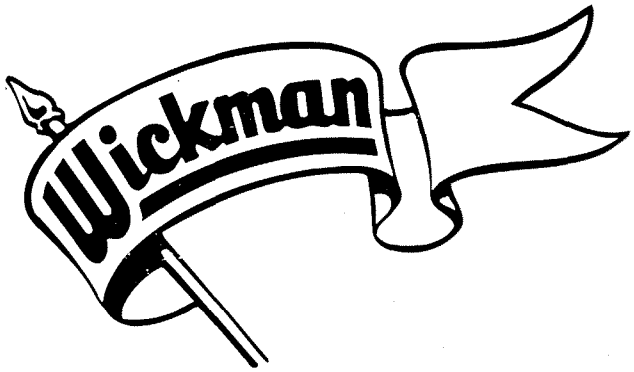

OPERATORS HANDBOOK

FOR

WICKMAN 1" (25.2mm) EIGHT SPINDLE BAR AUTOMATIC LATHE

OPERATORS HANDBOOK

FOR

WICKMAN 1" (25.4mm) EIGHT SPINDLE

BAR AUTOMATIC LATHE

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SUMMARY CONTENTS LISTING

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

PREFACE

This handbook provides the basic information and instructions necessary for the operation, and tooling of all Wickman 1" (25.4mm) 8 Spindle range of Multi Spindle Bar Automatic Lathes.

The contents will familiarize the reader with the machine and control specifications, installation procedure, the functions of the Operator's controls, operating procedures, safety at work and all the relevant aspects of the machine.

The handbook should be read thoroughly. It will enable the Operator to gain the knowledge required for the correct and efficient operation of the machine.

A Maintenance Manual and Parts List is also available for this range of 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 operated properly and with safety. It should be clearly understood that the operator must be properly trained, have the required skills and be authorised to operate the machine.

If it should arise that the person authorised to operate 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 and 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.

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" (25.4mm) EIGHT SPINDLE BAR AUTOMATIC LATHE

WICKMAN 1" (25.4mm) EIGHT SPINDLE BAR AUTOMATIC LATHE ARRANGED FOR SPINDLE STOPPING

WICKMAN 1" (25.4mm) EIGHT SPINDLE BAR AUTOMATIC LATHE ARRANGED FOR DOUBLE BAR FEEDING

WICKMAN 1" (25.4mm) EIGHT SPINDLE BAR AUTOMATIC LATHE ARRANGED FOR SPINDLE STOPPING AND DOUBLE BAR FEEDING

This Handbook applies to all the machines indicated above.

MACHINE SERIAL / INSPECTION NUMBER

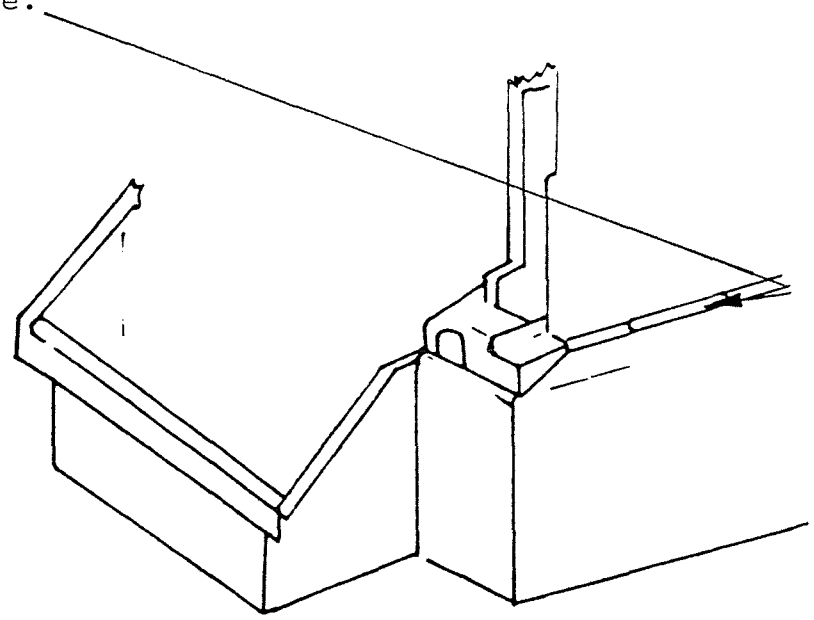
In the event that queries arise with regard to the operation of the machine, it is important to note that the following details need to be given to Wickman's in all correspondence, ie:

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.

The Serial Number of the machine is stamped here.



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SECTION ONE - MACHINE SPECIFICATIONS

1.1 1" (25.4mm) Eight Spindle Bar Automatic Lathe.
Standard and Double Bar Feed Machines.

Description	Unit	Specification	Remarks
CAPACITY			
Bar capacity:			
Round	mm	25.40	Solid Collet
Hexagon A/flats	mm	22.00	Solid Collet
Square A/flats	mm	18.00	Solid Collet
Round	mm	25.40	Master Collet/Pads
Hexagon A/flats	mm	22.00	Master Collet/Pads
Square A/flats	mm	18.00	Master Collet/Pads
Bar feed stroke:	mm	12 to 178	
Approach strokes:			
Centre Block. Standard	mm	63.50	1.6 Sec. Idle Time
Optional	mm	88.90	2.0 Sec. Idle Time
Front & Rear Independent Slides. Standard	mm	73.00	1.6 Sec. Idle Time
Optional	mm	101.60	2.0 Sec. Idle Time
Feed strokes:			
Centre Block.	mm	0 to 88.90	
Front & Rear Independent Slides.	mm	0 to 88.90	
Cross slides:			
Stations 1 and 2	mm	0 to 25.40	
Stations 3,4,7 & 8	mm	0 to 18.25	
Stations 5 and 6	mm	0 to 41.27	Lever position 'A'
		0 to 20.60	Lever position 'B'
End Working Attachment Pushers, 2 Each Side, Total Stroke.	mm	127.00	
Spindle speed range:	r/min	199 to 2737	
Number of steps:		26	
Cycle time range:	Secs	3.7 to 229	
Main Motor Power	Kw	18.50	
GENERAL INFORMATION			
Required Floor Space: (Refer to foundation drawing for swing over covers).	mm	1397 x 3740	O/all length excludes the stock carriage.
	mm	1397 x 6632	O/all length includes the stock carriage.
Shipping Weight including the Stock Carriage (nett)	Kg	7950	Including Electrics

1.1 1" (25.4mm) Eight Spindle Bar Automatic Lathe.
Arranged for Spindle Stopping.

Description	Unit	Specification	Remarks
CAPACITY			
Bar capacity:			
Round	mm	25.40	Solid Collet
Hexagon A/flats	mm	22.00	Solid Collet
Square A/flats	mm	18.00	Solid Collet
Round	mm	25.40	Master Collet/Pads
Hexagon A/flats	mm	22.00	Master Collet/Pads
Square A/flats	mm	18.00	Master Collet/Pads
Bar feed stroke:	mm	12 to 178	
Approach strokes:			
Centre Block. Standard	mm	63.50	1.6 Sec. Idle Time
Optional	mm	88.90	2.0 Sec. Idle Time
Front & Rear Independent Slides. Standard	mm	73.00	1.6 Sec. Idle Time
Optional	mm	101.60	2.0 Sec. Idle Time
Feed strokes:			
Centre Block.	mm	0 to 88.90	
Front & Rear Independent Slides.	mm	0 to 88.90	
Cross slides:			
Stations 1 and 2	mm	0 to 25.40	
Stations 3,4,7 & 8	mm	0 to 18.25	
Stations 5 and 6	mm	0 to 41.27	Lever position 'A'
		0 to 20.60	Lever position 'B'
End Working Attachment Pushers, 2 Each Side, Total Stroke.	mm	127.00	
Spindle speed range:	r/min	200 to 2773	
Number of steps:		26	
Cycle time range:	Secs	3.7 to 225	
Main Motor Power	Kw	18.50	
GENERAL INFORMATION			
Required Floor Space: (Refer to foundation drawing for swing over covers).	mm	1397 x 3740	O/all length excludes the stock carriage.
	mm	1397 x 6632	O/all length includes the stock carriage.
Shipping Weight including the Stock Carriage (nett)	Kg	7950	Including Electrics

1.1 Machine Specifications - General All Models

Description	Unit	Specification	Remarks
GENERAL			
Coolant Tank Capacity	Litres	590	
Jacking Screws		4 Off	
Service Tool Kit		1 Off	Toolbox, spanners, wrenches,tool height setting gauge
LUBRICATION			
Main Spindle Bearings & Spindle Drum			See Section on Lubrication
Main Drive Housing			Splash lubrication
Intermittent 'Vogel' System			System delivers oil in metered quantities to chosen lubrication points at timed intervals, plus some greasing points.
All Electric Motors			Sealed for life - maintenance free

1.2 Electrical Specifications

Description	Unit	Specification	Remarks
MAINS SUPPLY CONDITIONS:			
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
MAIN SPINDLE MOTOR: Foot mounted, totally enclosed, fan cooled	kW	18.50	Standard
Motor Speed	R/Min R/Min	1,450.0 1,450.0	At 50Hz At 60Hz
SWARF CONVEYOR MOTOR: Flange Mounted, totally enclosed fan cooled.	kW	0.18	Standard screw type swarf conveyor.

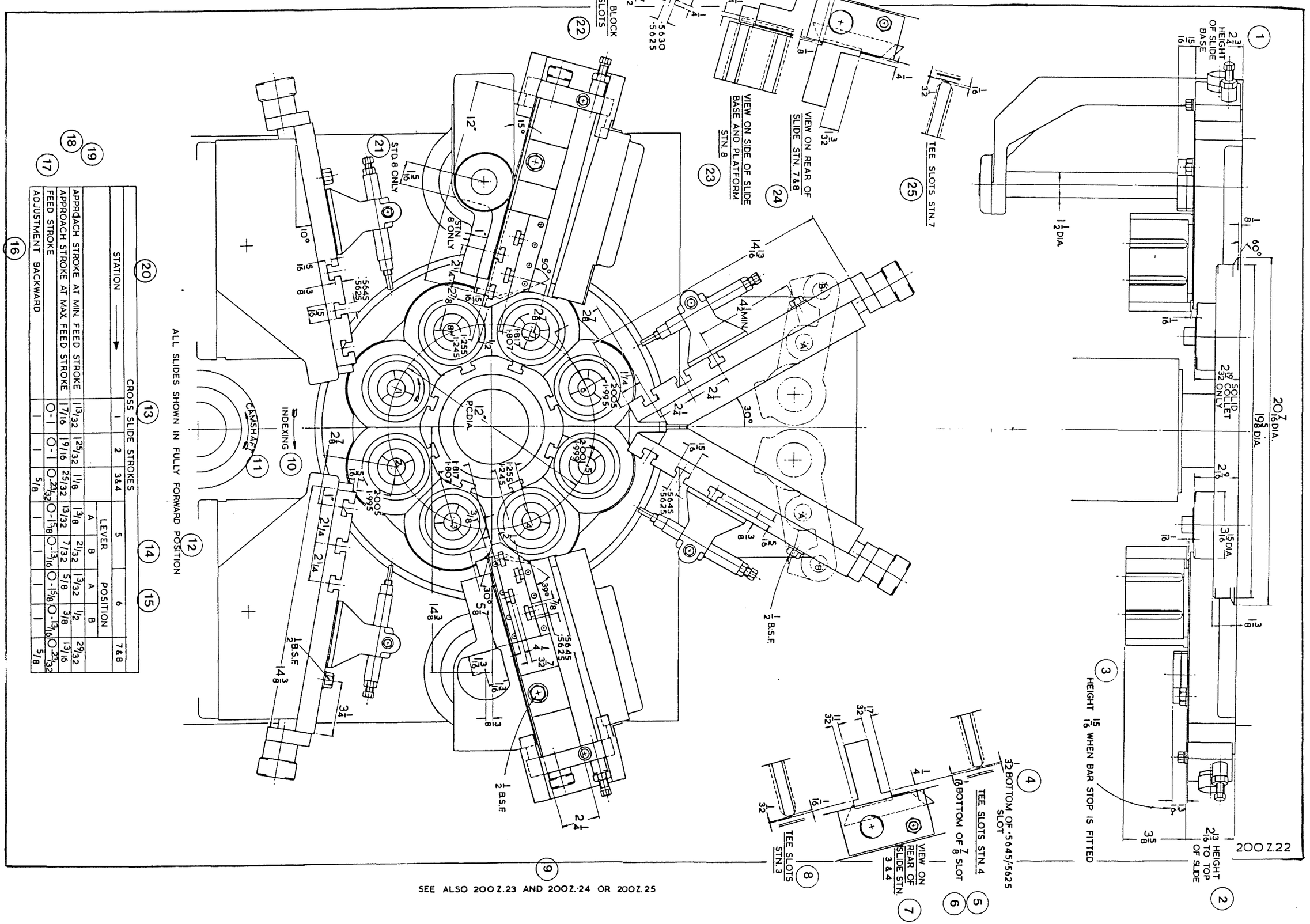
Power to the equipment is supplied through the Electrical Control Enclosure.

1.3 Capacity Charts

Drg. No:	Description:
200Z22	Capacity Chart 1" (25.4mm) 8 Spindle Single Bar Feed Automatic.
200Z22M	Capacity Chart 1" (25.4mm) 8 Spindle Single Bar Feed Automatic. (Metric)
200Z23	Capacity Chart 1" (25.4mm) 8 Spindle Single Bar Feed Automatic
200Z23M	Capacity Chart 1" (25.4mm) 8 Spindle Single Bar Feed Automatic (Metric)
200Z24	Capacity Chart 1" (25.4mm) 8 Spindle Standard Bar Stop Automatic.
200Z25	Capacity Chart 1" (25.4mm) 8 Spindle Special Bar Stop Automatic.

Capacity Chart 1" (25.4mm) - 8 Spindle Bar Auto.Lathe Drg.200Z22

1. 2.3/4"Height of slide base
2. 2.13/16"Height to top of slide
3. Height 15/16" when bar stop is fitted
4. 1/32"Bottom of slot
5. Tee slots station 4
6. 1/16" Bottom of 7/8" slot
7. View on rear of slide station 3 & 4
8. Tee slots station 3
9. See also 200Z23 and 200Z24 or 200Z25
10. Indexing
11. Camshaft
12. All slides shown in the fully forward position
13. Cross slide strokes
14. Lever
15. Position
16. Adjustment backwards
17. Feed stroke.
18. Approach stroke at max. feed stroke
19. Approach stroke at min. feed stroke
20. Station
21. Station 8 only
22. Centre block tee slots
23. View on side of slide base and platform station 8
24. View on rear of slide station 7 & 8
25. Tee slots station 7



CROSS SLIDE STROKES						
STATION →	1	2	3&4	5	6	7&8
LEVER POSITION A				3/8	1/2	29/32
LEVER POSITION B				2 1/32	3/32	13/16
APPROACH STROKE AT MIN. FEED STROKE	13/32	25/32	1 1/8	3/8	3/32	1/2
APPROACH STROKE AT MAX FEED STROKE	7/16	9/16	25/32	13/32	7/32	5/8
FEED STROKE	O-1	O-1	O-23/32	O-15/8	O-13/16	O-15/8
ADJUSTMENT BACKWARD	1	1	5/8	1	1	1

Capacity Chart 1" (25.4mm) 8 Spindle Bar Auto.Lathe Drg.200Z22M

1. 69.9 Height of slide base
2. 71.4 Height to top of slide
3. Height 23.8 When bar stop is fitted
4. 0.8 Bottom of.5645/.5625 slot
5. Tee slots station 4
6. 1.6 Bottom of 22.2 slot
7. View on rear of slide stations 3 & 4
8. Tee slots station 3
9. See also 200Z23 and 200Z24 or 200Z25.
10. Indexing
11. Camshaft
12. All slides shown in fully forward position
13. Cross slide strokes
14. Lever
15. Position
16. Adjustment backwards
17. Feed stroke
18. Approach stroke at max. feed stroke
19. Approach stroke at min. feed stroke
20. Station
21. STN 8 only
22. Centre block tee slots
23. View on side of slide base and platform station 8
24. View on rear of slide station 7 & 8
25. Tee slots station 7

CROSS SLIDE STROKES								
STATION ◄	1	2	3&4	5		6		7&8
				LEVER		POSITION		
				A	B	A	B	
APPROACH STROKE AT MIN FEED STROKE	35·7	45·2	28·6	34·9	16·7	27·8	12·7	23·0
APPROACH STROKE AT MAX FEED STROKE	36·5	39·7	19·8	10·3	5·6	15·9	9·5	20·6
FEED STROKE	0-25·4	0-25·4	0-18	30-41·3	0-20·6	0-41·3	0-20·6	0-18·3
ADJUSTMENT 3·2MM/REV	25·4	25·4	15·9	25·4	25·4	25·4	25·4	15·9

(16) (17) (18) (19) (20) (13) (14) (15)

ALL SLIDES SHOWN IN FULLY FORWARD POSITION (12)

CAMSHAFT (11)

INDEXING (10)

(21) STD 8 ONLY

(22) CENTRE BLOCK TEE SLOTS

(23) VIEW ON SIDE OF SLIDE BASE AND PLATFORM STN 8

(24) VIEW ON REAR OF SLIDE STN 7&8

(25) TEE SLOTS STN 7

(8) TEE SLOTS STN 3

(7) VIEW ON REAR OF SLIDE STN 3 & 4

(6) 1·6 BOTTOM OF 22·2 SLOT

(5) TEE SLOTS STN 4

(4) 0·8 BOTTOM OF 14·33/14·29 SLOT

(9) (3) HEIGHT 23·8 WHEN BAR STOP IS FITTED

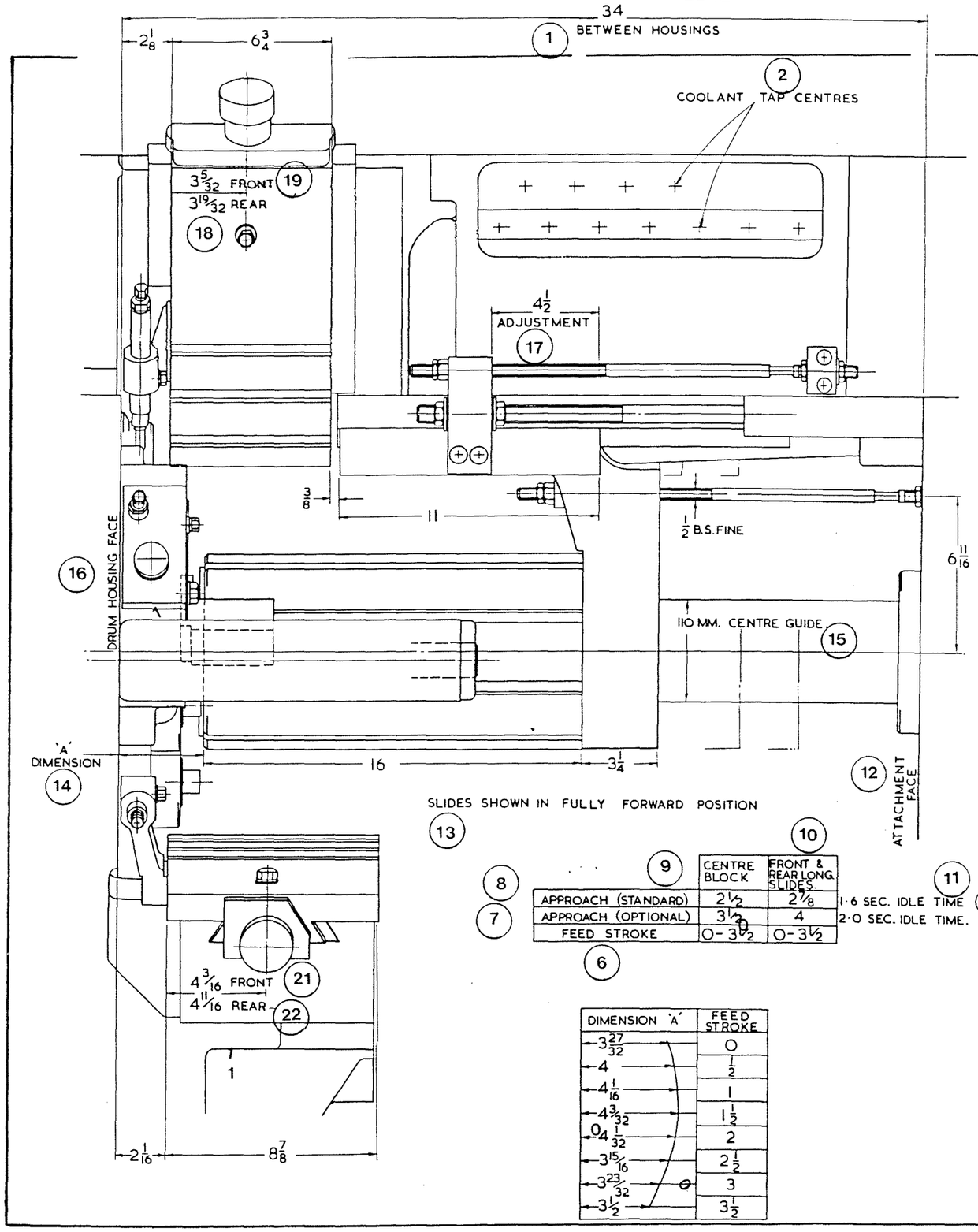
(2) HEIGHT TO TOP OF SLIDE 71·4

(1) HEIGHT OF SLIDE BASE 69·9

200Z22M METRIC

Capacity Chart 1" (25.4mm) 8 Spindle Bar Auto.Lathe Drg. 200Z23

1. Between housings
2. Coolant taps centres
3. Longitudinal slides tee slots
4. Longitudinal slides and pusher arm
5. Idle time with standard spindles 1.6sec. with 2.1/2" approach cam
   Idle time with standard spindles 2.0sec. with 3.1/2" approach cam
   Idle time with spindle stopping 2.0sec. with 2.1/2 or 3.1/2" approach cam
6. Feed stroke
7. Approach (optional)
8. Approach (standard)
9. Centre block
10. Front and rear long slides
11. 1.6sec. idle time (standard machine only)
    2.0sec. idle time
12. Attachment face
13. Slides shown in fully forward position
14. 'A' dimension
15. Centre guide
16. Drum housing face
17. Adjustment
18. 3.19/32" Rear
19. 3.5/32" Front
20. See also 200Z22 & 200Z24 or 200Z25
21. 4.3/16" Front
22. 4.11/16" Rear

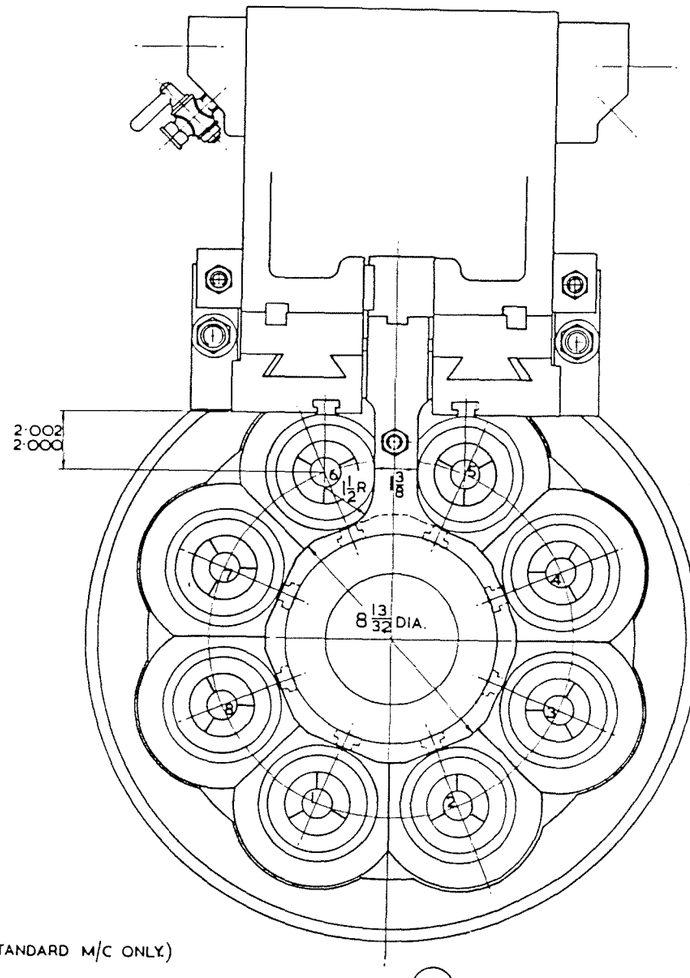


	CENTRE BLOCK	FRONT & REAR LONG. SLIDES.
APPROACH (STANDARD)	2 1/2	2 1/8
APPROACH (OPTIONAL)	3 1/2	4
FEED STROKE	0-3 1/2	0-3 1/2

8 7 9 10 6

11 1·6 SEC. IDLE TIME (STANDARD M/C ONLY.)
2·0 SEC. IDLE TIME.

DIMENSION 'A'	FEED STROKE
3 27/32	0
4	1/2
4 1/16	1
4 3/32	1 1/2
4 1/32	2
3 15/16	2 1/2
3 23/32	3
3 1/2	3 1/2



4 4 9/32
1/4
7/8
7/32
·5630
·5625
2·829
2·830
LONGITUDINAL SLIDES TEE SLOTS.
3

4 LONGITUDINAL SLIDES AND CENTRE BLOCK PUSHER ARM.

5
IDLE TIME WITH STANDARD SPINDLES 1·6 SECS WITH 2 1/2 APPROACH CAM.
IDLE TIME WITH STANDARD SPINDLES 2·0 SECS. WITH 3 1/2 APPROACH CAM.
IDLE TIME WITH SPINDLE STOPPING 2·0 SECS WITH 2 1/2 OR 3 1/2 APPROACH CAM

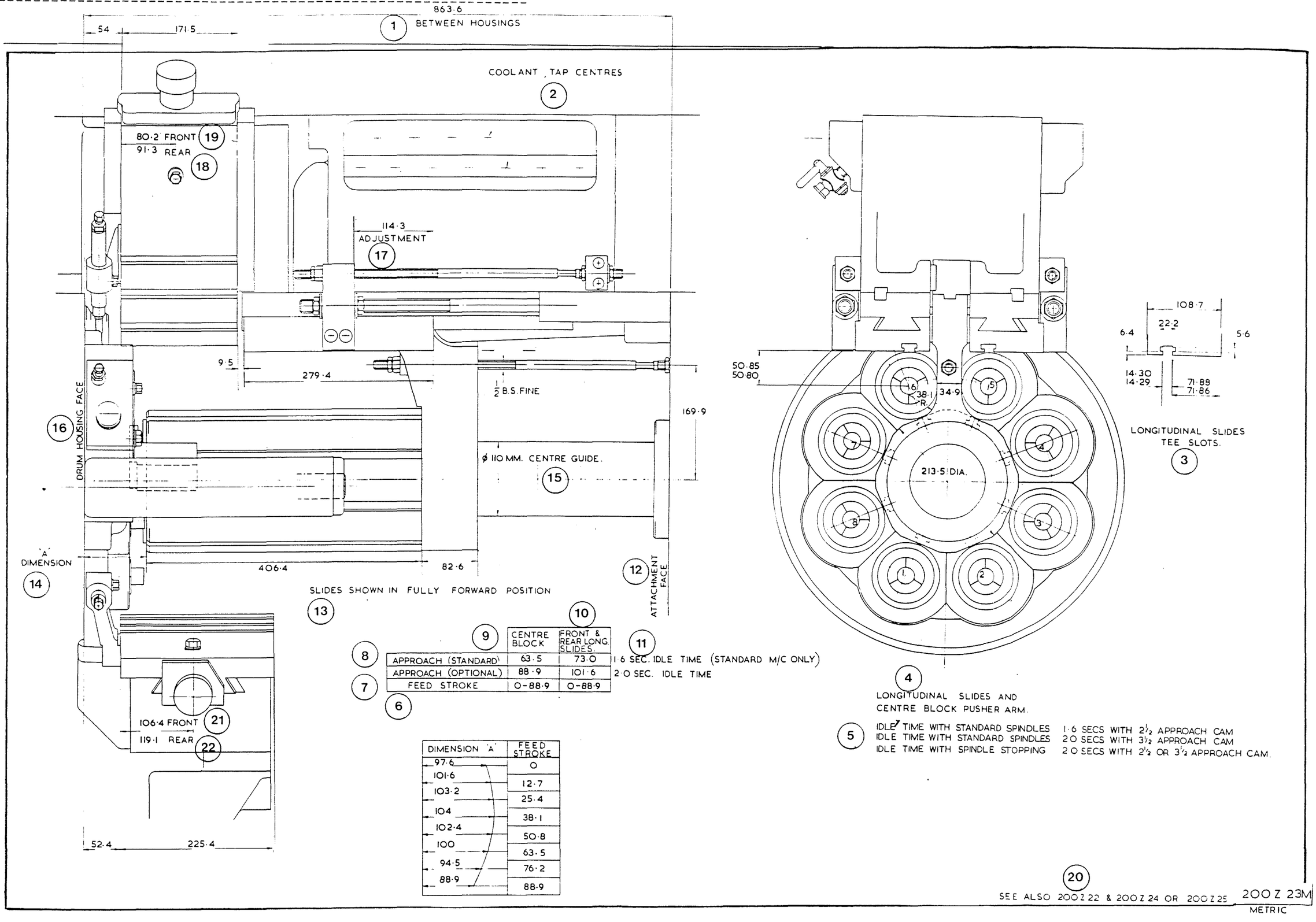
20 SEE ALSO 200Z22 & 200Z24 OR 200Z25.

200Z23

Capacity Chart 1" (25.4mm) 8 Spindle Bar Automatic Lathe Drg.200Z23M

1. Between housings
2. Coolant tap centres
3. Longitudinal slides tee slots
4. Longitudinal slides and pusher arm
5. Idle time with standard spindles 1.6sec.with 2.1/2 approach cam
   Idle time with standard spindles 2.0sec.with 3.1/2 approach cam
   Idle time with spindle stopping 2.0sec.with 2.1/2 or 3.1/2 approach cam
6. Feed stroke
7. Approach (optional)
8. Approach (standard)
9. Centre block
10. Front and rear long slides
11. 1.6sec. idle time (standard machines only)
    2.0sec. idle time
12. Attachment face
13. Slides shown in fully forward position
14. 'A' dimension
15. 110mm Centre guide
16. Drum housing face
17. Adjustment
18. 91.3 Rear
19. 80.2 Front
20. See also 200Z22 & 200Z24 or 200Z25
21. 106.4 Front
22. 119.1 Rear

Capacity Chart 1" (25.4mm) 8 Spindle Bar Automatic Lathe 200Z23M



9	CENTRE BLOCK	FRONT & REAR LONG. SLIDES.	11
8 APPROACH (STANDARD)	63·5	73·0	1·6 SEC. IDLE TIME (STANDARD M/C ONLY)
APPROACH (OPTIONAL)	88·9	101·6	2·0 SEC. IDLE TIME
7 FEED STROKE	0–88·9	0–88·9	

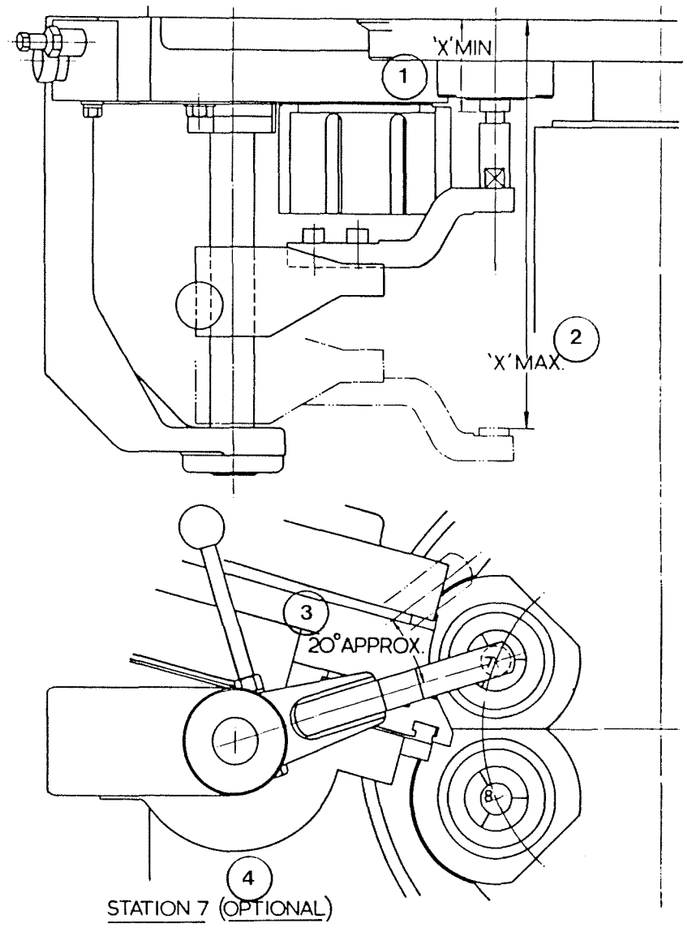
10

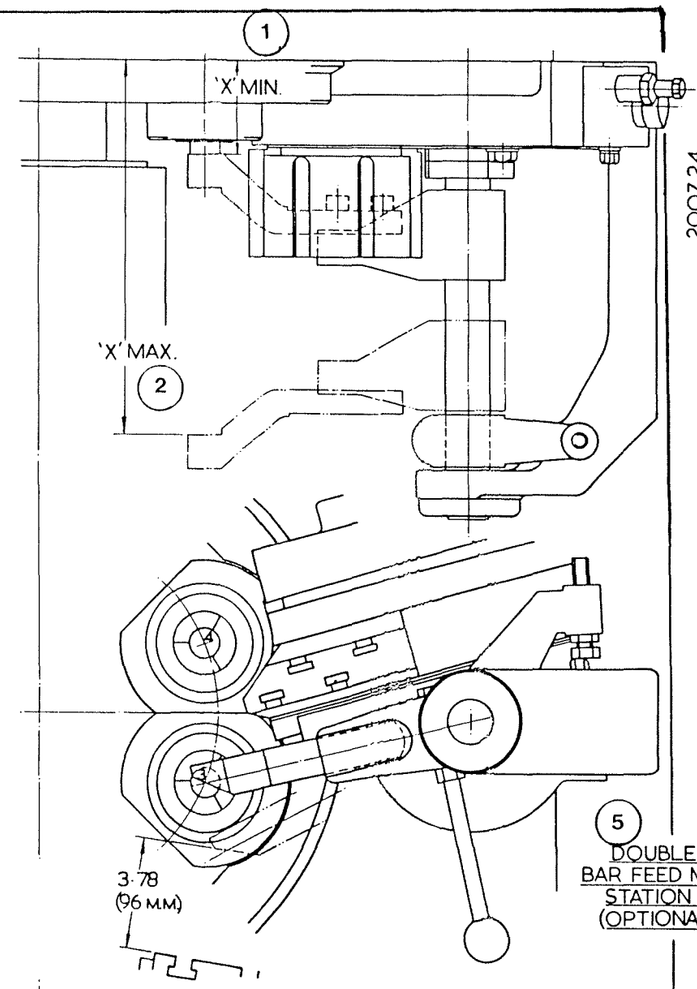
6

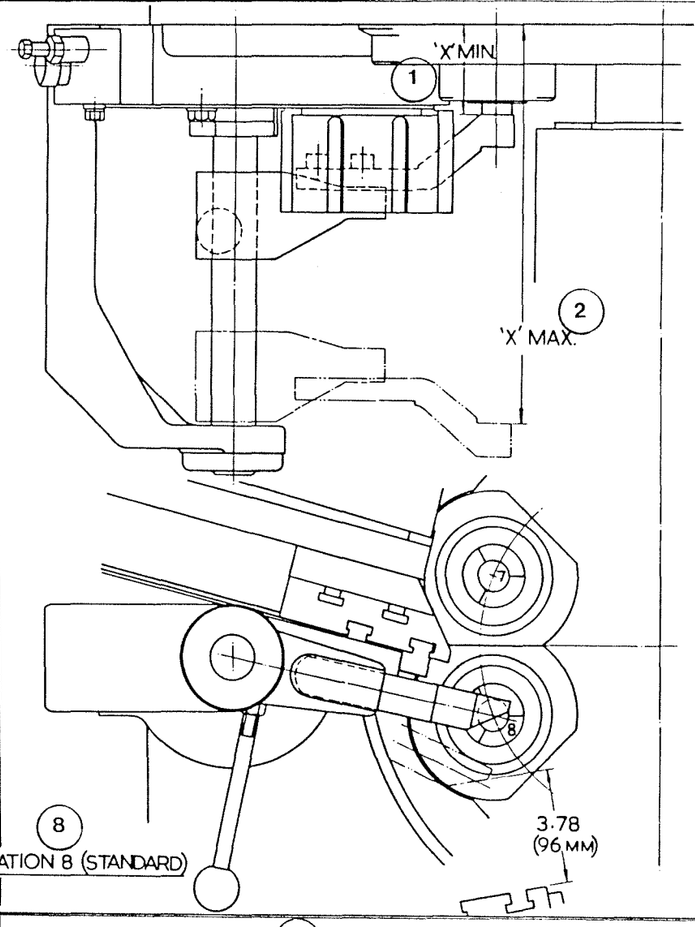
DIMENSION 'A'	FEED STROKE
97·6	0
101·6	12·7
103·2	25·4
104	38·1
102·4	50·8
100	63·5
94·5	76·2
88·9	88·9

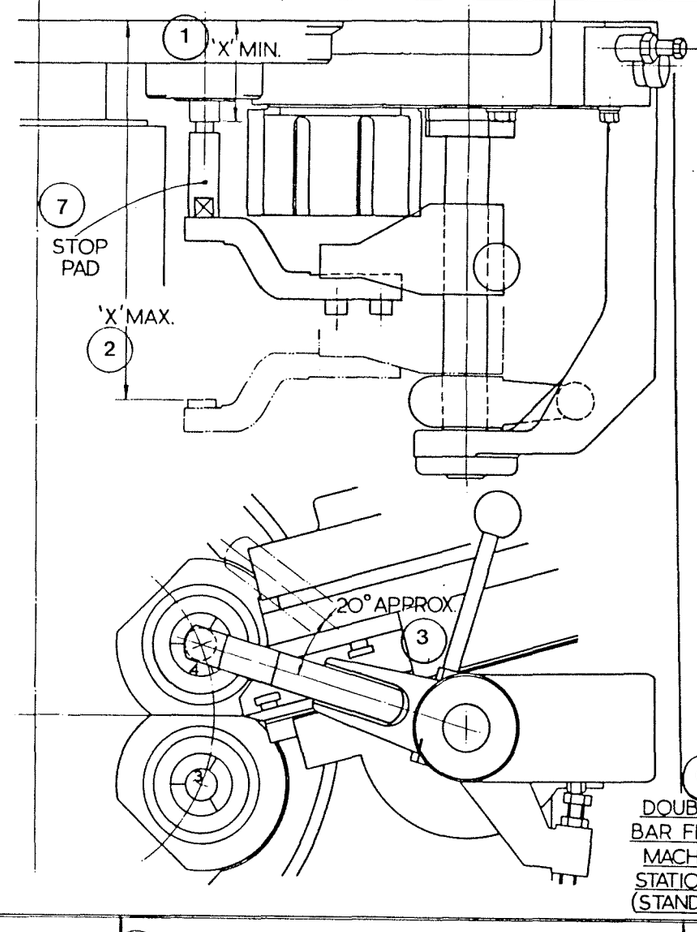
Capacity Chart 1" (25.4mm) 8 Spindle (Standard Bar Stops) Drg. 200Z24

1. 'X' Min.
2. 'X' Max.
3. 20 Deg. Approx.
4. Station 7 (optional)
5. Double bar feed machine station 3 (optional)
6. Double bar feed machine station 4 (optional)
7. Stop pad
8. Station 8 (standard)
9. See table to select stop pad required (pads supplied with machine tool kit)
10. Bar feed 0.5 to 7.0 (12.7 to 177.8mm) in all stations
11. On double bar feed machines the longer bar feed should be at the front.
12. Max. difference between bar lengths feed 5.75 (146mm)
13. Station 3
14. Station 7
15. Station 4
16. Station 8
17. Stop pad No
18. Bar stand out 'X'









(18) BAR 'STAND OUT "X'

STOP PAD No. → (17)	——		255 X 162		255 X 163		255 X 164		255 X 165		255 X 166		255 X 167	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
STATION. 8 (16)	3·06 78MM	13.38 340MM	—	—	—	—	—	—	—	—	—	—	—	—
STATION. 4 (15)	—	—	6·31 160MM	12·50 318MM	5·81 148MM	12·00 305MM	5·31 135 MM	11·50 292MM	4·69 119MM	10·88 276MM	4·06 103MM	10·25 260MM	3·31 84MM	9·50 241MM
STATION. 7 (14)	—	—	5·31 135MM	13·50 343MM	4·81 122MM	13·00 330MM	4·31 110MM	12·50 318MM	3·69 94MM	11·88 302MM	3·06 78MM	11·25 286MM	3·06 78MM	10·50 267MM
STATION. 3	3·06 78MM	12·38 314MM	—	—	—	—	—	—	—	—	—	—	—	—

(13)

(9) SEE TABLE TO SELECT STOP PAD REQUIRED (PADS SUPPLIED WITH MACHINE MACHINE TOOL KIT)

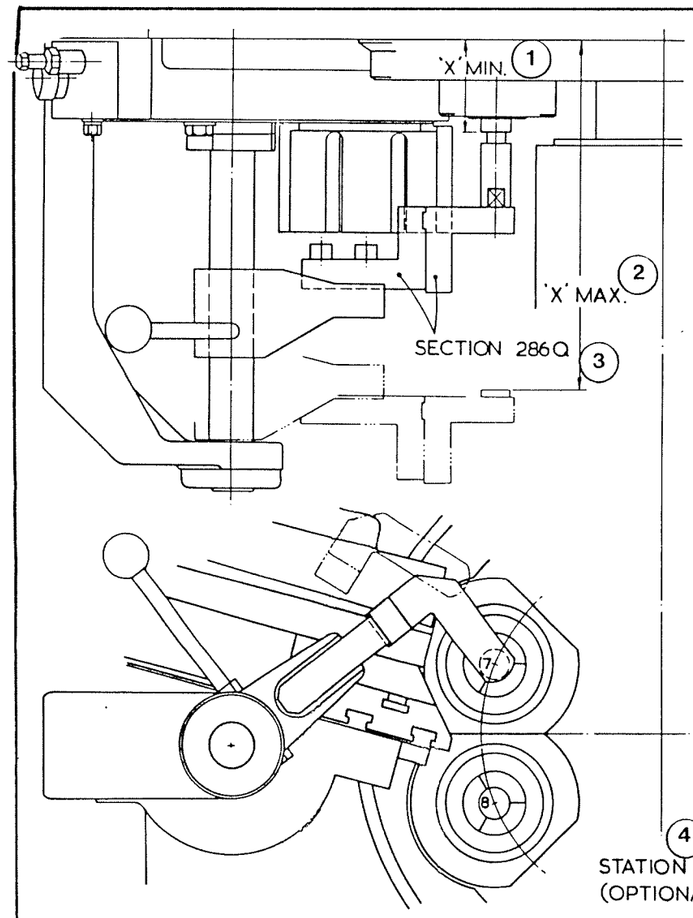
(10) BAR FEED 0·5 TO 7·0 (12·7 TO 177·8MM.) IN ALL STATIONS

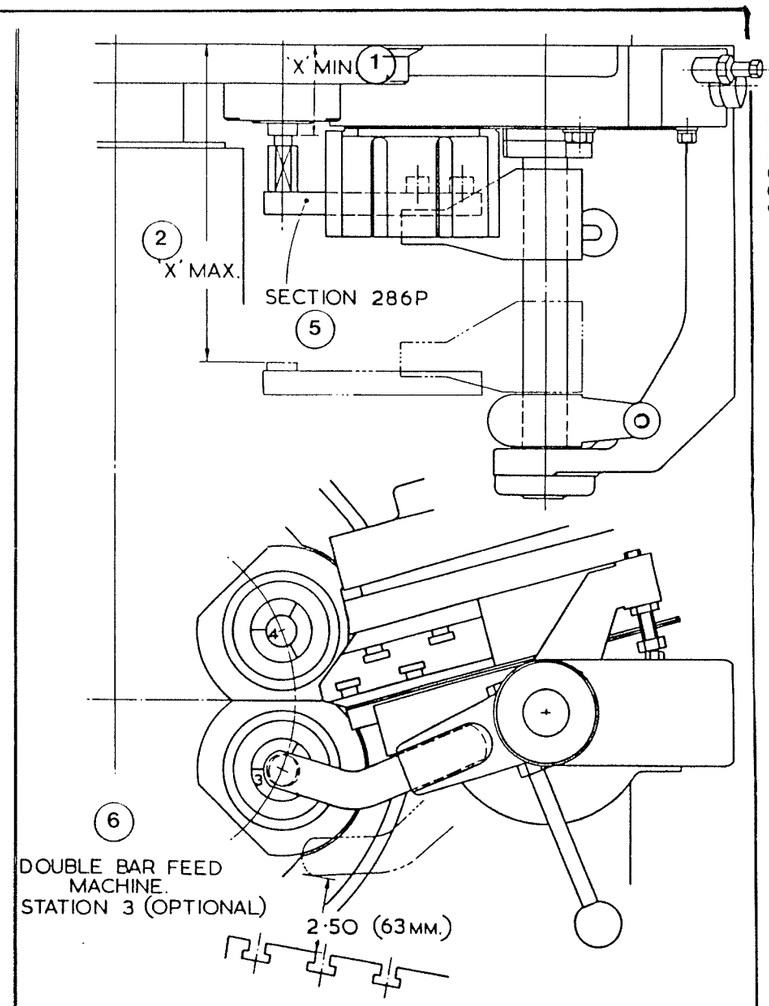
(11) ON DOUBLE BAR FEED MACHINES, THE LONGER BAR FEED SHOULD BE AT THE FRONT.

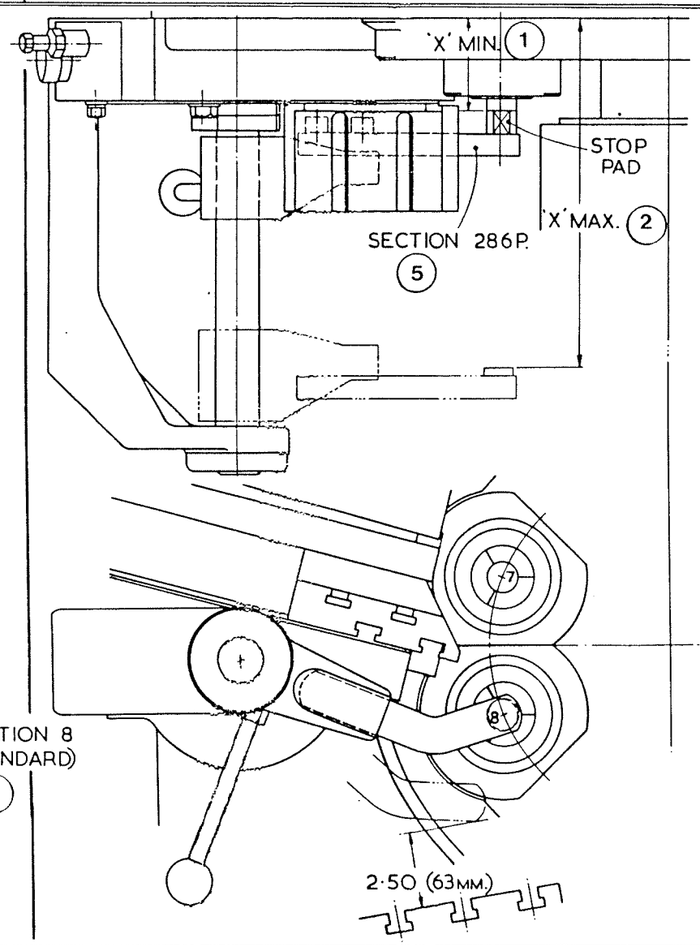
(12) MAXIMUM DIFFERENCE BETWEEN BAR LENGTHS FED 5·75 (146 MM)

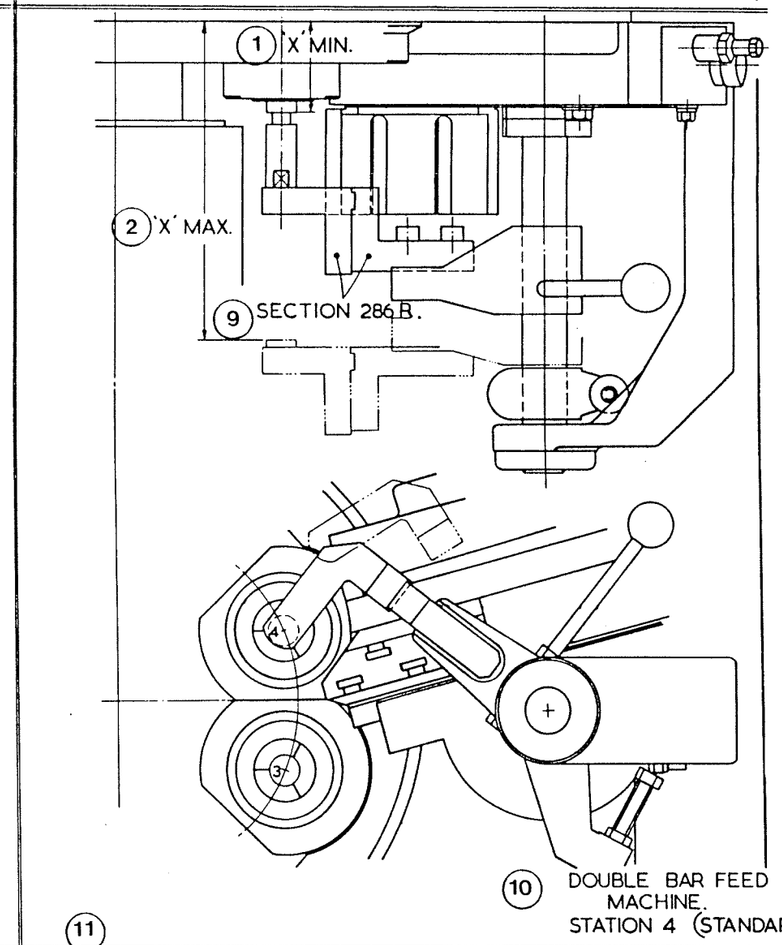
Capacity Chart 1" (25.4mm) 8 Spindle Special Bar Stops Drg. 200Z25

1. 'X' Min.
2. 'X'Max.
3. Section 286 Q
4. Station 7 (optional)
5. 286 P
6. Double bar feed machine station 3 (optional)
7. Station 8 (standard)
8. See also 200Z22 & 200Z23
9. Section 286 R
10. Double bar feed machine station 4 (standard)
11. See table to select pad required (pads supplied with machine tool kit
12. Bar stop arms move through approx. 20Deg.in all stations
13. Bar feed 0.5 to 7.0 (12.7 to 177.8mm) all stations
14. On double bar feed machines, the longer bar feed should be at the front
15. Maximum difference between bar lengths Fed 5.75 (146mm)
16. Station 3
17. Station 7
18. Station 4
19. Station 8
20. Stop pad No
21. Bar stand-out 'X'









20 STOP PAD No →	21 BAR 'STAND-OUT' 'X'											
	255 X 162		255 X 163		255 X 164		255 X 165		255 X 166		255 X 167	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
19 STATION 8	3·44 87 MM.	11·63 295 MM.	3·06 78 MM.	11·13 283 MM.	3·06 78 MM.	10·63 270 MM.	3·06 78 MM.	10·00 254 MM.	3·06 78 MM.	9·38 238 MM.	3·06 78 MM.	8·63 219 MM.
STATION 4 18	5·00 127 MM.	10·63 270 MM.	4·50 114 MM.	10·13 257 MM.	4·00 102 MM.	9·63 244 MM.	3·38 86 MM.	9·00 229 MM.	3·06 78 MM.	8·38 213 MM.	3·06 78 MM.	7·63 194 MM.
STATION 7 17	5·00 127 MM.	11·63 295 MM.	4·50 114 MM.	11·13 283 MM.	4·00 102 MM.	10·63 270 MM.	3·38 86 MM.	10·00 254 MM.	3·06 78 MM.	9·38 238 MM.	3·06 78 MM.	8·63 219 MM.
STATION 3	4·31 110 MM.	10·63 270 MM.	3·81 97 MM.	10·13 257 MM.	3·31 84 MM.	9·63 244 MM.	3·06 78 MM.	9·00 229 MM.	3·06 78 MM.	8·38 213 MM.	3·06 78 MM.	7·63 194 MM.

16

11 SEE TABLE TO SELECT STOP PAD REQUIRED. (PADS SUPPLIED WITH MACHINE TOOL KIT.)

12 BAR STOP ARMS MOVE THROUGH APPROX 20° IN ALL STATIONS.

13 BAR FEED 0·5 TO 7·0 (12·7 TO 177·8 MM) ALL STATIONS.

14 ON DOUBLE BAR FEED MACHINES, THE LONGER BAR FEED SHOU BE AT THE FRONT.

15 MAXIMUM DIFFERENCE BETWEEN BAR LENGTHS FED 5·75 (146 M

Operators Notes

SECTION TWO - INSTALLATION AND PRELIMINARY CHECKS

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 No.200Y50C, Fig.2.1. for use with a lifting frame shown on Drawing No.100Y579, 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 No.200Y50C 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:Appox.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.2.3.

The swarf conveyor, if supplied, may also be fitted, see Fig.2.3 Drawing 200Z56A 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 2.8.

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 Wickmans 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.

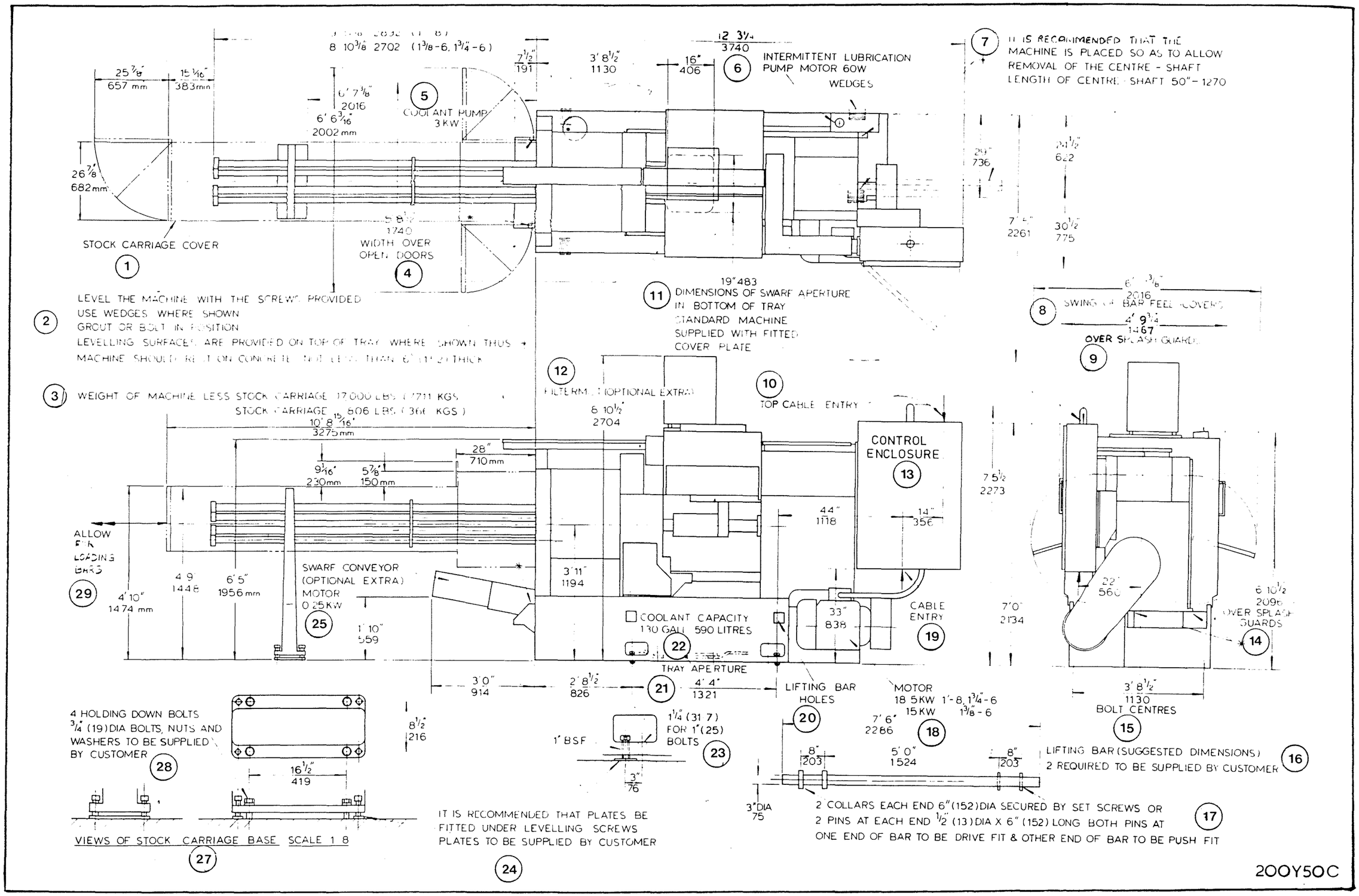
(b) An adjacent stop button, which, when pressed will stop the helical conveyor transporter.

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.

Foundation Drawing 200Y50C

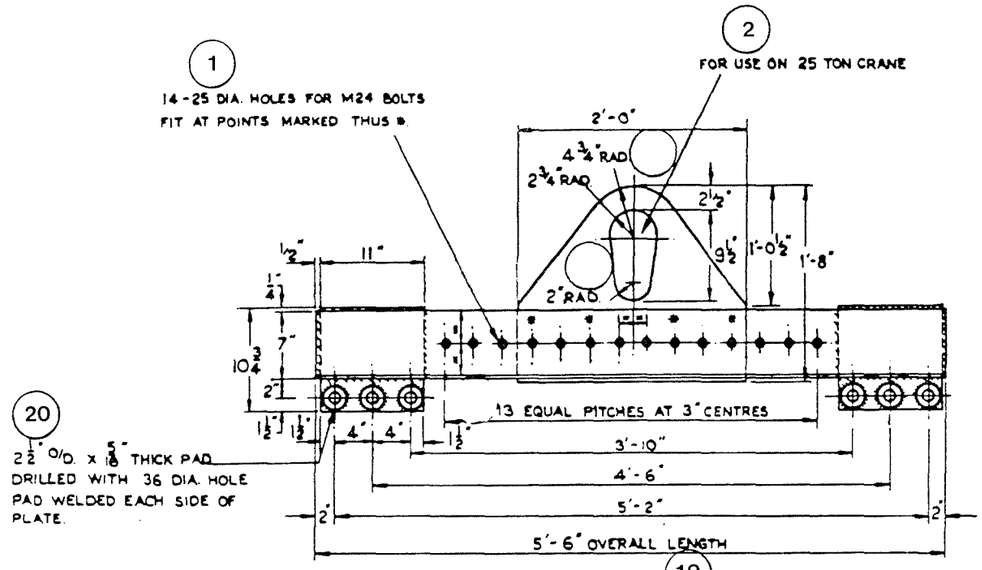
1. Stock Carriage Cover.
2. Level the machine with the screws provided, use Wedges where shown, Grout or Bolt in position. Levelling surfaces are provided on top of tray where shown, thus * machine should rest on concrete not less than 6" (152) thick.
3. Weight of machine less Stock Carriage 17,000 LBS (7711 KGS)
   Stock Carriage 806 LBS (366 KGS)
4. Width over open door.
5. Coolant pump 3 Kw.
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"-1270.
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 Exclosure.
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" (152) Dia. secured by Set Screws or 2 pins at each end 1/2" (13) Dia. x 6" (152) 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 18.5 kW 1"-8, 1.3/4"-6, 15 kW 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" (31.7) for 1" (25) Bolts
24. It is recommended that plates be fitted under levelling screws. Plates to be supplied by customer.
25. Swarf Conveyor (optional extra) Motor 0.25 kW
26. Foundation Drawing Frame 2 Bar machines.
27. Views of Stock Carriage Base, scale 1:8.
28. Four Holding down bolts 3/4" (19) dia. bolts, nuts and washers to be supplies by customer.
29. Allow 12'6" (3810) for loading bars.

Fig.2.1 Foundation Plan Drg.200Y50C



Detail of 10 Ton Lifting Beam.Drg. 100Y579

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.


1
14-25 DIA. HOLES FOR M24 BOLTS FIT AT POINTS MARKED THUS *.
2
FOR USE ON 25 TON CRANE
2'-0"
4¾" RAD
2¾" RAD
2½"
9½"
1'-0½"
1'-8"
2" RAD.
11"
½"
¼"
7"
10¾"
2"
13 EQUAL PITCHES AT 3" CENTRES
3'-10"
4'-6"
5'-2"
5'-6" OVERALL LENGTH
20
2½" O/D. x ⅝" THICK PAD DRILLED WITH 36 DIA. HOLE PAD WELDED EACH SIDE OF PLATE.
19
18
DETAIL OF LIFTING BEAM
ONE REQUIRED AS DRAWN
S.W.L. 10 TONS
APPROX. WEIGHT COMPLETE: 7 CWT.
PAINT THIS AREA RED
4
5
⅜ DIA GRUB SCREW FITTED TO EACH SCREW EYE TO PREVENT RED PORTION ENTERING TAPPED TURNBUCKLE.
¾
14
6'-11" WITH TURNBUCKLE IN MEAN POSITION
13
THIMBLE EYE
2'-5" B/B TURNBUCKLE
16
15
1½" STRAINING SCREW 11¼" OPENING
17
THIMBLE EYE
12
9" SOFT EYE
MINIMUM DISTANCE BETWEEN SPLICES
11
10
DETAIL OF 18 MM. DIA. WIRE ROPE SLING
4 REQ'D AS DRAWN
8
THIMBLE EYE TO FIT ONTO 1¼" LARGE BOW SHACKLE.
3
7" x 3½" x 18" R.S.C's
6
1¼ 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 & SOFT SPLICE AT BOTTOM AS DETAIL. E.W.L = 6'-11" (4 OFF)
9
DETAIL OF 10 TON LIFTING BEAM
100Y579

Swarf Conveyor 200Z56A

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) dia.
8. Strainer basket.
9. Tray strainer and strainer box.
10. Motorised centrifugal pump.

Fig. 2.3. Swarf Conveyor 200Z56A

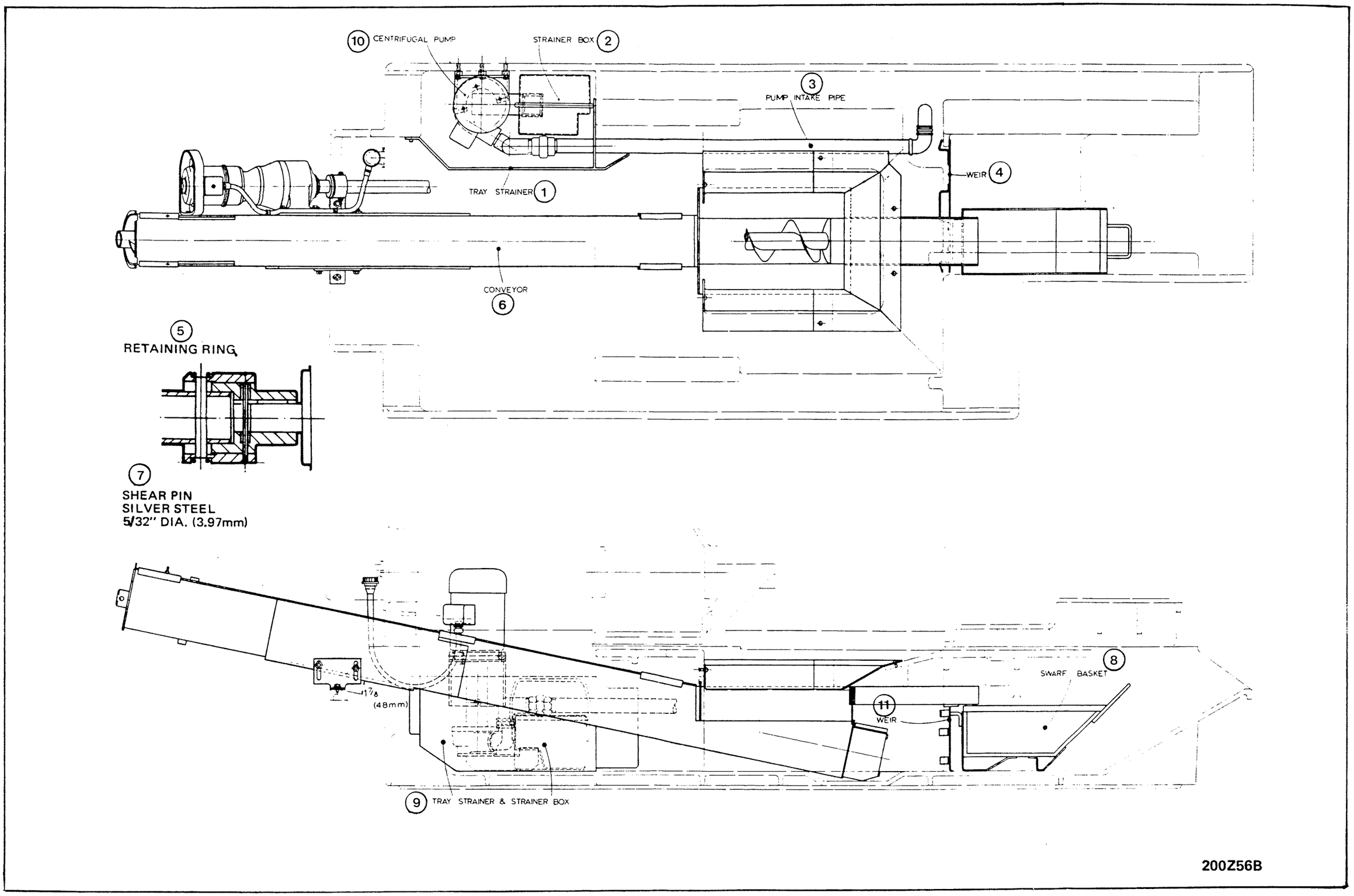
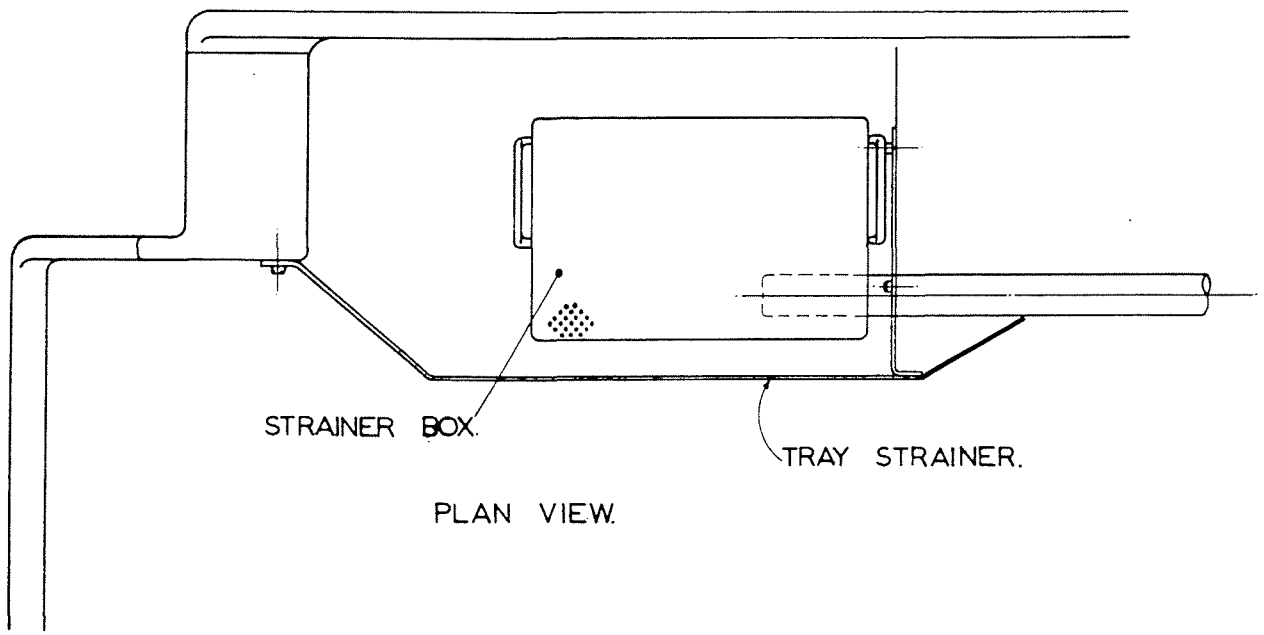
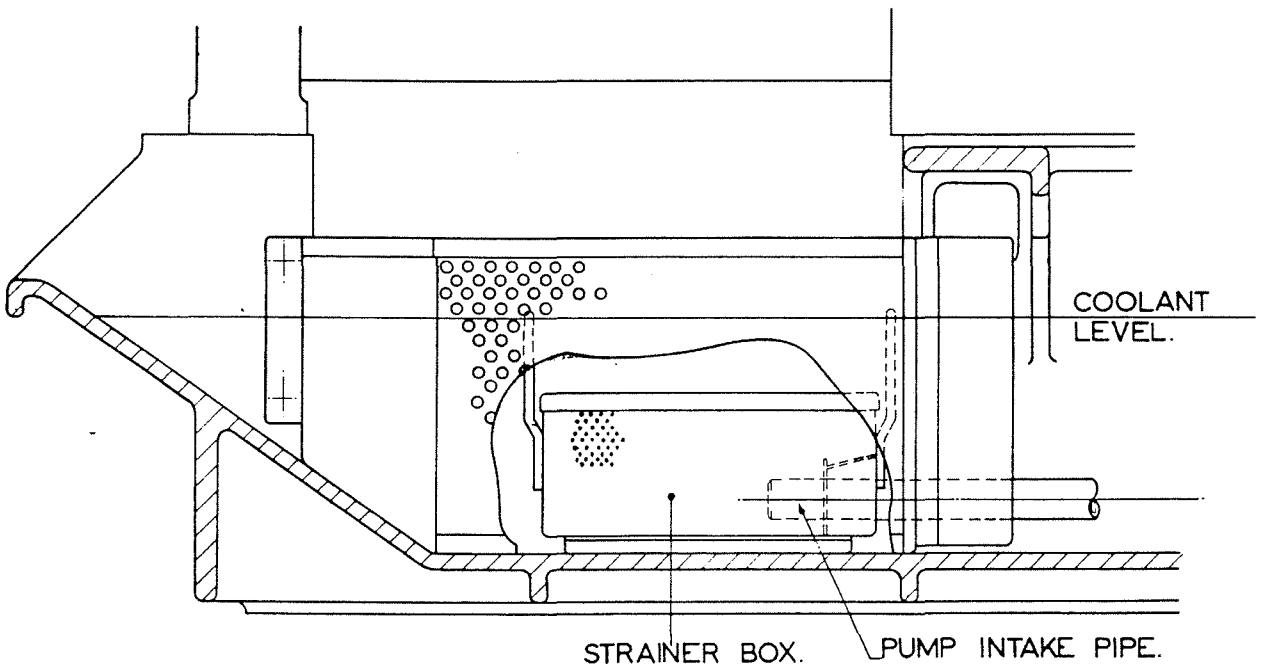


Fig. 2.4 Assembly Coolant Strainer Box 200Y55

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





2.5 Continuous Lubrication System

The oil tank is situated in the tray of the machine in the front of the main drive housing. 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 stainer 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 and part is bypassed before the 'Micronic' 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.

Grease should be applied to all the grease nipples on plate. Use ball bearing grease sparingly in the spindle nose labyrinth seal nipples.

2.5a Intermittant 'Vogel' Lubrication System

This system delivers oil in metered quantities to chosen lubrication points at timed intervals, see Fig.2.5 Drg.200Z161A.

Oil is pumped from a 15 litre capacity reservoir by an electric pump (4MTR), which is controlled by a pair of timers mounted in the control panel. A green signal lamp (LT4) on the front of the control panel indicates when the pump is running. 9TR timed contact closes, resetting the 9TR clutch. 12TR clutch is energised and retained. 4M is energised and the lubrication motor 4MTR runs until it is reset by the pressure switch PS3 after the delivery of a lubrication shot. Should the oil pressure fail, the machine will stop at the end of the cycle and a red signal lamp 8LT will be illuminated. Lack of oil pressure can be caused by insufficient oil in the reservoir, or a broken connection in the oil pipe line. The reservoir oil level is monitored by the float switch 2FS.

The timers are set before the machine is despatched, but may be adjusted if necessary. The lubrication system is correctly adjusted before despatch, but should be checked on installation in the Customer's plant and at regular intervals.

2.5b Greasing Points

The greasing points are shown on Fig.2.6 Drg.200Z160.

2.5c 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.

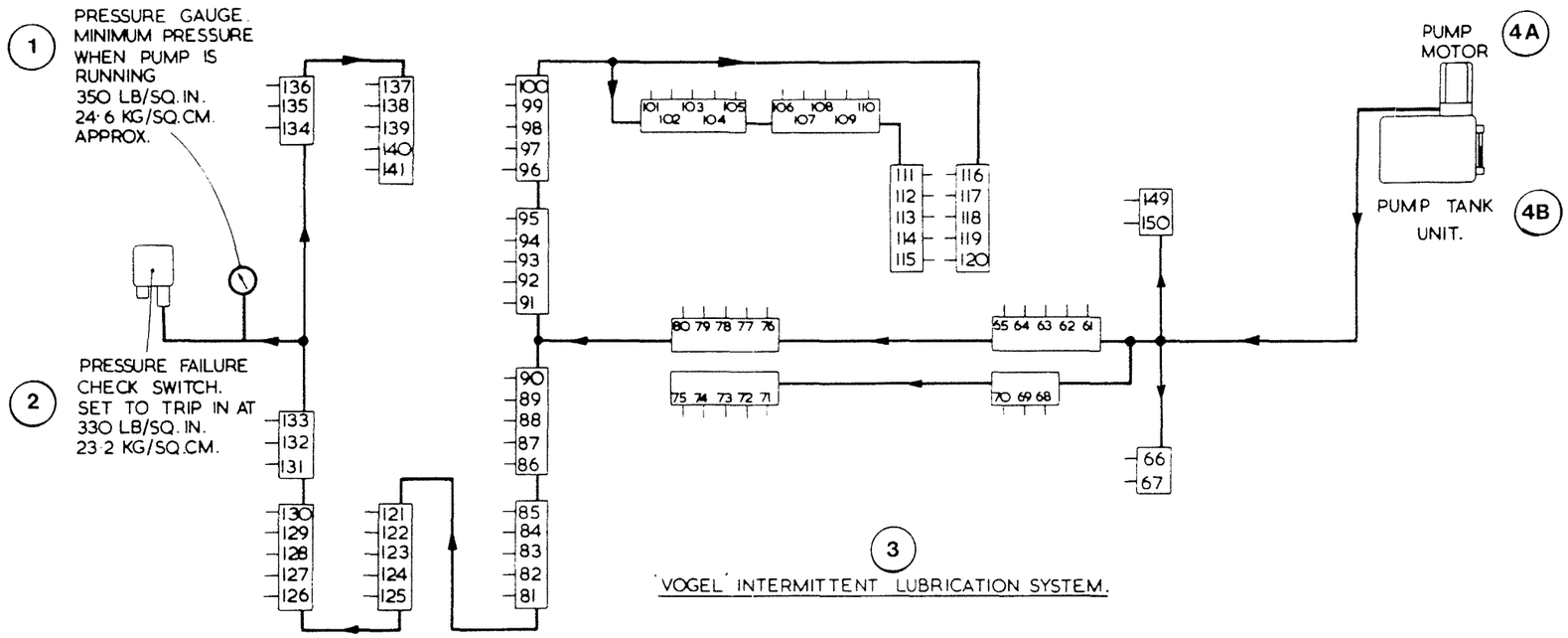
Schematic Lubrication Diagram Drg. 200Z161A

1. Pressure gage min. pressure when pump is running 350lbs/sq.in 24.6Kg/sq.cm. approx.

2. Pressure failure check switch set to trip in at 330lb/sq.in. 32.2Kg/sq.cm.

3. Vogel intermittent lubrication system
4A. Pump motor
4B. Pump tank motor
5. Pressure failure check switch set to trip in at 28lb/sq.in. 1.97Kg/sq.cm.

6. Continious lubrication system
7. Relief valve
8. Pressure gage normal setting 30lb/sq.in. 21Kg/sq.cm.
9. Relief valve
10. Purolator filter
11. Gear pump driven by machine
12. Micronic filter
13. Reverse relief valve
14. Filter/foot valve


1
PRESSURE GAUGE.
MINIMUM PRESSURE WHEN PUMP IS RUNNING
350 LB/SQ. IN.
24·6 KG/SQ.CM.
APPROX.
2
PRESSURE FAILURE CHECK SWITCH.
SET TO TRIP IN AT
330 LB/SQ. IN.
23·2 KG/SQ.CM.
PUMP MOTOR
4A
PUMP TANK UNIT.
4B
3
'VOGEL' INTERMITTENT LUBRICATION SYSTEM.
5
PRESSURE FAILURE CHECK SWITCH.
SET TO TRIP IN AT
28 LB/SQ.IN.
1·97 KG/SQ.CM.
6
CONTINUOUS LUBRICATION SYSTEM.
7
RELIEF VALVE.
8
PRESSURE GAUGE.
NORMAL SETTING
30 LB/SQ.IN.
2·1 KG/SQ.CM.
9
RELIEF VALVE.
10
PUROLATOR FILTER.
11
GEAR PUMP. DRIVEN BY MACHINE.
12
MICRONIC FILTER.
13
REVERSE RELIEF VALVE.
14
FILTER / FOOT VALVE.

200Z161A

Notes on Wickman Oil Grades

Wickman oil references conform to the lubricants in I.S.O.3498 (1979). The letters of the I.S.O. code identify the lubricant type and the number after the letter is the average kinematic viscosity at 40 deg.C expressed in millimetres squared per second, or centistrokes.
Exceptions are lubricants specified by makers of assemblies used on Wickman machines.
For general lubrication in the machine reservoirs where Wickman grade 4 is indicated and for colder ambient conditions, I.S.O. grades CB 46, HL 46 and HM 46 are suitable. For warmer conditions I.S.O. grades CB 68, HL 68, and HM 68 are an advantage.

Avoid the use of oil with any 'tacky' or 'sticky' properties which create severe problems with oil metering equipment and with clutch and brake operation.
Wickman oil grade 6 is intended for the reduction box fitted on older type screw conveyors used in 5/8"-6 machines and some earlier conveyors used on other size machines. I.S.O. grade G220 is suitable.
Later screw conveyors use a box 'filled for life' with a synthetic lubricant reference 'Optimol' 5150 and should not need attention.
Where a box is accidentally drained and 'Optimol' 5150 or suitable equivalent is unavailable, the box must be 'flushed' to remove the synthetic before filling with I.S.O. grade G220.
Note: The lower drive box on the conveyor should be filled with the oil used for general lubrication. ie. grade 4 and 5.
Some machines are fitted with a 'Mayfran' hinged belt conveyor which is driven by a reduction box 'filled for life' with Kluber D220 EP.
The lubricant should not normally require renewal but if lost or drained the following options could be used.
'Aral' Degol GS220. Mobil Glygoyle 80. Shell Tivela WB.
Wickman grade 7 is a 'tacky' oil for slideways and is used where some types of coolant wash away the oil supplied by the automatic system. It is to be applied as extra lubrication manually using the lever type oil gun supplied with the machine. I.S.O. grades G68, G150, G220 are suitable, it must not be used in the circulating system.

Grease.

Grade 1. is intended for grease packed bearings in electric motors.

Grade 2. for spindle nose and spindle drum seals, Where water based coolants are used, choose a grease with resistance to water contamination.

Lubrication Chart Drg.200Z160

1. Vogel intermittent lubrication system
2. Pump tank D 15 litres 33 gallons

   Oil level sight glass

   Low level monitoring float switch

   Filler cap

3. Continuos lubrication system pressur failure check switch normal setting 28lb/sq.in. 1.97Kg/sq.cm. Normally closed pressure held open by system pressure closes when pressure falls below 20lb/sq.in. operating warning light on panel door and stopping feed and main motor at end of cycle.

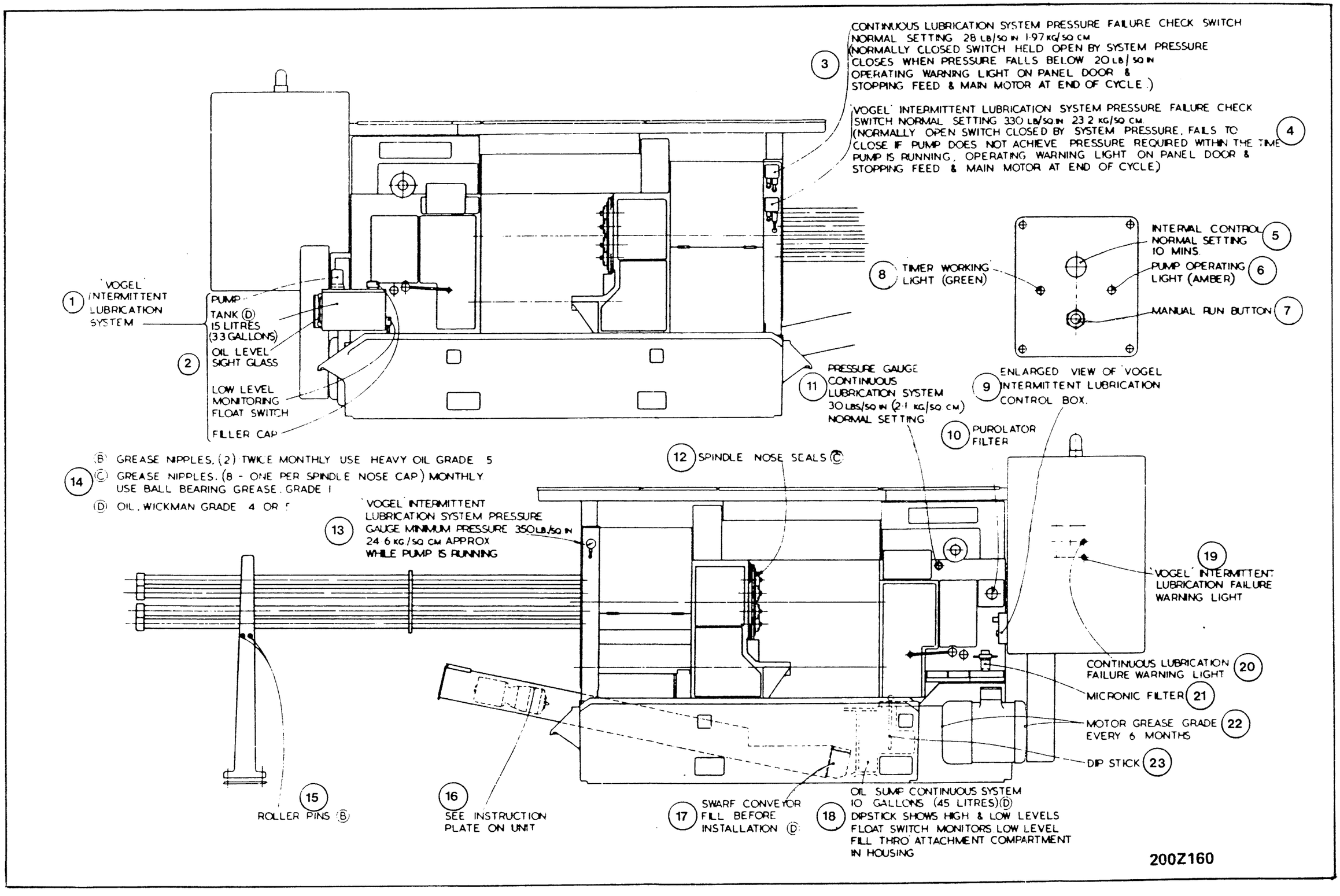
4. Vogal intermittent lubrication system failure pressure check switch normal setting 33lb/sq.in.23.2Kg/sq.cm.normally open switch closed by sysem pressure, fails to close if pump does not achieve pressure required within the time pump is running Operating warning light on panel door and stopping main motor at a end of cycle.

5. Internal control
6. Pump operating light amber
7. Main run button
9. Timer working light green
10. Purolator filter
11. Pressure gauge continuos lubrication system 30lb/sq.in. 21.Kg/sq.cm. normal setting
12. Spindle nose seals
13. Vogel intermittent lubrication system pressure gauge min. pressure 350lb/sq.in. 24.6Kg/sq.cm. approx. while pump is running

14. B Grease nipples (2) Twice monthly use heavy oil grade 5
    C Grease nipples (8-one per spindle nose cap) monthly
    D Oil Wickman grade 4 or 5

15. Roller pins
16. See instruction plate on unit
17. Swarf conveyor fill before installation
18. Oil sump continuous 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. Vogel intermittent lubrication failure warning light
20. Continuous lubrication failure warning light
21. Micronic filter
22. Motor grease every six months
23. Dip stick


3 CONTINUOUS LUBRICATION SYSTEM PRESSURE FAILURE CHECK SWITCH NORMAL SETTING 28 LB/SQ IN 1·97 KG/SQ CM (NORMALLY CLOSED SWITCH HELD OPEN BY SYSTEM PRESSURE CLOSES WHEN PRESSURE FALLS BELOW 20 LB/SQ IN OPERATING WARNING LIGHT ON PANEL DOOR & STOPPING FEED & MAIN MOTOR AT END OF CYCLE.)
4 VOGEL INTERMITTENT LUBRICATION SYSTEM PRESSURE FAILURE CHECK SWITCH NORMAL SETTING 330 LB/SQ IN 23·2 KG/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)
1 VOGEL INTERMITTENT LUBRICATION SYSTEM
PUMP
TANK (D) 15 LITRES (3·3 GALLONS)
2 OIL LEVEL SIGHT GLASS
LOW LEVEL MONITORING FLOAT SWITCH
FILLER CAP
8 TIMER WORKING LIGHT (GREEN)
INTERVAL CONTROL NORMAL SETTING 10 MINS. 5
PUMP OPERATING LIGHT (AMBER) 6
MANUAL RUN BUTTON 7
11 PRESSURE GAUGE CONTINUOUS LUBRICATION SYSTEM 30 LBS/SQ IN (2·1 KG/SQ CM) NORMAL SETTING
9 ENLARGED VIEW OF VOGEL INTERMITTENT LUBRICATION CONTROL BOX.
10 PUROLATOR FILTER
12 SPINDLE NOSE SEALS (C)
14 (B) GREASE NIPPLES, (2) TWICE MONTHLY USE HEAVY OIL GRADE 5
(C) GREASE NIPPLES, (8 - ONE PER SPINDLE NOSE CAP) MONTHLY USE BALL BEARING GREASE, GRADE 1
(D) OIL, WICKMAN GRADE 4 OR 5
13 VOGEL INTERMITTENT LUBRICATION SYSTEM PRESSURE GAUGE MINIMUM PRESSURE 350 LB/SQ IN 24·6 KG/SQ CM APPROX WHILE PUMP IS RUNNING
19 VOGEL INTERMITTENT LUBRICATION FAILURE WARNING LIGHT
CONTINUOUS LUBRICATION FAILURE WARNING LIGHT 20
MICRONIC FILTER 21
MOTOR GREASE GRADE EVERY 6 MONTHS 22
DIP STICK 23
15 ROLLER PINS (B)
16 SEE INSTRUCTION PLATE ON UNIT
17 SWARF CONVEYOR FILL BEFORE INSTALLATION (D)
18 OIL SUMP CONTINUOUS SYSTEM 10 GALLONS (45 LITRES) (D) DIPSTICK SHOWS HIGH & LOW LEVELS FLOAT SWITCH MONITORS LOW LEVEL FILL THRO' ATTACHMENT COMPARTMENT IN HOUSING
200Z160

2.6 Summary of Lubricants

Wickman Oil Grade	1	2	3	4	5
Application	Light Spindle Oil	Air Line Lubrication for Cold Climates	Air Line Lubrication 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	
				Electric Motors	Spindle Nose Cap
B.P	Energol CS 300	Energol HP 20-C		Ener Grease LS3	Ener Grease LS3
CASTROL	Alpha 417	Magna BD		Spheerol AP3	Spheerol AP3
CENTURY	WLP	428AP		Lupus 3	Lupus 3
DUCKHAMS	Galrex 9	Adglide 6		Admax 13	Admax 13
ESSO	Esstic 78	Febis K73		Beacon 2/3	Beacon 2/3
GULF	Mechanism LP 85	Gulway 52 or Slidway 52		Gulfcrown No. 3	Gulfcrown No. 3
MOBIL	DTE oil BB	Vectra Oil		Mobilplex 48	Mobilplex 48
PETROFINA	Solna 58	Artac 37		Marson HTL 3	Marson HTL 3
SHELL ISO VG NO:	220	68 or 320		Alvania R2 & R3	Alvania R2 & R3
TEXACO	Regal GR & O	Way Lubricant D		Regal Starfal Premium 3	Regal Starfal Premium 3
VAUGHAN	Cosmolubric EHC	Way Lubricant		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.

2.7 Coolant

The electrically driven centrifugal coolant pump (see fig.2.8) is monted on the internal face of the rear wall of the machine tray,which holds 620 litres (134 Gallons) of coolant when filled to the top level of the indicator plate.

The coolant pump motor MTR3 is controlled by two way connector switches mounted on the front and rear push button stations. By turning selector switch SS5 or SS6 to the start function energises the coolant pump motor and starts the coolant flowing. The coolant flow may be started from the front or rear of the machine depending on the setting of the front or rear selector switches SS1 or SS2.

Under normal circumstances if the coolant motor stops for some unforseen fault, the machine will stop at the end of cycle. If the machine is intended to run dry, ie. the selector switch is turned to the dry run function, in which the coolant pump motor is not started in the first place, then the machine will run normally.

The power to the pump motor may be disconnected for maintenance at a plug and socket connection situated on the end bracket of the machine.

The coolant is drawn from the tray through the strainer box which should be correctly fitted over the intake pipe. The strainer which is fitted with a loose lid, should be inspected and cleaned at regular intervals.

Coolant taps are provided on the coolant headers on either side of the machine top beam, and on the stand pipes adjacent to the lower cross slides.

Holes sealed by taper plugs are provided in the coolant headers for additional taps. On some set-ups it may be convenient to use the additional plugged holes so that the flexible pipes will clear other pipes or attachments.

2.7a Concerning Coolant

Both neat oil or soluble oil in water may be used, but when using the latter type one must except that there are dangers of rust occurring in the machine, and that a system of preventive maintenance is essential. Always ensure that a high quality soluble oil is used and that it contains rust inhibitors.

NOTE:

Make sure that that the soluble solution is correctly mixed, ie.that the oil is put into and mixed with the water. 'NOT' WATER INTO THE SOLUBLE OIL.

Make sure that the soluble is changed at pre-determined intervals and not allowed to become contaminated to such an extent that the mixture becomes unstable.

WARNING

Operator hygiene is important when using all types of cutting oil (See Health and Safety, Operating Discipline)

2.8 Procedures before Starting the Machine

Before starting the machine the following procedures should be carefully carried out:-

1 Ensure that all protective grease has been cleaned off the machine and that the oil tank in the tray of the machine is clean, and that all residual protective grease and the cleansing agents are removed from the machine tray.

2 Fill the oil tank in the tray of the machine. This is done through the filler/breather/strainer provided and accessible externally. Approximately 10 gallons (45 litres) of oil are required. Use oil grade ISO 3498 CB68 or alternative HL68 or HM68.

3 Ensure that the oil baths below the main and upper camshaft wormwheels are full. Fill the drip tray above the mechanism operating the endworking slides.

4 Apply the oil gun to all the nipples as shown on Drg.200Z160 using lubricant as specified in the oil chart Sec. 2.6. See that the stock carriage springs are well greased.

5 Fill the tray with coolant (approximately 130 gallons (590 litres) are required). Check that the rotation of the electrically driven coolant pump is correct; that the strainer box is correctly positioned and that all coolant taps are closed.

6 Place the speed range change gears in the neutral position and the feed clutch in brake, when checking the direction of the main motor rotation. Note! should any bar ends remain in the machine, disengage both the feed and fast motion slipping clutches before wiring up and do NOT handwind the machine.

7 Wire up the machine. Check the direction of rotation of the driven pulley, which should be clockwise looking from the motor end as shown on drawing 216Z1D. Read the section on controls before starting the machine.

8 Disengage the index clutch and hand wind the machine through a complete cycle, to check that all moving parts operate freely. If excessive pressure is required on the hand crank, locate and correct the cause.

9 Engage the index clutch, disengage the collet operating shoe and hand wind through index. If excessive pressure is required on the hand crank, locate and correct the cause.

10 Run the motor and check that the lubrication system is working. Lift the cover on the top of the main drive housing and check that the oil is feeding the distributor tray beneath. Check the pressure gauge, the spindle sight feeds on the beam and all drip points by removing covers. Regulate the oil feed where necessary.

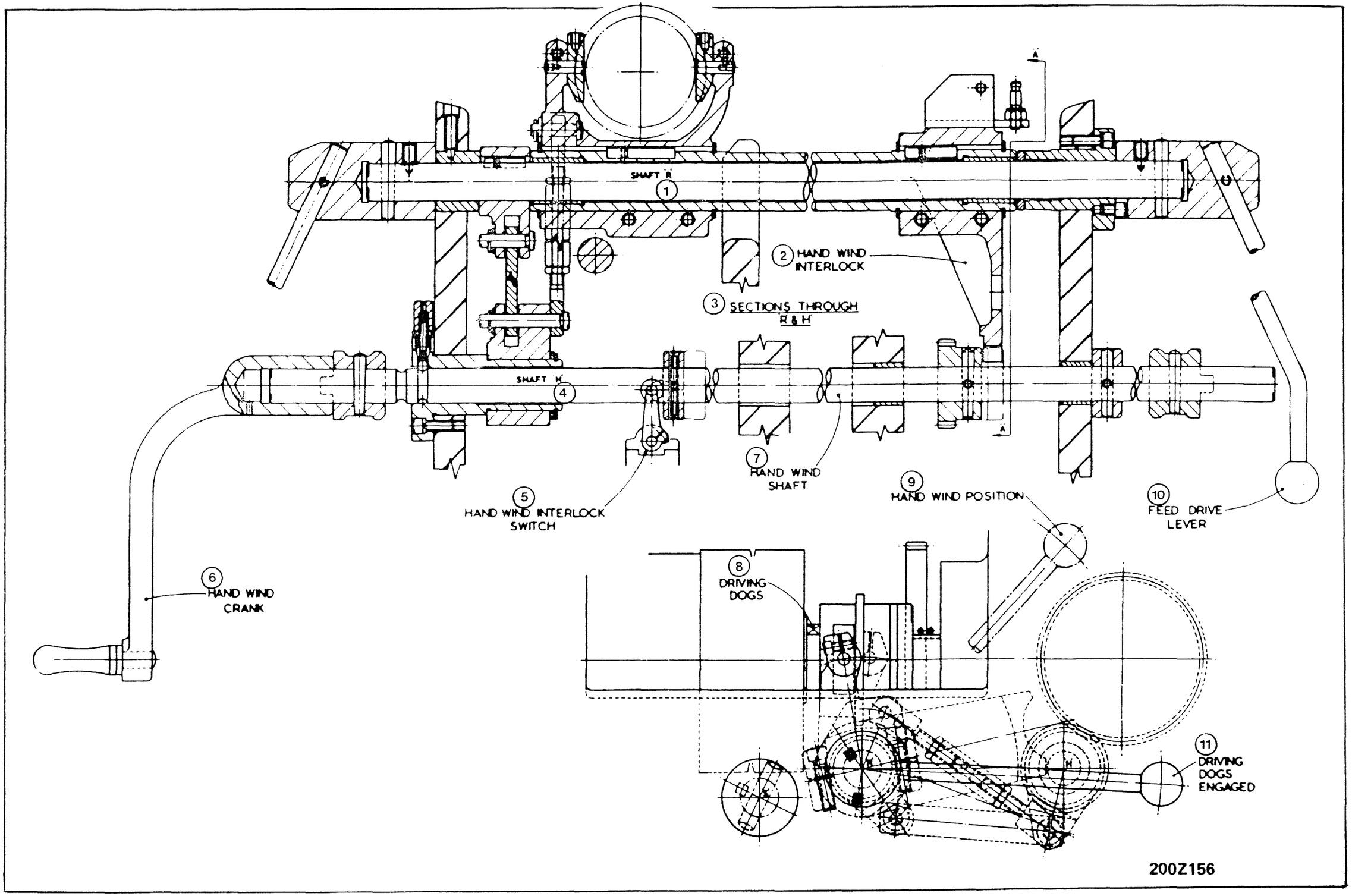
11 Check that the collets and the feed fingers are correctly fitted.

12 Engage the 'low' range change gears and run the machine under power feed. The machine is then ready for normal running.

Control Shaft Arrangement Drg. 200Z156

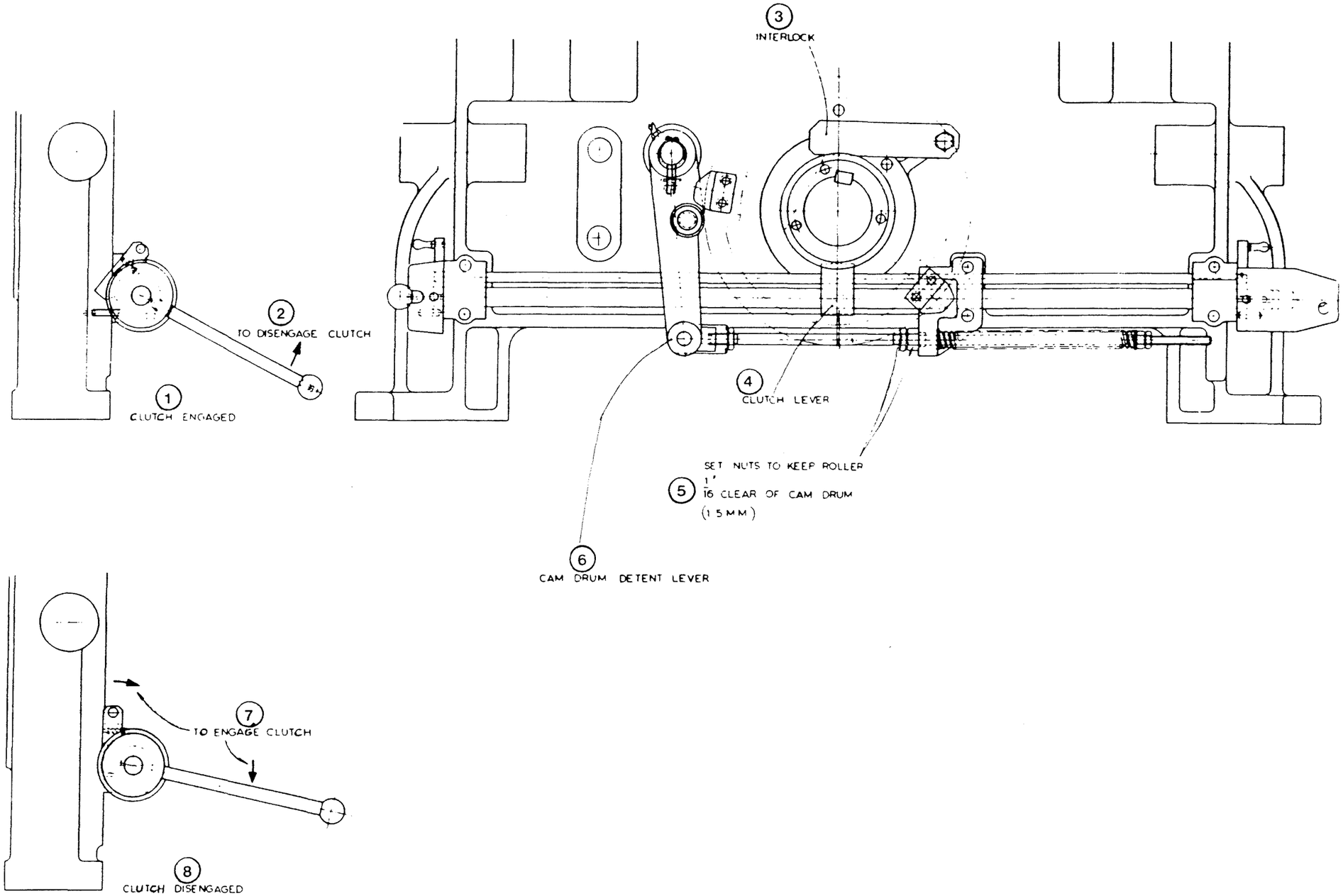
1. Shaft 'A'
2. Handwind interlock
3. Sections through R & H
4. Shaft 'H'
5. Handwind interlock switch
6. Handwind crank
7. Handwind shaft
8. Driving dogs
9. Handwind position
10. Feed drive lever
11. Driving dogs engaged

Fig. 2.7 Drg. 200Z156



Index Clutch Lever Drg. 300Z276B

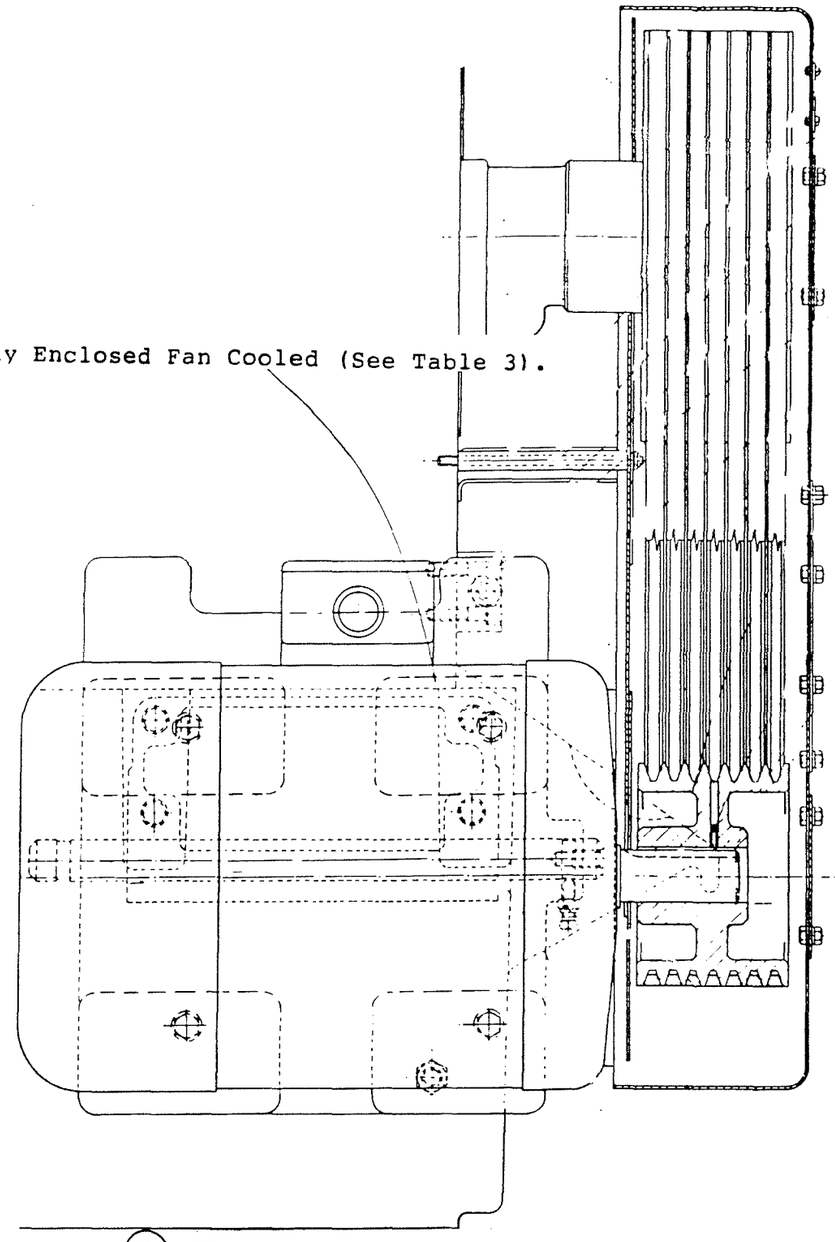
1. Clutch engaged
2. To disengage clutch
3. Interlock
4. Clutch lever
5. Set nuts to keep roller 1/16" (1.5mm) clear of cam drum
6. Cam drum detent lever
7. To engage clutch
8. Clutch disengaged


3
INTERLOCK
2
TO DISENGAGE CLUTCH
1
CLUTCH ENGAGED
4
CLUTCH LEVER
SET NUTS TO KEEP ROLLER
5
1/16 CLEAR OF CAM DRUM
(1.5MM)
6
CAM DRUM DETENT LEVER
7
TO ENGAGE CLUTCH
8
CLUTCH DISENGAGED
300Z276B

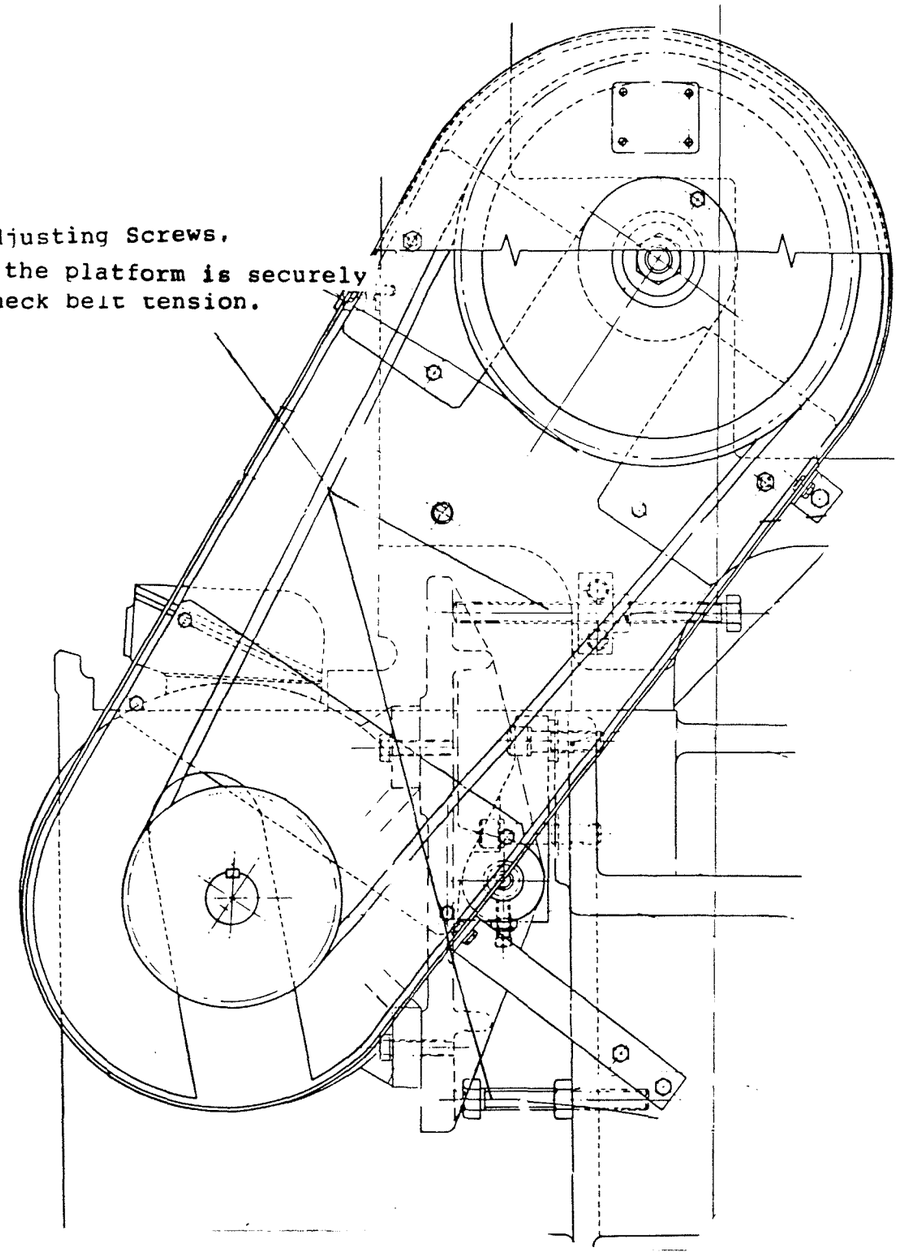
Motor Drive Drg.216Z1D

1. Brook Motor - Totally Enclosed Fan Cooled (See Table at 3).
2. Platform Adjusting Screws, check that the platform is securely clamped, check belt tension.
3. Table.

(1) Brook Motor - Totally Enclosed Fan Cooled (See Table 3).



(2) Platform Adjusting Screws, check that the platform is securely clamped, check belt tension.



(3) TABLE

Motor	Motor Pulley	Key	Platform	Motor Fixing Bolts	Bolt Size	Washer	Belt 7 Per Set	Remarks
L286T 30HP.1750rpm.60Hz	216X126	127/1664	216Y03F/1	WSP167/0828	1/2"BSPx1.3/4"	130/08	B253 (890)	
D180L 30HP.1750rpm.60Hz	216X125	216X108	216Y03F/1	WSP167/0828	" " "	" "	" "	
D180L 30HP.1460rpm.50Hz	216X105B	216X108	216Y03F/1	WSP167/0828	" " "	" "	" "	
D108L 20HP.960rpm. 50Hz	216X105B	216X108	216Y03F/1	WSP167/0828	" " "	" "	" "	

216 Z1D

Operators Notes

3.1 Controls

The machine controls fall basically into two groups:-

(1) The electrically hand operated switches at the front and rear of the machine together with additional switchgear mounted on the front of the control panel door.

(2) The manual controls.

3.2 Electrical Controls

The 'Front' or 'Rear' key selector switch, the main motor control, the feed control and indicator light, coolant 'Start / Dry run control and coolant 'not running'indicator light,'the feed stop' push button and 'guard interlock'pilot light are duplicated at the front and rear of the machine in push button stations (see Fig. 3.1 Panel).In addition the front push button station includes a main motor 'stop' button and the switch for selecting functions:- 'set up','production run' and 'stop end of cycle'. The rear push button station has the additional ' 'emergency stop' button. Further switch gear is mounted on the front of the control panel door.

The front and rear key selector switches are dual function switches and must be at the same setting, either 'Front' or 'Rear' before the appropriate main motor start/jog button can be used to start the main motor. This acts as a safety precaution when making adjustments or setting the tooling.

Setting both selector switches to the 'Front' position renders the rear main motor start/jog button, feed engagement 'start/jog' button and 'coolant running' control inoperative. Similarly, setting both selector switches to the 'Rear' position renders the front main motor start/jog button inoperative. The key selector switches are marked 'A' for the front and 'B' for the rear.

Note:

The front/rear selector switches must always be set to the side of the machine on which the operator is setting up or making adjustments to the machine.

The main motor start/jog and the feed run/jog buttons are dual purpose switches with the means of selecting the function and activating the same. In order to set the switch for start or jog it is necessary to turn the knurled ring surrounding the pushbutton to the appropriate function before depressing the pushbutton. The main motor and the feed pushbuttons are marked 'I' and 'T'. The 'I' position is the run function and the 'T' position the jog function. When the feed is engaged, start the machine only by the jog button. After starting the machine allow a lapse of a few seconds before engaging the feed clutch in order to provide time to enable the electrical control gear to change from star to delta and allow the lubrication system to operate.

The 'stop' button and the rear mounted 'emergency stop' button are independent from the 'front' and 'rear' selector switches and the machine can be stopped from the front or rear of the machine. Stopping the main motor for any reason also engages the feed brake, hence the

feed push button must be pressed to re-engage the feed.

The coolant 'On' an 'Off' switch is a two position rotary switch, which when switched to coolant start the coolant will flow; but when to dry run the coolant will stop flowing. The coolant start function will only start the coolant pump from that side of the machine indicated by the selector switches. Indicator lights are illuminated when the coolant is not flowing.

The front and rear 'feed stop' are push buttons which may be used from either side of the machine to apply the feed brake whilst leaving the main motor running.To engage the feed brake the button must be depressed.

The feed trip selector switch mounted in the front push button station only and marked 'set up', 'run' and 'trip'is a three position selector switch which selects any of these three functions. When the three position selector switch is turned to 'set up' the machine will run in continuous cycle with out the coolant running and without the conveyor operating; when turned to 'run' the machine will run in continuous cycle untill the bar is exhausted or the machine is stopped for other reasons. When turned to 'trip' an electrical circuit is prepared which will stop the machine at the end of its current cycle with the feed brake. The 'set up' function is used for setting purposes only.

The guard interlock pilot light marked 'guard open' on the front and rear push button stations will be illuminated should either one or both guard covers be left open.

Further switch gear mounted on the front of the control panel door comprises of:

a) Isolator/main circuit breaker and disconnect switch

b) The conveyor start, forward/jog reverse switch

c) Conveyor stop button

d) Tooling area lighting Off/On switch

e) Constant lubrication reset button

f) Intermittent lubrication reset button

g) Lubrication prime button

Indicator lights that illuminate when:

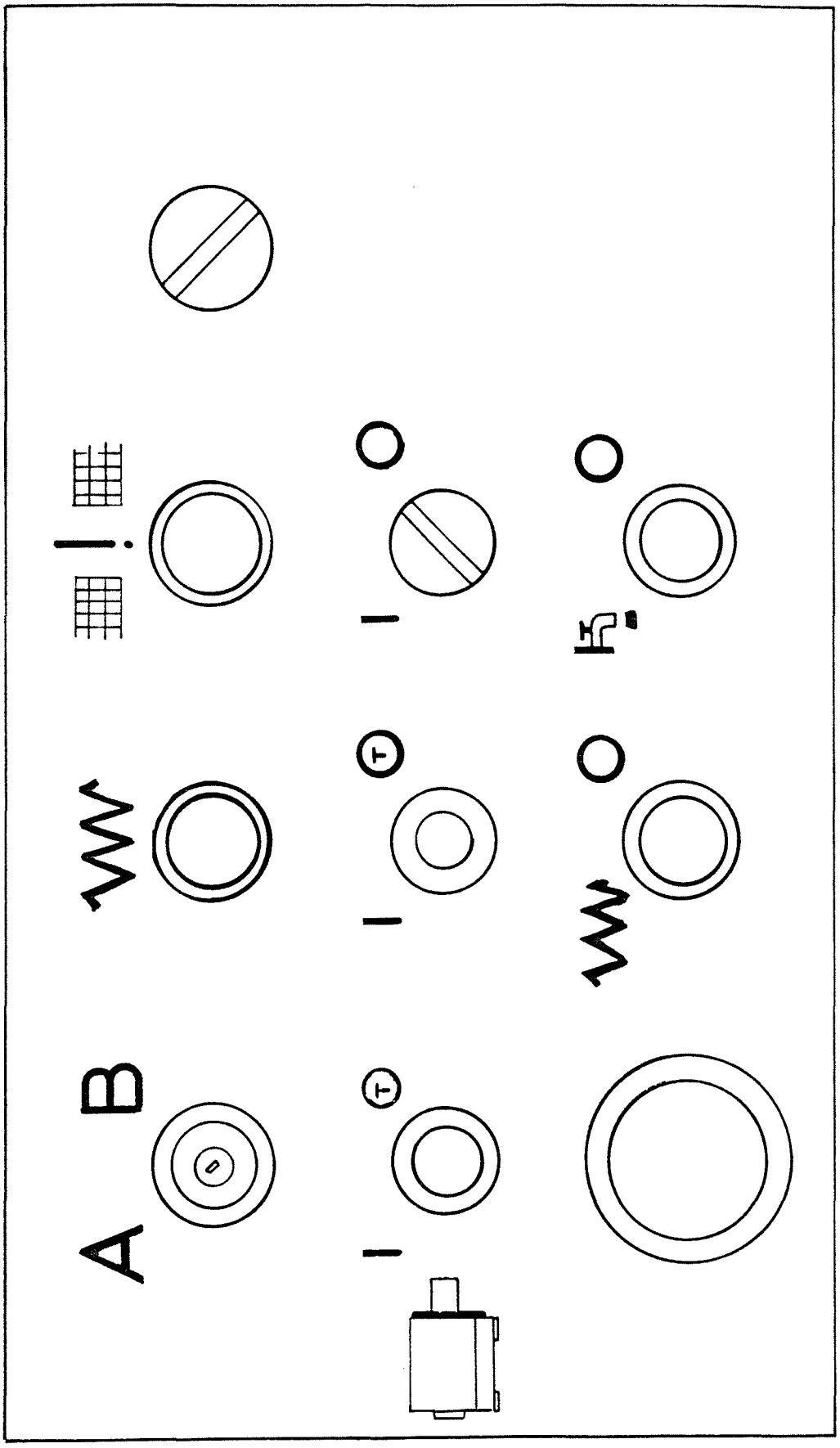
a) Swarf conveyor is not running

b) Constant lubrication fails

c) Vogel lubrication pump is not running

The conveyor start forward/jog reverse switch is a dual purpose switch with the means of selecting the function and activating same, conveyor stop is a push button as are constant lubrication reset, intermittent lubrication reset and intermittent lubrication prime. Lighting off and on switch is a rotary one.

Fig.3.1 Front and Rear Control Panel



3.3 Manual Controls

The manual controls comprise:-

(1) The feed shaft dog clutch operating lever.
(2) The hand-wind engagement mechanism, handwind shaft & crank.
(3) The index clutch lever.
(4) The collet hand operation lever.
(5) The bar feed shoe lever.
(6) The collet operating shoe disengagement mechanism.
(7) The bar stop lever.

Handwinding the Machine:-

Handwinding the machine through its cycle of operations is necessary when checking the freeness of operation of the spindle drum when indexing, the machine slides through their cycle of operations and also for setting purposes. Handwinding can be achieved by engaging the manual controls '1', '2' and '3' in the following order:-

(1) The feed drive shaft dog clutch operating lever is duplicated at the front & rear of the machine. In their horizontal "in feed position", it is not possible to fit the handwind crank to its shaft and as long as these levers are horizontal the dog clutch is engaged and the feed and braking by means of the electrical push buttons is possible.

Once the feed is braked by means of the appropriate button, the lever is raised into its over-centre position, physically disengaging the feed drive shaft dog clutch and electrically isolating the electro-magnetic feed clutch from the electro-magnetic brake. Raising the lever also releases the mechanical interlock allowing the handwind shaft pinion to be engaged.

(2) The handwind crank can be fitted to the handwind pinion shaft at either the front or rear of the machine. The handwind pinion is engaged by sliding the pinion shaft across the machine. It is retained in the engaged or disengaged positions by a spring loaded plunger. This can only be done with the feed drive shaft dog clutch operating lever in its "UP" position. Handwinding is not possible unless electric power is energising the machine, or when electrical power is not available by releasing the electro-magnetic spring applied brake manually by means of the tensioning screws; see the instruction plate on the brake cover.

In order to handwind 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 raising this lever disengages the 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 a position where it is possible to slide the handwind pinion into mesh with the handwind gear mounted on the lower worm shaft. The action of sliding the pinion into mesh trips the handwind interlock switch which energises the electro-magnetic brake, thus releasing the brake to permit handwinding to take place.

In the event of a machine not having electric power available, the electro-magnetic spring applied brake can be released manually in the following manner:- Two retraction screws are

provided in the brake cover; these, and two knurled plugs should be removed from the cover and the retraction screws inserted through the holes vacated by the knurled plugs. The retraction screws are then screwed 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 shaft dog clutch operating lever from the handwind position whilst the handwind crank is on the shaft.

(3) The Index Clutch Lever

The index clutch lever actuates the index clutch on the main camshaft. By raising the lever the clutch is disengaged. This renders inoperative the drum indexing, the drum locking mechanism. the collet operating mechanism and the bar feed. The index clutch is spring loaded into engagement. Levers are duplicated at the front and the rear of the machine and the action of raising these levers allows spring actuated pivoted latches, each mounted adjacent to each lever, to engage with a restraining pin assembled into the hub of the clutch lever assembly, to hold the index clutch out of engagement.

The spring actuated pivoted latch must be turned in a clockwise direction looking at the front of the machine, or anti-clockwise looking at the rear of the machine, to allow the index clutch lever to be lowered to allow the spring loaded to be engaged.

An interlock is provided to prevent the disengagement of the index clutch during the fast motion portion of the machine cycle which also includes drum indexing and drum locking.

A cam drum detent lever, its roller and spring loaded rod in conjunction with projecting dogs on the cam drum, ensure that any angular drift of the cam drum that may take place whilst the index clutch is disengaged, is corrected so that the clutch engagement can be effected.

Care should be taken not to run the machine spindles longer than is absolutely necessary without indexing the spindle drum, as lubrication of the work spindles is effected at the top two positions of the spindle drum only.

(4) The Collet Hand Operation Lever.

When loading bars, the collet may be opened and closed by hand by inserting the hand lever provided, into the collet operating lever and by pushing the lever towards the spindle drum to open the collet or pulling the lever towards the end of the machine to close the collet. This is only possible when the cam roller is opposite the gap in the cams. The "auto stop" mechanism timing cam should be set to trip the machine at this point automatically when the bar stock is exhausted or when the manual trip switch is operated. The hand lever is loose and is fitted into its boss for checking collet adjustment and the lever should be removed after use.

(5) The Collet Shoe and Bar Feed Disengagement Lever.

The collet/shoe bar feed shoe disengagement lever is arranged to disengage either or both shoes for setting and bar loading

purposes. The lever has three positions and is situated on the end bracket of the machine. The handle of the lever is spring loaded, the forward part of which is the locating plunger. (See Drg.266 Z 1).By withdrawing the location plunger and moving the lever in an anti-clockwise direction, looking on the end bracket of the machine, disengages both or either shoes in the following order:

a) In position 2, both the collet and the bar feed shoes are engaged with their respective mating parts, ie. the collet toggle operating sleeve and the feed tube bobbin.

b) In position 1, the collet shoe is engaged and the bar feed shoe is disengaged.

c) In position 0 both the collet and the bar feed shoe are disengaged.

d) The thrust, when the bars are being pushed through their feed fingers, is taken by the aligning ring. The collet shoe and bar feed shoe operating lever must be moved into position 2 before re-starting the machine.

(6) Bar Stop Lever.

In order to facilitate the removal of the bar ends, the bar stop may be hand operated by the lever on the bar stop. By pulling this lever the bar stop is moved clear of the bar, thus permitting the bar end to be removed.

Concerning Controls

(1) Selector switches are provided so that the main motor can only be started by the push button on the selected side of the machine. When the machine is stopped for adjustments to the machine, or tooling or attachments, the selector switches should be set for the side of the machine on which the operator is working, as a safety precaution.

(2) Start the motor before engaging the feed clutch. Allow the control gear to change from star to delta before engaging the clutch. When starting from cold use the jog button to allow oil to circulate before running the machine.

(3) Should it be necessary to engage the feed clutch before starting the main motor, start the main motor on the jog button.

(4) If a slipping clutch disengages, locate the cause of the overload before re-engaging the slipping clutch, re-starting the machine and re-engaging the feed. Additional plungers and springs can be fitted to the slipping clutch and spares are included in the machine equipment kit for this purpose. They should only be applied in exceptional circumstances.

(5) Do not handwind the machine through the feed part of the cycle when threading attachments are included in the set up unless the diehead has been opened or the tap and tapholder or die and dieholder have been removed.

(6) Regularly check the adjustment of all multi-plate mechanical clutches by hand. They should neither be so slack as to cause slip, nor so tight that excessive pressure is required to engage them. The clutches should just bite when engaged.

(7) Check the air gap of the electro-magnetic feed brake.

Operators Notes

4.1 Feed and Speed Charts & Example of Use

Feed and Speed Chart 1"- 8 Drg.272Y149A (1.6sec.2.1/2" Approach Cam)

Feed and Speed Chart 1"- 8 Drg.272Y150 (2.0sec.3.1/2" Approach Cam)

Feed and Speed Chart 1"- 8 Drg.272Y152 Spindle Stopper

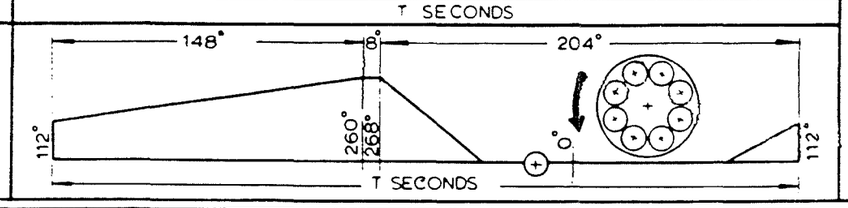
Example of use Feed and Speed Chart

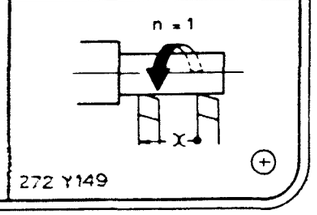
Wickman 1"-8

A	58	56	54	52	49	46	43	40	38	36	34	32	30	58	56	54	52	49	46	43	40	38	36	34	32	30	n (148°)	n (8°)
B	34	36	38	40	43	46	49	52	54	56	58	60	62	34	36	38	40	43	46	49	52	54	56	58	60	62		
N/MIN	2737	2496	2280	2086	1829	1605	1408	1234	1129	1032	941	856	776	703	641	586	536	470	412	382	317	290	265	242	220	199		
71	27	3·0	3·1	3·3	3·4	3·7	4·0	4·3	4·7	5·0	5·3	5·7	6·1	6·5	7·1	7·8	8·1	8·7	9·8	10·9	12·2	13·7	14·8	16·0	17·4	19·0	21	61	3·3
69	30	3·2	3·4	3·5	3·7	4·0	4·3	4·7	5·2	5·5	5·9	6·3	6·7	7·2	7·8	8·4	9·1	9·8	10·9	12·2	13·7	15·4	16·7	18·1	19·7	22	24	69	3·7
66	32	3·4	3·8	3·7	3·9	4·3	4·6	5·1	5·6	5·9	6·3	6·8	7·3	7·9	8·5	9·2	9·9	10·7	12·0	13·4	15·1	17·0	18·4	20	22	24	26	77	4·2
64	35	3·6	3·8	4·0	4·2	4·6	5·0	5·5	6·1	6·5	6·9	7·5	8·0	8·7	9·4	10·2	11·0	11·9	13·3	15·0	16·8	18·9	19·0	21	22	24	27	29	87	4·7
61	38	3·9	4·1	4·4	4·6	5·0	5·5	6·1	6·7	7·2	7·7	8·3	8·9	9·7	10·5	11·4	12·3	13·3	15·0	16·8	18·9	21	23	25	28	30	33	99	5·4
58	41	4·2	4·5	4·7	5·0	5·5	6·0	6·7	7·4	7·9	8·5	9·2	9·9	10·8	11·7	12·7	13·7	14·9	16·7	18·9	21	24	26	28	31	34	37	112	6·1
56	43	4·4	4·7	5·0	5·3	5·8	6·4	7·1	7·9	8·5	9·1	9·8	10·6	11·6	12·6	13·7	14·8	16·0	18·1	20	23	26	28	31	34	37	40	122	6·6
53	46	4·8	5·1	5·4	5·8	6·4	7·1	7·8	8·7	9·3	10·1	10·9	11·8	12·9	14·0	15·2	16·5	17·9	20	23	26	29	32	35	38	41	45	138	7·5
50	49	5·2	5·6	5·9	6·3	7·0	7·8	8·6	9·6	10·3	11·2	12·1	13·1	14·3	15·6	17·0	18·4	20	23	26	29	33	36	39	42	46	51	156	8·4
49	50	5·4	5·7	6·1	6·5	7·2	8·0	8·9	9·9	10·7	11·6	12·5	13·6	14·8	16·2	17·6	19·1	21	24	27	30	34	37	40	44	48	53	162	8·8
46	53	5·8	6·3	6·7	7·2	7·9	8·8	9·8	11·0	11·9	12·8	13·9	15·2	16·5	18·1	19·7	21	23	26	30	34	38	42	45	50	54	60	183	9·9
43	56	6·4	6·9	7·4	7·9	8·8	9·8	10·9	12·2	13·2	14·3	15·5	16·9	18·5	20	22	24	26	29	33	38	43	47	51	56	61	67	207	11
41	58	6·8	7·3	7·9	8·4	9·4	10·5	11·7	13·1	14·2	15·4	16·7	18·2	19·9	22	24	26	28	32	36	41	46	51	55	61	66	73	225	12
38	61	7·5	8·1	8·7	9·4	10·4	11·7	13·1	14·7	15·9	17·3	18·8	21	22	25	27	29	32	36	41	46	53	57	63	68	75	83	255	14
35	64	8·3	9·0	9·7	10·4	11·7	13·1	14·7	16·5	17·9	19·4	21	23	25	28	30	33	36	41	46	52	60	65	71	78	85	94	291	16
32	66	9·2	9·9	10·7	11·6	13·0	14·5	16·3	18·4	20	22	24	26	28	31	34	37	40	46	52	59	67	73	80	87	96	106	328	18
30	69	10·1	10·9	11·8	12·7	14·3	16·1	18·1	20	22	24	26	29	31	35	38	41	45	51	58	66	75	81	89	97	107	118	366	20
27	71	11·3	12·2	13·2	14·3	16·1	18·1	21	23	25	28	30	33	36	39	43	47	51	58	66	75	85	93	101	111	122	134	418	23
25	74	12·5	13·8	14·7	15·9	17·9	21	23	26	28	31	33	36	40	44	48	52	57	65	74	84	96	104	114	125	137	151	471	25
23	76	13·8	14·9	16·2	17·6	19·6	23	26	29	31	34	37	40	44	49	53	58	64	72	82	94	106	116	127	139	153	168	526	28
21	78	15·3	16·6	18·0	19·5	22	25	29	32	35	38	41	45	50	55	60	65	71	81	92	105	119	130	143	156	172	189	591	32
18	81	18·2	19·6	22	24	27	30	34	38	42	46	50	55	60	66	72	79	86	98	111	127	144	158	172	189	208	229	716	39

L	2·5	5	7·5	10	20	30	35	89
	1/4	1/2	3/4	1	2	3	3½	
n (148°)	4·1	8·3	12·4	16·5	33	50	58	147
n (8°)	3·6	7·2	10·8	14·5	29	43	51	129
	3·2	6·5	9·7	13·0	26	39	45	115
	2·9	5·7	8·6	11·5	23	34	40	102
	2·5	5·0	7·6	10·1	20	30	35	90
	2·2	4·4	6·7	8·9	17·8	27	31	79
	2·0	4·1	6·1	8·2	16·4	25	29	73
	1·8	3·6	5·4	7·2	14·5	22	25	64
	1·6	3·2	4·8	6·4	12·8	19·2	23	57
	1·5	3·1	4·6	6·2	12·3	18·5	22	55
	1·4	2·7	4·1	5·5	10·9	16·4	19·1	49
	1·2	2·4	3·6	4·8	9·7	14·5	16·9	43
	1·1	2·2	3·3	4·4	8·9	13·3	15·6	40
	1·0	2·0	2·9	3·9	7·8	11·7	13·7	35
	·86	1·7	2·6	3·4	6·9	10·3	12·0	31
	·76	1·5	2·3	3·0	6·1	9·1	10·7	27
	·68	1·4	2·0	2·7	5·5	8·2	9·6	24
	·60	1·2	1·8	2·4	4·8	7·2	8·4	21
	·53	1·1	1·6	2·1	4·2	6·4	7·4	18·9
	·47	·95	1·4	1·9	3·8	5·7	6·7	16·9
	·42	·85	1·3	1·7	3·4	5·1	5·9	15·1
	·35	·70	1·0	1·4	2·8	4·2	4·9	12·4

X (·001")

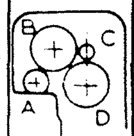


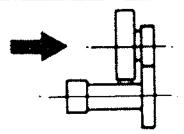


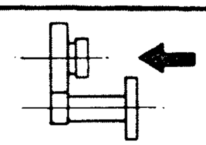
STANDARD SPINDLES 2½ APPROACH STROKE FEED AND SPEED PLATE 1"-8 (1.6 SECS.IDLE TIME)

272Y149A

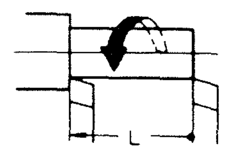
Wickman 1"-8







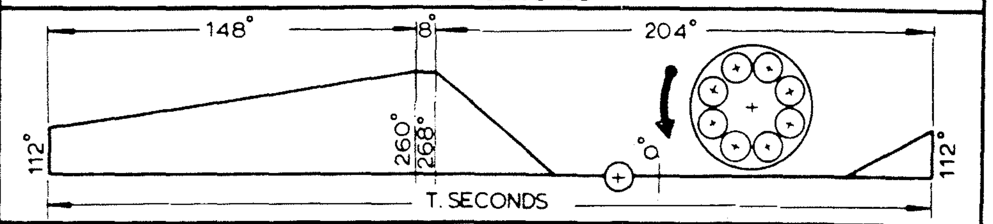
n(148°)
n(8°)

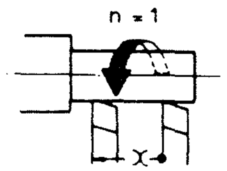


A		58	56	54	52	49	46	43	40	38	36	34	32	30
B		34	36	38	40	43	46	49	52	54	56	58	60	62
N/MIN		2737	2496	2280	2086	1829	1605	1408	1234	1129	1032	941	858	776
7:	27			3.7	3.9	4.1	4.4	4.7	5.1	5.4	5.7	6.1	6.5	7.0
69	30		3.8	3.9	4.1	4.4	4.8	5.1	5.6	5.9	6.3	6.7	7.1	7.7
66	32	3.8	4.0	4.2	4.4	4.7	5.1	5.5	6.0	6.3	6.8	7.2	7.7	8.3
64	35	4.0	4.2	4.4	4.7	5.0	5.5	5.9	6.5	6.9	7.4	7.9	8.5	9.1
61	38	4.3	4.5	4.8	5.0	5.5	5.9	6.5	7.1	7.6	8.1	8.7	9.4	10.1
58	41	4.6	4.9	5.1	5.4	5.9	6.5	7.1	7.8	8.3	8.9	9.6	10.3	11.2
56	43	4.9	5.1	5.4	5.7	6.3	6.8	7.5	8.3	8.9	9.5	10.2	11.1	12.0
53	46	5.2	5.5	5.9	6.2	6.8	7.5	8.2	9.1	9.8	10.5	11.3	12.2	13.3
50	49	5.6	6.0	6.4	6.8	7.4	8.2	9.0	10.0	10.8	11.6	12.5	13.6	14.7
49	50	5.8	6.1	6.5	7.0	7.6	8.4	9.3	10.3	11.1	12.0	12.9	14.0	15.3
46	53	6.3	6.7	7.1	7.6	8.4	9.3	10.3	11.4	12.3	13.3	14.4	15.6	17.0
43	56	6.8	7.3	7.8	8.3	9.2	10.2	11.3	12.6	13.6	14.7	16.0	17.3	18.9
41	58	7.2	7.7	8.3	8.9	9.8	10.9	12.1	13.6	14.6	15.8	17.2	18.7	20
38	61	7.9	8.5	9.1	9.8	10.9	12.1	13.5	15.1	16.3	17.7	19.2	21	23
35	64	8.7	9.4	10.1	10.8	12.1	13.5	15.1	16.9	18.3	19.9	22	24	26
32	66	9.6	10.3	11.1	12.0	13.4	15.0	16.8	18.8	20	22	24	26	29
30	69	10.5	11.3	12.2	13.1	14.7	16.5	18.5	21	23	24	27	29	32
27	71	11.7	12.6	13.6	14.7	16.5	18.5	21	23	25	28	30	33	36
25	74	12.9	14.0	15.1	16.3	18.3	21	23	26	28	31	34	37	40
23	76	14.2	15.3	16.6	18.0	20	23	26	29	31	34	37	41	45
21	78	15.7	17.0	18.4	19.9	22	25	29	32	35	38	42	46	50
18	81	18.6	20	22	24	27	30	34	39	42	46	50	55	60
C	D	T. SECONDS												

A		58	56	54	52	49	46	43	40	38	36	34	32	30
B		34	36	38	40	43	46	49	52	54	56	58	60	62
N/MIN		703	641	588	538	470	412	362	317	290	265	242	220	199
7:	27	7.5	8.0	8.6	9.2	10.2	11.3	12.6	14.1	15.2	16.5	17.9	19.4	21
69	30	8.2	8.9	9.5	10.2	11.3	12.6	14.1	15.8	17.1	18.5	20	22	24
66	32	9.0	9.6	10.4	11.1	12.4	13.9	15.5	17.4	18.8	20	22	24	26
64	35	9.9	10.6	11.4	12.3	13.7	15.4	17.2	19.4	21	23	25	27	30
61	38	10.9	11.8	12.7	13.7	15.4	17.2	19.4	22	24	26	28	31	33
58	41	12.1	13.1	14.2	15.3	17.2	19.3	22	24	27	29	31	34	38
56	43	13.0	14.1	15.2	16.4	18.5	21	23	26	29	31	34	37	41
53	46	14.4	15.6	16.9	18.3	21	23	26	30	32	35	38	42	46
50	49	16.0	17.4	18.9	20	23	26	29	33	36	39	43	47	51
49	50	16.6	18.0	19.6	21	24	27	30	34	37	41	45	49	53
46	53	18.5	20	22	24	27	30	34	39	42	46	50	55	60
43	56	21	22	24	26	30	34	38	43	47	51	56	62	68
41	58	22	24	26	29	32	37	41	47	51	56	61	67	73
38	61	25	27	30	32	36	41	47	53	58	63	69	75	83
35	64	28	31	33	36	41	47	53	60	65	71	78	86	94
32	66	32	34	37	41	46	52	59	67	74	80	88	96	106
30	69	35	38	42	45	51	58	66	75	82	89	98	107	118
27	71	40	43	47	51	58	66	75	85	93	102	112	122	135
25	74	44	48	53	58	65	74	84	96	105	114	125	137	151
23	76	49	54	59	64	73	83	94	107	117	127	140	153	169
21	78	55	60	66	72	82	93	105	120	131	143	157	172	189
18	81	66	73	79	87	98	112	127	145	156	173	189	208	229
C	D	T. SECONDS												

		n (148°)	(8°)	L 2.5	5	7.5	10	20	30	35	89	
				1/4	1/2	3/4	1	2	3	3½		
7:	27	61	3.3	4.1	8.3	12.4	16.5	33	50	58	147	X (·01 MM)
69	30	69	3.7	3.6	7.2	10.8	14.5	29	43	51	129	
66	32	77	4.2	3.2	6.5	9.7	13.0	26	39	45	115	
64	35	87	4.7	2.9	5.7	8.6	11.5	23	34	40	102	
61	38	99	5.4	2.5	5.0	7.6	10.1	20	30	35	90	
58	41	112	6.1	2.2	4.4	6.7	8.9	17.8	27	31	79	
56	43	122	6.6	2.0	4.1	6.1	8.2	16.4	25	29	73	
53	46	138	7.5	1.8	3.6	5.4	7.2	4.5	22	25	64	
50	49	156	8.4	1.6	3.2	4.8	6.4	12.8	19.2	23	57	
49	50	162	8.8	1.5	3.1	4.6	6.2	12.3	18.5	22	55	
46	53	183	9.9	1.4	2.7	4.1	5.5	10.9	16.4	19.1	49	
43	56	207	11	1.2	2.4	3.6	4.8	9.7	14.5	16.9	43	
41	58	225	12	1.1	2.2	3.3	4.4	8.9	13.3	15.6	40	
38	61	255	14	1.0	2.0	2.9	3.9	7.8	11.7	13.7	35	
35	64	291	16	.86	1.7	2.6	3.4	6.9	10.3	12.0	31	X (·001")
32	66	328	18	.76	1.5	2.3	3.0	6.1	9.1	10.7	27	
30	69	366	20	.68	1.4	2.0	2.7	5.5	8.2	9.6	24	
27	71	418	23	.60	1.2	1.8	2.4	4.8	7.2	8.4	21	
25	74	471	25	.53	1.1	1.6	2.1	4.2	6.4	7.4	18.9	
23	76	526	28	.47	.95	1.4	1.9	3.8	5.7	6.7	16.9	
21	78	591	32	.47	.85	1.3	1.7	3.4	5.1	5.9	15.1	
18	81	716	39	.35	.70	1.0	1.4	2.8	4.2	4.9	12.4	





272 Y150

SPECIAL 3½" APPROACH STROKE 2.0 SECS. IDLE TIME

272Y150

Wickman 1"-8S

A	B	N/MIN	56	54	52	49	46	43	40	38	36	34	32	30	28
			36	38	40	43	46	49	52	54	56	58	60	62	64
			2773	2534	2318	2032	1783	1565	1371	1255	1146	1045	951	863	780
71	27				3·7	3·9	4·1	4·4	4·8	5·0	5·3	5·6	6·0	6·4	6·9
69	30			3·7	3·9	4·2	4·5	4·8	5·2	5·5	5·8	6·2	6·6	7·0	7·6
66	32		3·8	3·9	4·1	4·4	4·7	5·1	5·5	5·9	6·2	6·6	7·1	7·6	8·2
64	35		4·0	4·2	4·4	4·7	5·1	5·5	6·0	6·4	6·8	7·2	7·7	8·3	9·0
61	38		4·3	4·5	4·7	5·1	5·5	6·0	6·5	7·0	7·4	8·0	8·5	9·2	10·0
58	41		4·6	4·8	5·1	5·5	6·0	6·5	7·2	7·6	8·2	8·8	9·4	10·2	11·0
56	43		4·8	5·0	5·3	5·8	6·3	6·9	7·6	8·1	8·7	9·3	10·1	10·9	11·8
53	46		5·1	5·4	5·8	6·3	6·9	7·5	8·3	8·9	9·6	10·3	11·1	12·0	13·1
50	49		5·5	5·9	6·2	6·8	7·5	8·3	9·1	9·8	10·5	11·4	12·3	13·3	14·5
49	50		5·7	6·0	6·4	7·0	7·7	8·5	9·4	10·1	10·9	11·7	12·7	13·8	15·0
46	53		6·2	6·5	7·0	7·7	8·5	9·3	10·4	11·2	12·0	13·0	14·1	15·3	16·7
43	56		6·7	7·1	7·6	8·4	9·3	10·3	11·5	12·3	13·3	14·4	15·6	17·0	18·6
41	58		7·1	7·6	8·1	9·0	9·9	11·0	12·3	13·2	14·3	15·5	16·8	18·3	20
38	61		7·8	8·3	8·9	9·9	11·0	12·2	13·7	14·7	16·0	17·3	18·8	21	22
35	54		8·6	9·2	9·9	11·0	12·2	13·6	15·3	16·5	17·9	19·4	21	23	25
32	66		9·4	10·1	10·9	12·1	13·5	15·1	17·0	18·4	19·9	22	24	26	28
30	69		10·3	11·1	11·9	13·3	14·9	16·6	18·7	20	22	24	26	29	31
27	71		11·5	12·3	13·3	14·9	16·7	18·7	21	23	25	27	30	32	36
25	74		12·6	13·6	14·7	16·5	18·5	21	23	25	28	30	33	36	40
23	76		13·9	15·0	16·2	18·2	20	23	26	28	31	33	37	40	44
21	78		15·3	16·6	18·0	20	23	26	29	31	34	37	41	45	49
18	81		18·2	19·7	21	24	27	31	35	38	41	45	49	54	59

56	54	52	49	46	43	40	38	36	34	32	30	28	n (148°)	n (8°)
36	38	40	43	46	49	52	54	56	58	60	62	64		
713	651	595	522	458	402	352	322	294	269	244	222	200		
7·3	7·8	8·4	9·3	10·3	11·4	12·8	13·8	14·9	16·1	17·5	19·1	21	60	3·2
8·1	8·7	9·3	10·3	11·5	12·8	14·3	15·4	16·7	18·1	19·7	22	24	68	3·7
8·8	9·4	10·1	11·3	12·6	14·0	15·7	17·0	18·4	20	22	24	26	76	4·1
9·7	10·4	11·2	12·4	13·9	15·6	17·5	18·9	20	22	24	27	29	86	4·6
10·7	11·5	12·4	13·9	15·5	17·4	19·6	21	23	25	27	30	33	98	5·3
11·9	12·8	13·8	15·5	17·4	19·5	22	24	26	28	31	34	37	111	6·0
12·7	13·8	14·8	16·7	18·7	21	24	26	28	30	33	36	40	121	6·5
14·1	15·3	16·5	18·6	21	23	27	29	31	34	37	41	45	136	7·4
15·7	17·0	18·4	21	23	26	30	32	35	38	42	46	51	154	8·3
16·3	17·6	19·1	22	24	27	31	33	36	40	44	48	53	160	8·7
18·1	19·6	21	24	27	31	35	38	41	45	49	54	59	181	9·8
20	22	24	27	30	34	39	42	46	50	55	60	67	205	11
22	24	26	29	33	37	42	46	50	54	60	65	72	222	12
24	27	29	33	37	42	47	52	56	61	67	74	82	252	14
28	30	33	37	42	47	54	58	64	70	76	84	93	287	16
31	34	36	41	47	53	60	66	72	78	86	95	104	324	18
34	37	40	46	52	59	67	73	80	87	96	105	116	362	20
39	42	46	52	59	67	76	83	91	99	109	120	132	413	22
43	47	51	58	66	75	86	93	102	112	122	135	149	465	25
48	52	57	65	74	84	95	104	114	124	136	150	166	519	28
54	59	64	73	83	94	107	117	127	140	153	169	186	584	32
65	71	77	88	100	113	129	141	154	169	185	204	225	707	38

L	2·5	5	7·5	10	20	30	35	89
	1/4	1/2	3/4	1	2	3	3½	
n (148°)	4·2	8·4	12·5	16·7	34	50	59	149
n (8°)	3·7	7·3	11·0	14·6	29	44	51	130
	3·3	6·6	9·8	13·1	26	39	46	117
	2·9	5·8	8·7	11·6	23	35	41	104
	2·6	5·1	7·7	10·2	20	31	36	91
	2·2	4·5	6·7	9·0	18·0	27	32	80
	2·1	4·1	6·2	8·3	16·6	25	29	74
	1·8	3·7	5·5	7·3	14·7	22	26	65
	1·6	3·2	4·9	6·5	13·0	19·5	23	58
	1·6	3·1	4·7	6·2	12·5	18·7	22	55
	1·4	2·8	4·1	5·5	11·0	16·6	19·3	49
	1·2	2·4	3·7	4·9	9·8	14·7	17·1	43
	1·1	2·2	3·4	4·5	9·0	13·5	15·7	40
	·99	2·0	3·0	4·0	7·9	11·9	13·9	35
	·87	1·7	2·6	3·5	7·0	10·4	12·2	31
	·77	1·5	2·3	3·1	6·2	9·3	10·8	27
	·69	1·4	2·1	2·8	5·5	8·3	9·7	25
	·61	1·2	1·8	2·4	4·8	7·3	8·5	22
	·54	1·1	1·6	2·1	4·3	6·4	7·5	19·1
	·48	·96	1·4	1·9	3·9	5·8	6·7	17·1
	·43	·86	1·3	1·7	3·4	5·1	6·0	15·2
	·35	·71	1·1	1·4	2·8	4·2	4·9	12·6

X (·01 MM) X (·001")

C D — T SECONDS

148° 8° 204° 112° 260° 268° 0° 112° T SECONDS

n = 1 X

272 Y152

FEED AND SPEED CHART – SPINDLE STOPPING MACHINE

272Y152

Fig.4.1 Example of use Feed and Speed Chart

1. Example: Using 49.43 Spindle gears
2. Range gears
3. Spindle gears
4. High range
5. Low range
6. Spindle revs. during the 148 deg.feed cutting time
7. Spindle revs.during the 8 deg.of dwell
8. Feed stroke set on any one slide
9. Example: L = 2" or L = 20mm

10. Travel of slide in thousandths of an inch (or hundreths of a mm.) for one revolution of the spindle during 148 deg. of cutting time.

11. Cycle time 360 deg.
12. T secs.
13. Indexing ect.
14. 204 deg. fast motion time (slide return : indexing : slides approach)

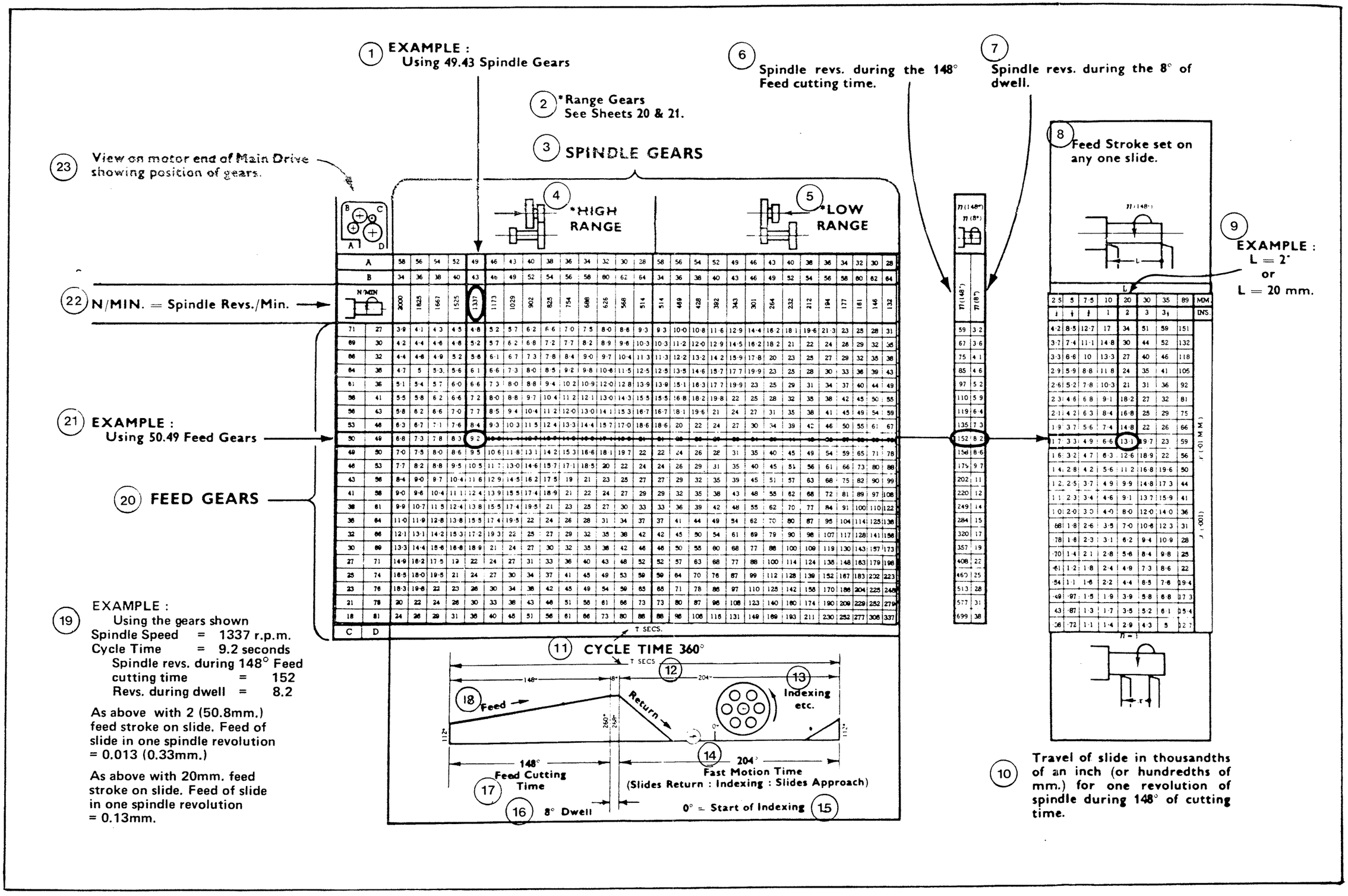
15. 0 deg.= Start of indexing
16. 8 deg. dwell
17. 148 deg. Feed cutting time
18. Feed
19. Example: Using the gears shown
    Spindle speed = 1337r.p.m.
    Cycle time = 9.2 secs.
    Spindle revs, during 148 deg.feed
    Cutting time - 152, Revs. during dwell = 8.2

    As above with 2" 50.8mm feed stroke on slide. Feed of slide in one revolution = 0.013 (0.13mm)

    As above with 20mm feed stroke on slide. Feed of slide in one spindle revolution = 0.13mm.

20. Feed gears
21. Example: using 50.49 gears
22. N/Min. = Spindle revs. per min.
23. View on motor end of main drive showing position of gears

Fig. 4.1 Example of use Feed and Speed Chart



Cutting Speed Chart - Standard Machine Drg. 200V173

1. N/Min
2. Dia. ins.
3. Dia. mm.
4. Cutting speed Ft/min.
5. Cutting speed Metres/min.

DIA. M/M.					DIA. INS.				N/MIN.
25	20	15	10	5	1"	3/4	1/2	1/4	1/8	
218	174	131	87	44	726	544	363	181	91	2773
199	159	119	80	40	663	498	332	166	83	2534
182	146	109	73	36	607	455	303	152	76	2318
160	128	96	64	32	532	399	266	133	66	2032
140	112	84	56	28	467	350	233	117	58	1783
123	98	74	49	25	410	307	205	102	51	1565
108	86	65	43	22	359	269	179	90	45	1371
99	79	59	39	20	329	246	164	82	41	1255
90	72	54	36	18	300	225	150	75	38	1146
82	66	49	33	16	274	205	137	68	34	1045
75	60	45	30	15	249	187	124	62	31	951
68	54	41	27	14	226	169	113	56	28	863
61	49	37	25	12	204	153	102	51	26	780
56	45	34	22	11	187	140	93	47	23	713
51	41	31	20	10	170	128	85	43	21	651
47	37	28	19	9·3	156	117	78	39	19	595
41	33	25	16	8·2	137	102	68	34	17	522
36	29	22	14	7·2	120	90	60	30	15	458
32	25	19	13	6·3	105	79	53	26	13	402
28	22	17	11	5·5	92	69	46	23	12	352
25	20	15	10	5·1	84	63	42	21	11	322
23	19	14	9·2	4·6	77	58	38	19	9·6	294
21	17	13	8·5	4·2	70	53	35	18	8·8	269
19	15	11	7·7	3·8	64	48	32	16	8·0	244
17	14	10	7·0	3·5	58	44	29	15	7·3	222
16	13	9·4	6·3	3·1	52	39	26	13	6·5	200
CUTTING SPEED METRES/MIN.					CUTTING SPEED FT./MIN.					

1. N/Min
2. Dia. ins.
3. Dia. mm.
4. Cutting speed Ft./min.
5. Cutting speed Metres/min.

DIA. M/M.					DIA. INS.					N/MIN.
5	10	15	20	25	1/8	1/4	1/2	3/4	1"	
43	86	129	172	215	90	179	358	537	717	2737
39	78	118	157	196	82	163	327	490	653	2496
36	72	107	143	179	75	149	298	448	597	2280
33	66	98	131	164	68	137	273	410	546	2086
29	57	86	115	144	60	120	239	359	479	1829
25	50	76	101	126	53	105	210	315	420	1605
22	44	66	88	111	46	92	184	276	369	1408
19	39	58	78	97	40	81	162	242	323	1234
18	35	53	71	89	37	74	148	222	296	1129
16	32	49	65	81	34	68	135	203	270	1032
15	30	44	59	74	31	62	123	185	246	941
13	27	40	54	67	28	56	112	168	224	856
12	24	37	49	61	25	51	102	152	203	776
11	22	33	44	55	23	46	92	138	184	703
10	20	30	40	50	21	42	84	126	168	641
9·2	18·4	28	37	46	19	38	77	115	153	586
8·4	17	25	34	42	18	35	70	105	140	536
7·4	15	22	30	37	15	31	62	92	123	470
6·5	13	19	26	32	13	27	54	81	108	412
5·7	11·4	17	23	28	12	24	47	71	95	362
5·0	10	15	20	25	10·4	21	41	62	83	317
4·6	9·1	14	18	23	9·5	19	38	57	76	290
4·2	8·3	13	17	21	8·7	17	35	52	69	265
3·8	7·6	11·4	15	19	7·9	15·8	32	48	63	242
3·5	6·9	10·4	14	17	7·2	14·4	29	43	58	220
3·1	6·3	9·4	13	16	6·5	13	26	39	52	199
CUTTING SPEED METRES/MIN.					CUTTING SPEED FT./MIN.					

4.2 Changing Spindle Speed Gears

An example of the use of the speed and feed plate and charts is shown in Section 4.1.

Access to the spindle speed pick off gears "A" and "B" can be gained by removing the cover on the end face of the main drive housing situated above the belt guard.

Access to the high-low range change, Fig.4.2 Drg.200Z163 is gained by removing the cover above the manual controls at the front of the main drive housing.

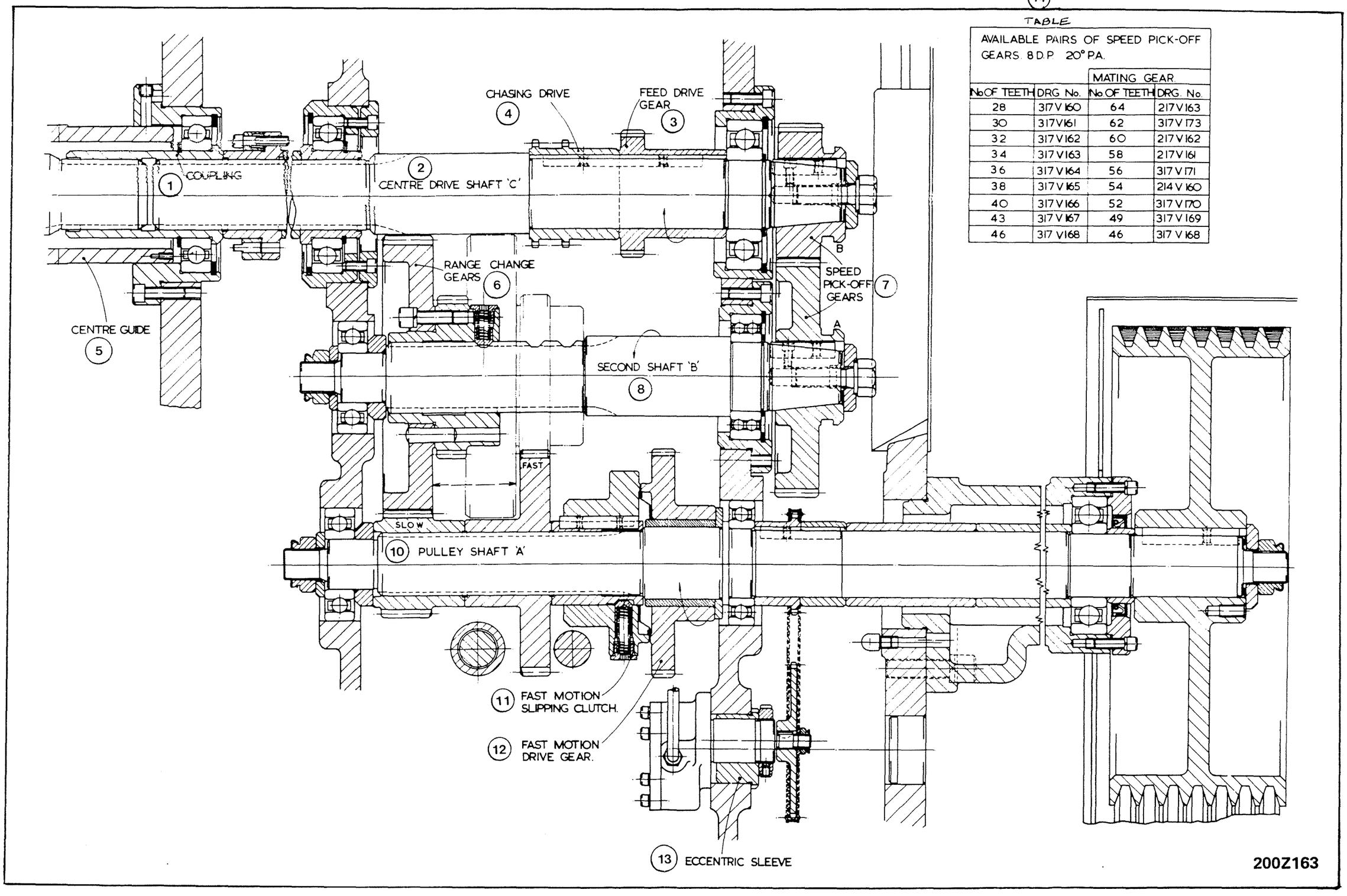
The speed and feed plate on the main drive housing and the feed and speed charts contained in this handbook show the gears 'A' and 'B' in the top column and immediately below, the spindle speed N revolutions per minute for the high range and the low range.

The two gears "A" and "B" are keyed onto taper shafts and held by slotted washers and hexagon nuts. Unscrew the nuts sufficiently to remove the washers and slide the gear extractor, supplied in the tool kit, over the groove in the gear boss. Tighten the extractor bolt against the end of the shaft to withdraw the gear. One gear should be withdrawn just enough to be free on its taper and then the other gear completely removed. This ensures that the gears remain meshed thus preventing the shaft from turning whilst using the extractor. A gear that is very tight will free if the extractor bolt is given a sharp tap with a mallet. Gears and shafts must be cleaned before replacing.

In order to change the high-low range, lever the gear into position. The compound gear assembly has a spring detent which engages into the location grooves cut into the driven shaft 'B', to locate the appropriate gear into the required speed range. Facing the front of the machine, slide the gear to the extreme right for the low range and to the extreme left for the high range. Neutral is midway between the extremes.

Arrangement of Main Drive Gearing. Drg.200Z163

1. Coupling
2. Centre Drive Shaft 'C'.
3. Feed Drive Gear.
4. Chasing Drive.
5. Centre Guide.
6. Range Change Gears.
7. Speed Pick-off Gears.
8. Second Shaft 'B'.
9. Drive to the Lubrication Pump.
10. Pulley Shaft 'A'.
11. Fast Motion Slipping Clutch
12. Fast Motion Drive Gear.
13. Eccentric Sleeve
14. Table.



AVAILABLE PAIRS OF SPEED PICK-OFF GEARS. 8 D.P. 20° P.A.

		MATING GEAR.	
No OF TEETH	DRG No.	No OF TEETH	DRG. No.
28	317 V 160	64	217 V 163
30	317 V 161	62	317 V 173
32	317 V 162	60	217 V 162
34	317 V 163	58	217 V 161
36	317 V 164	56	317 V 171
38	317 V 165	54	214 V 160
40	317 V 166	52	317 V 170
43	317 V 167	49	317 V 169
46	317 V 168	46	317 V 168

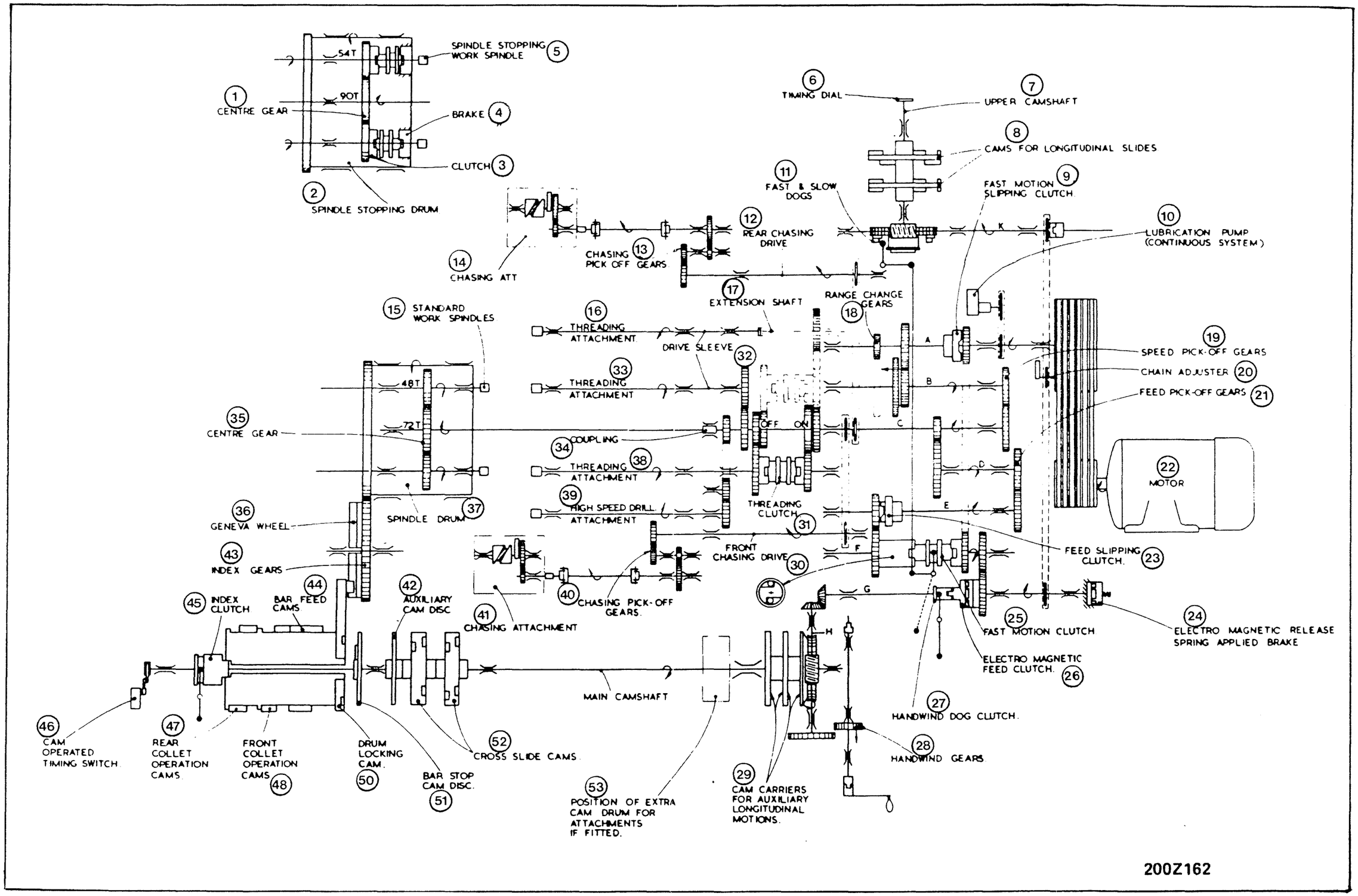
4.3 Changing Feed Gears

Access to the feed gears "C" and "D" can be gained by removing the cover on the end face of the main drive housing, motor end, refer to Fig. 4.4 Drg.200Z68A.

The speed and feed plate and charts contained in this handbook show the gears "C" and "D" in the vertical columns on the left hand side, the cycle times in seconds in the central area and the feeds per the chosen slide stroke on the right hand side of the charts. The feeds are expressed in units of 0.001 inches or 0.01mm

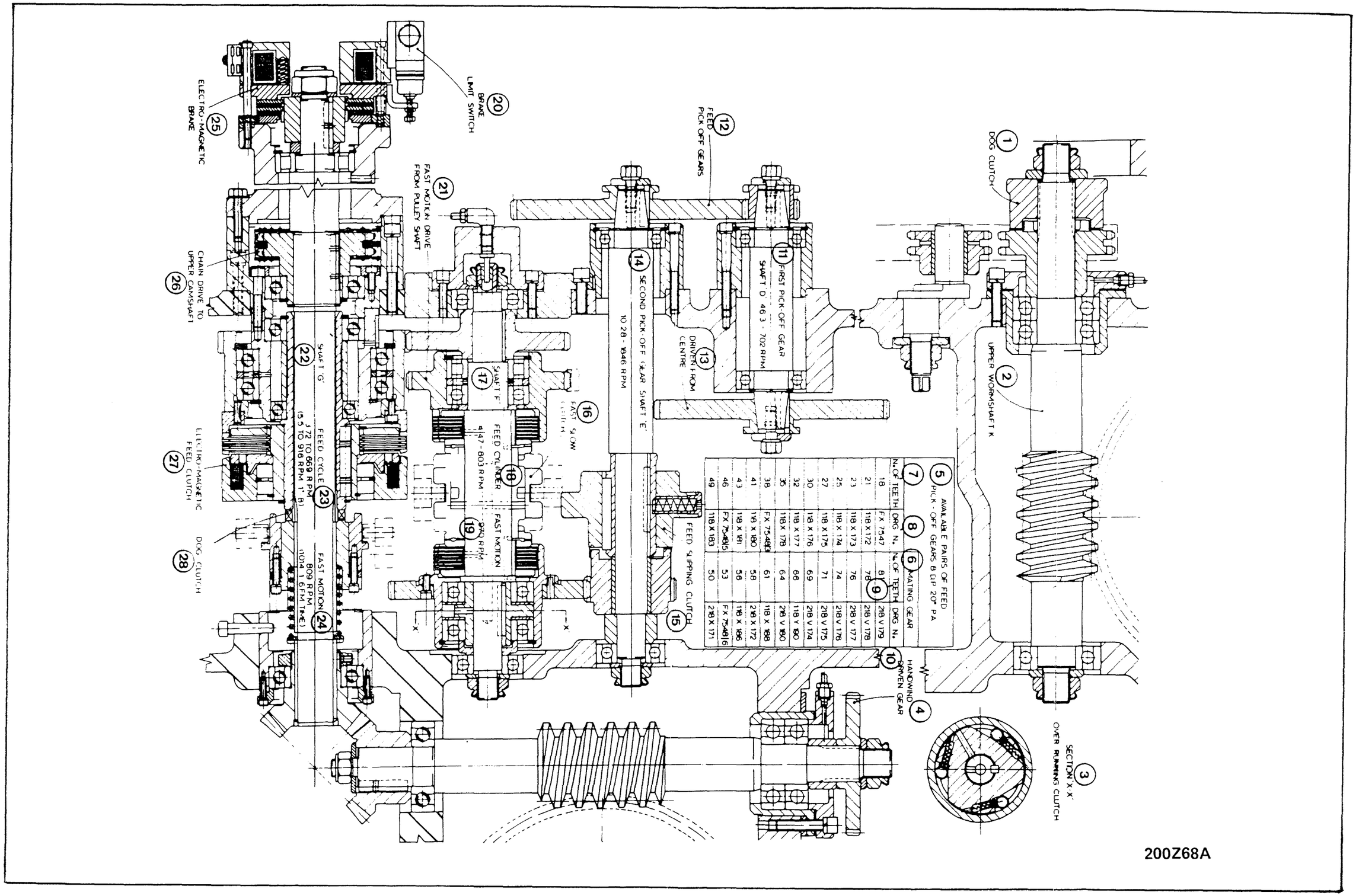
The two feed gears are keyed onto taper shafts and are retained by slotted washers and hexagon bolts. The gears are changed in the manner described for the speed gears, using the extractor supplied in the tool kit. Partially loosen both gears by unscrewing the bolts sufficiently to remove the slotted washers and applying the gear extractor. Once freed from the tapered shafts, both gears can be removed. Gears and shafts must be cleaned before replacing the gears. For Feed and Speed Charts see Fig.4.1 Drgs.272Y149A,272Y150 & 272Y152.

1. Centre gear
2. Spindle Stopping Drum
3. Clutch
4. Brake
5. Spindle stopping work spindle
6. Timing dial
7. Upper camshaft
8. Cams for longitudinal slides
9. Fast motion slipping clutch
10. Lubrication pump (continuous system)
11. Fast and slow dogs
12. Rear chasing drive
13. Chasing pick-off gears
14. Chasing attachment
15. Standard work spindles
16. Threading attachment
17. Extension shaft
18. Range change gears
19. Speed pick-off gears
20. Chain adjuster
21. Feed pick-off gears
22. Motor
23. Feed slipping clutch
24. Electro magnetic release spring applied brake
25. Fast motion clutch
26. Electro magnetic feed clutch
27. Handwind dog clutch
28. Handwind gears
29. Cam carriers for auxiliary longitudinal motions
30. Front chasing drive
31. Threading clutch
32. Drive sleeve
33. Threading attachment
34. Coupling
35. Centre gear
36. Geneva wheel
37. Spindle drum
38. Threading attachment
39. High speed drill attachment
40. Chasing pick-off gears
41. Chasing attachment
42. Auxiliary cam disc
43. Index gears
44. Bar feed cams
45. Index clutch
46. Cam operated timing switch
47. Rear collet operation cams
48. Front collet operation cams
49. Drum locking cam
50. Bar stop cam disc
51. Cross slide cams
52. Main camshaft
53. Position of extra cam drum for attachments if fitted


1 CENTRE GEAR
54T
90T
2 SPINDLE STOPPING DRUM
SPINDLE STOPPING WORK SPINDLE 5
BRAKE 4
CLUTCH 3
6 TIMING DIAL
7 UPPER CAMSHAFT
8 CAMS FOR LONGITUDINAL SLIDES
11 FAST & SLOW DOGS
FAST MOTION SLIPPING CLUTCH 9
10 LUBRICATION PUMP (CONTINUOUS SYSTEM)
12 REAR CHASING DRIVE
13 CHASING PICK OFF GEARS
14 CHASING ATT
17 EXTENSION SHAFT
RANGE CHANGE GEARS 18
15 STANDARD WORK SPINDLES
16 THREADING ATTACHMENT
DRIVE SLEEVE 32
33 THREADING ATTACHMENT
19 SPEED PICK-OFF GEARS
CHAIN ADJUSTER 20
FEED PICK-OFF GEARS 21
22 MOTOR
35 CENTRE GEAR
48T
72T
34 COUPLING
38 THREADING ATTACHMENT
39 HIGH SPEED DRILL ATTACHMENT
THREADING CLUTCH
31 FRONT CHASING DRIVE
36 GENEVA WHEEL
SPINDLE DRUM 37
43 INDEX GEARS
40 CHASING PICK-OFF GEARS.
41 CHASING ATTACHMENT
30
FEED SLIPPING CLUTCH. 23
45 INDEX CLUTCH
44 BAR FEED CAMS.
42 AUXILIARY CAM DISC
25 FAST MOTION CLUTCH
24 ELECTRO MAGNETIC RELEASE SPRING APPLIED BRAKE
ELECTRO MAGNETIC FEED CLUTCH. 26
MAIN CAMSHAFT
27 HANDWIND DOG CLUTCH.
46 CAM OPERATED TIMING SWITCH
47 REAR COLLET OPERATION CAMS.
FRONT COLLET OPERATION CAMS 48
DRUM LOCKING CAM. 50
BAR STOP CAM DISC. 51
52 CROSS SLIDE CAMS.
28 HANDWIND GEARS
53 POSITION OF EXTRA CAM DRUM FOR ATTACHMENTS IF FITTED.
29 CAM CARRIERS FOR AUXILIARY LONGITUDINAL MOTIONS.
OFF ON
A B C D E F G H K
200Z162

Feed Gearing Drg.200Z68A

1. Dog clutch
2. Upper wormshaft
3. Section 'XX' over running clutch
4. Handwind driven gear
5. Available pair of feed pick-off gears 8DP.20Deg.PA.
6. Mating gearng Clutch
7. No.of teeth
8. Drg. No.
9. No. of teeth
10. Drg. No. Over-run Clutch
11. First pick-off gear shaft D 463/702 RPM.
12. Feed pick-off gears
13. Driven from centre
14. Second pick-off gear shaft E 1028/846RPM.
15. Feed slipping clutch
16. Fast-slow clutch
17. Shaft E
18. Feed cylinder 447/803RPM.
19. Fast motion
20. Brake limit switch
21. Fast motion drive from pulley shaft
22. Shaft G
23. Feed cycle
24. Fast motion 809RPM. 1014 1.6 FM time
25. Electro-magnetic brake
26. Chain drive to upper camshaft
27. Electro-magnetic feed clutch
28. Dog clutch


1 DOG CLUTCH
2 UPPER WORMSHAFT K
3 SECTION X-X OVER RUNNING CLUTCH
4 HANDWIND DRIVEN GEAR
5 AVAILABLE PAIRS OF FEED PICK-OFF GEARS @ DP 20° PA
6 MATING GEAR
7 No. OF TEETH
8 DRG No.
9 No. OF TEETH
10 DRG No.
18 FX 7547 21 118 X 172
21 118 X 173 23 118 X 174
23 118 X 175 25 118 X 176
25 118 X 177 27 118 X 178
27 118 X 179 30 118 X 180
30 FX 75483 36 118 X 188
32 118 X 180 41 118 X 188
36 118 X 181 43 118 X 191
41 FX 75485 46 118 X 193
46 118 X 183 49 FX 75486
50 218 V 178 53 218 V 179
64 218 V 180 66 218 V 174
66 218 V 175 69 218 V 176
69 218 V 177 71 218 V 178
74 218 V 179 76 218 V 180
76 218 X 172 78 218 X 171
78 218 X 188 81 218 X 186
11 FIRST PICK-OFF GEAR SHAFT D 463 - 702 RPM
12 FEED PICK OFF GEARS
13 DRIVEN FROM CENTRE
14 SECOND PICK-OFF GEAR SHAFT 'E' 1028 - 1846 RPM
15 FEED SLIPPING CLUTCH
16 FAST SLOW
17 SHAFT 'F'
18 FEED CYLINDER
19 FAST MOTION 890 RPM
20 BRAKE LIMIT SWITCH
21 FAST MOTION DRIVE FROM PULLEY SHAFT
22 SHAFT 'G'
23 FEED CYCLE 372 TO 669 RPM (5.5 TO 9.16 RPM 1" P)
24 FAST MOTION 809 RPM (10.14 6 FM TAPE)
25 ELECTRO-MAGNETIC BRAKE
26 CHAIN DRIVE TO UPPER CAMSHAFT
27 ELECTRO-MAGNETIC FEED CLUTCH
28 DOG CLUTCH
X X
200Z68A

4.4 Changing Feed Fingers and Steady Bushes

Bars can be fed on the single bar feed machine from either the 8th or 7th station according to the positioning of the bar feed shoe carrier,(See Fig.4.5 Drg.200Z169,Fig.4.6 200Z170,Fig.4.7 200Z171,and Fig.4.8 200Z172).The double bar feed machine is arranged to bar feed in the 8th and 4th stations as standard or in the 7th or 3rd stations as an option. Hence the bar feed tubes should be withdrawn from either the 7th or 8th stations on the single bar feed machine dependent on the station selected. On the double bar feed machine the bar feed tubes are withdrawn from the 8th or 4th stations (standard) or 7th or 3rd stations (optional).

The feed fingers are fitted to their feed tubes which carry on their outer ends the bar feed bobbins, the outer part of which carry shielded ant-friction bearings. The feed tube steady bushes are also fitted into the bobbins and are locked in position by screwed sleeves and slotted locknuts.

In order to remove the feed fingers from the feed tube assemblies it is necessary to remove the assemblies from the machine. This can be accomplished by (a) turning the plate on the rear of the centre stop, which is held in position by a spring plunger, until a gap in the plate is in line with the bar feed station/stations; (b) disengaging the bar feed shoe by moving the bar feed shoe lever into its down position; (c) sliding back the stock carriage tube.

The stock carriage tube can be released from its driving disc by pushing the stock carriage tube towards the driving disc, turning the tube assembly anti-clockwise approximately 18 deg. and pulling the tube assembly away from the driving disc.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 flanged sleeve, form a bayonet type lock. The re-assembly in the driving disc is affected by reversing the above procedure.

Note:

The removal of the bar feed tube assemblies in any other stations than those mentioned above also requires the alignment fingers to be lifted clear.

The stock tubes may be adjusted closer to the spindle, by releasing the flanged sleeve on the tube and reclamping same in the required position. This is useful when using bars of a small diameter,in order to give maximum support to the bar.

Note:

It is is important however,before increasing the bar feed stroke, that the tubes be moved back and then re-set after completing the change.

When removing the feed fingers from their tubes assemblies, it is necessary to place the feed tube assembly on a rod held in a vice which runs through holes drilled through the feed tube at the feed finger end. This enables each feed finger to be unscrewed (left hand thread), with the wrench provided in the tool kit, without distorting the feed tube.

Caution:

Gripping the feed tube in a vice will distort the tube and prevent the feed finger from being unscrewed. Refrain from using amallet on the wrench to overtighten when replacing the feed fingers. The feed fingers should be cleaned and their threads free from debris before assembling them into their feed tubes, which should also be thoroughly clean.

Collet Operation In Station 8 Drg. 200Z169

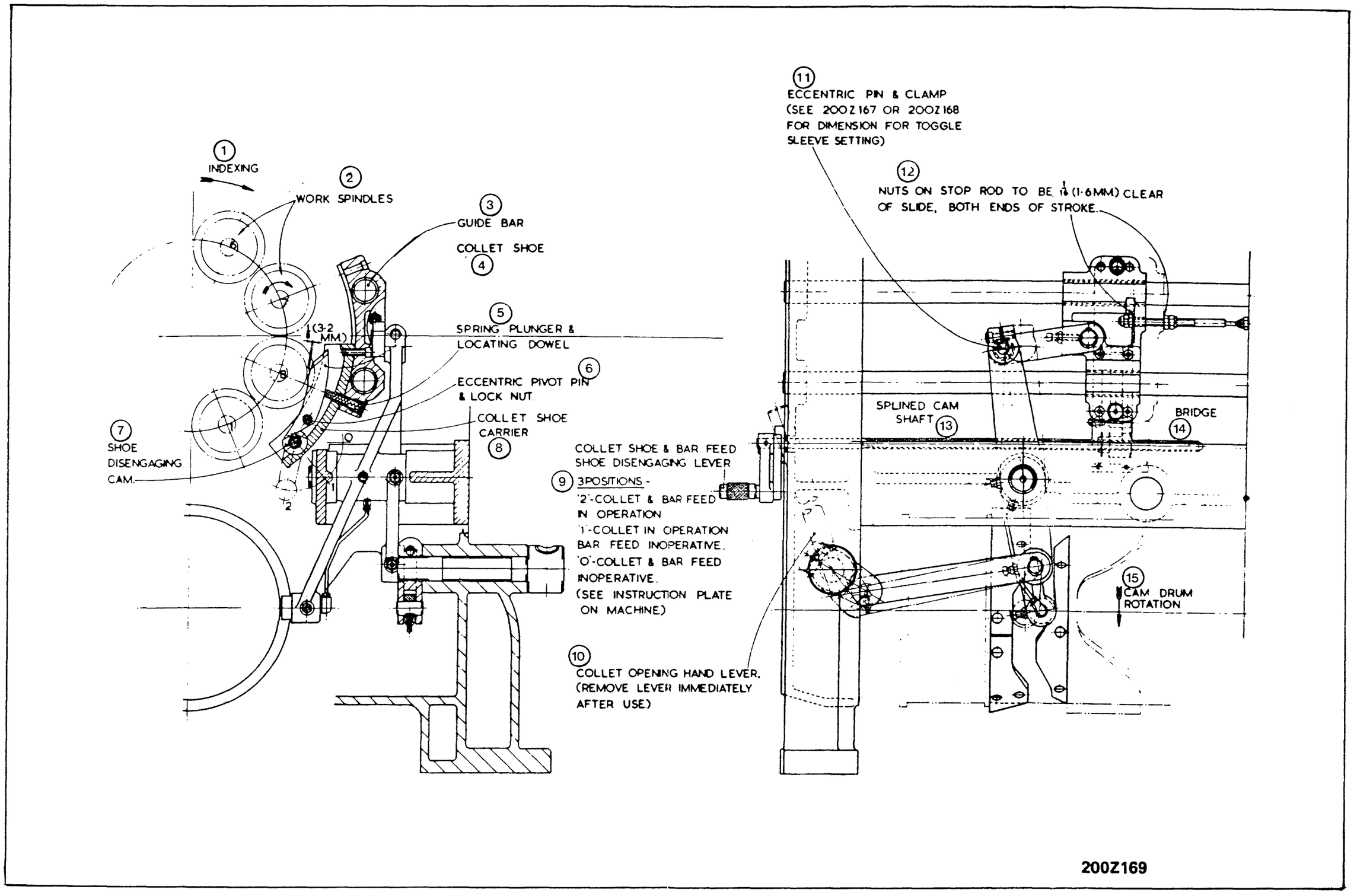
1. Indexing
2. Work spindles
3. Guide bar
4. Collet shoe
5. Spring plunger and locating dowel
6. Eccentric pivot pin and locknut
7. Shoe disengaging cam
8. Collet shoe carrier
9. Collet shoe and bar feed shoe disengaging lever
   3 positions

   '2' Collet and bar feed in operation

   '1' Collet in operation bar feed inoperative

   '0'Collet and bar feed inoperative (see instruction plate on machine.

10. Collet opening hand lever. (Remove lever immediately after use)
11. Eccentric pin and clamp (see 200Z167 or 200Z168 for dim. for toggle sleeve setting)
12. Nuts on stop rod to be 1/16" (1.6mm) clear of slide, both ends of stroke.
13. Splined camshaft
14. Bridge
15. Cam drum rotation


1 INDEXING
2 WORK SPINDLES
3 GUIDE BAR
COLLET SHOE 4
5 SPRING PLUNGER & LOCATING DOWEL
1/8 (3·2 MM)
6 ECCENTRIC PIVOT PIN & LOCK NUT
COLLET SHOE CARRIER 8
7 SHOE DISENGAGING CAM.
COLLET SHOE & BAR FEED SHOE DISENGAGING LEVER
9 3 POSITIONS -
'2'-COLLET & BAR FEED IN OPERATION
'1'-COLLET IN OPERATION BAR FEED INOPERATIVE.
'0'-COLLET & BAR FEED INOPERATIVE.
(SEE INSTRUCTION PLATE ON MACHINE)
10 COLLET OPENING HAND LEVER. (REMOVE LEVER IMMEDIATELY AFTER USE)
11 ECCENTRIC PIN & CLAMP (SEE 200Z167 OR 200Z168 FOR DIMENSION FOR TOGGLE SLEEVE SETTING)
12 NUTS ON STOP ROD TO BE 1/16 (1·6MM) CLEAR OF SLIDE, BOTH ENDS OF STROKE.
SPLINED CAM SHAFT 13
BRIDGE 14
15 CAM DRUM ROTATION
200Z169

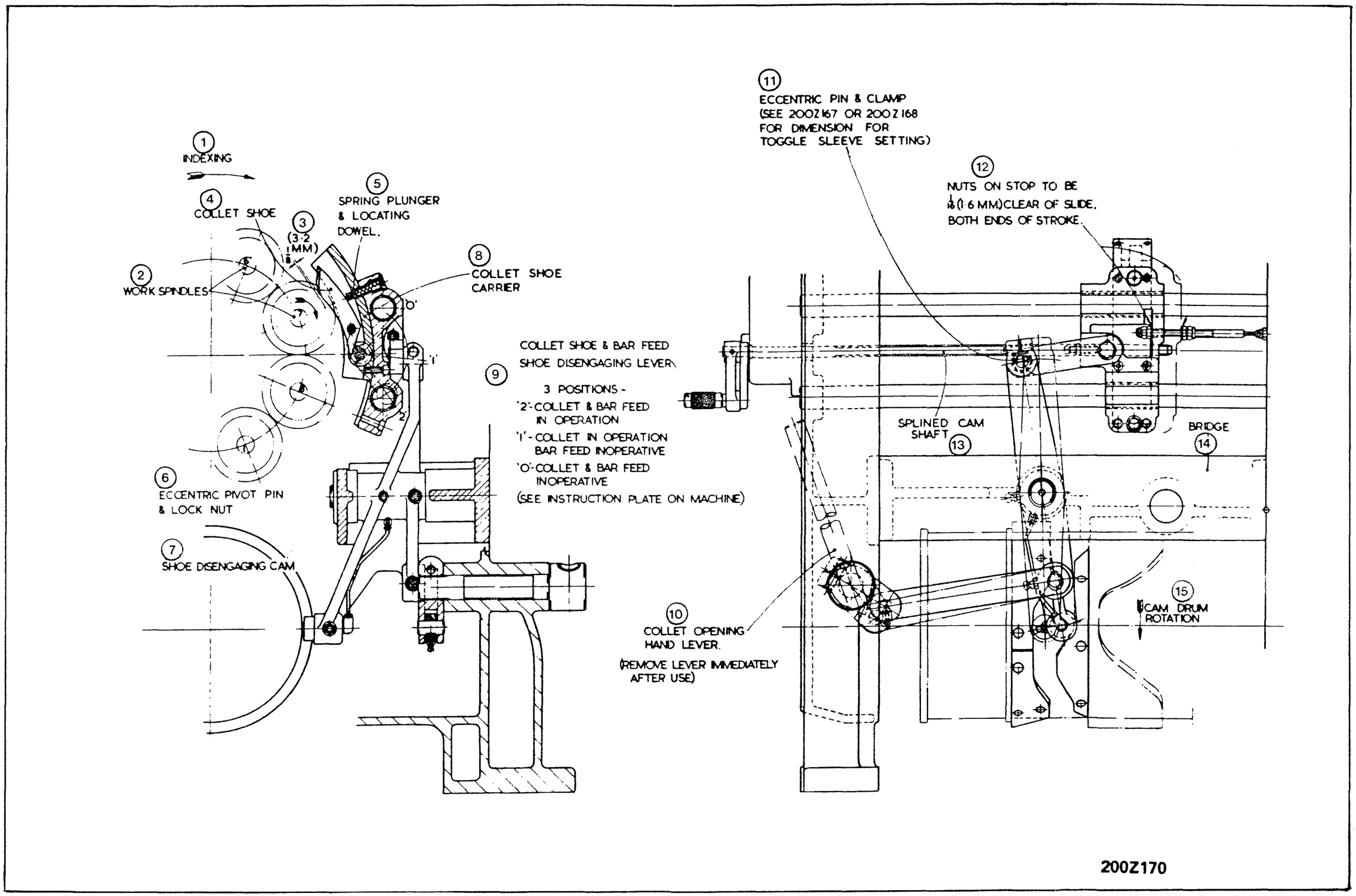
Collet Operation In Station 7 Drg. 200Z170

1. Indexing
2. Work spindles
3. 3.2mm
4. Collet shoe
5. Spring plunger and locating dowel
6. Eccentric pivot pin and locknut
7. Shoe disengaging cam
8. Collet shoe carrier
9. Collet shoe and bar feed disengaging lever
   3 Positions

   '2' Collet and bar feed in operation

   '1' Collet in operation, bar feed inoperative

   '0' Collet and bar feed inoperative
   See instruction plate on machine
10. Collet opening hand lever
11. Eccentric pin and clamp (see 200Z167 or 200Z168)
    for dim.for toggle sleeve setting
12. Nuts on stop to be 1/16" (1.6mm) Clear of slide both ends
    of stroke
13. Splined camshaft
14. Bridge
15. Cam drum rotation


1 INDEXING
2 WORK SPINDLES
3 (3·2 MM)
4 COLLET SHOE
5 SPRING PLUNGER & LOCATING DOWEL.
6 ECCENTRIC PIVOT PIN & LOCK NUT
7 SHOE DISENGAGING CAM
8 COLLET SHOE CARRIER
9 COLLET SHOE & BAR FEED SHOE DISENGAGING LEVER
3 POSITIONS -
'2'-COLLET & BAR FEED IN OPERATION
'1'-COLLET IN OPERATION BAR FEED INOPERATIVE
'0'-COLLET & BAR FEED INOPERATIVE
(SEE INSTRUCTION PLATE ON MACHINE)
10 COLLET OPENING HAND LEVER.
(REMOVE LEVER IMMEDIATELY AFTER USE)
11 ECCENTRIC PIN & CLAMP (SEE 200Z167 OR 200Z168 FOR DIMENSION FOR TOGGLE SLEEVE SETTING)
12 NUTS ON STOP TO BE 1/16 (1·6 MM) CLEAR OF SLIDE, BOTH ENDS OF STROKE.
13 SPLINED CAM SHAFT
14 BRIDGE
15 CAM DRUM ROTATION
200Z170

4.5 Changing Collets

The collets, which are the "draw-in" style, are operated by toggle mechanisms on the end of the work spindles. The collets and collet tubes may be released by withdrawing the spring plunger from the collet adjusting ring and by turning the right hand threaded ring. This will release the collet complete with its draw tube so that it can be withdrawn from the workspindle in the tooling area of the machine. Replacement collets and each spindle nose seating should be thoroughly cleaned to remove all debris and coolant scum deposits and examined before fitting each replacement collet onto the spindle nose location key and screwing the collet adjustment ring into the collet tube to draw the collet back into its seating. Collet tension is set by adjusting the collet adjustment ring and must be tested by using 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 small variations in bar size. If the machine is run without collets and tubes, the collet adjusting ring assembly must be removed from each spindle.

Before replacing bars in the feed fingers and finally adjusting collet tension, set the bar feed stroke.

Always taper the ends of the bars to ensure they have an easy passage through the feed fingers and collets.

The leverage provided by the length of the collet closing hand lever, when testing collet tension by hand, is sufficient to close a correctly adjusted collet. A tube extension placed on the lever is dangerous practice and should not be considered.

Coolant should not be directed at a running spindle which is empty of bar, since the coolant will run through the spindle and spray out of the stock carriage end of the machine. If tube material is being machined, bungs should be fitted in the rear end of each tube to prevent coolant flowing straight through.

Check that the collet is closed before starting the machine. Always close the collet before disengaging the collet operating finger from the bobbin.

Always re-engage the locking plunger with the collet adjusting ring after adjusting the collet.

4.6 Selecting The Collet Closing and Bar feed Station

a) In order to change the collet operating station, ie. between 7th or 8th stations, the collet shoe carrier must be re-positioned.

   First unscrew the the spring plunger/locating dowel from the collet slide. Next remove the three cap screws securing the disengaging lever bracket to the end bracket, and withdraw the splined camshaft from the engagement with both the collet shoe and the bar feed shoe disengaging cams. Remove the three cap screws securing the collet shoe carrier to the collet slide. The collet shoe carrier may now be slid around its arc to the new station, the spring/plunger dowel being re-positioned to suit the new station and the three cap screw replaced.

Note:

One of the screws has a new position adjacent to the re-positioned locating dowel.

b) With the splined cam shaft already withdrawn from both the collet shoe and the bar feed shoe disengaging the cams as a result of re-positioning the collet shoe carrier, withdraw the splined trip shaft from the engagement with the trip finger, having first removed the three cap screws securing the cover plate. This reveals the end of the shaft which is grooved to give a good grip. Unscrew the spring plunger locating dowel and the three cap screws as in the collet slide-repositioning, and move the bar feed shoe carrier to its new position and replace the three cap screws, noting that as in the collet/slide, one screw is in a new position adjacent to the spring plunger/locating dowel.

c) Finally replace the splined camshaft to engage both collet and bar feed shoe disengaging cams. Replace the trip shaft in its new position, to engage the trip finger, and refit the cover plate and screws.

4.7 Setting Bar Feed Stroke

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 its fully forward position, which is constant irrespective of the bar feed stroke set. Loosen the centre stop and slide it back as far as it will go. Unlock the stroke setting block and move the bar feed link/ body to the desired stroke, with reference to the stroke setting scale and securely lock the stroke setting block. Next handwind the machine until the bar feed slide is in its fully back position for the selected stroke. The centre block should then be set to its new position.

Should it be necessary to change the bar feed stroke after all the bars are loaded into the machine, all collets should be opened before starting the above procedure. If the bar feed stroke is increased whilst the bars are in the machine and the collets are not opened, 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 bar feed link to collapse. If the stroke is decreased when the bars are in the machine, each bar feed tube must be set in the loading station until all eight are in their new position. The centre stop can then be re-set.

The bar feed shoe is spring loaded and will be depressed should the bar feed bobbin index round out of position. Always ensure that the centre stop is correctly re-set after changing feed fingers or altering the bar feed stroke. Check that the bar feed shoe is put into engagement after inserting the new bar.

The stock tube in the stock carriage may be adjusted closer to the spindle by releasing the flanged sleeve on the stock tube and reclamping same in its new position. This is usfull when using bar of a small diameter,in order to give it maximum support. However it is essential before increasing the bar feed stroke to move the stock tubes back and reset them in their required position after the bar feed stroke has been changed.

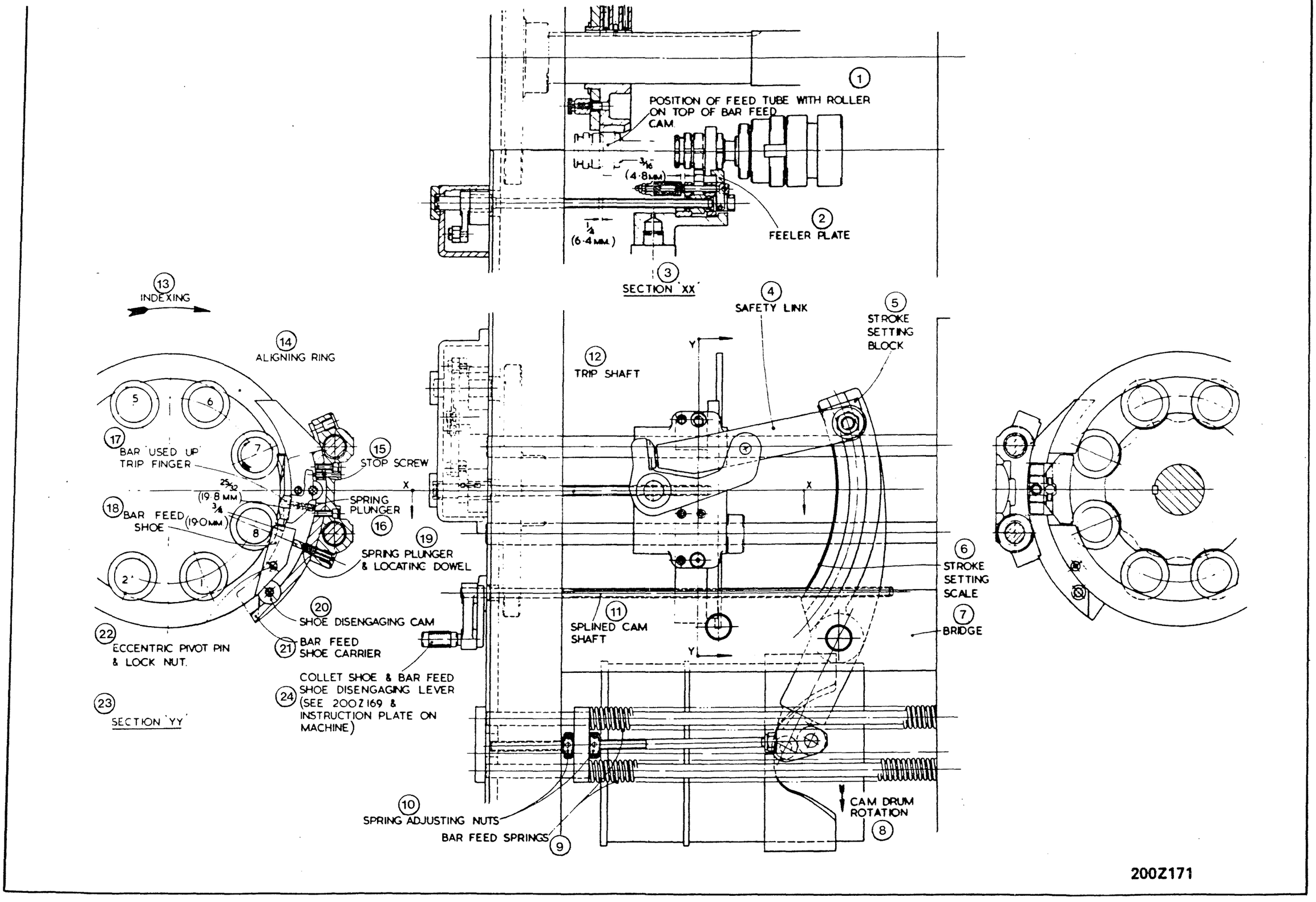
Convoluted springs are contained within the stock carriage tubes and

retained by end caps. They 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 them into the bar tubes.

Springs to accommodate 1" (25.4mm) diameter bar are fitted as standard whilst springs for 5/8" (16mm) and 3/8" (10mm) are available as optional extras.

Bar Feed Mechanism (In 8th Station) Drg. 200Z171

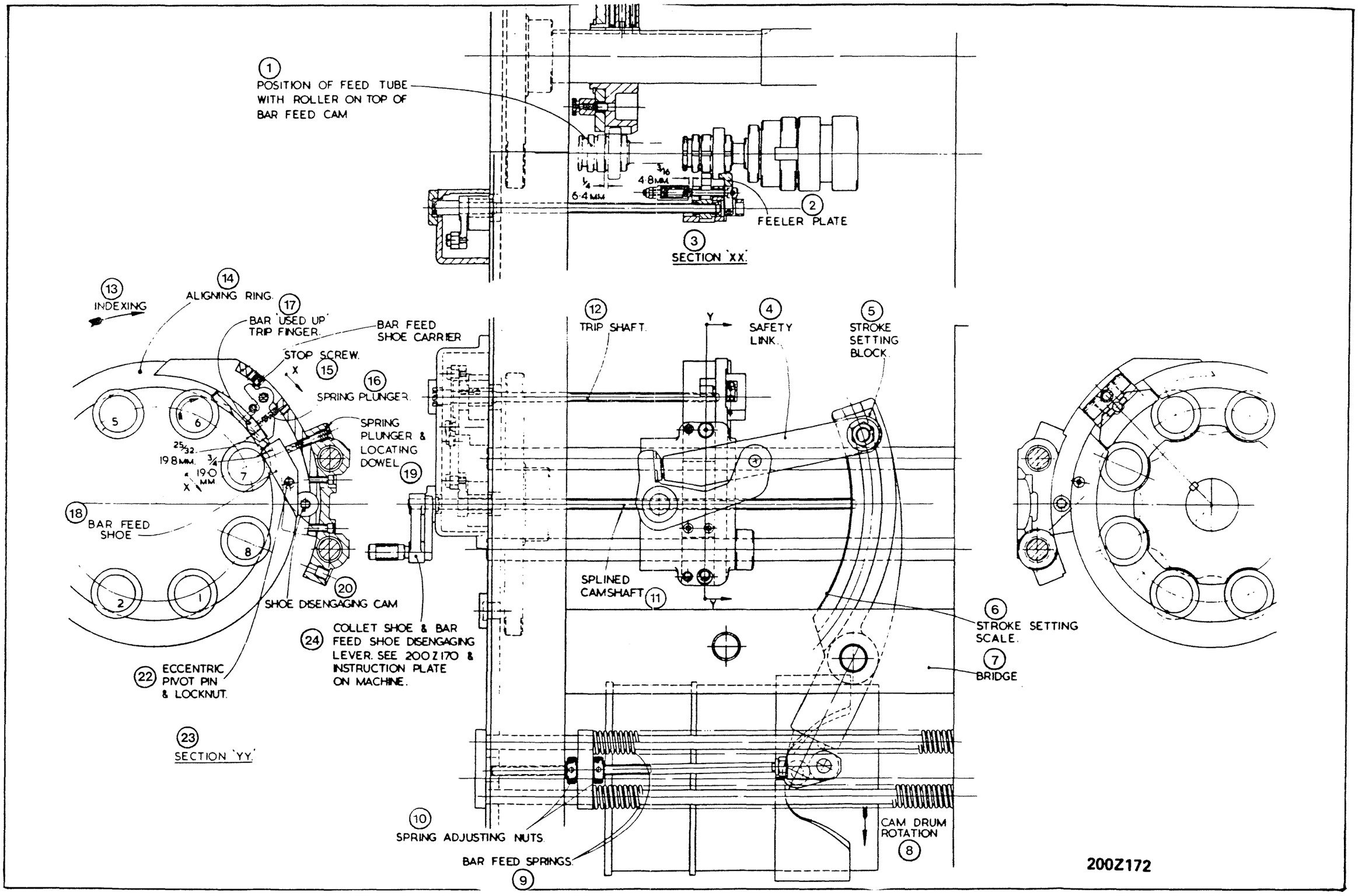
1. Position of feed tube with roller on top of bar feed cam.
2. Feeler plate
3. Section 'XX'
4. Safety link
5. Stroke setting block
6. Stroke setting scale
7. Bridge
8. Cam drum rotation
9. Bar feed springs
10. Spring adjusting nuts
11. Splined cam shaft
12. Trip shaft
13. Indexing
14. Aligning ring
15. Stop screw
16. Spring plunger
17. Bar 'used up' trip finger
18. Bar shoe feed
19. Spring plunger and locating dowel
20. Shoe disengaging cam
21. Bar feed shoe carrier
22. Eccentric pivot pin and lock nut
23 Section 'YY'
24. Collet shoe and bar feed, shoe disengaging lever
    (see 200Z169 and instruction plate on machine)


1
POSITION OF FEED TUBE WITH ROLLER ON TOP OF BAR FEED CAM.
3/16 (4·8mm)
1/4 (6·4 mm.)
2
FEELER PLATE
3
SECTION XX
13
INDEXING
14
ALIGNING RING
17
BAR USED UP TRIP FINGER
15
STOP SCREW
25/32 (19·8 MM)
3/4 (19·0MM)
18
BAR FEED SHOE
SPRING PLUNGER
16
19
SPRING PLUNGER & LOCATING DOWEL
20
SHOE DISENGAGING CAM
22
ECCENTRIC PIVOT PIN & LOCK NUT.
21
BAR FEED SHOE CARRIER
24
COLLET SHOE & BAR FEED SHOE DISENGAGING LEVER (SEE 200Z169 & INSTRUCTION PLATE ON MACHINE)
23
SECTION YY
12
TRIP SHAFT
4
SAFETY LINK
5
STROKE SETTING BLOCK
6
STROKE SETTING SCALE
7
BRIDGE
11
SPLINED CAM SHAFT
10
SPRING ADJUSTING NUTS
9
BAR FEED SPRINGS
CAM DRUM ROTATION
8
200Z171

Bar Feed Mechanism (7th Station) Drg. 200Z172

1. Position of feed tube with roller on top of bar feed cam
2. Feeler plate
3. Section 'XX'
4. Safety link
5. Stroke setting block
6. Stroke setting scale
7. Bridge
8. Cam rotation drum
9. Bar feed springs
10. Spring adjusting nuts
11. Splined cam shaft
12. Trip shaft
13. Indexing
14. Aligning ring
15. Stop screw
16. Spring plunger
17. Bar 'used up' Trip finger
18. Bar feed shoe
19. Spring plunger and locating dowel
20. Shoe disengaging cam
21. Bar feed shoe carrier
22. Eccentric pivot pin
23. Section 'YY'
24. Collet shoe and bar, feed shoe disengaging lever
    (see Drg.200Z170 and instruction plate on the machine)

Fig. 4.8 Drg. 200Z172



4.8 Adjusting the Bar Stop

The bar stop arm and its projecting stop is mounted on and keyed to a shaft which passes through the drum housing and the cut of slide base in station 8. It is clamped to the shaft by two pad bolts, the stud of one of the pad bolts being extended to form the bar stop hand lever. The projecting stop is bolted to the bar stop arm and may be turned around to accommodate longer components.

Operation of the bar stop is by an extension spring with a cam return through a pre-loaded compression/spring on a link rod 'A', to a double lever 'D' mounted on the serrated end of the bar stop shaft,

During the working cycle of the machine, the bar stop is held against a diameter on the cam by the extension spring and the stop is away from the workpiece. After parting off the workpiece, and at the start of the fast motion return, a flat on the cam diameter allows the extension spring to bring the stop into its operative position at 297deg. The spring holds the double lever against a positive stop 'B' After bar feeding, the cam operates the mechanism withdrawing the bar stop and the spindle indexes to station 1.

The standard bar stop is normally fitted in station 8, but may be fitted in the 7th station using a stop pad to form an extension of the bar stop. Similarly, when the machine is arranged for double bar feeding, station 8 and 4 are the normal stations with the option to use stations 7 and 3. A chart on the bar stop capacity charts (Sec 1.3 Drg.200Z24) Standard bar stops, and 200Z25 (Special bar stops) Show the choice of stop pads for varying bar lengths in differing stations.

Modifications to the bar stop's angular position can be made by turning the stop screw 'C' and by adjusting the locknuts on the link rod 'A'.

When the automatic trip stops the feed with the collet open ready for insertion of new bar, the old bar end should first be taken out of the collet by holding the bar stop out of position by means of the hand lever, which compresses the spring on the link rod 'A'.

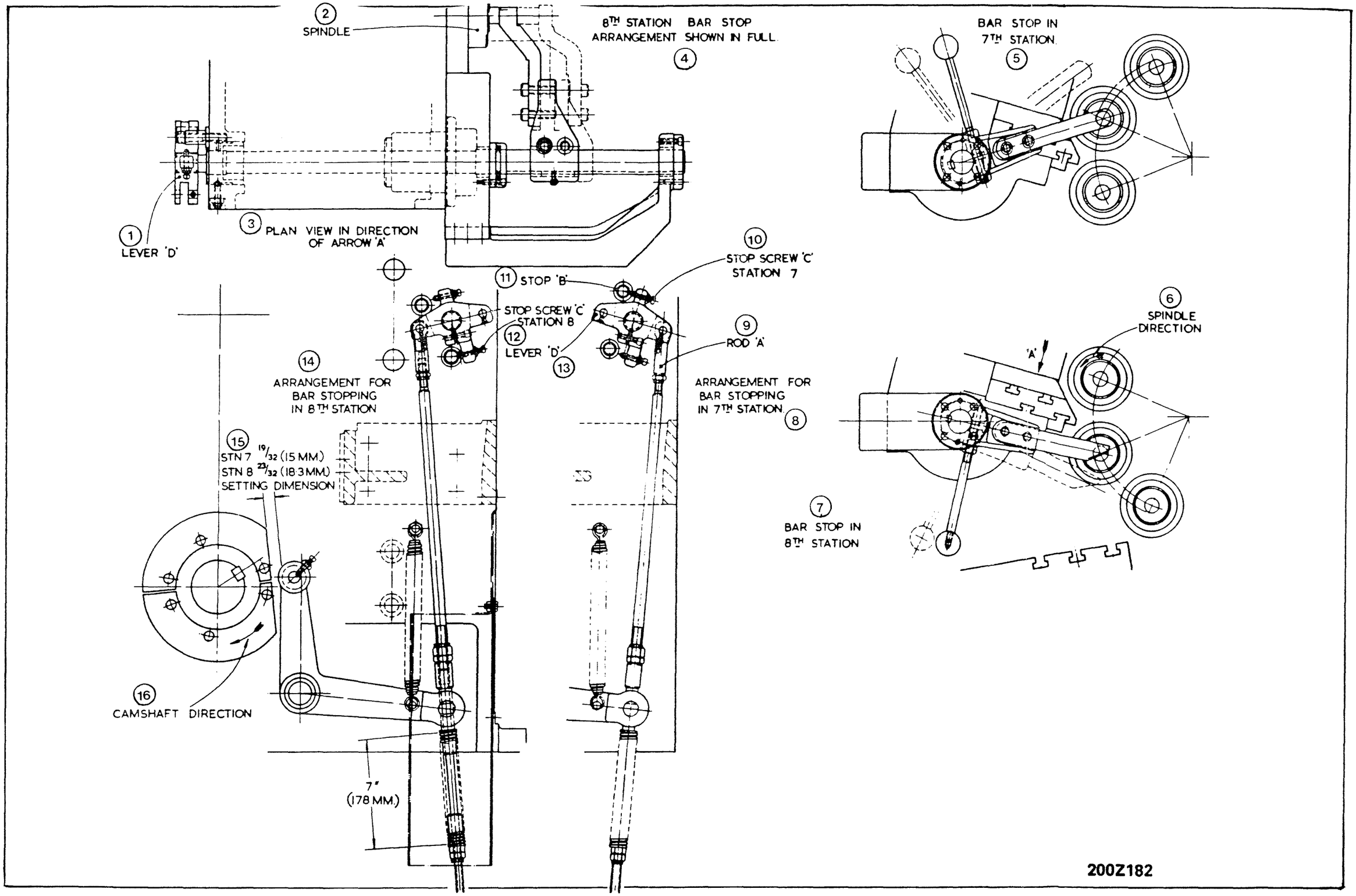
Note:

> The bar stop must be swung down in the 8th station, but up in the 7th station. In station 3 on the double bar feed machine the bar stop is swung down and up in station 4.

Reverse operation of the bar stop in station 7.
The direction of the swing of the bar stop may be reversed by connecting the link rod 'A' to the outer arm of the double lever 'D' When used in station 7, the stop 'B' must be placed in the alternative hole, and the stop screw 'C' reversed. The links of the link rod may need re-adjustment after changing over.

When the set up includes threading using a die head, special cranked bar stops must be used according to the station in which they are used and the length of bar feed.

1. Lever 'D'
2. Spindle
3. Plan view in direction of arrow 'A'
4. 8th Station bar stop arrangement shown in full
5. Bar stop in 7th station
6. Spindle direction
7. Bar stop in 8th position
8. Arrangement for bar stopping in 7th station
9. Rod 'A'
10. Stop screw 'C'
11. Stop 'B'
12. Stop screw 'C' station 8
13. Lever 'D'
14. Arrangement for bar stopping in 8th station
15. Stn.7 19/32" (15mm)
    Stn.8 23/32 (18.3mm)
    Setting dimension
16. Camshaft direction


2 SPINDLE
8TH STATION BAR STOP ARRANGEMENT SHOWN IN FULL
4
BAR STOP IN 7TH STATION
5
1 LEVER 'D'
3 PLAN VIEW IN DIRECTION OF ARROW 'A'
10 STOP SCREW 'C' STATION 7
11 STOP 'B'
STOP SCREW 'C' STATION 8
12 LEVER 'D'
9 ROD 'A'
13
6 SPINDLE DIRECTION
'A'
14 ARRANGEMENT FOR BAR STOPPING IN 8TH STATION
ARRANGEMENT FOR BAR STOPPING IN 7TH STATION
8
15 STN 7 19/32 (15 MM)
STN 8 23/32 (18·3 MM)
SETTING DIMENSION
7 BAR STOP IN 8TH STATION
16 CAMSHAFT DIRECTION
7" (178 MM.)
200Z182

4.9 Bar Loading

Caution:

Stop the machine before opening the bar feed covers in order to avoid tool damage.

A safety trip is fitted to the bar feed covers at the front and rear of the machine and opening these covers without stopping the machine could cause tool damage.

Bar stock should be in good condition, clean and straight and free from scale, corrosion and paint in order to keep the down time for bar loading to a minimum. Dependent on the component geometry and cycle time, bar loading can account for a large proportion of the down time, hence the quality of the bar is an important element of high operational efficiency. To remove an unsatisfactory bar from the machine loses valuable working time; bars with a large diametral tolerance are also disadvantageous. The grading of bars to the same overall length is recommended. To assist bar loading they should be chamfered at each end and the end faces squared to minimise drill breakage.

Machines with automatic stop after bar exhaustion mechanism, stops the machine automatically with the collet open, the machine feed disengaged and the main motor stopped in order to permit the operator to remove the bar end and rebar the machine. The hand lever on the bar stop provides the facility to swing the bar stop arm clear of the bar when removing the bar end. Bar ends should not be allowed to drop into the swarf conveyor trough.

Two methods of bar loading are recommended; but experience, bar size and component length will determine the most efficient procedure for a particular set up.

Small diameter bars. (Main motor stopped) Move the bar feed shoe lever to withdraw the shoe from the feed tube bobbin and manually retract the bar stop arm to permit the withdrawal of the bar end. Enter the bar into the stock carriage tube and feed it forward so that it enters the bar feed tube. Release and withdraw the stock carriage tube sufficiently to grip the bar by hand and feed the bar up to the internal taper in the feed finger. With a sharp movement of the arm, tap the bar through the feed finger and the collet up to the bar stop. On a small bar feed setting it can be an advantage to set the centre stop farther back in order to obtain the arm movement and inertia required, but it is essential that the setting of the centre stop does not allow the feed tube bobbin to foul the stock carriage tubes when the machine is in motion. This applies to the 1.3/8" (35mm) machine only, since this machine has the facility to move the stock carriage tubes closer to the work spindles.

Large diameter bars. (Main motor stopped)
Move the bar feed shoe lever to withdraw the shoe from the feed tube bobbin and manually retract the bar stop arm to permit the withdrawal of the bar end. Enter the bar into the stock carriage tube and into the feed tube. By using a short length of bar inserted into the end of the the stock carriage tube, tap the new bar through the feed finger and the collet up to the bar stop.

After loading the new bar, close the collet by hand with the closing lever, adjust the collet tension if necessary, return the stock carriage tube into its forward seating and lock it into position by

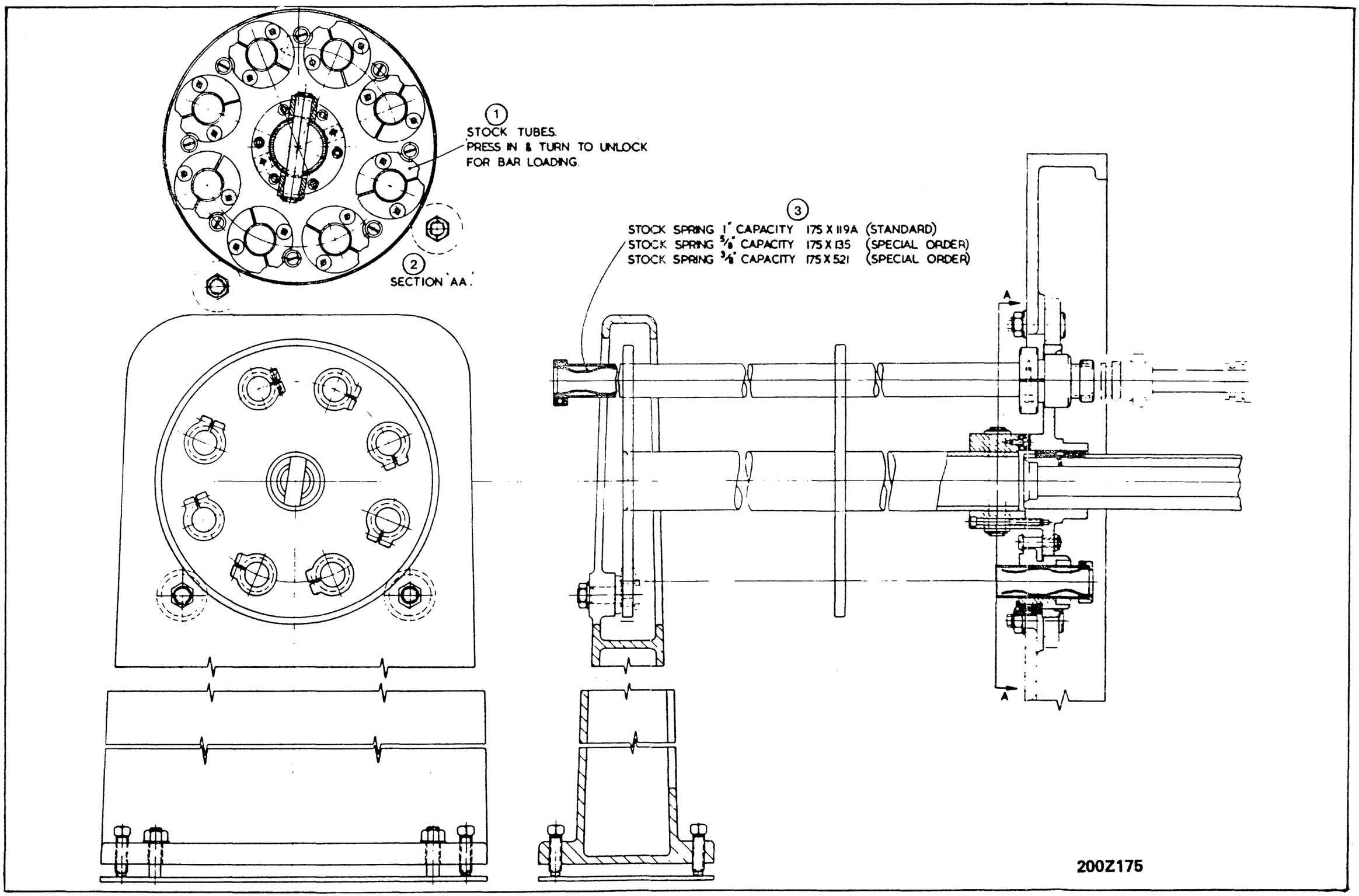
turning it clockwise, reset the auto stop trip latch and re-start the machine.

In certain circumstances where the tooling set up includes some machining behind the cut off datum in order to prepare the bar for further machining in the subsequent cycle of operations, it may be preferable to feed the new bar just past the cut off datum so that it can be prepared during the first complete cycle of operations. This ensures that the tools do not foul the new bar in fast motion when bar is fed to the bar stop for the subsequent machining cycle to take place.

Under no circumstances should a collet tension be set that cannot be easily closed by the lever provided. Do not attempt to close the collet under power by using the "JOG" function.

Arrangement of Stock Carriage Drg. 200Z175

1. Stock tubes, press in and turn to unlock for bar loading
2. Section 'AA'
3. Stock spring 1" capacity 175X119A (standard)
   Stock spring 5/8" capacity 175X135 (special order)
   Stock spring 3/8" capacity 175X521 (special order)


1
STOCK TUBES.
PRESS IN & TURN TO UNLOCK
FOR BAR LOADING.
2
SECTION 'AA'.
3
STOCK SPRING 1" CAPACITY 175 X 119A (STANDARD)
STOCK SPRING 5/8" CAPACITY 175 X 135 (SPECIAL ORDER)
STOCK SPRING 3/8" CAPACITY 175 X 521 (SPECIAL ORDER)
A
A
200Z175

4.10 Setting the Longitudinal Slides

The central main tool block and the front and rear independent longitudinal slides are adjusted for feed stroke on each of their respective quadrants as illustrated on Fig.4.11 Drg. 200Z60. The feed is set by releasing the two hexagon socket screws in the stroke setting blockand by sliding the block up or down the operating quadrant to the desired stroke setting as indicated on the scale mounted on each quadrant. The stroke setting blocks must be firmly clamped when set. The central quadrant controls the main tool block and the side quadrants control their corresponding longitudinal slides.

Adjustment is made easier with the machine stopped in the "dwell" position at the end of forward feed as indicated on the timing dial. The slide dead stops must be adjusted clear before altering the stroke strokes, as the fully forward position of the slides is not constant for all strokes because the faces of the feed operating quadrants are straight. When the quadrants are set to their desired stroke the dead stops must be re-set.

The fast motion sliding block is guided in a narrow guide and restrained vertically by keep/plates at each side. It is operated fromthe fast motion cam by a toggle, and at the end of the fast approach stroke it is locked against the traverse spring bar 'A',Fig.4.11 Drg. 200Z60 so that it is held rigid during the slow feed cycle. Referring to the Timing Diagram Drg. 200Y31 it should be noted that the drum locking isnot completed until 86 Deg. and the fast approach of the longitudinalslides commence at 77 Deg. It is therefore important to ensure,when tooling the machine, that any roller steadies employed do not contact the bar or pre-turned diameter before the drum is fully locked.

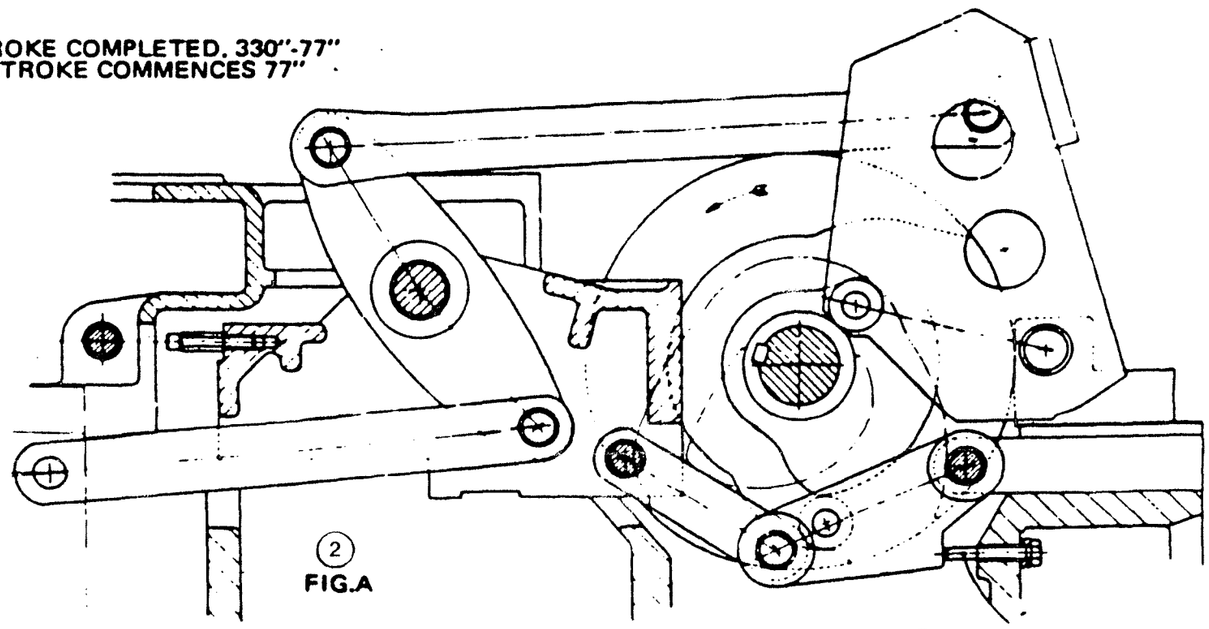
The fast motion cam gives as standard, a constant approach stroke of 2.5" (63.5mm). An optional stroke of 3.5" (89mm) is available if required, but entails a lengthening of the idle time to 2 seconds. The above mentioned fast motion strokes apply to the central main tool block. Because of the lever geometry of the independent slide linkage, the movement of the fast motion sliding block gives an increased fast approach stroke to the independent slides of 2.7/8" (73mm) and a optional stroke at a 2 second idle time of 4" (101.6mm)

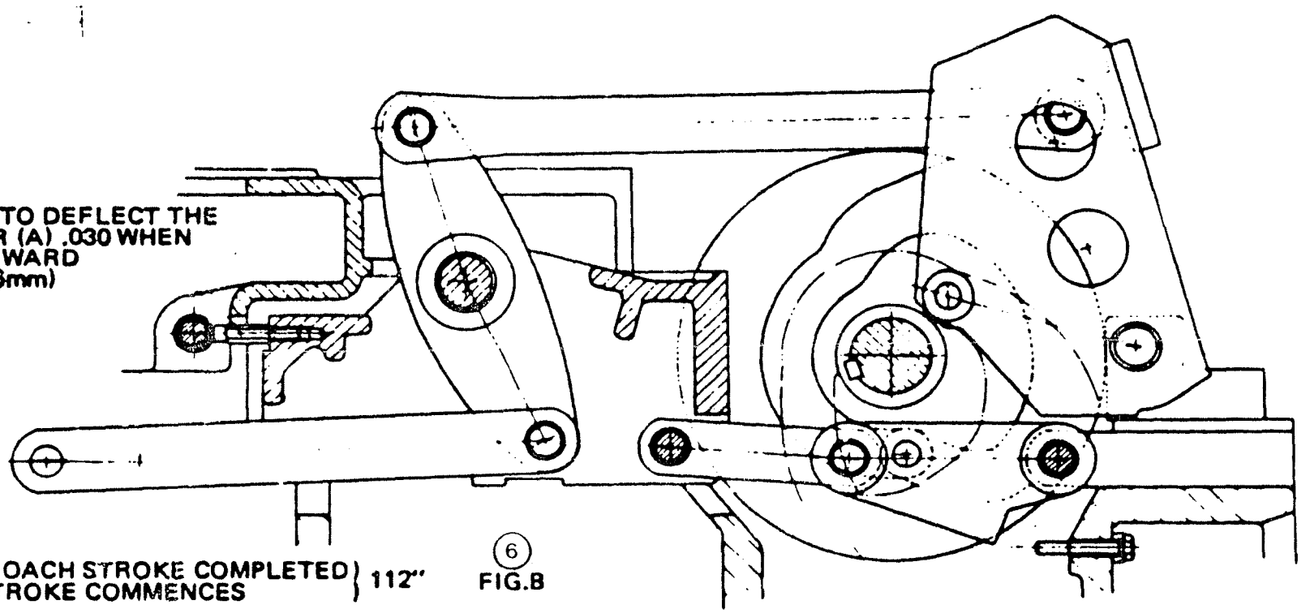
No endwise adjustment is provided for the main tool block and its forward position varies with the feed stroke set. This is given on the capacity charts 200Z23 (British Imperial and metric dimensions) under the dimension 'A', which is the distance between the front face of the main tool block and the face of the main drive housing for the feed strokes varying from zero to 3.5" (88.9mm)

The linear position of the front and rear independent longitudinal slides can be adjusted 4.1/2" (114mm) by turning the two locknuts along their screwed pusher rods in the desired direction after moving the slide dead stop nuts to accommodate the adjustment. A spacer between the hexagon nuts on the screwed push rod, and housed in the slide pusher bracket, is slightly wider than the pusher bracket thereby allowing for slight mis-alignment of the push rod. The dead stops must always be adjusted clear when altering the slide stroke and re-set afterwards.

Longitudinal Slides Operation 200Z60

1. Fast Return Stroke completed. 330deg.-77deg. Fast approach Stroke.
2. Fig. A.
3. Stop Screw (C) to give .015"clearance when Toggle is unlocked. (.015"= .4mm).
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. Fig. C
16. Feed stroke completed,fast return stroke commences (268 deg.)
17. Link to Centre Block.
18. Spring bar 'A'
19. Stop bolt





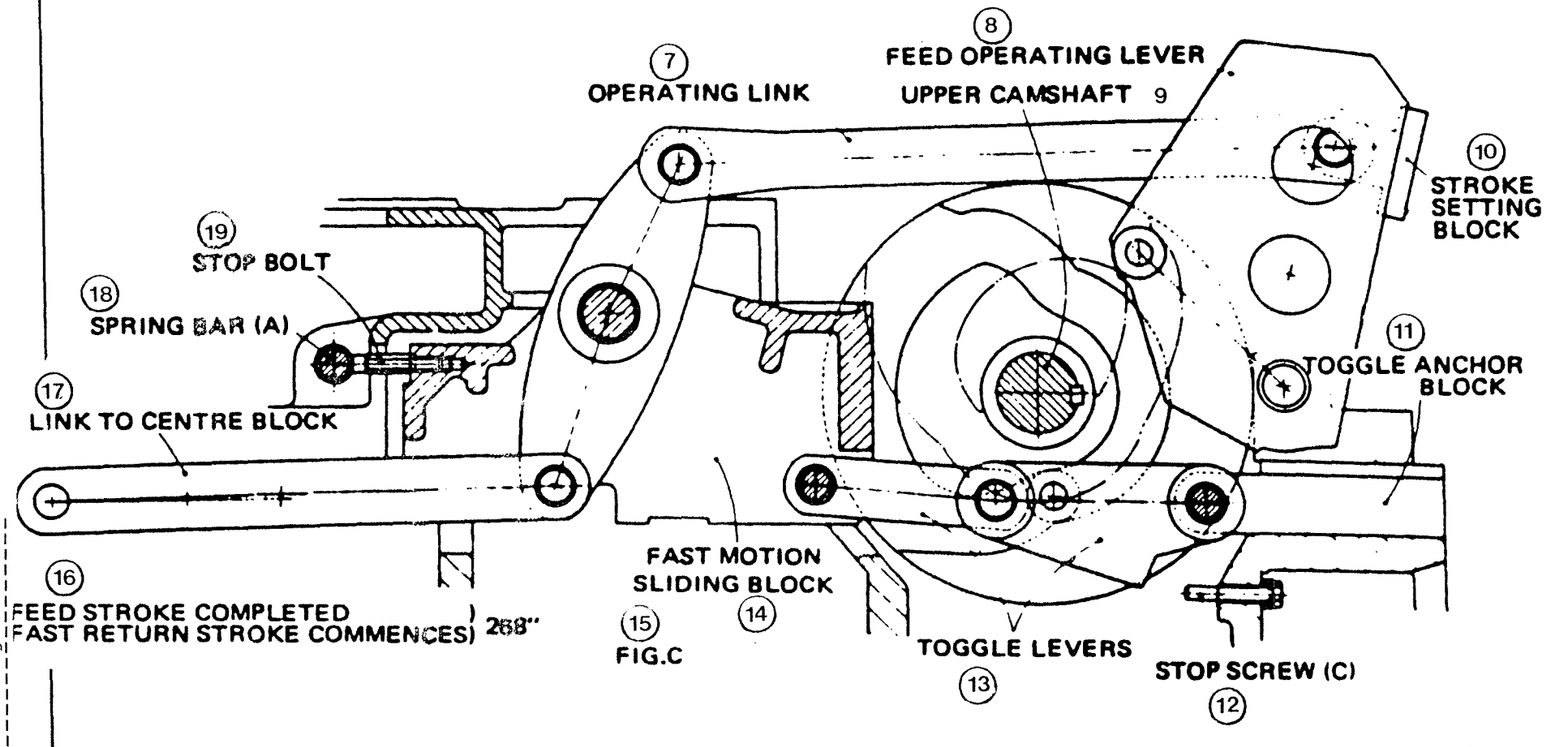
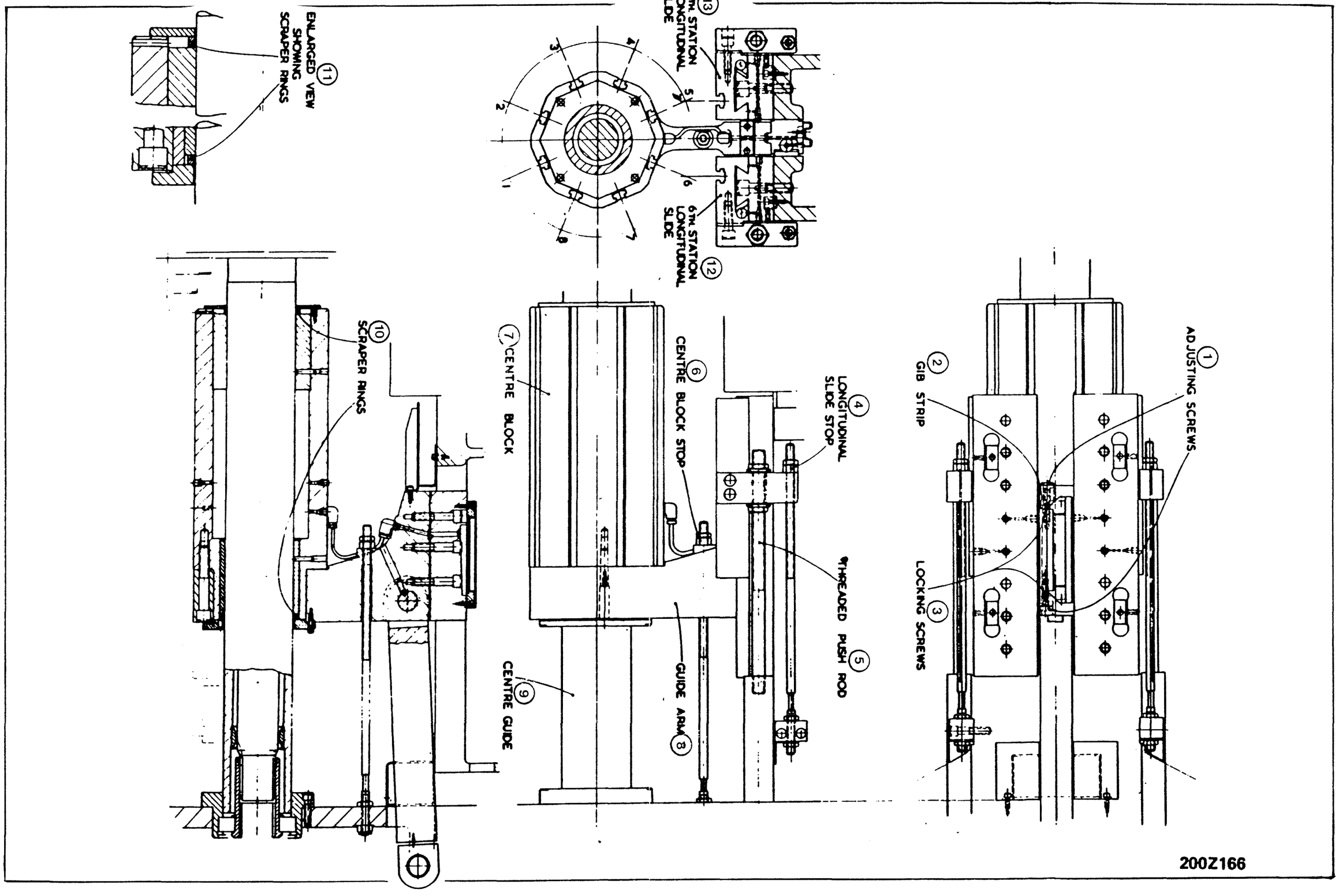


Fig. 4.11 Drg. 200Z60

Centre Block and Longitudinal Slides 200Z166

1. Adjusting Screws.
2. Gib Strip.
3. Locking Screws.
4. Independent Slide Stop.
5. Threaded Push-Rod.
6. Centre Block Stop.
7. Centre Block.
8. Guide Arm.
9. Centre Guide.
10. Scraper Rings.
11. Enlarged views showing Scraper Rings.
12. 6th station Longitudinal Slide.
13. 5th station Longitudinal Slide.

Fig. 4.12 Drg. 200Z166



4.11 Cross Slide Adjustment & Stroke Setting

Four main cross slides and two intermediate dual purpose cross slides are fitted as standard. The two lower cross slides in stations 1 and 2 are used principally for rough forming operations: the two upper cross slides in stations 5 and 6 are usually used for finishing operations whilst the two intermediate dual purpose cross slides provide a choice of part off stations, station 7 or 8 on the single bar feed machine or stations 7 and 3 or stations 8 and 4 on the double bar feed machine. The intermediate dual purpose cross slide stations not used for part off work are available for alternative suitable operations.

The capacity chart dimensions are so arranged, from the nominal dimensions given, there is considerable backward adjustment and a limited amount of forward adjustment from which it is possible to determine the maximum forward and backward positions. The slide operating mechanism gives an approximate constant forward position at the end of feed stroke to all cross slides for all strokes.

All cross slides are fitted with dead stops bearing on selective stop screws in the spindle drum thrust and stop ring. At each indexed position of the spindle drum, each slide dead stop operates against a different stop screw, so that such small errors as may exist in the positions of the spindles in the spindle drum, and in the accuracy of the drum locators and drum locking, can be cancelled out.

All cross slides are fitted with micrometer dials for fine adjustment. All cross slides may be adjusted towards or away from the work spindles by releasing the hexagon nut on the face of each slide and turning the micrometer dial. No adjustments or changes in stroke setting should be carried out without first slackening off the cross slide dead stop and re-setting it after making the adjustment or change of stroke. Care must also be exercised after all cross slide adjustments or changes in stroke to re-tighten the hexagon nut on the face of the slide before handwinding or running the machine.

The cross slide dead stops are screwed into barrels which are held in stop brackets by pad bolts. This arrangement allows the barrels to slip if excessive pressure is set.

The feed strokes are more easily set if the cross slides are in their fully forward positions. Although the end of feed stroke is substantially constant apart from the micrometer adjustment; with a particular type of tool holder in use on any slide, the micrometer dial only needs slight adjustment when changes are made to the slide stroke and compensating adjustments of the dead stop is made.

Each lower cross slide is operated directly by a lever underneath it. The lever is assembled onto and keyed to a shaft which moves accurately and which is carried in two bosses in the detachable slide base. The connection between the lever and slide assembly is by a link. The connection to the T-slot in the cross slide cam lever where stroke adjustment is made by a further inboard lever mounted on and keyed to the shaft and the connecting link.

Each upper cross slide is operated by a lever and a link behind it. The lever is keyed to and mounted on a large shaft carried in bushed bosses in the beam. This shaft in turn has a lever on its inner end which is provided two holes "A" and "B", to which a link in connected by of a stud thus connecting the lever down to the tee slot where

stroke adjustment is made. The alternative hole positions provide different ranges of stroke adjustment as indicated on the capacity chart 200Z22 and the scales. Where the range of strokes provided is adequate, it is preferable to use the outer hole "B", as the mechanism is less than heavily loaded.

Each intermediate dual purpose slide is operated by an integral bearing sleeve/pinion gear and a slide mounted gear rack. The integral bearing sleeve/pinion gear is co-axially mounted on the bar stop operating shaft, both of which are supported be a spigotted bearing bush assembled in the cross slide housing and a flanged bearing bush in the wall of the drum housing on the double bar feed machine, whilst on the single bar feed machine in station 3, the bar stop shaft is replaced by a plain headed support shaft which is located and screwed to the cross slide housing. A further lever assembled and keyed to the integral bearing sleeve/pinion gear and situated inboard inside the drum housing, connects it via a link to the cross slide cam lever where the stroke adjustment is made.

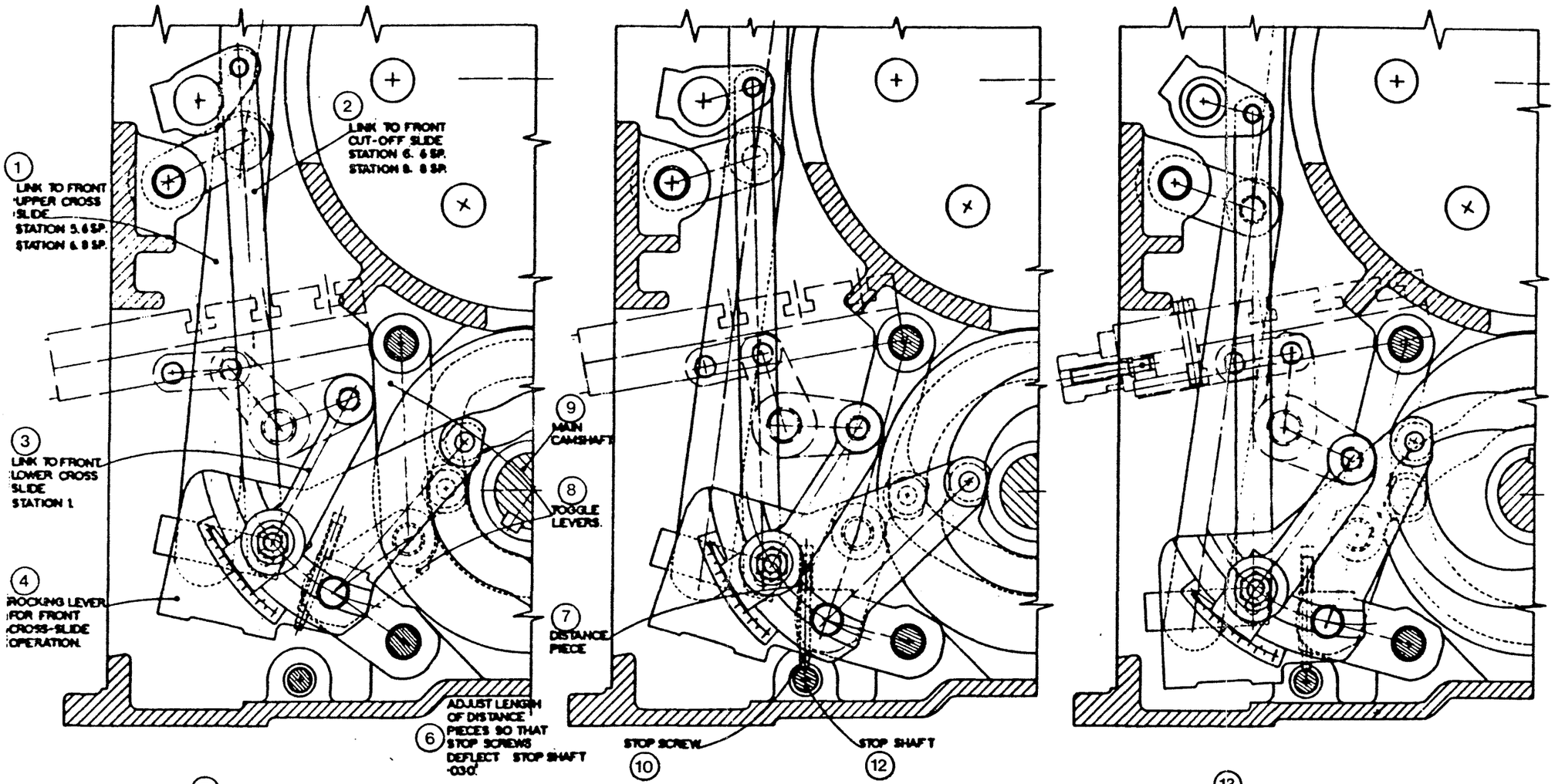
The adjustment of stroke for the front cross slides (lower, upper and cut off) is made on the front feed rocking lever and the adjustment for the stroke for the rear cross slides (lower, upper and 3rd forming) on the rear feed rocking lever. It is apparent which of the scales corresponds to the various slides.

The upper or lower slide stroke setting blocks are in tee slots, intermediate stroke setting blocks slide in a central slot and the adjustment is clamped by means of a ring spanner on the hexagon nuts on the four keep-strip studs.

The feed stroke of any slide can be set independently by sliding the stroke setting block of the operating link along the rocking lever tee slot or the central slot to the required stroke indicated on the scale. The stroke setting blocks must be firmly clamped when set to the required stroke. The feed strokes are more easily set if the cross slides are in their fully forward position.

Cross Slide Operation, 200Z65A

1. Link to Front Upper Cross Slide station 5.
2. Link to Front Cut-off Slide station 6.
3. Link to Front Lower 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 Stop Screws deflect Stop Shaft .030".
9. Stop Screw.
10. Stop Shaft.
11. Fast Return Stroke Completed 315 deg.-55 deg. Fast Approach Stroke commences 55 deg. Fig A.
12. Fast Approach completed } 112 deg.
    Feed Stroke commences }
13. Feed Stroke completed. Fig B.} 268 deg.
    Fast Return Stroke commences }
    Fig C.



(5) FAST RETURN STROKE COMPLETED 315°-55°
FAST APPROACH STROKE COMMENCES. 55°
FIG. A.

(11) FAST APPROACH STROKE COMPLETED
FEED STROKE COMMENCES. } 112°
FIG. B.

(13) FEED STROKE COMPLETED
FAST RETURN STROKE COMMENCES } 268°
FIG. C.

200Z65A

4.12 Special Slide Motions

By utilising auxiliary motions and special cams, non standard slide motions for special applications can be provided. For details of the auxiliary longitudinal motions, refer to the section dealing with the attachments. Details of these motions are also described in the Maintenance Manual supplied with the machine.

4.13 Feed Trip, Manual Trip & Automatic Stop Mechanisms

Automatic safety mechanisms and a manually selected "stop end of cycle" function are incorporated to stop the machine should any of the following situations arise:-

1. The disengagement of the feed slipping clutch.

2. A manually operated selector switch, panel mounted, (see section 3.2, electrical controls), set to stop the machine at the end of the cycle.

3. The Automatic stop mechanism has been activated when the bar stock is exhausted in any spindle.

4. Safety switches incorporated into special tooling devices become activated.

Feed Trip Mechanism

An electrical circuit is prepared by a limit switch operated by the disengagement of the feed slipping clutch to instantly de-energise the electro-magnetic feed clutch, activate the electro-magnetic brake and stop the main motor.

Manual Trip Mechanism

A manual selector switch mounted on the control panel door covers three functions:- "Production Run", "Set-Up" and "Stop End of Cycle". When set to "Production Run" the machine runs in continuous cycle. The "Set-Up" function allows the machine to run without the coolant and swarf conveyor working. "Stop End of Cycle" prepares an electrical circuit so that when a cam operated timing switch is actuated the electro-magnetic feed clutch is disengaged, the electro-magnetic brake activated and the main motor stopped at the end of cycle with the collet open. This position can be varied if required.

The Automatic Stop Mechanism (Bar Stock Exhausted)

The automatic stop senses the absence of bar stock in a particular feed finger,and stops the machine at the end of the next cycle ready for bar loading.

When a spindle indexes into the bar feed station, the ball bearing of the feed tube assembly sweeps across the angled face of the feeler plate, which is spring loaded towards the end bracket. If there is a bar being gripped in the feed finger, the assembly will be restrained and the ball bearing will push the feeler plate away against its spring. Should there be no bar stock left in the feed finger, then the finger plate will push the feed tube assembly towards the end bracket of the machine to a position where the continuation of indexing causes the ball bearing of the feed tube assembly to depress the bar used up trip finger, rotating the trip shaft and operating the bar expired trip switch. This then prepares the electrical circuit, so that when

the end of the cycle cam operates its trip switch, the electro-magnetic feed clutch is de-energised allowing the feed brake to be activated,with the collet open and the signal lamp on the top of the control panel illuminated.(For Automatic Stop Mechanism Drg. 200Z171 see Fig. 4.7)

4.14 Double Bar Feed Machine

This machine is arranged to bar feed in the 8th and 4th stations as standard or in the 7th and 3rd stations as an option. The bar feed operations and collet operation are duplicated on the front and rear of the machine. The bar feed lever at the rear of the machine is operated by the bar feed lever at the front. The link connecting the rear bar feed slide is adjustable, so that components of different lengths can be produced up to a maximum difference of 5.75" (146mm). A scale is provided on the link which is set to the difference between the bar feed lengths. The longest component must always be set on the front bar feed slide. Where the two components produced per cycle are of equal length, the link top half and the link bottom half must be set to zero on the link scale.

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

The component is parted off the bar in the 8th and 4th stations, cut off slides being provided in both stations. The bar feed occurs as on the standard machine immediately before indexing.

The 4th station bar stop is operated from the cams on the auxiliary cam disc in the drum housing. This excludes the use of the rear auxiliary cross slide motions in the 3rd and 4th stations or the 5th station.

Duplicate units of the automatic stop mechanism are fitted to operate in both stations.

The double bar feed machine can be made to operate as a single bar feed machine after the following adjustments:-

1) Set the collet and bar feed rear engagement handle to the neutral position, ie. position 0

2) Set the stroke at the rear so that the two halves of the aligning ring are in one plane during indexing.

3) Take of the rear bar stop.

4.15 Spindle Stopping Machine

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

A special spindle drum is used,Drg.200Z168 Fig.4.14 each work spindle running on a pair of precision preloaded back to back angular contact ball bearings at the front and a precision parallel roller journal at the rear.

Each spindle gear is driven from the central gear and runs freely on a pair of'back to back' angular contact ball journal bearings when the multi-plate brake is engaged.
The brake is non-adjustable, as a series of preloaded cushion springs are provided to limit and maintain the torque, which is sufficient to brake the spindles rapidly to a standstill.

The multi-plate 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 station 7 and 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 into and out of engagement by means of the block provided in the tool kit, ensuring that the adjustment is not too tight and that the glut pressure is not so excessive as to cause over-heating or a jam.

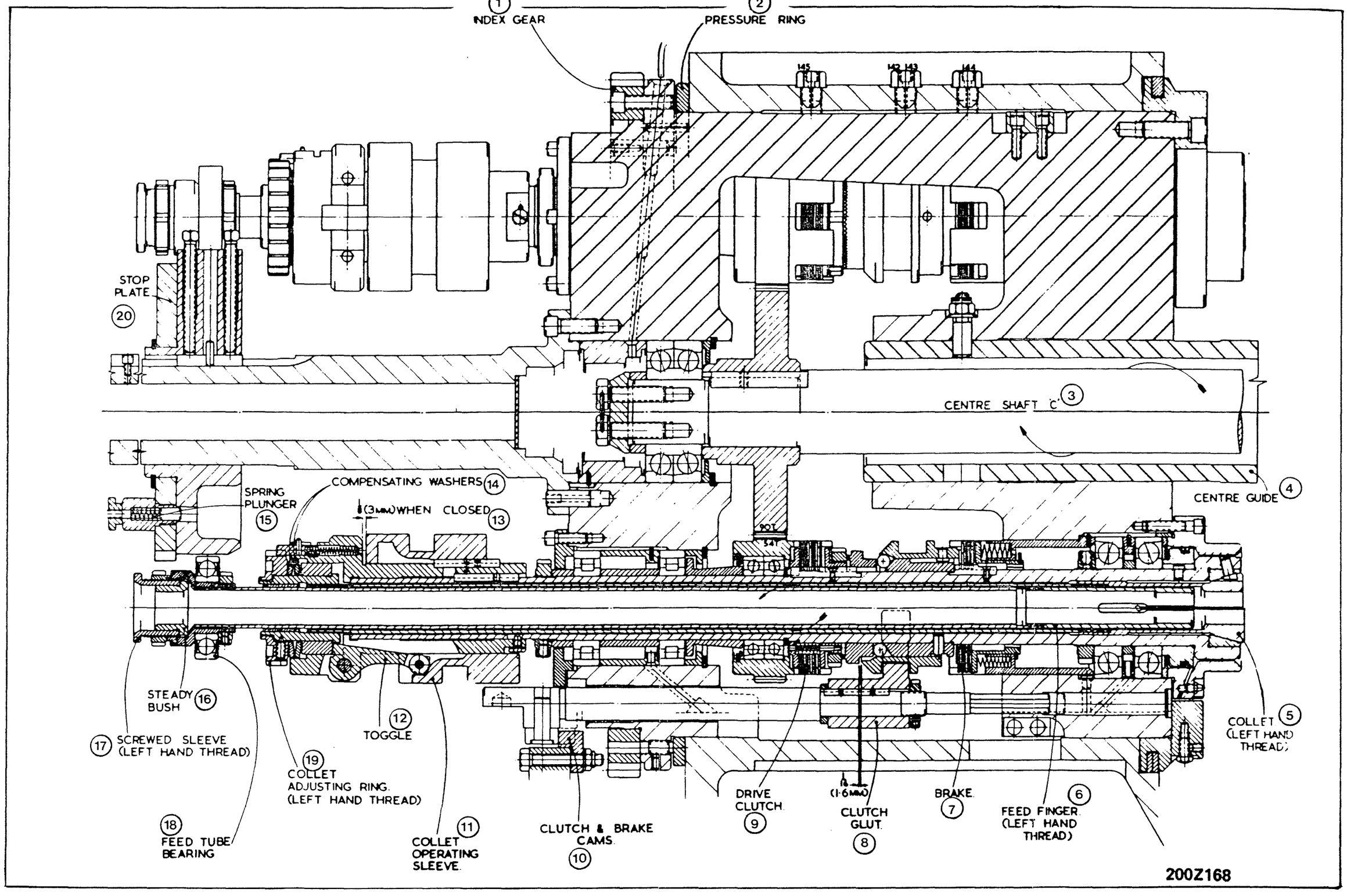
The clutch gluts are operated in turn, during index of the spindle drum by a series of cams secured in housings at the bar feed end of the drum housing. The cams may be selected to suit varying tooling conditions and are supplied to order, see Drg. 200Z176A Fig.4.15.

Cams may be changed without removing housings. When fitting new cams, handwind the machine 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 special and limited application to suit customers components.

The Spindle Stopping Mechanism, Drg. 200Z168

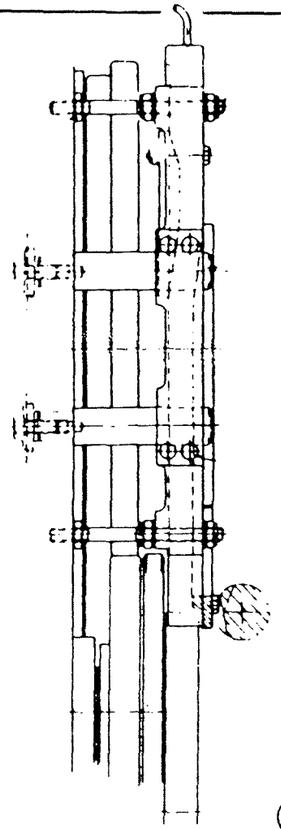
1. Index gear
2 Pressure ring
3. Centre shaft 'C'
4. Centre guide
5. Collet left hand thread
6. Feed finger left hand thread
7. Brake
8. Clutch glut
9. Drive clutch
10. Clutch and brake cams
11. Collet operating sleeve
12. Toggle
13. 1/8" (3mm) when closed
14. Compensating washers
15. Spring plunger
16. Steady bush
17. Screwed sleeve left hand thread
18. Feed tube bearing
19. Collet adjusting ring left hand thread
20. Stop plate

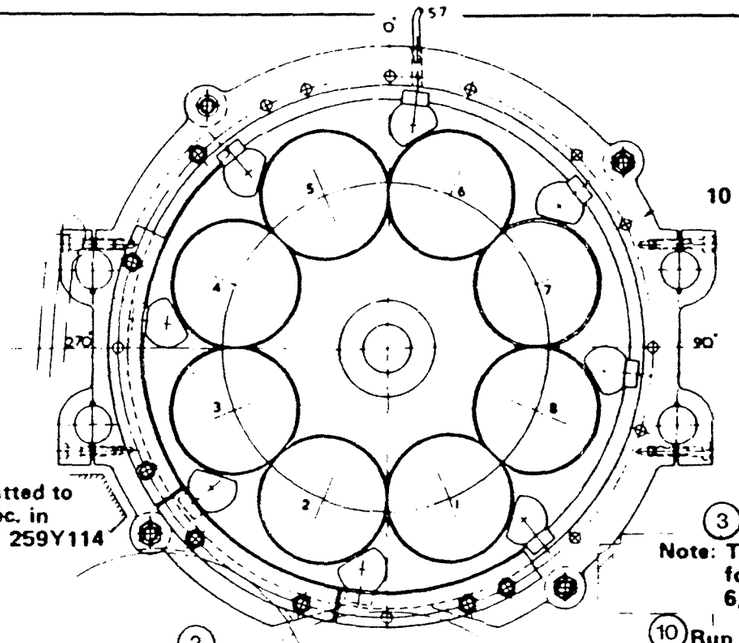
Fig. 4.14 Drg. 200Z168



Spindle Stopping Cams, Drg. 200Z176A

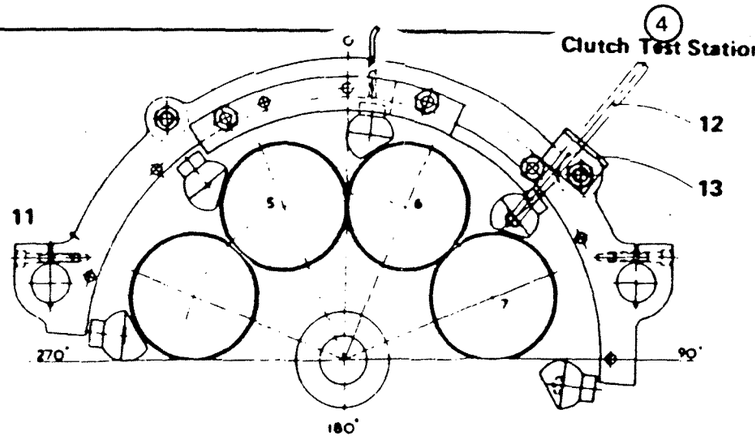
1. To be fitted to 267A section in place of 259Y114
2. Optional cam carrier arrangement for stopping in any station
3. Note: This cam may also be used for running in stns. 1,4,5,6,7 or 8..
4. Clutch test station
5. Standard cam carrier arrangements for stopping in 5th,6th and 7th in any combination.
6. Drum housing
7. 4.3/4" Ref.
8. Run in 1,4,5,6,7,or 8
9. Run in 2nd
10. Run in 3rd
11. Single
12. Leading
13. centre
14. Trailing
15. Typical development of cams in 18.1/2"PC Dia. viewed from inside carrier.
16. Spindle stopped
17. Stopping cams required
18. Single
19. Leading
20. Centre
21. Trailing
22. Run cam required
23. Dia.
24. Cam carrier required
25. Note: Stopping is not advised in the bar feed station A maximum of 3 stopped spindles is allowable when used with double bar feed. Cams for stopping in stations 1,2 or 3 can only be fitted or removed by partially dismantling the machine. When using the machine without stopping any spindle a run cam 212V226/5 must be fitted following the hand clutch testing position.





(1) To be fitted to 267A sec. in place of 259Y114

(2) Optional Cam Carrier arrangement for stopping in any Station.



(4) Clutch Test Station.

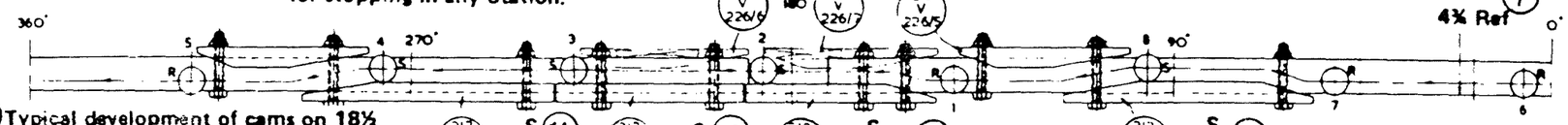
(5) Standard Cam Carrier Arrangement for stopping in 5th, 6th & 7th, in any combination.

(3) Note: This cam may also be used for running in Stns. 1,4,5, 6,7 or 8.

(10) Run in 3rd. (9) Run in 2nd (8) Run in 1,4,5,6,7,8.

(6) Drum HSG.

(7) 4¾ Ref



(15) Typical development of cams on 18½ P.C. dia. viewed from inside of carrier. R = Run (22) S = Stop (23)

(24)

(16) SPINDLE STOPPED	(17) STOPPING CAMS REQUIRED SINGLE	LEADING	CENTRE	TRAILING	RUN CAMS REQUIRED	DIAG	CAM CARRIER REQUIRED
1	(18) 212V226/1	(19)	(20)	(21)	212V226/7	A	2122225
2	212V226/1				212V226/6	B	2122225
3	212V226/1				212V226/5	C	2122225
4	212V226/1				212V226/5	D	2122225
5	212V226/1				212V226/5	E	212V224 on 2225
6	212V226/1				212V226/5	F	212V224 on 2225
7	212V226/1				212V226/5	G	212V224 on 2225
8	212V226/1				212V226/5	H	2122225
1.2		212V226/2		212V226/3	212V226/6	J	2122225
1.2.3		212V226/2	212V226/4	212V226/3	212V226/5	K	2122225
2.3		212V226/2		212V226/3	212V226/5	L	2122225
2.3.4		212V226/2	212V226/4	212V226/3	212V226/5	M	2122225
3.4		212V226/2		212V226/3	212V226/5	N	2122225
3.4.5		212V226/2	212V226/4	212V226/3	212V226/5	O	2122225
4.5		212V226/2		212V226/3	212V226/5	P	2122225
4.5.6		212V226/2	212V226/4	212V226/3	212V226/5	Q	2122225
5.6		212V226/2		212V226/3	212V226/5	R	212V224 on 2225
5.6.7		212V226/2	212V226/4	212V226/3	212V226/5	S	212V224 on 2225
6.7		212V226/2		212V226/3	212V226/5	T	212V224 on 2225
6.7.8		212V226/2	212V226/4	212V226/3	212V226/5	U	2122225
7.8		212V226/2		212V226/3	212V226/5	V	2122225
7.8.1		212V226/2	212V226/4	212V226/3	212V226/7	W	2122225
8.1		212V226/2		212V226/3	212V226/7	X	2122225
8.1.2		212V226/2	212V226/4	212V226/3	212V226/6	Y	2122225

NOTE -

(25) STOPPING IS NOT ADVISED IN THE BAR FEED STATION
A MAXIMUM OF 3 STOPPED SPINDLES IS ALLOWABLE
WHEN USED WITH DOUBLE BAR FEED, CAMS FOR STOPPING IN STATIONS 1,2 OR 3 CAN ONLY BE FITTED OR REMOVED BY PARTIALLY DISMANTLING THE MACHINE
WHEN USING THE MACHINE WITHOUT STOPPING ANY SPINDLE, A RUN CAM (212V226/5) MUST BE FITTED FOLLOWING THE HAND CLUTCH TESTING POSITION

200Z176A

SECTION FIVE - ATTACHMENTS

General Notes.

Standard Attachments are available for:-

High Speed Drilling in all stations.
Independent Reaming in stations 3,4,7 and 8
Threading in stations 3,4,5,6,7 and 8.
External Chasing in stations 5 and 6.
Auxiliary Longitudinal Slide Operation, stations 5 and 6.
Auxiliary Cross Slide Operation, stations 3,4,7, and 8.
Auxiliary cross slide operation in stations 3 and 4 or station 5 (Single bar feed only)
Auxiliary cross slide operation in stations 6 or stations 7 and 8
Threading Attachment Return Check Switch, stations 3,4,5,6,7 & 8

Note: This switch should not be used in the part-off station/stations

Because many of the parts are interchangeable between the various attachments, they are split into sections. The sections required to make up any particular attachment can be seen on the attachment sections chart, plate 200Y39.

When more than one attachment is to be fitted to the machine, the items required are an addition of all the sections designated in the respective columns and should be specified on the tool layout.

Attachment Sections Chart, Drg.200Y39

1. Tooling arrangement
2. Threading with die-head
3. Threading with clutch drive (solid taps & dies)
4. Reaming with auxiliary longitudinal motion
5. Slow
6. Speed
7. Reaming
8. With bar feed not in same station
9. With bar feed in the same station
10. High speed drilling fitted to centre block or longitudinal slides
11. High speed drilling with auxiliary longitudinal motion
12. Synchronous drive
13. Thread chasing
14. Auxiliary cross slide motion
15. Remarks

16.

Section number	Description of section
218A	Threading clutch DR. Stations 3,4,5,6,7 or 8
281E	Attachment gears
282B	Thrd. Attachment, drive sleeve
286B	Threading cams station 5
286C	Threading cams station 6
286H	Threading attachment common parts
286J	Threading attachment extra parts station 5 or 6
286K	Pusher bracket stations 3 & 8
286L	Pusher bracket stations 3,4,7 or 8
186F	Threading attachment turn check switch
286M	Extra parts to fit section 186F
286P	Special bar stop } Station 3 or 8
286Q	when using die-head } Station 7
286R	in the same station } Station 4
287A	Threading and reaming cams station 3,4,7,or 8
188	Attachment body and slide
289D	Auxiliary Longitudinal motion common parts
289E	Extra parts front stations 7 or 8
289F	Extra parts rear stations 3 or 4
289G	Extra parts lower stations 3 or 8
289H	Extra parts upper stations 4 or 7
190J	Synchronous drive
290B	High speed drill drive
290C	High speed drill gears & jockey arm assembly
290D	High speed drill spindle
192 Mk III	Chasing attachment
192B	Chasing attachment cams and gears
292J	Chasing attachment drive station 6
292K	Chasing attachment drive Station 5
293	Auxiliary cross slide common parts
293A	Auxiliary cross slide motion extra parts station 5 or 6
293	Auxiliary cross slide motion extra parts station 7 and 8
293E	Auxiliary cross slide motion extra parts station 3 and 4
	Bracket tool holder

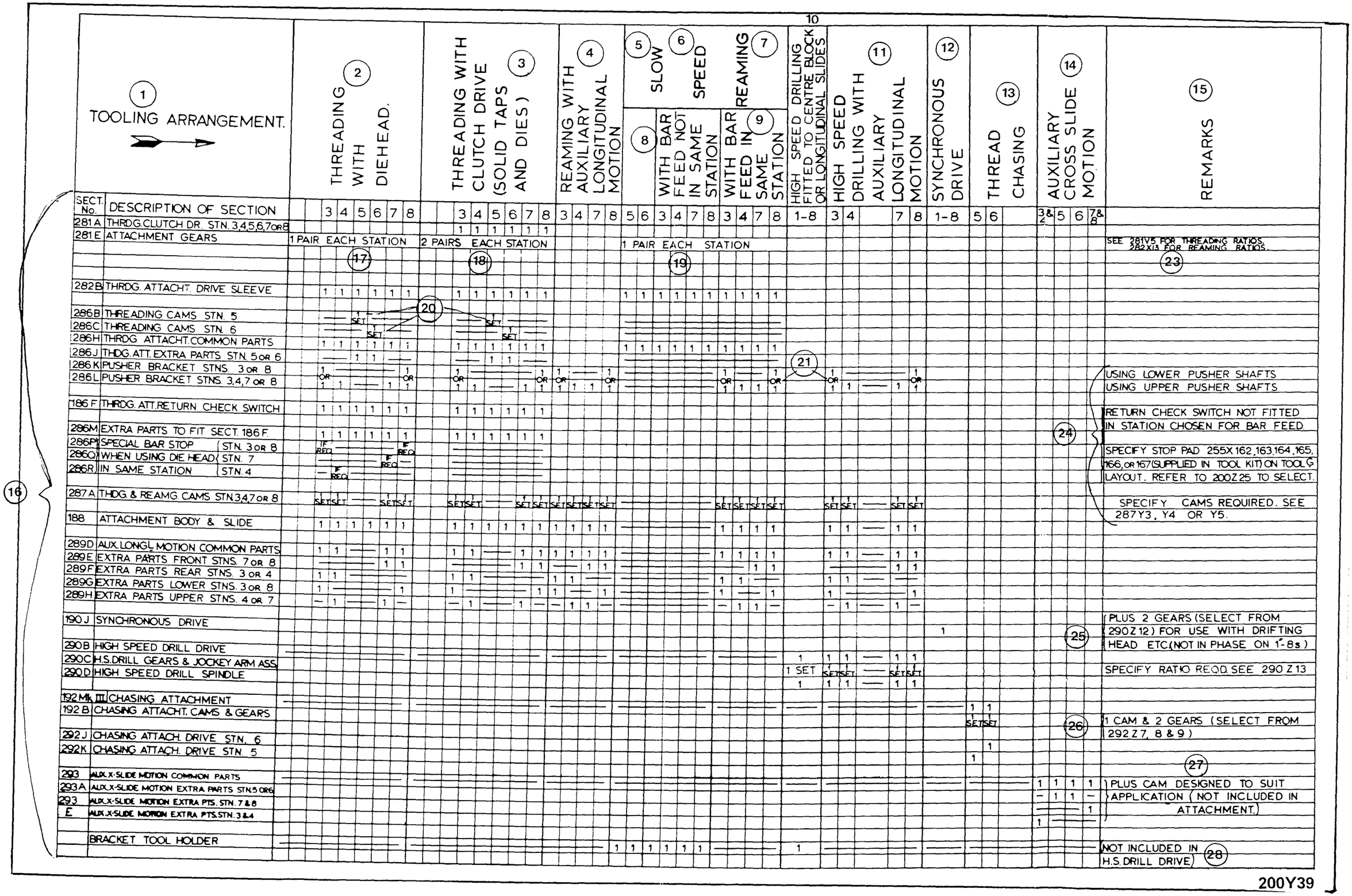
17. One pair each station
18. Two pairs each station

19. one pair each station
20. Set
21. or
22. If red
23. See 281V5 For threading ratios 282X13 for reaming ratios

24. Using lower pusher shafts
    Using upper pusher shafts
    Return check switch not fitted in station chosen for bar feed
    166 or 167 Supplied in tool kit on tool G layout refer to 200Z25 to select
    Specify cams required see 287Y3, Y4 or Y5

25. Plus two gears select from 290Z12 for use with drifting head ect. (not in phase on 1-8s)
    Specify cams required see 287Y3, Y4 or Y5

26. 1 cam and 2 gears select from 292Z7, Z8 and Z9
27. Plus cam designed to suit application not included in attachment
28. Not included in high speed drill drive


10
1 TOOLING ARRANGEMENT.
2 THREADING WITH DIEHEAD.
3 THREADING WITH CLUTCH DRIVE (SOLID TAPS AND DIES)
4 REAMING WITH AUXILIARY LONGITUDINAL MOTION
5 SLOW SPEED
6 SLOW SPEED WITH BAR FEED NOT IN SAME STATION
7 REAMING
8 REAMING WITH BAR FEED IN SAME STATION
9 HIGH SPEED DRILLING FITTED TO CENTRE BLOCK OR LONGITUDINAL SLIDES
11 HIGH SPEED DRILLING WITH AUXILIARY LONGITUDINAL MOTION
12 SYNCHRONOUS DRIVE
13 THREAD CHASING
14 AUXILIARY CROSS SLIDE MOTION
15 REMARKS
SECT. No.
DESCRIPTION OF SECTION
281A THRDG.CLUTCH DR. STN. 3,4,5,6,7 OR 8
281E ATTACHMENT GEARS
1 PAIR EACH STATION
2 PAIRS EACH STATION
1 PAIR EACH STATION
SEE 281V5 FOR THREADING RATIOS. 282X13 FOR REAMING RATIOS.
17
18
19
23
282B THRDG. ATTACHT. DRIVE SLEEVE
20
286B THREADING CAMS STN. 5
286C THREADING CAMS STN. 6
286H THRDG. ATTACHT. COMMON PARTS
286J THDG. ATT. EXTRA PARTS STN. 5 OR 6
286K PUSHER BRACKET STNS. 3 OR 8
286L PUSHER BRACKET STNS. 3,4,7 OR 8
21
USING LOWER PUSHER SHAFTS
USING UPPER PUSHER SHAFTS
186F THRDG. ATT. RETURN CHECK SWITCH
RETURN CHECK SWITCH NOT FITTED IN STATION CHOSEN FOR BAR FEED.
286M EXTRA PARTS TO FIT SECT. 186F.
286P SPECIAL BAR STOP STN. 3 OR 8
286Q WHEN USING DIE HEAD STN. 7
286R IN SAME STATION STN. 4
IF REQ.
24
SPECIFY STOP PAD 255X162,163,164,165, 166, OR 167 (SUPPLIED IN TOOL KIT) ON TOOL LAYOUT. REFER TO 200Z25 TO SELECT.
16
287A THDG & REAMG CAMS STN. 3,4,7 OR 8
SET
SPECIFY CAMS REQUIRED. SEE 287Y3, Y4 OR Y5.
188 ATTACHMENT BODY & SLIDE
289D AUX. LONGL. MOTION COMMON PARTS
289E EXTRA PARTS FRONT STNS. 7 OR 8
289F EXTRA PARTS REAR STNS. 3 OR 4
289G EXTRA PARTS LOWER STNS. 3 OR 8
289H EXTRA PARTS UPPER STNS. 4 OR 7
190J SYNCHRONOUS DRIVE
(PLUS 2 GEARS (SELECT FROM 290Z12) FOR USE WITH DRIFTING HEAD ETC (NOT IN PHASE ON 1-8s)
25
290B HIGH SPEED DRILL DRIVE
290C H.S. DRILL GEARS & JOCKEY ARM ASS.
290D HIGH SPEED DRILL SPINDLE
1 SET
SPECIFY RATIO REQD. SEE 290Z13
192 Mk III CHASING ATTACHMENT
192B CHASING ATTACHT. CAMS & GEARS
292J CHASING ATTACH. DRIVE STN. 6
292K CHASING ATTACH. DRIVE STN. 5
26
1 CAM & 2 GEARS (SELECT FROM 292Z7, 8 & 9)
293 AUX. X-SLIDE MOTION COMMON PARTS
293A AUX. X-SLIDE MOTION EXTRA PARTS STN. 5 ORG
293E AUX. X-SLIDE MOTION EXTRA PTS. STN. 7 & 8
AUX. X-SLIDE MOTION EXTRA PTS. STN. 3 & 4
27
PLUS CAM DESIGNED TO SUIT APPLICATION (NOT INCLUDED IN ATTACHMENT.)
BRACKET TOOL HOLDER
NOT INCLUDED IN H.S. DRILL DRIVE
28
200Y39

5.1 Slow Speed Reaming

In certain circumstances it is desirable to ream at a lower surface speed than that chosen for the other operations. When the reamer is driven in the same direction as the work spindle, but at a faster or slower speed, the difference between the speed of the work and that of the reamer will provide a suitable speed for reaming.

It should be noted that right hand cutting reamers should be driven slower than the spindle speed and left hand cutting reamers should be driven faster than the spindle speed.

The rotation of the reamer can be obtained by mounting the reamer holder in the threading spindle, Sec.286B housed in the attachment body and slide, Sec.188, or a bracket toolholder and driving it with the threading attachment drive sleeve,(section 188) or a bracket tool holder and driving it with the threading attachment drive sleeve (section 256B using common parts (section 286H)

Selecting a ratio from the tables shown on Drg. 282X13 and 282X14
The effective reamer speed in R.P.M. = $\frac{\text{Work spindle R.P.M.}}{\text{Ratio}}$

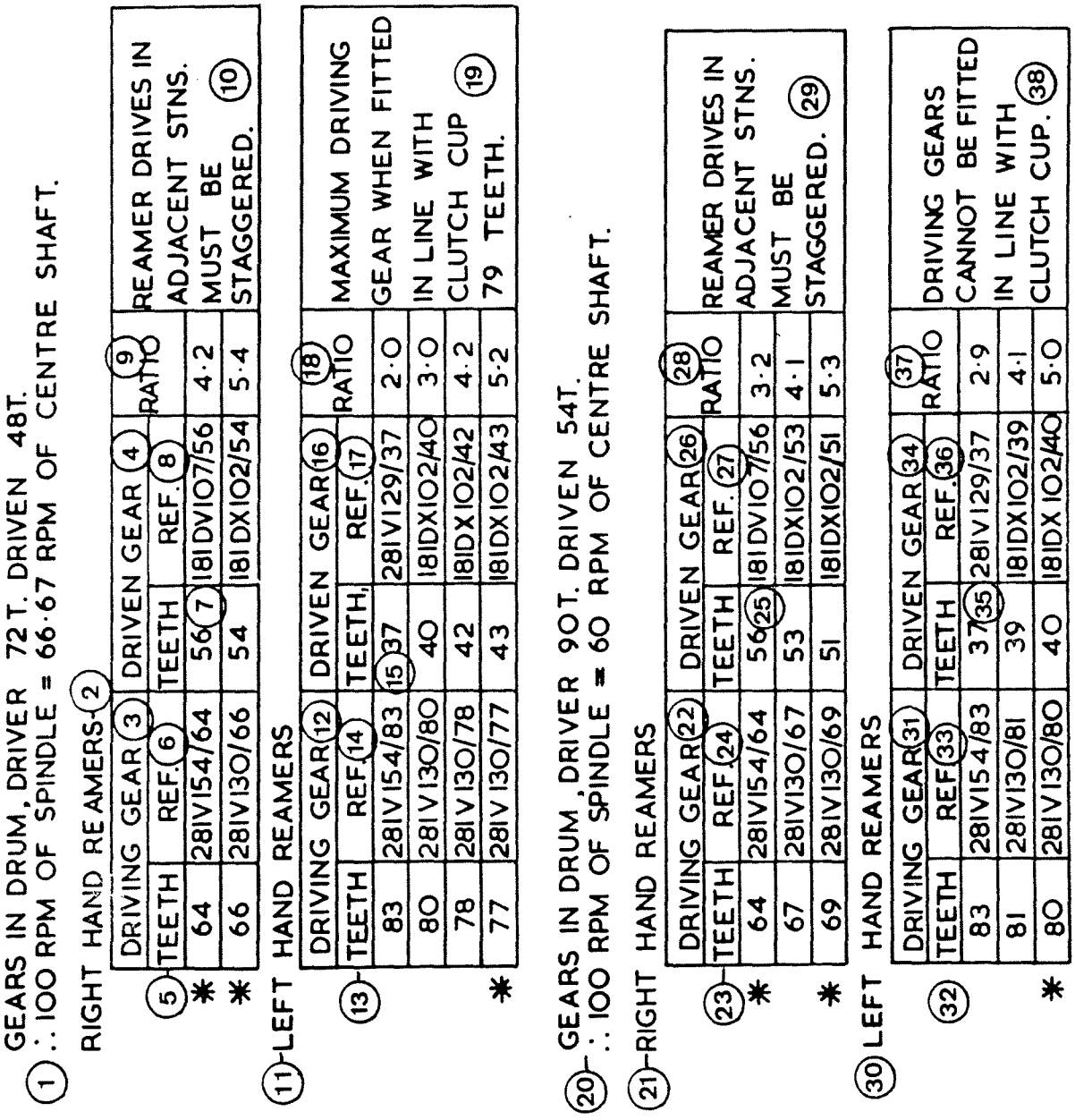
Gear Ratio Tables Drg. 282X13 and 282X14

1. Gears in drum driver 72T driven 48T
   100 RPM.of spindle = 66.67 RPM. of centre shaft

2. Right hand reamers
3. Driving gear
4. Driven gear
5. Teeth
6. Ref.
7. Teeth
8. Ref.
9. Ratio
10. Reamer drives in adjacent stations must be staggered
11. Left hand reamers
12. Driving gear
13. Teeth
14. Ref.
15. Teeth
16. Driven gear
17. Ref.
18. Ratio
19. Maximum driving gear when fitted in line with clutch cup 79T

20. Gears in drum, driver 90T. driven 54T.
    100 RPM. of spindle = 60 RPM. of centre shaft

21. Right hand reamer
22. Driving gear
23. Teeth
24. Ref.
25. Teeth
26. Driven gear
27. Ref.
28. Ratio
29. Reamer drives in adjacent stations must be staggered
30. Left hand reamers
31. Driving gear
32. Teeth
33. Ref.
34. Driven gear
35. Teeth
36. Ref.
37. Ratio
38. Driving gears cannot be fitted in line with clutch cup.
39. Standard pair of gears


(1) GEARS IN DRUM, DRIVER 72 T. DRIVEN 48T.
∴ 100 RPM OF SPINDLE = 66·67 RPM OF CENTRE SHAFT.
RIGHT HAND REAMERS (2)
(5)
DRIVING GEAR (3) | DRIVEN GEAR (4) | RATIO (9) | REAMER DRIVES IN ADJACENT STNS. MUST BE STAGGERED. (10)
TEETH | REF. (6) | TEETH | REF. (8)
64 | 281V154/64 | 56 (7) | 181DV107/56 | 4·2
* 66 | 281V130/66 | 54 | 181DX102/54 | 5·4 *
(11) LEFT HAND REAMERS
(13)
DRIVING GEAR (12) | DRIVEN GEAR (16) | RATIO (18) | MAXIMUM DRIVING GEAR WHEN FITTED IN LINE WITH CLUTCH CUP (19) 79 TEETH.
TEETH | REF. (14) | TEETH, | REF. (17)
83 | 281V154/83 (15) 37 | 281V129/37 | 2·0
80 | 281V130/80 | 40 | 181DX102/40 | 3·0
78 | 281V130/78 | 42 | 181DX102/42 | 4·2
77 | 281V130/77 | 43 | 181DX102/43 | 5·2 *
(20) GEARS IN DRUM, DRIVER 90T. DRIVEN 54T.
∴ 100 RPM OF SPINDLE = 60 RPM OF CENTRE SHAFT.
(21) RIGHT HAND REAMERS
(23)
DRIVING GEAR (22) | DRIVEN GEAR (26) | RATIO (28) | REAMER DRIVES IN ADJACENT STNS. MUST BE STAGGERED. (29)
TEETH | REF. (24) | TEETH | REF. (27)
64 | 281V154/64 | 56 (25) | 181DV107/56 | 3·2
67 | 281V130/67 | 53 | 181DX102/53 | 4·1
* 69 | 281V130/69 | 51 | 181DX102/51 | 5·3 *
(30) LEFT HAND REAMERS
(32)
DRIVING GEAR (31) | DRIVEN GEAR (34) | RATIO (37) | DRIVING GEARS CANNOT BE FITTED IN LINE WITH CLUTCH CUP. (38)
TEETH | REF (33) | TEETH | REF. (36)
83 | 281V154/83 | 37 (35) | 281V129/37 | 2·9
81 | 281V130/81 | 39 | 181DX102/39 | 4·1
* 80 | 281V130/80 | 40 | 181DX102/40 | 5·0 *
*STANDARD PAIRS OF GEARS (39)

5.2 Auxiliary Longitudinal Slides Operation - Stns.5 & 6.

Two types of unit are available:-

(1) The simpler type, Sec.224D for the 5th station and Sec.225D see Drg. 224Z2, consists of a lever mounted on a fulcrum stud located in and clamped to the beam, this lever replacing the standard lever carried on the sliding block mechanism. A shorter lever shaft is fitted to the sliding block and the standard link is connected to the special lever of the auxiliary motion in the appropriate 5th and/or 6th station.

A maximum stroke of 5.25" (133mm) is available using the auxiliary mechanism and the standard feed cam, the feed rates being 1.5" times those shown on the speed chart.

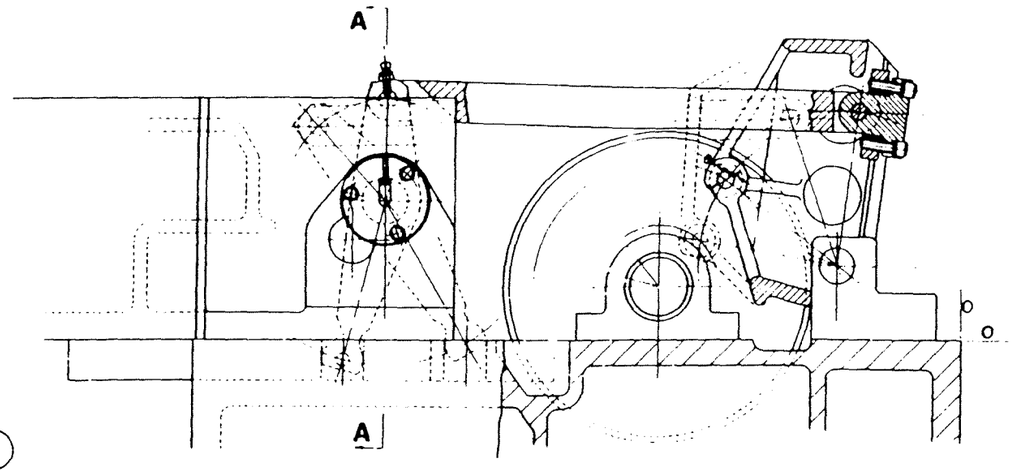
Alternatively a different lever may be mounted on the fulcrum stud to give a maximum stroke of 3.5"(90mm).

This unit can be interchanged between the 4th and 5th stations. Special cams may be used with these motions to suit tooling requirements.

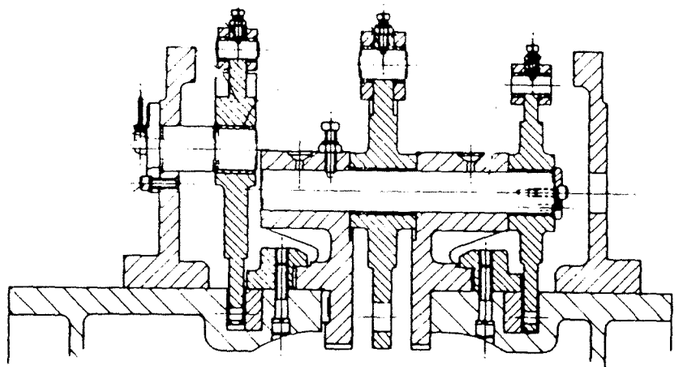
(2) A second type of unit, Sec.224A for stn.5 and Sec.225A for stn.4 is available to be mounted as described above, but a non-standard linkage and quadrant are used to obtain a maximum stroke of 7" (178mm) using standard feed cams.

Auxiliary Longitudinal Slides Drg. 224Z2

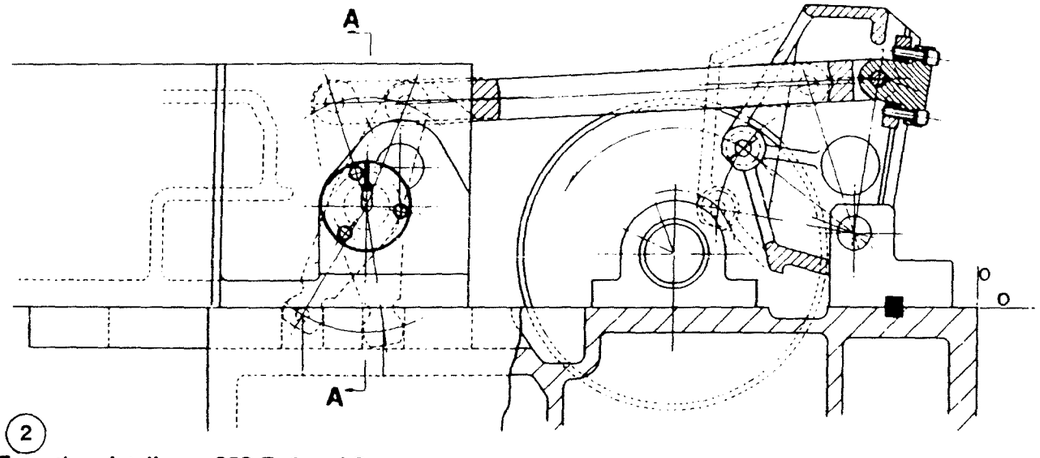
1. Tooling dept. to specify lever and cams required.
2. For other details see 223Z1 and 223Z2
3. Section 'AA'



(1) Tooling Dept. to specify Lever and Cams required



(3) Section 'AA'



(2) For other details see 223.Z. 1 and 2

5.3 Auxiliary Longitudinal Motions for Stns.3 or 4, 7 or 8

Common parts section 289D
Extra parts rear 3rd or 4th stations section 289F } See
Extra parts front 7th or 8th stations section 289E }Fig.5.4 Drg.289Z11
Extra parts lower 3rd or 8th stations section 289G }
Extra parts upper 4th or 7th stations section 289H }

These motions are required for operating the attachment body and slide, Sec.188, to perform reaming, threading and other operations in the aforementioned stations

The motion is obtained from two upper push rods, station 4 and 7, and the two lower ones, stations 3 and 8. These push rods are provided with pusher brackets which connect the slide body to the pusher rod. The movement of the push rod is derived from plate cams bolted to the auxiliary cam discs on the main camshaft.

The cams impart movement to the quadrant levers, linked to the bell crank levers, which actuate the push rods. The quadrant levers are provided with a slot along which the link may be moved to vary the stroke, which is read of the scale on the top face of the quadrant lever. The scale is graduated to show the total stroke in inches and millimeters.

The push rod operating levers are articulated, the two halfs being joined by a shear pin. Should the shear pin shear , due to an overload the attachment will be positively returned, but will not feed forward during the next cycle.

The cam disc is provided with three rows of 36 tapped holes each, the periphery of each cam being marked 0,6,12,24,30 and 36, relative to the keyway as identification of the holes.

When using cams on either side of the central cam carrier, check that the same screw hole is not used by both cams.

Note:
That the total cam rise must not exceed 2.75" (69.85mm)

Adjustment of The Upper Push Rods.

Set the projection of the upper push rods to 1" (25.4mm) dimension with the cam fully inward (ie. 2.875" 73.02mm) radius or minimum roller radius, if the maximum roller radius is greater than 5.625" (142.87mm) and the stroke adjusting slider is to 5" (127mm) on the scale. Adjust by slackening off the locknuts (RH and LH) and by rotating the long vertical link rods.

Adjustment of The Lower Link Rods.

Set the projection of the lower push rods to 1" (25.4mm) dimension with the cam roller fully inward as above and the stroke adjusting slider set at 4.250" (108mm) stroke on scale. Adjust by slackening off the locknuts (RH and LH) and rotating the short link rod.

1. Ref.
2. Upper push rod
3. Lower push rod
4. Station 4
5. Station 5
6. Keyway dimensions refer to keyways inside and outside housing
7. Very important, total cam rise must not exceed 2.3/4" (69.85mm)
8. 5.7/8" max. 2.7/8" min.rad. but note restriction on total cam rise.
9. Keyway shown at 0deg. timing
10. 1.1/8" (28.58mm) dia. roller
11. 23" (584mm) max. 15.5/8" (397mm) min.
12. Keyway
13. 4.7/8" dia (123.83mm)
14. 3.2450/3.2442 dia. (82.42/82.40mm)
15. Upper push rod
16. Max. stroke
17. Lower push rod
18. Station 7
19. Station 8
20. 15.3/8" dia. (177.8mm)
21. Upper push rods
    Set projection of upper push rods to 1" 25.4mm dimension with cam roller fully in (2.5/8"R or min. roller radius. If max. roller is greater than 5.5/8" and stroke adjusting slider set at 5" 127mm Stroke on the scale. Adjust by slackening locknuts (RH & LH) and rotating the long vertical link rod.

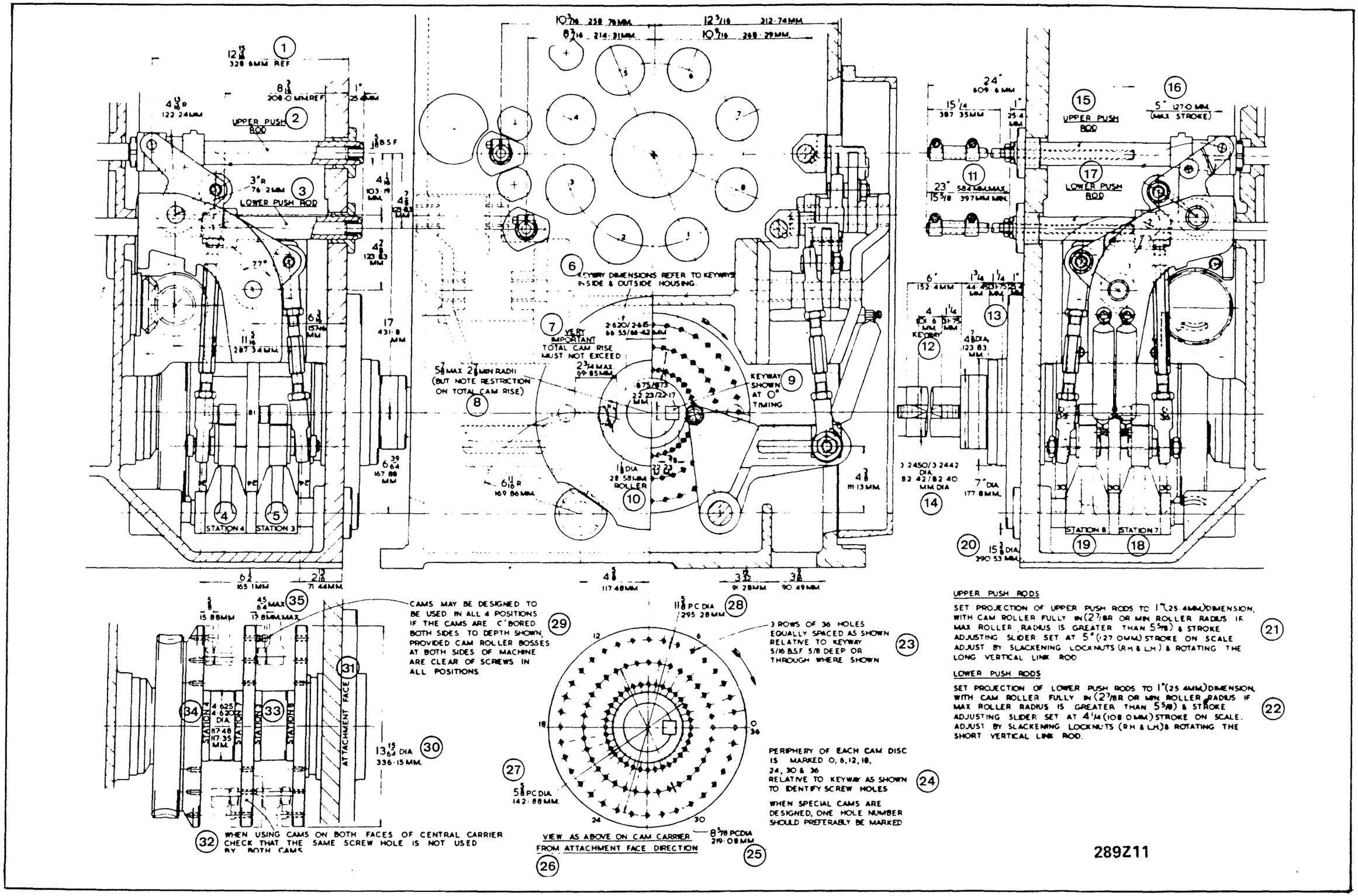
22. Lower push rods
    Set projection of lower push rods to 1" 25.4mm dimension with cam roller fully in 2.7/8"R or min. roller radius if max. roller radius is greater than 5.5/8" and stroke adjusting slider set at 4.1/2" 108mm stroke on scale. Adjust by slackening locknuts(RH & LH) and rotating the short vertical link rod.

23. 3 rows of 36 holes equally spaced as shown relative to the keyway 5./16"BSF x 5/8" deep or through where shown.

24. Periphery of each cam disc is marked 0,6.12,18,24,30 and 36 relative to the keyway as shown to identify screw holes
    When special cams are designed one hole number should be marked.

25. 8.5/8" PC Dia.219.08mm
26. View as above on cam carrier from attachment face direction
27. 5.5/8"PC Dia.142.88mm
28. 11.5/8" PC Dia. 295.28mm
29. Cams may be designed to be used in all 4 positions if the cams are C' bored both sides to depth shown provided can roller bosses at both sides of machine are clear of screws in all positions.

30. 13.15/64"dia. 336.15mm
31. Attachment face
32. When using cams on both faces of central carrier check that the same screw hole is not used by both cams.
33. Station 7 station 8
34. 4.625/4.620 Dia. 117.48/117.35mm
35. 45/64" max. 17.8mm max.


1
2 UPPER PUSH ROD
3 LOWER PUSH ROD
4 STATION 4
5 STATION 3
6 KEYWAY DIMENSIONS REFER TO KEYWAYS IN SIDE & OUTSIDE HOUSING
7 VERY IMPORTANT TOTAL CAM RISE MUST NOT EXCEED
8 (BUT NOTE RESTRICTION ON TOTAL CAM RISE)
9 KEYWAY SHOWN AT 0° TIMING
10 ROLLER
11
12 KEYWAY
13
14
15 UPPER PUSH ROD
16
17 LOWER PUSH ROD
18 STATION 7
19 STATION 8
20
21 UPPER PUSH RODS
SET PROJECTION OF UPPER PUSH RODS TO 1"(25.4MM) DIMENSION, WITH CAM ROLLER FULLY IN (2 7/8R OR MIN. ROLLER RADIUS IF MAX ROLLER RADIUS IS GREATER THAN 5 5/8) & STROKE ADJUSTING SLIDER SET AT 5"(127.0MM) STROKE ON SCALE ADJUST BY SLACKENING LOCKNUTS (R.H. & L.H.) & ROTATING THE LONG VERTICAL LINK ROD
22 LOWER PUSH RODS
SET PROJECTION OF LOWER PUSH RODS TO 1"(25.4MM) DIMENSION, WITH CAM ROLLER FULLY IN (2 7/8R OR MIN. ROLLER RADIUS IF MAX ROLLER RADIUS IS GREATER THAN 5 5/8) & STROKE ADJUSTING SLIDER SET AT 4 1/4 (108.0MM) STROKE ON SCALE. ADJUST BY SLACKENING LOCKNUTS (R.H. & L.H.) & ROTATING THE SHORT VERTICAL LINK ROD.
23 3 ROWS OF 36 HOLES EQUALLY SPACED AS SHOWN RELATIVE TO KEYWAY 5/16 B.S.F. 5/8 DEEP OR THROUGH WHERE SHOWN
24 PERIPHERY OF EACH CAM DISC IS MARKED 0, 6, 12, 18, 24, 30 & 36 RELATIVE TO KEYWAY AS SHOWN TO IDENTIFY SCREW HOLES
WHEN SPECIAL CAMS ARE DESIGNED, ONE HOLE NUMBER SHOULD PREFERABLY BE MARKED
25
26 VIEW AS ABOVE ON CAM CARRIER FROM ATTACHMENT FACE DIRECTION
27
28
29 CAMS MAY BE DESIGNED TO BE USED IN ALL 4 POSITIONS IF THE CAMS ARE C'BORED BOTH SIDES TO DEPTH SHOWN, PROVIDED CAM ROLLER BOSSES AT BOTH SIDES OF MACHINE ARE CLEAR OF SCREWS IN ALL POSITIONS.
30
31 ATTACHMENT FACE
32 WHEN USING CAMS ON BOTH FACES OF CENTRAL CARRIER CHECK THAT THE SAME SCREW HOLE IS NOT USED BY BOTH CAMS
33 STATION 2
34 STATION 1
35
289Z11

5.4 Threading Attachments, Stns.3,4,5,6,7 & 8

Threading can be performed in stations 3,4,5 6,7,& 8. Threading operations are usually performed at lower surface speed than those suitable for turning or drilling and as it is not possible to vary the spindle speed during the cycle, and in order to obtain suitable surface speeds for threading whilst still using economical work spindle speeds, it becomes necessary to rotate the threading tool in the same direction as the work spindle but at a faster or slower speed. The difference between the work spindle speed and the threading tool speed will then provide an effective surface speed for threading.

A commonly used threading speed is 1/5th of the work spindle speed, requiring the threading tool to be rotated at 4/5th of the work spindle speed for right hand threads, or one-and-one-fifth times the work spindle speed for left hand threads. This is termed an "On" ratio of 5, being the ratio of work spindle revolutions to threading revolutions during the "On" threading of the die or tap. If the cycle time permits, higher ratios may be used to reduce the surface speed for threading as varying materials may dictate, and to increase tool life and improve surface finish. Lower ratios may also be employed on free cutting materials, thus achieving faster cycle times.

Since a solid tap or die after cutting the thread must also be run "Off" the component during the feed cycle, this non-productive operation should be performed as quickly as possible. Excessive difference between forward and return speeds will, however, increase clutch wear and create a possible difficulty in maintaining threading length & surface finish. A commonly used "OFF" ratio is approximately 2:1, ie. the relative speed is half the work spindle speed.

Fitting The Threading Clutch Drive. Sec.281A

Assemble the threading drive gears onto their adaptors and together with their spacers, assemble them onto the centre shaft as shown on Fig.5.5 Drg. 281Z11. In order to facilitate this it is necessary to withdraw the centre shaft sufficiently to provide the space to assemble the aforementioned parts onto the centre shaft. To remove the centre shaft it is necessary to remove the speed pick-off gears and the screws retaining the bearing housing. This enables the bearing housing and the centre shaft to be withdrawn outwards from the main drive housing wall.

If threading clutches are to be fitted in stations 5 and 6, the reset bracket should next be fitted to the underside of the sliding block.

The universal drive is fitted as shown on Fig.5.5 Drg.281Z11
Fit the rear bearing housing into the appropriate bore in the inner wall of the main drive housing attachment drive compartment and clamp same by the square head screws and its mating clamping pin. An alternative rear bearing housing must be modified as indicated in Fig. 5.5 Drg. 281Z11 when fitted in station 8. The threading clutch can then be fitted complete with its driven gears and the diehead drive section 282B,less adaptor Drg. 282X122, slid into position into its appropriate bore in the front wall of the main drive housing to support it. Finally clamp the threading attachment drive, section 282B to the front wall of the main drive housing with socket head cap screw screws and spring washers and clamp the threading clutch shaft to the threading attachment drive sleeve with self locking hexagon nuts. The rear bearing housing must be connected to the oil supply, two connections being provided from the top of the main drive housing, forward of the upper wormwheel. The oil supply is adjusted at the distribution block on top of the housing.

If the clutch assembly is required to be in the forward position, ie. using either the central or forward mounted driving gears, then it is possible to use these combinations in stations 3,4,5,6,7, and 8. Should the clutch assembly be required in the rear position, then the adaptor plate should be fitted to the diehead drive and the clutch unit secured to the adaptor.

The clutch actuating shaft together with its latch mechanism and operating glut should be fitted after assembling the clutch into the machine, with the actuating spring being removed for this purpose. With the operating glut adjusted and clamped onto its actuating shaft so that in the "ON" position there is a 1/64" (0.4mm) clearance between the clutch bobbin and the adjacent clutch parts and the latch has 0.015" (0.038mm) clearance to drop into engagement. In stations 5 and 6, the nuts in front of the glut should be set with the sliding block fully back to obtain the above condition

In stations 3,4,& 7 or 8 the reset block is set on the push rod to obtain the above condition with the attachment mechanism fully back.

In all stations the pair of hexagon locknuts limiting the travel into the "OFF" position should be set so there is 1/32" (0.8mm) clearance between the bobbin and the adjacent clutch parts.

Both sides of the clutch should then be adjusted and finally the actuating spring should be adjusted so that the clutch will trip satisfactorily. When the threading clutch drive is used with self opening dieheads, the actuating spring with its hexagon locknuts should be removed. The latch and its pivot pin are then removed. The pair of locknuts on the clutch actuating shaft must then be moved along the shaft and clamped against the coaxial sleeve to retain the clutch in the "ON" position.

Clutch Adjustment

Both sides of the clutch should be adjusted to give satisfactory non-slip drive in the "ON" and "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 then 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.

Clutch Dismantling (Servicing or Overhaul Purposes)

This is straight forward procedure, 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.

Application of the Threading Clutch.Section 281A.

The replacement on a diehead drive of the driven gear and its adaptor plate by a threading clutch results in a universal threading drive which can be used for solid taps and dies. This universal drive gives an "ON" ratio and an "OFF" ratio, controlled by a threading clutch. The threading clutch assembly may be mounted in stations 3,4,5,6,7 and 8 in the forward position, ie. with the glut shaft bolted directly onto the clutch drive sleeve of section 282B, or by using the adaptor plate from section 282B, the clutch may be mounted in the rear position in stations 3,4,7 and 8, only thus providing a choice of three separate ratio drives. The ratios available and the required gears are listed on Fig.5.5 Drg.281Z11.

When more than one threading clutch drive is fitted to a machine, the following conditions apply.

Right hand threads to be cut:-
Three different "ON" ratios may be fitted
Three different "OFF" ratios may be fitted

Left hand threads to be cut:-
Three different "ON" ratios may be fitted.
Three different "OFF" ratios may be fitted.
Note: Only one is listed

Right hand and left hand threads to be cut:-
Two R.H. "ON" and one L.H. "ON" ratio may be fitted
One R.H. "OFF" and two L.H. "OFF" ratio may be fitted
ie. Four different ratios.

Driven gears having more than 43 teeth in adjacent stations must be staggered.
Driving gears having more than 79 teeth may not be mounted in line with the clutch cup.

When the threading clutch is fitted for use with a self opening diehead, the "ON" ratio is engaged continuously by retaining the glut shaft in the one position. This avoids frequent stripping and refitting of the clutch drive to suit solid taps and dies or self opening dieheads.

Threading Calculations

When considering using threading attachments,it is first necessary to establish the number of work spindle revolutions required. These depend on the lead, the length of thread to be cut and the threading ratios used, an allowance of two threads being made for starting.

When using self-opening dieheads the number of work spindle revolutions required may be found by multiplying the number of threads to be cut, plus the allowance for starting, by the "ON" ratio used.

Example of calculating the number of work spindle revolutions required when using a self opening diehead.

Work spindle revolutions = (number of threads to be cut + 2) X "ON" ratio.

Example Metric

To cut a 1.5mm pitch thread X 30mm long using an "ON" ratio of 5, the work spindle revolutions = $\frac{30}{1.5}$ + 2) X 5 = 110 revolutions.

Example (Imperial)
To cut a 20T, P.I thread x 0.75" long with a "ON" ratio of 5.
Work spindle revolutions = (0.750" x 20) + 2) x 5 = 85 Revolutions

Example of calculating the number of work spindle revolutions required when using solid taps and dies. When using solid taps and dies , extra revolutions will be required for the solid taps or dies to run off the workpiece.

The number of revolutions required, equals the number of threads to be cut, plus the starting allowance,multiplied by the sum of the "ON" and "OFF" ratios.

Calculation (b)

Example Metric

To cut a 1.5mm pitch thread X 30mm long using an "ON" ratio of 5 and an "OFF" ratio of 2.

Spindle revolutions = (number of threads to be cut + 2) X ("ON" and "OFF" ratios)

Work spindle revolutions = $\frac{30}{1.5}$ + 2) X (5+2) = 154 revolutions.

Example Imperial

To cut 20T.P.I thread x 3/4" long with an "ON" ratio of 5 and an "OFF" ratio of 2.

Work spindle revolutions = (0.75" x 20) + 2)x (5 + 2) = 119 revs.

When threading in stations 3,4,5,or 6 and using standard timing cams, ascertain that the work spindle revolutions required for threading do not exceed the available cutting revolutions which are given on the speed and feed chart. The available cutting revolutions depend on the cycle time and are determined by the longest operation which, in some cases, may be the threading operation.

When threading in stations 7 or 8 on a single bar feed machine when using one of these stations for the part off or on a double bar feed machine when threading in stations 3 and 7 or 4 and 8,the time allowed for threading expressed in work spindle revolutions, allowing time for the parting off operation, should not normally exceed half of the available cutting operations.

Provision is made for the return cam to be retarded in 10 deg. steps, so that approximately 1/2, 9/16 and 5/8 of the cutting revolutions are available for threading. The use of these figures depends upon the relative strength of the work at the time threading is completed, as the part off tool is usually part way through the work piece. This may be corrected in some cases, by setting a longer part off stroke than necessary, and arranging for the part off tool to cut only at the end

of the feed stroke. This will depend on the allowable feed rates on the part off tool. In the case of the calculated revolutions required for threading exceeds the maximum revolutions available, the cycle time must be increased to give more available cutting revolutions, or a faster "ON" ratio used.

1. Fitted for use with Self-opening Die-Heads.
2. Set Nuts to retain Clutch.
3. Set these nuts with no clearance when clutch is forward with clearance at P.
4. Reset bracket
5. Set these nuts to reset when sliding block is fully back with clearance shown at M & N
6. Connect to oil supply
7. 1/64"Clearance M see note 2
8. 1/32"clearance P see note 1
9. 1/64"Clearance N see note 2
10. Fitted for use with solid taps and dies
11. Section 282B

12. Driven gear E
    Driven gear F
    Driving gear A
    Driving gear C

13. Clamping screw
14. Section 281A (Alternatively when chasing drive section 292F or 292G is fitted use parts shown see 292Z17 or 18)
15. On
16. Section 217
17. Off

18. Clutch can be fitted in front position in stations 3,4,5,6,7,& 8
    Clutch can only be fitted in rear position in stations 3,4,7 & 8

    Driven gears larger than 43 teeth in adjacent stations must be staggered.

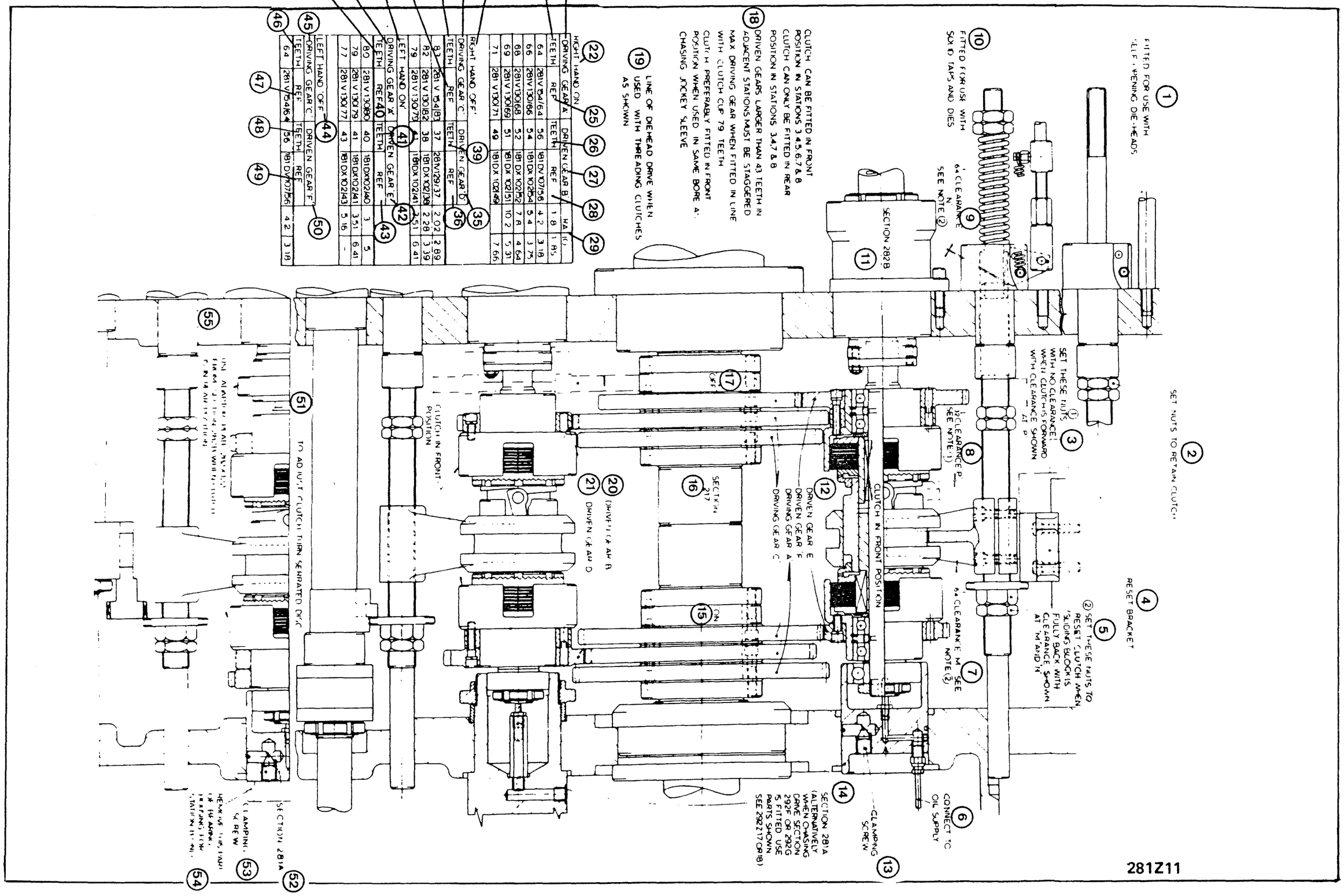
    Maximum driving gear when fitted in line with clutch cup 79 teeth

    Clutch preferably fitted in front position when used in same bore 'A' chasing jockey sleeve.

19. Line of diehead drive when used with threading clutches as shown.
20. Driven gear B
21. Driven gear D
22. Right hand 'ON'
23. Driving gear A
24. Teeth
25. Ref.
26. Teeth
27. Driven gear
28. Ref.
29. Ratio
30. Right hand 'OFF'
31. Driving gear C
32. Teeth
33. Ref.
34. Teeth
35. Driven gear D
36. Ref.
37. Left hand 'ON'
38. Driving gear A
39. Teeth
40. Ref.

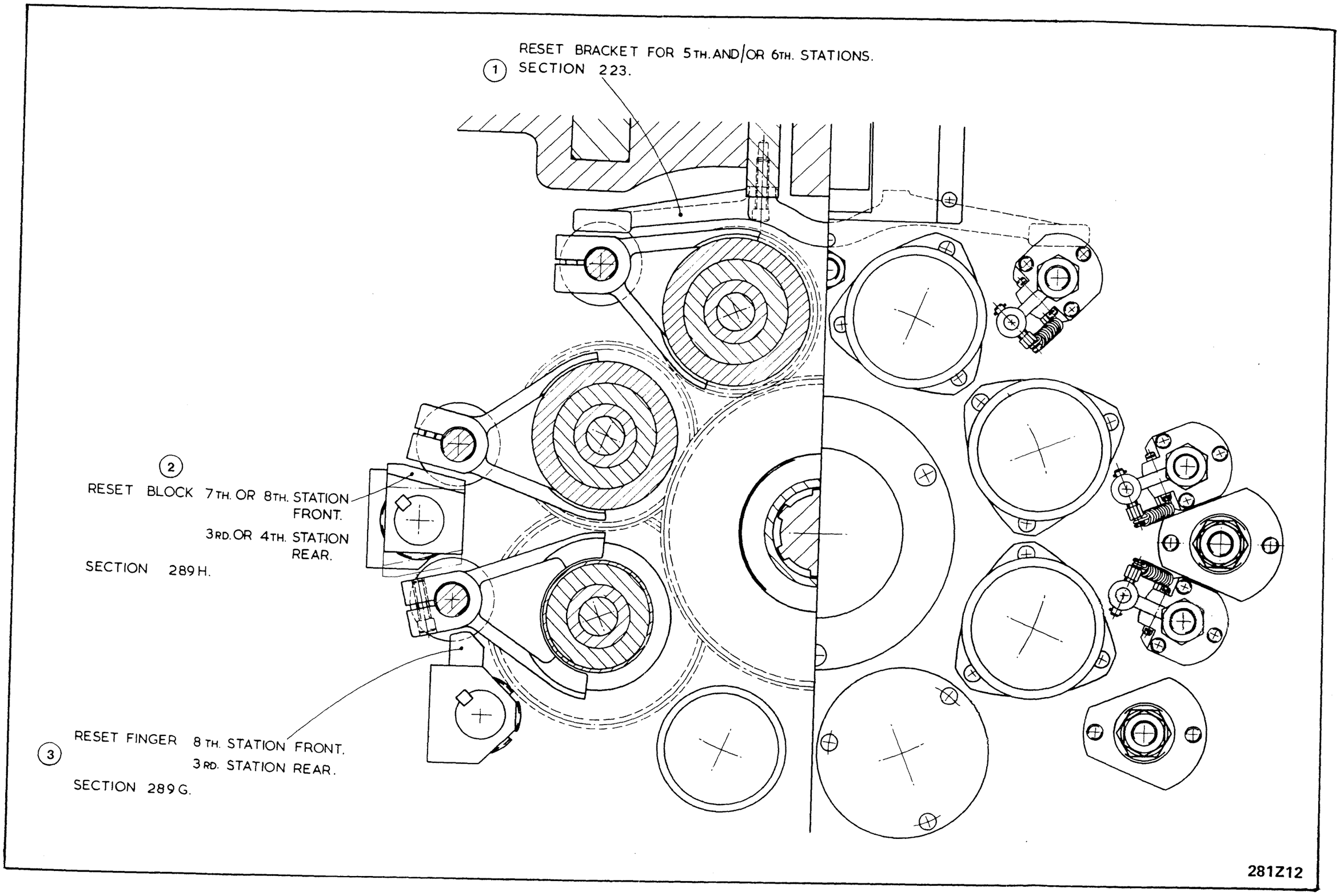
41. Teeth
42. Driven gear E
43. Ref.
44. Left hand 'OFF'
45. Driving gear C
46. Teeth
47. Ref.
48. Teeth
49. Ref.
50 Driven gear F
51. Adjust clutch turn serrated disc
52. Section 281A
53. Clamping screw
54. Remove this part of bearing housing for station 8 only
55. Use adaptor plate 282X122 from section 282B when clutch is in rear position.

Fig. 5.5 Drg. 281Z11



Application Drg. of Threading clutch drive Drg. 281Z12

1. Reset bracket for 5th and/or 6th stations section 223.
2. Reset block 7th or 8th station front, 3rd or 4th station rear section 289H
3. Reset finger 8th station front, 3rd station rear section 289G.


(1) RESET BRACKET FOR 5TH. AND/OR 6TH. STATIONS.
SECTION 223.
(2) RESET BLOCK 7TH. OR 8TH. STATION FRONT.
3RD. OR 4TH. STATION REAR.
SECTION 289H.
(3) RESET FINGER 8TH. STATION FRONT.
3RD. STATION REAR.
SECTION 289G.
281Z12

Threading Attachment Drive Sleeve. Sec.282B

The threading attachment drive sleeve is fitted to drive the threading attachment when used only with a self opening diehead or a collapsing tap, as these tools are not rotated off the workpiece and an 'ON' drive ratio is required.

The threading attachment drive shaft is provided with a number of holes, into which can be inserted a pin supporting two rollers, which engage in the driving slots cut in the drive shaft sleeve. The pin and rollers are retained by a retaining collar carrying a retaining circlip.

The drive sleeve runs in ball journals and carries an adaptor plate on which is mounted the driven gear'B' directly engaging with the driving gear 'A' mounted on the centre shaft.

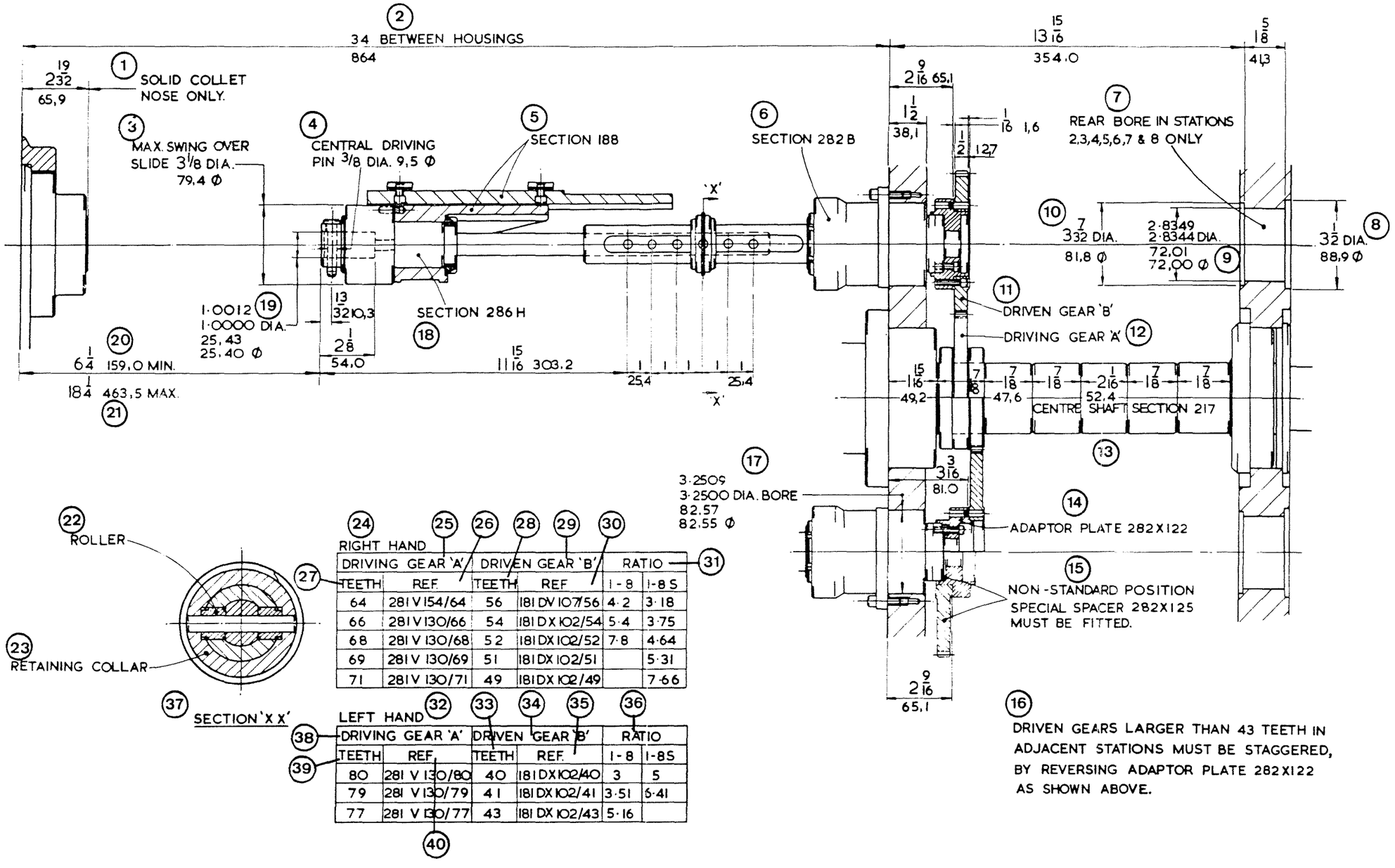
Two or more units can be driven from the same driving gear provided the driven gears do not exceed 43 teeth. When using gears with more than 43 teeth ie.(on all right hand threads), they must be staggered by reversing the adaptor plate. By fitting a spacer behind the adaptor plate a third unit may be driven.

The application Fig.5.7 Drg.282Y12 gives the details of the threading ratios provided and the required driving and driven gears.

1. Solid collet nose only
2. Between housing
3. Max. swing over slide 3.1/8" dia.
4. Central driving pin 3/8" dia. (9.5mm)
5. Section 188
6. Section 282B
7. Rear bore on stations 2,3,4,5,6,7 and 8
8. 3.1/2" dia. (88.9mm)
9. 2.8349/2.8344" dia. (72.01/72.00mm)
10. 3.7/32"dia. (81.8mm)
11. Driven gear'B'
12. Driving gear 'X'
13. Centre shaft section 217
14. Adaptor plate 282X122
15. Non-standard position special spacer 282X125 must be fitted.

16. Driven gears larger than 43 teeth in adjacent stations must be staggered. By reversing the adaptor plate 282X122 as shown above.

17. 3.2509/3.2500" dia. bore (82.57/82.55mm)
18. Section 286H
19. 1.0012/1.0000"dia. (25.43/25.40mm)
20. 6.1/4" min. (159mm)
21. 18.1/4" max. (463.5mm)
22. Roller 23.
23. Retaining collar
24. Right hand
25. Driving gear A
26. Ref.
27. Teeth
28. Teeth
29. Driven gear B
30. Ref.
31. Ratio
32. Left hand
33. Teeth
34. Driven gear B
35. Ref.
36. Ratio
37. Section 'XX'
38. Driving gear A
39. Teeth
40. Ref.



24 RIGHT HAND	25	26	28	29	30	31
DRIVING GEAR 'A'		DRIVEN GEAR 'B'			RATIO	
27 TEETH	REF.	TEETH	REF.		1-8	1-8S
64	281V154/64	56	181DV107/56		4·2	3·18
66	281V130/66	54	181DX102/54		5·4	3·75
68	281V130/68	52	181DX102/52		7·8	4·64
69	281V130/69	51	181DX102/51			5·31
71	281V130/71	49	181DX102/49			7·66

32 LEFT HAND	33	34	35	36
38 DRIVING GEAR 'A'		DRIVEN GEAR 'B'		RATIO
39 TEETH	REF.	TEETH	REF.	1-8	1-8S
80	281V130/80	40	181DX102/40	3	5
79	281V130/79	41	181DX102/41	3·51	6·41
77	281V130/77	43	181DX102/43	5·16	

40

282Y12

5.5 Fitting the Threading Attachments to Stns. 5 and 6

Assemble the threading spindle, Sec.286H into the attachment body and slide, Sec.188, radially locating and clamping the threading spindle housing into the attachment body with the coaxial washer and slotted locknut.

Assemble the retaining collar and spring clip into the driving portion of the threading attachment drive sleeve, section 282B.

Offer the assembly of the threading spindle and attachment body and slide up to the appropriate upper independent slide (Stn. 5 or 6) locating the splined tail of the threading spindle into the splined bore of the driving sleeve of the threading attachment drive, Sec.182. Clamp the body and slide assembly to the independent slide, taking care to position the slide to reduce to a minimum the overhang of the threading attachment body on its slide during its working positions.

Assemble the driving rollers into the driving slots of the drive sleeve, and fit the driving pin through the retaining collar, rollers and the tail shaft of the threading spindle, selecting the appropriate hole in the tail shaft which gives satisfactory clearances at each end of the slots in the driving sleeve in the forward and return positions of the threading attachment. Finally fit the roller pin retaining spring clip.

The appropriate pusher brackets, are fitted to the independent slide and the attachment body together with the push rods, clamps, spring assembly, and extension spring as shown on Fig.5.8 Drg.286Z14.This drawing illustrates the threading unit as used in conjunction with the threading clutch drive or as a diehead drive. Finally fit the trip rod with clamp "E" for tripping the threading clutch, or alternatively when using a self opening diehead, the diehead trip rod, clamp "F" and "G" and diehead operating glut.

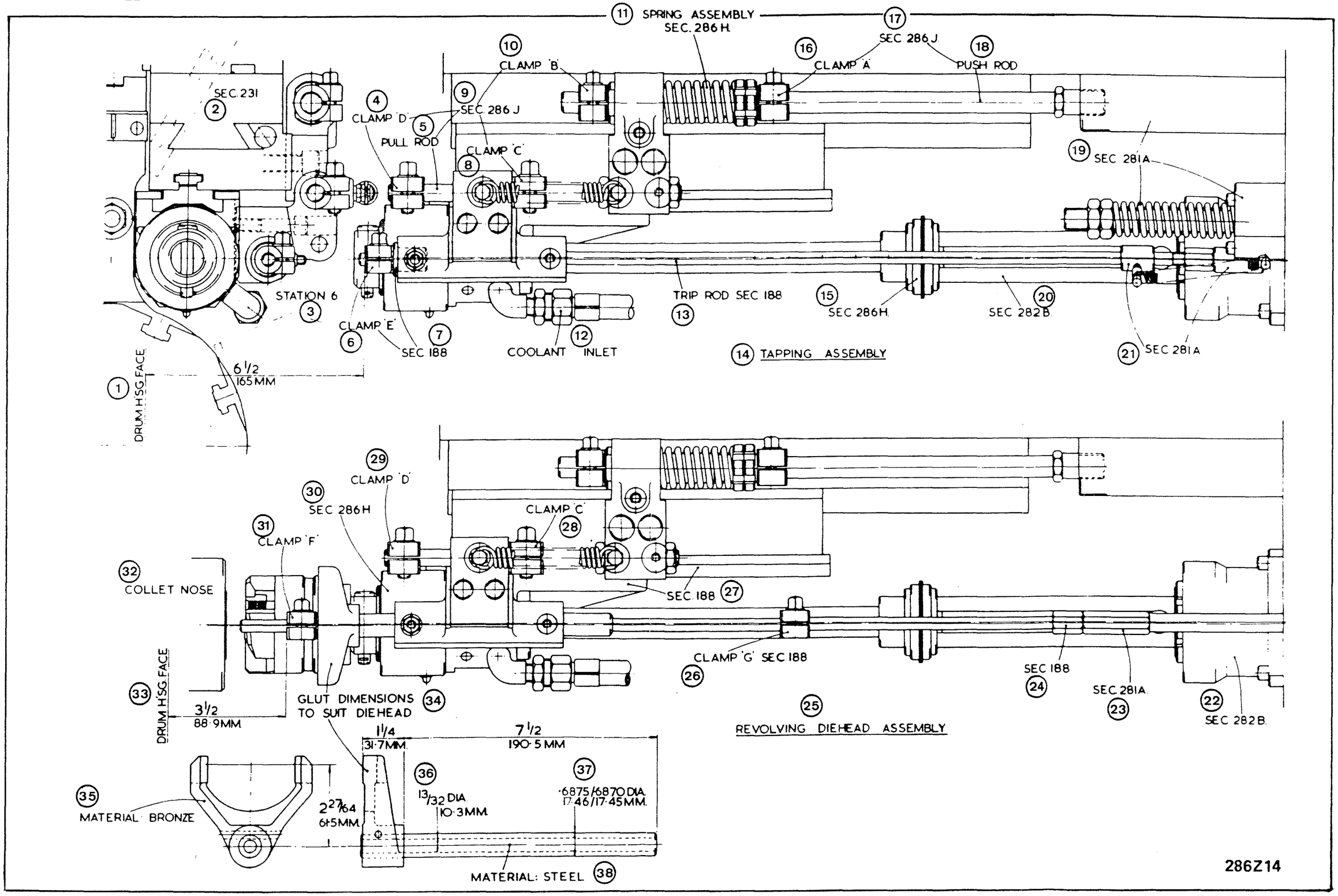
The diehead or tap or button die holder is fitted into the bore at the front end of the threading spindle and is driven by a central pin housed in the spindle nose which passes through the shank of the diehead or tap or button die holder. It is essential that the spring security ring is replaced in the coaxial external groove of the threading spindle nose to ensure that the threaded central pin does not fret loose when the threading spindle is revolving.

When using taps or button dies it is essential that they are mounted in floating holders.

Fitting the Threading Units to Stations 3 and 6

The fitting instructions for stations 4 and 5 equally apply to the stations 3 and 6 with the exception that the units when used in station 3 and 6 are clamped to the centre tool block and pushed by the 3rd and/or 6th auxiliary longitudinal motions, Secs.289A for stn.6 and 289B for stn.3. See Drg.286Z11. It is advisable to fit the auxiliary longitudinal motions before fitting the threading attachments.

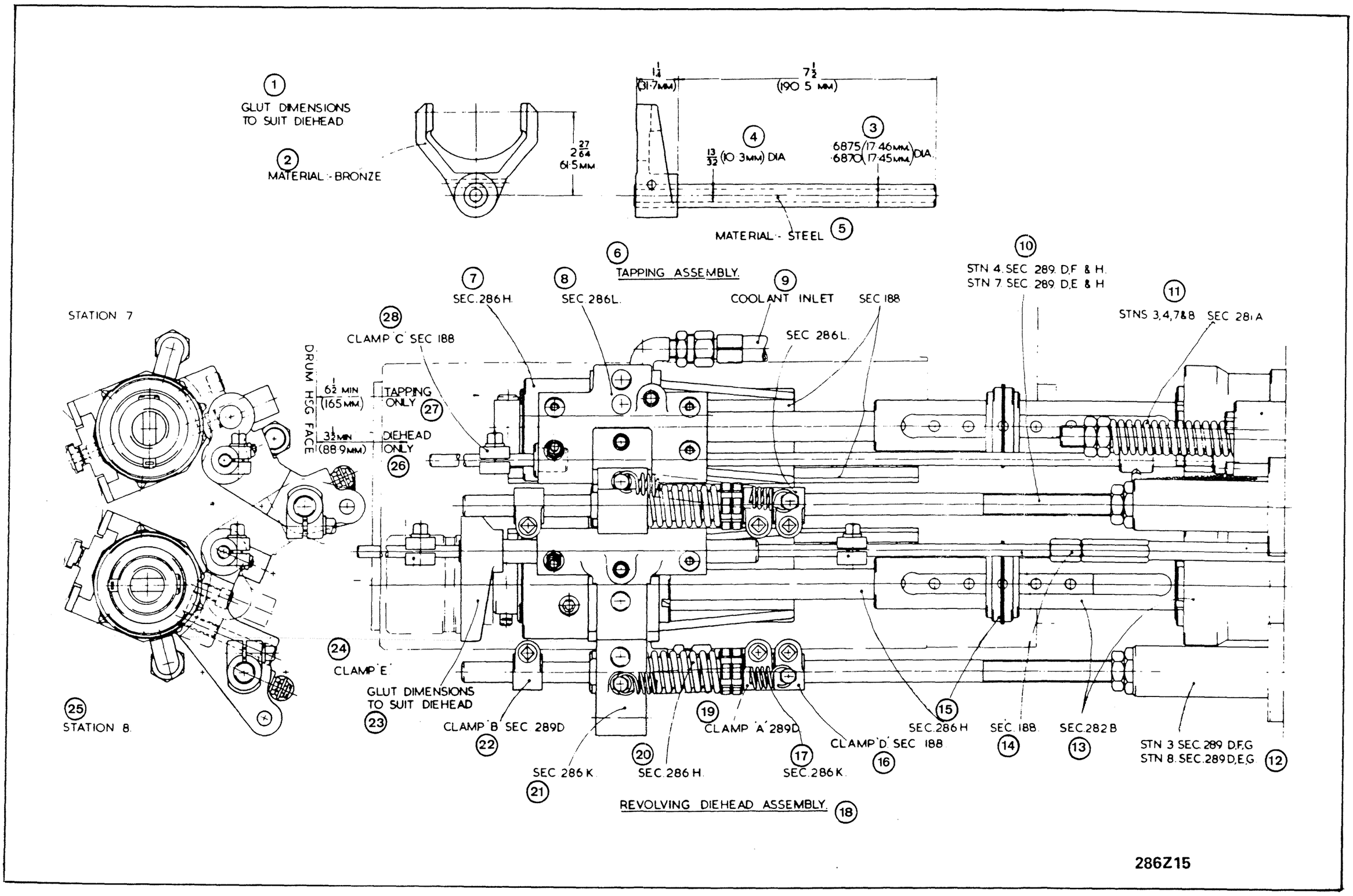
1. Drum housing face
2. Sec. 231' Sec. 286 A
3. Station 6
4. Clamp D.
5. Pull rod
6. Clamp E
7. Sec. 188
8. Clamp C
9. Sec. 286J
10. Clamp B
11. Spring assembly Section 286 A
12. Coolant inlet
13. trip rod sec.188
14. Tapping Assembly.
15. Sec. 286 H
16. Clamp A Inlet.
17. Sec. 286 J
18. Push rod
19. Sec.281A5.
20. Sec. 282 B
21. Sec.281 A 1.3/4-6.
22. Sec. 282 B
23. Sec. 281 A
24. Sec.1888.
25. Revolving diehead assembly
26. Clamp G sec. 188
27. Sec. 188.
28. Clamp C
29. Clamp D
30. Sec. 286
31. Clamp F
32. Collet nose
33. Drum housing face
34. Glut dimensions to suit diehead
35. Material Bronze
36. 13/32"dia. (61.5mm)
37. .6875/.6870" dia. (17.46/17.45mm)
38. Material steel


11 SPRING ASSEMBLY SEC. 286 H
17 SEC 286 J
16 CLAMP 'A'
18 PUSH ROD
10 CLAMP 'B'
9 SEC 286 J
4 CLAMP 'D'
5 PULL ROD
CLAMP 'C' 8
2 SEC 231
19 SEC 281A
STATION 6 3
CLAMP 'E' 6
7 SEC 188
12 COOLANT INLET
13 TRIP ROD SEC 188
15 SEC 286H
20 SEC 282B
21 SEC 281A
1 DRUM H'SG FACE
6 1/2 165MM
14 TAPPING ASSEMBLY
29 CLAMP 'D'
30 SEC 286H
31 CLAMP 'F'
32 COLLET NOSE
33 DRUM H'SG FACE
3 1/2 88·9MM
GLUT DIMENSIONS TO SUIT DIEHEAD 34
CLAMP 'C' 28
SEC 188 27
CLAMP 'G' SEC 188
26
25 REVOLVING DIEHEAD ASSEMBLY
SEC 188 24
SEC 281A 23
22 SEC 282B
1 1/4 31·7MM
7 1/2 190·5 MM
36
13/32 DIA 10·3MM
37
·6875/6870 DIA 17·46/17·45MM
35 MATERIAL BRONZE
2 27/64 61·5MM
MATERIAL: STEEL 38
286Z14

Fitting The Threading Attachment To Stations 3,4,7 or 8

The fitting instructions for the attachments used in stations 5 and 6 equally apply to those used in stations 3,4,7, or 8 with the exception that the units , when used in the aforementioned stations are clamped to the centre block and pushed by the appropriate auxiliary longitudinal motions, section 289. It is advisable to fit the auxiliary motion/motions before fitting the threading attachment.

1. Glut dimensions to suit diehead
2. Material Bronze
3. .6875/.6870"dia. (17.46/17.45mm)
4. 13/32"dia. (10.3mm)
5. Material Steel
6. Tapping assembly
7. Sec. 286 H
8. Sec. 286 L
9. Coolant inlet
10. Stn.4 sec. 289 DF & H
    Stn.7 sec. 289 DE & H
11. Stns. 3,4,7,& 8 Sec. 281 A
12. Stn.3 sec. 289 D.F.G.
    Stn.8 sec. 289 D.E.G.
13. Sec 282 B
14. Sec. 188
15. Sec. 286 H
16. Clamp D sec 1881
17. Sec. 286 K
18. Revolving diehead assembly
19. Clamp A sec. 289 D
20. Sec. 286 H
21. Sec. 286 K
22. Clamp B sec. 289 D
23. Glut dimensions to suit diehead
24. Clamp E
25. Station 8


1
GLUT DIMENSIONS TO SUIT DIEHEAD
2
MATERIAL - BRONZE
2 27/64
61·5 MM
1 1/4 (31·7 MM)
7 1/2 (190 5 MM)
4
13/32 (10 3MM) DIA
3
6875 (17·46 MM) 6870 (17·45 MM) DIA
MATERIAL - STEEL
5
6
TAPPING ASSEMBLY.
7
SEC. 286 H.
8
SEC. 286 L.
9
COOLANT INLET
SEC 188
SEC 286 L.
10
STN 4. SEC 289. D.F & H.
STN 7. SEC 289. D.E & H
11
STNS 3,4,7&8 SEC 281A
STATION 7
28
CLAMP 'C' SEC 188
DRUM HSG FACE
6 1/2 MIN (165 MM)
TAPPING ONLY
27
3 1/2 MIN (88·9 MM)
DIEHEAD ONLY
26
25
STATION 8.
24
CLAMP 'E'
GLUT DIMENSIONS TO SUIT DIEHEAD
23
CLAMP 'B' SEC 289D
22
SEC 286 K.
21
20
SEC. 286 H.
19
CLAMP 'A' 289D
17
SEC. 286 K.
CLAMP 'D' SEC 188
16
15
SEC. 286 H
SEC. 188
14
SEC. 282 B
13
STN 3 SEC 289 D.F.G
STN 8. SEC. 289 D.E.G
12
REVOLVING DIEHEAD ASSEMBLY.
18
286Z15

5.6 Setting the Threading Attachment for Stations 5 and 6

The following should be read in conjunction with the application drawing, Fig. 5.7 Drg. 286Z14.

Setting instructions for Self Opening Dieheads:-

(1) Set the stroke setting block on the appropriate feed operating quadrant lever to the scale setting as calculated using the following described procedures. Make sure the stroke setting block is securely clamped after setting the stroke or making adjustments to the stroke.

(2) Handwind the machine to the begining of feed stroke.

(3) Adjust clamp 'A',until dies are just clear of the thread to be cut in or on the workpiece. If the length of thread to be cut is less than the scale setting, a minimum clearance equal to the scale setting less the thread length must be set between the threading tool and the start of the thread in or on the workpiece.

(4) Set clamp 'C' in conjunction with clamp 'A' to obtain the most advantageous working position of the attachment body on its slide.

(5) Set clamp 'C' just clear of the push sleeve.

(6) Set clamp 'D' with a minimum clearance equal to the thread length plus the clearance set between the dies and the start of the thread on the workpiece minus the scale setting. It is advisable to start with more clearance than specified and adjust closer after the diehead trip has been set correctly. This Clamp 'D' must not contact the attachment body bracket before the diehead has opened.

(7) Set clamp 'F' to open the diehead when the correct length of thread has been cut; the forward motion of the push rod must have ceased before the diehead opens.

(8) Set clamp 'G' to close the diehead when the attachment is fully back.

(9) For Taps and Button Dies only.

a) As (1) for self opening dieheads

b) As (2) for self opening dieheads

c) As (3) for self opening dieheads

d) As (4) for self opening dieheads

e) As (5) for self opening dieheads

(10) Set clamp 'D' with a minimum clearance equal to the thread length plus the clearance between the tap or button die and the start of the thread on the workpiece plus 0.125"(3mm). It is advisable to start with more clearance than this and adjust closer after the clutch trip has been correctly set. This Clamp 'D' must not contact the attachment body bracket before the tap or button die have finished cutting the

(11) Set clamp 'E' to trip the clutch into reverse when the tap or button die has reached the specified length of thread to be cut. This can be done by setting the clamp clear of the bush by an amount equal to the thread length plus the clearance set, minus 0.125 (3mm). (See Fig.5.7 Drg. 286Z14)

5.7 Setting the Threading Attachment for Stations 3,4,7, and 8

Refer to the application Fig.5.9 Drg. 286Z15 when fitting the attachment to the machine. Refer to the attachment chart, Drg. 200Y39 forthe sections required to build and fit these attachments in stations 34,7 and 8.

Self Opening Dieheads.

(1) Having set the correct scale setting, handwind the machine to the beginning of the feed stroke.

(2) Adjust clamp 'A' until the dies are just clear of the thread to be cut in or on the workpiece. If the length of thread to be cut is less than the feed stroke setting, a minimum clearance equal to the feed stroke less the thread length must be set between the threading tool and the start of the thread in or on the workpiece.

(3) Set clamp 'E' to arrest the diehead opening glut and sleeve so that the continued forward motion of the diehead to open same, cuts the required length of thread. The forward motion of the push rod must have ceased before the diehead opens.

(4) Set clamp 'B' so that, whilst never touching the push sleeve during the forward motion of the diehead, it would never-the-less give a positive pull back to the attachment should the return spring fail.

(5) Set clamp 'D' to close the diehead when the attachment is fully back.

(6) Taps and Button Dies only.

a) Set the correct scale setting, handwind the machine to the start of feed stroke.

b) Set clamp 'A' as in paragraph (2) of the diehead instructions above.

c) Set the clamp 'C' to trip the clutch into reverse when the tap or button die has reached the specified length of thread to be cut. This may be done by setting the clamp clear of the bush to the amount equal to the thread length plus the clearance set between the button die and the start of the thread in or on the workpiece, less 0.125" (3mm).

d) Set clamp 'B' as stated in paragraph (4) of the diehead instructions above.

General Notes on the Setting of Threading Attachments.
These notes are applicable to attachments to all threading stations See Application Drawing Fig. 5.9 Drg. 286Z15.

It is advisable to check threading attachment settings by use of the "JOG" button and with the index out so that all settings and

adjustments can be checked and modified if necessary.

Never hand wind the machine through feed when threading is set and a component is at the threading station.

Never hand wind backwards without either relieving the clamp 'A' and ensuring that the tap or button die is clear of the workpiece, or removing the tap or button die from the attachment. When using a self opening diehead, this may be tripped open in order to handwind backwards.

When setting, watch the movement of the attachment to observe whether the threading clutches are slipping: movement ceases when this occurs and the machine should be stopped immediately and clutches adjusted.

Scale setting, the clearance to be set between the threading tools and the start of the thread, and the threading cams, ratio gears and attachment sections required should be specified on the tooling layout and not left to the setter to calculate and specify.

It should be noted that the setting instructions given for the 5th and 6th stations refer to components up to 4" - 6" (100 - 150mm) long depending on the length of the diehead or tapholder and tap or die holder and die and also the stroke set.

For component lengths above this, the fast motion travel to the threading spindle must be reduced by setting clearance between the pusher sleeve and clamp 'B'. When tapping in these circumstances it may be found necessary to fit a return spring between the pusher bracket and the main drive housing (tapped holes are provided) to relieve the tap from the workpiece until fast return positively pulls the threading tool clear of the workpiece.

5.8 Selecting Cams for Threading.

Threading cams must be used when threading, the cam profile enabling consistent and accurate setting of the attachment. One threading cam is available for 4th station and one for 5th station.
see Fig.5.10 Drg. 286Y4C.

Selecting cams for threading. Threading cams Section 286B for station 5 and 286C for station 6.

Four cams are available for stations 3 and 4 and four cams for station 7 and 8 Fig.5.11 Drg. 287Y3.

The timing of the movements given by these cams are shown on the timing diagram Fig.5.13 Drg.200Y31 and the following sequence of movements to the threading push rod is produced.

(1) Fast approach stroke.

(2) Feed Stroke. This is set to suit the thread being cut and serves to lead the threading tool correctly.

(3) Drop Back. This is slightly greater than the feed stroke, and takes place while the threading tool continues cutting; the tool being pulled along by the thread being cut.

(4) Dwell. This continues while the threading completes the cutting and in the case of solid taps and dies, allows the tool to run 'OFF" the workpiece.

(5) Fast return, with accelerated timing cams. This occurs while the centre tool block and the cross slides are feeding forward.
The feed cam may be advanced in 10 deg. steps and the guard cam in steps of 5 deg.limited only by the screws retaining cam on the reverse side of the middle cam disc, see Fig.5.11 Drg. 287Y3.

5.9 Fitting Threading Cams for 5th and 6th Stations

Threading cams are fitted in place of the feed cams in the upper longitudinal motions with the line across the face of the cam in line with the groove on the outside of the cam disc. It will be found easier to fit the cams if the operating link is disconnected from the operating lever by the removal of the pin which is retained by a screw in the stroke adjusting block. The outer guard cam 286V145A or 286V14A should only be fitted when using taps or button dies, and not with self opening dieheads.

Fitting Threading Cams for 3,4,7 and 8 Stations.Fig.5.11 Drg.287Y3

The three pieces that comprises the threading cam are fitted to the drum in the position shown on Fig.5.11 287Y3. A groove across the rim of the drum indicates 0 deg. timing and the cams should be positioned from this groove. Check that a 1.1/4" (31.75mm) roller will pass all points around the cam.

5.10. Calculating the Scale Setting for Threading Cams for Stations 5 and 6.& Also for Stns.3,4,7 & 8

These Threading cams have the same amount of rise as the standard feed cams.but is divided into two parts, an approach stroke and a feed stroke.

The approach stroke = 5/8 of the quadrant setting
The feed stroke = 3/8 of the quadrant setting

The total stroke is equal to the scale setting,To this total stroke must be added the machine fast motion approach stroke, to obtain the total movement of the push rod. the rate of feed during feed stroke is twice the feed rate of the standard feed cams, or twice the feed rate shown on the speed and feed chart for the particular scale setting.

Calculation (c)

$$\text{Scale setting in inches} = \frac{\text{available cutting revolutions}}{2 \times \text{"ON" ratio} \times \text{T.P.I.}}$$

$$\text{Scale setting in mm} = \frac{\text{available cutting revolutions} \times \text{pitch of thread}}{2 \times \text{"ON" ratio.}}$$

Maximum scale setting is 3.1/2" (88.9mm).

For example, to cut a 20 T.P.I. thread using an "ON" ratio of 5, available cutting revolutions from the speed and feed chart = 100. (This is determined by the longest operation).

$$\text{Scale setting} = \frac{100}{2 \times 5 \times 20 \text{ T.P.I.}} = \frac{100}{200} = 1/2"$$

for example, to cut a 1.5mm pitch thread using an "ON" ratio of 5, available cutting revolutions from the speed and feed chart = 100. (This is determined by the longest operation).

$$\text{Scale setting in millimeters} = \frac{100 \times 1.5\text{mm}}{2 \times 5} = \frac{150}{10} = 15\text{mm}$$

Calculating the Scale Setting for the Threading Cams for Stations 3,4,7 and 8.

The feed stroke and scale settings are to be found on Drg.287Y3.

A choice of four feed cams is given and the cam giving the greatest scale setting should be used where ever possible for ease of removal of bar ends. The scale setting gives the total stroke in inches and millimeters, and the setting chosen must be at least equal to the distance from the end of the work to the furthest end of the thread to be cut plus 1.5" (38.1mm) to allow clearance for the bar stop.

In these stations it is first necessary to determine the feed stroke to provide the required feed for the thread to be cut as specified in the following formula. When the feed stroke has been determined, the quadrant scale setting for the selected cam can be determined by reference to the feed stroke/scale setting chart Fig.5.11 Drg.287Y3 This shows the feed stroke in mm/inches and parallel to this is the scale setting for the chosen cam. In order to find the quadrant scale setting, mark the required feed stroke on the vertical scale marked "FEED STROKE", then draw a horizontal line across to the scale setting for the appropriate cam. Where the horizontal line intersects the scale setting line is the figure for positioning the stroke setting block on the quadrant scale.

The feed stroke is determined as follows:-

$$\text{The feed stroke in inches} = \frac{\text{available cutting revolutions}}{4.11 \times \text{"ON" ratio} \times \text{T.P.I.}}$$

$$\text{The feed stroke in mm} = \frac{\text{available cutting revolutions} \times \text{thread pitch}}{4.11 \times \text{"ON" ratio}}$$

For example:- to cut a 20 T.P.I. thread using an "ON" ratio of 5, available cutting revolutions from the speed and feed chart = 100.

$$\text{The feed stroke} = \frac{100}{4.11 \times 5 \times 20} = \frac{100}{411} = 0.243"$$

For example:- to cut a 1.5mm pitch thread using an "ON" ratio of 5, available cutting revolutions from the speed and feed chart = 100.

$$\text{The feed stroke} = \frac{100 \times 1.5}{4.11 \times 5} = \frac{150}{20.55} = 7.3\text{mm}.$$

The available cutting revolutions are based upon the longest operation but where cut off operations are involved in station 3 and always in station 6 the actual revolutions for the threading operation must relate to either 50%, 56% or 62% of the variable cutting revolutions.

Hence this must be taken into consideration when selecting the available cutting revolutions for calculating the feed stroke and deciding upon the cycle time since the available cutting revolutions encompass the total degrees of cam surface in the feed cycle.

The formula for the feed stroke computation has two variables for a given thread pitch, the available cutting revolutions and the "ON" ratio. The "ON" ratio is determined by the optimum surface speed for cutting the material to be threaded and the available cutting revolutions are directly dependent on the cycle time. The choice of cam is directly dependent upon the tooling considerations and this will have a direct bearing on the cycle time and hence the available cutting revolutions.

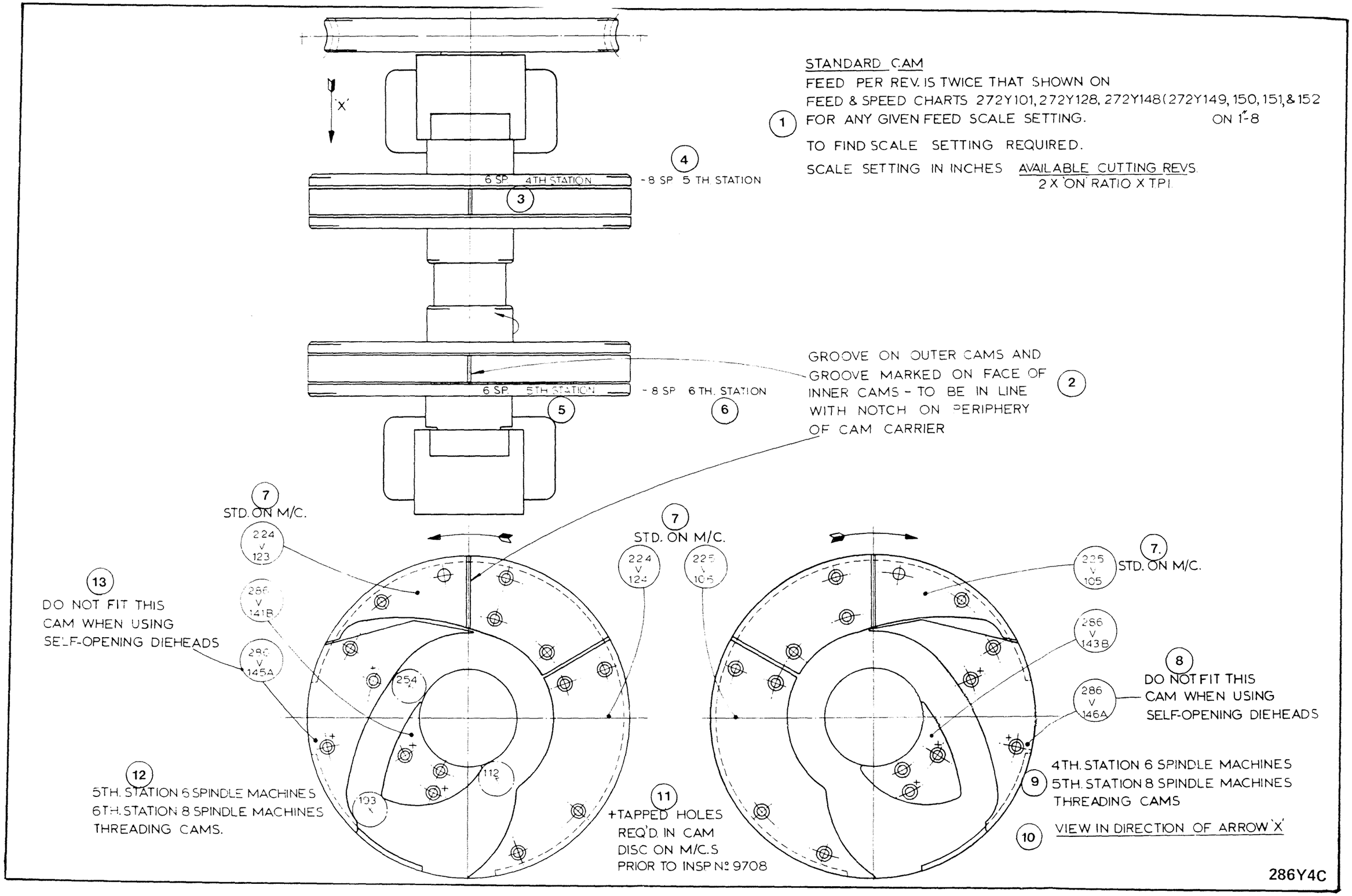
Threading Cams for the 5th and 6th Stations, Drg.286Y4C

1. Standard cam
   Feed per Rev is twice that shown on Feed and Speed Charts - 272Y149A,150,and 152
   for any given Feed Scale Setting.
   To find Scale Setting required:

$$\text{Scale Setting in inches} = \frac{\text{Available Cutting Revs.}}{2 \times \text{"ON" Ratio} \times \text{T.P.I.}}$$

$$\text{Scale Setting in MM} = \frac{\text{Available Cutting Revs.} \times \text{Pitch}}{2 \times \text{"ON" Ratio}}$$

2. Groove on outer Cams and Groove marked on face of inner Cams to be in line with notch on periphery of Cam Carrier.
3. 4th Station.
4. 8 Sp 5th Station.
5. 5th Station
6. 8Sp 6th.Station
7. Std on machine
8. Do not fit this cam when using self opening dieheads.
9. 4th station 6 spindle machines (Not Applicable)
   5th station 8 spindle machines
   threading cams
10. View in direction of arrow 'X'
11. Not Applicable
12. 5th station 6 spindle machines (Not Applicable)
    6th station 8 spindle machines
    Threading cams
13. Do not fit this cam when using self opening dieheads
14. Standard on machine
15. Standard on machine


STANDARD CAM
FEED PER REV. IS TWICE THAT SHOWN ON FEED & SPEED CHARTS 272Y101, 272Y128, 272Y148 (272Y149, 150, 151, & 152 ON 1"-8
1 FOR ANY GIVEN FEED SCALE SETTING.
TO FIND SCALE SETTING REQUIRED.
SCALE SETTING IN INCHES = AVAILABLE CUTTING REVS. / 2 X 'ON' RATIO X TPI
X
4
6 SP 4TH STATION
- 8 SP 5 TH STATION
3
6 SP 5TH STATION
- 8 SP 6 TH. STATION
5
6
GROOVE ON OUTER CAMS AND GROOVE MARKED ON FACE OF INNER CAMS - TO BE IN LINE WITH NOTCH ON PERIPHERY OF CAM CARRIER
2
7
STD. ON M/C.
224 V 123
286 V 141B
286 V 145A
13
DO NOT FIT THIS CAM WHEN USING SELF-OPENING DIEHEADS
254
112
193
12
5TH. STATION 6 SPINDLE MACHINES
6TH. STATION 8 SPINDLE MACHINES
THREADING CAMS.
7
STD. ON M/C.
224 V 124
225 V 105
11
+TAPPED HOLES REQ'D. IN CAM DISC ON M/C.S PRIOR TO INSP Nº 9708
7.
STD. ON M/C.
225 V 105
286 V 143B
286 V 146A
8
DO NOT FIT THIS CAM WHEN USING SELF-OPENING DIEHEADS
9
4TH. STATION 6 SPINDLE MACHINES
5TH. STATION 8 SPINDLE MACHINES
THREADING CAMS
10
VIEW IN DIRECTION OF ARROW 'X'
286Y4C

Threading cams for 3,4,7 and 8 Stations, Drg.287Y3

1. Cams for front auxiliary longitudinal motions (view from attachment face)
2. Cams for rear auxiliary longitudinal motions (view from attachment face)
3. Attachment face
4. Position of front aux. longitudinal motion cams
5. Outer cam disc.
6. Station 8
7. Station 3
8. Middle cam disc
9. Station 7
10. Station 4
11. Inner cam disc = 0.97 x Scale Setting.
12. Actual feed
13. Scale setting for various cams
14. Cam ref. number
15. Actual feed stroke
16. Position of rear auxiliary longitudinal motion cams see 289Z11 for details of numbering of holes in discs

17. To obtain actual feed stroke

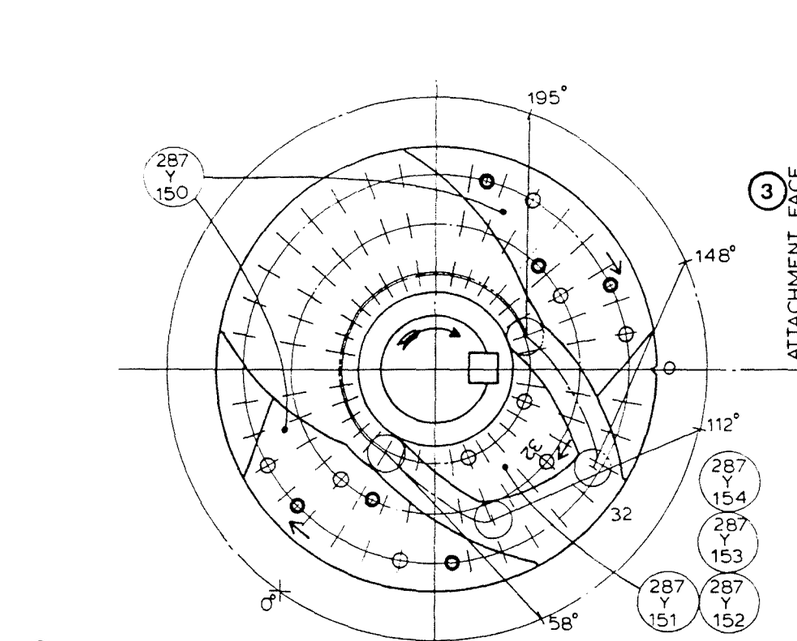
$$\text{Actual feed stroke in inches} = \frac{\text{Available cutting revs.}}{4.11 \times \text{TPI.x 'ON' Ratio}}$$

$$\text{Feed Stroke in millimeters} = \frac{\text{Cutting Revs x Pitch of Thread}}{4.11 \times \text{'ON' Ratio}}$$

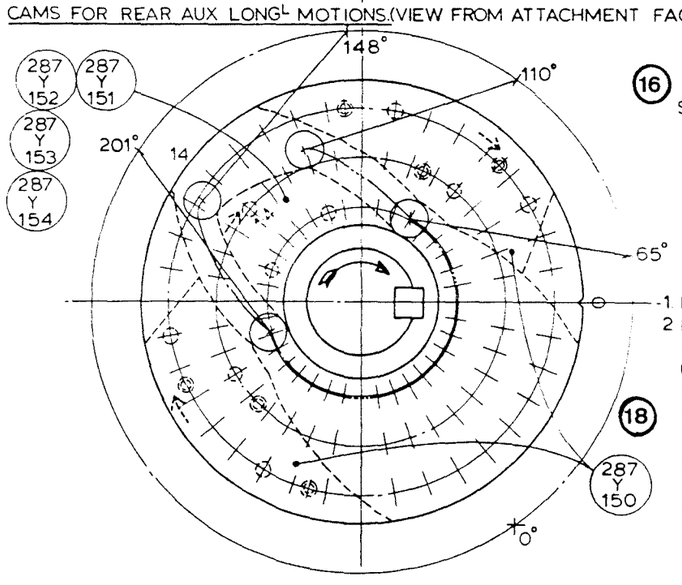
18. TO FIND SCALE SETTING
    1. Mark feed stroke required on Vertical Scale.
    2. Draw horizontal line across and where it cuts. The Cam Lines gives the Scale Setting.

    NOTE. Where a choice of two Cams are available it is preferable to use the one giving the highest scale setting.

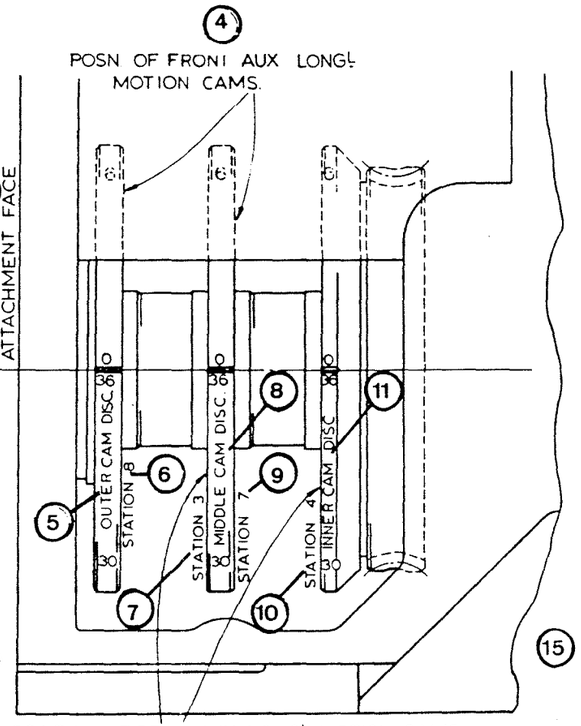
    Total stroke equals scale setting
    Note: Feed cam may be advanced in steps of 10 deg. and guard cams in steps of 5 deg.subject to limitation of screws retaining cams on the other side in the case of the middle cam carrying disc.



2 CAMS FOR REAR AUX LONGL MOTIONS.(VIEW FROM ATTACHMENT FACE)



1 CAMS FOR FRONT AUX. LONGL MOTIONS (VIEW FROM ATTACHMENT FACE)



POSITION OF REAR AUX. LONGL MOTION CAMS.

SEE 289Z11 FOR DETAILS OF NUMBERING OF HOLES IN DISCS.

16

TO OBTAIN ACTUAL FEED STROKE

17

ACTUAL FEED STROKE = $\frac{\text{AVAILABLE CUTTING REVS.}}{4{\cdot}11 \times \text{T.P.I.} \times \text{'ON' RATIO}}$ (INS.)

OR

$= \frac{\text{AVAILABLE CUTTING REVS} \times \text{PITCH (IN MM.)}}{4{\cdot}11 \times \text{'ON' RATIO}}$ (MM.)

TO FIND SCALE SETTING

1 MARK ACTUAL FEED STROKE REQUIRED ON VERTICAL SCALE.

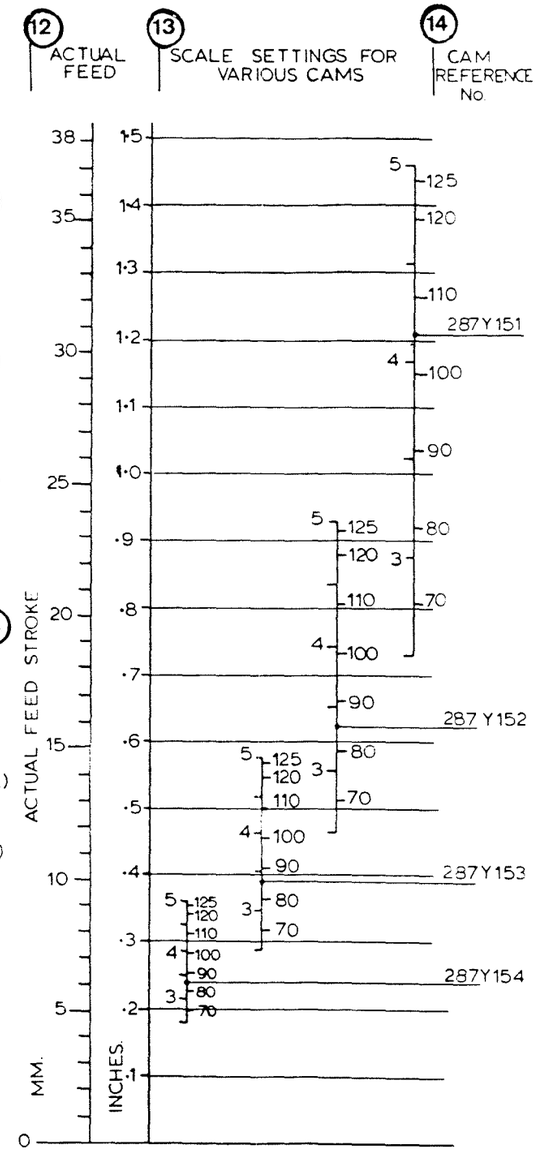
2 DRAW HORIZONTAL LINE & WHERE IT CUTS THE CAM LINES GIVES THE SCALE SETTING.

(NOTE :-WHERE A CHOICE OF TWO CAMS IS AVAILABLE IT IS PREFERABLE TO USE THE ONE GIVING THE HIGHEST SCALE SETTING.)

18

TOTAL STROKE EQUALS SCALE SETTING.

NOTE :- FEED CAM MAY BE ADVANCED IN STEPS OF 10° & GUARD CAMS IN STEPS OF 5° SUBJECT TO LIMITATION OF SCREWS RETAINING CAMS ON THE OTHER SIDE IN THE CASE OF THE MIDDLE CAM CARRYING DISC.



287Y3

5.11 Threading Attachment Return Check Switch

Sections 286G and 186F.

This unit is fitted to the threading attachment in 3,4,6,7 and 8 with the exception when the part off operation is carried out.

The unit consists of a bracket mounted micro-switch with a spring cushioned bell crank lever, a spring operated rod, stop plate, electrical conduit and wiring.

The unit and electrical circuit are so designed that the return of the threading attachment to its fully back position every cycle prepares the electrical circuit for continuous production. The Failure of the threading attachment to return to its fully back position also prepares the electrical circuit so that the timing switch fitted at the bar feed end of the main camshaft de-energises the electro-magnetic feed clutch and engages the electro-magnetic feed brake to stop the machine at collet open. For the electrical circuit please refer to the wiring diagram supplied with the machine.

The switch bracket is bolted to the main drive housing attachment face,See Fig.5.12 Drg.286Z16 and the stop plate 'A'is screwed to the threading attachment bracket; the operating rod carrying the spring 'B' and the clamp is passed through the stop plate, In station 3,4,7 and 8 one spring is fitted whilst in 5th and 6th stations two springs should be fitted.

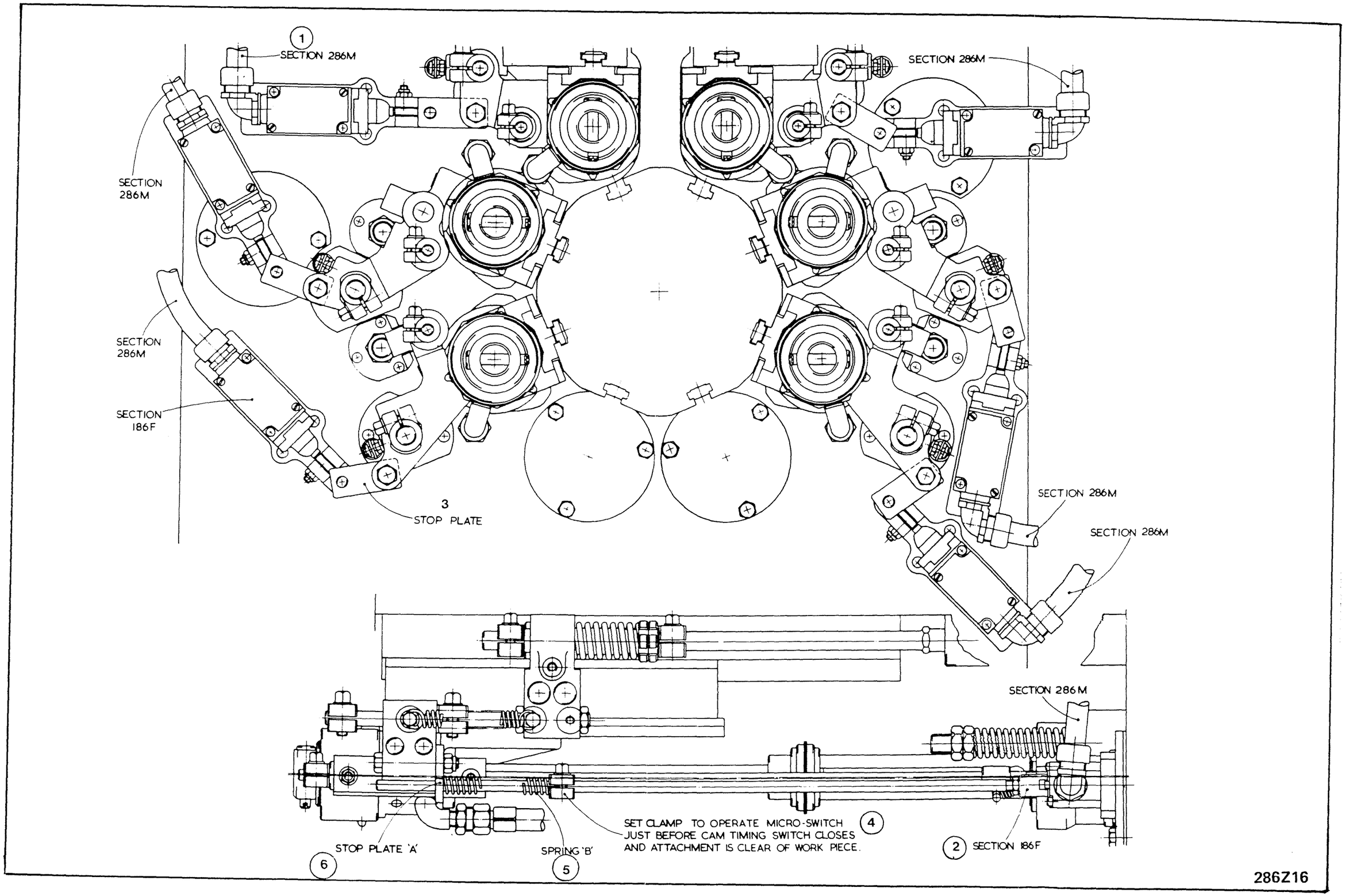
The mechanism is set by hand-winding the machine until the main camshaft timing switch rising up the cam slope is heard to operate (camshaft cover should be removed). Handwind backwards three turns of the handle, and set clamp 'A' on the operating rod to compress the springs 'B' and hold the micro switch in its selected position. Check that sufficient spring movement is available to cover any further return stroke.

It is advisable to check the action of the micro switch daily by holding the operating rod so that it does not operate the switch and in this condition the feed should be tripped when the attachment returns.

Micro-Switch for Checking Threading Attachment Return Drg.286Z16

1. Section 286M
2. Section 186F
3. Stop plate
4. Set cam to operate micro-switch just before cam timing switch closes and attachment is clear of work piece
5. Spring 'B'
6. Stop plate 'A'

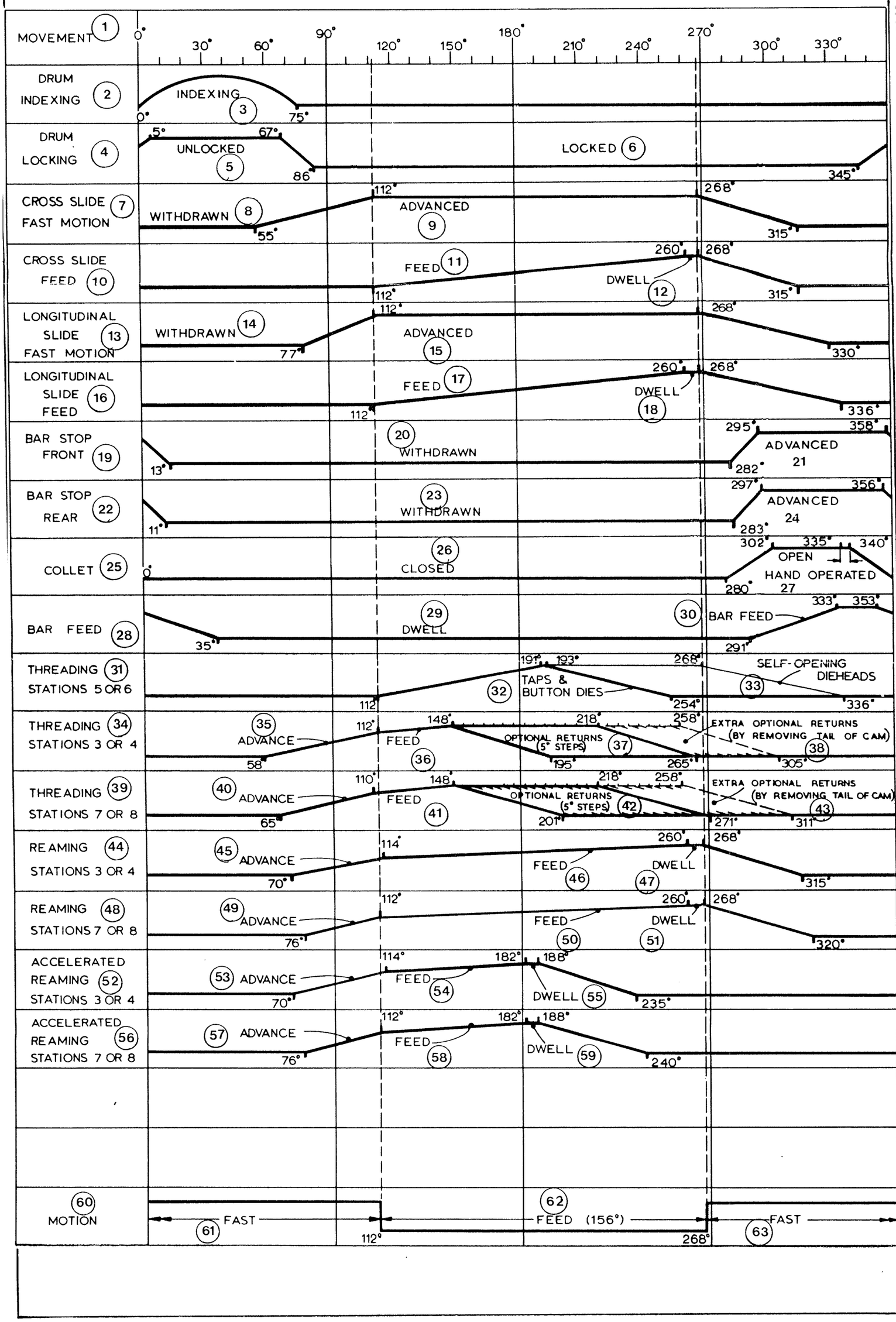
Fig. 5.12 Drg. 286Z16



Timing Diagram Drg. 200Y31

1. Movement
2. Drum indexing
3. Indexing
4. Drum locking
5. Unlocked
6. Locked
7. Cross slide fast motion
8. Withdrawn
9. Advanced
10. Cross slide feed
11. Feed
12. Dwell
13. Longitudinal slide fast motion
14. withdrawn
15. Advanced
16. Longitudinal slide feed
17. Feed
18. Dwell
19. Bar stop front
20. Withdrawn
21. Advanced
22. Bar stop rear
23. Withdrawn
24. Advanced
25. Collet
26. Closed
27. Open hand operated
28. Bar feed
29. Dwell
30. Bar feed
31. Threading stations 5 or 6
32. Taps and button dies
33. Self opening dieheads
34. Threading stations 3 or 4
35. Advance
36. Feed
37. Optional returns 5" steps
38. Extra optional returns (by removing tail of cam)
39. Threading stations 7 or 8
40. Advance
41. Feed
42. Optional return 5" steps
43. Extra optional returns (by removing tail of cam)
44. Reaming stations 3 or 4
45. Advance
46. Feed
47. Dwell
48. Reaming stations 7 or 8
49. Advance
50. Feed
51. Dwell
52. Accelerated reaming stations 3 or 4
53. Advance
54. Feed
55. Dwell
56. Accelerated reaming stations 7 or 8
57. Advance
58. Feed
59. Dwell

60. Motion
61. Fast
62. Feed
63. Fast



OPFR2/8
12/6/90

Fig.5.13 Drg.200Y31

Frame 2, 8-Spindle
Bar, Operators

5.12 Attachment Body & Slide. Sec.188 Drg.288Z11

The attachment body and slide is designed to carry reamer holders,the threading spindle, the High Speed Drilling spindle and any other end working tools of the shank type.

It is used in conjunction with other attachment sections to obtain a motion different from those given by the centre tool block and the independent slides.

The attachment body and slide can be fitted in the 3rd,4th 7th or 8th stations, the slide being mounted on the centre tool block. It can also be mounted in the 5th and 6th stations on the independent longitudinal slides.

The attachment body and slide is operated in the 3rd,4th,7th and 8th stations by cams through the auxiliary longitudinal motion for the station concerned, Cams are available for accelerated and standard timing and reaming for threading in these stations.

5.13 Reaming in Stations 3.4,5,6,7,and 8

Reaming in the 5th and 6th stations

When reaming in the 5th and 6th stations, Standard 5th and 6th longitudinal cams are used. The reamer holder is carried in a bracket tool holder on the independent slides. Timing of the movements is shown on Fig.5.13 Drg. 200Y31 and the required stroke should be set on the quadrant scale.

Reaming in stations 3,4,7 and 8

The attachment body and slide and auxiliary longitudinal motions are operated by cams mounted on the cam discs on the main camshaft in the drive housing. Cams are available for standard or accelerated timing in the 3rd and 4th stations and also for accelerated timing in the 7th or 8th stations, Fig.5.14 Drg. 287Y5 and Fig.15 287Y4. Four reaming cams are available for both standard and accelerated timing in each station. This range of cams gives different proportions of feed to the approach stroke.

Standard timing cams are timed with the centre tool block, whereas accelerated timing cams return early in order to clear the workpiece prior to parting off.

When part off occurs early, due to setting excessive travel on the parting off tool slide, the clearance of the reaming (or threading spindle) to the workpiece will reduce.

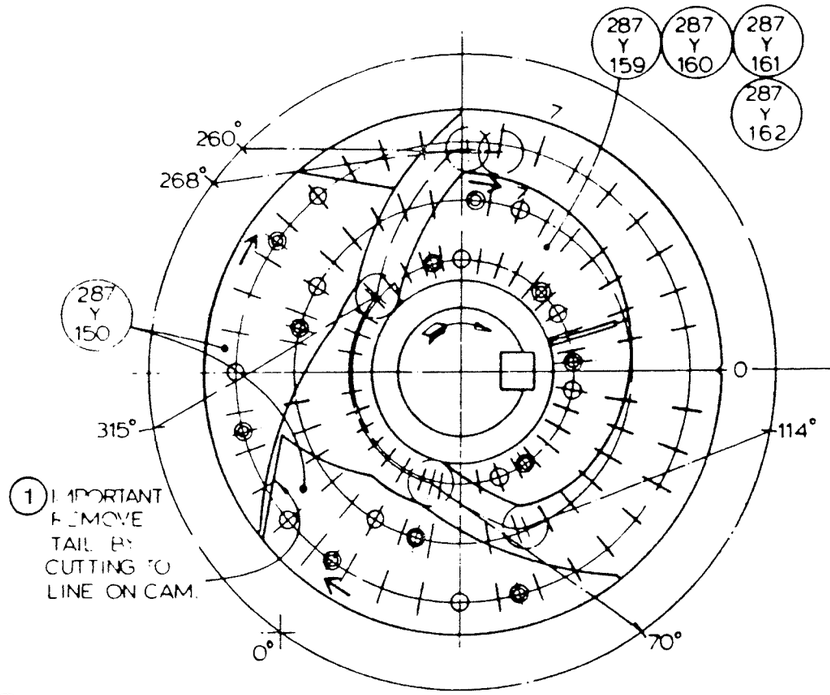
In stations employed in parting off the minimum tool stroke that can be used for reaming should allow for the thickness of the bar stop,

The feed stroke and the scale setting directions are given on Fig.5.14 Drg. 287Y5 and Fig.5.15 Drg. 287Y4. The cam giving the greatest scale setting should be used where ever possible.

1. Important remove tail by cutting to the line of cam
2. Cams for rear auxiliary longitudinal motions (view from attachment face)
3. Attachment face
4. Position of front auxiliary longitudinal motion cams
5. Outer cam disc
6. Station 8
7. Station 3
8. Middle cam disc
9. Station 7
10. Station 4
11. Inner cam disc
12. Actual feed stroke
13. Scale setting for various cams
14. Cam ref. No
15. Actual feed stroke
16. Position of rear auxiliary longitudinal motion cams see 289Z11 for details of numbering of holes in discs
17. To obtain feed and revolutions of spindle
    From feed and speed chart obtain feed/rev for the actual feed stroke.

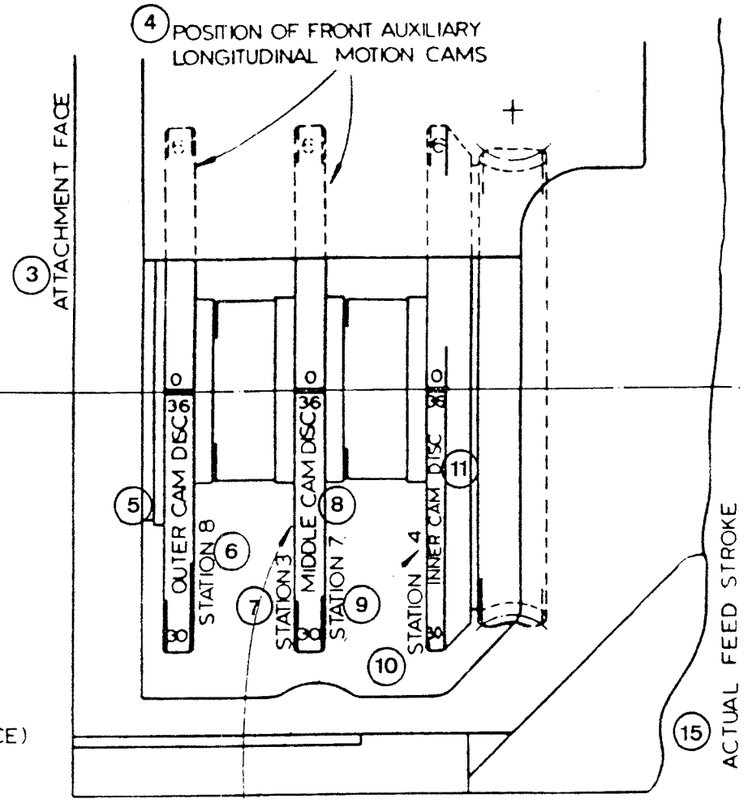
18. To obtain scale setting
    1.Mark feed stroke required on actual feed stroke scale
    2.Draw horizontal line and where it cuts the cam lines gives the scale setting
    Note: Where a choice of two cams is available it is preferable to use the one giving the highest scale setting.
    Total stroke equals scale setting.

19. Important remove tail by cutting to line of cam.
20. Cams for front auxiliary longitudinal motions (view from attachment face)
21. Inches

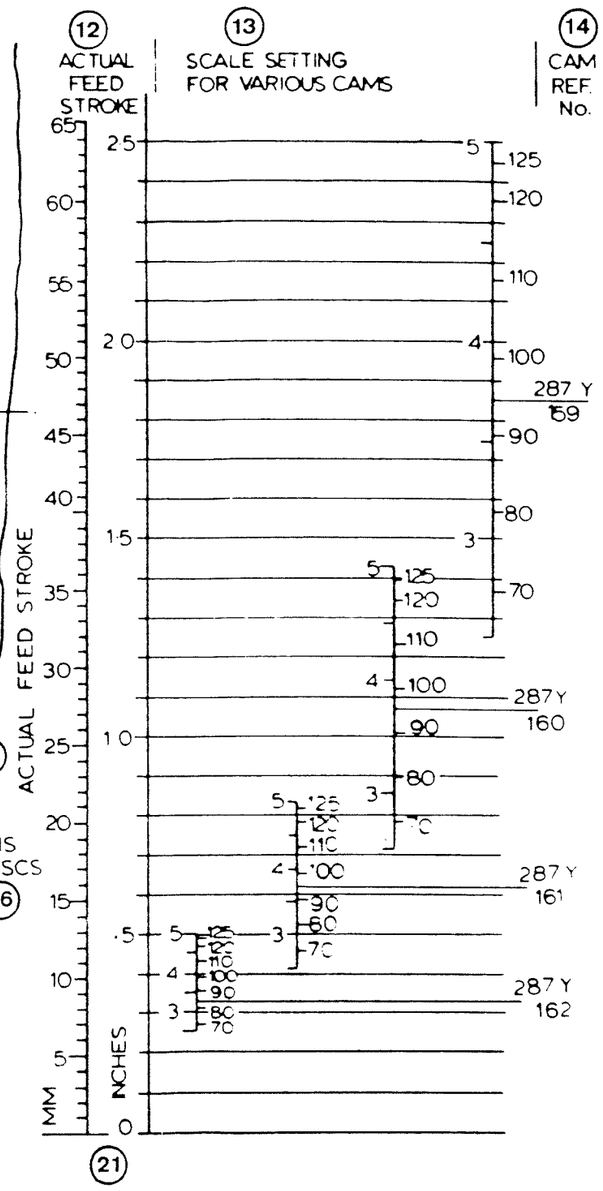


(1) IMPORTANT REMOVE TAIL BY CUTTING TO LINE ON CAM.

(2) CAMS FOR REAR AUXILIARY LONGITUDINAL MOTIONS (VIEW FROM ATTACHMENT FACE)



POSITION OF REAR AUXILIARY LONGITUDINAL MOTION CAMS
SEE 289Z11 FOR DETAILS OF NUMBERING OF HOLES IN DISCS



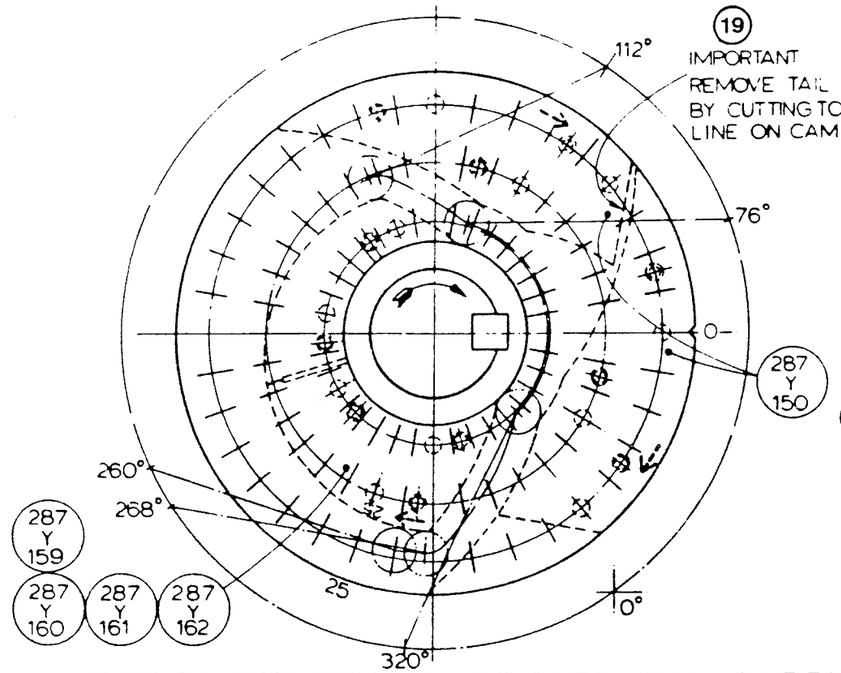
(16)

TO OBTAIN FEED/REVOLUTION OF SPINDLE
FROM FEED & SPEED CHART OBTAIN FEED/REV
FOR THE ACTUAL FEED STROKE (17)

TO OBTAIN SCALE SETTING.
1 MARK FEED STROKE REQUIRED ON
ACTUAL FEED STROKE SCALE
2 DRAW HORIZONTAL LINE & WHERE IT CUTS THE CAM
LINES GIVES THE SCALE SETTING
(18) (NOTE - WHERE A CHOICE OF TWO CAMS IS AVAILABLE
IT IS PREFERABLE TO USE THE ONE GIVING
THE HIGHEST SCALE SETTING.)
TOTAL STROKE EQUALS SCALE SETTING

(21)

(19) IMPORTANT REMOVE TAIL BY CUTTING TO LINE ON CAM



(20) CAMS FOR FRONT AUXILIARY LONGITUDINAL MOTIONS (VIEW FROM ATTACHMENT FACE)

287Y5

Accelerated Reaming Cams Stations, 3,4,7 & 8 Drg. 287Y4

1. Cams for front auxiliary longitudinal motions.(View from attachment face)
2. Cams for rear auxiliary longitudinal motions.(View from attachment face)
3. Attachment face
4. Position of front auxiliary longitudinal motion cams
5. Outer cam disc
6. Station 8
7. Station 3
8. Middle cam disc
9. Station 7
10. Station 4
11. Inner cam disc
12. Actual feed stroke
13. Scale setting for various cams
14. Cam ref. No.
15. Actual feed stroke
16. Position of rear auxiliary longitudinal motion cams (see 289Z11 for details of numbering of holes in disc)

17. Note:
    Cams may be advanced in steps of 5 deg. subject to the limitation of screws retaining cams on the other side in the case of the middle cam carrying disc.

18. To obtain scale setting.

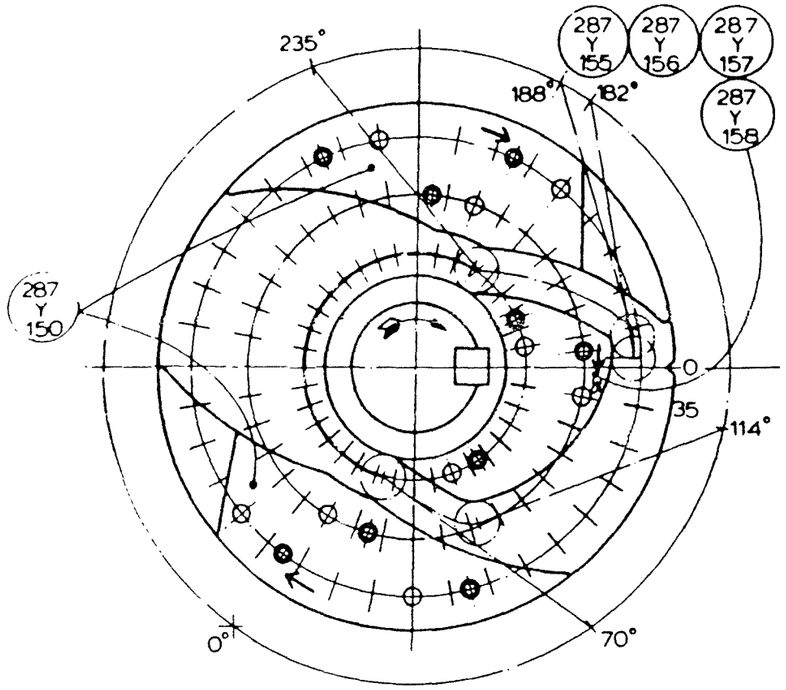
    1. Mark feed stroke required on actual feed stroke scale

    2. Draw horizontal Line & where it cuts the cam lines gives the cam setting.

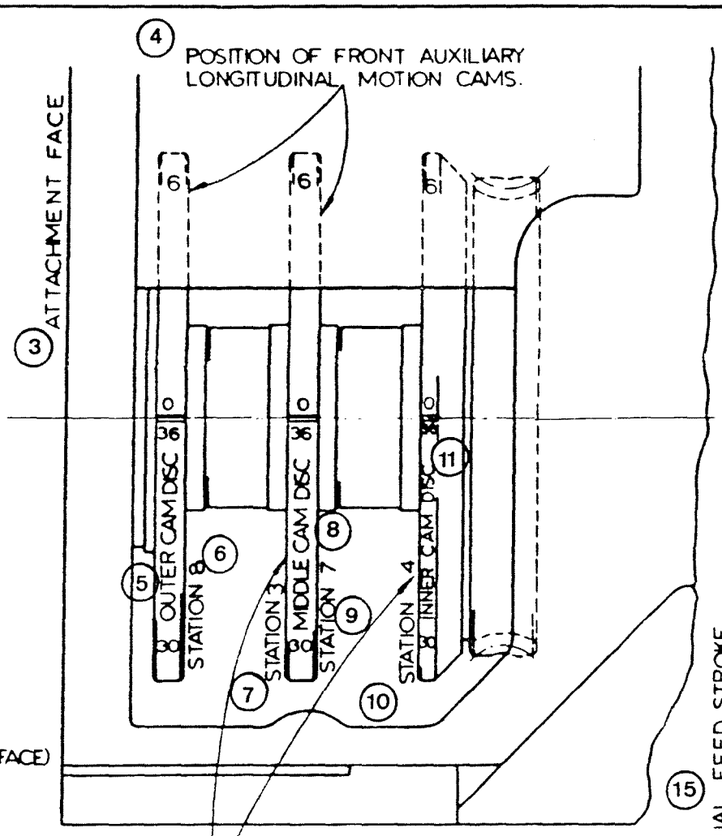
    Note:
    Where the choice of two cams is available it is preferable to the one giving the highest scale setting.

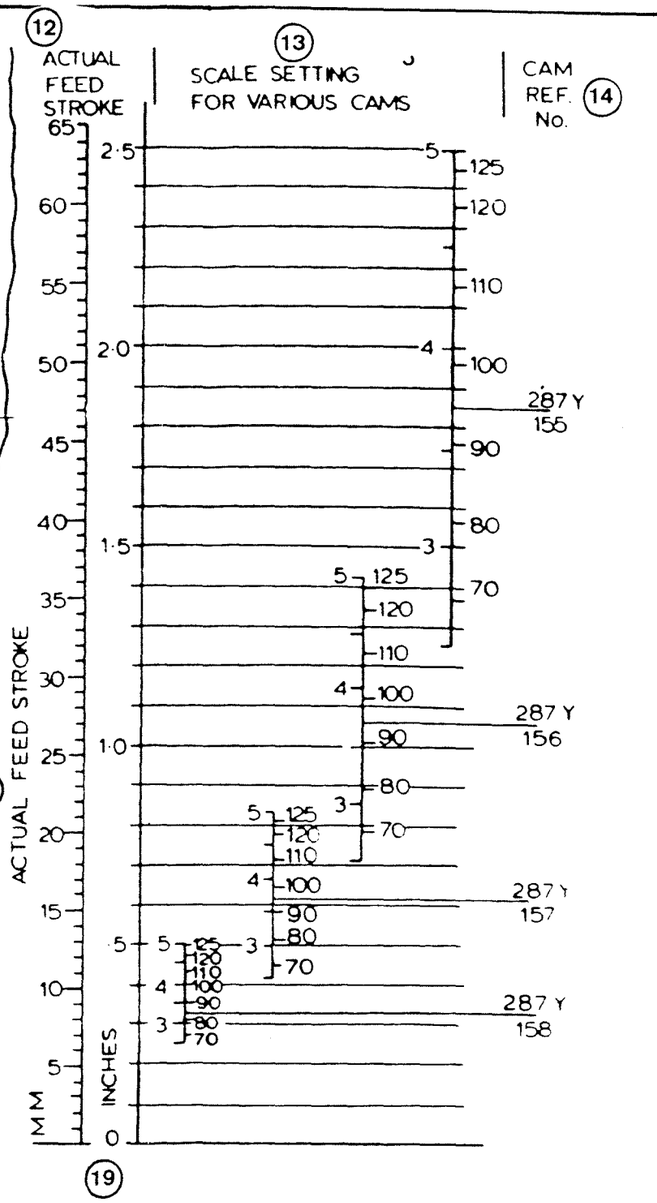
    Total stroke equals scale setting.

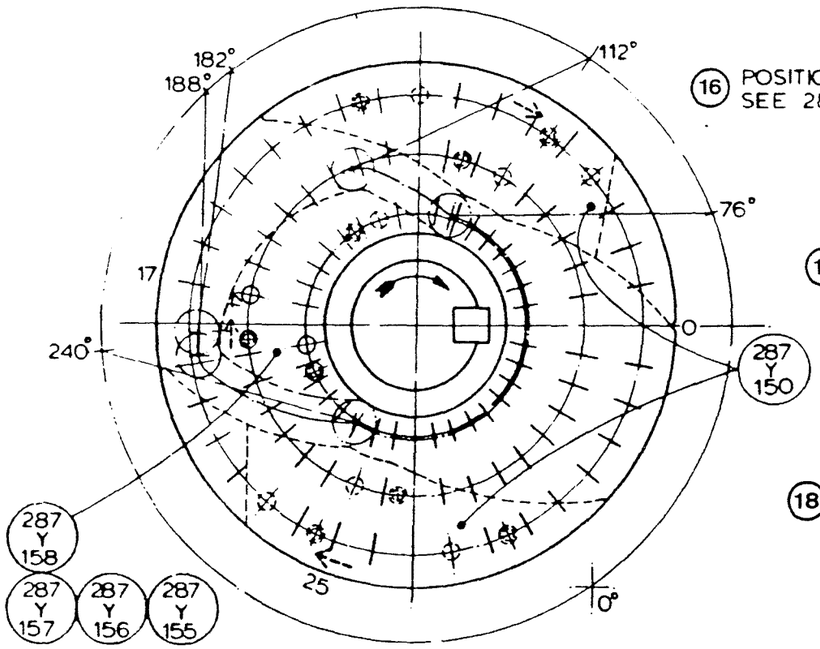
19. Inches



(2) CAMS FOR REAR AUXILIARY LONGITUDINAL MOTIONS (VIEW FROM ATTACHMENT FACE)







(1) CAMS FOR FRONT AUXILIARY LONGITUDINAL MOTIONS. (VIEW FROM ATTACHMENT FACE)

(16) POSITION OF REAR AUXILIARY LONGITUDINAL MOTION CAMS SEE 289Z11 FOR DETAILS OF NUMBERING OF HOLES IN DISCS

NOTE :- CAMS MAY BE ADVANCED IN STEPS OF 5° SUBJECT TO THE LIMITATION OF SCREWS RETAINING CAMS ON THE OTHER SIDE IN THE CASE OF THE MIDDLE CAM CARRYING DISC.

(17)

TO OBTAIN FEED / REVOLUTION OF SPINDLE
FROM FEED & SPEED CHART OBTAIN FEED/REV FOR 2·11 x ACTUAL FEED STROKE.

TO OBTAIN SCALE SETTING
1. MARK FEED STROKE REQUIRED ON ACTUAL FEED STROKE SCALE
2. DRAW HORIZONTAL LINE & WHERE IT CUTS THE CAM LINES GIVES THE SCALE SETTING

(18)

(NOTE - WHERE A CHOICE OF TWO CAMS IS AVAILABLE IT IS PREFERABLE TO USE THE ONE GIVING THE HIGHEST SCALE SETTING.)

TOTAL STROKE EQUALS SCALE SETTING.

287Y4

5.14 High Speed Drilling Attachment

Drive Section 290B, Spindle unit section 290D, and gear and idler arm assembly 290C.

This attachment can be fitted in all stations.

When more than one attachment is fitted, they must be driven at the same drill to workspindle ratio. The standard ratios available are 1.52 to 1, 1.98 to 1, 2.52 to 1 and 2.97 to 1. on the standard machine; the 1.98 to 1 ratio is supplied as standard. On the spindle stopping machine the available ratios are 1.46 to 1,1.88 to 1.2.37 to 1 and 2.77 to 1 with the ratio 1.88 to 1 supplied as standard. The drill and workspindle rotate in opposite directions and the quoted ratio allows for this and gives the relative speed of the drill to the work. A ratio of 1.98 to 1 means that the relative drill speed is 1.98 times the workspindle speed, ie. the drill revolves at 0.98 of the work spindle revolutions per minute as the work but in the opposite direction.

The driving and driven gears for the ratio required are selected from the table on drawing 290Z13. The idler gear carried on a stud in the drive bracket can be fitted in one of two positions depending on the gear ratio selected. This is illustrated on Fig.5.16 Drg. 290Z13.

Only one ratio may be fitted at one time. High speed drilling may be fitted in adjacent stations except the ratios 1.52 to 1 on the standard machine. If these two ratios are used in the 5th or 6th stations check that the threading clutch reset bracket clears the driven gear.

The live spindle Section 290D uses a Bristol Erickson collet to grip the drill with a range of collets ranging from 0.098 to 0.551" (2.5 to 14mm) bore capacity. The maximum drill size through the back stop thread is 0.5" (12.7mm)

Locknuts (L.H. thread) on the drilling spindle adjust a stop rod which provides fine adjustment to the drill and acts also as a positive end stop to absorb the drilling pressure. The live spindle unit fits the standard and overhanging bracket tool holders and the attachment body of Section 188.

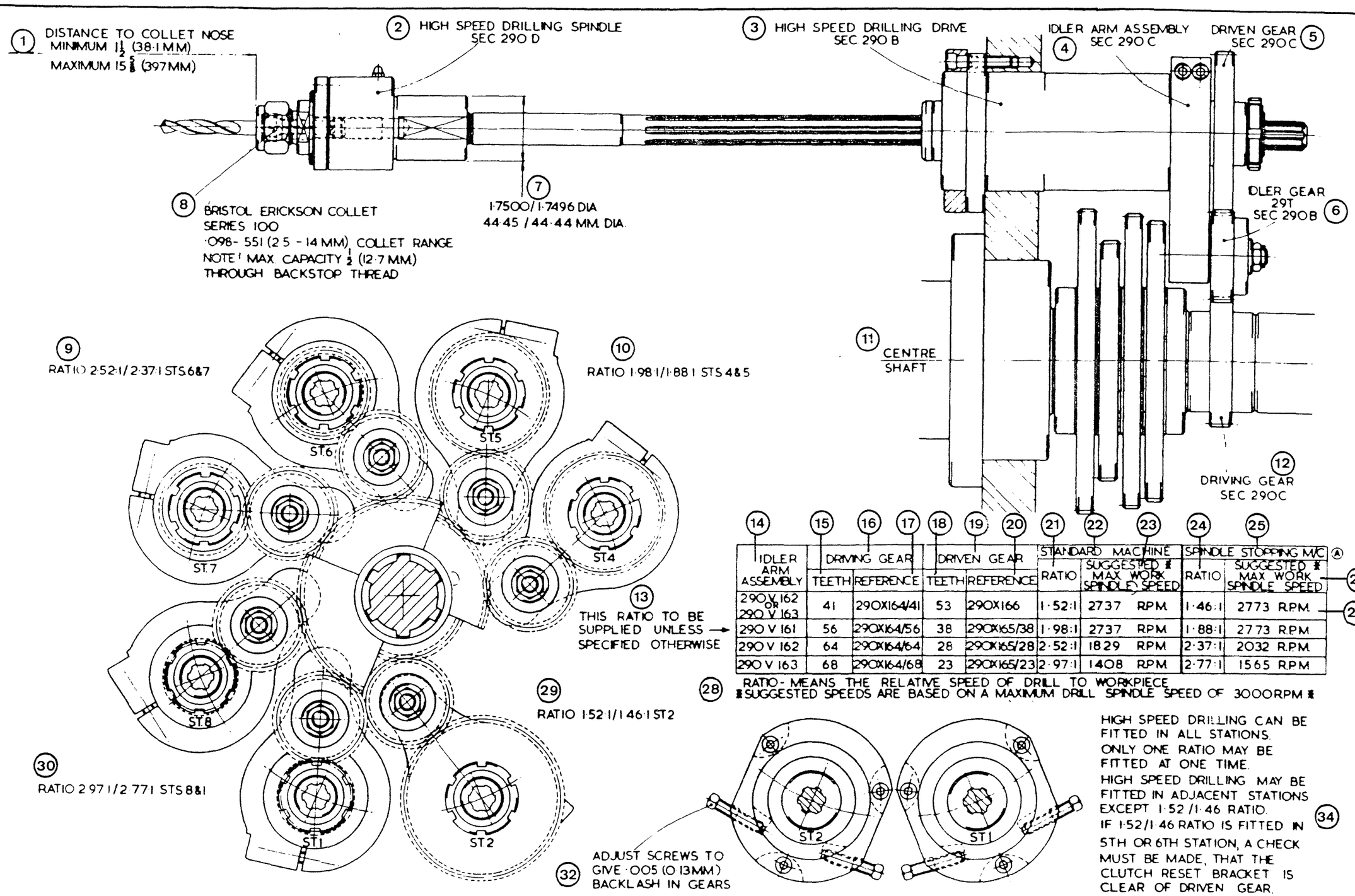
High Speed Drilling Attachment, Drg.290Z13

1. Distance to collet nose min.1.1/2" (38.1mm) max.15.5/8" (397mm)
2. High speed drilling spindle sec. 290D
3. High speed drilling drive sec. 290B
4. Idler arm assembly sec. 290C
5. Driven gear sec. 290C
6. Idler gear 29T sec. 290B
7. 1.7500/1.7496"dia. (44.45/ 44.44mm dia.)
8. Bristol Erickson collet series 100 .098/.551 (2.5/14mm) collet range.

   Note:
   Max. capacity 1/2" (12.7mm) through back stop thread

9. Ratio 2.52 to 1/2.37 to 1 stns. 6 & 7
10. Ratio 1.98 to 1 1.88 to 1 stns. 4 & 5
11. Centre shaft
12. Driving gear sec.290C
13. This ratio to be supplied unless specified otherwise
14. Idler arm assembly
15. Teeth
16. Driving gear
17. Reference
18. Teeth
19. Driven gear
20. Reference
21. Ratio
22. Standard machine
23. Suggested max. work spindle speed
24. Ratio
25. Spindle stopping machine
26. Suggested max. work spindle speed
27. R.P.M
28. Ratio - means the relative speed of drill to workpiece
    Suggested speeds are based on a max. drill spindle speed 3000 RPM.
29. Ratio 1.52/1.46 stn. 2
30. Ratio 2.97 to 1/2.77 to 1 stns. 8 & 1
31. View inside attachment housing
32. Adjust screws to give .005 (0.13mm) backlash in gears
33. View outside attachment housing
34. High speed drilling can be fitted in all stations. Only one ratio may be fitted at one time. High speed drilling may be fitted in adjacent stations except 1.52/1.46 ratio. If 1.52/1.46 ratio is fitted in 5th or 6th station, a check must be made that the clutch reset bracket is clear of driven gear.

35. To order Sec. 290C specify: Ratio, Idler arm assembly, Driving gear and driven gear



14 IDLER ARM ASSEMBLY	15 DRIVING GEAR TEETH	16 DRIVING GEAR REFERENCE	17	18 DRIVEN GEAR TEETH	19 DRIVEN GEAR REFERENCE	20	21 STANDARD MACHINE RATIO	22 STANDARD MACHINE SUGGESTED * MAX WORK SPINDLE SPEED	23	24 SPINDLE STOPPING M/C Ⓐ RATIO	25 SPINDLE STOPPING M/C Ⓐ SUGGESTED * MAX WORK SPINDLE SPEED
290 V 162 OR 290 V 163	41	290X164/41		53	290X166		1·52:1	2737	R.P.M.	1·46:1	2773 R.P.M.
290 V 161	56	290X164/56		38	290X165/38		1·98:1	2737	R.P.M.	1·88:1	2773 R.P.M.
290 V 162	64	290X164/64		28	290X165/28		2·52:1	1829	R.P.M.	2·37:1	2032 R.P.M.
290 V 163	68	290X164/68		23	290X165/23		2·97:1	1408	R.P.M.	2·77:1	1565 R.P.M.

5.15 Synchronous Plain Pick-Up Attachment & Pick Up & Back Machining Attachment

Pick-Up attachments are available for the 8th and 4th stations.(Stn.4 principally for the use on double bar feed machines).The attachment is either the 'plain pick-up' where a component is to be steadied to provide a pipeless part-off, or for 'pick-up and back machining operations' where a component is to receive a minor back machining operation after part-off such as chamfering, recessing or deburring. The latter is done in conjunction with a special bar stop cam and mechanism, with a suitable tool mounted on the rear face of the bar stop arm.

The Attachment consists of an attachment body and spindle assembly with a bobbin operated compensated dead length collet, the assembly arranged to operate on a slide bolted to the centre tool block. The front end of the spindle is arranged to be flushed out with filtered coolant to exclude swarf.

The Spindle is fitted with an ejector, designed to suit the component to be manufactured, and is operated by a push rod co-axially mounted through a hollow drive shaft on the return stroke of the attachment. The push rod is mounted in the adaptor plate secured to the ejector rod housing which is located in and clamped to the rear wall of the attachment drive compartment of the main drive housing.

The spindle attachment body carries on two support rods, a cam and yoke assembly for operating the collet bobbin at any point in the longitudinal travel of the attachment by means of a splined shaft extending from a bracket bolted to the main drive housing attachment face. It is operated accurately from a cam drum and lever mechanism.

The Drive Unit Drg. 200Y183

The drive unit comprises of a drive drive housing, mounted in the appropriate attachment bore of the main drive housing attachment face; the housing supports a hollow splined driving sleeve which engages with the splined driving shaft of the pick up attachment. The hollow driving sleeve is supported by ball journal bearings and carries the synchronous driven gear which meshes with the driving gear on the centre shaft of the machine inside the main drive housing. The driven gear has 48 teeth when fitted to the standard machine and 45 teeth when fitted to the spindle stopping machine.

On standard machines (not spindle stopping machines) the spindles in the spindle drum are so arranged that the angular position of the collet driving keys of all spindles in any station is always the same within 180 deg.,so that a collet with a hexagon or square bore may be used in the pick up attachment. To achieve this the attachment spindle must be arranged to come into line, by selecting the best gear teeth To mesh and by choosing the best of the five keyways available in the bore of the attachment driven gear, to engage the key on the hollow splined driving sleeve.

The Auxiliary Longitudinal Motion.

Section 289D		Common parts
	E }	
	G }	Extra parts for station 8

The longitudinal motion is obtained by the use of the standard auxiliary motion sections listed above, the special cams required being mounted on the appropriate cam disc. These cams are supplied with the attachment to suit the component.

The Collet Operating Mechanism Drg. 200Z185

The collet of the pick up attachment in both the 4th and 8th stations is operated from a split cam drum clamped around the main camshaft in the front of the main drive housing, and carrying separate adjustable dogs for the opening and closing the collet by means of a cam lever, having a spring over centre device and adjustable dead stops in each direction.

For the 4th station attachment, extra levers and links connect to the lever on its splined shaft.

The cam drum,dogs and levers are all shrouded by sheet metal covers.

Bar Stop Drg. 200Z180.

For the plain pick up attachment the standard bar stop can be used.

For the pick up and back machining operations in station 8 a special bar stop assembly A11823 is used, which is adapted for mounting a special cutter, and provides a dead stop to control the depth of machining.

A special bar stop cam replaces the standard bar stop cam

The Assembly of the Pick Up Attachment

Fit the drive unit see Fig.5.20 Drg. 200Y183 in its appropriate bore, together with the gears transmitting the drive from the centre shaft. Fit the ejector rod assembly together with the splined drive shaft through the drive unit. Fit the cams and the longitudinal motion. Fit the pick up spindle assembly to the centre block with the slide in its best position. Couple the splined drive shaft to the spindle and assemble the stop rod and pusher rod.

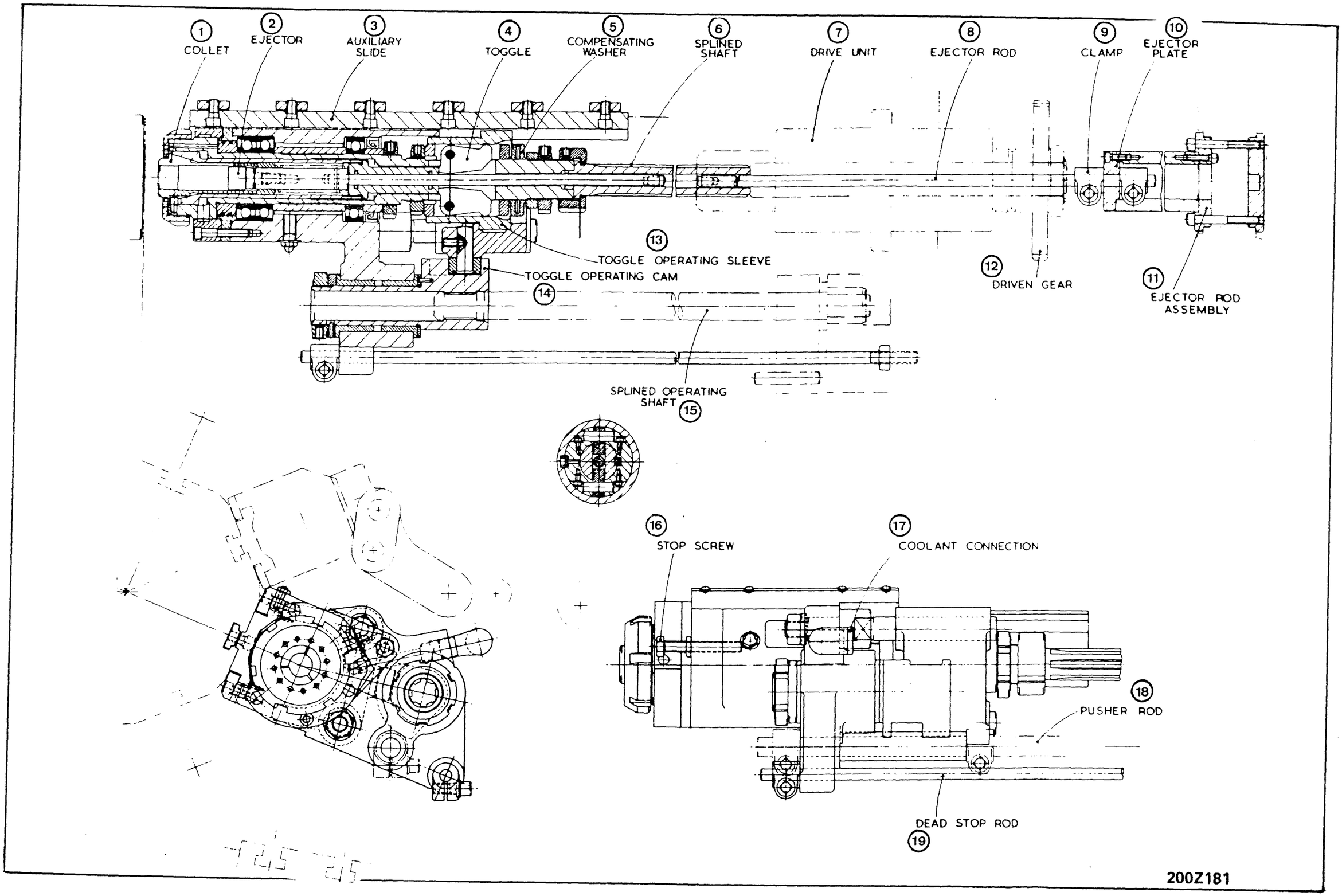
If required by the set up, align the attachment collet with the work spindle collet by selection of the best gear tooth meshing, and the best of 5 keyways in the driven gear as previously described,(this is only possible on standard machines, not spindle stopping machines).

Fit the ejector, collet closing sleeve, collet and spindle nose cap. connect coolant to the spindle head. Lubricate spindle bearings through the oil nipple provided. Finalise all adjustments.

Synchronous Pick-Up Attachment Station 8 Drg. 200Z181

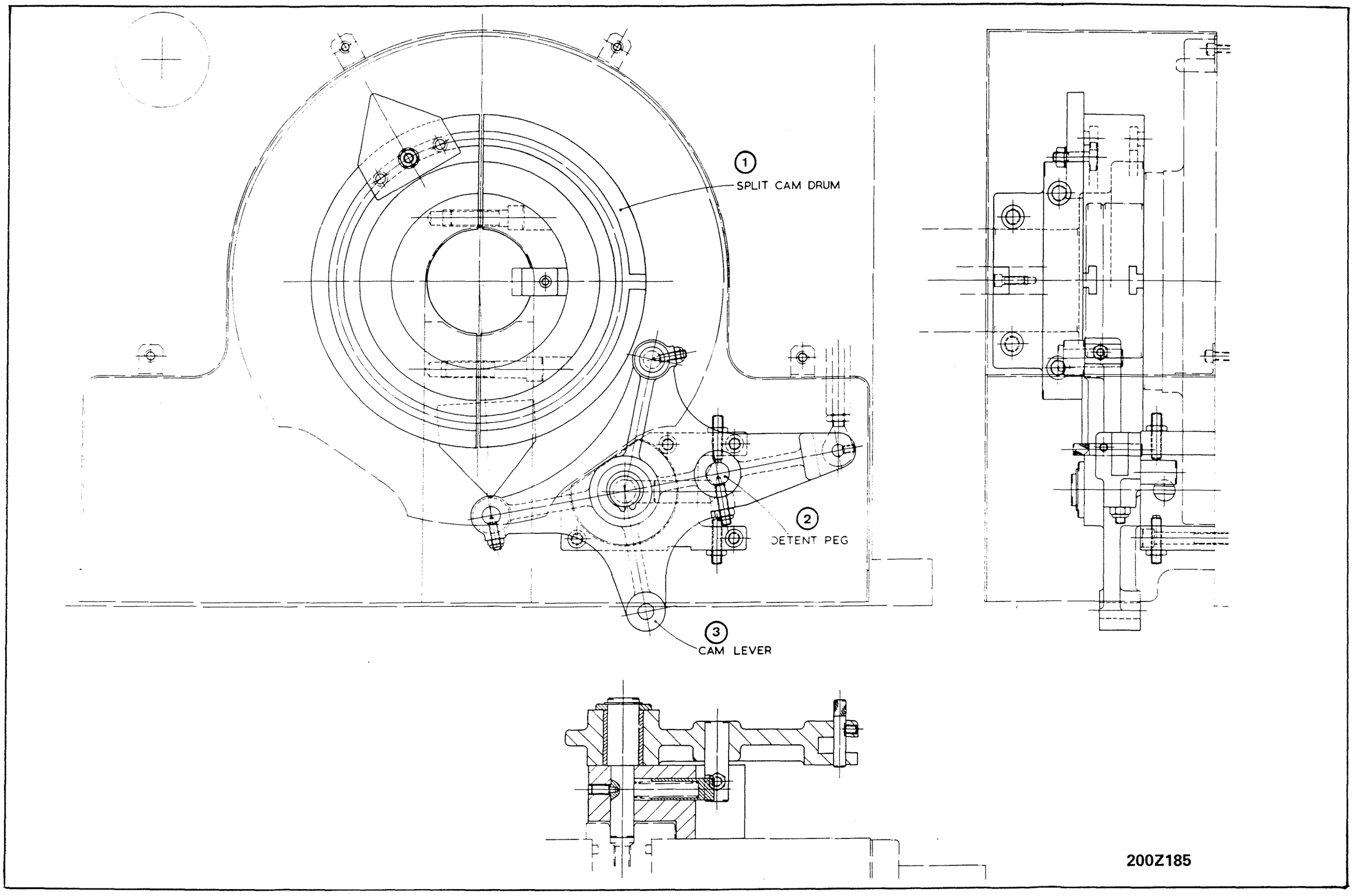
1. Collet
2. Ejector
3. Auxiliary slide
4. Toggle
5. Compensating washer
6. Splined shaft
7. Drive unit
8. Ejection rod
9. Clamp
10. Ejector plate
11. Ejector rod assembly
12. Driven gear
13. Toggle operating sleeve
14. Toggle operating cam
15. Splined operating shaft
16. Stop screw
17. Coolant connection
18. Pusher rod
19. Dead stop rod

Fig. 5.17 Drg. 200Z181



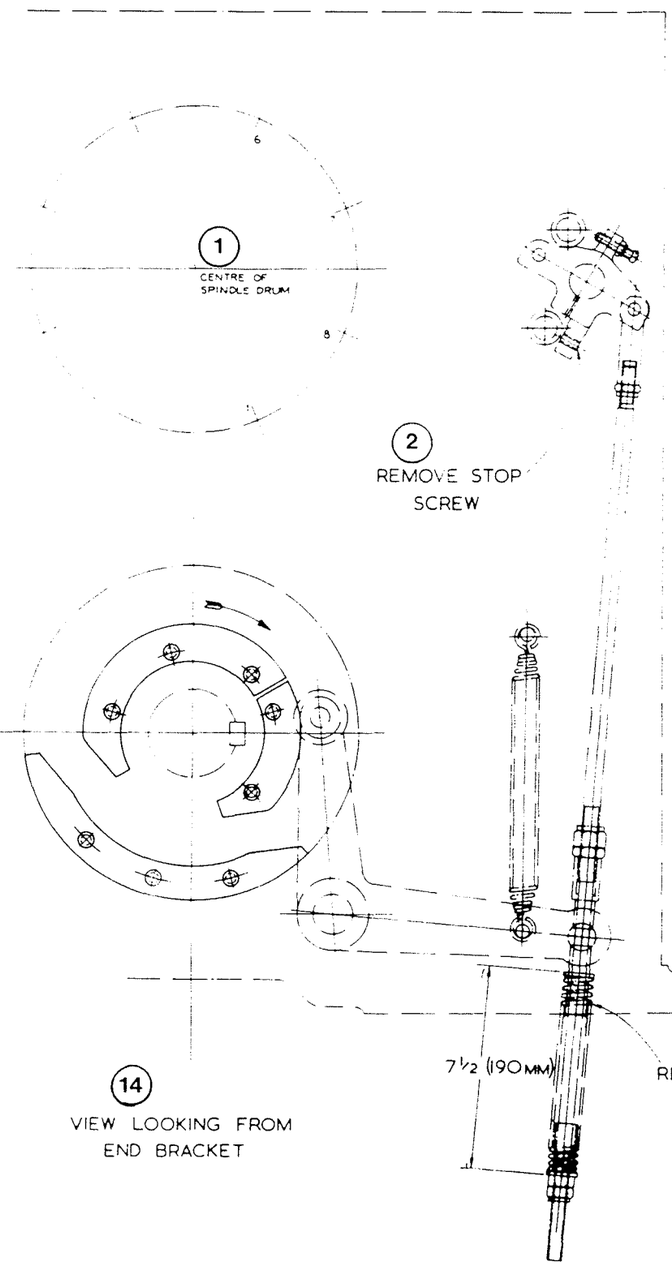
Cam Drum and Operating Lever, Collet Mechanism Drg. 200Z185

1. Split cam drum
2. Detent peg
3. Cam lever

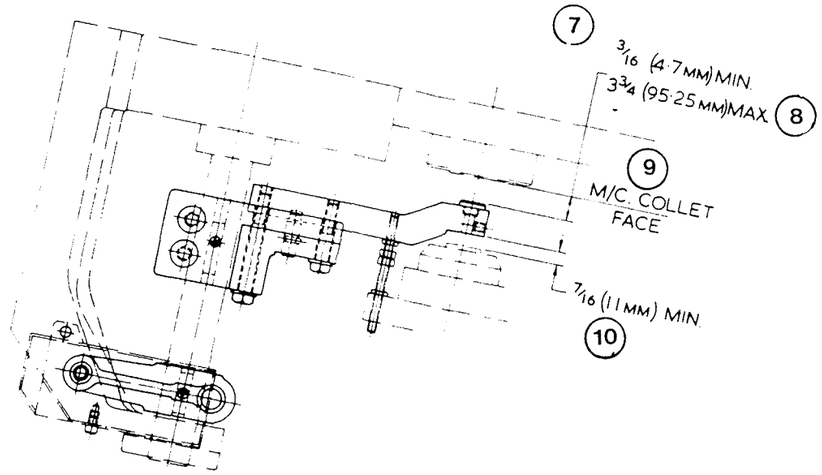

1
SPLIT CAM DRUM
2
DETENT PEG
3
CAM LEVER
200Z185

The Arrangement of bar Stop and Back Burr, Pick Up Attch.Drg.200Z180

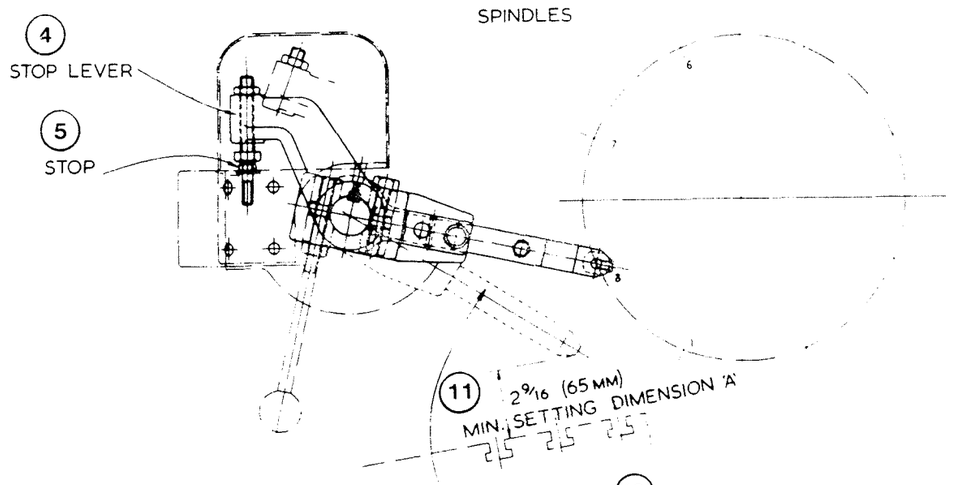
1. Centre of spindle drum
2. Remove stop screw
3. Set stop screw to give min. setting dimension
4. Stop lever
5. Stop
6. View towards spindles
7. 3/16" (4.7mm)min.
8. 3.3/4"(95.25mm) max.
9. M/C Collet face
10. 7/16"(11mm) min.
11. 2.9/16"(65mm)min. setting dimension 'A'
12. Check that bar stop clears tool holders on station one cross slide
13. Replace standard machine spring with spring 295X199
14. View looking from end bracket



3
SET STOP SCREW TO GIVE MIN. SETTING DIMENSION 'A'



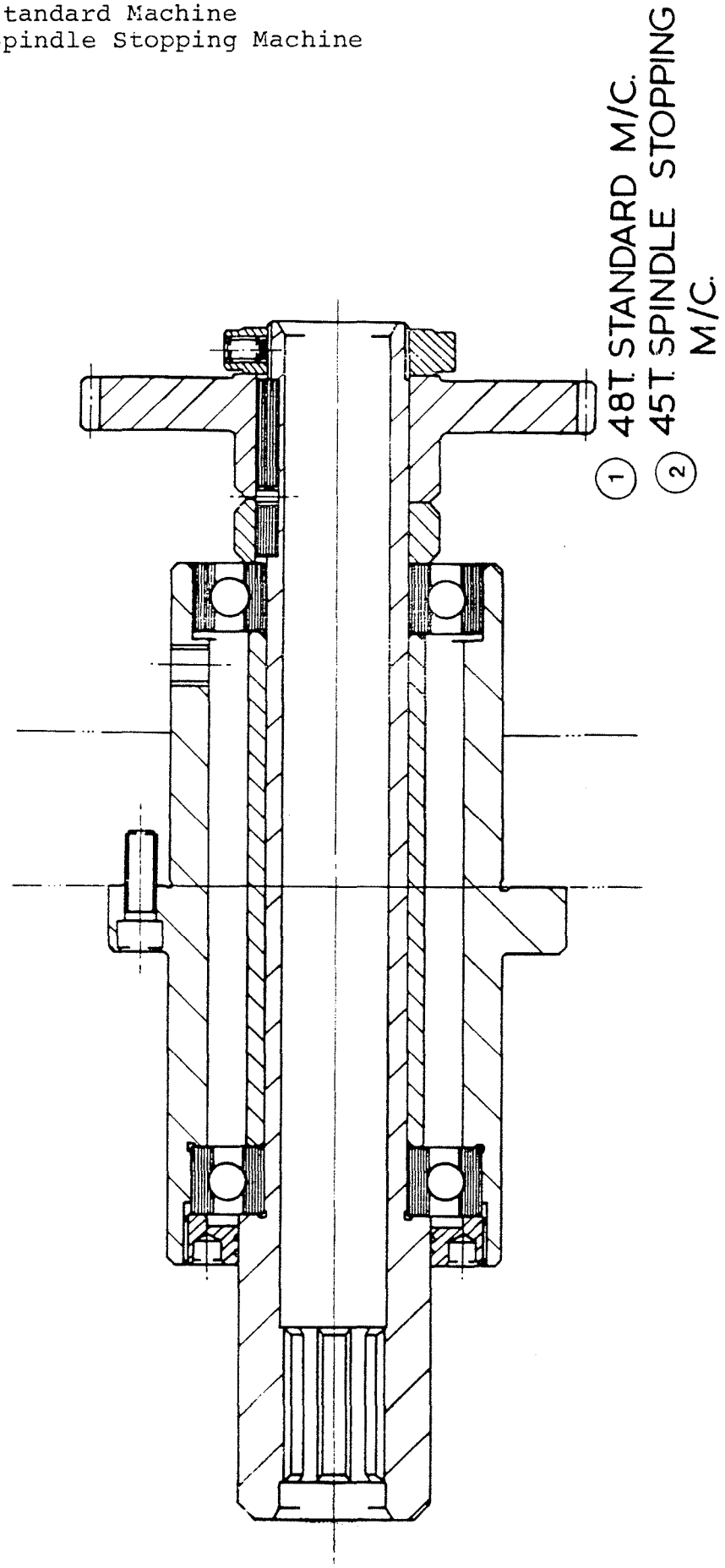
6
VIEW TOWARDS SPINDLES



200Z180

Fig 5.20 Pick-Up Attachment & Drive Unit Drg. 200Y183

1. 48T Standard Machine
2. 45T Spindle Stopping Machine



5.16 Chasing Attachments for Stns.5 & 6 Fig.5.21 Drg.292Z19

This attachment can be fitted to the cross slide in the 5th & 6th station and comprises: A drive unit, Chasing attachment,& extra Parts.

The Drive Unit, Sec.192 Mk.111. Stn.5 Fig.5.22. Stn.6 Fig.5.23.

The chasing slide is oscillated by the lead cam, and is moved to and from the work by the relief cam and tension spring. The tension of the spring can be adjusted by the nuts on the spring anchor, whilst the attachment is running to give the machine quiet running. The tension required varies according to the speed.

The maximum speed at which the attachment should be run is 400 cycles per minute.

Oil must be maintained in the reservoir and checked daily.

The drive is by chain from the centre shaft sprocket to a shaft which extends through to the drive unit mounted on the attachment face of the main drive housing. The final drive across to the chasing attachment is by a universally jointed shaft.

The drive unit is fitted with two pick-off gears which are selected to give the ratio required to suit the job.

The ratio is the number of work spindle revolutions during one revolution of the attachment camshaft, ie. with a ratio of 6:1 the spindle revolves six times during one revolution of the camshaft.

On the spindle stopping machine, the final gears on the drive unit are different to those used on the standard machine. When ordering the attachment for use on a spindle stopping machine this must be stated. The relation of the drive pin in the slotted shaft must be correct as indicated by the identification letters

5th Station Chasing Attachment

Selection of Threading Ratio

The ratio is chosen in conjunction with the lead cam to suit the lead of the thread to be cut, both of which are selected from the chart at With any lead cam, various leads can be cut by using different ratios. Ratios of 4:1, 5:1 and 6:1 are preferred in order to obtain the maximum number of passes of the tool over the work during the cutting cycle. When using high spindle speeds, the ratio chosen must be such as to keep the speed of the attachment within the maximum allowable. The number of work spindle revolutions during the 8 deg. dwell (See Feed & Speed Charts) must be more than the ratio used. This ensures at least one complete pass to give a parallel thread.

Changing Lead Cams

Remove attachment from cross slide and cover plate above chasing slide.
Release the tension on relief spring and unhook from the spring anchor
Swing the slide forward until roller is free from lead cam.
Remove the large end cap on the face opposite to drive shaft.
Remove the camshaft nut, bearing and spacer.
The lead cam may then be removed. Extraction holes 1/4" BSF are provided in the inner cam.
The new lead cam is fitted in the reverse order, checking that there is clearance for the lead roller all the way round the cam track.

Chasing Cutter

This is designed to suit the lead cut. The width of chasing cutter may be determined by the job when threading behind a shoulder. The length behind the shoulder must be equal to the total travel due to the lead cam, plus the width of the chasing cutter, plus an allowance at each end for clearance. Determine the minimum width of undercut as follows:

$$\text{Minimum width of undercut} = .0725L + \frac{L}{R} + \text{clearance}$$

where L = lead of cam
R = ratio
clearance = .010" (.025 mm.)

If found necessary to reduce the cutting load, teeth may be ground off the chaser, leaving 1 in $\frac{R}{2}$ teeth.

(Take $\frac{R}{2}$ to nearest less whole number).

e.g. Using ratio of 7, leave one in every
$(\frac{7}{2} = 3.1/2)$ three teeth.

The chasing cutter is mounted on a removable bracket which clamps to the dovetail on the slide. A stop screw in the bracket can be set so that the bracket may be removed and replaced without altering the endwise setting. The height of the cutting edge is set from the edge of the bracket by the gauge provided.

Setting

The feed strokes set on the cross slide is set to the depth of thread plus .005" (.01 mm). This is so small that the stroke must be set and checked by using a dial indicator. With the cross slide at the start of the feed, mount a dial indicator so that it registers the stroke of the slide. Handwind to the end of feed and check the travel indicated adjust cross slide link until correct travel is obtained.

Taper in the thread can be eliminated by loosening the clamp bolts and adjusting the set screws in the strip behind the attachment. Ensure that all bolts are tight before running the attachment.

Left Hand Threads

Left hand threads are obtained by using left hand lead cams,

The spring, plunger and cap in the attachment chasing slide must be reversed to give endwise pressure in the opposite direction.

Application

Fig. 5.21 Drg. 292Z19 Gives the diameter and length capacity of the attachment and also useful information on lead cams and ratios to be used, undercut dimensions ect.

1. 7/16"dia. 'U' limit
2. 3/4" max. using 192X134
3. 1.3/4"dia. standard
4. 1/8"dia.'U' limit
5. 1.3/4"max. stn.5
6. 2.1/16"max. stn.6
7. General dimensions of chasing cutter if found necessary to reduce the cutting load,teeth may be ground off leaving Ratio Teeth
   2
   Take Ratio to nearest lesser number.
   2

   eg. Using ratio of 7 to 1 leave on one in every 7/2 ie.1 in 7 T

8. 1.27/32"max. 27/32"min.
9. Chasing cutter shown in mid position
10. 3.1/2"min.
11. 6.3/4"max.
12. Front face of drum housing
13. 9.3/4"max. forward position of longitudinal slide
14. Lead cam
15. Relief cam
16. Min. width of undercut
17. Pitch
18. Cam lead
19. Station 6
20. Lead cams
21. Drg. No
22. RH Thread
23. LH Thread
24. Lead to be cut
25. Station 5
26. Cam lead ratio
27. 1.21/32"max. 27/32"min. position at end of feed stroke

28. Lead to be cut = Cam lead
    Ratio

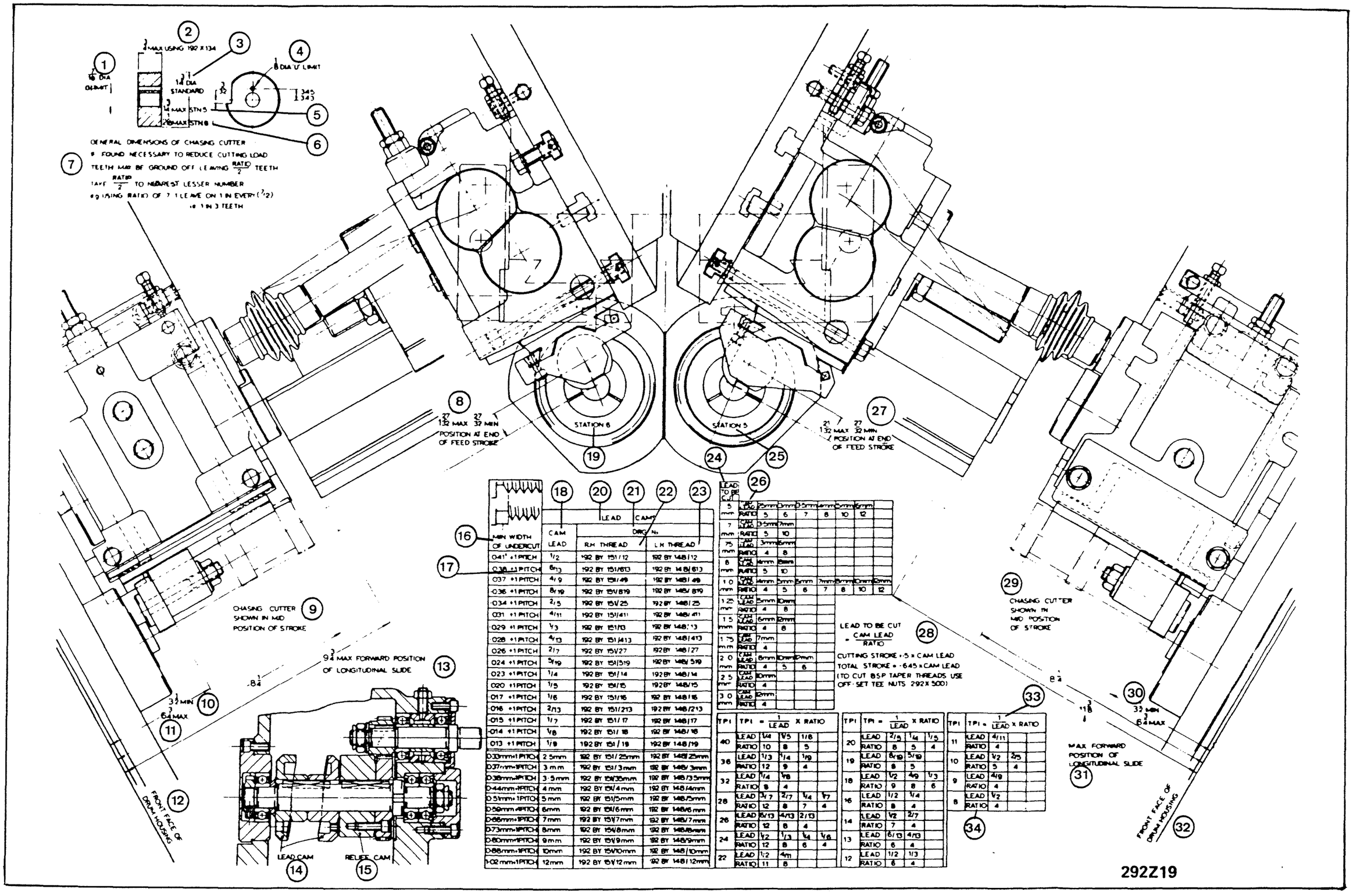
    Cutting stroke = .5 x cam lead
    Total stroke = .645 x cam lead

    To be cut BSP taper threads, use off set tee nuts 292X500

29. Chasing cutter shown in mid position of stroke
30. 3.1/2"min. 6.3/4"max.
31. Max. forward position of longitudinal slide
32. Front face of drum housing
33. TPI = 1 x Ratio
    Lead

34. Lead ratio

Fig. 5.21 Drg. 292Z19



Chasing Attachment Drive 5th Station Drg. 292Z17

1. Important these universal joint fork ends must be in line
2. Driven pick off gear
3. Station 5
4. Driven pick off gear
5. Station 4
6. Centre drive shaft
7. Station 3
8. List of available pick off gears 20 deg. PA
9. No of teeth
10. DP
11. Drawing Ref.No.
12. Ratio
13. No. of teeth
14. DP
15. Driver
16. Drg. Ref. No.
17. No. of teeth
18. DP
19. Driven
20. Drg. Ref. No.
21. Alternative position for chaser
22. Standard chaser bracket
23. Centre shaft
24. The following items are also required
25. 27T 1"- 8
    30T 1"- 8 Spindle Stopping
26. Drg. No.
27. No. off

IMPORTANT:
THESE UNIVERSAL JOINT FORK ENDS MUST BE IN LINE

1

2 DRIVEN PICK-OFF GEAR

3 STATION 5

4 DRIVER PICK-OFF GEAR

36T

24T

5

STATION 4

6 CENTRE DRIVE SHAFT

7 STATION 3

8

LIST OF AVAILABLE PICK-OFF GEARS 20° PA		
No OFF TEETH	DP	DRAWING REF No
44	20	192BV130A/1
50	20	192BV130A/2
55	20	192BV131A/1
60	20	192BV131A/2
66	20	192BV131A/3
33	18	192BV130A/3
66	18	192BV131A/4
33	16	192BV130A/4
55	16	192BV131A/5
33	14	192BV130A/5
36	14	192BV131A/6
42	14	192BV131A/8
44	14	192BV131A/7
24	12	192BV130A/6
44	12	192BV131A/9

RATIO	DRIVER			DRIVEN		
	No OF TEETH	DP	DRG REF No	No OF TEETH	DP	DRG REF No
4:1	66	20	192BV131A/3	44	20	192BV130A/1
5:1	60	20	192BV131A/2	50	20	192BV130A/2
6:1	55	20	192BV131A/1	55	20	192BV131A/1
7:1	36	14	192BV131A/6	42	14	192BV131A/8
8:1	33	14	192BV130A/5	44	14	192BV131A/7
9:1	44	20	192BV130A/1	66	20	192BV131A/3
10:1	33	16	192BV130A/4	55	16	192BV131A/5
11:1	24	12	192BV130A/6	44	12	192BV131A/9
12:1	33	18	192BV130A/3	66	18	192BV131A/4

9 10 11 12 13 14 15 16 17 18 19 20

21 ALTERNATIVE POSITION FOR CHASER

22 STANDARD CHASER BRACKET

23 CENTRE SHAFT

24 THE FOLLOWING ITEMS ARE ALSO REQUIRED

DRG No	No OFF
192X148	1
192X215	1
192X219	1
292X189	1
292X190	2
292V211	
WSP No	No OFF
170/0624	2
170/0688	2
188/0532	2
198/13	4

26 27

27T 1·8
30T 1·85

25

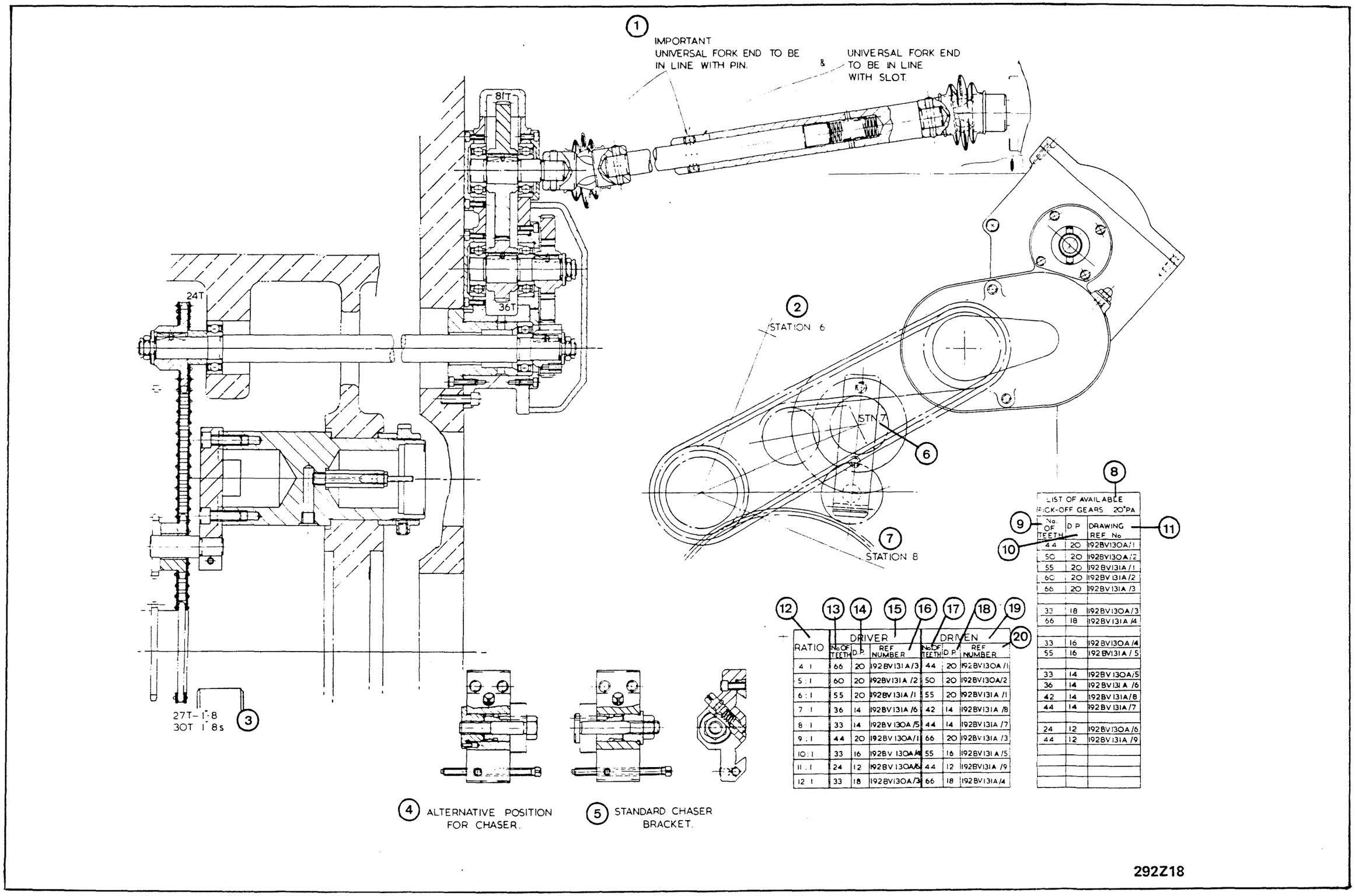
292Z17

Chasing Attachment Drive 6th Station Drg. 292Z18

1. Important universal fork end to be in line with pin and universal fork end to be in line with slot

2. Station 6
3. 27T 1"- 8
   30T 1"- 8 Spindle Stopping

4. Alternative position for chaser
5. Standard chaser bracket
6. Stn 7
7. Station 8
8. List of available pick off gears 20 deg.PA
9. No. of teeth
10. DP
11. Drawing Ref. No.
12. Ratio
13. No. of Teeth
14. DP
15. Driver
16. Ref Number
17. No. of teeth
18. DP
19. Driven
20. Ref. No.


1
IMPORTANT
UNIVERSAL FORK END TO BE IN LINE WITH PIN.
&
UNIVERSAL FORK END TO BE IN LINE WITH SLOT.
8T
24T
36T
27T-18
30T 18s
3
2
STATION 6
STN 7
6
8
7
STATION 8
9
10
11
LIST OF AVAILABLE PICK-OFF GEARS 20°PA
No. OF TEETH
D P
DRAWING REF No
44 20 192BV130A/1
50 20 192BV130A/2
55 20 192BV131A/1
60 20 192BV131A/2
66 20 192BV131A/3
33 18 192BV130A/3
66 18 192BV131A/4
33 16 192BV130A/4
55 16 192BV131A/5
33 14 192BV130A/5
36 14 192BV131A/6
42 14 192BV131A/8
44 14 192BV131A/7
24 12 192BV130A/6
44 12 192BV131A/9
12
13
14
15
16
17
18
19
20
RATIO
DRIVER
DRIVEN
No OF TEETH
D P
REF NUMBER
4 : 1 66 20 192BV131A/3 44 20 192BV130A/1
5 : 1 60 20 192BV131A/2 50 20 192BV130A/2
6 : 1 55 20 192BV131A/1 55 20 192BV131A/1
7 : 1 36 14 192BV131A/6 42 14 192BV131A/8
8 : 1 33 14 192BV130A/5 44 14 192BV131A/7
9 : 1 44 20 192BV130A/1 66 20 192BV131A/3
10 : 1 33 16 192BV130A/4 55 16 192BV131A/5
11 : 1 24 12 192BV130A/6 44 12 192BV131A/9
12 : 1 33 18 192BV130A/3 66 18 192BV131A/4
4 ALTERNATIVE POSITION FOR CHASER.
5 STANDARD CHASER BRACKET.
292Z18

5.17 Auxiliary Cross Slide Operation

Section 293 Common parts
Section 293A Extra parts for stations 5 or 6
Section 293B Extra parts for stations 7,8 together or stn.3 & 4 together.

For the special purposes, where the timing of standard cross slide cams and operation mechanism is unsuitable, the two upper and the four intermediate cross slides can be operated from 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 either 3rd and 4th or 5th cross slide, but not all. On double bar feed machines, however, this cam is not available for auxiliary cross slide operation, as it is used for the operation of the rear bar stop. The other auxiliary cam can operate either the 6th or 7th and 8th (cut off) cross slides but not all.

A common cam lever assembly is available for operation by these cams, and operates links which are used in place of the standard connections to the feed rocker levers. The identification of all parts required is shown in Fig.5.24 Drg. 293Z11.

The common cam lever assemble 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 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. The scale cannot be calibrated in actual travel, because of variations in the type and throw of the cam used.

The link connecting stations 5 and 6 slides is connected in the line with the standard links.

The link connections to stations 3 or 4 and 7 or 8 slides 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 key in line with the link.

Attachment Drive

This is a general purpose drive unit which may be used as a direct drive to attachments, or as an idler gear unit for high speed drilling or milling.

It is not suitable for driving a pick up attachment,which has its own special drive unit.

For limitations on attachments in adjacent stations See Fig 5.25 Drg. 290Z12.

Auxiliary Cross Slide motion Upper & Intermediate Drg. 293Z11

1. Sections required
2. Stations 3 & 4
   Station 5
   Station 6
   Station 7 & 8

3. Two auxiliary cross slide motions can not be used on the same side of the machine concurrently
4. 1.1/2"dia. roller
5. Section 293
6. 1"- 8 Stations 5 or 6
7. Upper lever connected in hole 'A'
   Upper lever connected in hole 'B'

8. Slide movement = cam rise x scale reading x .85

   $$\text{Slide movement} = \frac{\text{cam rise x scale reading x .85}}{2}$$

9. 1"- 8 - Stations 3 & 4 or 7 & 8
10. Slide movement = cam rise x scale reading x .8
11. 3rd and 4th stations
12. Section 293E
13. Part section on 'B'
14. Rear

15. 12 Holes 3/8"BSF.equi.spaced on 12.1/2"PCD.(317.50mm)
    12 Holes 3/8"BSF.equi.spaced on 9.1/8"PCD.(231.77mm)
    12 Holes 3/8"BSF.equi spaced on 6.7/8"PCD.(174.63mm)

16. Min. rad.to roller centre when operating on intermediate cross slides.

17. Rotation
18. View looking at collet end of spindles

19. 0 deg. timing angle, max. rad.to roller centre when operating on upper cross slide

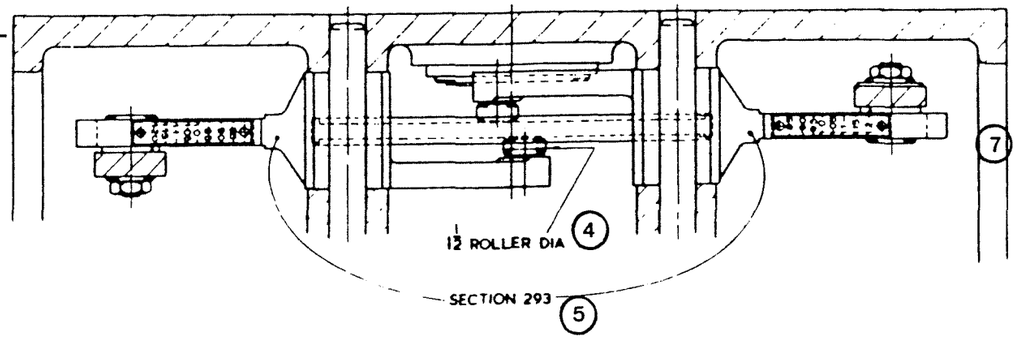
20. Section 293A
21. 14 OD cam disc
22. Front
23. 7th and 8th stations section 293E
24. 5.875/5.871"dia.(149.22/149.12mm)
25. 13.5034/13.500"Cam locating dia.(342.98/342.90mm)
26. 1/16" x 45 Deg. chamfer on cams to clear rad.
27. 5/8" thickness of cams (15.88mm)
28. Max. that screw should enter can disc is 7/16"(11mm)
    Part section 'AA'

(1)

1"-8	SECTIONS REQUIRED			
	293	293A	293E	
STATIONS 3 & 4	1		1	
STATION 5	1	1		
STATION 6	1	1		
STATIONS 7 & 8	1		1	

(2)

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



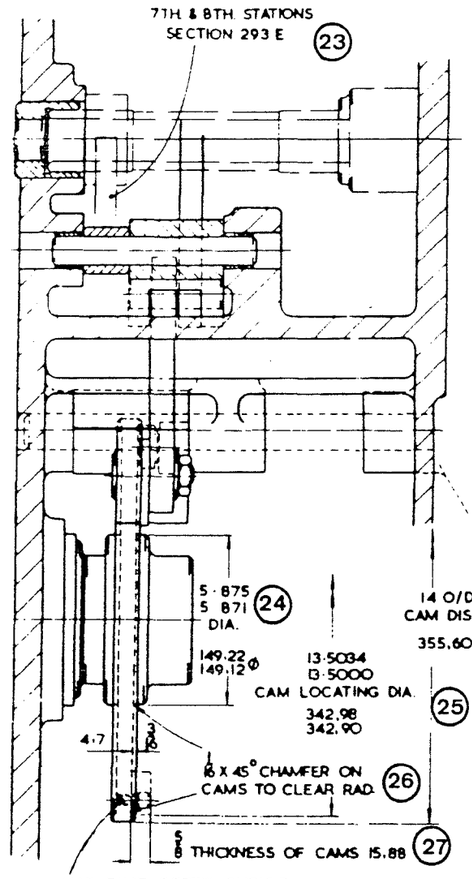
(6)

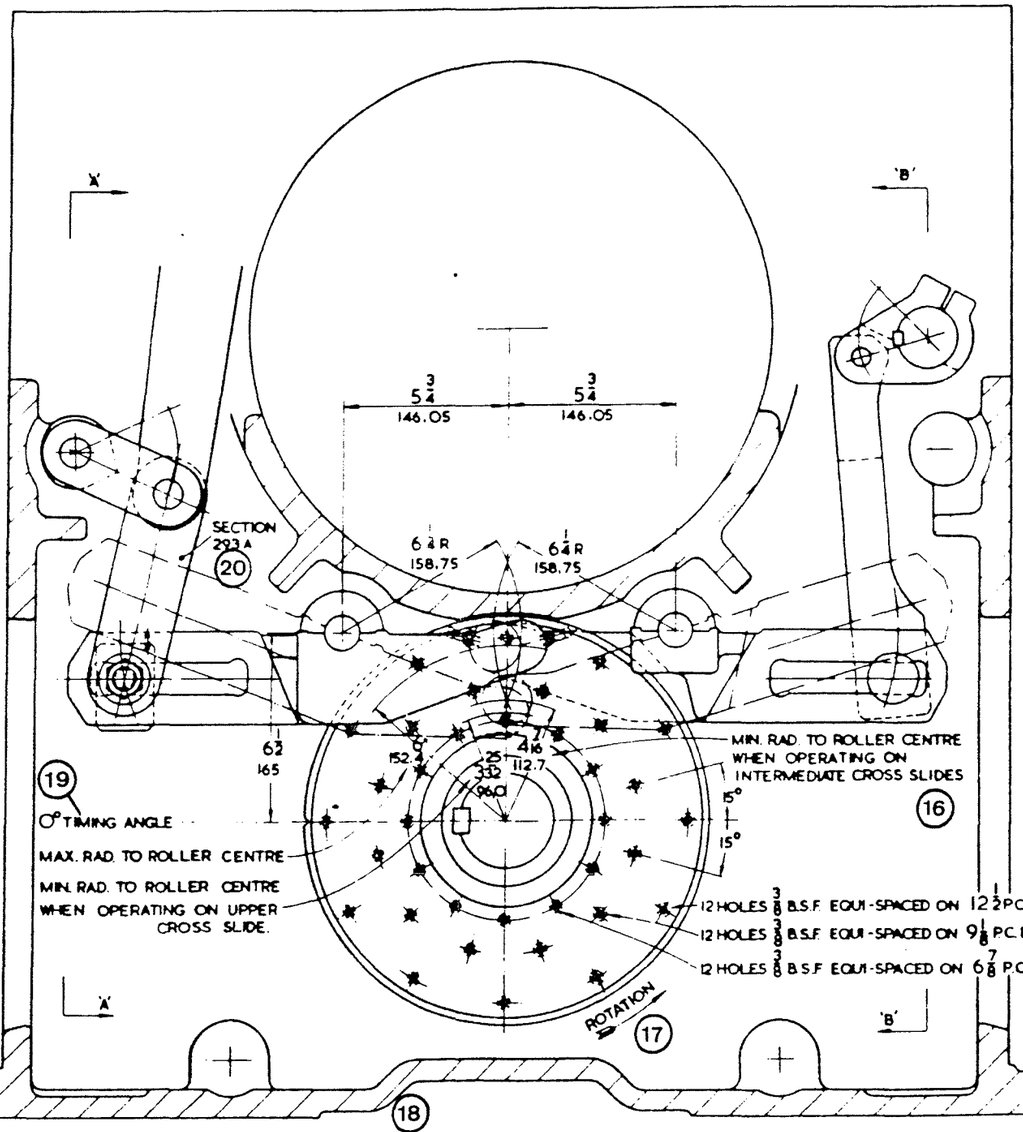
1"-8 — STATIONS 5 OR 6	
UPPER LEVER CONNECTED IN HOLE 'A'	SLIDE MOVEMENT = CAM RISE X SCALE READING X ·85
UPPER LEVER CONNECTED IN HOLE 'B'	SLIDE MOVEMENT = CAM RISE / 2 X SCALE READING X ·85

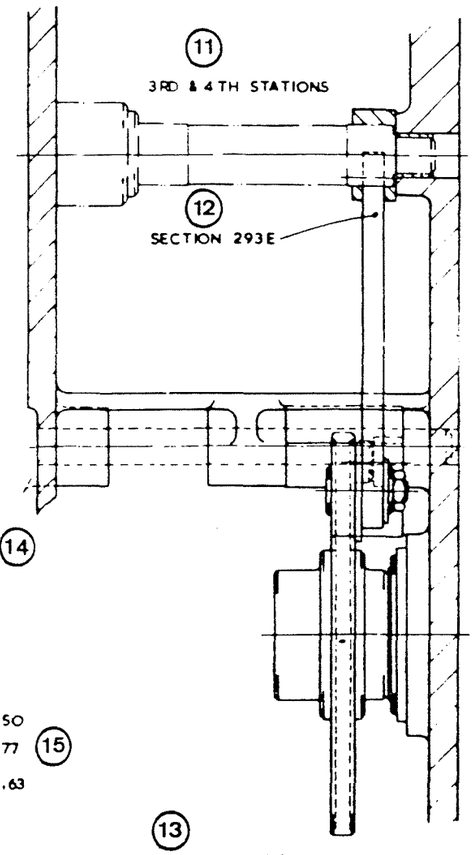
(8)

1"-8 — STATIONS 3 & 4 OR 7 & 8 (9)
SLIDE MOVEMENT = CAM RISE X SCALE READING X 8

(10)





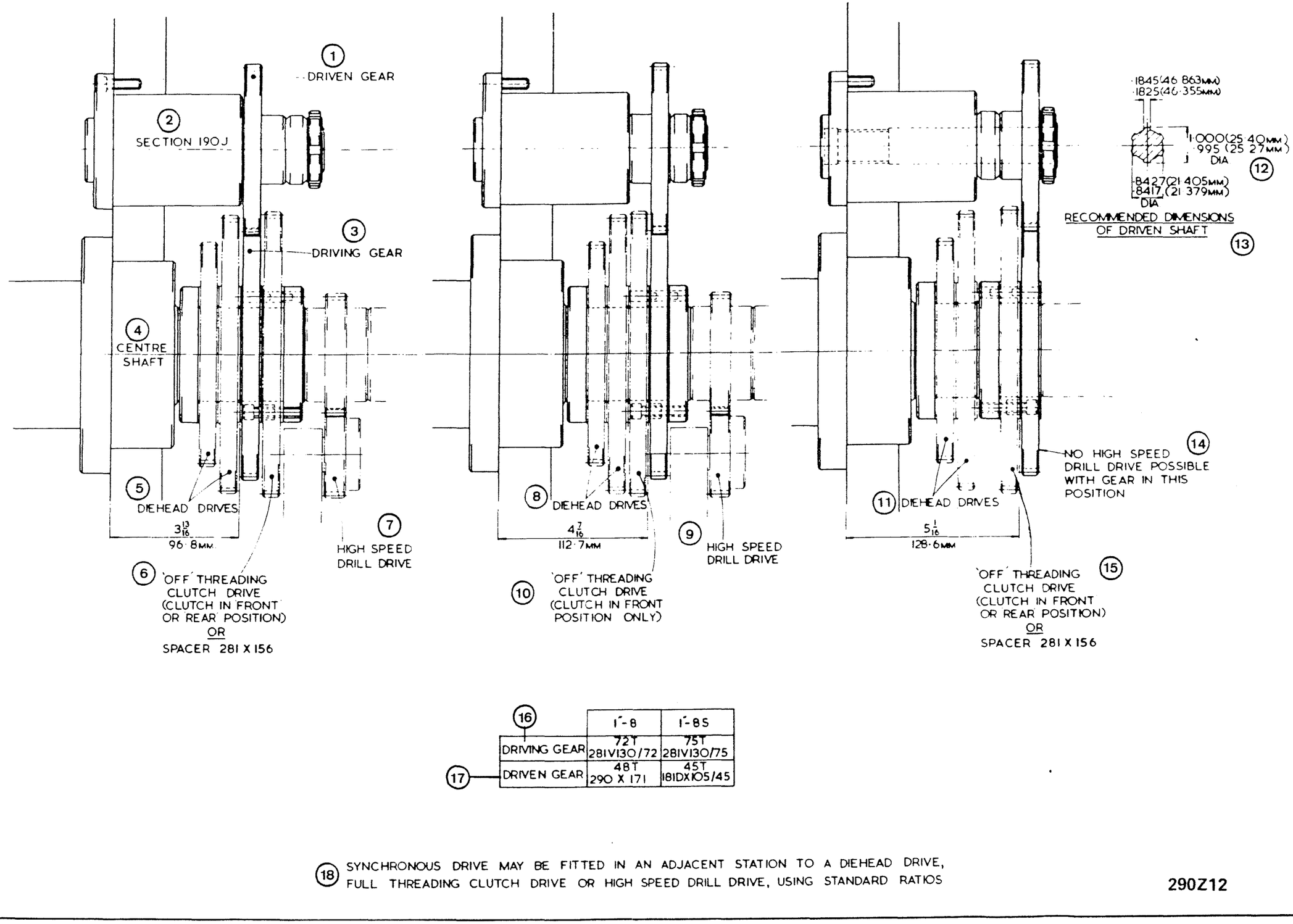


293Z11

5.18 Synchronous Attachment Drive Drg. 290Z12

1. Driven gear
2. Section 190J
3. Driving gear
4. Centre shaft
5. Diehead drives
6. 'Off'the threading clutch drive (clutch in front or rear position or spacer 281X156

7. High speed drill drive
8. Diehead drives
9. High speed drill drive
10. 'Off' Threading clutch drive (clutch in front position only)
11. Diehead drives
12. 1.000"(25.40mm)/.995"(25.27mm)
13. Recommended dimensions of driven shaft
14. No high speed drill drive (clutch in front or rear position) or spacer 281X156
15. 'Off Threading clutch drive (clutch in front or rear position) or spacer 281X156
16. Driving gear
17. Driven gear
18. Synchronous drive may be fitted in an adjacent station to a diehead drive, full threading clutch drive or high speed drill drive, using standard ratios.



	1"-8	1"-8S
DRIVING GEAR	72T 281V130/72	75T 281V130/75
DRIVEN GEAR	48T 290 X 171	45T 181DX105/45

5.19 Wickman 1"- 8 Spindle Bar Automatic Metric toolholder List

T/Holder No.	T/Holder Description	T/Station
21 M01-008	Roller turner (standard roller 8mm - 25.4mm dia.)	1,2,3.& 4
22 M02-010	Roller turner(standard rollers 8mm - 25.4mm dia.)	4 & 5
23 M01-007	Universal roller steady(standard rollers 8mm - 25.4mm dia.)	All
M6-1-25	Knee turner	
26 M01-001	Collet type drill holders	All
26 M01-002	Collet type drill holders	All
M6-1-26	Bush type drill holder	All
M6-1-27 (1,2, & 3 MT)	Taper shank drill holder	All
M6-1-28	Recess slide (ramp type) plus extra long rod MCS 998	All
M6-1-29	Floating reamer holder	All
M6-1-30	Adj. drill holder	All
M6-1-35	Circular form toolholder Base	2, 5, & 6 Restricted use in 1
M6-1-36	Circular form toolholder base	1 & 5
M6-1-37	Circular form toolholder base	2 & 6
M6-1-38	Flat form toolholder	1 & 5
38 M02-007	Flat form toolholder wide RH. Tool nearest collet stns. 4 & 8 (T/H body nearest collet stns. 3 & 7	3,4,7 & 8
38 M02-008	Flat form toolholder wide LH. T/H body nearest collet stns. 4 & 8 (tool nearest collet stns. 3 & 7)	3,4,7 & 8
M6-1-39	Flat form toolholder When used in stn. 2 will not clear spindle nose in stn.3	2 & 6
M6-1-40	Dovetail form toolholder Wide type	1 & 5
M6-1-41	Dovetail form toolholder	2 & 6

M6-1-45	Shank type roller turner (new design 45-M01- pending)	All
M6-1-48	Blade toolholder (WSP blade)	1 & 5
48-M02-004	Blade toolholder (Empire Tool) used for part-off. 17mm deep tool.	3 & 8
	SMD258 Setting gauge for above - extra	
48-M02-009	Blade toolholder (Empire Tool) used for part-off. 17mm deep tool	4 & 7
	SMD257 setting gauge for above - extra	
M6-1-49	Blade toolholder (WSP blade)	2 & 6
M6-1-50	Tangential Knee Turner	All
50- M01-009	Knee turner (tangential)	All
M6-1-51	Floating reamer holder (lightweight)	All
M5-78-53	Tap holder	3,4,5,6,7 & 8
M6-1-54	Recessing slide push over shank type	5 & 6
M6-1-55	Roller steady shank type. New design 55-M01 pending	All
57-M01-003	Roller marking attachment for use with flat toolholder	1.2,5 & 6
M6-1-58	Balance turner	All
60-M01-004	Bracket toolholder	All
M6-1-68	Roller ending box. New design 68-M01 pending	All
70-M02-005	Flat form toolholder narrow RH. Tool nearest collet stns. 4 6 8 T/H body nearest collet stns.3 & 7	3,4,7 & 8
70-M02-006	Flat form toolholder narrow LH. T/H body nearest collet stns.4 & 8 Tool nearest collet stns 3 & 7	3,4,7 & 8
M6-1-72/4	Skiving toolholder	5
M6-1-72/5	Skiving toolholder	2 & 6
M6-1-73	Shaving toolholder	5 & 6
M6-1-74	Dovetail form toolholder narrow	1 & 5
74-M02-011	Dovetail form toolholder narrow	3
74-M02-012	Dovetail form toolholder narrow	7

M6-1-75	Dovetail form toolholder narrow	2 & 6
75-M02-013	Dovetail form toolholder narrow	4
M6-1-80	Knee Turner wide	All
M6-1-83	Former block assembly	5 & 6
M6-1-88/1,2,3A	Three Roll Steady	All
98-M01-005A	Overhanging bracket toolholder	5
98-M01-006A	Overhanging bracket toolholder	6