RECORD MACHINE DETAILS	DISTRIBUTOR
MODEL SERIAL No. DATE OF PURCHASE VOLTAGE PHASE Hz **QUOTE THIS INFORMATION WHEN REQUESTING SERVICE OR SPARES.**	

HANDBOOK
BO10000

RW (F,S,H) SERIES

INFINITETY VARIABLE SPEED
BANDSAWING
MACHINE

ISSUE 2 17-05-94 RF 11097

CONTENTS

SPECIFICATION

Models RWF/RWS/RWH	20R: 20" (500mm) Throat, 3 Wheel, Infinitely Variable Speed 30R: 30" (760mm) Throat, 3 Wheel, Infinitely Variable Speed		
Wheel Diameter	14"		355mm
Blade Lengths	20R: 130" 30R: 112" 30R: 147"		3302mm 2845mm 3734mm
Max. Blade Width	3/4"		20mm
Motor	1.5 H.P.	900 R.P.M.	1.1 KW
Alternative (1)	1.5 H.P.	750 R.P.M.	1.1 KW
Electric Supply	220/240 Volts 3 Phase 60 Hz		
Alternative (1)	220/240 Volts 3 Phase 50 Hz		
Alternative (2)	380/440 Volts 3 Phase 60 Hz		
Alternative (3)	380/440 Volts 3 Phase 50 Hz		
Alternative (4)	575 Volts 3 Phase 60 Hz		
Max Distributed Fixed Table Load	160 pounds		72 kilograms
Gross Weights	20R: 825 pounds 30R: 925 pounds		375 kilograms 420 kilograms

FOR BEST RESULTS USE 'STARTRITE' SAW BLADES

WHEN ORDERING PARTS, PLEASE STATE:-

1. Machine Model and Serial Number
2. Part Number (where applicable) and Description
3. Quantity required
4. Specify power supply for electrical components

NOTE: ILLUSTRATIONS MAY VARY IN DETAIL, ACCORDING TO MODEL.

OPERATING SAFETY PRECAUTIONS.

Before attempting to operate machine, become familiar with the controls and operating instructions.

Do not start machine unless all guards are in place, keep guards in place when sawing.

Check that table direction control lever is at STOP position before starting machine (Machines fitted with Hydraulics)

Adjust and secure table before loading workpiece. (Do not exceed the maximum table load).

Position the top guides as close as possible to the workpiece.

Hold small or unstable workpieces by means of a clamp or other device. Keep hands clear of the saw blade at all times.

Keep the work area free of tools and off-cuts.

Stop the machine to make adjustments.

Stop the machine before leaving it unattended.

Wear eye protection.

Use care in uncoiling and installing new saw blades as the teeth are very sharp. It is advisable to wear gloves when handling saw blades.

Do not leave saw blades on the floor.

Machining some materials may create a hazard to health in the form of fumes, dust or the risk of fire or explosion. In such cases it is imperative that expert advice is obtained on the correct handling of such materials, and the fitting of additional equipment to the machine, in order to achieve the required standard of safety.

INSTALLATION.

To transport machine to site, use fork lift truck with forks placed under base of machine (steady machine during transport), or use hoist with sling positioned as shown in Fig.1.

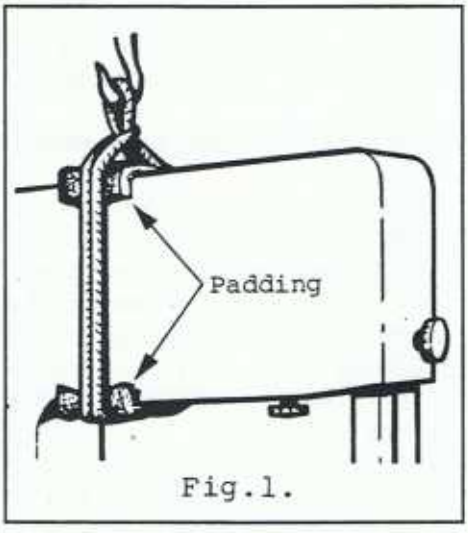


Fig.1.

WARNING : ATTACHMENT OF SLING TO TABLE MAY DAMAGE THE MACHINE.

Adequate working and job lay off space is essential to efficient operation, so do not site the machine in a cramped position in the workshop. Bandsaw blades tend to get tangled and damaged if hung from a hook or stacked on the floor, therefore cupboard space provided adjacent to the machine will protect saw blades in storage and encourage the operator to select a suitable saw blade for the job.

SECTION 2

INSTALLATION (CONTINUED).

The base of the machine is provided with four fixing holes to accept 3/8" dia. anchor bolts (not supplied) but the machine may be fixed in position with resilient mounting pads secured by adhesive in order to avoid damage to the floor. Where necessary, the floor must be levelled so that the machine stands with equal firmness at all fixing points. Remove the anti-rust protective coating where applied, and in particular from the working elements of the machine.

SLIDING TABLE: (RWS & RWH MACHINES).

Soak the table slideway wipers with oil.
IMPORTANT : The table slideway rollers and bearings are pre-loaded and adjusted for correct alignment. On no account should this setting be tampered with before the correct method of adjustment and re-assembly is fully understood, see Section on Sliding Table/Manual Feed (Parts Lists & Illustrations).

FITTING TABLE TO MACHINE : (RWF, RWS, RWH MACHINES).

If the machine has been shipped with the table as a seperate item, re-assemble table to machine in the following manner:-

1. Lift the table into position allowing the trunnion to seat and the bolt to pass through the slot in the cradle. Where necessary, the bolt may be assembled into the trunnion by passing it through the table insert aperture.
2. From the underside of the cradle platform, assemble in bolt on order :-
   Spring Housing, spigot end first.
   Spring into body of housing.
   Washer, plain face first.
   Nut, using wrench supplied.

HYDRAULIC SYSTEM (RWH MACHINES) :

If the table has been shipped as a seperate item the two hydraulic pipes which run from the control box to the fittings on the side of the machine must be re-connetced to the control box. Do not fill hydraulic tank until machine has been connected to the electricity supply.

CONNECTION TO THE ELECTRICITY SUPPLY.

Before connecting to the electricity supply, see Section on Electrical System for full instructions.

HYDRAULIC SYSTEM (RWH MACHINES) :

Fill hydraulic tank with recommended grade of hydraulic oil :-
ESSO Nuto H44; GULF Harmony 43AW; D.T.E. 24; TEXACO Rando HDA:
Start machine and check pipe fittings for leaks, When the machine has been running for approximately ten minutes, shift table control lever to 'TRAVERSE' and check pressure gauge reading when the table has travelled the full extent of its stroke. If necessary, slacken knob at the front of the control box and turn the slotted screw to give an indicated pressure reading of 100 - 105 P.S.I. re-locking knob after adjustment. Set table feed control dial to maximum (mark 20) and operate the hydraulic table in each direction to the full extent of its stroke to disperse air locks so that the table moves with a smooth uniform motion. The table must travel in the direction indicated by the operating lever or it will be impossible to obtain fine feed control on the forward stroke. If this is the case, the two flexible hydraulic pipes from the control box must be interchanged where they are fitted to the body.

INFINITELY VARIABLE SPEED TRANSMISSION:

If the machine has been supplied with the control assembly as a seperate item, re-assemble as follows.

On speed Control Assembly (see Fig.2), remove end locking collar (not illustrated) from control screw 'B'. Locate assembly to side of machine and place control screw through aperture in machine body. Support assembly and guide control screw into 'sleeve'. Wind handle clockwise until control screw protrudes from other end of 'sleeve'. Secure assembly to machine by means of three screws and washerssupplied.
With machine running, wind handle until locking collar 'C' is hard against face of 'sleeve'. Slacken off nut 'A' and align scale drum 'D' so that No.'300' is opposite pointer on plate and tighten nut. Wind handle back until low speed No.'50' is opposite pointer. With machine set on low speed, switch off machine and replace end locking collar on control screw and set it hard against 'sleeve', tighten set screws.

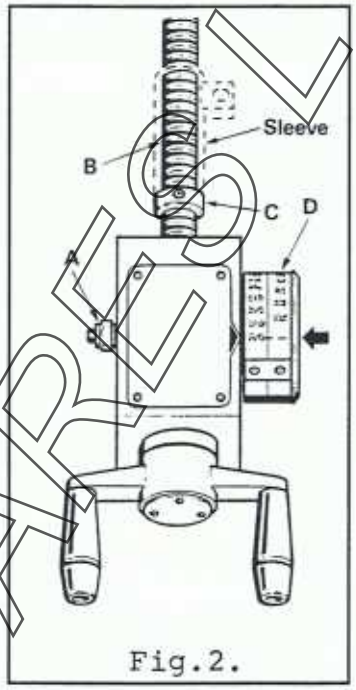


Fig.2.

TENSIONING DRIVE BELTS :

The drive belts have been factory set and should not require tensioning.
If however, the belts need re-tensioning proceed as follows:-
Set the machine to run on lowest speed and stop machine. Locate tension control stud on motor platform and release both nuts (see Fig.3) so that the trunnion is free to move. With trunnion freed the belt tension will be automatically re-set by the weight of the motor platform. With the belts correctly tensioned, tighten nuts against trunnion taking care not to alter its position. Start machine and check the belt tension throughout the entire speed range, and re-adjust if necessary as before.

SETTING UP THE MACHINE.

For full instructions on how to set up the machine for correct use, see Section on Setting Up/Blade Guides.

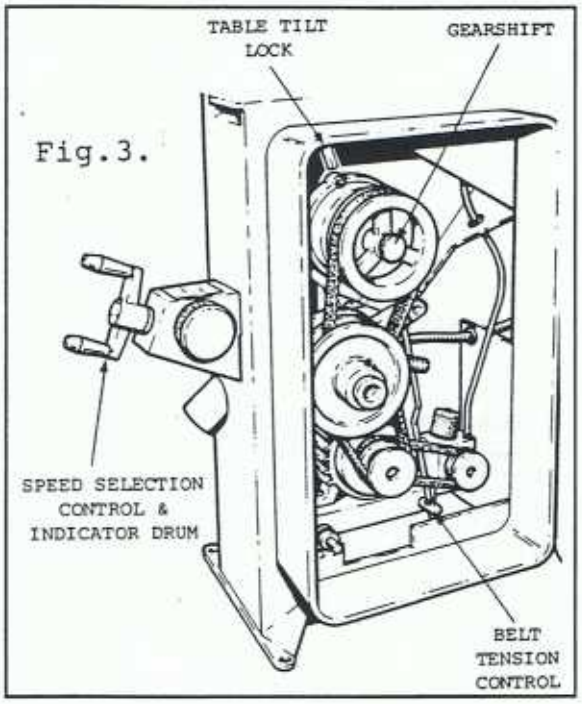


Fig.3.

MACHINE CONTROLS.

INFINITELY VARIABLE SPEED TRANSMISSION

The drive transmission is by means of a two speed gearbox working in conjunction with an infinitely variable speed unit. The gearshift iaccessible through the door at the rear of the machine, (seeFig.3), allows selection of either the low speed range of 50-300ft/min.(16-90 m/min.),or the high speed range of 500-3000 ft/min (160 - 900 m/min.). To select the low speed range PUSH IN gearshift, to select the high speed range PULL OUT gearshift.

MACHINE CONTROLS (CONTINUED).

Always ensure that the gearshift is fully engaged before starting the machine. Before changing gear, select the highest speed in the range (this will make it easier to turn the gearbox pulley). Turning the gearbox pulley by hand and holding gearshift knob (making sure that gearshift knob does not rotate with the pulley) will help it slide into mesh. It is important that the motor be allowed to stop before operating gearshift.
IMPORTANT: DO NOT SHIFT GEAR WHEN MOTOR IS RUNNING. SHIFTING GEAR WHEN MOTOR IS RUNNING WILL DAMAGE GEARBOX.
Precise speed adjustment throughout the two speed ranges is controlled by the handwheel situated at the side of the machine, the saw speed being indicated in both feet and meters per minute on the rotating scale.
IMPORTANT: OPERATING VARIABLE SPEED CONTROL HANDWHEEL WHEN THE MOTOR IS STOPPED WILL DAMAGE THE VARIABLE SPEED DRIVE.

FIXED TABLE : (RWF MACHINES).

The table is secured in position by a single bolt passing through the cradle with the tilt locking nut accessable through the door at the rear of the machine (see Fig.3. Page 5). Slackening the nut about one half turn will allow the table to be tilted 45" to the right and 15" to the left when the zero stop pin is removed from the left hand side of the table mounting.

SLIDING TABLE : (RWS/RWH MACHINES).

The table is secured in position by a single bolt passing through the cradle with the tilt locking nut accessable through the door at the rear of the machine (see Fig.3. Page 5). Slackening the nut about one half turn will allow the table to be tilted 45" to the right and 15" to the left when the zero stop pin is removed from the left hand side of the table mounting.
A table traverse of 8@'' (215 mm) can be obtained with both manual and hydraulic feed systems. When required, the length of stroke can be limited by means of stop collars mounted on the threaded shaft situated beneath the table.

HYDRAULIC SYSTEM (RWH MACHINES).

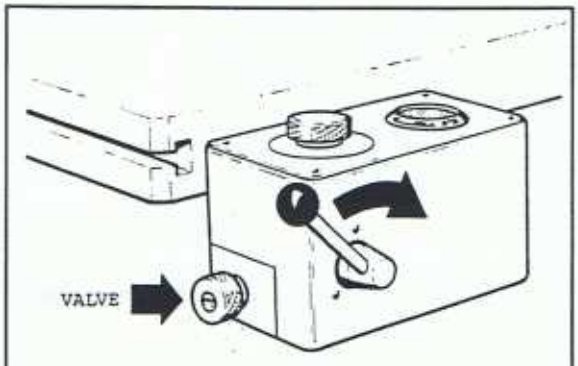


Fig.4.

Hydraulic pressure is generated by a pump driven from the main drive motor and therefore operates only when the motor is running. The working pressure is regulated by the valve situated on the front of the control box, see Fig.4, and is normally set at 100 p.s.I. but may be increased, if necessary to 130 P.S.I. The four position lever controls the direction of the table traverse so that when the Fig.4. lever is moved away from the operator, the table also moves away from the operator and vice-versa. Shifting the lever to its central position will stop the table at any point of its stroke. The handknob controls the rate of feed from zero to a maximum of approximately 25 inches per minute. The greater the number on the dial setting, the faster the feed. Shifting the control lever to the extreme position will override the feed setting and provide fast traverse.

MAINTENANCE.

WEEKLY MAINTENANCE :

Remove embedded chips from bandwheel tyres.
Clean upper and lower blade guide assemblies and check for wear.
Clean table slideways and charge felt wipers with a few drops of oil. Do not apply oil or grease to slideways as this may cause the adhesion of dirt.
Table roller bearings are pre-packed with grease and should not require further lubrication.
IMPORTANT : DO NOT USE COMPRESSED AIR JET TO CLEAN MACHINE AS CHIPS MAY BE BLOWN ONTO TABLE TRACKS, RESULTING IN ERRATIC OPERATION FO TABLE OR SEIZURE OF ROLLERS.

MONTHLY MAINTENANCE :

Remove air filter from top of air compressor (one screw) and insert a few drops of oil onto screw hole. Do not crush filter when replacing screw.
Check condition and tension of drive belts, see page 5 for instructions.
Lubricate table hand feed mechanism (RWS machines only).
Check level of hydraulic oil in tank (RWH machines only).

Every three months apply grease to grease nipple situated on Expanding Pulley Assembly (see Section on Infinitely Variable Speed Transmission).
DO NOT USE EXCESSIVE GREASE.

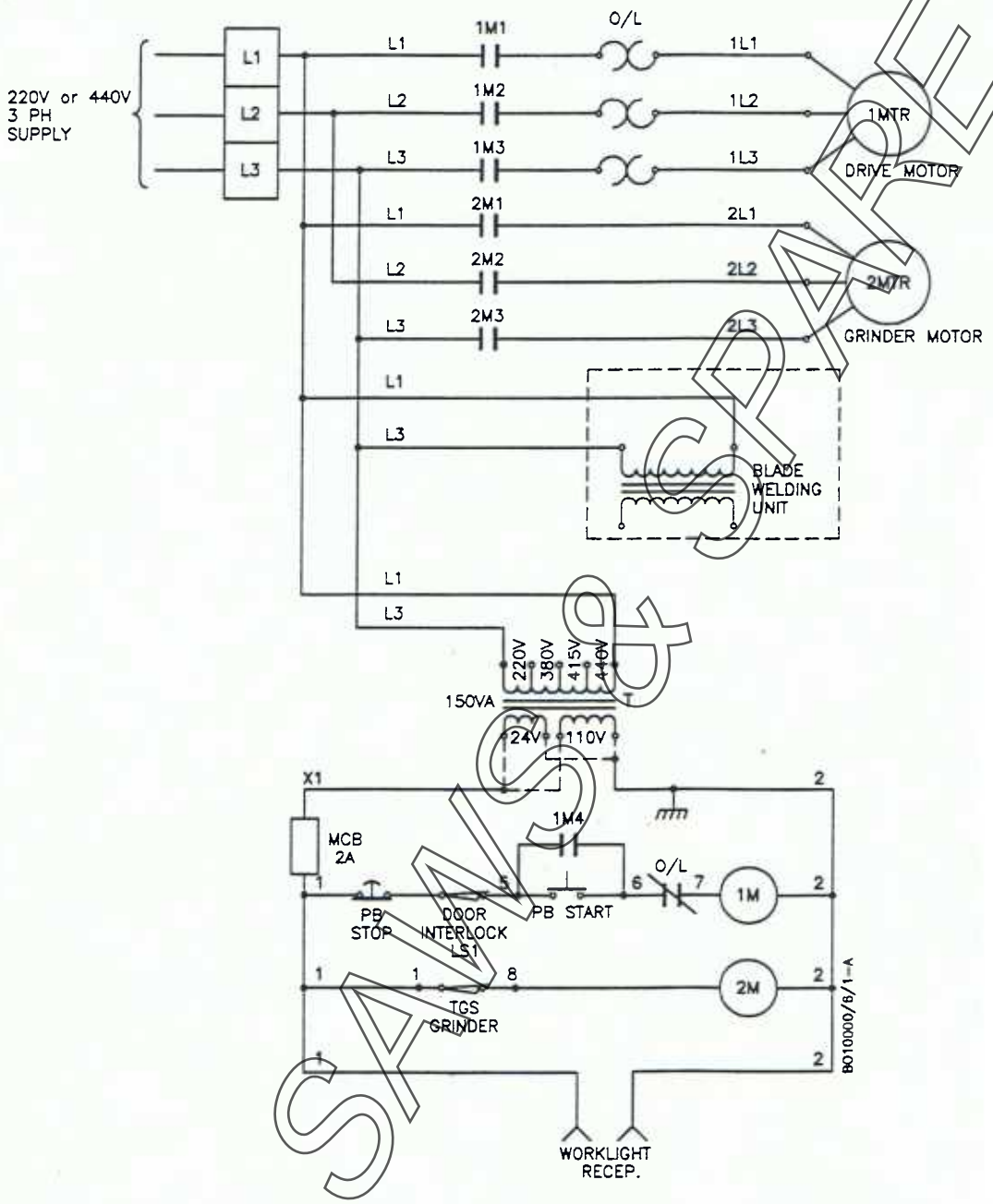
YEARLY MAINTENANCE :

Drain hydraulic system (RWH machines), clean tank and replace filter (Part No.AC 33 B). Refill with 8 imperial pints (4.5 litres) of clean hydraulic oil and operate controls to remove air locks, see page 4.

GENERAL :

Otherwise than above, clean and lubricate working parts as required.
The bandwheels and pumps have sealed-for-life bearings which do not require further lubrication.
Periodically inspect the welder and grinder units, see Section on Die Making/Welding for instructions.

APPROVED LUBRICANTS.	
GENERAL LUBRICATION TABLE SLIDEWAY WIPERS AIR COMPRESSOR	ESSO Esstic 50 Oil GULF Service 51 Oil MOBIL Mobilgear 629 Oil TEXACO Ursa P20 Oil
TABLE ROLLER BEARINGS MOTOR BEARINGS	ESSO Beacon 3 Grease GULF Gulfcrown No.3 Grease MOBIL Mobilplex 48 Grease TEXACO Regal Starfak Premium 3 Grease
GEARBOX	ESSO Pen-o-led EP2 Oil GULF EP65 Lubricant Oil MOBIL Mobilgear 629 Oil TEXACO Meropa 2 Lubricant Oil
HYDRAULIC SYSTEM (RWH MACHINES)	ESSO Nuto H44 Oil GULF Harmony 43AW Oil MOBIL D.T.E. 24 Oil TEXACO Rando HDA Oil



CIRCUIT DIAGRAM FOR 240V/440V 3PHASE 50/60HZ MACHINES
24V OR 110V CONTROL CIRCUIT

WIRING INSTRUCTIONS

If the machine is of the correct voltage, connect supply leads to terminals L1; L2 and L3 in the teminal box (or disconnect switch if fitted) at rear of machine.

IMPORTANT: DO NOT SHIFT GEAR WHEN MOTOR IS RUNNING

Check motor rotation, saw blade must pass downwards through the table. If necessary, interchange supply leads L1 and L3 to reverse rotation.

ELECTRIC CONTROL PANEL

The electric control panel is located inside the machine body, and access is obtained by removing the panel cover situated at the rear of the machine body. The complete panel may be removed from the machine by disconnecting the external wires to the terminal block and removing securing nuts retaining panel.

220 Volt machines will operate on 220/240 Volt; 3 Phase; 50/60 Hz supply.
440 Volt machines will operate on 380/440 Volt; 3 Phase; 50/60 Hz supply.
Machines supplied for use on 440 Volt; 3 Phase; 50/60 Hz supply may be adapted to operate on 220 Volt; 3 Phase; 50/60 Hz and vice-versa.

SETTING UP THE MACHINE.

Select a saw blade suitable for the work in hand, see Section on Sawing Practice. If the work involves internal contour sawing, or the blade is to be made up from bulk strip, refer to Section on Welder & Grinder Units (where applicable).

Lower the top bandwheel by turning the blade tension control knob and remove saw blade. Place selected saw blade over bandwheels with the teeth facing forward and downward through the table (see Fig.1), and apply sufficient blade tension to remove slack. It is important that both the top and bottom guide assemblies are set back clear of the saw blade so that it is not deflected and follows a true path between the bandwheels. Rotate the bandwheels by hand to establish the path of the saw blade. Adjust the tracking control knob to position the saw blade approximately central on the bandwheels as shown in

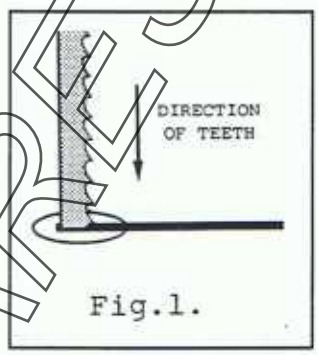
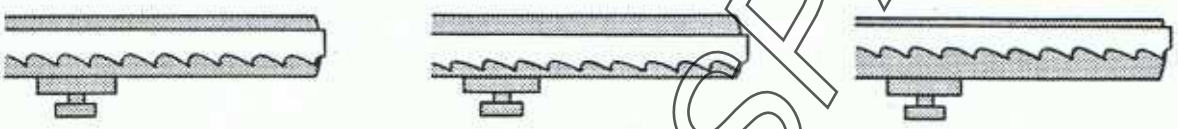


Fig.1.



TRACKING CORRECT
Blade runs approximately central on bandwheel.

TRACKING INCORRECT
Blade runs toward front edge of bandwheel.

TRACKING INCORRECT
Blade runs toward back edge of bandwheel.

Fig.2.

NOTE: 30" Throat Models have a tracking control fitted to both the top and third bandwheels. Care must be taken when setting these machines in order to avoid conflicting settings between the tracking controls. For this reason, the top bandwheel should be set in the mean position and the tracking controlled from the third bandwheel. After this procedure has been completed, a small final adjustment may be necessary to the top bandwheel control. This point does not arise of course when the machine is to be used on two wheel operation as the tracking procedure is carried out solely by the top bandwheel control.

When the saw blade tracks in a satisfactory manner, apply the appropriate blade tension as shown by the tension indicator, see Fig.3. The tension scale registers tension applied in terms of saw blade width, thus a reading of 1/2" indicates that tension to suit a 1/2" wide saw blade has been applied. The saw blade length, provided that it is acceptable to the machine, does not affect the indicated tension. The indicator will give a fair guide as to the correct tension required, but it may be necessary to vary this slightly according to circumstances.

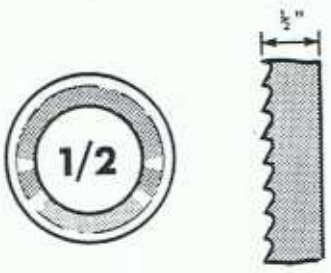


Fig.3.

SECTION 15

SOLID INSERT BLADE GUIDES

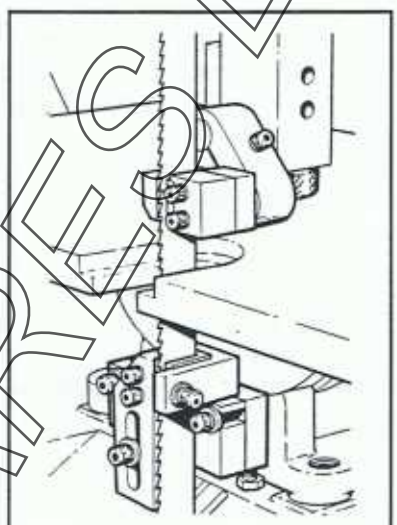


Fig.4.

These guides (fitted as standard on all machines) give the greatest possible support to the saw blade and are therefore most suitable for precision sawing. In most cases greater working life of the saw blade can be obtained than is possible with other types of guides. Solid insert guides (see Fig.4) as the name implies, have the guiding faces machined into a solid block, thereby eliminating the need for individual adjustment to separate controlling elements. The guide inserts are made in a range of sizes to suit blade widths (see Parts List on page 3). After initial setting each size of insert is automatically positioned when fitted into the guide holder.
Check each new saw blade before use for smoothness on sides and back edge at welded joint. New guide inserts should be allowed to bed in by being subjected only to light feed pressure during the first few minutes of use.
An occasional small application of saw wax or tallow to the saw blade will generally improve performance and prolong working life of both saw blade and guide inserts. Remove and clean the guide inserts at each blade change, or more frequently if necessary. Do not allow the guide inserts to become seized in the holders so that the self aligning action is inhibited.

Initial setting of the guide holders is best accomplished by fitting a wide saw blade. Fit guide inserts to suit width of blade to be used. Slacken securing screws (Items 1 & 19) and position the insert locators to hold the guide inserts with minimum side clearance but free enough to pivot under finger pressure. The correct size guide inserts should always be used as they offer maximum support to the sawblade (see Fig.5).
Position guide holders so that guide inserts support the saw blade without deflecting it from a straight line (see Fig.6). After adjusting the guides, rotate bandwheels by hand to ensure that the saw blade runs free. The top guides should be set as close as possible to the workpiece to offer maximum support to the saw blade in its working condition. Incorrectly set guides can only result in poor quality work and short blade life.

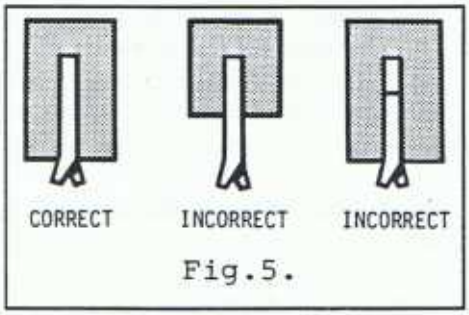


Fig.5.

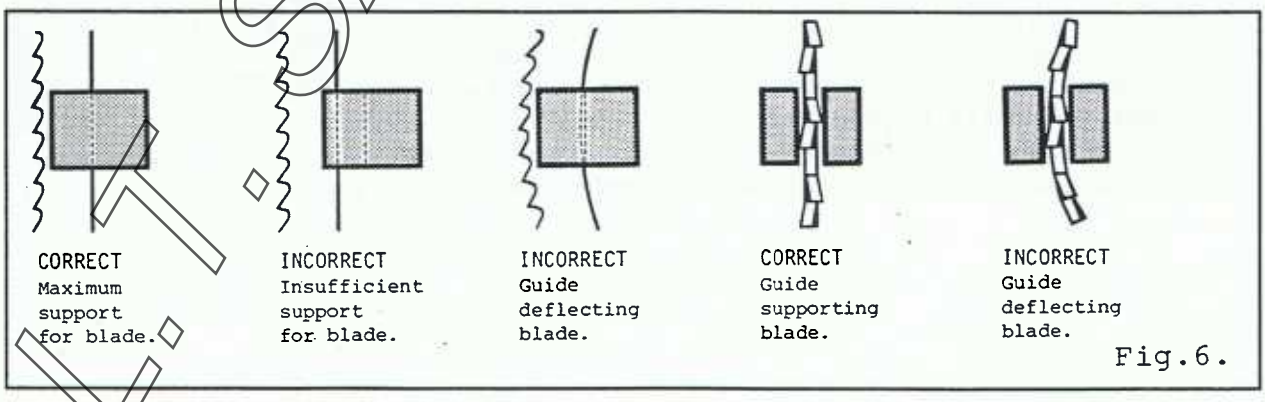
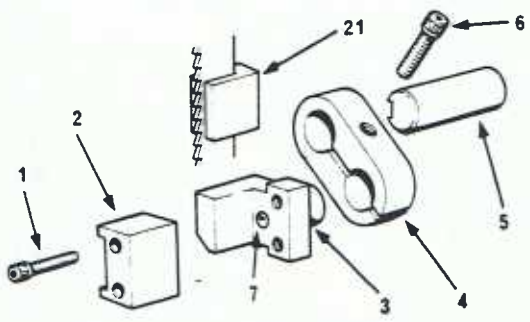
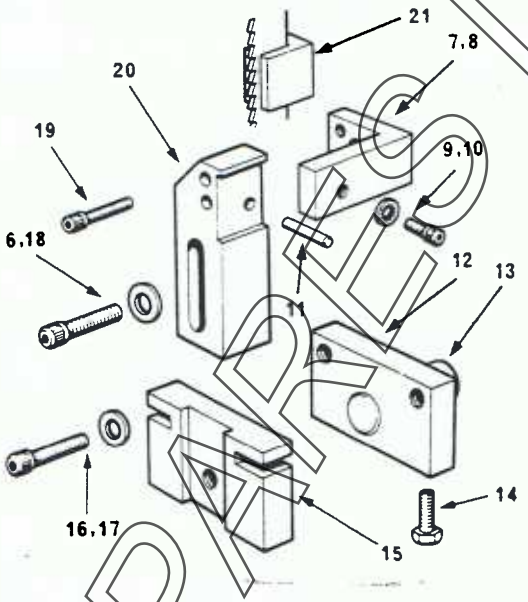


Fig.6.





SOLID INSERT BLADE GUIDES (UPPER) - ASSEMBLY NO: SM624

ITEM	PT NO	DESCRIPTION	NO OFF
1	BO5010	Cap Screw;	2
2	4157	Insert Locator	1
3	4158	Guide Insert Holder	1
4	4156	Holder Arm	1
5	4154	Spigot	1
6	BO5028	Cap Screw;	1
7	BO5870	Drive Screw;	1

SOLID INSERT BLADE GUIDES (LOWER) - ASSEMBLY NO: SM712

6	BO5027	Cap Screw;	1
7	BO5870	Drive Screw;	1
8	4326	Insert Locator	1
9		NOT USED	
10	BO5004	Cap Screw;	1
11	BO5331	Mills;	1
12	4324	Back Plate	1
13	4327	Spigot	1
14	BO5501	Hex. Screw;	2
15	4325	Stem Holder	1
16	BO5915	Washer	2
17	BO5021	Cap Screw;	2
18	BO5918	Washer	1
19	BO5011	Cap Screw;	2
20	4323	Stem	1

SOLID GUIDE INSERTS - PART NUMBERS - ASSEMBLY NO: SM1950

BLADE THICKNESS	ITEM 21 DESCRIPTION	NO OFF
0.025"	4146/A Guide Insert x 1/8" (3mm) wide	2
0.025"	4148/A Guide Insert x 1/4" (5mm) wide	2
0.025"	4149/A Guide Insert x 3/8" (10mm) wide	2
0.025"	4150/A Guide Insert x 1/2" (13mm) wide	2
0.032"	4151/A Guide Insert x 5/8" (16mm) wide	2

SECTION 15

COMBINATION BLADE GUIDES

Combination blade guides, as the name implies, have two different functions. They can be set in the normal position (seeFig.7) and used for continuous high speed sawing, or they can be set at an angle see Fig.8) and used for angled sawing. Combination blade guides will accept either guide inserts or side rollers (see Parts List on page 5). The guides, which are available as an optional extra, utilise standard location points on the machine, and are therefore fully interchangeable with all other blade guides and attachments on all models.

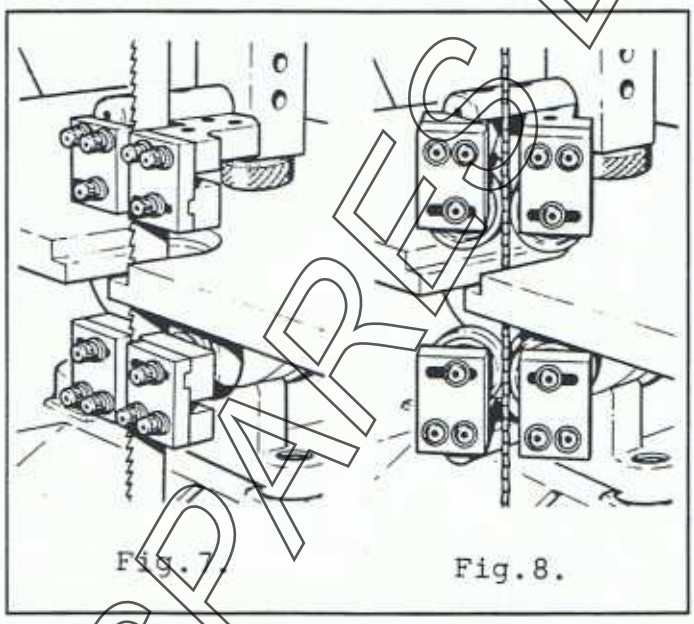


Fig.7. Fig.8.

Assemble the blade guides to the machine using the standardlocation points. Fit guide inserts (Item 39) or side rollers (Item 38) to suit width of blade to be used (see Parts List on page 5). Slacken securing screws (Item 36) and position the guide inserts so that they support the saw blade without deflecting is from a straight line. The arm (Item 30) may be set an angle to the guide body (Item 32). By this means the saw blade is twisted at an angle of 40o to the axis of the table, so as to overcome the limited capacity of the throat size when sawing across a long narrow workpiece, see Figs.9 & 10. When the guides are used in the angled position, side rollers must be fitted and the blade speed should not exceed 300 ft/min. (91 meters /min.).

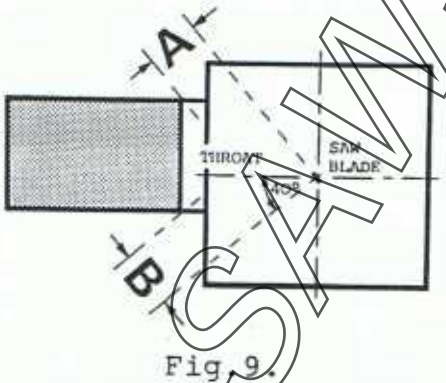


Fig.9.

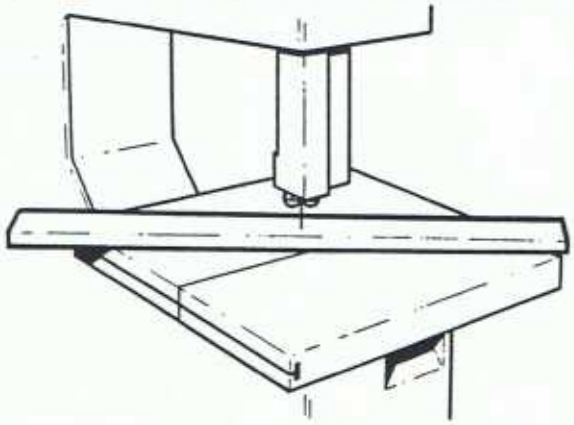
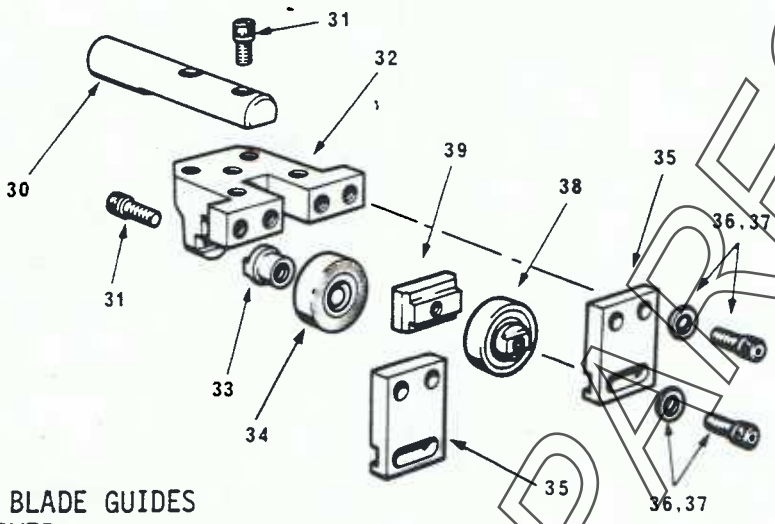


Fig.10.

APPROXIMATE THROAT CAPACITIES WITH SAW BLADE TWISTED AT 40o										
MACHINE TYPE	14"		18"		20"		24"		30"	
	ins	mm	ins	mm	ins	mm	ins	mm	ins	mm
DIMENSION'A'	5.875	150	9.5	240	11	280	14	355	18.625	475
DIMENSION'B'	7	175	10	255	11.25	285	13.75	350	17.625	450

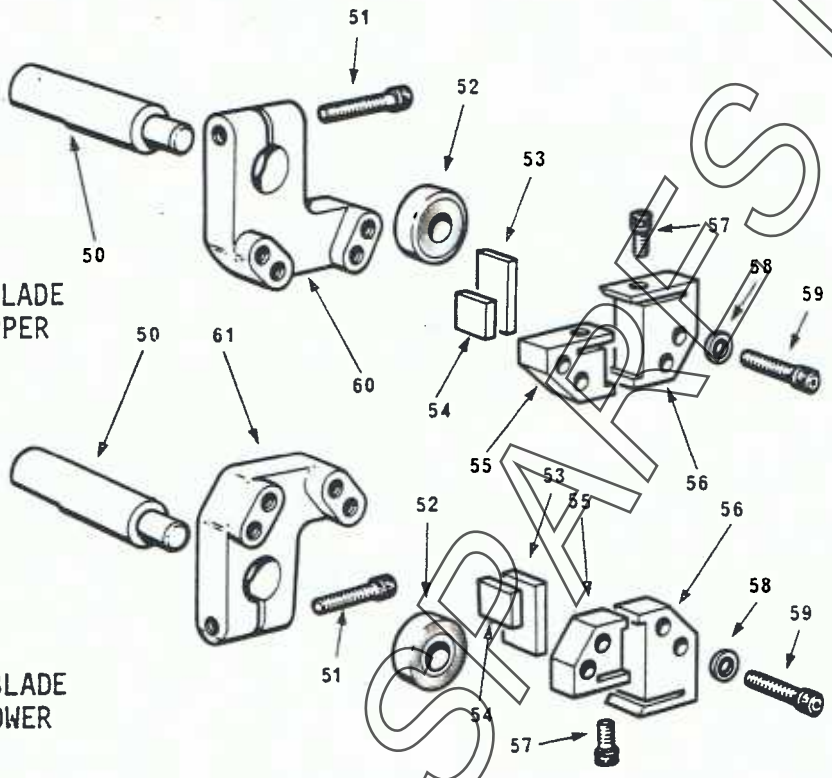


COMBINATION BLADE GUIDES
- UPPER & LOWER

COMBINATION GUIDES (UPPER & LOWER) - ASSEMBLY NO(S): SM290/A; SM290/B & SM290/C

NOTE Two (2) SM290 Combination Guide Assemblies req'd per machine. Quantities shown are for two assemblies.

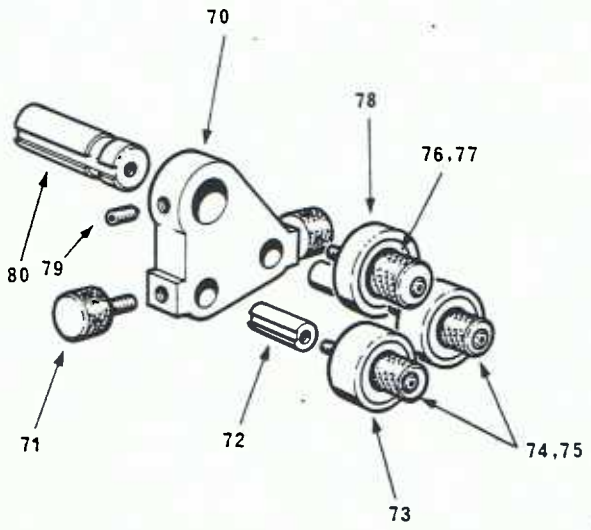
ITEM	PT NO	DESCRIPTION	NO OFF
30	2563	Arm	2
31	BO5007	Cap Screw	1
32	2562	Guide Body	1
33	2565	Roller Spindle	1
34	BO2002	Bearing;	1
35	2564	Guide Bracket	1
36	BO5006	Cap Screw	1
37	BO5913	Washer	4
		SIDE ROLLERS used on SM290/B & SM290/C only	
38	SM306	Side Rollers for 5/8" wide blade	4
	SM307	Side Rollers for 1/2" wide blade	4
		GUIDE INSERTS used on SM290/A only	
39	SM316	Guide Inserts; 5/32"-1/8"(4-3mm) wide blades	4
	SM317	Guide Inserts; 3/16"-1/4"(5-6mm) wide blades	4
	SM318	Guide Inserts; 3/8" -1/2"(10-13mm) wide blades	4
	SM319	Guide Inserts; -5/8"(16mm) wide blades	4



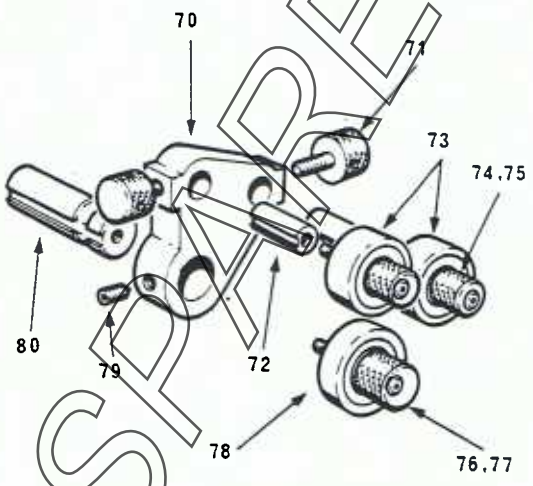
UNIVERSAL BLADE GUIDES (UPPER) - ASSEMBLY NO: SM454
UNIVERSAL BLADE GUIDES (LOWER) - ASSEMBLY NO: SM455

NOTE ! Items 50 to 59 are common to both assemblies and quantities shown are for BOTH assemblies.

ITEM	PT NO	DESCRIPTION	NO OFF
50	3504	Support Arm	2
51	BO5011	Cap Screw;	1
52	BO2002	Bearing;	2
53	3512	Guide Insert - large	1
54	3513	Guide Insert - small	1
55	3505	Guide Holder	1
56	3506	Guide Holder	1
57	BO5001	Cap Screw;	2
58	BO5941	Washer	4
59	BO5003	Cap Screw;	4
60	3507	Guide Body - top	1
61	3508	Guide Body - bottom	1



UNIVERSAL ROLLER BLADE GUIDES - UPPER



UNIVERSAL ROLLER BLADE GUIDES - LOWER

UNIVERSAL ROLLER BLADE GUIDES, UPPER - ASSEMBLY NO: SM1559/A
UNIVERSAL ROLLER BLADE GUIDES, LOWER - ASSEMBLY NO: SM1559/B

NOTE ! Quantities shown are for BOTH assemblies.

ITEM	PT NO	DESCRIPTION	NO OFF
70	7467	Guide Body	1
71	2535	Thumb Screw	2
72	7466	Guide Roller Spindle	2
73	BO2010	Bearing;	2
74	2458	Guide Roller Bush	2
75	BO5012	Cap Screw;	2
76	2459	Thrust Roller Bush	1
77	BO5011	Cap Screw;	1
78	BO2002	Bearing;	1
79	BO5194	Set Screw;	2
80	2456	Thrust Roller Spindle	1

SAW AND SPEED SELECTION CHART.

MATERIAL	WATER TO STARCOOL RATIO		MATERIAL THICKNESS UNDER 0.25"	0.25"-0.5"	0.5"-1"	OVER 1"
ANALINE FORMALDEHYDE	-	FPM	3500	3200	3000	2900
		TPI	18	14	10	3S
ALUMINIUM - Die Casting	20	FPM	1500	1200	900	750
		TPI	18	10	8	6S
ALUMINIUM - Sand Cast Alloy	20	FPM	1200	1000	800	600
		TPI	18	14	10	6S
ALUMINIUM - Rolled & Extruded Sections	20	FPM	2500	2000	1500	1400
		TPI	18	10	8	6S
ASBESTOS - Corrugated	-	FPM	3000	3000	3000	3000
		TPI	14	10	6	3S
ASBESTOS - Paper	-	FPM	3000	3000	3000	2800
		TPI	10	8	6	3S
ASBESTOS - Wall-Board	-	FPM	150	100	100	100
		TPI	14	10	6	3S
BABBIT	20	FPM	2500	2000	1500	1200
		TPI	18	14	8	6
BAKELITE	-	FPM	2500	2300	2000	1500
		TPI	14	10	8	6S
BERYLLIUM	-	FPM	175	150	100	75
		TPI	18	14	10	8
BONE	-	FPM	3500	3200	3000	3000
		TPI	10	8	6	3S
BRAKE LINING	-	FPM	300	250	200	200
		TPI	14	10	8	6
BRASS - Cast	-	FPM	350	300	200	150
		TPI	18	14	6	3S
BRASS - Soft Commercial	-	FPM	2500	2000	1500	1300
		TPI	18	14	8	6
BRONZE - AlumiNIUM	-	FPM	330	320	300	250
		TPI	18	14	10	6
BRONZE - Menganese	-	FPM	800	600	350	300
		TPI	18	14	8	6
BRONZE - Phosphor	-	FPM	500	350	300	250
		TPI	18	14	8	6
BRONZE - Silicon		FPM	1200	900	600	400
		TPI	18	14	10	6
CADMIUM	-	FPM	3500	3200	3000	2800
		TPI	10	8	6H	3S
CARBON	-	FPM	3600	3600	3600	3000
		TPI	18	14	6	3S
CARDBOARD - Corrugated	-	FPM	3500	3500	3000	3000
		TPI	SC	SC	SC	SC
CARDBOARD - Sheet	-	FPM	3000	300	300	2500
		TPI	14	10	8	6H

Speeds indicated are for Carbon Steel Saw Blades. (Regular tooth where not stated otherwise.) H = Hook Tooth; S = Skip Tooth; SC = Scallop Blade; KN = Knife Edge Blade; W = Water; FPM = Feet Per Minute; TPI = Teeth Per Inch

SAW AND SPEED SELECTION CHART.

MATERIAL	WATER TO STARCOOL RATIO		MATERIAL THICKNESS UNDER 0.25"	0.25"-0.5"	0.5"-1"	OVER 1"
CELLULOSE ACETATE	20	FPM	3500	3500	3000	2500
		TPI	14	10	8	3S
CELLULOSE NITRATE	W	FPM	1500	1200	1100	1000
		TPI	10	8	6S	3S
COPPER - Beryllium	20	FPM	2500	2500	1600	1200
		TPI	14	10	6	3S
COPPER - Hard Drawn	20	FPM	800	700	550	400
		TPI	18	14	10	6H
COPPER - Commercial Pure	20	FPM	3200	3000	2700	2500
		TPI	18	14	6	3S
CORK	-	FPM	3500	3500	3500	3500
		TPI	14	10	6H	4H
ETHYL CELLULOSE	W	FPM	3500	3000	2500	2000
		TPI	10	8	6	3S
FIBRE BOARD	-	FPM	2500	1500	1100	1000
		TPI	18	14	10	6
FORMICA	-	FPM	3500			
		TPI	18			
FRONTIER METAL	20	FPM	800	750	700	600
		TPI	18	14	8	3S
GLASS BONDED MICA	-	FPM	75	75	50	50
		TPI	18	14	10	8
GLASS FIBRE	-	FPM	1000	1000	1000	1000
		TPI	18	14	10	6H
GRAPHITE	-	FPM	3000	3000	3000	2500
		TPI	18	14	10	4H
HORN - Animal	-	FPM	2500	2000	1500	1200
		TPI	24	18	14	10
IRON - Grey Cast	-	FPM	200	150	125	100
		TPI	24	18	14	10
IRON - Malleable	-	FPM	275	260	230	200
		TPI	18	14	10	6
IRON - Meehanite	-	FPM	150	130	120	110
		TPI	18	14	10	6
LEAD	20	FPM	3000	2500	1800	1200
		TPI	18	14	10	6S
LEATHER	-	FPM	3500	3200	3000	2800
		TPI	14	10	6	3S
LINEN	-	FPM	3500	3500	3500	3500
		TPI	KN	KN	SC	SC
MAGNESIUM	W	FPM	3500	3300	3200	3000
		TPI	14	10	6H	4H

Speeds indicated are for Carbon Steel Saw Blades. (Regular tooth where not stated otherwise.) H = Hook Tooth; S = Skip Tooth; SC = Scallop Blade; KN = Knife Edge Blade; W = Water; FPM = Feet Per Minute; TPI = Teeth Per Inch

SAW AND SPEED SELECTION CHART.

MATERIAL	WATER TO STARCOOL RATIO		MATERIAL THICKNESS UNDER 0.25"	0.25"-0.5"	0.5"-1"	OVER 1"
MICA	-	FPM	225	225	200	200
		TPI	18	14	10	8
MONEL	-	FPM	150	125	50	50
		TPI	18	14	8	6H
NEOPRENE	-	FPM	3000	2800	2500	2300
		TPI	10	8	6	4H
NICKEL SILVER	20	FPM	300	250	200	180
		TPI	18	14	10	6
PAPER - Sheet	-	FPM	3000	3000	2500	2500
		TPI	18	14	10	6H
PAPER - Tissue	-	FPM	3500	3500	3500	3000
		TPI	18	14	10	6H
PERSPEX	20	FPM	3500	3500	3000	2500
		TPI	14	10	6	3S
PHENOL FORMALDEHYDE	-	FPM	3500	3500	3000	3000
		TPI	14	10	6	3S
PLEXIGLASS	-	FPM	3500	3500	3000	2500
		TPI	14	10	6	3S
POLYSTYRENE	-	FPM	3000	2500	2000	2000
		TPI	10	8	6	3S
RUBBER - Crepe	-	FPM	3500	3500	3500	3000
		TPI	10	8	6	6S
RUBBER - Hard	-	FPM	3000	2800	2500	2300
		TPI	10	8	6	4H
SILVER	20	FPM	2800	2400	2200	2000
		TPI	18	14	10	6
SLATE	-	FPM	750	700	600	500
		TPI	18	14	10	6
STEEL - Carbon Case Hard'g SAE1010;1012;1016; EN32A/B	20	FPM	180	160	150	140
		TPI	24	14	10	6H
STEEL - 0.2% Carbon SAE101-1023; EN3	20	FPM	240	210	180	160
		TPI	24	14	10	6H
STEEL - Carbon Manganese SAE1024; 1027; EN14	20	FPM	240	220	200	175
		TPI	18	14	10	6
STEEL - 0.3% Carbon SAE1029; 1030; EN5	20	FPM	230	200	180	160
		TPI	24	14	10	6
STEEL - 0.4% Carbon SAE1037-1040; EN8	20	FPM	200	150	125	100
		TPI	24	14	10	6
STEEL - 0.55% Carbon SAE1054; 1055; EN9	20	FPM	200	150	125	100
		TPI	24	14	10	6H
STEEL - Low Carbon F/Cut SAE1111-1113;1211-1213;1215;EN1	20	FPM	250	220	200	180
		TPI	18	14	10	6H
STEEL - Case Hard F/Cut SAE1115;1117;EN32M;202	20	FPM	200	190	180	160
		TPI	24	14	10	6

Speeds indicated are for Carbon Steel Saw Blades. (Regular tooth where not stated otherwise.) H = Hook Tooth; S = Skip Tooth; SC = Scallop Blade; KN = Knife Edge Blade; W = Water; FPM = Feet Per Minute; TPI = Teeth Per Inch

SECTION 16

SAW AND SPEED SELECTION CHART.

MATERIAL	WATER TO STARCOOL RATIO		MATERIAL THICKNESS UNDER 0.25"	0.25"-0.5"	0.5"-1"	OVER 1"
STEEL - 0.4% Carbon F/Cut	20	FPM	230	200	180	160
SAE1137-1141; EN8M		TPI	24	14	10	6
STEEL - 3% Nickel	20	FPM	150	125	100	90
SAE2317; 2330-2345; EN33,51		TPI	18	14	10	6H
STEEL - 1% Chrome Molybdenum	20	FPM	150	100	90	60
SAE4130-4140; EN19,20		TPI	18	14	10	6H
STEEL - 1.5% Nickel Chrome	15	FPM	150	125	100	75
Moly; SAE4340; EN24		TPI	18	14	10	6H
STEEL - 2% Nickel Moly	15	FPM	150	125	100	75
SAE4640; EN160		TPI	18	14	10	6H
STEEL - 1% Chrome Vanadium	15	FPM	175	125	100	75
SAE6150; EN47		TPI	18	14	10	6H
STEEL - Nickel Chrome Moly	20	FPM	140	110	90	70
SAE8616-8645; EN100		TPI	18	14	10	6H
STEEL - Silicon Manganese	20	FPM	160	140	125	100
SAE9255EN45		TPI	18	14	10	6H
STEEL - 3% Nickel Chrome	15	FPM	125	100	80	60
SAE9310-9217; EN36		TPI	18	14	10	6H
STEEL - 1% Carbon Chrome	15	FPM	160	130	100	75
SAE50100-52100; EN31		TPI	24	14	10	6H
STEEL - Die	15	FPM	125	100	80	60
D-2; D-3		TPI	18	14	10	6H
STEEL - Die	15	FPM	100	80	65	60
D-7		TPI	24	18	10	6H
STEEL - Hot Working	15	FPM	125	100	75	60
H-12; H-13; H-21		TPI	18	14	10	6H
STEEL - Tool	15	FPM	115	95	60	65
L-6; L-7		TPI	18	14	10	8
STEEL - High Speed	20	FPM	185	150	125	90
M-1		TPI	18	14	10	6H
STEEL - High Speed	15	FPM	130	100	80	60
M-2 to M-5; M-10		TPI	18	14	10	6H
STEEL - Die	20	FPM	175	150	125	100
O-1; O-2		TPI	18	14	10	6H
STEEL - Die	20	FPM	210	180	150	120
O-6		TPI	18	14	10	6H
STEEL - Shock Resisting	15	FPM	125	100	80	65
S-1		TPI	18	14	10	6H
STEEL - Shock Resisting	15	FPM	100	80	60	55
S-2; S-5		TPI	18	14	10	6H
STEEL - High Speed	15	FPM	140	110	90	70
T-1; T-2		TPI	18	14	10	6H

Speeds indicated are for Carbon Steel Saw Blades. (Regular tooth where not stated otherwise.) H = Hook Tooth; S = Skip Tooth; SC = Scallop Blade; KN = Knife Edge Blade; W = Water; FPM = Feet Per Minute; TPI = Teeth Per Inch

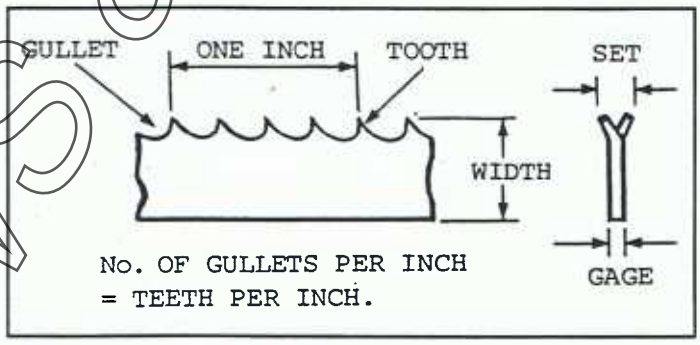
SAW AND SPEED SELECTION CHART.

MATERIAL	WATER TO STARCOOL RATIO		MATERIAL THICKNESS UNDER 0.25"	0.25"-0.5"	0.5"-1"	OVER 1"
STEEL - High Speed	15	FPM	115	95	85	70
T-4; T-5; T-6; T-8		TPI	18	14	10	6H
STEEL - Water Hardening	20	FPM	175	150	125	100
		TPI	18	14	10	6H
STRAW BOARD	-	FPM	3500	3500	3000	3000
		TPI	14	10	8	6S
STRING	-	FPM	3500			
		TPI	SC			
TUFNOL	-	FPM	2500	2300	2000	1500
		TPI	14	10	6H	6H
WOOD	-	FPM	3600	3600	3600	3600
		TPI	14	10	6H	4H
ZINC	20	FPM	2500	2300	2000	1500
		TPI	14	10	6H	6H

Speeds indicated are for Carbon Steel Saw Blades. (Regular tooth where not stated otherwise.) H = Hook Tooth; S = Skip Tooth; SC = Scallop Blade; KN = Knife Edge Blade; W = Water; FPM = Feet Per Minute; TPI = Teeth Per Inch

SAW TERMINOLOGY.

An understanding of the design and application of the various types of saw blades obtainable is essential if the bandsawing technique is to be fully exploited. Selection of the most suitable blade for the job is very important as a poor choice can lead to much wasted time and money.



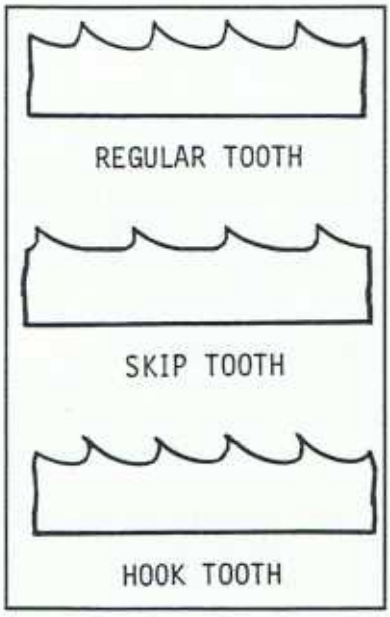
TOOTH PITCH is important if optimum blade performance is to be obtained. Tooth pitch is determined mainly on the basis of material thickness and to some extent on material hardness. For a given material thickness, a tough or abrasive material will require more teeth in engagement than a soft ductile one.
Too many teeth in engagement will decrease the tooth loading to the point where the teeth cannot penetrate the material and so skid across the cutting face. The heat generated by friction due to this rubbing action will cause the cutting edges to break down. It is a common error, especially where work hardening materials are concerned, to increase feed pressure so as to make the saw teeth bite under these conditions. This practice will produce a ragged inaccurate cut and rapidly destroy the saw blade. Where there are insufficient teeth in engagement however, they can penetrate the material too quickly to produce a well formed chip. The stubby chip so produced leaves an inclined face where it breaks away from the cutting face and so causes the succeeding tooth to bounce.

TOOTH PITCH - continued

When this condition is reached, the uneven penetration of the teeth set up periodic vibrations in the form of saw blade chatter.Persistant sawing under these conditions can dull the teeth by impact and in extreme cases, cause the tips of the teeth to break away. The chip produced by each tooth remains trapped in the gullet until it emerges from the underside of the workpiece, therefore as the material thickness increases, the gullet must accommodate a larger chip. Considerable heat is generated if the chip is compressed into insufficient gullet space and with ductile materials, such chips tend to become welded to the teeth resulting in seizure or breakage of the saw blade.

TOOTH FORM refers to the profile of the tooth. Metal cutting bandsaw blades are generally manufactured with one of three basis forms, namely, Regular, Skip, or Hook tooth form. Terminology varies among saw blade manufacturers and these may be otherwise referred to as Precision, Buttress, and Claw tooth respectively.

REGULAR TOOTH saw blades are the most common in use because the zero front rake and well rounded gullet present a robust tooth with good shock resistance and work penetration properties. It will produce accurate fine finish work in steel and most medium hard materials but tend to clog when used on soft or ductile alloys. Standard pitches are 6,8,10,14,18,24 & 32 teeth / inch.



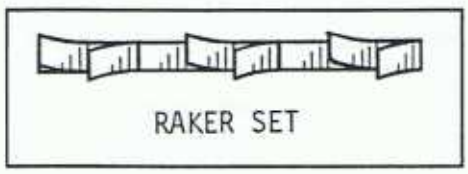
SKIP TOOTH form is similar to the regular tooth form but alternate teeth are omitted, a design which allows greater gullet capacity without unduly weakening the body of the blade. Providing the thickness of the material permits, a skip tooth saw blade will give best performance on aluminium and copper alloys. Fast economical sawing of hardwoods and plastics are possible with this type of saw blade. Standard pitches are 3,4 & 6 teeth per inch.

HOOK TOOTH form has positive front rake which considerably assists work penetration and hence produces faster cutting times on harder materials. The coarse pitch and large gullets associated with this type of saw blade make it particularly suitable for sawing deep sections. It is not recommended for use on abrasive materials. Standard pitches are 2,3,4 & 6 teeth per inch.

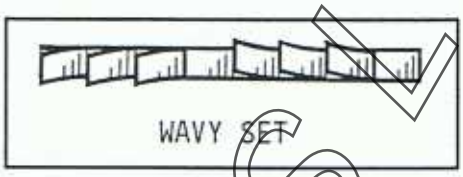
TOOTH SET is the angling of the saw teeth so that the tips protrude beyond the body of the saw blade. The width of the saw cut produced provides the working clearance necessary for the body of the saw blade and permits some degree of steering to negotiate curves.

STANDARD SET teeth are set alternately to the left and to the right, a style which is popular for cutting soft materials and wood.

RAKER SET saw blades have one tooth set to the left and one tooth set to the right followed by one unset tooth. This style of set is widely used and is to be preferred for contour sawing.

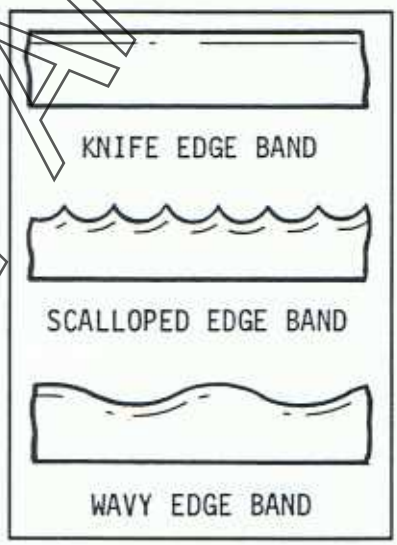


WAVY SET blades have the teeth alternately set to the left and right in groups or waves. With this formation of tooth set, relatively few teeth are cutting at the side of the kerf and therefore there is some tendency for the saw blade to jam when sawing abrasive materials.



SAW GAUGE is the actual thickness of the body of the saw blade. Some makers produce special gauge saw blades for specific purposes but generally saw blades up to and including 1/2" wide are .025", 5/8" and 3/4" wide are .032", and 1" wide are .035" gauge thickness

Knife edge bands are suitable for cutting soft material such as woven fabrics, sponge, rubber, and corrugated cardboard. Where the nature of the material is fibrous and difficult to sever, wavy or scalloped edge blades are better as the teeth provide a more positive cutting action. Typical applications are cutting cork, filter elements, felt and composite materials such as transformer coils. Because these bands separate the material, no dust or swarf is produced and a smooth finish is usually obtained. Most plastics can be sawn with a metal cutting saw blade. Very little difficulty should be experienced in sawing thermosetting materials, although some have an abrasive nature which shortens the life of a saw blade.



BLADE WIDTH FOR CONTOUR SAWING

For contour sawing the width of the saw blade must be chosen with regard to the smallest radius to be sawn, thus a small radius will demand the use of a narrow saw blade. The beam strength and permissible tension decreases rapidly for narrow saw blades and it therefore follows that narrow saw blades are particularly sensitive to excessive stress which will cause stretching and deformation at low speed or premature breakage through fatigue at high speed. Saw blades which fail through abuse of this kind are useless and must be discarded although the teeth may be still in good condition. It is impossible to be precise as to the smallest radius any given saw blade will cut as so much depends on job conditions and the skill of the operator. The Saw Blade Width Selection Chart below offers a basic guide on this point. Several drilled holes at strategic points around the contour may be necessary to negotiate small radii or cut to a sharp corner.

SAW BLADE WIDTH	1/8"	3/16"	1/4"	3/8"	1/2"	5/8"	3/4"
MINIMUM SAWING RADIUS	5/16"	5/8"	1"	11/2"	21/2"	4"	53/4"

NOTE : Blade width capacity of machines vary according to model.

SECTION 16

BANDSAWING PRACTICE.

For straight sawing use the widest saw blade the machine will accept. The success of a bandsawing operation is determined by the accuracy, finish, blade cost and operating time involved. It is usually possible to improve on one of these factors at the expense of the others. This may be expressed in general terms as follows :-

Maximum saw blade life : Medium saw blade tooth pitch, speed and feed.
Minimum sawing time : Coarse tooth pitch, fast speed and heavy feed.
Fine accurate finish : Fine tooth pitch, fast speed and light feed.

COMMON SAWING PROBLEMS.

BLADE WANDERS FROM TRUE LINE:
Excessive feed pressure.
Blade teeth dull or of too fine pitch.
Guide inserts not controlling blade through wear or incorrect adjustment.
Blade tracking incorrect.
Loss of set to one side of saw teeth.
PREMATURE BLADE BREAKAGE:
Excessive feed pressure, and/or too much blade tension.
Worn or incorrectly set guides.
Joint improperly welded and annealed.
Blade too wide for curved cut.
Bandwheels worn.
Blade teeth of too fine pitch.
BLADE BOWS IN DEEP CUT:
Excessive feed pressure.
Blade teeth dull or of too fine pitch.
Insufficient blade tension, and/or blade too narrow for depth of cut.
Blade running off at start of cut.
BLADE TEETH DULL RAPIDLY:
Insufficient feed pressure.
Blade pitch too fine.
Guide inserts snagging set of teeth.
Speed too fast.
TEETH TORN FROM BLADE:
Excessive feed pressure.
Gullets of teeth loading.
Pitch of teeth too coarse.
Blade speed too fast.
BLADE DEVELOPING TWIST:
Excessive feed pressure.
Guide inserts snagging blade.
Blade too wide for radius of cut.
Excessive blade tension.
Blade not tracking correctly.
Loss of set to one side of saw teeth.
BLADE VIBRATES IN CUT:
Workpiece not properly seated or securely held.
Blade speed too fast, and/or blade pitch too coarse.
Insufficient blade tension.

DIE MAKING

By careful drilling it is possible to produce a punch and die from one piece of material, the waste from the die aperture forming the punch, see Fig.1. The chart gives recommended saw blade width, hole sizes, and angles for die thickness of 1/2"-3".

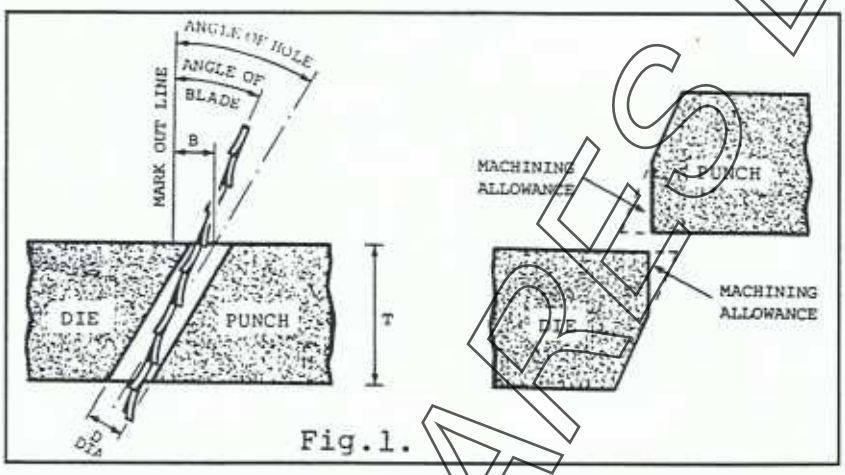


Fig.1.

DIE THICKNESS T.	1/2"	3/4"	1"	11/4"	11/2"	13/4"	2"	21/2"	3"
BLADE WIDTH B	1/8"	1/8"	1/8"	1/16"	1/16"	1/16"	1/16"	1/4"	1/4"
ANGLE OF HOLE (DEG)	37.0	26.5	20.5	24.0	20.5	18.0	15.5	16.5	14.0
HOLE DIA. D.	3/16"	3/16"	3/16"	9/32"	9/32"	9/32"	9/32"	3/8"	3/8"
ANGLE OF BLADE	26.5	18.5	14.0	16.5	14.0	12.0	10.5	11.5	9.5

For other combinations of die thickness and saw width calculate the machining geometry as follows:

Let T = Die Thickness
B= width of selected saw blade
Then:- Starting hole diameter = 3B/T
Starting hole centre to mark out line =B
Tangent of starting hole angle 3B/T
Tangent of saw blade angle = 2B/T

By following the foregoing formulae, a machining allowance equal to 75% of the saw blade width will be obtained. This allowance may be reduced by slight alteration of the drilling and sawing angles.

TANGENTS OFANGLES

TANGENT	0.017	0.035	0.052	0.070	0.087	0.105	0.123	0.140	0.158	0.176	0.194
ANGLE	1	2	3	4	5	6	7	8	9	10	11
TANGENT	0.213	0.231	0.249	0.268	0.287	0.306	0.325	0.344	0.364	0.384	0.404
ANGLE	12	13	14	15	16	17	18	19	20	21	22
TANGENT	0.424	0.445	0.466	0.488	0.510	0.532	0.544	0.577	0.601	0.625	0.649
ANGLE	23	24	25	26	27	28	29	30	31	32	33
TANGENT	0.675	0.700	0.727	0.754	0.781	0.810	0.839	0.869	0.900	0.933	0.966
ANGLE	34	35	36	37	38	39	40	41	42	43	44

BUTT-WELDING SAW BLADES

The process of butt-welding consists of clamping the saw biade between two sets of jaws, one set fixed and the other set moveable. The ends of the blade are heated by the passage of a heavy electric current and at the same time, they are forced together by a pre-determined amount under spring pressure. The blade welding unit enables the operator to rejoin broken blades or to produce new bands from bulk coil blade strip as required. Internal contours may be sawn after passing one end of the blade strip through a starting hole, then making the joining weld, see Fig.1.

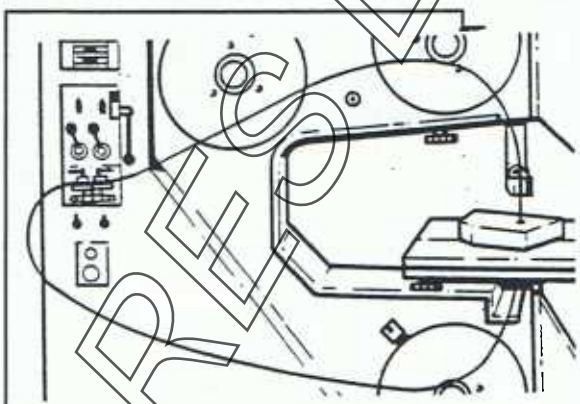


Fig.1.

PREPARING THE SAW BLADE.

Cut the saw blade to length using the blade shear attached to the front of the welder. The shear is operated by moving the handle upwards. With coarse pitch blades, the blade should be sheared in line with the tooth point in order to maintain a uniform tooth pitch after welding. It is important that the ends of the saw blade are sheared square in both planes and without burr. To achieve this the blade is to be inserted in the shears with the teeth facing to the front. The back edge of the blade must seat against the back of the shears and against the alignment stop. Thoroughly clean each end of the blade with emery for a distance of 11/2in. until bright metal shows over the whole width of the blade. Make sure the clamping jaws of the welder are free from dirt and grease.

WELDING.

A diagram of the butt-welder is given in Fig.2. Adjust the welding current, up-set way and up-set pressure according to saw blade width. Place the prepared ends of the blade into position by means of the clamping screws, making sure that the two ends of the blade butt together at a point mid- way between the jaws. In order to avoid damage to both jaws and blade, it is important that the blade teeth face forward against the front stops. Turn the up-set way lever to the position marked WELD and hold it there until the weld is finished. The current is switched off automatically at the completion of the welding operation. After welding, slacken the clamping screws.

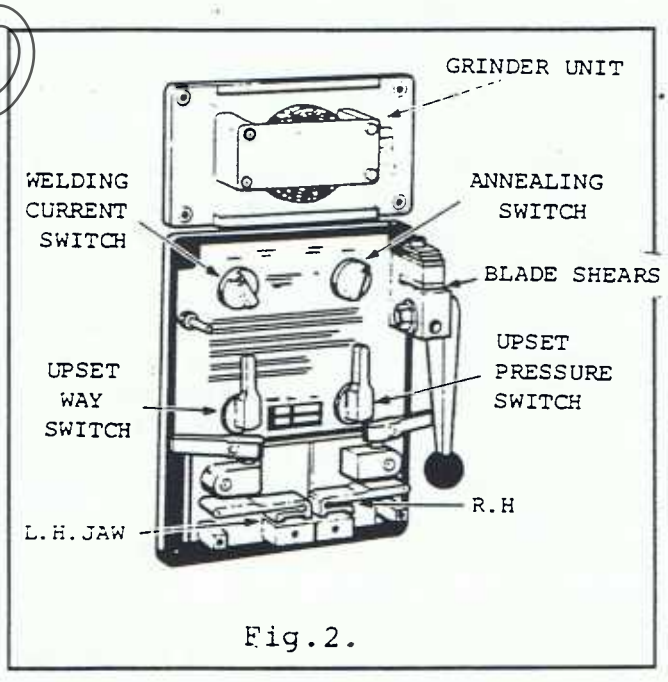


Fig.2.

CAUTION: Sparks may fly during welding, therefore it is advisable to protect the face.

SECTION 19

ANNEALING

A join produced by welding alone is brittle and would break after very little service. In order to overcome this the blade join must be annealed by a second operation. Set the up-set way switch to the ANNEAL position. Re-clamp the blade with the weld midway between the jaws. Press the anneal button continuously until the weld is a dark cherry red. This process should be repeated a few seconds at a time letting the heat go slowly. Gradually reduce the length of time that the button is depressed as the process proceeds.

FINISHING

The excess weld flash must be removed by grinding, some care being taken to maintain a uniform blade thickness. The gullets of the teeth adjacent to the weld should be cleaned out as necessary. After the weld has been dressed in this fashion, anneal the joint to a pale blue colour.

POSSIBLE FAULTS

If the weld has run too much or even shows holes, then the proportion of up-set pressure to welding is incorrect. In such a case increase the up-set pressure or decrease the welding current, it may be necessary to do both. If however, the up-set pressure is too great and the welding current too small, the weld will have the appearance of loose layers.

NOTE : Operating characteristics may vary slightly according to supply voltage therefore it may be necessary to use an alternative setting in order to achieve optimum results.

CARE OF THE BUTT-WELDING UNIT

The most important part of the care of the welder is the careful handling of the bronze jaws. It is impossible to obtain satisfactory welds with dirty or uneven jaws. Any drops of weld, or dirt which may have entered the jaws should be removed immediately. From time to time check the clamps for uniform clamping pressure as follows :-

Place in position as for annealing, a clean smooth band (blade with set of teeth removed) as wide as the jaws. Upon operation of the annealing button, the band should become simultaneously and uniformly red over the whole width. If this is not the case, inspect the clamps for any foreign matter which may have entered. If the jaws and pressure faces appear clean, it will be necessary to dress the pressure faces where the band heats most quickly bearing in mind that the band heats less quickly where the clamping pressure is least. The pressure faces should be dressed in line with fine emery wrapped around a piece of wood. Take care to thoroughly clean away emery dust. The bronze jaws should not be filed. The moving jaws are mounted on a sensative ball bearing track and therefore should not be forced in anyway.

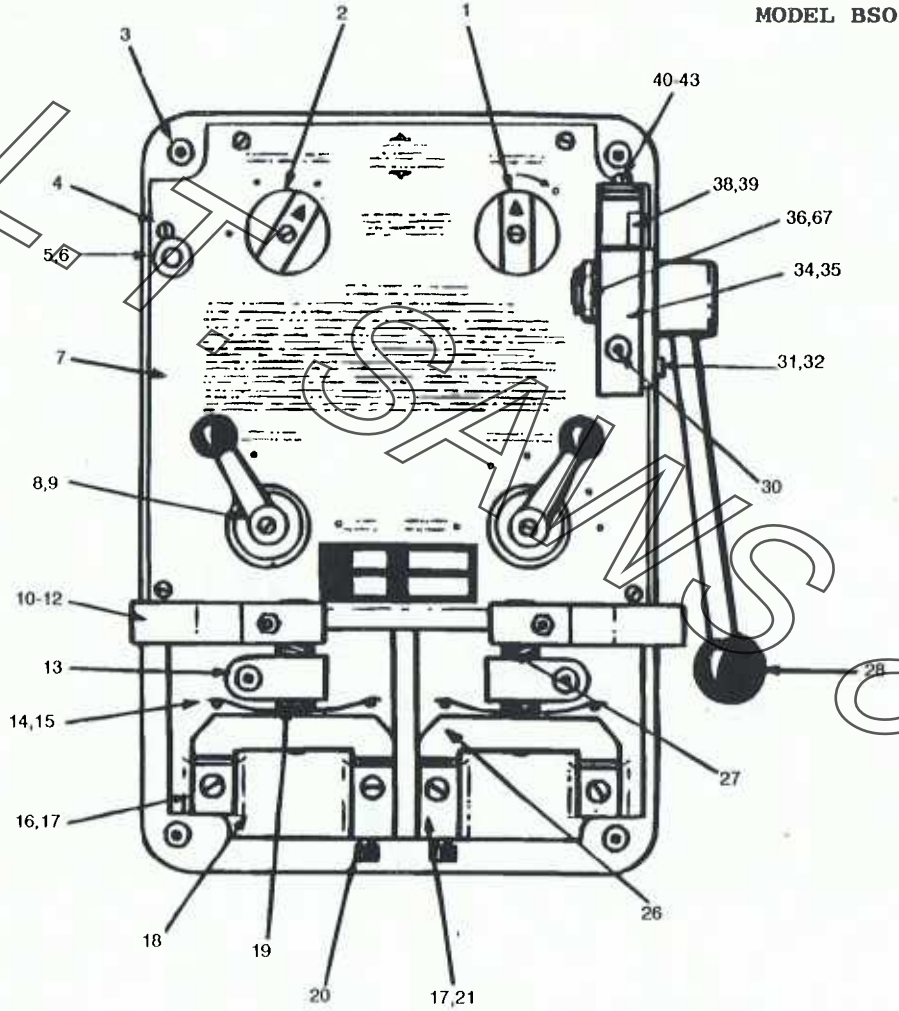
CARE OF THE GRINDING UNIT

The grinding motor will produce excessive whine if allowed to run with an unbalanced wheel. Dress new wheel upon replacement and if necessary, adjust wheel clamping washer to run eccentric in order to improve dynamic balance. Dress periphery of wheel occasionally to remove embedded swarf. **Wheel size:** 63 mm. Dia. x 15 mm. Wide x 10 mm; **Bore Grade** : A46PV; **Max. speed:** 3000 r.p.m. Synchronous

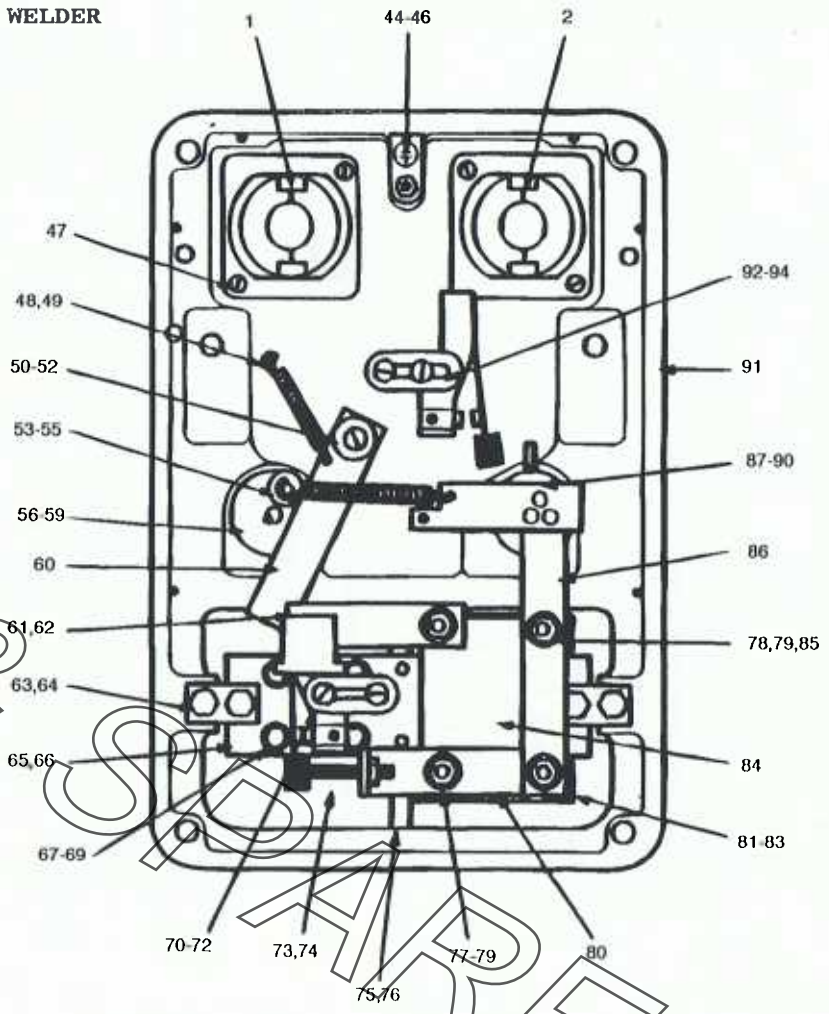
PARTS LIST FOR MODEL BSO.16 WELDER

ITEM	PART NUMBER	DESCRIPTION	No.OFF
1	BO1329	Switch No.A214E with Handle No.G521	1
2	BO1328	Switch No.A231E with Handle No.G521	1
3	BO5067	Soc. Hd. Cap Screw	4
4	BO7750	Ch. Hd. Screw	6
5	5385	Support Bolt	1
6	BO5752	Hex. Locknut	1
7	5285	Instruction Plate	1
8	BOS1172	Control Knob	2
9	BO7751	Ch.Hd.Screw	2
10	5247	Clamp Handle	2
11	BO5477	Ch. Hd. Screw	2
12	BO5712	Hex. Nut	2
13	BO5061	Soc. Hd. Cap Screw	2
14			
15	BO7769	Mills Pin	2
16	5259	Blade Location Plate (Outer)	2
17	BO7752	Rd. Hd. Screw	4
18	EAB90/12	L.H. Jaw	1
19	5246	L.H. Clamp Screw	1
20	BO5059	Soc.Hd.Cap Screw	2
21	5260	Blade Location Plate (Inner)	2
22			
23			
24			
25			
26	EAB90/12	R.H.Jaw	1
27	5245	R.H. Clamp Screw	1
28	SM1391	Handle Assembly	1
29			
30	BO5072	Soc.Hd.Cap Screw	1
31	BO5890	Dowel Pin	1
32	6665	Knife (Old No.5381)	1
33			
34	6663	Shear Body (Old No. 5379)	1
35	BO7754	Mills Pin	1
36	BO2244	Disc Spring	1
37	BO5755	Self Locking	1
38	6664	Shear Knife (Old No. 5380)	1
39	BO7755	C'sk.Hd.Screw	2
40	5383	Plate	2
41	5382	Distance Piece (Lower)	1
42	5384	Distance Piece (Upper)	1
43	BO7756	Pan Hd. Screw	1
44	3879	Earth Tag	1
45	BO7757	Brass Stud	1
46	BO7758	Brass Hex.	2
47	BO5476	Ch. Hd. Screw	4
48	BO5427	Tension Spring	1
49	BO7759	Grooved Mills Pin	1
50	5423	Distance Piece	1
51	5425	Spacing Cap	1
52	BO5478	Ch. Hd.Screw	1
53	5424	Roller	1

(CONTINUED)



FRONT VIEW



REAR VIEW
(WITH TRANSFORMER REMOVED)

PARTS LIST FOR MODEL BSO.16 WELDER - CONTINUED

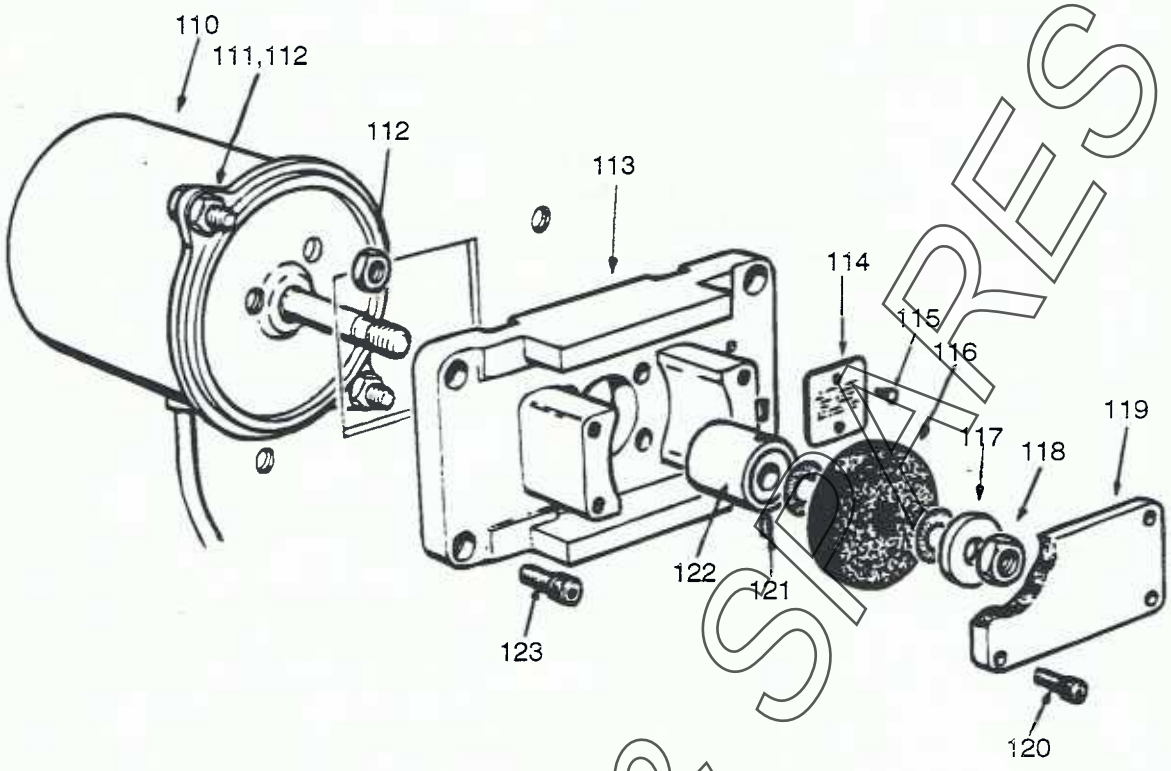
ITEM	PART NUMBER	DESCRIPTION	No.OFF
54	5431	Tension Spring	1
55	BO7760	Grooved Mills Pin	1
56	5268	Index Cam	1
57	5250	Switch Centre Bolt (Short)	1
58	5426	Compression Spring	3
59	BO7761	Steel Ball	3
60	5271	Cam Lever	1
61	5269	Striker Plate	1
62	5270	Striker Pin	1
63	5276	Carriage Clamp	2
64	BO5552	Hex. Hd. Screw	4
65*	5278	Carriage	1
66*	5281	Insulator Plate	1
67*	5282	Insulator Tube	4
68*	BO5547	Hex. Hd. Screw	4
69*	BO7762	Fibre Washer	4
70	SM980	Cut-Out Switch	1
71	5430	Spacing Block	1
72	BO5479	Ch. Hd. Screw	2
73	BO7763	Std. Stud	1
74	BO7764	Hex. Locknut	1
75*	5283	Spark Protection Plate	1
76*	BO7765	St. Stl. R'sd. C'sk. Hd. Screw	2
77*	5274	Distance Bolt (Short)	2
78*	BO5751	Hex. Locknut	4
79*	BO5713	Hex. Nut	5
80	5272	Switch Bracket	1
81*	SM944	Hair Pin & Strip Assembly	4
82*	5279	Slide Rail L.H. & R.H.	1
83*	BO7766	Steel Ball	14
84*	5273	Connection Plate	1
85*	5275	Distance Bolt (Long)	2
86	SM936	Cam Striker	1
87	5251	Switch Centre Bolt (Long)	1
88	5252	Centre Cam	1
89	BO7767	Dowel Pin	1
90	BO5340	Sel-lock Pin	1
91	5240	Front Plate	1
92	SM981	Start Switch	1
93	5428	Spacing Block	1
94	BO7768	Ch. Hd. Screw	2

NOTE * ITEMS INCLUDED ON SM945 CARRIAGE ASSEMBLY

NOT ILLUSTRATED:

Transformer (State Voltage)

GRINDER - ASSEMBLY No.SM918



ITEM	PART NUMBER	DESCRIPTION	No.OFF
110	STARCR0091	Motor Type KT4540 (1PH)	1
	STARCR0092	Motor Type KT4540 (3PH)	1
111	B05548	Hex.Hd.Screw	2
112	B05713	Hex. Nut	4
113	4565	Mounting Plate	1
114	4567	Speed Plate (50Hz)	1
	4670	Speed Plate (60Hz)	1
115	B05871	Hammer Drive Screw	2
116	B02570	Grinding Wheel	1
117	5084	Washer	1
118	B05716	Hex. Nut	1
119	4566	Guard Plate	1
120	B05007	Soc. Hd. Cap Screw	4
121	B05186	Soc. Set Screw	2
122	5189	Collar	2
123	B05067	Soc. Hd. Cap Screw	4

AIR/SPRAY COOLANT KIT

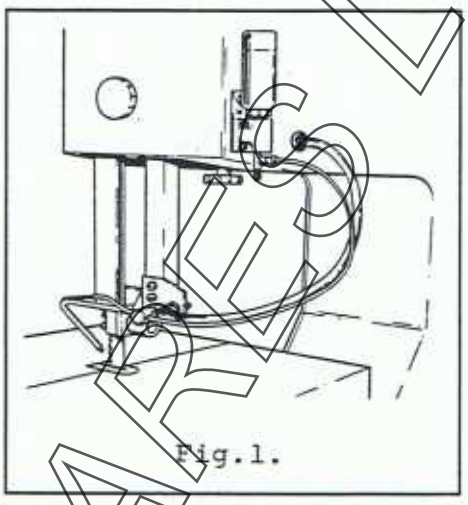


Fig.1.

Fig.1 shows the air/spray coolant kit (Part No SM2021) fitted to the machine. The coolant is delivered through a drip feed system, which works in conjunction with an air pump driven from the main motor. The spray nozzle should be positioned as close as is convenient to the saw blade with the air jet impinging on the teeth at the point of entry into the workpiece. Apart from cooling and lubricating the saw teeth, the air/spray assists in cleaning the saw gullets and removes swarf ahead of the saw cut to facilitate following a marked line. A solution of one part STARCOOL soluble cutting cutting oil with twenty parts water will prove suitable for machining most materials where a coolant is required. The necessary quantity to be applied is quite small and generally should be no more than can be evaporated and carried away by the chips. Pools of coolant forming on the job and table serve no useful purpose and usually indicate that excessive coolant is being used.

NOTE : DILUTED STARCOOL SOLUBLE CUTTING OIL IS THE ONLY RECOMMENDED COOLANT. USE OF OTHER OILS MAY CAUSE DIFFICULTY IN OPERATION, AND IN SOME CASES, DAMAGE TO PARTS OF THE MACHINE.

CIRCLE CUTTING ATTACHMENT

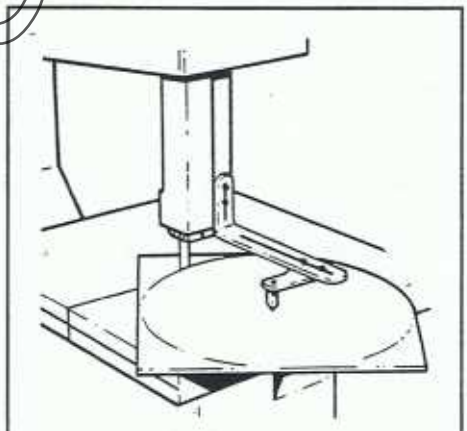


Fig.2.

Fig.2 shows the circle cutting attachment (Part No.SM260) in use on a machine, which facilitates the production sawing of circular blanks up to 18" dia. The unit is easily fitted to the tool post and thus may be raised and lowered when feeding blanks without disturbing the setting of the location pin. A drilled or punched location point will be required in each blank, the location being positioned at a distance equal to the sawing radius from one edge. sufficient material should be allowed on the other sides of the blank to prevent the blade emerging from the cut until the full circle has been completed. Select the blade width according to the radius to be sawn. The location pin must be set to lie tangential to the blade otherwise blade wander will result. If the blade tends to cut away from a true circle, the pin position is incorrect, or possibly the blade is too wide.

RIP FENCE

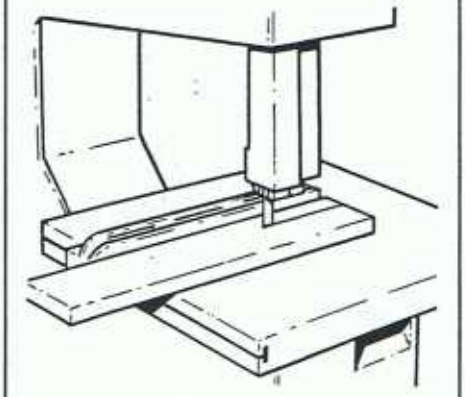


Fig.3.

Fig.3 shows the rip fence (part No SM302) in use on a machine. It can be used for making accurate parallel cuts using hand feed, or as a work stop using power feed.

SECTION 20

BANDFILE GUIDE

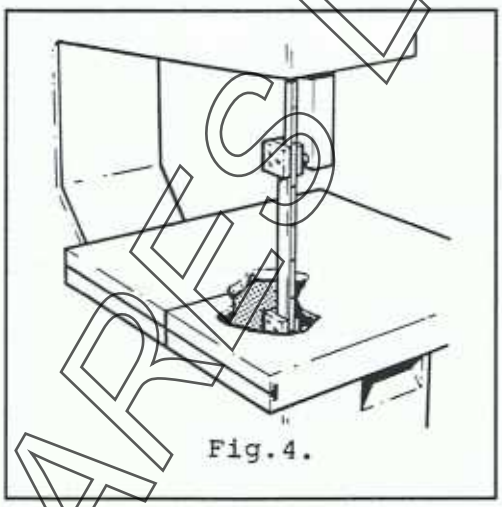


Fig.4.

Fig.4 shows the bandfile guide (Part No. SM287) in position on the machine, which adapts the machine for power filing. Band filing presents an economic method of production machining straight and contour faces. Because there is no tendency for the file to rock, wide faces can be finished to fairly close tolerances. Bandfiles consist of short lengths of file sections attached to a flexible steel band which has a joint for unlocking and re-joining, thus peraitting the filing of internal contours. The guides will accommodate standard files of 1/4", 3/8", or 1/2" width. To set up the machine for band filing :- Remove the saw blade, blade guides, Blade guard and table insert. Assemble back guide and spacers to suit width of file to be used. Insert the support arms into the same holes as used to locate the blade guides. Mount the band file on the bandwheels with the teeth facing downwards through the table, and track in a similar way to a saw blade. Apply only sufficient tension to keep the fileband on the bandwheels without it slipping.

NOTE :EXCESSIVE TENSION WILL DAMAGE THE BAND.

Position the bandfile back guide just clear of the back face of the band. Fit special table insert provided.

WARNING : An incorrectly adjusted file guide may prevent the file segments from interlocking in the correct manner and thus result in the segments being torn from the backing band. It is important that a new bandfile is only lightly loaded when first used in order to allow the file segments to bed down. Use a filing speed of around 60 feet per minute for die steel, and up to 120 feet per minute for mild steel. Speeds in excess of 300 feet per minute may damage the bandfile. Embedded swarf should be periodically removed to prevent the workpiece being scored. This problem can be reduced by a light application of tallow or chalk. Care must be taken to avoid kinking the backing band in storage and for this reason, the bandfile should be stored in its original container when not in use.

ABRASIVE BAND GUIDE

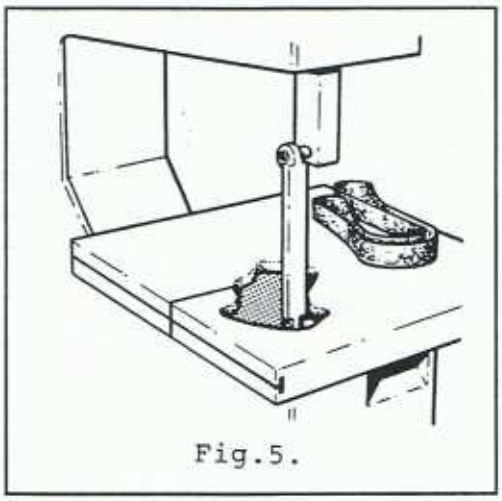


Fig.5.

Fig.5 shows the abrasive band guide (Part No. SM298) set up on machine. One inch wide abrasive bands are available in 40, 80 or 120 grit and are ideal for a large variety of small finishing and deburring operations. To set up the abrasive band guide:- Remove the saw blade, blade guides, blade guard and table insert. Assemble abrasive band guide into the same holes as used to locate the blade guides. Mount the abrasive band on the bandwheels, with the joint of band overlap (on the abrasive side) to face upwards from the table. Apply tension as for a 1/4" wide blade. Align face of guide to back of band. Use highest blade speed available.

WORKLIGHT

Fig.6. shows the worklight which plugs into the machine on a low voltage circuit. The magnetic base and flexible arm allow the light to be positioned anywhere to give good illumination of the workpiece and the optional magnifying lens allows greater accuracy.

NOTE: The worklight and magnifying lens are supplied as seperate items.

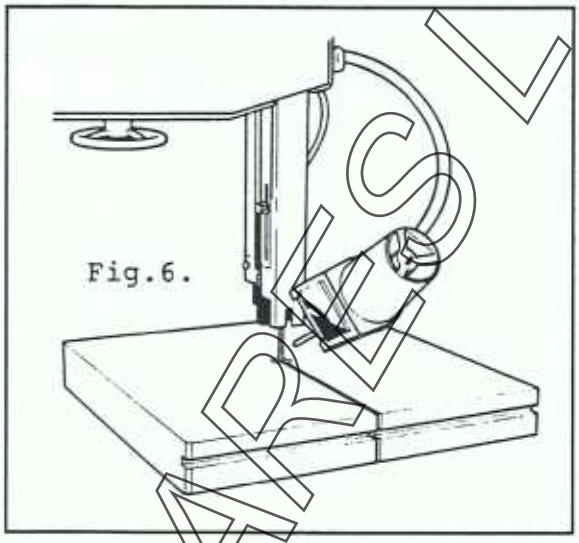


Fig.6.

MITRE GAUGE & PUSHER ATTACHMENT

Fig.7. shows the mitre gauge and pusher attachment in use on a machine. The mitre gauge and pusher (Part No.SM198/B) are used on fixed table machines, the pusher providing an easy means of feeding and controlling the workpiece. The mitre gauge is also available with a bolt on housing (Part No.SM358), used on machines with sliding tables it allowsthe mitre gauge to be positioned a different distances from the blade.

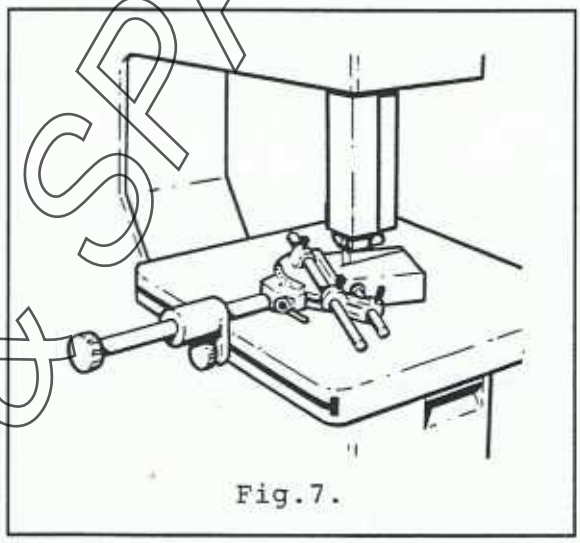


Fig.7.

GEARED PUSHER ATTACHMENT

Fig.8. shows the geared pusher attachment (Part No.SM46/A) in use on a machine. On machines with fixed tables somemechanical advantage may be obtainedby using this equipment. The geared pusherattachment is clamped to the front tableflange and provides a practical means ofapplying feed pressure with a high degreeof control.

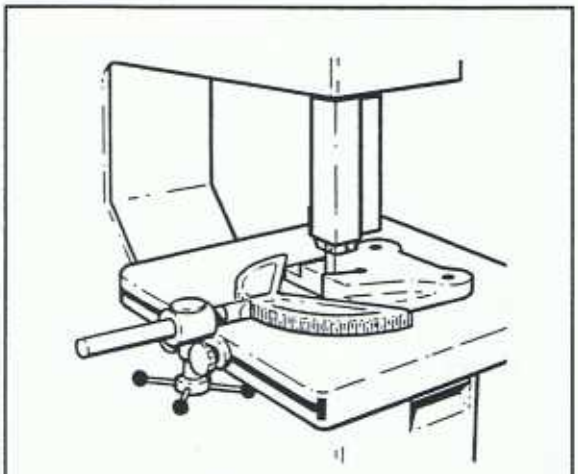


Fig.8.

SECTION 20

CONTOUR WORK HOLDING KIT

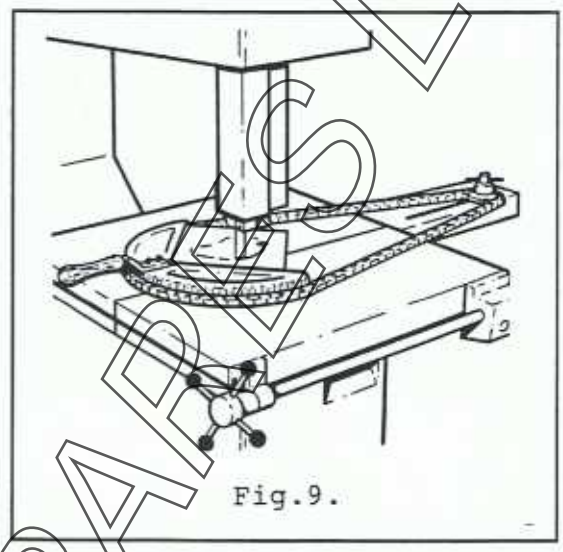


Fig.9.

Fig.9. shows the contour work holding kit (Part No.SM2004) in use on a machine. The mecanical advantages offered by the hand feed mechanism of the sliding table can be used to some advantage in die making. The die block cannot be clamped to the work table in the usual way if contour sawing is involved as manipulation of the workpiece is necessary. In this instance, the table motion can be transferred by roller chain passing both around the workpiece and a jockey wheel attached to the rack cover at the rear of the table. By this method, the workpiece is steered by one hand and feed applied by the other. Hold circular work piece by wrapping the chain directly around the job. To prevent the chain slipping, saw a small slot in the periphery of the work- piece and insert a small piece of saw blade so as to engage with the chain.

UNIVERSAL WORK HOLDING KIT

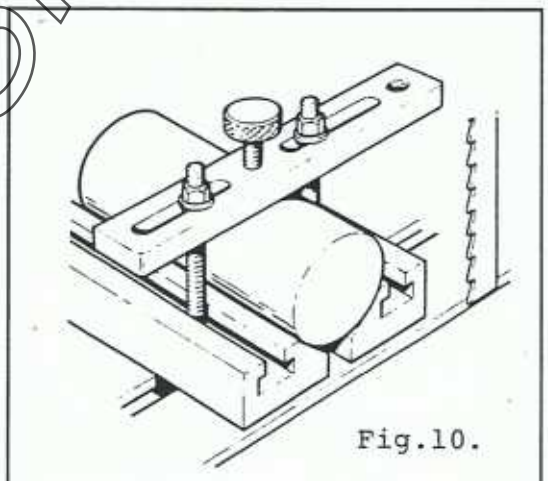


Fig.10.

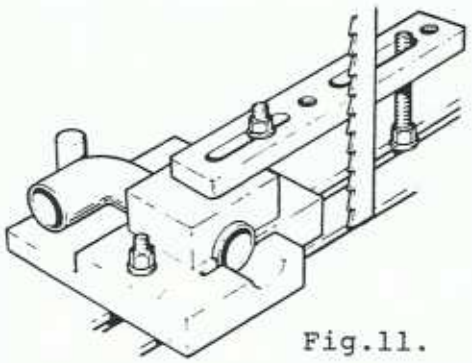


Fig.11.

For dealing with standard shapes/sections,a universal work holding kit (Part No.SM2001) is available for use on a sliding table. Fig.10 shows a typical set-up constructed from standard parts of the kit to hold round bar. This type of fixture will accomodate bars from 1/4" to 5" dia. for either square or angled cutting. The kit provides a flexible system of construction whereby a variety of work table fixtures can be rapidly devised and assembled by the operator. By this method, many production notching, splitting and trimming jobs can be tackled with negligible tooling costs. A typical example of this is the slicing and trimming of thin wall tubing which presents both a location and clamping problem. If the clamping pressure is too great, the tube will be deformed. Should the clamping pressure be insufficient, however, the tube will sli under cutting pressure and probably damage the saw blade. Fig.11. shows a simple fixture to locate and clamp formed pipe bends for an end trimming operation. This low cost fixture was made from a hardwood block bored to suit the outside of the tube and then split across the centre of the hole. One of the halves is reduced in size to from a clamp pad. The larger piece forms the base of the fixture and is fitted with an end stop pin to determine the trimmed length. The break off burr is almost eliminated by extending the base so as to support the tube on both sides of the cut. Variations of this type of fixture will eliminate distortion when sawing irregular extruded sections.

CIRCLE CUTTING ATTACHMENT - ASSEMBLY NO: SM260

ITEM	PT NO	DESCRIPTION	NO OFF
1	2545	Arm	1
2	BO5019	Cap Screw;	5
3	BO5915	Washer	5
4	2544	Centre Bracket	1
5	2543	Centre Pin	1

COOLANT (PK115) ASSEMBLY NO: SM2021

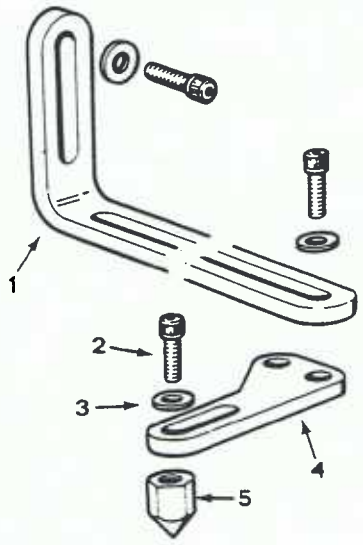
10	SM679	Coolant Tube	1
11	BO6382	Black Tube;	0.91
12		Items 12 & 13 integral to BO2456	
13			
14	BO2456	Valve;	1
15	BO5011	Cap Screw;	4
16	BO5942	Washer	4
17	BO5367	Sel-loc;	1
18	4202	Valve Stem	1
19	4200	Valve Body	1
20	1209	Neoprene Washer	1
21	4203	Screw Cap	1
22	BO2572	Bottle;	1
23	BO5958	'Vacca' Washer;	1
24	4201	Bush	1
25	4204	Instruction Plate; Coolant	1
26	4199	Mounting Bracket	1

GRAVITY FEED MIST SPRAY - SPARES KIT - ASS'Y NO: SM2021

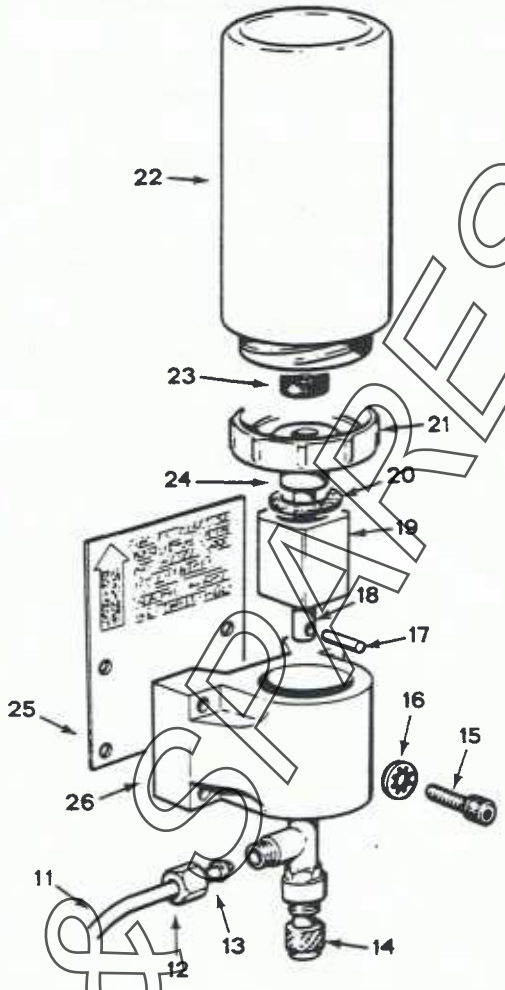
This Spares Kit consists of Items 17 - 21 & 23 - 25 above.

RIP FENCE - ASSEMBLY NO: SM302

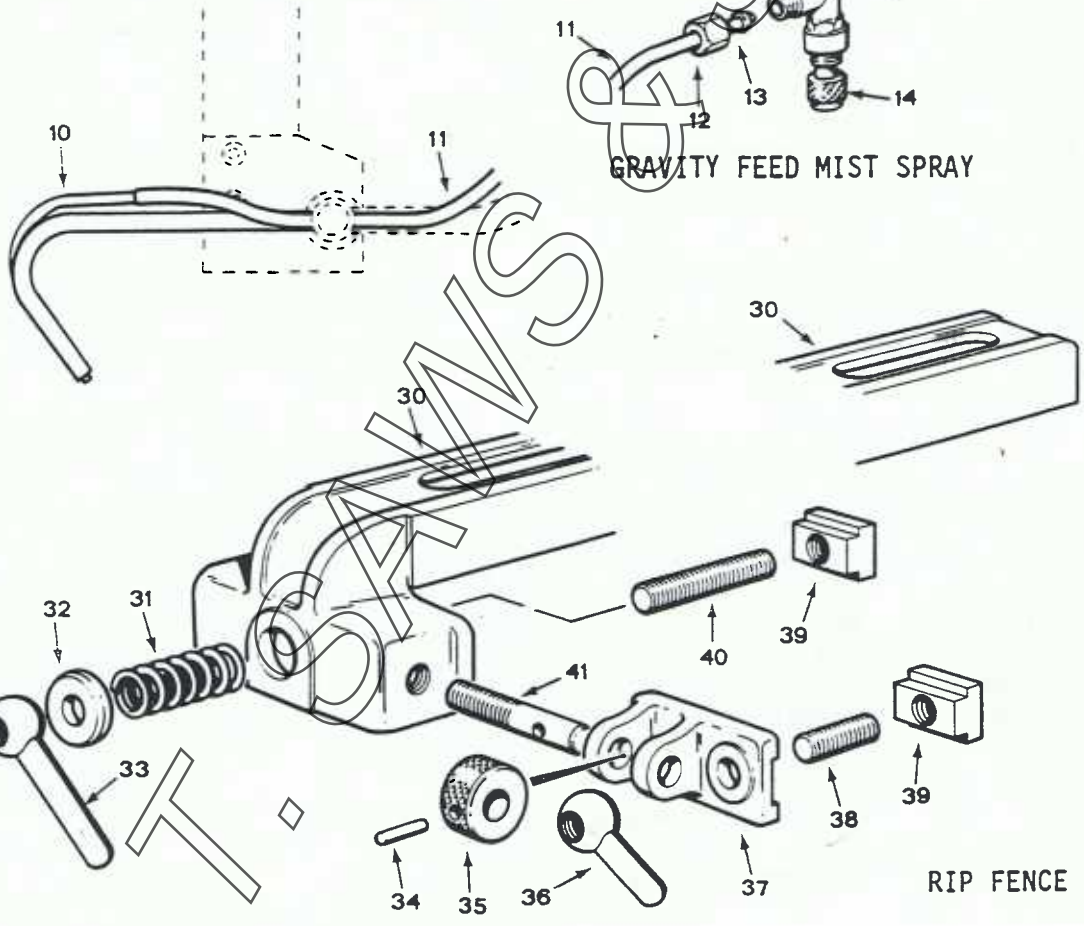
30	1205	Fence	1
31	BO2231	Spring;	1
32	1114	Special Washer	1
33	1143/METRIC	Ball Handle	1
34	BO5346	Sel-loc;	1
35	1112/METRIC	Adjustment Collar	1
36	1111/METRIC	Locking Handle	1
37	1206	Fence Adj. Bracket	1
38	3229	Stud	1
39	2842	Tenon Nut - small	2
40	2841	Stud	1
41	1113	Adjustment Screw	1



CIRCLE CUTTING
ATTACHMENT



GRAVITY FEED MIST SPRAY



RIP FENCE

MITRE GAUGE & PUSHER ATTACHMENT - ASSEMBLY NO: SM198/B

ITEM	PT NO	DESCRIPTION	NO OFF
50	1822	Gauge Rod	1
51	1507/A	Bracket	1
52	BO5195	Set Screw;	1
53	1388	Zero Plate	1
54	BO5871	Drive Screw;	2
55	1513	Scale	1
56	BO5415	Phillips Rec. Screw;	2
57	7486	Thumb Screw	3
58	1526	Stop Rod	1
59	1837	End Stop	1
60	BO5311	Slot Screw;	2
61	1821	Facing Strip	1
62	1511	Protractor Body	1
63	1820	Special Nut	1
64	BO5747	Locknut;	1
65	1514	Cradle	1
66	1499	Spring	1
67	1516	Stud	1
68	1515	Bush	1
69	1143/METRIC	Ball Handle	1
70	2842	Tenon Nut - small	1
71	3229	Stud	1
72	BO5919	Washer	1
73	2513/METRIC	Hand Knob	1
74	5130	Handknob; RH	1
75	2512	Housing	1
76	2514/A	Shaft; Long	1

MITRE GAUGE - ASSEMBLY NO: SM358

NOTE: Items 50 - 73 & 75 of SM198?b are common to SM358

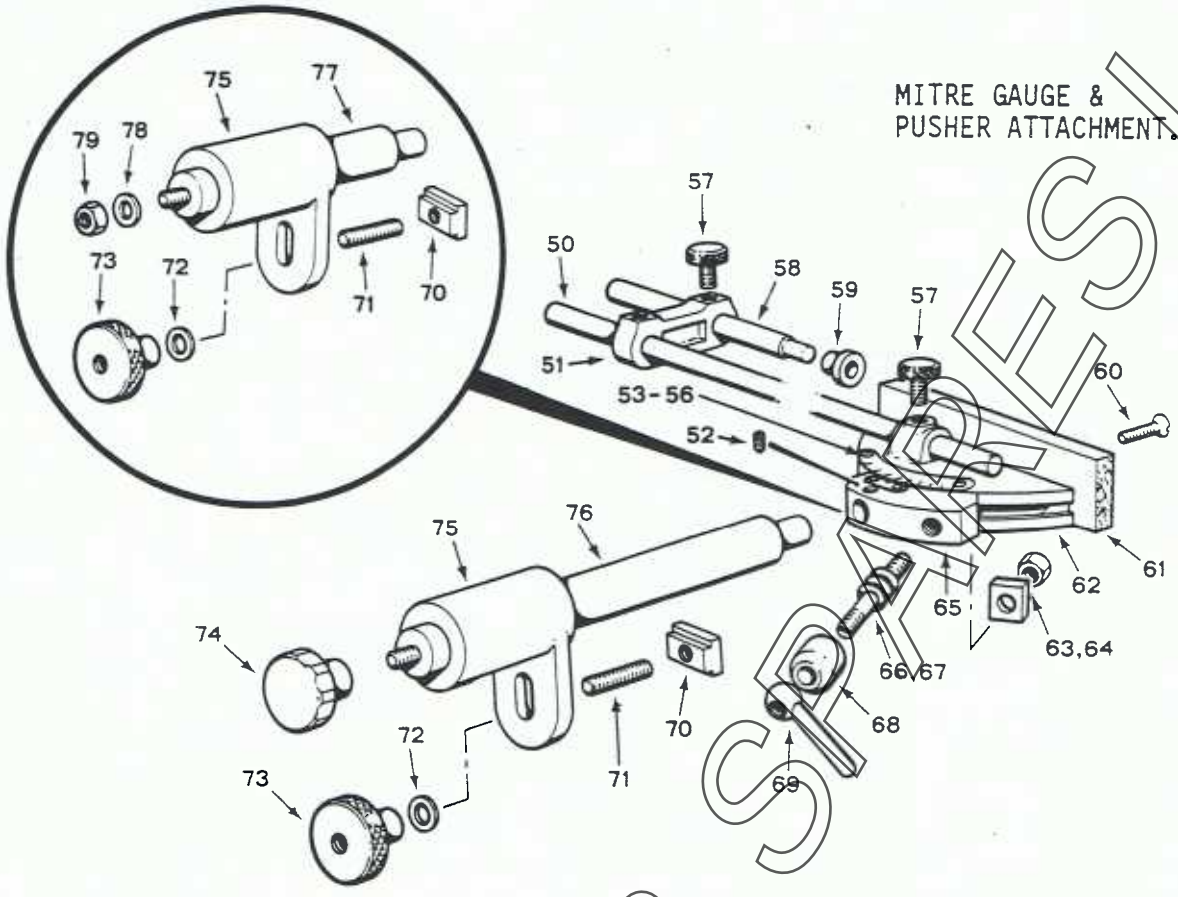
77	2975/METRIC	Spigot	1
78	2447	Washer	1
79	BO5716	Full Nut;	1

GEARED PUSHER ATTACHMENT - ASSEMBLY NO: SM46/A

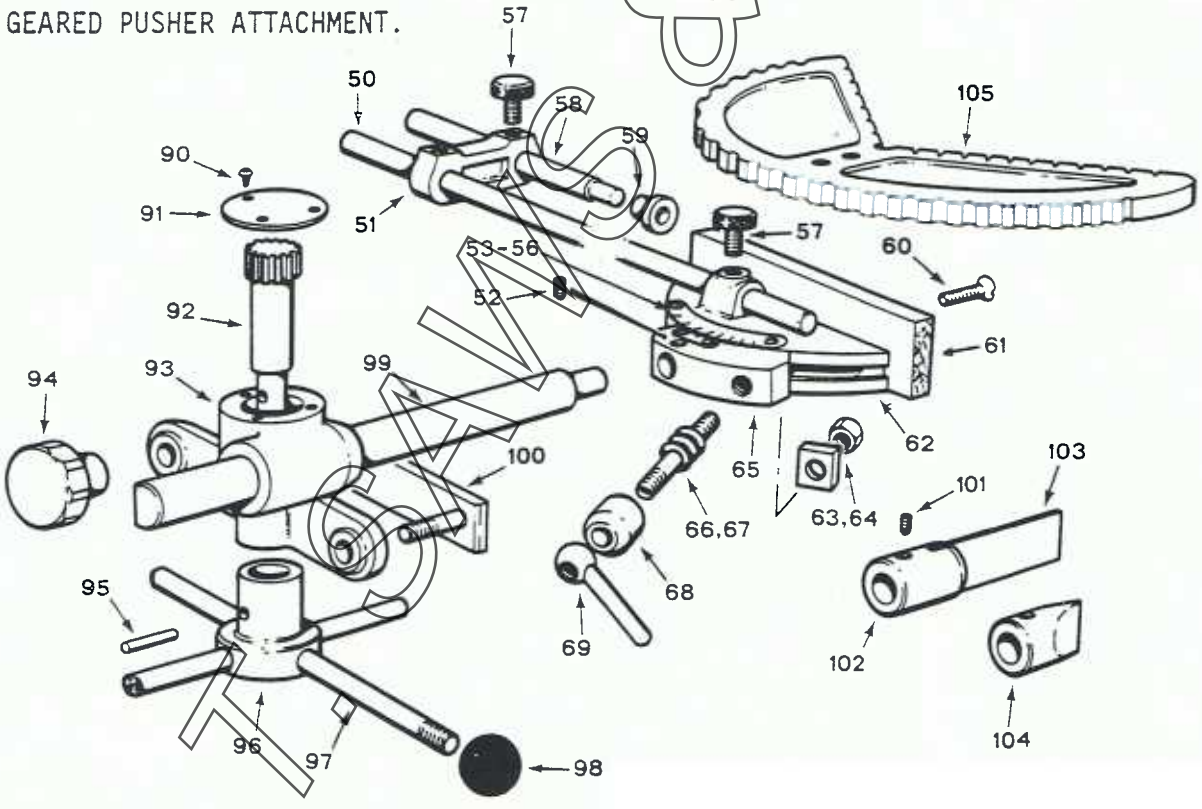
NOTE: Items 50 - 69 of SM198/B are common to SM358

90	BO5405	Phillips Rec. Screw;	3
91	1525	Cover Plate	1
92	971	Pinion Shaft	1
93	1519	Housing	1
94	BO2539	Knob;	2
95	BO5379	Sel-loc;	1
96	1522	Hub	1
97	1391	Lever	4
98	BO2540	Knob;	4
99	1524/B	Rack	1
100	SM351	Tenon Strip Assembly	1
101	BO5163	Set Screw;	3
102	2057	Pusher Head - split	1
103	2058	Pusher Head - solid	1
104	2056	Leaf Spring	1
105	2008	Work Holder	1

MITRE GAUGE &
PUSHER ATTACHMENT.



GEARED PUSHER ATTACHMENT.



POLISH GUIDE - ASSEMBLY NO: SM298

ITEM	PT NO	DESCRIPTION	NO OFF
120	2426	Backing Plate	1
121	2425	Support Arm	2
122	BO5703	Full Nut	2
123	BO5918	Washer	2

BANDFILE GUIDE - ASSEMBLY NO: SM287

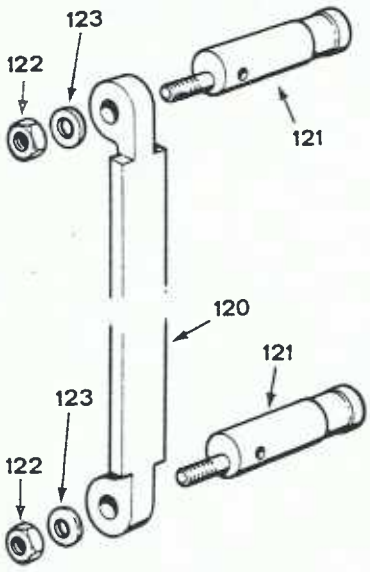
130	BO5012	Cap Screw;	4
131	BO5007	Cap Screw;	1
132	1984	Edge Guide	4
133	BO5700	Full Nut	4
134	2377	Guide Bracket	2
135	1990/A	Spacer 1/4"	2
	1990/B	Spacer 3/8"	2
	1990/C	Spacer 1/2"	2
136	1989/A	Back Guide 1/4"	1
	1989/B	Back Guide 3/8"	1
	1989/C	Back Guide 1/2"	1
137	3613	Table Insert	1

CONTOUR CUTTING - ASSEMBLY NO: SM2004

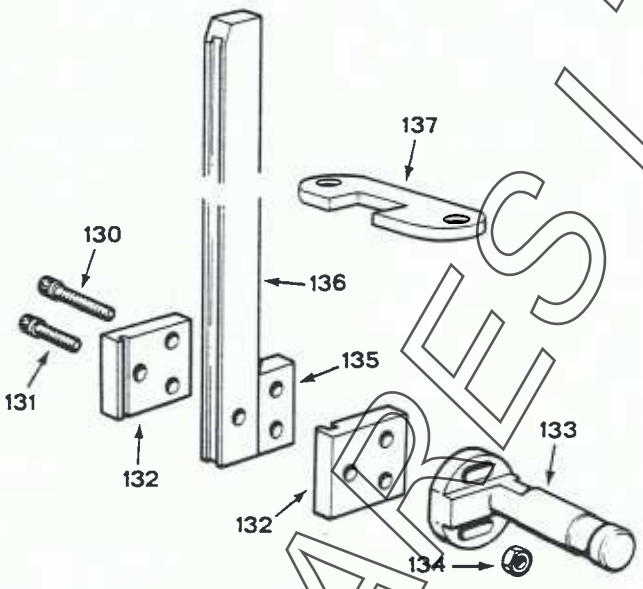
140	2008	Work Holder	1
141	BO6482	5" Paddle Handle with Ferrule	1
142	2862	Handle Bracket	1
143	BO5019	Cap Screw;	2
144	2863	Hook	1
145	BO2170	Chain;	1
146	BO5151	Set Screw;	1
147	2864	Tommy Bar	1
148	BO2308	Bush;	1
149	2865	Flanged Pulley	1
150	2866	Spindle Nut	1
151	2867	Spindle	1

UNIVERSAL WORK HOLDER - ASSEMBLY NO: SM2001

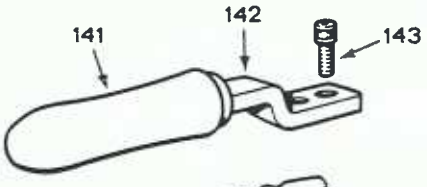
160	2837	Work Holder	2
161		SAME AS ITEM 160	
162	2839/METRIC	Clamp Bar	2
163	2843/METRIC	Thumb Screw	2
164	BO5716	Full Nut	12
165	BO5919	Washer	12
166	2840/METRIC	Stud	4
167	2841	Stud	6
168	2842	Tenon Nut - small	8

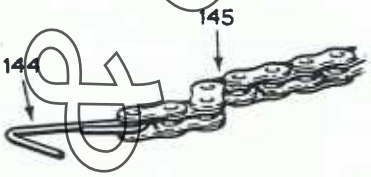


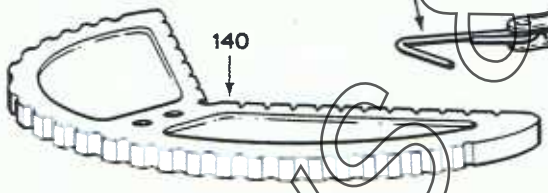
ABRASIVE BAND GUIDE

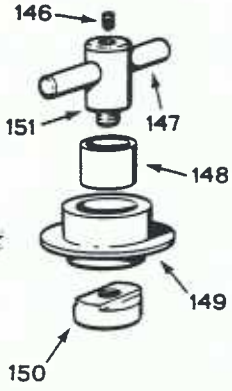


BANDFILE GUIDE

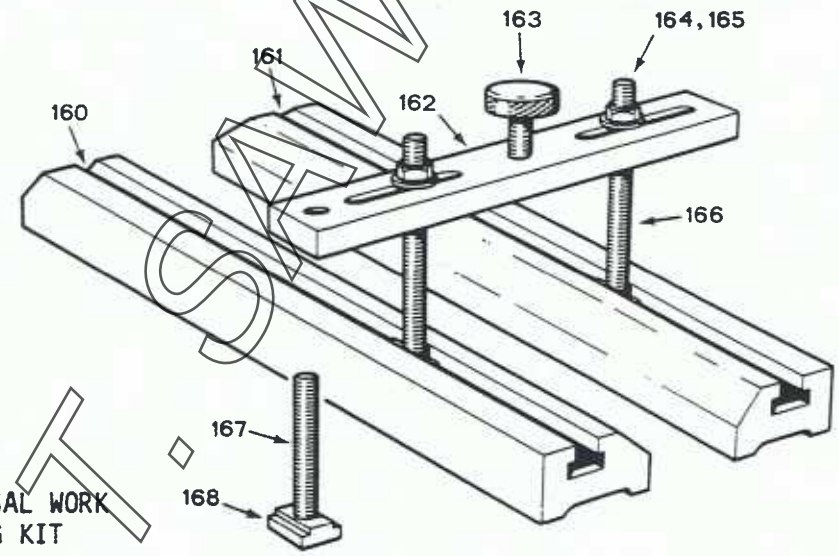








CONTOUR WORK HOLDING KIT



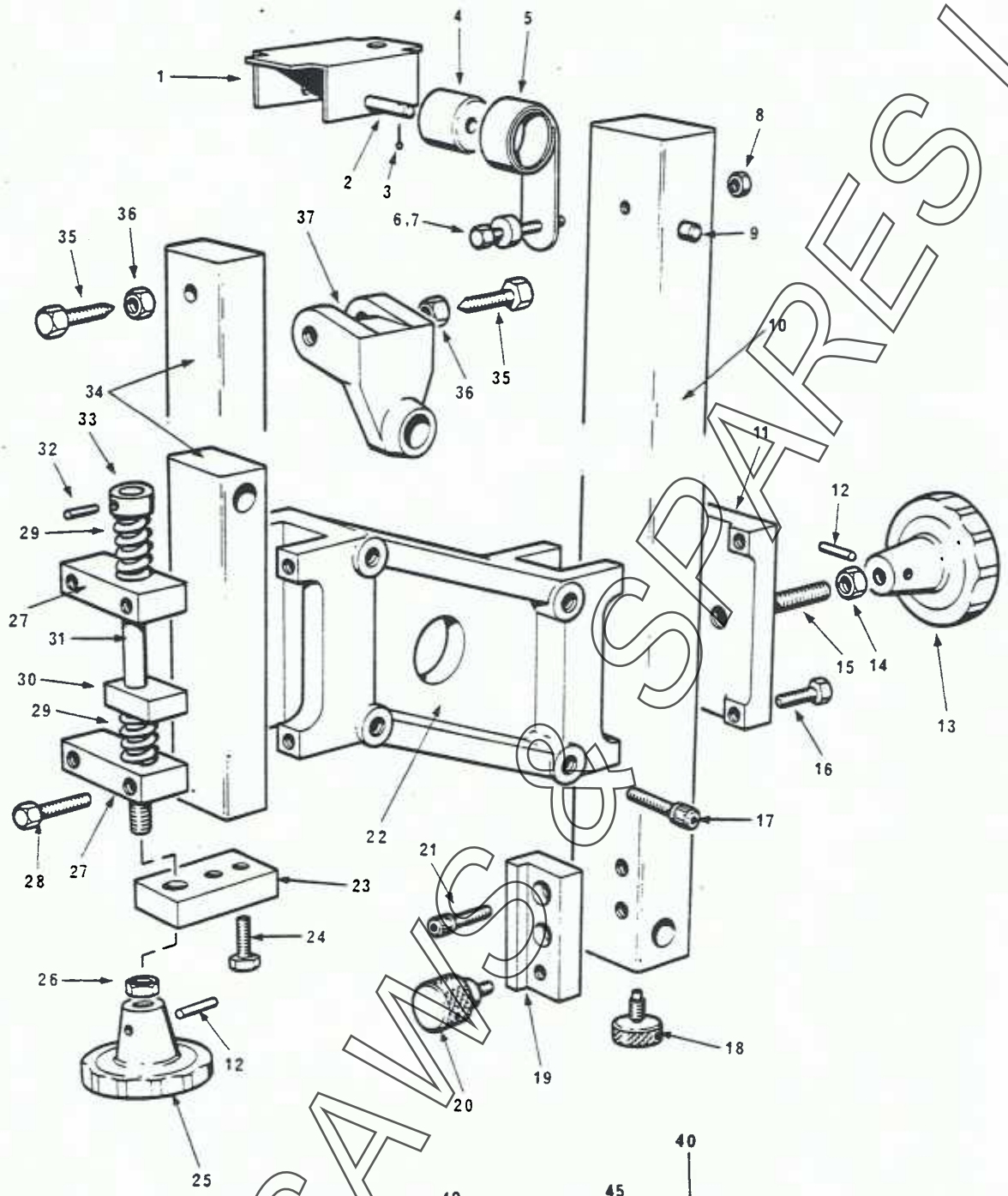
UNIVERSAL WORK HOLDING KIT

TOP BRACKET - ASSEMBLY NO'S: SM598 & SM599

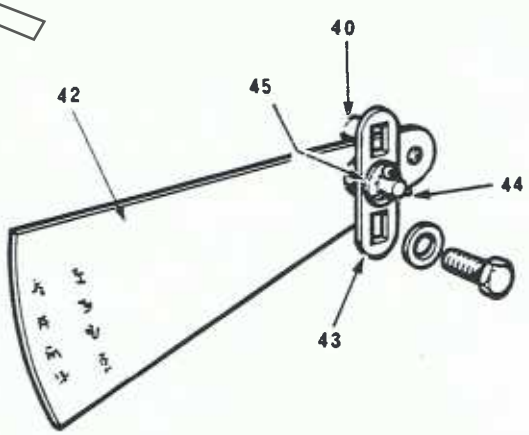
ITEM	PT NO	DESCRIPTION	NO OFF
NOTE:	SM598 Items 1 - 34 ONLY (20" Throat Machines)		
	SM599 Items 1 - 37 (30" Throat Machines)		
1	2378	Reel Bracket	1
2	2379	Reel Spindle	1
3	BO5810	Split Pin;	2
4	4105	Reel	1
5	BO2189	Spring;	1
6	Bo5001	Cap Screw;	1
7	BO5912	Washer	1
8		NOT USED	
9	BO5362	Sel-loc;	1
10	4106	Tool Post	1
11	4108	Capping Plate	1
12	BO5346	Sel-loc;	2
13	5130	Handknob; RH	1
14	BO5743	Locknut	1
15	2339	Clamping Stud	1
16	BO5501	Hex. Screw;	4
17	BO5260	Cap Screw;	4
18	2501	Thumb Screw	1
19	2453	Top Guard Bracket	1
20	2338	Thumb Screw	1
21	BO5007	Cap Screw;	2
22	4103	Top Bracket	1
23	2345	Threaded Block	1
24	BO5503	Hex. Screw;	2
25	5132	Handknob; LH	1
26	BO5744	Locknut LH	1
27	3258	Cap	2
28	BO5504	Hex. Screw;	4
29	2490	Spring;	2
30	2341	Register Block	1
31	3260	Tensioning Screw	1
32	BO5345	Sel-loc;	1
33	2520	Threaded Collar	1
34	4107	Guide Bar (SM598; 20" m/cs)	1
	3259	Guide Bar (SM599; 14" & 30" m/cs)	1
35	5682	Pivot Screw	2
36	BO5153	Locknut	2
37	5681	Tilt Bracket	1

TENSION INDICATOR - ASSEMBLY NO: SM963/B

40	2349	Register Pin	1
41	2350	Fulcrum Pin	1
42	5213	Indicator Plate - Imperial	1
43	5466	Fulcrum Plate	1
44	BO5810	Split Pin;	1
45	BO5914	Washer	1
NOT ILLUSTRATED			
	5467	Fulcrum Bush	1



TOP BRACKET



TENSION INDICATOR

TOP HUB - ASSEMBLY NO: SM213

NOTE: From Serial No. 56399 onwards bandwheels part number 5115 are identified by a `grooved ring' on the hub.

ITEM	PT NO	DESCRIPTION	NO OFF
60	5134	Spindle	1
61	5115	Top Wheel Hub	1
62	BO6034	Internal Circlip;	2
63	BO2016	Bearing;	2
64	5116	Spacer	1
65	4941/A	Washer	1
66	BO5561	Hex. Screw;	4
67	BO5917	Washer	3

TRACKING BANDWHEEL HUB - ASSEMBLY NO: SM284

NOTE: From Serial No. 56399 onwards bandwheels part number 5115 are identified by a `grooved ring' on the hub.

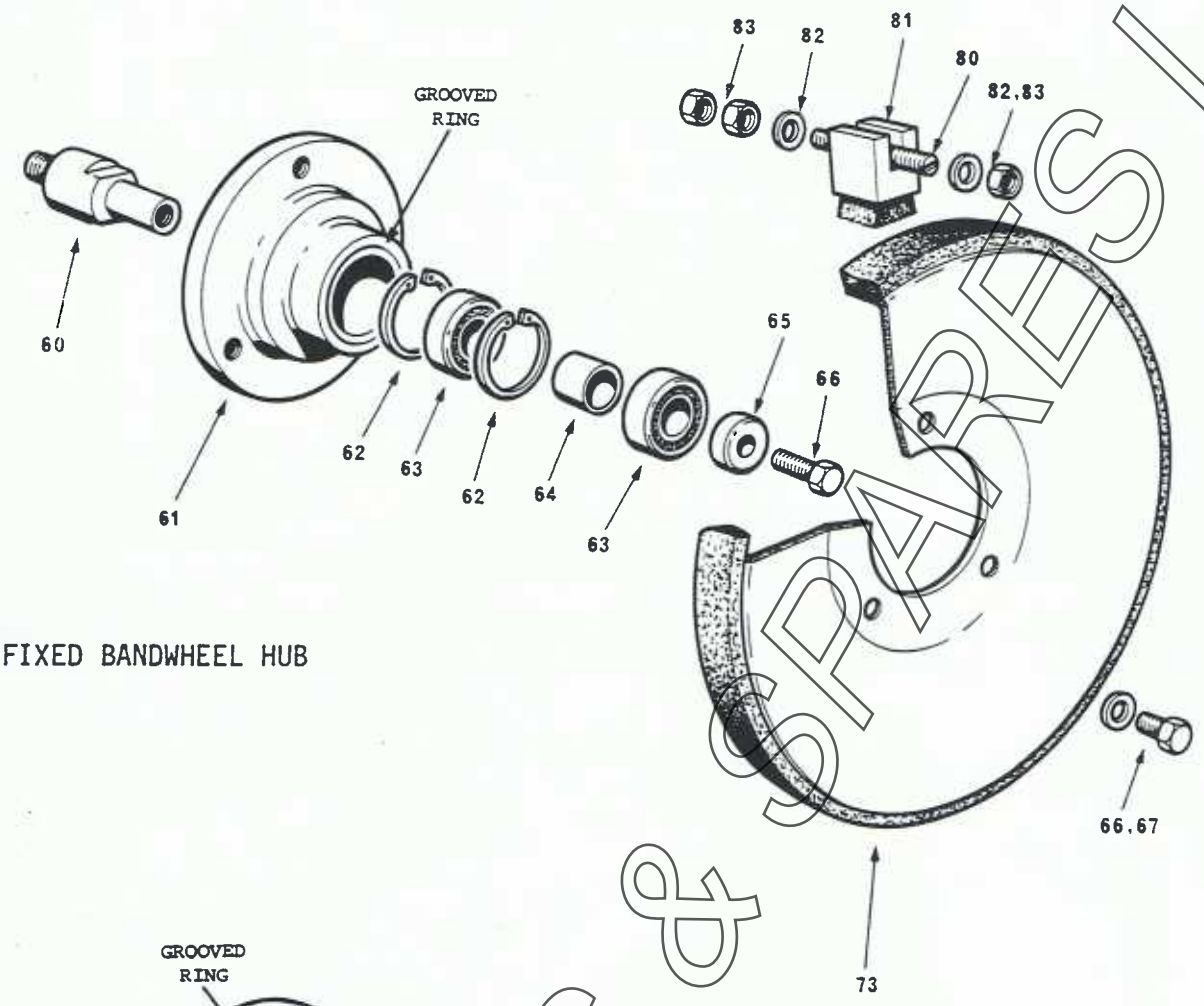
61	5115	Top Wheel Hub	1
62	BO6034	Internal Circlip;	2
63	BO2016	Bearing;	2
64	5116	Spacer	1
65		NOT USED	
66	BO5561	Hex. Screw;	3
67	BO5917	Washer	3
68	5117	Jacking Screw	1
69	5114	Spindle	1
70	BO5186	Set Screw;	2
71	5118	Control Knob	1
72*	2466	Instruction Label	1
73*	2473	Bandwheel 14" diameter	1

WHEEL BRUSH - ASSEMBLY NO: SM1001

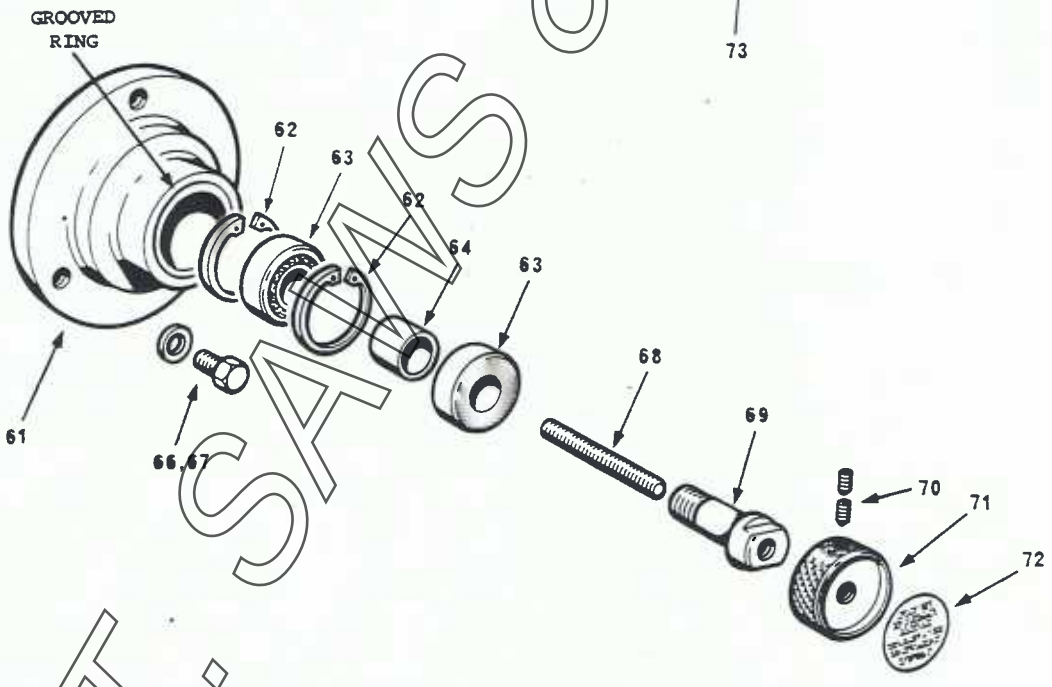
80	5485	Stud	1
81	2270	Wire Brush	1
82	BO5928	Mudguard Washer	2
83	BO5714	Full Nut	2

* denotes these valid parts do not belong to this machine

WHEEL BRUSH



FIXED BANDWHEEL HUB



TRACKING BANDWHEEL HUB

TRACKING BLOCK - ASSEMBLY NO: SM1395

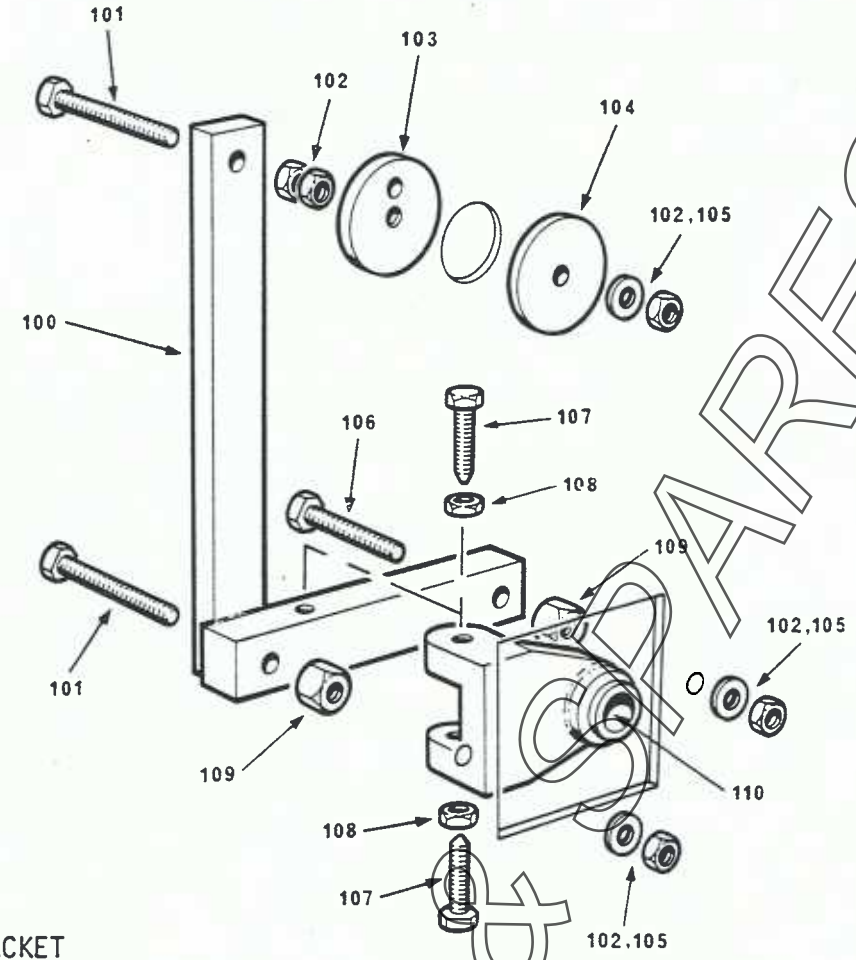
NOTE ! 30" Throat Machines ONLY

ITEM	PT NO	DESCRIPTION		NO OFF
100	SM1140	Tracking Block		1
101	BO5594	Hex. Screw;	(bottom screw)	1
	BO5570	Hex. Screw;	(top screw)	1
102	BO5715	Full Nut		3
103	5797	Nut Plate		1
104	5796	Washer		1
105		NOT USED		
106	BO5567	Hex. Screw;		1
107	5682	Pivot Screw		2
108	BO5731	`P' self locking Nut		2
109	5798	Special Nut		2
110	5681	Tilt Bracket		1

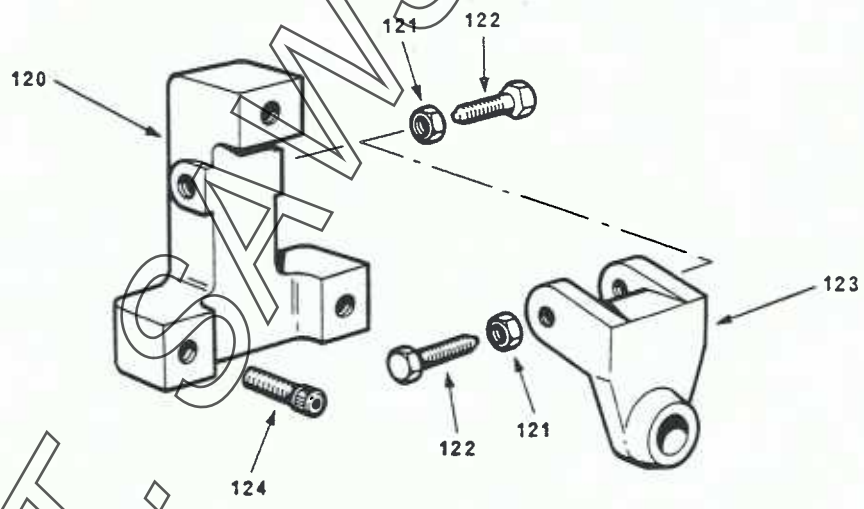
PIVOT BRACKET - ASSEMBLY NO: SM333

NOTE ! 20" Throat Machines ONLY

120	3708	Bridge Piece	1
121	BO5753	Locknut	2
122	5682	Pivot Screw	2
123	5681	Tilt Bracket	1
124	BO5028	Cap Screw;	3



TRACKING BRACKET



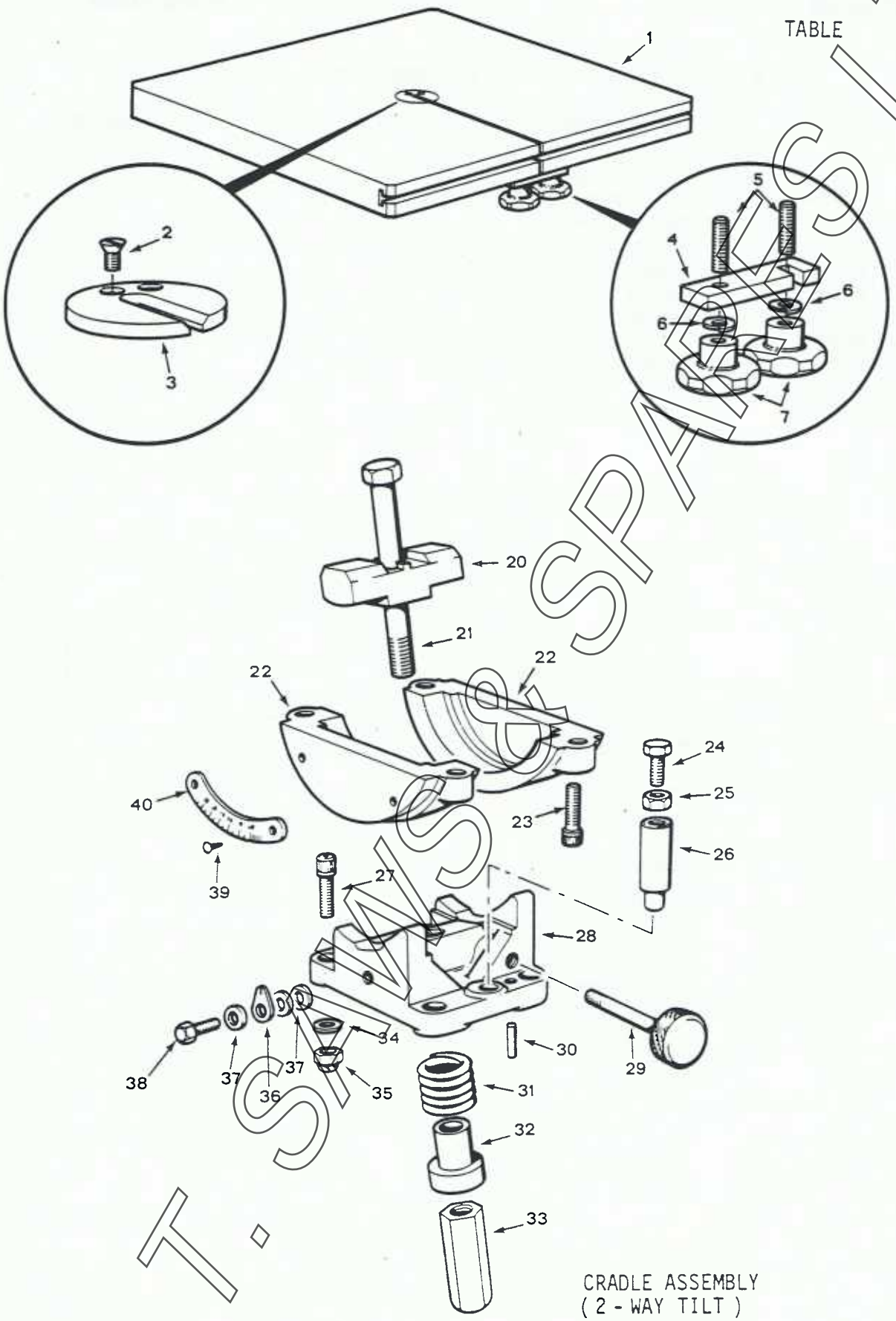
PIVOT BRACKET

20" & 30" FIXED TABLE - ASSEMBLY NO: SM2058

ITEM	PT NO	DESCRIPTION	NO OFF
1	8595	Fixed Table	1
2	BO5267	C/Sk Screw;	1
3	2922	Table Insert	1
4	2828	Swing Latch	1
5	BO5839	Stud;	2
6	BO5919	Washer	2
7	BO2547	Handwheel;	2
	BO5563	Hex. screw;	4
	8579	Trunnion Clamp	2
	BO5890	Dowel;	2
	BO5917	Washer	4

TRUNNION & CRADLE - ASSEMBLY NO: SM2057

20	8556	Clamp Pad	1
21	BO5611	Hex. Bolt;	1
22	2835	Trunnion	1
23		NOT USED	
24	BO5517	Hex. Screw;	1
25	BO5742	Locknut;	1
26	2373/A	Stop Pillar	1
27		NOT USED	
28	2367/B	Tilt Cradle	1
29	2500	Thumb Screw	1
30		NOT USED	
31	BO2215	Spring;	1
32	2370/B	Sleeve	1
33	8557	Clamp Nut;	1
34		NOT USED	
35		NOT USED	
36	2372	Pointer	1
37	BO5914	Washer	3
38	BO5507	Hex. Screw;	1
39	BO5871	Drive Screw;	2
40	2371	Tilt Scale	1

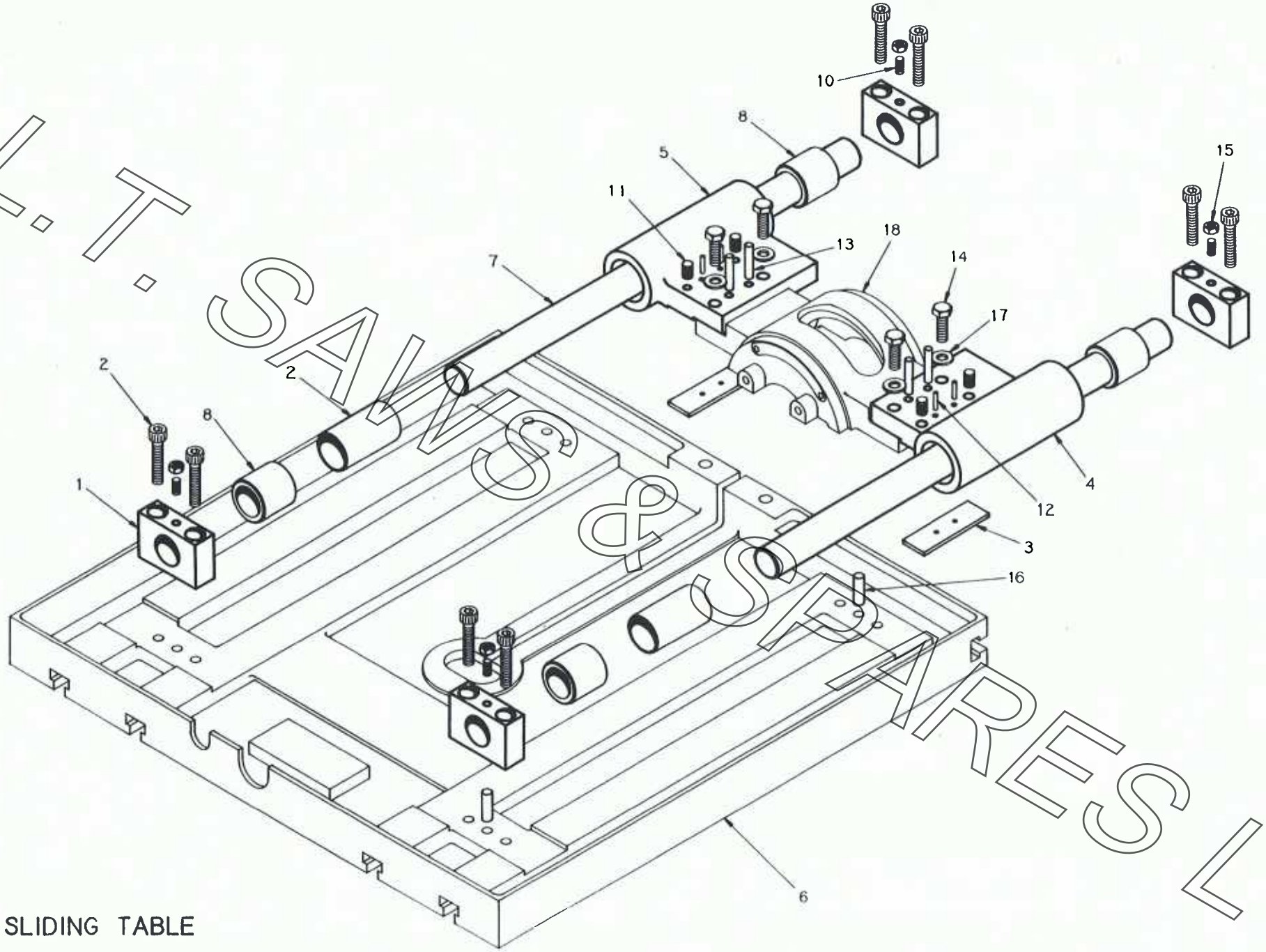


CRADLE ASSEMBLY
(2 - WAY TILT)

SLIDING TABLE - ASSEMBLY NO: SM2059

ITEM	PT NO	DESCRIPTION	NO OFF
1	8576	Shaft Support	4
2	8578	Bearing Spacer	2
3	8581	Sliding Plate	2
4	8592	Bearing Housing m/c LH	1
5	8593	Bearing Housing m/c RH	1
6	8594	Sliding Table m/c	1
7	8599	Shaft	1
8	BO2338	Bush;	4
9	BO5078	Cap Screw;	8
10	BO5195	Set Screw;	4
11	BO5203	Set Screw;	4
12	BO5345	Sel-loc;	4
13	BO5357	Sel-loc;	4
14	BO5519	Hex. Screw;	4
15	BO5752	Locknut	4
16	BO5362	Sel-loc;	2
17	BO5917	Washer	4
18	SM2057	Trunnion & Cradle Assembly	1
NOT ILLUSTRATED			
	BO5753	Locknut	4

NOTE: For details of SM2057, Trunnion and Cradle Assembly, see Section 36

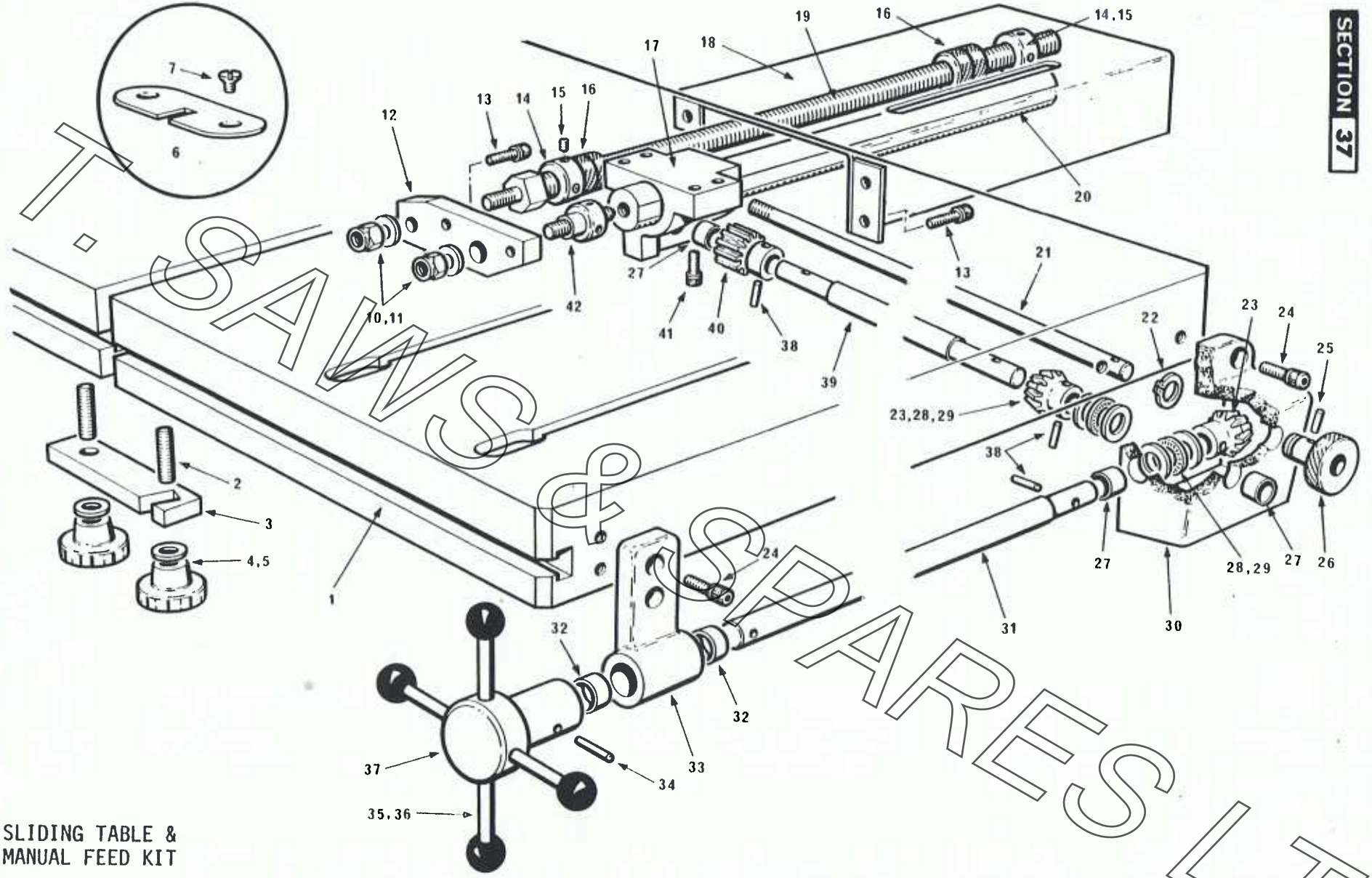


SLIDING TABLE

MANUAL FEED KIT - ASSEMBLY NO: SM2003

ITEM	PT NO	DESCRIPTION	NO OFF
1	8594	Sliding Table m/c	1
2	BO5839	Stud;	2
3	2828	Swing Latch	1
4	BO5919	Washer	2
5	BO2547	Handwheel;	2
6	2922	Table Insert	1
7	BO5306	Slot Screw;	1
10	BO5775	Binx Nut	2
11	BO5919	Washer	2
12	4419	Anchor Plate	1
13	BO5018	Cap Screw;	5
14	8564	Stop Collar	2
15	BO5185	Set Screw;	4
16	8566	Locking Ring	1
17	2830	Rack Housing	1
18	SM649	Rack and/or Cylinder Cover	1
19	SM426	Feed Stop Screw	1
20	2817	Rack	1
21	2818	Locking Screw	1
22	BO6006	Ext. Circlip;	1
23	2715	Mitre Gear	2
24	BO5026	Cap Screw;	4
25	BO5369	Sel-loc;	1
26	2819	Locking Screw Knob	1
27	BO2304	Bush;	3
28	BO2065	Thrust Washer;	4
29	BO2065	Thrust Race;	2
30	2829	Bevel Gear Housing	1
31	2822	Outer Feed Shaft	1
32	BO2305	Bush;	2
33	2827	Feed Shaft Bracket	1
34	BO5333	Mills Pin;	1
35	2831	Feed Handle	4
36	BO2539	Knob;	4
37	2826	Hub	1
38	BO5373	Sel-loc;	3
39	2823	Inner Feed Shaft	1
40	2836	Pinion	1
41	BO5019	Cap Screw;	4
42	2956	Rack Coupling	1

NOTE: Items 1 - 18 onthis page are not the same as Items 1 - 18 on page 1 of this same Section



SLIDING TABLE &
MANUAL FEED KIT

INSTRUCTIONS FOR DISMANTLING THE SLIDING TABLE & CRADLE

The table is mounted on four pre-loaded rollers which are engaged under pressure between the table tracks.
BE SURE THAT THE METHOD OF PRE-LOADING THESE UNITS IS FULLY UNDERSTOOD BEFORE ATTEMPTING TO DISMANTLE OR ADJUST THIS UNIT.

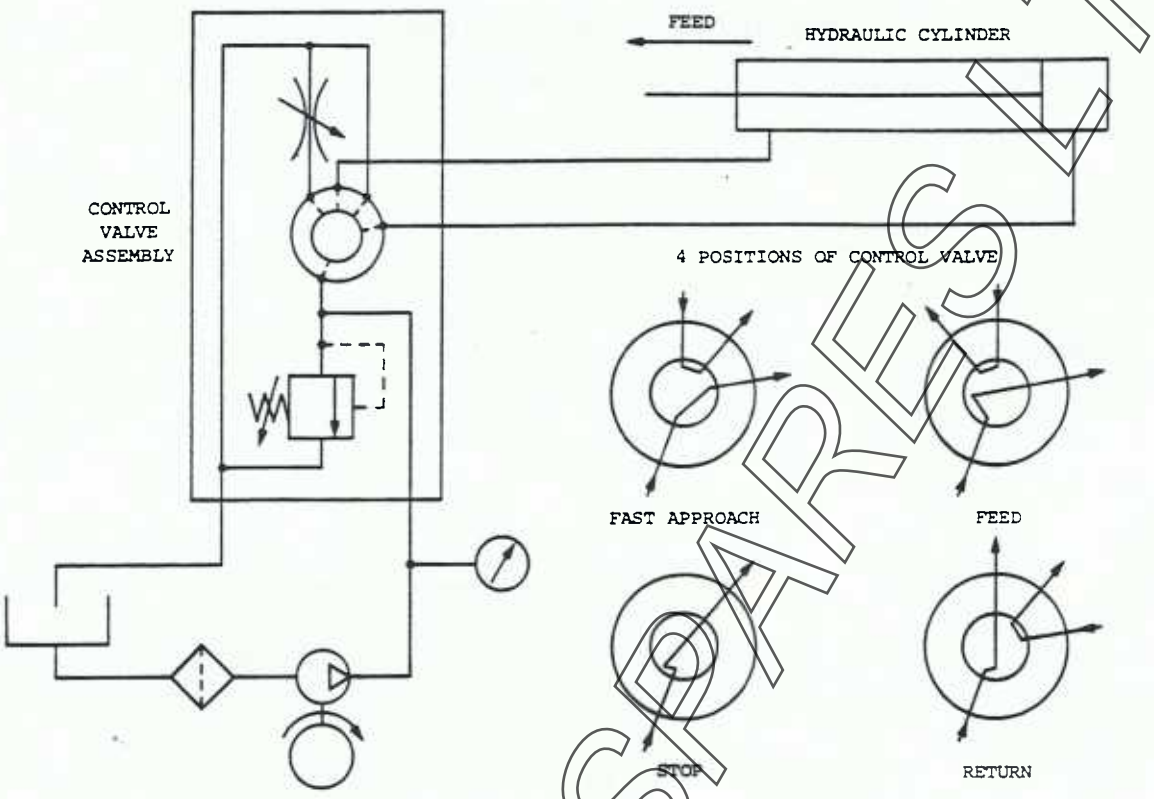
1 Through the access door at the rear of the machine, remove special nut, sleeve and compression spring (Items 89, 90 & 91). Support the table whilst this operation is carried out.
2 Lift the table vertically away from the cradle mounting and place top face down on a bench.
3 Remove two screws securing anchor plate (Items 12 & 13 of SM2003) to allow the rack assembly to be disengaged.
4 Mark both roller brackets (Item 65) to establish their original positions.
5 Screw inwards two jacking screws (Item 70) to one roller bracket only (do not alter the jacking screws to the second roller bracket, or the pre-set alignment of the table will be lost and remove two retaining screws (Item 99). The roller bracket can now be removed and the cradle assembly lifted away from the table.
6 Without disturbing the setting of the jacking screws, remove the second roller bracket.
7 Remove two shrouds with wiper assemblies (Items 78, 80, 81, 82 & 83).
8 Slacken screws (Item 77) and press out roller spindle (Item 60) complete with roller and bearings.

INSTRUCTIONS FOR RE-ASSEMBLING THE SLIDING TABLE & CRADLE

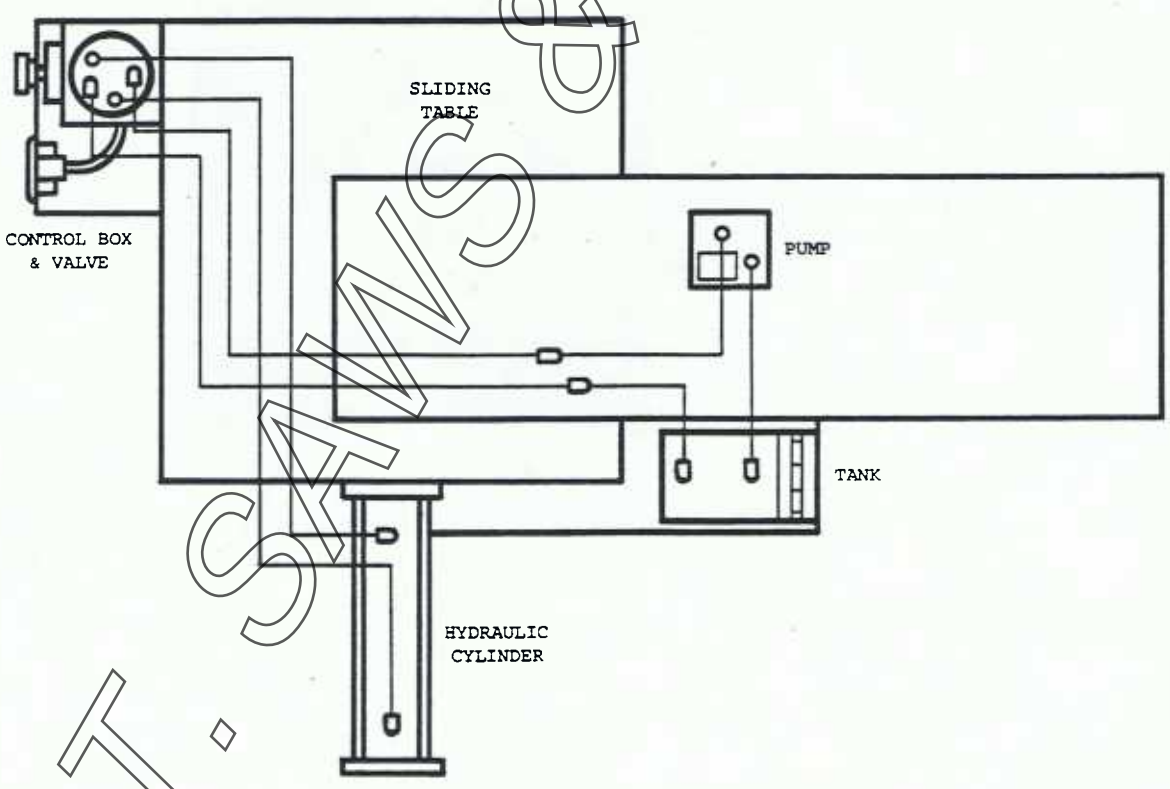
1 Assemble needle bearings, thrust washers and roller (Items 61, 62, 63 & 64) on roller spindle (Item 60) with light coating of medium grease.
NOTE : If the needle bearings (Item 63) have been replaced, check that they do not protrude beyond either face of the collar.
2 Insert the roller spindle complete with roller etc. into the roller bracket and press home with a force of 70 lb.(32kg.).This pressure must be maintained whilst the clamping screw (Item 77) is securely locked. Assemble all four rollers in this fashion.
3 Assemble the appropriate roller bracket to the side of the trunnion which has the jacking screws in the original position and secure the bracket in place. Make sure that the side of the roller bracket is in contact with the head of jacking screws.
4 Assemble the trunnion to the table so that the rollers engage in one side of the table track.
5 Place the second roller bracket in position and tighten the fixing screws with a light finger pressure only. Apply a force of 90 lb. (41 kg.) between the roller bracket and the trunnion to pre-load the rollers into the table tracks. Securely tighten the fixing screws whilst this force is maintained. Adjust the other two jacking screws so that their heads make firm contact with the side of the second roller bracket.
6 Assemble the roller shrouds making sure that the wipers make good contact with the table tracks and adjacent machined faces. New wipers should be charged with oil before fitting.
7 Complete assembly in reverse order, ensuring that there is good alignment of working parts in order to avoid undue stiffness to the table movement. New wipers will impart some additional stiffness which will ease as soon as the wipers have embedded down. On no account must the pre-loading be eased off in order to remove this preliminary stiffness.

TABLE ALIGNMENT

The alignment of the table relative to the blade may be adjusted by careful setting of the position of the roller brackets. The table should be removed from the machine for this purpose and the instructions for pre-loading the rollers applied.



HYDRAULIC CIRCUIT DIAGRAM FOR RWH MACHINES.

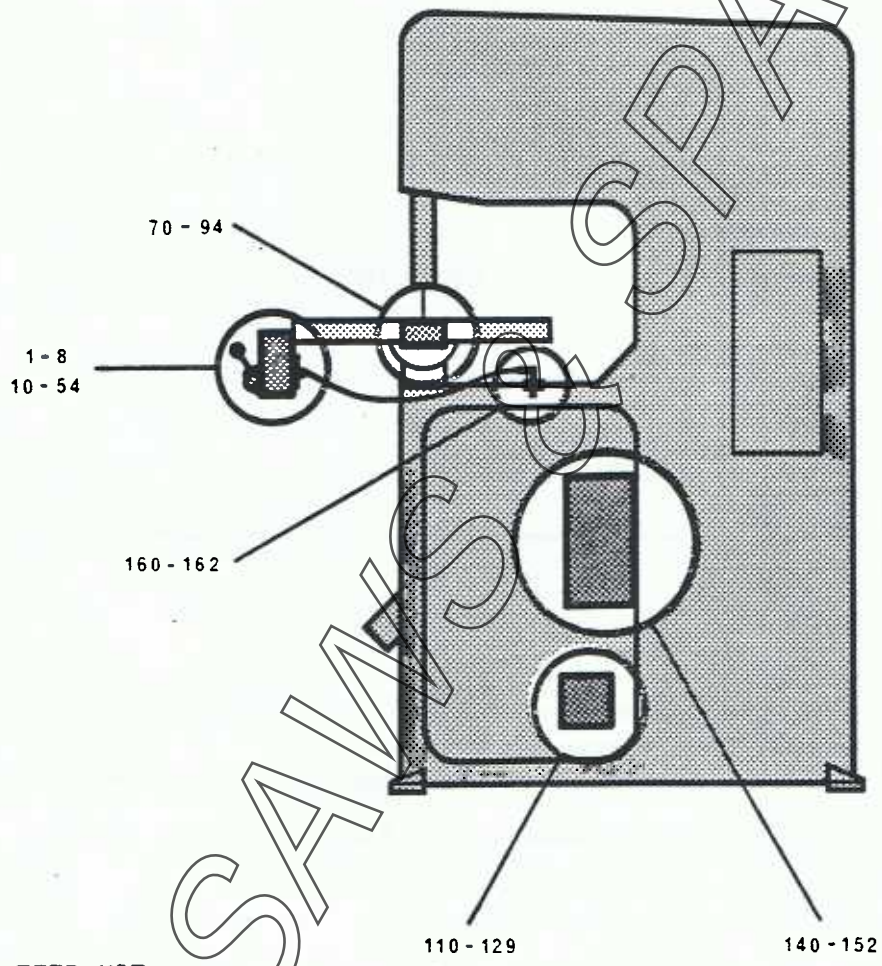


HYDRAULIC PIPE LAYOUT FOR RWH MACHINES.

SECTION 38

HYDRAULIC FEED - ASSEMBLY NO: SM2009/A

ITEM	PT NO	DESCRIPTION	NO OFF
1- 54	SM1673/A	Table Control Assembly	1
70- 94	SM724	Hydraulic Cylinder (RWH)	1
110-129	SM532	Hydraulic / Coolant Pump	1
140-152	SM1847	Hydraulic Tank	1
160	BO2493	Flexitube;	2
161	BO2403	Fitting;	2
162	BO2418	Female Elbow;	2
NOT ILLUSTRATED			
	BO2408	Equal Tee;	1



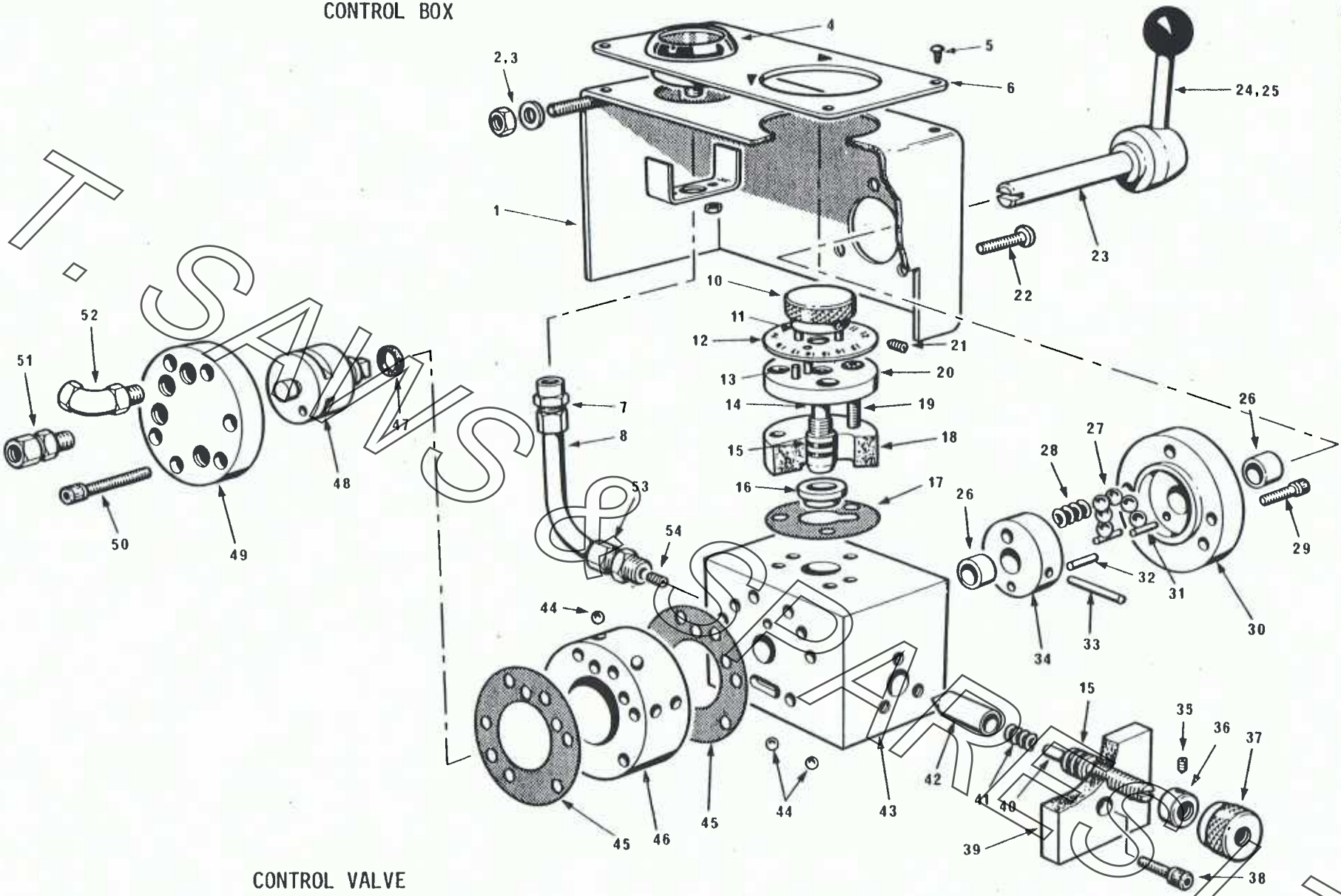
HYDRAULIC FEED KIT

TABLE CONTROL - ASSEMBLY NO: SM1673/A

ITEM	PT NO	DESCRIPTION	NO OFF
1	SM1689	Control Box Assembly	1
2	BO5715	Full Nut	4
3	BO5944	Washer	4
4	BO2423	Male Elbow;	3
5	5564	Female Adaptor;	3
6	BO2446	Branch Tee;	1
7		NOT USED	
8	BO2412	Male Stud;	1
9	BO2469	Poppet Valve;	1
10	BO5457	Domed Screw;	2
11	BO5195	Set Screw;	2
12	7905	Valve Knob	1
13	BO2422	Male Elbow;	3
14	BO2470	Speed Control Valve;	1
15	BO2468	Rotary Valve;	1
16	BO2426	Male Stud Tee;	1
17	BO2403	Fitting;	3
18	BO6384	Black Tube;	1.0
19		NOT USED	
33		NOT USED	
31	BO2454	Pressure Guage	1
32	BO2448	Female Stud;	1
33*	7921	Snubber Disc	1
34			
35			
36			
37			
38			

Note ! Items 20 - 29 inc. and 34 - 38 inc. are not used.

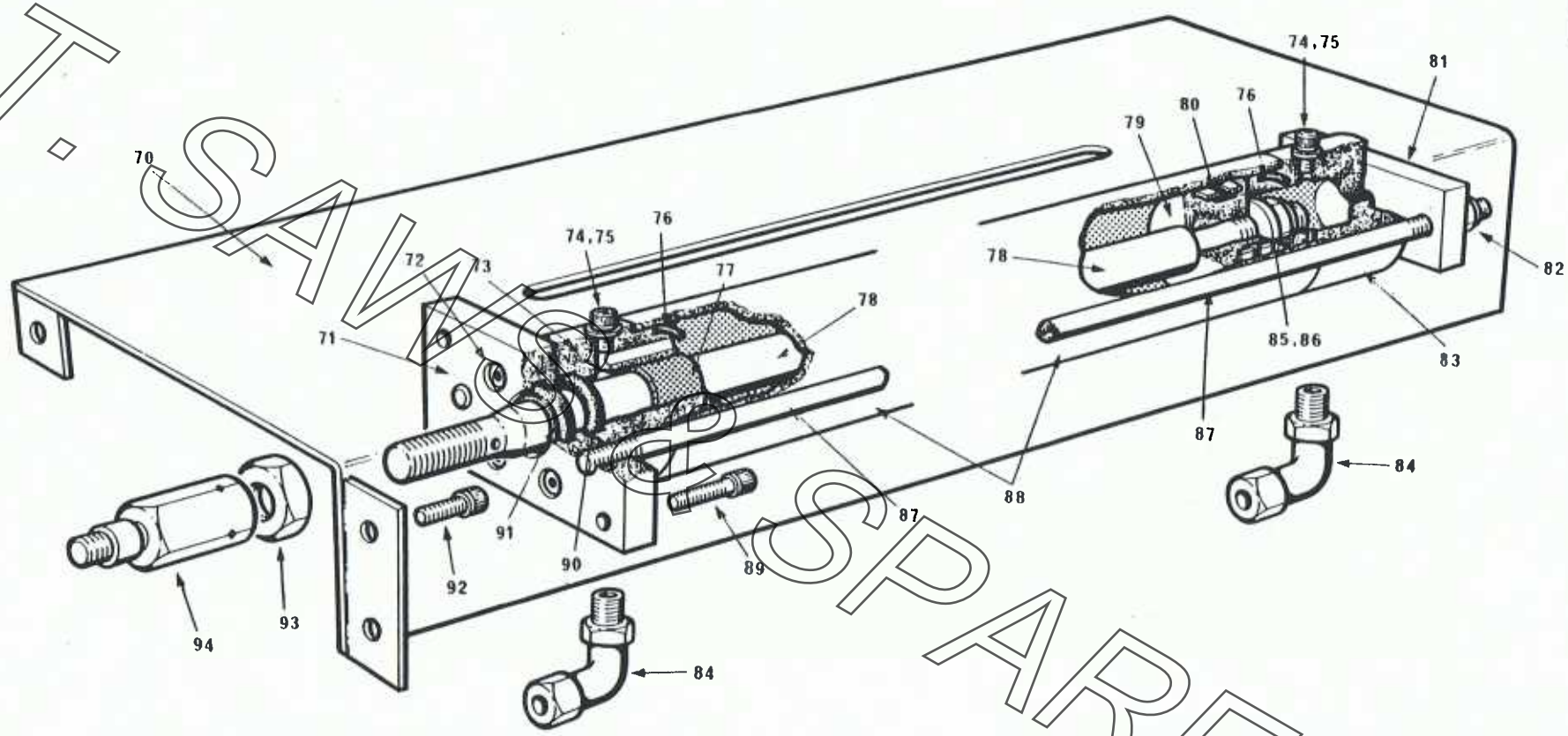
CONTROL BOX



CONTROL VALVE

HYDRAULIC CYLINDER - ASSEMBLY NO: SM724

ITEM	PT NO	DESCRIPTION	NO OFF
70	SM649	Rack and/or Cylinder Cover	1
71	5745	Mounting Plate	1
72	BO5265	C/sk Screw;	4
73	5747	Front End Cap	1
74	BO5058	Cap Screw;	2
75	BO5951	F/Washer;	2
76	BO2263	O-Ring;	2
77	BO2305	Bush;	1
78	5737/B	Piston Rod	1
79	5738	Piston Head	1
80	BO2110	Seal;	1
81	4401	Tie Bar	1
82	BO5774	Binx Nut	2
83	5746	Rear End Cap	1
84	BO2421	Stud Elbow	2
85	BO5775	Binx Nut	1
86	BO5954	F/Washer;	1
87	8678	Tie Rod	2
88	4397/B	Cylinder Barrel	1
89		NOT USED	
90	BO2111	Fluid Seal;	1
91	BO2114	Wiper Ring;	1
92		NOT USED	
93	BO5748	Locknut	1
94	5739/A	Adaptor	1



HYDRAULIC CYLINDER

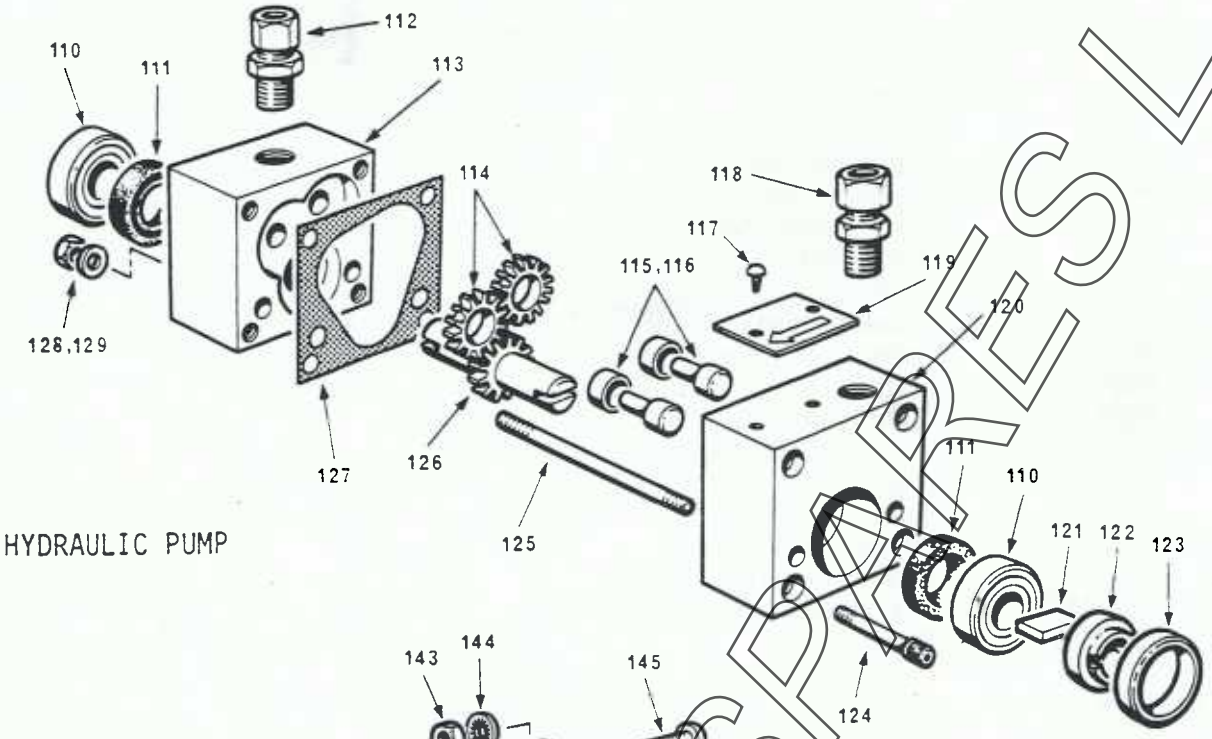
HYDRAULIC / COOLANT PUMP - ASSEMBLY NO: SM532

ITEM	PT NO	DESCRIPTION	NO OFF
110	BO2013	Bearing;	2
111	BO2119	O-Seal;	2
112	BO2412	Male Stud	1
113	3645	Pump Body	1
114	3648	Gear	2
115	994	Planet Pinion Pin	2
116	BO2302	Bush;	2
117	BO5870	Drive Screw;	2
118	BO2410	Male Stud	1
119	3649	Instruction Plate	1
120	3646	Cap	1
121*	3608	Key	1
122*	3588	Coupling	1
123*	3589	Register Ring	1
124	BO5013	Cap Screw	4
125*	3609	Stud	2
126	3647	Drive Shaft	1
127	3584	Gasket	1
128*	BO5700	Full Nut	6
129*	BO5914	Washer	2

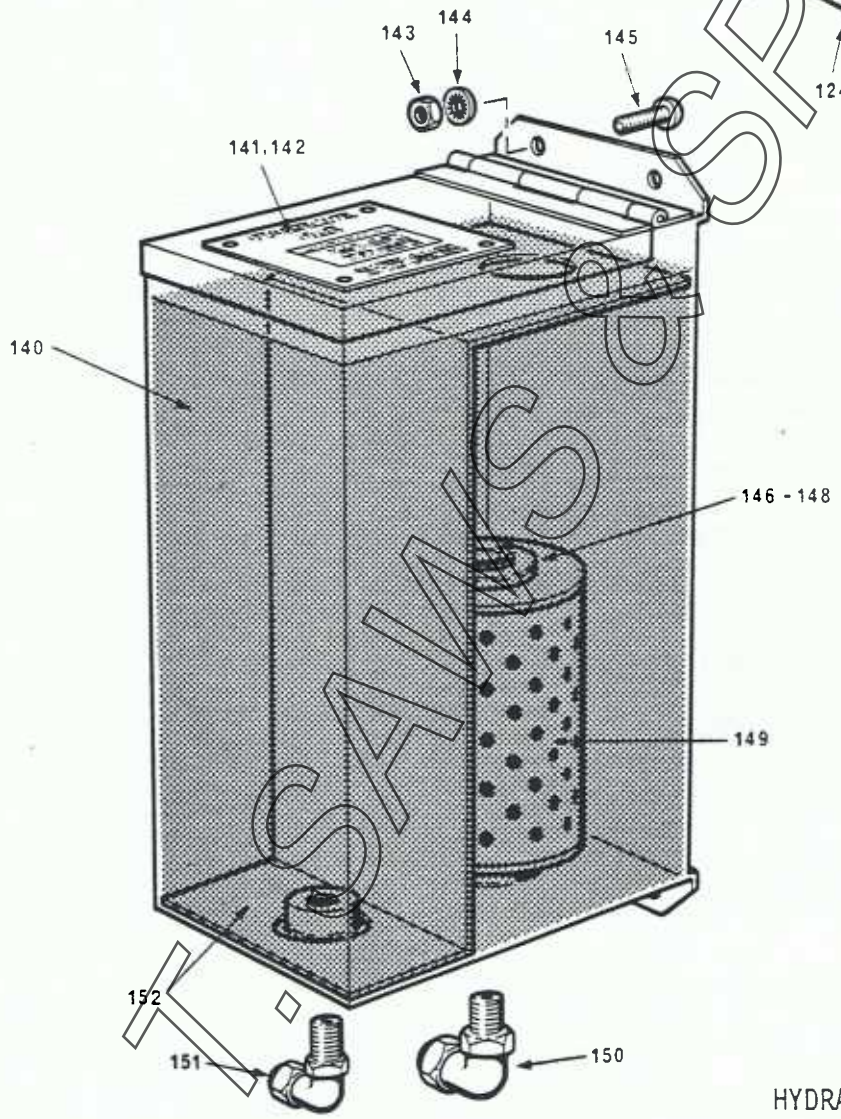
HYDRAULIC TANK - ASSEMBLY NO: SM1847

140	SM606	Hydraulic Oil Tank	1
141	4084	Instruction Plate	1
142	BO5794	Pop Rivet	4
143*	BO5713	Full Nut	4
144*	BO5942	Washer	4
145*	BO5415	Rd. Head Rec. Screw	4
146	3187	Filter Ret. Washer	1
147	BO5601	Hex. Bolt;	1
148	BO5919	Washer	1
149	BO2569	Filter	1
150	BO2424	Male Elbow	1
151	BO2426	Male Stud Tee	1
152	4083	Oil Tank Baffle	1

* denotes these valid parts do not belong to this assembly



HYDRAULIC PUMP



HYDRAULIC TANK

AIR COMPRESSOR - ASSEMBLY NO: SM486/A

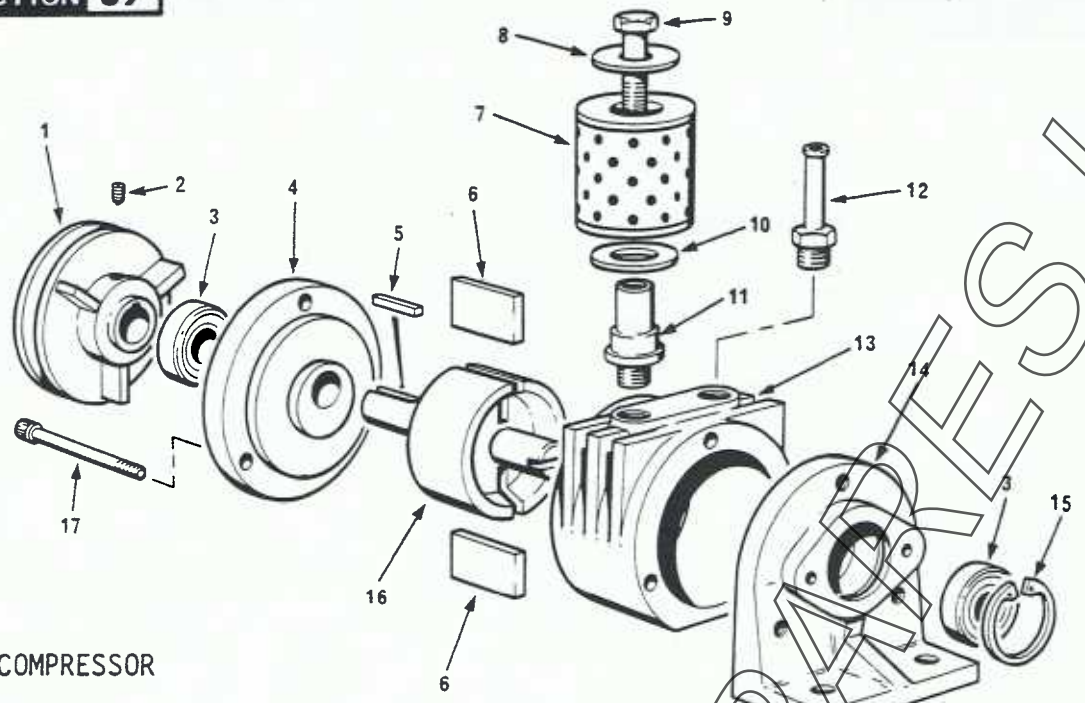
ITEM	PT NO	DESCRIPTION	NO OFF
1	5354	Compressor Pulley	1
2	BO5186	Set Screw;	1
3	BO2013	Bearing;	2
4	3575	End Cap	1
5	1148	Key;	1
6	3579	Vane	2
7	BO2568	Filter;	1
8	3611	Washer	1
9	BO5564	Hex. Screw;	1
10	3612	Washer	1
11	3599	Filter Mounting	1
12	BO2430	Nozz;e;	1
13	3576	Cylinder	1
14	3577	Cylinder Mounting	1
15	BO6034	Int. Circlip;	1
16	3578	Rotor	1
17	BO5016	Cap Screw;	3

AIR PUMP - ASSEMBLY NO: SM98

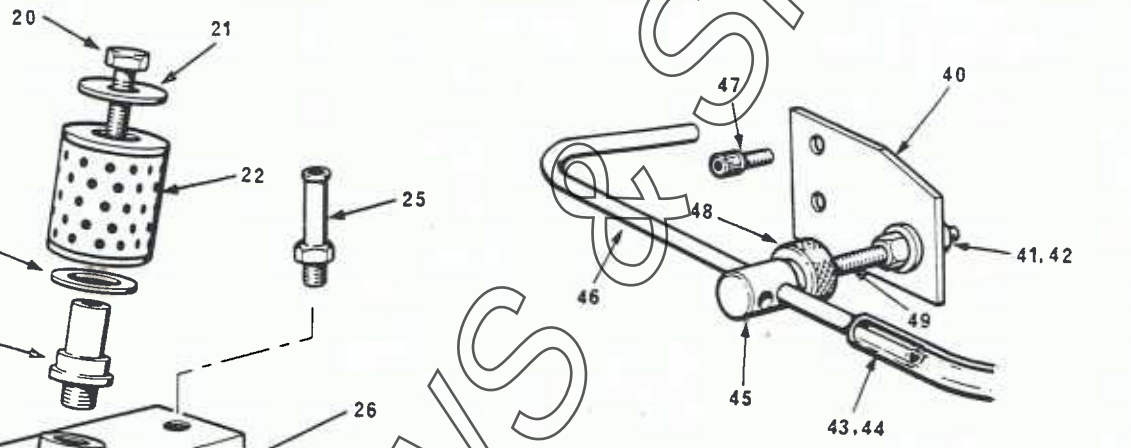
20	BO5564	Hex.Screw	1
21	3611	Washer	1
22	BO2568	Filter;	1
23	3612	Washer	1
24	3621	Filter Mounting	1
25	BO2429	Nozzle;	1
26	1245	Pump Body	1
27	1247	Spindle	1
28	1248	Vane	2
29	BO2000	Bearing;	2
30	535	Bearing Spacer	1
31	1244	Cover (Air Pump)	1
32	BO5186	Set Screw;	1
33	5353	Pump Pulley	1
34	BO5007	Cap Screw;	4

BLOWER KIT - ASSEMBLY NO: SM2041

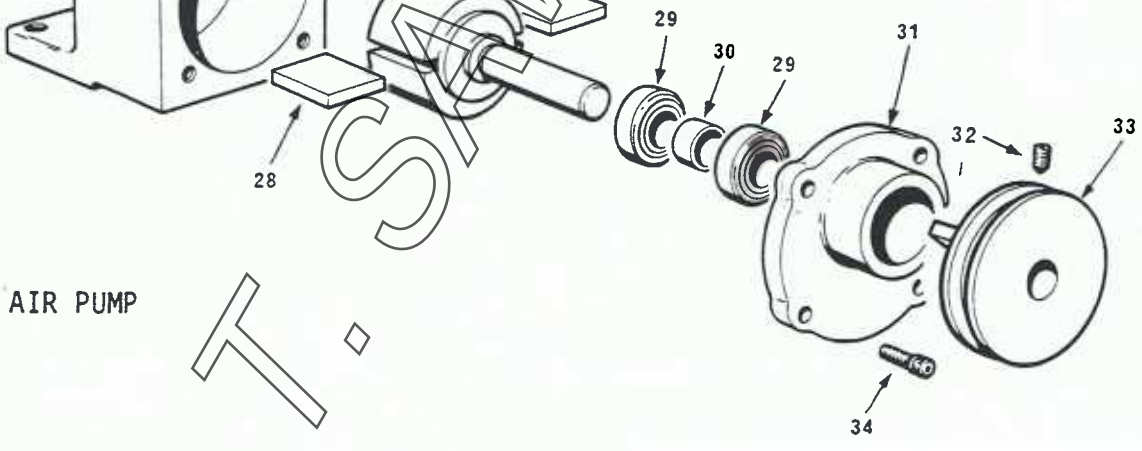
40	4241	Mounting Plate	1
41	BO5708	Full Nut	2
42	BO5919	Washer	2
43	BO6373	Westoflex Tube	0.02
44	BO6378	Clear Tube	2.92
45	3630	Sleeve	1
46	4930	Chipblower Pipe	1
47	BO5017	Cap Screw;	2
48	3628	Thumb Knob	1
49	3635	Adjustment Screw	1



AIR COMPRESSOR



CHIPBLOWER



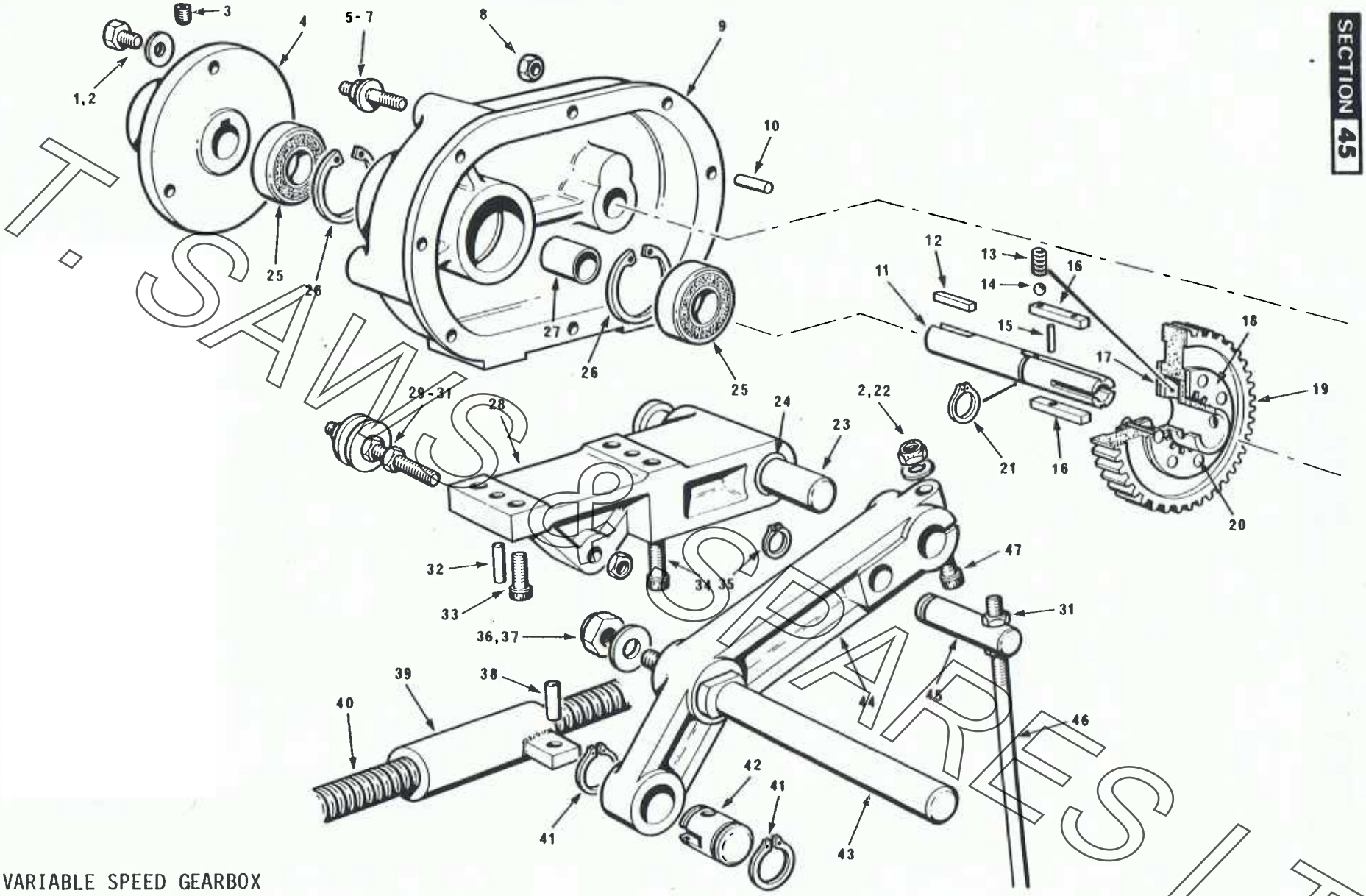
AIR PUMP

MAINTENANCE

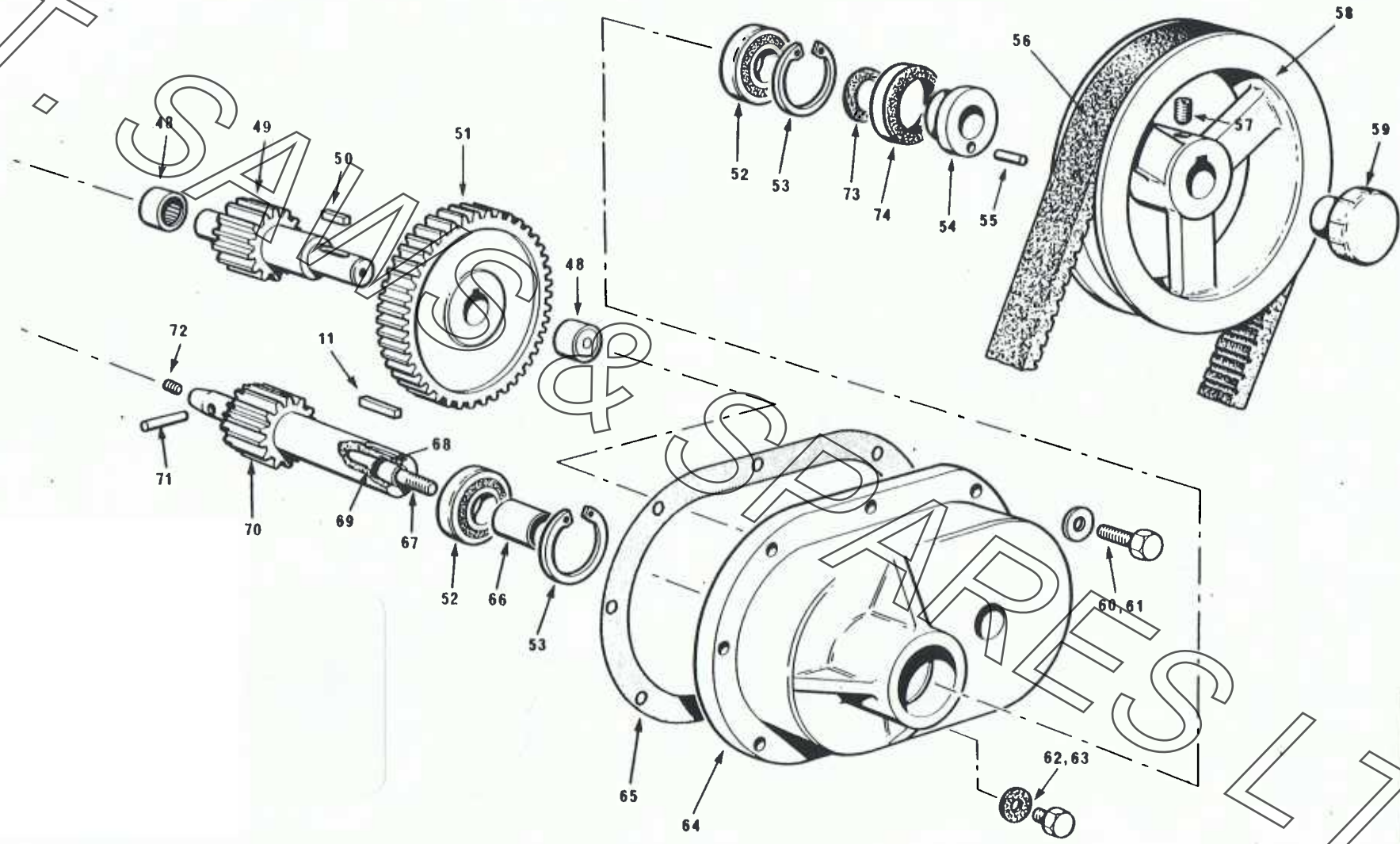
Every three (3) months apply grease to the grease nipple (item 125) situated on the Expanding Pulley Assembly No: SM958 (see Section 45, page 8). DO NOT USE EXCESSIVE GREASE. Check tension of drive belts and adjust if neccessary, see section on Installation / Maintenance for instructions.

VARIABLE SPEED GEARBOX - ASSEMBLY NO: SM1004

ITEM	PT NO	DESCRIPTION	NO OFF
1	BO5560	Hex.Screw;	3
2	BO5917	Washer	4
3	BO5199	Set Screw;	1
4	2561	Bandwheel Hub	1
5	BO5831	Stud;	3
6	BO5704	Full Nut	3
7	BO5919	Washer	3
8	BO5702	Full Nut	6
9	4172	Gearbox Housing	1
10	BO5884	Dowel;	2
11	1029	Output Shaft	1
12	1148	Key;	2
13	BO2197	Spring;	1
14	BO2100	Steel Ball;	1
15	BO5370	Sel-loc;	1
16	1027/A	Key	2
17	1036	Liner	1
18	1035	Clutch Plate	1
19	1044	Intermediate Gear	1
20	BO5799	Rivet;	8
21	BO6007	Ext.Circlip;	1
22	BO5731	'P' s/l Nut	1
23	5345	Pivot Shaft	1
24	BO2329	Bush;	2
25	BO2001	Bearing;	2
26	BO6040	Int.Circlip;	2
27	1030	Spacer	1
28	5334	Bracket	1
29	5352/A	Stud	1
30*	4238	Washer	2
31	BO5715	Full Nut	4
32	BO5376	Sel-loc;	2
33	BO5019	Cap Screw;	2
34	BO5024	Cap Screw;	2
35*	BO6006	Ext.Circlip;	1
36	BO5776	Binx Nut	1
37	BO5921	Washer	1
38*	BO5362	Spring Pin;	1
39*	SM953	Sleeve & Lug	1
40*	5340	Speed Control Screw	1
41*	BO6010	Ext.Circlip;	2
42*	5343	Coupling	1
43	5346	Pulley Shaft	1
44	5492	Control lever	1
45*	5348	Trunnion	1



VARIABLE SPEED GEARBOX

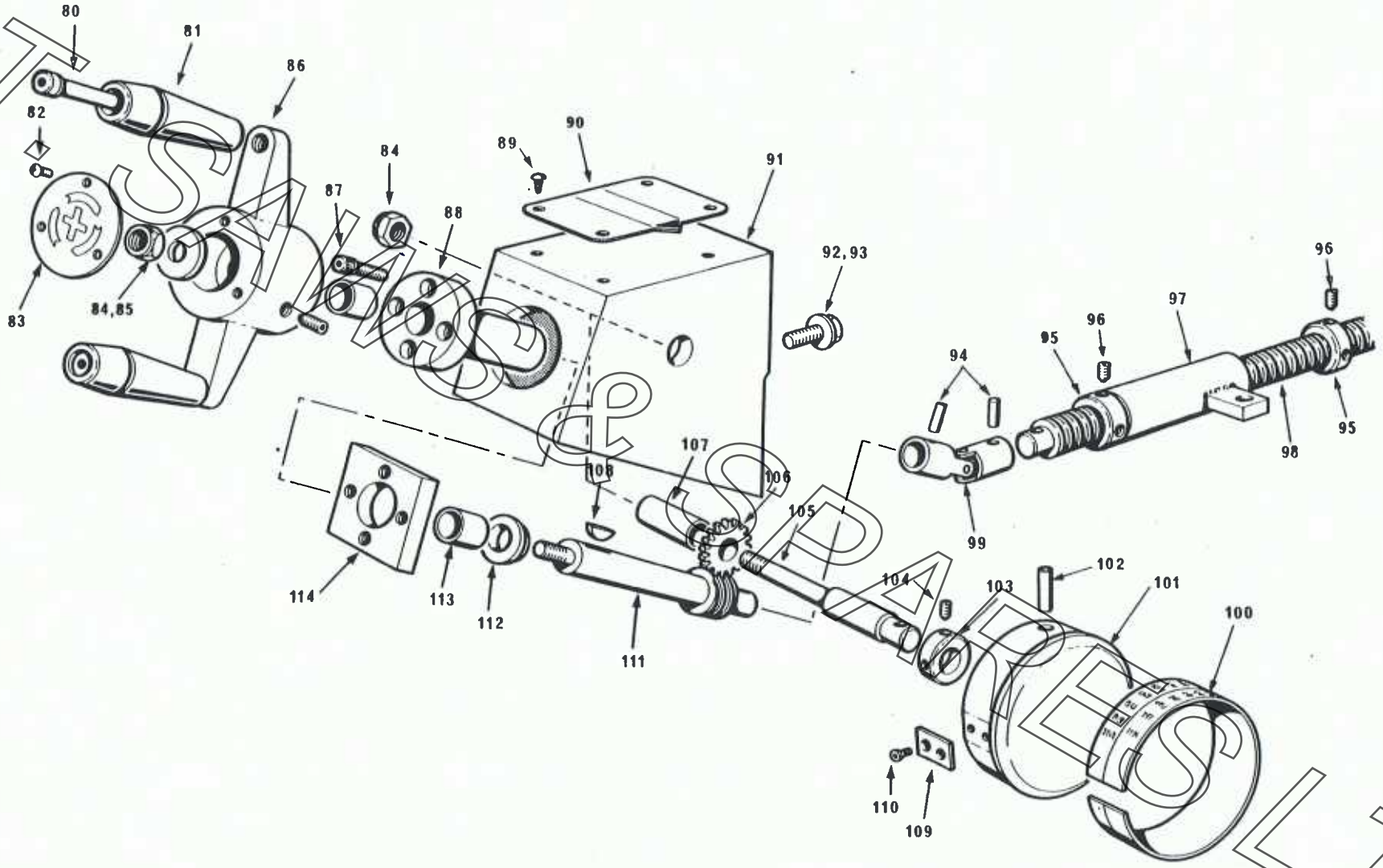


VARIABLE SPEED GEARBOX

VARIABLE SPEED GEARBOX - ASSEMBLY NO: SM1004 - continued

ITEM	PT NO	DESCRIPTION	NO OFF
46*	5493	Tensioning Stud	1
47	BO5080	Cap Screw;	1
48	BO2069	Needle Race;	2
49	3253	Layshaft	1
50	1147	Key	1
51	3252	Gear	1
52	BO2009	Bearing;	2
53	BO6037	Int.Circlip;	2
54	5332	Bush	1
55	BO5344	Sel-loc;	1
56*	BO2155	Drive Belt (Upper);	1
57	BO5201	Set Screw;	1
58	5490	Gearbox Pulley	1
59	BO2531	Handwheel;	1
60	BO5512	Hex. Screw;	6
61	BO5915	Washer	6
62	BO5525	Hex. Screw;	2
63	BO5954	F/Washer	2
64	4173/A	Gearbox Cover	1
65	4223	Gasket	1
66	1031/B	Spacer	1
67	1037	Control Rod	1
68	BO2311	Bush;	1
69	BO2261	O-Ring;	1
70	1032	Input Shaft	1
71	1024	Pin	1
72	BO5151	Set Screw;	1
73	1209	Neoprene Washer	1
74	BO2120	O-Seal;	1

* denotes these valid parts do not belong to this assembly.



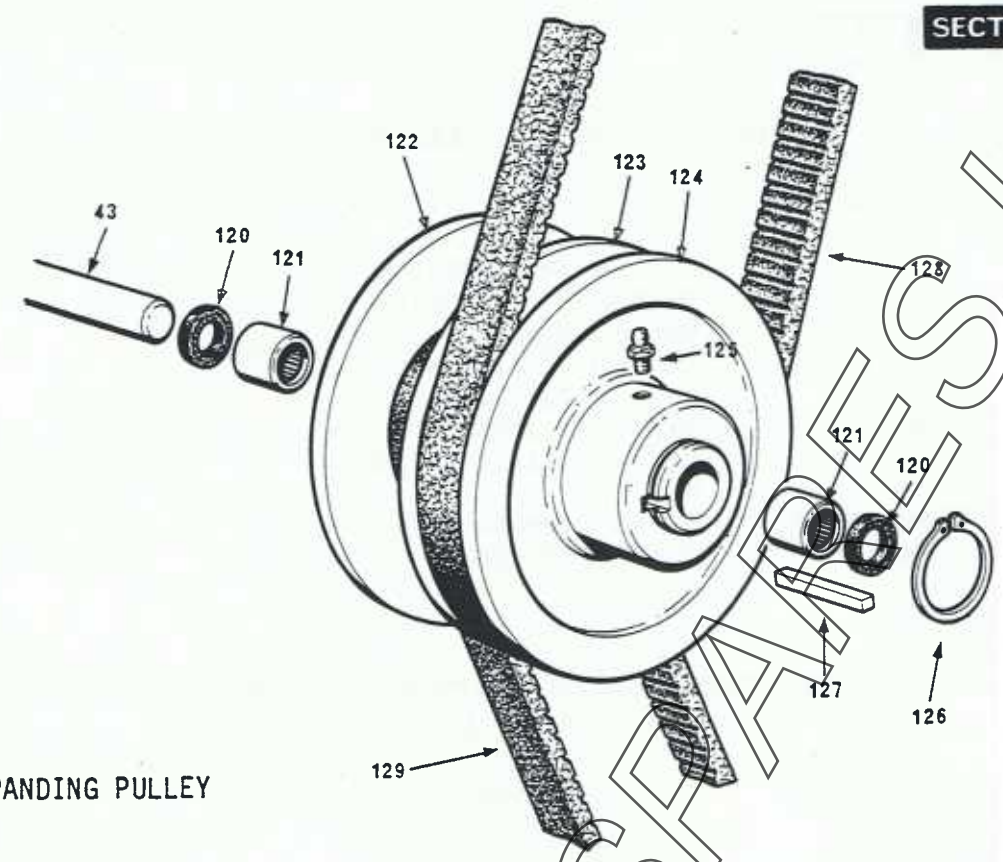
VARIABLE SPEED CONTROL

SECTION 45

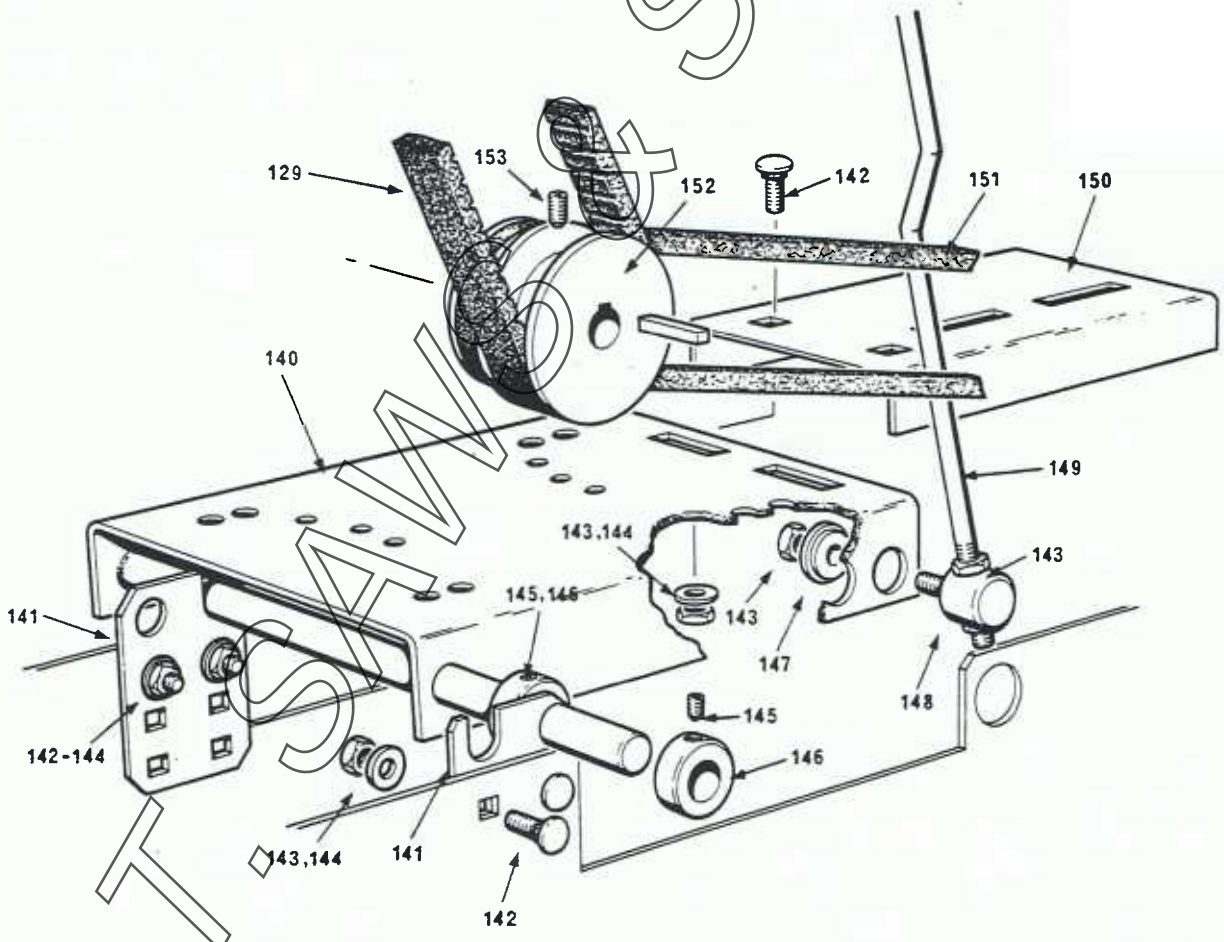
VARIABLE SPEED CONTROL - ASSEMBLY NO: SM1006/A

ITEM	PT NO	DESCRIPTION	NO OFF
80	BO5482	Shouldered Screw;	2
81	BO2535	Handle;	2
82	BO5405	Phillips Rec.Screw;	3
83	4220	Cover Plate	1
84	BO5743	Locknut	2
85	2447	Washer	1
86	4216	Handle	1
87	BO5021	Cap Screw;	4
88	4217	Bush	1
89	BO5870	Drive Screw;	4
90	4205	Instruction Plate	1
91	5335	Speed Control Housing	1
92*	BO5561	Hex. Screw;	3
93*	BO5917	Washer	3
94	BO5373	Sel-loc;	2
95	5350	Sleeve Stop	2
96	BO5186	Set Screw;	4
97	SM953	Sleeve & Lug	1
98	5340	Speed Control Screw	1
99	SM212	Universal Joint	1
100*	5488	Speed Scale - 50Hz models	1
	5489	Speed Scale - 60Hz models	1
101	4209	Indicator Drum	1
102	BO5332	Mills pin;	1
103	666	Locking Collar	1
104	BO5151	Set Screw;	2
105	4211	Indicator Spindle	1
106	4210	Gear	1
107	4212	Spacer	1
108	BO6460	Key;	1
109	4219	Scale Clamp	1
110	BO5255	C/sk Screw;	2
111	4208	Operating Bracket	1
112	4215	Spacer	1
113	BO2305	Bush;	2
114	4218	Clamping Plate	1
115	BO5165	Set Screw;	1

* denotes these valid parts do not belong to this assembly.



EXPANDING PULLEY



VARIABLE SPEED MOTOR PLATFORM

SECTION 45

EXPANDING PULLEY - ASSEMBLY NO: SM958

ITEM	PT NO	DESCRIPTION	NO OFF
120	BO2124	Bearing Seal;	2
121	BO2077	Needle Race;	2
122	5327	Inner Pulley Section	1
123	5328	Central Pulley Section	1
124	5329	Outer Pulley Section	1
125	BO2479	Nipple;	1
126	BO6014	Ext. Circlip;	1
127	5331	Key	1
128*	BO2155	V Belt;	1
129*	BO2154	V Belt;	1

VARIABLE SPEED MOTOR PLATFORM - ASSEMBLY NO(S): SM1000/B & SM1002/C

140	SM999	Motor Platform Assembly	1
141	5435	Platform Support Bracket	2
142	BO5620	Coach Bolt;	4
143	BO5715	Full Nut	4
144	BO5917	Washer	4
145	BO5186	Set Screw;	2
146	5401/B	Collar	2
147	5443	Spacing Washer	1
148	5480	Trunnion	1
149	5493	Stud	1
150*	5434	Pump Platform	1
151*	BO2142	V Belt;	1
152	5491	Motor & Pump Pulley	1
153	BO5201	Set Screw;	1

NOTE Drive belts and vee belts may vary according to the motor fitted. Please check the number on the belt and order accordingly.

* denotes these valid parts do not belong to this assembly.

UPPER BLADE GUARD - ASSEMBLY NO: SM1076

ITEM	PT NO	DESCRIPTION	NO OFF
1	SM1078	Cover & Stop Assembly	1
2	SM1077	Guard Welded Assembly	1
3	BO5917	Washer	1
4	BO5826	Thumb Screw;	1
5*	2338	Thumb Screw	1
6*	2453	Guard Bracket	1

INTERMEDIATE BLADE GUARD - ASSEMBLY NO: SM524

NOTE ! Used on 30" Throat Machines ONLY

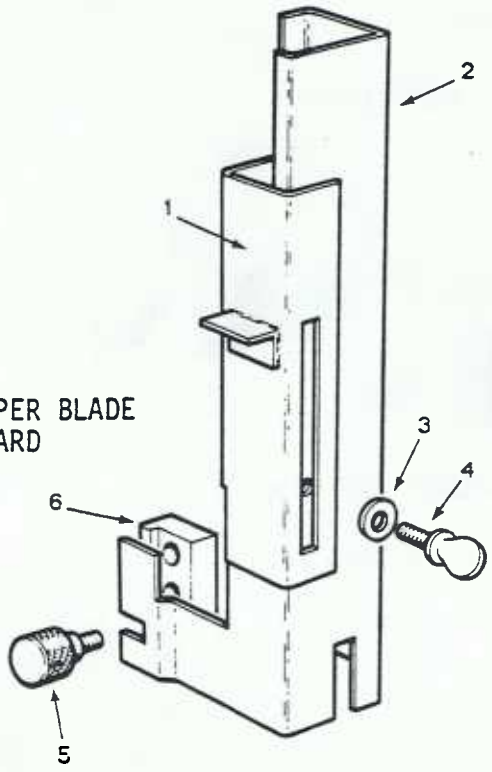
10	SM389	Intermediate Guard	1
11	2711	Thumb Knob	3
12	BO	Cap Screw;	3
13	BO5714	Full Nut	3

LOWER BLADE GUARD - ASSEMBLY NO: SM858

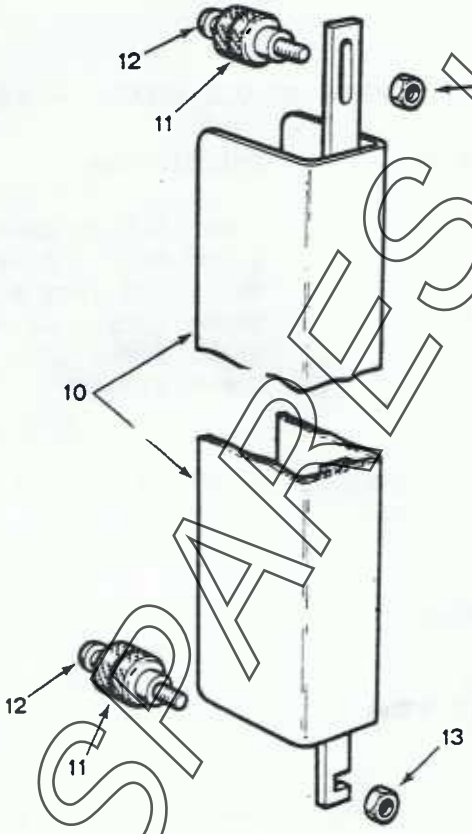
20	SM857	Blade Guard	1
21	BO5562	Hex. Screw;	2
22	BO5917	Washer	4
23	5035	Adjustable Guard	1
24	BO5785	Wing Nut	4
25	BO5753	Locknut	1

* denotes these valid parts do not belong to this assembly.

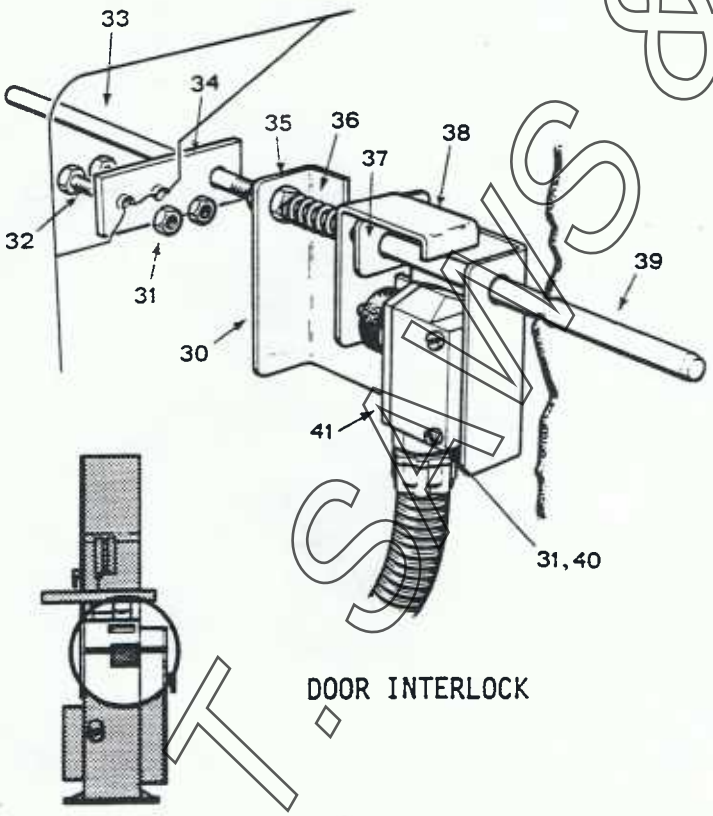
SECTION 47



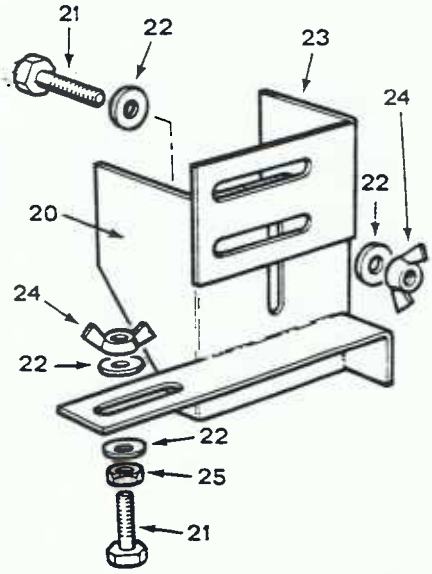
UPPER BLADE GUARD



INTERMEDIATE BLADE GUARD



DOOR INTERLOCK



LOWER BLADE GUARD