

ACCORD
VERTICAL
MILL
MANUAL
1642, 1649,

February 1

2011

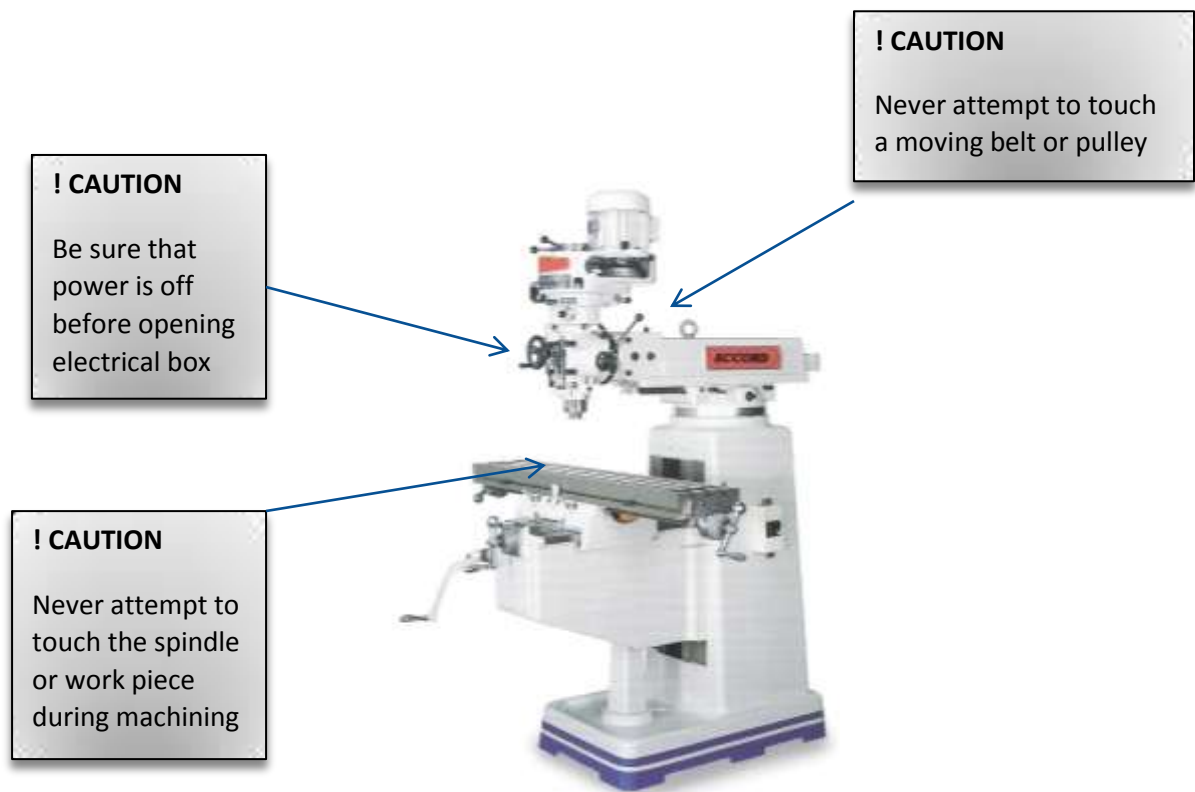
Operation and service manual for Stephead and Variable speed Turret
Milling Machines Model BPS-1642 / 1649

OPERATION
MANUAL FOR
TURRET
MILLING
MACHINE

CH-1 INSTALLATION

SAFETY PRECAUTIONS

1. BE SURE THAT THE INSTRUCTION MANUAL IS FULLY UNDERSTOOD. OPERATOR MUST FOLLOW INSTRUCTIONS FROM THIS MANUAL TO OPERATE THE MACHINE SAFELY.
2. UNTRAINED PERSONELL OPERATING THIS EQUIPMENT IS PROHIBITED.
3. SET ALL COVER IN POSITION BEFORE OERATION
4. USE PROPER SAFETY EQUIPMENT SUCH AS:
 - a. SAFETY GOGGLES
 - b. SAFETY SHOES
 - c. HAIR NET
 - d. PROPER CLOTHINGS
5. DO NOT OPERATE THIS MACHINE WITH GLOVES OR ANY TYOE OF ARTICLE OF CLOTHING THAT IS AROUND THE NECK SUCH AS NECK TIE, KEY CHAINS OR NECKLES.
6. NEVER REACH INTO THE MOVING SPINDEL WITH ANY PART OF YOUR BODY OR OTHER ITEMS WHILE THE MACHIN IS IN OPERATION- TO DO SO WILL CREATE AN UN SAFE WORKING. CONDITION AND MAY RESULT IN THE PHISICALY HARM TO THE OPERATOR.
7. NERVER RUN NEAR THE MACHINE WHILE IN OPERATION.
8. ALWAYS TURN POWER OFF WHILE PERFORMAING MAINTENANCE.
9. ALWAYS KEEP THE WORK AREA FREE FROM OIL OR OTHER FLUIDS WHLIE MACHINE IS OPERATING.

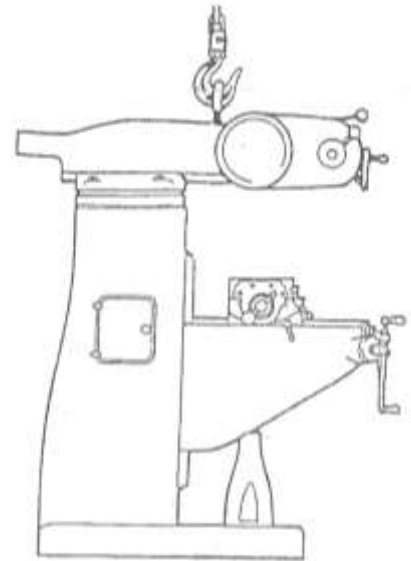


INSTALLATION

Always inspect lifting devices of ropes, slings, or harnesses to ensure safety
Keep area clear of any oils or fluids while placing the machine into position.
Never move machine into place without help when using a fork lift.
Always use caution when lifting.

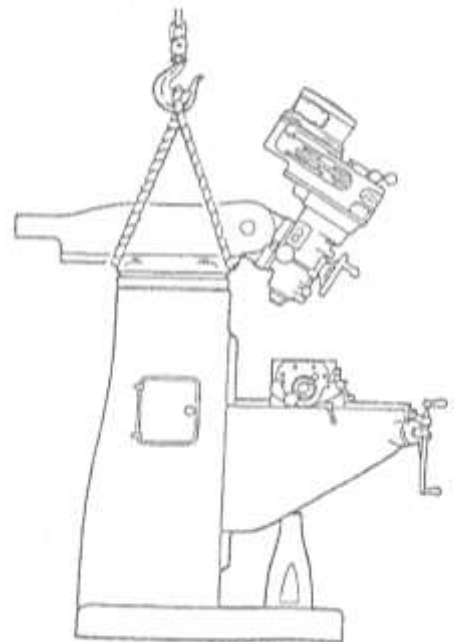
METHOD 1

1. Insert /4" Whitworth eye bolt into the top of the ram.
2. Ensure that bolt is fully secures before lifting.
3. It is recommended to tilt the head forward before lifting
4. Ram MUST BE LOCKED before lifting



METHOD 2

1. Use of rope sling
2. Insert pads or soft cloth to protect paint and finish
3. It is recommended to tilt the head before lifting
4. Ram Must BE LOCKED before lifting



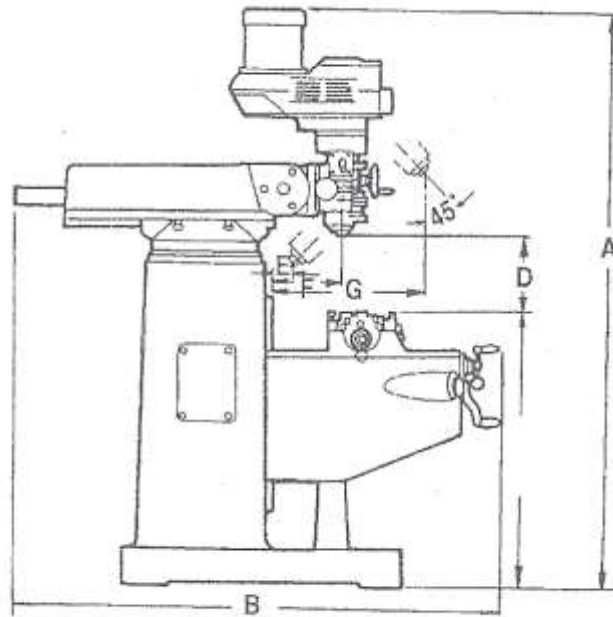
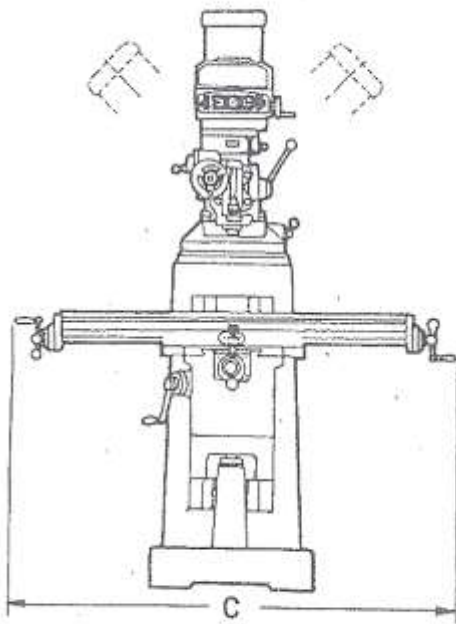
CLEANING

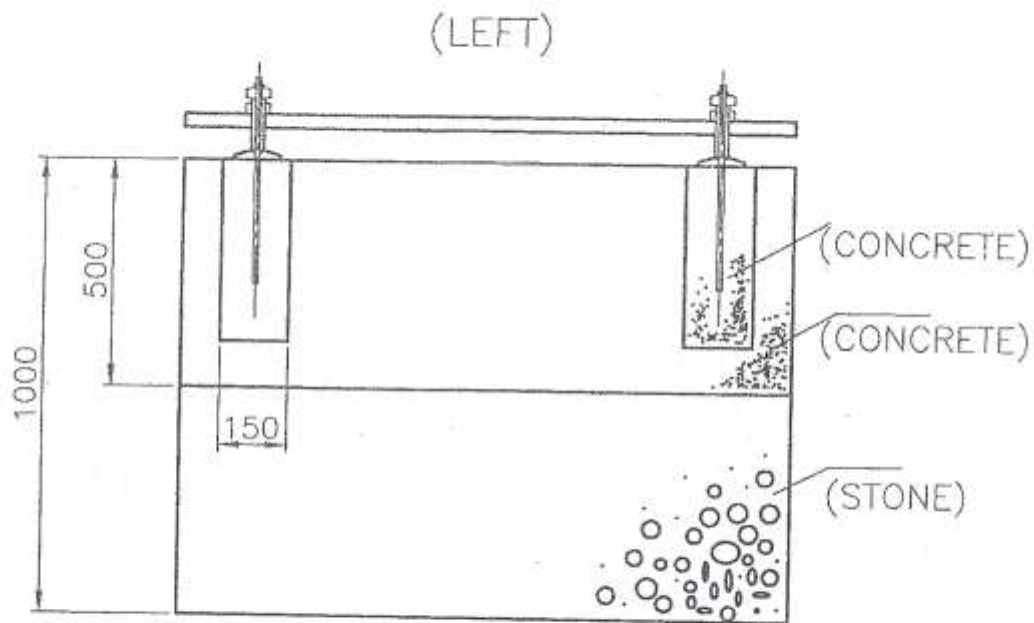
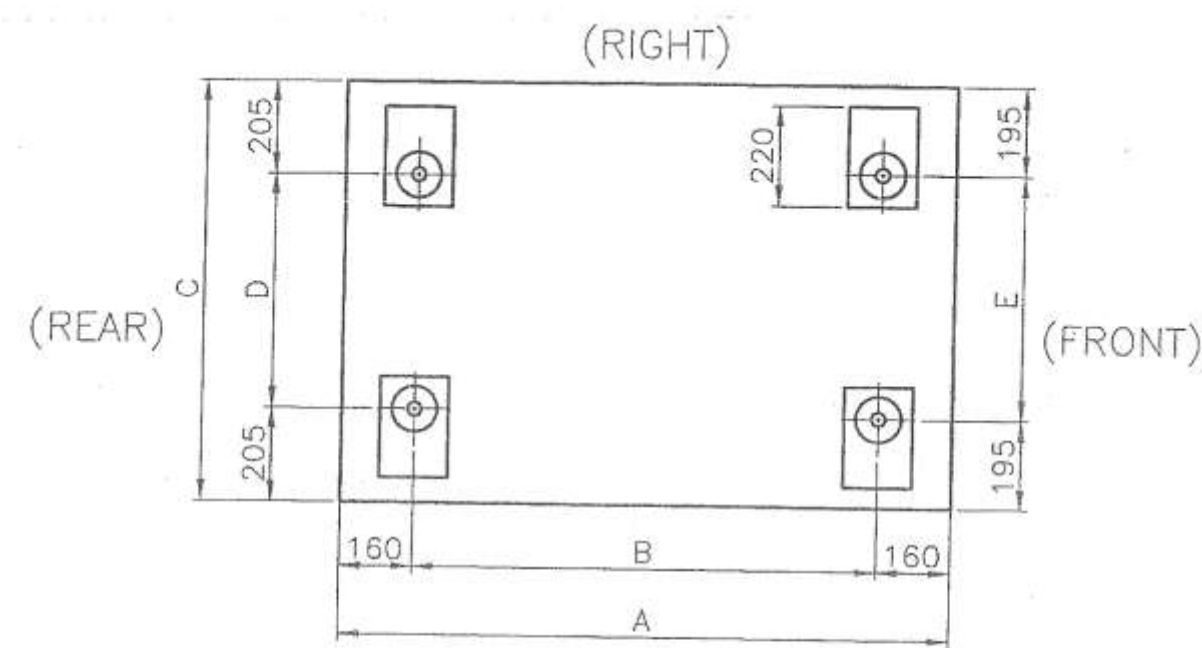
1. Remove rust preventative before moving any slideways – table column- ram- head
2. The coating is best removed by using paraffin applied with clean rags
3. Oil and grease all lubrication point

CH-1 MACHINE DIMENSION

Model		BPS-1642 / 3942
A x B x C		86" x 68" x 60"
D.	MAX	18"
	MIN	2"
E.	MAX	13"
	MIN	0"
F.	MAX	19 ½"
	MIN	5 ½"
G.	MAX	22"
	MIN	8 ¾"
NET WEIGHT		2,100 lbs

Model		BPS-1649 / 3949
A x B x C		
D.	MAX	86" x 68" x 67"
	MIN	2"
E.	MAX	13'
	MIN	0'
F.	MAX	19 ½'
	MIN	5 ½"
G.	MAX	22"
	MIN	8 ¾"
NET WEIGHT		2,200 lbs





A	B	C	D	E
1110	790	925	515	545

A. MACHINE SUPPLIED WITH ELECTRICAL BOX

- a. CHECK AND CONFIRM CORRECT VOLTAGE FROM FACTORY POWER SOURCE
- b. TURN MACHINE MAIN POWER SOURCE SWITCH TO “OFF” POSITION , THEN ENSURE THAT POWER SOURCE IS OFF
- c. CONNECT MAIN POWER SOURCE TO MACHINE WITH PROPER GROUNDING
- d. CLEAR ANY ITEMS THAT MIGHT be laying on table
- e. Power “ON” machine and check motor rotating for correct rotation direction Forward and reverse

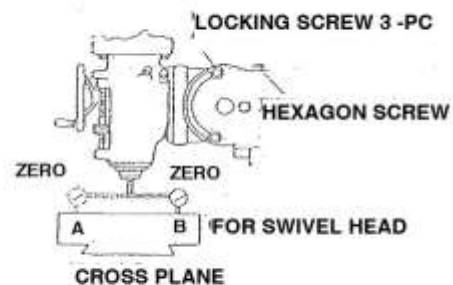
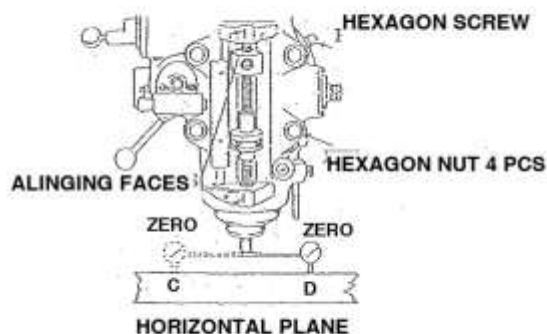
B. MACHINE SUPPLIED WITHOUT CONTROL PANEL

- a. Check the motor voltages against supply
- b. Turn power “OFF”, connect main power and ground wire
- c. Power “ON” machine and check motor rotating for correct rotation direction Forward and reverse

CH-1 INITIAL SETTING

1. If machine was delivered crated the table handles have been removed and secured in the tool box, these will need to be reinstalled.
2. The machine head was turned down for shipping purpose. The head must be turned up before positioning the mill into final location. This will redistribute the weight for slinging or eye bolt'
 - a. Turn head up by loosen "B-157 Adaptor nut
 - b. Always have assistance when positioning head from a right angle position to a vertical position
 - c. Proper care should be given to ensure that the weight of the head is not resting on the Adjustment Worn Shaft. Then turn the adjusting nut, the head should move easily when supported by the other person.
3. To set the milling head square to the table (HORIZONTAL)
 - a. Place a Spindle mounted indicator that sweeps 4.5" then indicate the head to a right angle position
 - b. Retighten B-152 lock handle
 - c. Loosen 4 locking bolt No "**B-157**" adaptor nut , turn the hexagon nut "B-189" Adjusting worm shaft
 - d. Adjust point C & D
4. To set milling head square to the table (**CROSS PLANE**)
 - a. Place a Spindle mounted indicator that sweeps 4.5" in the spindle
 - b. Lock spindle with B-152 lock handle.
 - c. Loosen 3 locking bolts part #2C-019, turn hexagon screw, then adjust point A and B

NOTE: X-Y-Z axis are locked separately, please loosen respective locking levers.



CHAPTER 2

OPERATION

When milling with longitudinal table feed only, it is advisable to clamp the knee to the column and the saddle to the knee to add rigidity to the members. This will improve operation for heavier cuts with minimum of vibration.

The saddle locking lever is located on the left side of the saddle.

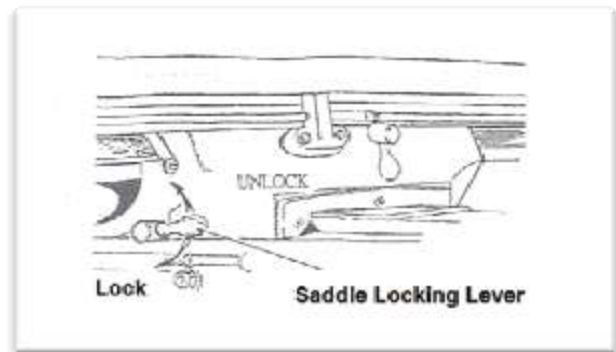
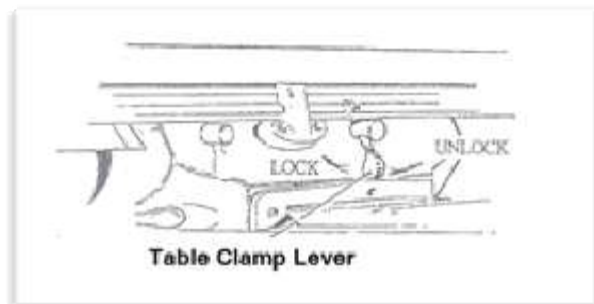


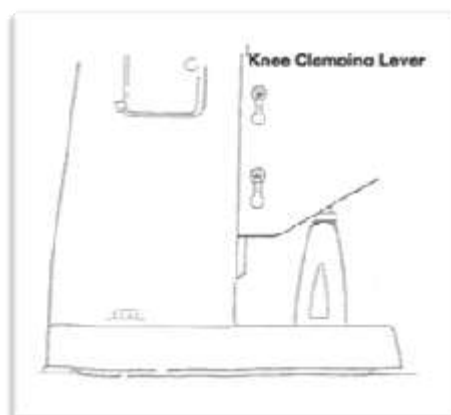
Table Clamping

The table clamp lever is located on front of saddle and should always be clamped when longitudinal travel is not required



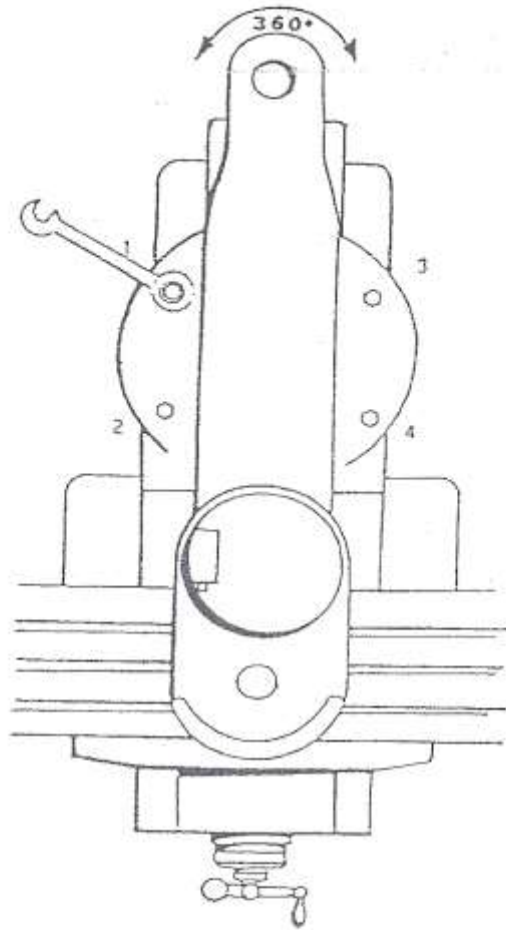
Knee Clamping

The Knee clamping lever is at the left side of the knee and should always be drawn upward to clamp the knee. This is only a tension brake. And will not lock the knee completely. Leave clamped at all-time unless using the knee in operation.



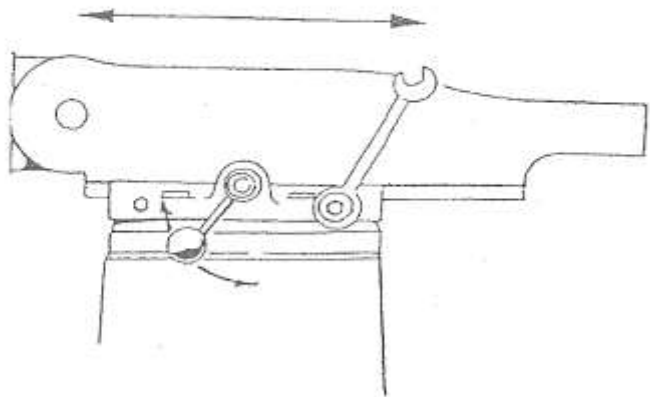
Swiveling Turret

- a. Use spanner wrench to loosen the 4 bolts
- b. Index to the required setting
- c. Tighten the 4 bolts

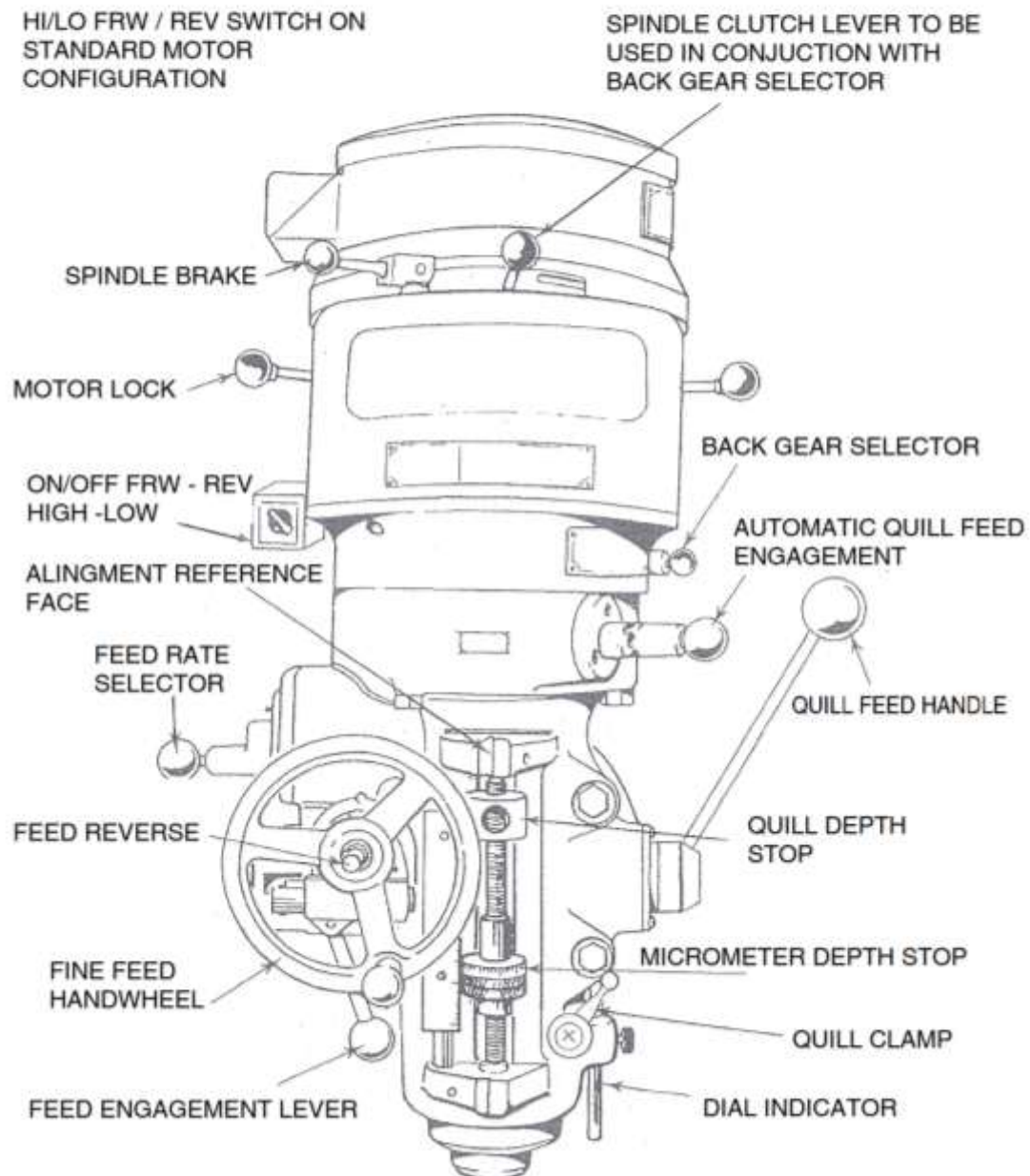


Moving Ram Slide

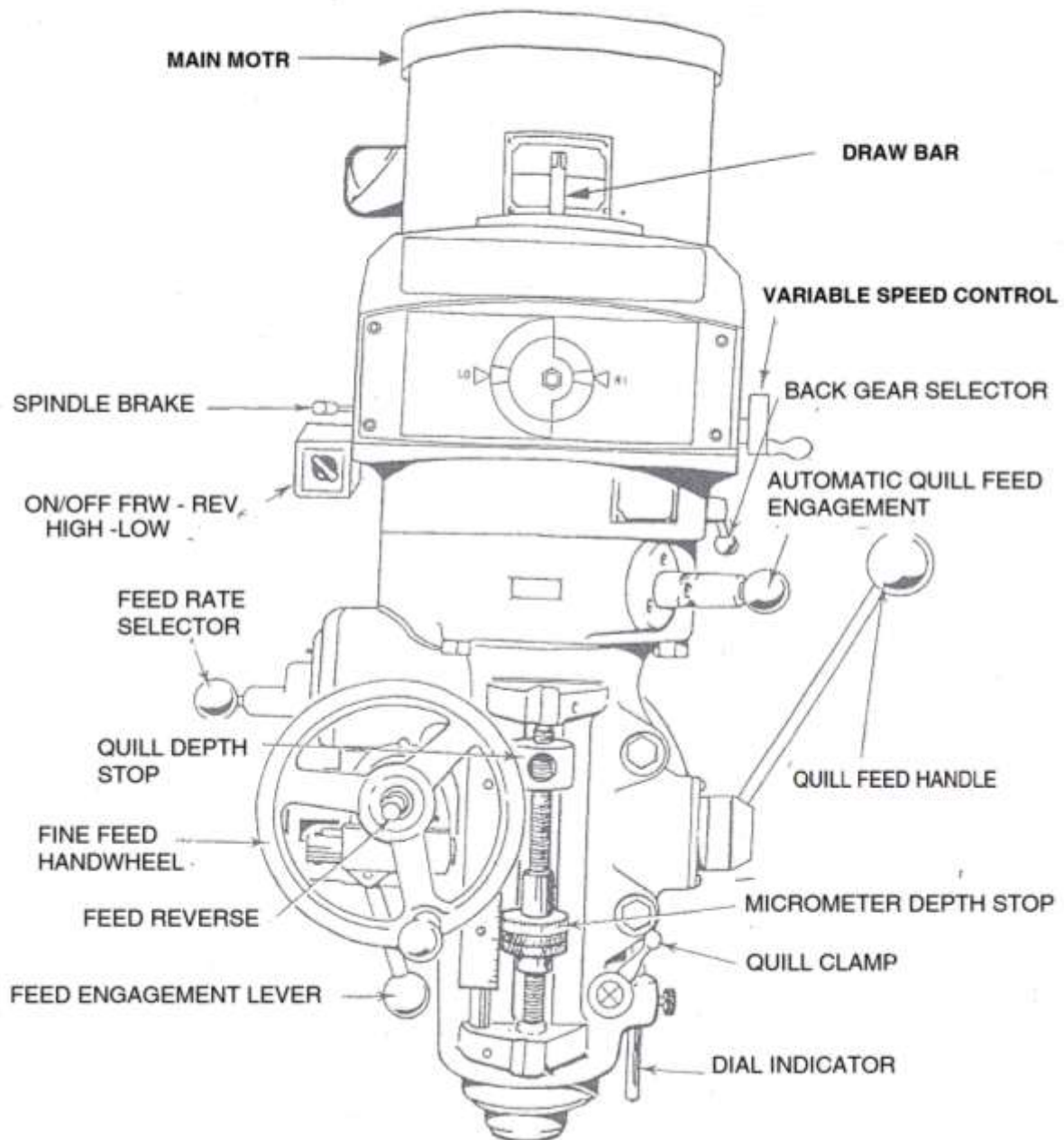
- a. Use spanner wrench to loose the 2 bolts
- b. Turn the handle to move the slide to the desired position
- c. Lock and tighten the 2 bolts



STEPHEAD CONFIGURATION



VARIABLE SPEED CONFIGURATION



FIND HAND FEED OPERATION

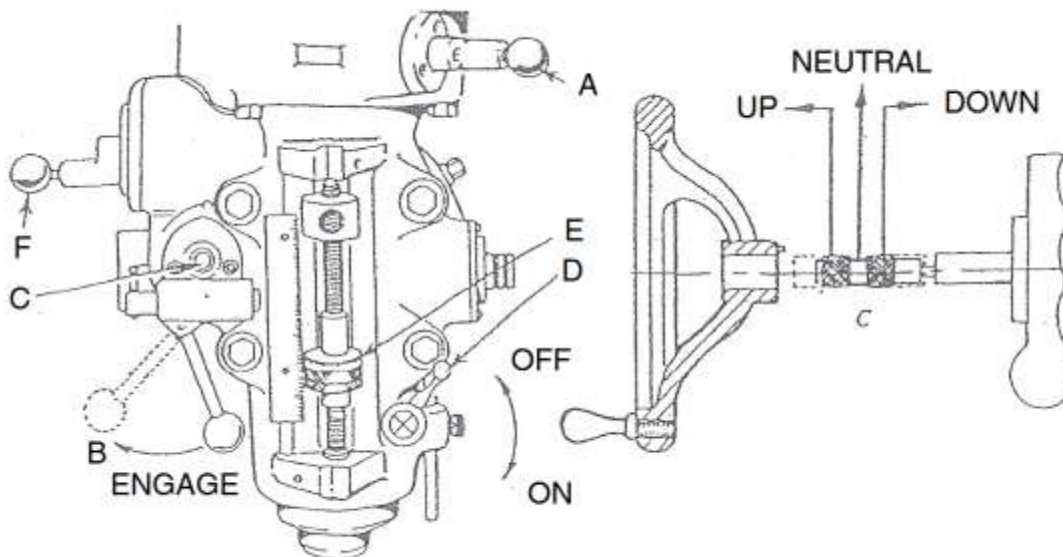
1. DISENGAGE AUTO QUILL FEED "A"
2. LOCATE "C" – IN MID POSITION FEED IS IN NETURAL
3. ENGAGE FEED TRIP LEVER "B"
4. THE QUILL IS NOW UNDER HANDWHEEL CONTROL

FIND HAND FEED OPERATION

"MAXIMUM CLUTCH LOAD – 3/8" DIAMETER IN STEEL"

1. ENSURE QUILL LOCK, "D" IS OFF
2. SET MICROMETER DIAL, "E" TO REQUIRED DEPTH
3. WHEN MOTOR IS STOPPED ENGAGE AUTO QUILL FEED "A"
4. SELECT FEED RATE "F" & FEED DIRECTION "C"
5. ENGAGE FEED TRIP LEVER "B"
6. FEED WILL AUTOMATICLY DISENGAGE "TRIP OUT" WITHIN 0.005" OF REQUIRED DEPTH
7. PRESS HAND FEED TO DEAD STOP FOR REPEATING OF ACCURACY OF ± 0.001 "

DO NOT ENGAGE QUILL FEED "A" OVER 3,000 R.P.M.



CH-2 OPERATION SPINDLE SPEEDS

STEPHEAD

SPINDEL SPEED - 50HZ 2 SPEED MOTOR –*Always stop motor before changing speed*

BACK GEAR	70	110	180	270	SWITCH POSITION 1
DIRECT	600	975	1540	2310	
BACK GEAR	140	220	360	540	SWITCH POSITION 2
DIRECT	1200	1950	3080	4620	

STEPHEAD

SPINDEL SPEED - 50HZ 2 SPEED MOTOR - *Always stop motor before changing speed*

BACK GEAR	70	110	180	270	SWITCH POSITION 1
DIRECT	600	975	1540	2310	
BACK GEAR	140	220	360	540	SWITCH POSITION 2
DIRECT	1200	1950	3080	4620	

VARIABLE SPEED

SPINDLE SPEED – 220/3/60

	HIGH SPEED	LOW SPEED
50HZ	455-3550	50-410
60HZ	550-4300	60-500

NEVER CHANGE SPEED SETTING ON VARIABLE HEAD WITHOUT MOTOR ON

STEPHEAD PULLEY CONFIGURATION

A. CHANGE SPEED

1. ISOLATE MACHINE FROM POWER SOURCE
2. SELECT HI/LOW SPEED AS REQUIRED
3. RELEASE "A" HANDLE
4. POSITION BELT ON APPROPRIATE PULLYS
5. SLIDE MOTOR TO THE REAR TO TENSION V-BEELT, THEN TIGHTEN "A" HANDLE

BELT, THEN TIGHTEN "A" HANDLE

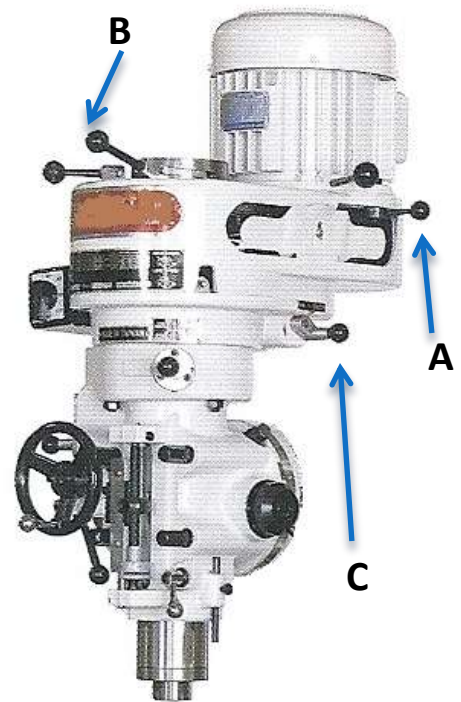
B. SELECTION OF HIGH LOW

1. STOP MOTOR
2. PUSH "B" HANDLE TO THE RIGHT BOTTOM
3. PULL "C" KNOB FORWARD TO "IN" POSITION
4. TURN SPINDLE BY HAND TO EASE CLUTCH ENGAGEMENT

NEVER CHANGE BACK GEAR WHILE MACHINE IS UNDER LOAD OR SPINDLE IS MOVING- OR WHILE HEAD IS COASTING TO STOP -USE THE SPINDLE BRAKE IF YOU'RE IN A HURRY

C. HIGH SPEED

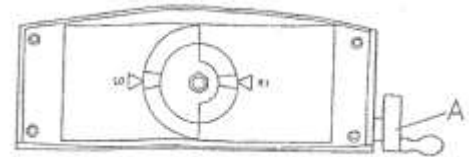
1. STOP MOTOR
2. PULL "C" KNOB BACKWARD TO "IN" POSITION
3. PULL "B" HANDLE FORWARD TO THE FRONT POSITION, UNTIL CLUTCHES ARE FELT TO ENGAGE.



SPINDLE SPEED SELECTION VARIABLE

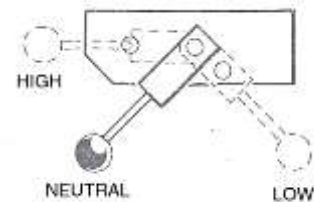
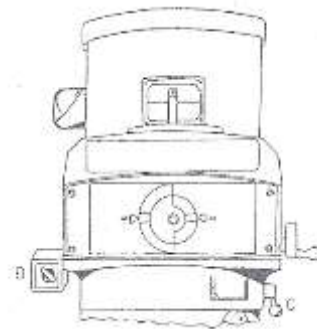
1. CHANGE SPEED WHEEL

- a. NEVER ATTEMPT TO DIAL "A" WHEN MOTOR IS NOT RUNNING. DOING SO WILL RESULT IN DAMAGING THE VARI-SPEED LINKAGE
- b. TURN WHEEL "A" TO SELECT THE DESIRED SPINDLE SPEEDS



2. BACK GEAR OPERATION

- a. HI/LOW SPEEDS
- b. TURN OFF MOTOR
- c. MOVE HANDLE "C" THROUGH NEUTRAL TO LOW POSITION
- d. EASE IN BACK GEAR SELECTION BY ROTATING SPINDLE BY HAND ONLY (DO NOT RUN THE MILL UNDER POWER)
- e. SWITCH FROM LOW (BACK GEAR) REVERSE THE PROCESS



CHAPTER 3

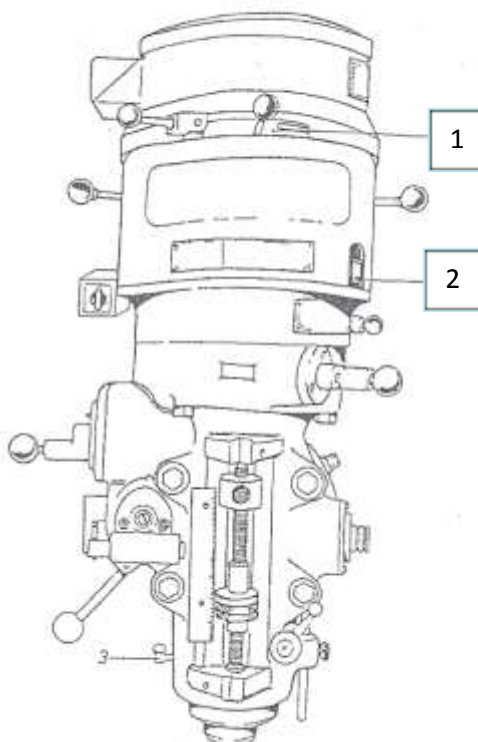
MAINTENANCE

CH-3 MAINTENANCE- LUBRICATION

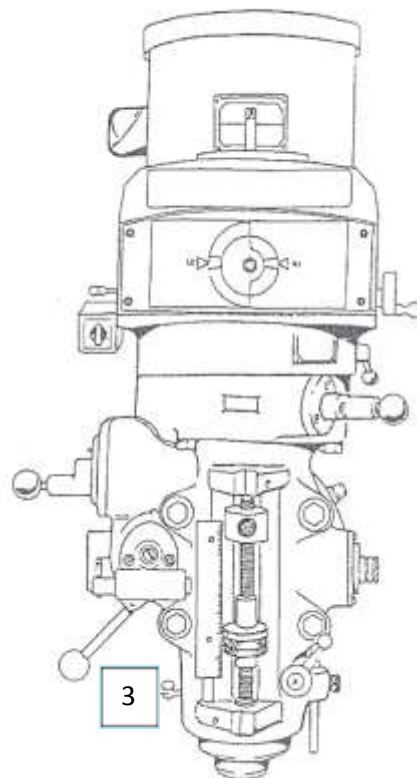
FREQUENCY	LUBRICATE	LUBRICANT	QTY	LUBE AY
TWICE WEEKLY	CAP RING	VACTARA HEAVY MEDIUM	5 DROPS	1
TWICE WEEKLY	SPINDLE GEAR	GREASE	TOP-OFF	2
TWICE DAILY	QUILL	VACTRA HEAY MEDIUM	5 DROPS	3

FAILURE TO LUBRICATE QULL WILL CAUSE DAMAGE

STEP PULLEY



VARI SPEED HEAD

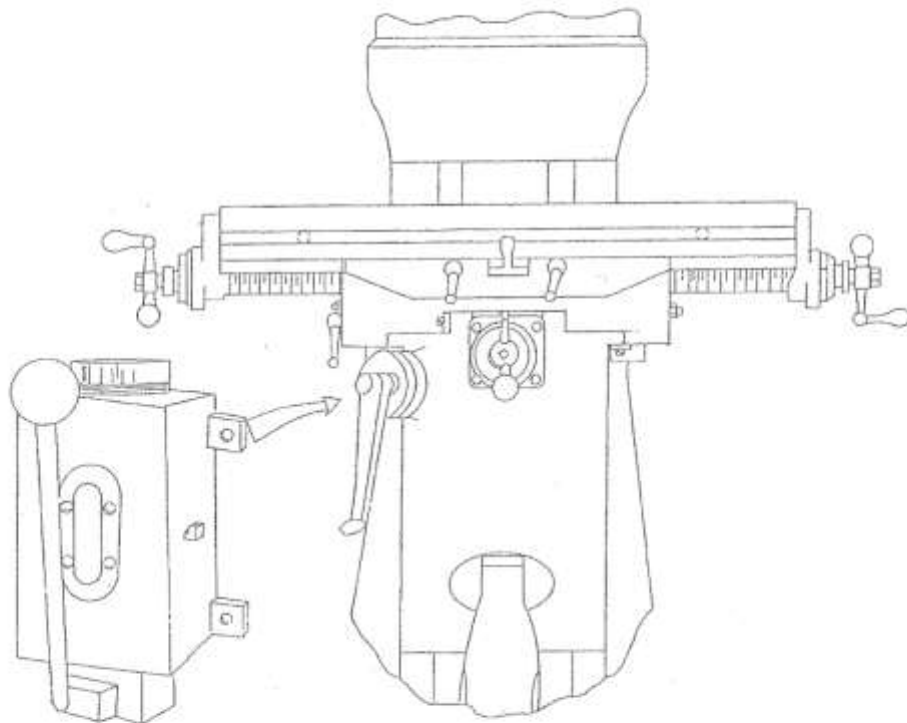


ONE SHOT LUBRICATION

Regular Lubrication:

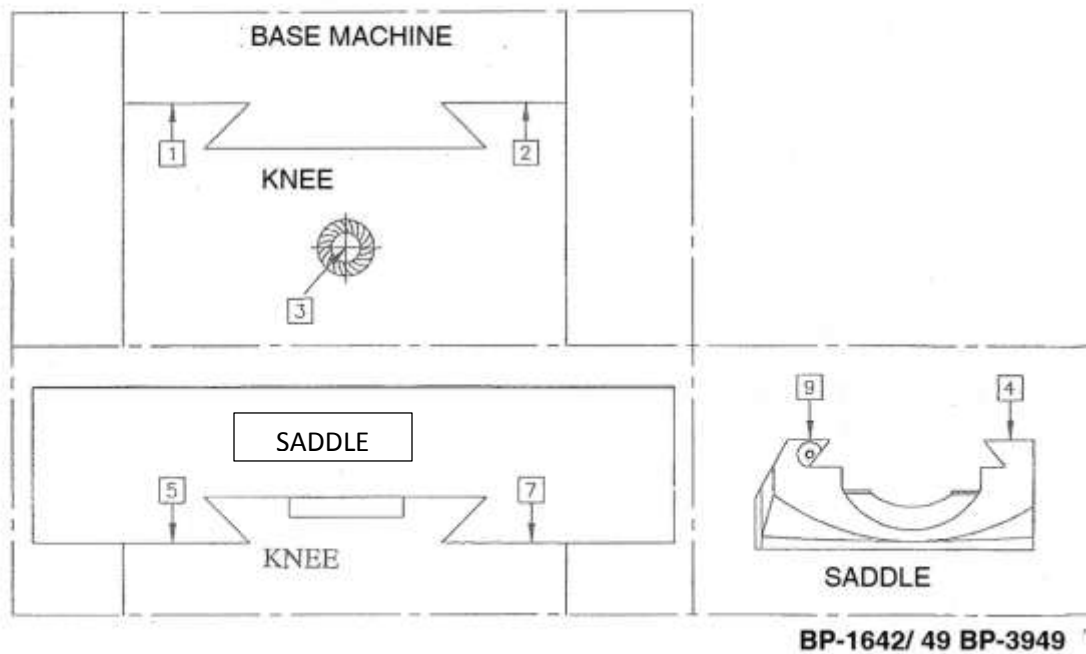
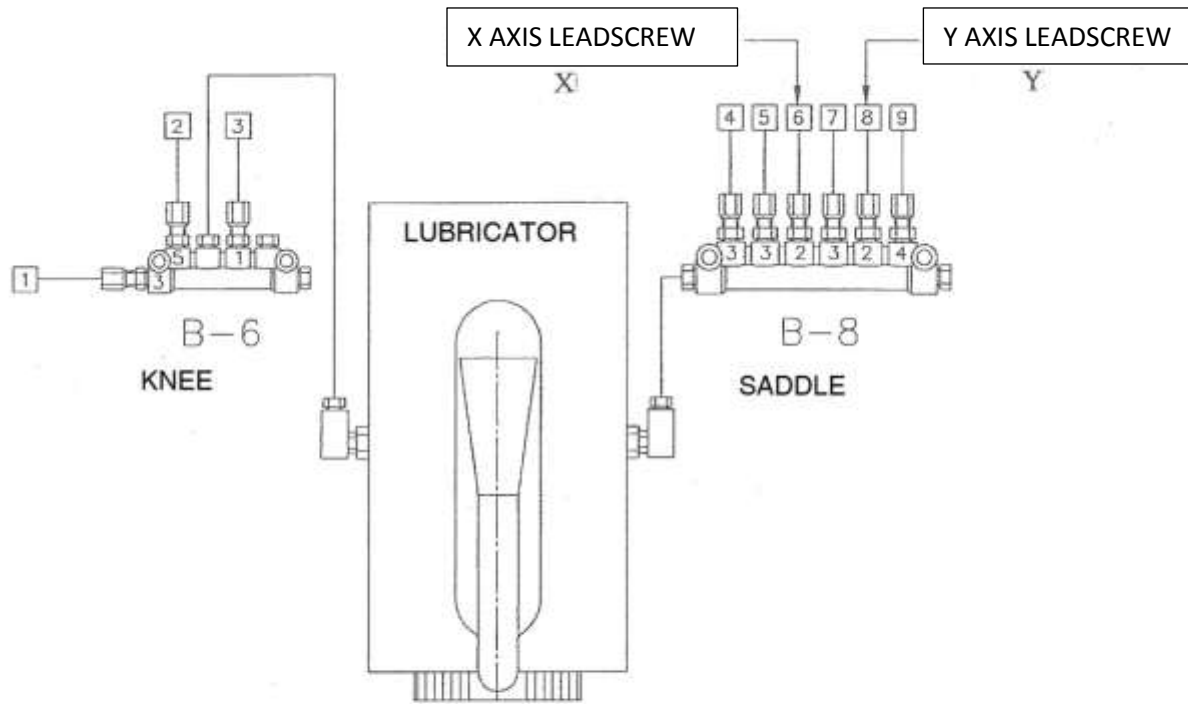
PLEASE USE LUBRICATION SLIDE WAY OIL #68 – Mobil #2

IT IS RECOMMENDED TO LUBRICATE WITH THE ONE SHOT SYSTEM AT LEAST ONCE DURING ANY MILLING OPERATION, HOWEVER IT LONG TRAVELS ARE USE WITH A POWER FEED MORE FREQUENT THE MILL SHOULD BE LUBRICATED, ESPECIALLY IF THE MILL IS IN HIGH PRODUCTION. AUTO-LUBRICATION SYSTEM ARE OPTIONAL



ONE SHOT LUBRICATION

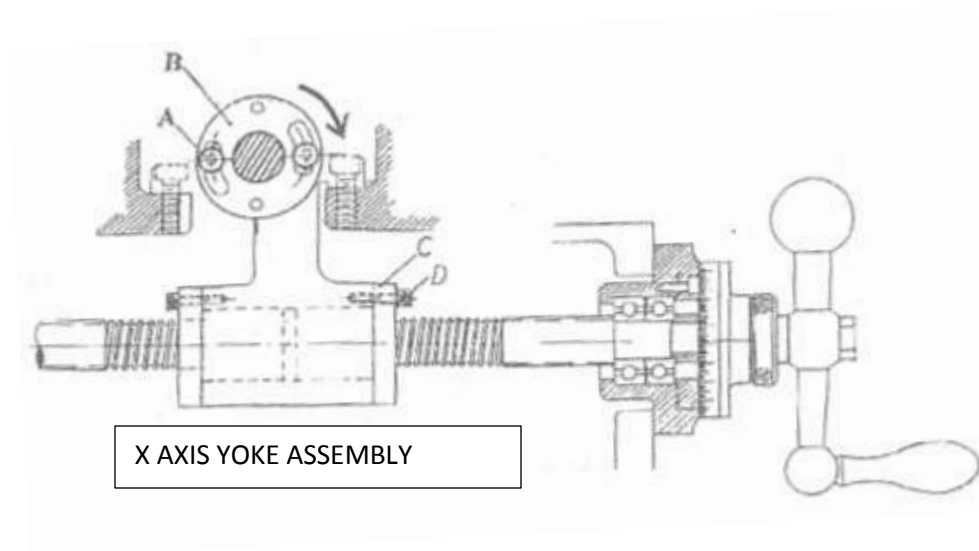
LUBRICATION POINTS



LONGITUDINAL X-AXIS

TABLE SCREW ASSEMBLY

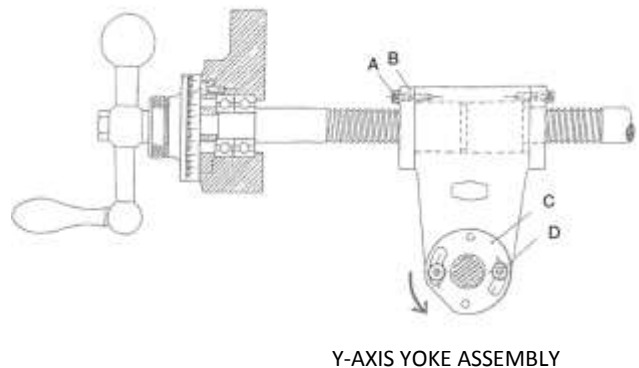
1. MOVE THE TABLE TO THE LEFT
2. LOOSEN 2 PCS LOCK SCREW "A"
3. TIGHTEN NUT "B" **(CLOCKWISE)**
4. THEN TIGHTEN 2 PCS LOCK SCREW "A"



CROSS Y-AXIS

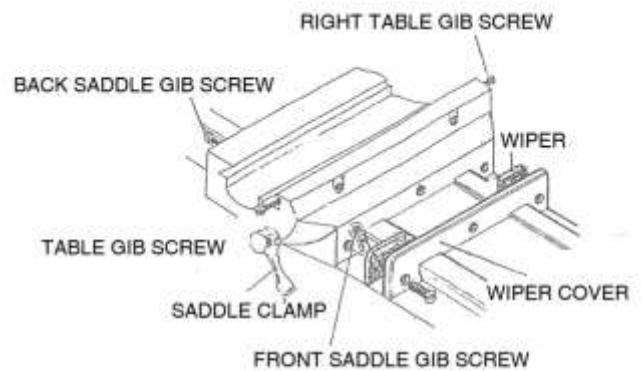
CROSS LEAD SCREW ASSEMBLY

1. MOVE SADDLE TO THE MIDDLE POSITION
2. LOSSEN 2 PCS LOCK SCREW "D"
3. TIGHTEN NUT "C" **(COUNTER-COLCK WISE)**
4. THEN TIGHTEN 2 PCS LOCK SCREW "D"



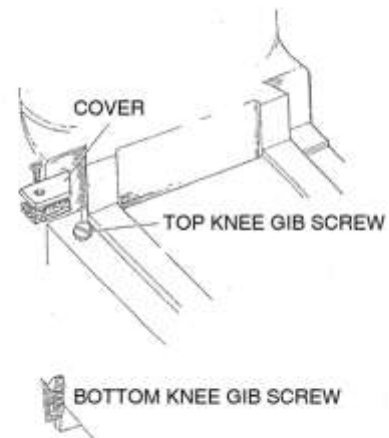
1. TABLE SADDLE WAYS

- a. REMOVE ALL SWarf, CHIP AND OTHE POSSIBLE CONTAINEMTS
- b. LOOSEN RIGHT TABLE GIB SCREW AND TURN LEFT TABLE GIB SCREW IN CLOCKWIISE UNTIL A SLIGHT DRAGE IS FELT



2. SADDLE KNEE WAYS

- a. REMOVE ALL SWarf, CHIPS AND ANY OTHER POSSIBLE CONTAINMENTS
- b. REMOVER COVER
- c. LOOSEN BACK SDDLE GIB SCREW AND TURN FRONT SADDLE GIB SCREW UNTIL A SLIGHT DRAG IS FELT.
- d. REPLACE THE WIPER



3. KNEE COLUMN WAYS

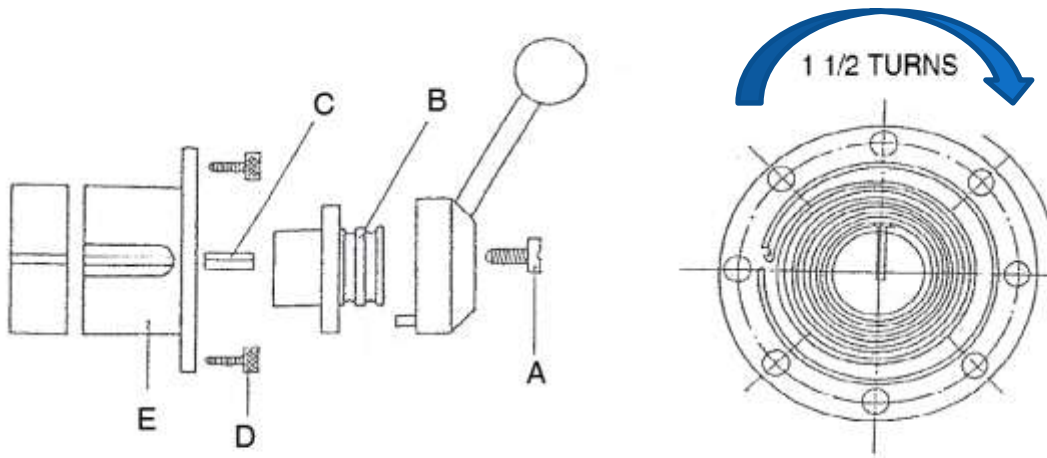
- a. REMOVE ALL SWarf, CHIPS AND ANY OTHER POSSIBLE CINTAINMENTS
- b. REMOVER COVER
- c. LOOSEN BACK SADDLE GIB SCREW AND TURN FRONT SADDLE GIB SCREW IN CLOCKWISE UNITIL A SLIGHT DRAG IS FELT
- d. REPLACER WIPER

REMOVAL AND REPLACEMENT

1. POSITION QUILL ALL THE WAY RETRACTED , APPLY QUILL LOCK
2. REMOVE SCREW "A" (*PART # B-169*), HUB "B" (*PART # B-176*)
3. ROTATE SPRING COVER (*PART # B-177*) UNTIL REALEASING SPRING TENSION IN COUNTER-CLOCKWISE **SLOWLY AND GENTLY**.
4. REMOVE END OF CLOCK SPRING FROM THE PEG ON THE SPRING PIN (*PART # B-168*)
5. REMOVE CLOCK SPRING (BEWARE OF THE SPRING TENSION), PERSONAL INJURY MAY RESULT IT YOU DROP IT OR FAIL TO REMOVE IT PROPERLY. REPLACE WITH NEW ONE
6. REFIT SPPRING IN REVERSE ORDER, THEN TEST THE REVERSE TENSION OF THE CLOCK SPRING
ADJUST TENSION AS FOLLOWS:

ADJUSTMENT OF NEW SPRING

1. REMOVE THE FIRST SCREW "D" (*PART # B-169*),
2. INSERT A PIN
3. REMOVE THE SECOND SCREW "D" (*PART # B-169*),
4. ADJUST ANGLE OF "E" (*PART # B-177*)
5. AS REQUIRED, TIGHTEN THE TENSION IN A CLOCK WISE MOTION, RELEASE THE TENSION IN COUNTER-CLOCKWISE.



CH-3 MAINTENANCE- COLLET ALINGING SCREW REPLACEMENT

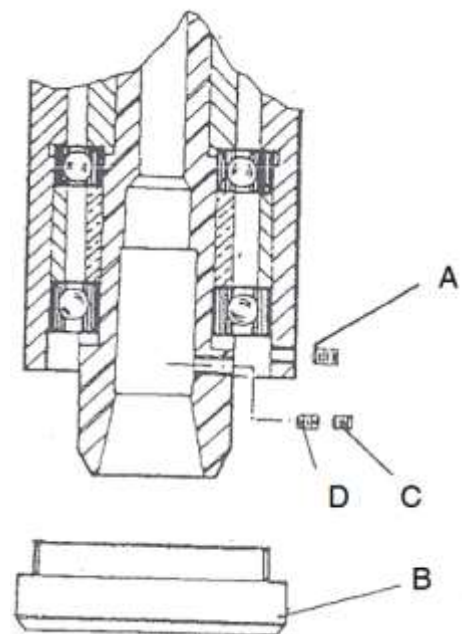
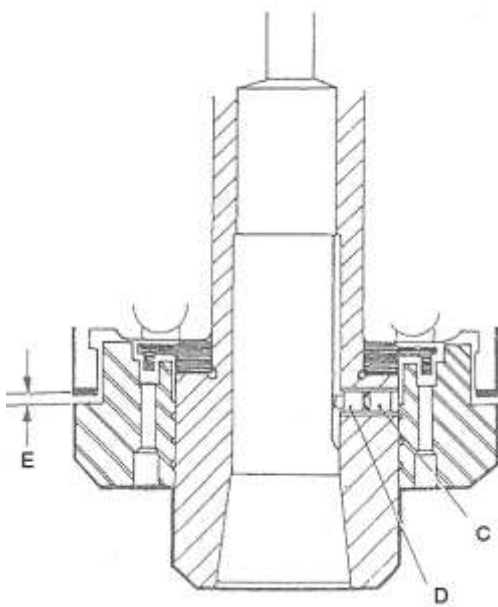
1. REMOVE SET SCREW "A"
2. UNSCREW NOSE CAP "B" (LEFT HAND THREAD) BEWAE THAT THE SPINDLE GOES DOWN.
3. REMOVE LOCK SCREW "C" & COLLET ALIGNING SCREW "D"
4. AIM THE SLOT OF R-8 COLLET AT SCREW "D"
5. ADJUST SCREW "D" TO THE PROPER POSITION DO NOT GRIP THE COLLET TO DEATH
6. REPLACE AND LOCK NOSE CAP "B" PROPERLY

USE CAUTION: EXCESSIVE TOUQUE ON LOCK NUT WILL CAUSE QUILL DISTORTION

7. REPLACE AND LOCK SET SCREW "A" PROPERLY

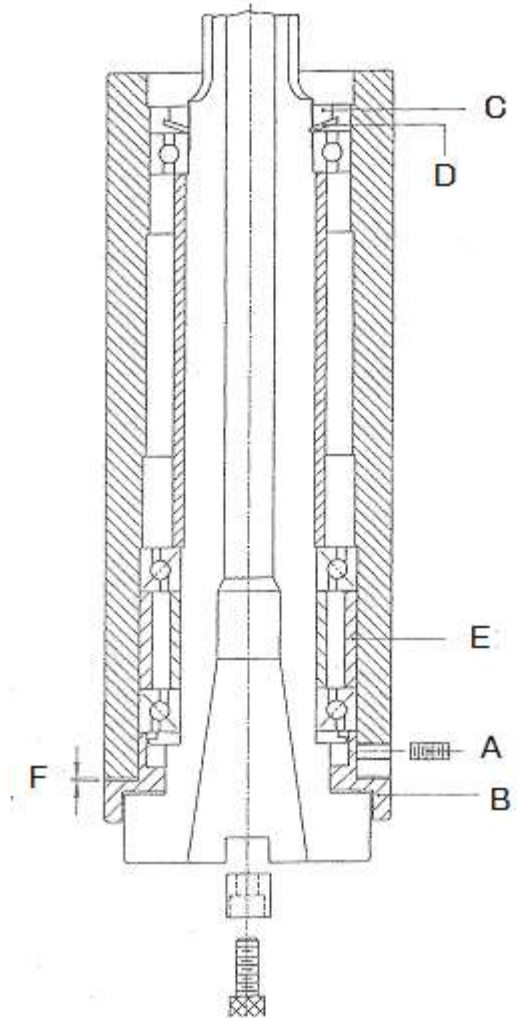
USE CAUTION: EXCESSIVE TOUQUE ON LOCK SCREW WILL CAUSE QUILL DISTORTION

8. CHECK IF THERE IS A GAP BETWEEN NOSE CAP, "B" AND QUILL, IF THERE IS NO GAP, REMOVE NOSE CAP "B", MACHINING IT UNTIL THERE IS A GAP



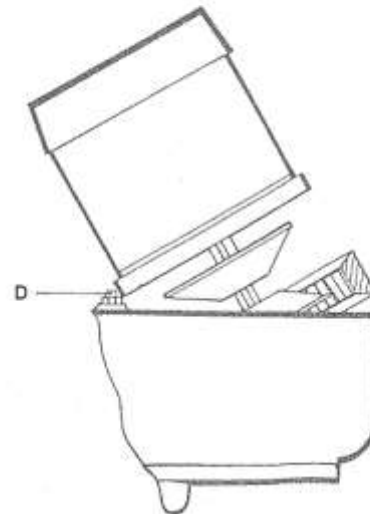
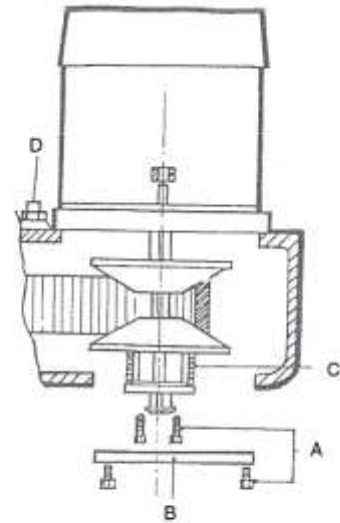
NT30

1. REMOVE MILLING TOOLING AND DRAW BAR
2. TAKE OFF SET SCREW "A"
3. LOOSEN ADJUSTING NUT "B" (LEFT-HAND THREAD) UNTIL DISENGAGED FROM QUILL, AND HOLD SPINDLE WHICH WILL NOT FALL OUT.
4. REMOVE WHOLE SPINDLE ASSEMBLY, THEN PULL OPEN CIRCLIP "D" AND ADJUSTING NUT "C" UNTIL BUSHING "E" IS TIGHTENED
5. REPLACE SPINDE; TIGHTEN ADJUSTING NUT "B" USING AMPLE AMOUNT OF TROQUE TO SEAT. INSPECT THE GAP IN "F" SHOULD **BE .5 TO 1MM** BETWEEN NUT AND QUILL, IF NO GAP IS PRESENT REMOVE NUT AND MACHIN IT USE A SCALE TO MEASURE DIMENSION BEFORE ASSEMBLY
6. FIT SET SCREW "A" RE-DRILL A HOLE AND TIGHTEN IT PROPERLY (NOT TO TIGHT)



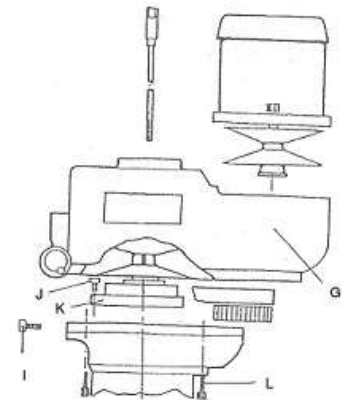
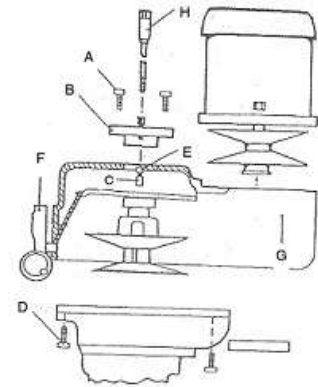
VARI SPEED HEAD:

1. REMOVE MAIN MOTOR
 - a. ADJUST SPINDLE SPEED TO HIGHEST SPEED
 - b. TURN OFF MAIN POWER SUPPLY TO MACHINE
 - c. REMOVE 3 SCREWS "A" AND COVER "B"
 - d. SEPARATE THE CONNECTING WIRE BETWEEN FORWARD AND REVERSE SWITCH AND MOTOR
 - e. REMOVE THE 4 LOCKING NUTS "D"
 - f. MOTOR IS READY FOR REMOVAL



TIMING BELT REPLACEMENT

1. REMOVE THE MOTOR
2. REMOVE DRAW BAR "H" AND MILLING CUTTER
3. REMOVE THE 3 SCREWS "A" AND BEARING HOUSING "B"
4. REMOVE THE 2 SCREW "E" AND THE BUSHING "C"
5. REMOVE THE 6 SCREWS "D"
6. REMOVE THE 2 SCREWS WHICH LOCATED IN THE BOTTOM OF THE 4 SCREWS OF THE SPEED CHANGE "F"
7. REMOVE THE TOP HOUSING "G" AND THE SPEED CHANGER "F"
8. REMOVE THE 4 ALLEN HEAD SCREW (PARTS #VS-051)
9. REMOVE BRAKE BASE (*PART #VS-050*) AND PULLEY
10. TIMING BELT IS READY TO REPLACE

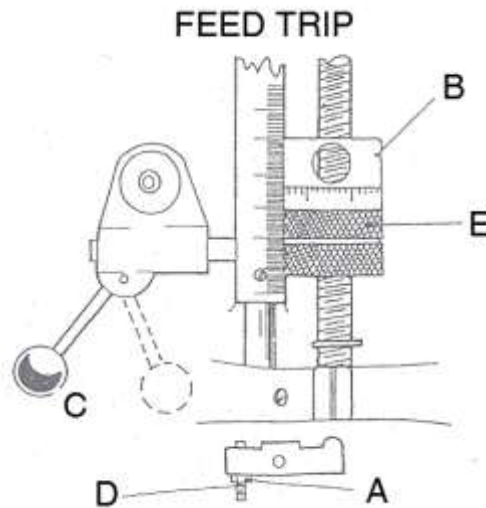


DRIVE BELT REPLACEMENT

1. REPEAT ITEMS 1 -7
2. BELT IS READY TO BE REPLACED

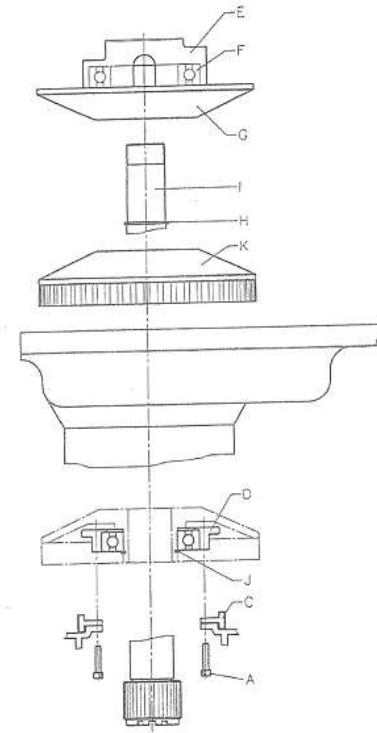
FEED TRIP ADJUSTMENT

1. RELEASE LOCKNUT "A" (*PART # B-143*)
2. ENGAGE TRIP HANDLE "C" (*PARTS NO B-104*)
3. ADJUST MICROMETER NUT "E" (*PART # B-162*) AGAINST QUILL STOP KNOB "B" (*PART # 163*)
4. SLOWLY TURN ADJUSTING SCREW "D" (*PART # B-146*) UNTIL CAM ROD "C" (*PART # B-104*) TRIPS
5. THEN TIGHTEN HEXAGON NUT "A" (*PART # B-143*)
6. ENGAGE CAN ROD "C" (*PART # B-104*)
7. FIT HANDWHEEL, (*PART #B-125 WITH B-126*), ADJUST QUILL STOP KNOB "B" (*PART #B-163*) AGAINST MICROMETER NUT "E" (*PARTS # B-162*), CHECK THAT SMART TRIP ACTION IS OBTAINED



VARI SPEED

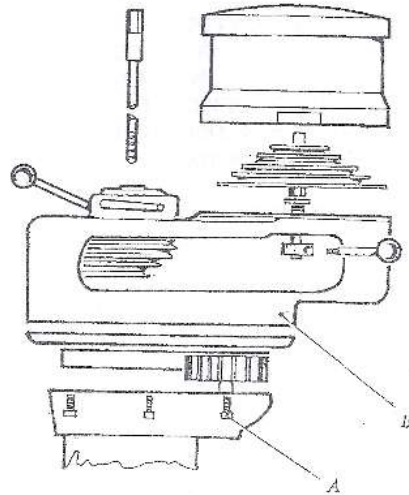
1. REMOVE THE MOTOR
2. SAME AS TIMING BELT REPLACEMET ITEMS 1 -9
3. REMOVE "E" "F" "G" (AIM AT THE DLOT AND REMARKED THE FIRST)
4. REMOVE "H" CIR-CLIP
5. REMOVE CLUTCH GEAR SHAFT "T" FROM DOWN SIDE
6. REMOVE "J" CIR-CLIP
7. REMOVE "K" TOP OF VARIABLE SPEED PULLEY
8. REMOVE "A" ALLEN HEAD SCREW.
9. REMOVE "D" BRAKE BEARING BASE
10. BRAKE SHOE READY FOR REPLACEMENT



STEP PULLEY

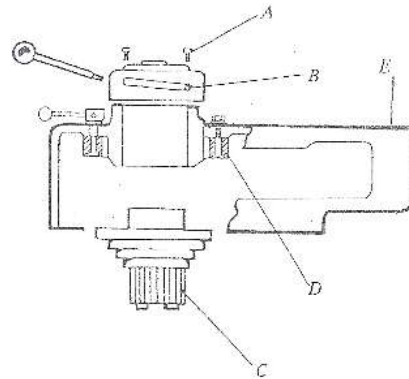
DRIVE BELT

1. ISOLATE MACHINE
2. REMOVE DRAW BAR
3. REMOVE MOTOR
4. LOWER QUILL TO FULL EXTENSION
5. REMOVE 6 SCREW "A"
6. REOMOVE BELT HOUSING "B" , LIGHT TAP TO WITHDRAW FROM DOWELS
7. THE BELTS MAY NOW BE CHANGED



BRAKE SHOE REPLACEMENT

1. REPEAT SEQUENCE 1 THRU 6 ABOVE
2. REMOVE 2 SCREWS "B"
3. PUSH BAERING HUB "C" CLEAR OF HOUSING
4. TURN BELT HOUSING Upside-Down
5. REPLACE SHOE
6. REPLACE A-008 SPRING PLUNGER AND A-009 SPRING, INSTALL LOCK WAHERS AND NUT
7. REPLACE BEARING HUB "C"



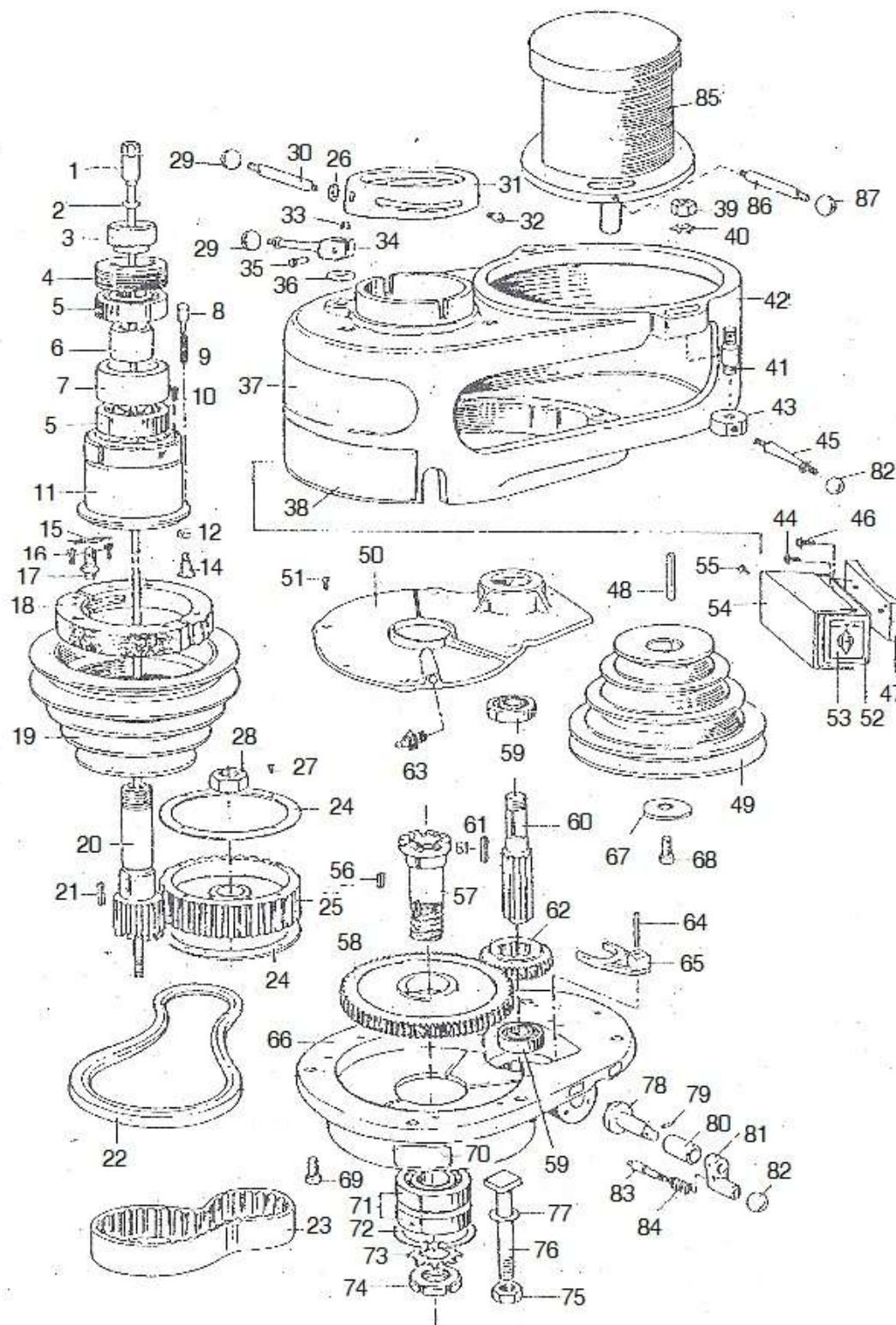
WHEN ORDERING REPLACEMENT PARTS

ALWAYS REFER TO

-  **MACHINE MODEL NUMBER**
-  **MACHINE SERIAL NUMBER**
-  **PARTS NUMBER**
-  **DESCRIPTION**
-  **QUANTITY**

CH-4 PARTS HEAD TOP HOUSING ASSEMBLY –STEP PULLEY

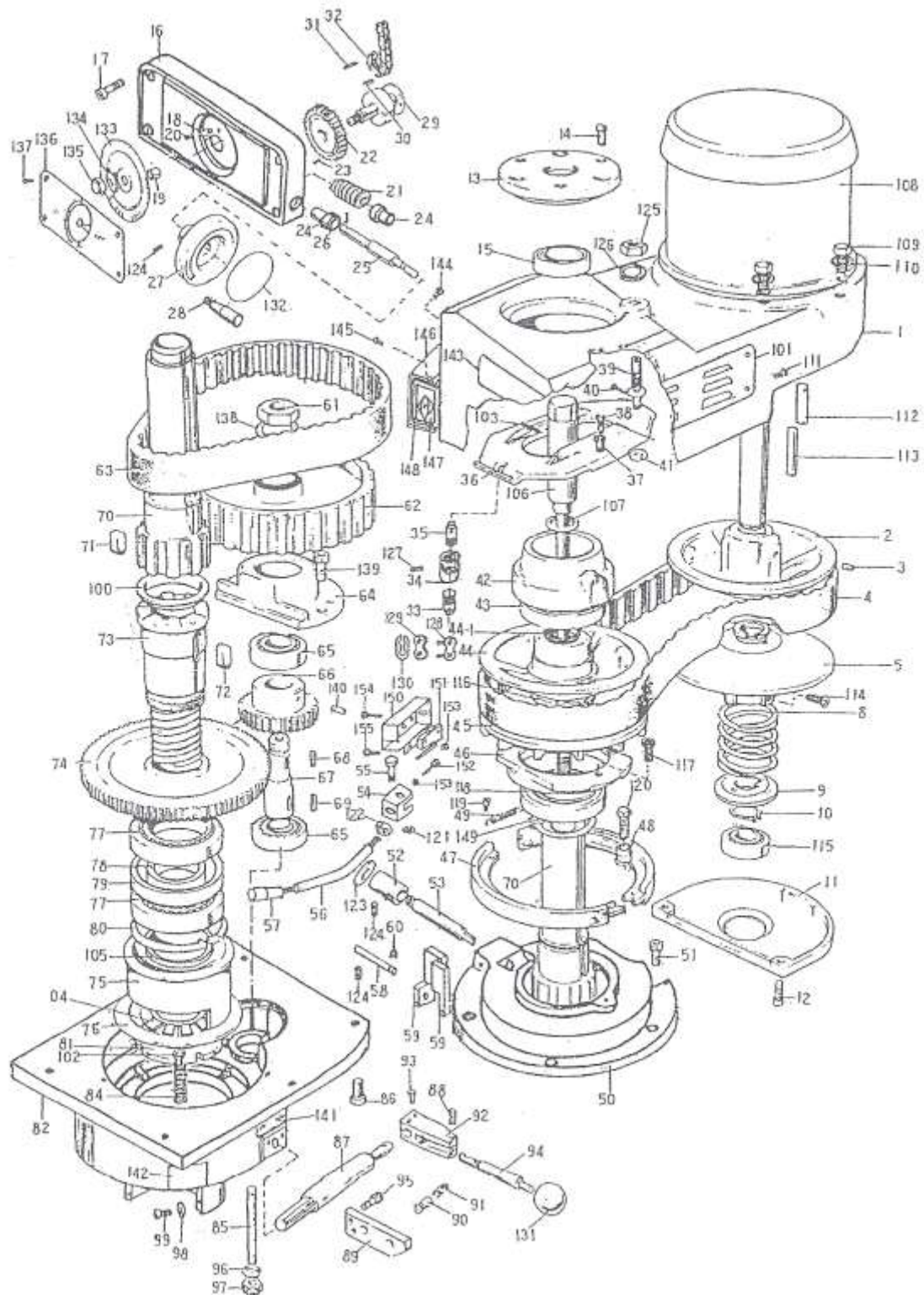
PARTS NO A001-A087



CH-4 PARTS HEAD TOP HOUSING ASSEMBLY –STEP PULLEY

A-001	DRAW BAR		A-047	SWITCH BASE
A-002	WASHER		A-048	KEY 7X7X30
A-003	UPPER BEARING LOCKNUT		A-049	MOTOR PULLEY
A-004	BEARING SLEEVE LOCKNIT		A-050	GEAR HOUSING COVERALLEN HEAD SCREW
A-005	BEARING	(6207ZZ)	A-051	ALLEN HEAD SCREW M5X12
A-006	INNER BEARING BUSHING		A-052	INNER SWITCH BOX
A-007	OUTER BEARNG BUSHING		A-053	FWR/REV SWITCH
A-008	SPRING PPLUNGER		A-054	OUTER SWITCH BOX
A-009	SPRING		A-055	ROUND HEAD SET SCREW5/32"X1/4"
A-010	ALLEN HEAD SCREW	M3X8	A-056	KEY 8X8XX16
A-011	SPINDLE PULLEY BEARING SLEEVE		A-057	GEAR HUB
A-012	HEXGON NUT	5/16"	A-058	SPINDLE GEAR
A-			A-059	BEARING 6203ZZ
A-014	SET SCREW	M3x10	A-060	COUNTER SHAFT
A-015	SPRING	A-016	A-061	KEY 5X5X15
A-016	ALLEN HEAD SCREW	M3X10	A-062	COUNTER SHAFT GEAR
A-017	BRAKE LOCK STUD		A-063	GREASE NIPPLE 1/8" PT
A-018	BRAKE LOCK		A-064	LONG DOWEL PIN
A-019	SPINDLE PULLEY		A-065	BACK GEAR SHIFTER FORK
A-020	SPINDLE PULLEY HUB		A-066	GEAR HOUSING
A-021	KEY	6X6X6	A-067	WASHER M8
A-022	V-BELT	A-34	A-068	ALLEN HEAD SCREW M8X25
A-023	TIMING BELT	225L	A-069	ALLEN HEAD SCREW M6X20
A-024	TIMMING BELT PULLEY FLANGE		A-070	DISENGAGE FEED INST PLATE
A-025	TIMMING BELT PULLEY		A-071	BEARING 6208ZZ
A-026	HX NUT 5/16"		A-072	CIRCLIP R-80
A-027	FLA HEAD SCREW 3/16 X 3/8		A-073	CIRCLIP A W08
A-028	HEX NUT 5/8 -18NF		A-074	BEARING LOCK NUT
A-029	BLACK PLASTIC KNOB		A-075	HEX NUT 7/16"
A-030	SPINDLE CLUTCK LEVER		A-076	VERTICAL TEE BOLT
A-031	CAP RING		A-077	COMPRESSION WASHER
A-032	SPINDLE CLUTCH CAM RING PIN		A-078	ECCENTRIC SHAFT
A-033	SNAP RING		A-079	LONG ROLL PIN
A-034	BRAKE LOCK HANDLE		A-080	BACK GEAR SHIFTER BUSHING
A-035	BRAKE LOCK PIN		A-081	SHIFT CRANK
A-036	WASHER		A-082	BLACK PLASTIC BALL
A-037	SPEED PLATE			
A-038	OPERATION INSTRUCTION PLATE		A-084	COMPRESSION WASHER
A-039	HEX NUT 3/8" X 24NF		A-085	MOTOR
A-040	SPRING WASHER 3/8"		A-086	HANDLE
A-041	MOTOR MOUNTING STUDS		A-087	BLACK PLATIC BALL
A-042	BELT HOUSING			
A-043	MOTOR LOCK NUT			
A-044	ROUND HEAD SET SCREW			
A-045	MOTOR LOCK NUT HANDLE			
A-046	ROUND HEAD SET SCREW M6X16			

CH-4 PARTS HEAD TOP HOUSING ASSEMBLY –VARIABLE HEAD



CH-4 PARTS HEAD TOP HOUSING ASSEMBLY –VARIABLE HEAD

VS-001	BELT HOUSING	
VS-002	MOTOR MOUNTING PULLEY	
VS-003	SET SCREW	M8X8
VS-004	VARI SPEED BELT	900VC-3830
VS-005	LIVE MOTOR PULLEY	
VS-005-1	BRONZE SLEEVE	
VS-008	SPEED CHANGE SPRING	
VS-009	SPRING BASE	
VS-010	CIRCLIP	S28
VS-011	MOTOR BASE	
VS-012	ALLEN HEAD SCREW	M6X16
VS-013	BEARING BLOCK	
VS-014	ALLEN HEAD SCREW	M6X25
VS-015	BEARING	6007ZZ
VS-016	SPEED CHANGE BLOCK	
VS-017	ALLEN HEAD SCREW	M6X30
VS-018	SET SCREW	3/16"X3/4"
VS-019	BUSHING	
VS-020	SET SCREW	M6X6
VS-021	WORM	
VS-022	WORM GEAR	
VS-023	SPRING PIN	5X10
VS-024	BRASS BUSHING	
VS-025	VARI SPEED SHAFT	
VS-026	SPRING PIN	
VS-027	CHANGE SPEED GEAR HAND WHEEL	
VS-028	CHANGE SPEED GEAR HANDLE	
VS-029	WORM GEAR HOLDER	
VS-030	SPRING PIN	3X18
VS-031	SPRING PIN	3X24
VS-032	CHAIN	#35
VS-033	BOLT	
VS-034	BOLT BASE	
VS-035	SPEED CHANGE PLATE	
VS-036	SPEED CHANGE PLATE	
VS-037	PLATE COVER	
VS-038	ALLEN HEAD SCREW	M5X20
VS-039	CHANGE SPEED SCREW	
VS-040	PIN	3/32"X1
VS-041	WASHER	M8X8
VS-042	VARIABLE SPEED SHAR BASE	
VS-043	BEARING	6012ZZ
VS-044	LIVE VARIABLE SPEED PULLEY	
VS-044-1	HOUSING	
VS-045	VARIABLE SPEED PULLEY	
VS-046	BRAKE BEARING BASE	
VS-047	BRAKE DRUM	
VS-048	BRAKE DRUM LOCKNUT	
VS-049	SPRING	
VS-050	BRAKE BASE	
VS-051	ALLEN HEAD SCREW	M6X16
VS-052	BRAKE BUSHING	

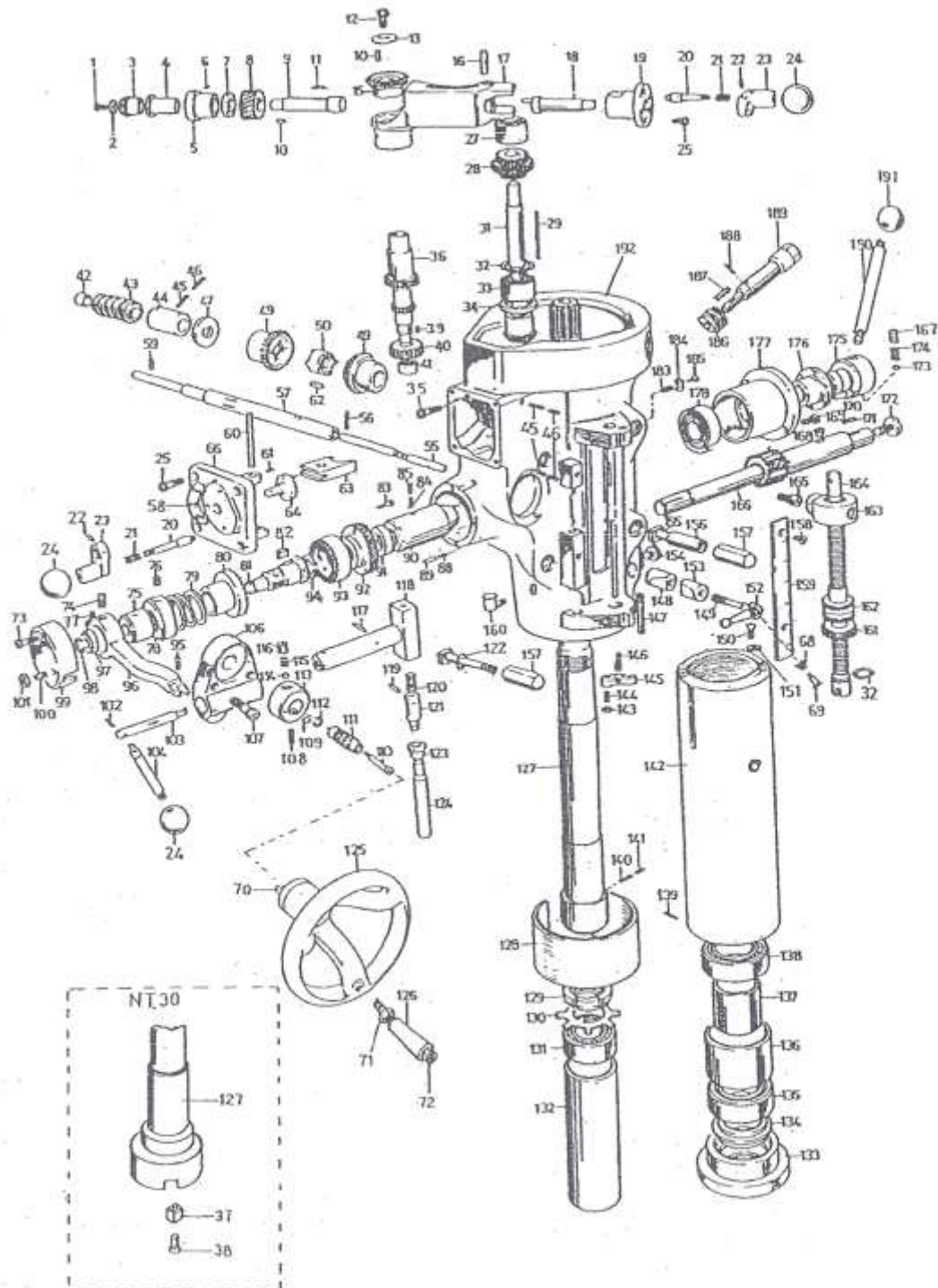
VARIABLE SPEED HEAD

VS-053	BRAKE SHAFT	
VS-054	BRAKE HANDLE BASE	
VS-055	BRAKE LOCK PIN	
VS-056	BRAKE HANDLE	
VS-057	BLACK PLASTIC BALL	3/8"
VS-058	BRAKE OPERATION AXLE	
VS-059	BRAKE BLOCK	
VS-060	CIRCLIP	E5
VS-061	HEX NUT	5/8" 18NFX5/16"
VS-062	TOOTHED PULLEY	
VS-063	TIMING BELT	225L
VS-064	BEARING HOUSING	
VS-065	BEARING	6203ZZ
VS-066	GEAR	
VS-067	GEAR SHAFT	
VS-068	KEY	5X5X15
VS-069	KEY	5X5X18
VS-070	CLUTCH GEAR SHAFT	
VS-071	KEY	8X8X16
VS-072	KEY	8X8X12
VS-073	CLUTCH GEAR SHAFT	
VS-074	GEAR WHEEL	
VS-075	QUILL	
VS-076	LOCK WASHER	
VS-077	BEARING	6908ZZ
VS-078	SPACER	
VS-079	OUTER BEARING SPACER HOUSING	
VS-080	CIRCLIP	R62
VS-081	CLUTCH GEAR SHAFT LOCKOUT	R40XP1.0
VS-082	GEAR BOX BASE	
VS-084	SPRING	
VS-085	BOLT	
VS-086	ALLEN HEAD SCREW	
VS-087	CLUTCH RING CONTROL SHAFT	M8X25
VS-088	PIN	3X18
VS-089	HIGH/LOW SPEED PLATE	
VS-090	LOCATING PIN	
VS-091	SPRING	
VS-092	HANDLE BASE	
VS-093	ALLEN HEAD SCREW	M5X12
VS-094	CLUTCH HANDEL	
VS-095	ALLEN HEAD SCREW	M6X16
VS-096	SPRING WASHER	7/16"
VS-097	HEX NUT	7/16"
VS-098	WASHER	3/16"
VS-099	ROUND HEAD PHILIPS SCREW	3/16"X3/8"
VS-100	SHAFT FERRULE	
VS-101	COER	
VS-102	PIN	
VS-103	SPRING PIN	4X30
VS-104	LOCK NUT	AW08
VS-105	SPACER WASHER	
VS-106	DRAW BAR	NT30#,R8
VS-107	WASHER	NT30#,R8
VS-108	MOTOR	
VS-109	HEX NUT	3/8" X 1"

VARIABLE SPEED HEAD

VS-110	SPRING WASHER	3/8"
VS-111	ROUND HEAD PHILIPS SCREW	3/16" X3/8"
VS-112	KEY	7X7X25
VS-113	BRASS KEY	7X7X30
VS-114	SET SCREW	M4X10
VS-115	BEARING	6204ZZ
VS-116	CIRCLIP	S40
VS-117	ALLEN HEAD SCREW	M6X12,M6X16
VS-118	BEARING	6010ZZ
VS-119	CAP SCREW	1/8"X14"
VS-120	HEX NUT	M6X25
VS-121	CIRCLIP	E5
VS-122	HEX NUT	3/8"
VS-123	WASHER	
VS-124	SET SCREW	M6X6
VS-125	HEX NUT	3/8"
VS-126	SPRING WASHER	3/8"
VS-127	SET SCREW	M4X6
VS-128	CHAIN CIRCLIP	
VS-129	CIRCLIP COVER	
VS-130	CIRCLIP	
VS-131	PLASTIC HANDLE	1/4"
VS-132	NAME PLATE	
VS-133	SPEED PLATE	50-3550,600-4300
VS-134	WASHER	5/16"
VS-135	NUT	5/16"
VS-136	SPEED PLATE	
VS-137	ROUND HEAD PHILIPS SCREW	M4X6
VS-138	SPRING WASHER	5/8"
VS-139	ALLEN HEAD SCREW	M5X20
VS-140	SET SCREW	1/4", M8
VS-141	HIGH/LOW SPEED PLATE	
VS-142	QUILL FEED PLATE	
VS-143	NAME PLATE	
VS-144	ROUND HEAD PHILIPS SCREW	5/32"X1/4"
VS-145	ROUND HEAD PHILIPS SCREW	M6X1
VS-146	SWITCH COVER	
VS-147	FORWARD/REVERSE SWITCH	
VS-148	SWITCH COVER	
VS-149	CIRCLIP	S50
VS-150	MICRO SWITCH COVER	
VS-151	MICRO SWITCH	Z15G1794
VS-152	ALLEN HEAD SCREW	M4X16
VS-153	HEX NUT	M4
VS-154	ROUND HEAD PHILIPS SCREW	M4X25
VS-155	ALLEN HEAD SCREW	M6X12,M6X16

CH-4 PARTS QUILL ASSEMBLY R-8 SPINDLE



CH-4 PARTS QUILL ASSEMBLY R-8 SPINDLE

B-001	ALLEN HEAD SCREW	M5X10
B-002	PINION WASHER	M5
B-003	FEED BEVEL PINION	
B-004	FEED WORM GEAR SHAFT SLEEVE	
B-005	WORM CRADLE BUSHING	
B-006	SET SCREW	1/4"X1/4"
B-007	WORM GEAR SPACER	
B-008	FEED DRIVE WORM GEAR	
B-009	FEED DRIVE WORM GEAR SHAFT	
B-010	KEY	3X3X8
B-011	KEY	3X3X20
B-012	ALLEN HEAD SCREW	M8X12
B-013	WASHER	M8
B-015	FEED REVERSE BEVEL GEAR	
B-016	FEED ENGAGE PIN	
B-017	WORM GEAR CRADEL	
B-018	ECCENTRIC SHAFT	
B-019	SHAFT SLEEVE	
B-020	GEAR SHAFT PLUNGER	
B-021	COMPRESSION SPRING	
B-022	ROLL PIN	3X20
B-023	SHAFT CRANK	
B-024	BLACK PLASIC BALL	1/4"
B-025	ALLEN HEAD SCREW	M5X12
B-027	CLUSTER GEAR SHAFT UPPER BEARING	
B-028	CLUSTR GEAR ASSEMBLY	
B-029	KEY	3X3X5
B-031	CLUSTER GEAR SHAFT	
B-032	CIRCLIP	S16
B-033	BEVEL GEAR BEARING	
B-034	BEVEL GEAR THRUST SPACER	
B-035	ALLEN HEAD SCREW	
B-036	FEED DRIVING GEAR	
B-037	STOP BLOCK	
B-038	ALLEN HEAD SCREW	
B-039	KEY	3X3X8
B-040	FEED DRIVE GEAR	
B-041	BEARING	BA66
B-042	BUSHING	
B-043	BOSTOM WORM	
B-044	FEED WORM SHAFT BUSHING	
B-045	LONG SOCKET SET SCREW	M8X8
B-046	SET SCREW	M6X8
B-047	FEED WORM SHAFT THRUST WASHER	
B-048	FEED REVERSE BEVEL GEAR	
B-049	FEED REVERSE CLUTCH	
B-055	REVERSE CLUTCH ROD	
B-056	LONG ROLL PIN	3X20
B-057	FEED WORM SHAFT	
B-058	FEED PLATE	

CH-4 PARTS QUILL ASSEMBLY R-8 SPINDLE

B-059	LONG PIN	3X12
B-060	LONG PIN	
B-061	SET SCREW	M5X5
B-062	KEY	3X3X15
B-063	BACK GEAR SHAFT FORK	
B-064	CLUSTER GEAR SHAFT CRANK	
B-066	CLUSTER GEAR COVER	
B-068	SPRING	
B-069	SCREW	
B-070	SPRING PIN	3X15
B-071	HEX NUT	5/16"
B-072	LONG SCREW	
B-073	ALLEN HEAD SCREW	M5X35
B-074	CLUTCH RING PIN	
B-075	CLUTCH RING	
B-076	SET SCREW	M6X6
B-077	PIN	5X20
B-078	OVERLOAD CLUTCH LOCKNUT	
B-079	SAFETY CLUTCH SPRING	
B-080	OVERLOAD CLUTCH	
B-081	OVERLOAD CLUTCH SLEEVE	
B-082	KEY	5X8X13
B-083	ROUND HEAD SCREW	4X16
B-084	SET SCREW	M6X8
B-085	SET SCREW	MEX8
B-088	COMPRESSION SPRING	
B-089	OVERLOAD CLUTCH LEVER SPRING PLUNGER	
B-090	QUIL PINION SHAFT BUSHING	
B-091	WORM GEAR SPACER	
B-092	OVERLOAD CLUTCH WORM GEAR	
B-093	OVERLOAD CLUTCH RING	
B-094	KOHINOOR CIRCLIP	S15
B-095	DOWELL PIN	5X14
B-096	OVERLOAD CHLUTCH TRIP LEVER	
B-097	OVERLOAD CLUTCH WASHER	
B-098	SNAP RING	E9,S10
B-099	CLUTCH ARM COVER	
B-100	SET SCREW	M6X16
B-101	HEX NUT	M6
B-102	DOWELL PIN	
B-103	CAM ROD	
B-104	CAM ROD	
B-106	FEED TRIP BRACKET	
B-107	ALLEN HEAD SCREW	M6X20
B-108	SET SCREW	M6X20
B-109	KEY	3X3X10
B-110	FEED REVERSE KNOB STUD	
B-111	REVERSE KNOB	
B-112	SNAP RING	E5
B-113	HANDWHEEL CLUTCH	
B-114	STEEL BALL	3/16"
B-115	COMPRESSION SPRING	

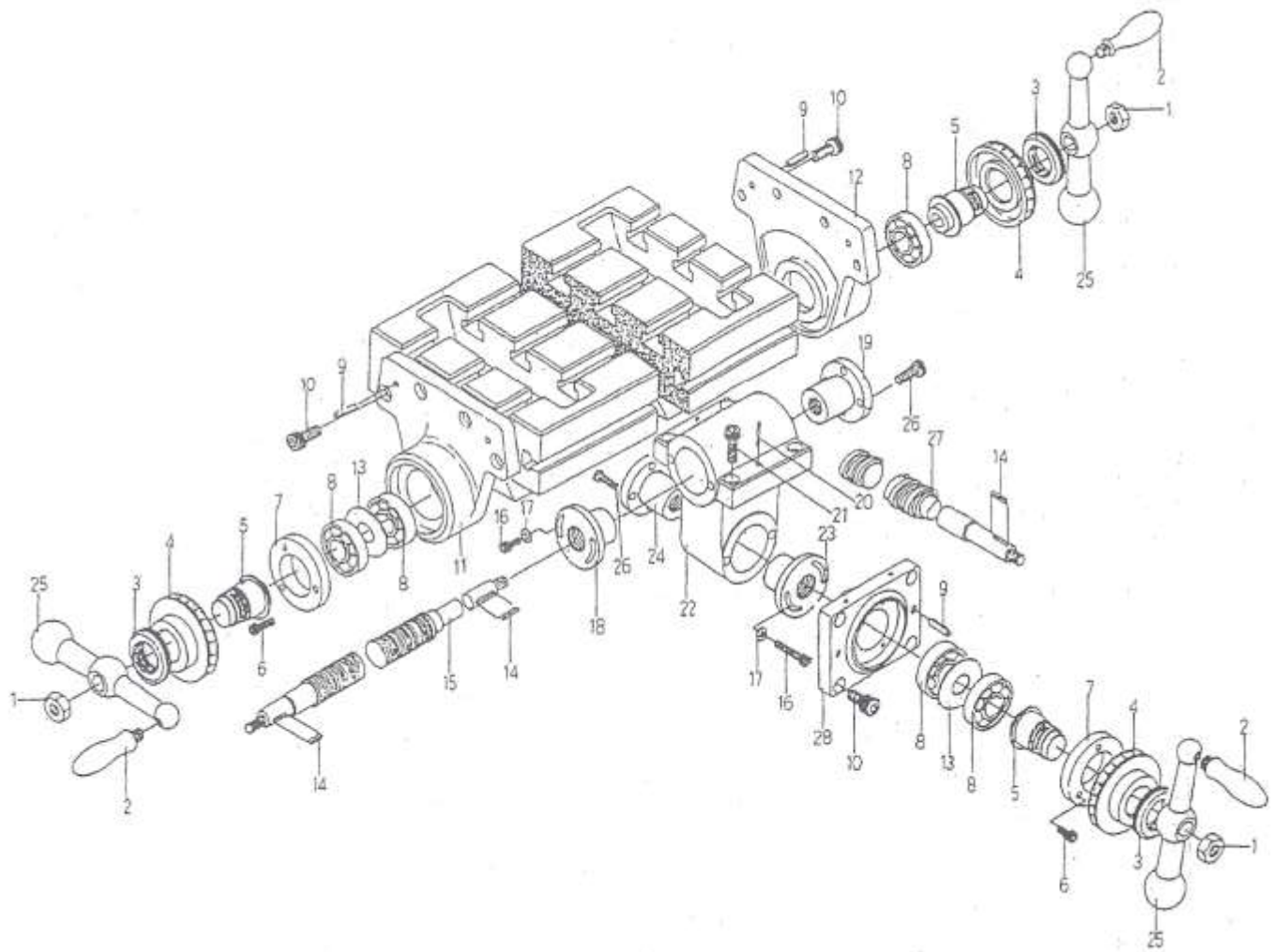
CH-4 PARTS QUILL ASSEMBLY R-8 SPINDLE

B-116	SET SCREW	M8X8
B-117	LONG ROLL PIN	3X14
B-118	CAM ROD SLEEVE ASSEMBLY	
B-119	LONG ROLL PIN	
B-120	COMPRESSION SPRING	
B-121	TRIP PLUNGER	
B-122	SPRING WASHER	1/2"
B-123	TRIP PLUNGER BUSHING	
B-124	FEED TRIP PLUNGER	
B-125	HANDWHEEL	
B-126	HANDWHEEL HANDLE	
B-127	SPINDLE	R-8 /30
B-128	QUILL SKIRT	
B-129	LOCKNUT	AN06
B-130	CIRCLIP	ANO6
B-131	BEARING	6206ZZ
B-132	SLEEVE	
B-133	NOSE PIECE	
B-134	SPINDLE DIRT SHIELD	
B-135	BEARING	7207
B-136	BEARING SPACER	
B-137	BEARING SPACER	
B-138	BEARING	7207
B-140	SET SCREW	
B-141	SET SCREW	M6X6
B-142	QUILL	
B-143	HEX NUT	M4 X 6
B-144	SET SCREW	M4X16
B-145	FEED TRIP LEVER	
B-146	ADJUSTING SCREW	
B-147	INDICATOR ROD	
B-148	SRILLED LOCK SLEEVE	
B-149	QUILL LOCK BOLT	
B-150	ROUND HEAD PHILIPS SCREW	M5X10
B-151	WASHER	M5
B-152	LOCK HANDLE	
B-153	QUILL LOCK SLEEVE TAPPED	
B-154	INDICATOR ROD SCREW	
B-155	TEE BOLT	
B-156	LOWER CLAMPING BOLT SPACER	
B-157	ADAPTOR NUT	
B-158	ROUND HEAD PHILLIPS SCREW	M4 X 6
B-159	MICROMETER SCALE	
B-160	OIL CUP	1/8 PT
B-161	QUILL MICRO STOP NUT	
B-162	MICROMETER NUT	
B-163	QUILL STOP KNOB	
B-164	QUILL MICRO STIO SCREW	
B-165	ALLEN HEAD SCREW	3/8"X5/8"
B-166	QUILL PINION SHAFT	
B-167	SET SCREW	M6X6
B-168	SPRING PIN	

CH-4 PARTS QUILL ASSEMBLY R-8 SPINDLE

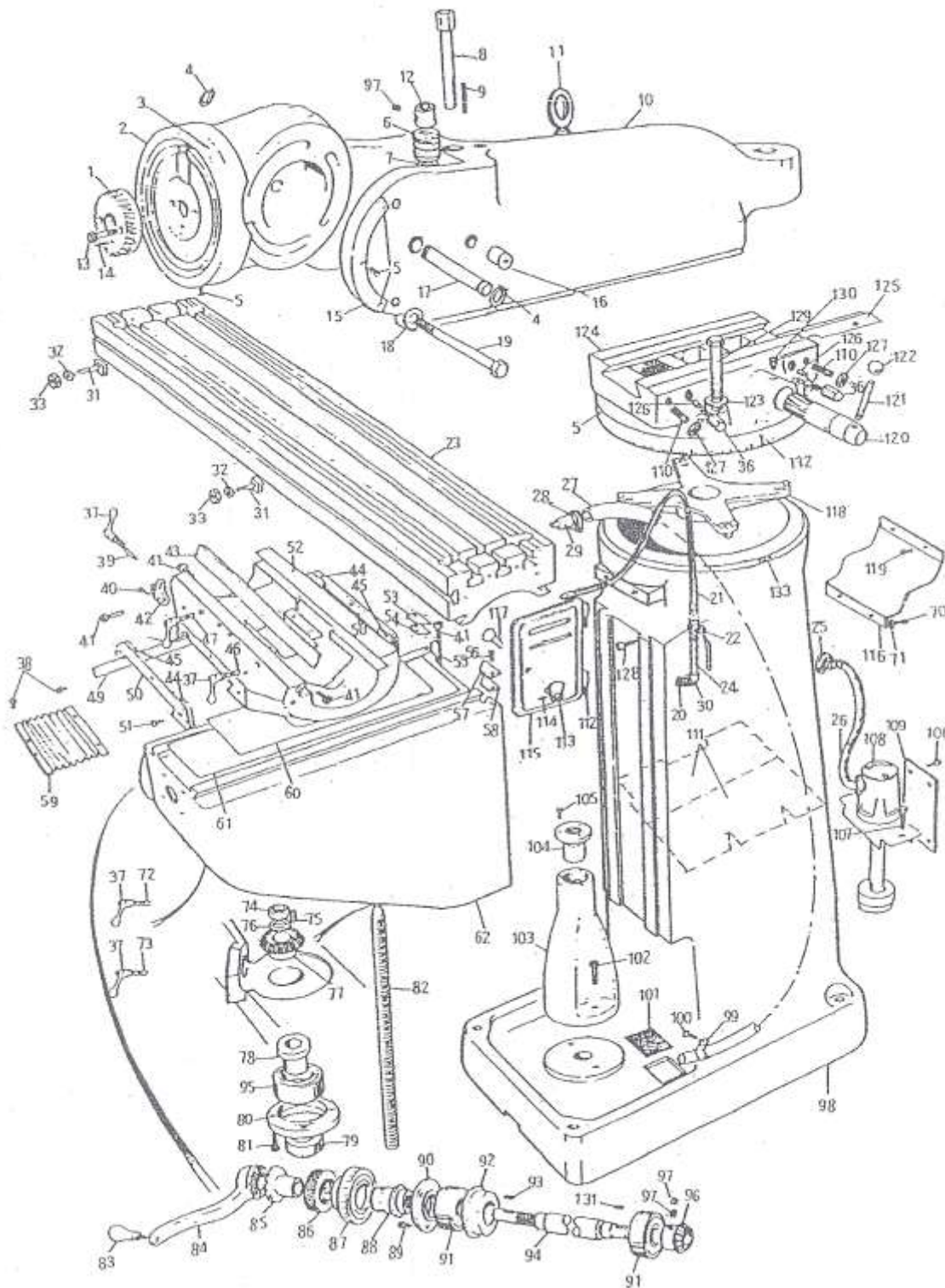
B-169	ALLEN HEAD SCREW	M5X12
B-170	LONG DOWELL PIN	
B-171	KEY	3X3X20
B-172	PINION SHAFT HUB SLEEVE	
B-173	STEEL BALL	3/16"
B-174	COMPRESSION SPRING	
B-175	RACK FED HANDLE HUB	
B-176	PINION SHAFT HUB SLEEVE	
B-177	SPRING COVER	
B-178	CLOCK SPRING	
B-183	REVERSE TRIP BALL LEVER	
B-184	FEED REVERSE TRIP PLUNGER	
B-185	REVERSE TEIP BALL LEVER SCREW	
B-186	WORM GEAR	
B-187	KEY	4X4X18
B-189	ADJUSTMENT WORM SHAFT	
B-190	PINION SHAFT HUB HANDLE	
B-191	BLACK PLASTIC KNOB HANDLE	3/8"
B-192	QUILL HOUSING	

CH-4 PARTS YOKE ASSEMBLY



CH-4 PARTS YOKE ASSEMBLY

D-001	HEX NUT	1/2"X20NF
D-002	HANDLE	3
D-003	DIAL LOCK NUT	
D-004	DIAL LOCK NUT	5mm/0.2"
D-005	DIAL HOLDER	
D-006	ALLEN HEAD SCREW	M6X12
D-007	BEARING RETAINING RING	
D-008	BEARING	6204ZZ
D-009	SPRING PIN	5X30
D-010	ALLEN HEAD SCREW	M10X25
D-011	LEFT BEARING BRACKET	
D-012	RIGHT BEARING BRACKET	
D-013	BEARING SPACER	
D-014	KEY	3X3X25
D-015	LONGITUDINAL SCREW	
D-016	ALLEN HEAD SCREW	M6X20
D-017	WASHER	M6
D-018	LONGITUDINAL ADJ NUT	
D-019	LONGITUDINAL NUT	
D-020	SPRING PIN	5X30
D-021	ALLEN HEAD SCREW	M10X20
D-022	FEED NUT BRACKET	
D-023	CROSS ADJUSTING NUT	
D-024	CROSS NUT	
D-025	HAND WHEEL	
D-026	ALLEN HEAD SCREW	M6X20
D-027	CROSS FEED SCREW	
D-028	CROSS FEED BEARING BRACKET	



CH-4 PARTS MAIN BODY CASTING AND CROSSLIDE

2C-001	QUILL HOUSING	
2C-002	RAM ADAPTOR	
2C-003	ADAPTOR SCALE	
2C-004	ADAPTOR PIVOT STUD CIRCLIP	S28
2C-005	RIVET	
2C-006	VERTICAL ADJUSTING WORN SHAFT	
2C-007	WORM THRUST WASHER	
2C-008	VERTICAL ADJUSTING WORM SHAFT	
2C-009	KEY	5X5X50
2C-010	RAM ADAPTOR	
2C-011	LIFTING HOOK	3/4"
2C-012	SLEEVE	
2C-013	ALLEN HEAD SCREW	M6X25
2C-014	SPRING PIN	8X30
2C-015	ANGLE PLATE	
2C-016	SLEEVE	
2C-017	ADAPTOR PIVOT STUD	
2C-018	SPRING WASHER	1/2"
2C-019	ADAPTOR LOCKONG BOLT	
2C-020	NIPPLE CONNECTOR	3/8" PT
2C-021	COOLANT OIL HOSE	
2C-022	BALL VALVE	3/8" PT
2C-023	TABLE	9"X42"
2C-023A	TABLE	9"X49"
2C-024	PIPE	
2C-025	HOSE CLIP	
2C-026	PLASTIC HOSE	
2C-027	PLASTIC HOSE	
2C-028	HOSE CLIP	
2C-029	CONNECTOR	
2C-030	ELBOW CONNECTOR	
2C-031	STOP PIECE T-BOLT	
2C-032	TABLE STOP PIECE	
2C-033	HEX NUT	3/8"
2C-034		
2C-035		
2C-036		
2C-037	TABLE LOCK BOLT HANDLE	
2C-038		
2C-039	SADDLE LOCK PLUNGER	
2C-040	ALLEN HEAD SCREW	3/8"X3/4"
2C-041	STRIP ADJUSTING SCREW	
2C-042	TABLE STOP BRACKET	

MAIN BODY CASTING AND CROSSLIDE

2C-043	GIB	
2C-044	WIPER	
2C-045	WIPER	
2C-046	TABLE LOCK PLUNGER	
2C-047	TABLE LOCK PLUNGER	
2C-048		
2C-049	SIDE RAKED GIB	
2C-050	WIPER	
2C-051	ROUND HEAD PHILLIPS SCREW	3/16" X 1/2"
2C-052	SADDLE	
2C-053	WIPER LEFT	
2C-054	WIPER LEFT	
2C-055	GIB	
2C-056	ROUND HEAD PHILLIPS SCREW	M6X12
2C-057	WIPER RIGHT	
2C-058	WIPER RIGHT	
2C-059	FRONT CHIP GUARD	
2C-060	Y AXIS SCREW COVER SET	
2C-061	CHIP GUARD	
2C-062	KNEE	
2C-063		
2C-064		
2C-065		
2C-066		
2C-067		
2C-068		
2C-069		
2C-070	ROUND PHILLIPS SCREW	3/16" X 1/2"
2C-071	WASHER	3/16"
2C-072	KNEE LOCK PLUNGER	
2C-073	KNEE LOCK PLUNGER	
2C-074	HEX NUT	1/2" - 20NF
2C-075	KEY	5X5X520
2C-076	WASHER	1/2"
2C-077	BEVEL GEAR	
2C-078	BEARING BUSHING	
2C-079	DISTANCE BUSHING	
2C-080	BEARING RETAINING RING	
2C-081	ALLEN HEAD SCREW	M6X20
2C-082	ELEVATION SCREW	
2C-083	HANDLE	
2C-084	ELEVATING CRANK	
2C-085	GEAR SHAFT CLUTCH INSERT	
2C-086	DIAL LOCK NUT	
2C-087	DIAL	
2C-088	DIAL HOLDER	

MAIN CASTING BODY AND CROSSLIDE

2C-089	ALLEN HEAD SCREW	M6X20
2C-090	BEARING RETAINING RING	
2C-091	BEARING	
2C-092	BEARING BASE	
2C-093	KEY	3X3X18
2C-094	ELEVATING CRANK	
2C-095	BEARING	6207ZZ
2C-096	BEVEL DRIVE GEAR	
2C-097	SET SCREW	M6X6
2C-098	COLUMN	
2C-099	WATER HOSE SOLID COLLET	3/4"
2C-100	ROUND HEAD PHILLIPS SCREW	3/16"X12"
2C-101	FILTRATION COVER	
2C-102	ALLEN HEAD SCREW	M10X25
2C-103	ELEVATING CRANK	
2C-104	NUT	
2C-105	ALLEN HEAD SCREW	M6X20
2C-106	ROUND HEAD PHILLIPS SCREW	3/16" X 38"
2C-107	ALLEN HEAD SCREW	M6X20
2C-108	COOLANT PUMP	1/8 HP
2C-109	PUMP COVER PLATE	
2C-110	SET SCREW	
2C-111	COLUMN CABINET BASE	
2C-112	HINGE PLATE	5X30
2C-113	DOOR LOCKING CAM	
2C-114	SET SCREW	M6X6
2C-115	DOOR LOCKING CAM	
2C-116	REAR CHIP GUARD	
2C-117	DOOR KNOB	
2C-118	COLUMN COLAR SPIDER	
2C-119	ROUND HEAD PHILLIPS SCREW	M6X12
2C-120	RAM PINION	
2C-121	RAM PINION HANDLE	
2C-122	PLASTIC BALL	
2C-123	SPRING WASHER	1/2"
2C-124	SWIVEL	
2C-125	GIB	
2C-126	LOCK PLUNGER	
2C-127	HEX NUT	3/8"
2C-128	ALLEN HEAD SCREW	M10X20
2C-129	FIXING BOLT	
2C-130	SET SCREW	
2C-131	KEY	
2C-132	SCALE	
2C-133	SCALE POINTER	2C-133

