



PARTS LIST  
FOR  
WICKMAN 1.3/4" - 6 SPINDLE  
and  
WICKMAN 1.3/8" - 6 SPINDLE  
BAR AUTOMATIC LATHES



WICKMAN MACHINE TOOL, INC  
1521 Imhoff Drive, Unit F, Lake in the Hills, IL 60156  
Telephone: (001) 847-458-6400 Fax : (001) 847-458-6401 fax  
Email : [info@wickman-usa.com](mailto:info@wickman-usa.com)



Wickman Machine Tool, Inc.  
1521 Imhoff Drive, Unit F  
Lake in the Hills, IL 60156  
Tel: 847 458 6400 Fax: 847 458 6401

We at Wickman Machine Tool are always working on improving our customer service. We want you, our customer, to feel confident that we are doing everything that we can to give you the best service possible.

Firstly, in order to improve our service; we need to improve the communication system between us and our customers. We have listed below a number of important contacts for you to reach the people you need to speak to directly with ease.

**MACHINE INQUIRIES / TECHNICAL**

**Jeremy Rose – President**  
Mobile: 847 736 6629  
Office: 847 458 6400 Ext 208  
Fax: 847 458 6401  
E-mail: [j.rose@wickman-usa.com](mailto:j.rose@wickman-usa.com)

**SPARES / GENERAL INQUIRIES**

**Reyna Rios – Spares/General Inquiries**  
Office: 847 458 6400 Ext 207  
Fax: 847 458 6401  
E-mail: [r.rios@wickman-usa.com](mailto:r.rios@wickman-usa.com)

**TECHNICAL SUPPORT**

**Scott Andersen – Technical Engineer  
- Spares / General Inquiries**  
Office: 847 458 6400 Ext 204  
Mobile: 847 217 6664  
Fax: 847 458 6401  
E-mail: [engineer@wickman-usa.com](mailto:engineer@wickman-usa.com)

**ACCOUNTS/MARKETING**

**Alison Rose – Office Manager / Accounts  
- Spares / General Inquiries**  
Office: 847 458 6400 Ext 201  
Mobile: 847 526 6664  
Fax: 847 458 6401  
E-mail: [a.rose@wickman-usa.com](mailto:a.rose@wickman-usa.com)

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Kind regards  
**The Wickman Team**



## PREFACE

This Manual provides the basic information and instructions that are necessary for the maintenance/servicing of the Wickman 1.3/8"-6 & 1.3/4"-6 Spindle Bar Automatic Lathes with Relay Logic Control Equipment.

The contents will familiarize the reader with the machine construction specifications, installation procedure, safety at work and all the relevant aspects of the machine.

The manual should be read thoroughly. It will enable the Engineer to gain the knowledge required for the correct and efficient servicing of the machine.

An Operator's Handbook is also available for the 1.3/8"-6 & 1.3/4"-6 machines.

## HEALTH AND SAFETY

Health and Safety at Work Act, 1974 - U.K. users only.

In accordance with the requirements of the Health and Safety at Work Act 1974, this manual embodies the necessary information to ensure that the machine tool can be maintained properly and with safety. It should be clearly understood that the engineer must be properly trained, have the required skills and be authorised to maintain the machine.

If it should arise that the person authorised to maintain the machine is undergoing training, he must be under the close supervision of another skilled and authorised person.

Adequate information is provided to enable the machine to be serviced and maintained in a satisfactory condition by engineers & electricians who have the necessary skills and authority. We recommend that a 'Permit to Work' system as detailed in BS5304; 1988 entitled "Safety of Machinery", should be operated.

## HEALTH AND SAFETY (Continued)

It is important that the various statutory regulations which are applicable, eg, 'The Protection of Eyes Regulations' are complied with.

### Operating Discipline

- (I) A clean, neat and well ordered machine and working area is the first essential of safety at work.
- (II) All guards, cover plates, cabinet doors and the tooling area guards must be in place or closed before any production run commences.
- (III) Never leave articles lying on any working surface where there is a danger that they may be dislodged by: any moving part of the machine, vibration, etc.
- (IV) Never wear rings, watches, neck-ties or loose-sleeved clothing when working on the machine.
- (V) Never operate the machine in excess of its rated capacity.
- (VI) Know where the EMERGENCY STOP BUTTON is.
- (VII) Never reach across a moving or rotating part of the machine
- (VIII) Never enter the tooling area or any other working part of the machine when the machine is running on production.
- (IX) When tool setting, changing tools or making adjustments, never enter the tooling area until the machine has been shut down.
- (X) When carrying out maintenance work, never enter any part of the machine, either mechanical or electrical, until the machine has been shut down and the isolator on the electrical control panel is in its "off" position, disconnecting the power supply.
- (XI) When working with lubrication oils and cutting oils of the soluble and straight cutting oil types, cleanliness is essential. Precautions must be taken to avoid all unnecessary contact with oil by ensuring that the machine's protective devices against coolant and oil spray are correctly closed and that protective clothing is worn. Never wear oil soaked clothes or place oily rags or tooling in the pockets of wearing apparel. Always wash oil from the body as soon as possible after contamination.

### The Safe Operation Of Work Holding Devices

Collet equipment and collet operating mechanisms must always be kept in first class condition, in order to ensure that the bar is securely gripped to withstand all the applied cutting forces. Tooling area guards must always be closed when the machine is in the "run" condition.



### MACHINE SIZE / MODEL RANGE

WICKMAN 1.3/8" (35mm) 6 SPINDLE BAR AUTO, STANDARD SPEED - STANDARD INDEX MACHINE

WICKMAN 1.3/8" (35mm) 6 SPINDLE BAR AUTO, STANDARD SPEED - STANDARD INDEX ARRANGED FOR DOUBLE BAR FEEDING.

WICKMAN 1.3/4" (44mm) 6 SPINDLE BAR AUTO, HIGH SPEED - STANDARD INDEX MACHINE.

WICKMAN 1.3/4" (44mm) 6 SPINDLE BAR AUTO, STANDARD SPEED - STANDARD INDEX MACHINE.

WICKMAN 1.3/4" (44mm) 6 SPINDLE BAR AUTO, STANDARD SPEED - STANDARD INDEX ARRANGED FOR DOUBLE BAR FEEDING.

WICKMAN 1.3/4" (44mm) 6 SPINDLE BAR AUTO, STANDARD SPEED - STANDARD INDEX ARRANGED FOR SPINDLE STOPPING.

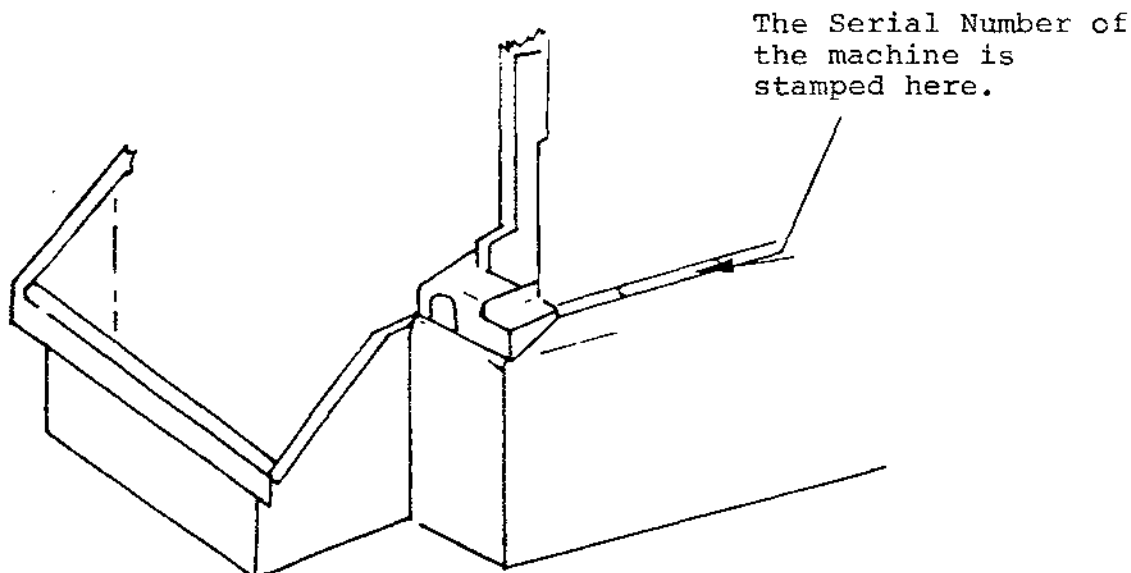
### MACHINE SERIAL / INSPECTION NUMBER

In the event that queries arise with regard to the maintenance of the machine, it is important to note the following details which would need to be given to Wickmans in all correspondence, ie:

Machine Inspection/Serial number, Machine size and Model.

The machine Inspection/Serial Number must always be quoted and is stamped on the machined-rim of the tray of the machine, on the left hand side, close to the Operators position. Additionally the number is also engraved on the machine Manufacturing Plate (WSP500B) which is affixed to the main drive housing casting at the rear of the machine.

Reference to this number will facilitate any service that may be required.



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Wickman Coventry Limited operate a policy of continual improvement.  
We therefore reserve the right to change the specifications and  
illustrations without notice.

SECTION ONE - MACHINE SPECIFICATIONS

1.1 Machine Specifications 1.3/8" (35mm) - 6 Spindle, Standard Speed Standard Index, Single and Double Bar Feed Machines.

Description	Unit	Specification	Remarks
<u>CAPACITY</u>			
Bar capacity:			
Round	mm	35.00	Solid Collet
Hexagon A/flats	mm	30.30	Solid Collet
Square A/flats	mm	24.75	Solid Collet
Round	mm	35.00	Master Collet/Pads
Hexagon A/flats	mm	30.30	Master Collet/Pads
Square A/flats	mm	24.75	Master Collet/Pads
Bar feed stroke:	mm	12.7 to 177.8	
Approach strokes: Main Tool Block and Independent Slides.	mm	88.90	
Feed strokes: Main Tool Block.	mm	0 to 88.90	
Independent Slides.	mm	0 to 88.90	
Cross slides: Stations 1 and 2.	mm	0 to 31.75	
Stations 3 and 6.	mm	0 to 22.20	
Stations 4 and 5.	mm	0 to 47.60	Lever position 'A'
		0 to 23.80	Lever position 'B'
Spindle speed range:	r/min	132 to 2000	
Number of steps:		28	
Cycle time range:	Secs	3.9 to 337	
Idle time	Secs	2.0	
Main Motor Power	Kw	15 or 18.5	
<u>GENERAL INFORMATION</u>			
Required Floor Space: (Refer to foundation drawing for swing over covers).	mm	1467 x 3930	O/all length excludes the stock carriage.
	mm	1467 x 6454	O/all length includes the stock carriage.
Shipping Weight including the Stock Carriage (nett)	Kg	8077	

1.1 Machine Specifications 1.3/4" (44mm) - 6 Spindle, Standard Speed  
Standard Index, Single and Double Bar  
Feed Machines.

Description	Unit	Specification	Remarks
<u>CAPACITY</u>			
Bar capacity:			
Round	mm	44.40	Solid Collet
Hexagon A/flats	mm	38.50	Solid Collet
Square A/flats	mm	31.40	Solid Collet
Round	mm	44.40	Master Collet/Pads
Hexagon A/flats	mm	38.50	Master Collet/Pads
Square A/flats	mm	31.40	Master Collet/Pads
Bar feed stroke:	mm	12.7 to 177.8	
Approach strokes: Main Tool Block and Independent Slides.	mm	88.90	
Feed strokes:			
Main Tool block	mm	0 to 88.90	
Independent slides	mm	0 to 88.90	
Cross slides:			
Stations 1 and 2	mm	0 to 31.75	
Stations 3 and 6	mm	0 to 22.20	
Stations 4 and 5	mm	0 to 47.60	Lever position 'A'
	mm	0 to 23.80	Lever position 'B'
Spindle speed range:	r/min	132 to 1667	
Number of steps:		26	
Cycle time range:	Secs	4.3 to 337	
Idle time	Secs	2.00	
Main Motor Power	Kw	18.5 or 22	
<u>GENERAL INFORMATION</u>			
Required Floor Space: (Refer to foundation drawing for swing over covers)	mm	1467 x 3930	O/all length excludes the stock carriage.
	mm	1467 x 6454	O/all length includes the stock carriage.
Shipping weight including the stock carriage (nett)	Kg	8077	

1.1 Machine Specifications 1.3/4" (44mm) - 6 Spindle, Standard Speed  
Standard Index, arranged for Spindle  
Stopping Stations 1 to 5.

Description	Unit	Specification	Remarks
<u>CAPACITY</u>			
Bar capacity:			
Round	mm	44.40	Solid Collet
Hexagon A/flats	mm	38.50	Solid Collet
Square A/flats	mm	31.40	Solid Collet
Round	mm	44.40	Master Collet/Pads
Hexagon A/flats	mm	38.50	Master Collet/Pads
Square A/flats	mm	31.40	Master Collet/Pads
Bar feed stroke:	mm	12.7 to 177.8	
Approach strokes: Main Tool Block and Independent Slides.	mm	88.90	
Feed strokes: Main Tool Block	mm	0 to 88.90	
Independent Slides	mm	0 to 88.90	
Cross slides: Stations 1 and 2.	mm	0 to 31.75	
Stations 3 and 6.	mm	0 to 22.20	
Stations 4 and 5	mm	0 to 47.60	Lever position 'A'
	mm	0 to 23.80	Lever position 'B'
Spindle speed range:	r/min	132 to 1667	
Number of steps:		26	
Cycle time range:	Secs	4.3 to 337	
Idle time	Secs	2.00	
Main Motor Power	Kw	18.5 or 22	
<u>GENERAL INFORMATION</u>			
Required Floor Space: (Refer to foundation drawing for swing over covers).	mm	1467 x 3930	O/all length excludes the stock carriage.
	mm	1467 x 6454	O/all length includes the stock carriage.
Shipping Weight including the stock carriage (nett)	Kg	8077	

1.1 Machine Specifications - General 1.3/8"-6 & 1.3/4"-6

Description	Unit	Specification	Remarks
<b>GENERAL</b>			
Coolant Tank Capacity	Litres	590	
Jacking Screws	4 off		
Service Tool Kit	1 off		Toolbox, spanners, wrenches, tool height setting gauge
<b>LUBRICATION</b>			
Main Spindle Bearings			See Section on Lubrication
Main Drive Housing			Splash lubrication
All Electric Motors			Sealed for life - maintenance free

1.2 Electrical Specifications 1.3/8" (55mm) 6 Spindle Bar Automatics

Description	Unit	Specification	Remarks
<b>MAINS SUPPLY CONDITIONS:</b>			
Line Voltage	Volts	220 to 575	Customer to advise.
Allowable variation in V	%	+ or - 10%	About nominal
Frequency	Hz	50 or 60	Customer to advise.
Allowable variation in Hz	%	+ or - 1%	About nominal
Total power requirements	kW	Variable	Dependent upon Customer's Mains Supply
<b>MAIN SPINDLE MOTOR:</b>			
Foot mounted, totally enclosed, fan cooled	kW	15.0	Standard
	kW	18.5	Special
Motor Speed	R/Min	1,450.0	At 50Hz
	R/Min	1,450.0	At 60Hz
<b>SWARF CONVEYOR MOTOR:</b>			
Flange Mounted, totally enclosed fan cooled.	kW	0.18	Standard screw type swarf conveyor.

1.3/4" (44mm) 6 Spindle Bar Automatics.

Description	Unit	Specification	Remarks
<b>MAINS SUPPLY CONDITIONS:</b>			
Line Voltage	Volts	220 to 575	Customer to advise.
Allowable variation in V	%	+ or - 10%	About nominal
Frequency	Hz	50 or 60	Customer to advise.
Allowable variation in Hz	%	+ or - 1%	About nominal
Total power requirements	kW	Variable	Dependent upon Customer's Mains Supply
<b>MAIN SPINDLE MOTOR:</b>			
Foot mounted, totally enclosed, fan cooled.	kW	18.5	Standard
	kW	22.0	Special
Motor Speed	R/Min	1,450.0	At 50Hz
	R/Min	1,450.0	At 60Hz
<b>SWARF CONVEYOR MOTOR:</b>			
Flange Mounted, totally enclosed fan cooled.	kW	0.18	Standard screw type swarf conveyor.

Power to the equipment is supplied through the Electrical Control Enclosure.



Maintenance Notes

## SECTION TWO - INSTALLATION

### 2.1 Installation and Lifting

In planning the siting of a machine, consideration should be given to the space required for chip removal, bar loading and servicing, ie, centre-shaft removal. Dimensions of suitable lifting bars for use with a crane are shown on Drawing 200 Y 50C, Fig.2.1. for use with a lifting frame shown on Drawing 100 Y 579, Fig.2.2. The lifting bars are fed through the holes provided in the machine tray and collars assembled & clamped to the bars in order to prevent the ropes used with the lifting frame from slipping. Care must be taken to ensure that the lifting frame ropes do not damage the machine during hoisting. Examine the position of the lifting frame with the tension on the ropes before the full weight of the machine is lifted.

Where a crane is not available, the machine may be moved by "wedge", truck or rollers and continuous machined surfaces are provided on the underside of the machine tray to facilitate the operation. Rollers must be longer than the machine tray width.

Careful handling of the machine will ensure accurate alignment.

### 2.2 Machine Foundation

The machine should be installed on a level and stable foundation in order to ensure accurate alignment is maintained. A concrete base is recommended, it provides the most suitable foundation because of its stability and because it is less prone to distortion when laid down in adverse soil conditions.

The actual depth of concrete base must be determined to suit the prevailing soil conditions, which must be capable of supporting the machine, ancillary equipment, tooling and the concrete base itself. The soil should be consolidated with crushed rock, pebbles and stones.

### 2.3 Levelling the Machine and Sundry Requirements

With the machine in position on the factory floor, adjust its level using the jacking screws provided in the machine tray. It is recommended that steel plates be placed between the floor and the screws. Longitudinal and lateral alignment levels can be checked with a precision spirit level on the facings provided at both ends of the machine tray, see Drawing 200 Y 50C, Fig.2.1. Wedges should be placed at the positions shown.

Foundation bolt holes are also provided for use where required, the bolts being embedded in the floor approximately 5ins (125mm).

Where not bolted-down, machines can be grouted or cemented by any shop approved method.

The stock carriage tube assembly (weight: 366kgs) should be lifted into position and made ready for attaching to the machine.

When the machine has been laid down and levelled, the stock carriage and stand should be fitted, the stock tubes being correctly aligned with the machine spindles. A good alignment check is to view the collet openings through the stock tubes. Adjusting screws in the base of the stock carriage stand are provided for alignment purposes and it is recommended that a steel plate be placed beneath each levelling screw before the adjustment takes place. When correctly aligned, the stock carriage stand should be bolted down and grouted in position.

All protective grease should then be removed from internal and external parts with paraffin or white spirit, taking care not to contaminate lubrication oil with protective grease and cleaning fluid residue.

### WARNING

When using paraffin or white spirit ensure that no naked flames are present. Do not smoke. Store cans/drums containing paraffin or white spirit correctly. Dispose of cleaning cloths and contaminated spirit according to factory regulations/safety procedures.

Coolant strainers, work baskets, chutes etc., can then be placed in position, see Fig.5.16

The swarf conveyor, if supplied, may also be fitted, see Fig.5.17 Drawing 200256A for the positioning of the swarf deflection chutes and electrical connection

The machine has an aperture in the tray floor for use with underground disposal systems, where all swarf and coolant passes through the tray and is conveyed to a collection depot. Machines are supplied with a cover plate fitted to the aperture and this should be unscrewed during installation in factory shops using the system and connections made to the centralised coolant supply.

### 2.4 Electrical Equipment

It is impossible in a general handbook to cover the electrical specification on each machine supplied, since the electrical equipment on each machine can vary considerably. Reference should be made to the wiring diagrams and other information forwarded with each machine.

The standard electrical control enclosure includes an isolator/main circuit breaker. Its only necessary to connect the line and earth. The rotation of the main motor should be clockwise when viewed from the pulley end. Before starting the main motor, read through the procedure in Section Three.

The wiring diagram is included and can be found in the data pocket inside the door of the control enclosure.

Star Delta starting is employed for the main motor unless otherwise specified. On Star Delta equipment, operation of the timer should be checked for a time lag of approximately 20 seconds, and all starter gear should be checked for freedom of movement.

Careful attention should be exercised in order to ensure that all the motor circuit breakers and the thermal overload heaters are correct for the electrical supply; this is important when dual voltage motors are supplied.

Supply voltage to the fluorescent tooling area lighting is 110V or the control circuit voltage. The voltage is increased through a transformer mounted in the lighting unit. The above details are checked by Wickman Bennett before despatch, but should also be rechecked at customer's site.

The swarf conveyor motor starter is fitted in the control panel and its control buttons are mounted upon the panel door. These controls comprise:-

(a) A two position selector/push button switch, which when turned counter-clockwise and pressed will start the helical conveyor transporter turning, when turned clockwise and pressed the helical conveyor transporter can be reverse jogged to clear any blockage.

(b) An adjacent stop button, which, when pressed will stop the helical conveyor transporter.

The various relays operated by the trip mechanism limit switches are in the control panel. Space is also provided in the control panel for additional starters for attachment motors if required. The supply leads should be brought to the mains terminals in the control panel.

Fig.2.1 Foundation Drawing 200 Y 50C

1. Stock Carriage Cover.
2. Level the machine with the screws provided, use Wedges where shown, Grout or Bolt in position. Levelling surfaces are provided on top of tray where shown, thus \* machine should rest on concrete not less than 6" (152mm) thick.
3. Weight of machine less Stock Carriage 17,000 lbs (7711Kgs).  
Stock Carriage 806 lbs (366Kgs).
4. Width over open door.
5. Coolant pump 3kW.
6. Intermittent Lubrication Pump Motor 60W. Wedged.
7. It is recommended that the machine is placed so as to allow removal of the Centre-Shaft. Length of Centre-Shaft 50" (1270mm)
8. Swing of Bar Feed Covers.
9. Over Splash Guards.
10. Top cable entry.
11. Dimensions of Swarf Aperture in bottom of tray. Standard machine fitted with cover plate.
12. Filtermist (optional extra)
13. Control Enclosure.
14. Over Splash Guards.
15. Bolt Centres.
16. Lifting Bar (suggested dimensions) 2 required to be supplied by customer.
17. Two collars each end 6" (152mm) dia. secured by Set Screws or 2 pins at each end 1/2" (13mm) dia. x 6" (152mm) long. Both pins at one end of bar to be a drive fit and the other end of bar to be a push fit.
18. Motor 18.5kW 1"-8, 1.3/4"-6, 15kW 1.3/8"-6
19. Cable entry
20. Lifting Bar Holes
21. Tray Aperture
22. Coolant Capacity 130 gall. 590 litres.
23. 1.1/4" (31.7mm) for 1" (25.4mm) Bolts
24. It is recommended that plates be fitted under levelling screws. Plates to be supplied by customer.
25. Swarf Conveyor (optional extra) Motor 0.25kW
26. Foundation Drawing Frame 2 Bar machines.
27. Views of Stock Carriage Base, scale 1:8.
28. Four Holding down bolts 3/4" (19mm) dia. bolts, nuts and washers to be supplies by customer.
29. Allow for loading bars.



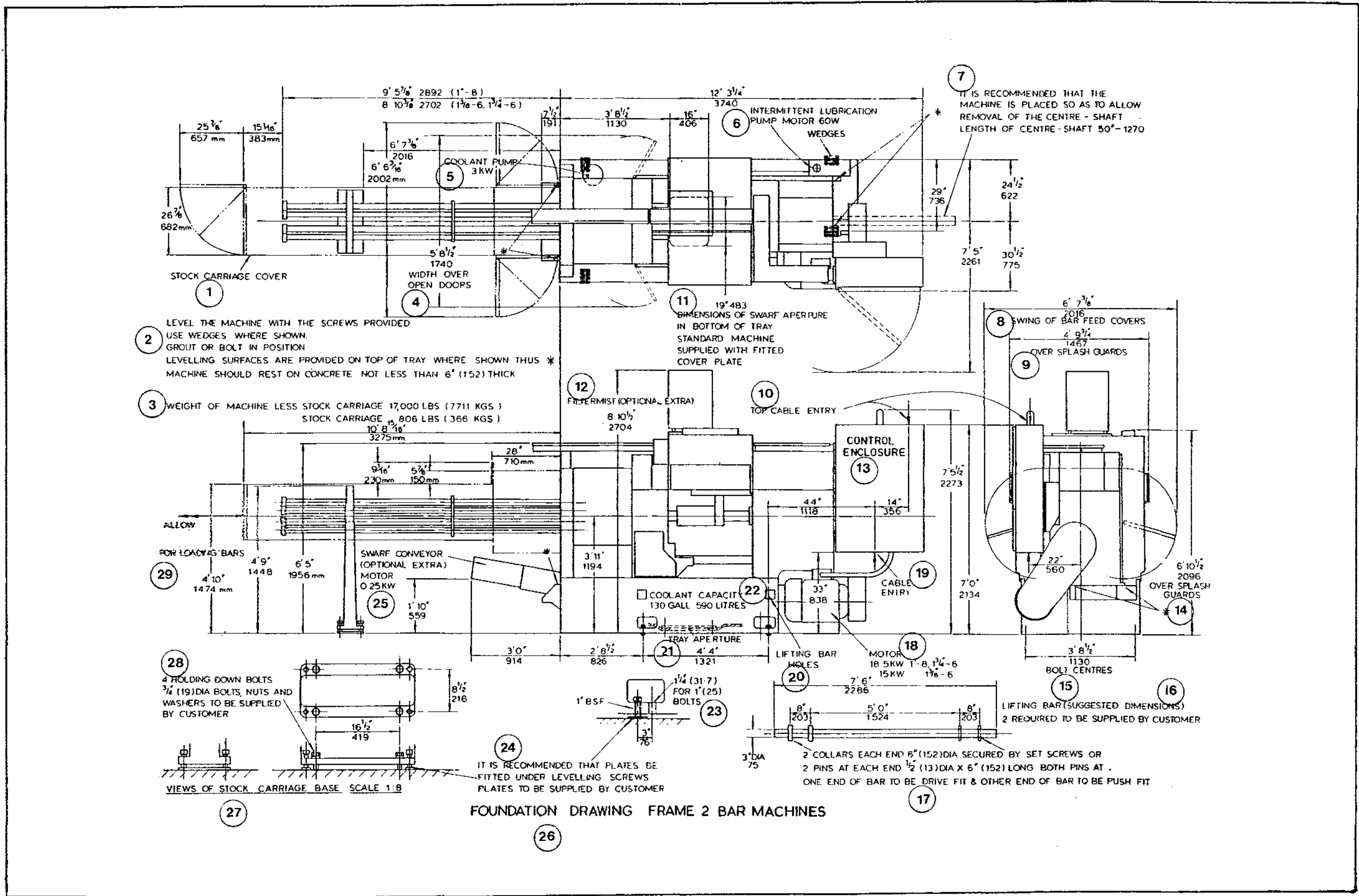
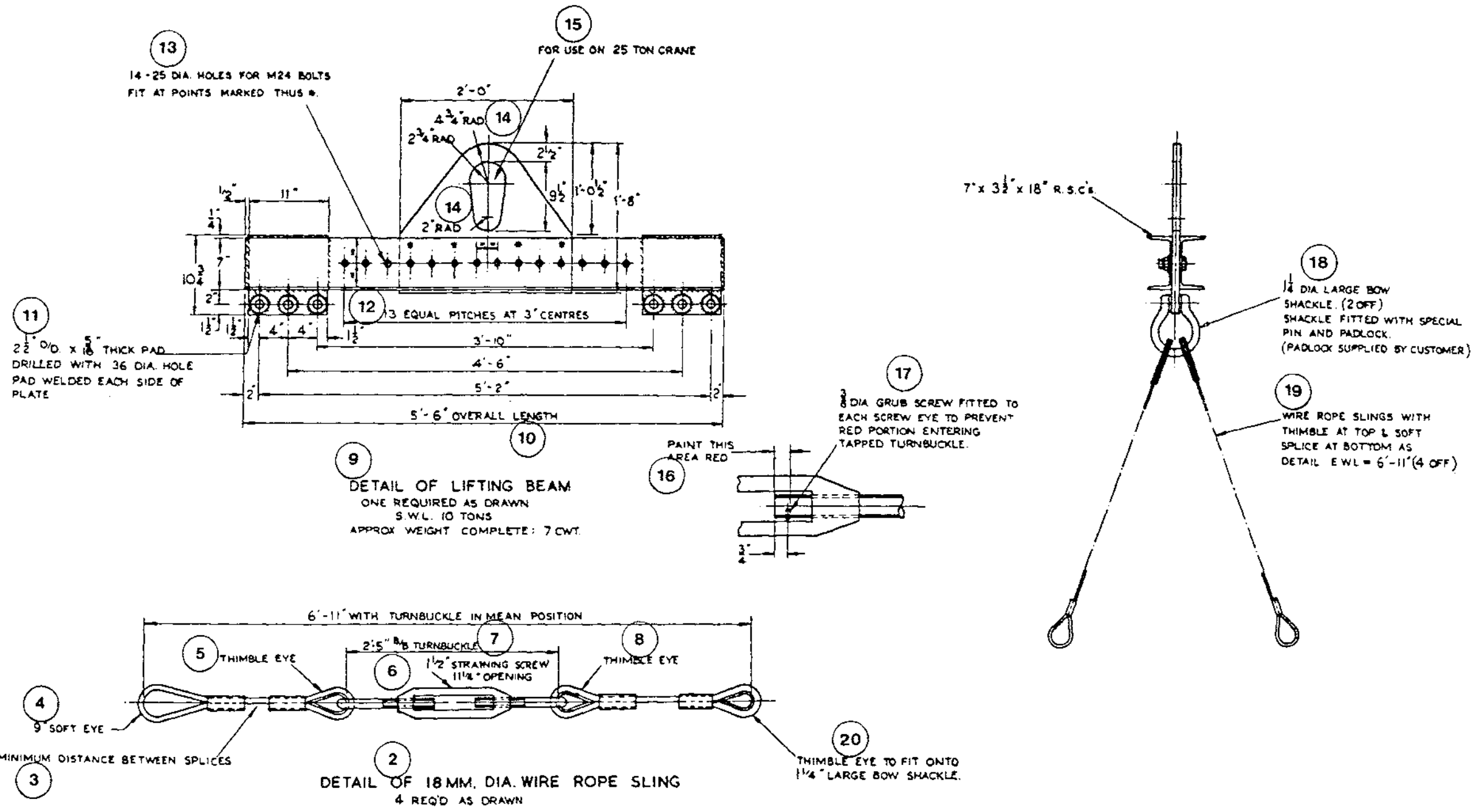


Fig.2.2 Detail of 10 Ton Lifting Frame Drg.100 Y 579

1. 14-25 Dia. holes for M24 Bolts  
Fit at points marked like this \*
2. For use on 25 ton crane.
3. 7" x 3.1/2" x 18" R.S.C's.
4. Paint this area Red.
5. 3/8" Dia. Grub Screw fitted to each eye to prevent Red portion entering tapped turnbuckle.
6. 1.1/4" Dia. Large Bow Shackle (2 off) Shackle fitted with special Pin and Padlock (Padlock supplied by customer).
7. Wire Rope Slings with Thimble at top and soft splice at bottom as detail. E.W.L. = 6"-11 deg. (4 off).
8. Thimble Eye to fit onto 1.1/4" Large Bow Shackle.
9. Detail of 10 ton Lifting Beam.
10. Detail of 18mm Dia. Wire Rope Sling (4 required as drawn).
11. Minimum distance between Splices.
12. 9" Soft Eye.
13. Thimble Eye.
14. 6'.11" with Turnbuckle in Mean position.
15. 2'.5" B/B Turnbuckle.
16. 1.1/2" Straining Screw 11.1/4" opening
17. Thimble Eye.
18. Detail of Lifting Beam. One required as drawn.  
S.W.L. 10 tons (approx. weight complete 7 cwt).
19. 5'.6" overall length.
20. 2.1/2" O/D x 5/16" Thick Pad. Drilled hole Pad welded each side of Plate.





CRANE AID SERVICES LTD DRG. No. 22-A9-2024C.

100Y 579

Maintenance Notes

## SECTION THREE - LUBRICATION

### 3.1 General Description

The oil tank is situated in the tray of the machine in the front of the main drive housing, see. Care must be taken to ensure that only lubricating oil is put into this tank. Use oil grade ISO 3498 CB68 or alternatives HL68 or HM68. The tank is filled through a filler/breather/strainer provided and accessible externally. When fitted, (optional extra) a low level float switch will shut down the machine if the oil falls to a level which would create a critical situation.

The lubricating pump is of the gear type and is chain driven from the constant speed pulley shaft. The pump is mounted in an eccentric bush for chain adjustment and is locked by a locknut.

The oil is drawn through a strainer with an adjacent foot valve to avoid priming. A relief valve is also fitted in the intake pipe to release pressure should the main motor be started running in the opposite direction. The oil is drawn through a strainer and pumped through a 'Purolator' filter to a relief valve set at maximum pressure. This does not normally require adjustment. The 'Purolator' knob should be turned daily and its element taken out and cleaned periodically. Part of the oil pumped through the 'Purolator' and the relief valve goes to the 'Micronic' filter situated on top of the machine. Part is bypassed before reaching this filter to another relief valve, set to give a pressure of approximately 20lbs/inch sq (1.4 kg/cm sq.) in the circuit from the 'Purolator'/relief valve, this pressure being displayed on a pressure gauge.

The oil which passes through the 'Micronic' filter feeds the spindles via the spindle sight feeds as well as all points feeding the drum housing, the upper cross slides and certain points on the collet and bar feed mechanisms. The 'Micronic' filter has a replacement element which must be changed periodically. A spare element is included with the equipment supplied with the machine. The spindle oil sight feeds are adjusted by the needle valves above each sight feed and should be set to give 10 to 20 drops of oil per minute. They should be observed frequently to see that the rate of feed is steady and in accordance with the instruction plate. The actual rate of feed should be adjusted according to the spindle speed, but should be kept on the generous side while the machine is new.

The oil which is bypassed before the 'Micronic' filter circulates to various needle valve headers and spray pipes arranged to feed points in the main drive housing. Oil is also fed to a drip tray above the longitudinal slides mechanism and is provided with drip pipes to feed all the important points in the mechanism.

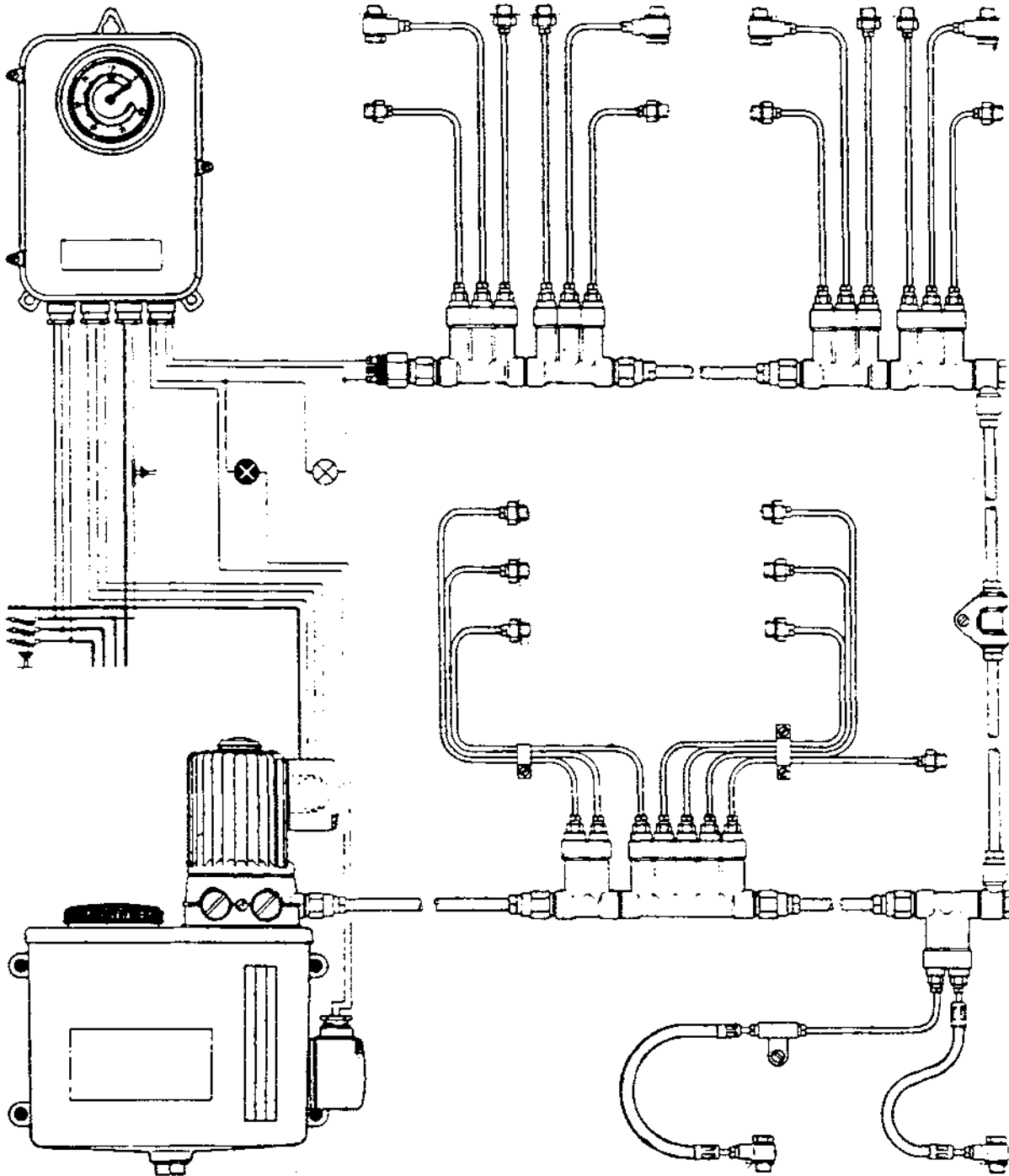
The lubrication system is adjusted correctly before the machine is despatched but should be checked on installation and at regular intervals.

Concerning Lubrication:

- (a) Check the oil level in the tank, it must not fall below the level indicated.
- (b) Frequent checks of the spindle sight feeds are necessary; also check that the main drive oil is circulating.
- (c) Turn the 'Purolator' knob daily.
- (d) Micronic Filter: Remove top to replace filter element.

### 3.2 Vogel 'Total Loss' Lubrication System

System with gear pump and timer for time-controlled 'total loss' lubrication.



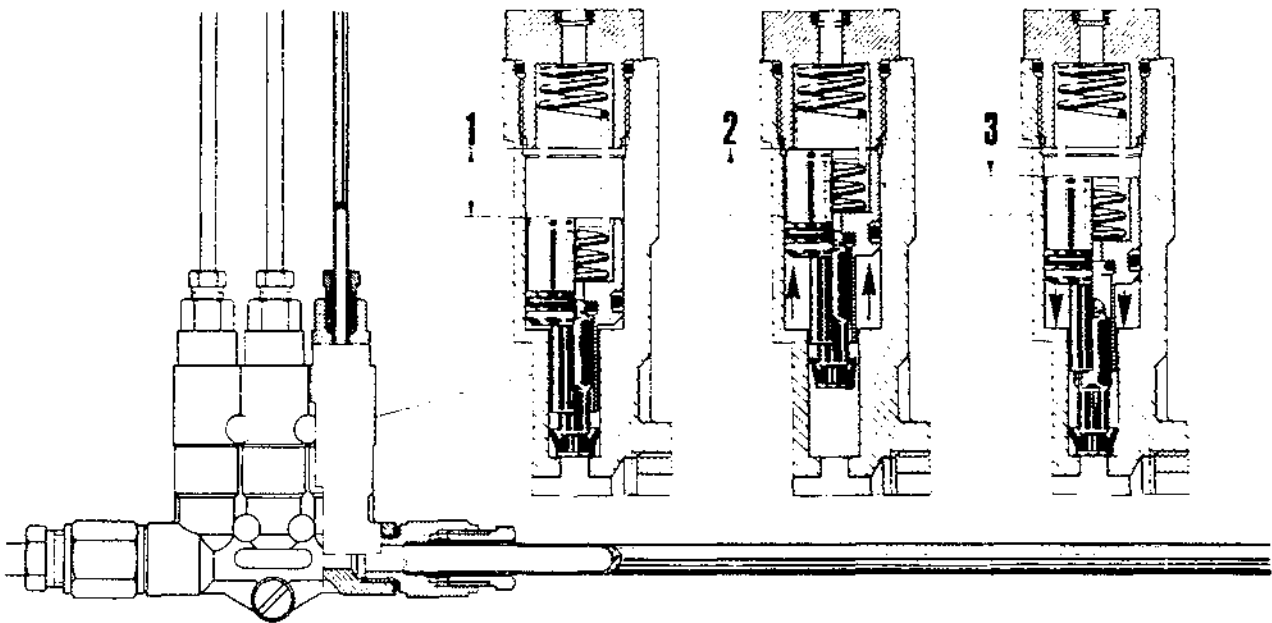
The timer controls the gear pump unit according to pre-set time intervals. In automatic systems, hydraulic or pneumatic-operated piston pumps in connection with a four or two way solenoid valve can be used instead of a gear pump. The correct amount of oil is attained by means of the piston distributors. After the lubrication process, the pump unit is switched off by the rising pressure switch. A time delay mechanism provides the required 'pressure resistance time'. With the float switch in the reservoir of the gear pump unit an electric control switch is provided for optic acoustic or similar signaling. A pilot lamp indicates the normal working of the gear pump unit. From our production units with outputs from 0.5 to 2.5 l/min. can be combined according to requirements, with oil reserves from 3 to 50 litres capacity.

### 3.3 Piston Distributors

For the 'Total Loss' lubrication system

#### Function

1. The oil allocated for the lubrication point is in front of the piston in the distributor.
2. When oil is supplied by the central lubrication pump, it moves the piston so that the oil in front is pushed by the pump pressure (10-45 bar) to the lubrication point.
3. On release of the main line the piston in the distributor returns to its initial position allowing the oil to flow into the space in front of it.



### 3.4 Gear Pump Units ME 5, MFE 5

The ME 5 Pump unit is mounted separately from the oil reservoir.

The MFE 5 Pump unit is for mounting to the oil reservoir.

#### Specifications

Output 0.5 l/min<sup>2</sup>  
 Max Back Pressure Permanently : 20 bar  
 Short-Time : 27 + bar

Permissible Operating Viscosity 20-1000mm<sup>2</sup> / s (cSt)  
 Suction Head 500mm  
 Weight 3kg

Three Phase Motor  
 Voltage 220/380 volts  
 Frequency 50 cycles

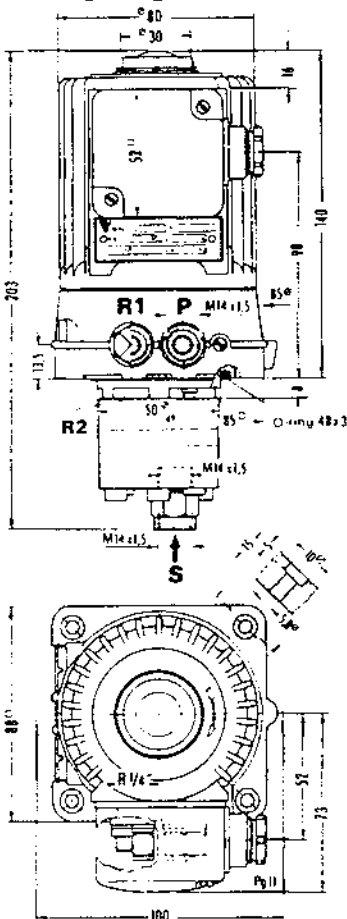
(Special voltages or frequencies must be stated when ordering)

Power Consumption 0.52/0.30amps  
 Rated Power 70 watts  
 Speed 2700 rpm  
 Duty Cycle 100%  
 Type of Enclosure 1P44

Mounting Position



For High Viscosity or thin oils, special gear pump units are available upon enquiry.



S = Inlet (suction port)  
 P = Outlet (8 Pressure Port)

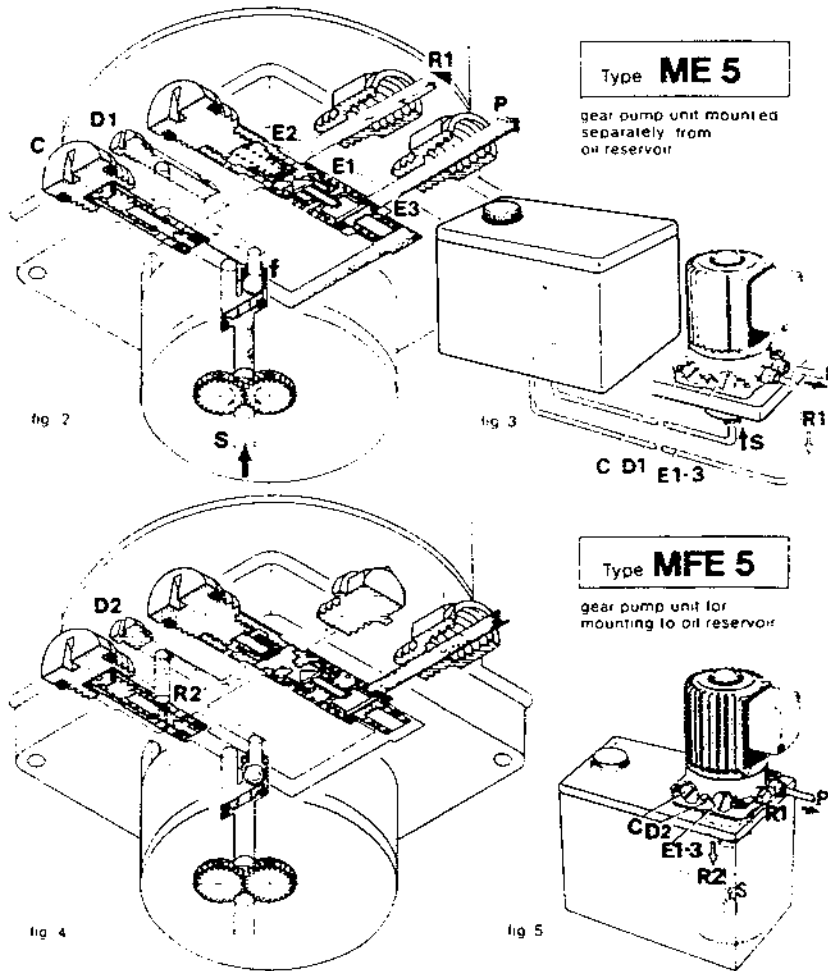
R1 (ME 5) resp. R2 (MFE 5) = Oil From Pressure Relief Valve and Pressure Regulating Valve.

Ports Tapped for Solderless Tube Connection (M14x1.5 For Tube 8mm Dia.)

## Gear Pump Units ME 5, MFE 5

In type ME 5, the long screw plug D1 blocks the port R2 of the return duct. The return oil from the valves f, c and E1 flows via port R1 through a tube to the separately mounted oil reservoir (Fig.2 and Fig 3).

In type MFE 5, the short screw D2 does not block the port R2. A screw plug seals the external port R1. Port R2 of the return duct drains directly into the reservoir without any connection facilities (see Fig.4 and 5).



Both types have the same hydraulic function.

Oil is sucked in at S and flows under pressure in the direction P (green pressure duct). The oil pressure closes valve f and opens valve E3, at the same time closing valve E1 against spring tension. If air is allowed into the circuit (due to low oil level in the reservoir), valve f remains open and bleeds the air oil mixture from the system into the return duct (see circle (o) marking the flow in direction R1. Valve C allows the excess oil pressure to flow into the return duct (see cross (+) marking).

When the pump stops (internal time), the spring loaded valve W1 opens and simultaneously valve E3 closes. The oil pressure returning from P is now released through valve E1, leaving only a small residual pressure controlled by valve E2. This 'pressure release' system is required for the correct function of the piston distributors.

The pressure release process is shown in Fig.4.



### 3.5 Summary of Lubricants

Wickman Oil Grade	1	2	3	4	5
Applicat-ion	Light Spindle Oil	Air Line Lubricat-ion for Cold Climates	Air Line Lubricat-ion for Warm Climates	Centralised Lube. Air Line Lub'e Hyd. syst. Gen.Lub'e for Cold Climates	General Lubrication Centralised System for Warm Climates
B.P	Energol HL 40	Energol HL 50	Energol HL or HLP 65	Energol HLP 80	Energol HLP 100
CASTROL	Hyspin AWS 10	Hyspin AWS 22	Hyspin AWS 32	Hyspin AWS 46	Hyspin AWS 68
CENTURY	P79A	P313	PWLA	PWLB	PWLC
DUCKHAMS	Zircon 1	Zircon 3	Zircon 4	Zircon 5	Zircon 6
ESSO	Nuto H36	Nuto H40	Nuto H44	Nuto H48	Nuto H54
GULF	Harmony 34AW	Harmony 40AN	Harmony 43AW	Harmony 48AW	Harmony 54AW
MOBIL	Velocite oil No 6	Velocite oil No 10	DTE oil light or DTE 24	DTE oil med. or DTE 25	DTE oil heavy med. or DTE 26
PETROFINA	Cirkan 15	Hydran 21	Hydran 31	Hydran 31	Hydran 37
SHELL ISO VG NO	10	22	37	46	68
TEXACO	Spintex 60	Spintex 100	Rando HD.A	Rando HD.B	Rando HD.C
VAUGHAN	KSO 5L	KSO No.1	Evco Med. Hyd. or Hydrodrive HP 150	Evco Heavy Hyd. or Hydrodrive HP 200	Evco Extra Heavy Hyd.or Hydrodrive HP 300

Where alternative grade references are given it is recommended that the lighter grade (lower number) is used unless oil consumption is excessive.

For Slideways Grade 5 is suitable for use with oil-base coolants and Grade 7 for use with water-base coolants.

Wickman Oil Grade	6	7	Wickman Grease Grade	1	2
Application	Reduction Units (Swarf conveyor)	Slideways		GREASES	
B.P	Energol CS 300	Energol HP 20-C		Electric Motors	Spindle Nose Cap
CASTROL	Alpha 417	Magna BD		Ener Grease LS3	Ener Grease LS3
CENTURY	WLP	428AP		Spheerol AP3	Spheerol AP3
DUCKHAMS	Galrex 9	Adglide 6		Lupus 3	Lupus 3
ESSO	Esstic 78	Febis K73		Admax 13	Admax 13
GULF	Mechanism LP 85	Gulway 52 or Slidway 52		Beacon 2/3	Beacon 2/3
MOBIL	DTE oil BB	Vectra Oil		Gulfcrown No. 3	Gulfcrown No. 3
PETROFINA	Solna 58	Artac 37		Mobilplex 48	Mobilplex 48
SHELL ISO VG NO:	220	68 or 320		Marson HTL 3	Marson HTL 3
TEXACO	Regal GR & O	Way Lubricant D		Alvania R2 & R3	Alvania R2 & R3
VAUGHAN	Cosmolub- ric EHC	Way Lubricant		Regal Starfal Premium 3	Regal Starfal Premium 3
				Evco BB No. 3 Grease	*Cosmolube Grease/No4 Grease

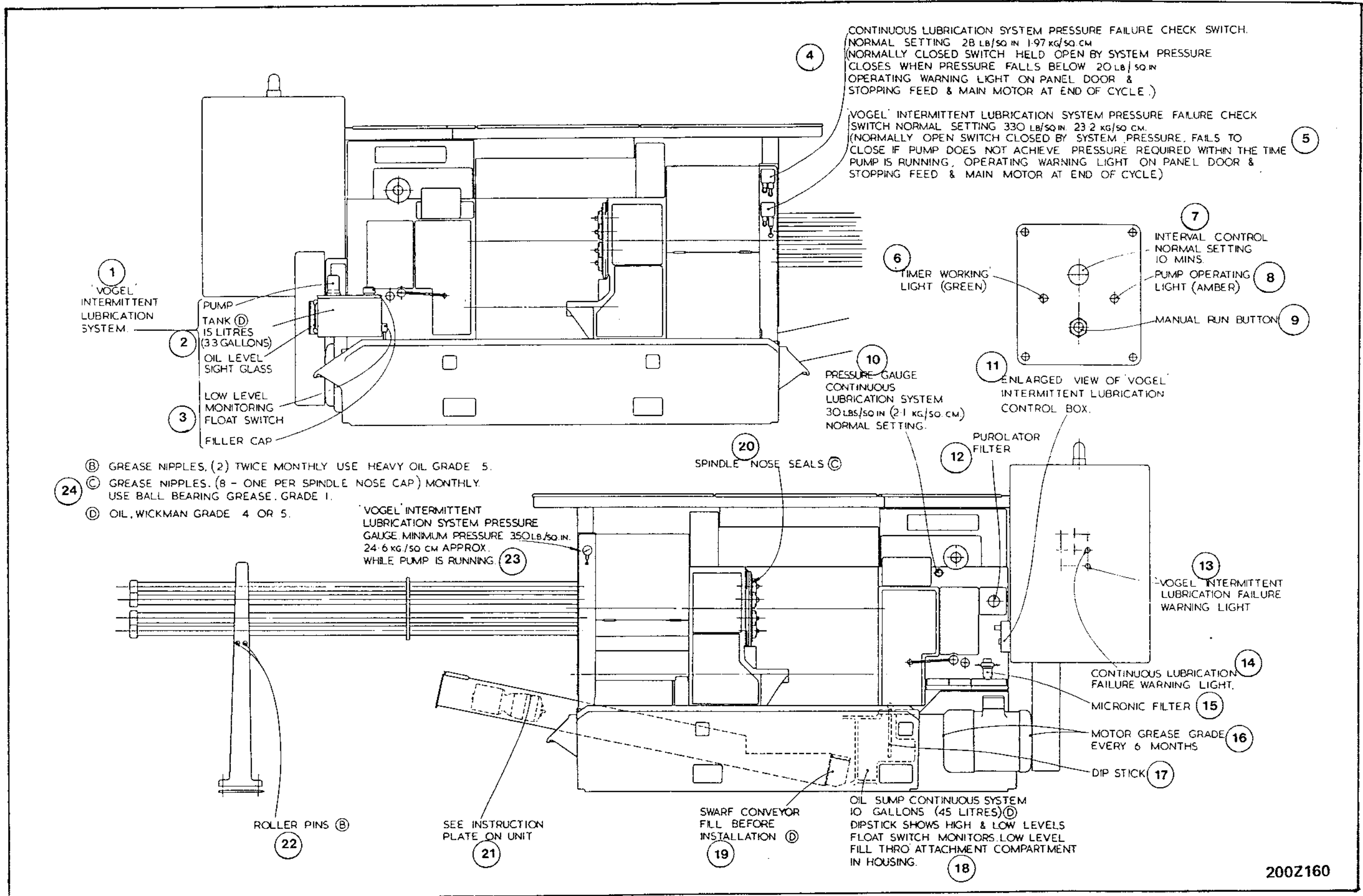
REMARKS:

For Slideways Grade 5 is suitable for use with oil-base coolants and Grade 7 for use with water-base coolants.

\* Re: Cosmolube No. 4: Use sparingly and only in nose cap seals.

Fig.3.1 Lubrication & Greasing Points Diagram Drg.200 Z 160

1. Vogel intermittent lubrication sytem
2. Pump, Tank D 15 Litres,3.3 Gallons,Oil level sight glass.
3. Low level monitoring float switch,& Filler cap.
  
4. Continuous lubrication sytem pressure failure check switch  
Normal setting 28 lb/sq.in (1.97kg./sq cm.)  
Normally closed switch held open by system pressure  
Closes when pressure falls below 20lb/sq.in.  
Operating warning light on panel door & stopping feed and main motor at end of cycle.
  
5. 'Vogel intermittent lubrication system pressure failure check swi  
switch normal setting 330lb/sq.in. (23.2Kg/sq.cm.) Normally open  
switch closed by system pressure fails to close if pump does not  
achieve pressure required within the time pump is running,  
operating warning light on panel door & stopping feed & main  
motor at end of cycle.
  
6. Timer working light (Green)
7. Interval control, normal setting 10mins.
8. Pump operating light (Amber)
9. Manual run button
10. Pressure gauge continuous lubrication system 30lb/sq.in.  
(2.1Kg/sq.cm.) Normal setting.
11. Enlarged view of Vogel intermittent lubrication control box.
12. Purolator filter
13. Vogel intermittent lubrication failure warning light.
14. Continuous lubrication failure warning light.
15. Micronic filter
16. Motor grease grade (every six months)
17. Dip stick
  
18. Oil sump continucus system 10 gallons (45 Litres)D  
Dip stick shows high and low levels.  
Float switch monitors low level  
Fill through attachment compartment in housing.
  
19. Swarf conveyer Fill before installation.
20. Spindle nose seals
21. See instruction plate on unit
22. Roller pins
  
23. Vogel intermittent lubrication system pressure gauge  
minimum pressure 350lb/sq.in. (24.6Kg/sq.cm.) appox.  
while pump is running.
  
24. B Grease nipples (2) twice monthly use heavy oil grade 5.  
  
C Grease nipples (8 - one per spindle nose) monthly use  
ball bearing grease grade 1.  
  
D Oil Wickman grade 4 or 5.



200Z160

SECTION FOUR - PREVENTATIVE MAINTENANCE SCHEDULE

4.1 1000 Hour Procedures

WARNING

Isolate the machine electrically before carrying out any preventative maintenance schedules.

Work Schedule to be carried out after 200, 1,000, 2,000, 3,000 hours running, at 1,000 hour intervals thereafter.

Cross Slide Felt Wipers & Aprons: Inspect and check for damage. Remove swarf particles.

Change Gear Securing Nuts: Check tightness.

Attachments and Tooling Equipment  
Securing Nuts: Check tightness.

Chasing Attachment Drive (if fitted): Inspect drive chain, check tension, Remove covers and check lubrication. Push back gaiter covers on universal joints and inspect.

Feed Drive - Brake Clutch: } Inspect and check adjustment (see  
Feed - Fast Clutch: } Sec.5.23 and machine plate).  
Threading: } Check drive chain tension  
Drive Clutch: }

Collet Operating Shoe: } Inspect for correct alignment and  
Bar Feed Shoe } lubrication. (Renew when worn).

Six Collet Operating Sleeves: Inspect for correct alignment and movement to avoid overheating.

Bar Feed Mechanism: Check adjustment.

Bar Feed Mechanism Aligning Ring: Inspect for alignment.

Cyclic System: Inspect for leakage caused by loose connections and damaged tubing.

Upper Camshaft: Check tightness of bolts on coupling between wormwheel and shaft.

Main Block Positive Stop: Check for excessive pressure.

Independent Slides Positive Stop: Check for excessive pressure.

Cross Slide Positive Stops: Check for excessive pressure.

Drum Housing:  
Main Drive Housing: Clean lubricating oil sumps.

Coolant System: Clean tray, taps, pipes and ducts (including manifolds).

Bar Feed Tube Assemblies: Remove and thoroughly clean. Inspect Feeders.

Collet Tubes, Collets:	Remove and thoroughly clean. Inspect Collets.
Spindle Bore and Collet Seating:	Clean. Inspect collet keys for excessive wear.
Longitudinal Slides:	Pull quadrants back, push forward to check free movement. Adjust gib strip if required.
Spindle Speed and Feed Change Gears:	Inspect lubrication.
Main Drive Housing:	All chain drives, check adjustment and sprocket alignments.
All Cams and Cam Rollers:	Inspect for excessive wear, oil, rollers and pins.
Spindle Drum:	Check end float (see Sec.5.6)
<u>4.2 2000 Hour Procedures</u>	
Work Schedule to be carried out after 200, 2,000, 4,000 hours running, at 2,000 hour intervals thereafter.	
Intake Strainer for Pump on Continuous Lubrication System:	Inspect and Clean.
Interlube Cyclic Metered Lubrication System if fitted:	Check frequency of operation.
Main Drive Belts:	Remove cover, check belt tension and inspect for excessive wear.
Handwind Interlock System:	Inspect and check (see handbook).
Bar Feed Spring:	Check setting.
Control Panel Wire Connections:	Check for tightness.
Control Panel:	Hand operate contactors and relays, ensure free action.
'PUROLATOR' Metal Edge Filter:	Remove, clean filter and case, refit.
'PUROLATOR' "Micronic" Cartridge Filter:	Remove bowl, renew cartridge.
Upper and Intermediate Cross Slides:	Strip, Clean, refit and adjust gib strip.
4th & 5th Station Longitudinal Slides:	Strip, Clean, refit and adjust gib strip.
Chasing Attachment (if fitted):	Strip, Clean, inspect for wear, refit.
Stock Carriage:	Remove springs, clean, regrease, renew as necessary.
Feed Tube:	

Steady Bushes:	Examine and renew if worn.
Spindles, Collet Operating Toggles:	Strip and examine for wear. (Renew in matched pairs).
Pulley Shaft:	Check for oil leak adjacent to pulley, and renew oil seal if necessary.
Spindles:	Remove collet operating sleeve, examine internal form. Check for correct movement.
Conveyor:	Remove from machine and clean thoroughly. Examine for damage, adjust and refit as necessary.
Spindle Drum:	Check indexing, measure over index. (see Sec.5.7).
Drum Locking:	Check setting (see Sec.5.7).
Drum Latch:	Check setting, inspect for excessive wear.
Interlube Cyclic Metered Lubrication if fitted:	Drain and clean reservoir.
Centre Block:	Drain and flush. Clean Strainer on guide block. Adjust gib strip if required. Do not over-tighten.
Attachments:	Strip attachment slides, clean, refit and adjust. Inspect, replace worn items. Gears, bearings, splined shafts, clutch parts etc.
Switches:	Check setting, ensure free action, inspect for mechanical damage, check securing screws.
Flexible Electrical Conduits:	Inspect for damage.
Lower Cross Slides:	Strip, clean, refit and adjust gib strip. Replace aprons and felt if worn.
Conveyor Drive Motor Bearings:	See manufacturer's Service Sheets or follow a known procedure for low power motor maintenance.
Upper Camshaft Housing:	Check oil supply to drip tray and outlets.

#### 4.3 4000 Hour Procedures

Work Schedule to be carried out after 4,000 and 8,000 hours running, at 4,000 hour intervals thereafter.

Coolant Pump (Gear Type Only):	Strip and Clean, examine gears, shafts and gland. Renew as required. Refit.
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Continuous Lubrication System:	Remove and strip pump, clean and examine for wear. renew as required. Refit.
Main Drive Housing:	Examine lower and upper camshaft. Worm and Wormwheel. Drives for wear. Replace worn gears.
Spindle Drum, Spindle: Drive Gears:	Examine for wear. Renew if worn.
Cross Slides, Upper and Intermediate:	Replace return springs.
All Chain Drives:	Renew worn chains.
Drum Locking:	Renew Cam Roller and Pin if necessary. Examine Cam and Renew if worn.
Bar Stop Mechanism:	Strip Covers and examine cams, rollers and pins. Replace if worn.
Spindle Assembly:	Remove feed tube assemblies and examine. Replace worn bearings. Remove spindle nose caps, examine piston ring seals, replace if worn.

#### 4.4 12000 Hour Procedures

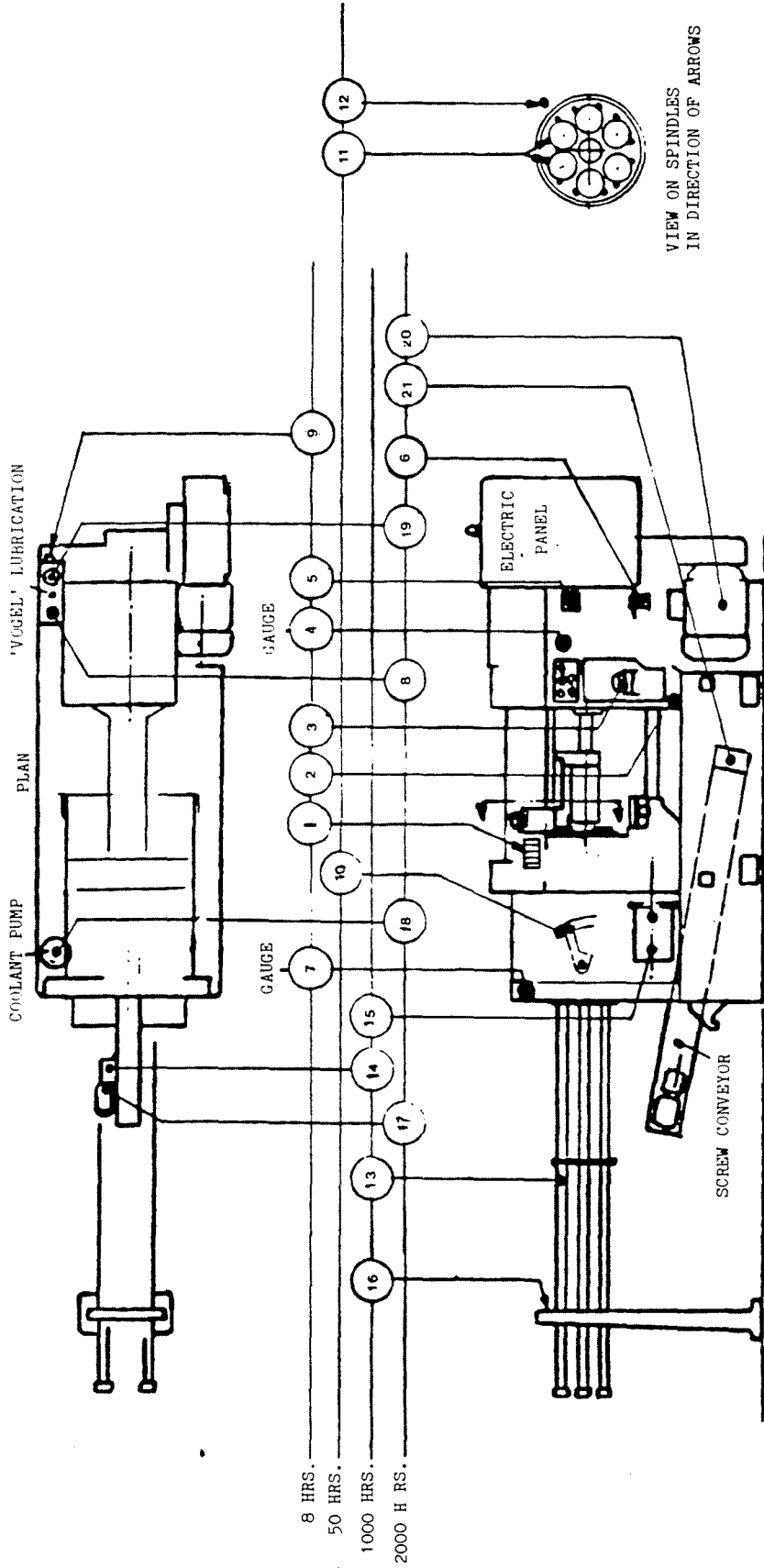
Work Schedule to be carried out after 12,000 hours running.

Longitudinal Motion:	Examine bushes, and pins, replace as necessary.
Camshafts:	Examine for worn keys and keyways.
Cross Slide Operation:	Dismantle front and rear cam levers and renew bushes. Remove links and cross slide levers and renew bushes and pins and worn shafts.
Main Drive Housing:	Examine initial drive shafts (3). Replace if worn.
Drum Housing & Drum:	Withdraw spindle drum, examine front bearing area on drum & in housing for excessive wear and damage. (Consult Wickman Engineer). Examine drum seal, replace if worn.



Lubrication Preventive Maintenance Diagram

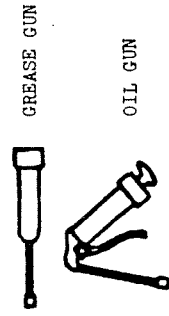
LUBRICATION PREVENTIVE MAINTENANCE



VIEW WITH SPLASH GUARDS REMOVED

SEE SHTS. 2 & 3 FOR MACHINE & ATTACHMENTS DETAILS  
 SHT. 4 CLASSIFICATION OF LUBRICANTS I.S.O. 3498

THE OIL GRADES QUOTED ARE A GUIDE TO SUITABLE VISCOSITIES  
 SOME VARIATIONS ARE PERMISSIBLE TO SUIT THE CLIMATIC CONDITIONS



LUBRICATION, PREVENTIVE MAINTENANCE

LUBE. POINT	FREQUE NCY. HOURS	DESCRIPTION	CAPACITY LITRES	INSTRUCTIONS	LUBRICANT GRADE I.S.O. 3498
1	8	circulating Lube. - Sight Glass		Check Flow	
2*	8	Circulating Lub. - Dip Stick		Check Level, Fill If Required	
3	2000	" - Filler, (Reservoir)	95	Empty, clean, & Refill Reservoir	CB68 OR HL68, HM68
4	8	" - Pressure Gauge		Check 2.2 BAR. 30 P.S.I.	
5	8	" - Metal Edge Filter		Turn Knob, 2 Turns, Remove & Clean Every 2000 Hrs.	
6	2000	" - Throw-away Cartridge Filter		Remove Bowl, Replace Cartridge	
7	8	Cyclic Lub. (Vogel) Pressure Gauge		Check, 25BAR min. (350 P.S.I.) Approx. 6 Cycles / HR.	
8	2000	" " Filler ( Reservoir)	15	Drain & clean Tank, Refill	CB68 ECT.
9*	8	" " Sight Glass		Check Level, Fill If Required	
10	50	Bar Feed Adjustment. 1 Nipple		Oil Gun	CB68 ECT.
11	50	Spindle Nose Seals 12 Nipples		1 Pump Of Grease Gun, Jog Spindles & Repeat XM2 or XM3	
12	50	Drum Seal 2 Nipples		1 Pump Of Gun, Index Machine & Repeat For 6 Indexes	XM2 or XM3
13	1000	Stock Carriage Springs		Remove, Inspect, Clean & Regrease XM2	
14	1000	Screw Type Swarf Conveyor, Reduction Unit	0.5	Check level, Oil refer. As Makers plate	
15	1000	Bar Feed Cam Drum		Fill As Required, Later M/Cs 'OPTMOL' 5150 0	
16	1000	Support Rollers, 3Nipples(Later M/Cs Sealed Bearings)		Oil Gun	CB68 ECT.
				Oil Gun	CB68 ECT.

\* Note: Reservoir Filler/Breather Caps & Strainers Should Be Checked & Cleaned When Nec. sary.  
 O Alternative Oil I.S.O. G.200

## SECTION FIVE - MACHINE CONSTRUCTION AND MAINTENANCE PROCEDURES

### 5.1 Main Frame

The frame comprises the tray which forms the base; the drum housing; the main drive housing and the beam. These main castings are bolted and dowelled together to form a rigid closed frame. The end bracket is bolted and dowelled to the tray and supports the front end of the stock carriage. It is connected to the drum housing by two guide rods on which the bar feed and the collet operating slides are mounted.

### 5.2 Main Drive

The motor, fig. 5.1, Drg.21621D is mounted on a platform. This platform pivots on a shaft mounted in a bracket which is bolted to the side of the tray. Two screws are provided to adjust the platform for belt tension and should be adjusted to clamp the platform securely.

Main Drive Gearing. Fig.5.2 Drg.200Z54A From the pulley shaft 'A', the second shaft 'B' is driven by means of the range of change gears which provide high and low speed ranges. The speed range is changed by sliding the double gear along its shaft. The double gear is located by means of a spring plunger which engages grooves in the shaft. A neutral position is provided. The speed pick-off gears transmit the power from this shaft to the centre shaft 'C'. The centre shaft extends through the attachment compartment to a coupling. From the coupling an extension of the centre shaft passes through the centre guide to the spindle drum. Fig.5.6 Drg.300 Z 57

Access to the speed pick-off gears is at the end of the main drive housing. They are mounted on taper shafts and an extractor is supplied with the tool kit. Gears and shafts should be cleaned before fitting.

The feed drive is taken from the centre shaft by gears. The fast motion drive is taken from the pulley shaft by gears through the fast motion slipping clutch. This slipping clutch is provided to protect the machine against excessive overload during the fast motion part of the cycle. If the fast motion safety clutch is disengaged as a result of an overload, the drive is transferred to the feed drive through the feed slipping clutch, and if this disengages, it operates the feed trip mechanism as described in Before re-engaging the slipping clutch, the cause of the overload must be located and corrected.

The oil pump is chain driven from the pulley shaft. The oil pump is mounted on an eccentric sleeve which can be turned to adjust the tension of the chain. The eccentric bush is locked by means of the notched nut behind the pump sprocket.

### 5.3 Feed Gearing

The feed drive is taken by gears from the centre shaft to the first pick-off gear shaft. The feed pick-off gears take the drive to the second pick-off gear shaft. The feed pick-off gears are mounted on taper shafts and an extractor is supplied in the tool kit. Access to the pick-off gears is at the end of the main drive housing.

The second pick-off gear shaft carries the feed slipping clutch. This is provided to protect the machine from excessive over-load during the feed portion of the cycle and is arranged so that it completely

disengages and operates the limit switch mounted adjacent to it and trips the feed trip mechanism, . Before re-engaging the slipping clutch, the cause of the overload must be located and corrected. The slipping clutches are re- engaged by sliding the body along until the dogs re-engage.

The gear engaging the feed slipping clutch on the second pick off gear shaft drives the feed gear and its plate clutch assembly. A roller over-run clutch is also built into this assembly. This takes the drive during the feed portion of the machine cycle whilst the feed clutch is engaged and the fast motion clutch is dis-engaged. On dis-engaging the feed clutch and engaging the fast motion clutch, the roller over-run clutch allows the fast motion drive to over run the feed drive.

The fast motion drive to the feed/fast motion shaft is taken from the pulley shaft through the fast motion slipping clutch, the driving gear the driven gear and the fast motion plate clutch assembly.

The fast motion and the feed motion plate clutches are operated by a lever controlled by cam dogs on the face of the upper longitudinal slide camshaft worm wheel. This lever is link connected to a further lever on the control shaft which carries the operating yoke actuating either the fast or feed motion clutches. The link is adjustable for length in order to set the correct travel for the clutch operating sleeve. This is set before the machine leaves the Wickman plant and should not normally require adjustment.

Adjacent to the fast motion driven gear on the feed/fast motion shaft is the final drive gear to the feed shaft. It engages with and drives the driven gear/outer member of the 24 volt DC electro-magnetic feed clutch, which when energised drives the mating dog clutch sleeve and the feed shaft.

The feed shaft is carried in roller bearings and supported by the end wall and the inner attachment drive compartment wall of the main drive housing.

The electro-magnetic brake is mounted outboard on the end wall of the main drive housing. The outboard end of the feed shaft and its braking plates assembly are spring engaged and electro-magnetically released. The operation of the feed stop button de-energises the feed clutch and the brake clutch thus allowing the brake springs to apply the feed brake. The "feed Stop" button should always be used for stopping the feed and applying the brake. Do NOT use the FEED DRIVE LEVER for this purpose. To hand wind the machine it is first necessary to press the feed stop push button to arrest the feed. The feed drive shaft dog clutch operating lever may now be lifted until it comes against a stop and retains itself. The action of lifting this lever disengages the feed dog clutch through which power could be transmitted, trips the feed dog clutch interlock switch to open the feed circuit and moves the mechanical interlock lever into the position where it is possible to slide the hand wind pinion into mesh with the hand wind gear mounted on the lower worm shaft.

The action of sliding the pinion into mesh trips the hand wind interlock switch which energises the electro-magnetic brake, thus releasing the brake allowing the handwinding to take place. In the event of a machine not having electric power available the brake will be applied and handwinding will not be possible.

In order to overcome this, two retraction screws are provided in the brake cover. Insert the screws through the holes left by removing the

knurled headed plugs and screw them into the brake unit until the brake armature plate is solidly retracted. Handwinding is now possible. It is impossible to engage the feed until the screws have been removed and it is impossible to lower the feed drive lever from the handwind position whilst the handwind crank is on its shaft. The electro-magnetic brake should be adjusted to obtain the correct air gap as instructed on the adjacent instruction plate. Lubrication is by drip feed to the clutch plates and bearings.

Faults affecting the feed and motor circuits.

The feed will disengage, the fail-safe spring brake will be applied and the motor will stop and cannot be restarted until the fault due to the following circumstances has been corrected.

(a) The feed slipping clutch disengages.

When the feed trip cam switch operates, the feed will disengage, the brake will be applied and the motor will stop and cannot be restarted until the fault due to the following circumstances has been corrected.

(a) Threading return check switch not closed on completion of attachment return stroke.

(b) Bar expired switch open due to bar exhaustion.

(c) Rotary selector switch.

The upper worm shaft is driven from the sprocket through a dog clutch. This dog clutch can be disengaged by slackening the nut on the shaft, which allows the upper worm shaft to be rotated by means of the square end while the lower camshaft remains stationary, thus enabling the timing to be altered or corrected as required. Alternatively, the machine can be hand cranked with the dog clutch disengaged until the timing required is obtained.

Timing of main and upper camshafts in relation to each other is carried out by handwinding the upper camshaft to 0 (V notches on the periphery of cam discs vertically above the centre of the shaft). Disengaging the dog clutch on the rear end of the upper wormshaft (by slackening the hexagon nut and sliding the dog clutch). Handwind the main camshaft to 0 (keyway and notches in discs and drums horizontal to the front of the shaft centre) and re-engage the dogs. Either camshaft may be advanced in relation to the other by this means where it is possible or desirable for tooling purposes.

Fig.5.1 Motor Drive Drg.216Z1D

1. Belt Guard
2. Locking Nuts
3. Motor Platform
4. Jack Screw

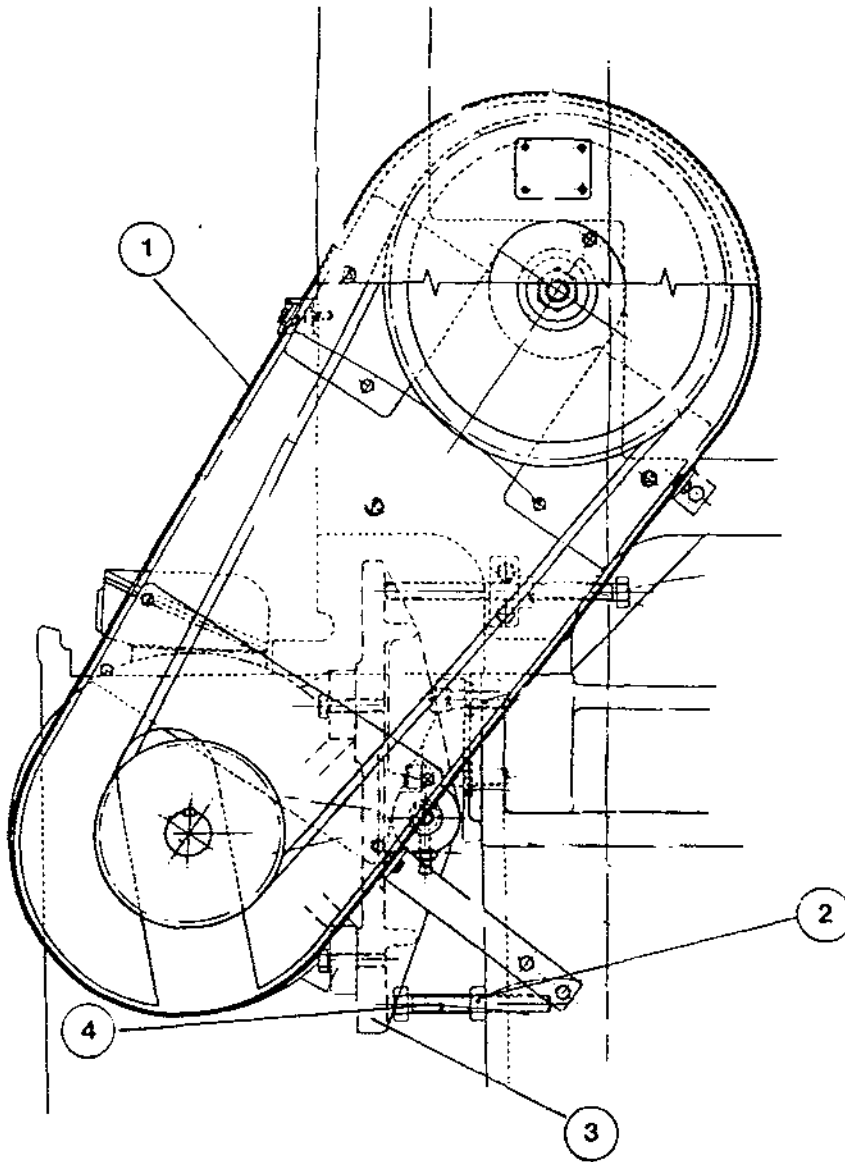
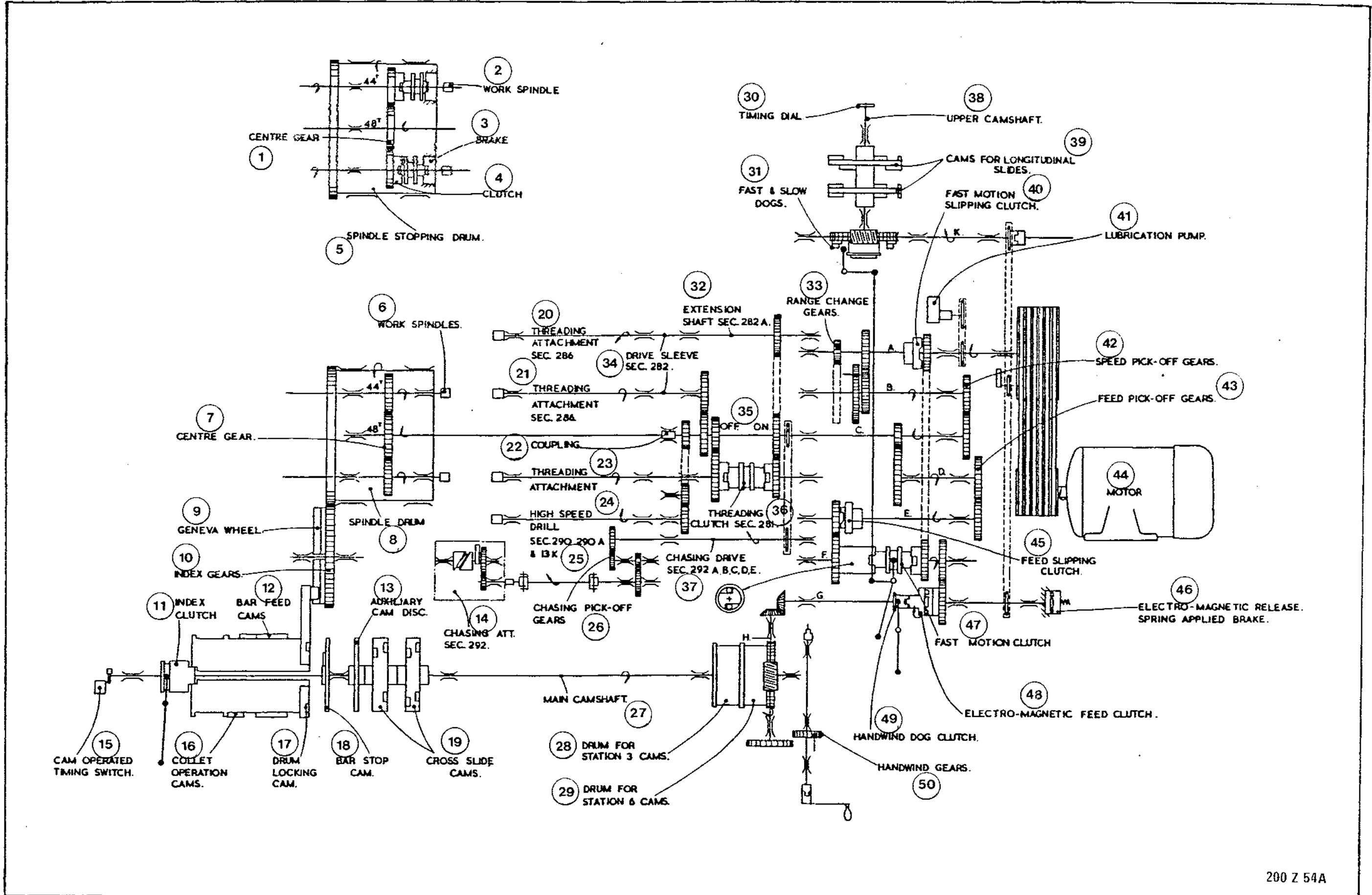


Fig.5.2 Gearing and Camshaft layout Drg.200Z54A

1. Centre gear
2. Work spindle
3. Brake
4. Clutch
5. Spindle stopping drum
6. Work spindles
7. Centre gear
8. Spindle drum
9. Geneva wheel
10. Index gears
11. Index clutch
12. Bar feed cams
13. Auxiliary cam disc
14. Chasing attachment
15. Cam operated timing switch
16. Collet operation cams
17. Drum locking cam
18. Bar stop cam
19. Cross slide cam
20. Threading attachment Section 286
21. Threading attachment Section 286
22. Coupling
23. Threading attachment
24. High speed drill
25. Section 290, 290A & 13K
26. Chasing pick-off gears
27. Main camshaft
28. Drum for station 3 cams
29. Drum for station 6 cams
30. Timing dial
31. Fast & slow dogs
32. Extension shaft
33. Range change gears
34. Drive sleeve Section 282
35. Off,On
36. Threading clutch Section 281
37. Chasing drive Section 292 A, B, C, D & E
38. Upper camshaft
39. cams for longitudinal slides
40. Fast motion slipping clutch
41. Lubrication pump
42. Speed pick-off gears
43. Feed pick-off gears
44. Motor
45. Feed slipping clutch
46. Electro magnetic release spring-applied brake
47. Fast motion clutch
48. Electro magnetic feed clutch
49. Handwind dog clutch
50. Handwind gears

Fig 5.2 Drg.200Z54A



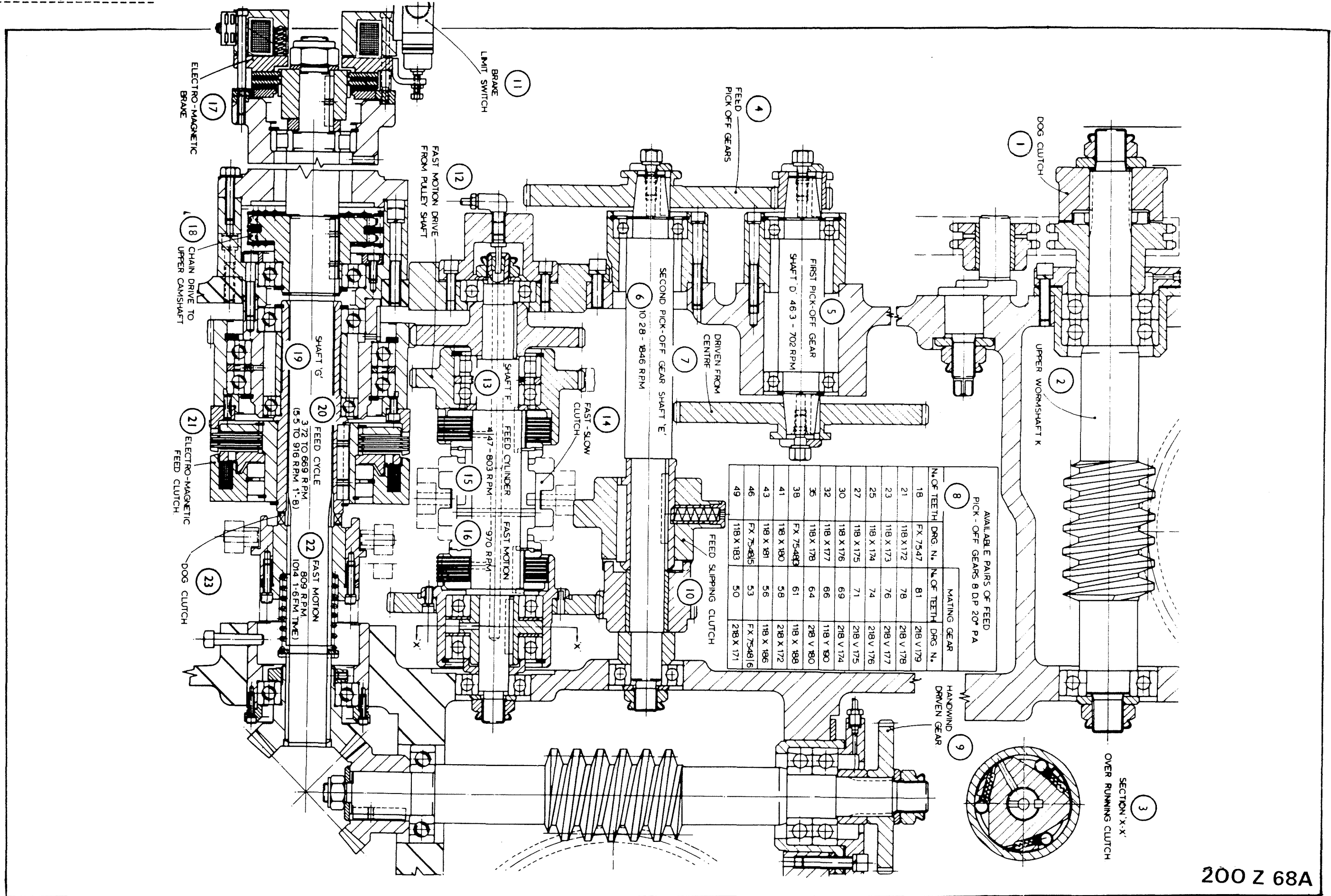
200 Z 54A



Fig.5.3 Feed Gearing Drg.200Z68A

1. Dog clutch
2. Upper wormshaft
3. Section XX over running clutch
4. Handwind driven gear
5. Feed slipping clutch
6. First pick-off gear shaft 'D'
7. Feed pick-off gears
8. Driven from centre shaft
9. Second pick-off shaft 'E'
10. Fast-slow clutch
11. Fast motion drive from pulley shaft
12. Chain drive to upper camshaft
13. Feed clutch
14. Brake

15.	Mating Gear			
	No of Teeth	Drawing No	No of Teeth	Drawing No
	18	FX 7547	81	218V179
	21	118X172	78	218V178
	23	118X173	76	218V177
	25	118X174	74	218V176
	27	118X175	71	218V175
	30	118X176	69	218V174
	32	118X177	66	118X190
	35	118X178	64	218V180
	38	FX7548/3	61	118X188
	41	118X180	58	218X272
	43	118X181	56	118X186
	46	FX7548/5	53	FX7548/6
	49	118X183	50	218X171



200 Z 68A

#### 5.4 The Main Camshaft

The main camshaft extends from the wormwheel in the main drive through the drum housing to the end bracket. It carries the cross slide feed and approach stroke cams, bar stop, bar feed, and collet operating cams, spindle drum locking cams, the geneva roller and the index clutch. End thrusts on the camshaft are taken by angular contact ball bearings in the end bracket.

The cam drum is fitted in the main drive housing which carries the reaming and threading cams, these being fitted when required. Special cams may also be fitted when necessary. These cams normally operate the auxiliary longitudinal motions. Sections 289A and 289B which are arranged to operate standard and special attachments in 3rd and 6th stations.

A portion of the camshaft in front of the main drive housing is provided with a keyway. This enables special cam drums to be fitted at this point.

A timing switch cam disc in the drum housing, with tapped holes to enable special cams to be fitted. Fig.5.5. These cams can operate the cross slide through the appropriate auxiliary cross slide motion. Section 293, 293A, 293C or 293D.

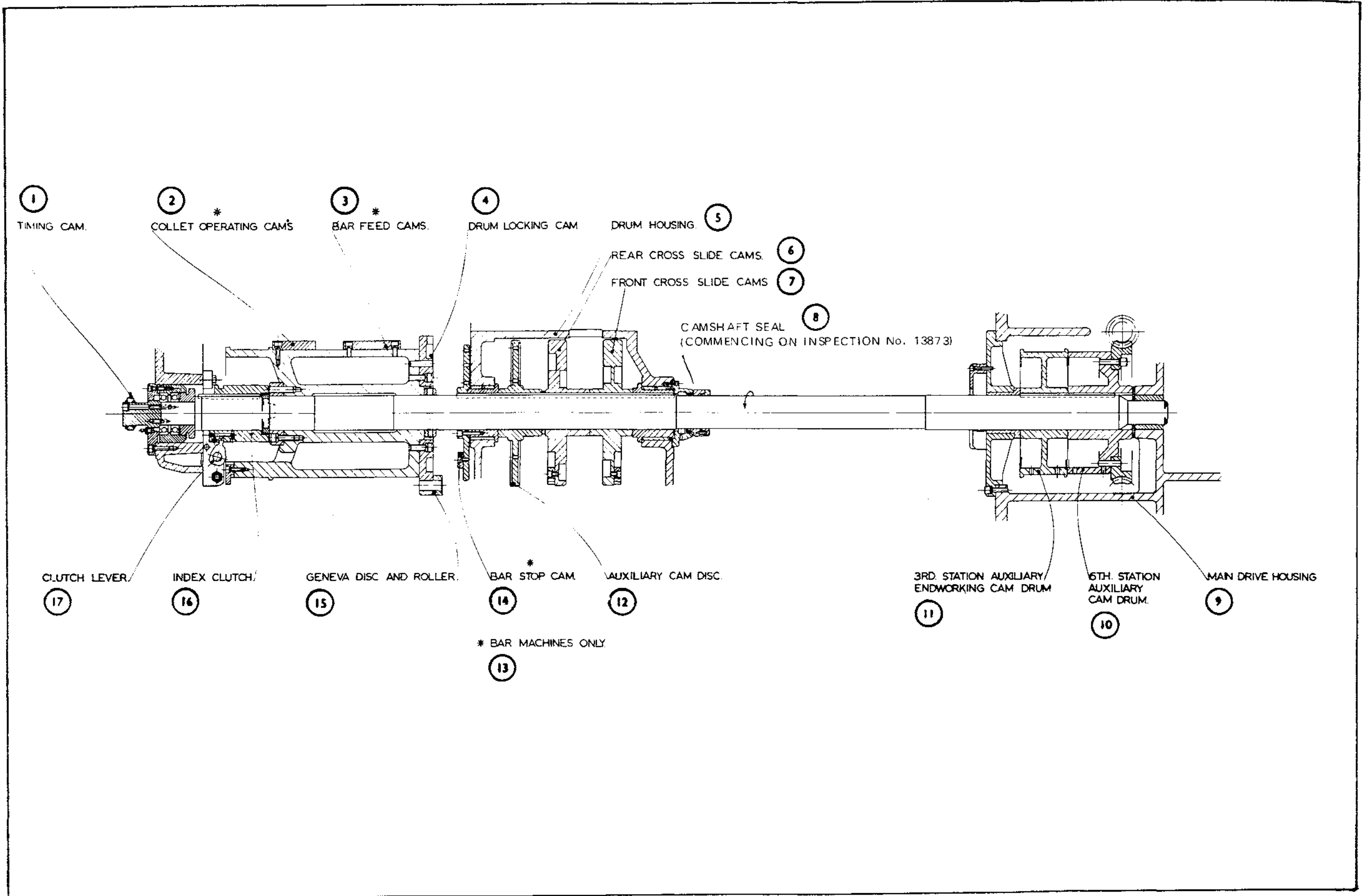
#### 5.5 Upper Camshaft

Beyond the end bracket an extension is fitted to the camshaft to carry the timing cam operating the timing switch for the trip mechanism, additional cams and limit switches may be added as check switches for the control of attachments.

The cam dogs controlling the fast motion clutch are mounted on the face of the wormwheel. Normal timing is for the fast motion dog to engage the clutch at the end of "dwell" (268 deg timing), and for the slow motion dog to engage at the start of "feed" (112 deg timing), see timing diagram. The timing dials are mounted on each end of the camshaft.

Fig. 5.4 Main Camshaft Drg.300 Z 77A

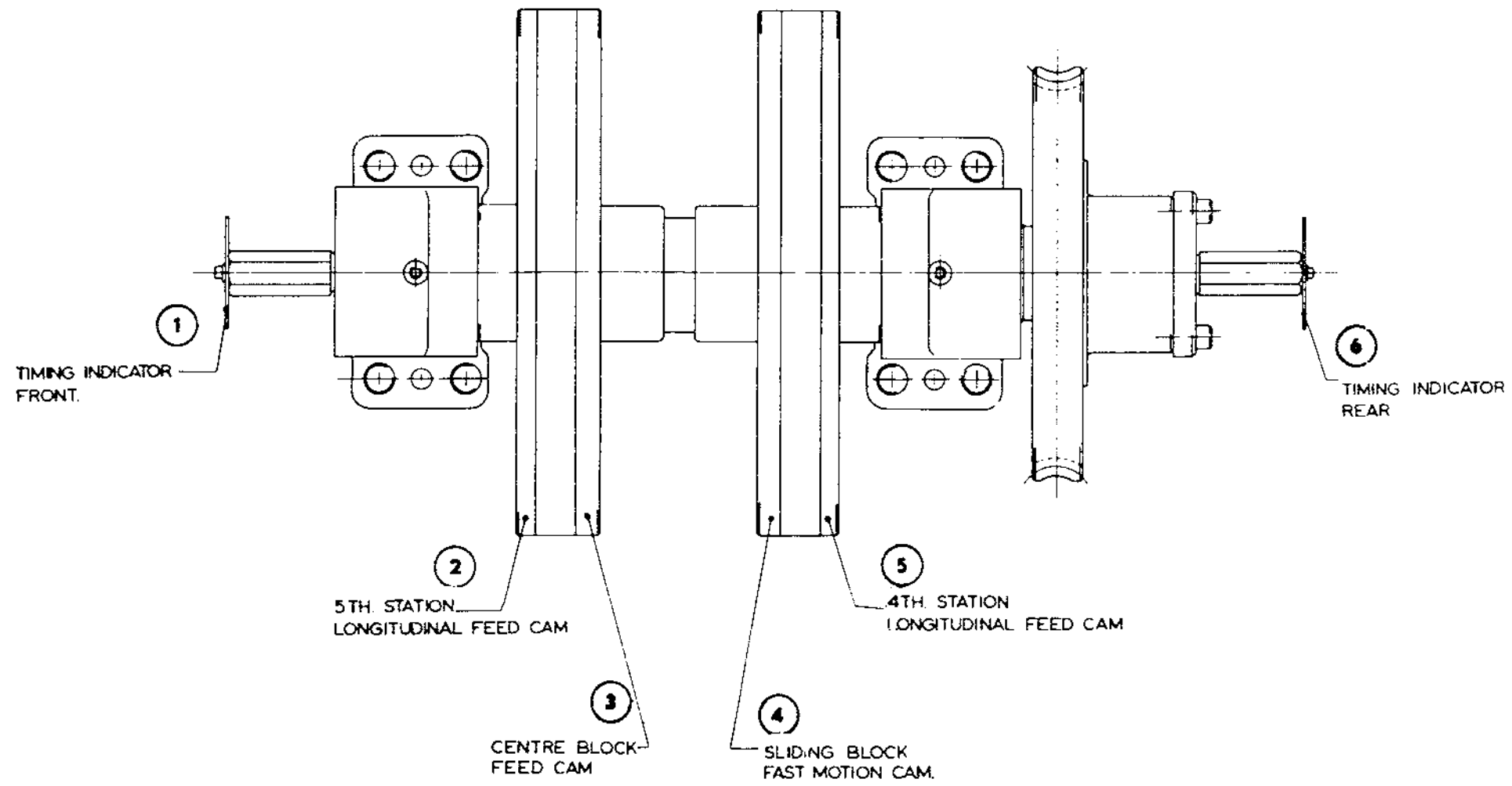
1. Timing cam
2. Collet operating cams (bar machines only)
3. Bar feed cams (bar machines only)
4. Drum locking cam
5. Drum housing
6. Rear cross slide cams
7. Front cross slide cams
8. Camshaft seal
9. Main drive housing
10. 6th Station auxiliary cam drum
11. 3rd Station auxiliary end working cam drum
12. Auxiliary cam disc
13. Bar machines only
14. Bar stop cam (Bar machines only)
15. Geneva disc & roller
16. Index Clutch
17. Clutch lever



300 Z 77A

Fig. 5.5 Upper Camshaft Drg.300 Y 70

1. Timing indicator front
2. 5th Station longitudinal feed cam
3. Centre block feed cam
4. Sliding block fast motion cam
5. 4th Station longitudinal feed cam
6. Timing indicator rear



300Y70

## 5.6 The Spindle Drum Indexing & Locking Mechanism

The spindle drum carries the work spindles and the centre guide on which the centre tool block slides, so ensuring consistent alignment of the work spindles with the centre tool block.

End thrusts on the spindle drum are taken by three thrust blocks on the rear of the drum housing. Should end float develop, the thrust blocks should be removed and their faces carefully adjusted so that a 0.002" feeler gauge can be inserted between the thrust block and the flange of the drum.

The spindle drum is indexed anti-clockwise, looking at the collets, by gearing from the Geneva wheel. At each cycle the spindle drum is indexed slightly past the correct position to allow the drum latch to drop into position. It is then drawn back by the drum locking mechanism and clamped against the hardened and ground locators.

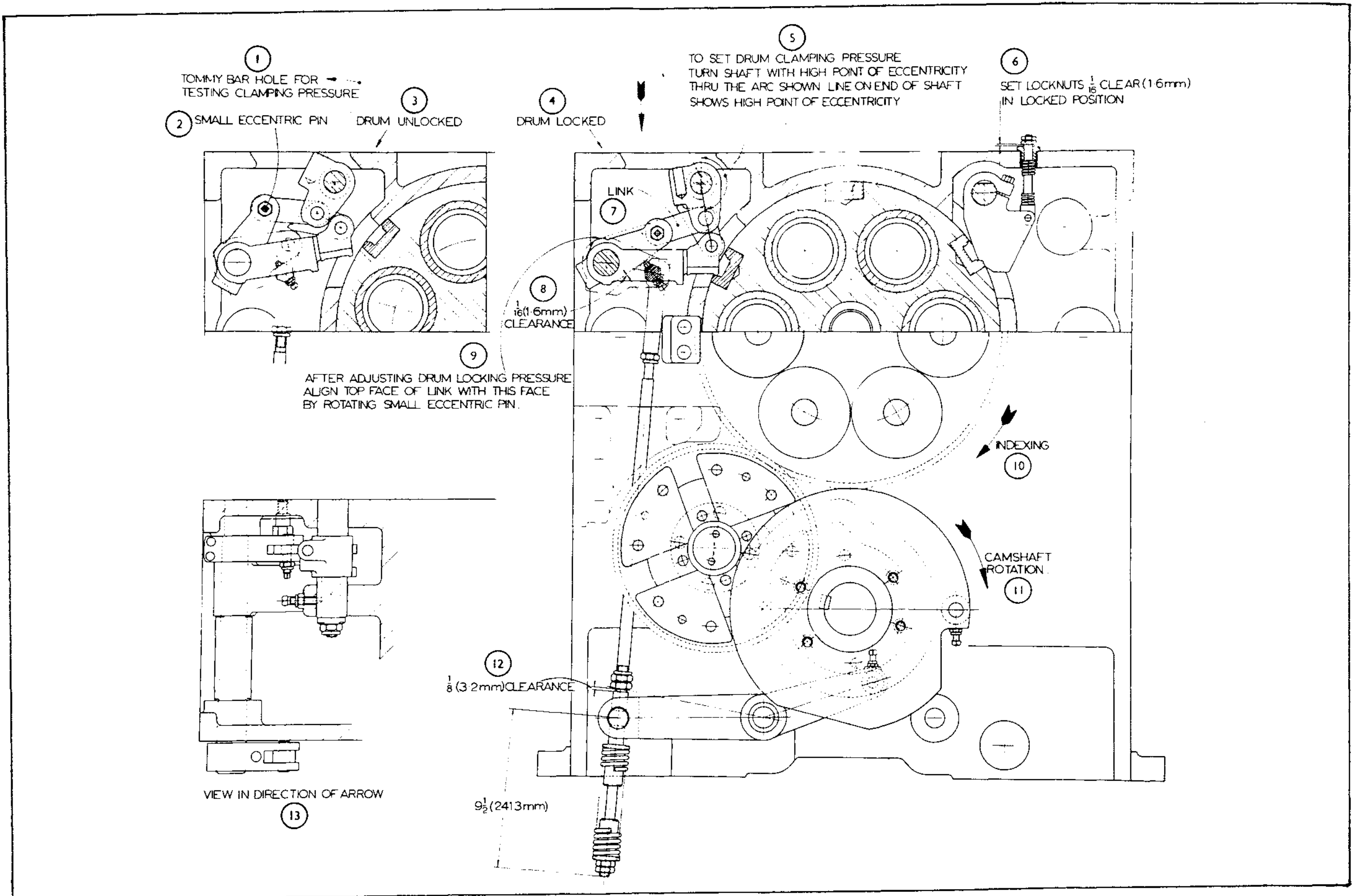
A large seal is fitted into a recess at the front of the drum housing and prevents coolant and swarf entering around the periphery of the spindle drum.

A flanged stem bolted and dowelled to the back of the spindle drum drives the stock carriage and carries a disc supported by rollers in the end bracket. The stem also carries an adjustable guide on the back of which is a star shaped stop disc retained by a circlip. The disc can be indexed into two positions and has a spring plunger to locate it - one position limits the travel of the feed tubes and the other allows the feed tubes to be withdrawn for replacement of the feed fingers. See Fig. 5.6 Drg.300Z57



Fig. 5.6 Spindle Drum Indexing & Locking Mechanism Drg.300 Z 57

1. Tommy bar hole for testing clamping pressure
2. Small eccentric pin
3. Drum unlocked
4. Drum locked
5. To set drum clamping pressure turn shaft to high point of eccentricity through the arc shown. Line on end of shaft shows high point of eccentricity.
6. Set locknuts 1/16" clear (1.6mm) in locked position
7. Link
8. 1/16" (1.6mm) Clearance
9. After adjusting drum locking pressure align top face of link with this face by rotating small eccentric pin.
10. Indexing
11. Camshaft rotation
12. 1/8" (3.2mm) Clearance
13. View in direction of arrow



300Z 57

### 5.7 Drum Locking

The drum locking mechanism at the rear of the machine is essentially a toggle mechanism arranged to lock the spindle drum very near the dead centre position of the toggle. The amount of off-set by which the toggle does not reach the dead - centre position is adjusted during manufacture at the abutment between the upper toggle lever and the toggle link. The toggle link is attached to the lower lever. The lower lever carries the locking pad and pivots freely about the operating shaft, whose position is designed so as the path of the locking pad during the locking and unlocking movement results in the minimum sliding contact and wear between the locking pad and the locator in the spindle drum.

The upper toggle lever pivots freely on its journal on the Fulcrum pin which is eccentric to the rest of the pin.

The eccentric fulcrum pin should be adjusted and locked so that when operated lightly by hand with a tommy bar in the upper toggle lever, the locking mechanism just binds the spindle drum. This operation should preferably be done when the spindle bearings have reached their normal temperature for the speed and conditions prevailing, and with the long operating rod connecting the outer lever to the spring box disconnected. The high point of the eccentric is marked on the end of the shaft and should be adjusted to the lie in the arc when the mechanism is locked.

The toggle is operated by a link connected to a lever on the operating shaft and these form a toggle to give a positive lock with a light operating load.

In the locked position the top link should be in line with the facing on the lever and there should be approximately  $1/16$ " (1.6mm) clearance between the lever and stop screw.

The pre-loaded locking spring assembly should be adjusted by turning the operating rod to obtain  $9\frac{1}{2}$ " (241mm) from the centre of the pin to the end of the rod in the locked position.

The nuts above the assembly should then be adjusted  $1/8$ " (3.2mm) clear of the assembly. See Fig. 5.6.

### 5.8 Work Spindles

The work spindles are mounted in extra precision pre-loaded anti-friction bearings. The front caps of the spindles carry the stop screws for the cross slides. The stop screws can be adjusted so that the slightest variation between spindles can be eliminated by the stop pressure.

The bearings are lubricated from sight feeds on the beam above the drum housing.

The bar is fed out in 6th station after the feed cycle has finished and immediately prior to indexing.

The collets, which are of the draw-in style, are operated by a toggle mechanism on the end of the work spindles. The collets may be removed by drawing back the spring plunger and turning the left-hand threaded adjusting sleeve. This will release the collet complete with its draw tube. The new collet can then be screwed onto the draw tube and the whole replaced in the spindle. Tension is set on the collet by means of the adjusting sleeve. The tension must be tested by means of the hand lever, care being taken to ensure that excessive pressure is not required to close the collet. A spring compensator is included in the toggle mechanism to accommodate any small variations in bar size. If the machine is run without collets and tubes, the collet adjusting sleeve must be removed from the spindle.

The feed fingers are fitted to feed tubes which carry on their outer ends the bar feed bobbins, the outer parts of which are formed by shielded anti-friction bearings.

To remove the feed fingers it is first necessary to slide back the stock carriage tubes. This is done by first pushing the tube towards the machine and then turning anticlockwise until the head of the tube is free to slide back. By turning the plate on the rear of the centre stop which is held in position by a spring plunger, the feed tubes may be removed complete. To remove the feed tube in station 6, the bar feed shoe lever must also be moved to the down position. To remove the feed tubes in any station but station 6, when the automatic stop is fitted, the alignment fingers must be lifted clear.

Steady bushes are fitted in the end of the feed tubes and are retained by a screwed sleeve and nut.

Collet operating mechanism Fig.5.8 200 Z 78. After the workpiece is cut off in station the 6th station, the collet is opened, bar stock is fed out to the bar stop which controls the length and the collet is closed just before indexing commences. (See timing dia. 200 Y 29)

The collet operating mechanism consists of a cam operated lever carried on a fulcrum pin in the bridge between the drum housing and the end bracket and connected at its upper end to the collet slide by a link. The link pin in the upper end of the lever is eccentric and is clamped in the lever so that the position of the collet slide and bobbins can be adjusted to ensure that the bobbins have overtraveled beyond the point where the is fully closed.

Hand operation of the collet is provided by inserting the hand lever in its boss on the shaft in the end bracket. The inner lever, Clamped on the shaft serrations, is connected to the cam lever by a link so arranged that the operator has considerable purchase over the load. The angular position of the hand lever can be varied to suit the operator by moving the inner on the shaft serrations. The collet can be operated by hand only while the cam roller is in the gap provided in the cam track. the timing switch cam for the trip mechanism should be set so that it operates at this point (indicated on the timing dial), so that, when the feed trips, there is no pressure on the collet shoe is avoided.

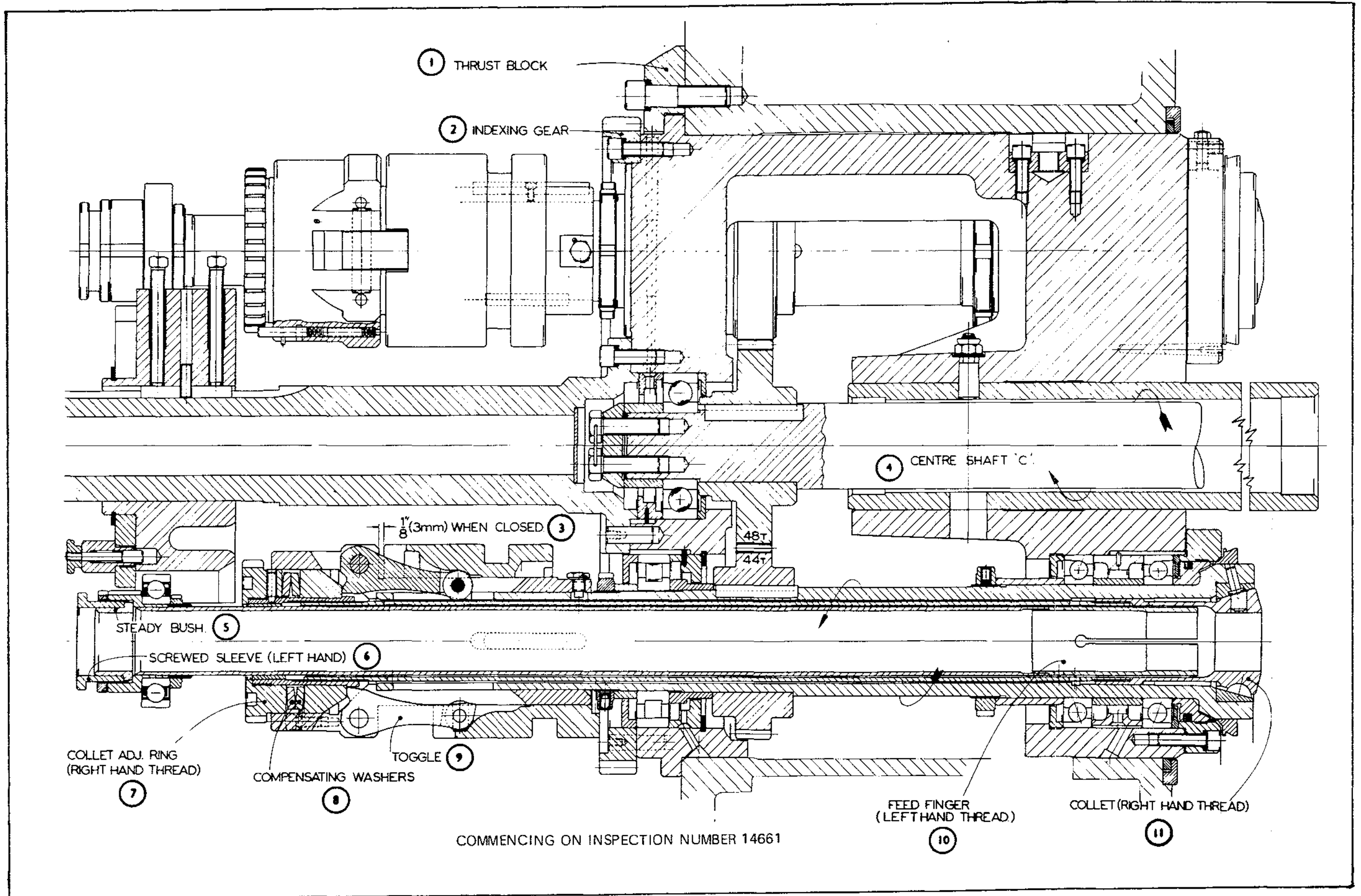
A stop rod and lock nuts are provided to prevent the slide being moved further than required.

The collet slide slides on two round guides and carries the collet shoe, which engages each collet bobbin in turn. The shoe is spring loaded so that should a bobbin index out of position the finger will be depressed, preventing damage. A knurled head back stop screw, the backstop may be screwed inward, disengaging the shoe from the collet bobbin and rendering the collet mechanism inoperative.

Collet adjustment is made by withdrawing the locking plunger and turning the adjusting nut, using the special tool provided. One pin of the tool should be placed in the groove in the face of the nut, while the other rests in any half round notch. The tool can be used to 'ratchet' the nut in any direction, giving very quick adjustment. Alternatively an adjustable pin spanner can be used in a similar way. The thread is a RIGHT HAND THREAD.

Fig. 5.7 Work Spindle Arrangement Drg. 200 Z 80A

1. Thrust block
2. Indexing gear
3. Centre shaft 'C'
4. Collet (right hand thread)
5. Feed finger (left hand thread)
6. Toggle
7. Compensating ring
8. Collet adjusting ring (right hand thread)
9. Steady bush
10. Screwed sleeve
11. 1/8" (3mm) when closed



200 Z 80A

## 5.9 Collet and Bar Feed Operation

The collet slide is operated in station 6 by cams through a lever and link. The pin at the top of the lever is eccentric. This enables the collet operating shoe to be lined up with the collet bobbins. It is initially set at the works and should not require adjustment. A stop rod and locknuts are provided to prevent the slide being moved further than is required.

A screw in the top of the collet operating slide acts as a backstop for the collet operating finger. By unclamping this screw and screwing it inwards, the collet operating shoe may be disengaged from the bobbins rendering the collet operating mechanism inoperative. The collet operating shoe is spring-loaded so that if a bobbin comes round out of position, the finger will be depressed preventing damage.

Hand operation of the collet is provided for checking adjustment, but can be used only while the cam roller is in the gap provided in the cams. The cam plate for the cam timing switch should be kept set to trip the machine at this point.

The bar feed is operated by cams and springs through the bar feed lever and a link. The slide is fed forward by two compression springs and returned by cam. By means of the nuts on the spring connecting rod, the spring tension may be varied to suit requirements. The link to the bar feed slide is constructed so that it will collapse should the bar feed be prevented from returning under the action of the cam. Should this occur, the obstruction must be removed before resetting the link.

The bar feed stroke should be set before the bars are loaded into the machine. First handwind the machine until the bar feed slide is in the fully forward position. Loosen the centre stop and slide this as far back as it will go. If section 153 (the auto stop after completion of the bar) is fitted, the pusher plate and bracket and the aligning plate carrier must also be moved back. These are clamped on their rods by means of pad bolts. To move the pusher plate and bracket backwards, it may be necessary to lift it clear of the bar feed bobbin.

Next handwind the machine until the bar feed slide is in the fully back position, the centre stop should be set to its new position. If the auto stop is also fitted, the aligning plate carrier and the pusher plate and bracket should be reset. In this case the centre stop is set so that the back of the plate is in line with the bottom of the milled slot in the aligning plate carrier.

The stock carriage tubes may be adjusted to and from the spindle by releasing the head on the tube and reclamping in the desired position. This is desirable, when using small diameter bars, in order to give the maximum support to the bar.

If the stock carriage tubes have been set forward, they should be moved back before increasing the bar feed stroke and reset after completing the change.

When repositioning the centre stop on machines with the auto stop fitted, it may be set father back than as stated previously. This is useful when short feed strokes are set as it gives more available movement for forcing the new bar through the feed finger when loading. The centre stop should be set so that the bar feed tubes cannot wander backwards or foul the stock carriage tubes if these are adjusted forward.

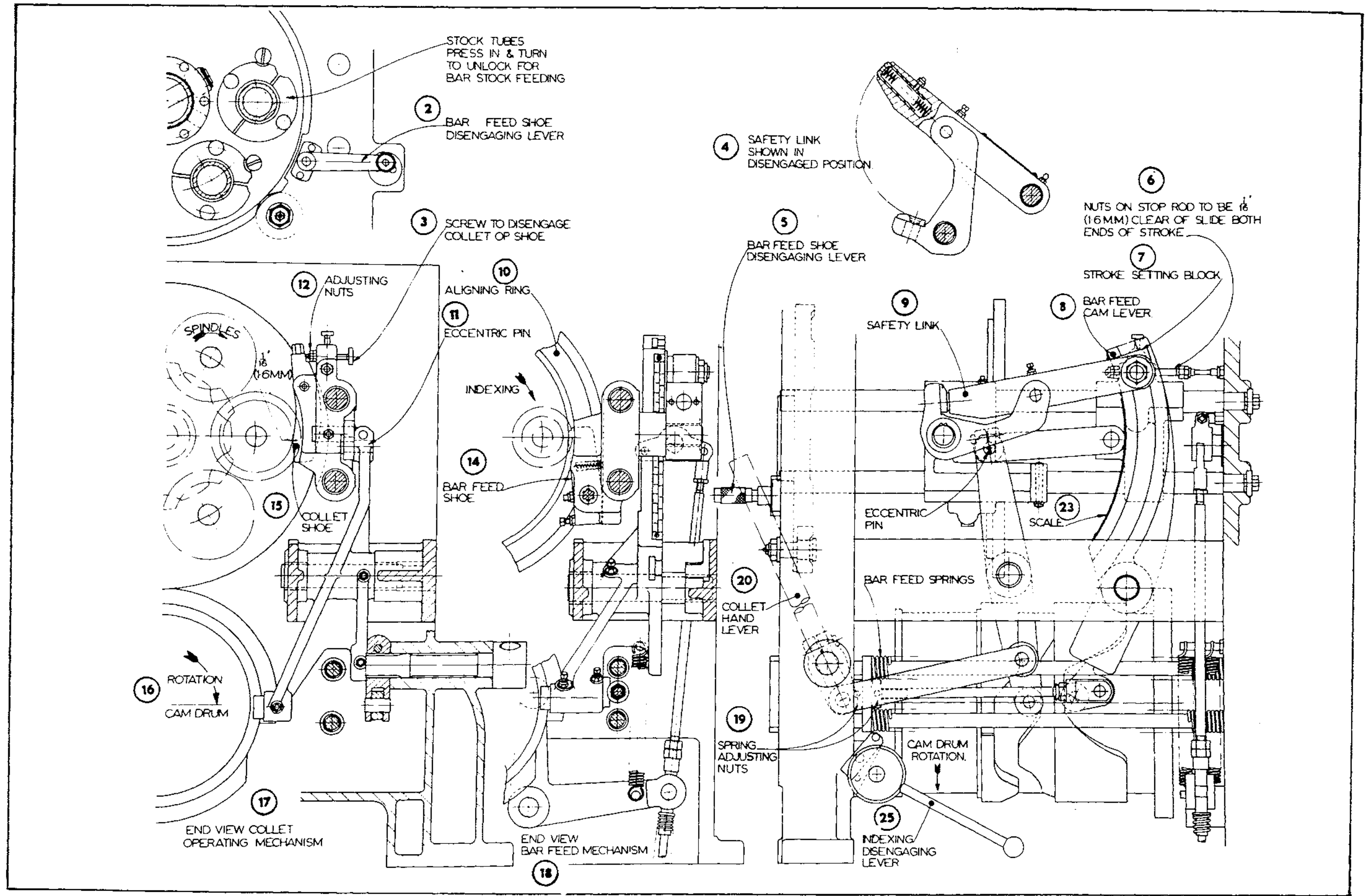
Should it be necessary to change the bar feed stroke after the bars are loaded into the machine, all the collets should be opened before starting the above procedure. If the stroke is increased whilst bars are in the machine and the collets are not open, the aligning ring on the bar feed slide will have to return all the feed tubes at once and this extra load will cause the link to collapse. If the stroke is decreased when bars are in the machine, each bar feed tube must be set in the loading station until all six are in the new position; the centre stop can then be reset.

The bar feed shoe is spring-loaded and will be depressed should a bar feed bobbin index round when out of position.



Fig. 5.8 Collet Operating Mechanism Drg. 200 Z 78

1. Stock tubes press in and turn to unlock for bar stock feeding
2. Bar feed shoe disengaging lever
3. Shoe to disengage collet operation shoe
4. Safety link shown in disengaged position
5. Bar feed shoe disengaged lever
6. Nuts on stop rod to be 1/16" (1.6mm) clear of slide both ends of stroke
7. Stroke setting block
8. Bar feed cam lever
9. Safety link
10. Aligning ring
11. Eccentric pin
12. Adjusting nuts
13. Indexing
14. Bar feed shoe
15. Collet shoe
16. Rotation cam drum
17. End view collet operating mechanism
18. End view bar feed mechanism
19. Spring adjusting nuts
20. Collet hand lever
21. Eccentric pin
22. Bar feed springs
23. Scale
24. Cam drum rotation
25. Indexing disengaging lever



200 Z78

#### 5.10 Bar Stop

The bar stop arm is mounted on a shaft which passes through the drum housing and the cut-off slide base. It is clamped to this shaft by a pad bolt one of which is extended to form the bar stop hand lever.

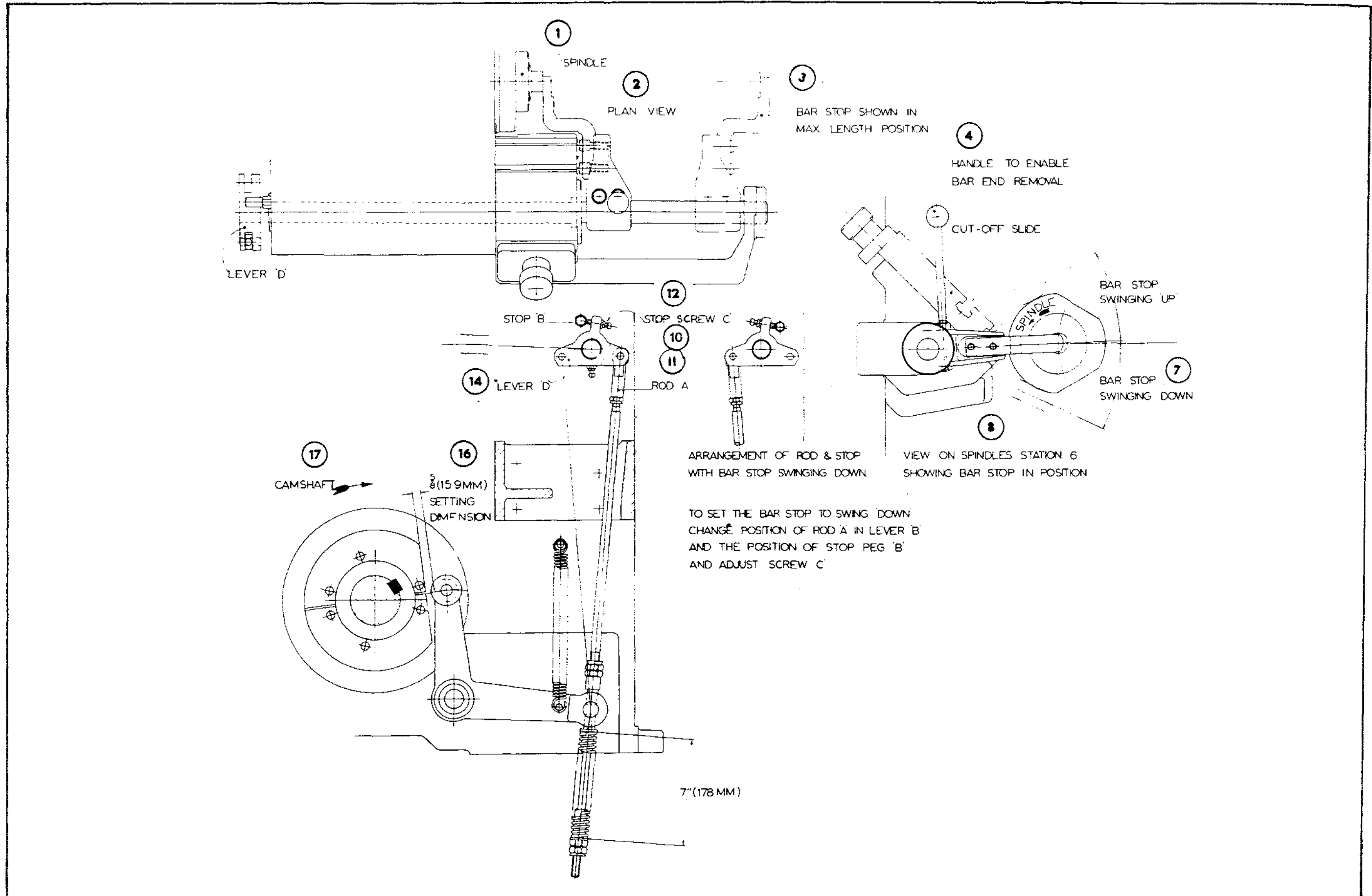
The bar stop itself is bolted to its bracket and may be turned round to accommodate long jobs.

It is operated by tension with cam return through a lever, a link rod and a double lever. The link rod is extended to take a spring which will compress should any obstruction prevent the bar stop from operating under the force of the cam. The double lever carries a stop screw which is set against the stop pin when the bar stop is central to the bar. The above settings are used when the bar stop is in the up-swinging position.

It can be arranged to swing downwards by connecting the link rod to the second arm of the double lever. When used in this position, the stop pin must be placed in the second hole and the stop screw reversed. The nuts on the link rod may need readjustment after changing over.

Fig 5.9 Bar Stop Drg. 200 Z 79

1. Spindle
2. Plan view
3. Bar stop shown in max. length position
4. Handle to enable bar end removal
5. Cut-off slide
6. Bar stop swinging up
7. Bar stop swinging down
8. View on spindles station 6 showing bar stop in position
9. Arrangement of rod and stop with bar stop swinging down
10. To set the bar stop to swing down change position of rod 'A' in lever 'B' and the position of stop peg 'B' and adjust screw 'C'
11. Rod 'A'
12. Stop screw 'C'
13. Stop 'B'
14. Lever 'D'
15. Lever 'D'
16. 5/8" (15.9mm) Setting dimension



200Z79

## 5.11 Centre Tool Block and Longitudinal Slides

The centre tool block slides on the nitrided centre guide and is fitted with scraper rings, slides on the centre guide which indexes with the spindle drum. Torque loads on the block are taken against the guide faces in the beam by the guide block on the top of the guide arm, adjustment for wear being provided by a gib strip. Care should be taken when adjusting the gib strip, to check adjustment throughout the travel, as wear will tend to occur mainly on the portion covered by the short strokes.

Oil is fed from drip points in the beam through a strainer on the guide block and down a pipe to the reservoir between the bushes in the centre block. Drain and filter plugs are provided for the periodical draining and flushing out.

The block pushed by the lower link at the longitudinal mechanism and no endwise adjustment is provided. The stop rod is provided to control length accurately. Stop nuts should be slackened off well clear before adjusting slide stroke, as the final position of the block is not constant for all strokes.

The faces and tenon slots are ground to close tolerances and the block is positioned angularly so that the stock tool holders may be fitted to any face without selection for height or centrality and without requiring boring in position

Longitudinal slides are mounted on V guides fitted on the beam, which are accurately adjusted for alignment and centrality by the tenon blocks. The tool slides are accurately adjusted for height and gib strips are provided. See Fig. 5.11 Drg. 300 Z 61.

Note: Gib strip adjustments are made in opposite directions as front and rear slides are identical, and the thick end of the gib strips therefore face in opposite directions.

Each slide is pushed by a rod screwed into the pusher bar and is adjustable for position by means of nuts on the rod. A spacer between the nuts is slightly wider than the bracket on the side of the slide, thereby allowing for slight mis-alignment of the push rod. A stop rod is provided to control accurate lengths from each side and is necked so that it will break in the event of a overload. The stop nuts must be slackened well clear before adjusting slide stroke as the final position of the slide is not constant for all strokes.

The centre block link Fig.5.12 Drg. 200 Z 60 and the longitudinal slide pusher bars are operated by levers carried on a common fulcrum pin in the fast motion sliding block. The top end of these levers are connected by links to stroke setting blocks in the feed operating levers which are each operated by a feed cam bolted and dowelled to the cam discs on the upper camshaft, Fig.5.5 Drg. 300 Y 70.

Fast motion sliding block is guided in a narrow guide in the top of the main drive housing and restrained vertically keep strips on each side. It is operated by the fast motion cam, by a toggle at the end of the fast approach stroke and is locked against the traverse spring stop bar 'A' so that it is held rigid during the slow feed cycle. The head of the stop screw is adjusted on assembly so that the stop bar is bent .030" (.76mm). When the sliding block is fully drawn back at the end of the fast return stroke, the stop screw 'C' is adjusted to be .015" (.4mm) clear of the toggle cam lever.

The fast motion cam gives constant approach strokes shown on the Drg. 200 Z 21A. An optional approach stroke cam can be fitted to give

the alternative strokes shown on Drg. 200 Z 21A But this entails dismantling the upper camshaft.

The feed stroke for each slide is set by sliding the stroke setting block up or down the slot in the feed operating lever to the position required, as indicated on the adjacent scale. Dead stops for the centre block and longitudinal slides must be slackened off before altering the stroke adjustment setting, as the fully forward position of the slides is not constant for all strokes because the face of the feed operating lever is straight.

The timing of the different movements is shown on the Timing Diagram Fig.5.10 Drg. 200 Y 29 and Fig.5.12 Drg. 200 Z 60

From 336 Deg. to 77 Deg. ie. mainly during indexing, the mechanism is in the position shown in Fig.5.12 Drg. 200 Z 60 Fig. 'A'.

As the drum indexing and locking is completed, the fast motion sliding block forward rapidly from 77 Deg. to 112 deg. against the bar stop 'A' the feed operating levers meanwhile remaining in the fully returned position.

On the completion of the fast approach stroke at 112 deg. the mechanism is in the position shown on Fig.5.12 Drg. 200 Z 60 Fig. 'B' and the feed motion clutch is engaged. The feed operating levers then commence slow feed movement from 112 Deg. to 268 Deg. The position of the stroke setting blocks determine the feed stroke which results.

At the end of the slow feed the mechanism is in the position shown in Fig.5.12 Drg. 200 Z 60 Fig. 'C' and there is a dwell at the end of which (268 Deg.) the fast motion clutch is engaged.

The fast motion sliding block and the feed operating levers and there associated links, levers and slides return together (from 268 Deg. to 336 Deg.) to the fully returned position.

When threading stations 4 or 5, the feed cams are changed for standard threading cams, which have different strokes.

For special purposes flanged fulcrum studs can be mounted in the bored holes in the beam casting. Special levers can then be mounted on the studs to operate the independent slide pusher bars direct from the feed lever links and levers.

With this arrangement there is no constant fast motion, but the ratio of levers can be so arranged to give long strokes independent of all other movements.

1. Timing diagram
2. Timing angle
3. Movement
4. Drum indexing
5. Indexing
6. Drum locking
7. Unlocked
8. Locked
9. Cross slide fast motion
10. Withdrawn
11. Advanced
12. Cross-slide feed
13. Feed
14. Dwell
15. Longitudinal slide feed
16. Withdrawn
17. Advanced
18. Longitudinal slide feed
19. Feed
20. Dwell
21. Bar stop
22. Front
23. Rear
24. Withdrawn
25. Rear
26. Front
27. Advanced
28. Collet
29. Closed
30. Open
31. Hand operated
32. Bar feed
33. Dwell
34. Bar feed
35. Threading stations 4 & 5
36. Advance
37. Feed
38. Taps and button dies
39. Self opening die heads
40. Threading station 3
41. Advance
42. Feed
43. Return
44. Threading station 6
45. Advance
46. Feed
47. Return
48. Reaming station 3
49. Advance
50. Feed
51. Dwell
52. Reaming station 6
53. Advance
54. Feed
55. Dwell
56. Reaming accelerated station 3
57. Advance
58. Feed
59. Dwell



- 60. Motion
- 61. Fast
- 62. Feed
- 63. Fast
- 64. Plain pick-up

Fig. 5.10 Drg. 200 Y 29

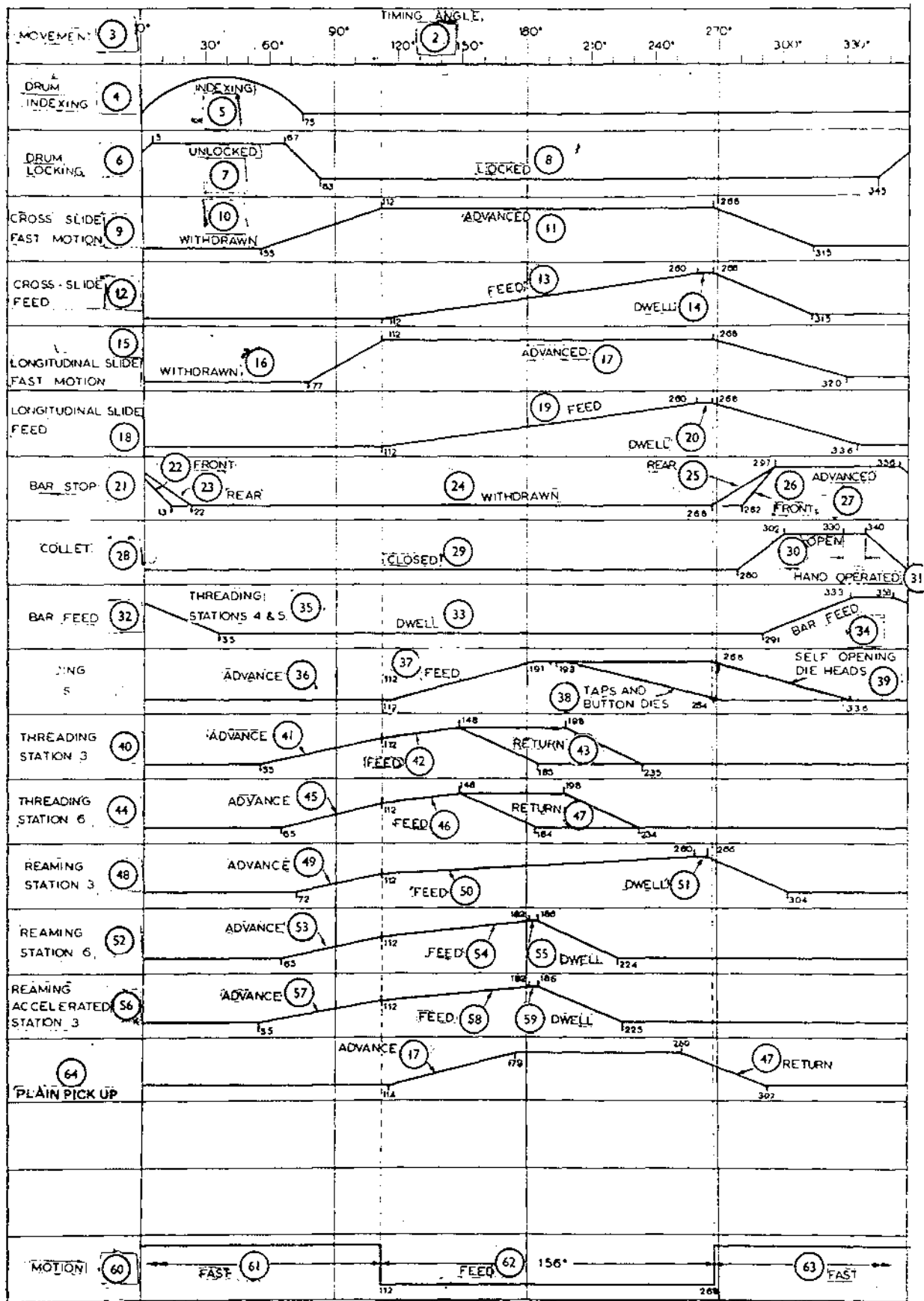
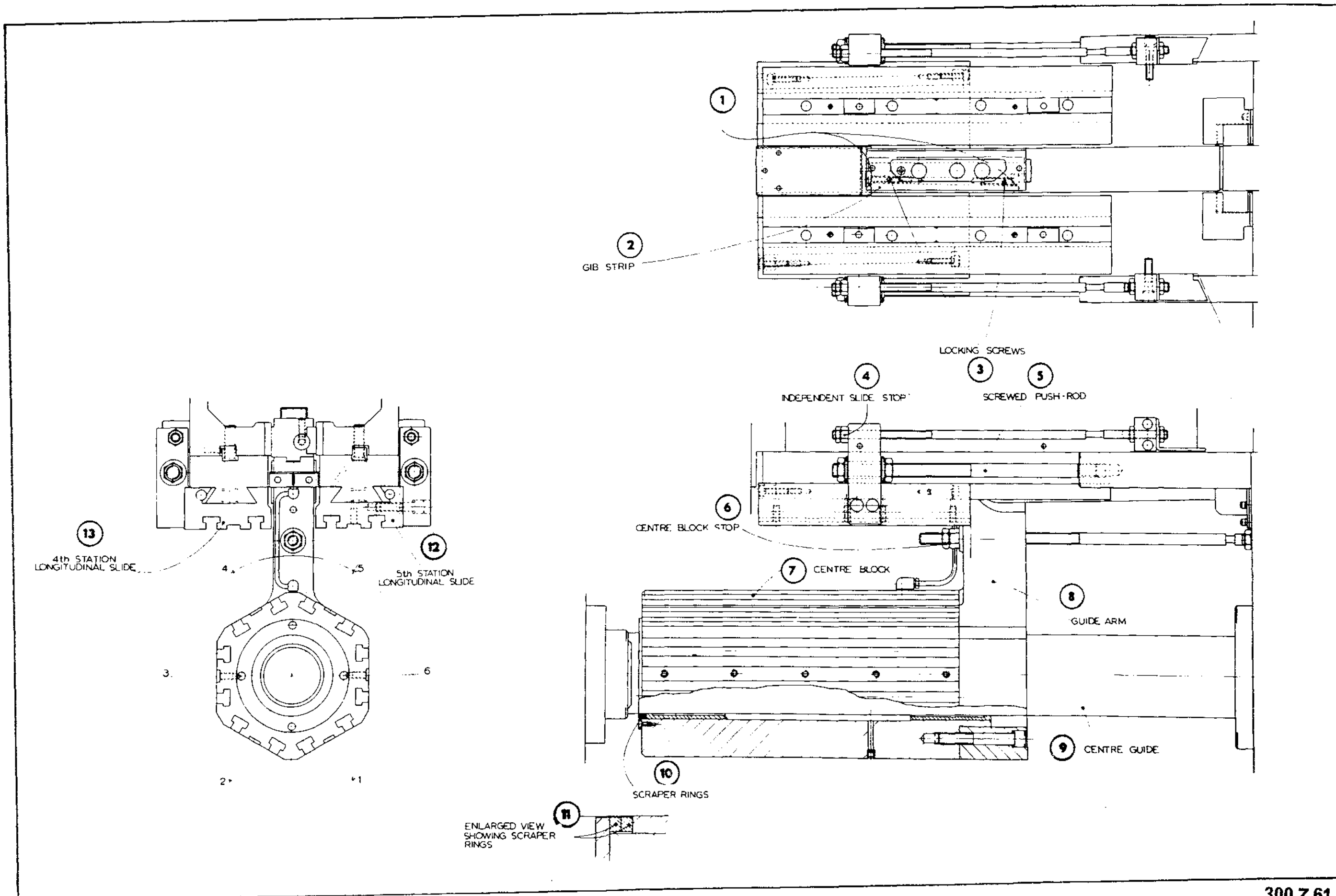


Fig. 5.11 Centre Block & Longitudinal Slides Drg. 300 Z 61

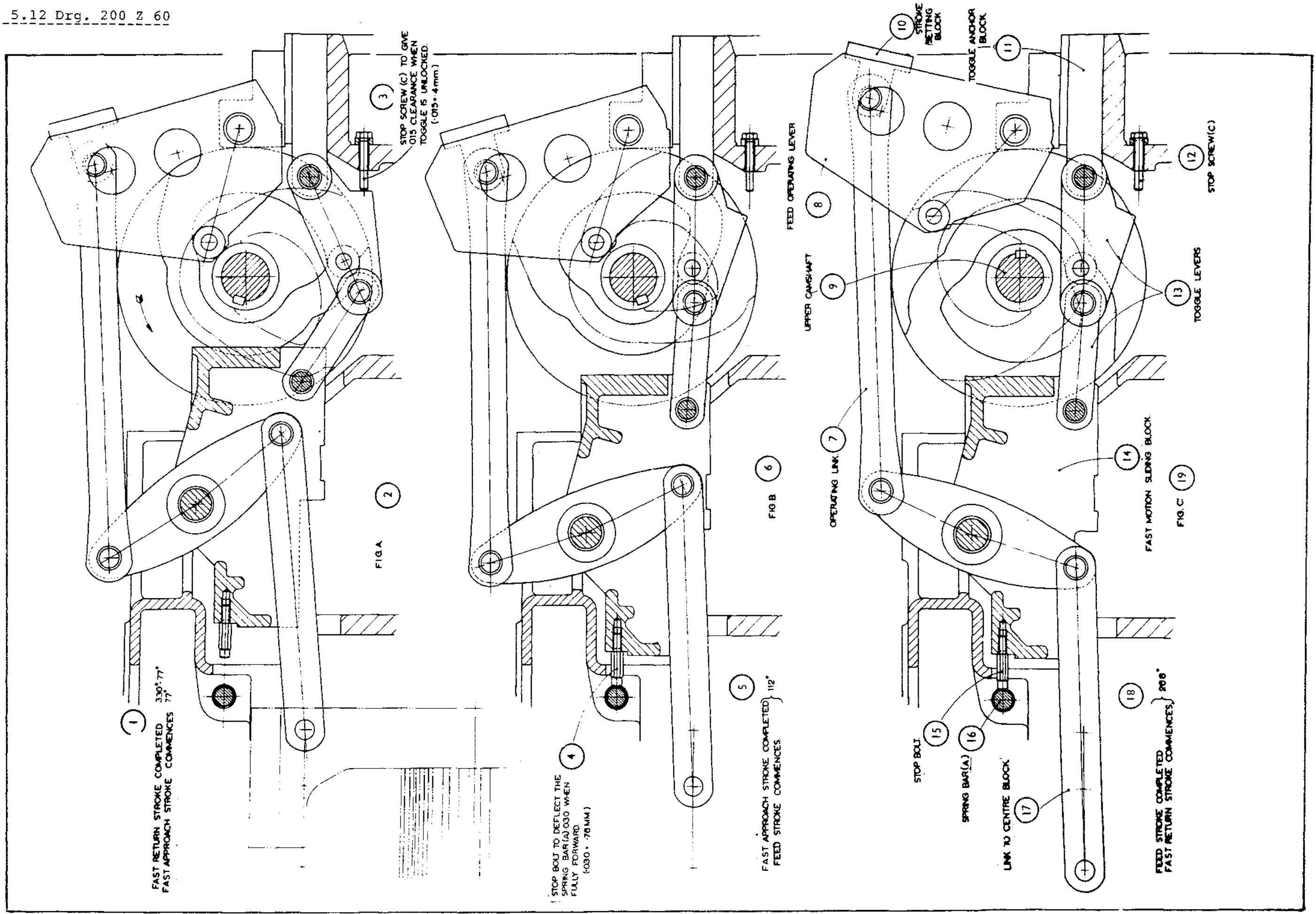
1. Adjusting screws
2. Gib strip
3. Locking screws
4. Independent slide stop
5. Screwed push rod
6. Centre block stop
7. Centre block
8. Guide arm
9. Centre guide
10. Scraper rings
11. Enlarged view Showing scraper rings
12. 5th Station longitudinal slide
13. 4th Station longitudinal slide



300 Z 61

Fig. 5.12 Longitudinal Slides Operation Drg. 200 Z 60

1. Fast return stroke completed 330Deg.-77Deg.fast approach stroke commences 77Deg.
2. Fig. A
3. Stop screw (C) to give .015 clearance when toggle is unlocked
4. Stop bolt to deflect the spring bar (A) .030 when fully forward (.030 = .76mm)
5. Fast approach stroke completed } 112 Deg.  
Feed stroke commences }
6. Fig. B
7. Operating link
8. Feed operating lever
9. Upper camshaft
10. Stroke setting block
11. Toggle anchor block
12. Stop screw (C)
13. Toggle levers
14. Fast motion sliding block
15. Stop bolt
16. Spring bar (A)
17. Link to centre block
18. Feed stroke completed
19. Fig.(C)



## 5.12 Cross Slide Operation

Four main cross slides shown on Fig.5.14 Drg. 200 Z 20A and the 6th station cut-off slide are fitted as standard, with the auxiliary 3rd forming slide available as optional equipment.

The two lower cross slides in stations 1 (front) and 2 (rear) are used principally for the rough forming operations and are wide and robust and operated by exceptionally heavy mechanism. They are steel and slide in dovetail ways in detachable guideways bolted and dowelled to the drum housing. The slideways are at an angle of 10 Deg. to the horizontal plane to give ample clearance for the work chute below the 6th (cut-off) station and to give less interference of toolholders with indexing.

The two upper cross slides in station 4 (rear) and 5 (front) are used for all kinds of finish forming, chamfering, undercutting, skiving and shaving operations as well as pushing recessing boxes, ect. They are steel in dovetail ways in detachable guideways bolted and dowelled to the beam at an angle of 30 Deg. to the vertical plane. The cut-off slide in 6th station and the optional 3rd station forming slide are steel and slide in brackets spigotted and dowelled to the drum housing.

All cross slides are fitted with micrometer screw for fine adjustments

Caution: After every adjustment the locking nut must be clamped to avoid strain on the adjusting screw.

All Cross slides except the cut-off slide are fitted with dead stops bearing on selective stop screws in the spindle bearing end caps. At each indexed position of the spindle drum each slide dead stop operate against a different stop screw, so that such small errors as may exist in the position of the spindles in the drum and in the accuracy of the drum locators can be cancelled out. The 3rd station forming slide dead stop bears on the stop screw which is also used for station 2.

Cross slide stop barrels are clamped in the stop bracket by pad bolts. If excessive stop pressure is used barrels will slip. Each time cross slides are adjusted by the micrometer screw adjuster the dead stop should be re-set. With an adjustable stroke mechanism of the type used it is impossible to arrange that the final position of each slide on the dwell portion of the cam is absolutely constant for all strokes in the range.

This position is however, substantially constant apart from the micrometer adjustment, so that with a particular type of toolholder in use on any slide the micrometer needs only slight adjustment with a change in the slide stroke and a compensating adjustment of the stop should be made.

During building the machine the selective stop screws are set so that all slides repeat on all positions of the spindle drum. However it may be found that a small consistent error is produced on certain spindles in certain stations due to faulty setting and in this case the selective stop screws can be carefully adjusted using the spanner provided in the tool kit.

Each cross slide is fitted with a taper gib strip with an adjusting screw at each end, both screws should be locked against the gib strip.

The front and rear lower slides are identical and the gib strips are, therefore on opposite sides relative to the spindle nose. The same applies to the upper cross slides.

The lower slide guideways are protected from swarf by a leather apron which should be replaced when it becomes damaged.

Cross slide T slot dimensions are the same for all slides and therefore toolholders are, as far as possible interchangeable. The top surfaces of the slides are adjusted on assembly to bring the height of the spindle from the slide within the limits on the Capacity Chart Drg. 200 Z 20A.

The capacity dimensions are so arranged that, from the normal dimensions given, there is considerable backward adjustment. Special toolholders designed to these nominal dimensions should then have adequate adjustment from the cross slide micrometer screw.

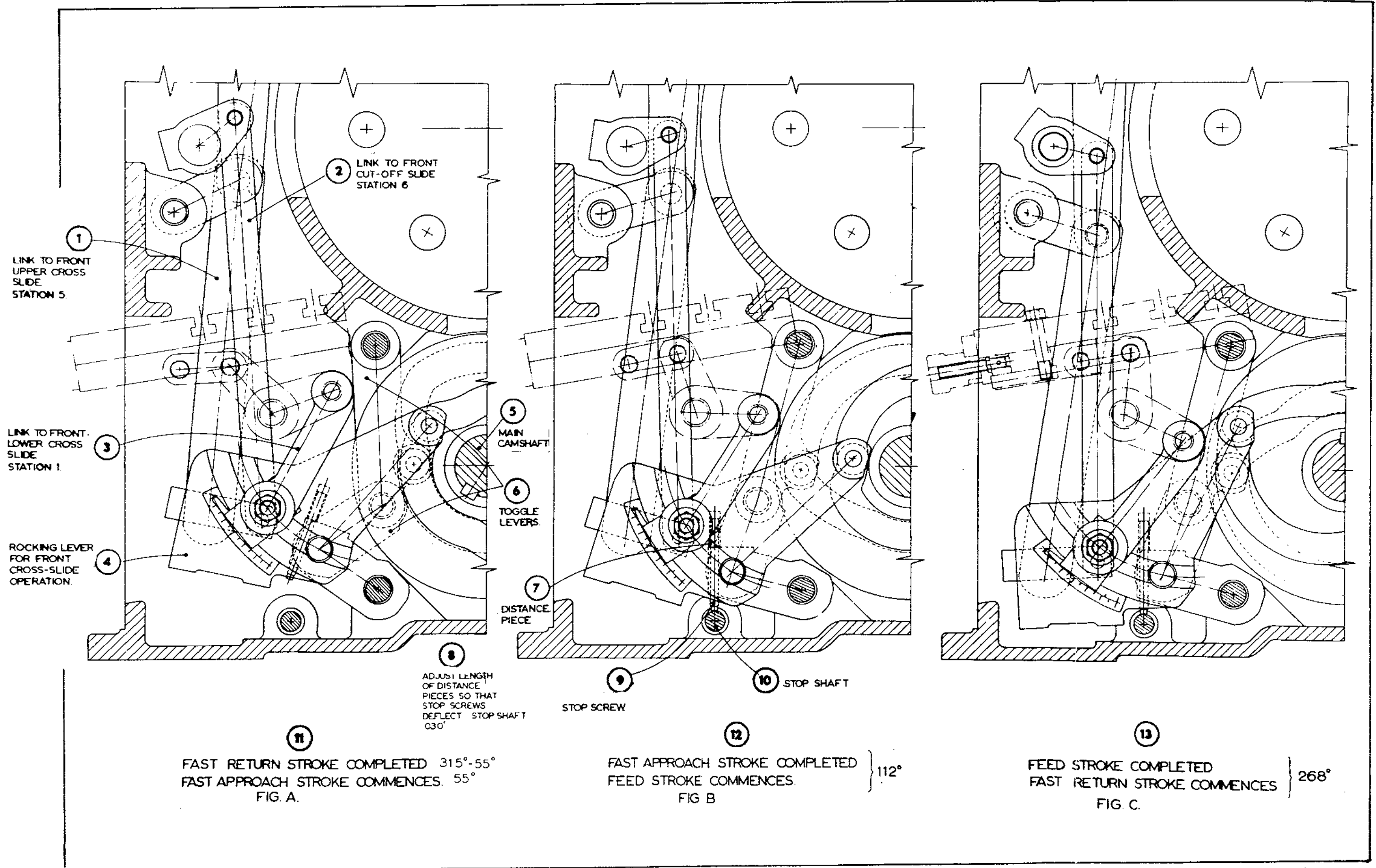
When double bar feed is fitted to the feed bar in station 3 the cut-off slide then fitted in this station is similar to the 6th station cut-off slide. ie., narrower than the normal 3rd forming slide.

Any cross slide can be removed from its guideway for cleaning, ect. by removing the adjustment clamp bolt or stud and winding the slide fully backwards until the micrometer knob disengages from the screw, and then finally drawing the slide from the guideway.



Fig. 5.13 Cross slide Operation Drg. 200 Z 65

1. Link to front upper cross slide station 5
2. Link to front cut-off slide station 6
3. Link to lower front cross slide station 1
4. Rocking lever for front cross slide operation
5. Main camshaft
6. Toggle levers
7. Distance piece
8. Adjust length of distance pieces so that the stop screws deflect stop shaft .030"
9. Stop screw
10. Stop shaft
11. Fast return stroke completed 315Deg.- 55deg. fast approach stroke commences 55Deg. Fig A
12. Fast approach completed } 112Deg.  
Feed stroke commences }
13. Fast stroke completed Fig. B } 268Deg.  
Fast return stroke commences Fig. C }  
Fig C

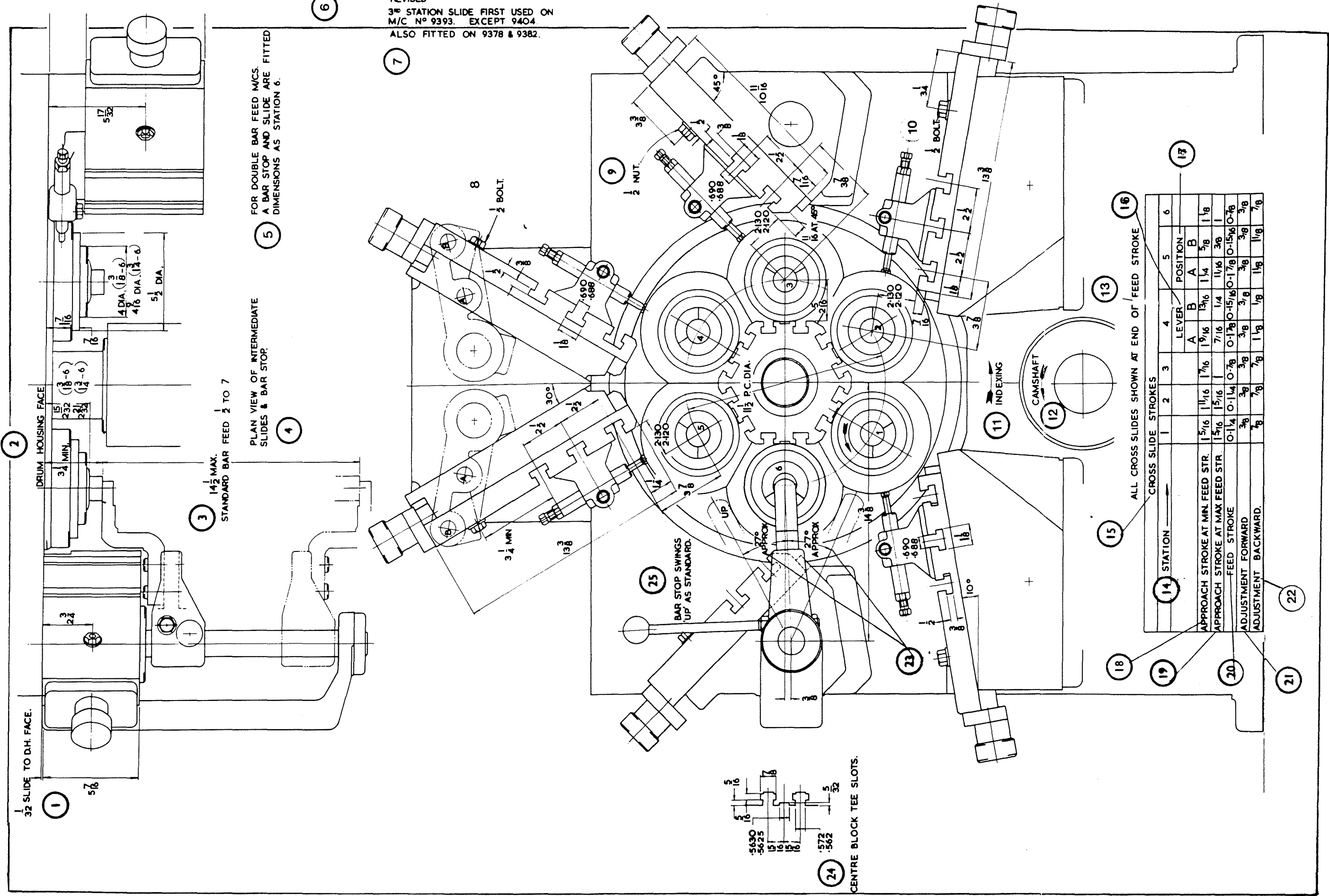


200 Z 65

Fig. 5.14 Capacity Chart Drg. 200 Z 20A

1. 1/32"D.H.face
2. Drum housing face
3. 14.1/2" Max. standard bar feed 1/2 To 7
4. Plan view of intermediate slides and bar stop
5. For double bar feed machines a bar stop and slide are fitted dimensions as station 6.
6. See also 200 Z 21A
7. 1/2" Bolt
8. Revised 3rd station slide first used on machine No. 9393 not 9404. Also fitted on 9378 & 9382
9. 1/2"Bolt
10. 1/2"Bolt
11. Indexing
12. Camshaft
13. All cross slides shown at end of feed stroke
14. Station
15. Cross slide strokes
16. Lever
17. Position
18. Approach stroke at min. feed stroke
19. Approach stroke at max.feed stroke
20. Feed stroke
21. Adjustment forward
22. Adjustment backwards
23. 27 Deg. appox.
24. Centre block tee slots
25. Bar stop swings 'up' as standard

REVISED  
 3<sup>RD</sup> STATION SLIDE FIRST USED ON  
 M/C N° 9393. EXCEPT 9404  
 ALSO FITTED ON 9378 & 9382.



14 STATION

CROSS SLIDE STROKES	LEVER POSITION	
	A	B
APPROACH STROKE AT MIN. FEED STR.	1 5/16	1 1/16
APPROACH STROKE AT MAX FEED STR.	1 5/16	1 5/16
FEED STROKE	0-1 1/4	0-7/8
ADJUSTMENT FORWARD	3/8	3/8
ADJUSTMENT BACKWARD	7/8	7/8

200 Z 20A (INCH)



### 5.13 Auxiliary Cross Slide Operation

For special purposes, where the timing of standard cross slide cams and operating mechanism is unsuitable, the two upper and the two intermediate slides can be operated with auxiliary cross slide mechanisms, with limitations as outlined below.

The auxiliary cam disc on the main camshaft in the drum housing is arranged so that the cams can be mounted on either or both faces. One auxiliary cam can operate the 3rd or 4th cross slide but not both. On the double bar feed machines, however, this cam is not available for auxiliary cross slide operation, as it is used for operation of the rear bar stop. The other auxiliary cam can operate the 5th or 6th (cut-off) cross slides but not both. A common cam lever assembly is available for operation by these cams and operates links which are used in place of the standard connections (See Fig.5.15 Drg. 293 Z 10). The common cam lever assembly has a split cap for the fulcrum boss and this fits on the upper toggle lever pin between the bosses on either side of the machine, as selected. A limited amount of adjustment of the ratio of the cam throw and the actual slide travel is provided and gives a ratio of slide travel/cam throw of from 0.85 to 1.2 according to the scale setting. This scale cannot be calibrated in actual travel because of variations in the type and throw of the cam used. The link connecting to stations 4 and 5 slides is connected in the line with the standard links. The link connecting to stations 3 and 6 is out of line with the standard position of the lever on the slide operating tube, but an additional keyway is provided and the lever is moved over to this keyway in line with the link. Information for design of auxiliary cross slide cams is given on Fig.5.15 Drg. 293 Z 10 Z 10 and should be used in connection with the timing diagram Fig.5.10 Drg.200 Y 29

Fig 5.15 Drg. 293 Z 10

1.	1.3/8-6	Sections Required				Can only be used with section 293
		293	293A	293B	293C	
		1		1		
	Station 3	1	1			
	Station 4	1	1			
	Station 5	1	1			
	Station 6	1			1	

2. Two auxiliary cross slide motions cannot be used on the same side of machine concurrently.
3. 1.1/2" Roller Dia. 38mm
4. Section 293

5.	1.3/8"-6 -----Stations 4 & 5	
	Upper Lever Connected in Hole 'A'	Slide movement = Cam Rise x Scale Reading
	Upper Lever Connected in Hole 'B'	Slide Movement = $\frac{\text{Cam Rise}}{3}$ x Scale Reading

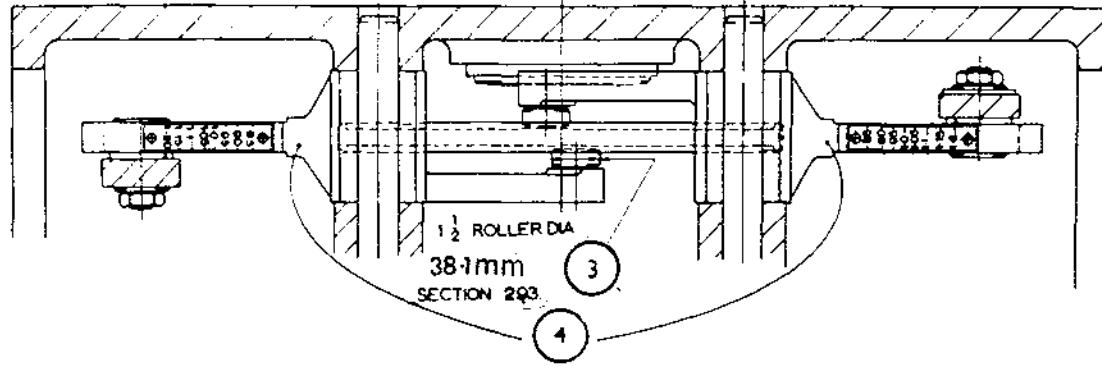
6.	1.3/8"-6 ----- Stations 3 & 6
	Slide Movement = Cam Rise x Scale Reading

7. Section 293C
9. Section 293B
10. Min. Rad. to roller centre when operating on intermediate cross slide
11. Part section on 'BB'
12. Rotation
13. 'O' Timing angle
14. Max. Rad. to roller centre
15. Min. Rad. to roller centre when operating on upper cross slide
16. 14 O/D Cam disc 355.6mm
17. Cam locating diameter
18. 1/16" x 45Deg. Chamfer on cams to clear Rad.1.6mm
19. 5/8" Thickness of cams 15.8mm
20. Max. That screw should enter cam disc is 7/16" 11.1mm
21. Part section 'AA'
22. View looking from collet end of spindles

Fig. 5.15 Drg. 293 Z 10

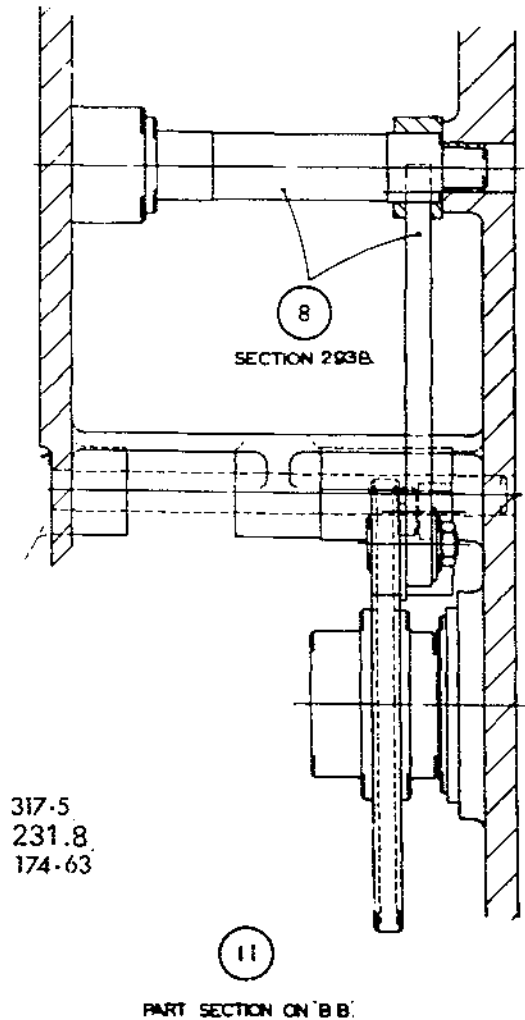
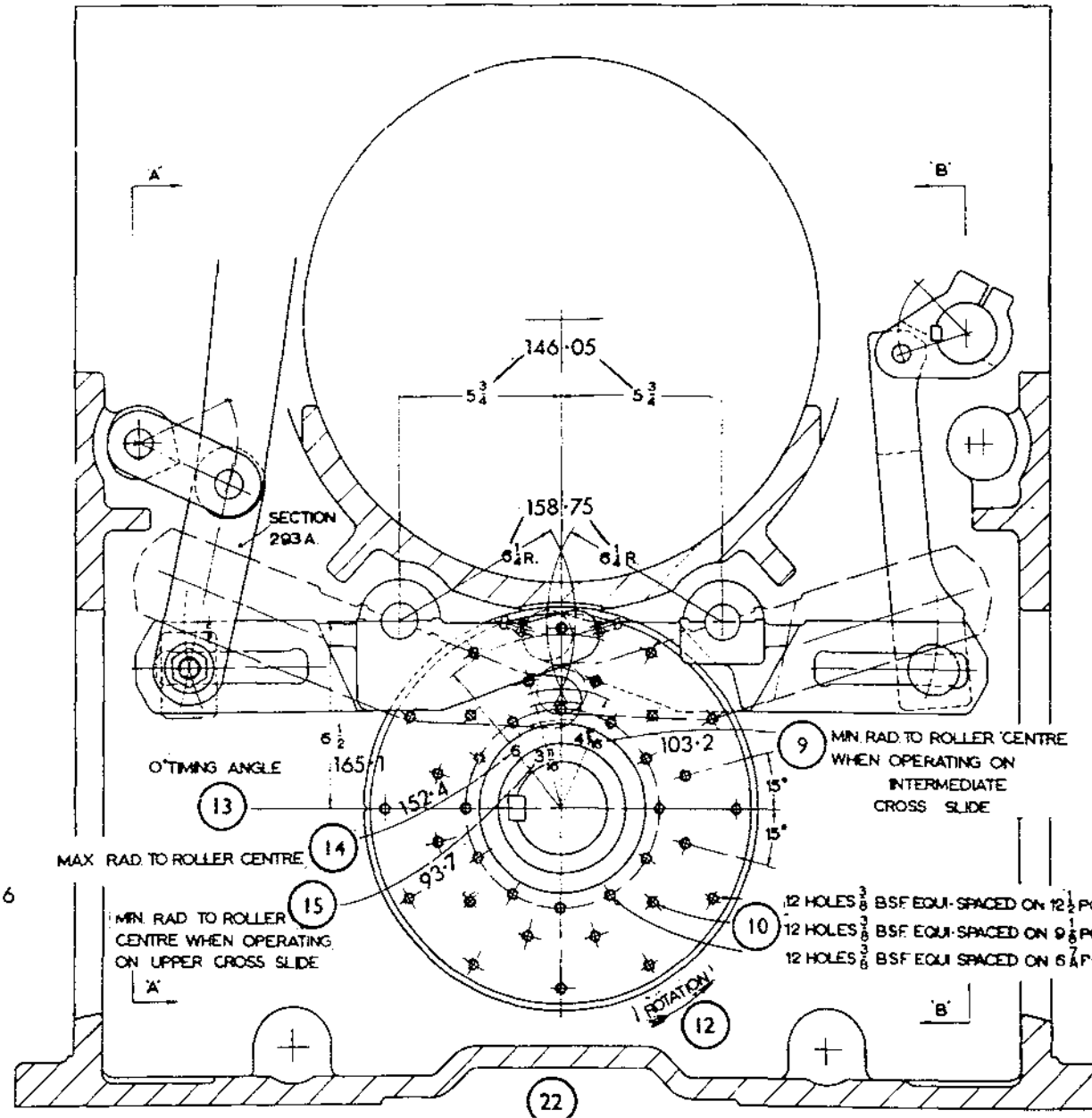
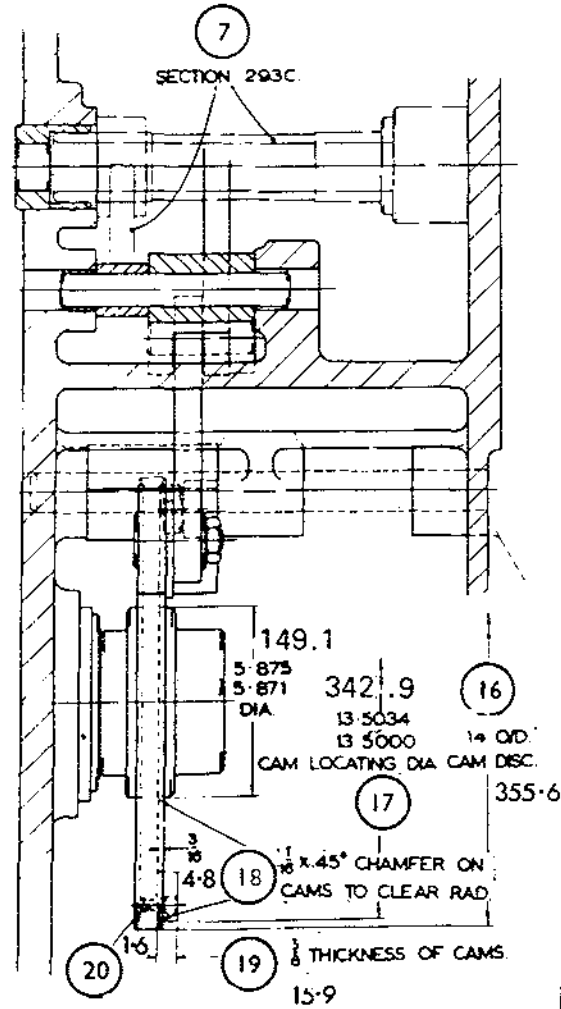
1 1/2 - 6	2 - 4	SECTIONS REQUIRED				
5 1/2 - 6	7 1/2 - 4	293	293A	293B	293C	CAN ONLY BE USED WITH SECTION 23D
STATION 3		1		1		
STATION 4	STATION 3	1	1			
STATION 5	STATION 4	1	1			
STATION 6		1			1	

TWO AUXILIARY CROSS SLIDE MOTIONS CAN NOT BE USED ON THE SAME SIDE OF MACHINE CONCURRENTLY



1 1/2 - 6, 5 1/2 - 6	STATIONS 4&5
2 - 4	STATION 3
7 1/2 - 4	STATIONS 3 & 4
UPPER LEVER CONNECTED IN HOLE A	SLIDE MOVEMENT - CAM RISE X SCALE READING
UPPER LEVER CONNECTED IN HOLE B	SLIDE MOVEMENT - CAM RISE X SCALE READING

1 1/2 - 6, 5 1/2 - 6	STATIONS 3 & 4
2 - 4	STATION 4
SLIDE MOVEMENT - CAM RISE X SCALE READING	





#### 5.14 Coolant

The coolant pump is mounted in the machine tray at the rear of the machine at the stock carriage end. It is a motorised centrifugal pump with a pump delivery of 159 litres per minute when pumping cutting oil of high viscosity or 242 litres per minute when pumping soluble water based cutting oils. The pump is driven by a totally enclosed, fan cooled, flanged mounted, 3 phase, 1.5 kW electric motor.

The coolant is pumped from the machine tray via a strainer box to the coolant taps located under the lower cross slides and in the coolant header on either side of the top beam of the machine. The strainer box should always be kept clear of swarf and should always be fitted over the pump intake pipe.

A weir across the discharge end of the tray permits swarf to settle in the bottom of the tray.

#### 5.15 Swarf Conveyor

This is fitted as an optional extra. It is of the screw type and is fitted beneath the drum housing and the end bracket, discharging the swarf beneath the stock carriage. Quickly detachable chutes are fitted in the tray between the main housings to guide the swarf into the conveyor.

There is a 5/32" 4mm diameter sliver steel shear pin in the coupling adjacent to the motor gearbox on the drive shaft. Before renewing a sheared pin the cause of overload must be located and corrected. Tommy bar holes are provided in the end of the conveyor screw so that it may be turned by hand. Spare shear pins are provided in the container secured to the side of the conveyor.

A basket is placed at the lower end of the conveyor which screens the small swarf held in suspension in the coolant. This basket must be emptied at regular intervals and not allowed to overflow.

Fig.5.16 Coolant Strainer Box Drg. 200 Y 55

1. Coolant level
2. Strainer box
3. Plan view
4. Tray strainer
5. Pump intake pipe

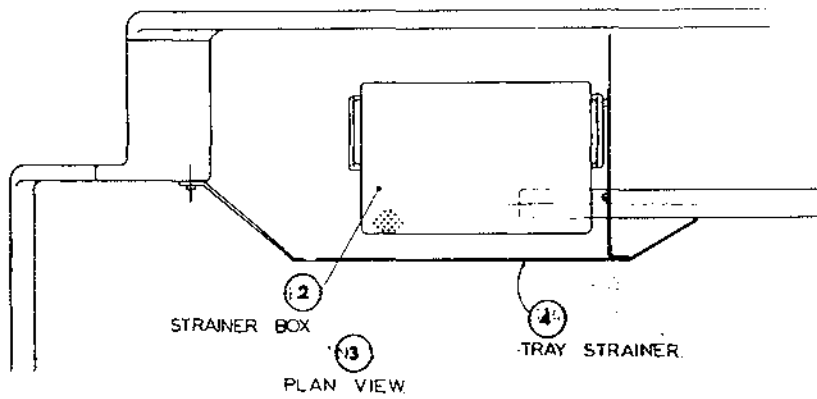
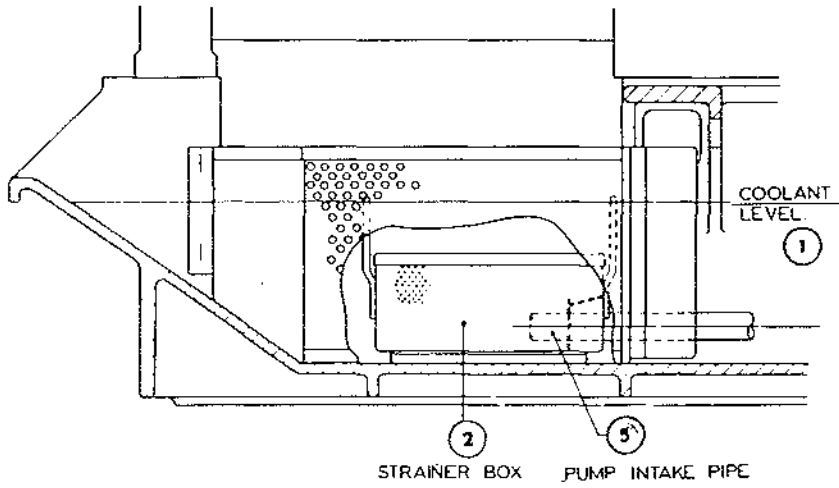
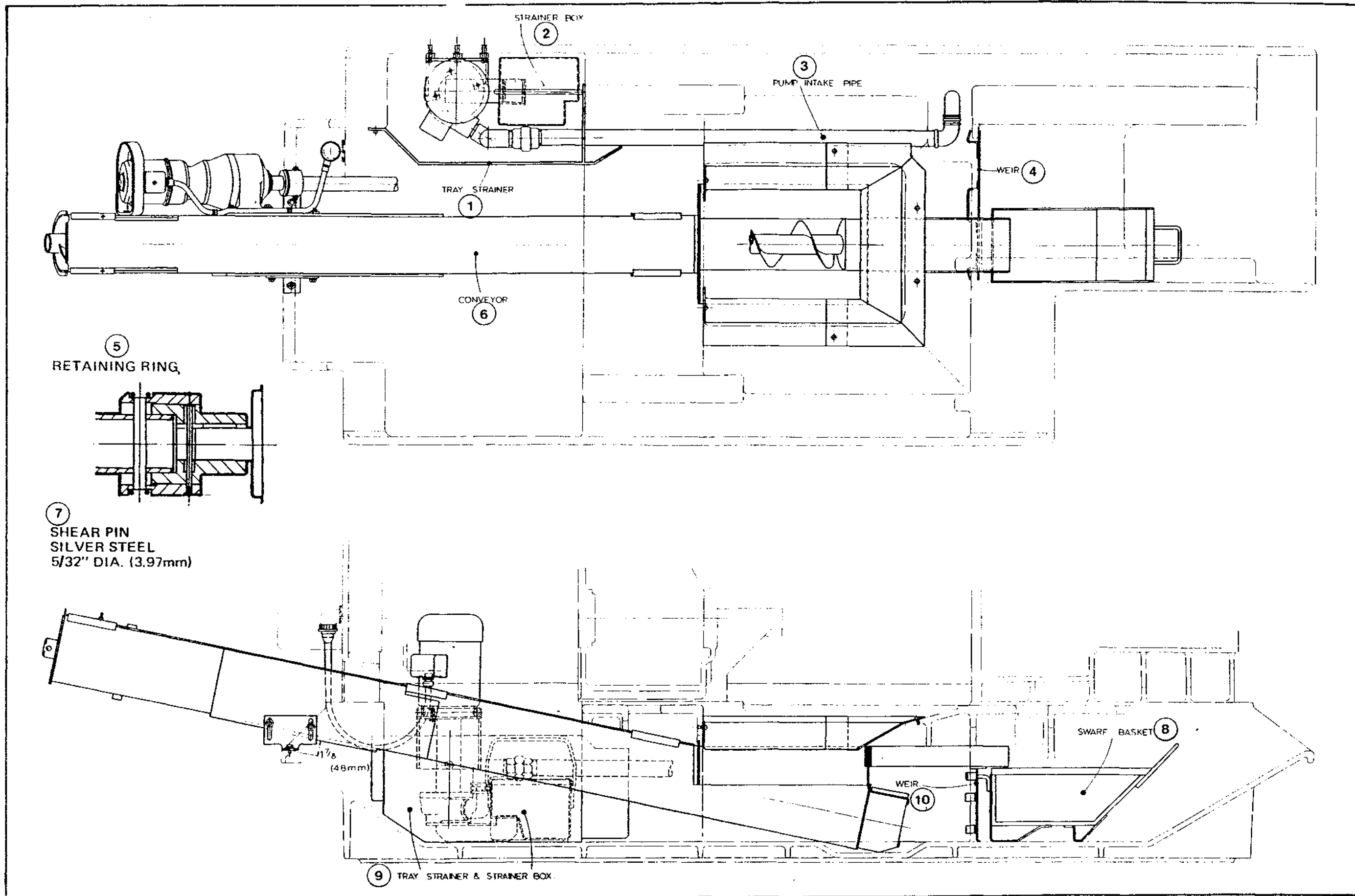


Fig. 5.17 Swarf Conveyor & Chutes Drg. 200 Z 56.

1. Tray strainer
2. Strainer box
3. Pump intake pipe
4. Weir
5. Retaining ring
6. Conveyor
7. Shear pin silver steel 5/32"dia. (3.97mm)
8. Strainer basket
9. Tray strainer and strainer box
10. Weir



200Z56B

### 5.16 Double Bar Feed

This machine is arranged to bar feed in 3rd and 6th stations. The bar feed operation and collet operation are duplicated on the front and rear of the machine.

The bar feed at the rear is operated by the bar feed lever at the front. The bracket to which the link is connected on the rear bar feed slide is adjustable so that jobs of different lengths can be produced up to a maximum of 1" (25.4mm) difference. A scale is provided on the bracket which is set to the difference between the bar feed lengths required. The longer job must always be set on the front bar feed slide. Where the two jobs are equal in length, the scale is set at 0.

The rear collet slide is operated by an independent lever from its own cams.

The jobs are parted off the bar in stations 3 and 6, cut-off slides being provided in both stations. Bar feed occurs after the feed stroke immediately before indexing.

The bar stop, fitted in station 3, is operated from cams on the spare cam disc in the drum housing. This excludes the use of the auxiliary cross slide motions, Sections 193, 193A, 193B, and 193C. The auto stop is fitted as standard. Duplicate unites are fitted to operate in both stations. Indicator lamps in the top of the control panel light up if the bar has been completed. The lamps are situated one behind the other and so indicate in which station the bar is completed.

The double feeding machine can be operated as a single feeding machine after making the following adjustments:-

1. Remove the rear bar feed shoe, complete with spring and plunger.
2. Set the same bar feed stroke on the rear as set on the front.
3. Retain the rear collet operating finger clear of the collet bobbins by means of the plunger.
4. Remove springs (N) from lower auto stop mechanism. This will render the mechanism inoperative. The upper auto stop mechanism must not be altered.
5. Take off the rear bar stop.

### 5.17 Spindle Stopping

When very large quantities of components are to be produced, requiring one or more secondary cross operations such as cross drilling, reaming, milling, sawing, tapping, ect. the machine can be supplied with Spindle Stopping Mechanism. Provision for fitting this mechanism is not made in normal machines and must be provided at an early stage of manufacture.

An entirely special spindle drum is used (see Fig. 5.19 Drg. 200 Z 83) Each spindle running on a pair of precision, preloaded 'back to back' angular contact ball journals at the front and a precision parallel roller journal at the rear.

Each spindle gear is driven from the central gear and runs loosely on ball and roller bearings when the multi-plate brake is engaged. The brake is non-adjustable, as a series of pre-loaded cushion springs are provided to limit and maintain the torque, and is sufficient to brake the spindles rapidly to a standstill.

The multi-spindle clutch on each spindle is engaged by the axial thrust developed by a row of balls, squeezed inwards against conical and flat faces by the clutch bobbin, when it is shifted by the cam operated clutch glut. The clutch is adjusted by turning the slotted

locknut from serration to serration on its right hand thread, the serrations being maintained in engagement by the clutch plate separating springs.

The clutch is accessible for adjustment in 6th station and an adjustment of one serration at a time can easily be made by a sharp hammer blow on a suitable punch. After each adjustment each clutch must be checked by levering the glut rod into and out of engagement by means of the block provided in the tool kit, and that the glut pressure is not so excessive as to cause overheating or a jam. The clutch gluts are operated in turn, during indexing of the spindle drum, by a suitable series of cams secured in housings at the bar feed end of the drum housing. the cam may be selected to suit varying tooling conditions and are supplied to order (See Fig. 5.15 Drg.202Z3) Cams may be changed without removing the housings. When fitting new cams, Handwind through index to ensure that the rollers pass freely all round the cam track. Cross slide attachments and drives for use on spindle stopping machines are usually designed for a special and limited application to suit customer's components.

Dismantling, spindles should be dismantled in 6th station. Feed tubes collet adjustment assembly and the collet bobbin are removed from the rear end of the spindle. The toggle pins, toggles, toggle carrier and thrust pads are removed followed by the rear bearing nut and spacer. The clutch glut can be removed after unscrewing the locknut and extracting the rod from the back.

With the centre block in the fully retracted position the front bearing nose cap can be removed. the spindle is then carefully removed leaving behind the rear spindle bearing, the drive clutch carrier, and adjusting rings.

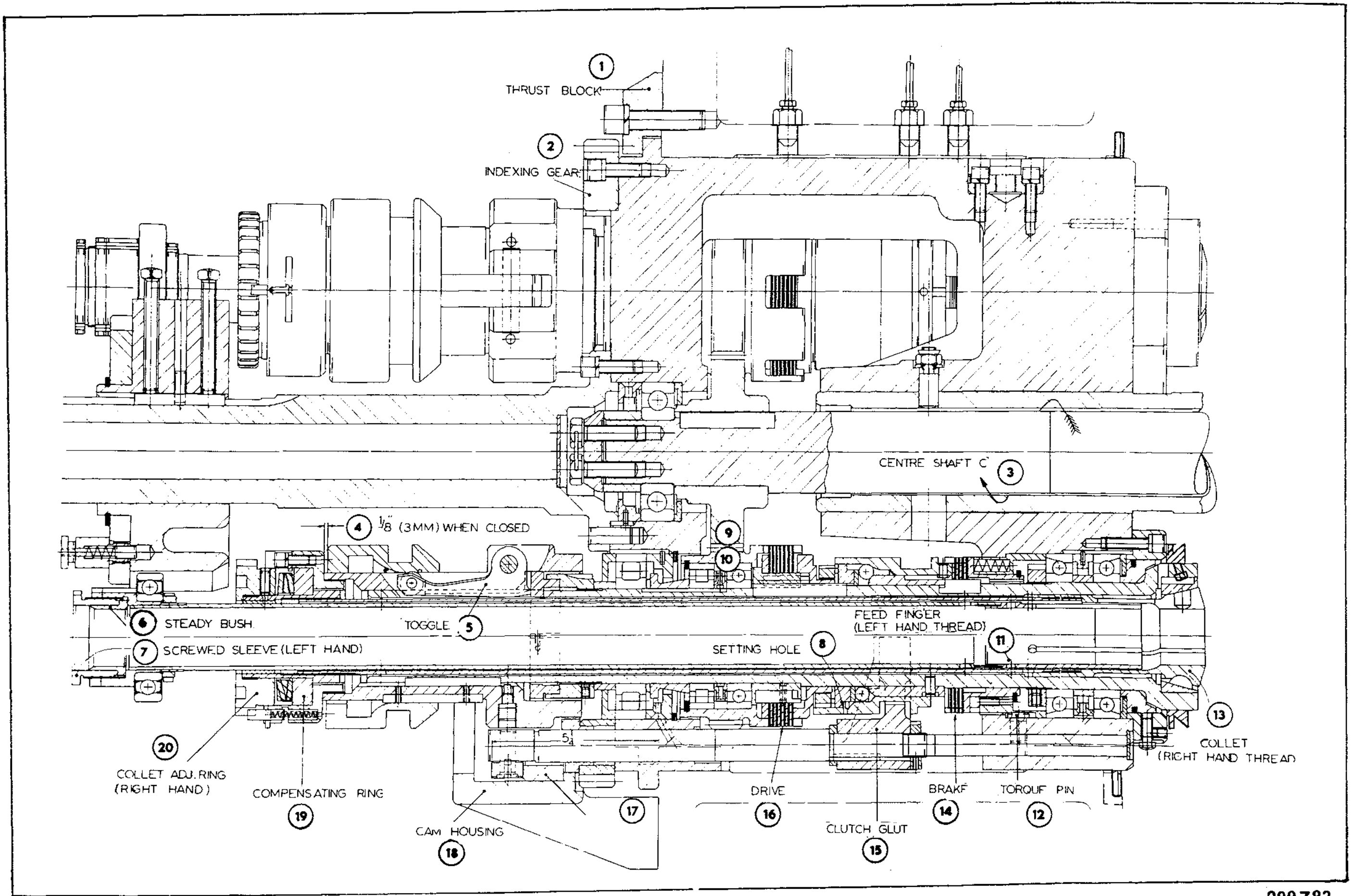
When reassembling spindles the brake housing keyway must be aligned with the torque pin fitted in the front bearing bore.

Retaining clips 1.5/16" in shape, should be made to hold the drive clutch plate assembly together.

The clutch should be engaged when tightening the rear bearing locknut. The spindle nose cap should be eased into place over the 'Piston ring' seal.

Fig. 5.18 Spindle Stopping Drg. 200 Z 83

1. Thrust block
2. Indexing gear
3. Centre shaft 'C'
4. 1/8" (3mm) when closed
5. Toggle
6. Steady bush
7. Screwed sleeve
8. Setting hole
9. 48T
10. 44T
11. Feed finger (left hand thread)
12. Torque pin
13. Collet (right hand)
14. Brake
15. Clutch glut
16. Drive
17. Clutch cams
18. Cam housing
19. Compensating ring
20. Collet adjustment ring (right hand)



200Z83



## 5.18 Speed and Feed Charts

Speed and Feed Chart for 1.3/8" - 6

Speed and Feed Chart for 1.3/4" - 6

Example of Use of Speed and Feed Chart

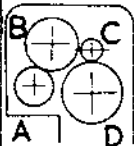
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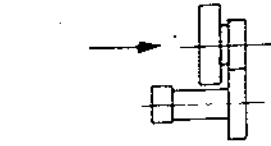
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71	27	3-9	4-1	4-3	4-5	4-8	5-2	5-7	6-2	6-6	7-0	7-5	8-0	8-6	9-3	9-3	10-0	10-8	11-6	12-9	14-4	16-2	18-1	19-6	21-3	23	25	28	31	59	3-2	4-2	8-5	12-7	17	34	51	59	151
69	30	4-2	4-4	4-6	4-8	5-2	5-7	6-2	6-8	7-2	7-7	8-2	8-9	9-6	10-3	10-3	11-2	12-0	12-9	14-5	16-2	18-2	21	22	24	26	29	32	35	67	3-6	3-7	7-4	11-1	14-8	30	44	52	132
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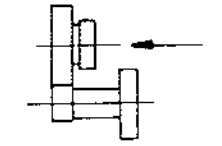
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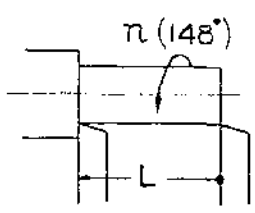
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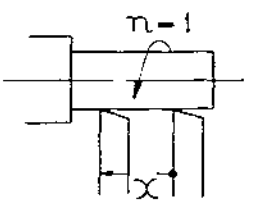








N/MIN		L																				n (148°)		n (8°)											
		2.5	5	7.5	10	20	30	35	39	M/M	INS	2.5	5	7.5	10	20	30	35	39	M/M	INS	n (148°)	n (8°)												
71	27	4.3	4.5	4.8	5.2	5.7	6.2	6.6	7.0	7.5	8.0	8.6	9.3	10.0	10.8	11.6	12.9	14.4	16.2	18.1	19.6	21.3	23	25	28	31	59	3.2	4.2	5.5	7.1	9.1	11.5	15.1	19.1
69	30	4.6	4.8	5.2	5.7	6.2	6.8	7.2	7.7	8.2	8.9	9.6	10.3	11.2	12.0	12.9	14.5	16.2	18.2	21	22	24	26	29	32	35	67	3.6	4.7	6.1	7.8	10.0	12.6	16.3	20.4
66	32	4.9	5.2	5.6	6.1	6.7	7.3	7.8	8.4	9.0	9.7	10.4	11.3	12.2	13.2	14.2	15.9	17.8	20	23	25	27	29	32	35	75	4.1	5.3	6.6	8.4	10.7	13.4	17.3	21.6	
64	35	5.3	5.6	6.1	6.6	7.3	8.0	8.5	9.2	9.8	10.6	11.5	12.5	13.5	14.6	15.7	17.7	19.9	23	25	28	30	33	36	39	85	4.6	5.9	7.3	9.2	11.6	14.4	18.5	23.0	
61	38	5.7	6.0	6.6	7.3	8.0	8.8	9.4	10.2	10.9	12.0	12.8	13.9	15.1	16.3	17.7	19.9	23	25	29	31	34	37	40	44	97	5.2	6.6	8.1	10.1	12.6	15.4	19.7	24.4	
58	41	6.2	6.6	7.2	8.0	8.8	9.7	10.4	11.2	12.1	13.0	14.3	15.5	16.8	18.2	19.8	22	25	28	32	35	38	42	45	50	110	5.9	7.3	8.9	11.0	13.6	16.5	21.0	26.0	
56	43	6.6	7.0	7.7	8.5	9.4	10.4	11.2	12.0	13.0	14.1	15.3	16.7	18.1	19.6	21	24	27	31	34	38	41	45	49	54	119	6.4	7.9	9.6	11.8	14.6	17.6	22.2	27.5	
53	46	7.1	7.6	8.4	9.3	10.3	11.5	12.4	13.3	14.4	15.7	17.0	18.6	20	22	24	27	30	34	39	42	46	50	55	61	135	7.3	8.9	10.7	13.0	15.8	18.9	23.8	29.5	
50	49	7.8	8.3	9.2	10.3	11.4	12.7	13.7	14.8	16.0	17.4	19.0	21	23	25	27	30	34	39	44	48	52	57	62	68	152	8.2	9.9	11.8	14.2	17.1	20.3	25.4	31.5	
49	50	8.0	8.6	9.5	10.6	11.8	13.1	14.2	15.3	16.6	18.1	19.7	22	24	26	28	31	35	40	45	49	54	59	65	71	158	8.6	10.4	12.4	14.8	17.8	21.1	26.4	32.8	
46	53	8.8	9.5	10.5	11.7	13.0	14.4	15.7	17.1	18.5	20	22	24	26	29	31	35	40	45	51	56	61	66	73	80	178	9.7	11.6	13.7	16.2	19.3	22.7	28.2	35.0	
43	56	9.7	10.4	11.6	12.9	14.5	16.0	17.5	19	21	23	25	27	29	32	35	39	45	51	57	63	68	75	82	90	202	11	12.9	15.1	17.7	21.0	24.4	30.1	37.2	
41	58	10.4	11.1	12.4	13.9	15.5	17.4	18.9	21	22	24	27	29	32	35	38	43	48	55	62	68	74	81	89	97	220	12	14	16.3	19.0	22.4	26.0	32.0	39.4	
38	61	11.5	12.4	13.8	15.5	17.4	19.5	21	23	25	27	30	33	36	39	42	48	55	62	70	77	84	91	100	110	249	14	16	18.4	21.6	25.2	30.4	37.2	45.0	
35	64	12.8	13.8	15.5	17.4	19.5	22	24	26	28	31	34	37	41	44	49	54	62	70	80	87	95	104	114	125	284	15	18	20.6	24.0	28.0	33.6	40.8	49.0	
32	66	14.2	15.3	17.2	19.3	22	25	27	29	32	35	38	42	45	50	54	61	69	79	90	98	107	117	128	140	320	17	20	22.8	26.4	30.8	36.8	44.4	53.0	
30	69	15.6	16.8	18.9	21	24	27	30	32	35	38	42	46	49	55	60	68	77	88	100	109	119	130	143	157	357	19	22	25.2	29.0	33.6	40.0	48.0	57.0	
27	71	17.5	19	22	24	27	31	33	36	40	43	48	52	57	63	68	77	88	100	114	124	135	148	163	179	408	22	26	29.4	34.0	39.0	46.0	55.0	65.0	
25	74	19.5	21	24	27	30	34	37	41	45	49	53	59	64	70	76	87	99	112	128	138	152	167	182	202	460	25	29	32.4	37.0	42.0	50.0	59.0	69.0	
23	76	22	23	26	30	34	38	42	45	49	54	59	65	71	78	85	97	110	125	142	155	170	186	204	225	513	28	33	36.6	41.0	46.0	54.0	64.0	75.0	
21	78	24	26	30	33	38	43	46	51	55	61	66	73	79	87	95	108	123	140	160	174	190	209	229	252	577	31	36	39.6	44.0	49.0	58.0	68.0	80.0	
18	81	29	31	35	40	45	51	56	61	66	73	80	88	96	105	115	131	149	169	193	211	230	252	277	305	689	38	44	47.4	52.0	57.0	67.0	78.0	91.0	

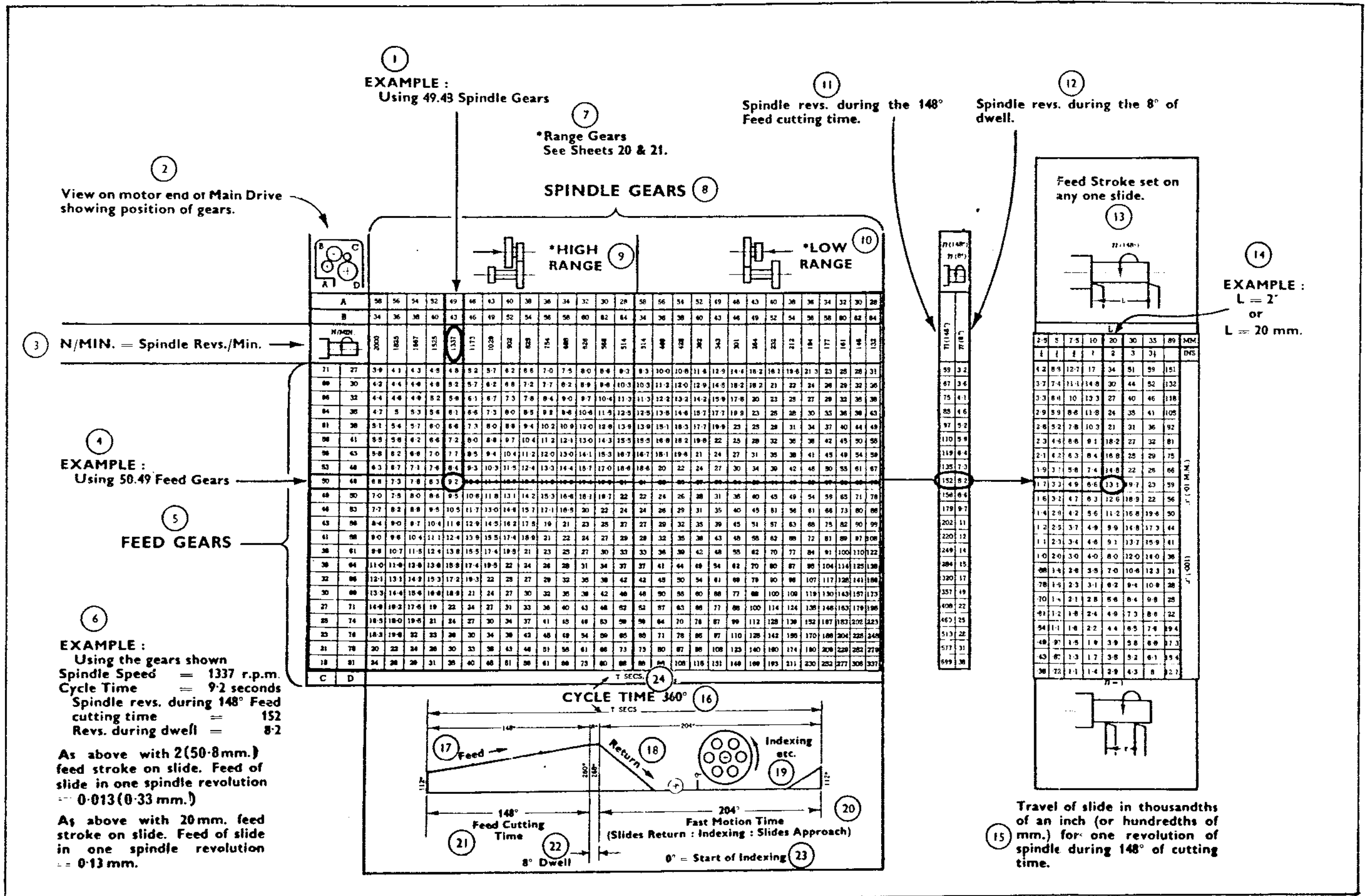


272Y148

272 Y 148

Example of Speed and Feed Chart

1. Example: Using 49 43 spindle gears
2. View on motor end of main drive, showing position of gears
3. N/Min.= Spindle revs./Min.
4. Example: Using 50 49 gears
5. Feed gears
6. Example: Using gears shown SPINDLE SPEED = 1337 r.p.m.  
CYCLE TIME = 9.2 sec.  
Spindle revs. during during 148Deg.feed  
CUTTING TIME = 152  
REVS. DURING WELL = 8.2  
As above with 20mm feed stroke on slide. feed of slide in one  
spindle revolution = 0.33mm.
7. \*Range gears. See sheets 20 & 21
8. Spindle gears
9. \*High range
10. \*Low range
11. Spindle revs during the 148 Deg. feed cutting time
12. Spindle revs.during 8 Deg.of dwell
13. Feed stroke set on any one slide
14. Example: L = 2" or L = 20mm
15. Travel of slide in hundredths of a mm. for one revolution of  
spindle during 148 Deg. of cutting time
16. Cycle time 360 Deg.
17. Feed
19. Indexing ect.
20. Fast motion time (slides return: indexing:slide approach)
21. Feed cutting time
22. 8 Deg. dwell
23. 0 Deg.= Start of indexing
24. T.sec.



### 5.19 Stock Carriage

The two main parts, the stand and the tube assembly, are erected and aligned as described in the Operator's Handbook. The tube assembly has a central tube to which are secured two tube carriers to space and guide the stock tubes. The rear carrier is supported on rollers in the stock carriage stand. See Fig.5.21 Drg. 200 Z 58

At the machine end, the front carrier is gear driven during indexing by a pinion from the drum indexing mechanism and must be correctly meshed to the marks on the gears. The stock tubes are located by a by a flanged sleeve secured to each tube and clamped in pairs to the front carrier.

The tubes should be handled carefully; bent or distorted tubes will make it more difficult to slide the tubes through the carriers.

The tube assembly has a central tube to which is welded two discs to space and guide the stock tubes. The rear disc is carried on the rollers in the stand.

At the machine end the central tube is connected to its driving disc (which is driven by the stem bolted to the back of the spindle drum) by a coupling designed to have a limited amount of both torsional and longitudinal flexibility. A ring which is bolted and tenoned to the driving disc is provided with a cross pin and flanged synthetic bushes which give the necessary flexibility.

When mounting the tube assembly, it is not necessary to detach the ring or cross pin as the complete assembly is secured by the six cap screws.

The stock tubes are located by a flanged sleeve clamped to the tube and positioned against the driving disc by a headed peg and spring plunger. This arrangement, combined with slots in the flange of the sleeve, forms a bayonet type lock. Rapid release of the lock is by pushing the tube towards the driving disc, turning the tube anti-clock wise approximately 15 Deg. and pulling back, bringing the slot in the flange past the headed peg.

Assembly is affected by reversing the process.

1.3/8"-6 machines have tubes that may be adjusted closer to the spindle, by releasing the flanged sleeve on the tube and reclamping in the desired position. This is useful when using bars of a small diameter, in order to give maximum support to the bar. Before increasing the bar feed stroke the tubes should be moved back, and then moved back, and reset after completing the change.

The tube position on 1.3/4"-6 machines is not adjustable.

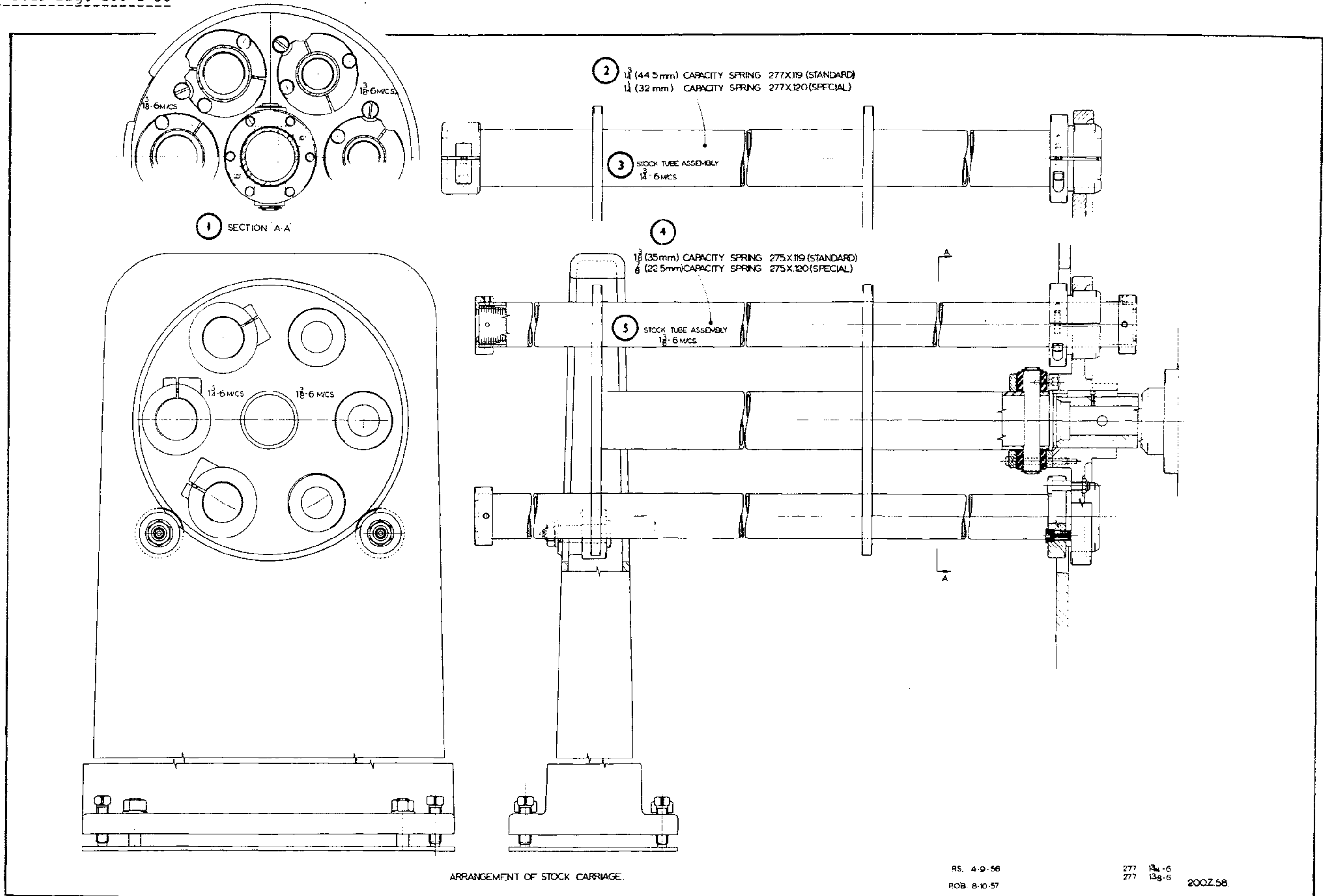
Springs are contained within the stock tubes and retained by end caps. The springs are convoluted to provide resilient support for the bar stock and reduce noise. The springs should be kept well lubricated with soft grease and all bars should be wiped over with grease or oil before inserting.

1.3/8"-6 machines are fitted with 1.3/8" (35mm) capacity springs as standard with 7/8" (22.5mm) springs available as an extra.

1.3/4"-6 machines are fitted with 1.3/4" (44.5mm) capacity springs as standard with 1.1/4" (32mm) springs available as an extra.

Fig. 5.19 Stock Carriage Drg. 200 Z 58

1. Section AA
2. 1.3/4" (32mm) Capacity spring 277 X 119 (standard)
3. Stock tube assembly. 1.3/4" - 6 machines
4. 1.3/8" (35mm) Capacity spring 275 X 119 (standard)  
7/8" (22.5mm) Capacity spring 275 X 120 (special)
5. Stock tube assembly 1.3/8" - 6 machines



RS. 4-9-56  
 ROB. 8-10-57

277 134-6  
 277 138-6 200Z58



## 5.20 Clutch Adjustment

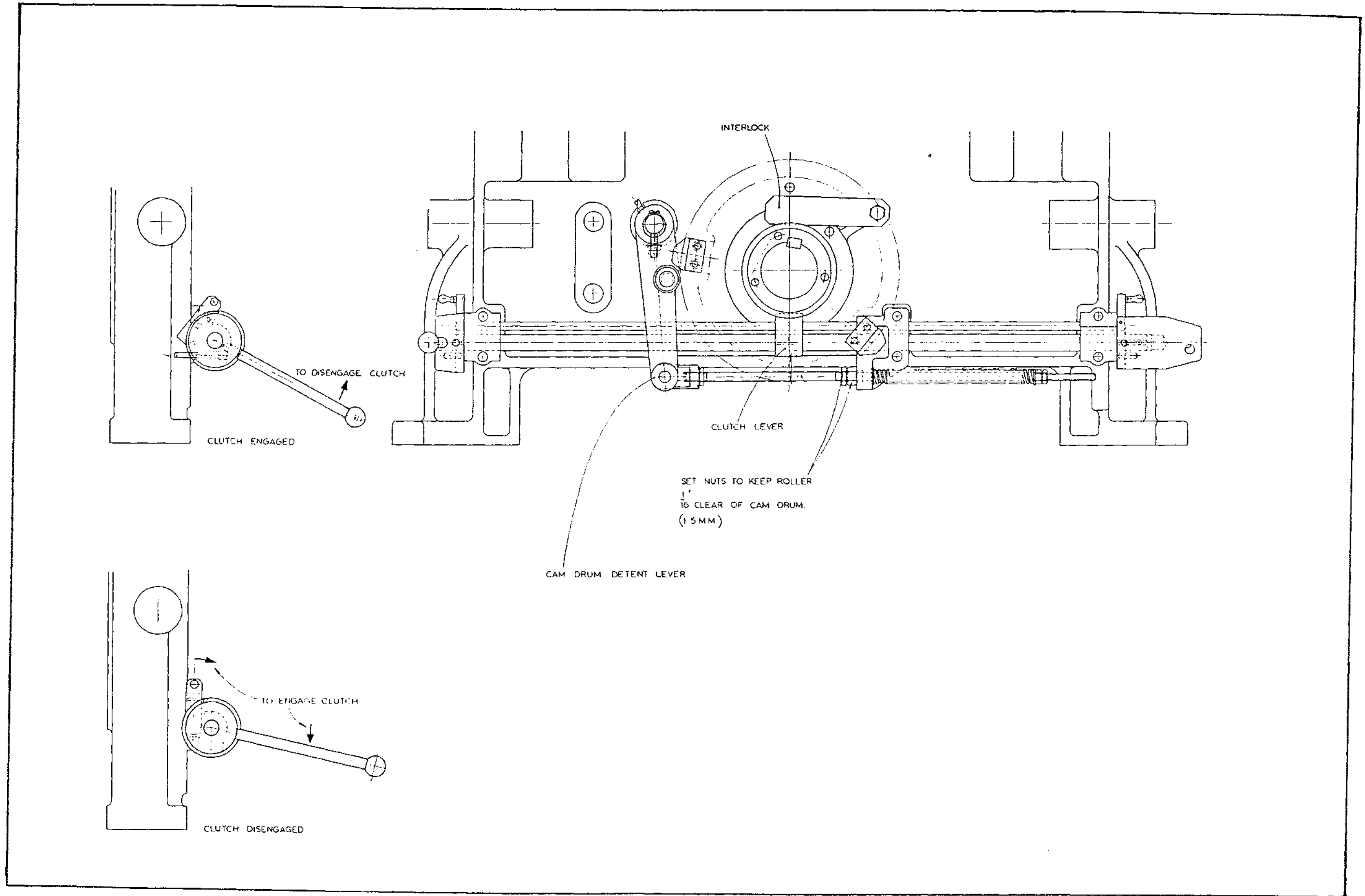
Both sides of the clutch should be adjusted to give a satisfactory non-slip drive in the 'ON' & 'OFF' positions. The serrated cam disc should be tapped around a serration at a time using a flat ended punch and hammer. To increase the driving power, rotation should be clockwise looking from the centre of the clutch towards the clutch plates. The glut spring should be removed and the clutch tested by levering with a bar between the main drive housing opening and the operating glut. When the clutch is operated from a mid position, the sliding bobbin should first move easily, then build up resistance to a maximum just as the plates compress together and the ease slightly as the internal toggles move over their high point. Set the minimum adjustment to obtain this feel without obtaining clutch slip or overheating. The clutch is a wet type and requires a good oil supply to the plates. See Fig.20 Drg. 300 Z 76.

### Clutch Dismantling (Servicing or Overhaul Purposes)

This is straight forward except for the removal of the operating bobbin which must be moved endwise after removing the clutch plates and the adjustment assemblies, rotated through 60 Degs. and again moved endwise off the inner member to allow three of the six operating pins to pass the toggles. Reverse the procedure to re-assemble.

Fig.5.20 Indexing Clutch Drg. 300 Z 76 B

1. Interlock
2. Clutch lever
3. To disengage clutch
4. Clutch engaged
5. Set nuts to keep roller 1/16" (1.5mm) clear of cam drum
6. Can drum detent lever
7. To engage clutch
8. Clutch disengaged



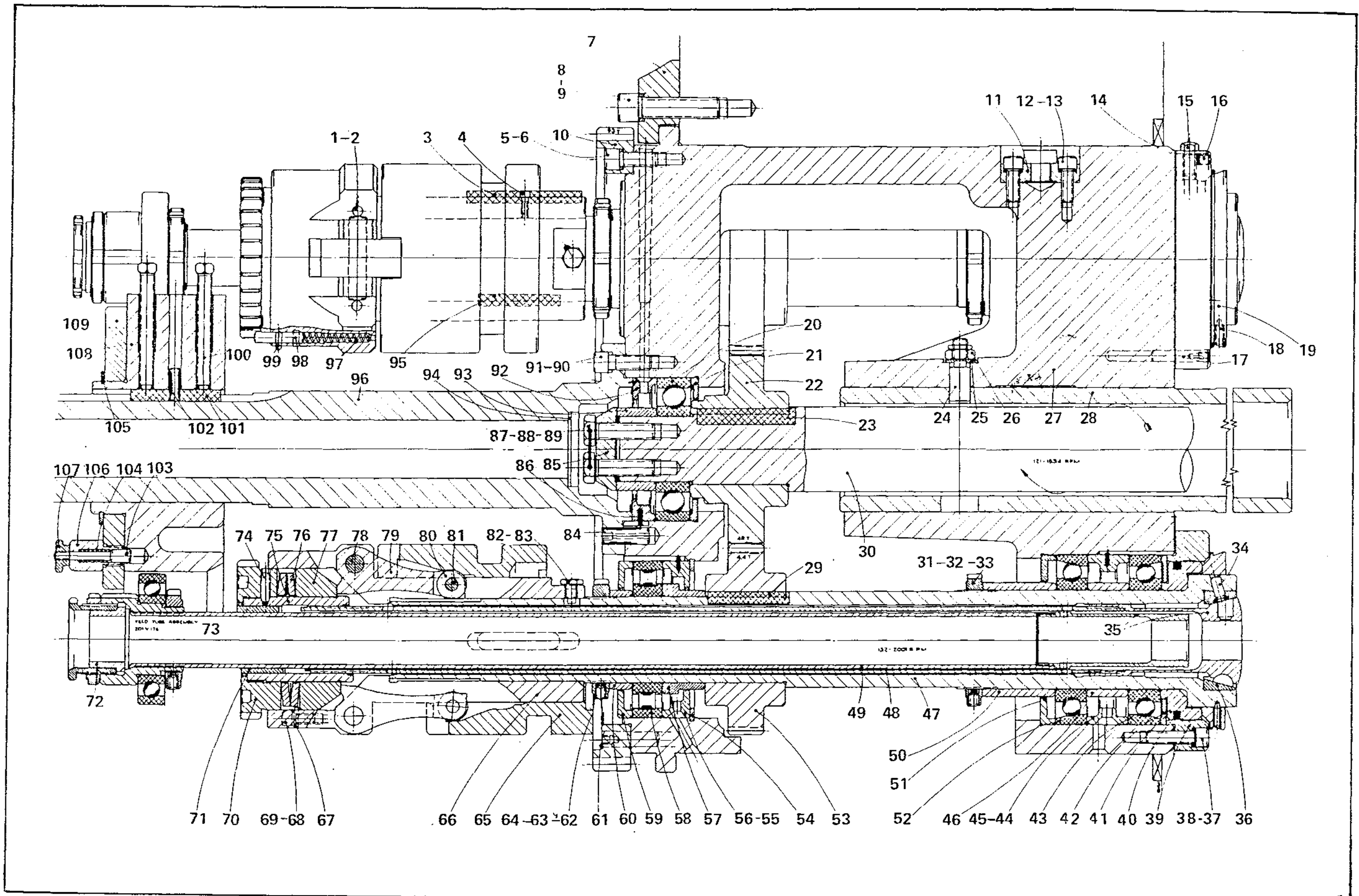
300Z 76B

SECTION SIX - PARTS LISTS AND GENERAL ARRANGEMENTS

Spindle Assembly Drg.201 Z 1

Part No.	Description
1.	154/03 Spring washer for 3/16" dia.
2.	156/206 2 B.A. Socket Head Cap Screw 3/8" long.
3.	301X158 Key
4.	156/208 2 B.A.Socket head cap screw x 1/2" long
5.	154/07 7/16"dia. Spring washer
6.	155/0720 7/16"BSF.Socket head cap screw x 1.1/4" long
7.	201X163 Thrust block
8.	154/10 5/8" dia.Spring washer
9.	155/1040 5/8" BSF.Socket Head Cap Screw 2.1/2" long
10.	201Y109A Index gear
11.	201X146 Locator
12.	154/06 3/8"dia.Spring washer
13.	155/0616 3/8"BSF.Socket head cap screw x 1" long
14.	153/05 Soft pad for 5/16"dia.
15.	301X156 Stop screw
16.	176/0505 5/16"BSF.Socket set screw cup point x 5/16"long
17.	141/4 11/32"dia. Taper pin x 1.3/4" long
18.	182/0412 1/4"BSF.Socket set screw taper point x 3/4" long
19.	201X103 Thrower ring
20.	SB6 Special bearing
21.	217X153 Spacer
22.	201X136 Centre shaft gear
23.	121/1648T 1/2"squ.Tapped key x 3" long
24.	217X142 Threaded taper pin
25.	130/07 7/16"dia. Flat washer
26.	203/07 7/16"BSF. Selflocking nut
27.	201Z101 Spindle drum
28.	217Y141E Centre guide
29.	122/1640T Tapped key 11/32"x 1/2" x 2.1/2" long
30.	217Y140A Centre driving shaft
31.	153/05 Soft pad for 5/16"dia.
32.	176/0506 5/16"BSF. Socket set screw cup point x 3/8" long
33.	171/75 75mm dia. locknut
34.	201X148 Pin
35.	- Supplied by the Tooling Dept.
36.	201X147C Spindle nose
37.	155/0624 3/8"BSF.Socket head cap screw x 1.1/2" long
38.	154/06 3/8"dia Spring washer
39.	201V114B Binding cap
40.	201X116 Piston ring
41.	201x115A Ring housing
42.	201X160 Labrinth ring
43.	SB2 Special bearing
44.	201X117 Front bearing spacer
45.	143/0406D 1/8"dia Mills pin x 3/8" long
46.	201X159 Spacer
47.	201Y102D Work spindle
48.	201X154A Collet tube
49.	201X155 Feed tube
50.	201X119 Spacer front bearing
51.	201X118 Front bearing, rear spacer
52.	SB2 Special bearing
53.	201X112 Spindle gear
54.	104/46P 12mm Internal circlip
55.	143/0406D 1/8"dia Mills pin x 3/8" long
56.	201X120 Rear bearing,inner spacer
57.	201X123 Rear bearing spacer
58.	SB4 Special bearing

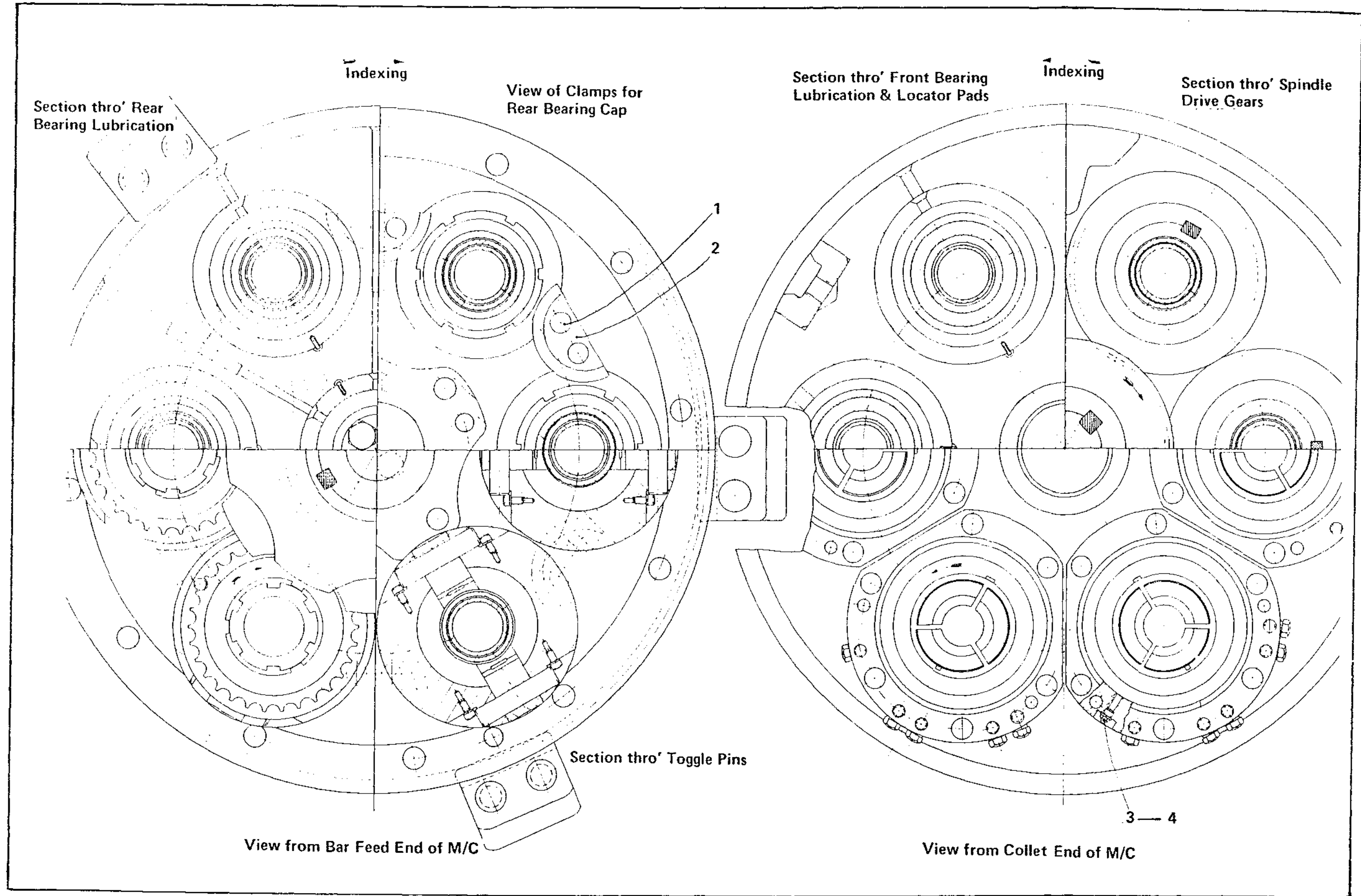
59.	201X121	Rear bearing cover
60.	201X124	Rear bearing end spacer
61.	141/14	1/2"dia. Taper pin x 2" long
62.	151/65	Slotted locknut
63.	176/0506	5/16"BSF. Socket set screw,cup point x 3/8" long
64.	153/05	Soft pad for 5/16"BSF.
65.	201Y111E	Toggle operating sleeve
66.	201Z110B	Toggle carrier
67.	301X190	Washer
68.	155/0512	5/16"BSF.Socket head cap screw x 3/4" long
69.	154/05	5/16"dia. Spring washer
70.	201V126A	Collet tubing sleeve
71.	201X130A	Support bush
72.	-	Supplied by the Tooling Dept.
73.	201V176	Feed tube assembly
74.	182/0514	5/16"BSF. Socket set screw,taper point x 7/8" long
75.	201V125A	Collet tubing sleeve
76.	201X122A	Compensating washer
77.	201X127	Thrust ring
78.	301X105	Pin for toggle
79.	301V104B	Toggle
80.	301X107	Roller for toggle
81.	301X106	Pin for toggle roller
82.	SP41J	Tab washer
83.	9101X117	Special screw
84.	201X173	Parallel pin
85.	217X145	Binding plate
86.	143/0406D	1/8"dia.Mills pin x 3/8" long
87.	-	Soft iron wire
88.	198/16	1/2"dia. Shakeproof washer
89.	316X144	Bolt
90.	155/0720	7/16"BSF.Socket head cap screw x 1/4" long
91.	154/07	7/16"Dia spring washer
92.	217X149	End spacer
93.	217X154	Inner spacer, centre bearing
94.	129/28	2.1/4"dia Welch plug
95.	122/1640T	Tapped key 11/32" x 1/2" x 2.1/2" long
96.	201Y165A	Driving coupling
97.	301X191	Plunger spring
98.	301X129	Plunger spring
99.	125/1008	Taper pin 5/32"dia x 1/2" long
100.	188/0756	7/16"BSF. Squ. head set screw x 3.1/2" long
101.	301X171	Key
102.	143/1016B	5/16"dia. Mills pin x 1" long
103.	577X125	Plunger
104.	558X128	Spring
105.	101/38	4"dia. External circlip
106.	577X123	Plunger housing
107.	577X126	Knob
108.	201Y168	Feed tube steady
109.	201V169	Stop plate



201 Z 1

Spindle Assembly (End View) Drg.201 Z 2

	Part No.	Description
1.	155/0614	3/8"BSF. Socket head cap screw x 7/8" long
2.	201X180	Clamp
3.	212/04	1/4"BSF. Oiler
4.	210/1725	1/4" Yellow washer



201 Z 2

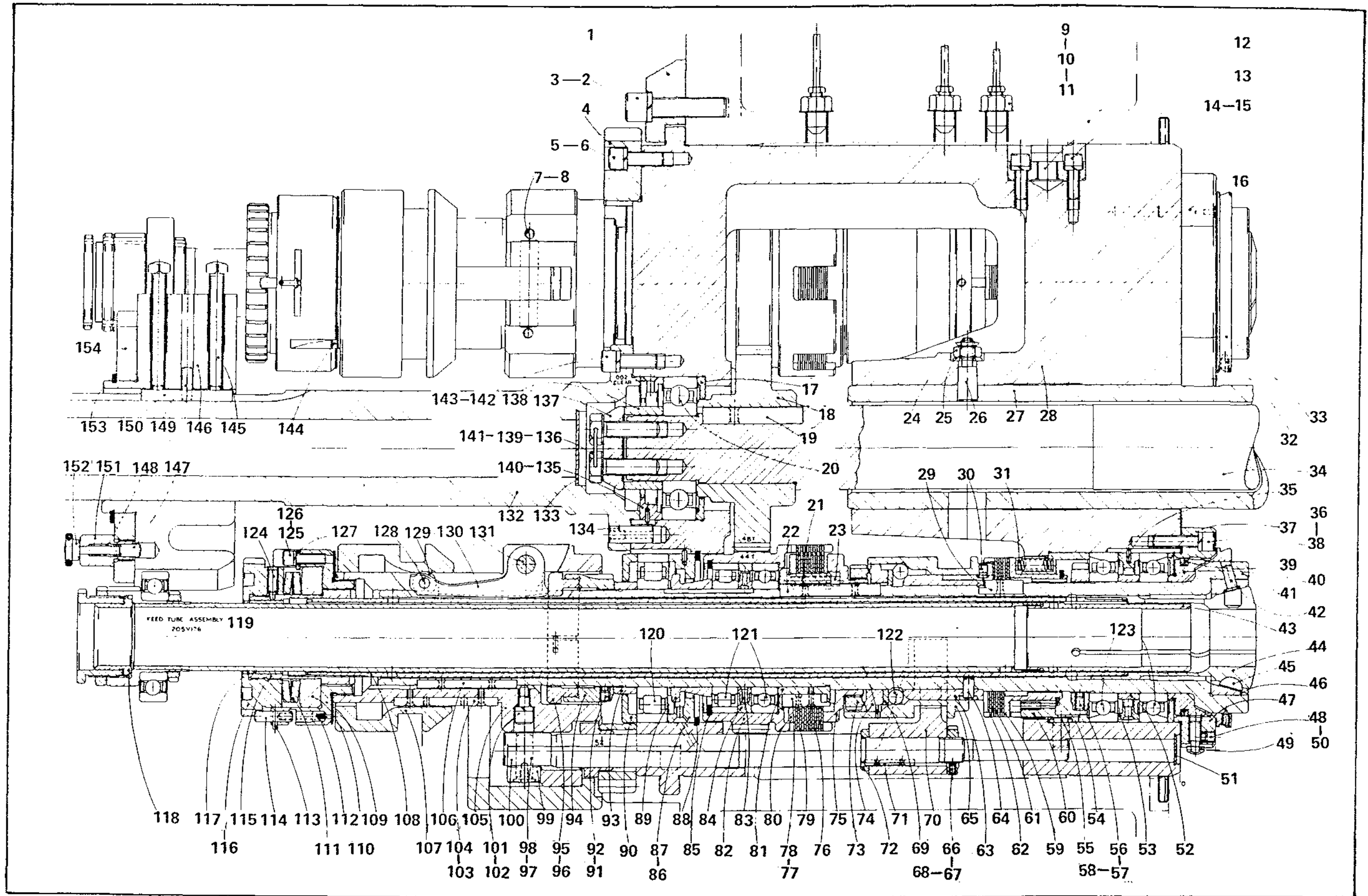


Spindle Stopping Assembly Drg.202 Z 1

Part No.	Description
1.	201X163 Thrust block
2.	155/1040 5/8"BSF.Socket head cap screw x2.1/2" long
3.	154/10 5/8"dia. Spring washer
4.	202Y109 Index gear
5.	154/07 7/16"dia Spring washer
6.	155/0720 7/16"BSF.Socket head cap screw x 1.1/4" long
7.	156/206 2BA.Socket head cap screw x 3/8" long
8.	154/03 3/16"dia. Spring washer
9.	221/3 Tubing sleeve 3/16" tube
10.	215/3 Tubing nut 3/16" tube
11.	568X157A Adaptor
12.	202V223 Extra drilling on drum housing 222Z101
13.	201X146 Locator
14.	155/0616 3/8"BSF. Socket head cap screw x 1" long
15.	154/06 3/8"dia Spring washer
16.	141/4 11/32"dia Taper pin x 1.3/4" long
17.	217X153 Spacer
18.	201X136 Centre shaft gear
19.	121/1648T 1/2" Tapped square key x 3" long
20.	SB6 Special bearing
21.	303X220A Clutch spring
22.	121/1248T 3/8"Tapped square key 3" long
23.	202X218 Pin
24.	203/07 7/16"BSF.Selflocking nut
25.	130/07 7/16"dia. Flat washer
26.	217X142 Taper pin threaded
27.	217Y141E Centre guide
28.	202Z101 Spindle drum
29.	202X200 Key
30.	102X197C Brake housing key
31.	202X199 Brake spring
32.	182/0408 1/4"BSF.Socket set screw,taper point x 1/2" long
33.	205X103 Thrower ring
34.	217Y140A Centre driving shaft
35.	143/0406D 1/8"dia. Mills pin x 3/8" long
36.	154/06 3/8"dia. Spring washer
37.	202X160 Labyrinth ring
38.	155/0624 3/8"BSF.Socket head cap screw x 1.1/2" long
39.	201X116 Piston ring
40.	202X115A Ring housing
41.	202X102B Work spindle
42.	201X148 Pin
43.	- Supplied by the Tooling Dept.
44.	- Supplied by the Tooling Dept.
45.	- Supplied by the Tooling Dept.
46.	203X147B Spindle nose
47.	201V114B Binding cap
48.	176/0505 5/16"BSF.Socket set screw,cup point x 5/16" long
49.	301X156 Stop screw
50.	153/05 Soft pad for 5/16"dia.
51.	129/11 Welch plug 7/8"dia
52.	202X159 Spacer
53.	203X117 Front bearing spacer
54.	103/41 95mm External circlip
55.	303X226A Drive key
56.	151/85 85mm dia. Slotted locknut
57.	176/0506 5/16"BSF.Socket set screw,cup point x 3/8" long
58.	153/05 Soft pad for 5/15"dia.

59.	202X195	Brake pressure sleeve
60.	202X196	Brake housing
61.	202X197	Brake plate inner
62.	202X198	Brake plate outer
63.	202X182	Clutch centre
64.	102X146	Bronze dowel
65.	202X181	Clutch bobbin
66.	203/227	Locknut
67.	179/204	2BA.Socket set screw,cup point x 1/4" long
68.	153/42	Soft pad for 2BA.
69.	202X202	Thrust plate
70.	202V207	Clutch fork
71.	121/0624T	3/16"Square taper key x 1/2" long
72.	203X209A	Clutch glut spacer
73.	202X201	Clutch adjusting nut
74.	202X184	Adjusting ring
75.	202X193	Thrust ring
76.	202X188	Clutch plate inner
77.	159X408	4BA.Socket countersunk screw x 1/2" long
78.	202X216	Clutch key
79.	202X189	Clutch plate outer
80.	202X186	Thrust plate
81.	202X217	Clutch centre
82.	202V112	Spindle gear
83.	202X221	Inner spacer
84.	202X222	Outer spacer
85.	104/45	115mm Internal circlip
86.	143/0406D	1/8"dia Mills pin x3/8" long
87.	202X120	Bearing inner spacer
88.	104/48P	130mm Internal circlip
89.	202X123	Rear bearing spacer
90.	205X121	Rear bearing cover
91.	153/05	Soft pad for 5/16"BSF.
92.	176/0505	5/16"BSF.Socket set screw,cup point x 5/16" long
93.	205X124	Rear bearing end spacer
94.	202X142	Locknut
95.	202X113	Split collar
96.	FX3588A	Pad
97.	143/0406D	1/8"dia.Mills pin x 3/8"long
98.	153X143	Cam roller pin
99.	153X142	Cam roller
100.	202V210	Clutch operating shaft
101.	301X150	Retaining screw
102.	154/06	3/8"dia. Spring washer
103.	159/206	2BA.Socket countersunk screw x3/8" long
104.	FX3360	Key
105.	202Y110	Toggle carrier
106.	122/1248T	Key 1/4" x 3/8" x 3" long
107.	202V111	Toggle operating sleeve
108.	205X154A	Collet tube
109.	202X127	Plunger housing
110.	202X105	Thrust ring
111.	201X122A	1/8"dia Mills pin x 3/8" long
112.	202X191	Plunger spring
113.	125/1008	5/32"dia.Taper pin x 1/2" long
114.	202X129	Plunger
115.	202X125B	Collet tubing sleeve
116.	201V126A	Adjusting sleeve
117.	205X130A	Support bush feed tube
118.	-	Supplied by Tooling Dept.
119.	205V176	Feed tube assembly
120.	SB11	Special bearing

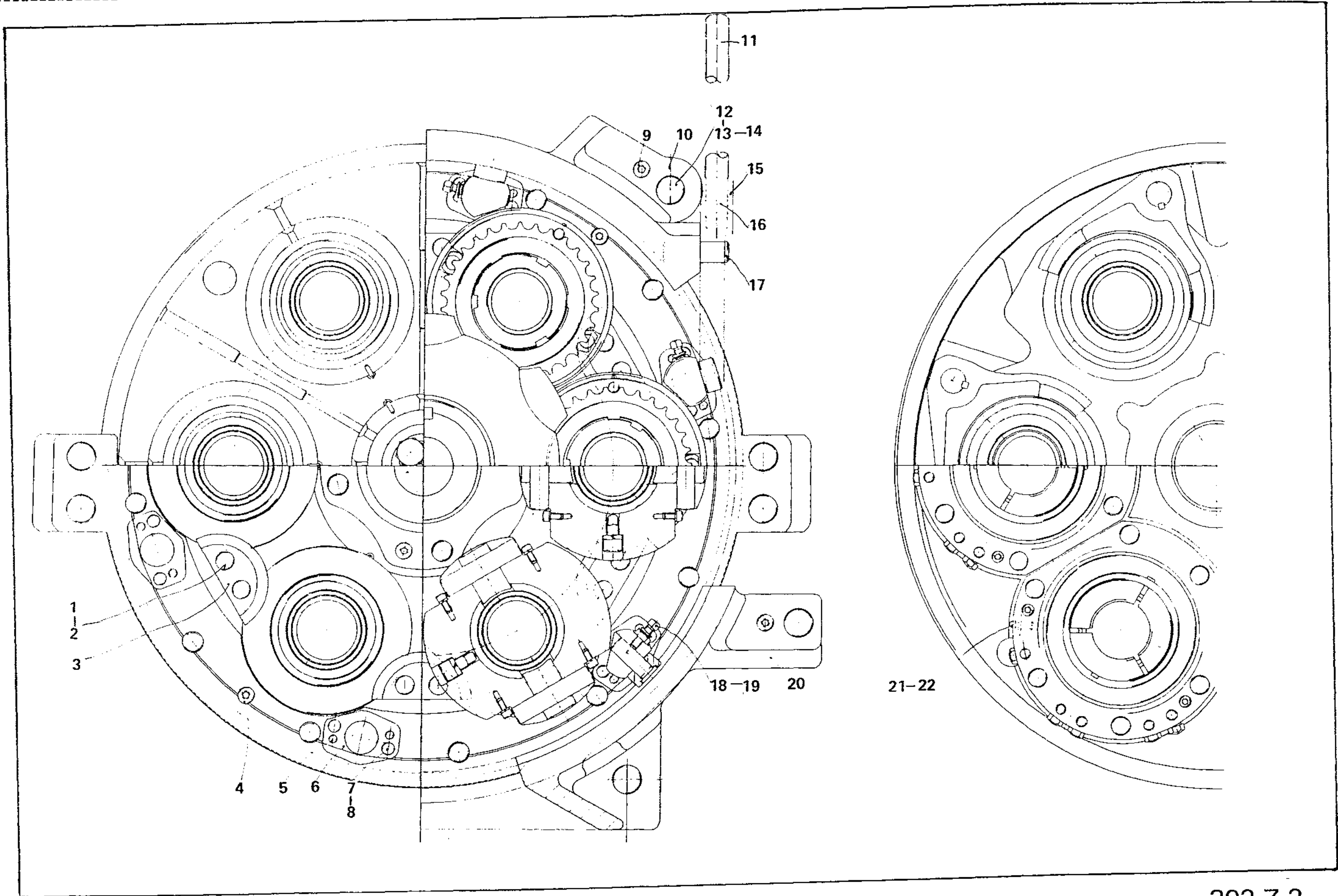
121.	SB50	Special bearing
122.	-	Hard steel ball,12mm dia.
123.	SB49	Special bearing
124.	182/0514	5/16"BSF.Socket set screw,taper point x 7/8" long
125.	185/0512	5/16BSF.Cheese head set screw x 3/4" long
126.	154/05	5/16"dia.Spring washer
127.	301X190	Washer
128.	FX7769	Pin for toggle roller
129.	FX7770	Toggle roller
130.	FY3539D	Toggle
131.	FX1040C	Pin
132.	201Y165A	Driving coupling
133.	129/28	Welch plug 2.1/4"dia.
134.	201X173	Parallel pin
135.	217X149	End spacer
136.	317X144	Bolt
137.	217X145	Binding plate
138.	217X154	Centre bearing inner spacer
139.	198/16	1/2"dia. Shakeproof washer
140.	143/0406D	1/8"dia.Mills pin x 3/8" long
141.	-	Soft iron wire
142.	155/0720	7/16"BSF.Socket head cap screw x 1.1/4" long
143.	154/07	7/16"dia. Spring washer
144.	202X165	Tab washer
145.	188/0756	7/16"BSF.Square head set screw x 3.1/2" long
146.	201Y168	Feed tube steady
147.	577X125	Plunger
148.	588X128	Spring
149.	143/1016B	5/16"dia. Mills pin x 1" long
150.	301X171	Key
151.	577X123	Plunger housing
152.	577X126	Knob
153.	101/38	External circlip 4"dia.
154.	201V169A	Stop plate



202 Z 1

Spindle Assembly (End View) Drg.202 Z 2

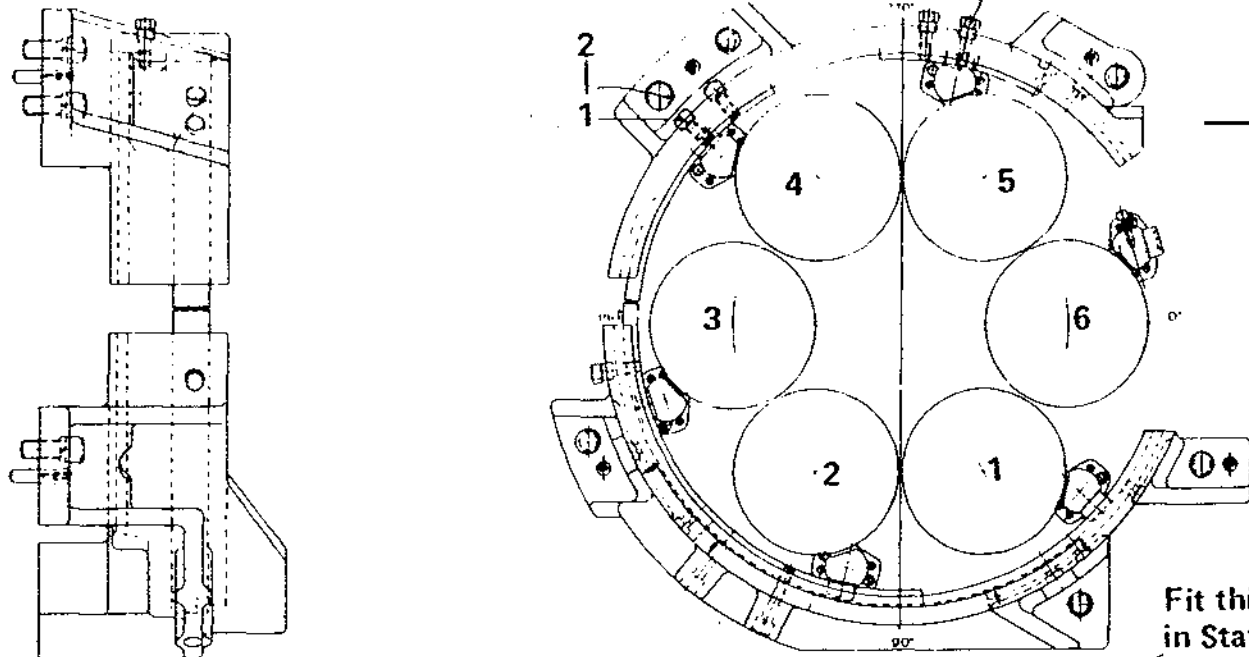
Part No.	Description
1.	155/0616 3/8"BSF.Socket head cap screw x 1" long
2.	154/06 3/8"dia Spring lock washer
3.	201X180 Clamp
4.	141/14 1/2"dia.Tapped taper pin x 2" long
5.	125/1616 1/4"dia.Solid taper pin x 1" long
6.	202X211 Glut rod bearing
7.	155/0412 1/4"BSF.Socket head cap screw x 3/4" long
8.	154/04 1/4"dia. Spring lock washer
9.	141/13 1/2"Dia.Tapped taper pin x 2" long
10.	202Z226/2 Cam support bracket
11.	202X203 Handle
12.	155/1052 5/8"BSF.Socket head cap screw x 3.1/4" Long
13.	155/1024 5/8"BSF.Socket head cap screw x 1.1/2" long
14.	154/10 5/8"dia. Spring washer
15.	202V212A Hand adjustment lever
16.	326/0816 1/4"dia. Tension pin x 1" long
17.	126/2032 5/8"dia. Parallel hardened dowel
18.	183/0416 1/4"BSF.Square head set screw x 1" long
19.	203/04 1/4"BSF.Self locking nut
20.	202Z226A/1 Cam support bracket
21.	210/1725 1/4"dia Yellow indicator washer
22.	212/04 1/4"BSF.Grease nipple



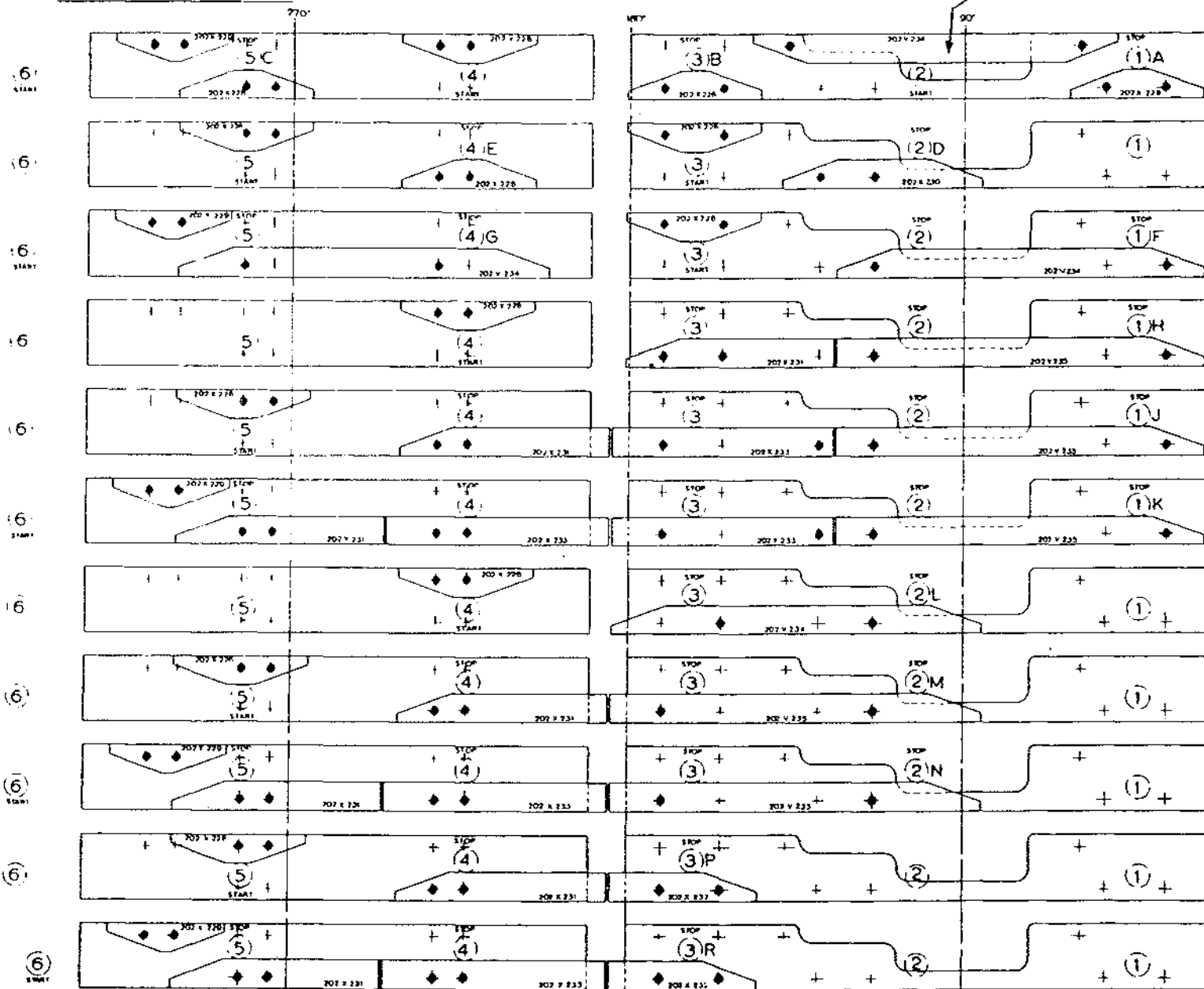
202 Z 2

Spindle Stopping Cams Drg. 202 Z 3

	Part No.	Description
1.	154/06	3/8"dia.Spring washer
2.	155/0616	3/8"BSF.Socket head cap screw x 1" long
3.	202X236	Bolt
4.	154/063/8"dia.	Spring washer



Fit this cam here as standard except when stopping in Station 2.



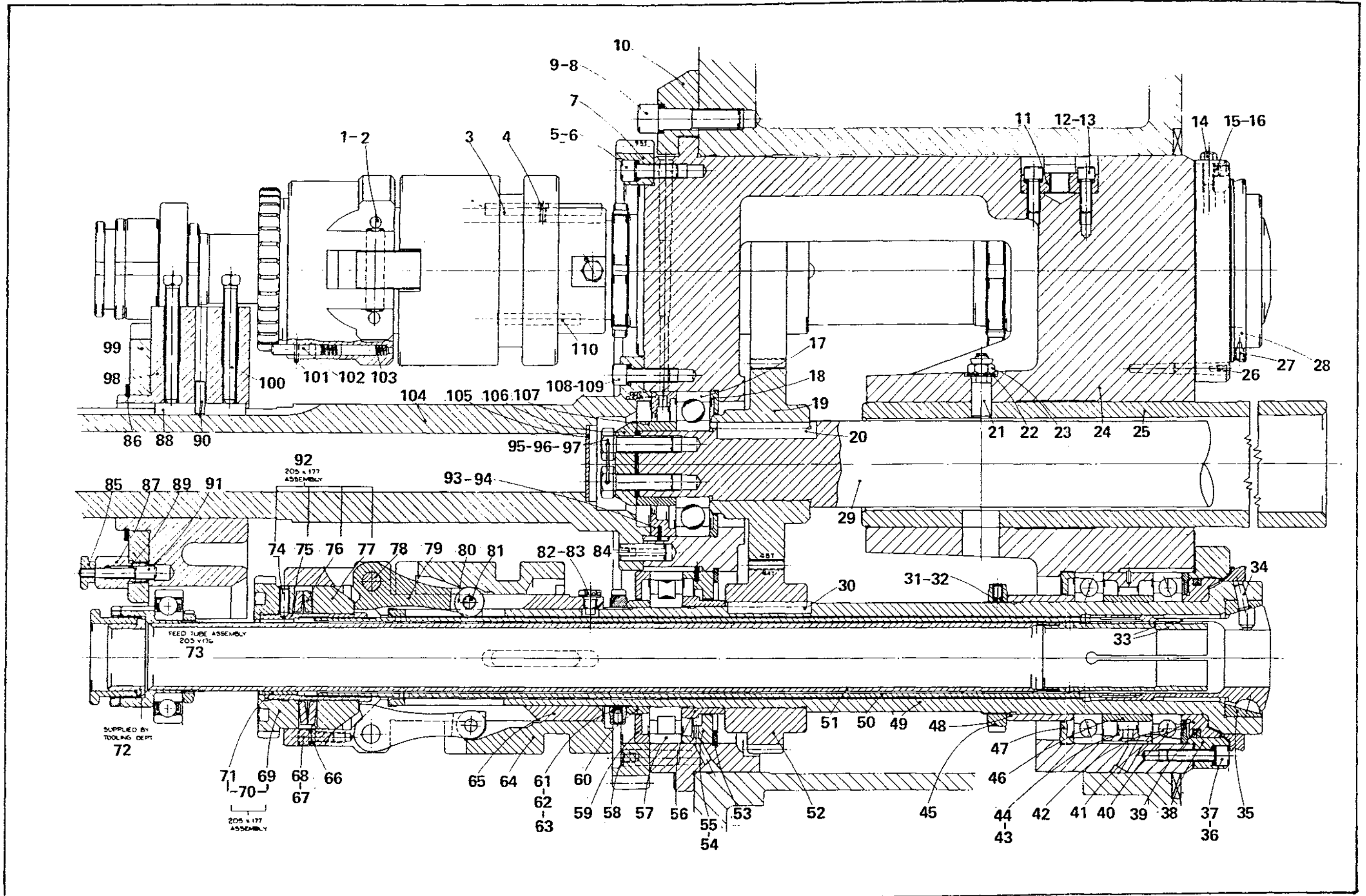
SPINDLE STOP AND REMAIN STOPPED IN STATION	CAMS REQUIRED	DEVELOPMENT LETTER
1	202 X 228	A
2	202 X 228, 202 X 230	D
3	202 X 228 (2 off)	B
4	202 X 228(2 off)	E
5	202 X 228, 202 X 229	C
1 & 2	202 X 228	F
1,2 & 3	202 X 228, 202 X 231, 202 X 235	H
1,2,3 & 4	202 X 228, 202 X 231, 202 X 233, 202 X 235	J
1,2,3,4 & 5	202 X 229, 202 X 231, (202 X 233-2 off) 202 X 235	K
2 & 3	202 X 238	L
2,3 & 4	202 X 228, 202 X 231, 202 X 235	M
2,3,4 & 5	202 X 229, 202 X 231, 202 X 233, 202 X 235	N
3 & 4	202 X 228, 202 X 231, 202 X 232	P
3,4 & 5	202 X 229, 202 X 231, 202 X 232, 202 X 233	R
4 & 5	202 X 229, 202 X 234	G



Spindle Assembly Drg. 205 Z 1A

Part No.	Description
1.	154/03 3/16"dia.Spring washer
2.	156/206 2BA.Socket head cap screw x 3/8"long
3.	301X158 Key
4.	156X206 2BA.Socket head cap screw x 3/8"long
5.	154/07 7/16"dia.Spring washer
6.	155/0720 7/16"BSF.Socket head cap screw x 1.1/4"long
7.	201Y109A Index gear on spindle drum
8.	155/1040 5/8"BSF.Socket head cap screw x 2.1/2"long
9.	154/10 5/8"dia.Spring washer
10.	201X163 Thrust block
11.	201X146 Locator
12.	155/0616 3/8"BSF.Socket head cap screw x 1"long
13.	154/06 3/8"dia Spring washer
14.	301X156 Stop screw
15.	153/05 5/16"Pad
16.	176/0505 5/16"BSF.Socket head set screw x 5/16"long
17.	SB6 Extra precision ball bearing,50mm bore 110mm O.D. Section 217
18.	217X153 Spacer (Section 217)
19.	201X136 Centre shaft gear
20.	121/1648T Key 1/2" x 1/2" x 3" (Section 217)
21.	217X142 Taper pin threaded (Section 217)
22.	130/07 7/16"dia Washer (Section 217)
23.	203/07 7/16"BSF.Selflocking hexagon nut (Section 217)
24.	205Z101A Spindle drum
25.	217Y141E Centre guide (Section 217)
26.	141/4 11/32" Extractable taper pin x 1.3/4" long
27.	182/0408 1/4"BSF.Set screw taper point x 1/2" long
28.	205X103 Thrower ring
29.	217Y140A Centre driving shaft (section 217)
30.	122/1640T 11/32" x 1/2" x 2.1/2" Key
31.	153/05 5/16" Pad
32.	176/0506 5/16"BSF.Socket head cap screw cup point x 3/8"long
33.	- Supplied by the tooling dept.
34.	201X148 Pin
35.	205X147B Spindle nose
36.	154/06 3/8"dia Spring washer
37.	155/0624 3/8"BSF,Socket head cap screw x 1.1/2"long
38.	201V114B Binding cap
39.	201X116 Piston ring
40.	202X115A Ring housing
41.	202X160 Labyrinth ring
42.	SB 49 Front spindle bearing
43.	143/0406D 1/8"dia.Mills pin x 3/8"long
44.	205X117B Front bearing spacer
45.	151/85 75mm Slotted lock nut 22 TPI.
46.	205X159 Front bearing spacer
47.	205X118B Front bearing rear spacer
48.	205X119B Spacer
49.	205Y102C Work spindle
50.	205X1055 collet tube
51.	205X155 Feed tube
52.	205X112A Spindle gear
53.	104/48P 130mm Internal circlip
54.	143/0406D 1/8"dia.Mills pin x 3/8"long
55.	205X120 Rear bearing inner spacer
56.	205X123 Rear bearing spacer

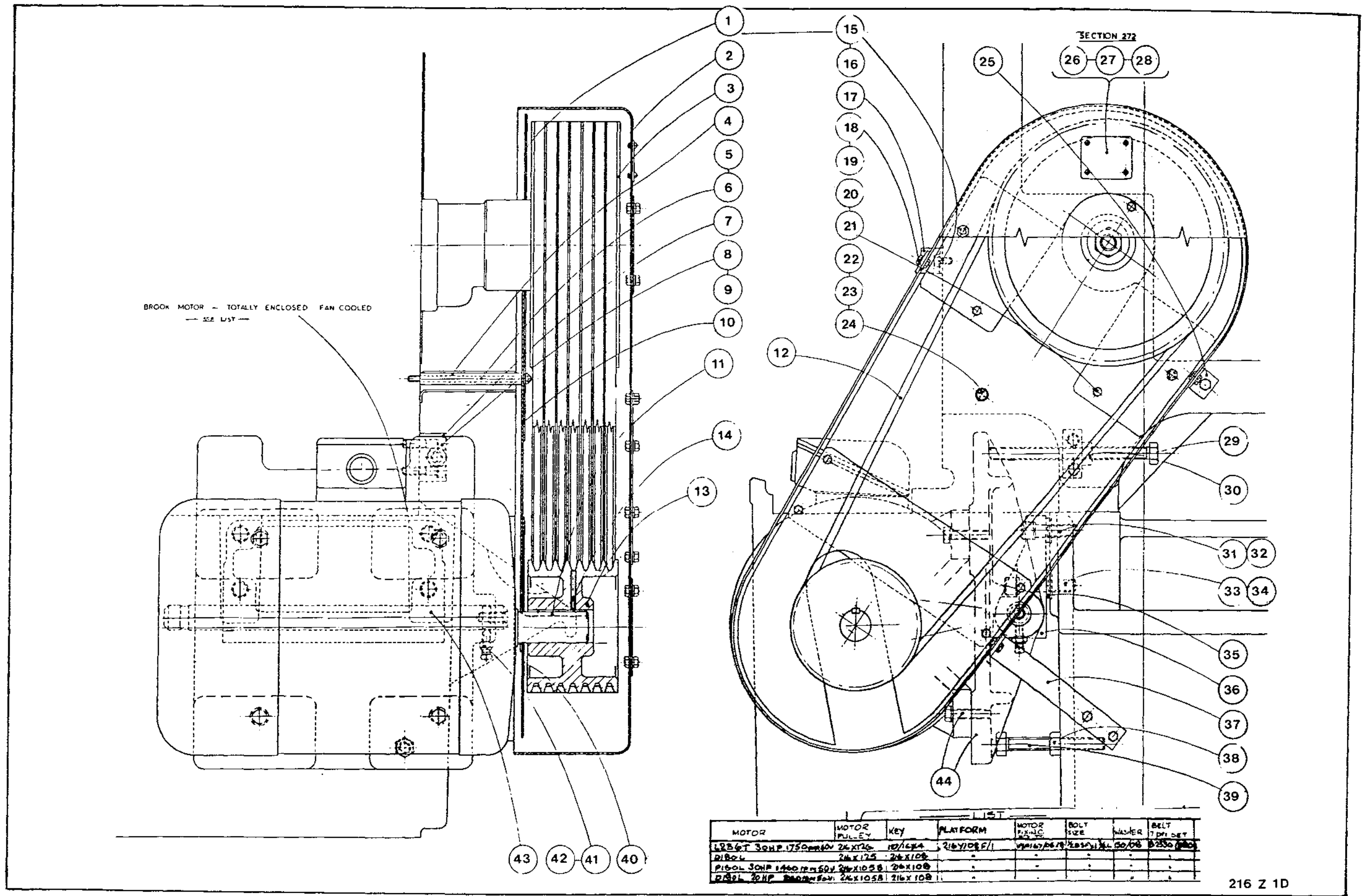
57.	SB 11	Roller journal 75 x 130 x 25mm
58.	141/14	1/2"dia.Extractable taper pin
59.	205X121	Rear bearing cover
60.	205X124	Rear bearing end spacer
61.	151/75	75mm Slotted lock nut 22 TPI.
62.	176/0506	5/16"BSF.Socket head cap screw x 3/8"long
63.	153/05	5/16"dia. Pad
64.	201Y111E	Toggle operated sleeve
65.	205Z110B	Toggle carrier
66.	301X190	Washer
67.	154/05	5/16"dia.Spring washer
68.	155/0512	5/16"BSF. Socket head cap screw x 3/4"long
69.	201V126A	Adjusting sleeve
70.	-	Assembly 205X177
71.	205X130A	Support bush
72.	-	Supplied by the tooling dept.
73.	-	Feed tube assembly
74.	182/0514	5/16"BSF.Socket set screw taper point x 7/8"long
75.	205X125B	Collet tubing sleeve
76.	201X122A	Compensating washer
77.	201X127	Thrust ring
78.	301X105	Pin for toggle
79.	301V104B	Toggle
80.	301X107	Roller for toggle
81.	301X106	Pin for toggle roller
82.	SP 41J	Tab washer
83.	901X 117	Special screw
84.	201X173	Parallel pin
85.	577X126.	Knob
86.	101/38	4"dia.External circlip
87.	577X123	Plunger housing
88.	301X171	Key
89.	558X128	Spring
90.	143/1016B	5/15"dia.Mills pin x 1"long
91.	577X125	Plunger
92.	-	205X177 Assembly
93.	143/0406D	1/8"dia.Mills pin x 3/8"long (section 217)
94.	217X149	End spacer (section 217)
95.	-	Soft iron wire (section 217)
96.	198/16	Shakeproof washer for 1/2"BSF. (section 217)
97.	317X144	Bolt (section 217)
98.	201Y168	Feed screw steady
99.	201V169A	Stop plate
100.	188/0756	7/16"BSF.Square head set screw x 3.1/2"long
101.	125/1008	5/32"dia.Taper pin x 1/2"long
102.	301X129	Plunger
103.	301X191	Plunger spring
104.	201Y165A	Driving coupling
105.	129/28	Welch plug 2.1/4"dia
106.	217X145	Binding plate (section 217)
107.	217X154	Centre inner bearing (section 217)
108.	154/07	7/16"dia.Spring washer
109.	155/0720	7/16"BSF.Socket head cap screw x 1.1/4"long
110.	122/1640T	Key 11/32" x 1/2" x 2.1/2"



205 Z 1A

Motor Drive Drg.216Z1D

	Part No	Description
1.	222V124	Belt guard back plate
2.	222Y122	Belt guard
3.	216V102	Driven pulley
4.	222X127	Belt guard spacer
5.	222X116	Belt guard stud
6.	203/06L	3/8"BSF Locknut
7.	316X106	Adjustment block
8.	155/0836	1/2"BSF Socket head cap screw 2.1/4"long
9.	154/08	1/2"BSF Spring washer
10.	222V121A	Belt guard back plate
11.	-	See list
12.	-	See list
13.	-	See list
14.	176/0612	3/8"BSF Socket set screw cup point 3/4"long
15.	167/0614	3/8"BSF Hex. head set screw 7/8"long
16.	197/12	3/8"dia. Shakeproof washer
17.	222X136A	Belt guard bracket
18.	167/0510	5/16"BSF Hex. head set screw 5/8"long
19.	197/11	5/16"dia. Shakeproof washer
20.	167/0510	5/16"BSF Hex. head set screw 5/8"long
21.	197/11	5/16"dia. Shakeproof washer
22.	222X116	Belt guard stud
23.	203/06L	3/8"BSF Self locking nut (thin)
24.	130/06	3/8"dia, Flat washer
25.	222X135	Belt guard bracket
26.	2034	4BA Self locking nut
27.	172X110A	Motor direction check plate
28.	165/406	4BA Socket head cap screw 3/8"long
29.	167/12160	3/4"BSF Hex. head set screw 10"long
30.	173/12	3/4"BSF Locknut
31.	155/1244	3/4"BSF Socket head cap screw 2.3/4"long
32.	154/12	3/4"dia.Spring washer
33.	155/1260	3/4"BSF Socket head cap screw 4.3/4"long
34.	154/12	3/4"dia.Spring washer
35.	316X107	Spacer
36.	216X104	Motor platform bracket
37.	222X126	Belt guard bracket
38.	173/12	3/4"BSF Locknut
39.	167/1296	3/4"BSF Hex. head set screw 6"long
40.	222V123A	Belt guard back plate
41.	188/0824	1/2"BSF Squ. head set screw 1.1/2"long
42.	203/08	1/2"BSF Self locking nut
43.	516X105	Shaft for motor platform
44.	-	See list

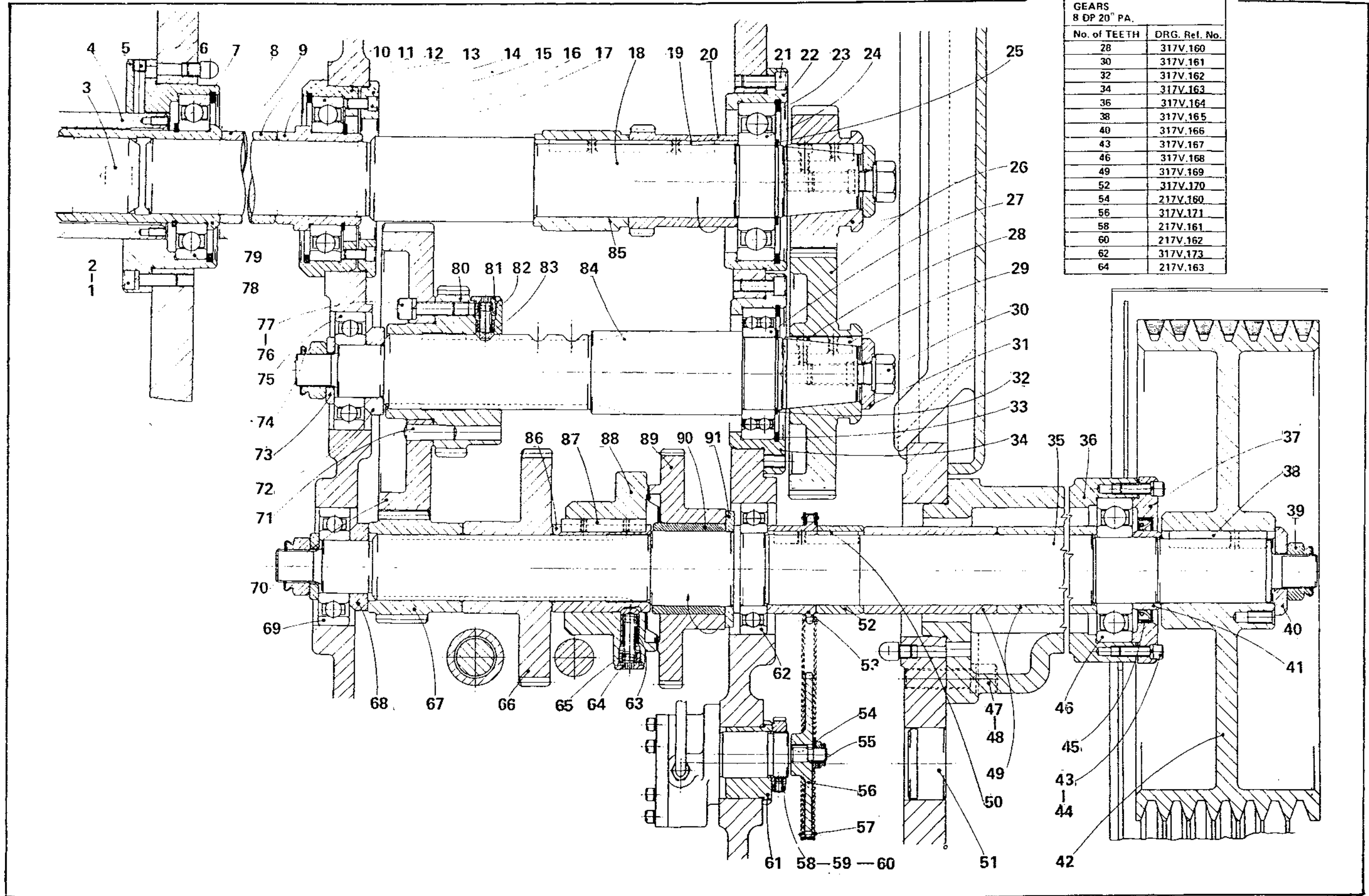


216 Z 1D

Drive Gearing Drg. 217 Z 1

	Part No,	Description
1.	155/0602	3/8"BSF.Socket head cap screw x 1.1/4"long
2.	154/06	3/8"Spring washer
3.	217Y140A	Centre driving shaft
4.	217Y141E	Centre guide
5.	217X117A	Centre guide bearing
6.	194/1	1/8"BSP.Socket pipe plug
7.	103/35	70mm External circlip
8.	104/47	125mm Internal circlip
9.	217X109	Centre shaft spacer
10.	217X110	Spacer
11.	217X113	Bearing sleeve
12.	104/47	125mm Internal circlip
13.	258/70	Light journal bearing 70mm x 125mm x 24mm
14.	217X143	Bearing housing
15.	217X107A	Clamp plate
16.	155/0510	5/16"BSF.Socket head cap screw x 3/8"long
17.	103/35	70mm External circlip
18.	217Y128	Centre drive shaft
19.	122/1640	Tapped key 1/2" x 11/32" x 2.1/2"long
20.	217X139	Driving pinion
21.	155/0616	3/8"BSF.Socket head cap screw x 1"long
22.	217V106	Bearing housing
23.	104/46	120mm Internal circlip
24.	275/55	Medium journal bearing 55mm x 120mm x29mm
25.	103/30	55mm External circlip
26.	-	See table on drawing
27.	265/55	Double row journal bearing 58mm x 100mm x 25mm
28.	155/0408	1/4"BSF.Socket head cap screw x 1/2"long
29.	317X185A	key
30.	217X119	Bolt
31.	217X116	'C'Washer
32.	103/30	55mm External circlip
33.	104/42	100mm Internal circlip
34.	217X105	Bearing housing
35.	217Y122A	Pulley shaft
36.	217V101A	Pulley bearing housing
37.	217X102	End cap
38.	121/164T	Tapped key 1/2" square x 3"long
39.	203/16L	1"BSF.Self locking nut
40.	317X116A	Clamp washer
41.	217X151	Pulley spacer
42.	216V102	Driven pulley
43.	154/05	5/16"Spring washer
44.	155/0616	5/16"BSF.Socket head cap screw x 1"long
45.	235/M6080	Oil seal 60 x 80 x 10mm
46.	257/50	Medium journal bearing 50 x 110 x 27mm
47.	155/1032	5/8"BSF.Socket head cap screw x 2"long
48.	154/10	5/8"Spring washer
49.	217X124A	Spacer
50.	122/1640T	Tapped key 1/2" x 11/32" x 2.1/2"long
51.	122X131A	Plug
52.	217X173	Spacer
53.	217X134	Oil pump sprocket
54.	130/07	7/16"Flat washer
55.	203/07	7/16"BSF.Self locking nut
56.	168X133	Pump sprocket
57.	110038	Roller chain 72 links
58.	153/04	Soft pad

59.	176/0405	1/4"BSF.Socket head cap screw 5/16"long
60.	168X136	Pump locknut
61.	168X134A	Eccentric bush
62.	258/55	Light journal bearing 55 x 100 x 21mm
63.	117X152	Plunger
64.	118X141	Spring retaining plug
65.	117X111A	Clutch spring
66.	217X146	High speed drive gear
67.	217X120	Slow speed drive gear
68.	217X130	Spacing washer
69.	257/40	Medium journal bearing 40 x 90 x 23mm
70.	217V148	Large sliding gear
71.	125/3224	1/2" dia Solid taper pin 1.1/2"long
72.	217X130	Spacing washer
73.	317X126	Clamp washer
74.	203/16L	1"BSF.Self locking nut
75.	257/40	Medium journal bearing 40 x 90 x 23mm
76.	154/07	7/16"Spring washer
77.	155/0724	7/16"BSF.Socket head cap screw x 1.1/2"long
78.	258/70	Light journal bearing 70 x 125 x 24mm
79.	217X115	Centre shaft coupler
80.	217X147	Small sliding gear
81.	118X141	Spring retaining plug
82.	217X111	Location spring
83.	217X152	Plunger
84.	217V125	Speed change shaft
85.	217X169	Spacer
86.	217X136	Slipping clutch centre
87.	121/1240	Tapped key 3/8" square x 2.1/2"long
88.	217V104	Slipping clutch body
89.	217X135A	Fast motion gear
90.	236/364436	Oil retaining bush
91.	217X131	Thrust bearing



LIST OF AVAILABLE SPINDLE SPEED GEARS 8 DP 20° PA.	
No. of TEETH	DRG. Ref. No.
28	317V.160
30	317V.161
32	317V.162
34	317V.163
36	317V.164
38	317V.165
40	317V.166
43	317V.167
46	317V.168
49	317V.169
52	317V.170
54	217V.160
56	317V.171
58	217V.161
60	217V.162
62	317V.173
64	217V.163

217 Z 1

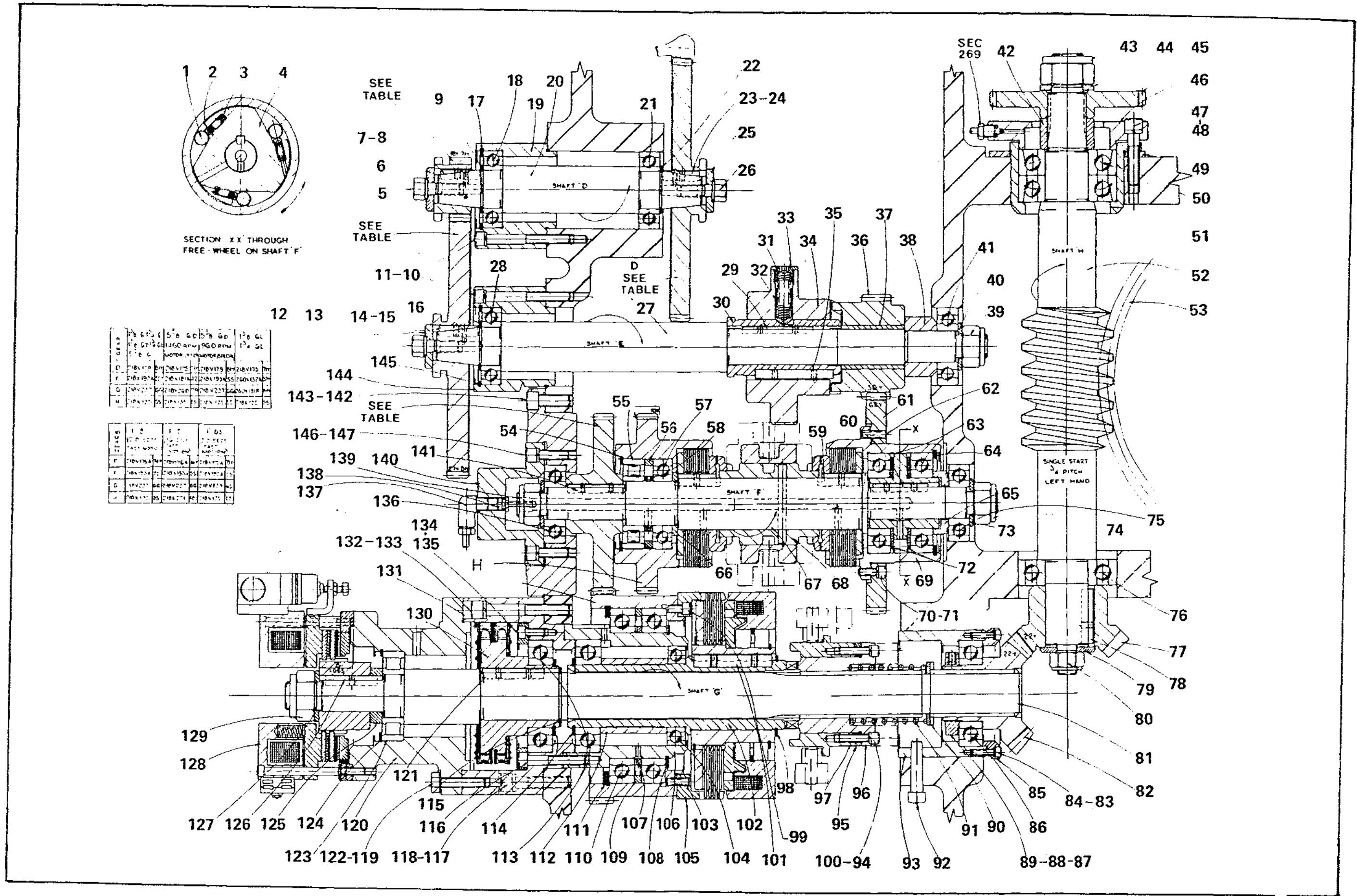


Electro-Magnetic Clutch & Brake for Feed Drive Drg. 218 Z 2A

Part No	Description
1. -	7/16"dia. Roller
2. 118X134	Free wheel plunger
3. 118X144A	Free wheel spring
4. 118X132	Free wheel body
5. 118X197A	Feed slip gear screw
6. 118X148	'C' Washer
7. 159/408	4BA.Socket countersunk head screw x 1/2"long
8. 118X200	Key for pick off gears
9. 103/19	30mm External circlip
10. 155/0544	5/16"BSF.Socket head cap screw x 2.3/4"long
11. 154/05	5/16"dia spring washer
12. 118X197A	Feed slip gear screw
13. 118X148	'C' Washer
14. 159/408	4BA.Socket countersunk head screw 1/2"long
15. 118X200	Key for pick off gears
16. 103/19	30mm External circlip
17. 104/33	62mm Internal circlip
18. 258/30.	30mm Light journal
19. 118X101A	Bearing housing
20. 218X145	Input shaft
21. 258/30	30mm Light journal
22. 103/19	30mm External circlip
23. 118X200	Key for pick off gears
24. 159/408	4BA.Socket countersunk head screw x 1/2"long
25. 118X148	'C'Washer
26. 118X197A	Feed slip gear screw
27. 218V149	Intermediate shaft
28. 258/30.	30mmLight journal
29. 122/1036T	7/32" x 5/16" Parallel tapped key x 2.1/4"long
30. 118X128A	Slipping clutch centre
31. 317X111	Clutch spring
32. 118X199	Plunger
33. 118X141	Spring retaining cap
34. 118Y127C	Slipping clutch body
35. 121/1040T	5/16" x 5/16"Parallel tapped key x 2.1/2"long
36. 118X130A	Gear
37. 236/182232	1.1/8"x 1.3/8"Oilite bush 2"Long
38. 118X122A	Collar
39. 203/12L	3/4"BSF.Self locking locknut
40. 130/12	3/4"dia. Flat washer
41. 257/25	25mm Medium journal
42. 218X158	Spacer
43. 203/16L	1"BSF.Self locking locknut
44. 118X161	Washer
45. 218X195	Handwind gear
46. 218X115A	End cap
47. 155/0628	3/8"BSF.Socket head cap screw x 1.3/4"long
48. 154/06	3/8"dia. Spring washer
49. 218X159	Spacer
50. SB22	Medium angle contact bearing
51. 218X113	Bearing housing
52. 218V137	Lower wormshaft
53. 218V124	Lower wormwheel
54. 104/36	72mm Internal circlip
55. 273/35Z	35mm Light roller journal
56. 118X110	Spacer
57. 258/35Z	35mm Light journal
58. 118X108	Spacer

59.	118X202	Clutch key
60.	121/0828T	1/4" x 1/4" Parallel tapped key x 1.3/4" long
61.	118X192	Feed input gear
62.	118X207	Drive pin
63.	258/40Z	40mm Light journal
64.	104/38	80mm Internal circlip
65.	118X142	Collar
66.	118X109	Collar
67.	118Y151B	Fast motion clutch shaft
68.	183X126	Modified Herbert No. 4 clutch
69.	118V131B	Clutch cup
70.	154/04	1/4" dia. Spring washer
71.	155/0410	1/4"BSF.Socket head cap screw x 5/8" long
72.	118X133	Roller retaining plates
73.	130/12	3/4" dia.Flat washer
74.	203/12L	3/4"BSF.Self locking locknut
75.	257/25	25mm medium journal
76.	257/35	35mm Medium journal
77.	218X196	Mitre wheel
78.	121/1228T	3/8" x 3/8" Parallel tapped key x 1.3/4" long
79.	218X112	Washer
80.	203/10L	5/8"BSF Self locking locknut
81.	218Y232	Feed clutch shaft
82.	218/241	Mitre Wheel
83.	154/03	2BA.Flat washer
84.	156/210	2BA. Socket head cap screw
85.	218X246	Clamp ring
86.	258/45	45mm Light journal
87.	176/0405	1/4" BSF Socket set screw,cup point 5/16" long
88.	153/04	1/4" dia. Soft pad
89.	151/45	45mm Slotted lock nut
90.	318X248	Spring abutment
91.	318X251	Spring
92.	139/13	3/8" dia. Headed dowel,extractable
93.	218X239	Bearing housing
94.	155/0416	1/4" BSF Socket head cap screw 1" long
95.	318X244	Adjusting washer
96.	318V238	Sliding clutch
97.	218X245	Bobbin
98.	103/30	55mm External circlip
99.	155/0408	1/4" BSF Socket head cap screw 1/2" long
100.	154/04	1/4" dia Spring washer
101.	318X260.	Metric key
102.	218Y236.	Clutch sleeve
103.	126/0812	1/4" dia Parallel dowel 3/4" long
104.	268/50	50mm Extra light journal
105.	318V230A	Electro magnetic clutch
106.	218V235	Bearing housing sleeve
107.	318X250.	Inner spacer
108.	103/42	100mm External circlip
109.	318X252	Outer spacer
110.	275/100	100mm Extra light ball journal
111.	104/50	140mm Internal circlip
112.	318X247	Spacer
113.	258/50.	50mm Light journal
114.	103/28	50mm External circlip
115.	101/18	1.1/2" dia. External circlip
116.	155/0528	5/16" BSF Socket head cap screw 1.3/4" long
117.	155/0628	3/8"BSF Socket head cap screw 1.3/4" long
118.	154/06	3/8" dia. Spring washer
119.	169/0524	5/16" BSF Hexagon head set screw 1.1/2" long
120.	218V233	Brake mounting body

121.	218X258	Metric key
122.	198/11	5/16" dia. Shakeproof washer
123.	273/35	35mm Light roller journal
124.	104/36	72mm internal circlip
125.	318X266A	Spacer
126.	118/04	1/4" dia. Spring washer
127.	130/14	7/8" dia. Flat washer
128.	118V231A	Electro magnetic brake
129.	203/14L	7/8" BSF Self locking locknut
130.	218X240	Drive sprocket
131.	218V234	Bearing housing
132.	154/06	3/8" dia. Spring washer
133.	155/0644	3/8" BSF Socket head cap screw 2.3/4" long
134.	218X242	Clamp plate
135.	155/0410	1/4" BSF Socket head cap screw 5/8" long
136.	257/25	25mm Medium journal
137.	219/17	3/16" Male elbow adaptor
138.	181AX126	Oil nipple
139.	168X160	Oil bush
140.	218X205	Bearing end cap
141.	121/0828T	1/4" X 1/4" Parallel key
142.	218V107	Bearing housing
143.	155/0620	3/8" BSF Socket head cap screw 1.1/4" long
144.	118X101A	Bearing housing
145.	104/33	62mm Internal circlip
146.	154/05	5/16" Spring washer
147.	155/0516	5/16" BSF Socket head cap screw 1" long



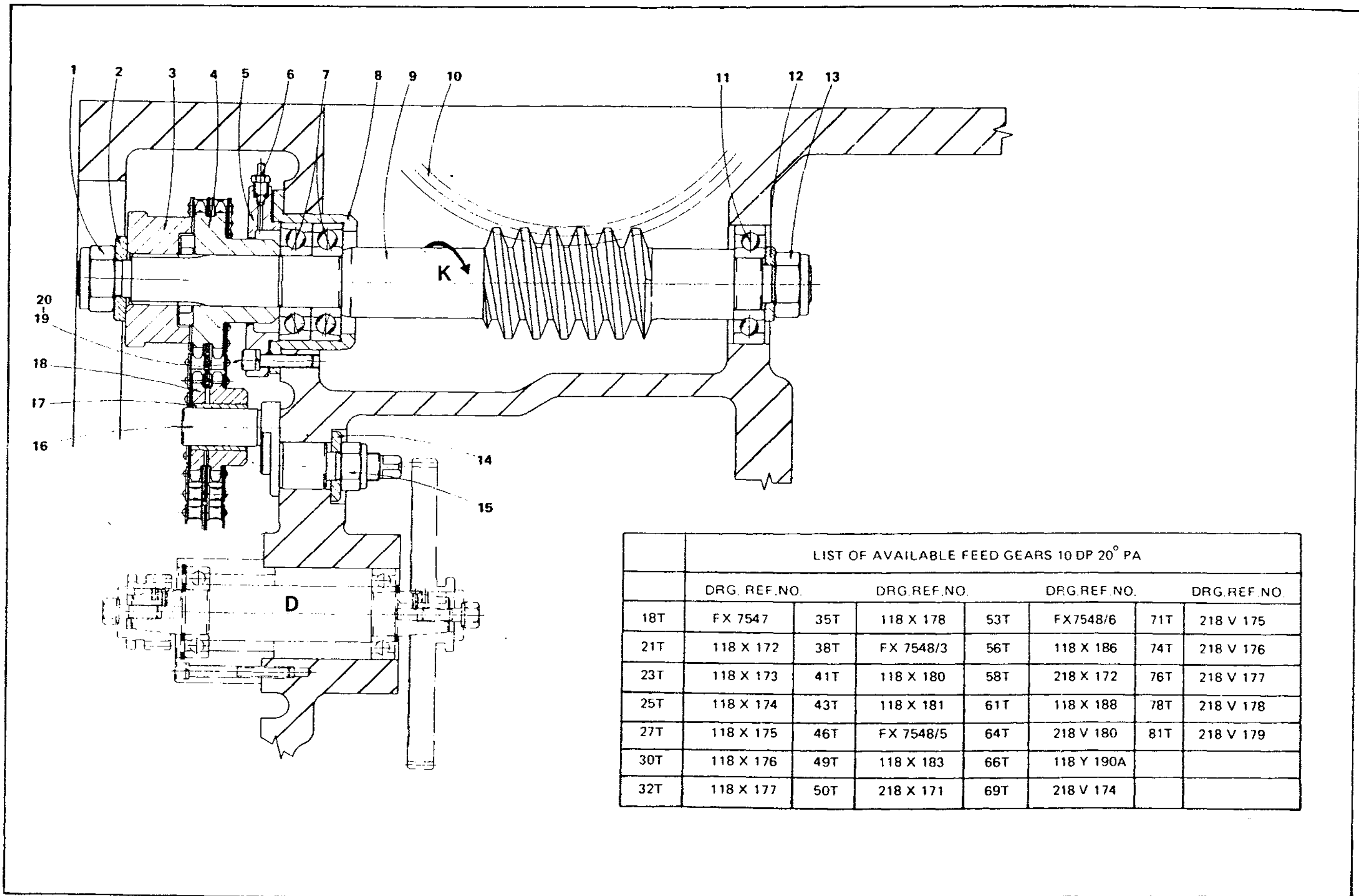
ITEM NO.	DESCRIPTION	QTY	UNIT
1	GEAR	1	EA
2	GEAR	1	EA
3	GEAR	1	EA
4	GEAR	1	EA

ITEM NO.	DESCRIPTION	QTY	UNIT
5	GEAR	1	EA
6	GEAR	1	EA
7	GEAR	1	EA
8	GEAR	1	EA

218 Z 2A

Electro Magnetic Clutch and Brake For Feed Drive Drg.218 Z 3

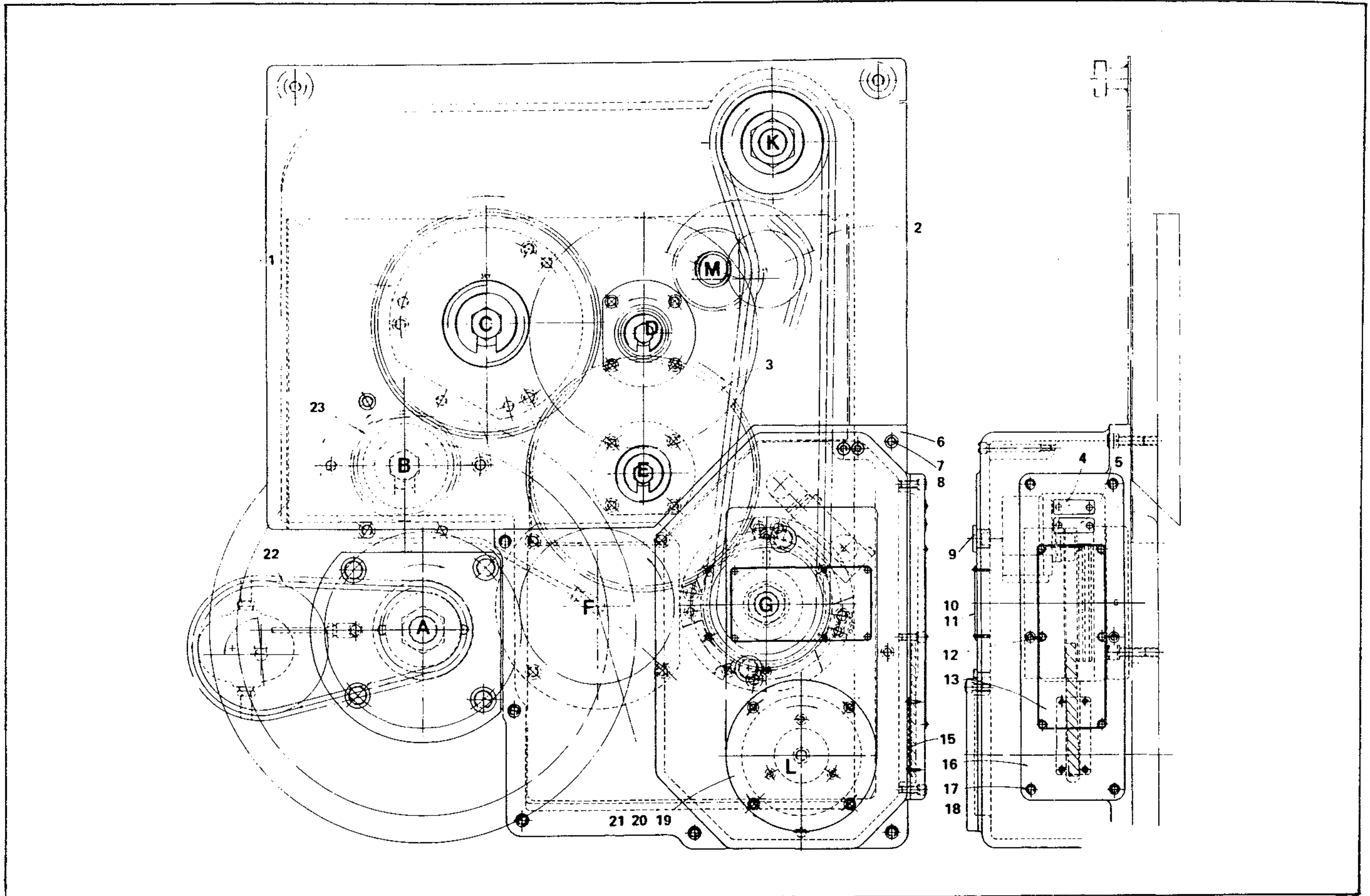
Part No	Description
1.	203/16L 1" BSF Self locking locknut
2.	317X126 Clamp Washer
3.	318X167 Clutch member
4.	318X168 Wormshaft sprocket
5.	218X115A End cap
6.	Section 268
7.	SB 22 Special bearing
8.	218X113 Bearing housing
9.	218V138. Upper wormshaft
10.	218Y125 Upper wormwheel
11.	257/35 Medium journal bearing 35mm x 80mm x 21mm
12.	318X111 Washer
13.	203/16L 1" BSF Self locking locknut
14.	518X197 Collar
15.	203/121 3/4" BSF Self locking locknut
16.	518X163 Jockey eccentric
17.	236/162024 1" x 1.1/4" Oil retaining bush
18.	218X169 Jockey sprocket
19.	155/0624 3/8" BSF Socket head cap screw 1.1/4" long
20.	154/06 3/8" dia.Spring washer



LIST OF AVAILABLE FEED GEARS 10 DP 20° PA							
	DRG. REF. NO.		DRG. REF. NO.		DRG. REF. NO.		DRG. REF. NO.
18T	FX 7547	35T	118 X 178	53T	FX 7548/6	71T	218 V 175
21T	118 X 172	38T	FX 7548/3	56T	118 X 186	74T	218 V 176
23T	118 X 173	41T	118 X 180	58T	218 X 172	76T	218 V 177
25T	118 X 174	43T	118 X 181	61T	118 X 188	78T	218 V 178
27T	118 X 175	46T	FX 7548/5	64T	218 V 180	81T	218 V 179
30T	118 X 176	49T	118 X 183	66T	118 Y 190A		
32T	118 X 177	50T	218 X 171	69T	218 V 174		

Motor Drive End of Main Drive Housing Drg. 218 Z 4A

Part No	Description
1.	Spindle speed pick-off gear, 34T, 8 D.P.
2. BS No.7 Duplex	Chain 1/2" Pitch, 0.335" Roller dia. 92 pitches long
3.	Feed pick-off gear, 27 teeth - 81 teeth, 10 D.P.
4. 291/81	Legend plate, 2LS
5. 291/2	Legend plate, 2MC
6. 222Z240	Magnetic brake housing
7. 155/0516	5/16" BSF Socket head cap screw 1" long
8. 154/05	5/16" dia. Spring washer
9. 118X141	Spring retaining plug
10. 165/404	4BA. Round head set screw 1/4" long
11. 318X253	Brake release instruction plate
12. 165/404	4BA. Round head set screw 1/4" long
13. 118V255	Brake adjustment name-plate
14. 165/404	4BA. Round head set screw 1/4" long
15. 322X242	Reset pin retaining plate
16. 322V241	Brake housing cover
17. 155/0410	1/4"BSF Socket head cap screw 5/8" long
18. 154/04	1/4" dia. Spring washer
19. 322X244	End cover
20. 155/0410	1/4"BSF Socket head cap screw 5/8" long
21. 154/04	1/4" dia. Spring washer
22. BS No. 3	Chain 3/8"Pitch, 0.25" roller dia. 64 pitches long
23. -	Spindle speed pick-off gear, 28T-58T, 8 D.P.



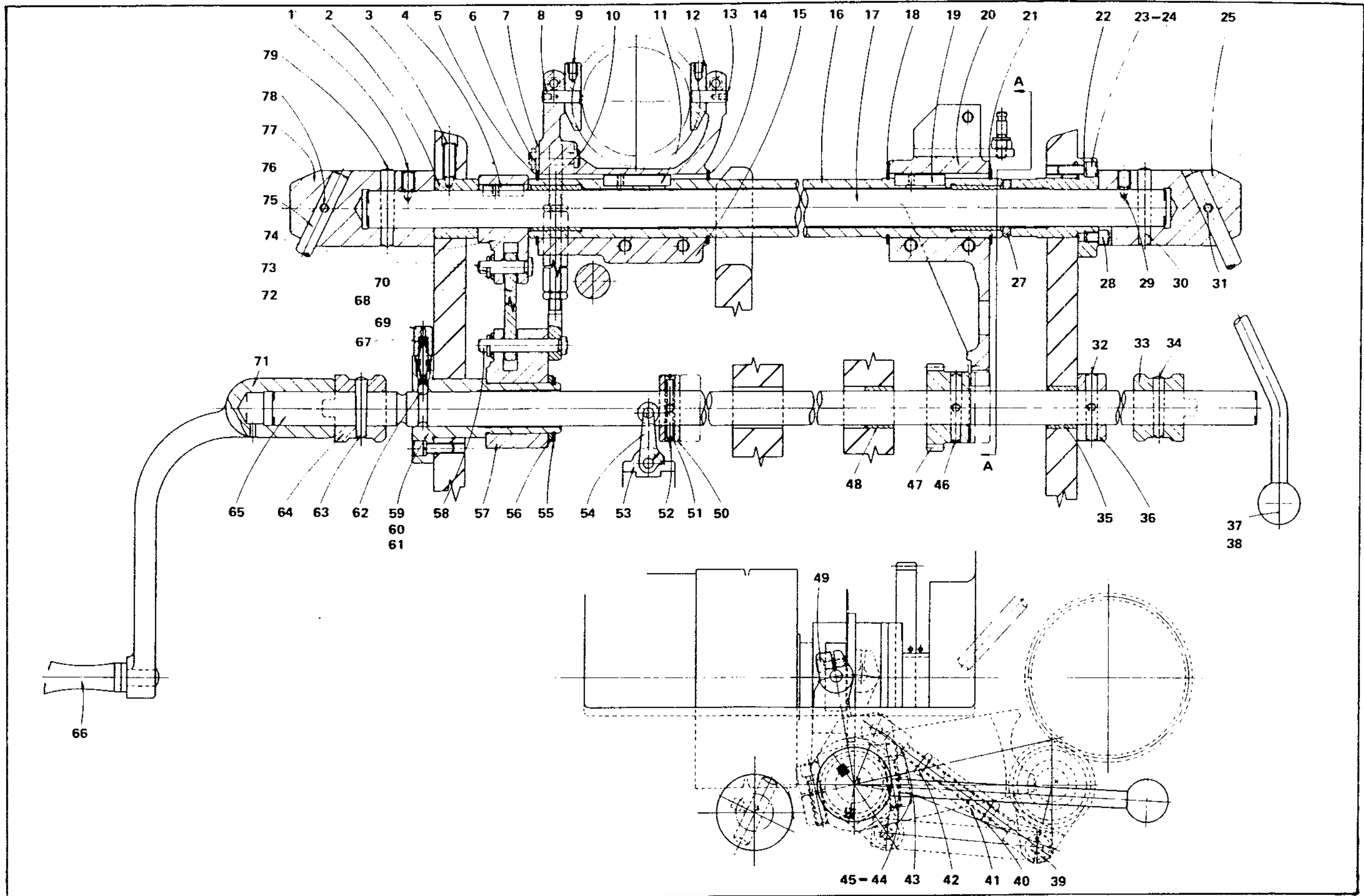
218 Z 4A



Control Shaft Drg. 219 Z 5A

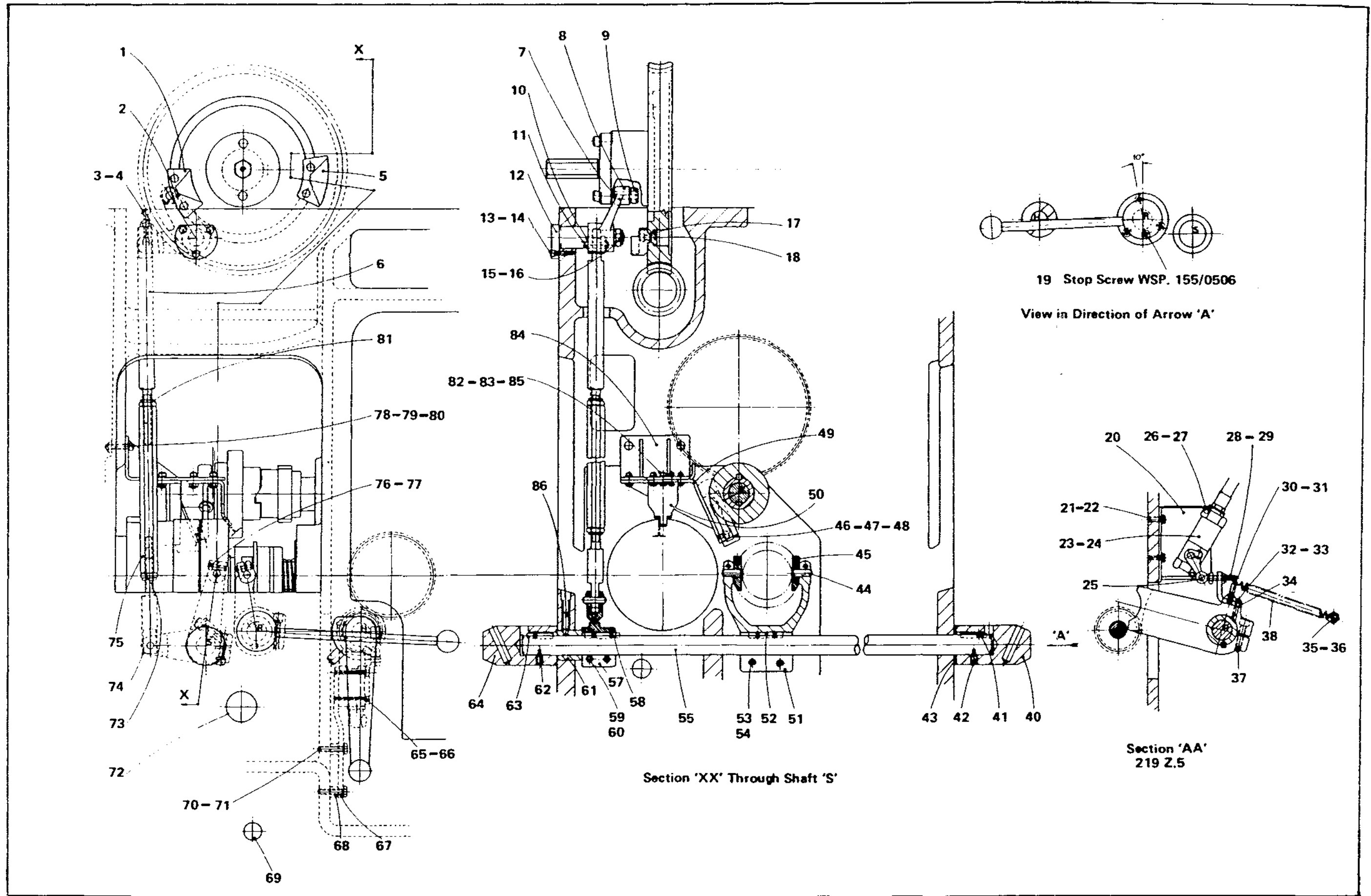
Part No	Description
1.	182/0612 3/8" BSF Socket set screw taper point 3/4" long
2.	219X232 Bearing bush
3.	182/0620 3/8"BSF Socket set screw taper point 3/8"long
4.	121/1020T Tapped key square 1.1/4" long
5.	101/20 1.3/4" dia. External circlip
6.	327/0608 3/32"dia. Cotter pin 1" long
7.	130/06 3/8" dia. Flat washer
8.	219X192 Glut pin
9.	219X110 Glut
10.	319X214 Link pin
11.	121/1040T 5/16" Square key 2.1/2" long
12.	219/110 Glut
13.	219X192 Glut pin
14.	101/20 1.3/4" dia. External circlip
15.	219Y201B Glut lever
16.	219Y205 Glut sleeve
17.	219V206 Feed lever shaft
18.	101/20 1.3/4" dia. External circlip
19.	121/1024T 5/16" Square tapped key 1.1/2"long
20.	219X202 Interlock lever
21.	101/20 1.3/4" dia. External circlip
22.	319V207 Bearing sleeve
23.	155/0514 5/16" BSF Socket head cap screw 7/8" long
24.	154/05 5/16" dia. Spring washer
25.	319V210 Front lever boss
26.	-
27.	319X226 Spacer
28.	155/0506 5/16" BSF Socket head cap screw 3/8" long
29.	182/0612 3/8" BSF Socket set screw,taper point 3/4" long
30.	125/2236 11/32" dia. Taper pin 2.1/4" long
31.	182/0416 1/4" BSF Socket set screw taper point 1/4" long
32.	125/2232 11/32" dia. Taper pin 2" long
33.	119X198A Driving sleeve
34.	125/222B 11/32" dia. Taper pin 1.3/4" long
35.	236/162014 Oil retaining bush 1" x 1.1/4" x 7/8" long
36.	219X231 Handwind shaft collar
37.	219X227 Feed lever
38.	241/9 Bakelite knob
39.	319X218 Link screw right hand
40.	173/06L 3/8" BSF Locknut
41.	319X219 Adjusting nut
42.	419V135 locknut, left hand
43.	319X217 Link screw, left hand
44.	155/0624 3/8" BSF Socket head cap screw 1.1/2" long
45.	154/06 3/8" dia. Spring washer
46.	125/2232 11/32" dia.Taper pin 2" long
47.	219X211 Handwind sliding gear
48.	236/162014 Oil retaining bush 1" x 1.1/4" x 7/8" long
49.	155/0410 1/4" BSF Socket head cap screw 5/8" long
50.	219X224 Trip collar
51.	326/0828 1/4" dia. Tension pin 1.3/4" long
52.	- Soft iron wire 18 SWG
53.	B51 A1 Square 'D' switch, class 9007 type 'B'
54.	MA1 Square 'D' Lever arm, class 9007
55.	101/18 1.1/2" External circlip
56.	319X213 Spacer
57.	319V204 Lever

58.	319X215	Link pin
59.	219V208	Bearing sleeve
60.	155/05140	5/16" BSF Socket head cap screw 7/8" long
61.	154/05	5/16" dia. Spring washer
62.	-	Steel ball 5/16" dia.
63.	125/222B	11/32" dia. Taper pin 1.3/4" long
64.	119X198A	Driving sleeve
65.	219X230	Handwind shaft
66.	519X204	Revolving handle
67.	219X193	Locating spring
68.	319X216	Link
69.	219X194	Spring retainer
70.	130/06	3/8" dia. washer
71.	119Y109B	Handwind lever
72.	327/0608	3/32" dia. Cotter pin 1" long
73.	319X214	Link pin
74.	319V203	Lever
75.	219X227	Feed lever
76.	241/9	Bakelite knob
77.	319V209	Rear lever boss
78.	182/0416	1/4" BSF Socket set screw taper point 1" long
79.	125/2236	11/32" dia. Taper dowel 2.1/4" long



219 Z 5A

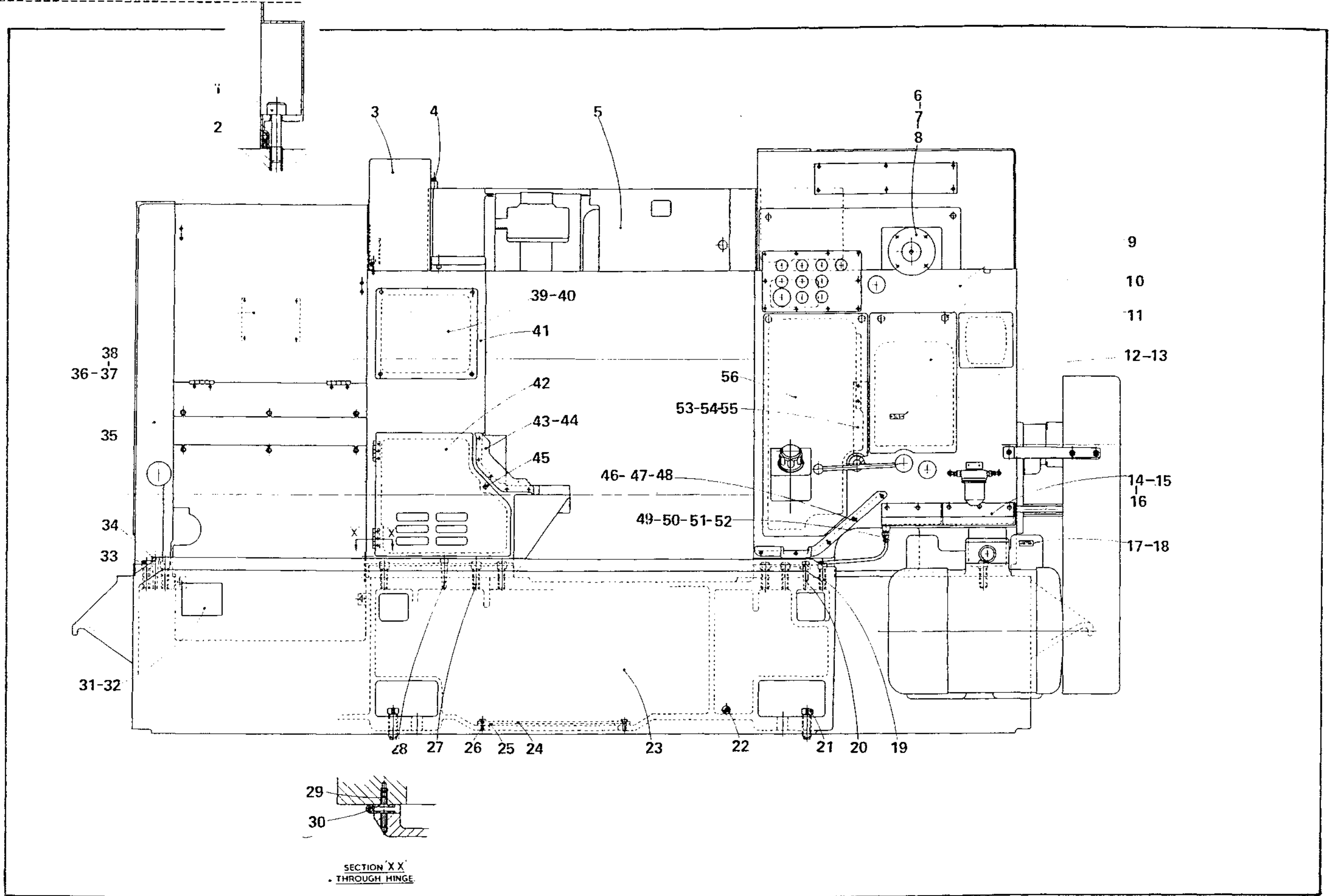
58.	121/1032T	5/16" square tapped key 2" long
59.	155/0624	3/8" BSF Socket head cap screw 1.1/2" long
60.	154/06	3/8" dia. Spring washer
61.	219X103	Bearing bush
62.	182/0612	3/8" BSF Socket set screw taper point 1/4" long
63.	121/1024T	5/15" Square tapped key 1.1/2" long
64.	219X135	Lever boss
65.	156/228	2BA Socket head cap screw 1.3/4" long
66.	154/03	3/16" dia. Spring washer
67.	319V223	Switch bracket
68.	219X228	Spacer
69.	129/13	Welch plug
70.	167/0524	5/16" BSF Hexagon headed screw 1.1/2" long
71.	198/12	5/8" dia, shake proof washer
72.	541X142	Plug for drum housing
73.	203/08L	1/2" BSF Locknut
74.	219X143	Link connector
75.	119X142A	Link
76.	154/04	1/4" dia. Spring washer
77.	155/0412	1/4" BSF Socket head cap screw 3/4" long
78.	203/05	5/16" BSF Self locking nut
79.	155/0520	5/16" BSF Socket head cap screw 1.1/4" long
80.	155/05	5/16" dia. Spring washer
81.	119X197	Special locknut
82.	203/04	1/4"BSF Self locking nut
83.	130/04	1/4" dia, Flat washer
84.	218V249	Support bracket
85.	155/0412	1/4" BSF Socket head cap screw 3/4" long
86.	182/0620	3/8"BSF Socket head set screw taper point 1.1/4"long



219 Z 6A

Cover Arrangement (Front) Drg. 222 Z 1A

Part No	Description
1.	222X227 Screw
2.	- 3/16" Neoprene strip, 5/8" long
3.	222Z267 Drum housing top motions cover
4.	155/0624 3/8" BSF Socket head cap screw 1.1/2" long
5.	222Z104B Beam
6.	159/404 4BA Countersunk Head screw 1/4" long
7.	172/157D Front programme disc (Bar machine only)
8.	372/157B Front programme disc (Chucking machines only)
9.	222Z105C Main drive housing
10.	122X130A Door knob
11.	222X115 Front drive cover
12.	291?3 Legend plate
13.	165/404 4BA Round head screw 1/4" long
14.	222Z302 Oil drip tray
15.	155/0512 5/16" BSF Socket head cap screw 3/4" long
16.	222X313 Gasket for oil drip tray
17.	291/70 Legend plate
18.	165/404 4BA Round head screw 1/4" long
19.	155/1440 7/8" BSF Socket head cap screw 2.1/2" long
20.	139/27 5/8" dia. Extractable taper dowel
21.	188/1648 1" BSF Square head set screw 3" long
22.	194/4 1/2" BSF Socket pipe plug
23.	222Z144B Tray
24.	122V228 Swarf aperture cover plate
25.	122V229A Swarf aperture gasket
26.	167/0620 3/8" BSF Hexagon headed set screw 1.1/4" long
27.	155/1440 7/8" BSF Socket head cap screw 2.1/2" long
28.	139/27 5/8" dia. Extractable taper dowel 3" long
29.	159/208 2BA Socket countersunk head screw 1/2" long
30.	422X139 Brass butt hinge
31.	272X142 Coolant capacity plate
32.	165/406 4BA Round head screw 3/8" long
33.	155/1440 7/8" BSF Socket head cap screw 2.1/2" long
34.	139/27 5/8" dia. Extractable taper dowel 3" long
35.	222Z102C End bracket (Bar machines only)
36.	203/4 4BA Self locking nut
37.	165/406 4BA Round head screw 3/8" long
38.	153Y154A Bar feed adjustment plate
39.	222X352 Drum housing cover
40.	155/0520 5/16" BSF Socket head cap screw 1.1/4" long
41.	222Z101B Drum housing
42.	222V137B Front drum housing door
43.	222V143B Swarf channel (Chucking machines only)
44.	155/0552 5/16 BSF Socket head cap screw 3.1/4" long (Chucking machines only)
45.	122X130A Door knob
46.	155/0540 5/16" BSF Socket head cap screw 2.1/2" long
47.	155/0524 5/16" BSF Socket head cap screw 1.1/2" long
48.	222V158 Oil drip shield
49.	225/618 3/8" dia. Copper tube
50.	221/8 3/8" Tubing sleeve
51.	215/10 3/8" Tubing nut
52.	218/19 1/4" BSP Adaptor 3/4" long
53.	203/04 1/4" BSF Self locking nut
54.	155/0416 1/4" BSF Socket head cap screw 1" long
55.	222X231 Oil splash shield
56.	222X106A Front attachment cover

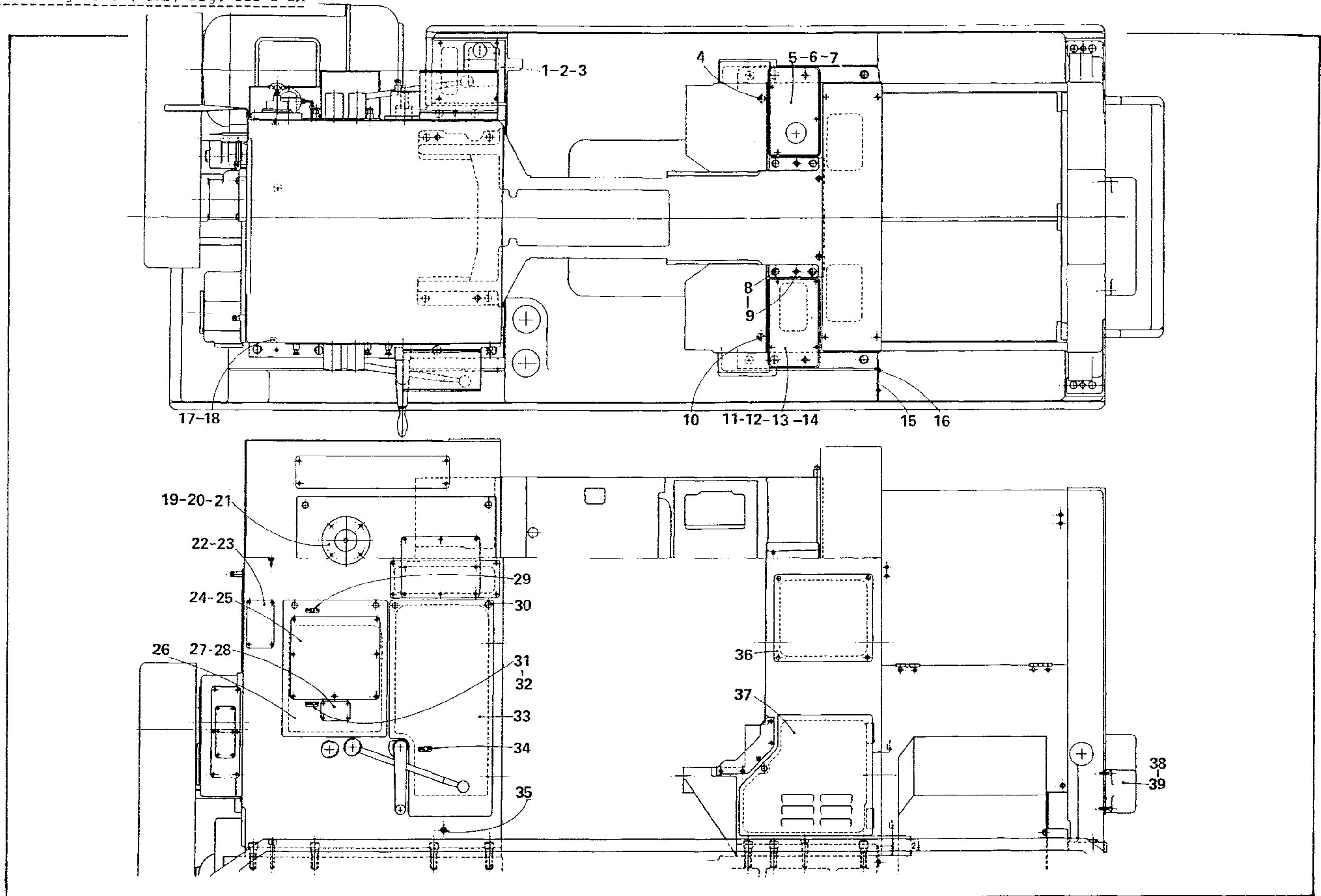


222 Z 1A

Cover Arrangement (Rear) Drg. 222 Z 2A

Part No	Description
1.	222Y152B Oil tank cover
2.	222V212A Gasket for oil tank cover
3.	155/0514 5/16" BSF Socket head cap screw 7/8" long
4.	194/4 1/2" BSP Socket pipe plug
5.	222Y201B Front tool tray
6.	155/0414 1/4" BSF Socket head cap screw 7/8" long
7.	222X203 Oil drip pipe
8.	155/1028 5/16"BSF Socket head cap screw 1.3/4" long
9.	139/26 5/8" dia. headed taper dowel extractable 2.1/2" long
10.	194/4 1/2" BSP Socket pipe plug
11.	155/0514 5/16"BSF Socket head cap screw 7/8" long
12.	222X213 Gasket for rear tool tray
13.	222Y202B Rear tool tray
14.	222X203 Oil drip pipe
15.	222X191 Rear tray cover
16.	164/0408 1/4"BSF Round head screw 1/2" long
17.	155/0410 1/4"BSF Socket head cap screw 5/8" long
18.	322X125 Filling piece
19.	159/404 1/4"BSF Socket counter sunk head screw 1/4" long
20.	372X159B Rear programme disc (Chucking machines only)
21.	172X159B Rear programme disc (Bar machines only)
22.	165/404 4BA Round head screw 1/4" long
23.	230E Machine identification plate
24.	165/204 2BA Round head screw 1/4" long
25.	272V Speed and feed plate
26.	222V108 Feed box cover
27.	165/404 4BA Round head screw 1/4" long
28.	- Herbert Clutch instruction plate
29.	291/1 Legend plate
30.	122X130A Door knob
31.	291/80 Legend plate
32.	165/404 4BA Round head screw 1/4" long
33.	222Y113 Rear attachment cover
34.	291/4 Legend plate
35.	194/4 1/2" BSP Socket pipe plug
36.	222X352 Drum housing cover
37.	222V138B Rear drum housing door
38.	155/0516 5/16"BSF Socket head cap screw 1" long
39.	222X134 Cover

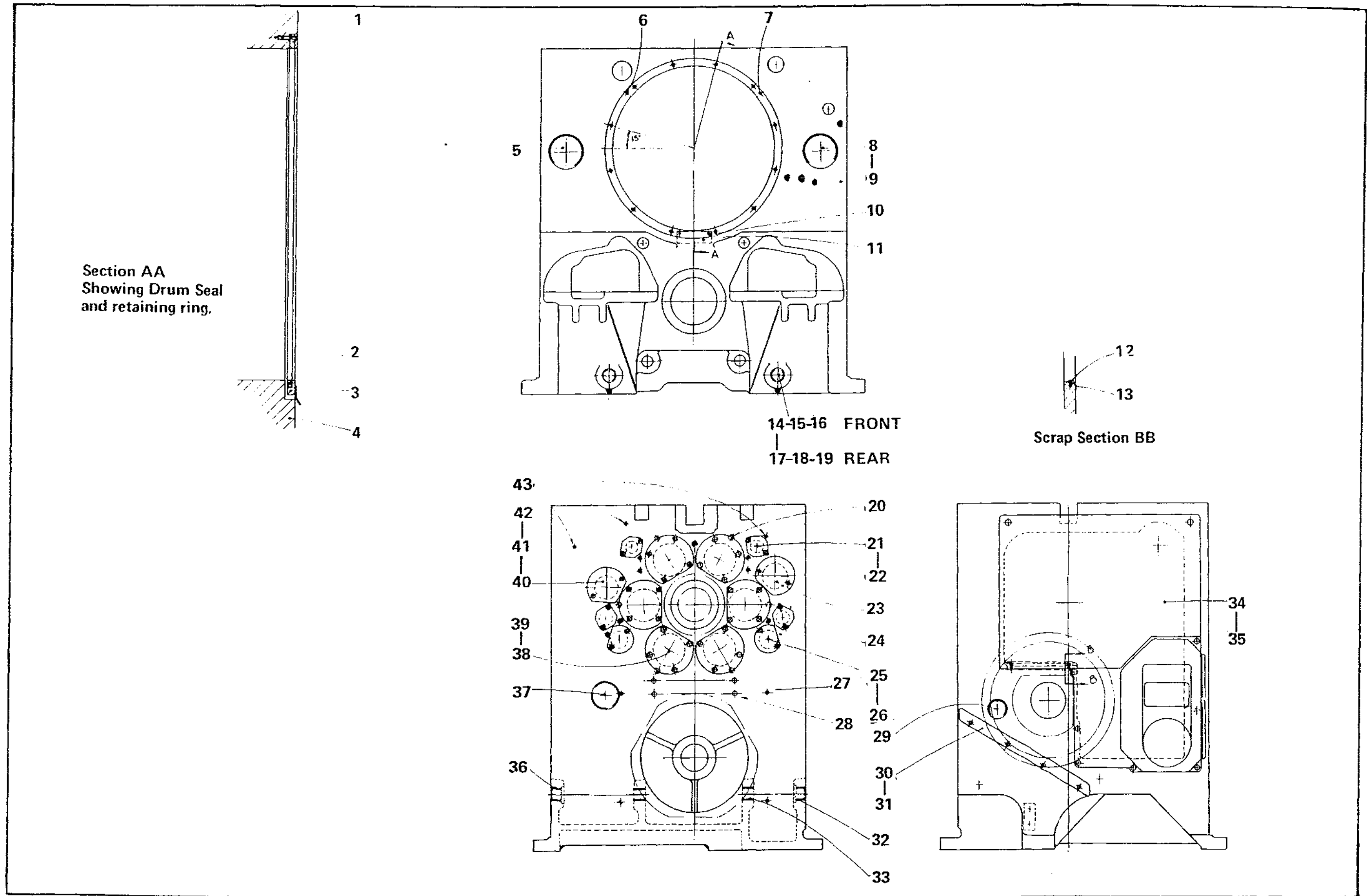




222 Z 2A

Cover Arrangement (End Views) Drg. 222 Z 3C

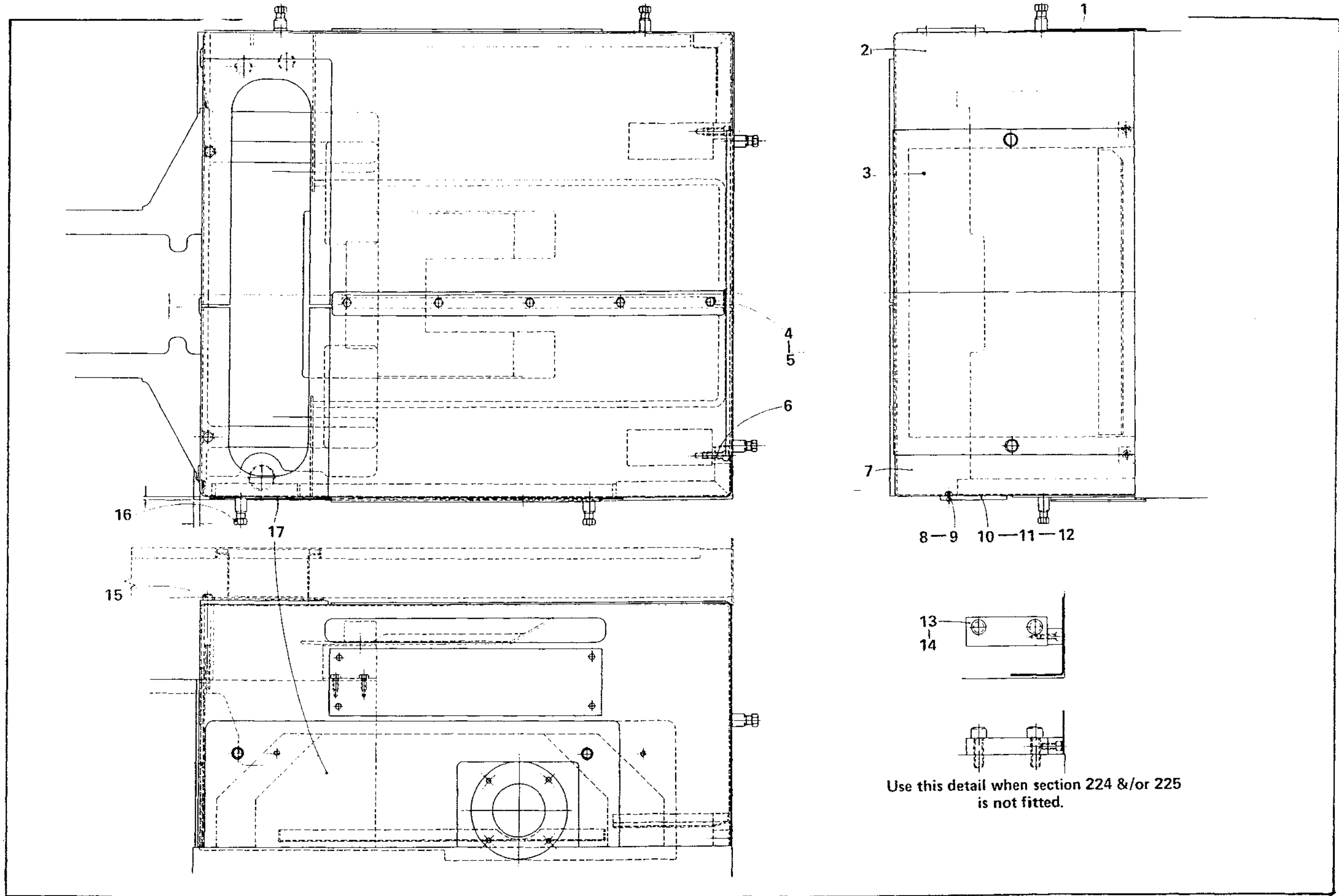
Part No	Description
1.	159/212 2BA Counter sunk screw 3/4" long
2.	222V205 Sealing ring
3.	222V204 Sealing ring retainer
4.	222Z101B Drum housing
5.	522X196 Plug
6.	213/2 2BA Grease nipple
7.	213/2 2BA Grease nipple
8.	22X196 Plug
9.	176/0812 1/2"BSF Socket set screw 3/4" long
10.	160/206 2BA Dome head screw 3/8" long
11.	222X198 Coolant guard plate
12.	160/206 2BA Dome head screw 3/8" long
13.	222X153 Splash plate
14.	222X129 Retaining plate
15.	182/0520 5/16" Socket set screw 1.1/4" long
16.	203/05 5/16"BSF Self locking nut
17.	322X128 Gasket for retaining plate
18.	322X129 Plug
19.	155/0512 5/16"BSF Socket head cap screw 3/4" long
20.	176/1012 5/8"BSF Socket set screw 3/4" long
21.	222X177A Cover plate, Glut shaft bores
22.	167/0512 5/16"BSF hexagon head set screw 3/4" long
23.	222X180A Cover plate chasing drive bore
24.	176/0612 3/8"BSF Socket set screw 3/4" long
25.	122X178B Cover plate pusher shaft bore
26.	176/0404 1/4"BSF Socket set screw cup point 1/4" long
27.	167/0410 1/4"BSF Hexagon head set screw 5/8" long
28.	176/0708 7/16"BSF Socket set screw 1/2" long
29.	- See 217 Z 1
30.	155/0516 5/16"BSF Socket head cap screw 1" long
31.	322X157 Oil drip shield
32.	236/182216 Oil retaining bush 1.1/8" x 1.3/8" x 1" long
33.	236/182220 Oil retaining bush 1.1/8" x 1.3/8" x 1.1/4" long
34.	222V243 Change gear cover
35.	122X130 Door bolt
36.	236/182220 Oil retaining bush 1.1/8" x 1.3/8" x 1.1/4" long
37.	537X116 Plug
38.	222X129 Cover plate attachment bores
39.	167/0612 3/8"BSF Hexagon head set screw 3/4" long
40.	322X180A Cover plate chasing drive bore
41.	155/0512 5/16"BSF Socket head cap screw 3/4" long
42.	154/05 5/16" dia. Spring washer
43.	176/0510 5/16"BSF Socket set screw 5/8" long

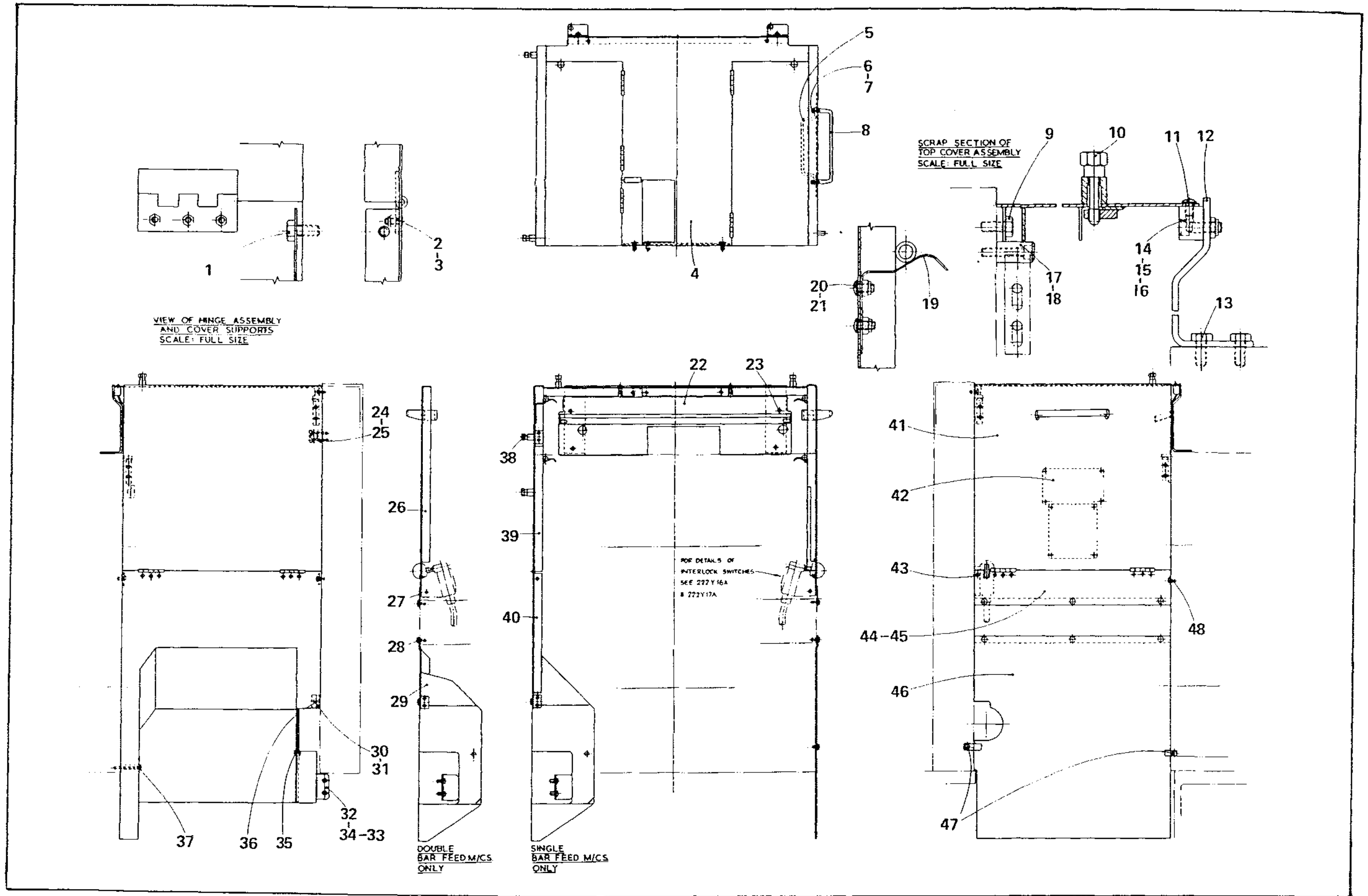


222 Z 3C

Top Covers (Main Drive Housing) Drg. 222 Z 4B

Part No	Description
1. 222Y250B	Rear cover plate, drive housing
2. 222Z148F	Rear side cover
3. 222Y300	End cover
4. 222V246A	Top cover strip
5. 167/0408	1/4"BSF Hexagon head set screw 1/2" long
6. 155/0616	3/8"BSF Socket head cap screw 1" long
7. 222Z147D	Front side cover
8. 203/2L	2BA Self locking locknut
9. 192/208	2BA Instrument head screw 1/2" long
10. 222Y160A	Name plate ( 1.3/8"-6) machines only)
11. 222Y62A	Name plate
12. 222Y183A	Name plate (1.3/4"-6 machines only)
13. 222X190	Securing block
14. 155/1028	5/8"BSF Socket head cap screw 1.3/4" long
15. 155/0688	3/8"BSF Socket head cap screw 5.1/2" long
16. 122X130A	Door bolt
17. 222Y249A	Front cover plate





222 Z 5A

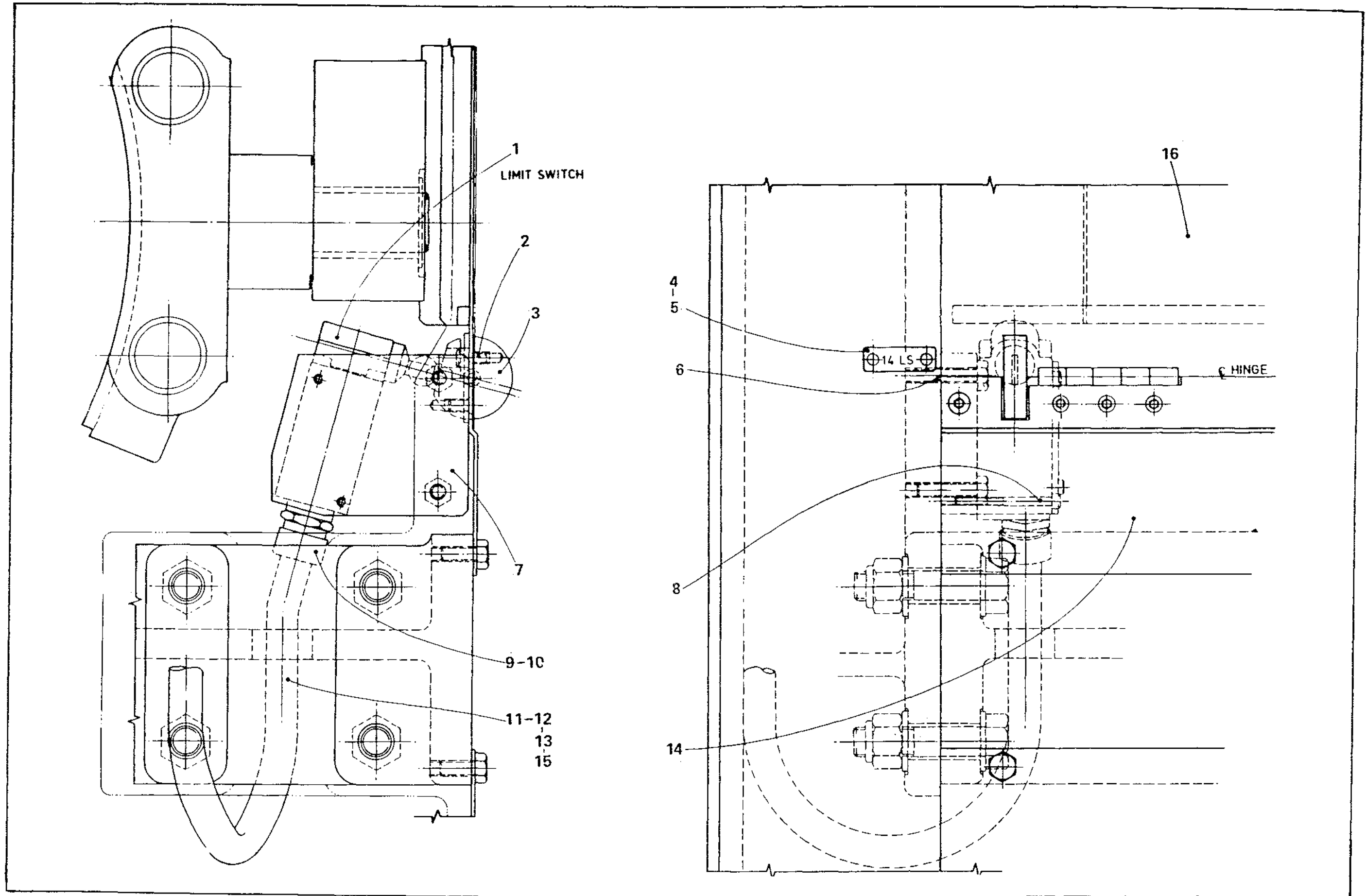
Bar Feed Covers Drg. 222 Z 5A

Part No	Description
1.	167/0512 5/16"BSF Hexagon head set screw 3/4" long
2.	159/208 2BA Socket counter sunk head screw 1/2" long
3.	203/2 2BA Self locking nut
4.	222Z296A Upper hinged cover (bar feed)
5.	222X328 Handle
6.	- 1/4 Whit.Hexagon head screw 3/4" long
7.	130/04 1/4" dia. Flat washer
8.	264V211 Handle
9.	167?0512 5/16"BSF Hexagon head set screw 3/4" long
10.	122X130A Door knob
11.	160/0408 1/4"BSF Dome head screw 1/2" long
12.	222V167 Top cover guide bracket
13.	167/0512 5/16"BSF Hexagon head set screw 3/4" long
14.	222X165A Top cover guide bracket
15.	155/0512 5/16"BSF Socket head cap screw 3/4" long
16.	203/05L 5/16"BSF Self locking nut
17.	122X204 Latch post
18.	155/0402 1/4"BSF Socket head cap screw 1.1/4" long
19.	122X116 Spring catch
20.	160/0408 1/4"BSF Dome head screw 1/2" long
21.	203/04 1/4"BSF Self locking nut
22.	222Y290A End cover for upper cross slide linkage
23.	155/0406 1/4"BSF Socket head cap screw 3/8" long
24.	155/0528 5/16"BSF Socket head cap screw 1.3/4" long
25.	222X288A Cover block
26.	222Y297A Hinged bar feed cover (double bar feed m/c only)
27.	222V306 Fixed bar feed cover (double bar feed m/c only)
28.	167/0512 5/16"BSF Hexagon head set screw 3/4" long
29.	222Z286 Fixed lower bar feed cover (double bar feed m/c only)
30.	222X309 Cover bracket
31.	155/0510 5/16"BSF Socket head cap screw 5/8" long
32.	269V173 Rear bar feed cover
33.	167/0512 5/16"BSF Hexagon head set screw 3/4" long
34.	269V174 Rear bar feed cover
35.	167/0510 5/16"BSF Hexagon head set screw 5/8" long
36.	167/0508 5/16"BSF Hexagon head set screw 1/2" long
37.	167/0544 5/16"BSF Hexagon head set screw 2.3/4" long
38.	122X130A Door knob,Single bar feed machines only
39.	222Y299A Hinged bar feed cover single bar feed m/c only
40.	222Z285A Fixed lower bar feed cover single bar feed m/c only
41.	222Y297A Hinged bar feed cover
42.	153X154A Bar feed adjustment plate
43.	158/0408 1/4"BSF Counter sunk head screw 1/2" long
44.	167/0512 5/16"BSF Hexagon head set screw 3/4" long
45.	222V305 Fixed bar feed bar cover
46.	222Y310 Fixed bar feed cover
47.	167/0508 5/16"BSF Hexagon head set screw 1/2" long
48.	167/0510 5/16"BSF Hexagon head set screw

Front Bar Feed Cover Interlock Drg. 222 Y 16A

Part No	Description
1.	B61F-Y-156-2 Square 'D' limit switch
2.	155/0406 1/4"BSF Socket head cap screw 3/8" long
3.	222X308 Cam
4.	165/404 4BA Round head screw 1/4" long
5.	291/14 Legend plate
6.	167/0520 5/16"BSF Hexagon head set screw 1.1/4" long
7.	222V307 Switch plate
8.	156/232 2BA Socket head cap screw 2" long
9.	15.04.2001 5/8" Conduit straight connector
10.	11.03.13 20mm Seal
11.	347/1048 5/8" dia. Anaconda
12.	15.04.1600 5/8" Conduit straight connector
13.	11.03.09 16mm Seal
14.	222V305 Fixed bar feed cover
15.	15.02.1216 16mm Conduit locknut
16.	222Y297A Hinged bar feed cover

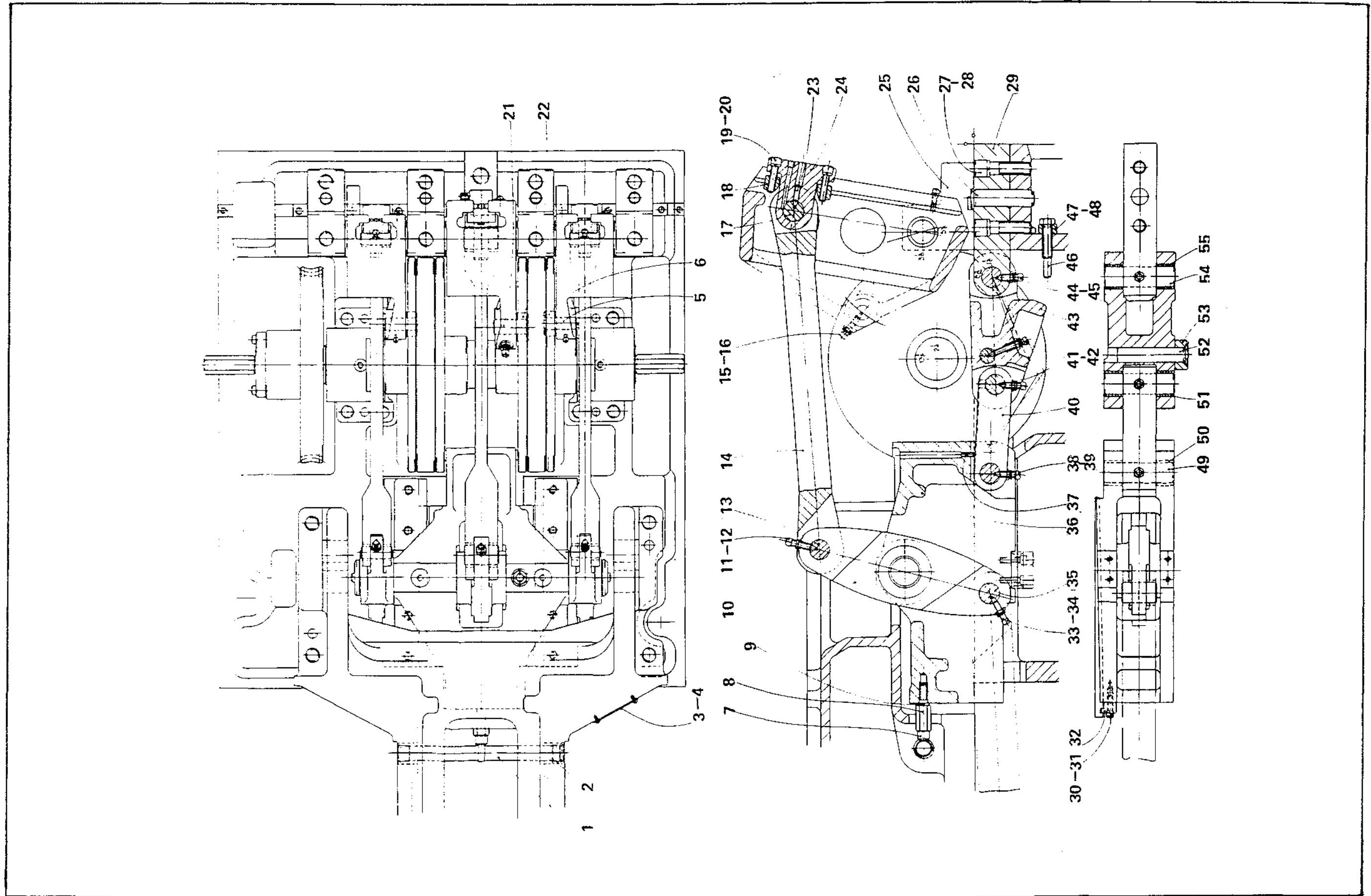




222 Y 16A

Centre Block Longitude Slides Operation Drg. 223 Z 1

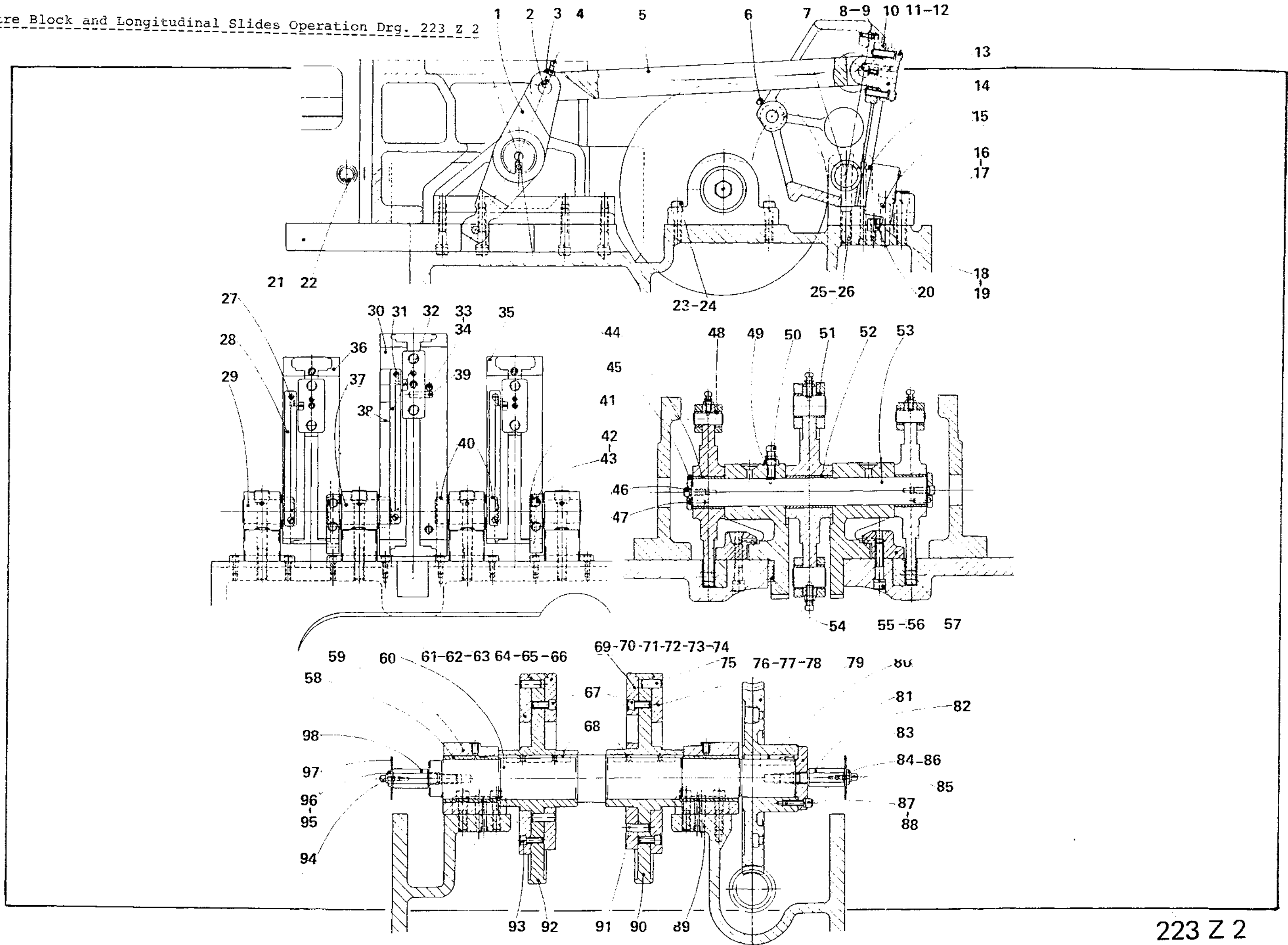
	Part No	Description
1.	223X169	Stop shaft
2.	223X177	Stop shaft bush
3.	272X122	Instruction plate
4.	165/206	2BA Round head screw 3/8" long
5.	123X103	Roller pin
6.	123X104	Roller
7.	123X178	Stop pad
8.	323X140A	Stop bolt
9.	154/08	1/2" dia. Spring lock washer
10.	223Y122	Centre lever
11.	203/06	3/8"BSF Self locking nut
12.	183/0320	3/8"BSF Square head taper point screw 1.1/4" long
13.	324X120	Link pin
14.	223Y116	Link
15.	203/06	3/8"BSF Self locking nut
16.	183/0624	3/8"BSF Square head taper point screw 1.1/2" long
17.	324X109	Link pin
18.	324X113	Clamp
19.	155/0728	7/16"BSF Socket head cap screw 1.3/4" long
20.	154/07	7/16" dia. Spring washer
21.	341X123	Roller pin
22.	523X135	Cam roller
23.	182/0620	3/8"BSF Socket set screw Taper point 1.1/4" long
24.	324X104A	Stroke adjusting block
25.	223V107	Fulcrum bracket
26.	323X167	Dowel pin
27.	155/1244	3/4"BSF Socket head cap screw 2.3/4" long
28.	154/12	3/4"dia. Spring washer
29.	223V160	Toggle anchor
30.	154/05	5/16" dia. Spring washer
31.	155/0516	5/16"BSF Socket head cap screw 1" long
32.	223X164	Gib strip anchor
33.	183/0620	3/8"BSF Square head screw taper point 1.1/4"long
34.	203/06	3/8"BSF Self locking nut
35.	324X120	Link pin
36.	223Z101A	Sliding block
37.	225/4050	Copper pipe
38.	183/0620	3/8"BSF Square head screw taper point 1.1/4" long
39.	203/06	3/8"BSF Self locking nut
40.	223V161	Toggle link
41.	183/0636	3/8"BSF Square head screw taper point 2.1/4" long
42.	203/06	3/8"BSF Self locking nut
43.	223V119A	Toggle lever
44.	183/0620	3/8"BSF Square head screw taper point 1.1/4" long
45.	203/06	3/8"BSF Self locking nut
46.	323X171	Toggle stop bolt
47.	323X172	Spacer (use with 3.1/2" fast motion)
48.	323X172	Spacer (use with 2.1/2" fast motion)
49.	223X168	Toggle pin
50.	323X173	Toggle bush
51.	323X174	Toggle bush
52.	341X122	Roller pin
53.	523X135	Cam roller
54.	223X168	Toggle pin
55.	323X174	Toggle bush



Centre Block and Longitudinal Slides Operation Drg. 223 Z 2

	Part No	Description
1.	224Y119	Side lever
2.	123X162	Link pin
3.	203/05	5/16"BSF Self locking nut
4.	183/0520	5/16"BSF Square head screw taper point 1.1/4" long
5.	123Y116	Link
6.	139/4	1/4" dia. headed taper pin
7.	123X114	Link pin
8.	203/04	1/4"BSF Self locking nut
9.	155/0414	1/4"BSF Socket head cap screw 7/8" long
10.	123X113A	Clamp
11.	155/0724	7/16"BSF Socket head cap screw 1.1/2" long
12.	154/07	7/16"dia. Spring lock washer
13.	123X111B	Stroke setting block
14.	176/0404	1/4"BSF Socket head cap screw 1/4" long
15.	125/4044	5/8"dia. Taper dowel 2.3/4" long
16.	154/10	5/8"dia Spring lock washer
17.	155/1044	5/8"BSF Socket head cap screw 2.3/4" long
18.	155/0512	5/16"BSF Socket head cap screw 3/4" long
19.	154/05	5/16"dia. Spring lock washer
20.	323X108	Fulcrum bracket tenon
21.	224Y112	Pusher arm
22.	102/11	1"dia. Internal circlip
23.	154/08	1/2"dia. Spring lock washer
24.	155/0832	1/2"BSF Socket head cap screw 2" long
25.	155/1080	5/8"BSF Socket head cap screw 5" long
26.	154/10	5/8"dia. Spring lock washer
27.	165/206	2BA Round head screw 3/8" long
28.	224X102	Scale
29.	223X109	Fulcrum pin
30.	223Z102A	Centre cam lever
31.	165/206	2BA Round head screw 3/8" long
32.	223X105	Scale
33.	154/05	5/16"dia. Spring lock washer
34.	155/0512	5/16"BSF Socket head cap screw 3/4" long
35.	123Z102B	Cam lever
36.	224Z101A	Front cam lever
37.	224X106	Fulcrum pin
38.	272X121A	Instruction plate
39.	143/1224D	3/8"dia. Pin 1.1/2" long
40.	123X110	Quadrant bush
41.	224X130	Stop
42.	154/06	3/8"dia. Spring lock washer
43.	155/0632	3/8"BSF Socket head cap screw 2" long
44.	236/283232	Oil retaining bush
45.	224X121	Retaining plate
46.	155/0616	3/8"BSF Socket head cap screw 1" long
47.	143/1016D	5/16"dia. Pin 1" long
48.	123X115	Bush
49.	203/08	1/2"BSF Self locking nut
50.	183/0832	1/2"BSF Square head screw taper point 2" long
51.	324X115	Link pin
52.	236/283224	Oil retaining bush
53.	223X123	Lever shaft
54.	223V163	Sliding block gib strip
55.	154/08	1/2"dia. Spring lock washer
56.	155/0804	1/2"BSF Socket head cap screw 2.1/2" long
57.	223V150	Retaining strip

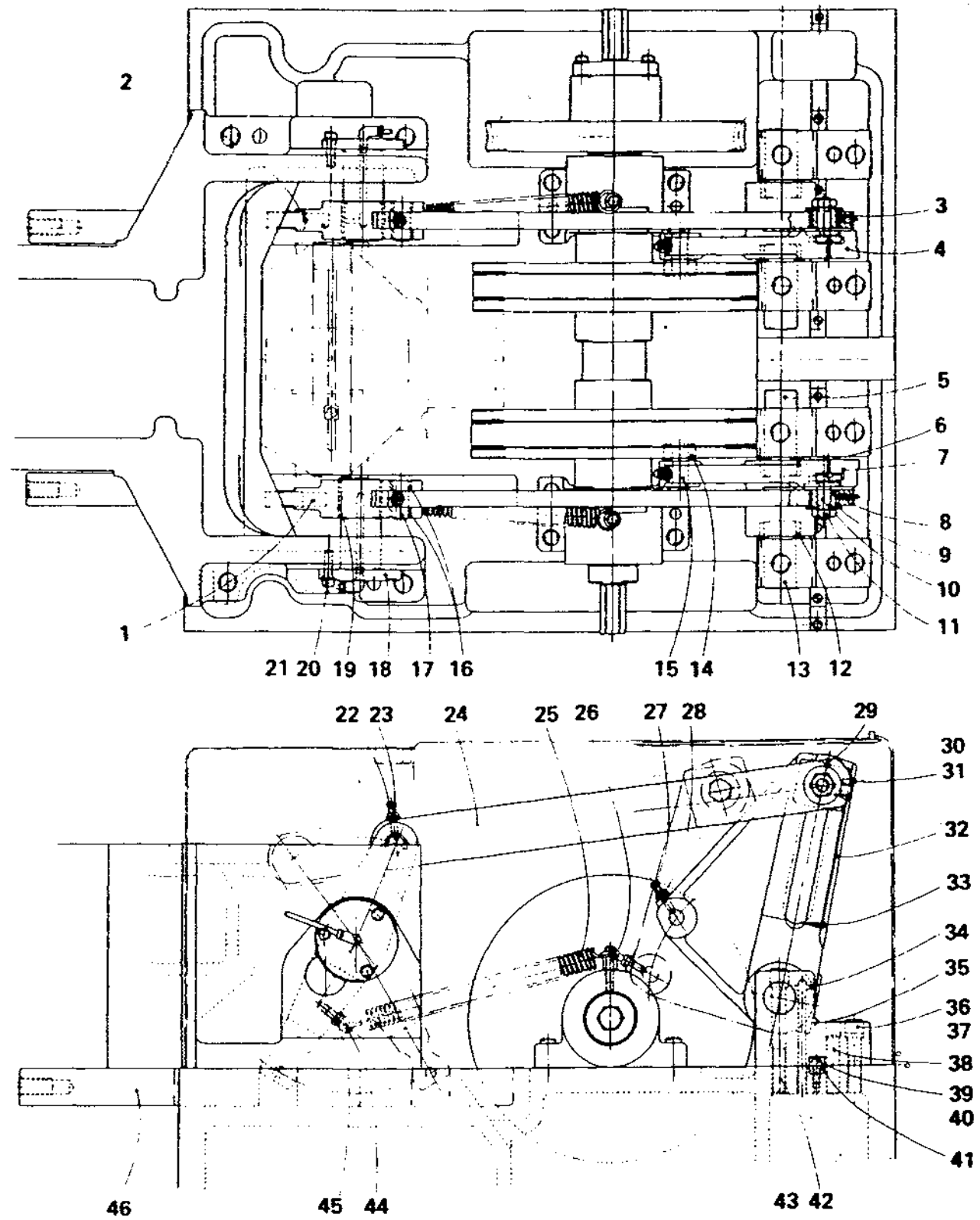
58.	223X126	Cam shaft bearing
59.	223Y130	Cam shaft bracket
60.	223Y124A	Upper cam shaft
61.	224Y122	Feed cam
62.	224V123	Return cam
63.	224V124	Guard cam
64.	223Y180	Centre block feed cam
65.	223Y181	Centre block return cam
66.	223V188	Centre block guard cam
67.	155/0716	7/16"BSF Socket head cap screw 1" long
68.	122/2064T	Tapped key 5/8" x 13/32" x 4" long
69.	223V184	Fast motion guard cam 2.1/2" (special order)
70.	223V185	Fast motion inner cam 2.1/2" (special order)
71.	223V186	Fast motion outer cam 2.1/2" (special order)
72.	223V182	Fast motion inner cam 3.1/2"
73.	223V183	Fast motion outer cam
74.	223V187	Fast motion guard cam 3.1/2"
75.	126/1620	1/2" dia Hardened parallel pin
76.	225V106	Guard cam
77.	225V104	Feed cam
78.	225V105	Return cam
79.	218Y125	Upper worm wheel
80.	223X131	Tapped key
81.	223X128	Clamp plate
82.	223X127A	Clamp pillar
83.	372X158A	Indicator plate
84.	372X160	Clamp plate
85.	195?0512	5/16"BSF Naylor collar head screw 3/4" long
86.	143/0406D	1/8"dia. grooved pin 3/8" long
87.	155/0620	3/8"BSF Socket head cap screw 1.1/4" long
88.	154/06	3/8"dia. spring washer
89.	141/15	1/2" Extractable taper dowel 2.1/4" long
90.	223Y153C	Rear cam carrier
91.	216/1624	1/2"dia. Hardened parallel dowel 1.1/2" long
92.	223Y152C	Front cam carrier
93.	155/0616	3/8"BSF Socket head cap screw 1" long
94.	195/0512	5/16"BSF Naylor collar head screw 3/4" long
95.	143/0406D	3/8"dia. Grooved pin 3/8" long
96.	372X160	Clamp plate
97.	372X158A	Indicator plate
98.	223X127A	Clamp pillar



223 Z 2

Auxiliary Longitudinal Slides Operation (Front and Rear) Drg.224 Z 1

Part No	Description
1.	224V151 Side lever
2.	224V151 Side lever
3.	236/182212 Oil retaining bush
4.	225Z150 Cam lever (rear)
5.	224X106 Fulcrum pin
6.	123X106 Quadrant bush
7.	224Z150 Cam lever (front)
8.	141X141 Sliding sleeve
9.	141X116 Slotted washer
10.	141X119 Tee bolt
11.	173/10HL 5/8"BSF Hexagon locknut
12.	123X110 Quadrant bush
13.	223X109 Fulcrum pin
14.	123X104 Roller
15.	123X103 Roller
16.	236/121609 Oil retaining bush
17.	123X162 Link pin
18.	224X152 Lever pivot
19.	236/283228 Oil retaining bush
20.	155/0616 3/8"BSF Socket cap screw 1" long
21.	154/06 3/8"dia. Spring washer
22.	183/0524 5/16" Square head screw taper point 1.1/2" long.
23.	203/05 5/16"BSF Self locking nut
24.	224V153 Link
25.	MSE 350 Extension spring
26.	189AX130 Spring anchor
27.	183/0524 5/16"BSF Square head screw taper point 1.1/2" long
28.	203/05 5/16"BSF Self locking nut
29.	156/206 2BA Socket head cap screw 3/8" long
30.	210/1725 9/16" O/dia Yellow indicator
31.	212/04 1/4"BSF Grease nipple
32.	224X154 Scale
33.	165/204 2BA Round head set screw 1/4" long
34.	176/0404 1/4"BSF Socket head cap screw cup point 1/4" long
35.	223V107 Fulcrum bracket
36.	155/1044 5/8"BSF Socket head cap screw 2.3/4" long
37.	154/10 5/8"dia. Spring washer
38.	125/4044 5/8"dia. Taper pin 3/4" long
39.	155/0512 5/16"BSF Socket head cap screw 3/4" long
40.	154/05 5/16"dia. Spring washer
41.	323X108 Fulcrum tenon
42.	155/1080 5/8"BSF Socket head cap screw 5" long
43.	154/10 5/8"dia. Spring washer
44.	389X115 Spring anchor
45.	203/06L 3/8"BSF Self locking nut (thin)
46.	224Y112 Pusher arm

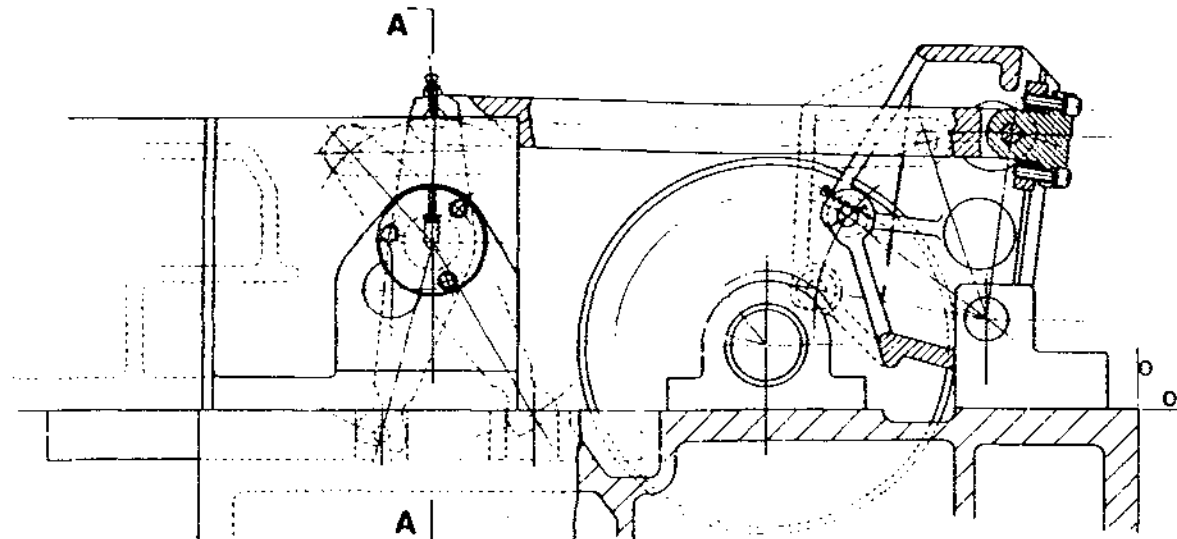


224Z1

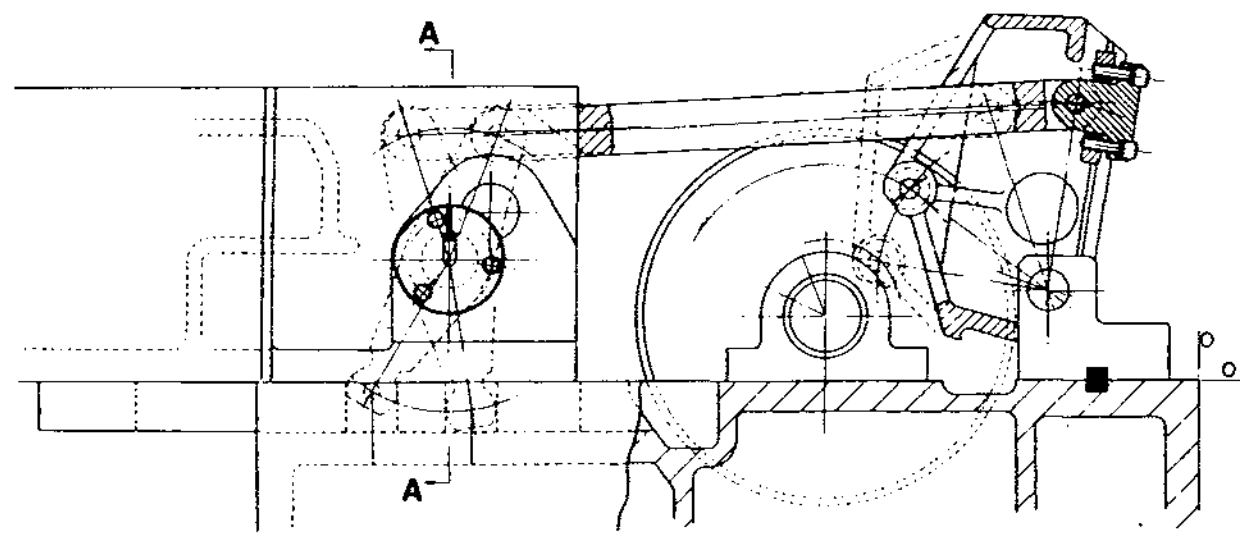


Auxiliary Longitudinal Slides Operation Drg. 224 Z 2

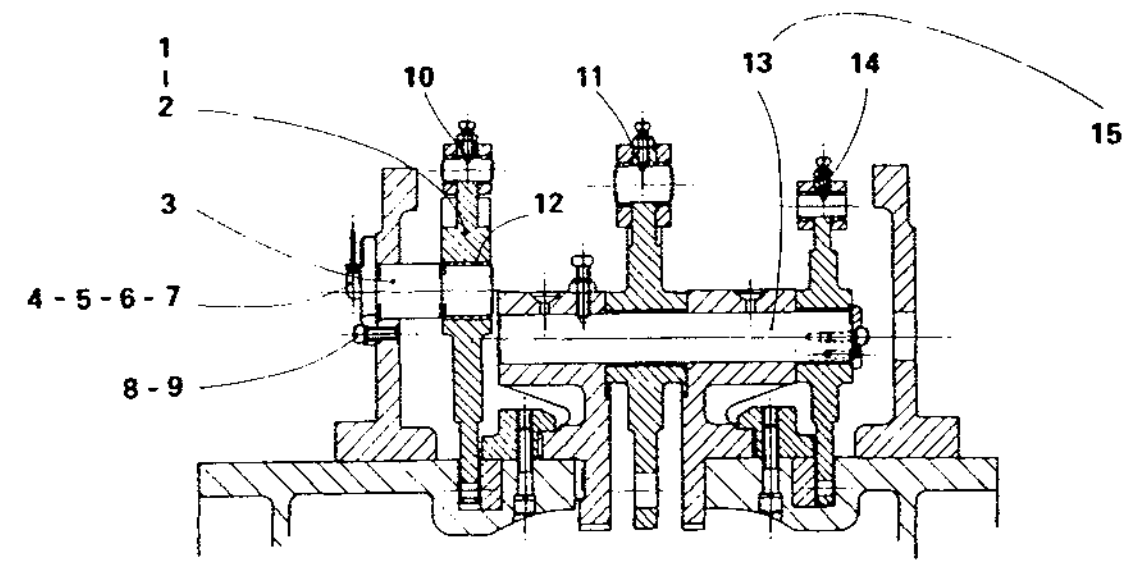
Part No	Description
1. 224V157	Side lever (use for 3.1/2" stroke)
2. 224V156	Side lever (use for 5.1/4" stroke)
3. 224X152	Lever pivot
4. 225/3050	Copper tube 3/16" dia.
5. 215/3	Tubing sleeve 3/16"
6. 221/3	Tubing nut 3/16"
7. 219/17	Male tube adaptor 3/16"
8. 154/06	3/8" dia. Spring washer
9. 155/0620	3/8"BSF Socket head cap screw 1.1/4" long
10. -	Section 224D
11. -	Centre block lever
12. 236/28.32.28	Oil retaining bush 1.3/4" x 2" x 1.3/4" long
13. 223X121	Lever shaft
14. -	Section 225 standard
15. -	Used when either station 224D or 225D is fitted Shaft 224X155 to be used when sections 224D and 225D are used concurrently



Tooling Dept. to specify Lever and Cams required



For other details see 223.Z. 1 and 2

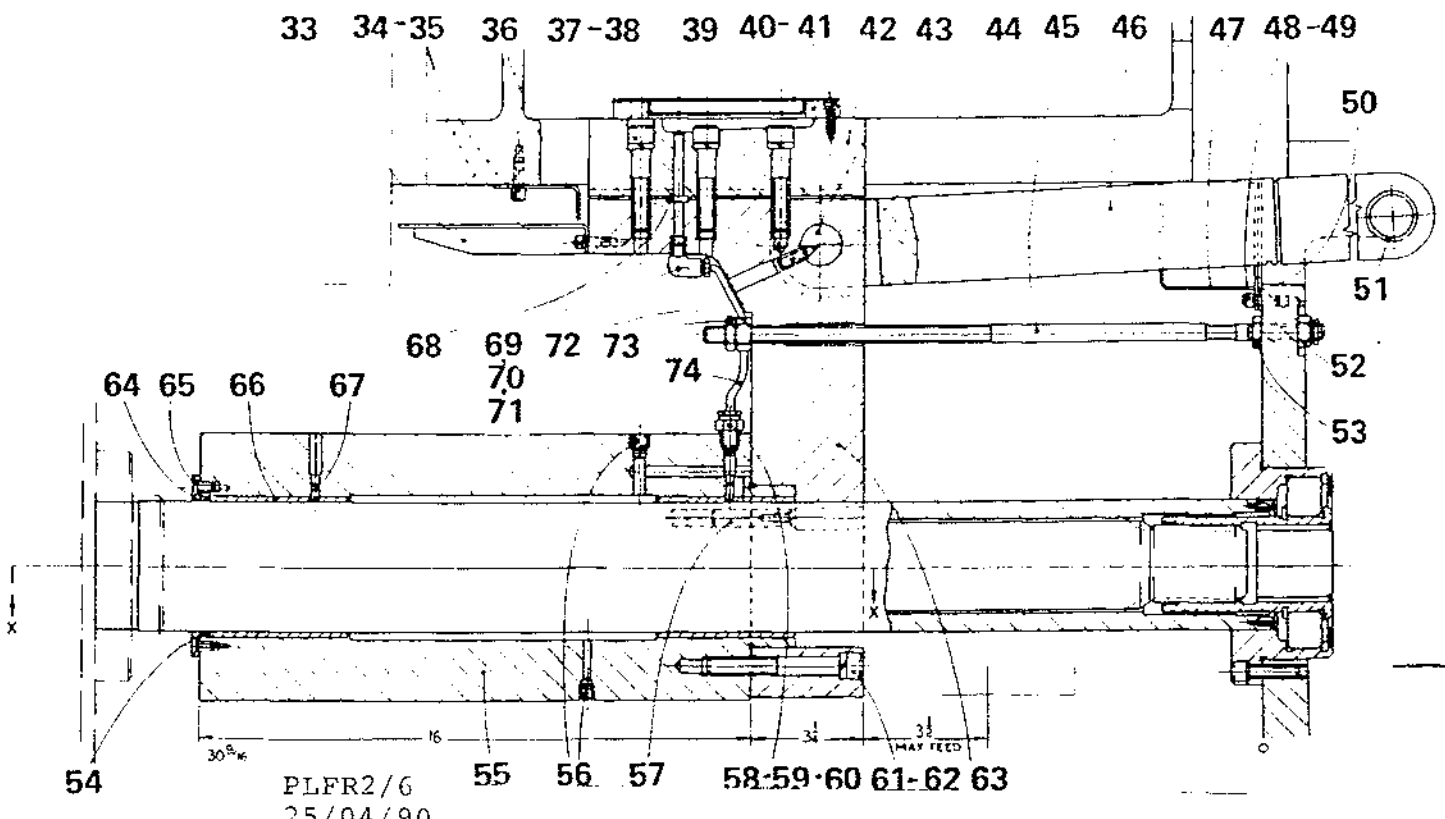
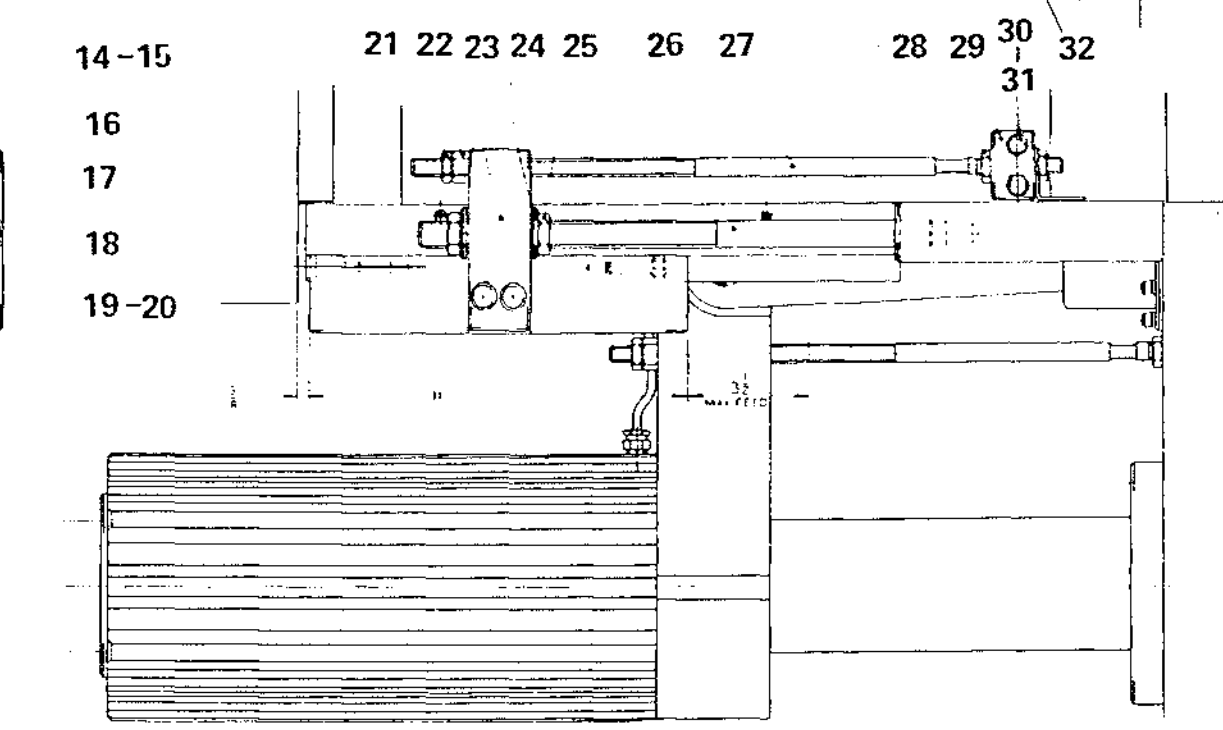
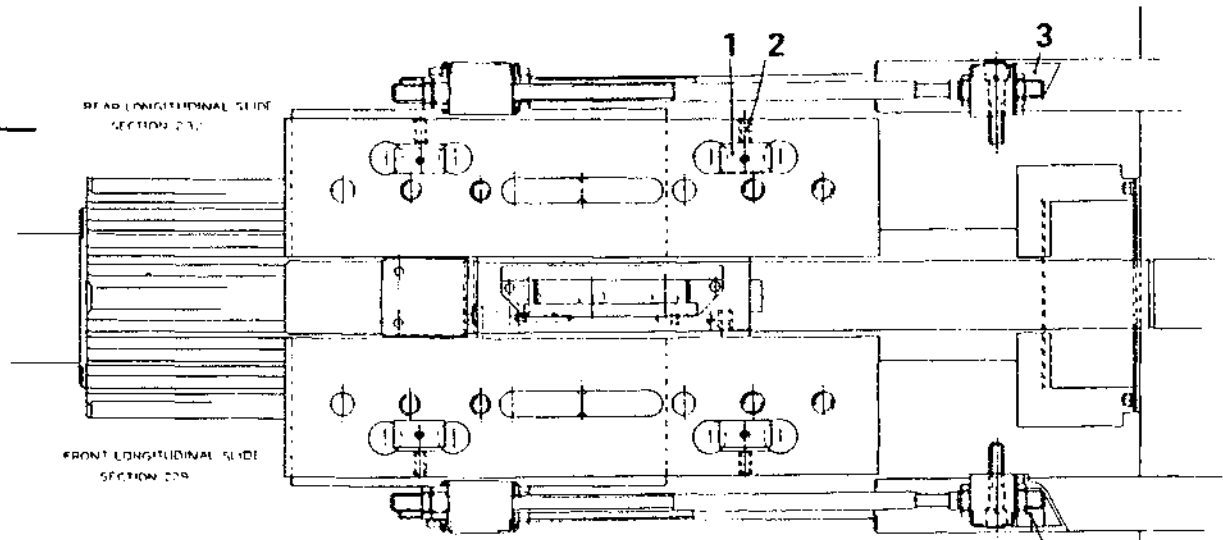
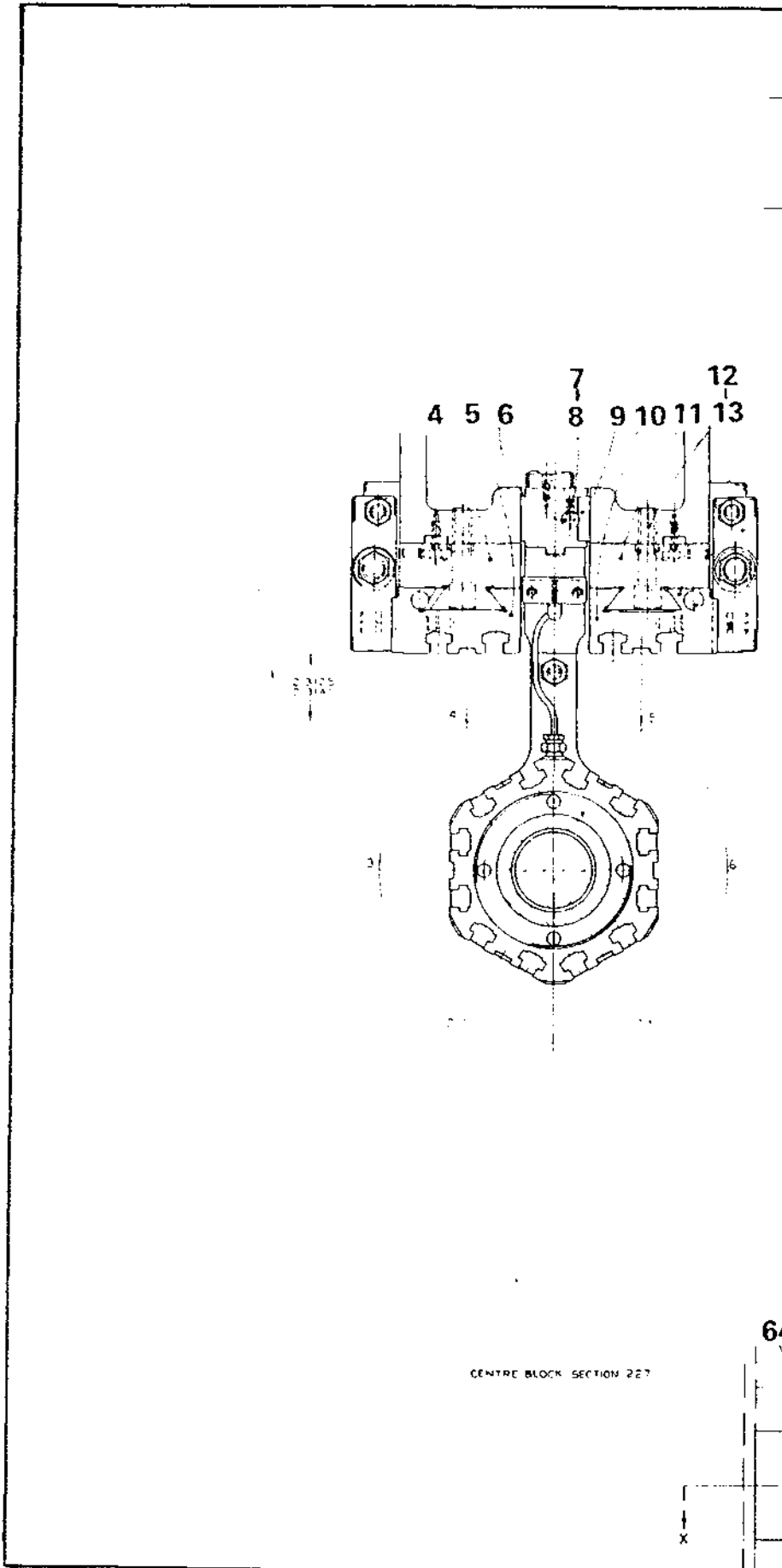


Section 'AA'

Centre Block and Longitudinal Slides Drg. 227 Z 1

Part No	Description
1.	229X105 Locating block
2.	178/0512 5/16"BSF Socket set screw half dog point 3/4"long
3.	229X113 Guard plate (rear)
4.	229Y102A Tool block guide
5.	229Y101A Tool block
6.	327X107 Gib adjusting screws
7.	153/04 1/4"BSF Soft pad
8.	176/0406 1/4"BSF Socket set screw cup point 3/8" long
9.	127X106 Gib strip
10.	229Y101A Tool block
11.	229Y102A Tool block guide
12.	154/10 5/8"dia. Spring lock washer
13.	155/1044 5/8"BSF Socket head cap screw 2.3/4"long
14.	155/0414 1/4"BSF Socket head a cap screw 7/8"long
15.	154/04 1/4"dia. Spring lock washer
16.	229X106 Extension arm
17.	529X103 Gib strip
18.	FX4539C Gig strip adjusting screw
19.	155/0828 1/2"BSF Socket head cap screw 1.3/4"long
20.	154/08 1/2"dia. Spring lock washer
21.	173/08HL 1/2"BSF Hexagon lock nut (Hardened)
22.	173/08H 1/2"BSF Hexagon nut (hardened)
23.	529X110 Spacer
24.	130/12 3/4"dia. Flat washer
25.	FX2599 Hexagon nut
26.	229X107 Adjusting screw
27.	329X111A Stop screw
28.	173/08H 1/2"BSF Hexagon lock nut (hardened)
29.	329X109A Stop block
30.	154/07 7/16"dia. Spring lock washer
31.	155/0732 7/16"BSF Socket head cap screw 2"long
32.	229X112 Guard plate (front)
33.	227X126 Centre guide swarf guard
34.	154/04 1/4"dia Spring lock washer
35.	155/0414 1/4"BSF Socket head cap screw 7/8"long
36.	227X127A Centre guide swarf guard
37.	155/0840 1/4"BSF Socket head cap screw 2.1/2"long
38.	154/08 1/2"dia. Spring lock washer
39.	227X125 Centre guide oil filter
40.	154/03 3/16"dia. Spring lock washer
41.	156/210 2BA Socket head cap screw 5/8"long
42.	227V105B Guide block
43.	324X120 Link pin
44.	182/0616 3/8"BSF Socket head set screw taper point 1"long
45.	227X111 Stop screw
46.	227Y120 Centre block link
47.	227V128 Splash guard
48.	155/0414 1/4"BSF Socket head cap screw 7/8"long
49.	154/04 1/4"dia. Spring lock washer
50.	227X130 Gasket
51.	324X115 Link bush
52.	203/08 1/2"BSF Self locking nut
53.	173/08HL 1/2"BSF Hexagon locking nut (hardened)
54.	227X113 Scraper ring
55.	227Y101B Centre block
56.	194/1 1/8"BSP Socket pipe plug
57.	141/15 1/2"dia. Extractable taper pin 2.1/4"long

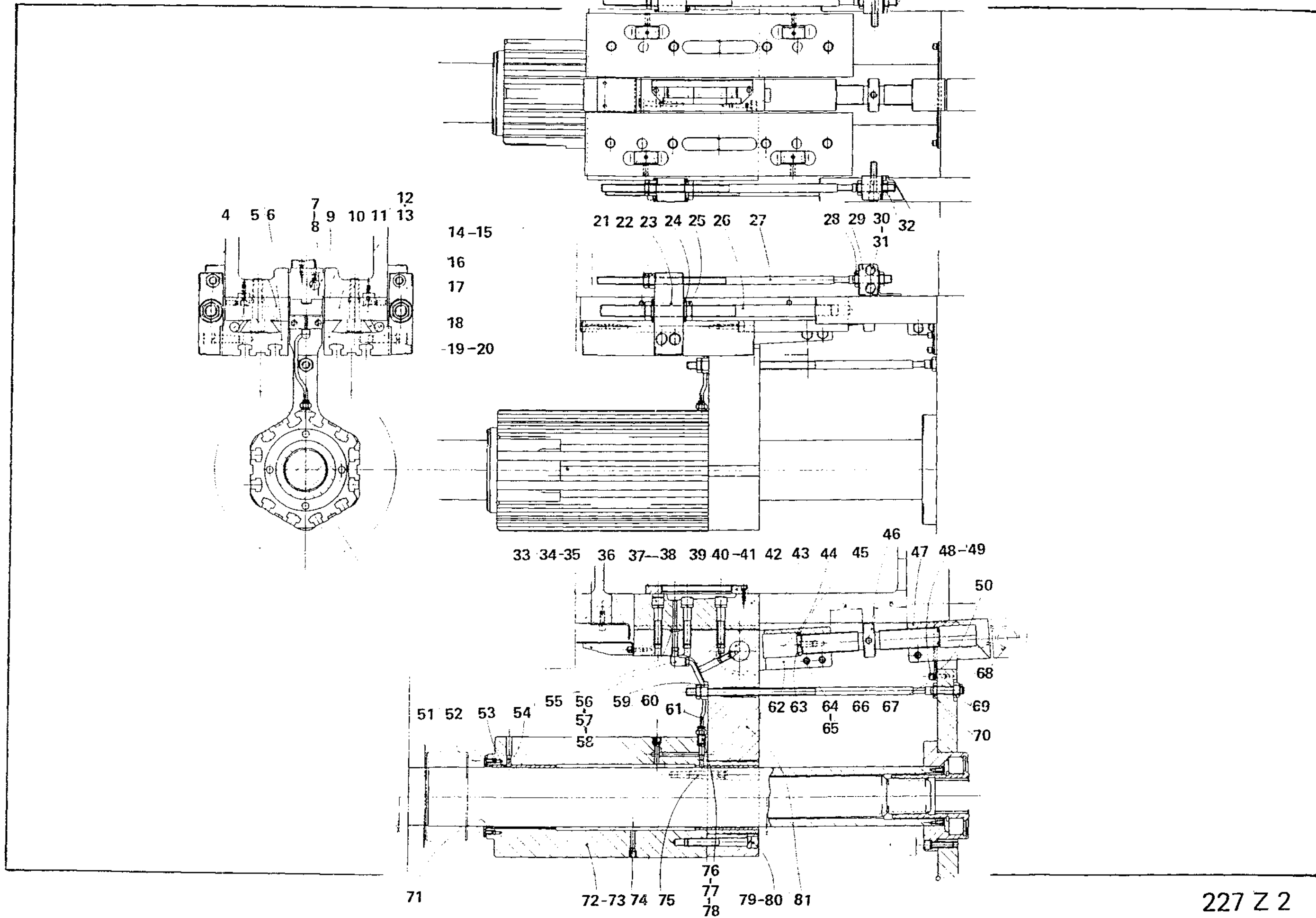
58.	14.72.0402	3/8"BSP-4mm Male connector
59.	14.07.04	4mm Tubing nut
60.	14.08.04	4mm Tubing sleeve
61.	154/08	1/2"dia Spring washer
62.	155/0864	1/2"BSP Socket head cap screw
63.	227Y102B	Guide arm
64.	227X114	Retaining plate
65.	158/0410	1/4"BSP Socket counter sunk head screw 5/8"long
66.	227X103	Centre block bush
67.	127X115	Dowel
68.	227X116	Packing washer
69.	14.75.0402	1/8"BSP-4mm Tube elbow
70.	14.07.04	4mm Tubing nut
71.	14.08.04	4mm Tubing sleeve
72.	173/08H	1/2"BSP Hexagon nut (hardened)
73.	173/08HL	1/2"BSP Hexagon locknut (hardened)
74.	14.02.610	6mm Copper tube 8" long



Centre Block and Longitudinal Slides Drg. 227 Z 2

	Part No	Description
1.	229X105	Locating block
2.	178/0512	5/16"BSF Socket set screw half dog point 3/4"long
3.	229X113	Guard plate (rear)
4.	229Y102A	Tool block guide
5.	229Y101A	Tool block
6.	327X107	Gib adjusting screw
7.	153/04	Soft pad
8.	176/0406	1/4"BSF Socket set screw cup point
9.	127X106	Gib strip
10.	229Y101A	Tool block
11.	229Y102A	Tool block guide
12.	154/10	5/8"dia. Spring lock washer
13.	155/1044	5/8"BSF Socket head cap screw 2.3/4"long
14.	155/0414	1/4"BSF Socket head cap screw 7/8"long
15.	154/04	1/4"dia. Spring lock washer
16.	229X106	Extension arm
17.	529X103	Gib strip
18.	FX4539C	Gib strip adjusting screw
19.	155/0828	1/2"BSF Socket head cap screw 1.3/4"long
20.	154/08	1/2"dia Spring lock washer
21.	173/08HL	1/2"BSF Hexagon lock nut (hardened)
22.	173/08H	1/2"BSF Hexagon nut (hardened)
23.	529X110	Spacer
24.	130/12	3/4"dia. Flat washer
25.	FX2599	Hexagon nut
26.	229X107	Adjusting screw
27.	329X111A	Stop screw
28.	173/08HL	1/2"BSF Hexagon lock nut (hardened)
29.	329X109A	Stop block
30.	154/07	7/16"dia. Spring lock washer
31.	155/0732	7/16"BSF Socket head cap screw 2"long
32.	229X112	Guard plate
33.	227X132	Centre guide swarf guard
34.	15404	1/4"dia. Spring lock washer
35.	155/0414	1/4"BSF Socket head cap screw 7/8"long
36.	227X134A	Centre guide swarf guard
37.	155/0840	1/2"BSF Socket head cap screw 2.1/2"long
38.	154/08	1/2"dia. Spring lock washer
39.	227X125	Centre guide oil filter
40.	154/03	3/16"dia. Spring lock washer
41.	156/210	2BA Socket head cap screw 5/8"long
42.	227V105B	Guide block
43.	324X120	Link pin
44.	182/0616	3/8"BSF Socket set screw taper point 1"long
45.	327X125A	Link stop
46.	327X123	Link adjuster
47.	227X129	Centre block link
48.	155/0414	1/4"BSF Socket head cap screw 7/8"long
49.	154/04	1/4"dia Spring lock washer
50.	227X130	Gasket
51.	227X114	Retaining plate
52.	158/0410	1/4"BSF Socket counter sunk head screw 5/8"long
53.	227X103	Centre block bush
54.	127X115	Dowel
55.	227X116	Packing washer
56.	14.75.0402	1/8"BSP-4mm Tube elbow
57.	14.07.04	4mm Tubing nut

58.	14.08.04	4mm Tubing sleeve
59.	173/08H	1/2"BSF Hexagon nut (hardened)
60.	173/08HL	1/2"BSF Hexagon locknut (Hardened)
61.	14.02.406	4mm Copper tube 8"long
62.	227X122	Centre block link
63.	158/0616	3/8"BSF Socket countersunk head screw 1"long
64.	327X124	Link bolt
65.	130/07	7/16"dia. Flat washer
66.	227X111	Stop screw
67.	227X131	Splash guard
68.	324X115	Link bush
69.	203/08	1/2"BSF Self locking nut
70.	173/08HL	1/2"BSF Hexagon lock nut (hardened)
71.	227X113	Scraper ring
72.	227X121B	Centre block (for single index m/c only)
73.	227Y124A	Centre block (for double index m/c only)
74.	194/1	1/8"BSP Socket pipe plug
75.	141/15	1/2"dia. Extractable taper pin 2.1/4"long
76.	14.72.0402	1/8"BSP-4mm Male connector
77.	14.07.04	4mm Tubing nut
78.	14.08.04	4mm Tubing sleeve
79.	154/08	1/2"dia. Spring washer
80.	155/0864	1/2"BSF Socket head cap screw 4"long
81.	227X102B	Guide arm

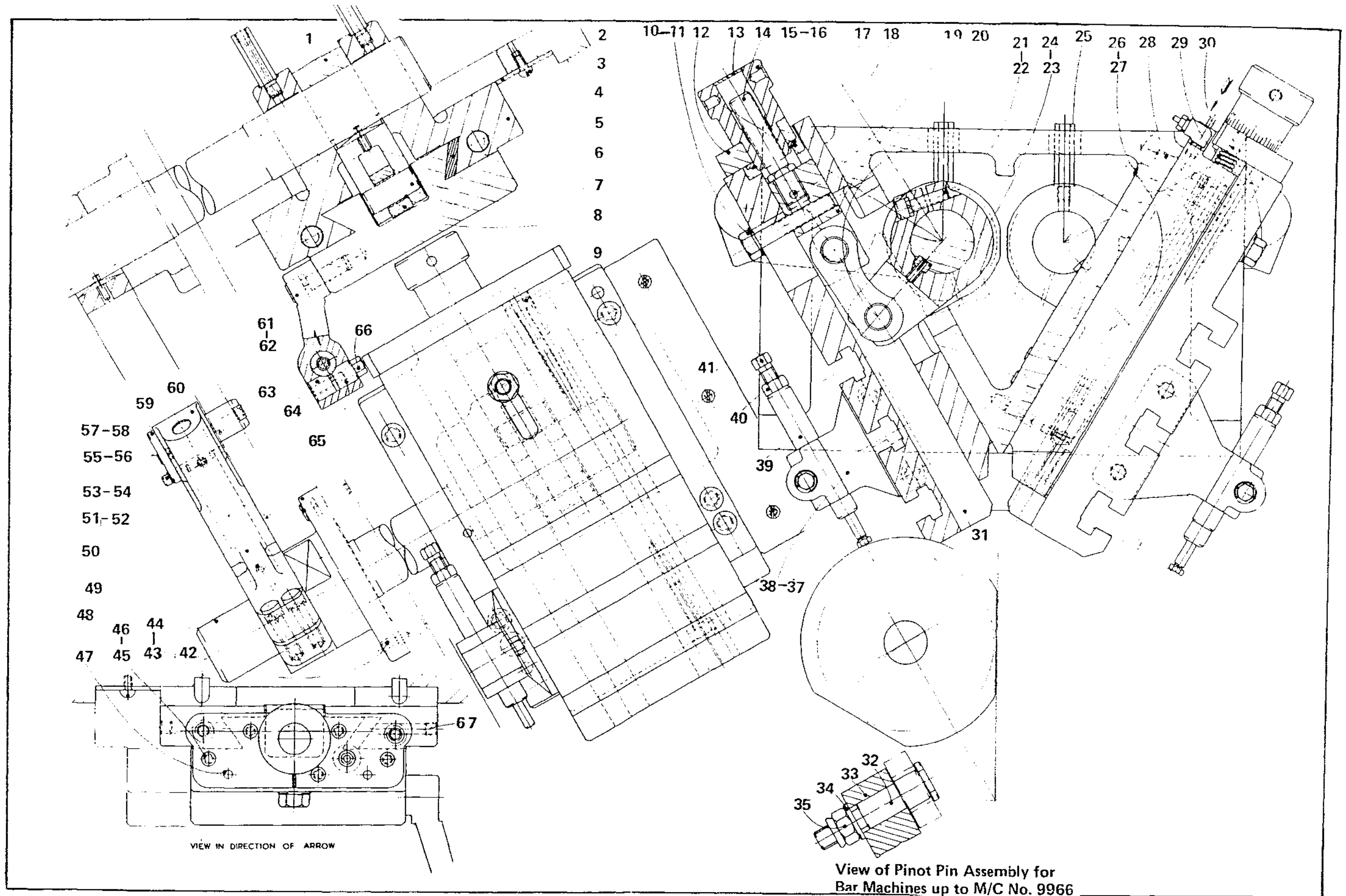




Cross Slides - Upper - Front and Rear Drg 235 Z 1

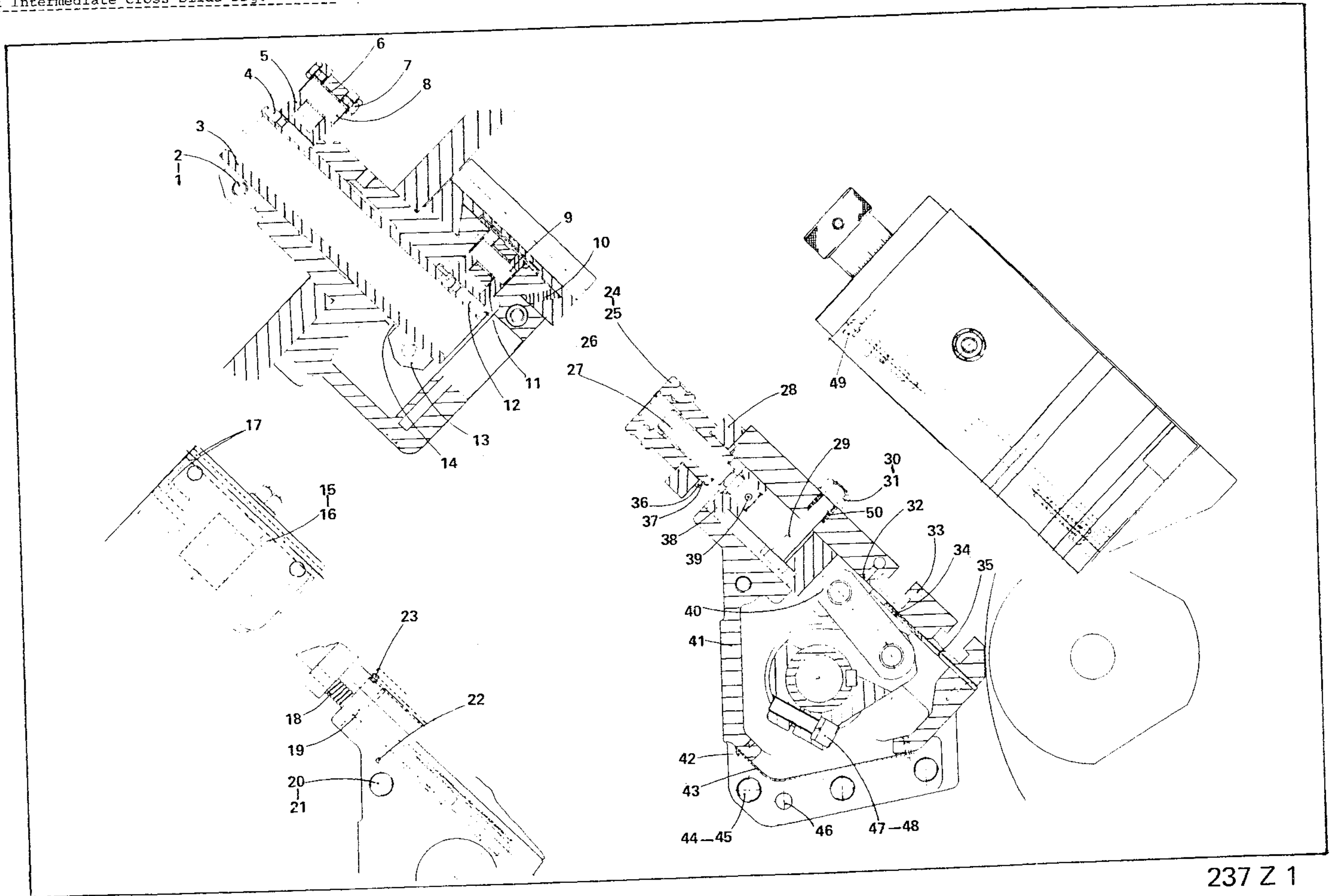
Part No	Description
1.	235V120 Slide lever
2.	164/0408 1/4"BSF Round head screw 1/2"long
3.	235X115 Cover plate
4.	325Z101B Upper cross slide base
5.	537Y112 Gib strip
6.	242X152 Link pin
7.	236/121412 oil retaining bush 3/4" x 7/8" x 3/4"long
8.	235X137 Link
9.	327X107 Gib strip adjusting screw
10.	130/08 1/2"dia. Washer
11.	167/0844H 1/2"BSF Hexagon head set screw 2.3/4"long (hardened)
12.	235X106A End bracket
13.	129/13 Welch plug
14.	342X139 Adjusting screw
15.	342V112E Micrometer head (English)
16.	342V112M Micrometer head (Metric)
17.	342X143 Spacer
18.	101/15 1.1/4"dia. External circlip
19.	125/1624 1/4"dia. Taper pin 1.1/2"long
20.	235X135 Adjusting block
21.	155/0624 3/8"BSF Socket head cap screw 1.1/2"long
22.	154/06 3/8"dia. Washer
23.	143/0614B 3/16"dia. Grooved Mills pin 7/8"long
24.	235X138 Operating arm key
25.	235X140 Tube adaptor
26.	155/0836 1/2"BSF Socket head cap screw 2.1/4"long
27.	154/08 1/2"dia. Spring washer
28.	141/7 13/32"dia. Extractable taper pin 1.3/4"long
29.	235X109A Upper cross slide spring
30.	235X110 Spring support
31.	235Z102 Upper cross slide
32.	235X128A Pivot pin
33.	235V119B Keyed upper lever
34.	130/10 5/8"dia Washer
35.	203/10 5/8"dia. Self locking nut
36.	-
37.	-
38.	242X130D Stop bracket (1.3/8"-6 machine)
39.	324X123A Stop bracket bush
40.	173/07H 7/16"BSF Hexagon nut (hardened)
41.	342X124B Stop bracket screw
42.	141/6 13/32"dia. Extractable taper pin 1.1/2"long
43.	154/07 7/16"dia. spring washer
44.	155/0728 7/16"BSF Socket head cap screw 1.3/4"long
45.	154/05 5/16"dia. Spring washer
46.	155/0516 5/16"BSF Socket head cap screw 1"long
47.	141/3 11/32"dia. Extractable taper pin 1"long
48.	235X125 Operating shaft
49.	165/204 2BA Round head screw 1/4"long
50.	572X111B Instruction plate
51.	155/0620 3/8"BSF Socket head cap screw 1.1/4"long
52.	154/06 3/8"dia. Spring washer
53.	235X117 Front bearing bracket
54.	235X118 Rear bearing bracket
55.	198/8 1/4"dia. Shake proof washer
56.	155/0410 1/4"BSF Socket head cap screw 5/8"long
57.	154/05 5/16"dia. Spring washer

58.	155/0544	5/16"BSF Socket head cap screw 2.3/4"long
59.	235X128A	Pivot pin
60.	235V119B	Keyed upper lever
61.	155/0824	1/2"BSF Socket head cap screw 1.1/2"long
62.	154/08	1/2"dia. Spring washer
63.	235X129	Retaining strip
64.	342X125	Threaded locking piece
65.	342X126	Plain locking piece
66.	342X122	Stop bracket lock bolt



Front Intermediate Cross Slide Drg. 237 Z 1

Part No	Description
1.	154/08 1/2" Spring lock washer
2.	155/0828 1/2"BSF Socket head cap screw 1.3/4"long
3.	237X157 Operating sleeve
4.	122/1628T Tapped key 1/2" x 11/32" x 1.3/4"long
5.	237X155 Operating lever
6.	236/101212 Oil retaining bush
7.	242X135 Locating screw
8.	237X164 Link pin
9.	237X164 Link pin
10.	237V153A Gib strip
11.	236/101212 Oil retaining strip
12.	237X167 Key
13.	237X156 Operating lever
14.	237X172 Spacer
15.	154/05 5/16"Spring washer
16.	155/0514 5/16"BSF Socket head cap screw 7/8"long
17.	193/104 1/8"BSP Parallel plug 1/4"long
18.	FX1552 Spring
19.	235X110 Spring support
20.	155/0888 1/2"BSF Socket head cap screw 5.1/2"long
21.	154/08 1/2"Spring lock washer
22.	179/402 4BA Socket set screw cup point 1/8"long
23.	179/403 4BA Socket set screw cup point 3/16"long
24.	342V112/E Micrometer head (English)
25.	342V112/M Micrometer head (Metric)
26.	129/13 1"dia Welch plug
27.	342X139 Adjusting screw
28.	237X154 End bracket
29.	237X160 Slide bolt
30.	130/08 1/2"dia. Flat washer
31.	173/08H 1/2"BSF Hexagon nut (hardened)
32.	14.02.406 4mm Copper pipe 7/16"long
33.	273V152C Front intermediate cut off slide
34.	159?208 2BA Socket counter sunk head screw 1/2"long
35.	237X166 Chip cover
36.	342X143 Spacer
37.	101/15 1.1/4"dia. External circlip
38.	237V159 Adjusting block
39.	125/1622 1/4"dia. Taper pin 1.3/8"long
40.	237X163 Link
41.	237Z151B Front intermediate slide base
42.	160/206 2BA Socket dome head screw 3/8"long
43.	239X123A Swarf shield
44.	154/08 1/2" Spring lock washer
45.	155/0828 1/2"BSF Socket head cap screw 1.3/4"long
46.	141/14 1/2"dia. Extractable taper pin 2"long
47.	155/0828 1/2"BSF Socket head cap screw 1.3/4"long
48.	154/08 1/2" Spring lock washer
49.	FX4539C Gib adjusting screw
50.	237X138 Bolt support spring

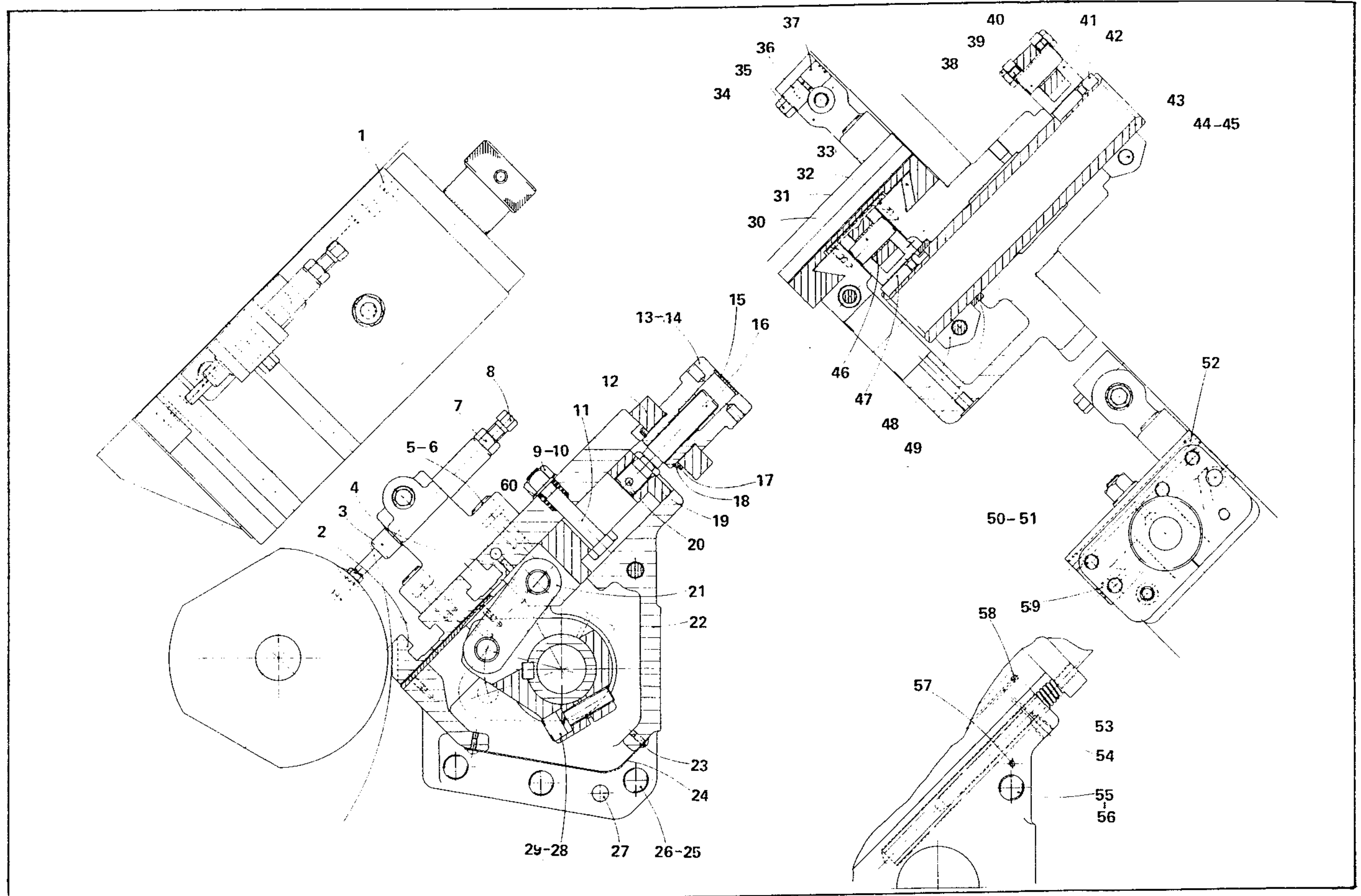


237 Z 1

Rear Intermediate Cut-Off Slide Drg. 239 Z 2

Part No	Description
1. FX4539C	Gib adjusting screw
2. 239V152C	Rear intermediate cut-off slide
3. 342X123A	Stop bracket bush
4. 14.02.406	4mm Copper pipe 7/16"long
5. 155/0820	1/2"BSF Socket head cap screw 1.1/4"long
6. 154/08	1/2" Spring lock washer
7. 173/07H	7/16"BSF Hexagon nut (hardened)
8. 342X124B	Stop bracket screw
9. 173/08H	1/2"BSF Hexagon nut (hardened)
10. 130/08	1/2"dia Flat washer
11. 273X160	Slide bolt
12. 273X154	End bracket
13. 342V112M	Micrometer head (Metric)
14. 342V112E	Micrometer head (English)
15. 129/13	1" Welch plug
16. 342X139	Adjusting screw
17. 342X143	Spacer
18. 101/15	1.1/4"dia. External circlip
19. 237V159	Adjusting block
20. 125/1622	Taper pin 1/4"dia.1.3/8"long
21. 237X163	Link
22. 329Z151B	Rear intermediate cutt-off slide base
23. 160/206	2BA Socket dome head screw 3/8"long
24. 239X123A	Swarf shield
25. 154/08	1/2" Spring lock washer
26. 155/0828	1/2"BSF Socket head cap screw 1.3/4"long
27. 141/14	1/2"dia. Extractable taper pin 2"long
28. 155./0828	1/2"BSF socket head cap screw 1.3/4"long
29. 154/08	1/2" Spring lock washer
30. 237X164	Link pin
31. 237X166	Chip cover
32. 159/208	2BA Socket counter sunk head screw 1/2"long
33. 237V153A	Gib strip
34. 239X176D	Stop bracket
35. 342X122	Stop bracket lock bolt
36. 342X126	Plain locking piece
37. 342X125	Threaded locking piece
38. 237X164	Link pin
39. 242X153	Locating screw
40. 236/101212	Oil retaining bush
41. 237X155	Operating lever
42. 122/1628	Tapped key 1/2" x 11/32" x 1.3/4"long
43. 237X157	Operating sleeve
44. 155/0828	1/2"BSF Socket head cap screw 1.3/4"long
45. 154/08	1/2" Spring washer
46. 236/101212	Oil retaining bush
47. 237X167	Key
48. 237X156	Operating sleeve
49. 237X172	Spacer
50. 154/05	5/16" Spring lock washer
51. 155/0514	5/16"BSF Socket head cap screw 7/8"long
52. 193/04	1/8"BSP Parallel plug 1/4"long
53. FX1552	Spring
54. 235X110	Spring support
55. 155/0888	1/2"BSF Socket head cap screw 5.1/2"long
56. 154/08	1/2" Spring lock washer
57. 179/402	4BA Socket set screw cup point 1/8"long

- 58. 179/403 4BA Socket set screw cup point 3/16"long
- 59. 193/104 1/8"BSP Pipe plug
- 60. 237X138 Bolt support spring

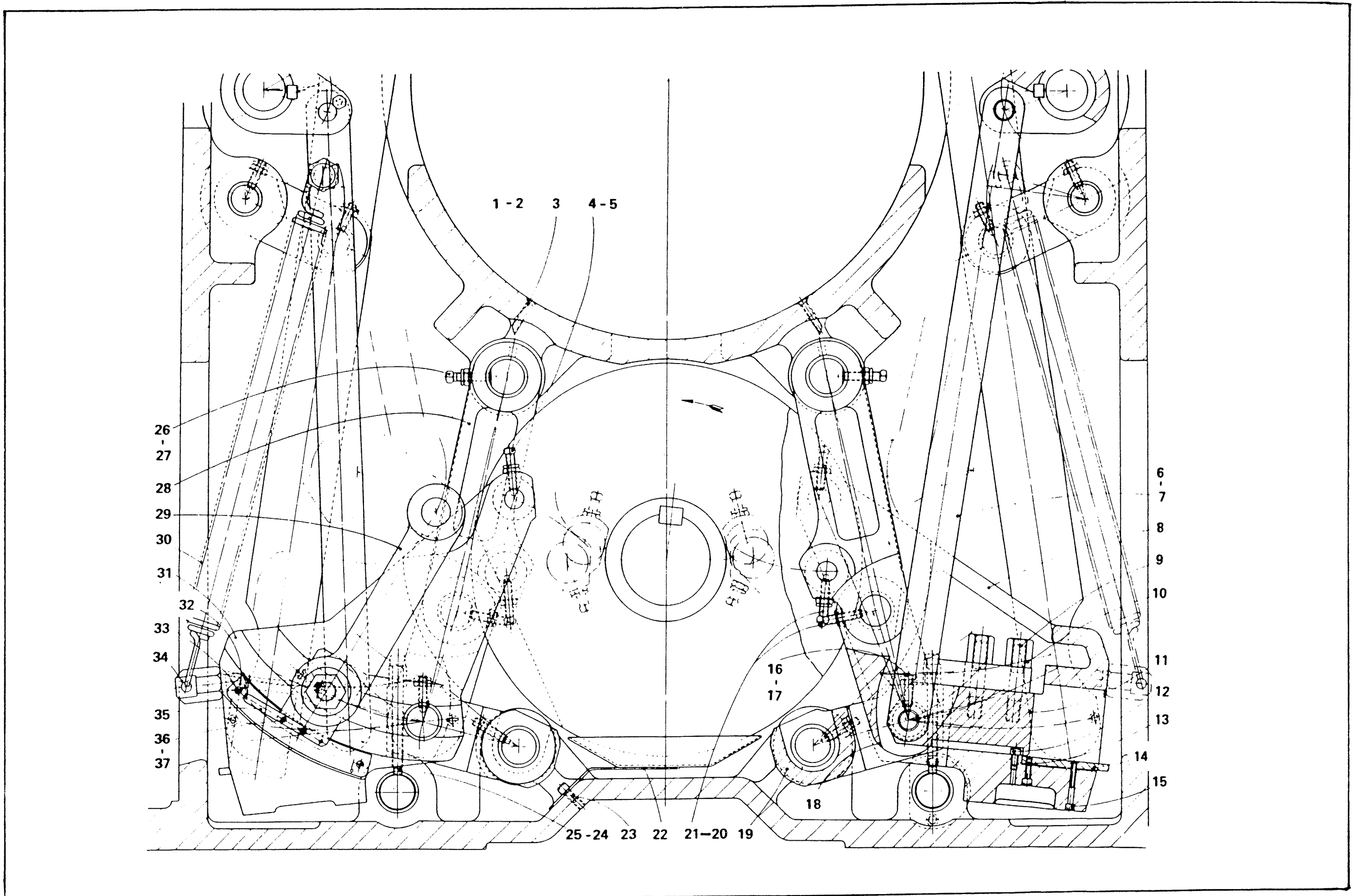


239 Z 2



Cross Slide Operation Drg. 241 Z 1A

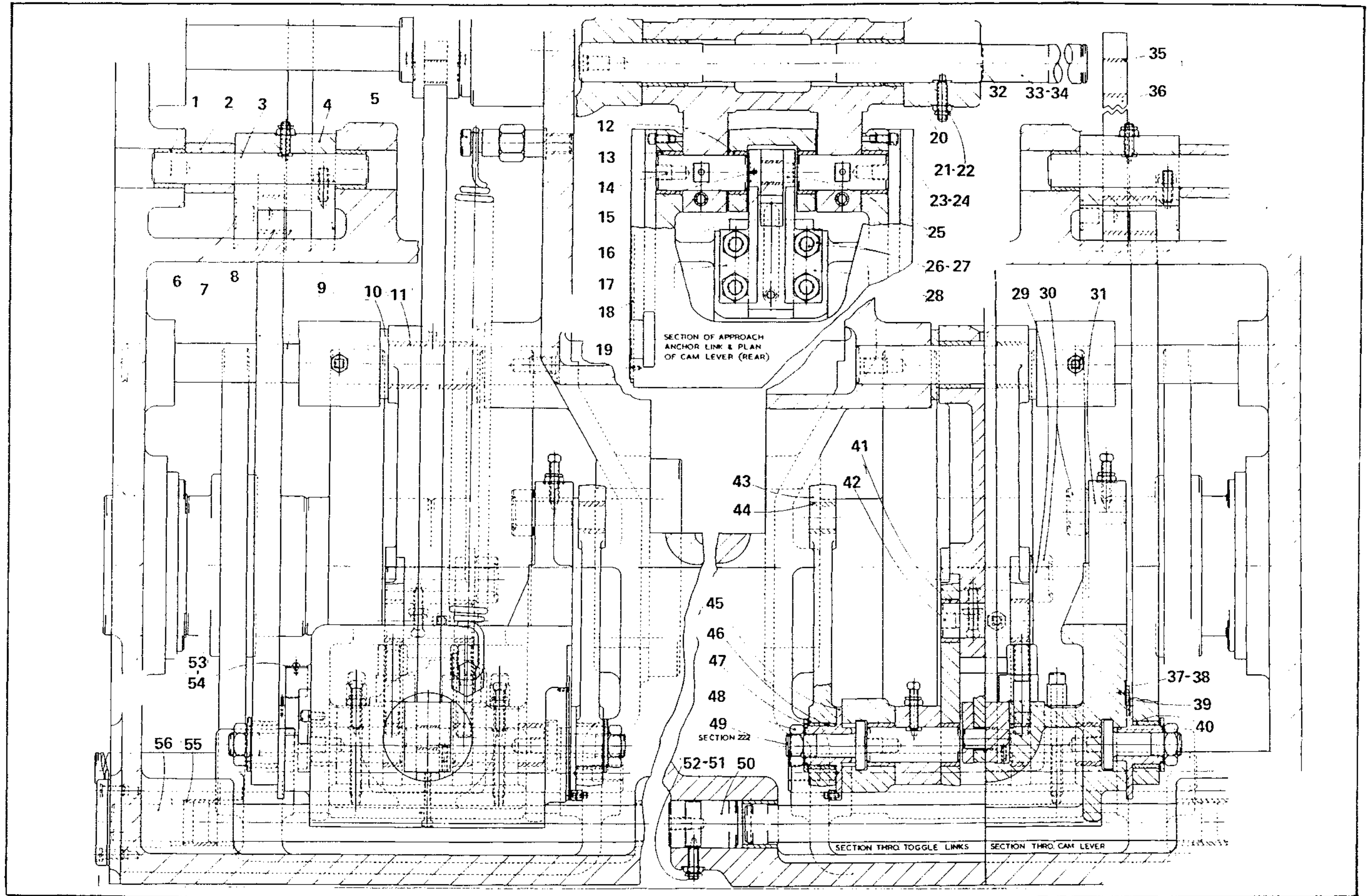
Part No	Description
1.	182/0520 5/16"BSF Socket head screw Taper point 1.1/4"long
2.	203/05 5/16"BSF Self locking nut
3.	225/4050 1/4"dia. Copper tube 1.1/4"long
4.	183/0524 5/16"BSF Square head set screw 1.1/2"long
5.	203/05 5/16"BSF Self locking nut
6.	237X105A Connecting link
7.	236/101212 Oil retaining bush 5/8" x 3/4" x 3/4"long
8.	241Z102C Rear cross slide cam lever
9.	237X119 Stud
10.	237X117 Deep nut
11.	237X110A Carrier
12.	155/0406 1/4"BSF Socket head cap screw 3/8"long
13.	156/212 2BA Socket head cap screw 3/4"long
14.	237X120A Scale
15.	156/224 2BA Socket head cap screw 1.1/2"long
16.	182/0520 5/16"BSF Socket head screw taper point 1.1/4"long
17.	203/05L 5/16"BSF Self locking nut (thin)
18.	241V105A Lower approach link
19.	241V103A Approach anchor link
20.	203/05 5/16"BSF Self locking nut
21.	183/0524 5/16"BSF Square head taper point set screw 1.1/2"long
22.	241Y150 Oil well
23.	155/0408 1/4"BSF Socket head cap screw 1/2"long
24.	241X121 Distance piece
25.	241X120 Stop screw
26.	183/0524 5/16"BSF Square head screw taper point 1.1/2"long
27.	203/05 5/16"BSF Self locking nut
28.	241Y104A Approach arm
29.	241V106 Feed link
30.	341V159B Extension spring
31.	241Z101C Front cross slide cam lever
32.	241X145 Scale for front lower cross slide
33.	159/406 4BA Counter sunk socket head screw 3/8"long
34.	541X156 Spring anchor lower
35.	241X160 Indicator finger
36.	156/406 4BA Socket head cap screw 3/8"long
37.	154/04 1/4"dia.Spring washer



241 Z 1A

Cross Slide Operation Drg. 241 Z 2A

Part No	Description
1.	236/162014 Oil retaining bush 1" x 1.1/4" x 7/8"long
2.	241X153 Spacer
3.	241X140 Pivot pin for forked intermediate lever
4.	241V109A Forked intermediate lever
5.	241X158 Spring anchor
6.	241X126 Link pin
7.	241X108A Connecting link
8.	236/162014 Oil retaining bush 1" x 1.1/4" x 7/8"long
9.	241X139 Fulcrum shaft for approach lever
10.	141X133 Adjusting washer
11.	236/202420 Oil retaining bush 1.1/4" x 1.1/2" x 1.1/4"long
12.	246/182210 Oil retaining bush Heavy duty 1.1/8"x 1.3/8"x 5/8"
13.	246/182214 Oil retaining bush 1.1/8"x 1.3/8"x 7/8"long
14.	241X127 Pivot pin
15.	179/208 2BA Socket set screw cup point 1/2"long
16.	236/101212 Oil retaining bush 5/8"x 3/4"x 3/4"long
17.	237X107 Clamp plate
18.	241X146 Scale for lower cross slide
19.	159/406 4BA Counter sunk socket head screw 3/8"long
20.	236/202424 Oil retaining bush 1.1/4"x 1.1/2"x 1.1/2"long
21.	182/0524 5/16"BSF Socket head screw taper point 1.1/2"long
22.	203/05 5/16"BSF Self locking nut
23.	155/0408 1/4"BSF Socket head cap screw 1/2"long
24.	154/04 1/4"dia. Spring washer
25.	227X108 Link pin
26.	237X119 Stud
27.	237X117 Deep nut
28.	237X106 Clamp plate
29.	241X159 Roller pin
30.	123X104 Roller
31.	123X103 Roller pin
32.	241X128 Fulcrum shaft for anchor link
33.	241X129 Fulcrum shaft for anchor link
34.	241X151 Fulcrum shaft for anchor link
35.	236/162014 Oil retaining bush 1"x 1.1/2"x 7/8"long
36.	241Y111 / Link to upper cross slides
37.	241X147 Scale for rear upper cross slide
38.	165/406 4BA Round head socket screw 3/8"long
39.	241X118 Indicator pin
40.	236/202414 Oil retaining bush 1.1/4"x 1.1/2"x 7/8"long
41.	246/182210 Oil retaining bush Heavy duty 1.1/8"x 1.3/8"x 5/8"
42.	241X125 Pivot pin
43.	241V106 Feed link
44.	236/121614 Oil retaining bush 3/4"x 1"x 7/8"long
45.	241X141 Sliding sleeve
46.	236/202414 Oil retaining bush 1.1/4"x 1.1/2"x 7/8"long
47.	241X116 Slotted washer
48.	173/12HL 3/4"BSF Hexagon locknut (hardened)
49.	241X119 Tee bolt
50.	222X129 Plug (section 222)
51.	203/05 5/16"BSF Self locking nut (section 222)
52.	182/0520 5/16"BSF Socket screw taper point 1.1/4"long
53.	165/406 4BA Round head socket screw 3/8"long
54.	241X149 Scale for front upper cross slide
55.	323X174 Toggle bush
56.	241X130 Stop shaft

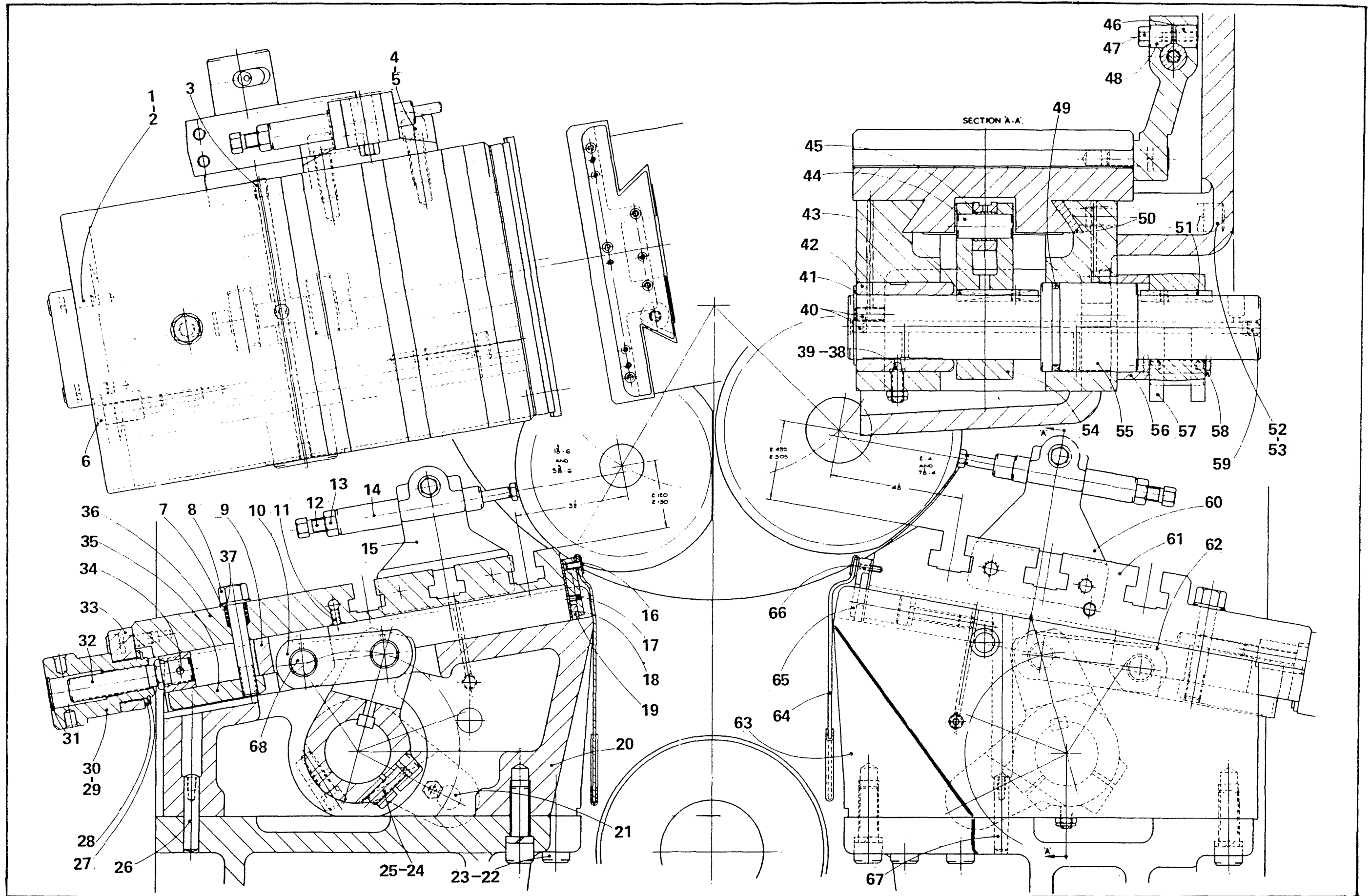


241 Z 2A

Lower cross Slides Drg. 242 Z 1A

Part No	Description
1.	155/0616 3/8"BSF Socket head cap screw 1"long
2.	154/06 3/8"dia. Extractable taper pin
3.	194/1 1/8"BSP Socket pipe plug
4.	155/0824 1/2"BSF Socket head cap screw 1.1/2"long
5.	154/08 1/2" Spring lock washer
6.	327X107 Gib strip adjusting screw
7.	130/08 1/2" Plain washer
8.	242X145 Slide bolt
9.	242V141 Adjusting block
10.	242X142 Link
11.	225/4050 1/4"dia Copper tube 1/2"long
12.	342X124B Stop bracket screw
13.	173/07H 7/16"BSF Hexagon nut (hardened)
14.	342X123A Stop bracket bush
15.	242X130D Stop bracket
16.	159/208 2BA Counter sunk head screw 1/2"long
17.	159/406 4BA Counter sunk head Screw 3/8"long
18.	242X146 Back plate for slide wiper
19.	242X147 Wiper
20.	242Z107C Lower front slide base
21.	337X164 Link pin
22.	154/10 5/8" Spring lock washer
23.	155/1028 5/8"BSF Socket head cap screw 1.3/4"long
24.	155/0624 3/8"BSF Socket head cap screw 1.1/2"long
25.	154/06 3/8"dia. Spring lock washer
26.	141/15 1/2"dia.Taper pin 2.1/4"long
27.	101/15 1.1/4"dia. External circlip
28.	342X143 Spacer
29.	342V112M Micrometer head (Metric)
30.	342V112E Micrometer head (English)
31.	129/13 1"dia. Welch plug
32.	342X139 Adjusting screw
33.	242X138 End bracket
34.	125/1624 1/4"dia. taper pin 1.1/2"long
35.	242X144 Nut
36.	242Y101B Lower cross slide
37.	237X138 Bolt support spring
38.	182/0620 3/8"BSF Set screw taper point 1.1/4"long
39.	203/06L 3/8"BSF Self locking nut
40.	194/1 1/8"BSP Socket pipe plug
41.	101/22 2"dia. External circlip
42.	242X155 Bearing
43.	122/1640T Tapped key 1/2" x 11/32" x 2.1/2"long
44.	242X152 Link pin
45.	236/121412 Oil retaining bush
46.	342X125 Threaded locking piece
47.	342X122 Stop bracket lock bolt
48.	342X126 Plain locking piece
49.	4-035 Nu lip ring
50.	539Y103 Gib strip
51.	122/1636T Tapped key 1/2" x 11/32"x 2.1/4"long
52.	155/1056 5/8"BSF Socket head cap screw 3.1/2"long
53.	154/10 5/8"dia. Spring lock washer
54.	235V120 Slide lever
55.	242V135A Operating shaft
56.	242X151 Spacer
57.	242V134 Feed lever

58.	242X153	Locating screw
59.	194/1	1/8"BSP Socket pipe plug
60.	342V130D	Stop bracket
61.	242Y103	Lower cross slide
62.	242X154	Link
63.	242Z108C	Lower rear slide base
64.	242V129	Flap
65.	242X149	Front plate for slide wiper
66.	159/212	2BA Counter sunk head screw 3/4"long
67.	141/15	1/2"dia. Extractable taper pin 2.1/4"long
68.	242X152	Link pin



242 Z 1A

Main Camshaft Drg. 244 Z 1B

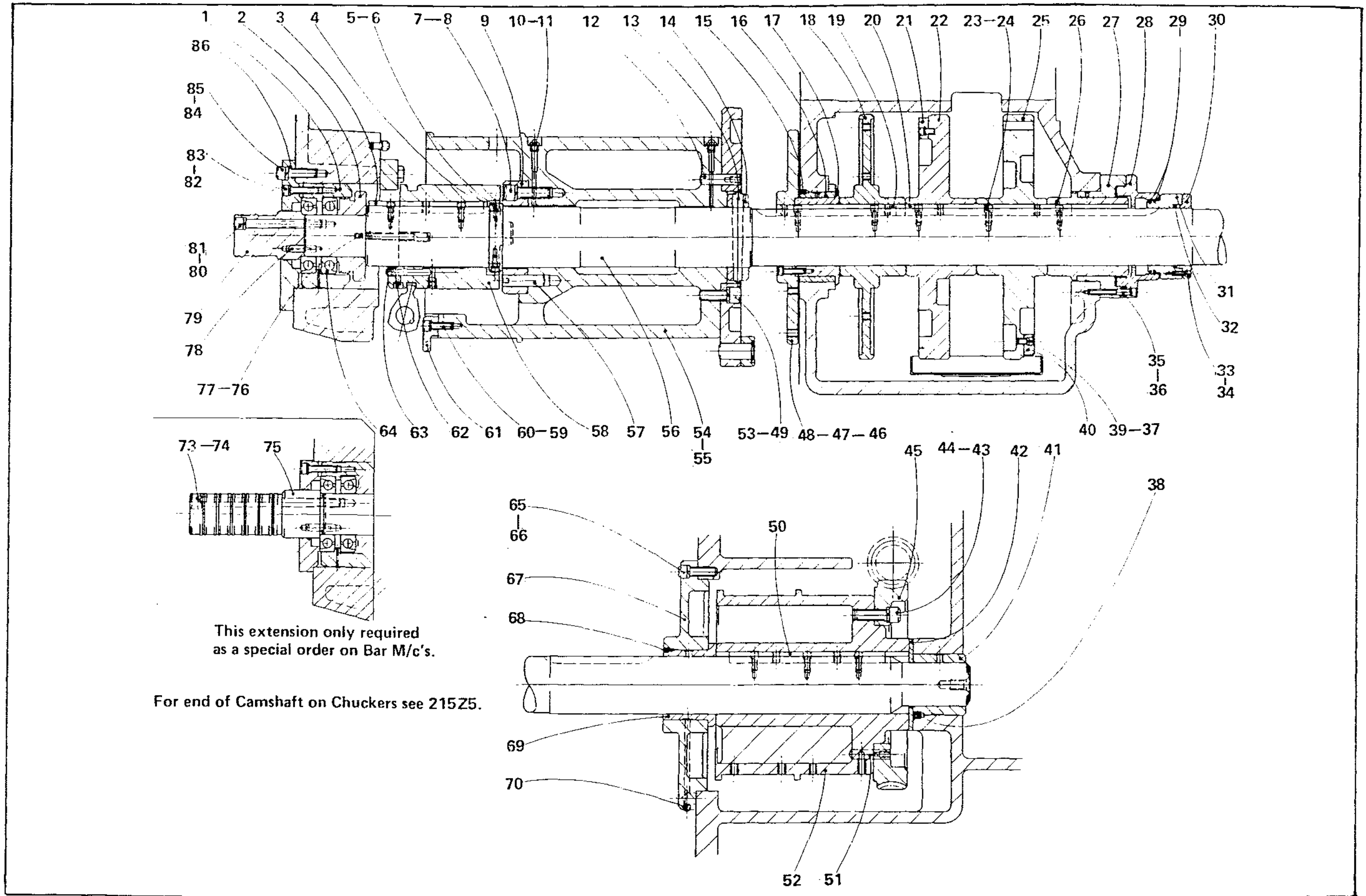
	Part No	Description
1.	544Y121C	End bearing housing
2.	344X145B	Thrust ring
3.	344X147A	Camshaft key
4.	344X127	Thrust ring
5.	155/0410	1/4"BSF Socket head cap screw 5/8"long
6.	154/04	1/4"dia. Spring washer
7.	155/1032	5/8"BSF Socket head cap screw 2"long
8.	154/10	5/8"dia. Spring washer
9.	344Y122	Clutch ring
10.	212/18	1/8"BSP Autolube nipple
11.	210/2525	Yellow washer
12.	141/20	5/8"dia. Taper pin 2.1/4"long
13.	125/4080	5/8"dia. Taper pin 5"long
14.	544X118	Collar
15.	176/0406	1/4"BSF Socket set screw cup point 3/8"long
16.	244X134	Camshaft bush
17.	244V138	Camshaft bearing sleeve
18.	244Y103	Auxiliary cam disc
19.	544X147A	Key
20.	344X148B	Camshaft key
21.	244X112/2	Cam insert rear
22.	244Z104	Rear cross slide cam
23.	155/0616	3/8"BSF Socket head cap screw 1"long
24.	154/06	3/8"dia. Spring washer
5.	244Z105	Front cross slide cam
26.	244V137A	Camshaft bearing sleeve
27.	244V135A	Camshaft bush (drum housing)
28.	244V153	Camshaft housing
29.	244X156	Piston ring
30.	244X155	End cap
31.	244X154	Ring housing
32.	354/42	'O'Ring 3.1/4"dia.
33.	155/0412	1/4"BSF Socket head cap screw 3/4"long
34.	154/04	1/4"dia. Spring washer
35.	155/0532	5/16"BSF Socket head cap screw 2"long
36.	154/05	5/16"dia. Spring washer
37.	155/0510	5/16"BSF Socket head cap screw 5/8"long
38.	176/0406	1/4"BSF Socket set screw cup point 3/8"long
39.	154/05	5/16"dia. Spring washer
40.	244X112/1	Cam insert front
41.	344X132	Camshaft bearing
42.	344X152	Thrust washer
43.	155/1032	5/8"BSF Socket head cap screw 2"long
44.	154/10	5/8"dia. Spring washer
45.	218V124	Lower wormwheel
46.	154/05	5/16"dia. Spring washer
47.	155/0520	5/16"BSF Socket head cap screw 1.1/4"long
48.	244Y125	Carrier (Bar stop cams)

46,47, and 48 Not on Chucking machines

49.	155/1028	5/8"BSF Socket head cap screw 1.3/4"long
50.	244X148A	Camshaft key
51.	141/20	5/8"dia. Taper pin 2.1/4"long
52.	244Y130A	Cam drum
53.	154/10	5/8 Dia. Spring washer
54.	244Z113	Cam drum



55.	244Y102A	Cam drum (not for chucking machines)
56.	244Y101B	Main camshaft
57.	344X144	Dowel
58.	344Y123B	Clutch body
59.	154/06	1/2"dia. Spring washer
60.	155/0620	3/8"BSF Socket head cap screw 1.1/4"long
61.	345X125	Detent
62.	212/04	Autolube nipple 1/4"BSF
63.	194/1	1/8"BSF Plug
64.	263/60	Angular contact ball journal light type 60x110x22mm
65.	155/0828	1/2"BSF Socket head cap screw 1.3/4"long
66.	154/08	1/2"dia. Spring washer
67.	244Y150	Bearing plate
68.	176/0405	1/4"BSF Socket set screw cup point 3/8"long
69.	244X151	Camshaft bearing
70.	194/1	1/8"BSF Plug
71.	-	
72.	-	
73.	155/08136	1/2"BSF Socket head cap screw 8.1/2"long
74.	154/08	1/2"dia. Spring washer
75.	544%151A	Camshaft extension 73,74 and 75 Special order only
76.	244X146	Spring support
77.	244X129A	Spring support
78.	544X152	Coupling pin
79.	344XV156A	Camshaft extension
80.	154/08	1/2"dia. Spring washer
81.	155/0872	1/2"BSF Socket head cap screw 4.1/2"long
	79,80 and 81	Not on chucking machines
82.	154/06	3/8"dia. Spring washer
83.	155/0628	3/8"BSF Socket head cap screw 1.3/4"long
84.	154/08	1/2"dia. Spring washer
85.	155/0828	1/2"BSF Socket head cap screw 1.3/4"long
86.	244V160	End cover



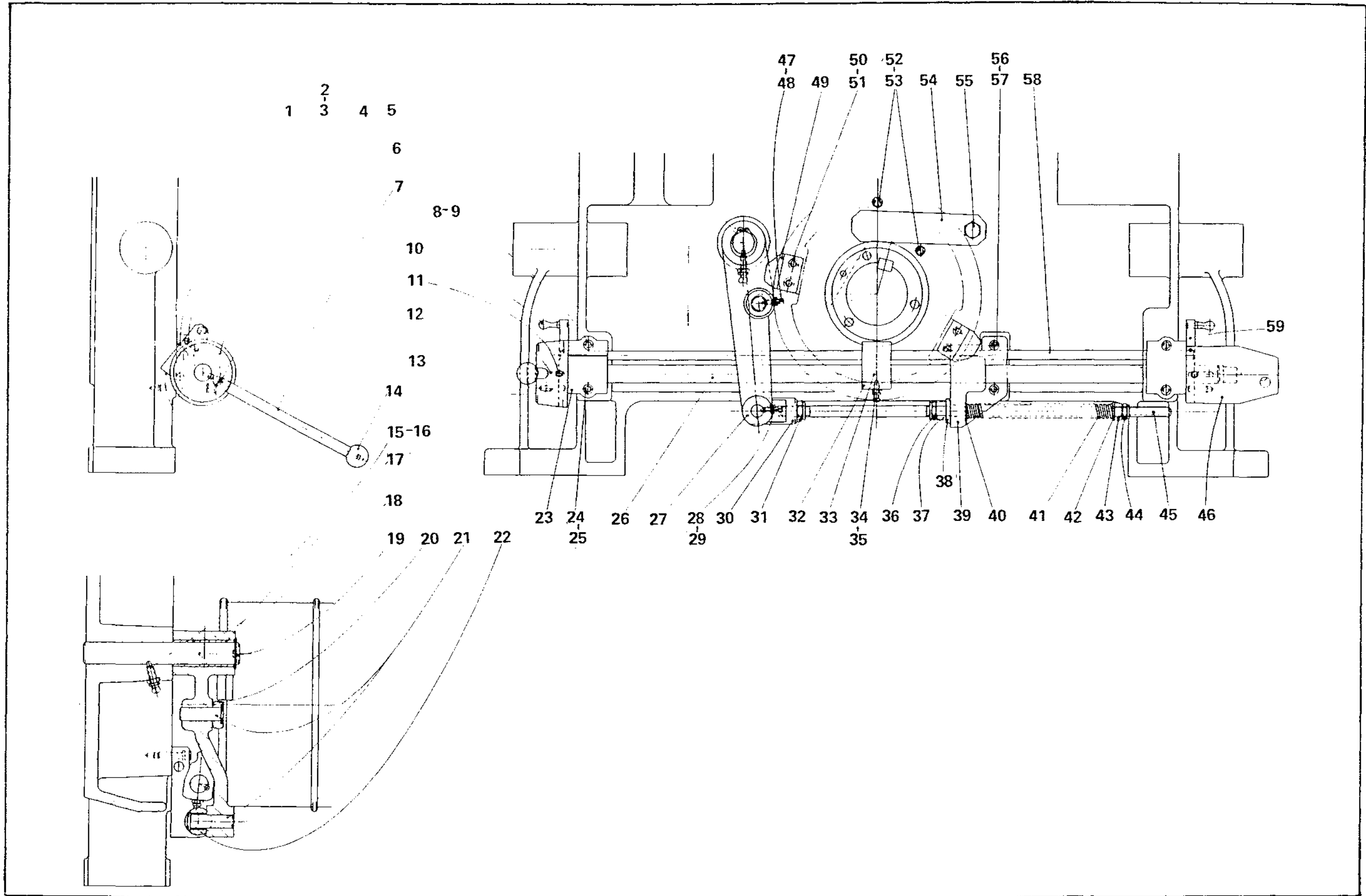
This extension only required  
as a special order on Bar M/c's.

For end of Camshaft on Chuckers see 215Z5.

244 Z 1 B

Index Clutch Operation Drg. 245 Z 1

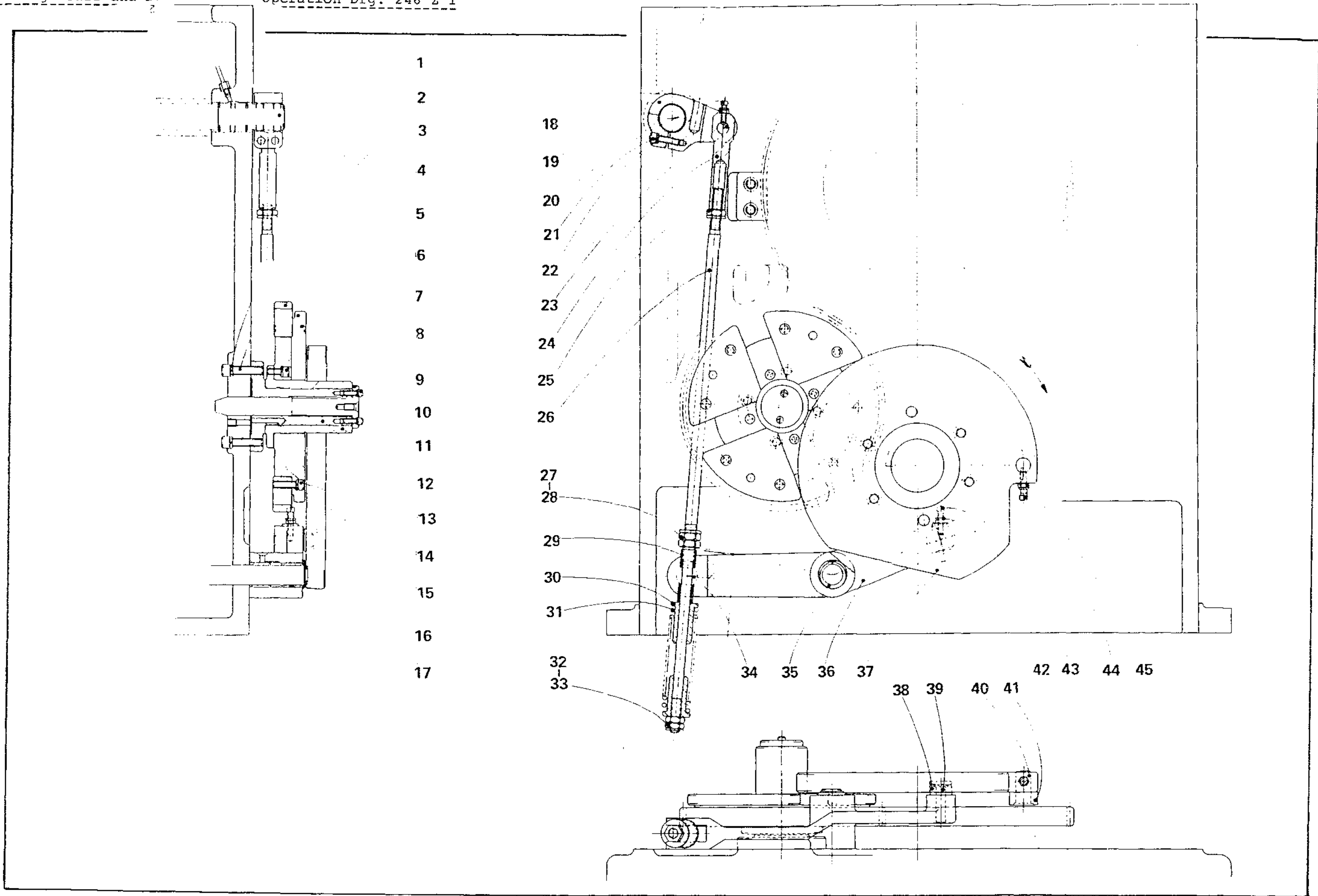
Part No	Description
1.	125/1116 11/32"dia. Taper pin 1"long
2.	354X110 Spring
3.	354X129 Spring sleeve
4.	345X108 Pawl
5.	345X106 Lever boss
6.	179/203 2BA Socket head set screw 3/16"long
7.	345X109 Lever
8.	155/0624 3/8"BSF Socket head cap screw 1.1/2"long
9.	154/06 3/8"dia. Spring washer
10.	356X137 Handle
11.	176/0612 3/8"BSF Socket set screw 3/4"long
12.	121/0824T Tapped key 1/4" Square x 1.1/2"long
13.	126/1218 3/8" dia. Parallel pin 1.1/8"long
14.	214/13 Bakelite knob (black)
15.	183/0628 3/8"BSF Square head set screw taper point 1.3/4"long
16.	203/06 3/8"BSF Self locking nut
17.	236/202424 Oil retaining bush
18.	101/15 1.14"dia. External circlip
19.	245X123 Pivot pin
20.	141X121 Cam roller
21.	141X122 Pin for cam roller
22.	236/121414 Oil retaining bush
23.	345X105 Clutch rod bracket
24.	155/0644 3/8"BSF Socket head cap screw 2.3/4"long
25.	154/06 3/8" dia. Spring washer
26.	245X104 Shaft
27.	345Y120A Lever
28.	183/0516 5/16"BSF Square head set screw taper point 1"long
29.	203/05 5/16"BSF Self locking nut
30.	599AX108 Pusher connection
31.	203/10L 5/8"BSF Self locking nut (thin)
32.	345V101C Clutch lever
33.	121/0828T Tapped key 1/4"Squ.x 1.3/4"long
34.	183/0516 5/16"BSF Squ. head set screw taper point 1"long
35.	203/05 5/16"BSF Self locking nut
36.	203/10L 5/8"BSF Self locking nut (thin)
37.	173/10 5/8"BSF Hexagon nut
38.	345X103 Washer
39.	345V102 Clutch lever bracket
40.	130/08 1/2"dia. Flat washer
41.	245X127 Spring
42.	130/08 1/2"dia. Flat washer
43.	173/08 1/2"BSF Hexagon nut
44.	203/08 1/2"BSF Self locking nut
45.	245X122 Spring rod
46.	245V106A Lever boss
47.	183/0516 5/16"BSF Squ. head set screw taper point 1"long
48.	203/05 5/16"BSF Self locking nut
49.	345X125 Detent
50.	155/0620 3/8"BSF Socket head cap screw 1.1/4"long
51.	154/06 3/8"dia. Spring washer
52.	155/0510 3/8"BSF Socket head cap screw 5/8"long
53.	154/06 3/8"dia. Spring washer
54.	545X111 Balking strip
55.	545X112 Fulcrum stud
56.	155/0624 3/8"BSF Socket head cap screw 1.1/2"long
57.	154/06 3/8"dia. Spring washer
58.	245X128 Shaft
59.	245X108 Pawl



245 Z 1

Indexing Gears and Drum Locking Operation Drg. 246 Z 1

Part No	Description
1.	261V126 Drum locking shaft
2.	154/08 1/2" Spring washer
3.	155/0832 1/2"BSF Socket head cap screw 2"long
4.	246Y102 Geneva wheel gear
5.	246Y101A Geneva wheel
6.	125/3228 1/2"dia. Taper pin 1.3/4"long
7.	154/06 3/8" Spring washer
8.	155/0616 3/8"BSF Socket head cap screw 1"long
9.	246X107 Spigot for Geneva wheel support
10.	155/0514 5/16"BSF Socket head cap screw 7/8"long
11.	154/05 5/16" Spring washer
12.	246V103 Geneva wheel bearing
13.	246V104 Geneva wheel support
14.	155/0724 7/16"BSF Socket head cap screw 1.1/2"long
15.	154/07 7/16" Spring washer
16.	250X126 Spacer
17.	236/202420 Oil retaining bush
18.	183/0520 5/16"BSF Taper point set screw 1.1/4"long
19.	361V106B Lever
20.	203/05 5/16"BSF Self locking nut
21.	155/0724 7/16"BSF Socket head cap screw 1.1/2"long
22.	154/07 7/16" Spring washer
23.	351X120 Drum locking rod
24.	361X121 Link end
25.	203/10L 5/8"BSF Self locking nut (thin)
26.	261X139 Drum locking rod
27.	203/12L 3/4"BSF Self locking nut (thin)
28.	173/12L 3/4"BSF Hexagon lock nut
29.	261X141 Spacer for drum locking rod
30.	351X141 Abutment for spring
31.	261X117 Spring
32.	203/10L 5/8"BSF Self locking nut (thin)
33.	173/10L 5/8"BSF Hexagon lock nut
34.	351X117 Pivot pin
35.	101/15 1.1/4"dia. External circlip
36.	261Y101A Drum locking lever
37.	246Z112C Geneva arm and drum locking cam
38.	389X120 Roller
39.	389X121 Roller pin
40.	523/134 Roller pin
41.	523X135 Cam roller
42.	203/06 3/8"BSF Self locking nut
43.	183/0628 3/8"BSF Taper point set screw 1.3/4"long
44.	183/0628 3/8"BSF taper point set screw 1.3/4"long
45.	203/06 3/8"BSF Self locking nut



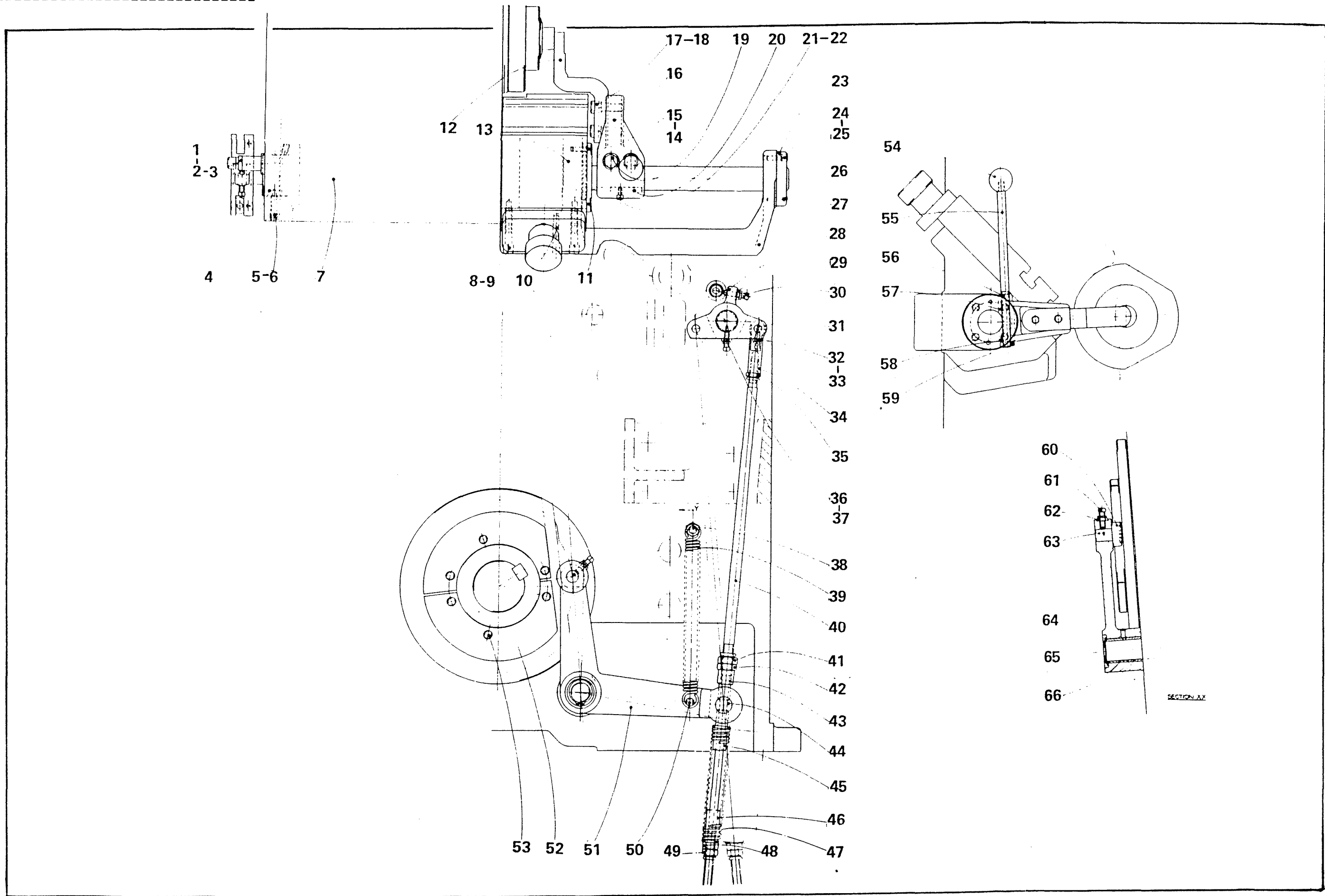
246 Z 1

Bar Stop 6th. Station Drg. 250 Z 1

Part No	Description
1. 154/08	1/2" Spring washer
2. 155/0844	1/2"BSF Socket head cap screw 2.3/4"long
3. 350X142B	Stop peg
4. 250X138	Bush for bar stop shaft
5. 182/0628	3/8"BSF Socket head taper point screw 1.3/4"long
6. 203/06	3/8"BSF Self locking nut
7. 250X112	Bar stop shaft
8. 154/07	7/16"dia. Spring lock washer
9. 155/0736	7/16"BSF Socket head cap screw 2.1/4"long
10. 141/3	11/32"dia Extractable taper pin 1.1/4"long
11. 250X133	Clamp plate
12. 250X109	Bar stop
13. 250X114	Bush for bar stop shaft
14. 154/04	5/16"dia. Spring lock washer
15. 155/0516	5/16"BSF Socket head cap screw 1"long
16. 250V108	Bar stop bracket
17. 155/0824	1/2"BSF Socket head cap screw 1.1/2"long
18. 154/08	1/2"dia. Spring lock washer
19. 167/0840H	1/2"BSF Hexagon head set screw 2.1/2"long
20. 122/1432T	Tapped key 7/16" x 9/32" x 2"long
21. 155/0408	1/4"BSF Socket head cap screw 1/2"long
22. 154/04	1/4"dia. Spring lock washer
23. 250X134	Support
24. 154/05	5/16"dia. Spring lock washer
25. 155/0516	5/16"BSF Socket head cap screw 1"long
26. 125/1620	1/4"dia. Taper pin 1.1/4"long
27. 250Y137A	Support bracket
28. 150Y115A	Bar stop lever
29. 203/05	5/16"BSF Self locking lock nut
30. 188/0524	5/15"BSF Squ. head dog point screw 1.1/2"long
31. 150X120	Link pin
32. 183/0416	1/4"BSF Squ. head taper point screw 1"long
33. 203/04L	1/4"BSF Self locking lock nut
34. 161X121A	Rod end
35. 203/08	1/2"BSF Self locking lock nut
36. 183/0520	5/16"BSF Squ.head taper point screw 1.1/4"long
37. 203/05	5/16"BSF Self locking lock nut
38. 250X123	Spring anchor
39. 250X122A	Bar stop spring
40. 250X116A	Link rod
41. 203/10	5/8"BSF Self locking nut
42. 173/10L	5/8"BSF Hexagon lock nut
43. 250X124A	Spacer
44. 150X117A	Pivot pin
45. 150X140	Spring guide
46. 150X141	Spring retainer
47. 250X106	Spring
48. 173/08	1/2"BSF Hexagon nut
49. 203/08	1/2"BSF Self locking nut
50. 143/1640K	Pin (two grooves)1/2"dia. 2.1/2"long
51. 250Y104A	Cam lever
52. 250V136	Front bar stop cam
53. 155/0612	3/8"BSF Socket head cap screw 3/4"long
54. 241/13	Bakelite knob (black)1.1/2"dia.
55. 150X132	Hand lever
56. 173/08H	1/2"BSF Hexagon nut (hardened)
57. 150X110	Pad bush

58.	150X111	Pad bush
59.	173/08L	1/2"BSF Hexagon lock nut
60.	141X121	Roller
61.	183/0520	5/16"BSF Squ. head taper point screw 1.1/4"long
62.	203/05	5/16"BSF Self locking nut
63.	124X116	Roller pin
64.	250X126	Spacer
65.	101/15	1.1/4"dia. External circlip
66.	236/202416	Oil retaining bush

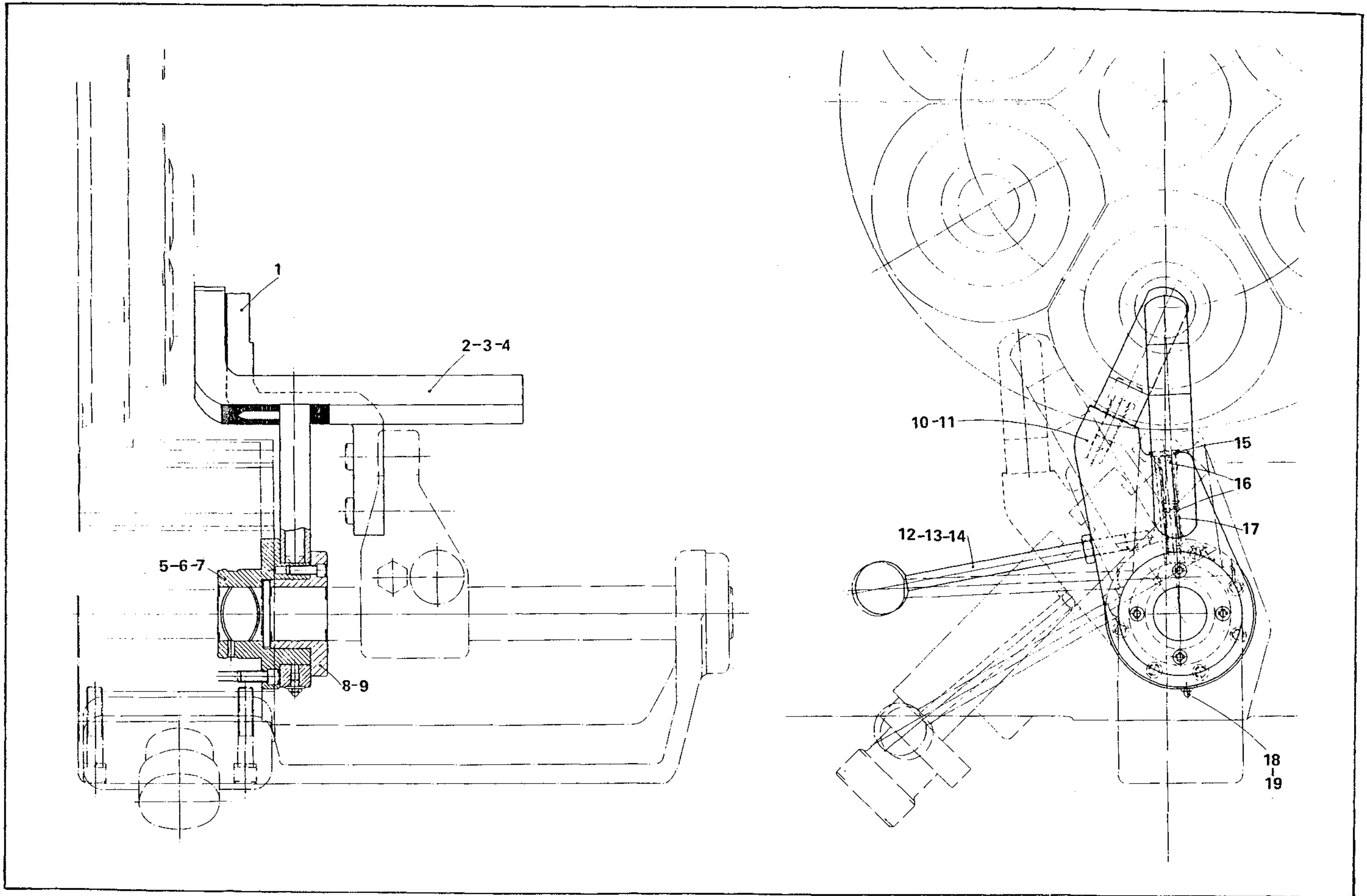




250 Z 1

Bar Stop 3rd.and 6th. Station Drg. 250 Z 4

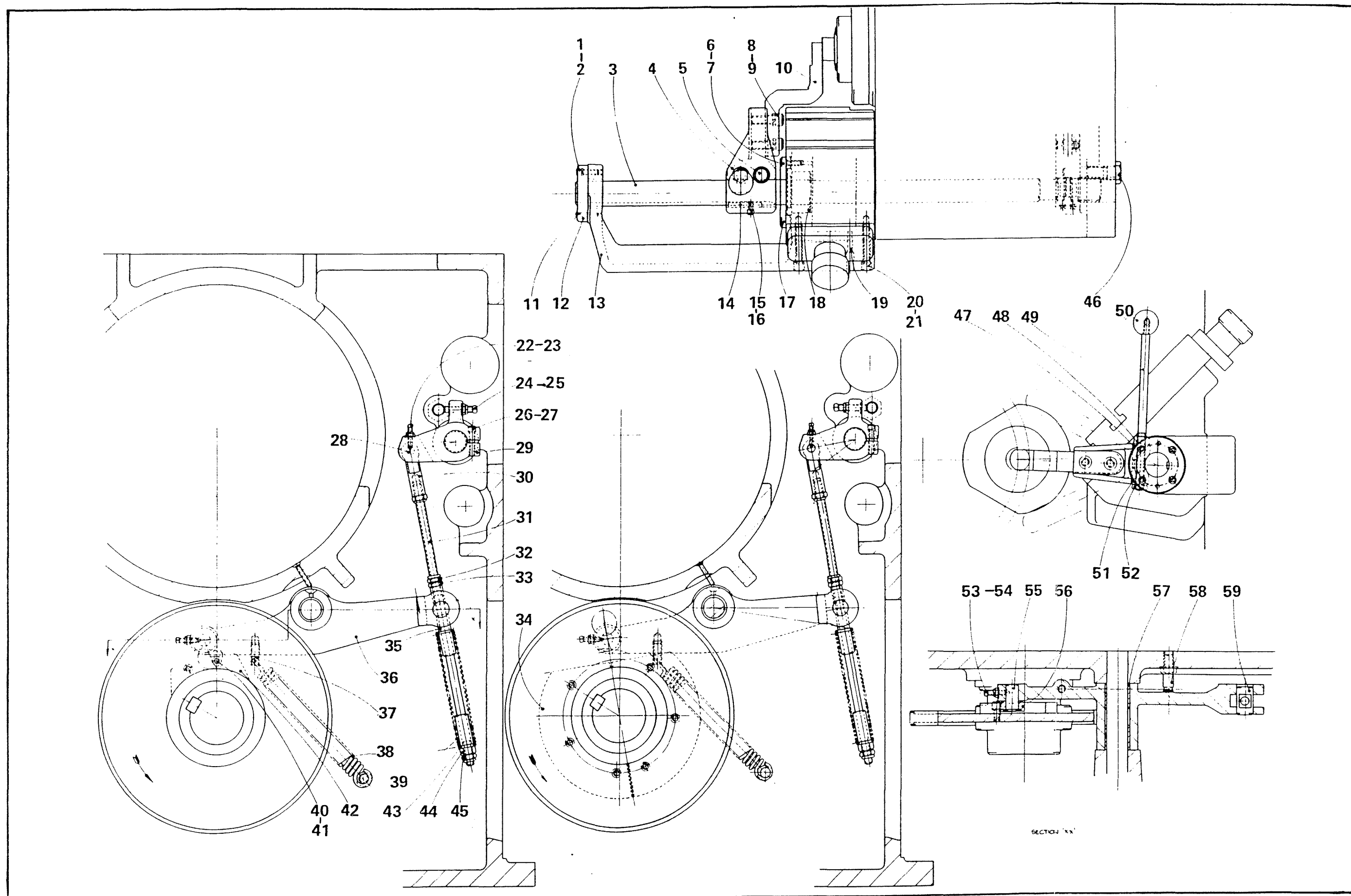
	Part No	Description
1.	250X171	Bar stop
2.	250X176	Bar stop
3.	155/0820	1/2"BSF Socket head cap screw 1.1/4"long
4.	154/08	1/2" Spring washer
5.	251X172	Bush for bar stop
6.	250X172	Bush for bar stop
7.	155/0512	5/16"BSF Socket head cap screw 3/4"long
8.	250X173	Clamp plate
9.	155/0412	1/4"BSF Socket head cap screw 3/4"long
10.	251V177	Bar stop lever
11.	250V177	Bar stop lever
12.	241/13	1.1/2"dia. black knob
13.	173/07L	7/16"BSF Hexagon locknut .
14.	250X174	Lever
15.	118X141	Spring retaining plug
16.	518X188	Overload clutch spring
17.	250X175	Plunger
18.	210/1725	Yellow indicator washer
19.	212/04	1/4"BSF Grease nipple



250 Z 4

Bar Stop 3rd. Station Drg. 251 Z 1

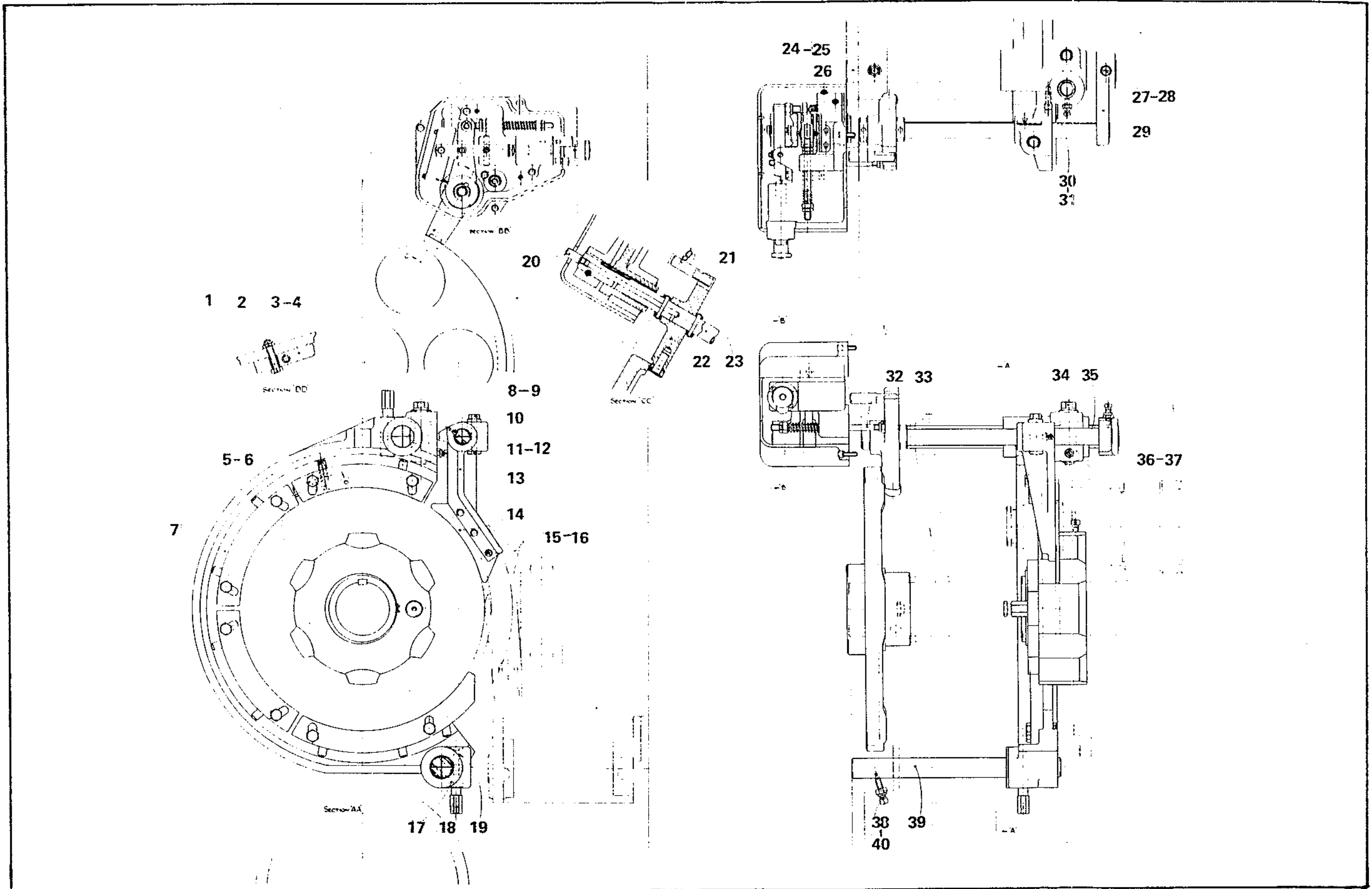
	Part No	Description
1.	155/0516	5/16"BSF Socket head cap screw 1"long
2.	154/05	5/16" Spring washer
3.	251X112	Bar stop shaft
4.	250V108A	Bar stop bracket
5.	167/0840H	1/2"BSF Hexagon head set screw 2.1/2"long (Hardened)
6.	155/0516	5/16 BSF Socket head cap screw 1"long
7.	154/05	5/16" Spring washer
8.	155/0824	1/2"BSF Socket head cap screw 1.1/2"long
9.	154/08	1/2" Spring washer
10.	250X109	Bar stop
11.	125/1620	1/4"dia. Taper pin 1.1/4"long
12.	250X134	Support
13.	250Y137A	Support bracket
14.	122/143T	Key 7/16" x 9/32" x 2"long
15.	155/0408	1/4"BSF Socket head cap screw 1/2"long
16.	154/04	1/4" Spring washer
17.	250X133	Clamp plate
18.	250X114	Bush for bar stop shaft
19.	141/3	11/32"dia. Taper pin 1.1/4"long
20.	155/0736	7/16"BSF Socket head cap screw 2.1/4"long
21.	154/07	7/16" Spring washer
22.	183/0420	1/4"BSF Squ.head Taper point set screw 1.1/4" long
23.	203/04	1/4"BSF Self locking nut
24.	188/0628	3/8"BSF Squ. head set screw 1.3/4" long
25.	203/06	3/8"BSF Self locking nut
26.	155/0524	5/16"BSF Socket head cap screw 1.1/2"long
27.	154/05	5/16" Spring washer
28.	150X120	Link pin
29.	251X115A	Bar stop lever
30.	161X121A	Rod end
31.	251X116	Bar stop operating rod
32.	203/081	1/2"BSF Self locking nut
33.	150X124	Adjusting nut
34.	251V136	Rear bar stop cam (down swinging)
35.	150X140	Spring guide
36.	251Y104A	Bar stop cam lever
37.	251X125	Spring anchor
38.	351X122A	Rear bar stop spring
39.	250X106	Bar stop spring
40.	155/0612	3/8"BSF Socket head cap screw 3/4"long
41.	154/06	3/8" Spring washer
42.	251X135	Rear bar stop cam (up swinging)
43.	150X141	Spring retainer
44.	173/08	1/2"BSF Hexagon nut
45.	203/08L	1/2"BSF Self locking nut
46.	251X142	Stop pin
47.	150X110	Pad bush
48.	173/08H	1/2"BSF Hexagon nut (hardened)
49.	150X132	Hand lever
50.	241/13	1.1/2"dia. Bakelite knob
51.	150X111	Pad bush
52.	173/08L	1/2"BSF Hexagon locknut
53.	183/0520	5/16"BSF Squ. head taper set screw 1.1/4"long
54.	203/05	5/16"BSF Self locking nut
55.	124X116	Roller pin
56.	141X121	Roller
57.	236/202424	Oil retaining bush
58.	251X123	Spring anchor
59.	150X117A	Pivot pin



251 Z 1

Automatic Stop (Front) Drg. 253 Z 1A

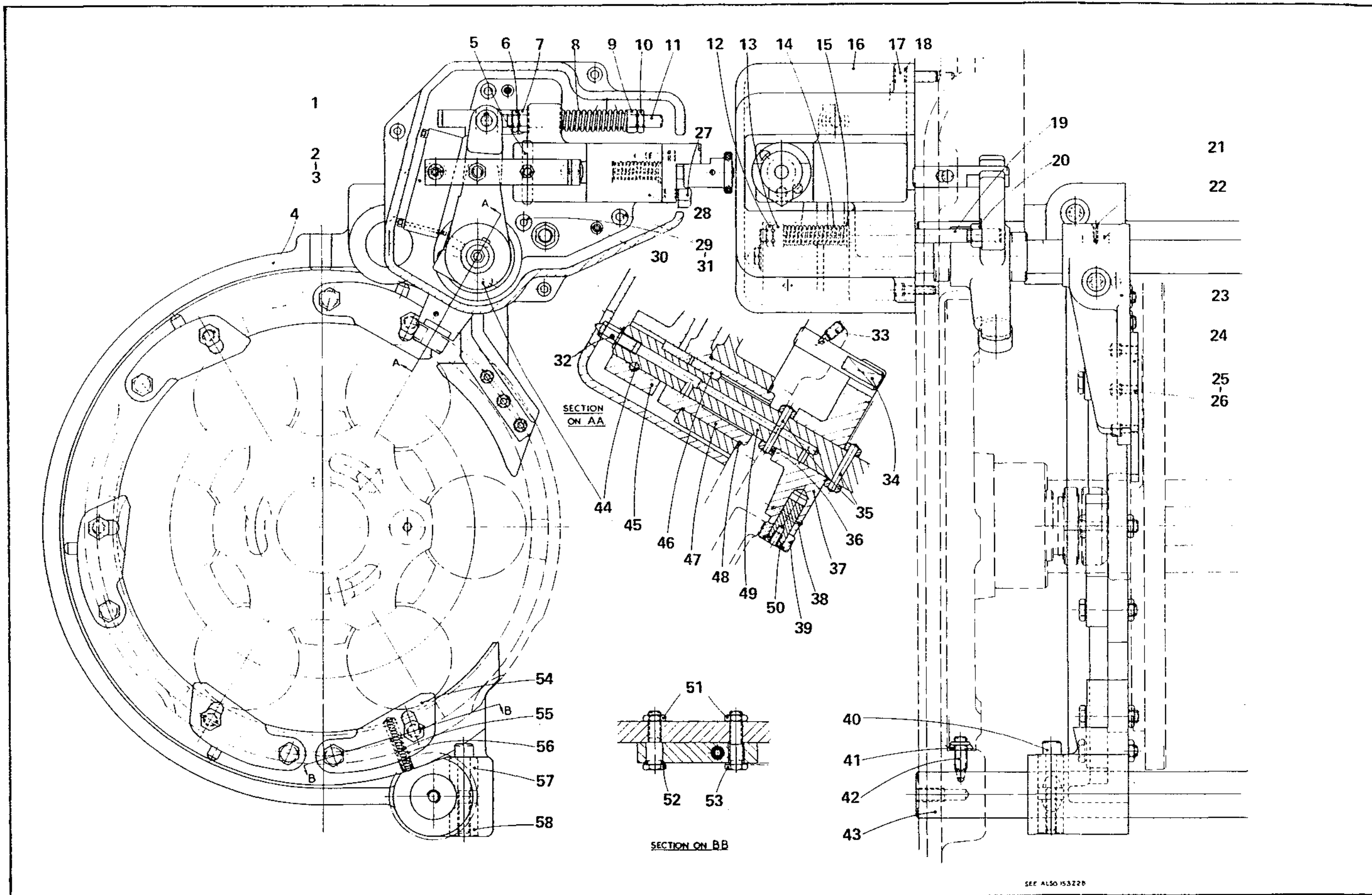
	Part No	Description
1.	153X163A	Stop screw
2.	203/06L	3/8"BSF Self locking nut
3.	253V107	Aligning plate
4.	253V171	Aligning plate 1st. station
5.	353X168C	Spring
6.	353X164A	Plunger
7.	253Y120A	Aligning plate carrier
8.	121/0824T	1/4" Squ. Tapped key 1.1/2"long
9.	156/408	4BA Hexagon socket head cap screw 1/2"long
10.	167/0632H	3/8"BSF Hexagon head set screw 2"long (hardened)
11.	128/6T	Pad bush 13/16"dia. x 1"long
12.	128/6C	Pad bush 13/16"dia. x 1"long
13.	253V121	Pusher bracket
14.	253X146	Pusher plate
15.	155/0410	1/4"BSF Socket head cap screw 5/8"long
16.	154/04	1/4" Spring lock washer
17.	128/6C	Pad bush 13/16"dia. X 1"long
18.	253X167	Bolt
19.	128/6T	Pad bush 13/16"dia. x 1"long
20.	212/1618	1/8"BSP Hexagon adaptor
21.	182/0512	5/16"BSF Hexagon socket taper point screw 3/4"long
22.	253X129	Cam roller bracket
23.	253X141	Trip shaft
24.	203/06	3/8"BSF Self locking nut
25.	183/0624	3/8"BSF Squ. head taper point screw 1.1/2"long
26.	253X139	Upper guide bar
27.	183/0520	5/16"BSF Squ. head taper point screw 1.1/4"long
28.	203/05	5/16"BSF Self locking nut
29.	253X132	Support arm
30.	155/0510	5/16"BSF Socket head cap screw 5/8"long
31.	154/05	Spring lock washer
32.	353X137	Spring rod
33.	203/06	3/8"BSF Self locking nut
34.	353X166	Pinion
35.	353X169	Bush
36.	183/0516	5/16"BSF Squ.head taper point screw 1"long
37.	203/05	5/16"BSF Self locking nut
38.	183/0624	3/8"BSF Squ. head taper point screw 1.1/2"long
39.	153X139	Upper guide bar
40.	203/06	3/8"BSF Self locking nut



253 Z 1A

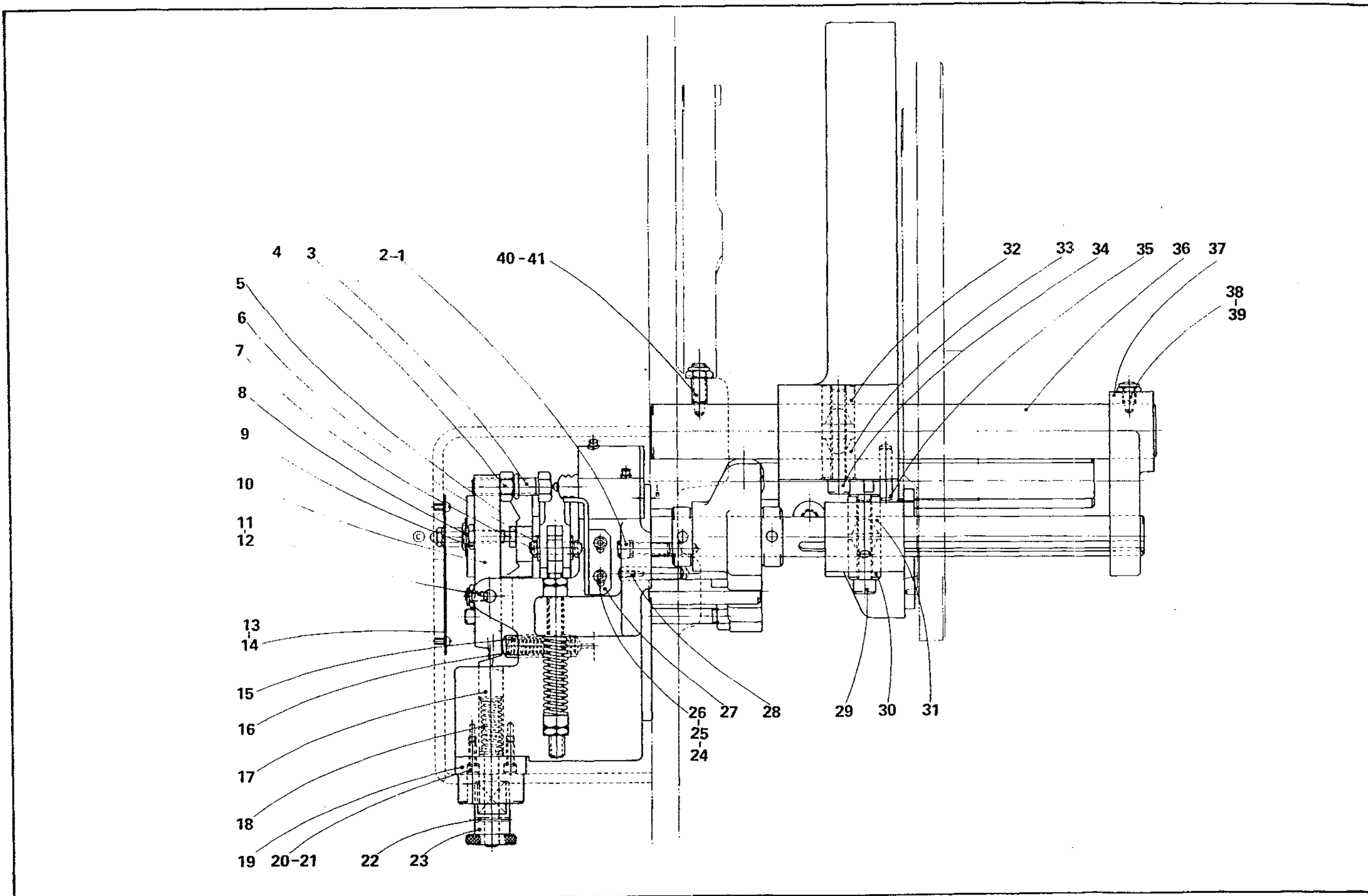
Part No.	Description
1.	4brms Burgess micro switch
2.	130/4 4BA Flat washer
3.	168/424 4BA Hexagon head set screw 1.1/2"long
4.	135Z120B Aligning disc carrier
5.	153X149 Pin
6.	173/06 3/8"BSF Hexagon locknut
7.	173/06 3/8"BSF Hexagon nut
8.	NSC 175 Morris spring
9.	173/06 3/8"BSF Hexagon nut
10.	173/06L 3/8"BSF Hexagon locknut
11.	153X134 Spring rod
12.	173/06L 3/8"BSF Hexagon locknut
13.	173/06 3/8"BSF Hexagon nut
14.	MSC 180 Morris spring
15.	130/06 3/8"dia. Flat spring
16.	153Y128A Cover
17.	155/0416 1/4"BSF Socket head cap screw 1"long
18.	154/04 1/4"dia. Spring washer
19.	153X137 Spring rod
20.	174/06 3/8"BSF Hexagon nut
21.	156/408 4BA Socket head cap screw 1/2"long
22.	121/0812T Parallel key 1/4" x 1/4" x 3/4"long
23.	153Y121B Pusher bracket
24.	153X146B Pusher plate
25.	154/04 1/4"dia. Spring washer
26.	155/0410 1/4"BSF Socket head cap screw 5/8"long
27.	153X165 Stop screw
28.	153Y122 Trip bracket
29.	155/0536 5/16"BSF Socket head cap screw 2.1/4"long
30.	141/3 11/32" Extractable taper dowel 1.1/4"long
31.	154/04 5/16"dia. Spring washer
32.	212/0818 1/8"BSP Adaptor
33.	182/0512 5/16"BSF Socket set screw 3/4"long
34.	153X153 Peg
35.	125/1624 1/4"dia. Taper pin 1.1/2"long
36.	153X133 Retaining ring
37.	153X129A Cam roller bracket
38.	125/1016 5/32"dia. Taper pin 1"long
39.	153X142 Cam roller
40.	155/0636 3/8"BSF Socket head cap screw 2.1/4"long
41.	203/06L 3/8"BSF Self locking nut
42.	182/0320 3/8"BSF Socket set screw taper point 1.1/4"long
43.	153X140A Lower guide bar
44.	125/2228 11/32"dia. Taper pin 1.3/4"long
45.	153X123A Trip lever
46.	121/0832T Parallel key 1/4" x 1/4" x 2"long
47.	153X124A Spring lever
48.	101/20 1.3/4"dia External circlip
49.	153X141 Trip shaft
50.	153X143 Roller pin
51.	173/06L 3/8"BSF Hexagon locknut
52.	153X138A Pivot screw
53.	153X163A Stop screw
54.	153X144B Aligning disc
55.	145/108 1/4" Compression spring
56.	153X164 Plunger
57.	128/6C 13/16" Pad bush 1"long
58.	128/6T 13/16" Pad bush 1"long Threaded





Automatic Stop (Front) Drg. 153 Z 2B

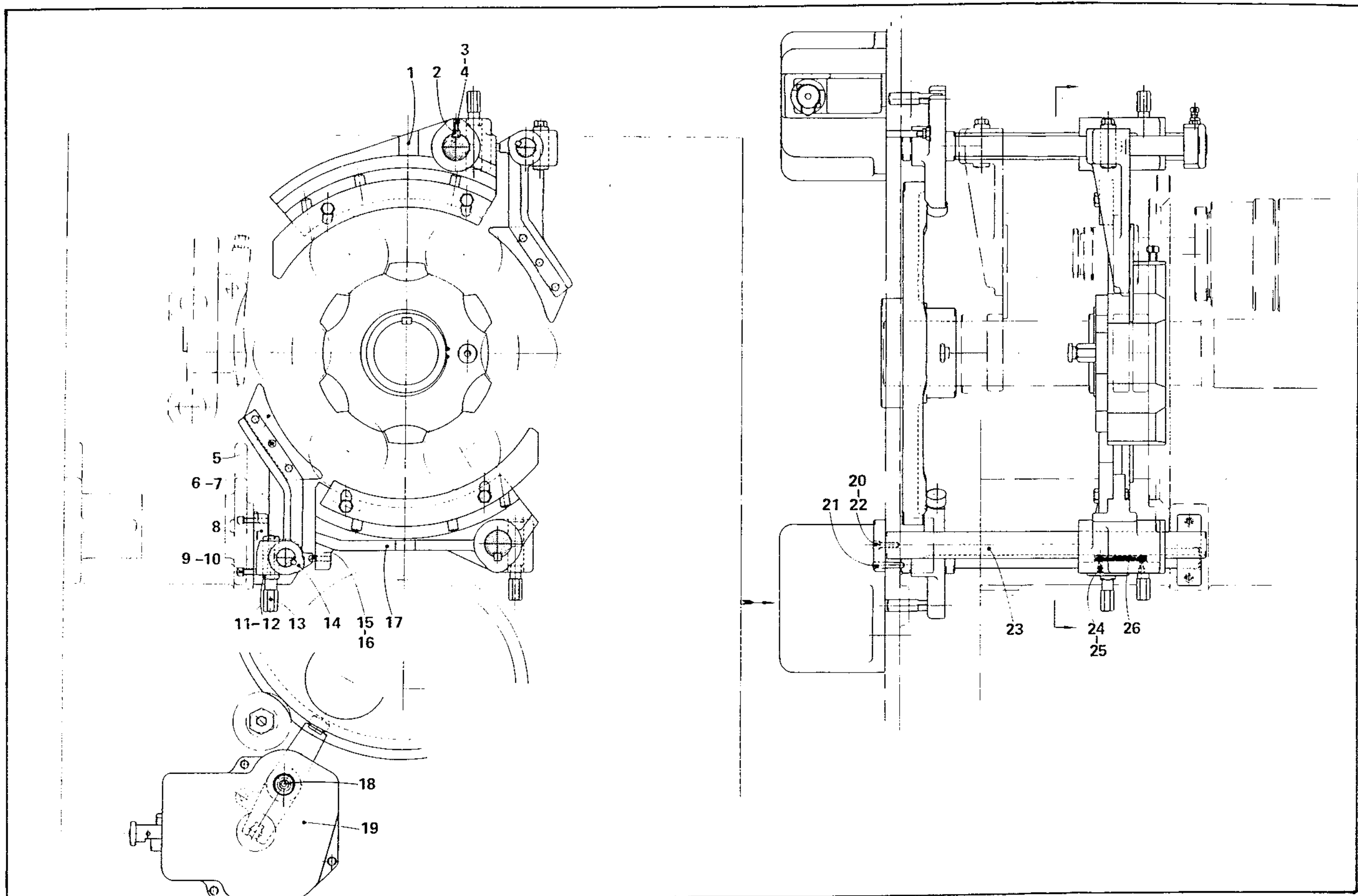
	Part No	Description
1.	155/0516	5/16"BSF Socket head cap screw 1"long
2.	154/05	5/16"dia Spring washer
3.	167/0728	7/16"BSF Hexagon head set screw 1.3/4"long
4.	203/07	7/16"BSF Self locking nut
5.	130/05	5/16"dia. Flat washer
6.	127/0405	1/16"dia. Cotter pin 3/4"long
7.	120X112	Striker pin
8.	153X166	Trip screw
9.	203/05L	5/16"BSF Self locking nut
10.	153X147A	Trip lever
11.	1760410	1/4"BSF Socket set screw cup point 5/8"long
12.	203/04	1/4"BSF Self locking nut
13.	172X143	Auto stop setting plate
14.	165/406	4BA Round head screw 3/8"long
15.	145/146	7/16" Compression spring 2.1/2"long
16.	158X124A	Plunger
17.	153X148	Trip plunger
18.	153X152	Latch spring
19.	153X135B	Latch disc
20.	156/210	2BA Socket head cap screw 5/8"long
21.	154/03	3/16"dia. Spring washer
22.	125/0814	1/8"dia. Taper pin 7/8"long
23.	153X136B	Latch knob
24.	198/6	2BA Internal shakeproof washer
25.	130/03	3/16"dia. Flat washer
26.	156/206	2BA Socket head cap screw 3/8"long
27.	153X167A	Stop
28.	141/3	11/32"dia. Taper dowel 1.1/4"long
29.	155/0632	3/8"BSF Socket head cap screw 2"long
30.	128/6C	Pad bush 13/16"dia. x 1"long
31.	128/6T	Pad bush 13/16"dia. x 1"long
32.	128/6T	Pad bush 13/16"dia. x 1"long
33.	128/6C	Pad bush 13/16"dia. x 1"long
34.	155/0636	3/8"BSF Socket head cap screw 2.1/4"long
35.	143/1020	5/16"dia. Mills pin 1.1/4"long
36.	153X139	Upper guide bar
37.	153X132	Support arm
38.	203/05L	5/16"BSF Self locking nut
39.	182/0512	5/16"BSF Socket set screw taper point 3/4"long
40.	203/06L	3/8"BSF Self locking nut
41.	182/0620	3/8"BSF Socket set screw taper point 1.1/4"long



153 Z 2B

Automatic Stop (Rear) Drg. 254 Z 1A

	Part No	Description
1.	254V123A	Aligning plate carrier
2.	122/1244	Key 3/8" x 1/4" x 2.3/4"long
3.	154/03	Spring lock washer
4.	156/208	2BA Hexagon socket head cap screw 1/2"long
5.	253X146	Pusher arm
6.	154/04	Spring lock washer
7.	155/0410	1/4"BSF Hexagon socket head cap screw 5/8"long
8.	254X126	Support block
9.	154/05	Spring lock washer
10.	155/0520	5/16"BSF Socket head cap screw 1.14"long
11.	128/6C	Pad bush 13/13"dia. 1"long
12.	128/6T	Pad bush 13/16"dia. 1"long
13.	253X167	Bolt
14.	254X121	Pusher bracket
15.	155/0510	5/16"BSF Socket head cap screw 5/8"long
16.	154/05	Spring lock washer
17.	254V124A	Aligning plate carrier (lower)
18.	254X101	Adaptor
19.	154Y128	Cover for trip bracket
20.	154/05	5/16" Spring washer
21.	125/2224	11/32"dia. Taper pin 1.1/2"long
22.	155/0516	5/16"BSF Socket head cap screw 1"long
23.	254X140	Guide bar
24.	156/208	2BA Hexagon socket head screw 1/2"long
25.	154/03	3/16" Spring washer
26.	154X127	Key



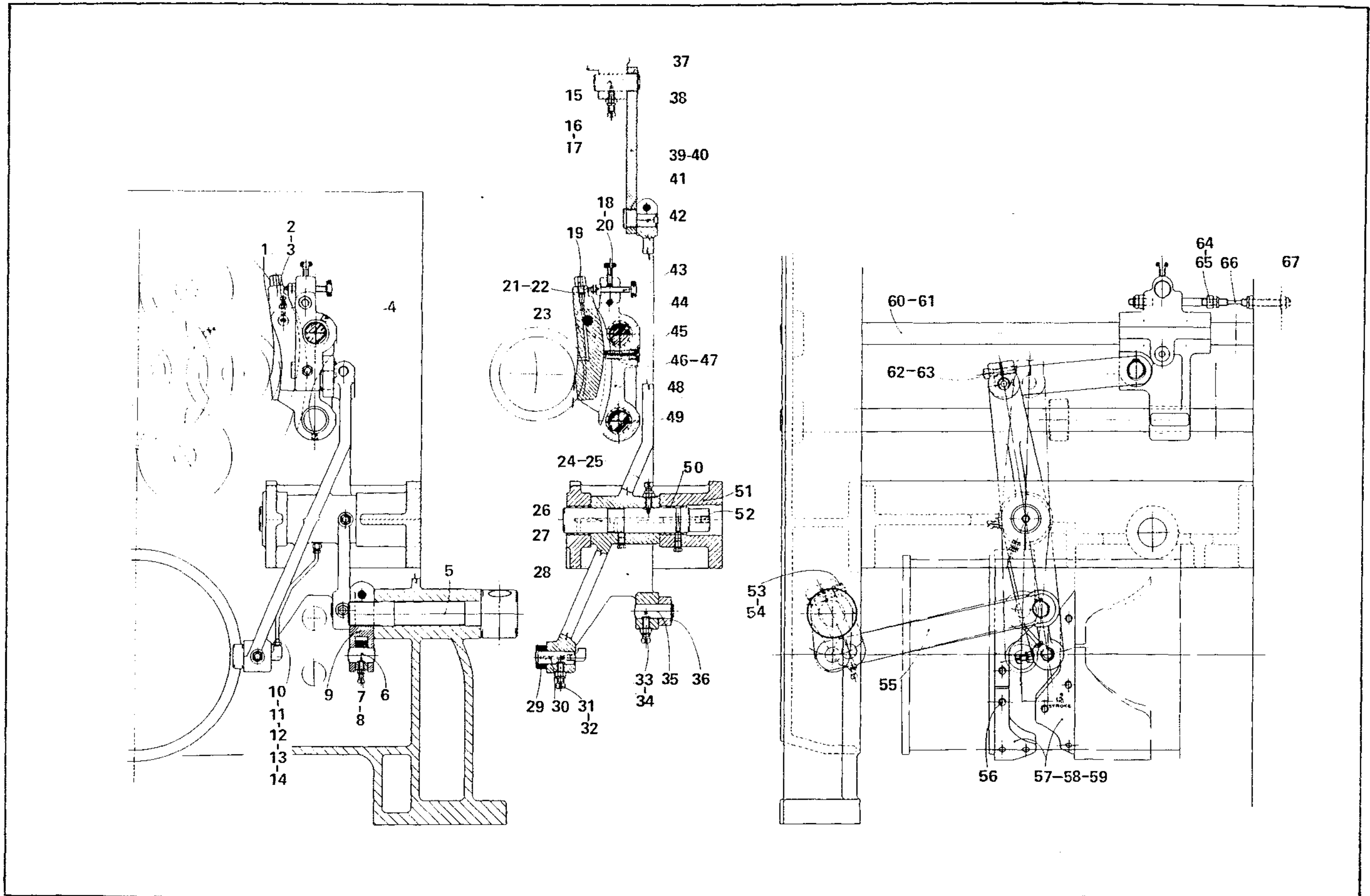
VIEW IN DIRECTION OF ARROW

254 Z 1 A

Collet Operating Mechanism (Front) Drg. 256 Z 1

Part No	Description
1.	156X110 Shoe pin
2.	203/04 1/4"BSF Self locking nut
3.	183/0416 1/4"BSF Squ. head set screw taper point 1"long
4.	194/1 1/8"BSP Socket pipe plug
5.	356V135 Shaft
6.	356X141 Link pin
7.	183/0416 1/4"BSF Squ. head set screw taper point 1"long
8.	203/04 1/4"BSF Self locking nut
9.	356X136A Hand operated lever
10.	14.75.0402 1/8"BSP 4mm Male elbow
11.	14.07.04 4mm Tubing nut
12.	14.08.04 4mm Tubing sleeve
13.	14.02.406 4mm dia. copper tube 12"long
14.	14.72.0402 1/8"BSP 4mm Straight connector
15.	156X132 Link pin
16.	183/0624 3/8"BSF Squ. head set screw taper point 1.1/2"long
17.	203/06 3/8"BSF Self locking nut
18.	153/05 Soft pad
19.	168X156 Adaptor
20.	210/04 Purefoy Adjusting screw
21.	173/06L 3/8"BSF Hexagon head locknut
22.	173/06 3/8"BSF Hexagon nut
23.	156X113 Collet operating shoe
24.	203/06 3/8"BSF Self locking nut
25.	183/0624 3/8"BSF Squ. head set screw taper point 1.1/2"long
26.	256X109A Pivot pin
27.	236/242824 Oil retaining bush 1.1/2"x 1.3/4"x 1.1/2"long
28.	256Y105A Collet operating lever
29.	158X112A Roller
30.	158X107A Cam roller pin
31.	183/0624 3/8"BSF Squ. head set screw taper point 1.1/2"long
32.	203/06 3/8"BSF Self locking nut
33.	183/0624 3/8"BSF Squ. head set screw taper point 1.1/2"long
34.	203/06 3/8"BSF Self locking nut
35.	356X140 Link pin
36.	101/9 7/8"dia. External circlip
37.	236/161810 Oil retaining bush 1"x 1.1/8"x 5/8"long
38.	101/11 1" External circlip
39.	256X104 Collet operating link (not required on sp.stop.m/c)
40.	202X224 Collet operating link (spindle stopp.machines only)
41.	236/161810 Oil retaining bush 1"x 1.1/8"x 5/8"long
42.	156X153 Eccentric pin
43.	156X130 Adjusting screw
44.	236/222624 Oil retaining bush 1.3/8"x 1.5/8"x 1.1/2"long
45.	118X141 Spring retaining plug
46.	158X124A Plunger
47.	156X128A Plunger pin
48.	156X101A Collet operating slide
49.	236222624 Oil retaining bush 1.3/8"x 1.5/8"x 1.1/2"long
50.	236/242824 Oil retaining bush 1.1/2"x 1.3/4"x 1.1/2"long
51.	258Z103A Connecting bridge
52.	194/1 1/8"BSP Socket pipe plug
53.	155/0828 1/2"BSF Socket head cap screw 1.3/4"long
54.	154/08 1/2"dia. Spring washer
55.	256Z142A Link
56.	155/0716 7/16"BSF Socket head cap screw 1"long
57.	256V171 Collet operating cam (front)

58.	256V172	Collet guard cam (front)
59.	256V	Collet closing cam (front)
60.	258V157C	Guide bar (not required Sp.stopping machines)
61.	258V156	Guide bar (Required only on Sp.stopping machines)
62.	154/07	7/16"dia. Spring washer
63.	155/0724	7/16"BSF Socket head cap screw 1.1/2"long
64.	203/07	7/16"BSF Self locking nut
65.	173/07L	7/16"BSF Hexagon nut (hardened)
66.	256X131	Stop rod (not required on Sp.Stopp.Machine)
67.	202X225	Stop rod (required only on SP. Stopp.Machines)



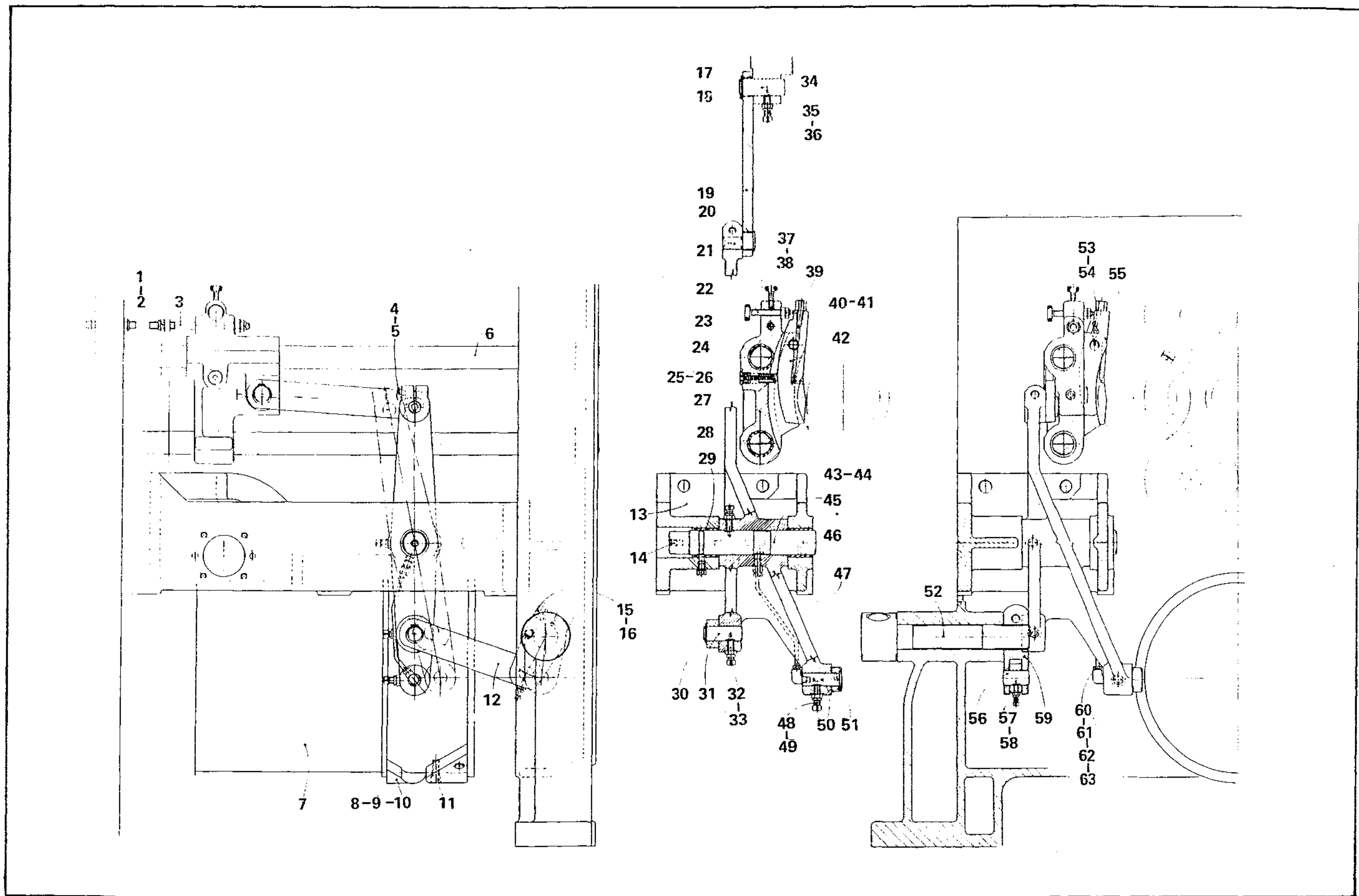


Collet Operating Mechanism (Rear) Drg. 257 Z 1

Part No	Description
1.	203/07 7/16"BSF Self locking hexagon nut
2.	173/07F 7/16"BSF Hexagon nut (hardened)
3.	256X131 Stop rod
4.	154/07 7/16"dia. Spring washer
5.	155/0724 7/16"BSF Socket head cap screw 1.1/2"long
6.	258X157C Guide bar
7.	257Y102A Cam drum
8.	257V171 Collet opening cam (rear)
9.	257V172 Collet guard cam (rear)
10.	257V173 Collet closing cam (rear)
11.	155/0716 7/16"BSF Hexagon socket cap screw 1"long
12.	357X142A Link
13.	259Z103B Connecting bridge
14.	194/1 1/8"BSP Pipe plug
15.	155/0828 1/2"BSF Hexagon socket cap screw 1.3/4"long
16.	154/08 1/2"dia. Spring lock washer
17.	236/161810 Oil retaining bush
18.	101/11 1"dia. external circlip
19.	257X104 Collet operating link
20.	236/161810 Oil retaining bush
21.	156X133 Eccentric pin
22.	156X130 Adjusting screw
23.	236/222624 Oil retaining bush
24.	118X141 Spring retaining plug
25.	156X128A Plunger spring
26.	158X124A Plunger
27.	257Z101A Collet operating slide (rear)
28.	236222624 OIL retaining bush
29.	236/242824 Oil retaining bush
30.	101/9 External circlip
31.	356X140 Link pin
32.	183/0624 3/8"BSF Squ. head set screw taper point 1.1/2"long
33.	203/06 3/8"BSF Self locking nut
34.	156X132 Link pin
35.	183/0624 3/8"BSF Squ. head set screw taper point 1.1/2"long
36.	203/06 3/8"BSF Self locking nut
37.	153/05 Soft pad
38.	210/40 Purefoy screw
39.	168X156 Adaptor
40.	173/06 3/8"BSF Hexagon nut
41.	173/06L 3/8"BSF Hexagon locknut
42.	156X113 Collet operating shoe
43.	183/0624 3/8"BSF Squ. head set screw taper point 1.1/2"long
44.	203/06 3/8"BSF Self locking nut
45.	256X109A Pivot pin
46.	236/242824 Oil retaining bush
47.	256Y105A Collet operating lever
48.	183/0624 3/8"BSF Squ. head set screw taper point 1.1/2"long
49.	203/06 3/"BSF Self locking nut
50.	158X107A Cam roller pin
51.	158X112A Roller
52.	256V135 Shaft
53.	203/04 1/4"BSF Self locking nut
54.	183/0416 1/4"BSF Squ. head set screw taper point 1"long
55.	156X110 Shoe pin
56.	356X141 Link pin
57.	183/0416 1/4"BSF Squ. head set screw taper point 1"long

58.	203/04	1/4"BSF Self locking nut
59.	356X136A	Hand operated lever
60.	14.75.0402	1/8"BSP 4mmMale elbow
61.	14.07.04	4mm Tubing nut
62.	14.08.04	4mm Tubing sleeve
63.	14.02.406	4mm Copper tube 12"long

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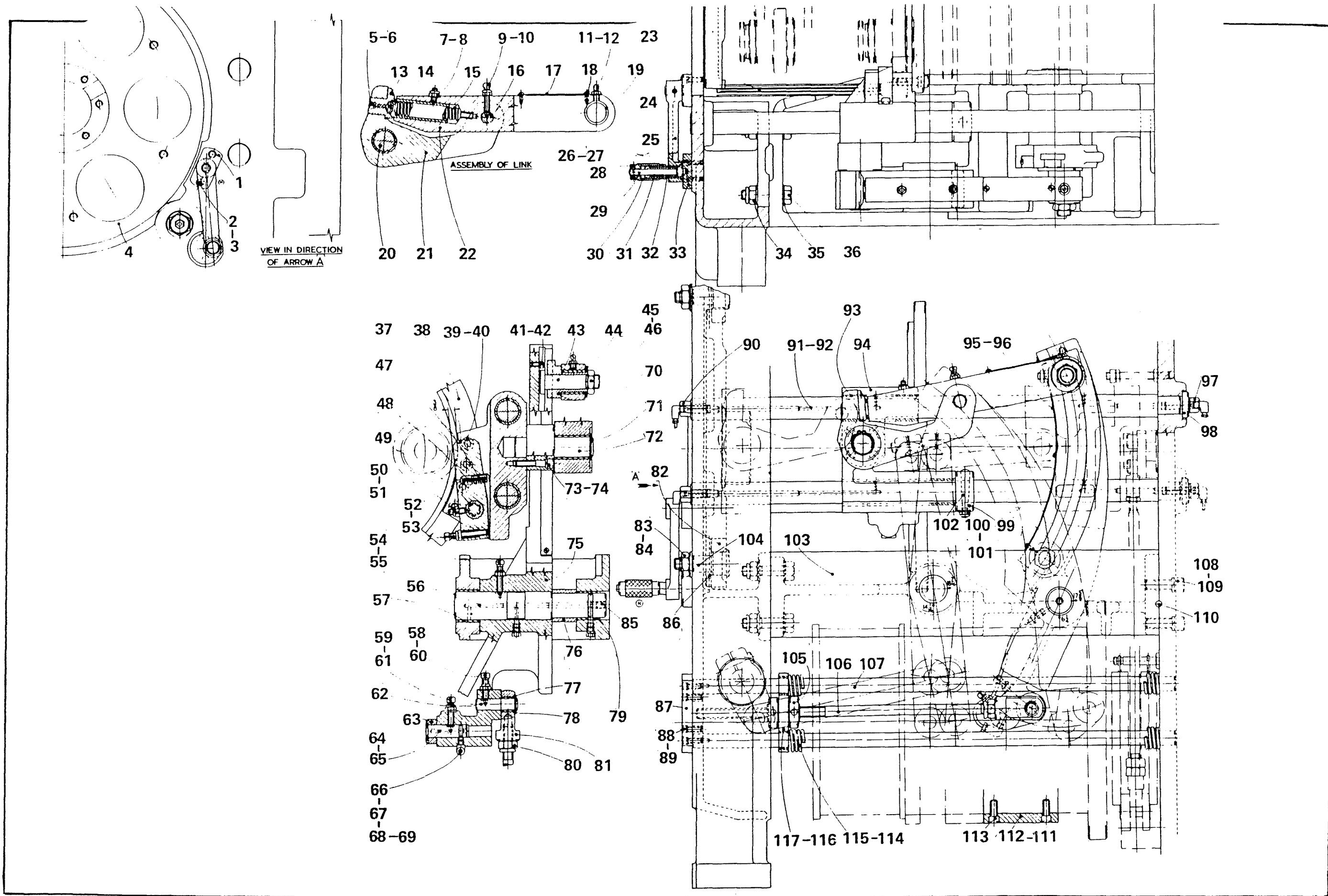


257 Z 1

Bar Feed Mechanism Drg. 258 Z 1

Part No	Description
1.	158X133A Bearing block
2.	155/0516 5/16"BSF Hexagon socket head cap screw 1"long
3.	154/05 5/16"dia Spring lock washer
4.	258Y150 Driving disc
5.	155/0416 1/4"BSF Hexagon socket head cap screw 1"long
6.	154/04 1/4"dia. spring lock washer
7.	203/5 5/16"BSF Self locking nut
8.	178/0516 5/16"BSF Hexagon socket set screw half dog 1"long
9.	183/0528 5/16"BSF Socket head screw taper point 1.3/4"long
10.	203/05 5/16"BSF Self locking nut
11.	210/2525 Yellow indicator washer
12.	212/4518 1/8"BSP Nipple 45Degree Angle
13.	358X169 Plunger seating
14.	358X168 Plunger
15.	358X170 Spring
16.	358X167 Pin
17.	172X107B Instruction plate
18.	165/206 2BA Slotted round head screw 3/8"long
19.	236/202424 Oil retaining bush
20.	236/202416 Oil retaining bush
21.	358Y166 Link body
22.	358V119 Bar feed link
23.	158X126B Splined shaft
24.	125/1620 1/4"dia. Plain taper pin 1.1/4"long
25.	158X132B Lever
26.	154/04 1/4"dia. Spring washer
27.	155/0414 1/4"BSF Socket head cap screw 7/8"long
28.	125/0814 1/8"dia. taper pin 7/8"long
29.	158X159 Plunger
30.	158X156 Plunger knob
31.	MSC 155 Morris spring 1/2"o/dia. 2.3/4"long
32.	158X154 Spring housing
33.	158X177B Plate
34.	203/10 5/8"BSF Self locking nut
35.	130/10 5/8" Plain washer
36.	170/1044 5/8"BSF Hexagon head bolt 2.3/4"long
37.	158X105C Bar feed shoe
38.	258Y158A Thrust ring (Not required on 1.3/8"-6D machines)
39.	154/08 1/2"dia. Spring washer
40.	155/0824 1/2"BSF Socket head cap screw 1.1/2"long
41.	154/04 1/4"dia.Spring washer
42.	155/0408 1/4"BSF Socket head cap screw 1/2"long
43.	368X108 Pivot bolt
44.	341X116 Slotted washer
45.	198/22 7/8"dia. lock washer
46.	173/14LH 7/8"BSF Hexagon locknut (hardened)
47.	158X124A Plunger
48.	158X179 Spring
49.	158X140 Splined shaft
50.	182/0620 3/8"BSF Socket set screw taper point 1.1/4"long
51.	203/06 3/8"BSF Self locking nut
52.	203/06L 3/8"BSF Self locking lock nut
53.	188/0636 3/8"BSF Squ.head set screw 2.1/4"long
54.	183/0632 3/8"BSF Squ.head set screw taper point 2"long
55.	203/06 3/8"BSF Self locking nut
56.	258X114A Pivot pin
57.	236/283224 Oil retaining bush 1.3/4"x 2"x 1.1/2"long

58.	183/0640	3/8"BSF Squ. head set screw 2.1/2"long
59.	203/06	3/8"BSF Self locking nut
60.	203/06	3/8"BSF Self locking nut
61.	183/0628	3/8"BSF Squ.head set screw taper point 1.3/4"long
62.	258X160	link pin
63.	158X112A	Roller
64.	176/0404	1/4"BSF Socket set screw 1/4"long
65.	258X107	Roller pin
66.	14.75.0402	1/8"BSP 4mm Male elbow
67.	14.07.04	4mm Tubing nut
68.	14.08.04	4mm Tubing sleeve
69.	14.02.406	4mm Copper tube 14"long
70.	358V127	Link pivot
71.	101/15	1.1/4" External circlip
72.	258X123	Link pivot
73.	155/0632	3/8"BSF Socket head cap screw 2"long
74.	154/06	3/8"dia Spring washer
75.	258Z104B	Bar feed lever
76.	258X115	Pivot pin spacer (not required on 1.3/8"-6D M/Cs)
77.	236/121414	Oil retaining bush 3/4"x 7/8"x 7/8"long
78.	101/6	3/4" External circlip
79.	236/242824	Oil retaining bush 1.1/2"x 1.3/4"x 1.1/2"long
80.	203/10	5/8"BSF Self locking nut
81.	599AX108	Pusher connection
82.	6307/2RS	R.H.P.Sealed bearing
83.	173/14HL	7/8"BSF Hexagon locknut (hardened)
84.	130/14	7/8"dia. Plain washer
85.	194/1	1/8"BSP Pipe plug
86.	130/16	1"dia. Plain washer
87.	158X155	Retaining plate
88.	155/0516	5/16"BSF Socket head cap screw 1"long
89.	154/05	5/16"dia Spring washer
90.	268X205	Adaptor
91.	258X157C	Guide bar
92.	258V156	Guide bar (1.3/4"-6S Machines only)
93.	236/222624	Oil retaining bush 1.3/8"x 1.5/8"x 1.1/2"long
94.	258Z101A	Bar feed slide
95.	165/206	2BA Round head screw 3/8"long
96.	258V109	Bar feed scale
97.	268X204	Adaptor
98.	158X117A	Guide washer
99.	258X162	Stop collar
100.	203/06L	3/8"BSF Self locking locknut
101.	130/06	3/8"dia. Plain washer
102.	158X163	Special taper pin
103.	258Z103A	Connecting bridge
104.	358X164B	Eccentric roller pin
105.	158X178A	Locknut
106.	258X151	Spring stud
107.	258X152	Spring guide
108.	154/10	5/8"dia. Spring washer
109.	155/1028	5/8"BSF Socket head cap screw 1.3/4"long
110.	126/1236	3/8"dia. Parallel Hardened dowel
111.	258Y172	Bar feed return cam
112.	258Y171	Bar feed cam (forward)
113.	155/0716	7/16"BSF Socket head cap screw 1"long
114.	259X161	Bar feed spring (required on 1.3/8"-6D M/Cs only)
115.	258X161	Bar feed spring (required on 1.3/8",1.3/4"-6 M/Cs)
116.	258X181	Bush
117.	158X153	Pressure plate



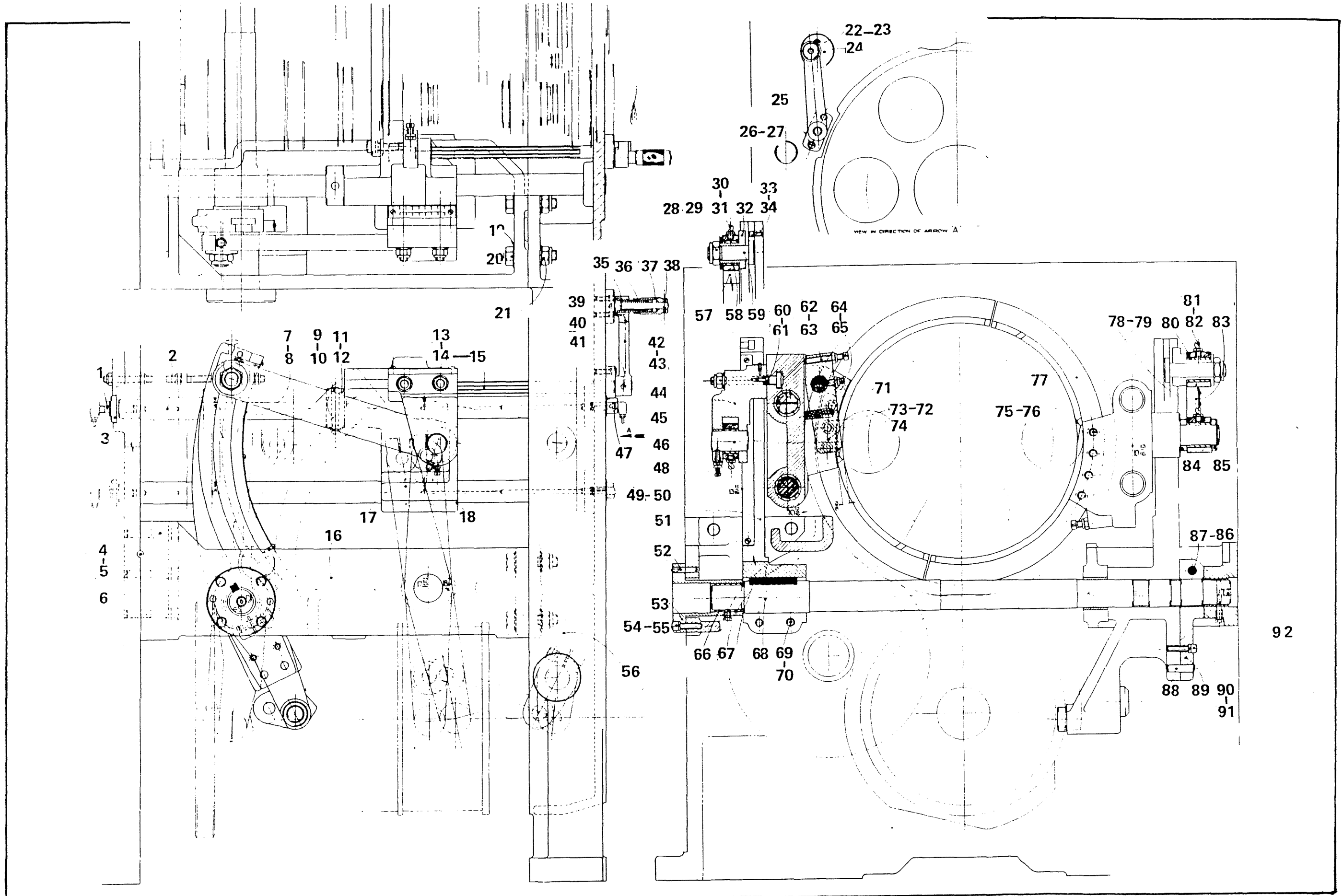
258 Z 1

Bar feed Mechanism (Rear) Drg. 259 Z 1

Part No	Description
1.	268X204 Adaptor
2.	258X157A Guide bar
3.	158X117A Guide washer
4.	155/0844 1/2"BSF hex. Socket head cap screw 1/2"long
5.	154/08 Spring lock washer
6.	126/1236 3/8"dia. Parallel dowel 2.3/4"long
7.	165/206 2BA Slotted round head screw 3/8"long
8.	258V109 Bar feed scale
9.	203/06L 3/8"BSF Self locking nut
10.	158X163 Special taper pin
11.	130/06 Plain washer
12.	258X162 Stop collar
13.	165/206 2BA Slotted round head screw 3/8"long
14.	259X109 Scale
15.	158X126B Splined shaft
16.	259Z103B Connecting bridge
17.	259Z101A Rear bar feed slide
18.	236/222624 Oil retaining bush
19.	130/10 Plain washer
20.	170/1044 5/8"BSF Hexagon head bolt 2.3/4"long
21.	203/10 5/8"BSF Self locking nut
22.	155/0414 1/4"BSF Hex. socket head cap screw 7/8"long
23.	154/04 Spring lock washer
24.	158X177A Plate
25.	158X133A Bearing block
26.	154/04 Spring lock washer
27.	155/0516 1/4"BSF Socket head cap screw 1"long
28.	203/14L 7/8"BSF Self locking locknut
29.	341X116 Slotted washer
30.	210/2525 Yellow indicator washer
31.	212/4518 1/8"BSP Nipple 45degree angle
32.	259V127 Link pivot
33.	154/04 Spring lock washer
34.	155/0408 1/4"BSF Hex. socket head cap screw 1/2"long
35.	158x154 Spring housing
36.	MSC 155 Morris comp. spring 7/16"o/dia.x 2"long
37.	158X156 Plunger knob
38.	125/0814 1/8"dia.Plain taper pin 7/8"long
39.	158/159 Plunger
40.	158X132B Lever
41.	125/1620 1/4"dia. Plain taper pin 1.1/4"long
42.	130/08 Plain washer
43.	203/08 1/2"BSF Self locking locknut
44.	259X118 Tee bolt
45.	259V115 Pivot bracket
46.	236/202416 Oil retaining bush
47.	268X205 Adaptor
48.	259X117 Link pin
49.	203/04 1/4"BSF Self locking nut
50.	183/0420 1/4"BSF Squ. head set screw 1.1/4"long
51.	259Y104B Bar feed lever
52.	141/2624 13/32"dia. Taper dowel 1.1/2"long
53.	259V120A Bearing housing
54.	154/06 3/8"dia. Spring washer
55.	155/0624 3/8"BSF Socket head cap screw 1.1/2"long
56.	222Z102B End bracket
57.	259X119 Link

58.	236/202416	Oil retaining bush 1.1/4"x 1.1/2"x 1"long
59.	259X108	Pivot bolt
60.	156/208	2BA Socket head cap screw 1/2"long
61.	259X122	Tenon
62.	203/06L	3/8"BSF Self locking locknut
63.	188/0636	3/8"BSF Squ. head set screw 2.1/4"long
64.	203/06	3/8"BSF Self locking nut
65.	182/0620	3/8"BSF Hex. socket screw taper point 1.1/4"long
66.	236/242828	Oil retaining bush
67.	121/1648T	Parallel key 1/2"Squ.x 3"long
68.	259Y114A	Feed lever shaft
69.	155/0828	1/2"BSF Hex. socket head cap screw 1.3/4"long
70.	154/08	Spring lock washer
71.	158X140	Splined bush
72.	158X179	Spring
73.	158X124A	Plunger
74.	158X105C	Bar feed shoe
75.	154/08	Spring lock washer
76.	155/0824	1/2"BSF Hex. socket head cap screw 1.1/2"long
77.	259Y116B	Thrust ring
78.	172X107A	Instruction plate
79.	165/206	2BA Round head set screw 3/8"long
80.	236/202424	Oil retaining bush
81.	210/2525	Yellow indicator washer
82.	212/4518	1/8"BSP Nipple
83.	258X198A	Link
84.	258X138	Spacer
85.	258X139	Spacer
86.	154/08	Spring lock washer
87.	155/0828	1/2"BSF Hex. socket head cap screw 1.3/4"long
88.	125/3224	1/2" Taper pin 1.1/2"long
89.	259V105A	Coupling lever
90.	155/0624	3/8"BSF Hex. socket head cap screw 1.1/2"long
91.	154/06	Spring lock washer
92.	194/1	1/8"BSP Pipe plug

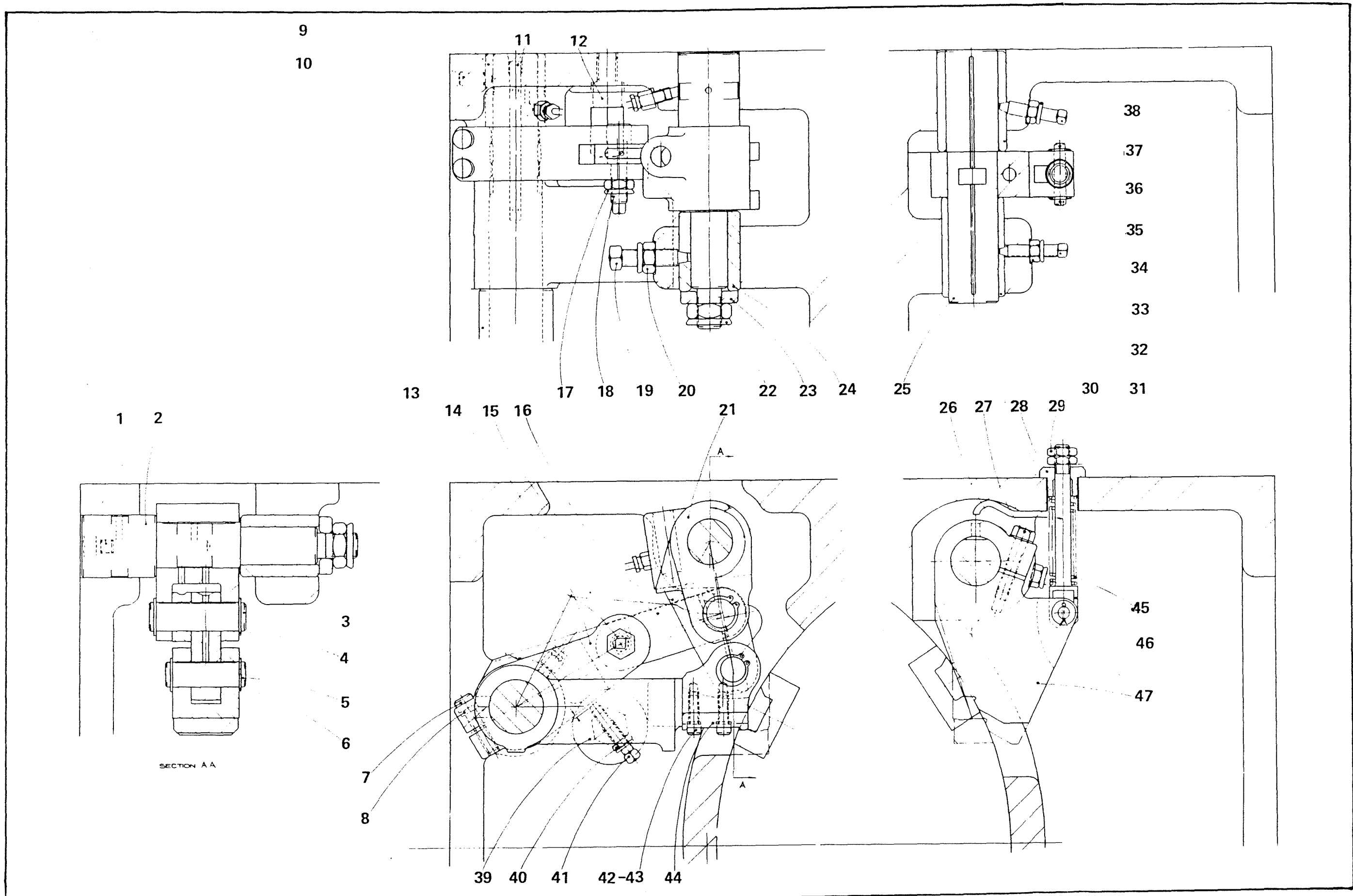




259 Z 1

Drum Locking Drg. 261 Z 1

	Part No	Description
1.	194/1	1/8"BSP Socket pipe plug
2.	261V128	Toggle lever eccentric shaft
3.	261X123	Pin
4.	101/9	7/8"dia. external circlip
5.	261X125	Pin
6.	101/6	3/4"dia. External circlip
7.	155/0624	3/8"BSF Socket head cap screw 1.1/2"long
8.	154/06	3/8"dia. Spring washer
9.	261X148	Bush
10.	182/0616	3/8"BSF Socket set screw taper point 1"long
11.	194/1	1/8"BSP Socket pipe plug
12.	361X149	Stop anchor
13.	261X129	Spacer
14.	261X103A	Operating lever
15.	261X146	Operating link
16.	261X105	Toggle lever
17.	203/08	1/2"BSF Self locking nut
18.	261X151	Eccentric pin
19.	183/0832	1/2"BSF Taper point set screw 2"long
20.	203/08	1/2"BSF Self locking nut
21.	261V102A	Toggle lever
22.	203/12L	3/4"BSF Self locking nut (thin)
23.	531X129	Locking washer
24.	261X130	Locking sleeve
25.	561X109	Latch pin
26.	198/13	3/8"dia. Shakeproof washer (internal teeth)
27.	167/0628	3/8"BSF Hex. head bolt 1.3/4"long
28.	561X114A	Spring retaining plug
29.	173/08L	1/2"BSF Hex. locknut
30.	561X110	Bush
31.	203/06	3/8"BSF Self locking nut
32.	183/0628	3/8"BSF Taper point set screw 1.3/4"long
33.	127/0406	1/16"dia. split Cotter pin 3/4"long
34.	561X142	Pin
35.	130/06	3/8"dia, washer
36.	561X111A	Bush
37.	183/0628	3/8"BSF Taper point set screw
38.	203/06	3/8"BSF Self locking nut
39.	261Y104A	Lower toggle lever
40.	203/06L	3/8"BSF Self locking nut (thin)
41.	188/0632	3/8"BSF Squ. head set screw 2"long
42.	154/05	5/16"dia Spring washer
43.	155/0514	5/16"BSF Socket head cap screw 7/8"long
44.	261X131	Drum locking pad
45.	MSC 190	Morris stock spring
46.	561X141	Retaining rod
47.	261V108	Drum latch

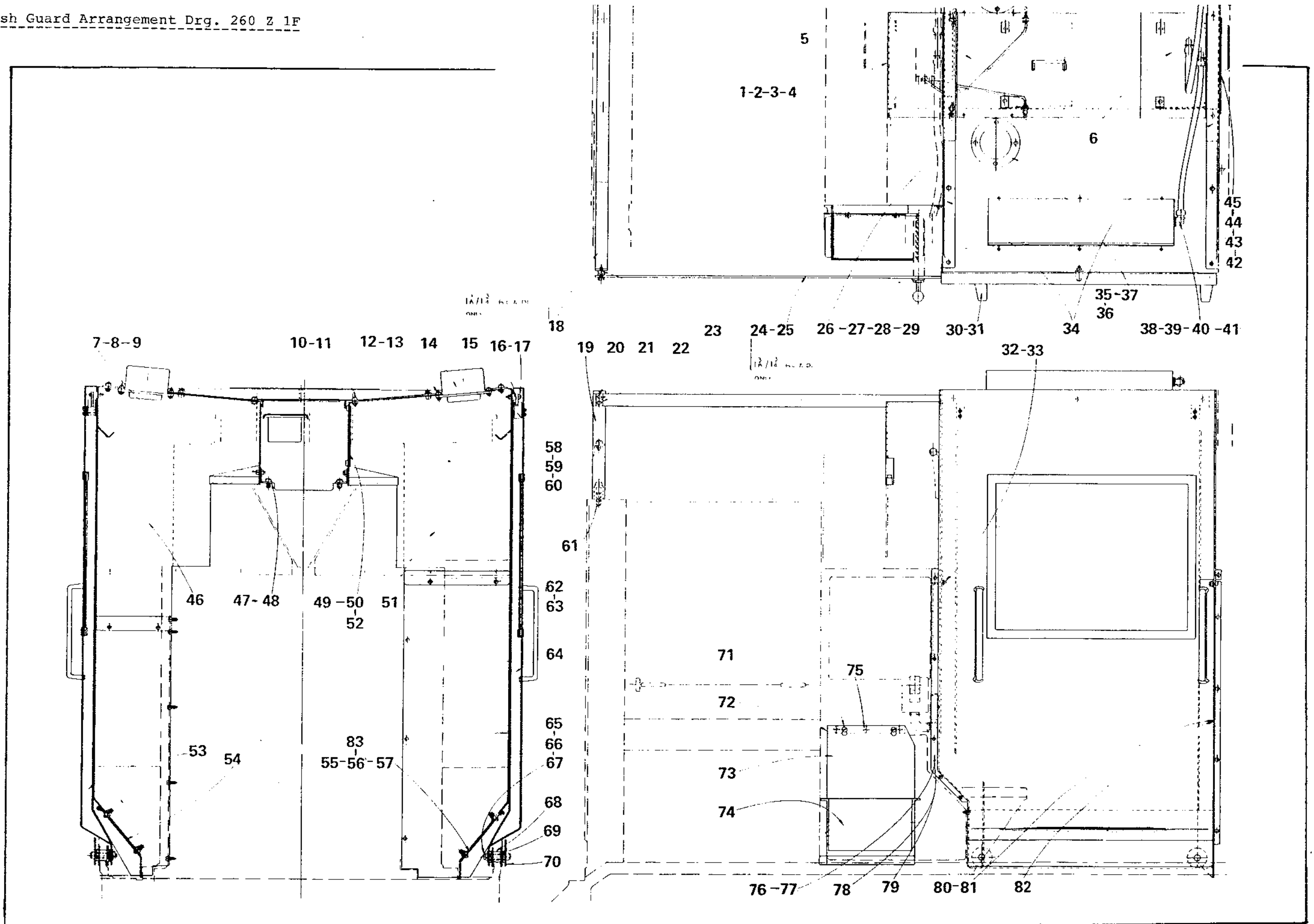


261 Z 1

Splash Guards Arrangement Drg. 260 Z 1F

	Part No	Description
1.	130/04	1/4"dia. Flat washer
2.	173/04	1/4"BSF Hex. locknut
3.	167/0408	1/4"BSF Hex. head set screw 1/2"long
4.	264Y269	Beam end cover
5.	264Y268	Beam cover plate
6.	264V270	Beam cover plate
7.	155/0612	3/8"BSF Socket head cap screw 3/4"long
8.	203/06	3/8"BSF Self locking nut
9.	130/06	3/8"dia. Flat washer
10.	203/03	3/8"BSF Self locking nut
11.	155/0612	3/8"BSF Socket head cap screw 3/4"long
12.	203/04	1/4"BSF Self locking nut
13.	155/0412	3/8"BSF Socket head cap screw 3/4"long
14.	264Y212	Fluorescent lamp
15.	264X199	Rail spacer
16.	203/05	5/16"BSF Self locking nut
17.	155/0520	5/16"BSF Socket head cap screw 1.1/4"long
18.	260Z191	Rail support
19.	264Z197	Rail support
20.	155/0520	5/16"BSF Socket head cap screw 1.1/4"long
21.	264X200	Rail stop
22.	155/0508	5/16"BSF Socket head cap screw 1/2"long
23.	264X199	Rail spacer
24.	260X190	Rail
25.	264X198	Rail
26.	14.14.04	4mm Bulk head connector
27.	14.15.12	12mm Locknut
28.	14.08.04	4mm Tubing sleeve
29.	14.07.04	4mm Tubing nut
30.	-	1/4"Whit.Hexagon head screw 3/4"long
31.	264V211	Handle
32.	20305	5/16"BSF Self locking nut
33.	155/0512	5/16"BSF Socket head cap screw 3/4"long
34.	264Y195	Hood support (Long)
35.	155/0410	1/4"BSF Socket head cap screw 5/8"long
36.	203/04	1/4"BSF Self locking nut
37.	264V120	Blanking plate
38.	15.04.1690	16mm 90degree Tubing connector
39.	11.03.09	16mm Conduit seal
40.	15.02.1216	16mm Conduit locknut
41.	347/1025	5/8"dia. Anaconda 25"long
42.	130/04	1/4"dia. Flat washer
43.	173/04	1/4" BSF Hex. nut
44.	167/0408	1/4"BSF Hex head set screw 1/2"long
45.	264V271	Beam end cover
46.	264Z19C	Rear splash guard hood
47.	155/0612	3/8"BSF Socket head cap screw 3/4"long
48.	264X253	Bracket
49.	155/0410	1/4"BSF Socket head cap screw 5/8"long
50.	264X254	Cover plate
51.	264Z193C	Front splash guard hood
52.	264X255A	Gasket
53.	264Z203A	Rear splash guard door
54.	264V252B	Rear tray
55.	203/05	5/16"BSF Self locking nut
56.	155/0512	5/16"BSF Socket head cap screw 3/4"long
57.	264X251B	Gasket

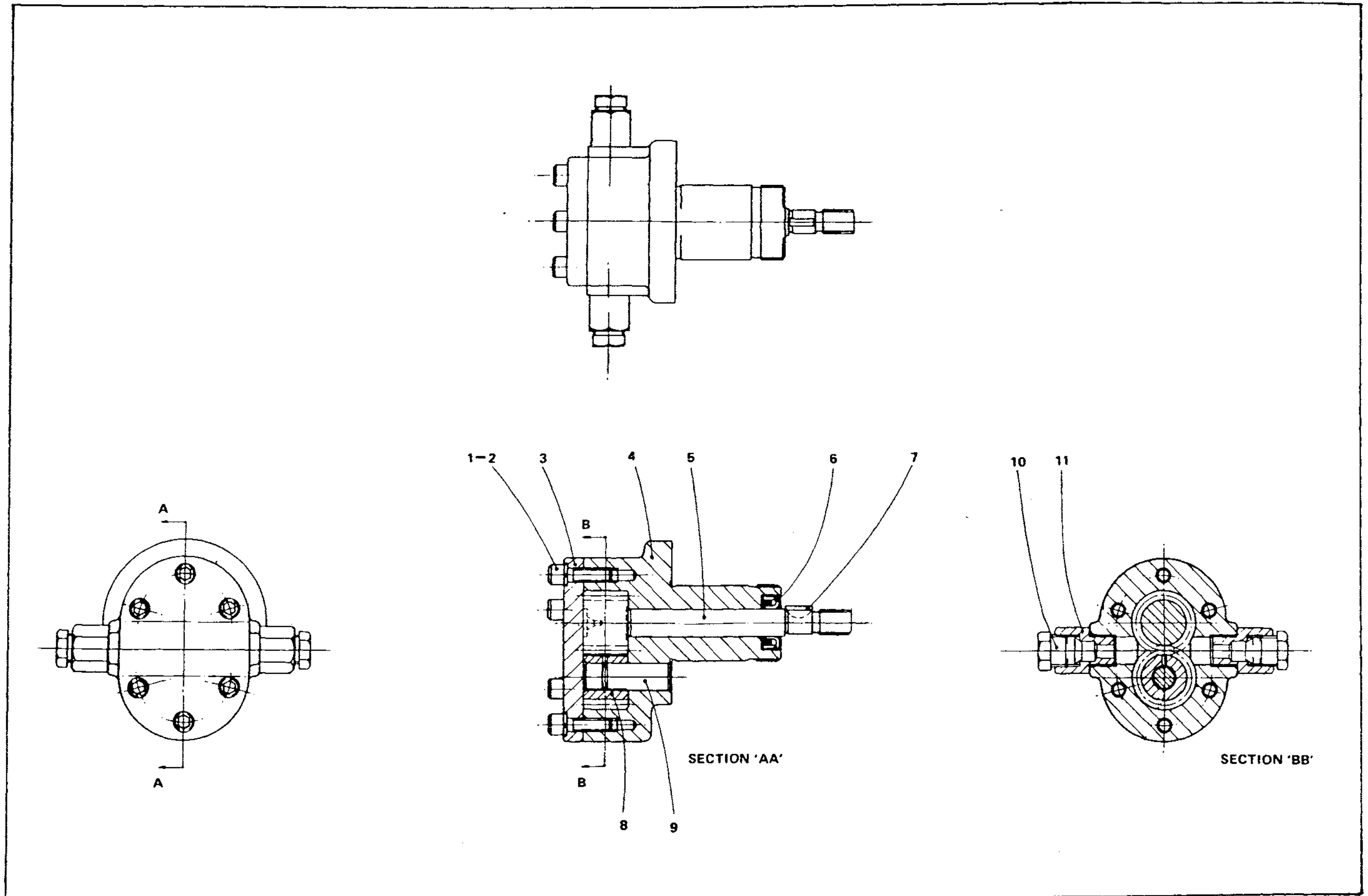
58.	264X201	Rail guide
59.	160/0416	1/4"BSF Socket dome head screw 1"long
60.	130/04	1/4"dia. Flat washer
61.	155/0840	1/2"BSF Socket head cap screw
62.	155/0512	5/16"BSF Socket head cap screw 3/4"long
63.	203/05	5/16"BSF Self locking nut
64.	264Z202A	Front splash guard doocr
65.	130/12	3/4"dia. Flat washer
66.	203/08	1/2"BSF Self locking nut
67.	155/0844	1/2"BSF Socket head cap screw 2.3/4"long
68.	264X204A	Splash guard roller
69.	264X205	Roller bush
70.	264X256	Roller guard
71.	04.17.0830	8mm Pan head screw 30mm long
72.	264X263	Support bar
73.	264Y261	Work basket support
74.	264Y260	Work basket
75.	155/0624	3/8"BSF Socket head cap screw 1.1/2"long
76.	155/0512	5/16"BSF Socket head cap screw 3/4"long
77.	264Z265	Rear drum housing blinker guard
78.	264Z264	Front drum housing blinker guard
79.	155/0512	5/16"BSF Socket head cap screw 3/4"long
80.	155/0512	5/15"BSF Socket head cap screw 3/4"long
81.	264Y267	Rear main drive housing guard
82.	264Y266	Front main drive housing guard
83.	130/05	5/16"dia.Washer



260 Z 1F

Lubrication Pump Drg. 168 Z 1B

	Part No	Description
1.	154/04	1/4"dia. Spring lock washer
2.	155/0414	1/4"BSF Socket head cap screw
3.	168X103A	Pump end plate
4.	168Y101B	Pump body
5.	168X109A	Pump gear shaft
6.	10016	Superfect oil seal
7.	123/30	Woodruff key 1/2"dia. 1/8"wide
8.	168X111A	Pump gear
9.	168X138A	Gear pin
10.	209/6	Plug
11.	218/19	Male adaptor

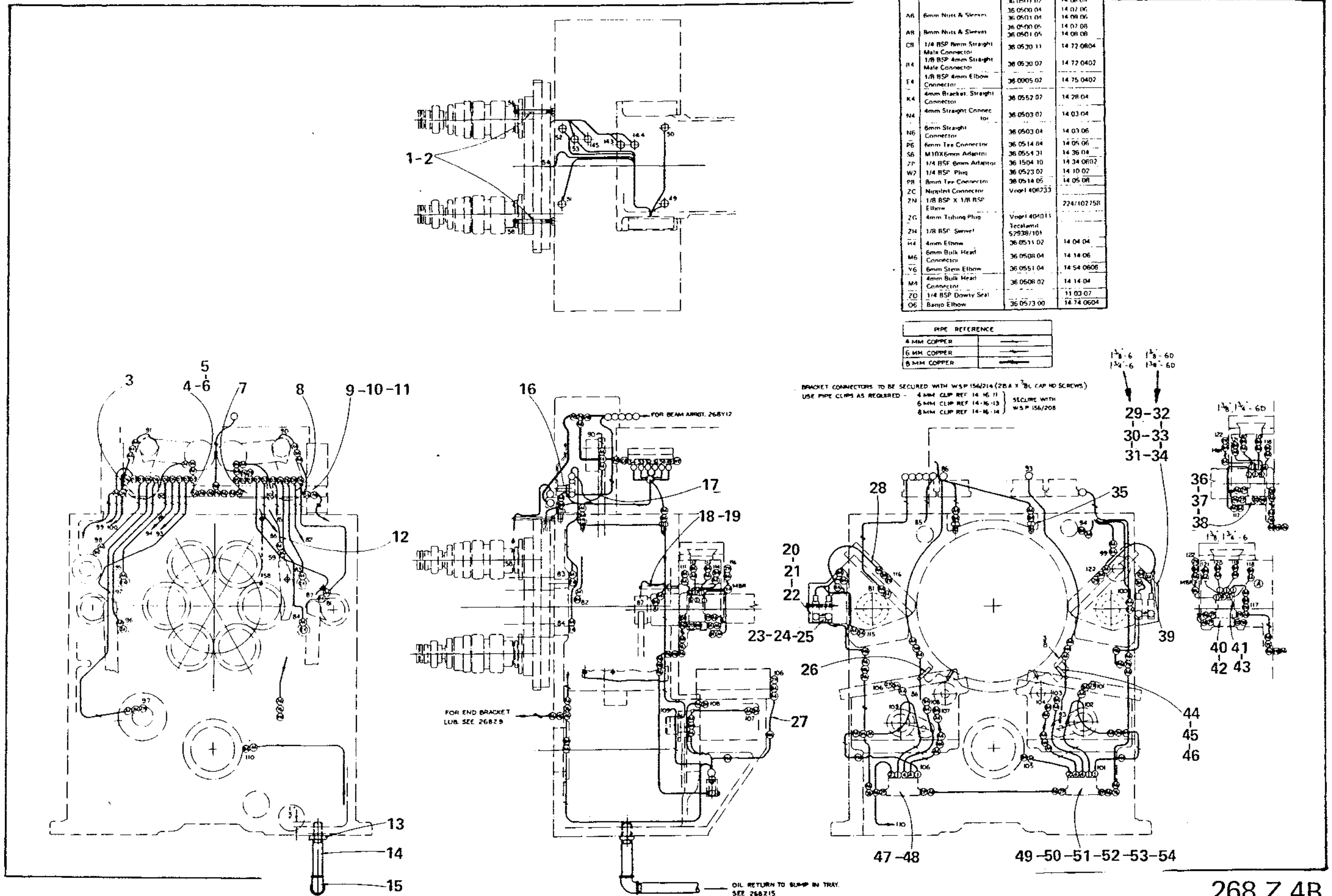


168 Z 1B



Lubrication Pipes (Drum Housing) Drg. 268 Z 4B

Part No	Description
1.	173/06 3/8"BSF Hex. nut
2.	568X187 Pipe support
3.	345/22112 Vogel distributor
4.	345/11122 Vogel distributor
5.	203/2 2BA Self locking nut
6.	156/214 2BA Socket head cap screw 7/8"long
7.	345/11111 Vogel distributor
8.	345/22222 Vogel distributor
9.	268X185A Strap
10.	155/0428 1/4"BSF Socket head cap screw 1.3/4"long
11.	203/04 1/4"BSF Self locking nut
12.	14.79.040500 4mm Metal braided flexible hose
13.	361/2212 3/4"BSP Hex. locknut
14.	360/12/57/C/18 3/4"BSP Pipe 7.1/8"long
15.	361/0112 3/4"BSP Elbow
16.	168X154 Packing piece
17.	14.79.040300 4mm Metal braided flexible hose
18.	268X196 Pipe support
19.	173/06 3/8"BSF Hex. nut
20.	268Y199 Pipe guard
21.	268X202 Spacer
22.	155/0452 1/4"BSF Socket head cap screw 3.1/4"long
23.	268X201 Spacer
24.	353G633 Vogel distributor
25.	155/0440 1/4"BSF Socket head cap screw 2.1/2"long
26.	268V121 Oil drip tray (Front cross slides)
27.	14.79.040300 4mm Metal braided flexible hose 300mm long
28.	14.79.040300 4mm Metal braided flexible hose 300mm long
29.	268Y198 Pipe guard
30.	268X202 Spacer
31.	155/0452 1/4"BSF Socket head cap screw 3.1/4"long
32.	268Y199 Pipe guard (Double bar feed M/Cs only)
33.	268X202 Spacer ( Double bar feed machines only)
34.	155/0452 1/4"BSF Socket head cap screw 3.1/4"long (Double bar feed machines only)
35.	568X157B Adaptor
36.	268X201 Spacer
37.	155/0440 1/4"BSF Socket head cap screw 2.1/2"long (Double bar feed machines only)
38.	353G336 Vogel distributor (Double bar feed M/Cs only)
39.	14.79.040300 4mm Metal braided flexible hose 300mm long
40.	353G366 Vogel distributor
41.	353G333 Vogel distributor
42.	268X201 Spacer
43.	155/0440 1/4"BSF Socket head cap screw 2.1/2"long
44.	268V122 Oil drip tray (Rear cross slides)
46.	155/0406 1/4"BSF Socket head cap screw 3/8"long
47.	368X149 Header bracket
48.	353G36635 Vogel distributor
49.	203/04 1/4"BSF Self locking nut
50.	155/0416 1/4"BSF Socket head cap screw 1"long
51.	355G33665 Vogel distributor
52.	368X149 Header bracket
53.	167/0510 5/16"BSF Hex. head set screw 5/8"long
54.	197/11 5/16"dia. Shakeproof washer



Description	Ennis Ref	Wickman Ref
A4 4mm Nuts & Sleeves	36 0500 07 36 0501 07	14 07 04 14 08 04
A6 6mm Nuts & Sleeves	36 0500 04 36 0501 04	14 07 06 14 08 06
A8 8mm Nuts & Sleeves	36 0500 05 36 0501 05	14 07 08 14 08 08
C8 1/4 BSP 6mm Straight Male Connector	36 0530 11	14 72 0804
R4 1/8 BSP 4mm Straight Male Connector	36 0530 02	14 72 0402
E4 1/8 BSP 4mm Elbow Connector	36 0005 02	14 75 0402
K4 4mm Bracket, Straight Connector	36 0552 07	14 78 04
N4 4mm Straight Connector	36 0503 02	14 03 04
N6 6mm Straight Connector	36 0503 04	14 03 06
P6 6mm Tee Connector	36 0514 04	14 05 06
S6 M10X6mm Adaptor	36 0554 31	14 36 04
ZP 1/4 BSP 6mm Adaptor	36 1504 10	14 34 0802
W2 1/4 BSP Plug	36 0522 02	14 10 02
PR 8mm Tee Connector	36 0514 05	14 05 08
ZC Nipple Connector	Voegl 406233	
ZN 1/8 BSP X 1/8 BSP Elbow		224/10275R
ZG 4mm Tubing Plug	Voegl 404011	
ZH 1/8 BSP Swivel	Tecolmit 57938/101	
H4 4mm Elbow	36 0511 02	14 04 04
M6 6mm Bulk Head Connector	36 0508 04	14 14 06
YG 6mm Stem Elbow	36 0551 04	14 54 0606
M4 4mm Bulk Head Connector	36 0508 02	14 14 04
ZD 1/4 BSP Downy Seal		11 03 07
O6 Banjo Elbow	36 0573 00	14 74 0604

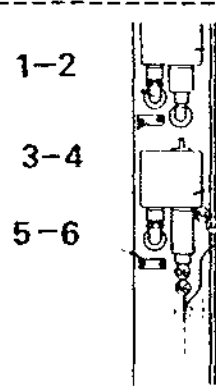
PIPE REFERENCE	
4 MM COPPER	—
6 MM COPPER	—
8 MM COPPER	—

BRACKET CONNECTORS TO BE SECURED WITH WSP 156/214 (2BA X 3/8" CAP HD SCREWS)  
 USE PIPE CLIPS AS REQUIRED - 4MM CLIP REF 14-16-11 SECURE WITH WSP 156/208  
 6MM CLIP REF 14-16-13  
 8MM CLIP REF 14-16-14

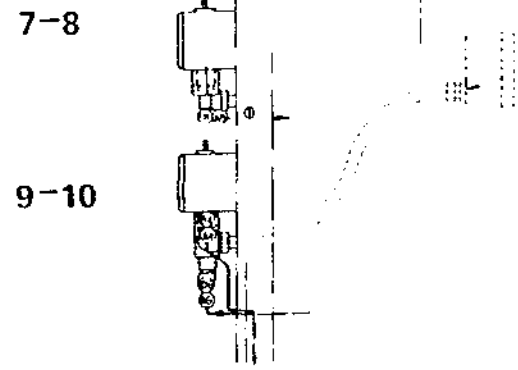
268 Z 4B

Lubrication Pipes (End Bracket) Drg. 268 Z 9

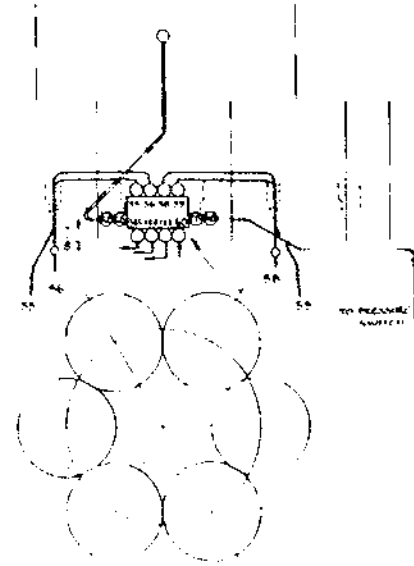
Part No	Description
1.	11.03.12 20mm Dowty seal
2.	15.04.2091 5/8" - 20mm 90Degree conduit elbow
3.	165/404 4BA Round head screw 1/4"long
4.	291/31 Legend plate
5.	165/404 4BA Roundhead screw 1/4"long
6.	291/32 Legend plate
7.	836T252J Allen Bradley Pressure switch
8.	155/0428 1/4"BSF Socket head cap screw 1.3/4"long
9.	836T300J Allen Bradley Pressure switch
10.	155/0428 1/4"BSF Socket head cap screw 1.3/4"long
11.	15.04.1600 5/8"-20mm Conduit connector
12.	11.03.09. 16mm Dowty seal
13.	15.02.1216 16mm Conduit locknut
14.	347/1036 5/8"dia. Anaconda 1m long
15.	268V187B Pipe support bracket
16.	155/0408 1/4"BSF Socket head cap screw 1/2"long
17.	268V187B Pipe support bracket
18.	345/22111 Vogel distributor
19.	156/214 2BA Socket head cap screw
20.	No.37 Bailey Mackay pressure switch
21.	14.79.040250 4mm Metal braided flexible hose 250mm long
22.	14.79.040300 4mm Metal braided flexible hose 300mm long
23.	345/33112 Vogel distributor
24.	345/22331 Vogel distributor
25.	203/04 1/4"BSF Self locking nut
26.	155/0428 1/4"BSF Socket head cap screw 1.3/4"long
27.	LV.10062 Adams 8 point double feed distributor block
28.	342/11 Vogel distributor



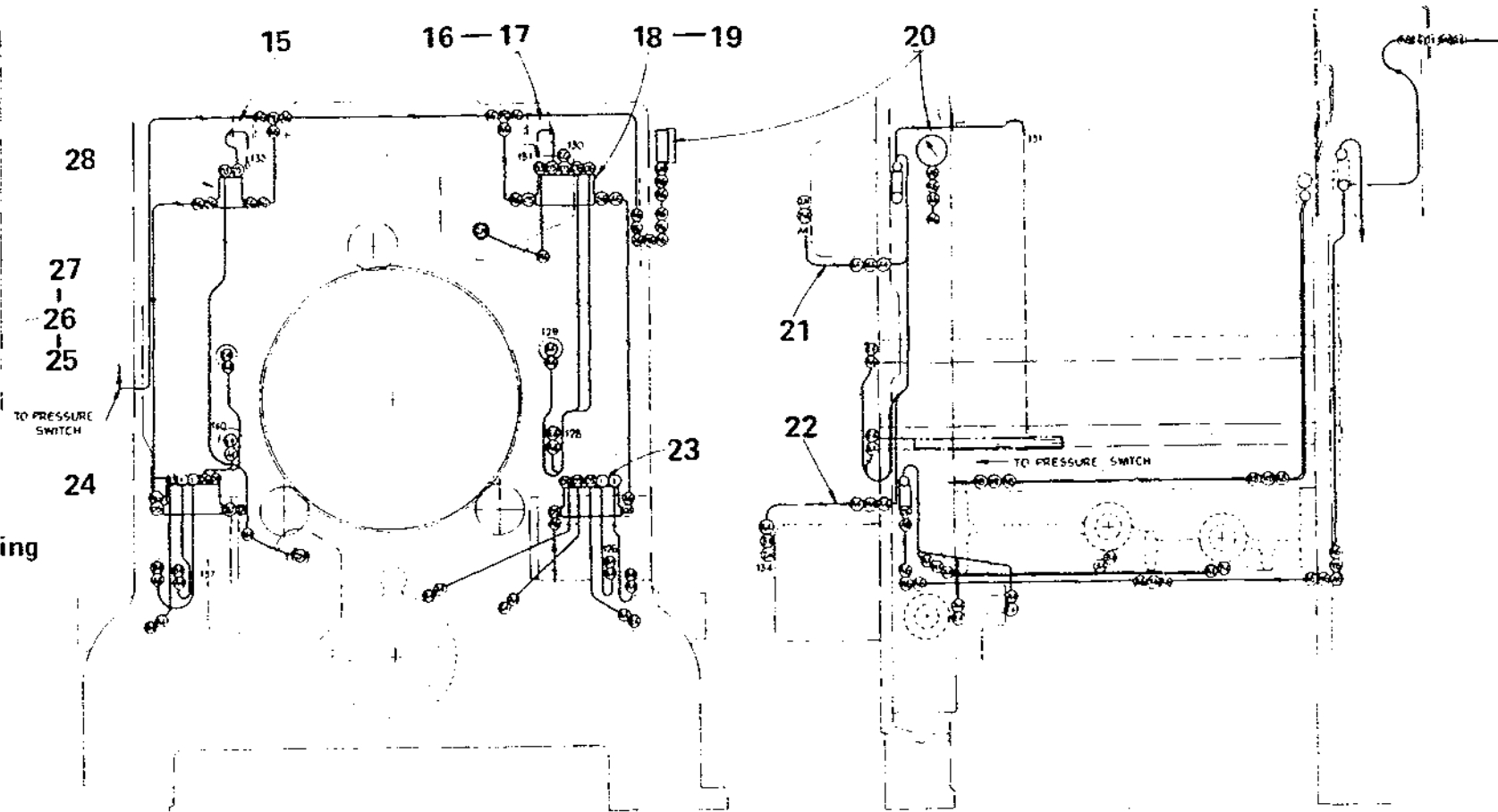
Scrap view showing pressure switches



Scrap view of collet & bar feed levers



Scrap view on rear face of drum housing



DESCRIPTION	ENOTS REFERENCE	WICKMAN REF.
A4 4MM Nut & Sleeve	36-0500-02 36-0501-02	14-07-04 14-08-04
A6 6MM Nut & Sleeve	36-0500-04 36-0501-04	14-07-06 14-08-06
A8 8MM Nut & Sleeve	36-0500-05 36-0501-05	14-07-08 14-08-08
S6 M10 6MM Straight Adaptor	36-0554-31	14-36-04
B4 1/8 BSP 4MM Straight Male Adaptor	36-0530-02	14-72-0402
D6 3/8 BSP 6MM Straight Male Adaptor	36-0530-18	14-72-0606
E4 1/8 BSP 4MM Elbow Adaptor	36-0005-02	14-75-0402
CB 1/8 BSP 8MM Straight Adaptor	36-0530-11	14-72-0804
FB 1/8 BSP 8MM Elbow Adaptor	36-0005-11	14-75-0804
J6 6MM Brkt. Elbow	36-0548-04	14-30-06
K6 6MM Brkt. Straight Connector	36-0552-04	14-28-06
P6 6MM Tee Connector	36-0514-04	14-05-06
ZA M10 Plug		
U6 1/8 BSP x 6MM Nippled Adaptor	36-0557-10	14-33-0604
O6 6MM Brkt. Tee Connector	36-0549-04	14-31-06
H6 6MM Elbow	36-0511-04	14-04-06
ZU 10MM Copper Washer	48021342	14-77-15
M6 6MM Bulkhead Connector	36-0508-04	14-14-06
M4 4MM Bulkhead Connector	36-0508-02	14-14-04
O5 1/8 BSP 6MM Banjo Elbow	36-0572-30	14-74-0602
ZH 1/8 BSP Swivel	Tecalemit 52938/101	
ZG 4MM Tubing Plug	Vogel	
N4 4MM Straight Connector	36-0503-02	14-03-04
N8 8MM Straight Connector	36-0503-05	14-03-08

PIPE REFERENCE	
4MM. COPPER	—+—
6MM. COPPER	—//—
8MM. COPPER	—///—

BOTH ENDS OF 4MM DELIVERY PIPES TO BE FITTED WITH CRITCHLEY SIZE 5 CABLE  
 MARKERS OF CORRECT DESIGNATION  
 BRACKET CONNECTORS TO BE SECURED WITH WSP.156/214 (2BA x7/8L.CAPHEAD SCREWS)  
 USE PIPE CLIPS AS REQUIRED:-

4MM CLIP REF. 14.16.11 } SECURE WITH  
 6MM CLIP REF. 14.16.13 } WSP. 156/208  
 8MM CLIP REF. 14.16.14 }

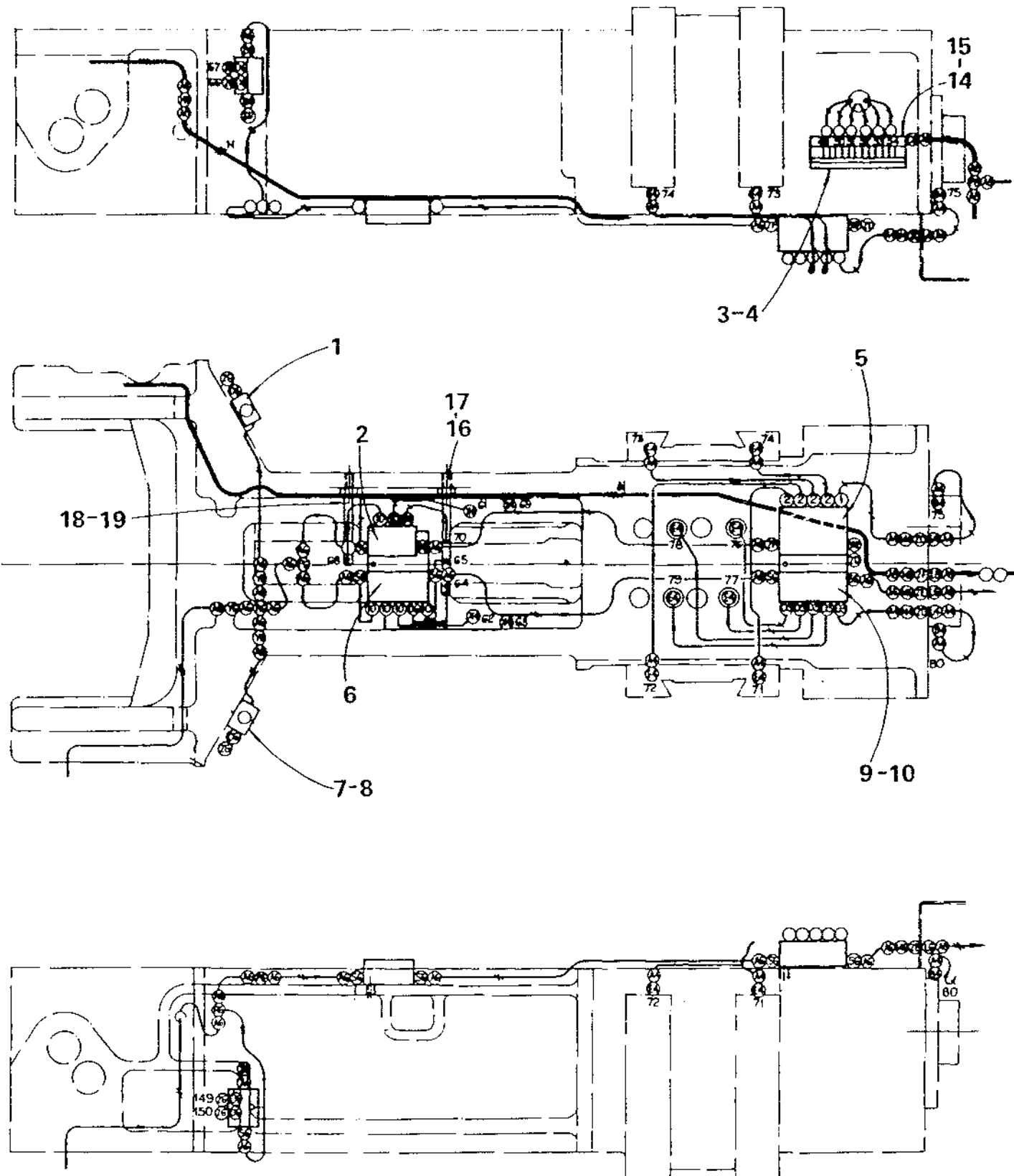
Lubrication Pipes (Main Housing) Drg. 268 Z 11A

Part No	Description
1.	368X150 Header bracket
2.	155/0428 1/4"BSF Socket head cap screw 1.3/4"long
3.	203/04 1/4"BSF Self locking nut
4.	168X178A Tomey oil pressure gauge
5.	268Y167A Oil Spray pipe (attachment component)
6.	225/5 5/16"dia. Tube clip
7.	156/208 2BA Socket head cap screw 1/2"long
8.	268V169 Oil spray pipe (main drive)
9.	268V170 Oil spray pipe (feed drive)
10.	268V171 Oil spray pipe (speed pick-off gears)
11.	268X172 Oil spray pipe (feed pick-off gears)
12.	268X190A Header bracket
13.	155/0428 1/4"BSF Socket head cap screw 1.3/4"long
14.	203/04 1/4"BSF Self locking nut
15.	268X195B Oil splash deflector
16.	LV10066 Adams 16 Way Double header
17.	198/12 5/16"dia lock washer
18.	167/0512 5/16"BSF Hex. head screw 3/4"long
19.	173/06 3/8"BSF Hex. nut
20.	368X178 Pipe support
21.	173/06 3/8"BSF Hex. nut
22.	268X174 Pipe support
23.	173/06 3/8"BSF Hex. nut
24.	568X185A Pipe support
25.	168X145 Purcolator housing gasket
26.	
27.	268X155 Pipe support
28.	APF87300 Micronic oil filter
29.	167/0410 1/4"BSF Hex. head set screw 5/8"long
30.	156/208 2BA Socket head cap screw 1/2"long
31.	225/5 5/16"dia. Tube clip
32.	203/04 1/4"BSF Self locking nut
33.	155/0428 1/4"BSF Socket head cap screw 1.3/4"long
34.	LV10066 Adams 16-way double header
35.	167/0510 5/16"BSF Hex. head set screw 5/8"long
36.	130/05 5/16"Flat washer
37.	268Z189 -
38.	155/0414 1/4"BSF Socket head cap screw 7/8"long
39.	155/0410 1/4"BSF Socket head cap screw 1/2"long
40.	268V308 Filter support bracket
41.	268V309 Blanking plate
42.	158/0516 5/16"BSF Socket counter sunk head screw 1"long
43.	165X152 Bulkhead return connection
44.	168X153 Bulkhead return connection
45.	- 3/4 BSP Locknut
46.	- 3/4 BSP Pipe 36.1/2"long
47.	LV 0047 Adams Oil strainer
48.	LFW 110G Flupac Filter



Lubrication Pipes (Beam) Drg. 268 Y 12

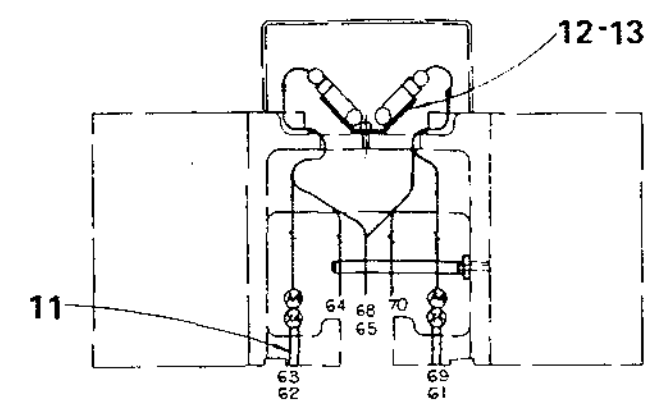
Part No	Description
1. 342/22	Vogel distributor
2. 343/332	Vogel distributor
3. 155/0428	1/4"BSF Socket head cap screw 1.3/4"long
4. L.V.10027	Adams 6-point sight feed block
5. 355/55553	Vogel distributor
6. 345/32333	Vogel distributor
7. 342/22	Vogel distributor
8. 156/214	2BA Socket head cap screw 7/8"long
9. 345/11111	Vogel distributor
10. 156/214	2BA Socket head cap screw 7/8"long
11. 168X584	Oil pipe extension
12. 268X181	Distributor bracket
13. 156/208	2BA Socket head cap screw 1/2"long
14. 372X124C	Oil sight feed plate
15. 165/406	4BA Round head screw 3/8"long
16. 568X198	Pipe support
17. 173/06	3/8"BSF Hex. nut
18. 173/06	3/8"BSF Hex. nut
19. 568X186	Pipe support



○	DESCRIPTION	ENOTS REF	WORKMAN REF
A4	4MM TUBING NUT & SLEEVE	36-0501-02	14 07 04
AG	6MM TUBING NUT & SLEEVE	36-0501-03	14 08 04
AB	8MM TUBING NUT & SLEEVE	36-0501-05	14 09 08
E4	1/8 BSP 4MM ELBOW CONCTR	36-0500-02	14 07 02
B4	1/8 BSP 4MM STRAIGHT TUB CONNECTOR	36-0550-02	14 07 02
H8	8MM ELBOW	36-0511-05	14 04 08
L4	LOCKNUT	36-0520-01	14 15 12
L6	LOCKNUT	36-0520-03	14 15 15
L8	LOCKNUT	36-0520-05	14 15 18
ZU	10MM COPPER WASHER	48021342	14 77 15
M4	4MM BULKHEAD CONCTR	36-0508-02	14 14 04
M6	6MM BULKHEAD CONCTR	36-0508-04	14 14 06
M8	8MM BULKHEAD CONCTR	36-0508-05	14 14 08
Y6	6MM STEM ELBOW	36-0551-04	14 54 06
PG	6MM TEE	36-0514-04	14 05 06
X4	1/8 BSP FEM 4MM CONCTR	36-0505-02	14 16 02
R6	6MM 4 WAY	36-0516-04	14 06 06
S6	6MM M10 ADAPTOR	36-0554-31	14 36 04
ZP	6MM 1/8 BSP ADAPTOR	36-1504-10	14 34 04
Z A	M10 PLUG		
Z D	M12 DOWTY SEAL		11 03 07
Z E	M15 DOWTY SEAL		11 03 09
Z F	M18 DOWTY SEAL		11 03 11
Z6	4MM TUBING PLUG	VOGEL	
W2	1/4 BSP PLUG	36-0523-02	14 10 02

USE PIPE CLIPS AS REQUIRED - 4MM CLIP REF 14 16 11 } SECURE WITH  
 6MM CLIP REF 14 16 13 } WSP 156/208  
 8MM CLIP REF 14 16 14 }

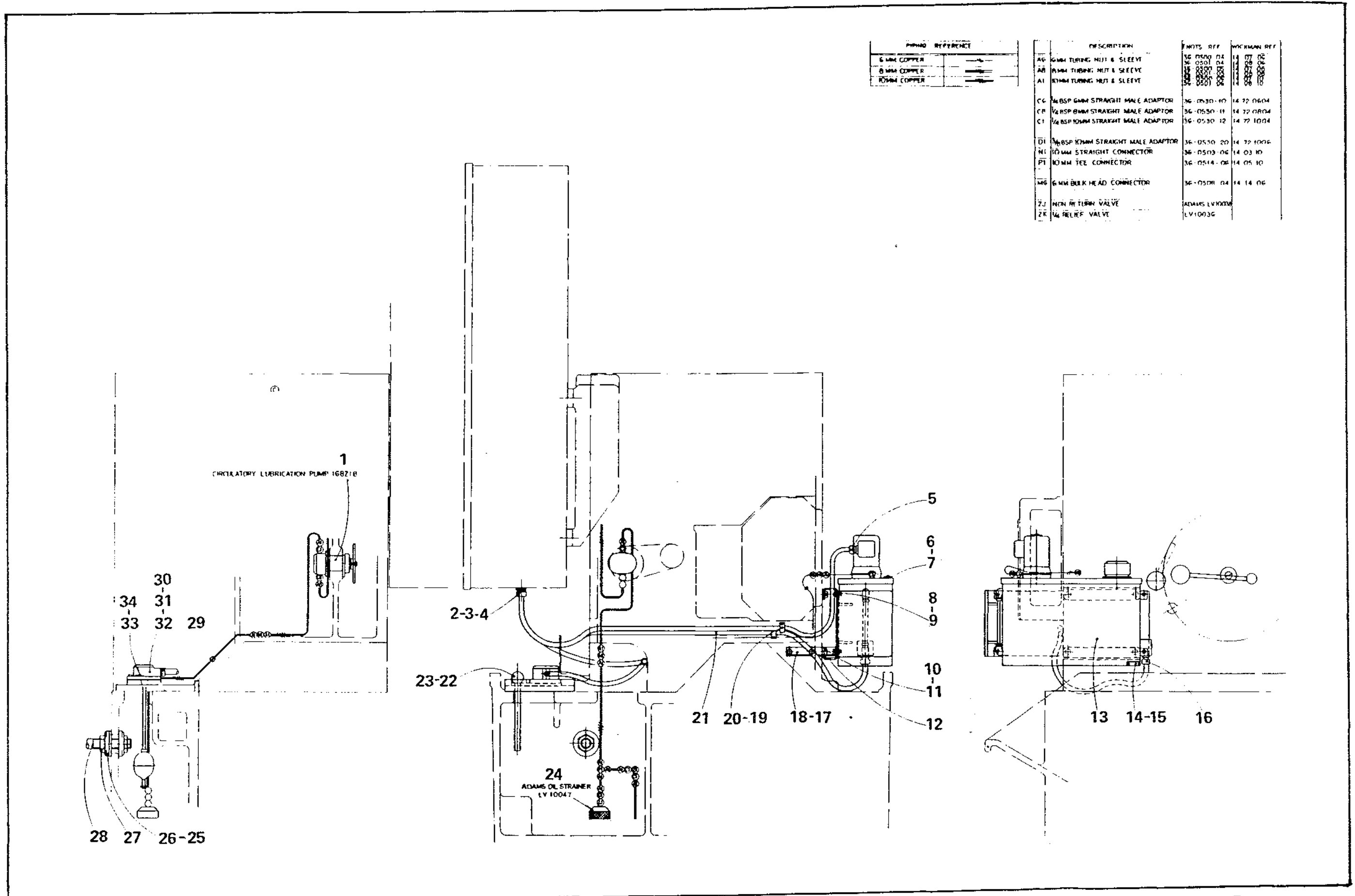
PIPING REFERENCE	
4 MM COPPER	—
6 MM COPPER	—
8 MM COPPER	—
8 MM NYLON	—





Lubrication of Reservoirs and Pumps (Vogel) Drg. 268 Z 15

Part No	Description
1. 168Z1B	Circulatory lubrication pump
2. 11.03.10	16mm Seal
3. 15.02.1216	16mm Locknut
4. 15.04.16	5/8"-16mm Conduit straight connector
5. 1138	Connector 'Kopex' PG11
6. 165/406	4BA Round head screw 3/8"long
7. 291/73	Legend plate
8. 167/0512	5/16"BSF Hex,head set screw 3/4"long
9. 203/05	5/16"BSF Self locking nut
10. 167/0614	3/8"BSF Hex. head set screw 7/8"long
11. 198/13	3/8"dia. Shakeproof washer
12. 268Z188	Mounting bracket
13. 268V193/1	Pump and reservoir assembly 230/440 volt 50cy.
268V193/2	Pump and reservoir assembly 500 volt 50cy.
268V193/3	Pump and reservoir assembly 600 volt 60cy.
268V193/4	Pump and reservoir assembly 240/480 volt 60cy.
14. 291/77	Legend plate
15. 165/406	4Ba Round head screw 3/8"long
16. 1138	Connector 'Kopex' PG11
17. 167/0512	5/16"BSF Hex. head set screw 3/4"long
18. 268X191	Anchor bracket
19. 156/208	2BA Socket head cap screw 1/2"long
20. 15.05.10	5/8" Pipe clip
21. 347/10192	5/8" Anaconda
22. 322X155	Handle
23. 241/13	Bakelite knob (Yellow)
24. LV.10047	Adams oil strainer
25. 168X153	Sealing washer
26. 168X152	Washer
27. 316/2212	3/4" BSP locknut
28. 360/12/292/C/44	3/4"BSP Pipe 36.1/2"long
29. 15.04.2001	5/8"-20mm Conduit straight connector
30. 130/08	1/2"dia. Flat washer
31. 167/0816	1/2"BSF Hex. head screw 1"long
32. 268V203	Float switch
33. 291/76	Legend plate
34. 165/406	4BA Round head screw 3/8"long

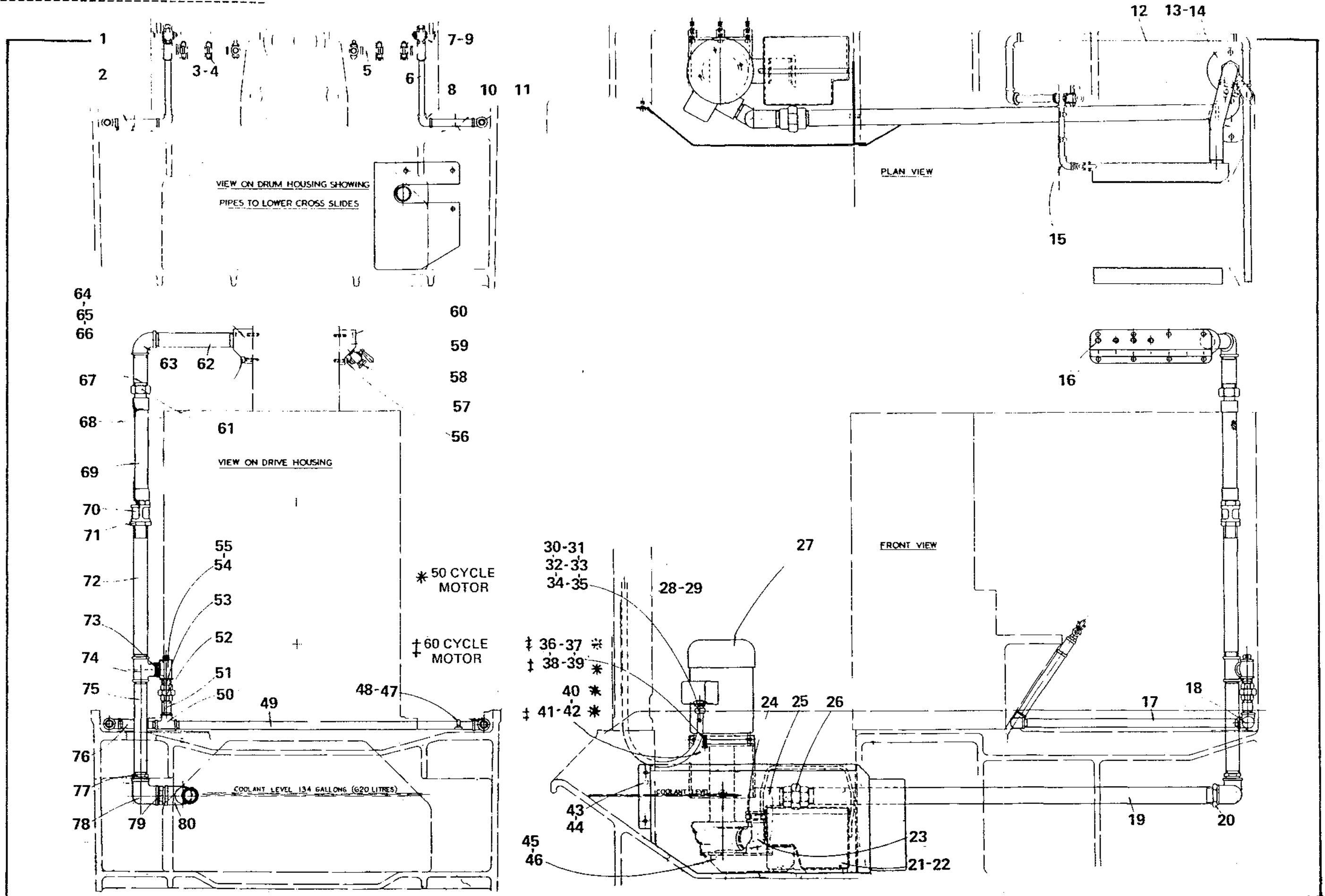


268 Z 15

Coolant Pipes System Drg. 269 Z 3A

Part No	Description
1.	14.19.1320 Tee 1/2"BSP 3/8"long
2.	360/0840B Steel pipe screwed 1/2"BSP 5"long
3.	165/212 2BA Round head screw 3/4"long
4.	361/3206 3/8" Pipe strap
5.	360/0654B 3/8"BSP Screwed steel pipe 6.3/4"long
6.	360/0876B 1/2"BSP Screwed steel pipe 9.1/2"long
7.	P211 3/8"BSP Coolant tap
8.	194/3 3/8"BSP Hex. socket pipe plug
9.	361/0108 1/2"BSP 90degree Female elbow
10.	360/0840E 1/2"BSP Screwed steel pipe
11.	361/0108 1/2"BSP 90degree Female elbow
12.	269X171 Blanking plate
13.	164/0510 5/16"BSF Round head screw 5/8"long
14.	269X144 Pipe collar
15.	361/0106 3/8"BSP 90degree Female elbow
16.	194/3 3/8"BSP Hex. socket pipe plug
17.	360/08216 1/2"BSP Screwed steel pipe 27"long
18.	361/0108 1/2"BSP 90degree Female elbow
19.	360/24/430/C/16 1.1/2"BSP Screwed steel pipe 53.3/4"long
20.	361/2224 1.1/2"BSP Locknut
21.	269Y165A Coolant strainer
22.	269Y172 Coolant strainer (5.5/8"-6D only)
23.	361/0124 1.1/2"BSP 90degree Female elbow
24.	361/1624 1/2"BSP Hex. nipple
25.	361/0224 1.1/2"BSP 90degree Male and female elbow
26.	361/2624 1.1/2"BSP Female union
27.	269Y170A Coolant pump
28.	291/72 MTR3 Legend plate
29.	165/406 4BA Round head screw 3/8"long
30.	165/210 2BA Round head screw 5/8"long
31.	15.05.14 Cable clip
32.	11.03.12 20mm Dowty seal
33.	15.02.1220 20mm Conduit Hex. locknut
34.	15.04.2000 Anaconda straight connector 3/4" 20mm conduit
35.	347/1295 Anaconda flexible conduit 3/4"dia.x 95"long
36.	198/13 Shakeproof washer
37.	198/11 Shakeproof washer
38.	- 3/8"UNC Hex. head set screw 1.1/4"long
39.	167/0520 5/16"BSF Hex. head set screw 1.1/4"long
40.	155/0732 7/16"BSF Socket head cap screw 2"long
41.	269Y169 Pump mounting bracket 60Hz motor
42.	269Y168 Pump mounting bracket 50Hz motor
43.	269Y 167 Tray strainer
44.	155/0512 5/16"BSF Socket head cap screw 3/4"long
45.	155/0412 1/4"BSF Socket head cap screw 3/4"long
46.	269V166 Pump inlet
47.	361/3208 1/2" Pump strap
48.	165/212 2BA Round Head screw 3/4"long
49.	360/08292 1/2"BSP Screwed steel pipe 36.1/2"long
50.	- Tee 1/2"x 1/2"x 3/4"BSP
51.	360/1220 3/4"BSP Screwed steel pipe 2.1/2"long
52.	361/2612 3/4"BSP Female union
53.	360/06 3/4"BSP Barrel nipple
54.	361/0912 3/4"BSP Equal tee
55.	361/1812 3/4"BSP Squ. headed plug
56.	155/0520 5/16"BSF Socket head cap screw 1.1/4"long
57.	P211 3/8 BSP Coolant tap

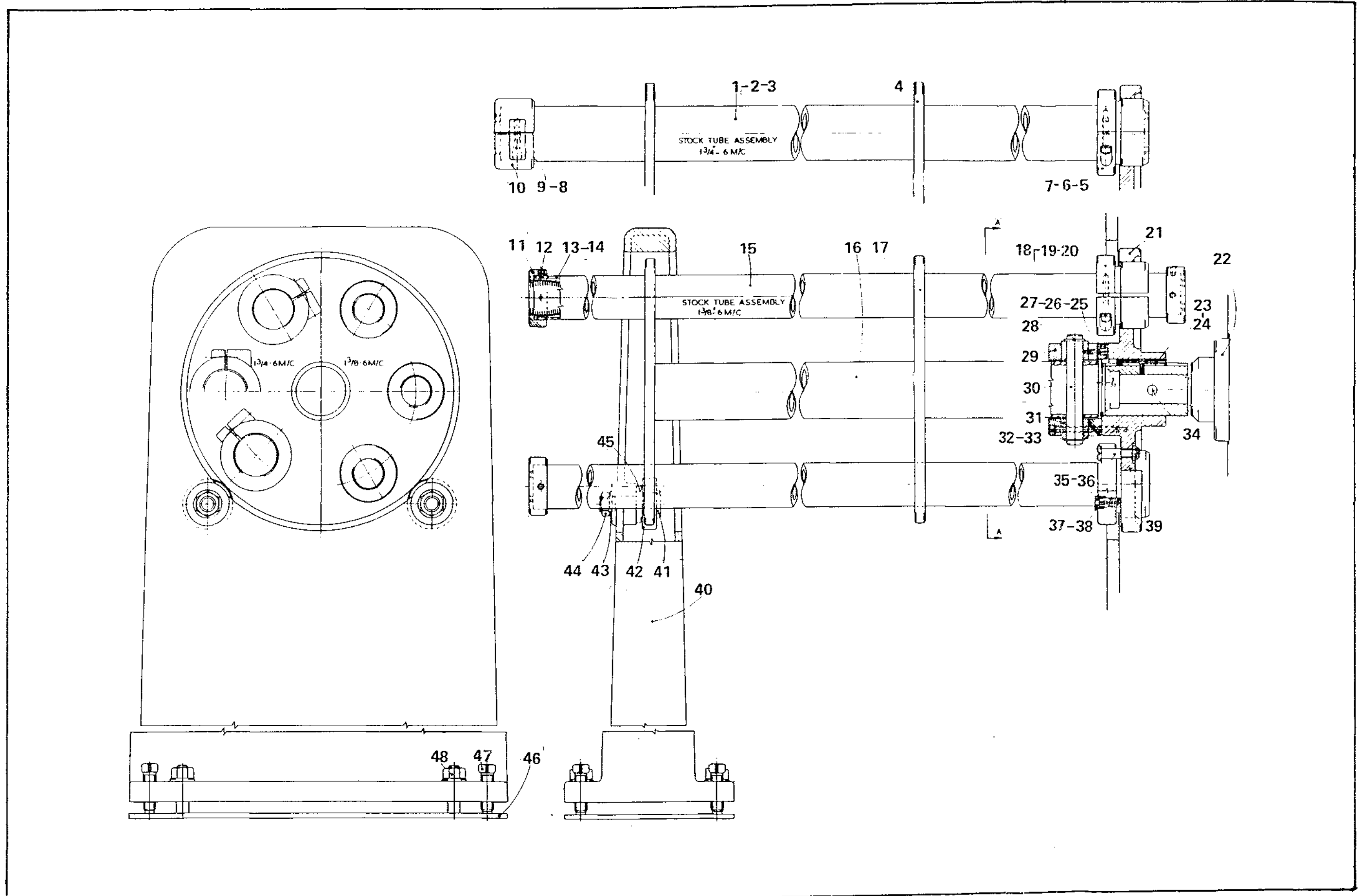
169X111	Manifold gasket (front)
169Y114	Coolant manifold
155/0536	5/16"BSF Socket head cap screw 2.1/4"long
169X146A	Sealing washer
269V129A	Pipe bend
361/0120	1/4"BSF 90degree Female elbow
155/0544	5/16"BSF Socket head cap screw 2.3/4"long
169Y115	Rear coolant manifold
169X113A	Manifold gasket (rear)
. 360/2040C09	1.1/4"BSF Screwed steel pipe 5"long
. 155/0528	5/16"BSF Socket head cap screw 1.3/4"long
. 169X138	1.1/4"BSF Superflex hose assembly
. 361/2120	1.1/4"BSF Socket
. 361/2220	1.1/4"BSF Back nut
. 360/201148C24	1.1/4"BSF Screwed steel pipe 18.1/2"long
. 360/06	3/4"BSF Barrel nipple
4. 14.19.0652	Tee 1.1/4"x 1.1/4"x 3/4"BSF
5. 360/20100B	1.1/4"BSF Screwed steel pipe 12.1/2"long
5. 360/0836B	1/2"BSF Screwed steel pipe 4.1/2"long
7. 14.19.1627	1.1/2"- 1.1/4"BSF Reducer
8. 361/0124	1.1/2"BSF 90degree Female elbow
9. 361/1624	1.1/2"BSF Hex. nipple
0. 361/0124	1.1/2"BSF 90degree Female elbow



269 Z 3A

Stock Carriage Drg. 275 Z 1A

	Part No	Description
1.	277X101	Stock tube
2.	277X119	Stock support spring 1.3/4" capacity
3.	277X120	Stock support spring 1.1/4" capacity
4.	277X106	Support disc
5.	277V103	Bush
6.	155/0628	3/8"BSF Socket head cap screw 1.3/4"long
7.	154/06	3/8"dia. Spring washer
8.	154/06	3/8"dia. Spring washer
9.	155/0632	3/8"BSF Socket head cap screw 2"long
10.	277V104	Spring retaining cap
11.	275X126	Cap
12.	178/0608	3/8"BSF Hex. socket set screw 1/2"long
13.	275X119	Stop support spring 1.3/8"capacity
14.	275X120	Stop support spring 7/8" capacity
15.	275X101	Stock tube
16.	375X102	Centre tube
17.	275X106	Support disc
18.	154/06	3/8"dia. spring washer
19.	155/0632	3/8"BSF Socket head cap screw 2"long
20.	275V103	Bush
21.	258Y150	Driving disc
22.	201Y165	Drive coupling
23.	156/206	2BA Socket head cap screw 3/8" long
24.	101X172	Key
25.	375X133	Tenon
26.	155/0512	5/16"BSF Socket head cap screw 3/4"long
27.	154/05	5/16"dia. spring washer
28.	101/11	1"dia. External circlip
29.	275V125A	Adaptor
30.	275X130A	Pin
31.	275X109	Drive bush
32.	154/06	3/8"Dia. Spring washer
33.	155/0664	3/8"BSF Socket head cap screw 4"long
34.	125/4072	5/8"dia. Taper pin 4.1/2"long
35.	203/08L	1/2"BSF Self locking lock nut
36.	175/130A	Stop screw
37.	175X132	Spring
38.	118X141	Spring retaining plug
39.	175X131	Plunger
40.	275V108	Stock carriage stand
41.	375X116A	Roller pin
42.	RHP.63072RS	Sealed bearing
43.	130/14	7/8"dia. Flat washer
44.	173/14L	7/8"BSF Hex. locknut
45.	317X216	Clamp washer
46.	Bolt	
47.	188/1240	3/4"BSF Squ. head set screw 2.1/2"long
48.	Plate	Supplied by customer



275 Z 1A

Attachments

Frame 2, 6-Spindle  
Bar, Parts

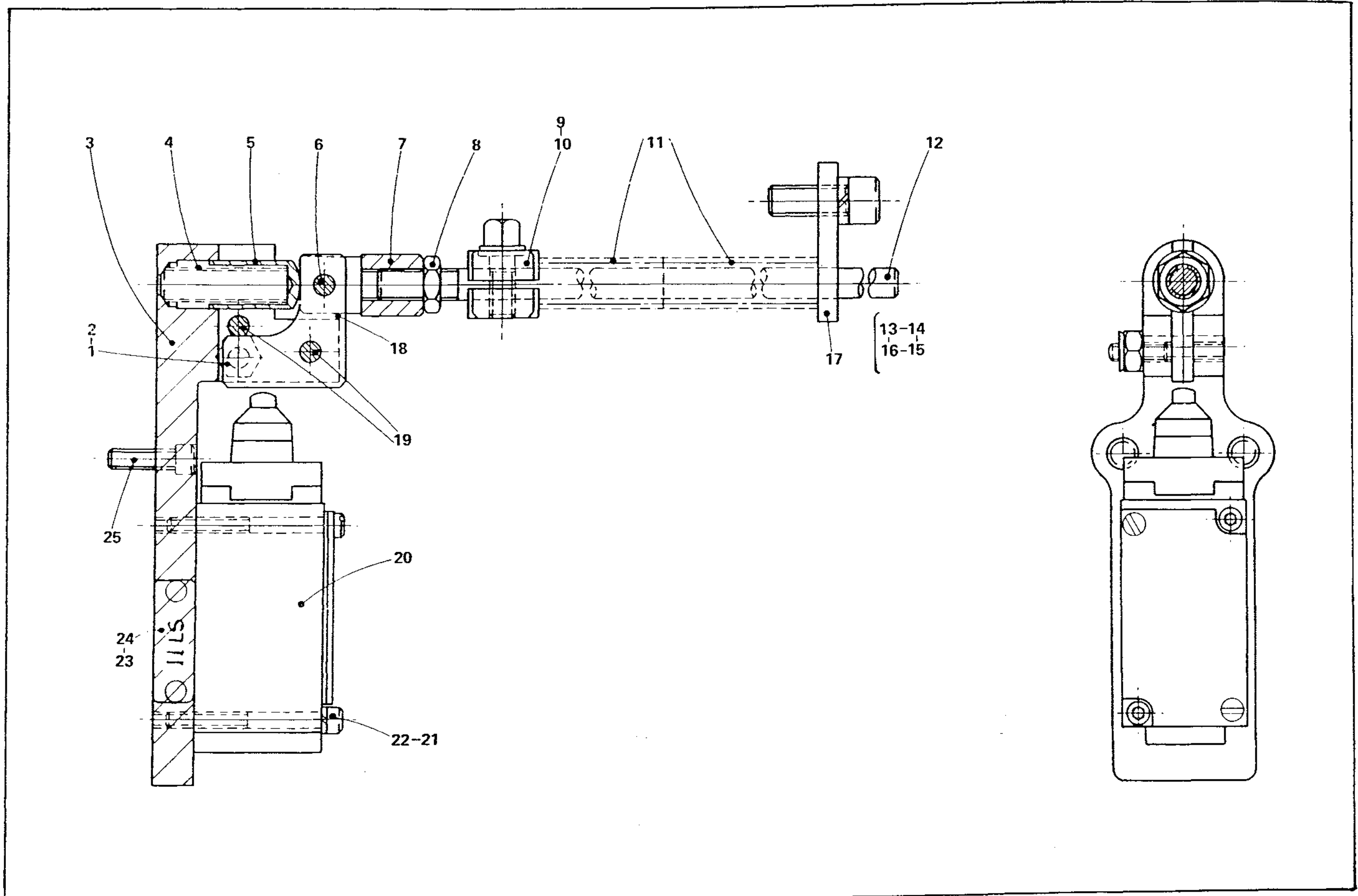
235

PLFR2/6  
25/04/90



Limit Switch For Checking Threading Attachment Return Drg. 186 V 20A

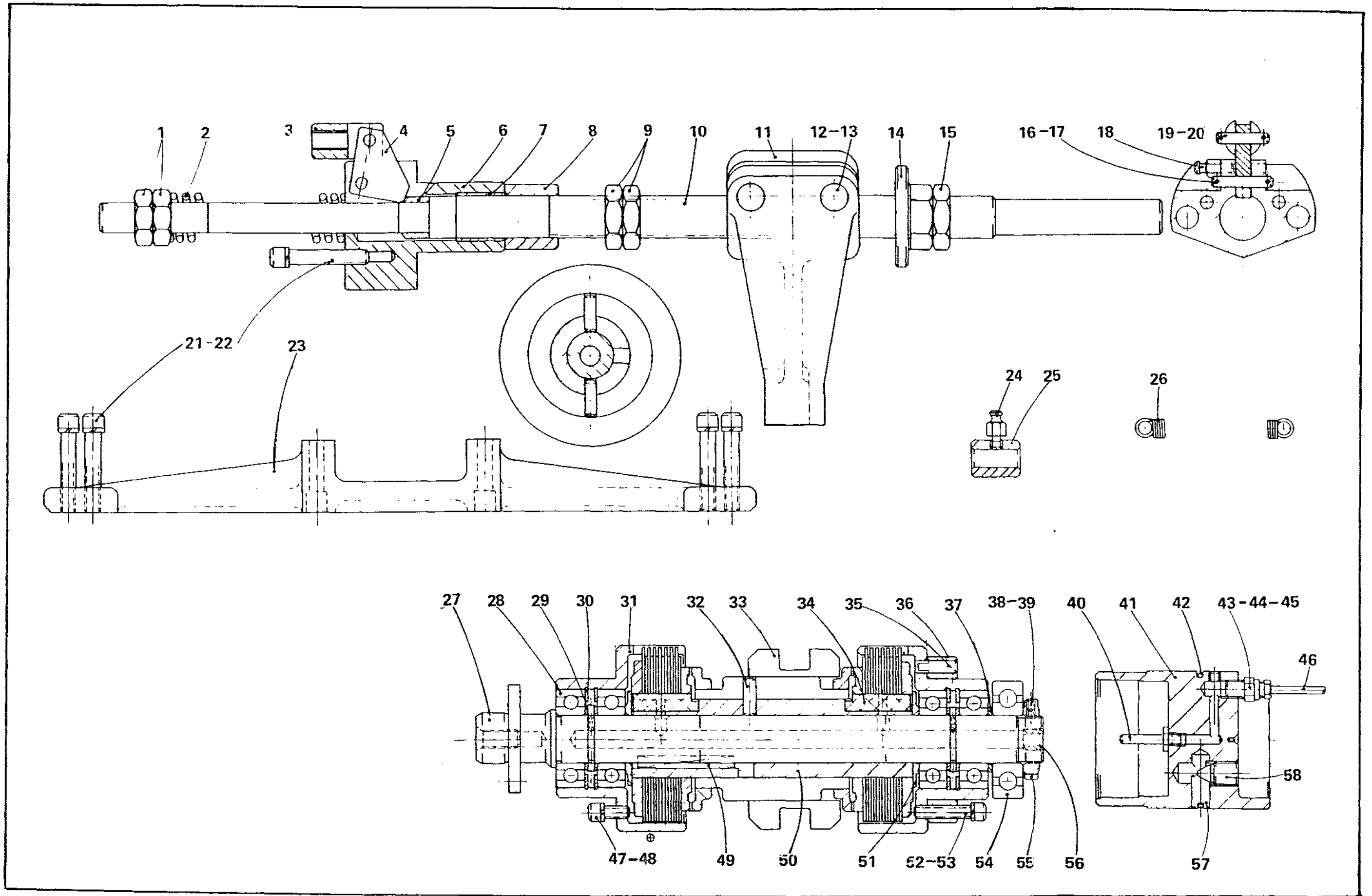
Part No	Description
1. 203/04	1/4"BSF Self locking nut
2. 178/0412	1/4"BSF Socket head set screw half dog point 3/4"long
3. 186X150A	Switch base
4. M.S.C.140	7/16"dia. Morris spring 2"long
5. 158X124A	Plunger
6. 143/0812B	1/4"dia. Mills grooved pin 3/4"long
7. 181X108	Link fork
8. 173/06L	3/8"BSF Hex. locknut
9. 195/0512	5/16"BSF Collar head screw 3/4"long
10. 188X108	Trip clamp
11. 145/176	5/8"dia. Compression Spring
12. 186X152	Operating rod
13. 167/0636	3/8"BSF Hex. head set screw 2.1/4"long Position 4 and 5
14. 203/06	3/8"BSF Self locking nut Position 4 & 5
15. 154/06	3/8"dia. Spring lock washer
16. 155/0616	3/8"BSF Socket head cap screw 1"long Position 3 & 6
17. 186X153	Stop plate
18. 186X151	Lever
19. 143/0816B	1/4" dia. Mills grooved pin 1"long
20. TypeB53E	Square 'D' Limit switch
21. 154/03	3/16"dia. Spring lock washer
22. 156/232	2BA Socket head cap screw 2"long
23. 165/404	4BA Round head screw 1/4"long
25. 155/0414	1/4"BSF Socket head cap screw 7/8"long



186 V 20A

Threading Clutch Drive, Section 281 Mk.1 Drg. 281 Y 1

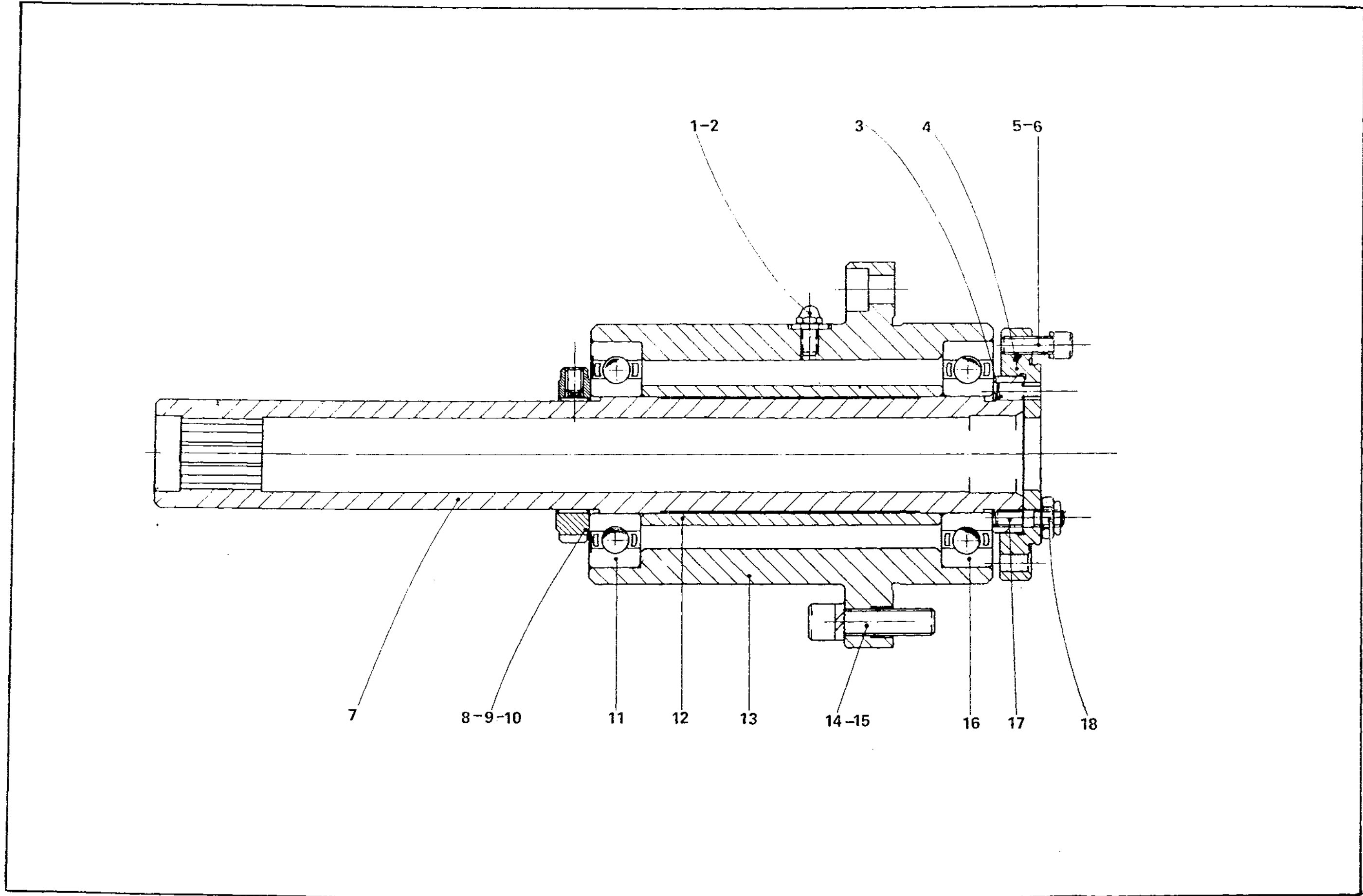
Part No	Description
1.	173/10HL 5/8"BSF Hex. locknut
2.	181AX118A Operating spring
3.	181X108 Latch link fork
4.	181AX104A Latch
5.	181AX105 Latch bush
6.	281X118 Trip sleeve
7.	236/141612 Oil retaining bush
8.	181AX113A Buffer bush
9.	181AX121 Locknut
10.	181AV101B Glut shaft
11.	281V114 Glut
12.	154/06 3/8"dia. Spring washer
13.	155/0620 3/8"BSF Socket head cap screw 1.1/4"long
14.	281X115 Reset nut
15.	181AX121 Locknut
16.	127/0405 1/16"dia. Split pin 5/8"long
17.	181AX106 Latch pivot pin
18.	181AX128 Spring anchor
19.	127/0405 1/16" dia. Split pin 5/8"long
20.	181AX107 Latch link pin
21.	155/0528 5/16"BSF Socket head cap screw 1.3/4"long
22.	154/05 5/16"dia. Spring washer
23.	281V123A Reset bracket
24.	181AX128 Spring anchor
25.	181AX115 Spring anchor sleeve
26.	MSE318 Morris extension spring
27.	281Y101A Clutch shaft
28.	258/25Z Ball journal bearing (light) 25 x 52 x 15mm
29.	183X112 Bearing spacer
30.	104/29 52mm Internal circlip
31.	183X114 Clutch cup
32.	126/0812 1/4"dia. Dowel pin 3/4"long
33.	No4 Herbert Multi-Grip Clutch
34.	183X111 Clutch key
35.	181DX110 Pin
36.	281Ax157 Gear spacer
37.	281X119 End bearing spacer
38.	153/42 Soft pad
39.	179/204 2BA Socket set screw 1/4"long
40.	568X162 Oil nipple
41.	381X110A End bearing housing
42.	381X113 Spring ring
43.	14.72.0402 1/8"BSP 4mm Tube straight male adaptor
44.	14.07.04 4mm Tubing nut
45.	14.08.04 4mm Tubing sleeve
46.	14.02.406 4mm Copper tube 30"long
47.	155/0410 1/4"BSF Socket head cap screw 5/8"long
48.	154/04 1/4"dia. Spring washer
49.	121/0832T 1/4"Squ. Tapped key 2"long
50.	183Y106 Clutch sleeve
51.	281Y109A Clutch thrust plate
52.	154/04 1/4"dia. Spring washer
53.	155/0420 1/4"BSF Socket head cap screw 1.1/4"long
54.	257/25 Ball journal bearing (medium) 25 x 62 x 17mm
55.	151/25 25mm Slotted locknut
56.	168X160 Oil bush
57.	381X111 Locking pin
58.	381X112A Locking screw



281 Y 1

Leading Attachment Drive Sleeve, Section 282 Mk.1 Drg 282 V 1A

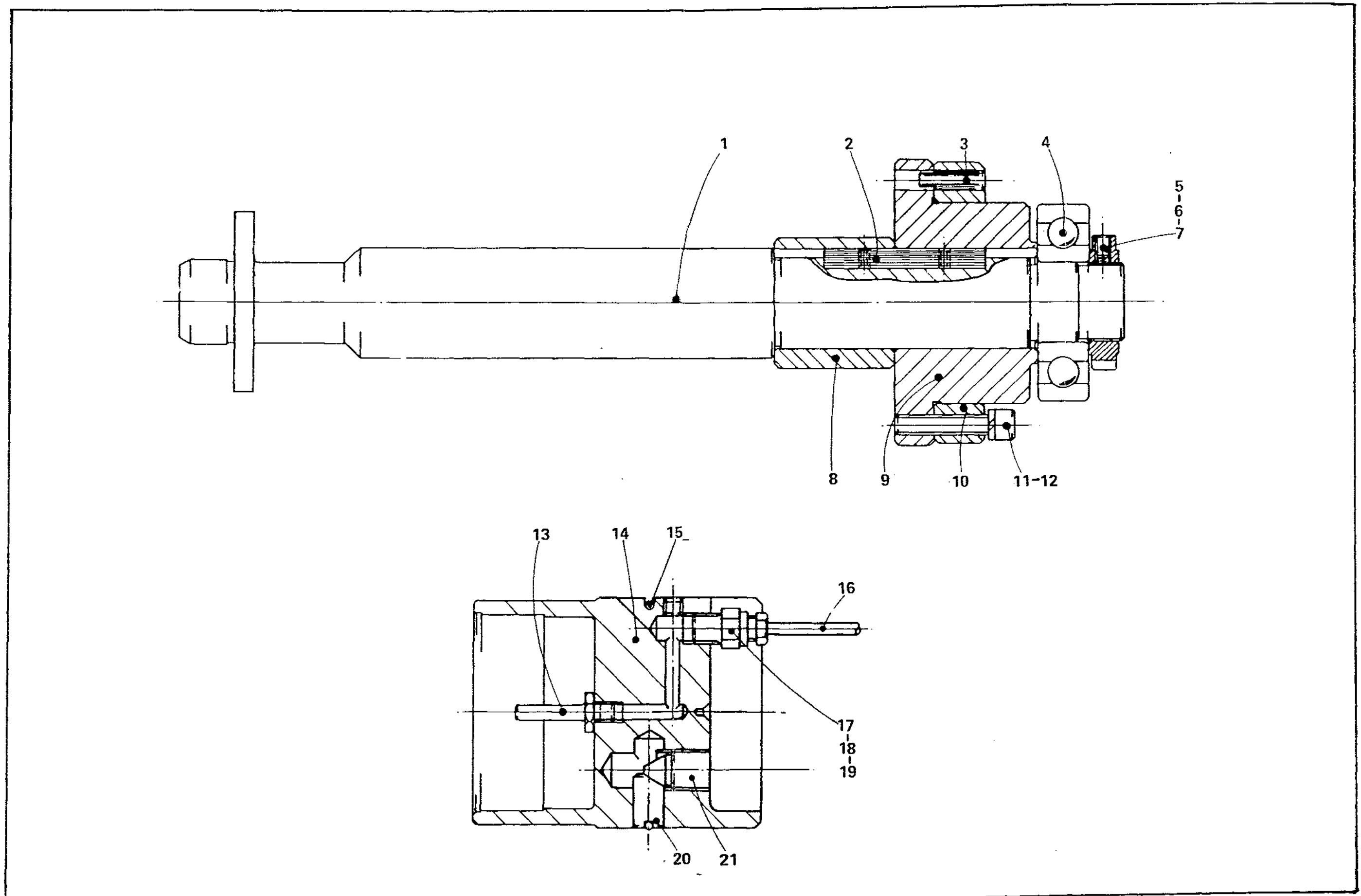
Part No	Description
1.	210/1725 Yellow indicator washer
2.	212/04 Grease nipple
3.	182X109 Coupling pin
4.	182X115 Diehead drive adaptor plate
5.	154/04 1/4"dia. Spring washer
6.	155/0412 1/4"BSF Socket head cap screw 3/4"long
7.	282V101 Diehead drive sleeve
8.	151/04 Slotted locknut
9.	153/04 Soft pad
10.	176/0405 1/4"BSF Set screw
11.	258/40ZS Ball journal 80 x 40 x 18mm
12.	282X106 Spacer
13.	282V104A Diehead drive housing
14.	154/06 3/8"dia. Spring washer
15.	155/0620 3/8"BSF Socket head cap screw 1.1/4"long
16.	258/40Z Ball journal bearing 80 x 40 x 18mm
17.	282X108 Coupling stud
18.	203/04 1/4"BSF Locknut



282 V 1A

Drive Sleeve Extension Shaft Drg. 282 V 2

Part No.	Description
1.	282V110 Extension shaft
2.	121/0832T 1/4"Squ.Tapped key 2"long
3.	181DX110 Pin
4.	257/25 Ball journal bearing (Medium) 25 x 62 x 17mm
5.	153/42 Soft pad
6.	179/204 2BA Socket set screw cup point 1/4"long
7.	151/25 25mm Slotted locknut
8.	282X112 Spacer
9.	282X111 Gear carrier
10.	281X157 Special clutch gear spacer
11.	155/0420 1/4"BSF Socket head cap screw 1.1/4"long
12.	154/04 1/4"dia. Spring washer
13.	568X162 Oil nipple
14.	381X110A End bearing housing
15.	381X113 Spring ring
16.	14.02.406 4mm Copper tube 30"long
17.	14.72.0402 1/8"BSP 4mmTube straight male adaptor
18.	14.07.04 4mm Tubing nut
19.	14.08.04 4mm Tubing sleeve
20.	381X111 Locking pin
21.	381X112A Locking screw

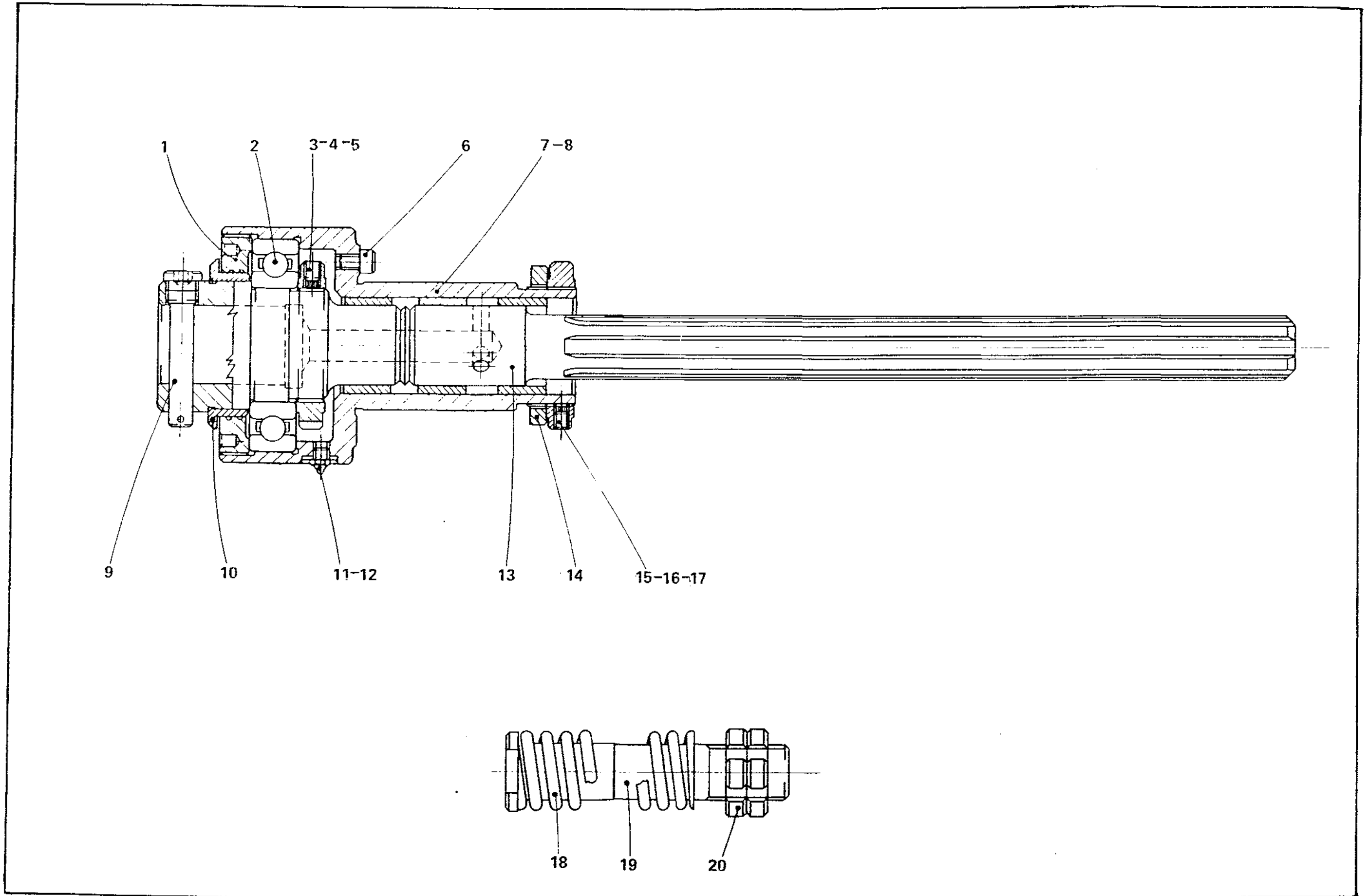


282 V 2



Parts Common to Threading Attch.Stat.3,4,5 & 6 Sect.286 Drg.286 Y 1A

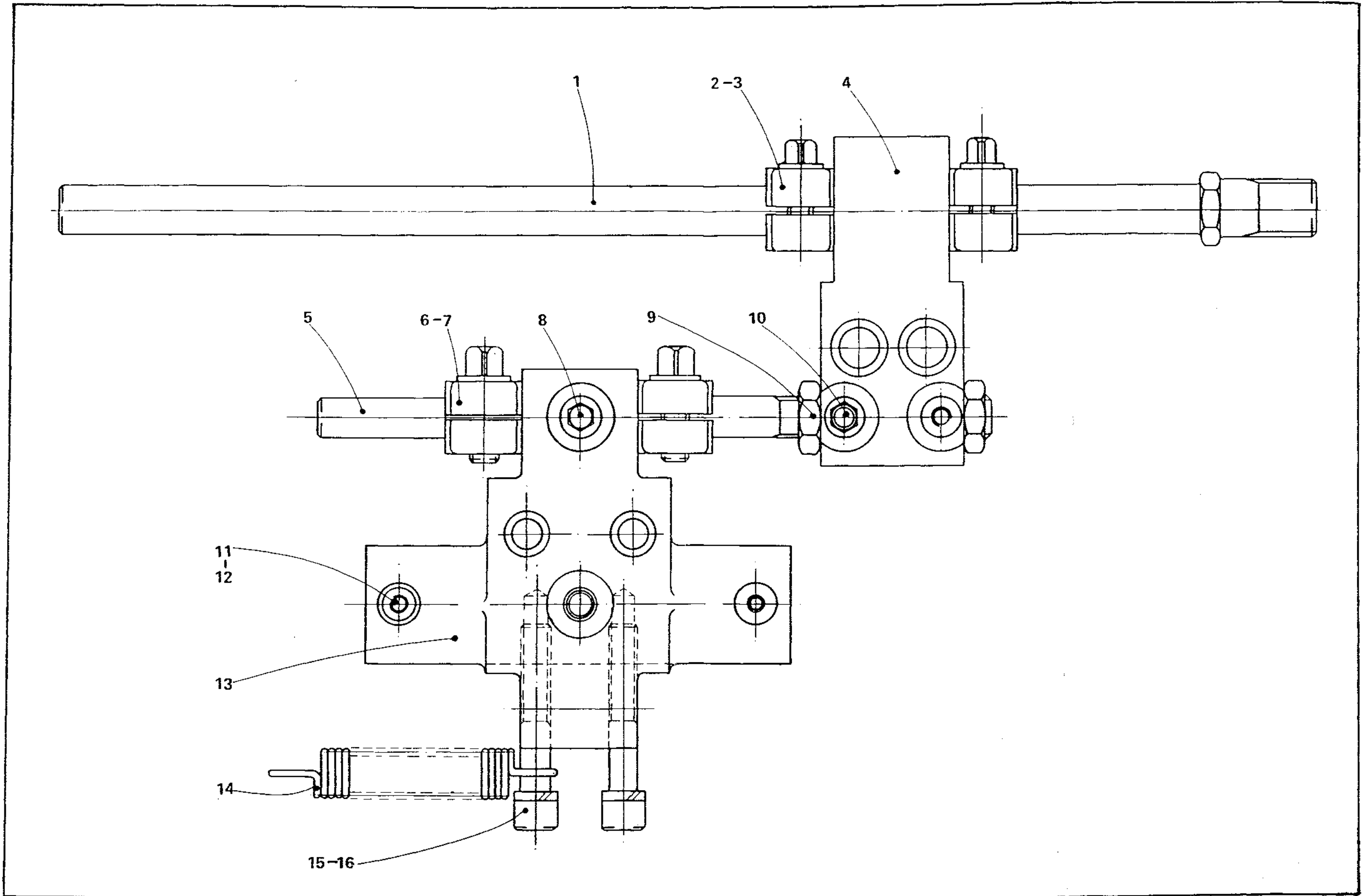
Part No	Description
1.	286X121 Locking ring
2.	258/45 Ball journal 45 x 85 x 19mm
3.	151/45 Locknut 45mm x 22 T.P.I.
4.	176/0405 1/4"BSF Socket set screw cup point 5/16"long
5.	153/04 Soft pad for 1/4"BSF
6.	155/0406 1/4"BSF Socket head cap screw 3/8"long
7.	286V113A Threading spindle housing (assembly 286V113A)
8.	286X150 Bush (286V113A Assembly)
9.	286X115A Drive pin
10.	286X112 Thrower ring
11.	212/04S 1/4"BSF Oil and grease nipple
12.	210/1725 Yellow indicator washer
13.	286V119 Threading spindle
14.	286X120A Clamp washer
15.	286X151 Locknut
16.	176/0404 1/4"BSF Socket set screw cup point 1/4"long
17.	153/04 1/4"BSF Soft pad
18.	FX6460 Feed spring
19.	186X135 Pusher spring sleeve
20.	186X124 Pusher sleeve locknut



286 Y 1A

Threading Attachment Extra Parts Stns.4 & 5 Sect.286A Mk1 Drg.286 V 2

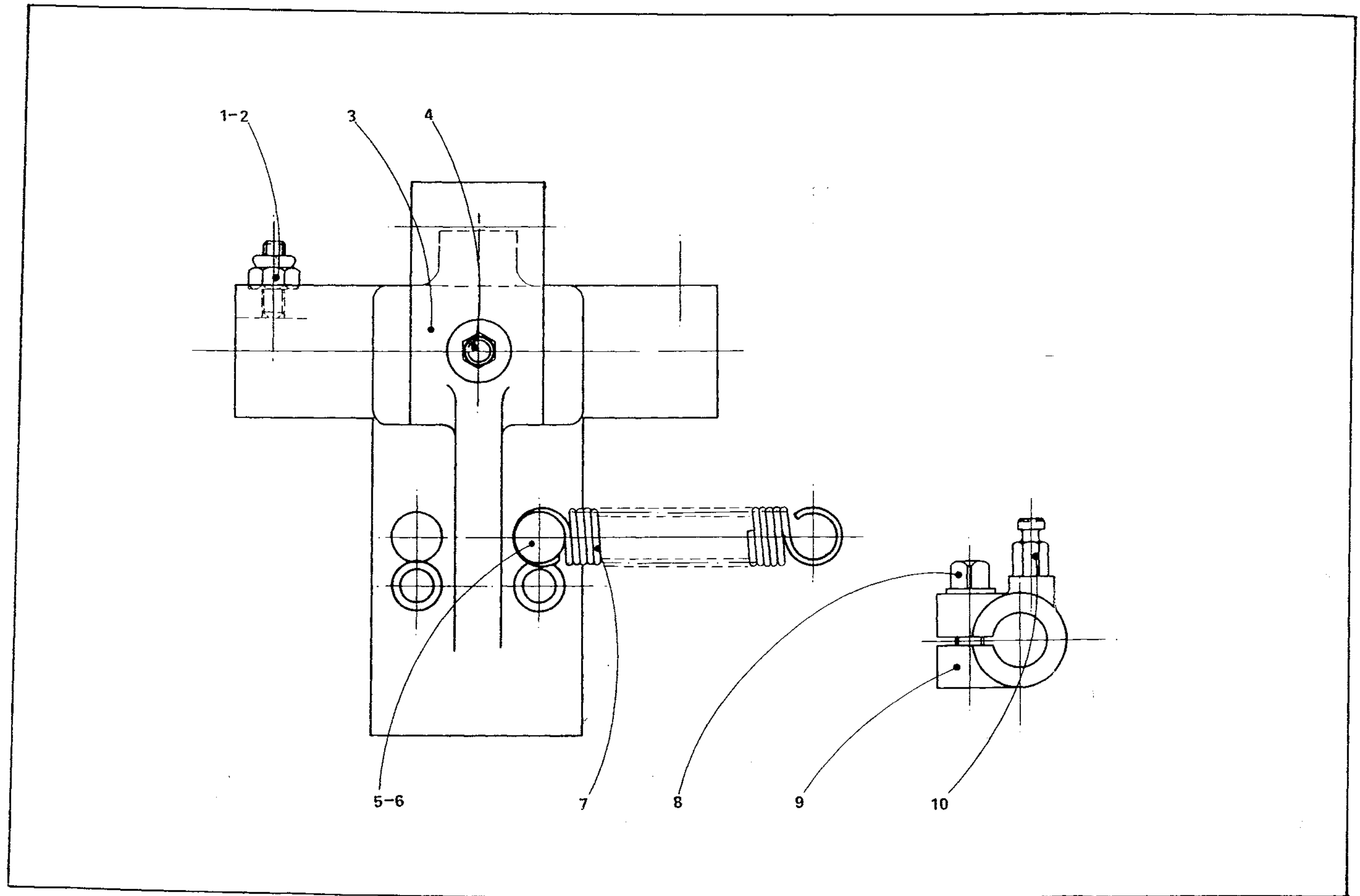
Part No	Description
1.	286X127A Push rod
2.	195/0516H 5/16"BSF Naylor collar head screw 1"long
3.	189AX115 Push rod clamp
4.	286X126A Slide bracket
5.	386X128 Pullrod
6.	195/0616H 3/8"BSF Naylor collar head screw 1"long
7.	388X105 Trip clamp
8.	386X148 Spring anchor
9.	173/08L 1/2"BSF Hex locknut
10.	386X148 Spring anchor
11.	203/04 1/4"BSF Hex. nut (pinnacle type)
12.	176/0414 1/4"BSF Hex. socket set screw cup point 7/8"long
13.	286V125B Attachment bracket
14.	386X145 Return spring
15.	154/06 3/8"BSF Spring lock washer
16.	155/0636 3/8"BSF Hex. socket head cap screw 2.1/4"long



286 V 2

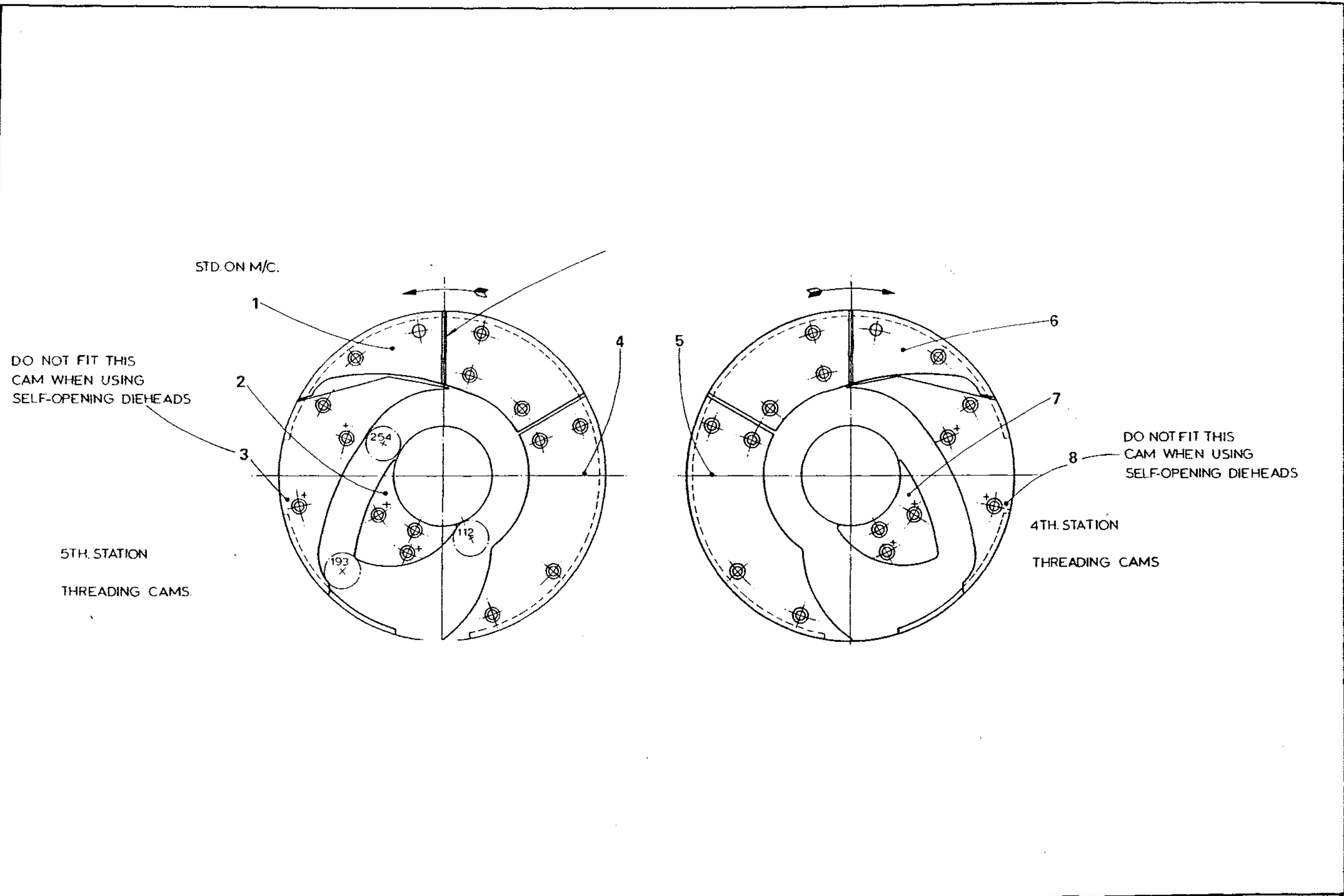
Threading Attachment Extra Parts Stns.3 & 6,Sect.286D Mk1 Drg.286 V 3

Part No	Description
1. 203/04	1/4"BSF Hex. nut (pinnacle type)
2. 176/0414	1/4"BSF Hex. socket set screw cup point 7/8"long
3. 286V129A	Attachment bracket
4. 386X148	Spring anchor
5. 155/0624	3/8"BSF Hex. socket head cap screw 1.1/2"long
6. 154/06	3/8"BSF Spring lock washer
7. 386X145	Return spring
8. 195/0516H	5/16"BSF Naylor collar head screw 1"long
9. 186X137A	Spring anchor clamp
10. 386X148	Spring anchor



Threading Cams Mk.11, Stations 4 and 5 Drg. 286 Y 4C

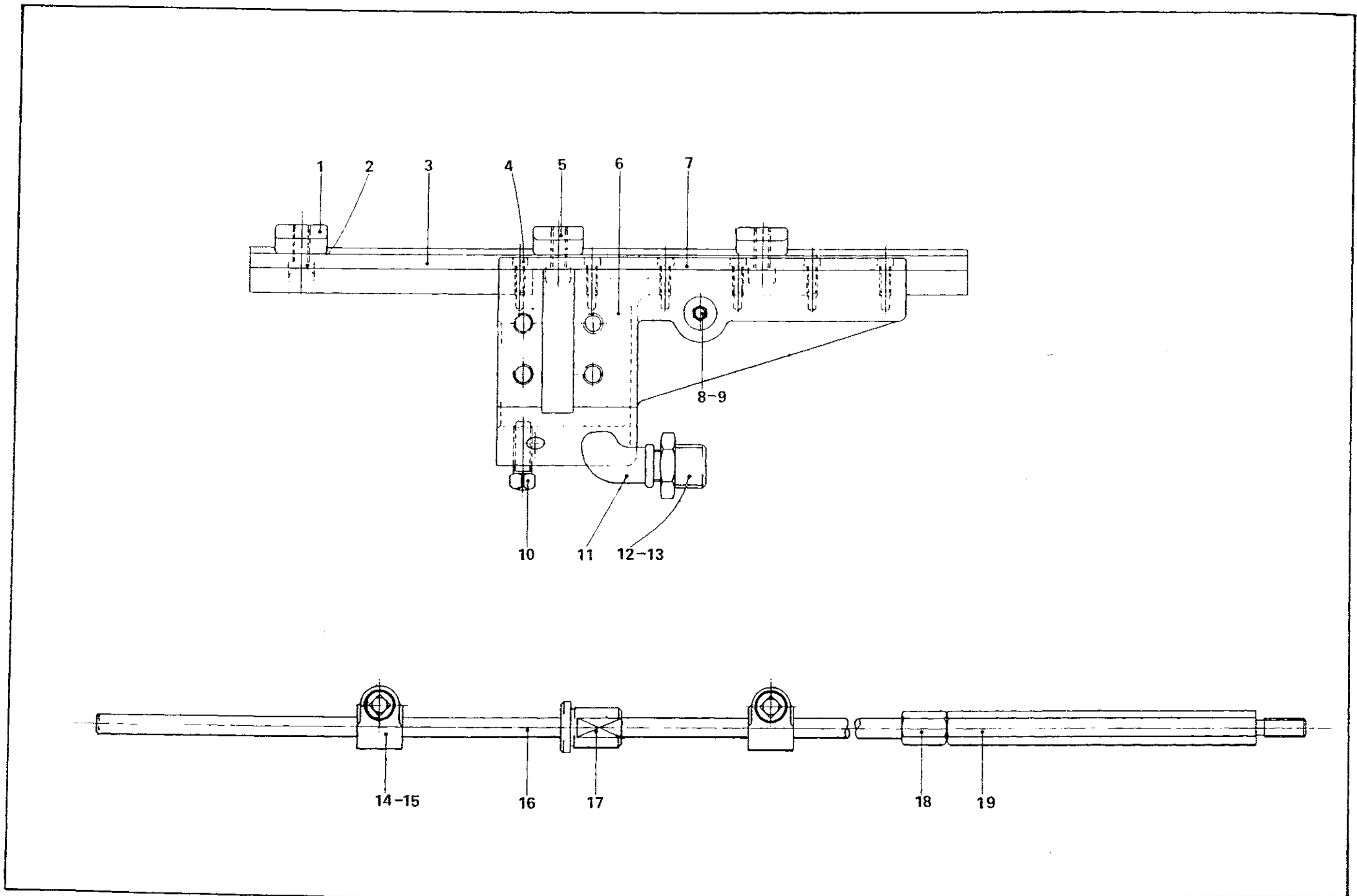
	Part No	Description
1.	224V123	Return cam
2.	286V141B	Threading cam
3.	286V145A	Return cam
4.	224V124	Guard cam
5.	225V106	Guard cam
6.	225V105	Return cam
7.	286V143B	Threading cam
8.	286V146A	Return cam





Attachment Body and Slide, Section 288 Mk.1 Drg. 288 Y 1

Part No	Description
1. 288X111	Tee nut
2. 155/0510	5/16"BSF Hex. socket head cap screw 5/8"long
3. 288V103B	Slide
4. 156/208	2BA Hex. socket head cap screw 1/2"long
5. 155/0512	5/16"BSF Hex. head cap screw 3/4"long
6. 288Y101A	Attachment body
7. 288X107	Guide strip
8. 212/04S	1/4"BSF Nipple (short)
9. 210/1725	Yellow indicator washer
10. 188/0616	3/8"BSF Squ. head set screw
11. -	1/4"BSP M & F Elbow
12. AD18	1/2" to 1/4" BSP Reducer
13. 194/2	1/4"BSP Hex. socket pipe plug (Taper)
14. 188X108	Trip clamp
15. 195/0512H	5/16"BSF Naylor collar head screw 3/4"long
16. 288X110	Trip rod
17. 288X112	Trip bush
18. 188X109	Nut
19. 288X108	Trip rod extension

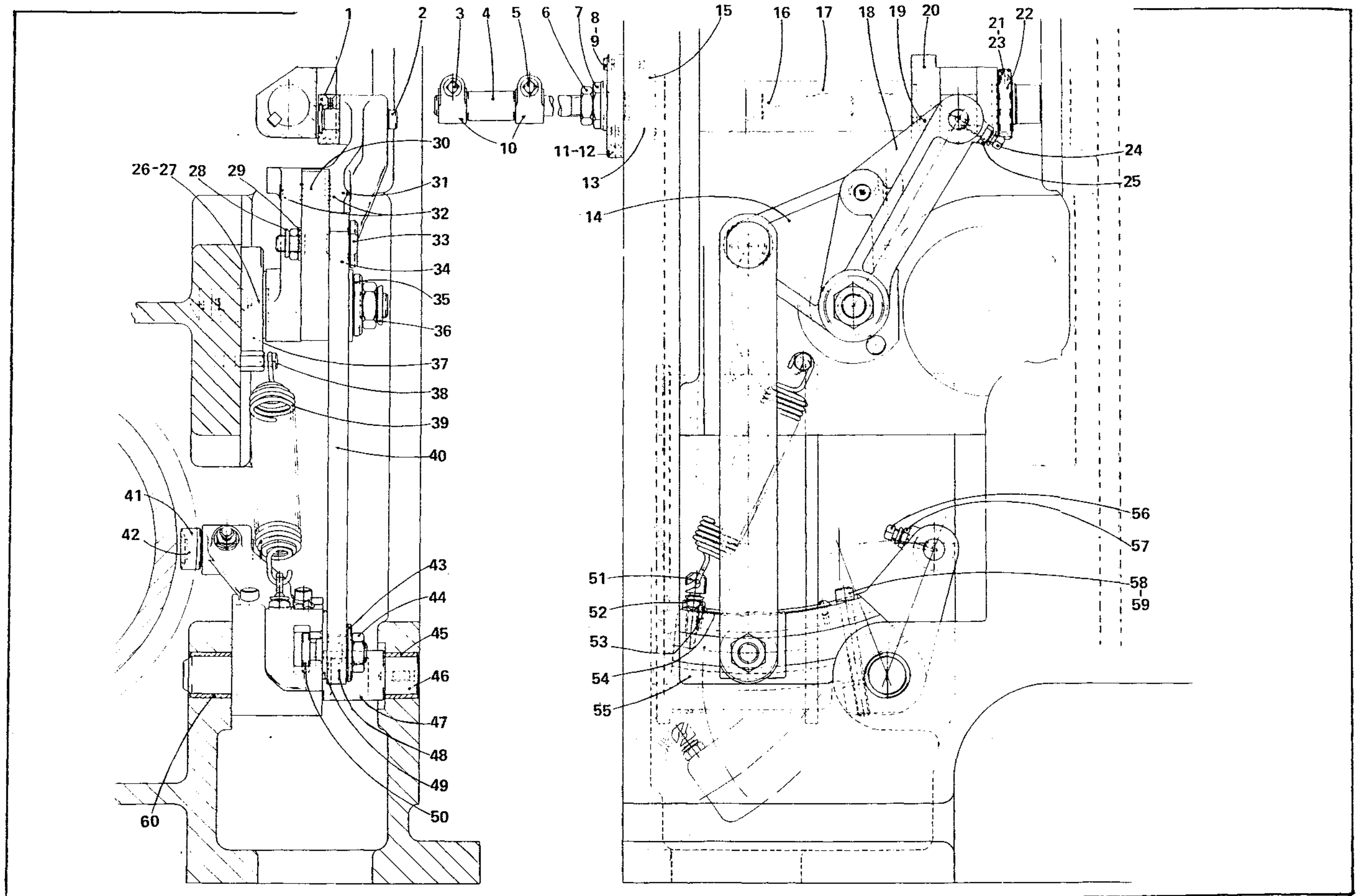


288 Y 1

Auxiliary Longitudinal Motion, 6th Stn. Mk.1 Drg. 289 Z 1

Part No	Description
1.	389X112 Slipper
2.	389X121 Roller pin
3.	195/0516H 5/16"BSF Squ. head collar screw 1"long
4.	189AX131 Push rod bush
5.	195/0516 5/16"BSF Squ.head collar screw 1"long
6.	173/10HL 5/8"BSF Locknut (hardened)
7.	189AX113 Push rod adaptor
8.	154/04 1/4"dia. Spring lock washer
9.	155/0414 1/4"BSF Socket head cap screw 7/8"long
10.	189AX115 Push rod clamp
11.	154/04 Spring lock washer
12.	155/0408 1/4"BSF Socket head cap screw 1/2"long
13.	189AX112 Push rod key
14.	189X117A Operating lever plate
15.	189A111 Push rod guide
16.	289X114 Push rod extension
17.	289V110 Pusher shaft
18.	289V102A Operating lever
19.	121/1024T 5/16"Squ. Tapped key 1.1/2"long
20.	289X104 Glut
21.	153/04 Soft pad
22.	150/20 Slotted locknut 1.1/4"dia.22T.P.I.
23.	176/0405 1/4"BSF Socket set screw 5/16"long
24.	183/0520 5/16"BSF Squ. head taper point screw 1.1/4"long
25.	203/05 5/16"BSF Self locking nut
26.	154/06 Spring washer
27.	155/0616 3/8"BSF Socket head cap screw 1"long
28.	203/08L 1/2"BSF Self locking nut
29.	130/08 1/2"dia.Flat washer
30.	289X119A Shear pin bush
31.	124/0532 5/32"dia. Parallel pin 2"long
32.	389X118 Shear pin bush
33.	389X125A Link pin
34.	236/161810 Oil retaining bush 1"x 1.1/8"x 5/8"long
35.	518X197 Collar
36.	203/12 3/4"BSF Self locking nut (thin)
37.	289X116 Operating lever pivot
38.	189AX130 Spring anchor
39.	289X124B Spring
40.	289X105 Link
41.	289X120 Roller
42.	389X121 Roller pin
43.	141X116 Slotted washer
44.	173/10HL 5/8"BSF Locknut (hardened)
45.	236/182216 Oil retaining bush 1.1/8" x 1.3/8" x 1"long
46.	289X103 Pivot pin
47.	289X127 bush
48.	236/161810 Oil retaining bush 1" x 1.1/8" x 5/8"long
49.	389X122 Sliding sleeve
50.	389X123 T Bolt
51.	389X115 Spring anchor
52.	203/06 3/8"BSF Self locking nut
53.	165/204 2BA Round head screw 1/4"long
54.	289X106 Scale
55.	289Y101A Quadrant lever
56.	183?0520 5/16"BSF Squ. head taper point screw 1.1/4"long
57.	203/05 5/8"BSF Self locking nut

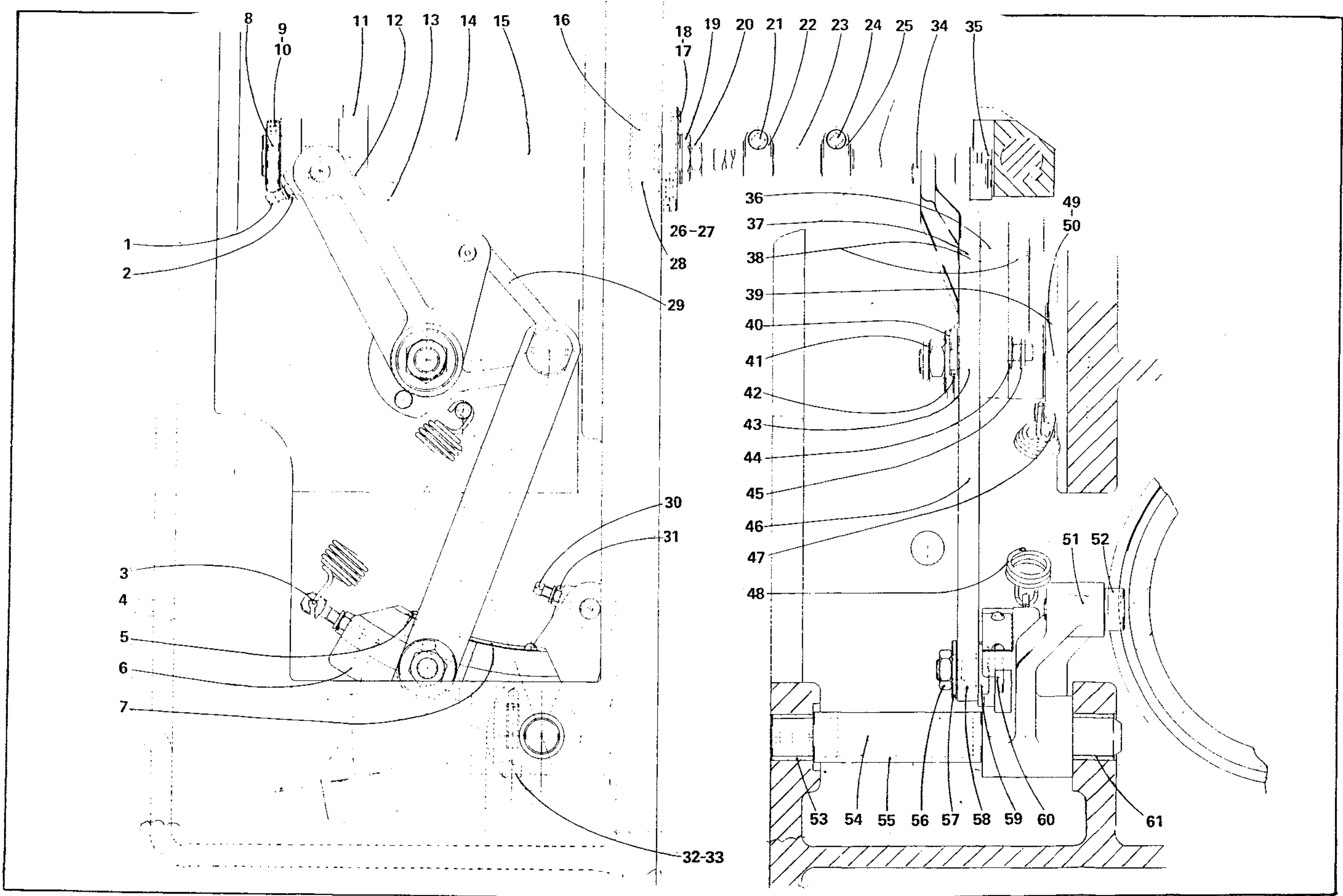
58. 15570656 3/8"BSF Socket head cap screw 3.1/2"long  
59. 154/06 Spring lock washer  
60.236/182220 Oil retaining bush 1.1/8" x 1.3/8" x 1.1/4"long



Auxiliary Longitudinal Motion, 3rd Station Mk.1 Drg. 289 Z 2

	Part No	Description
1.	183/0520	5/15"BSF Squ. head taper point screw 1.1/4"long
2.	203/05	5/16"BSF Self locking nut
3.	289X115	Spring anchor
4.	203/06	3/8"BSF Self locking nut
5.	165/204	2BA Round head screw 1/4"long
6.	289Y131A	Quadrant lever
7.	289X136	Scale
8.	150/20	Slotted locknut 1.1/4"dia. 22 T.P.I.
9.	153/04	Soft pad
10.	176/0405	1/4"BSF Socket set screw 5/16"long
11.	289X133	Glut
12.	121/1024T	5/16" Squ. tapped key 1.1/2"long
13.	289V132A	Operating lever
14.	289V110a	Pusher shaft
15.	289X114	Push rod extension
16.	189AX111	Push rod guide
17.	155/0414	1/4"BSF Socket head cap screw 7/8"long
18.	154/04	1/4"dia. Spring lock washer
19.	189AX113	Push rod bush
20.	173/10HL	5/8"ESF Hardened locknut
21.	195/0516H	5/16"BSF Squ.head collar screw 1"long
22.	189AX115	Push rod clamp
23.	189AX131	Push rod bush
24.	195/0516H	5/16"BSF Squ. head collar screw 1"long
25.	189AX115	Push rod clamp
26.	155/0408	1/4"BSF Socket head cap screw 1/2"long
27.	154/04	Spring lock washer
28.	189AX112	Push rod key
29.	289X117A	Operating lever plate
30.	183/0520	5/16"BSF Squ. head taper point screw 1.1/4"long
31.	203/05	5/16"BSF Self locking nut
32.	155/0628	3/8"BSF Socket head cap screw 1.3/4"long
33.	154/06	Spring lock washer
34.	389x121	Roller pin
35.	389X112	Slipper
36.	289X119A	Shear pin
37.	124/0532	5/32"dia. Parallel pin 2"long
38.	389X118	Shear pin Bush
39.	289X116	Operating lever pivot
40.	518X197	Collar
41.	203/12L	3/4"BSF Self locking nut (thin)
42.	389X125A	Link pin
43.	236/161810	Oil retaining bush
44.	130/08	Flat washer
45.	203/08L	1/2"BSF self locking nut
46.	289X135	Link
47.	189AX130	Spring anchor
48.	289X124B	Spring
49.	154/06	3/8"dia. Spring lock washer
50.	155/0616	3/8"BSF Socket head cap screw 1"long
51.	389X121	Roller pin
52.	289X120	Roller
53.	326/182220	Oil retaining bush
54.	289X134	Pivot pin
55.	289X128	Bush
56.	173/10HL	5/8"BSF Hardened locknut
57.	141X116	Slotted washer

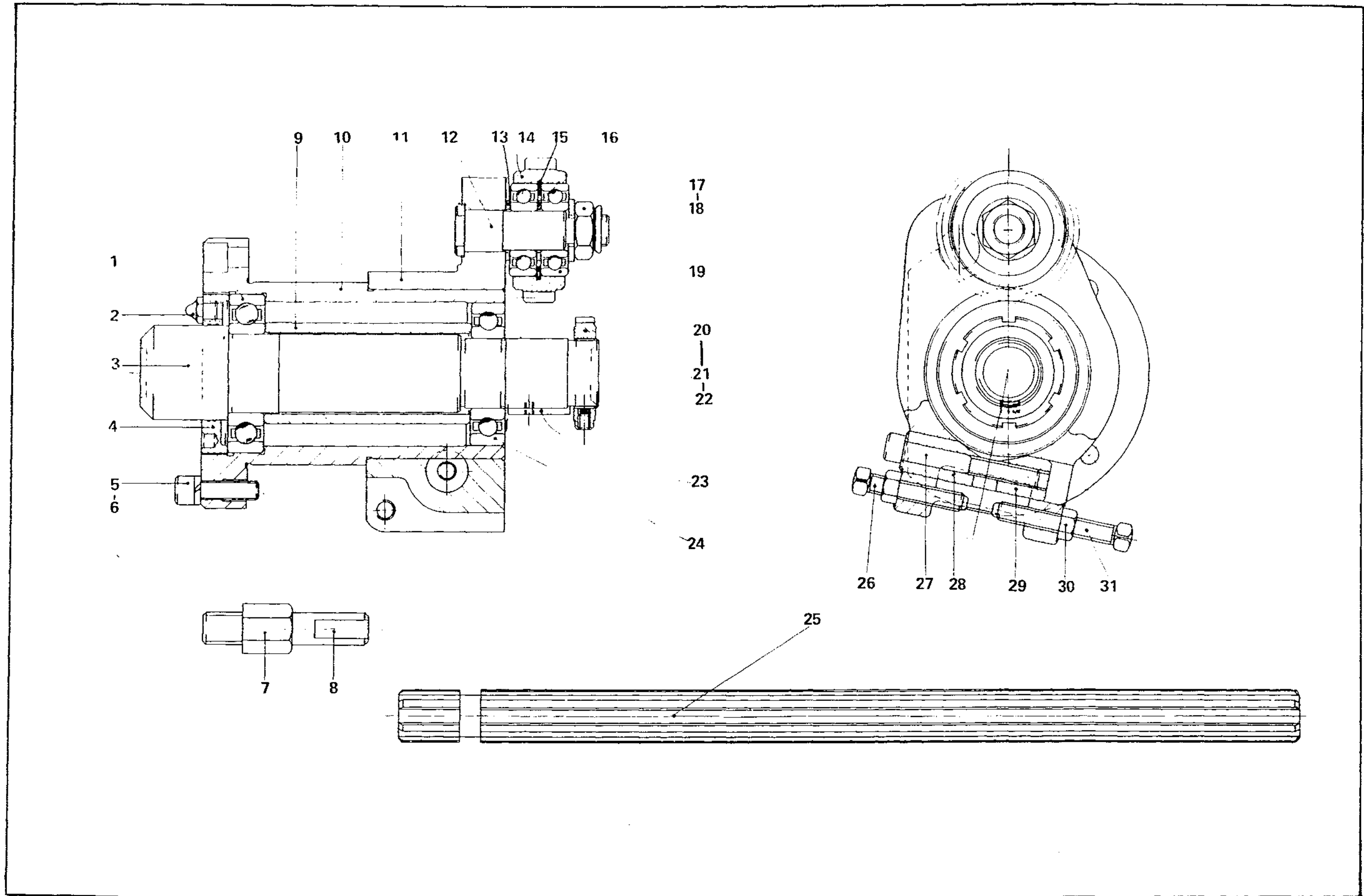
58.	236/161810	Oil retaining bush
59.	389X122	Sliding sleeve
60.	389X123	Tee bolt
61.	236/182220	Oil retaining bush





High Speed Drilling Drive, Section 290 Mk.1 Drg. 290 Y 1

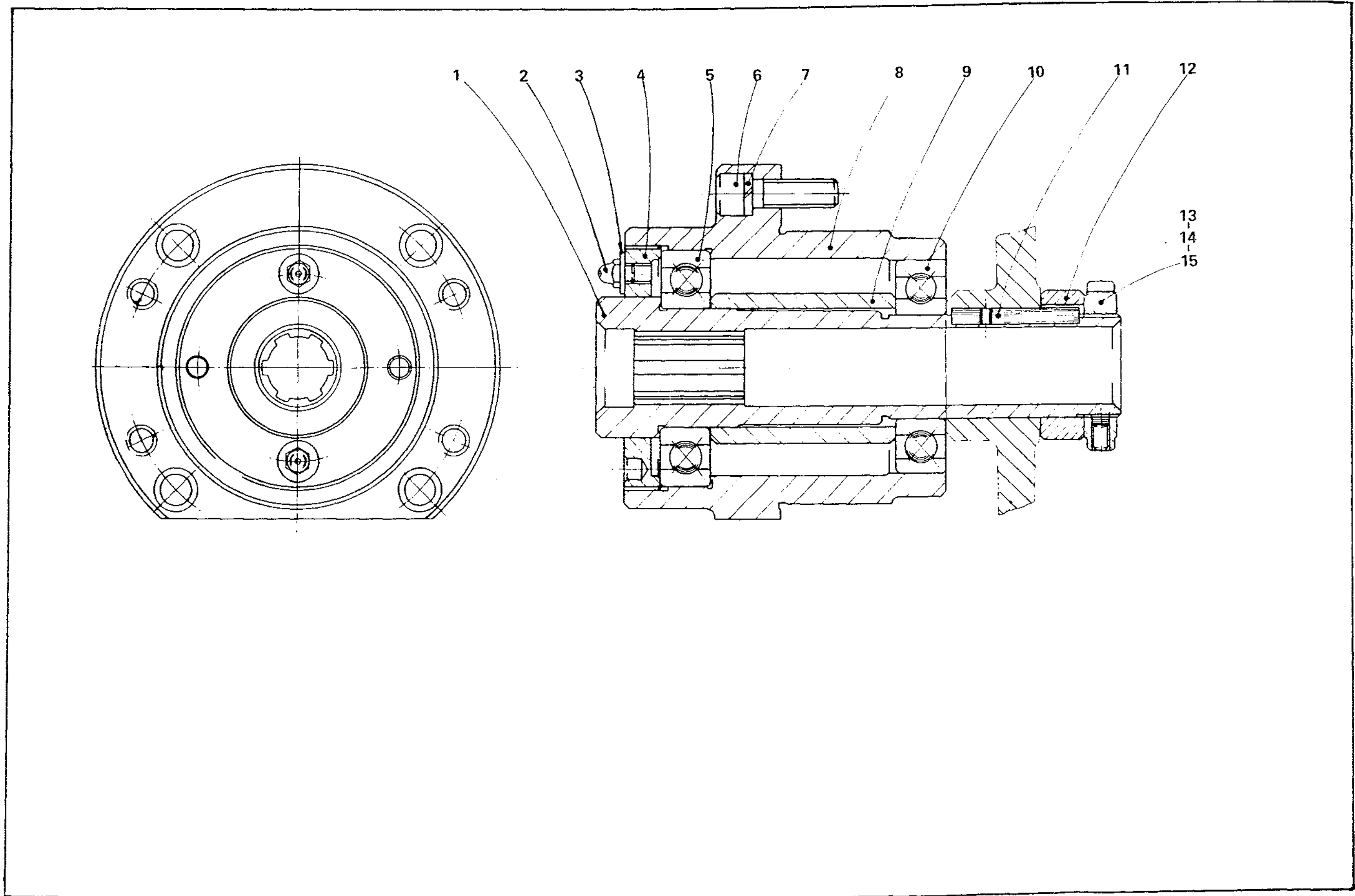
Part No	Description
1.	258/40 Ball journal Bearing (light) 40 x 80 x 18mm
2.	212/18 1/8"BSP Grease nipple
3.	290X128 Drive sleeve
4.	290X122 Bearing nut
5.	155/0620 3/8"BSF Hex. socket head cap screw 1.1/4"long
6.	154/06 Spring washer
7.	390X131 Nut
8.	390X120 Anchor pin
9.	290X119 Bearing spacer
10.	290V125A Drill drive housing
11.	290V126A Idler bracket
12.	290X118 Idler pin
13.	290X116 Idler spacer
14.	290X117 Idler gear
15.	104/27 internal circlip
16.	290X116 Idler spacer
17.	203/10L 5/8"BSF Pinnacle locknut
18.	130/10 Washer
19.	258/20 Ball journal (Light) 20 x 47 x 14mm
20.	150/22 Slotted locknut 1.3/8" x 22 T.P.I.
21.	176/0405 1/4"BSF Hex. socket set screw cup point 5/16"long
22.	153/04 Soft pad
23.	122/1220T Extractable key 1/4" x 3/8" x 1.1/4"long
24.	258/35 Ball journal (light) 35 x 72 x 17mm
25.	FX 3730A Splined shaft
26.	188/0632 3/8"BSF Squ. head set screw 2"long
27.	155/0644 3/8"BSF Hex.head cap screw 2.3/4"long
28.	590X110 Pad bush
29.	590X109 Pad nut
30.	173/06H Hex. nut hardened
31.	188/0640 3/8"BSF Squ.head set screw 2.1/2"long



290 Y 1

Synchronous Drive Drg. 290 V 5

Part No	Description
1. 290X142	Drive sleeve
2. 212/04S	1/4"BSF Oil or grease nipple
3. 210/1725	Yellow indicator washer
4. 290X144	Bearing nut
5. 258/40	Light metric journal 40mm bore
6. 155/0620	3/8"BSF Socket head cap screw 1.3/4"long
7. 154/06	3/8"dia Spring washer
8. 290V141A	Synchronous drive housing
9. 290X143	Bearing spacer
10. 258/35	Light metric journal 35mm bore
11. 122/1228T	Rectangular key Tapped 3/8" x 1/4" x 1.3/4"long
12. 190X145	Gear spacer
13. 150/22	Slotted locknut 1.3/8" x 22 T.P.I.
14. 153/04	1/2"dia.Spring washer
15. 176/0405	1/4"BSF Socket set screw 5/16"long

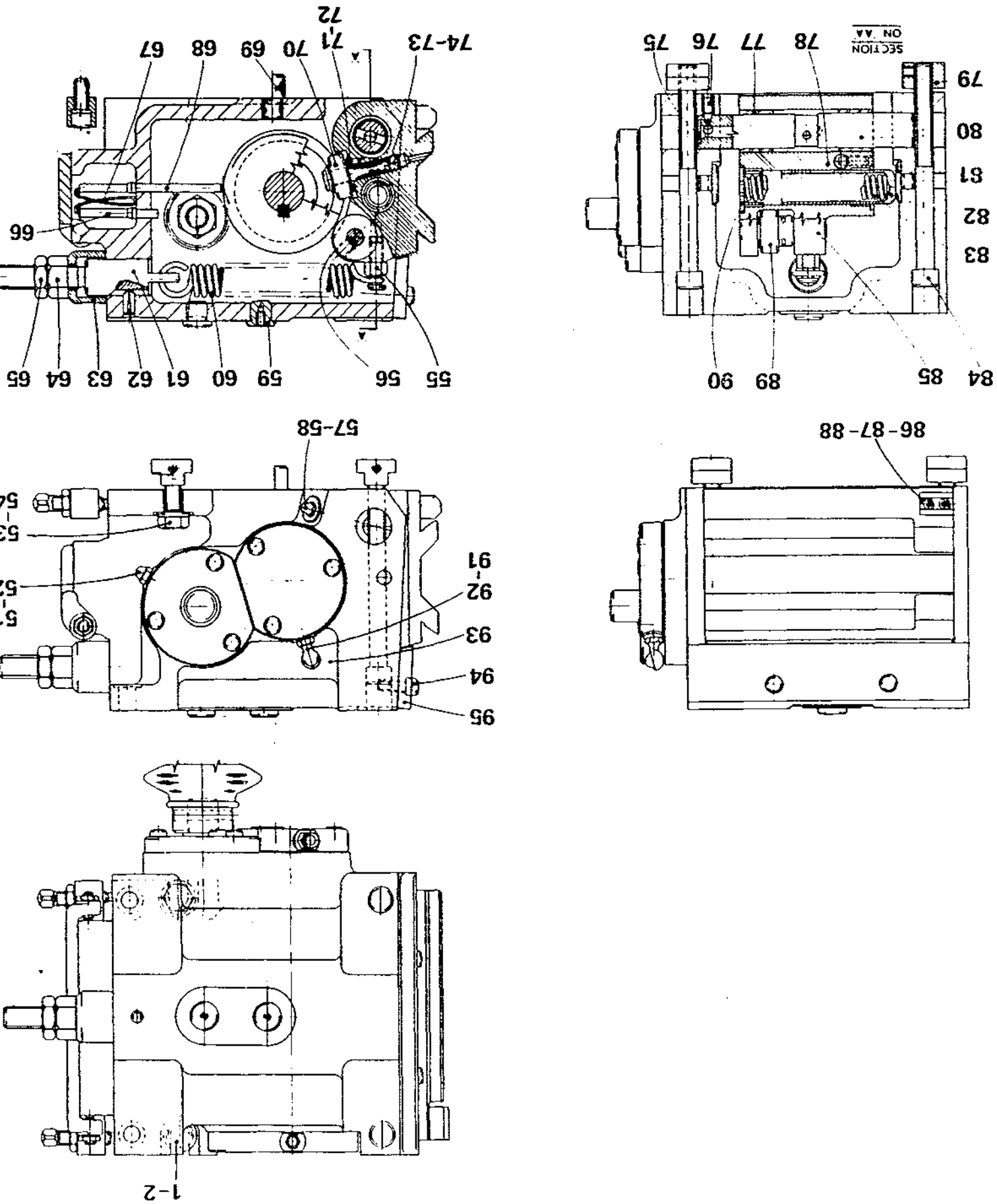


290 V 5

Chasing Attachment Drg. 192 Z 1B

Part No	Description
1.	155/0620 3/8"BSF Socket head cap screw 1.1/4"long
2.	130/06 3/8"dia. Flat washer
3.	153/42 Brass pad for 2BA
4.	179/204 2BA Hex. socket set screw cup point 1/4"long
5.	150/10 Slotted locknut 5/8"dia 22T.P.I.
6.	258/17 Light ball journal 17mm bore
7.	192x102 End cap
8.	155/0410 1/4"BSF Socket head cap screw 5/8"long
9.	154/04 1/4"dia. Spring washer
10.	176/0405 1/4"BSF Hex. socket set screw cup point 5/16"long
11.	192X125 Spacer
12.	2BY151 Standard lead cam
13.	192X126 Camshaft
14.	192BX103 Special cam for worm threads 250 cycles per min.max.
15.	192V150A Relief cam
16.	192X130 Driven gear
17.	154/04 1/4"dia. Spring washer
18.	155/0412 1/4"BSF Socket head cap screw 3/4"long
19.	SB58 Light ball angular contact 17mm bore
20.	155/0412 1/4"BSF Socket head cap screw 3/4"long
21.	154/04 1/4"dia. Spring washer
22.	203/08 1/2"BSF Self locking nut
23.	130/08 1/2"dia.Flat washer
24.	192X103 Thrust cap
25.	SB58 Light ball angular contact17mm bore
26.	192X128 Inner spacer
27.	192X127 Drive shaft
28.	192X104 End cap
29.	121/0824 1/2"Squ. key 1.1/2"long
30.	203/08 1/2"BSF Self locking nut
31.	130/08 1/2"dia. Flat washer
32.	121/0610 3/16"Squ. Key 5/8"long
33.	192X131 Driving gear
34.	192X129 Outer spacer
35.	173/05 5/16"BSF Hex. nut
36.	182/0516 5/16"BSF Hex. socket set screw taper point 1"long
37.	155/0412 1/4"BSF Socket head cap screw 3/4"long
38.	154/04 1/4"dia. Spring washer
39.	212/04 1/4"BSF Autolub nipple
40.	210/1725 Yellow indicator washer
41.	173/04L 1/4"BSF Locknut
42.	182/0412 1/4" BSF Socket set screw taper point 3/4"long
43.	192X105A Oil cover
44.	192X146 Lubrication plate
45.	165/404 4BA Round head set screw 14"long
46.	192X119 Adjustment strip
47.	155/0512 5/16"BSF Socket head cap screw 3/4"long
48.	154/05 5/16" Spring washer
49.	188/0520 5/16"BSF Squ. head set screw 1.1/4"long
50.	173/05L 5/16"Locknut
51.	210/1725 Yellow indicator washer
52.	212/9004 1/4"BSF Autolube nipple
53.	130/06 3/8"dia. Flat washer
54.	167/0620H 3/8"BSF Hex. head set screw hardened 1.1/4"long
55.	192X114 Spring anchor
56.	182/408 1/4"BSF Hex. set screw taper point 1/2"long
57.	210/1725 Yellow indicator washer

58.	212/04	1/4"BSF Autolube nipple
59.	192X159	Plug
60.	192X115	Tension spring
61.	192X116	Spring adjuster
62.	143/0808A	1/4"dia. Mills pin 1/2"long
63.	192X117	Collar
64.	173/08	1/2"BSF Hex. nut
65.	173/08L	1/2"BSF Locknut
66.	192X142A	Oil pipe
67.	192X143	Thrust washer
68.	192X160	Oil pipe
69.	192X118A	Locator
70.	192X112	Lead roller
71.	124/0205	1/16"dia. Parallel dowel 5/16"long
72.	192X143	Thrust washer
73.	192X113	Lead roller pin
74.	182/0408	1/4"BSF Socket set screw taper point 1/2"long
75.	192X147	Plug
76.	182/0408	1/4"BSF Hex. socket set screw 1/2"long
77.	192X108	Slide bush
78.	192Y107	Slide
79.	192X132	Tee nut
80.	192X109	Slide shaft
81.	192X123	Thrust pad
82.	192X120	Spring plunger
83.	192X122	Lead spring
84.	155/0672	3/8"BSF Socket head cap screw 4.1/2"long
85.	192110	Relief of roller pin
86.	192X161	Stop
87.	156/408	2BA Socket head cap screw 1/2"long
88.	154/4	1/4"dia. Spring washer
89.	192X111	Relief roller
90.	192X121	Spring cap
91.	212/9004	1/4"BSF Autolube nipple
92.	210/1725	Yellow indicator washer
93.	192Z101B	Main body
94.	155/0410	1/4"BSF Socket head cap screw 5/8"long
95.	192X106A	Cover plate



Frame 2, 6-Spindle  
Bar, Parts

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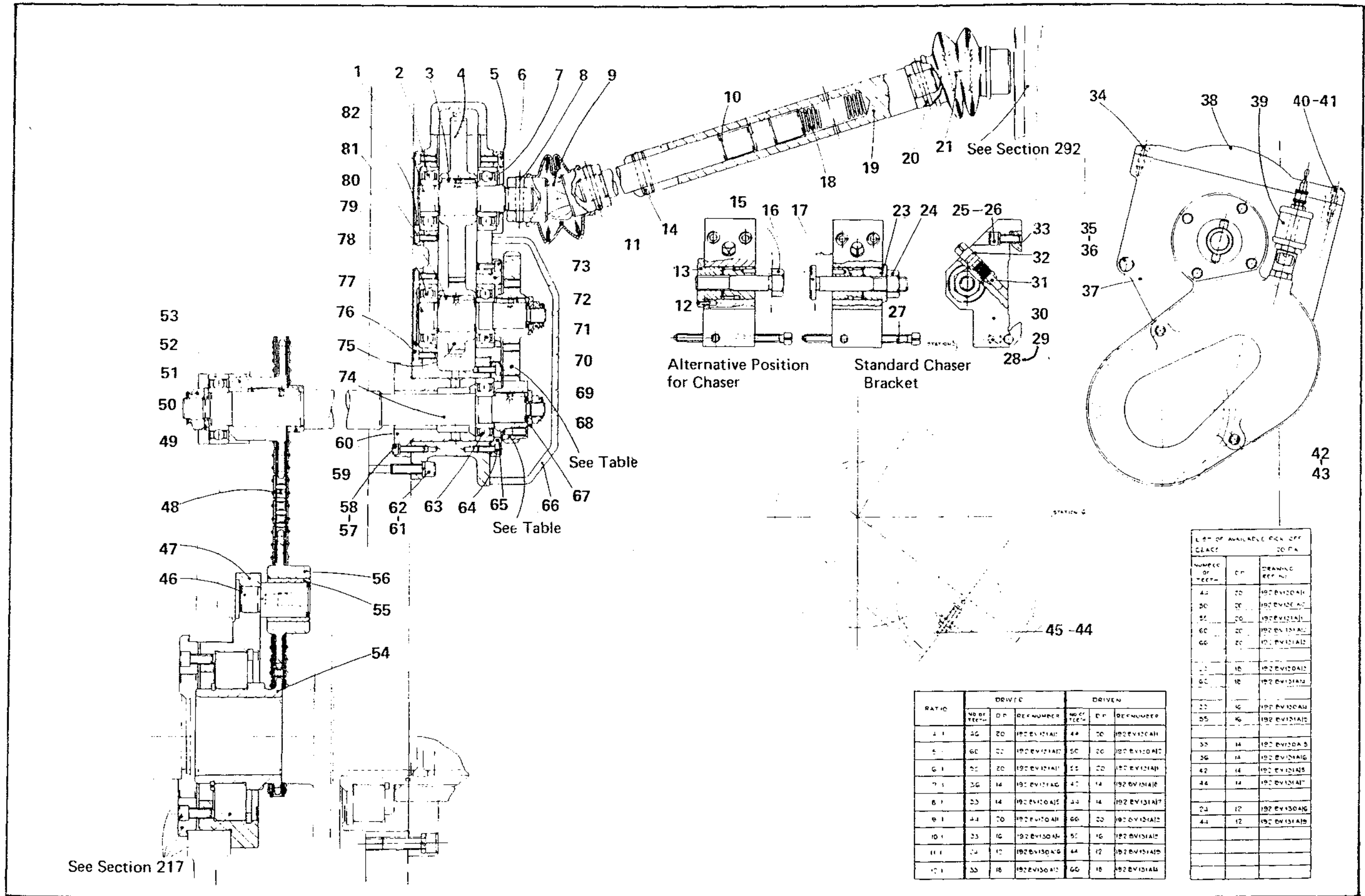
PLPR2/6  
25/04/90

192 Z 1B

Part No	Description
1.	192AX111 Final shaft
2.	263/20 Light metric angular contact bearing 20mm bore
3.	121/0816T 1/4"Squ.Tapped key 1"long
4.	192B102 Top cover
5.	156/208 2BA Socket head cap screw 1/2"long
6.	192AX105 End cover
7.	263/20 Light metric angular contact bearing 20mm Bore
8.	125/1622 1/4"dia. taper pin 1.3/8"long
9.	- Mollart Universal ball joint with cover No 3
10.	292X169A Drive shaft
11.	125/1622 1/4"dia. Taper pin 1.3/8"long
12.	326/0306 3/32"dia. Tension pin 3/8"long
13.	192X139A Clamp nut
14.	192AX120 Drive pin
15.	192X140 Clamp bolt
16.	192X134 Clamp bolt
17.	192X135A Adjusting gear
18.	192AX132 Coupling shaft spring
19.	192AX133 Drive sleeve
20.	125/1622 1/4"dia. Taper pin 1.3/8"long
21.	- Mollart Universal ball joint with cover No 3
22.	-
23.	192X138A Clamp bush
24.	173/07H 7/16"BSF Hex. nut hardened
25.	155/0410 1/4"BSF Socket head cap screw 5/8"long
26.	154/04 1/4"dia. Spring washer
27.	188/0452 1/4"BSF Squ. head set screw 3.1/4"long
28.	176/0406 1/4"BSF Socket set screw cup point 3/8"long
29.	153/04 1/4"BSF Soft pad
30.	292X187B Chaser bracket
31.	192X136A Adjusting worm
32.	124/0414 1/8"dia. Parallel pin 7/8"long
33.	192X137 Clamp
34.	159/210 Socket head counter sunk screw
35.	154/05 5/16"dia. Spring washer
36.	155/0504 5/16"BSF Socket head cap screw 2.1/2"long
37.	192AY101 Drive box
38.	292X102 Top cover
39.	- Rotherham sight feed lubricator No 0
40.	156/210 2BA Socket head cap screw 5/8"long
41.	154/03 3/16"dia. Spring washer
42.	156/228 2BA Socket head cap screw 1.3/4"long
43.	154/03 3/16"dia. Spring washer
44.	203/04 1/4"BSF Self locking nut
45.	183/0416 1/4"BSF Squ. head set screw taper point 1"long
46.	118X162A Jockey pin
47.	292V157 Jockey carrier housing
48.	- Chain B.S.No3 90 Pitches long
49.	130/10 5/8"dia. Flat washer
50.	203/10L 5/8"BSF Self locking nut
51.	258/25 Light metric bearing journal 25mm bore
52.	292X160A Driven sprocket
53.	121/0824T 1/4"Squ. Key 1.1/2"long
54.	292X158A Driving sprocket
55.	236/162020 Oil retaining bush 1" x 1.1/4" x 1.1/4"long
56.	292X159 Jockey sprocket
57.	154/03 3/16"dia. Spring washer



58.	156/212	2BA Socket head cap screw 3/4"long
59.	292X166A	Spacer
60.	192AX104	Location bush
61.	154/05	5/16"dia. Spring washer
62.	155/0516	5/16"BSF Socket head cap screw 1"long
63.	258/20	Light metric bearing journal 20mm bore
64.	156/208	2BA Socket head cap screw 1/2"long
65.	192AX107	Clamp ring
66.	192AV106A	Gear cover
67.	192AX114	Washer
68.	263/20	Light metric angular contact bearing 20mm bore
69.	192AX114	Washer
70.	203/07L	7/16"BSF Self locking nut thin
71.	121/0814T	1/4"Squ. Tapped key 7/8"long
72.	192AX108	Bearing housing
73.	156/208	2BA Socket head cap screw 1/2"long
74.	292X165	Drive shaft
75.	192BX101	Driving gear
76.	156/208	2BA Socket head cap screw 1.1/2"long
77.	192AX103	End cover
78.	192AX112	Intermediate shaft
79.	263/20	Light metric angular contact bearing 20mm bore
80.	121/0816T	1/4"Squ. Tapped key 1"long
81.	156/208	2BA Socket head cap screw 1/2"long
82.	192AX103	End cover



LIST OF AVAILABLE PICK OFF GEARS TO PA

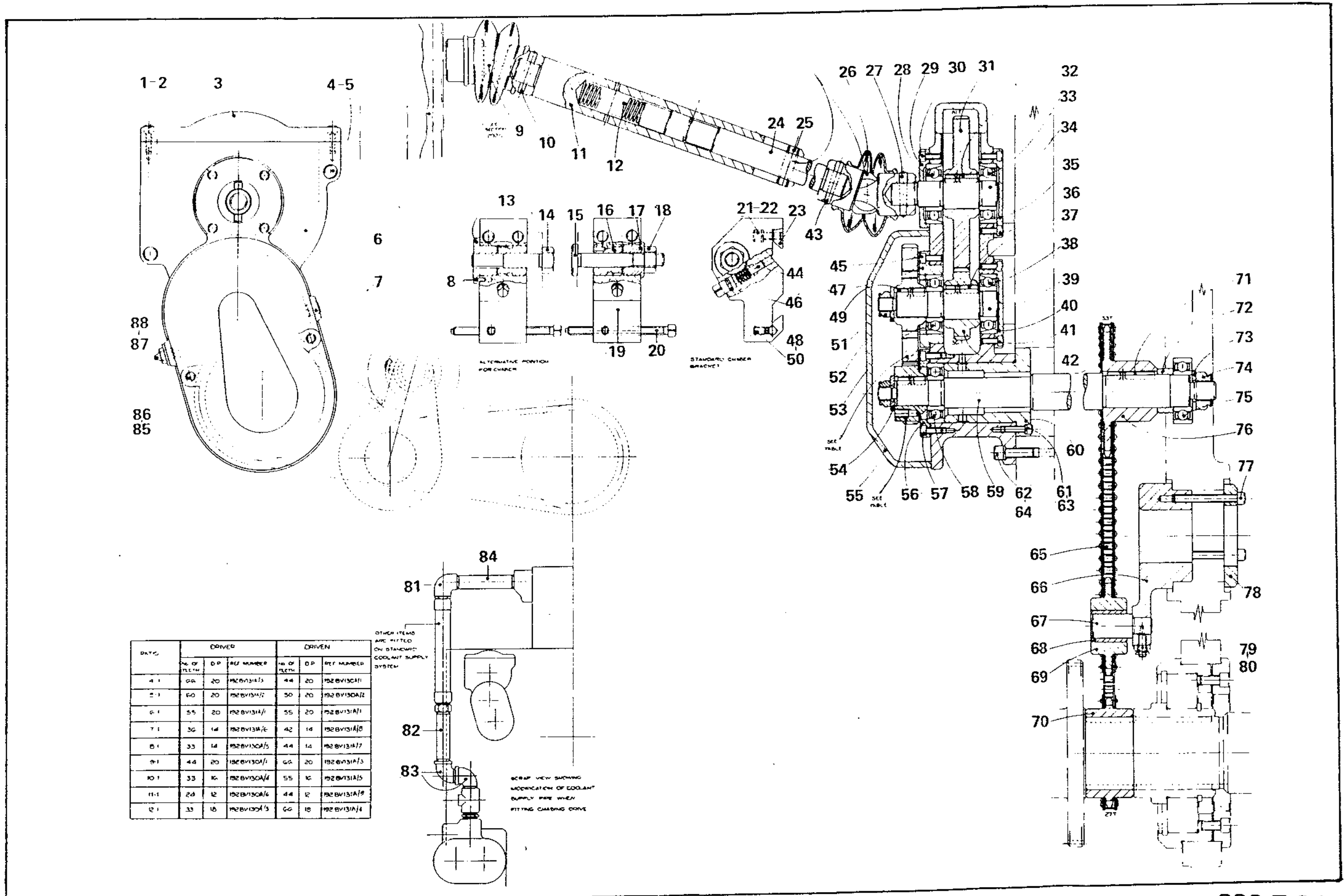
NUMBER OF TEETH	D.P.	DRAWING REF. NO.
42	20	192 EVIDIAH
50	20	192 EVIDIAH
51	20	192 EVIDIAH
60	20	192 EVIDIAH
66	20	192 EVIDIAH
71	16	192 EVIDIAH
80	16	192 EVIDIAH
81	16	192 EVIDIAH
82	16	192 EVIDIAH
55	16	192 EVIDIAH
53	14	192 EVIDIAH
36	14	192 EVIDIAH
42	14	192 EVIDIAH
44	14	192 EVIDIAH
24	12	192 EVIDIAH
44	12	192 EVIDIAH

RATIO	DRIVER			DRIVEN		
	NO OF TEETH	D.P.	REF NUMBER	NO OF TEETH	D.P.	REF NUMBER
1:1	20	20	192 EVIDIAH	44	20	192 EVIDIAH
5:1	60	20	192 EVIDIAH	50	20	192 EVIDIAH
6:1	60	20	192 EVIDIAH	51	20	192 EVIDIAH
7:1	20	14	192 EVIDIAH	42	14	192 EVIDIAH
8:1	20	14	192 EVIDIAH	44	14	192 EVIDIAH
9:1	44	20	192 EVIDIAH	66	20	192 EVIDIAH
10:1	20	16	192 EVIDIAH	50	16	192 EVIDIAH
11:1	24	12	192 EVIDIAH	44	12	192 EVIDIAH
12:1	33	16	192 EVIDIAH	66	16	192 EVIDIAH

Chasing attachment Drive 4th Station Drg. 292 Z 2A

Part No	Description
1.	154/03 3/16"dia. Spring washer
2.	156/210 2BA Socket head cap screw 5/8"long
3.	192AX102 Top cover
4.	154/05 5/16"dia. Spring washer
5.	155/0548 5/16"BSF Socket head cap screw 3"long
6.	392Y155A Drive box
7.	194/1 1/8"BSF Socket pipe plug
8.	326/0306 3/32"dia. Tension pin 3/8"long
9.	- Mollart Universal ball joint with cover No3
10.	125/1622 1/4"dia. Taper pin 1.3/4"long
11.	192AX133 Drive sleeve
12.	192AX132 Coupling shaft spring
13.	192X139A Clamp nut
14.	192X140 Clamp bolt
15.	192X134 Clamp bolt
16.	192X135A Adjusting gear
17.	192X138 Clamp bush
18.	173/07H 7/16"BSF nut hardened
19.	292X186A Chaser bracket
20.	188/0452 1/4"BSF Squ. head set screw 3/4"long
21.	155/0410 1/4"BSF Socket head set screw 5/8"long
22.	154/04 1/4"dia. Spring washer
23.	192X137 Clamp
24.	292X169A Drive shaft
25.	192X120 Drive pin
26.	- Mollart Universal ball joint with cover No3
27.	125/1622 1/4"dia. Taper pin 1.3/8"long
28.	263/20 Light metric angular bearing journal 20mm Bore
29.	192Ax105 End cover
30.	156/208 2BA Socket head set screw 1/2"long
31.	192BX102 Top cover
32.	121/0816T 1/4"dia. Tapped key 1"long
33.	263/20 Light metric angular contact bearing 20mm bore
34.	192AX111 Final shaft
35.	192AX103 End cover
36.	156/208 2BA Socket head cap screw 1/2"long
37.	121/0816T 1/4"Squ. Tapped key 1"long
38.	236/20 Light metric angular contact bearing 20mm bore
39.	192AX112 Intermediate shaft
40.	192AX103 End cover
41.	156/208 2BA Socket head cap screw 1/2"long
42.	192BX101 Driving gear
43.	125/1622 1/4"dia. Taper pin 1.3/8"long
44.	192X136A Adjusting worm
45.	156/208 2BA Socket head cap screw 1/2"long
46.	124/0414 1/8"dia. Parallel pin 7/8"long
47.	192AX108 Bearing housing
48.	153/04 Soft pad for 1/4"screw
49.	121/0814T 1/4"Squ. tapped key 7/8"long
50.	176/0406 1/4"BSF Socket set screw cup point 3/8"long
51.	203/07L 7/16"BSF Self locking nut Thin
52.	192AX114 Washer
53.	263/20 Light metric angular contact bearing 20mm
54.	192AX114 Washer
55.	392V168 Gear cover
56.	192AX107 Clamp ring
57.	156/208 2BA Socket head cap screw 1/2"long

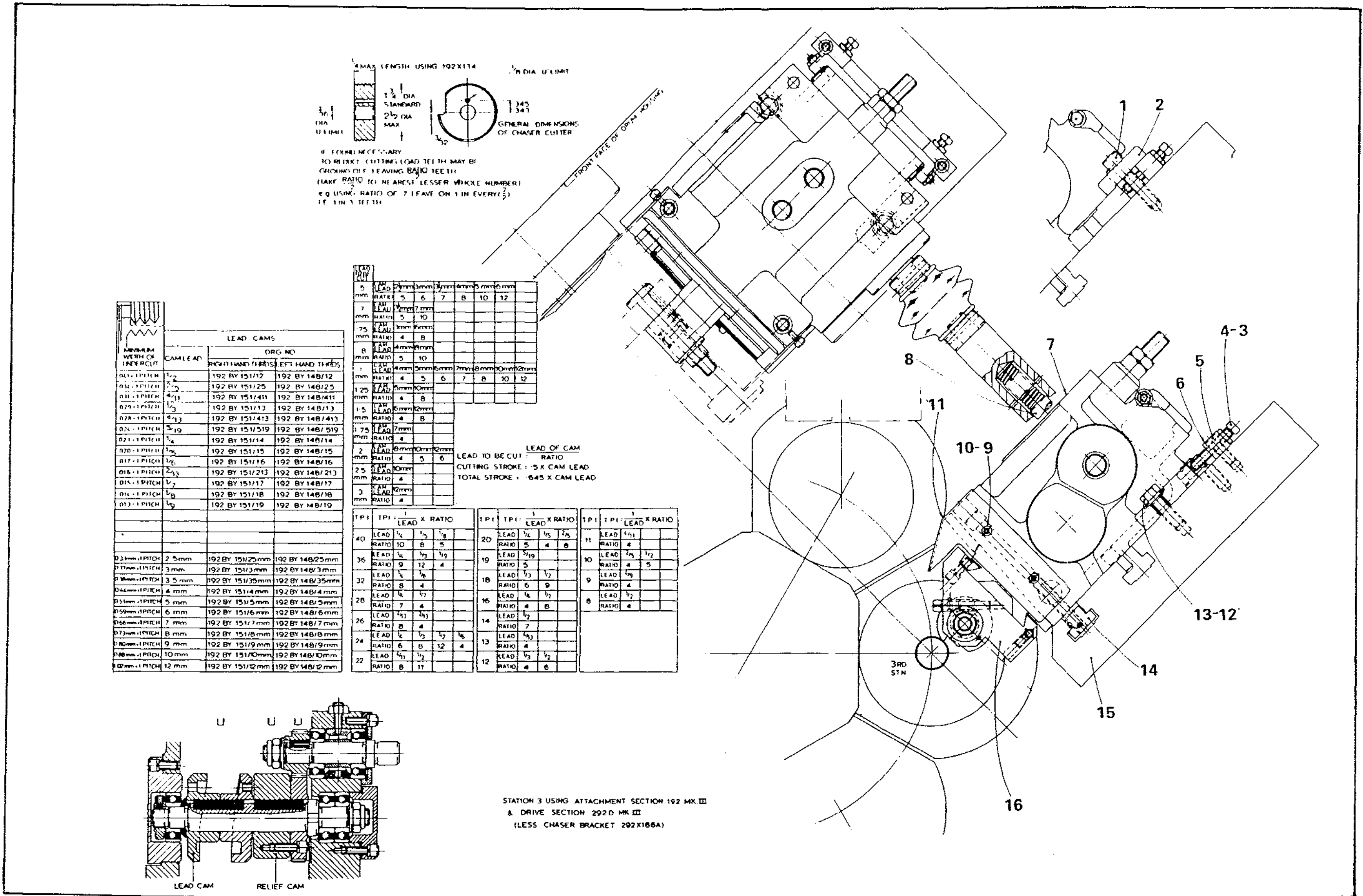
58.	258/20	Light metric journal bearing 20mm bore
59.	292X165	Drive shaft
60.	292X167	Location bush
61.	156/212	2BA Socket head cap screw 3/4"long
62.	155/0516	5/16"BSF Socket head cap screw 1"long
63.	154/03	3/16"dia. Spring washer
64.	154/05	5/16"dia.Spring washer
65.	-	Chain B.S.No3 89 pitches long
66.	292X176	Jockey carrier
67.	192AX118A	Jockey pin
68.	236/121618	Oil retaining bush 3/4" x 1" x 1.1/8"long
69.	292X175	Jockey sprocket
70.	292X162	Driving sprocket
71.	121/0824T	1/4"Squ. Tapped key 1.1/2"long
72.	292X166A	Spacer
73.	130/10	5/8"dia. Flat washer
74.	203/10L	5/8"BSF Self locking nut Thin
75.	258/25	Light metric journal race bearing 25mm
76.	292X160A	Driven sprocket
77.	155/0432	1/4"BSF Socket head cap screw 2"long
78.	192AX117A	Clamp ring
79.	182/0414	1/4"BSF Socket set screw taper point 7/8"long
80.	203/04	1/4"BSF Self locking nut
81.	-	1.1/4"BSP Equal elbow 90degree male & female
82.	-	1.1/4"BSP Pipe screwed both ends 7.1/2"long
83.	-	1.1/4"BSP Equal elbow 90degree male & female
84.	-	1.1/4"BSP Pipe screwed both ends 8.3/4"long
85.	154/03	3/16"dia. Spring washer
86.	156/228	2BA Socket head cap screw 1.3/4"long
87.	212/18	1/8"BSP Oil nipple
88.	210/2525	Yellow indicator washer



292 Z 2A

Chasing Attachment Station 3 Drg. 292 Z 53

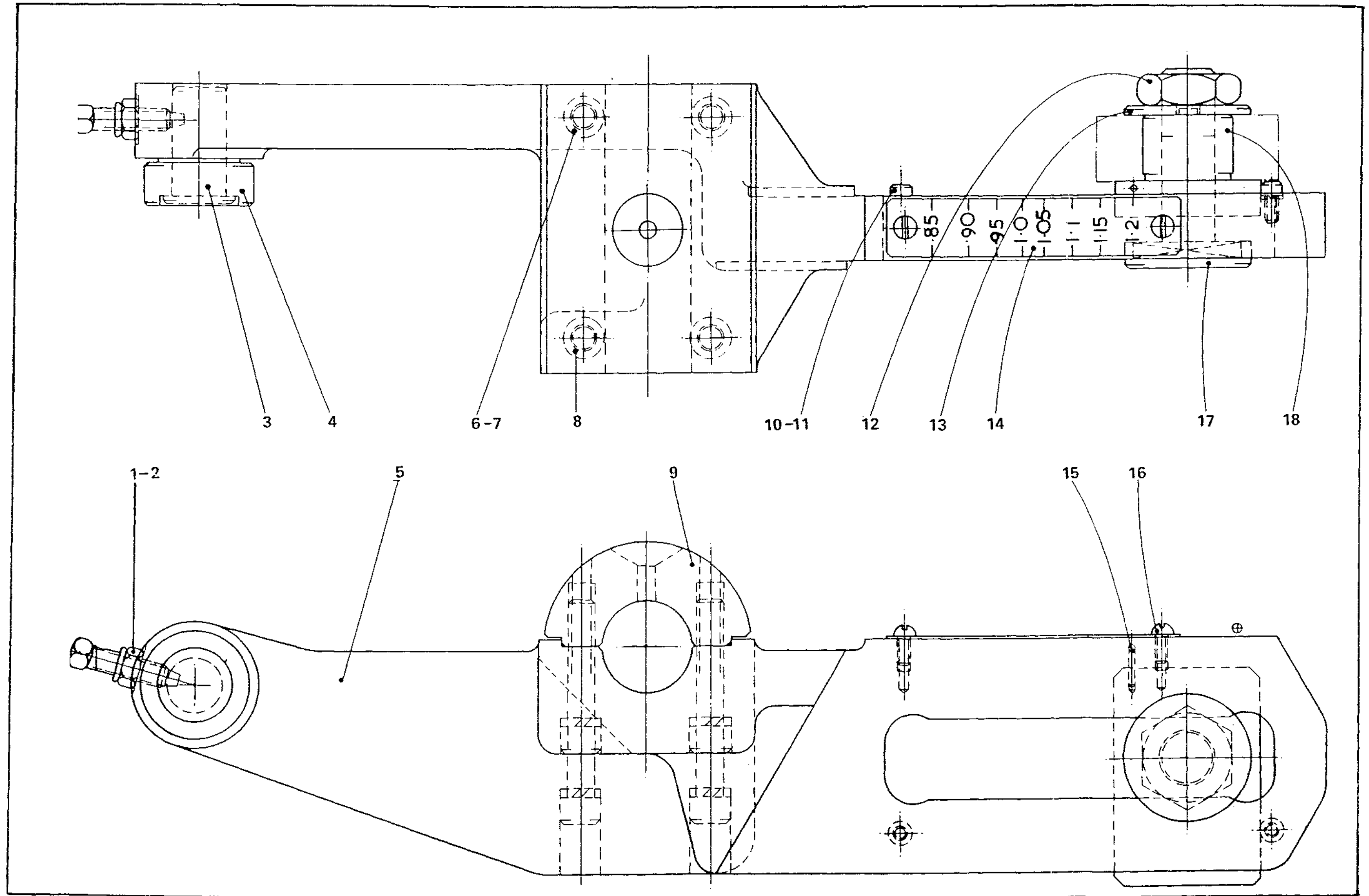
	Part No	Description
1.	155/0628	3/8"BSF Socket head cap screw 1.3/4"long
2.	292X190	Clamp
3.	173/05L	5/16"BSF Hex. locknut
4.	188/0528	5/16"BSF Squ. head set screw 1.3/4"long
5.	155/0512	5/15"BSF Socket head cap screw 3/4"long
6.	292X563	Modification to adjustment strip 292X189
7.	292Y562	Modification to chasing attachment 192Z101B
8.	292X564	Modification to drive shaft 292X169A
9.	154/03	3/16"dia.Spring washer
10.	156/206	2BA Socket head cap screw 3/8"long
11.	292X510	Swarf shield
12.	167/0620	3/8"BSF Hex. head set screw 1.1/4"long
13.	130/06	3/8"dia. Flat washer
14.	292X193	Tee nut
15.	292V561	Modification to 3rd form slide 239Y102
16.	292X187A	Chaser bracket - 5th station



Auxiliary Cross Slide Motion Drg. 293 V 1

	Part No	Description
1.	203/05	5/16"BSF Self locking locknut
2.	183/0520	5/16"BSF Taper point set screw 1.1/4"long
3.	124X116	Roller pin
4.	141X121	Cam roller
5.	293Y101	Cam lever
6.	155/0644	3/8"BSF Socket head cap screw 2.3/4"long
7.	154/06	Spring washer
8.	155/0628	3/8"BSF Socket head cap screw 1.3/4"long
9.	293Y103	Lever cap
10.	154/03	Spring washer
11.	156/206	2BA Socket head cap screw 3/8"long
12.	173/12HL	3/4"BSF Hex. locknut
13.	241X116	Slotted washer
14.	293X107	Scale
15.	393X118	Indicating pin
16.	165/206	2BA Round head screw 3/8"long
17.	293X106	Tee bolt
18.	241X141	Sliding sleeve

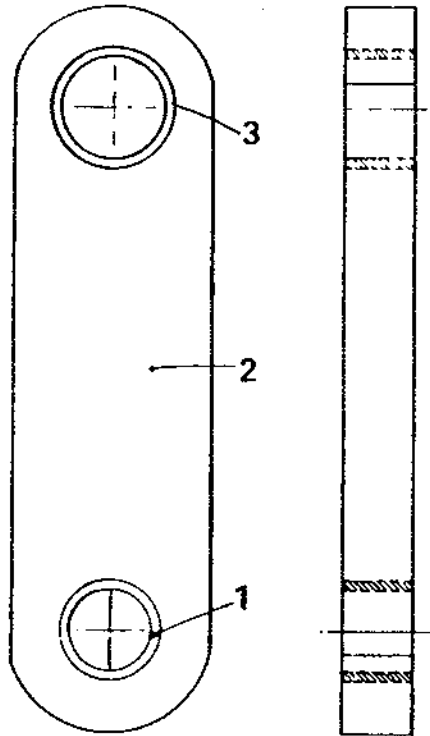




293 V 1

Auxiliary Cross Slide Motion Extra Parts Drg. 239 X 2

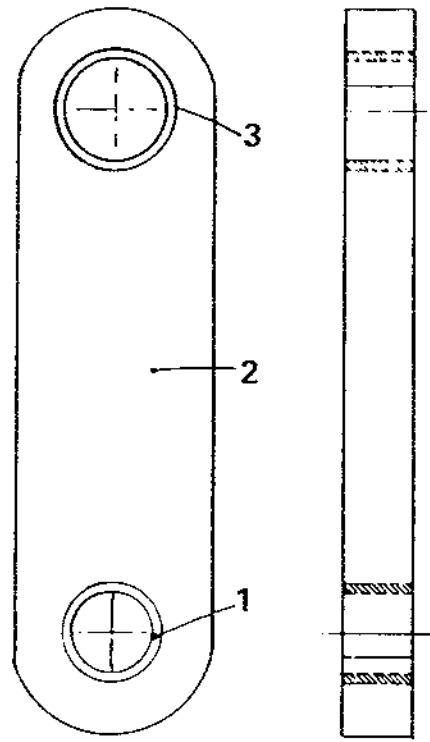
	Part No	Description
1.	236/162014	Oil retaining bush
2.	239X120	Connecting link
3.	236/202414	Oil retaining bush



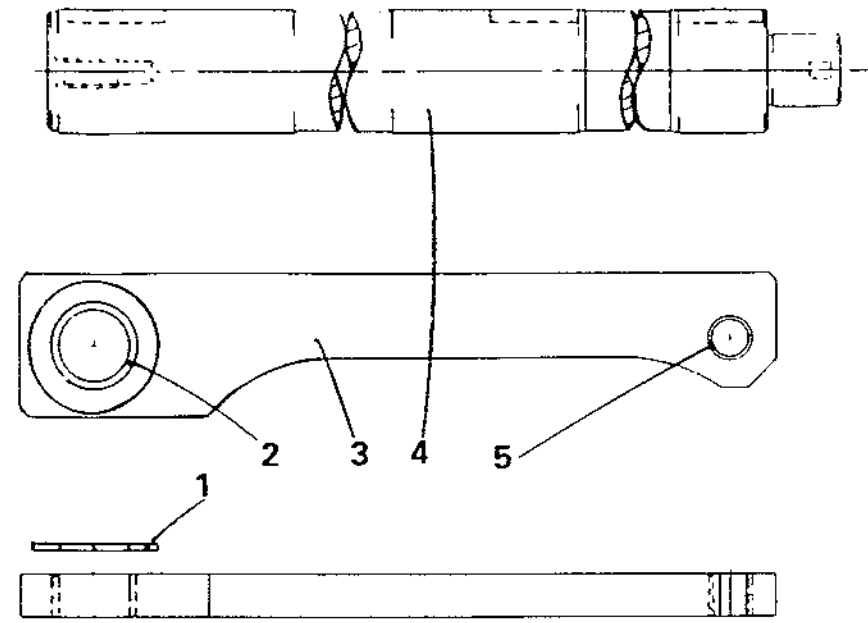
239 X 2

Auxiliary Cross Slide Motion link & Shaft Station 3 Drg.293 V 3

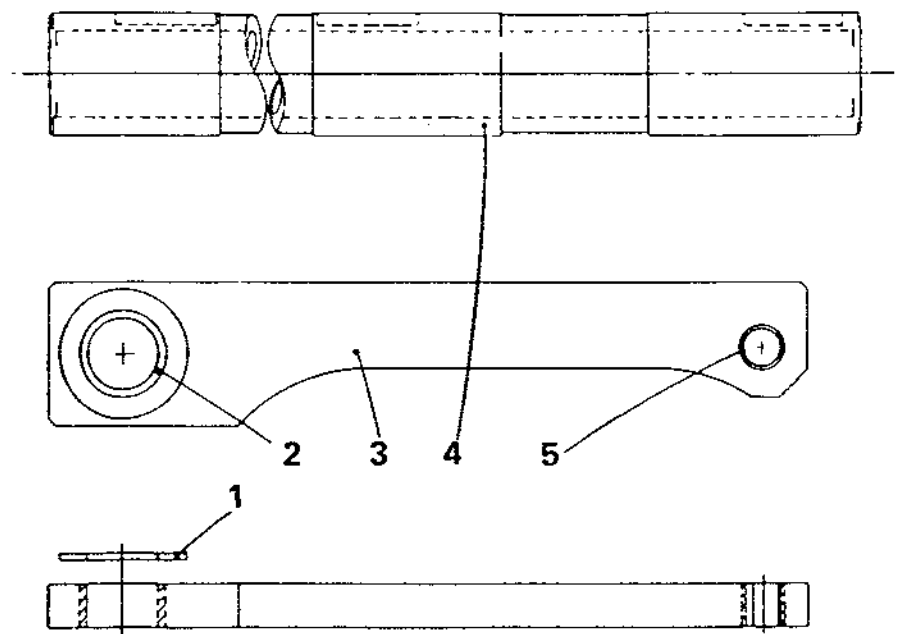
	Part No	Description
1.	293X141	Washer
2.	236/202412	Oil retaining bush
3.	293V140	Link for intermediate slide
4.	293V142	Operating shaft
5.	236/101212	Oil retaining bush



239 X 2

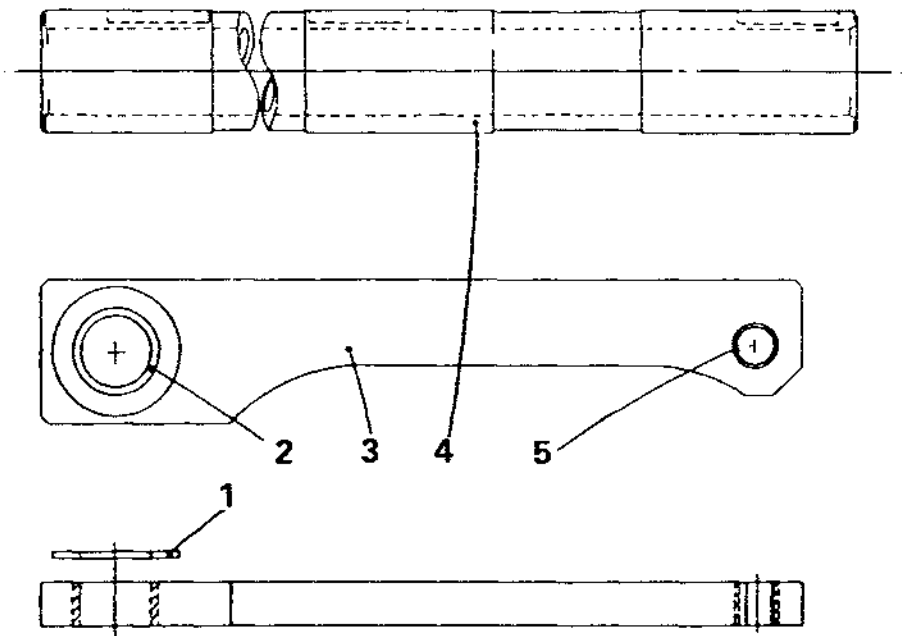


293 V 3



293 V 3

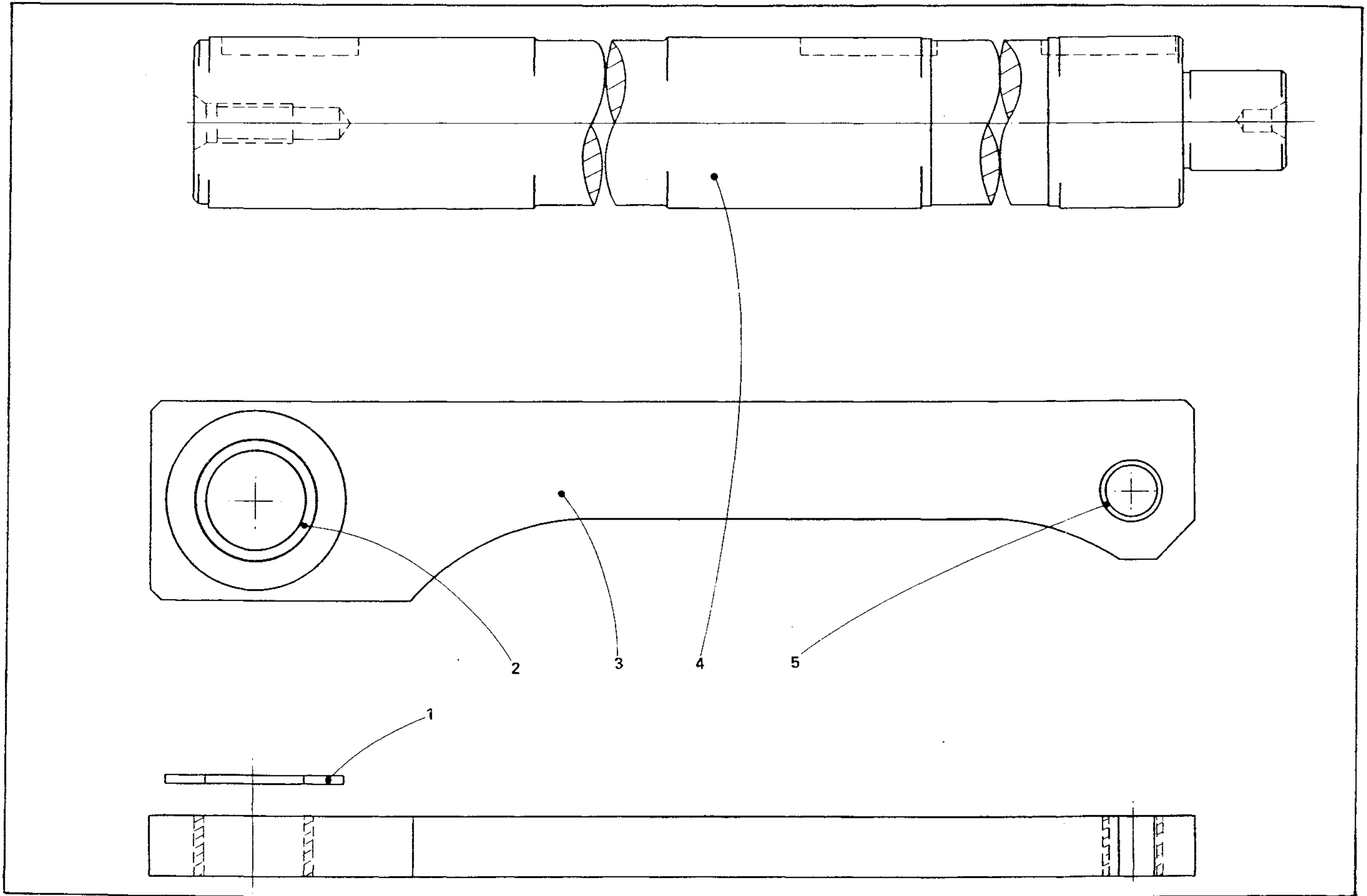
	Part No	Description
1.	293X141	Washer
2.	236/202412	Oil retaining bush
3.	293V140	Link for intermediate shaft
4.	293X138	Operating sleeve
5.	236/101212	Oil retaining bush



Auxiliary Cross Slide Motion Mk.1 Drg.293 V 5

	Part No	Description
1.	293X141	Washer
2.	236/202412	Oil Retaining bush 1.1/4" x 1.1/2" x 1.1/2"long
3.	293V140	Connecting link intermediate cross slide
4.	293V143	Operating shaft 3rd station
5.	236/101212	Oil retaining bush 5/8" x 3/4" x 3/4"long





293 V 5

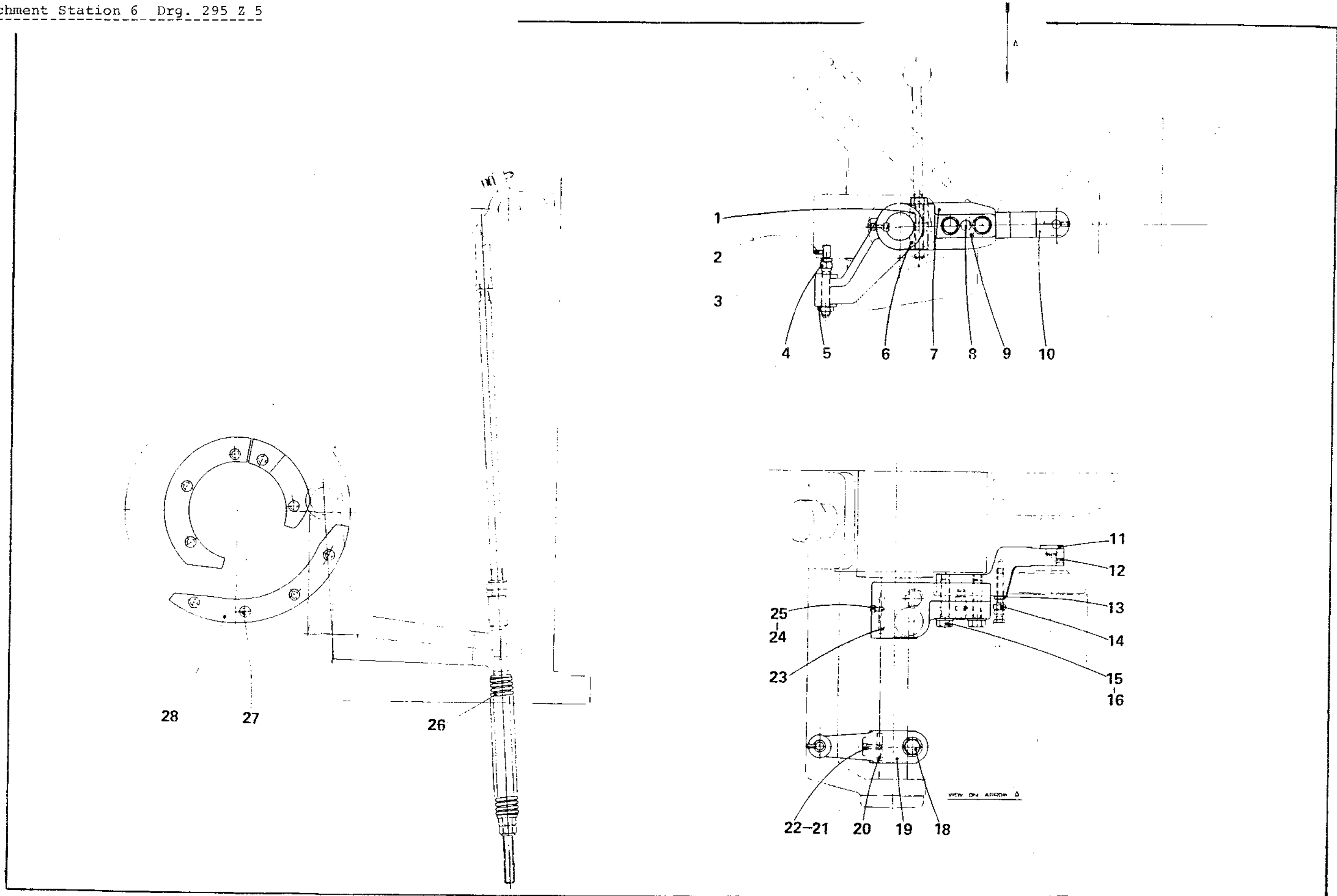
Special Bar Stop Mechanism for Back Burring with Pick-Up

Attachment Station 6 Drg. 295 Z 5

	Part No	Description
1.	150X110	Pad bush for lock bolt
2.	178/0408	1/4"BSF Socket set screw half dog point 1/2"long
3.	9242X120	Stop
4.	188/0840	1/2"BSF Squ. head set screw 2.1/2"long
5.	173/08L	1/2"BSF Locknut
6.	150X111	Pad bush for lock bolt
7.	295Y191	Bar stop bracket
8.	295X194	Eccentric pin
9.	236/0620	3/16"dia. Tension pin 1.1/4"long
10.	295V192	Bar stop
11.	295X193	Bar stop
12.	178/0408	1/4"BSF Socket set screw half dog point 1/2"long
13.	173/06L	3/8"BSF Locknut
14.	167/0632	3/8"BSF Hex. head set screw
15.	167/0836	1/2"BSF Hex. head set screw 2.1/4"long
16.	130/08	1/2"dia. Flat washer
17.	-	
18.	167/0840	1/2"BSF Hex. set screw 2.1/2"long
19.	295V196A	Bar stop positioning lever
20.	122/1424	Parallel key 7/16" x 9/32" x 1.1/2"long
21.	154/04	1/4"dia. Spring washer
22.	155/0412	1/4"BSF Socket head cap screw 3.1/4"long
23.	122/1432T	Parallel key 7/16" x 9/32" x 2"long
24.	154/04	1/4"dia. Spring washer
25.	155/0408	1/4"BSF Socket head cap screw 5/8"long
26.	295X199	Bar stop spring (replaces spring on standard machine)
27.	155/0612	3/8"BSF Socket head cap screw 3/4"long
28.	295Z198	Bar stop operating cam

Special Bar Stop Mechanism for Back Burring with Pick-Up

Attachment Station 6 Drg. 295 Z 5

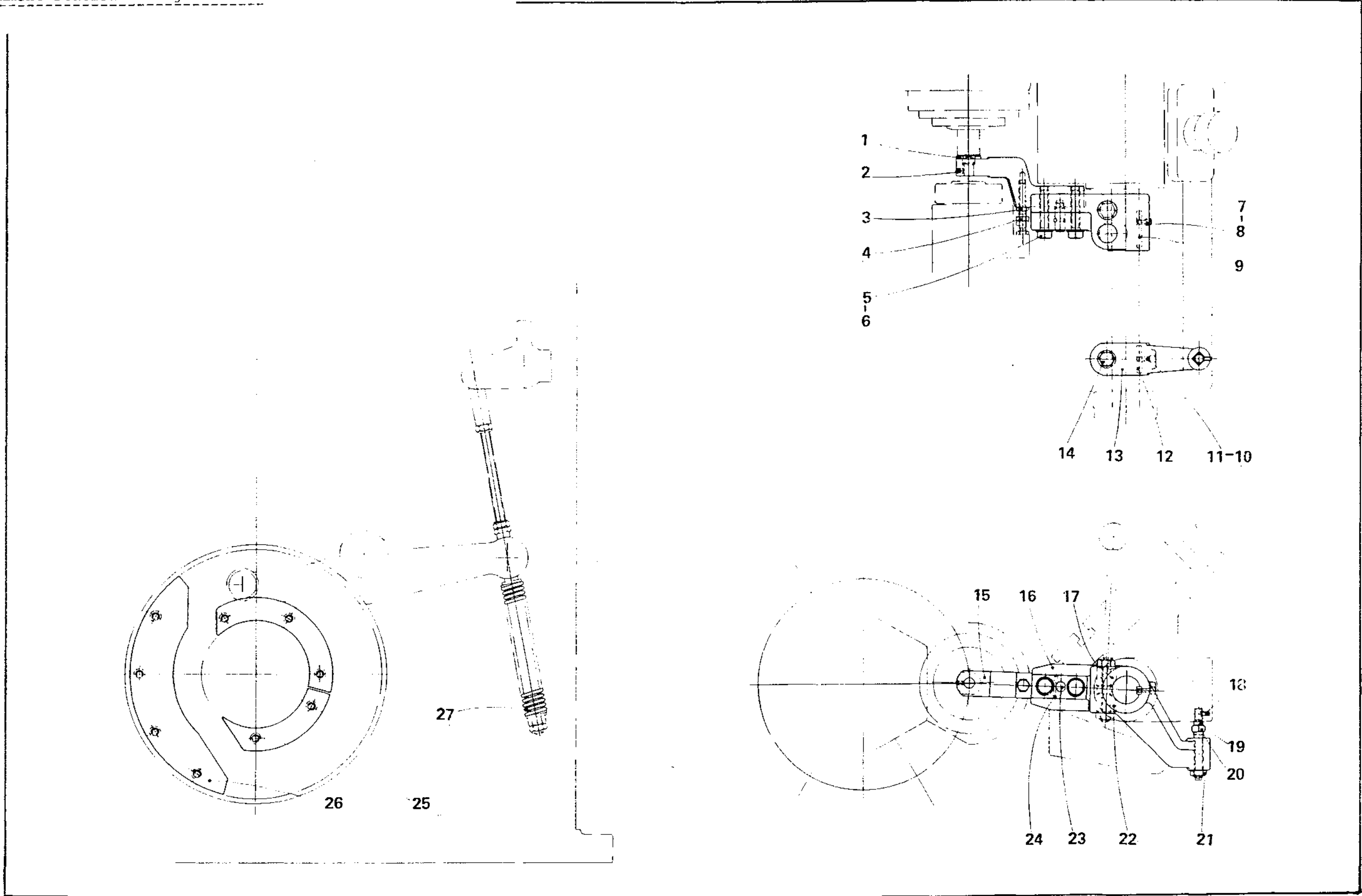


295 Z 5

Special Bar Stop Mechanism for Back Burring with Pick-Up

Attachment Station 3 Drg. 295 Z 6

	Part No	Description
1.	295X193	Bar stop
2.	178/0408	1/4"BSF Socket set screw half dog point 1/2"long
3.	173/06L	1/4"BSF Locknut
4.	167/0632	3/8"BSF Hex. head set screw 2"long
5.	167/0836	1/2"BSF Hex. head set screw 2.1/4"long
6.	130/08	1/2"dia. Flat washer
7.	155/0408	1/4"BSF Socket head cap screw 5/8"long
8.	154/04	1/4"dia. Spring washer
9.	122/1432T	7/16" x 9/32" x 2" long Tapped key
10.	154/04	1/4"dia. Spring washer
11.	155/0412	1/4"BSF Socket head cap screw 3/4"long
12.	122/1424	Key 7/16" x 9/32" x 1.1/2"long (Lever 295V196A to be supplied with key fitted)
13.	295V196A	Bar stop positioning lever
14.	167/0840	1/2"BSF Hex. head set screw 2.1/2"long
15.	295V192	Bar stop
16.	295Y191	Bar stop bracket
17.	150X110	Pad bush
18.	178/0408	1/4"BSF Socket set screw half dog point 1/2"long
19.	9242X120	Stop
20.	188/0840	1/2"BSF Socket head set screw 2.1/2"long
21.	173/08L	1/2"BSF Locknut
22.	150X111	Pad bush
23.	295X194	Eccentric pin
24.	326/0620	3/16"dia. Tension pin 1.1/4"long
25.	155/0612	3/8"BSF Socket head cap screw 3/4"long
26.	295Z197	Bar stop operating cam
27.	295X199	Bar stop spring (replaces spring on standard M/Cs)

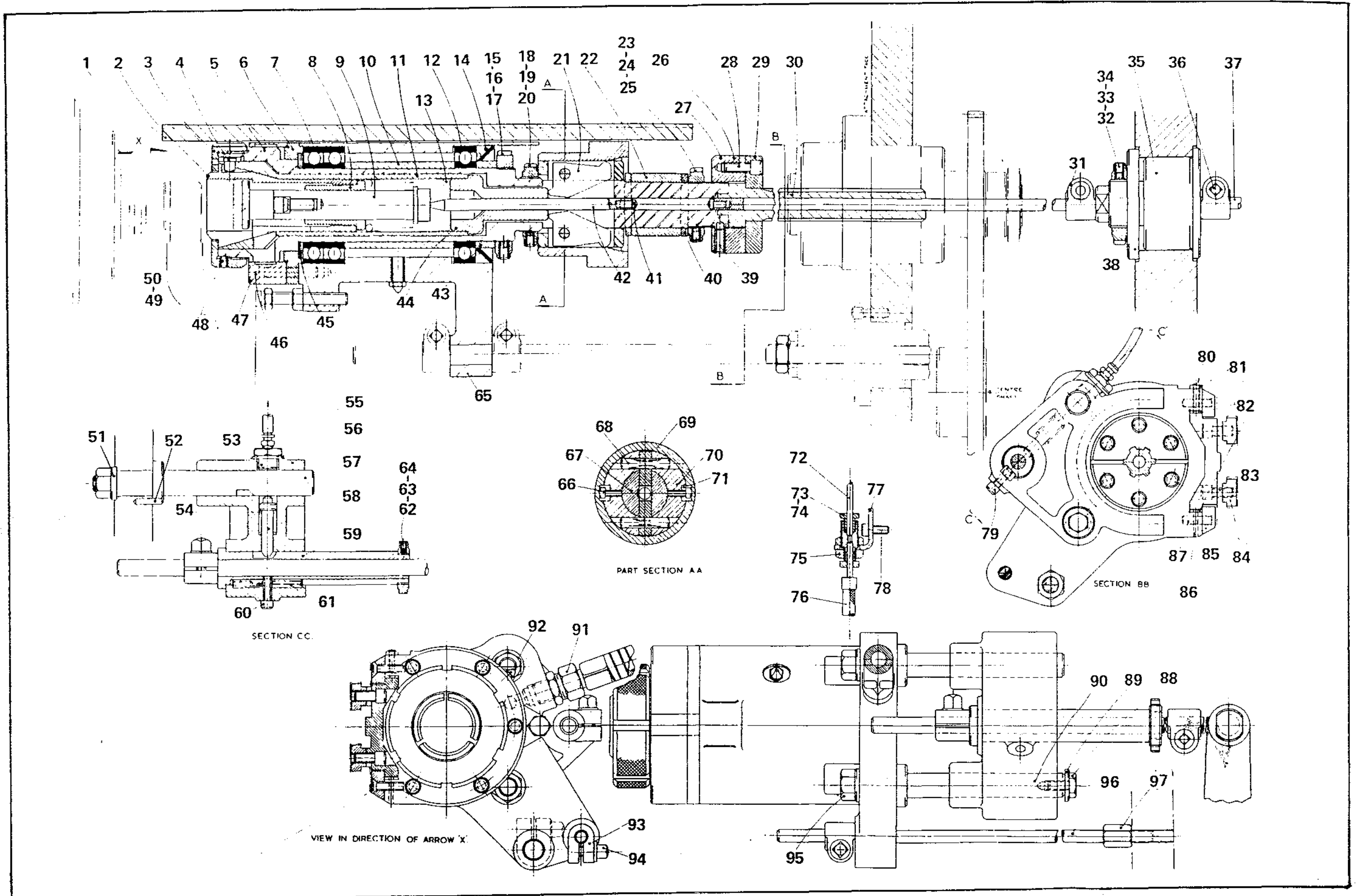


295 Z 6

Pick-Up Attachment 6th Position Drg. A7042C

	Part No	Description
1.	B8162B	Slide
2.	B8164F	Collet
3.	D54066B	Collet retainer
4.	D100450A	Ref.2 Locating peg
5.	B8167D	Drive shaft
6.	C22188	End plate
7.	SB 70	Extra light ball journal 70mm
8.	D100451	Locating plug
9.	D100452	Ejection plunger
10.	D54072	Spacer
11.	B8618D	Collet outer sleeve
12.	254/2.1/4"	Extra light ball journal 2.1/4"bore
13.	D54457	Collet spring
14.	W363262250	Western oil seal
15.	176/0506	5/16"BSF Socket set screw 3/8"long
16.	153/05	5/16"dia. soft pad
17.	150?36	2.1/4"dia Slotted locknut
18.	176/0405	1/4"BSF Socket set screw 5/16"long
19.	153/04	1/4"dia. soft pad
20.	150/26	1.5/8"dia. Slotted locknut
21.	D54076B	Collet closing toggle
22.	D55088	Spacer
23.	176/0405	1/4"BSF Socket set screw cup point 5/16"long
24.	153/04	1/4"dia. soft pad
25.	150/22	1.3/8"dia. Slotted locknut
26.	D54078	Coupling
27.	D54455	Spring retaining ring
28.	155/0512	5/16"BSF Socket head cap screw 3/4"long
29.	D54079A	Retainer
30.	C18689A	Splined drive shaft
31.	188X108	Trip clamp
32.	150/24	1.12"dia. Slotted locknut
33.	153/04	1/4"dia. soft pad
34.	176/0405	1/4"BSF Socket set screw 5/16"long
35.	D54084A	Ejector bung
36.	195/0516	5/16"BSF Naylor collar head screw 1"long
37.	D54083	Ejector rod -long
38.	D54085	Clamp plate
39.	-	5/16"BSF Socket set screw full dog point
40.	D55089	Comp. washer
41.	D53582	Ejector pin
42.	D100453	Ejector rod-short
43.	D54074	Spacer
44.	D54073A	Locating plug
45.	D54068	Labyrinth oil seal
46.	155/0528	5/16"BSF Socket head cap screw 1.3/4"long
47.	C22187A	Running gland
48.	178/0404	1/4"BSF Socket set screw 1/4"long
49.	D54179	Ejector
50.	D54069A	Ejector
51.	130/08	1/2"dia. Flat washer
52.	126/0612	3/16"dia. Parallel hardened dowel 3/4"long
53.	D54456	Adaptor
54.	MSC 162	Morris spring
55.	130/08	1/2"dia. Flat washer
56.	B8163	Glut
57.	D54087	Guide bar upper

58.	D54088	Plunger
59.	D54089B	Bush
60.	155/0410	1 1/4"BSF Socket head cap screw 5/8"long
61.	D54090	Rectangular parallel key
62.	150/14	7/8"dia. Slotted locknut
63.	153/42	4BA Soft pad
64.	179/204	2BA Socket set screw 1/4"long
65.	A7403E	Body for pick-up attachment
66.	156/206	2BA Socket head cap screw 3/8"long
67.	B8167C	Drive shaft
68.	D105298	Parallel pin
69.	C18691A	Collet closing sleeve
70.	D54093A	Toggle
71.	D54094	Toggle sleeve key
72.	225/3050	3/16"Copper tube
73.	221/3	3/16"Tubing sleeve
74.	215/3	3/16"Tubing nut
75.	222/1	3/16"Bulkhead connector
76.	195X141/24	Lubrication hose assembly
77.	D68000	Angle bracket
78.	155/0410	1/4"BSF Socket head cap screw 5/8"long
79.	155/0410	1/4"BSF Socket head cap screw 5/8"long
80.	181/212	2BA Socket head set screw 3/4"long
81.	174/2L	2BA Hex. locknut
82.	D69963	Adjusting strip
83.	155/0510	5/16"BSF Socket head cap screw 5/8"long
84.	D54096	Ref.1&2 Tee nut
85.	D54086B	Self retaining plates
86.	326/0412	1/8"dia. Tension pin 3/4"long
87.	158/0416	1/4"BSF Socket counter sunk head screw 1"long
88.	167/0510	5/16"BSF Hex. head set screw 5/8"long
89.	D53534	Stop washer
90.	D54091	Guide bar lower
91.	169X145	Griflex pipe assembly
92.	212/18	1/8"BSP grease nipple
93.	188X108	Trip clamp
94.	195/0516	5/16"BSF Naylor collar head screw 1"long
95.	173/08	1/2"BSF Hex. nut
96.	188X105	Trip rod long
97.	188X109	Nut

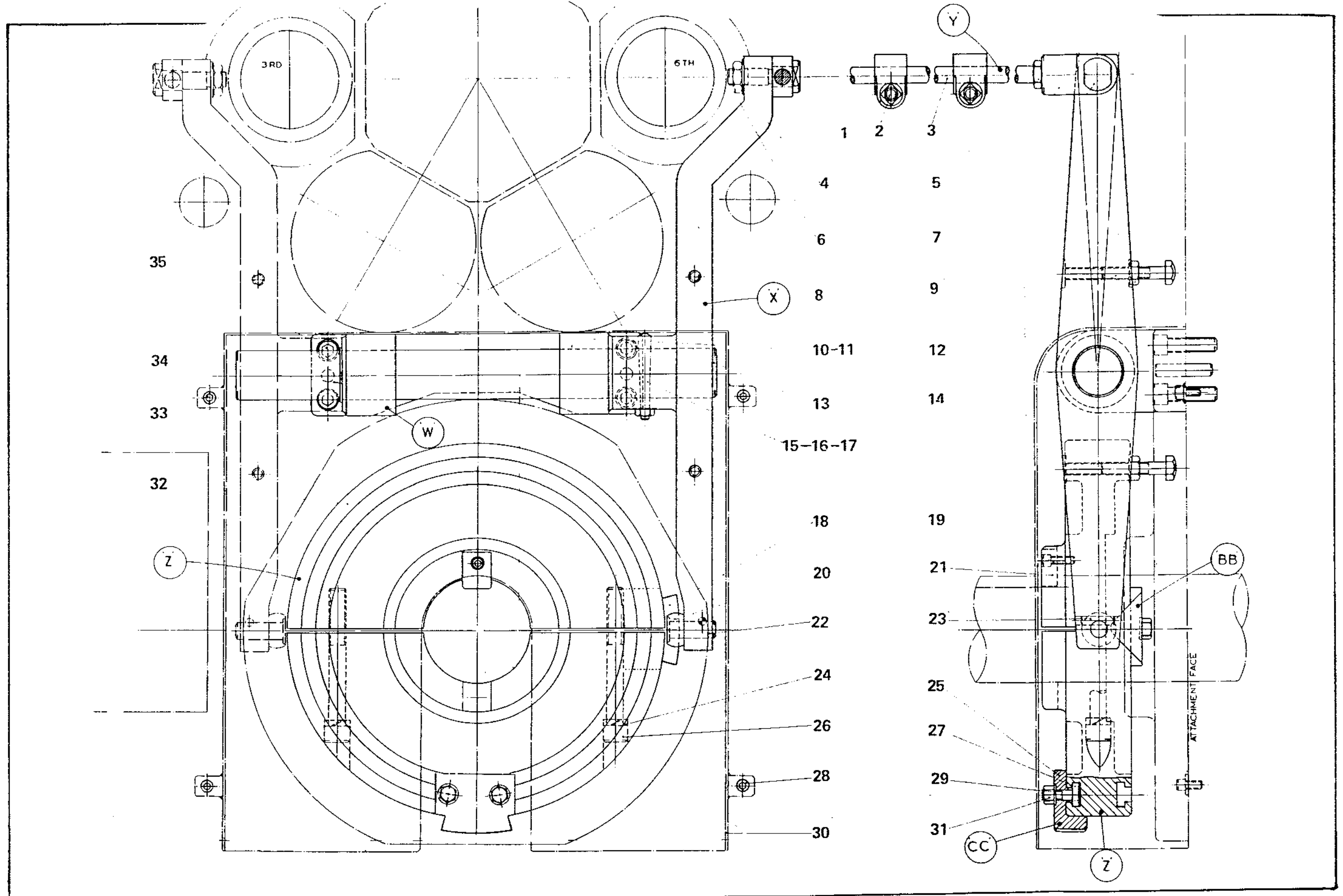


A 7042 C



Collet Operating Mechanism 6th Position Pick-Up Attachment Drg.A7989A

Part No	Description
1.	388X105 Trip clamp
2.	195/0616 3/8"BSF Naylor collar head screw 1"long
3.	D54220 Push rod
4.	130/08 1/2"dia. Flat washer
5.	173/08L 1/2"BSF Hex. locknut
6.	173/08L 1/2"BSF Hex. locknut
7.	D57333 Connection
8.	B8791A Collet operating lever
9.	D86571 Swivel pin
10.	B8792A Support bracket
11.	B13835 Support bracket -alternative
12.	D56737 Stop bolt
13.	C19851 Shaft
14.	173/06L 3/8"BSF Hex. locknut
15.	173/05 5/16"BSF Hex. nut
16.	D55985 Taper pin
17.	130/05 5/16"dia Flat washer
18.	D71440 Cam dog
19.	155/0412 1/4"BSF Socket head cap screw 3/4"long
20.	153X142 Roller
21.	D57750 Tenon
22.	153/143 Roller pin
23.	126/0616 3/16"Parallel hardened dowel 1"long
24.	154/08 1/2"dia. Spring washer
25.	D71440 Cam dog
26.	155/0864 1/2"BSF Socket head cap screw 4"long
27.	195/166 Tee bolt
28.	155/0412 1/4"BSF Socket head cap screw 5/8"long
29.	130/05 5/16"dia. Flat washer
30.	C19852A Ref.2 Cover
31.	173/05 5/16"BSF Hex. nut
32.	B8794C Cam drum
33.	155/0410 1/4"BSF Socket head cap screw 5/8"long
34.	101/18 1.1/2"dia. External circlip
35.	155/0724 7/16"BSF Socket head cap screw 1.1/2"long

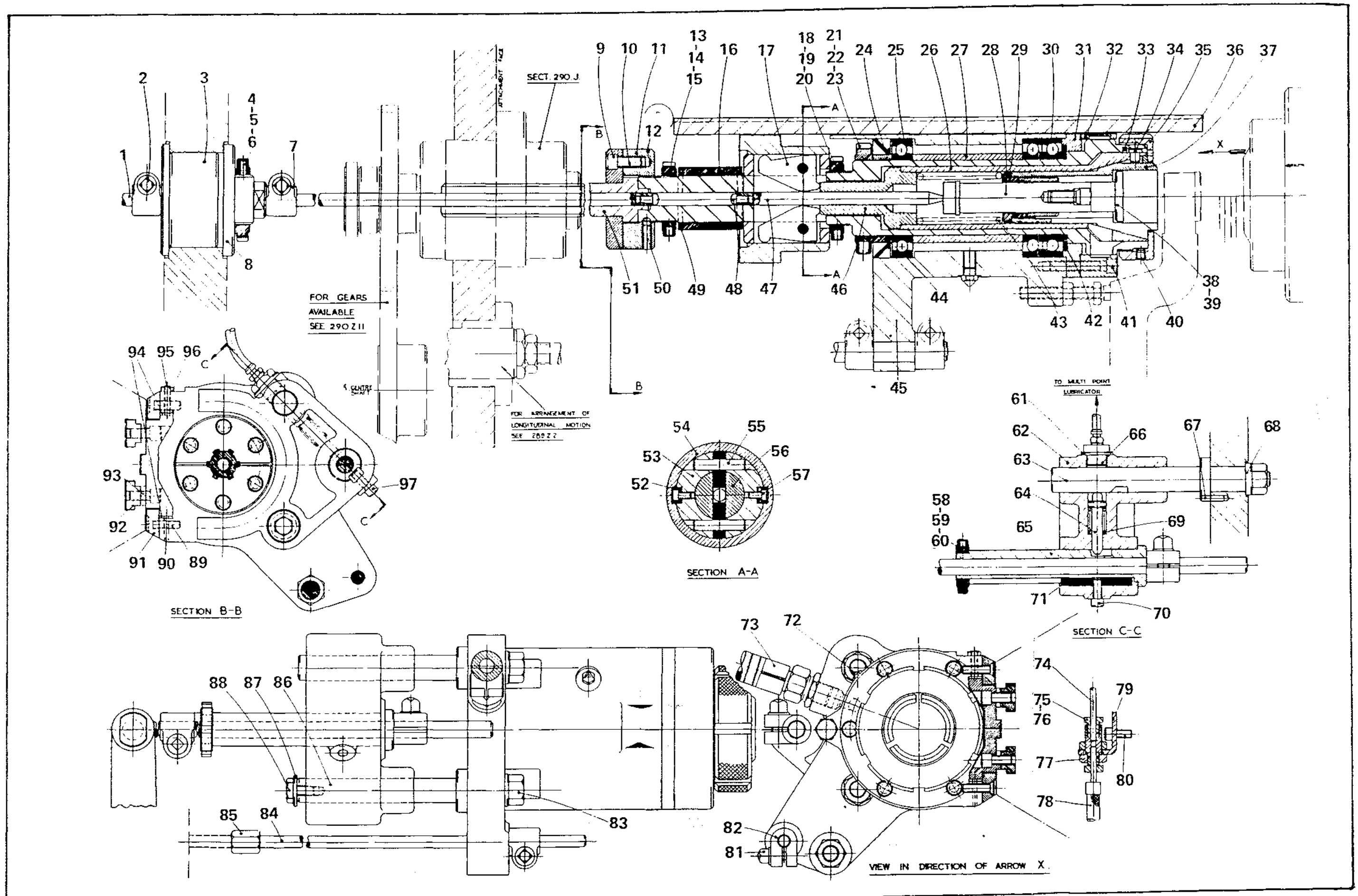


A 7589 A

Pick-Up Attachment 3rd Position Drg A7592C

Part No	Description
1. D54083	Ejector rod - long
2. 195/0516	5/16"BSF Naylor collar head screw 1"long
3. D54084A	Ejector bung
4. 176/0405	1/4"BSF Socket set screw cup point 5/16"long
5. 153/04	1/4"dia. Soft pad
6. 150/24	1/2"dia. Slotted locknut
7. 188X108	Trip clamp
8. D54085	Clamp plate
9. D54079A	Retainer
10. 155/0512	5/16"BSF Socket head cap screw 3/4"long
11. D54078	Coupling
12. D54455	Spring retaining ring
13. 176/0405	1/4"BSF Socket set screw cup point 5/16"long
14. 153/04	1/4"dia. Soft pad
15. 150/22	1.3/8"dia. Slotted locknut
16. D55088	Spacer
17. D54076B	Collet closing toggle
18. 176/0405	1/4"BSF Socket set screw cup point 5/16"long
19. 153/04	1/4"dia, Soft pad
20. 150/26	1.5/8"dia. Slotted locknut
21. 176/0506	5/16"BSF Socket set screw cup point 3/8"long
22. 153/05	5/16"dia. Soft pad
23. 150/36	2.1/4"dia. Slotted locknut
24. W36326250	Western oil seal
25. 254/2.1/4"	2.14" Extra light ball journal bearing
26. B8168D	Collet outer sleeve
27. D54072	Spacer
28. D100452	Ejection plunger
29. D100451	Locating plug
30. SB70	Extra light ball journal 70mm
31. C22216	End plate
32. C22215A	Running gland
33. B8167D	Drive shaft
34. D100450A	Ref.2 Locating peg
35. D54066B	Collet retainer
36. B8162B	Slide
37. B8164F	Collet
38. D54069	Ejector
39. D54179	Ejector
40. 178/0404	1/4"BSF Socket set screw 1/4"long
41. 155/0528	5/16"BSF Socket head cap screw 1.3/4"long
42. D54068	Labyrinth oil seal
43. D54457	Collet spring
44. D54074	Spacer
45. A7593B	Body for pick-up attachment
46. D54073A	locating pin
47. D100453	Ejector rod - short
48. D5382	Ejector pin
49. D55088	Spacer
50. -	5/16"BSF Full dog screw 1.3/4"long
51. C18689A	Splined drive shaft
52. D54094	Toggle sleeve key
53. D54093A	Toggle sleeve
54. C18691A	Collet closing sleeve
55. 126/1024	5/16"dia.Parallel pin 1.1/2"long
56. B8167D	Drive shaft
57. 156/206	2BA Socket head cap screw 3/8"long

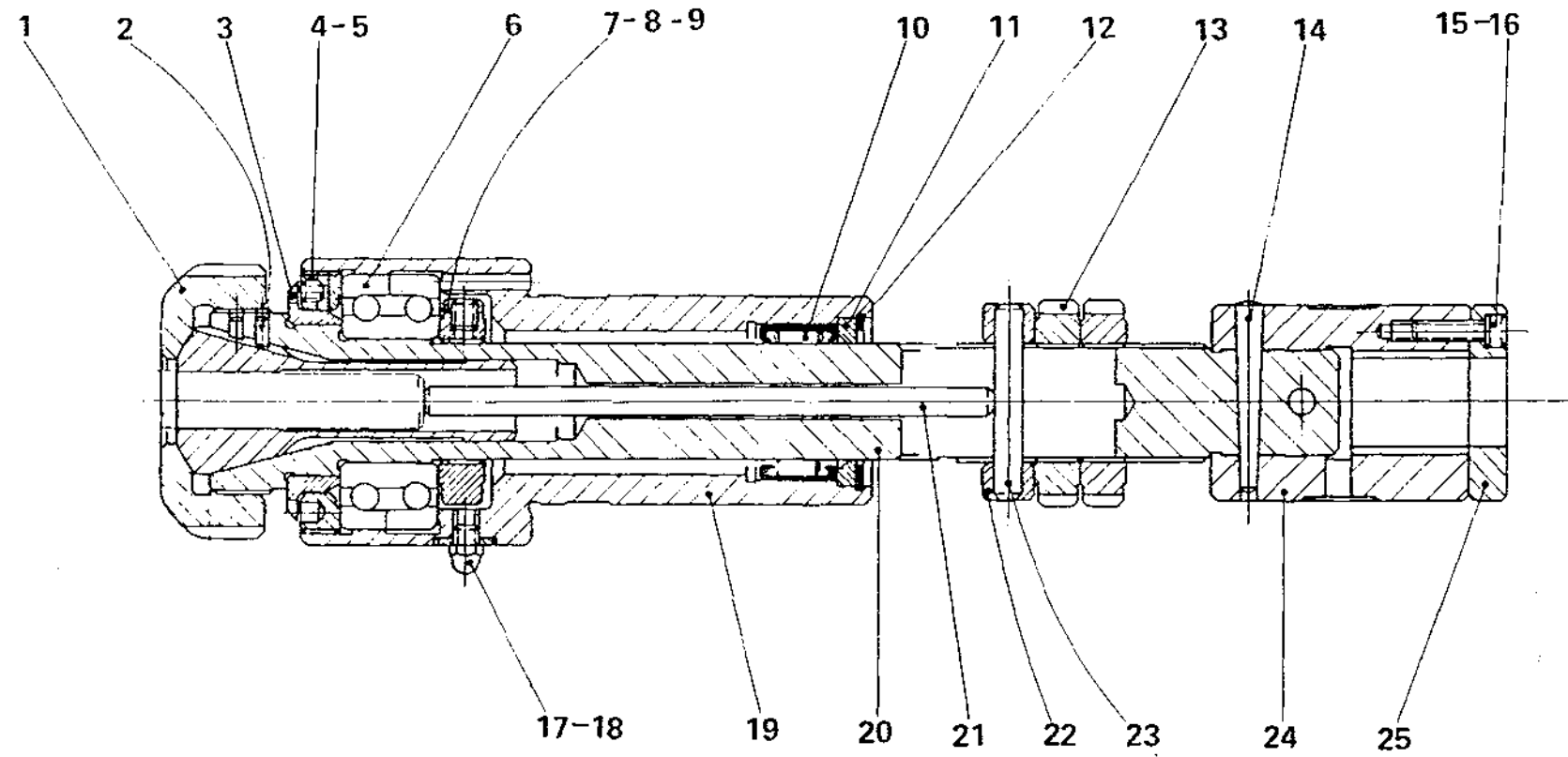
58.	179/204	2BA Socket set screw cup point 1/4"long
59.	153/42	2BA Soft pad
60.	150/14	7/8"dia. Slotted locknut
61.	130/08	1/2"dia. Flat washer
62.	B8813	Glut
63.	D54087	Guide bar - upper
64.	D54088	Plunger
65.	D54089B	Bush
66.	D54456	Adaptor
67.	126/0612	3/16"dia. Parallel hardened dowel 3/4"long
68.	130/08	1/2"dia. Flat washer
69.	MSC 162	Morris spring
70.	155/0410	1/4"BSF Socket head cap screw 5/8"long
71.	D54090	Rectangular parallel key
72.	212/18	1/8"BSP Grease nipple
73.	169X145	Griflex hose assembly
74.	225/3050	3/16"dia. copper tube 60"long
75.	221/3	3/16"dia. Tubing sleeve
76.	215/3	3/16"dia. Tubing nut
77.	222/1	3/16"dia. Enots bulkhead connector
78.	D57781	Ref.1.Lubricating hose assembly
79.	D68000	Angle bracket
80.	155/0410	1/4"BSF Socket head cap screw 5/8"long
81.	196/0516	5/16"BSF Naylor collar head screw 1"long
82.	188X108	Trip clamp
83.	173/08	1/2"BSF Hex. nut
84.	188X105	Trip rod - long
85.	188X109	Nut
86.	D54091	Guide bar - lower
87.	D53534	Stop washer
88.	167/0510	5/16"BSF Hex. head set screw 5/8"long
89.	158/0416	1/4"BSF Socket counter sunk head screw 1"long
90.	326/0412	1/8"dia.Tension pin 3/4"long
91.	D54086B	Slide retaining plates
92.	D54096	Ref.1 & 2 Tee nut
93.	155/0510	5/16"BSF Socket head cap screw 5/8"long
94.	D69963	Adjusting strip
95.	181/212	2BA Socket set screw half dog point 3/4"long
96.	174/2L	2BA Hex.nut
97.	155/0410	1/4"BSF Socket head cap screw 5/8"long



A 7592C

High Speed Drilling Attachment Mk.V1 Group K Drg. FY 304A

	Part No	Description
1.	FX3702A	Collet cap
2.	124/0406	1/8"dia. Parallel pin 3/8"long
3.	FX3735A	Oil thrower
4.	FX3736B	Locknut
5.	181/204	2BA Socket set screw 1/4"long
6.	269/30	Ball journal bearing 30mm x 62mm x 15/16"
7.	151/30	30mm Locknut
8.	176/0405	1/4"BSF Socket set screw 5/16"long
9.	153/04	Pad
10.	JH1812	Drawn cup roller bearing 1.1/8" x 1.1/2" x 3/4"
11.	FX3737	Seal
12.	102/19	Internal circlip
13.	FX3719A	Nut
14.	125/1628	1/4"dia. taper pin 1.3/4"long
15.	156/212	2BA Socket head cap screw 3/4"long
16.	154/03	3/16"dia. Spring washer
17.	212/04S	1/4"BSF Grease nipple
18.	210/1725	1/4"dia. Indicator washer
19.	FX3703E	Housing
20.	FV3718B	Spindle
21.	FX3724A	Pin
22.	FX3708A	Washer
23.	126/0828	1/4"dia.Parallel pin 1.3/4"long
24.	FX3707A	Coupling sleeve
25.	FX3734	Retaining plate

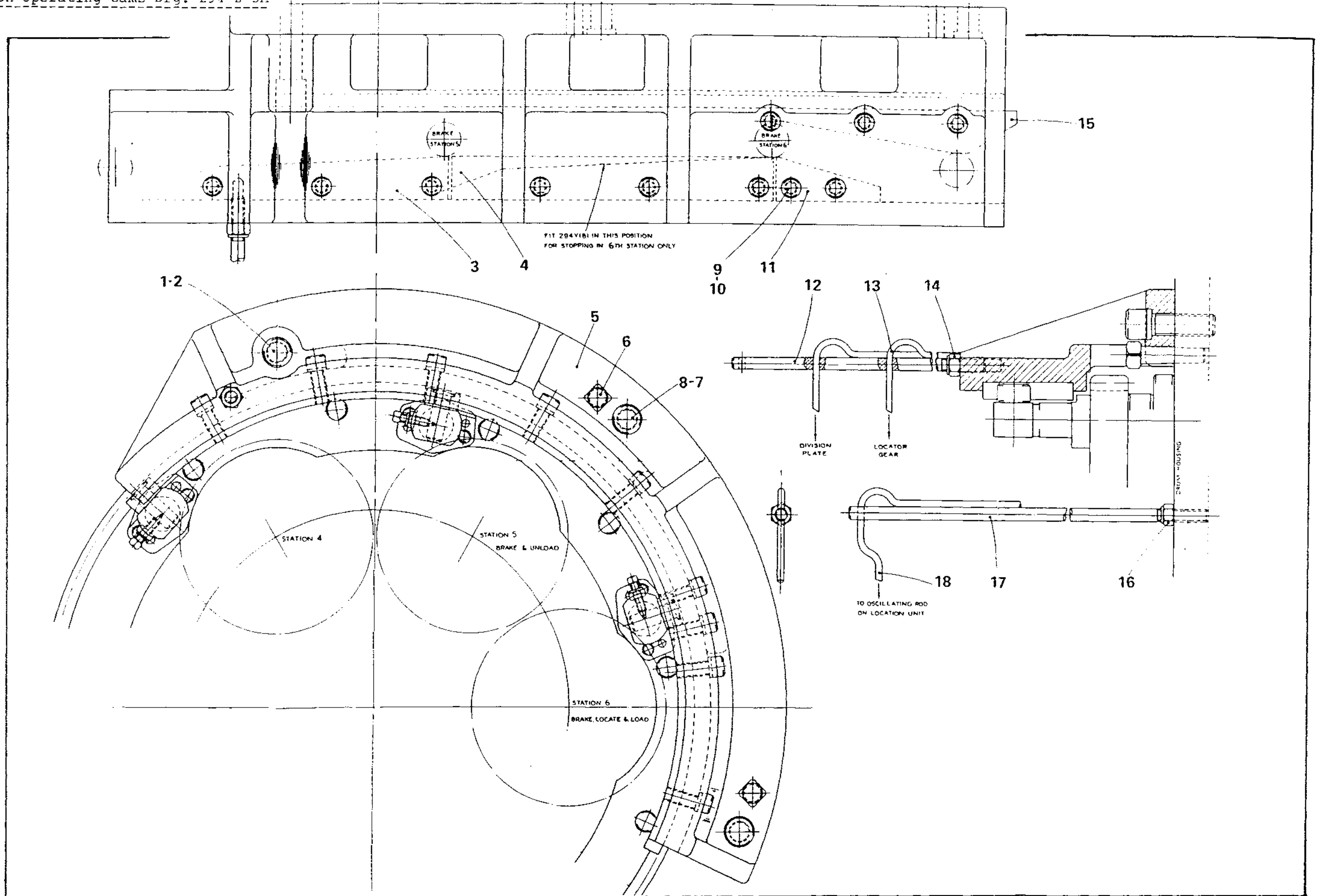


FY 304 A

Clutch Operating Cams Drg. 294 Z 3A

	Part No	Description
1.	154/10	5/8"dia. Spring washer
2.	155/1056	5/8"BSF Socket head cap screw 3.1/2"long
3.	294V181	Brake cam
4.	294V183	Guard cam
5.	294Z180A	Cam bracket
6.	139/15	1/2"dia. Taper pin 1.7/8"long
7.	155/1032	5/8"BSF Socket head cap screw 2"long
8.	154/10	5/8"dia. Spring washer
9.	155/0616	3/8"BSF Socket head cap screw 1"long
10.	154/06	3/8"dia. Spring washer
11.	294X184	Guard cam
12.	394X195	Oil pipe support
13.	225/3035	3/16"dia. Oil pipe
14.	203/06	3/8"BSF Nut
15.	294X182	Drive cam
16.	203/06	3/8"BSF Nut
17.	394X195	Oil pipe support
18.	225/3035	3/16"dia. Oil pipe

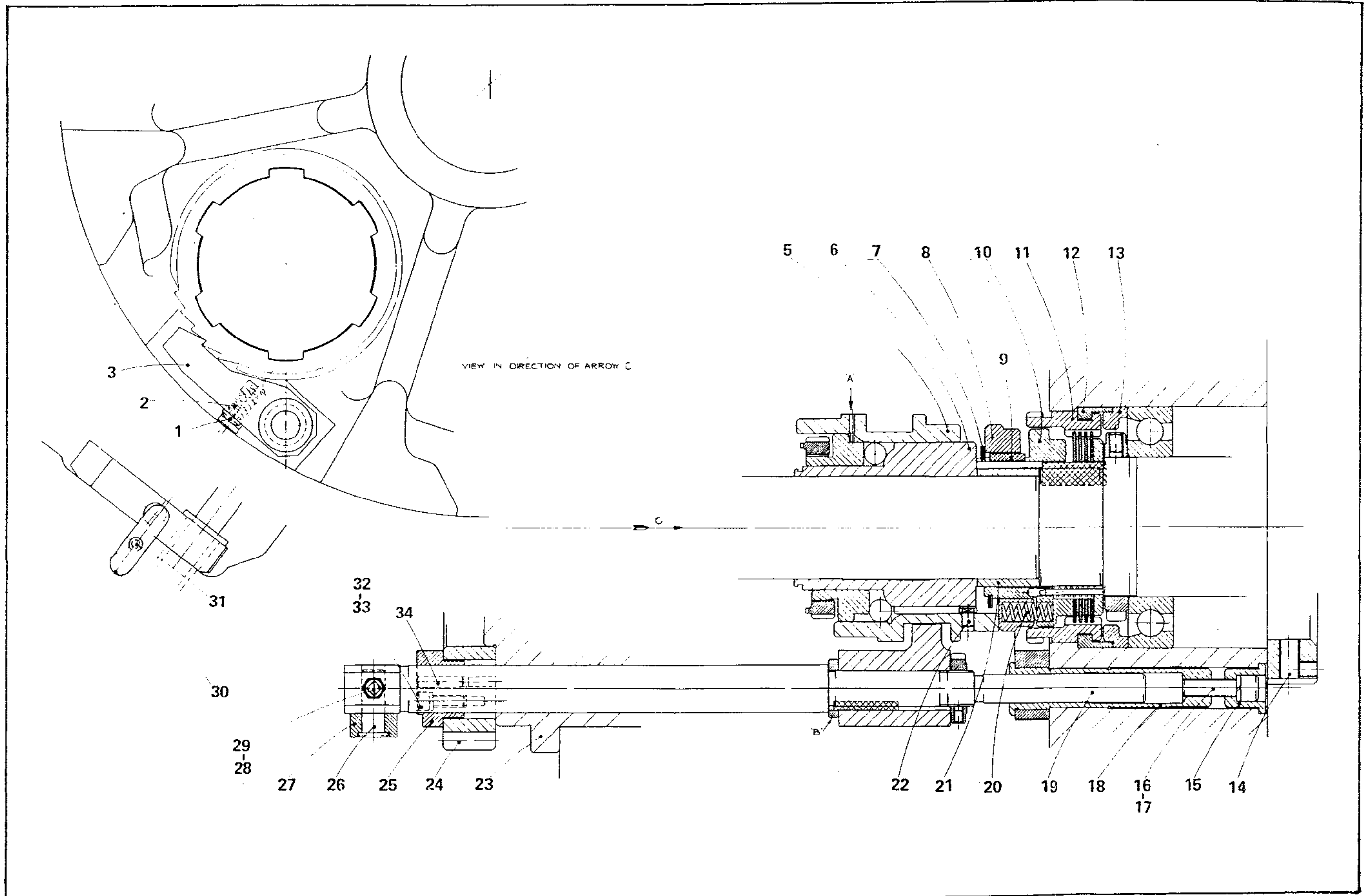




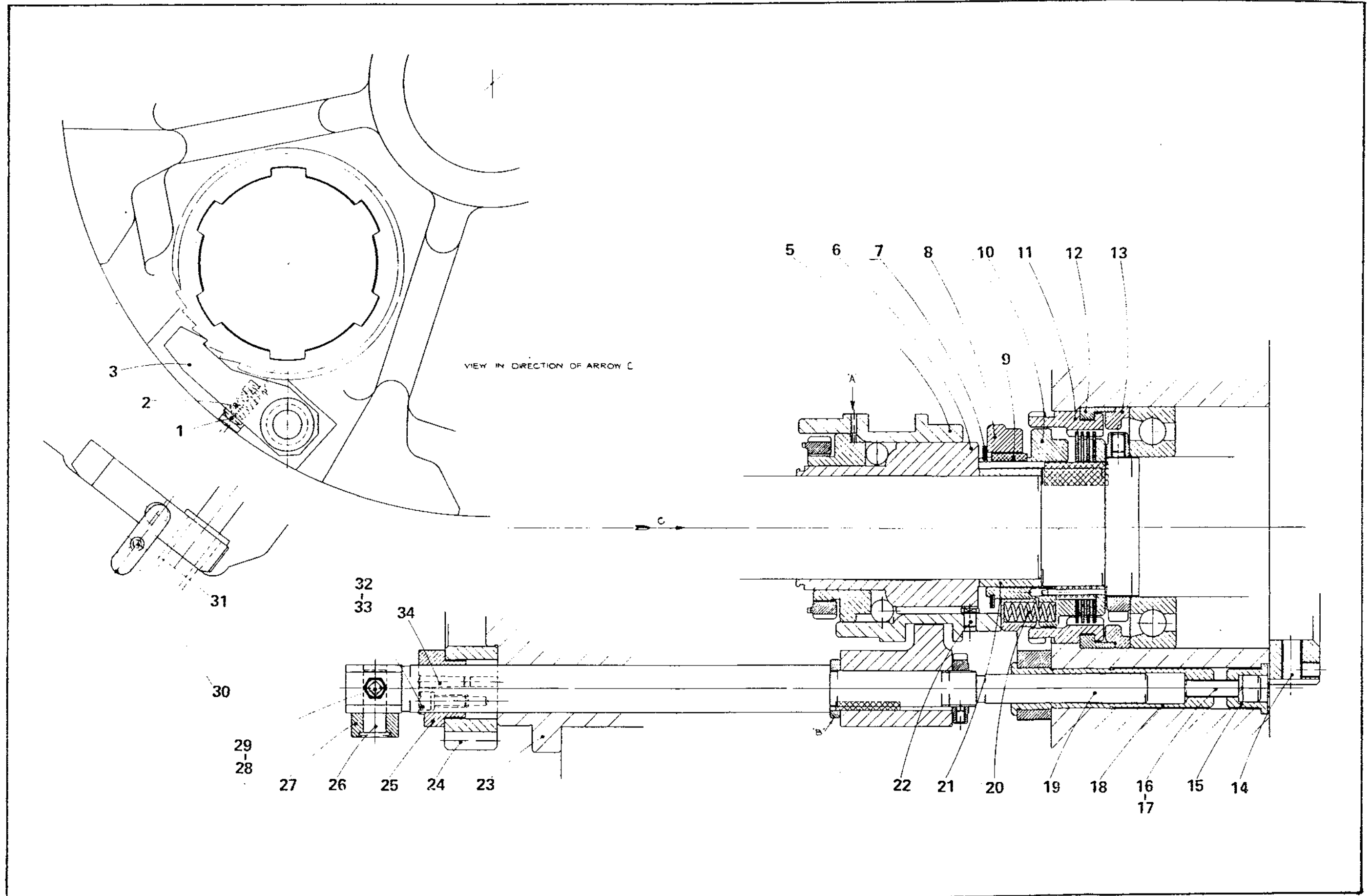
294Z 3A

Special Spindle Assembly for Spindle Stopping Drg. 294 Y 4

	Part No	Description
1.	294X208	PLunger
2.	294X207	Spring
3.	294X205	Latch
4.		
5.	294V220	Clutch bobbin
6.	294V219	Clutch inner member
7.	101/30	2.15/16"dia. External circlip
8.	294X217	Brake spring housing
9.	122/0812T	Key 1/4" x 3/16" x 3/4"long
10.	294V216	Brake clutch housing
11.	294V201A	Brake housing
12.	294X202	Retaining ring
13.	294X203	End spacer
14.	294X215	Modification to 210X114
15.	294X211	Bush
16.	155/0620	3/8"BSF Socket cap screw 1.1/4"long
17.	154/06	3/8"dia. Spring washer
18.	294X210	Glut rod bearing
19.	294V186	Clutch operating shaft
20.	202X199	Brake spring
21.	294X218	Spacer
22.	102X197C	Brake housing key
23.	294Y200	Modification to spindle drum
24.	202Y109	Modification to index gear
25.	202X211	Glut rod bearing
26.	153X143	Roller pin
27.	153X142	Roller
28.	203/04	1/4BSF Self locking nut
29.	183/0416	1/4"BSF Set screw taper point 1"long
30.	294X209A	Pressure key
31.	155/0408	1/4"BSF Socket head cap screw 1/2"long
32.	154/04	1/4"dia. Spring washer
33.	155/0412	1/4"BSF Socket head cap screw 3/4"long
34.	125/1616	1/4"dia.Solid taper pin 1"long



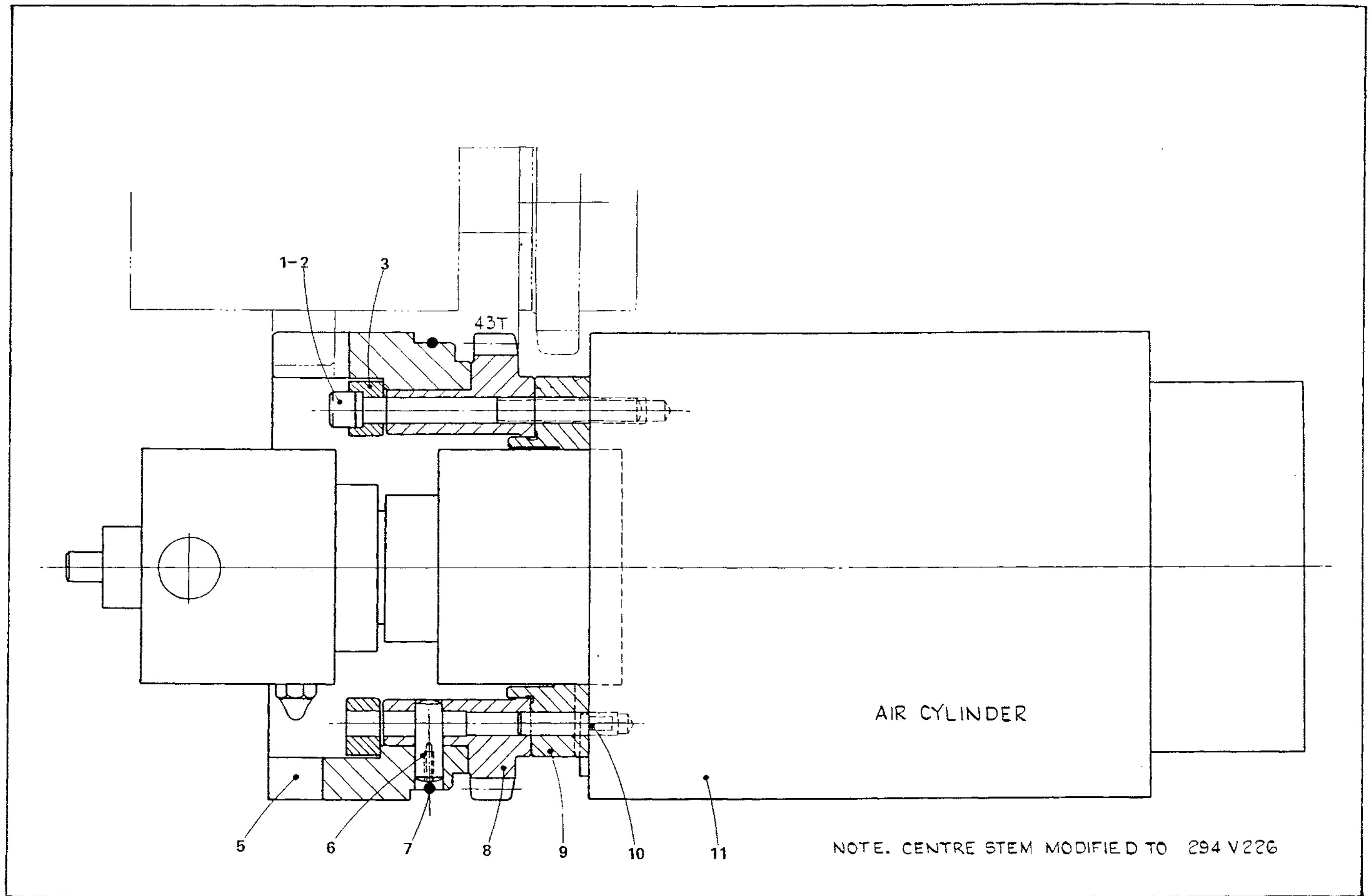
294Y 4



294Y 4

Sliding Gear Spindle Location Spindle Assembly Drg. 294 V 7

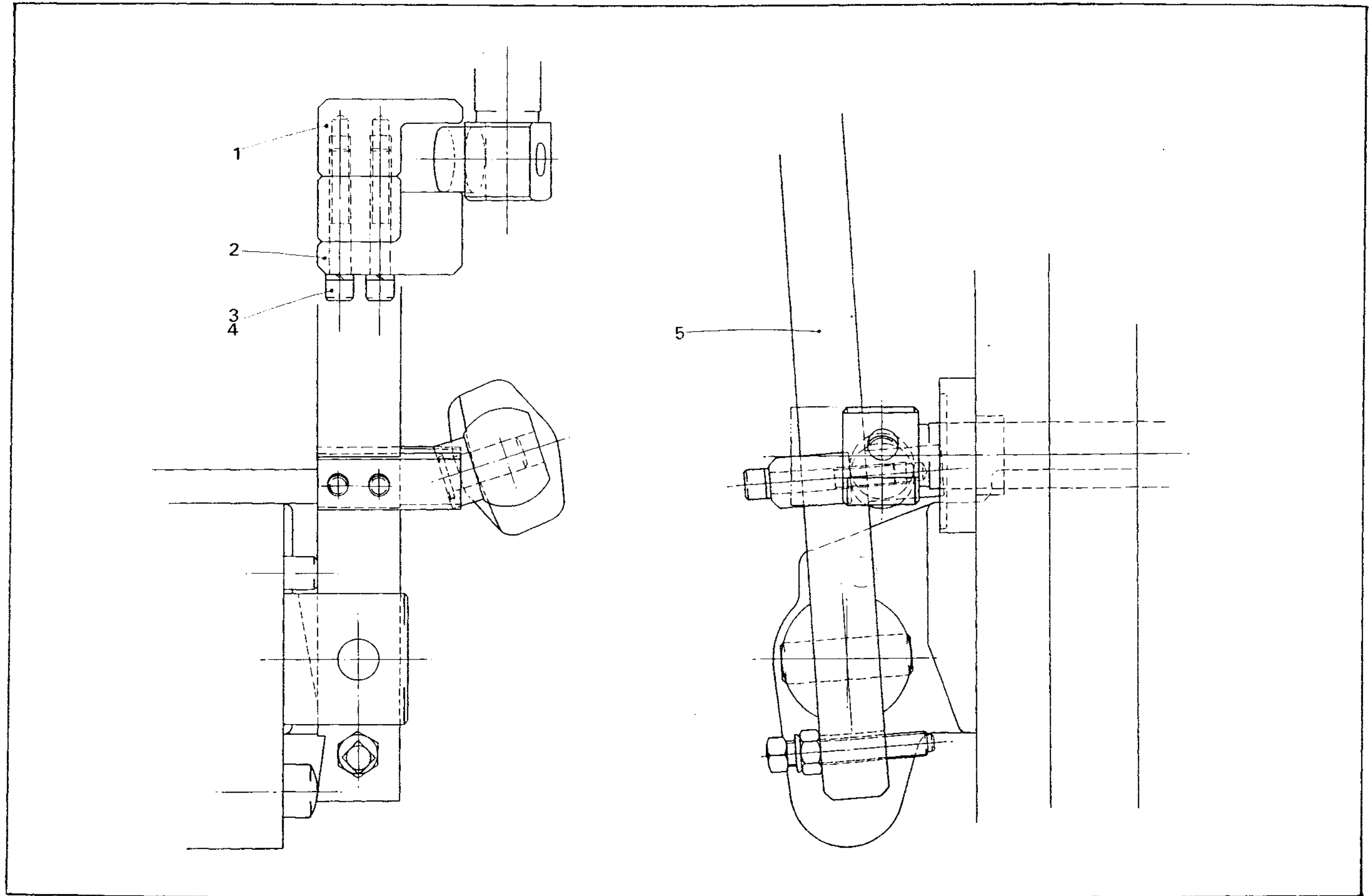
	Part No	Description
1.	154/05	5/16"dia. Spring washer
2.	155/0556	5/16"BSF Socket head cap screw 3.1/2"long
3.	394X232	Clamp plate
4.		
5.	394X228	Locating ring (1 way)
6.	141/2	11/32"dia. Extractable Taper dowel
7.	-	Soft iron wire
8.	394V227B	Location gear
9.	294X223	Location gear packer
10.	594X153	Dowel for location gear
11.	294X224	Modification to air cylinder TC 118



294V 7

Modification to Clutch Adjusting Unit Section 304D Drg. 294 V 5

	Part No	Description
1.	294X190	Finger
2.	294X189	Finger
3.	155/0532	5/16"BSF Socket head cap screw 2"long
4.	154/05	5/16"dia. Spring washer
5.	294V188	Lever

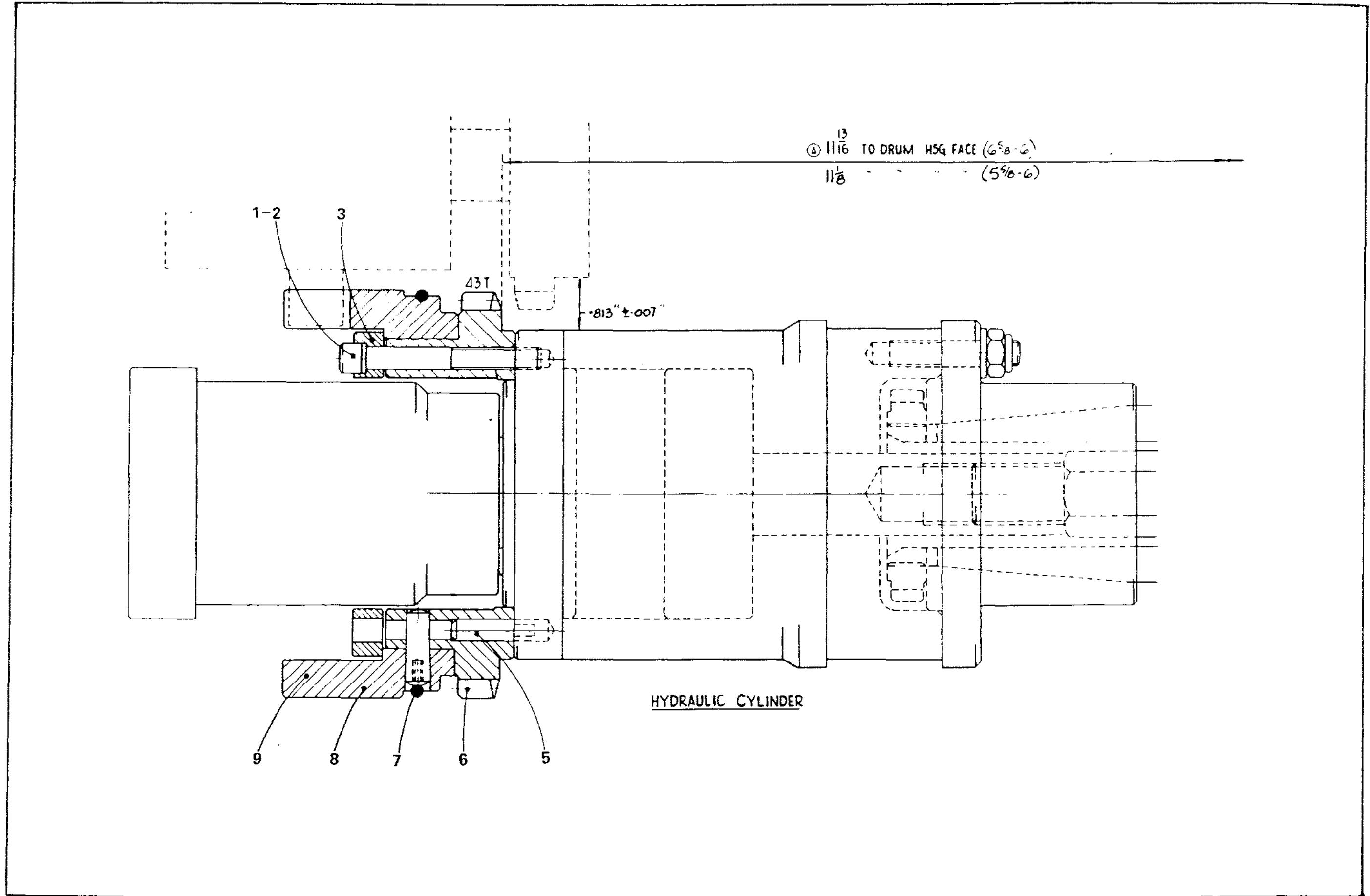


294.V.5.



Sliding Gear Spindle Location Spindle Assembly Drg. 394 V 9

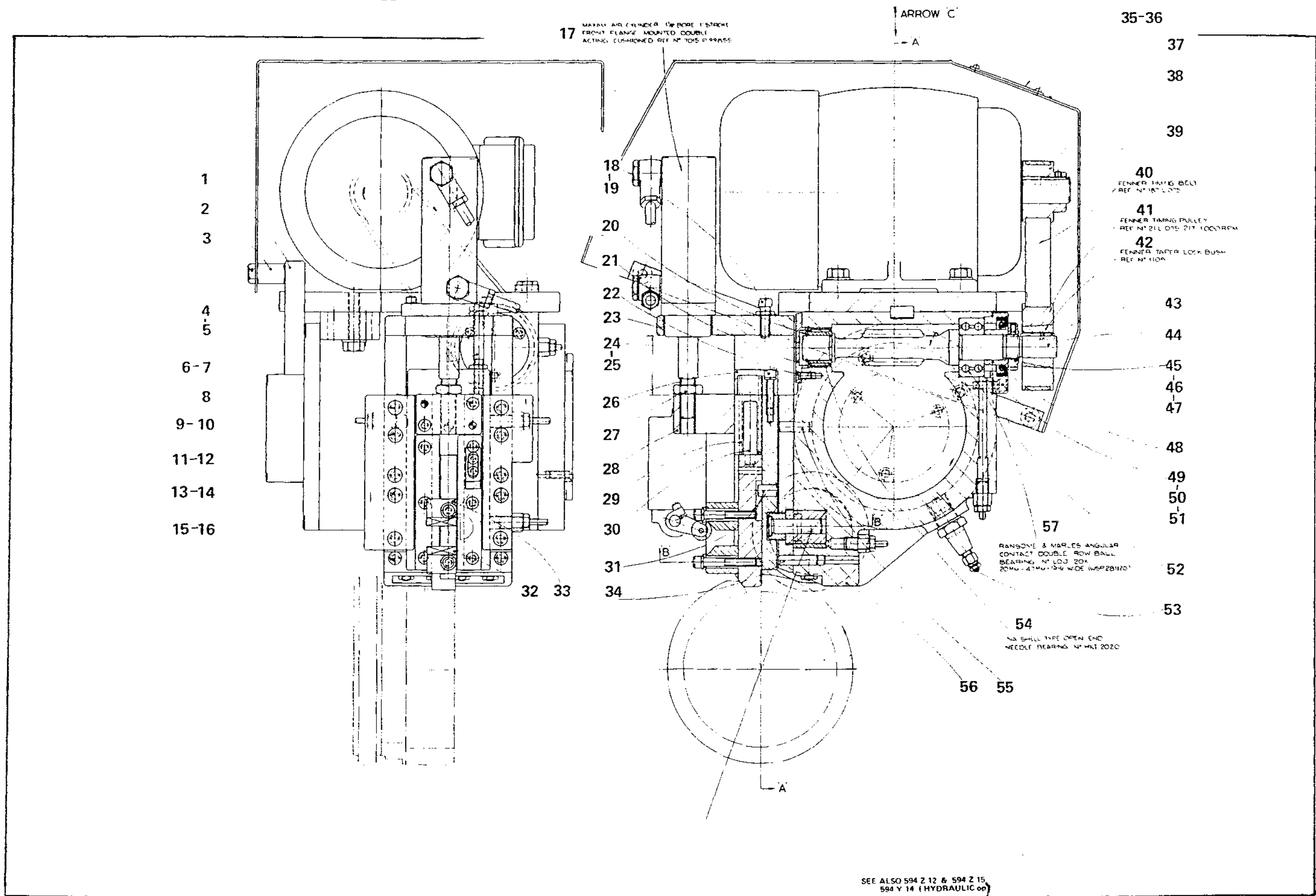
	Part No	Description
1.	154/05	5/16"dia. Spring washer
2.	155/0540	5/16"BSF Socket cap screw 2.1/2"long
3.	394X232	Clamp plate
4.	-	
5.	594X153	Dowel for gear
6.	394V227	Locating gear
7.		
8.	394X228	Locating ring (1 way)



394V 9

Sliding Gear Spindle Location Unit Drg. 594 Z 11

	Part No	Description
1.	594X221	Support bar
2.	594X220	Spacer
3.	167/0624	3/8"BSF Hex. head screw 1.1/2"long
4.	594X262	Stud
5.	175/05L	5/16"BSF Locknut
6.	154/04	1/4"dia.Spring washer
7.	155/0436	1/4"BSF Socket cap screw 2.1/4"long
8.	126/0818	1/4"dia. Dowel 1.1/8"long
9.	154/05	5/16"dia. Spring washer
10.	155/0516	5/16"BSF Socket cap screw 1"long
11.	154/05	5/16"dia. Spring washer
12.	155/0540	5/16"BSF Socket cap screw 2.1/2"long
13.	154/05	5/16"dia. Spring washer
14.	155/0544	5/16"BSF Socket cap screw 2.3/4"long
15.	154/05	5/16"dia. Spring washer
16.	155/0516	5/16"BSF Socket cap screw 1"long
17.	7015P99855	Maxam air cylinder
18.	188/0516	5/16"BSF Squ. head set screw 1"long
19.	173/05L	5/16"BSF Locknut
20.	103/9	20mm External circlip
21.	594X245A	Bung
22.	159/208	2BA Counter sunk head screw 1/2"long
23.	594V249A	Mounting plate
24.	155/0416	1/4"BSF Socket cap screw 1"long
25.	154/04	1/4"dia. Spring washer
26.	594X251	Spring block
27.	173/08L	1/2"BSF Locknut
28.	594X252A	Pusher block
29.	594X242	Compression spring
30.	594X253	Spindle guide
31.	125/1210	3/8"dia. dowel 5/8"long
32.	594X258	Trip block
33.	594X259	Trip block
34.	126/1020	5/16"dia. dowel 1.1/4"long
35.	165.	4BA Round head set screw 1/4"long
36.	594X275	Belt tension instruction plate
37.	594Y219A	Location unit cover
38.	594X263	Modification to Fenner pulley
39.	594X264	Key
40.	187L075	Fenner timing belt
41.	21L075	Fenner timing pulley
42.	1108	Fenner taper lock bush
43.	121/0618T	3/16"Squ. Key 1.1/8"long
44.	594X216	Wormshaft
45.	151/20	Slotted locknut
46.	179/204	2BA Socket head set screw 3/16"long
47.	153/42	Soft pad
48.	235/18302	Oil seal Gaco M15 12
49.	594X244	Seal housing
50.	155/0412	1/4"BSF Socket cap screw 3/4"long
51.	154/04	1/4"dia. Spring washer
52.	594X254	Spacer
53.	594V249A	Mounting plate
54.	KH1.2020	Ina needle bearing
55.	126/1016	5/16"dia. dowel 1"long
56.	594Z250	Location unit body
57.	281/20	R & M Angular contact double row ball bearing

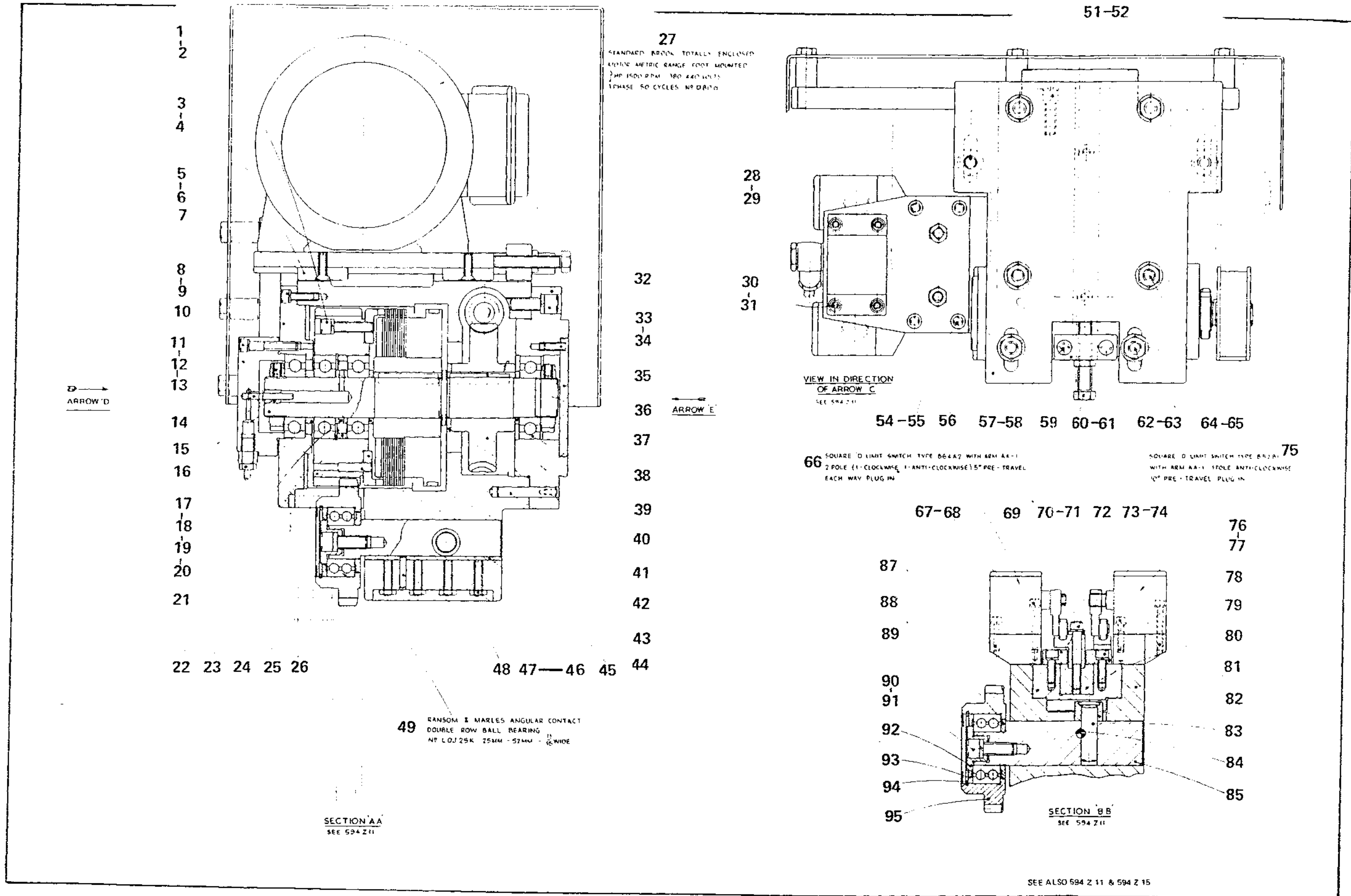


SEE ALSO 594 Z 12 & 594 Z 15  
594 Y 14 (HYDRAULIC OP)

Sliding Gear Spindle Location Unit Drg. 594 Z 12

	Part No	Description
1.	154/05	5/16"dia. Spring washer
2.	155/0520	5/16"BSF Socket head cap screw 1.1/4"long
3.	158/0412	1/4"BSF Counter sunk head screw 3/4"long
4.	594/241	Tenon
5.	154/04	1/4"dia. Spring washer
6.	155/0412	1/4"BSF Socket head cap screw 3/4"long
7.	594X237	Slide base
8.	154/04	1/4"dia. Spring washer
9.	155/0424	1/4"BSF Socket head cap screw 1.1/2"long
10.	594V247	Oiling cap
11.	153/04	1/4"dia. Soft pad
12.	176/0405	1/4"BSF Socket set screw 5/16"long
13.	151/30	Slotted locknut
14.	118X208	Oil nipple
15.	418X158	Oil bush
16.	594V222	Worm wheel shaft
17.	-	3/16"dia. Copper tube
18.	215/3	Tubing nut
19.	221/3	Tubing sleeve
20.	218/2	Encls male adaptor
21.	594X235	Bearing spacer
22.	594X234	Bearing Spacer
23.	104/33	62mm Internal circlip
24.	594X236	Spacer
25.	594X225	Clutch gear 40 teeth 33 rpm.
26.	594X232	Spacer
27.	D80A	Standard Brook totally enclosed motor metric range foot mounted, 380/440 Volts 3-phase 50 cycles
28.	167/0624	3/8"BSF Hex.head screw 1.1/2"long
29.	130/06	3/8"dia. washer
30.	156/216	2BA Socket head cap screw 1"long
31.	198/6	Lock washer
32.	594V238	Bearing housing
33.	154/06	3/8"dia. Spring washer
34.	155/0616	3/8"BSF Socket head cap screw 1"long
35.	158/0412	1/4"BSF Counter sunk head screw 3/4"long
36.	594X260	Plate
37.	121/1028T	5/16" Squ. Tapped key 1.3/4"long
38.	594X232	Spacer
39.	258/30	Ball journal light type 30x62x16mm
40.	594X217	Wormwheel 30 teeth, 33 rpm.
41.	594X233	Spacer
42.	141/1	11/32"dia. Taper dowel 1.3/4"long
43.	594X215	Clutch ESD10
44.	126/0816	1/4"dia. dowel 1"long
45.	594X229	Wear strip
46.	178/0416	1/4"BSF Socket set screw half dog point 1"long
47.	173/04L	1/4"BSF Locknut
48.	126/0614	3/16"dia. dowel 7/8"long
49.	LDJ25K	R & M Angular contact double row ball bearing 25mm x 52mm x 13/16" wide
50.	-	
51.	155/0514	5/16"BSF Socket head cap screw 7/8"long
52.	154/05	5/16"BSF Spring washer
53.	-	
54.	154/05	5/16"BSF Spring washer
55.	155/0516	5/16"BSF Socket head cap screw 1"long
56.	594X220	Spacer
57.	154/05	5/16"BSF Spring washer

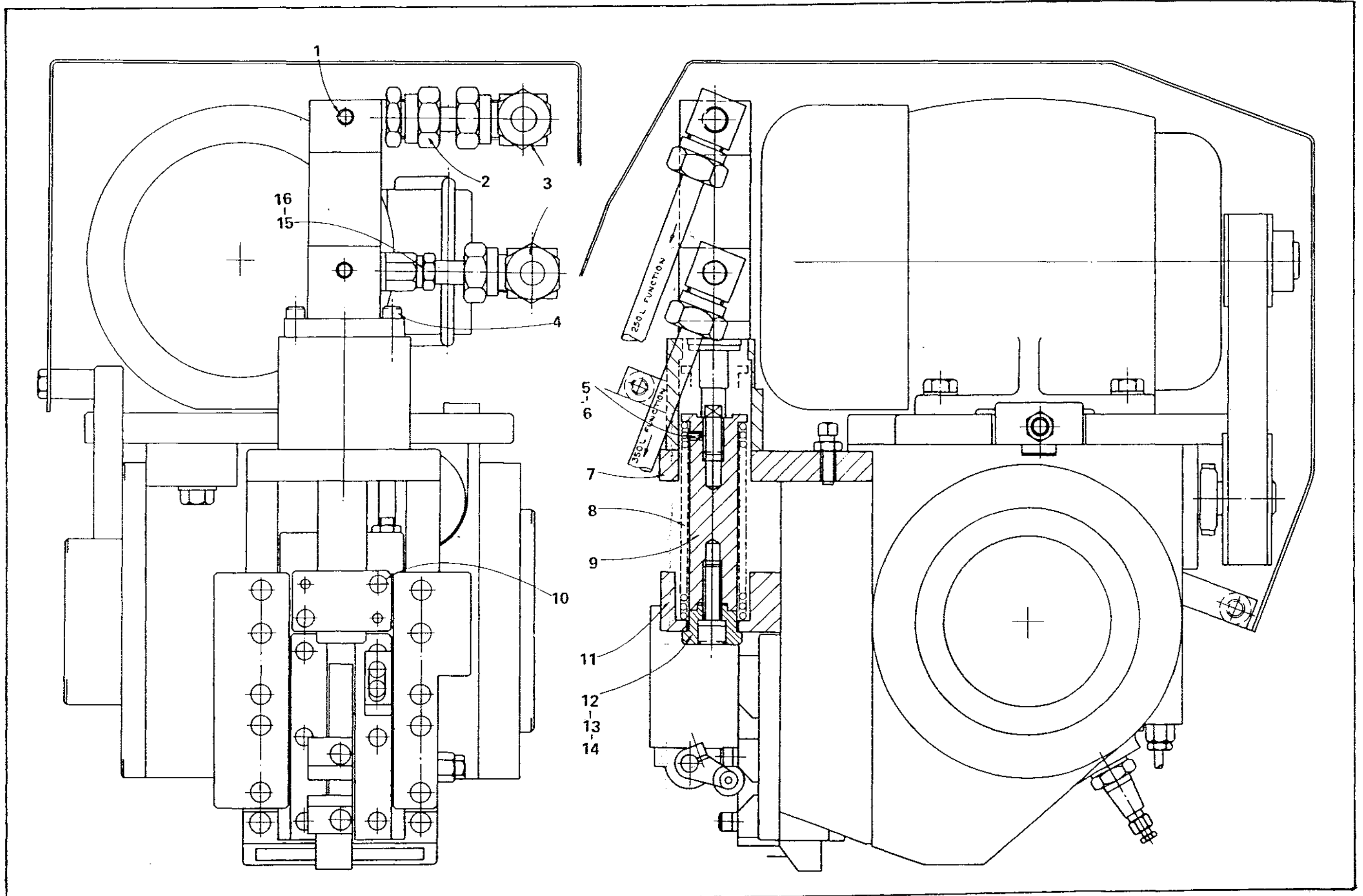
58.	155/0516	5/16"BSF Socket head cap screw 1"long
59.	594X243	Block
60.	167/0632	3/8"BSF Hex. head screw 2"long
61.	173/06L	3/8"BSF Locknut
62.	167/0620	3/8"BSF Hex. head screw 1.1/4"long
63.	130/06	3/8"dia. Washer
64.	167/0616	3/8"BSF Hex. head screw 1"long
65.	130/06	3/8"dia. Washer
66.	B64A2	Square 'D' limit switch with arm AA-1 2 pole (1 clockwise, 2 anti-clockwise) 5degree pre travel, each way plug in
67.	154/03	3/16"dia. Spring washer
68.	156/220	2BA Socket head cap screw 1.1/4"long
69.	594X255	Locator guide
70.	154/04	1/4"dia. Spring washer
71.	155/0428	1/4"BSF Socket head cap screw 1.3/4"long
72.	594X261	Washer
73.	154/03	3/16"dia. Spring washer
74.	156/212	2BA Socket head cap screw 3/4"long
75.	B52B1	Square 'D' limit switch with arm AA-1.1pole anti-clockwise, 10degree pre-travel, plug in
76.	154/04	1/4"dia. Spring washer
77.	155/0412	1/4"BSF Socket head cap screw 3/4"long
78.	594X272	Locator guide
79.	594X256	Slide guide
80.	594V248A	Locator
81.	594Y237	Slide base
82.	594X230	Roller
83.	594X231	Roller pin
84.	126/0814	1/4"dia. parallel dowel 7/8"long
85.	594V223	Sliding block
86.		
87.	594X257	Slide guide
88.	594Y246	Locator slide
89.	594Y226	Dust shield
90.	154/06	3/8"dia. Spring washer
91.	155/0616	3/8"BSF Socket head cap screw 1"long
92.	594X224	Retaining cap
93.	594X227	Dust shield
94.	104/29	52mm Internal circlip
95.	594X228B	Sliding gear



Location Unit when operated by Hydraulics Drg. 594 Y 14A

Part No	Description
1. -	Parker Hannifin Hydraulic cylinder to Wickman drawing 594X270B. Complete with 1/4"BSP port adaptor
2. A8/4SSAR	Stud stand pipe 1/2T-1/4 BSP
3. A8ER	Equal elbow 1/2T
4. 155/0416	1/4 BSP Socket cap screw 1"long
5. 179/203	2BA Socket set screw 3/16"long
6. 153/42	Soft pad
7. 594V265A	Mounting plate
8. 594X267	Compression spring
9. 594X266A	Cylinder rod extension
10. 155/0416	1/4"BSF Socket cap screw 1"long
11. 594X268	Pusher block
12. 594X269	End cap
13. 155/0620	3/8"BSF Socket cap screw 1.1/4"long
14. 154/06	3/8"dia. Spring washer
15. A8/4MSCR	Male stud coupling 1/2T-1/4 BSP
16. PP 45C	1/4"dia. Bonded washer

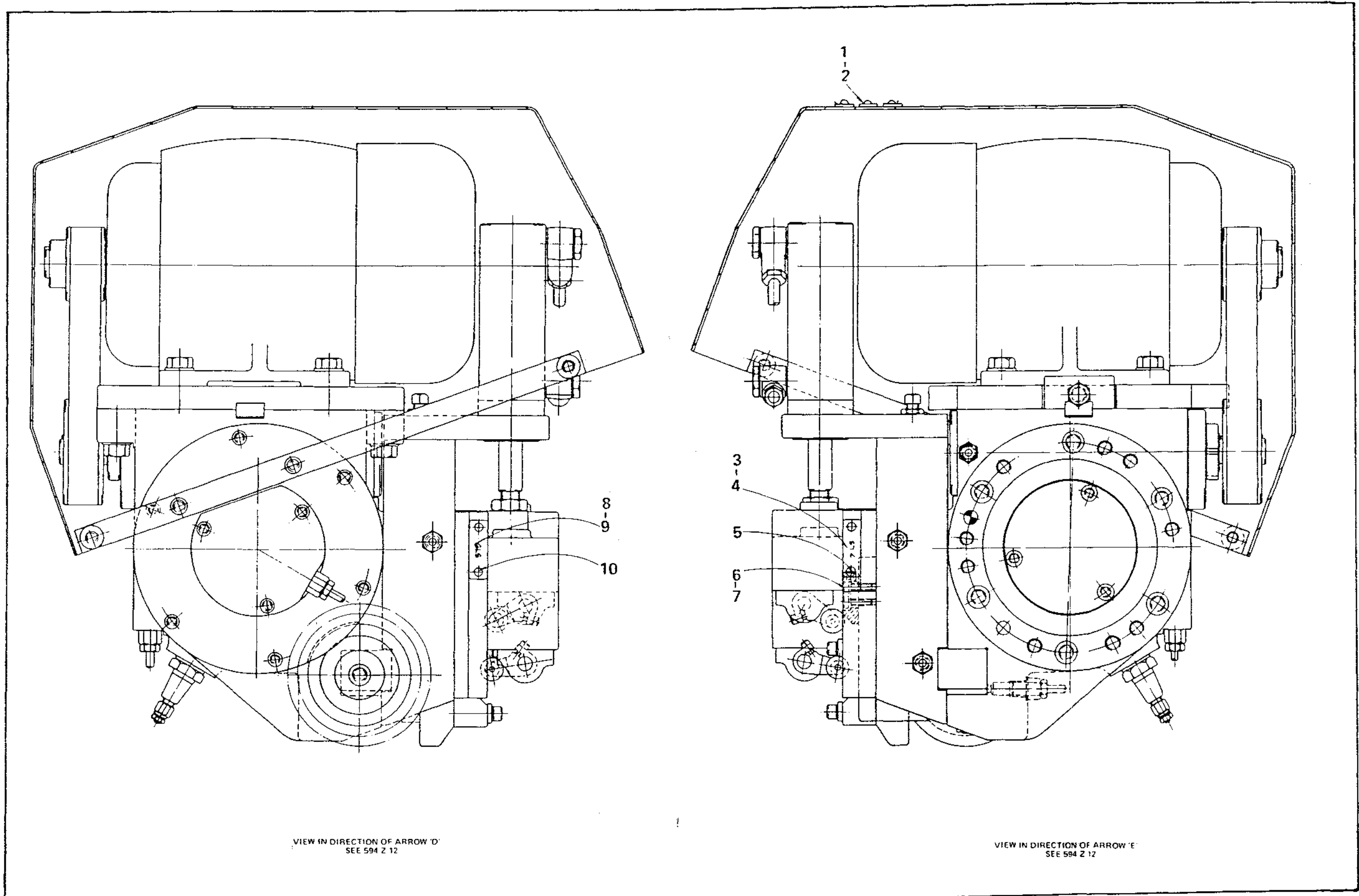




594Y 14A

Sliding Gear Spindle Location Unit Drg. 594 Z 15

	Part No	Description
1.	165/404	4BA Round head screw 1/4"long
2.	291/82	Legend plate 3 MC
3.	291/8	Legend plate 8LS (double index only)
4.	291/7	Legend plate 7LS (single index only)
5.	594X271	Trip block
6.	156/210	2BA Socket cap screw 5/8"long
7.	154/03	2BA Spring washer
8.	291/9	Legend plate 9LS (double index only)
9.	291/6	Legend plate 6LS (single index only)
10.	165/404	4BA Round head set screw 1/4"long



VIEW IN DIRECTION OF ARROW 'D'  
SEE 594 Z 12

VIEW IN DIRECTION OF ARROW 'E'  
SEE 594 Z 12

594Z 15