBUTTON
S05	END GUARD SWITCH
(S06)	CHUCK GUARD SWITCH
(S07)	FOOT OPERATED STOP SWITCH
TCI	CONTROL CIRCUIT TRANSFORMER

NOTE: REFERENCES IN BRACKETS INDICATE OPTIONAL ITEMS

AR250\09\01.1



'Bracketed'

Letter Code

Component

Conventional

Description Given

Pins and Dowels

GP1	Grooved Pin: Full length groove — Tight at one end
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
PB	Brass Pin or Pad
PT	Taper Pin
PS	Split Pin
LTP	Tension Pin: Light Duty
HTP	" " Heavy Duty

Nom. Ø X O/all length
" " "
" " "
" " "
" " "
Nom Ø X O/all length
" " "
Nom Ø (small end) X O/all length
Nom Ø X O/all length
Nom Ø X O/all length
" " "

Keys

KS	Square Parallel Key
KR	Rectangular Parallel Key
KW	Woodruff Key

Width X Thickness X Length
" " " "
Width X Height X Diameter

Circlips

CE	External Circlip: DIN 471
CE1	Round Section Circlip
CE2	Inverted Retainer (Truarc)
CB	Internal Circlip: DIN 472
CR	Radial Fitting Circlip: DIN 6799
CR1	Radial Retaining Clip (Spring fix)
CR2	Radial Fitting Circlip BS3673/3

DIN. Ref. Nom Shaft Ø and Thickness
Nom. Shaft Ø, Wire Ø
" " "
DIN. Ref. Nom Bore and Thickness
DIN Ref. Nom Ø and Thickness
Nom shaft Ø
" " "

Plain Bearings

DU	Composite Bearing Bush 'Glacier'
DX	" " " " " "
LB	Sintered Bronze Bush

Nom Bore, O.D. and Length
" " " "
Nom Bore O.D. and Length

Ball & Roller Bearings

BB	Std. Ball Bearing
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

Nom Bore Outside Ø and Length
" " " " "
" " " " "
" " " " "
" " " " "
" " " " "

For Needle Roller Brgs, Needle Thrust Races
Ball Thrust Brgs. and Taper Roller Bearings —
Manufacturers Name is Quoted as Letter Code — vis.

(INA)	(TORRINGTON)
(SKF)	or (GAMET)

Manufacturers Part No.
Quoted

'Bracketed'
Letter Code

Component

Conventional
Description Given

Seals

SM	Standard Oil Seal
SF	'V' Ring Seal (FORSHEDA)
RM	Standard 'O' Ring Seal
RM1	'Nu-Lip Ring' (Pioneer)

Nom Shaft \emptyset O.D. and Width
Manufacturers Part No.
Internal \emptyset of Ring, and Section \emptyset
Manufacturers Part No.

Lubrication Equipment

ON	Concave Oil Nipple: Drive in Type
ONI	" " " Threaded Type
OS	Oil Sight Glass
OS1	Oil Level Glass
OW	Oil Wick

Nom Hole \emptyset
Thread details
Nom Outside \emptyset .
" "
Nom \emptyset X Length

For Compression and other Pipe Fitting — Manufacturers Name is quoted as Letter Code vis.

(ENOTS.)
or (TECALEMIT)

Manufacturers Part Number
Quoted

Miscellaneous Items

BJ	Bail Joint
SB	Steel Ball
FK	Hexagon Wrench Key
HP	P.V.C. Hose
HC	Hose Clip
PP	Plastic Plug
WRS	Standard Spanner
EB	Eye Bolt
OW	Oil wick
CT	Copper tube
NT1	Nylon Tube Natural
NT2	Nylon Tube Blue
NT3	Nylon Tube Green
NT4	Nylon Tube Red

Thread Details
Nom \emptyset
Nom width across flats
Nom Bore and O.D.
Max. Hose \emptyset
Manufacturers Part Number
Std. Bolt size and width
across flats
Thread details
Nom \emptyset X Length
Nom outside \emptyset
Nom Bore
" "
" "
" "