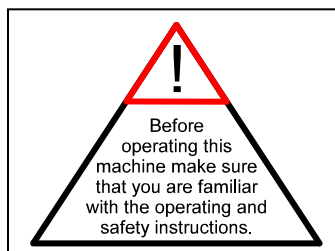


**MODEL HB 4400
HYDRAULIC MAGNETIC DRILL**



OPERATING MANUAL



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List of Contents with Drill Unit		Check List
RD4329	Safety Strap	YES/ NO
SRA3057	Pilot SRC120	YES/ NO
SRA25	Pilot SRC130 – SRC520	YES/ NO
RA3013	Pilot SRCL120	YES/ NO
SRA50	Pilot SRCL130 – SRCL650	YES/ NO
RD4088	4mm A/F Tee Handled Hexagon Key	YES/ NO
RD4367	Pipe Adaptor Fixing Strap	YES/ NO

[1] SPECIFICATION

Maximum hole cutting capacity in .2/.3C steel 52mm dia., 52mm deep.

Arbor bore 19.05mm dia. (3/4" dia.)

Motor Unit:	DANFOSS OMM32	*Speed 630 rpm *Torque 4.0 da Nm (cont) *kW 2.4 (cont)
Magnet:	Manually operated Tractive force at 20°C (25mm minimum plate thickness)	700kgs
Overall dimensions:	Height (max. extended) Height (min.) Width (inc. capstan) Overall length (inc. guard)	550mm 470mm 180mm 315mm
Nett weight:		23.00kgs
Hydraulic supply required:	Inlet Pressure Oil Flow (L/min)	140 Bar (2050 psi) 20 (cont) 25 (int)

3/8" B.S.P. INLET AND OUTLET PORTS

***Only when using a 100% hydraulic oil medium.**

After using a water based hydraulic medium, purge the motor with light lubricating oil.

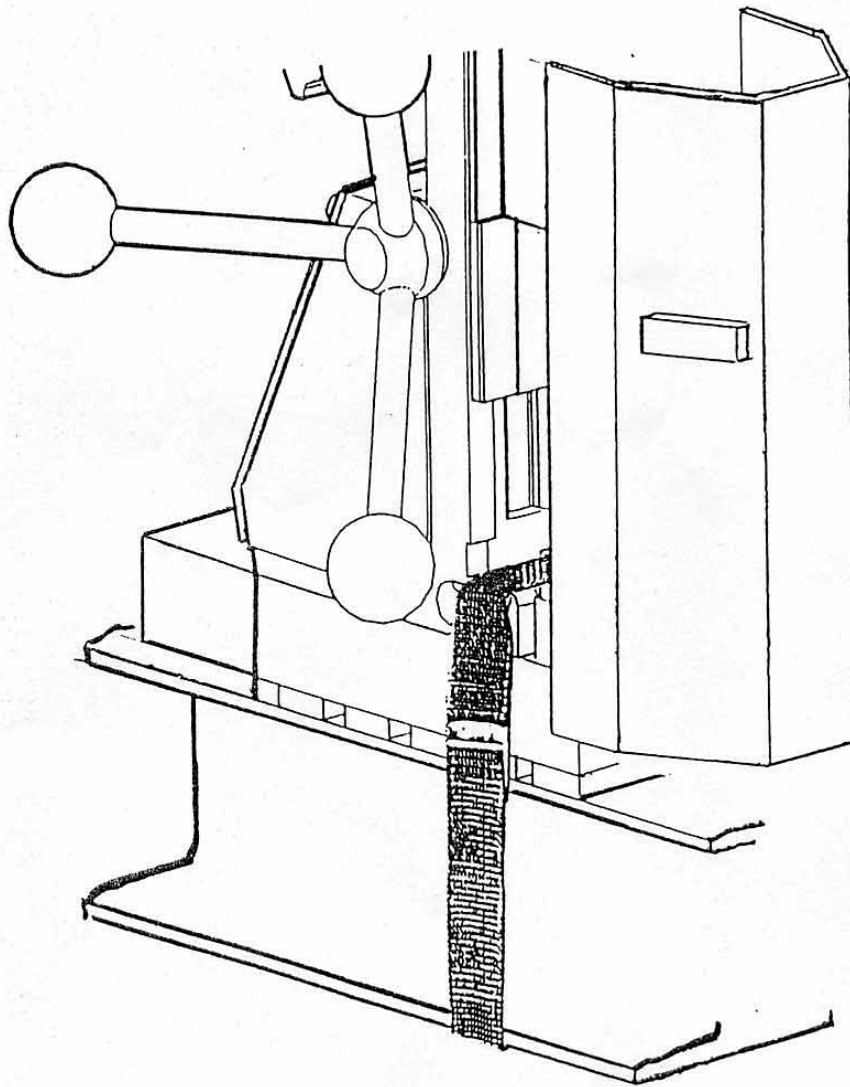
NB: ANY MODIFICATIONS TO THIS MACHINE WILL INVALIDATE THE GUARANTEE

[2] SAFETY PROCEDURES

READ BEFORE USING THE MACHINE

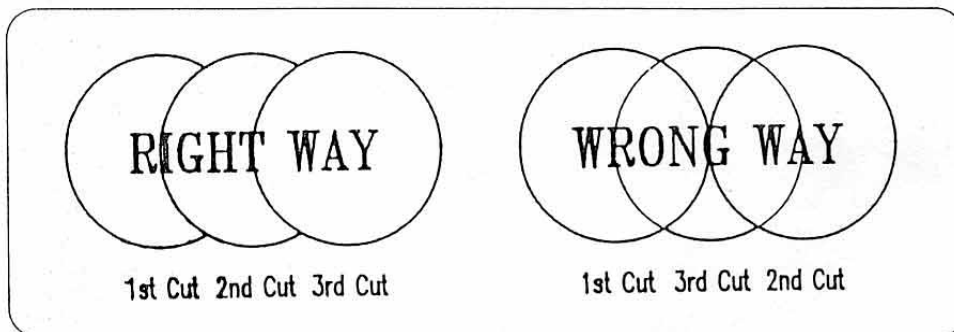
- ◆ **Always secure the machine with the safety strap RD4329 before starting to operate** - for the user's protection in case the magnetic base breaks loose whilst in use.
- ◆ **Always wear safety goggles and gloves.**
- ◆ Disconnect from the hydraulic supply when changing cutters or working on the machine.
- ◆ **Always ensure cutter retaining screws are secure**- they sometimes vibrate loose in use.
- ◆ Regularly clear the work area and machine of swarf and dirt, paying particular attention to the underside of the magnet base.
- ◆ With a gloved hand, and after switching off, remove any swarf which might have gathered around the cutter and arbor before proceeding with the next hole.
- ◆ Remove tie, rings, watches and any loose adornments which might entangle with the rotating machinery.
- ◆ Ensure that the magnet is fully activated before attempting to cut a hole.
- ◆ Should the cutter become «fast» in the workpiece, switch off the motor immediately to prevent personal injury. Disconnect from the hydraulic supply and turn arbor to and fro. **Do not attempt to free the cutter by switching the motor on and off.**
- ◆ If the machine is accidentally dropped, always thoroughly examine the machine for signs of damage and check that it functions correctly before trying to drill a hole.
- ◆ Regularly inspect the machine and check that nuts and screws are tight.
- ◆ Guard no. RD3397 is fitted covering the cutter and rotating spindle. The guard should be extended over the cutter during the drilling operation.
- ◆ Ensure an adequate supply of coolant is supplied to the cutter during the cutting cycle.
- ◆ Adjust the motor speed to give the correct cutting conditions to suit the cutter diameter and hydraulic medium.

SAFETY STRAP - RD4329



[3] OPERATING INSTRUCTIONS

- ◆ Before connecting the hydraulic supply ensure the motor switch is in the **OFF** position.
- ◆ Keep the inside of the cutter clear of swarf - it restricts the operating depth of the cutter.
- ◆ Apply the cutting fluid to the reservoir via the inducement slots in the arbor. It is then «metered» out by the pilot and is applied directly to the cutting edge. (Alternatively, fluid can be applied directly on to the workpiece making certain that it floods into the groove formed by the cutter.)
- ◆ Depress the pilot to ensure cutting fluid is being correctly metered.
- ◆ Locate machine in the required position for cutting the hole and activate the magnet by turning the ratchet handle clockwise to its maximum extent. Ensure that magnet rod is fully screwed home.
- ◆ Start the motor by turning the rotary valve to **ON**.
- ◆ Apply light pressure when commencing to cut a hole until the cutter is introduced into the work surface. Pressure can then be increased sufficiently to load the motor. Excessive pressure is undesirable when using the *Micro-Hydraulic* machine, it does not increase the speed of penetration and may cause the motor to stall. The motor will restart when the excessive pressure is released.
- ◆ Always ensure that the slug has been ejected from the previous hole before commencing to cut the next.
- ◆ Always cut overlapping holes as illustrated - do not use excessive pressure and ensure cutting fluid is reaching the teeth of the cutter.



- ◆ If the slug sticks in the cutter, move the machine to a flat surface, switch on the magnet and gently bring the cutter down to make contact with the surface. This will usually straighten a cocked slug and allow it to eject normally.

- ◆ Apply a small amount of light oil lubricant regularly to slide and arbor support bearing. Cutter breakage is usually caused by insecure anchorage, a loosely fitting slide or a worn bearing in the arbor support. (Refer to routine maintenance instructions.)

[4] MOUNTING OF CUTTERS

The following procedure is to be used when mounting cutters.

ALWAYS DISCONNECT MACHINE FROM POWER SUPPLY

Lay the machine on its side with feed handles uppermost, ensuring arbor is wound down to its lowest point to enable access to socket screws RD4066. Take the appropriate pilot and place through hole in shank of cutter. Insert shank of cutter into arbor ensuring alignment of two drive flats with socket screws RD4066. Tighten both screws securely using hexagon key RD4088.

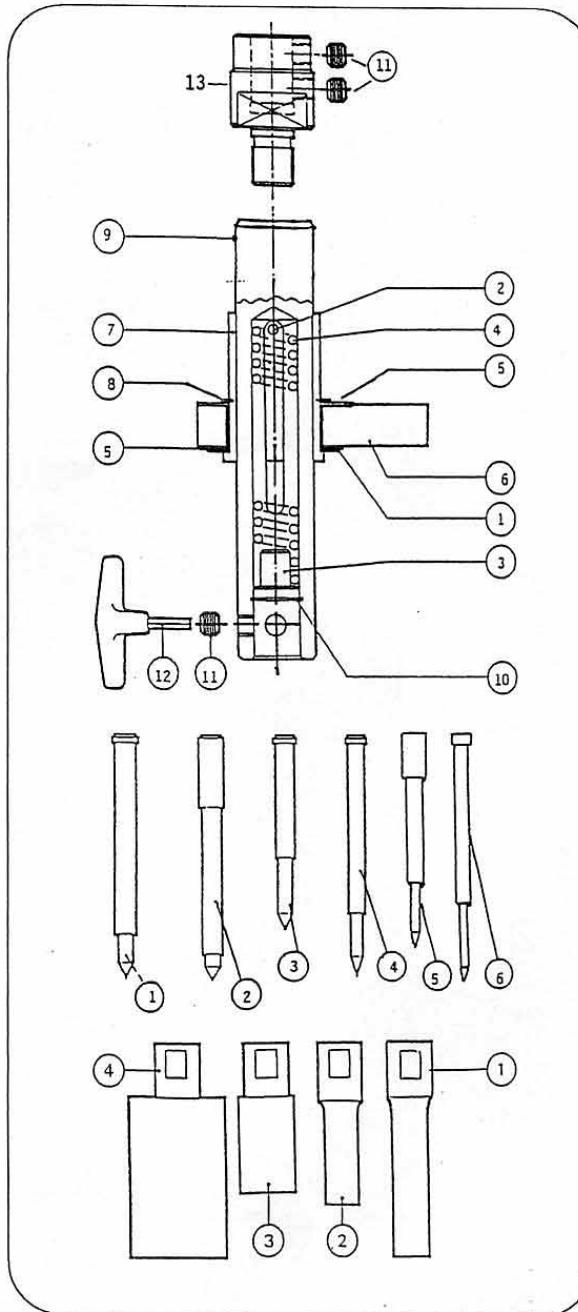
STANDARD RANGE For cutting through material up to 26mm thick			LONG SERIES RANGE For cutting through material up to 52mm thick		
Part No	Dia	Pilot No	Part No	Dia	Pilot
<u>RC120</u>	<u>12mm</u>	<u>RA3057</u>	<u>RCL120</u>	<u>12mm</u>	<u>RA3013</u>
RC130	13mm	RA359	RCL130	13mm	RA3030
RC140	14mm		RCL140	14mm	
RC150	15mm		RCL150	15mm	
RC160	16mm		RCL160	16mm	
RC170	17mm		<u>RCL170</u>	<u>17mm</u>	
<u>RC180</u>	<u>18mm</u>		RCL180	18mm	RA356
RC190	19mm	RA3047	RCL190	19mm	
RC200	20mm		RCL200	20mm	
RC210	21mm		RCL210	21mm	
RC220	22mm		RCL220	22mm	
RC230	23mm		RCL230	23mm	
RC240	24mm		RCL240	24mm	
RC250	25mm		RCL250	25mm	
RC260	26mm		RCL260	26mm	
RC270	27mm		RCL270	27mm	
RC280	28mm		RCL280	28mm	
RC290	29mm		RCL290	29mm	
RC300	30mm		RCL300	30mm	
RC310	31mm		RCL310	31mm	
RC320	32mm		RCL320	32mm	
RC330	33mm		RCL330	33mm	
RC340	34mm		RCL340	34mm	
RC350	35mm		RCL350	35mm	
RC360	36mm		RCL360	36mm	
RC370	37mm		RCL370	37mm	
RC380	38mm		RCL380	38mm	
RC390	39mm		RCL390	39mm	
RC400	40mm		RCL400	40mm	
RC410	41mm		RCL410	41mm	
RC420	42mm		RCL420	42mm	
RC430	43mm		RCL430	43mm	
RC440	44mm		RCL440	44mm	
RC450	45mm		RCL450	45mm	
RC460	46mm		RCL460	46mm	
RC470	47mm		RCL470	47mm	
RC480	48mm		RCL480	48mm	
RC490	49mm		RCL490	49mm	
RC500	50mm		RCL500	50mm	
RC510	51mm		RCL510	51mm	
RC520	52mm		RCL520	52mm	

[6] ARBOR/SPINDLE ASSEMBLY, CUTTERS AND PILOTS

Item	Component	Part No
1	Arbor Bearing	RD350
2	Roll Pin	RA353
3	Button	RA354
4	Compression Spring	RA355
5	Thrust Washer (2)	RA401
6	Bearing Bracket	RD3389
7	Ejector Sleeve	RD3396
8	Circlip	RD4320
9	Spindle/Arbor	RD33021
10	Circlip	RD4056
11	Skt.Set Screw (4)	RD4066
12	"T" Hex Wrench	RD4088
13	Adaptor	RD33024

PILOTS		
Item	For cutters	Part No
1	RCL180-RCL520	RA356
2	RC190-RC520	RA3047
3	RC130-RC180	RA359
4	RCL130-RCL170	RA3030
5	RC120	RA3057
6	RCL120	RA3013

CUTTERS	
Item	Description
1	Long Series 12 to 17mm dia to cut through 52mm thick material
2	Standard 12 to 18mm dia to cut through 26mm thick material
3	Standard 19 to 52mm dia to cut through 26mm thick material
4	Long Series 18 to 52mm dia to cut through 52mm thick material



[7] REMEDIES FOR HOLE MAKING PROBLEMS

Problem	Cause	Remedy
Magnetic base won't hold effectively	Failure of one magnet coil	Check that both sides of the magnet will attract a metal object
	Material being cut may be too thin for efficient holding	Attach an additional piece of metal under workpiece where magnet will be located, or mechanically clamp magnetic base to workpiece
	Swarf or dirt under magnet	Clean magnet
	Irregularity on contact between magnet and workpiece	Use extreme care, file only imperfections flush on to surface
Hole not cut at intended centre of cut	Magnetic base is not holding effectively	See causes and remedies above
	Worn arbor bushing and/or ejector collar	Replace! Only a few thousandths wear permissible. New arbor bushing is needed
	Too much feed pressure at start of cut	Light pressure until a groove is cut. The groove then serves as a stabilizer
	Cutter is dull, worn, chipped or incorrectly sharpened	Replace or resharpen. Sharpening service is available
	Worn or bent pilot, worn pilot hole	Replace part or parts
	Loose bolts on motor bushing support bracket, main casting or loose gib adjusting set screws	Adjust where necessary
Poor hole quality, cutter not cutting, motor stops	Incorrectly resharpened, worn or chipped cutter	Resharpen or replace
	Coming down on swarf lying on surface of workpiece	Take care not to start a cut on swarf
	Insufficient air pressure/volume	Check air supply
	Gibs out of adjustment or lack of lubrication	Adjust set screws
	Swarf accumulated (packed) inside cutter	Clear cutter

Problem	Cause	Remedy
Excessive cutter breakage	Steel swarf or dirt under cutter	Remove cutter, clean part thoroughly and replace
	Incorrectly resharpened or worn cutter	Always have a new cutter on hand to refer to for correct tooth geometry, along with instruction sheet
	Cutter skipping	See cause and remedy above
	Slideway needs adjustment	Adjust gibs
	Cutter not attached tightly to arbor	Retighten
	Insufficient use of cutting oil or unsuitable type of oil	Inject oil of light viscosity into the slot in the arbor and check to be sure oil is being metered into cutter when pilot is depressed. If not, check pilot groove and arbor internally for dirt or apply oil externally. Even a small amount of oil is very effective
Excessive cutter wear (see Cause and Remedy above)	Incorrectly resharpened cutter	Refer to instructions and a new cutter for proper tooth geometry
	Insufficient or spasmodic cutting pressure	Use sufficient steady pressure to slow the drill down. This will result in optimum cutting speed and chip load
Motor will not start	Insufficient hydraulic pressure/volume	Check hydraulic supply and spindle free to rotate

[8] MAINTENANCE

To be conducted only by authorised personnel

In order to ensure that the unit is used to its full efficiency there are a few basic maintenance needs to observe. A regular check out of the machine will also ensure a prolonged «life» for the cutters and easier operation.

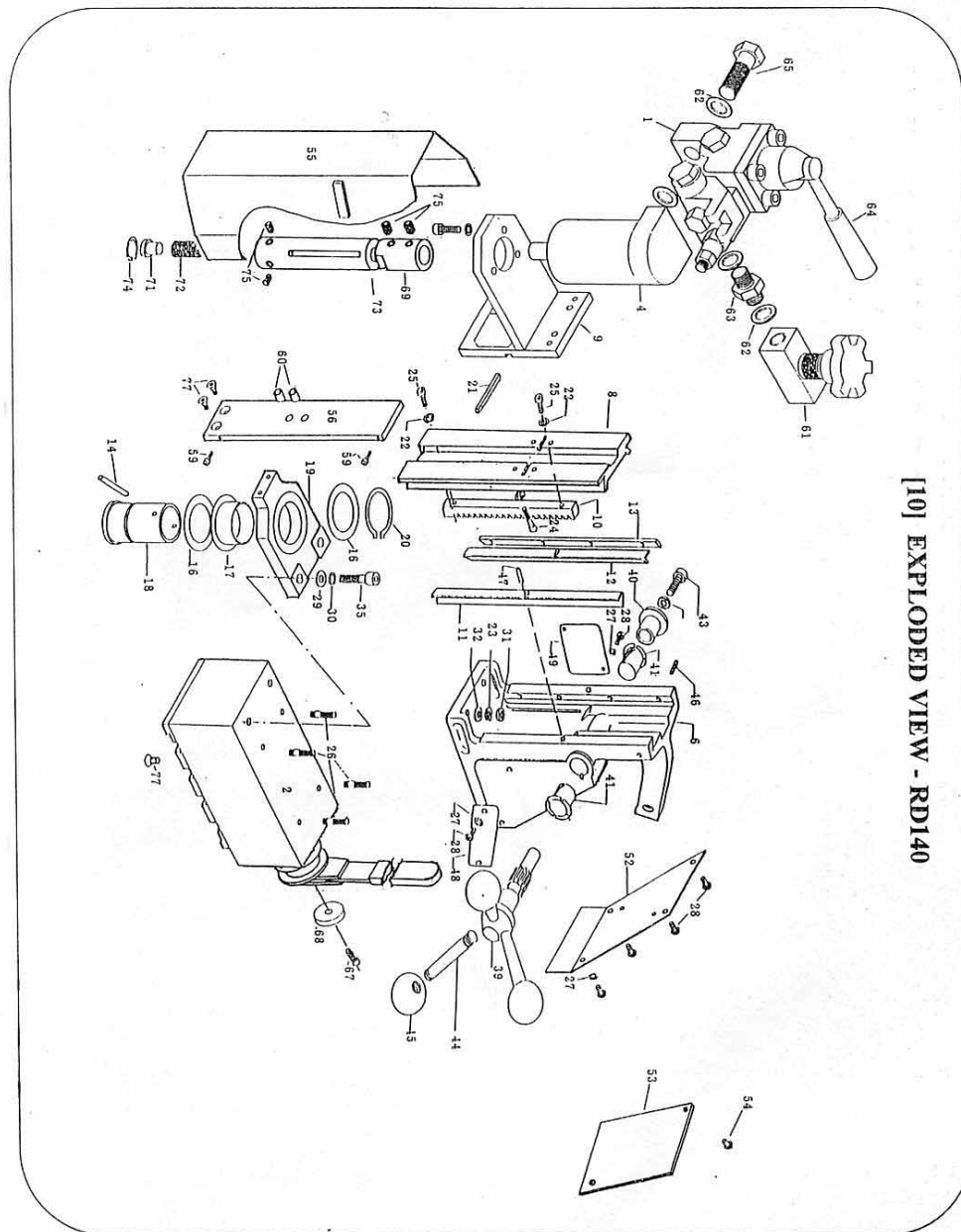
Before proceeding with any maintenance work be certain that the power supply is disconnected

ADJUSTMENT OF SLIDE AND ARBOR SUPPORT BRACKET

An essential requirement of the machine is that the slide RD3381 which controls the movement of the cutter, can move in a smooth and controlled manner, free of lateral movement and vibration.

This situation can be maintained by periodic adjustment of the slide and is accomplished in the following manner:

- ◆ Place the machine in a vertical position and, by means of the handwheel, raise the slide RD3381 to its highest position, thus exposing the maximum possible amount of the vee slideway. Clean the slideways thoroughly and apply a small amount of light machine oil to the wear surfaces.
- ◆ Now drop the slide to its lowest position within the main housing and loosen screws RD4227, thus allowing free movement of the arbor support bracket RD3389.
- ◆ With the allen key located and commencing with the two inner screws, gently feed in all the screws RD4312 until slight resistance is encountered.
- ◆ Operate the slide up and down a few times to test the movement and make any further necessary adjustments. Try to ensure that all the screws are exerting a uniform pressure on the slide from top to bottom.
- ◆ A perfectly adjusted slide will operate freely up and down without any sideways movement.
- ◆ Now, using fingers only, tighten the screws RD4227 holding the arbor support bracket RD3389.
- ◆ Place the machine on a steel plate, connect to supply and activate the magnet. Start up the motor. If the arbor is incorrectly aligned, the arbor support bracket RD3389 will be seen to oscillate. Make any necessary further adjustments to the bracket to ensure correct alignment of the spindle and finally tighten the screws RD4227 using a hex key.



[9] PARTS LIST - RD140

Item	Component	Part No	Item	Component	Part No	Item	Component	Part No
1	Motor Control Module includes items 64 and 65	RD43043	25	M5 Socket Head Screw	RD4325	54	1/8" SS Pop Rivet	RD43025
2	Magnet includes Pole Piece Set and items 66/67/68 and 77	RD43044 RD43047	26	M6 Stud	RD4340	55	Guard	RD3397
4	Motor includes item 76	RD43042	27	M4 Shakeproof Washer	RD4069	56	Guard Bracket	RD33000
6	Housing	RD3380	28	M4 Panhead Screw	RD4077	59	M3 Socket Head Screw	RD4103
8	Slide	RD3381	29	M8 Washer	RD4078	60	Spring Plunger	RD4346
9	Motor Bracket	RD3395	30	M8 Shakeproof Washer	RD4079	61	Needle Valve	RD43050
10	Rack	RD3350	31	M6 Nut	RD4087	62	Seal	RD43052
11	Fixed Gib Strip	RD3317	32	M6 Washer	RD4095	63	3/8" Equal Nipple	RD43051
12	Adjustable Gib Strip	RD3316	35	M8 Socket Head Set Screw	RD4227	64	Handle	RD43055
13	Gib Support Strip	RD3310	39	Capstan Pinion Shaft	RD3302	65	Hex Bolt	RD43056
14	Spiral Pin	RA353	40	Pinion Shaft Sleeve	RD3303	66	Ratchet Handle	RD43049
16	Thrust Washer	RA401	41	Nyliner Bearing	RD4313	67	M6 Socket Head Cap Screw	RD4156
17	Nylon Bearing	RD350	42	M6 Spring Washer	RD4207	68	M6 Washer	RD33030
18	Arbor Sleeve	RD3396	43	M6 Socket Head Screw	RD4098	69	Arbor Adaptor	RD33024
19	Bearing Bracket	RD3389	44	Capstan Arm	RD3383			
20	External Circclip	RD4320	45	Plastic Knob	RD4101	71	Button	RA354
21	Key	RD3009	46	M6 Socket Screw	RD4312	72	Spring	RA355
22	M5 Shakeproof Washer	RD4092	47	Tension Pin	RD4102	73	Arbor	RD33021
23	M6 Shakeproof Washer	RD4096	48	Name Plate	RD43010	74	Circclip	RD4056
24	M6 Socket Head Screw	RD4394	49	Information Plate	RD4362	75	M8 Socket Screw	RD4066
			52	Cover Plate	RD33017	76	Seal Kit	
			53	Identity Plate	RD33027	77	M5 10 Countersink Socket Screw	RD4338

REPLACEMENT OF ARBOR BEARING

Bearing RD350, fitted into the arbor support bracket, is a nylon sleeve. Replacement of the bearing becomes necessary when the cutters can be seen to «chatter» and the machine appears to vibrate. Referring to the assembly drawing, replacement of the bearing is accomplished as follows:

- ◆ Wind the machine slide to its lowest position
- ◆ Remove circlip RD4320 from ejector sleeve RD3384.
- ◆ Press sleeve RD3384 through the support bracket sufficiently to allow removal of bearing RD350. Fit replacement bearing ensuring location of dog into groove in bearing bracket which correctly orientates the bearing.
- ◆ Slide the sleeve and bearing back into position in the support bracket (ensure upper thrust washer RA401 is correctly positioned) and replace circlip RD4320.