

MACHINERY DIVISION

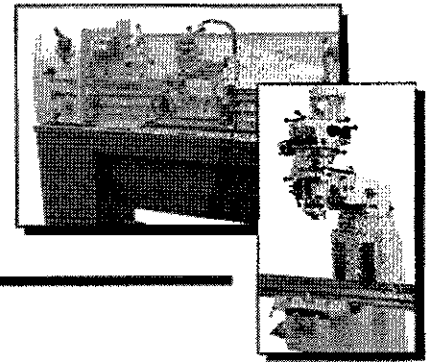
6465 18 MILE ROAD
STERLING HEIGHTS, MI 48314

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MODEL TUM-3VS MILLING MACHINE

THANK YOU FOR PURCHASING WITH KBC MACHINERY. ALL KBC MACHINES ARE BACKED BY OUR 1 YEAR PARTS REPLACEMENT WARRANTY. WHEN USED AS INTENDED, AND WITH PROPER MAINTENANCE THIS MACHINE WILL PROVIDE YOU WITH YEARS OF TROUBLE-FREE SERVICE. IF YOU NEED PARTS SIMPLY FILL OUT THE PARTS REQUEST FORM, AND FAX OR E-MAIL YOUR REQUEST. ALL OTHER QUESTIONS PLEASE CONTACT US @ :

**KBC MACHINERY
6465 18 MILE ROAD
STERLING HEIGHTS, MI 48314
PH (800) 860-1740
FAX (800) 862-1740
MACHINERY@KBCTOOLS.COM
WWW.KBCTOOLSANDMACHINERY.COM**



ATTN:

PARTS REQUEST FORM

YOUR COMPANY NAME: _____

STATE/PROVINCE _____

YOUR NAME _____

PHONE # + EXT _____

FAX # _____

MACHINE INFO: _____

MAKE/MANUFACTURER _____

MODEL NUMBER _____

YEAR MADE _____

SERIAL# _____

PARTS REQUESTED:

PART#	DESCRIPTION
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

PLEASE INCLUDE COPY(S) OF THE PARTS DRAWING FROM THE MANUAL AND CIRCLE THE PARTS NEEDED

FAX PARTS REQUEST TO (800) 862-1740
E-MAIL PARTS REQUEST TO: machinery@kbctools.com

THANKS; KBC MACHINERY - MICHIGAN



TOONG CHI

TURRET MILLING MACHINES

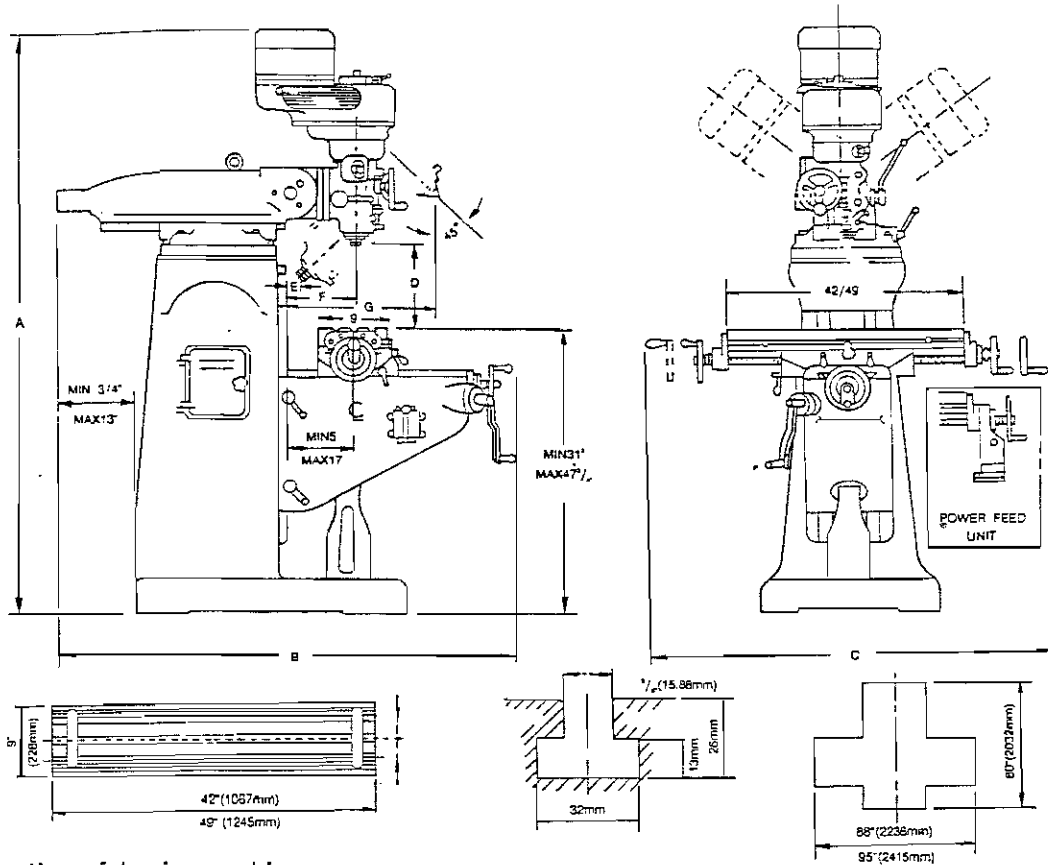
**OPERATION MANUAL
AND
PARTS LIST**

目錄

CONTENTS

規格 SPECIFICATION	
機體 Basic Machine	5
頭部 Head	7
安裝 INSTALLATION	
機器之搬動 Handling	9
機器之清潔 Cleaning	10
場地佈置圖 Floor Plan	11
地基、電源供給 Foundation—Power Supply	12
水平校正 Levelling	14
機器之歸零校正 Initial Setting	15
機器各部份名稱 LEGEND	
機體 Basic Maching	17
頭部 Head	19
操作 OPERATION	
起動、停車 Starting, Stopping	21
機器控制 Machine Controls	23
頭部控制 Head Controls	25
潤滑 LUBRICATION	
頭部 Head	29
機體 Basic Machine	31
預防 保養 PREVENTIVE MAINTENANCE	
保養 MAINTENANCE	
簡介 Introduction	33
頭部頂座 Head Top Housing	35
頭部 Head	41
前後螺桿調整 Cross Screw Adjustment	47
工作台螺桿調整 Table Screw Adjustment	48
調整楔調整 Gib Strip Adjustment	49
故障排除 TROUBLE—SHOOTING	
故障排除 Trouble—Shooting	51
檢驗規格表 Inspection chart	53
電氣回路圖 Electric Circuit Diagram	56
零件圖與零件表 SPARE PARTS DRAWING & PARTS LIST	
機身組件 Basic Machine Assembly	57
螺桿組件 Leadscrew Assembly	59
頭部組件 Head Assembly	61
頭部頂座 Head Top Housing	65
TUM-40VA & TUM-40VS	71

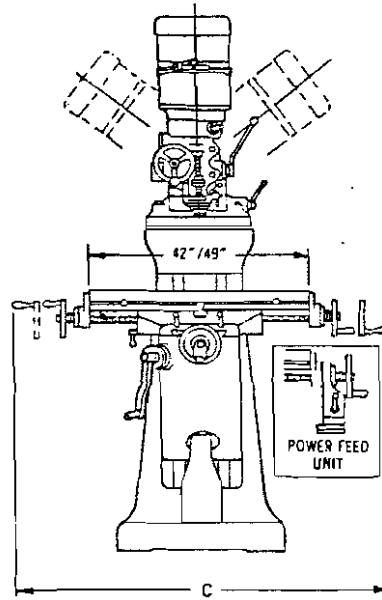
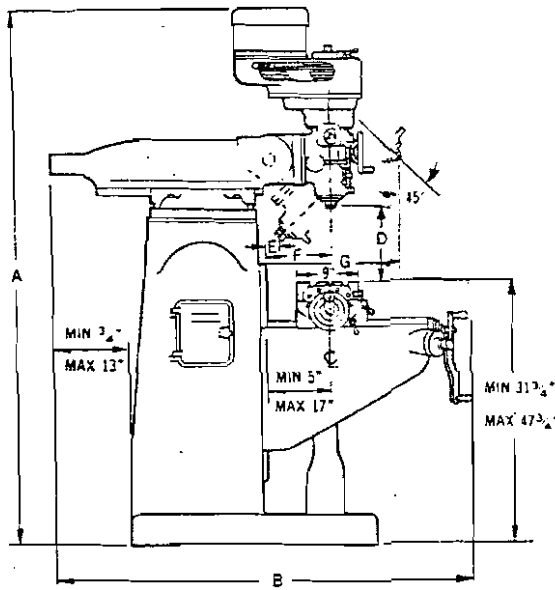
1 1/2 VA-T 規格 Specification



機體規格 Specification of basic machine

項 目	Item	INCHES(″)		METRIC(mm)	
工作台長度	Table length	42	49	1067	1245
工作台左右手動進給行程	Longitudinal traverse(Manual)	29 ²¹ / ₆₄	34 ³⁷ / ₆₄	745	878
工作台左右自動進給行程	Longitudinal traverse(Power feed)	26 ³ / ₁₆	31 ⁷ / ₁₆	665	793
工作台前後進給行程	Cross traverse	12		305	
工作台上進給行程	Vertical traverse	16		406	
工作台T型槽數	Number of Tee slots	3			
T型槽寬度和槽間距離	Width and Centres	5/8″ at 2 1/2″		15.88 at 63.5	
伸出臂移動行程	Ram movement	12		305	
主軸轉數(段)	Spindle speeds Number	3			
主軸轉速範圍(轉/每分)	Spindle speeds Range r.p.m.	80 ~ 2720 r.p.m.			
主軸一迴轉之上下進給量	Qull feeds , per Rev. of spindle	0017 · 0032 · 0053		04 · 08 · 13	
電動機馬力	Motor H.P.	2			
A. 全高	Overall height	80 1/2		2045	
B. 全長(前後)	Overall depth	63 3/4		1620	
C. 全寬(左右)	Overall width	87 3/4	94 3/4	2230	2408
D. 工作台面至主軸端面距離(最小~最大)	Table to spindle gage line(min ~ max)	0 ~ 18 3/8		0 ~ 466	
E. 頭部內傾 45° 與機身滑動面之距離(最小~最大)	Head 45° inward(min ~ max)	0 ~ 11 1/4		0 ~ 285	
F. 頭部正 90° 與機身滑動面之距離(最小~最大)	Head 90° (min ~ max)	6 3/4 ~ 19		171 ~ 482	
G. 頭部外仰 45° 與機身滑動面之距離(最小~最大)	Head 45° out ward(min ~ max)	9 ~ 21		228 ~ 533	
佔地面積	Floor area occupied	88(95) × 80		2236 × (2415) × 2032	
裝箱體積	Case space occupied	55 1/2 × 58 × 76		1410 × 1473 × 1930	
機械淨重	Net weight	2194 lb	2223 lb	950kg	1010kg
裝箱重置	Cross weight	2972 lb	3001 lb	1350kg	1363kg

1 1/2 VS-T 規格 Specification



規格 SPECIFICATIONS

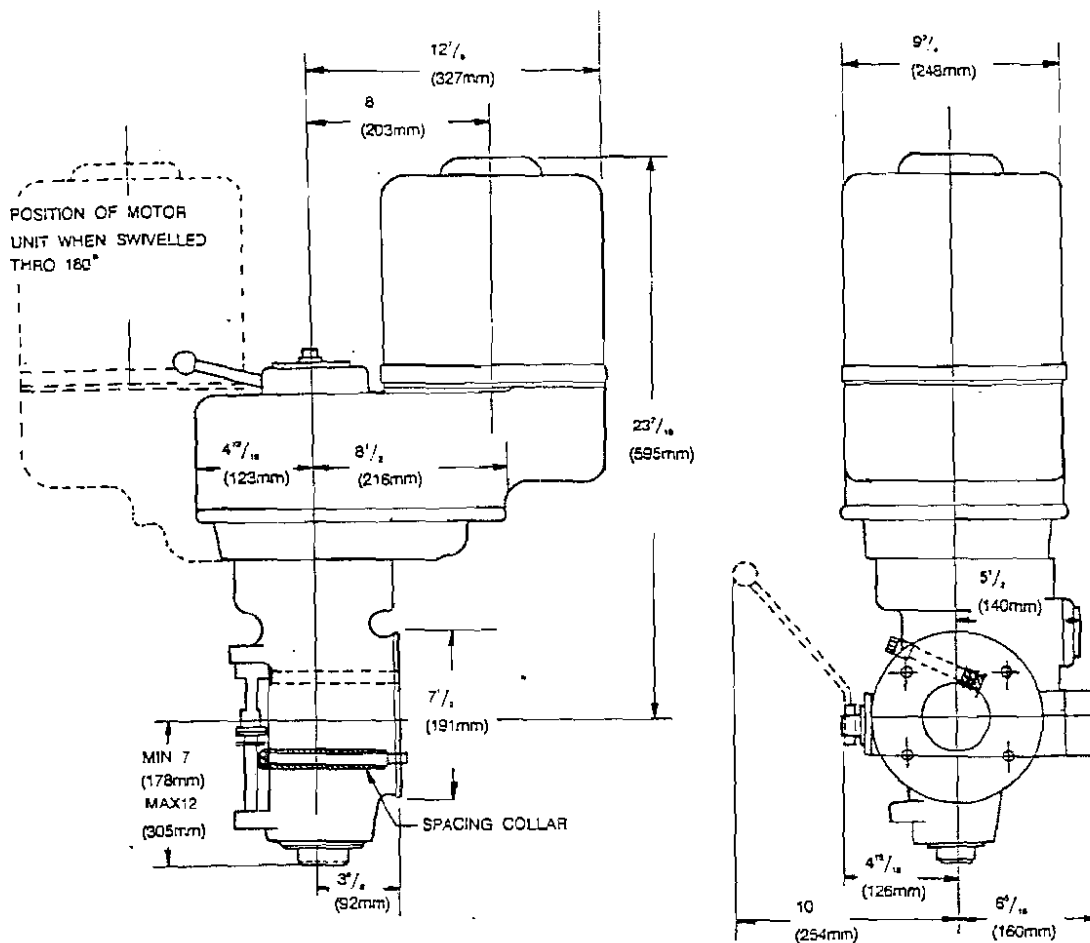
項目 ITEM	IN		MM	
工作台長度 Table length	42	49	1067	1245
工作台左右進給行程 Longitudinal travel(X)	29 11/16	34 3/8	745	878
工作台左右進給行程(附自動進給裝置) Longitudinal travel (with power feed unit)	26 3/16	31 7/16	665	798
工作台前後進給行程 Cross travel(Y)	12	12	305	305
工作台上下進給行程 Vertical travel of knee(Z)	16	16	406	406
A.全 高 A.Overall height	80 1/2	80 1/2	2045	2045
B.全長(前後) B.Overall depth	63 3/4	63 3/4	1620	1620
C.全寬(左右) C.Overall width.	87 3/4	94 3/4	2230	2408
D.工作台面至主軸端面距離(最小~最大) D. Spindle nose to table	min 0	0	0	0
	max 17 9/16	17 9/16	446	446
E.頭部內傾45°與機身滑動面之距離(最小~最大) E. Head 45° inward	min 0	0	0	0
	max 11 1/4	11 1/4	285	285
F.頭部正90°與機身滑動面之距離(最小~最大) F.Head 90°	min 6 3/4	6 3/8	171	171
	max 19	19	482	482
G.頭部外仰45°與機身滑動面之距離(最小~最大) G.Head 45° outward.	min 9	9	228	228
	max 21	21	533	533

Spindle speeds—80 135 210 325 660 1115 1750 2720 (R.P.M.) (60Hz)
 Power feed per spindle revolution—.0017".0032".0053" (.04 .08 .13mm)
 Special Accessories: Coolant System
 Power Longitudinal Feed

Spindle taper-R-8 or N.S.T. =30
 Quill travel-5" (127mm)
 Motor-2HP
 Net weight: 2100 lbs (997 kgs)

※ We reserve the right to modify and improve our products.

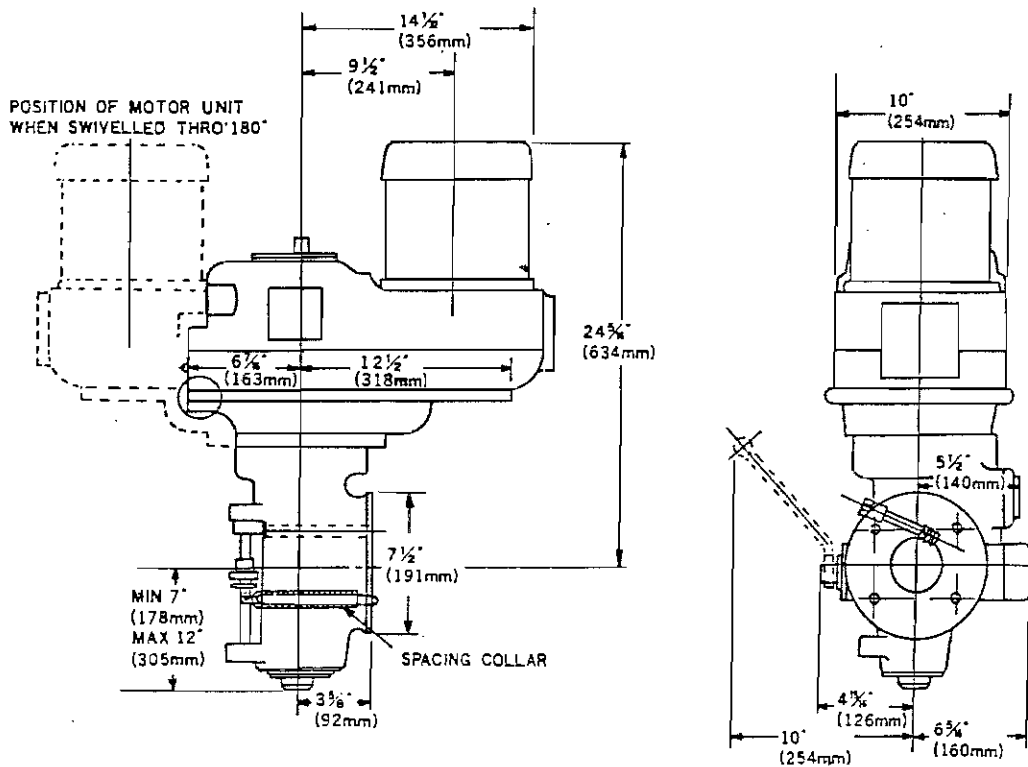
1 1/2 VA-T 規格 Specification



頭部規格 Specification of head

主軸迴轉數 (轉/每分) Spindle speeds R.P.M(60 cycles) 30,135,210,325,660,1115,1750,2720
主軸一迴轉之自動進給量 Power feed per spindle revolution .0017" .0032" .0053" (.04 .08 .13mm)
主軸端孔斜度 Spindle taper-R 8 or N. S. T. #30
主軸昇降套之進給行程 Quill travel-5" (127mm)
夾持範圍 Collet capacity 1/8" to 3/4" (3mm-19mm)
馬達馬力數 H.P. of Motor. 2
重量 Weight-183 lbs. (83 kgs.)

1 1/2 VS-T 規格 Specification



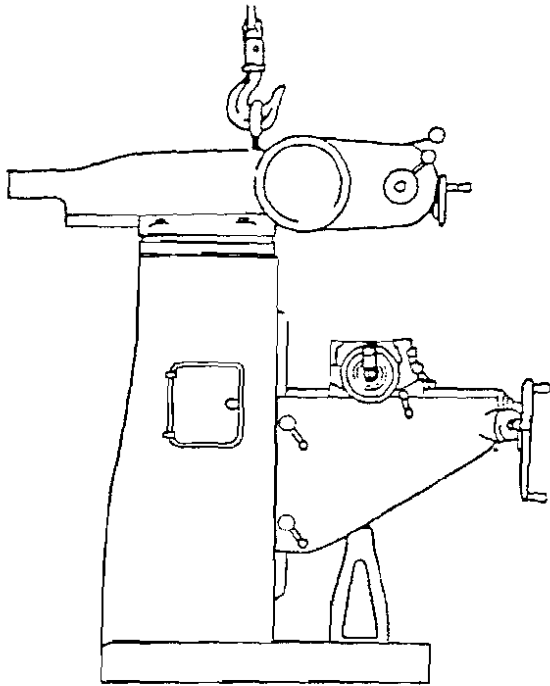
頭部規格 Specification of head

主軸迴轉數(無段)(轉/每分) Spindle speeds R.P.M.(60 cycles)60~4200 (Infinitely variable)
主軸一迴轉之自動進給量 Power feed per spindle revolution .0017" .0032" .0053" (.04 .08 .13mm)
主軸端孔斜度 Spindle taper R 8 or N. S. T. #30
主軸升降套之進給行程 Quill travel-5" (127mm)
夾持範圍 Collet capacity-1/8" to 3/4" (3mm-19mm)
馬達馬力數 H. P. of Motor -2
重量 Weight-196 lbs.(89kgs)

1 1/2 VA-T 1 1/2 VS-T 安裝 Installation

本機重量約為 2200 lbs.(997kgs)

This machine weight approximately 2200 lb (997kgs)

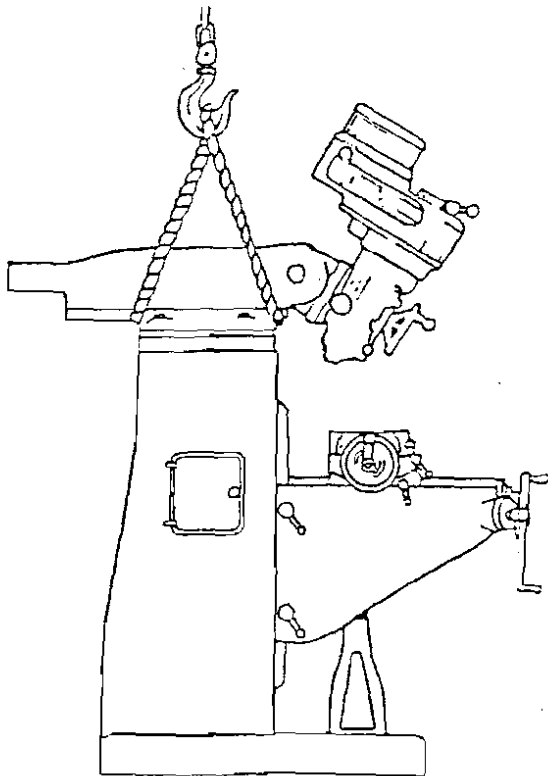


方法 1

如左圖所示：在吊起機器之前，先將頭部迴轉並固定，然後用 5/8" 惠氏螺紋之吊環將其確實鎖牢於伸出臂之螺紋孔內再行吊動。

METHOD 1

Insert 5/8" -11NC eye bolt in tapped hole. Ensure bolt is fully secured before lifting. It is advisable to swivel head before lifting machine.



方法 2

如左圖所示：在吊起機器之前，先將頭部前傾並固定，然後掛上適當的繩索，並在繩與機器接觸處墊上軟布墊，再行吊動。

METHOD 2

Use rope sling as illustrated. Insert pads of soft cloth between rope and machined edges. It is advisable to tilt the head before lifting machine.

1 1/2 VA-T 1 1/2 VS-T 安裝 Installation

1. 移動任一滑道前先除去防銹劑

1. Remove rust preventative before moving any slideways.

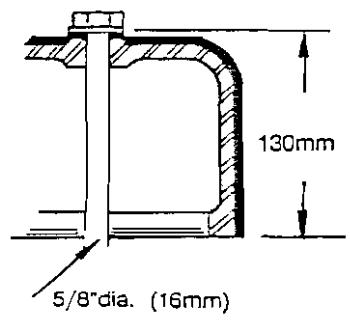
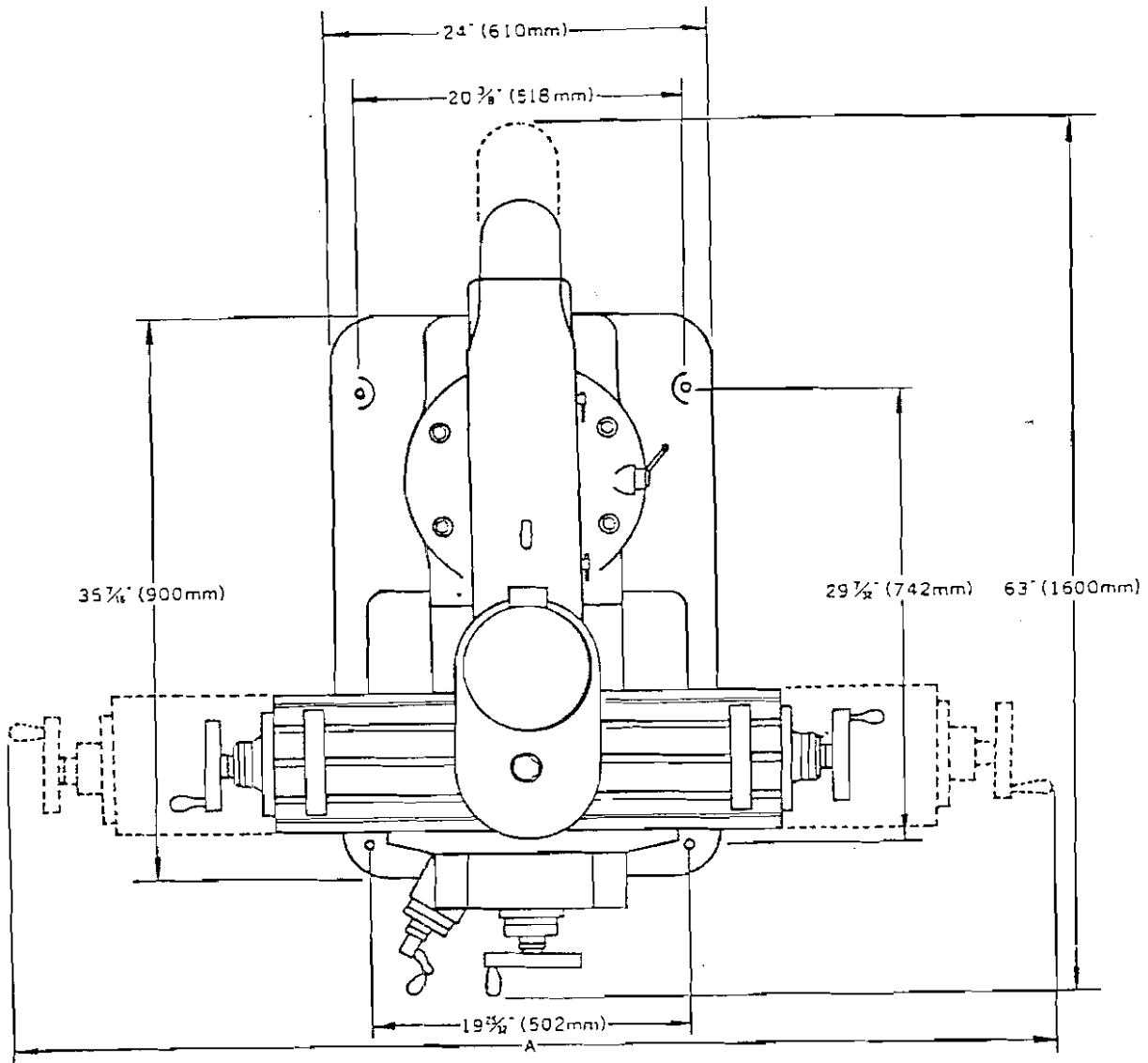
2. 防護層最好以清潔刷沾石臘油除去之，當護層軟化後以清潔破布擦乾淨。

2. The coating is best removed by using paraffin applied with a clean brush. When the coating has softened, remove with clean rags.

3. 以油或黃油潤滑潤滑點，參考此說明書的潤滑部份。

3. Oil or grease all lubrication points. Refer to the lubrication section of this manual P.29 To P.32.

1 1/2 VA-T 1 1/2 VS-T 安裝 Installation



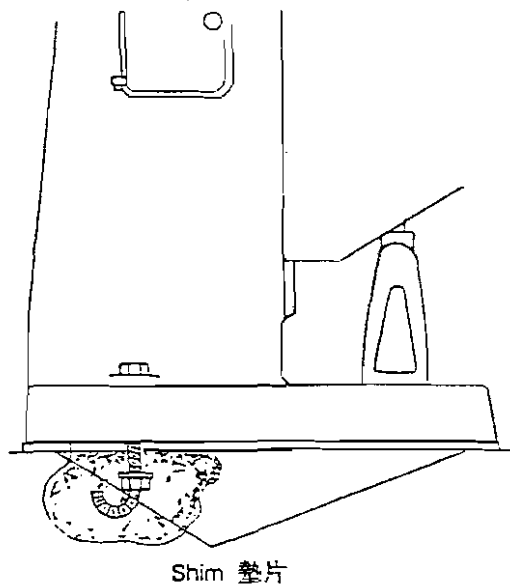
'A'尺寸 Table size	'A' DIMENSION Plain machine
42"	87 3/4" (2230mm)
49"	94 3/4" (2408mm)

場地佈置圖 Floor Plan

1 1/2 VA-T 1 1/2 VS-T 安裝 Installation

地基 FOUNDATION

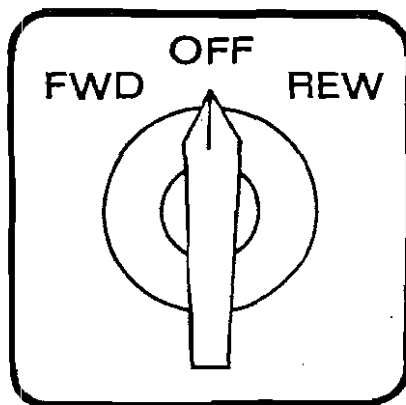
所有銑床應以螺栓鎖於一混凝土地基
本機器應安裝於固體水平地板或
防振墊片上以防止任何震動所產生的
移動。



Ideally all milling machines should be bolted to a concrete foundation. The machines however should be placed on a solid level floor or anti-vibration pads to prevent any rocking movement.

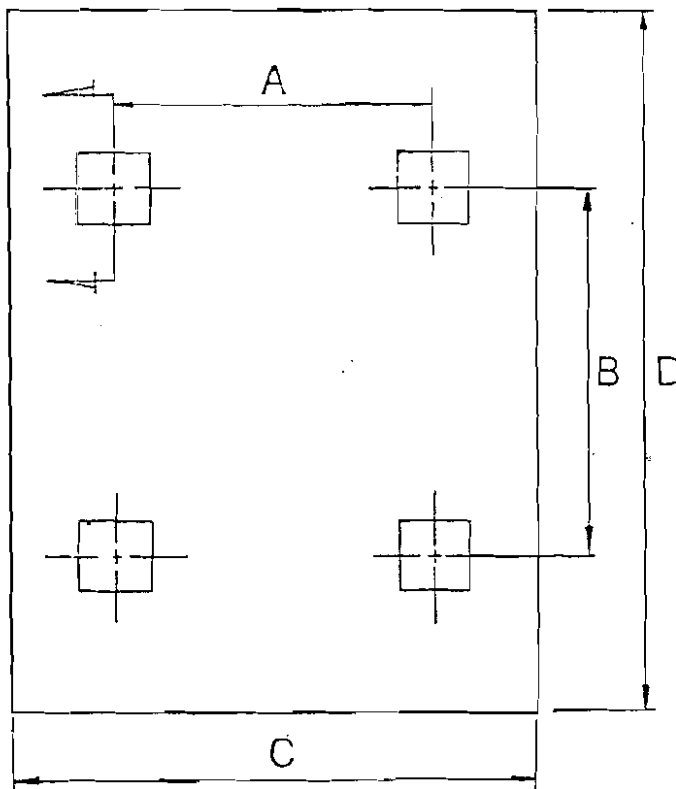
電源供給 POWER SUPPLY

- a) 檢查馬達電源之電壓。
 - b) 確使電源連接符合當地安全規章。注意當未裝控制盤時，頭部開關無過負荷保護作用。
- a) Check motor voltages against supply.
- b) Ensure that the supply is connected to comply with the local safety regulations.
Note the Head switch has NO overload protection, when a control panel is not fitted.



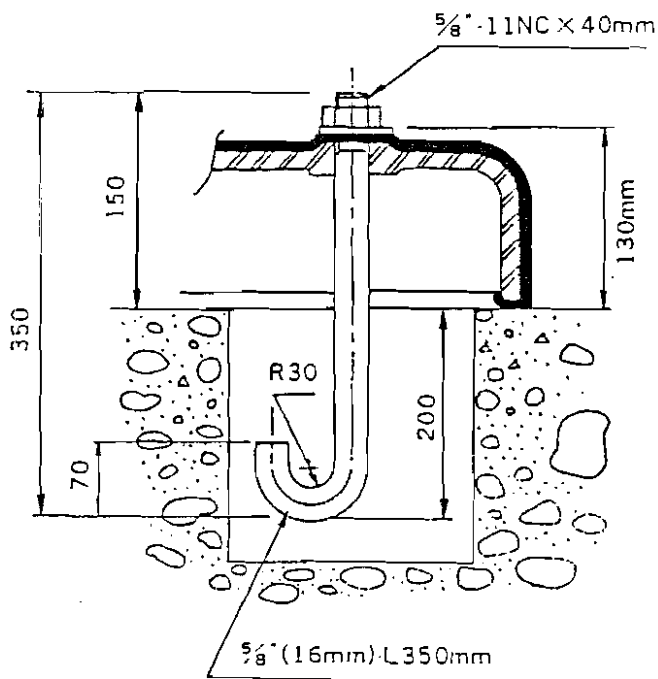
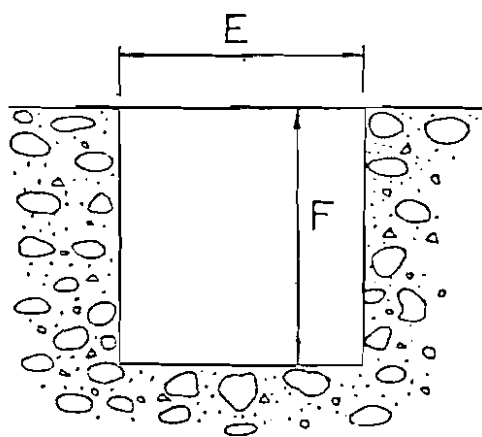
1 1/2 VA-T 1 1/2 VS-T 安裝 Installation

	尺 寸
A	518mm(20 3/8")
B	742mm(24 7/32")
C	1020mm(40 5/16")
D	1242mm(48 7/8")
E	200mm(7 7/8")
F	250mm(9 27/32")

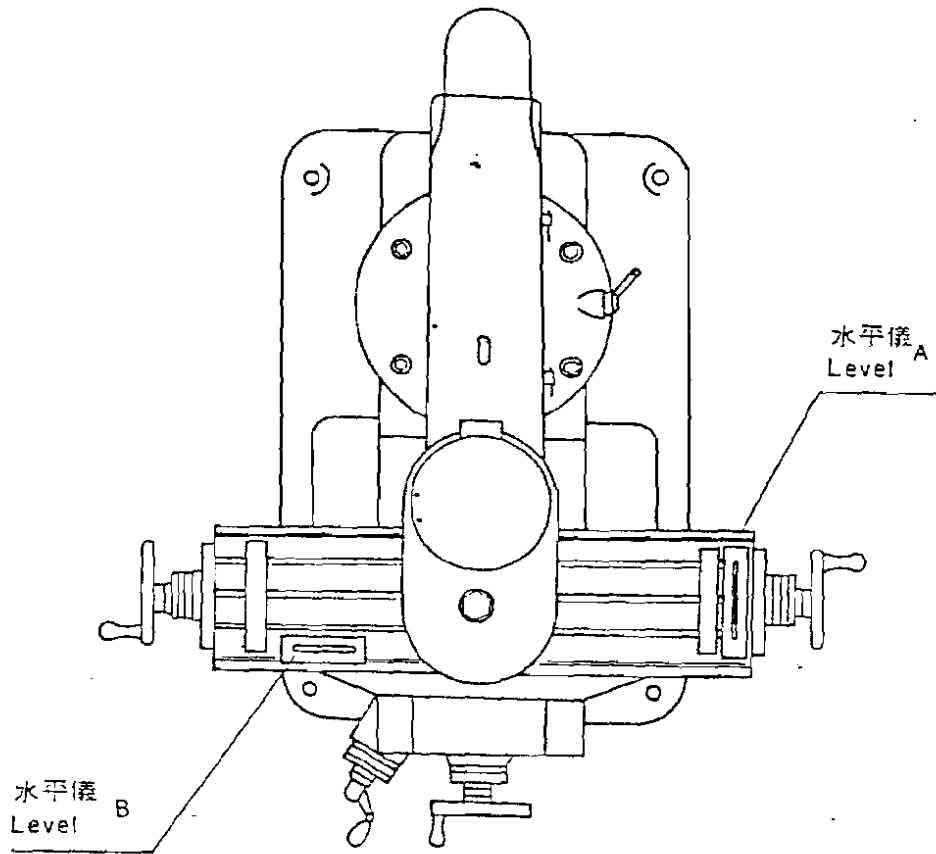


地基平面 Foundation plane

地基構築圖 Foundation Structure



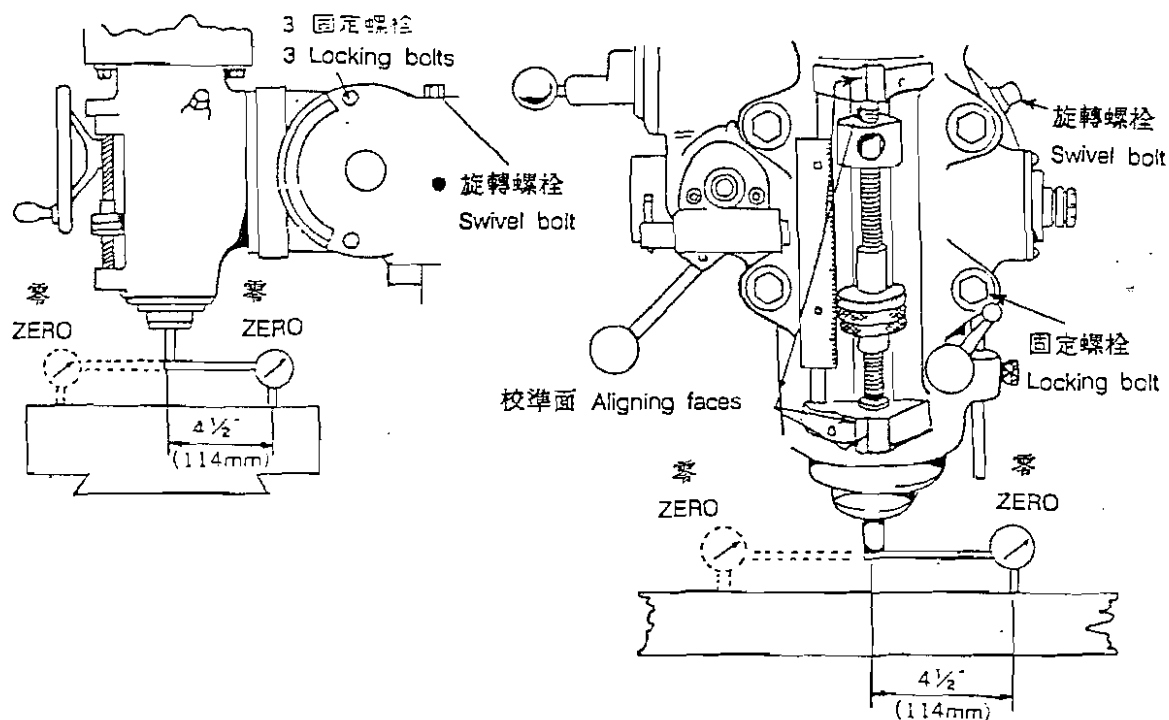
1 1/2 VA-T 1 1/2 VS-T 安裝 Installation



1. 用水平儀放在工作台上，如上圖示。
2. 檢查水平儀 A.B 的水平，其允許值 0.06mm/M.
3. 調整時用墊片墊入底床，調整畢鎖緊固定螺栓。

1. Putting levels on the table as illustrated.
2. Check the level A and B. The allowance approximate 0.06mm/M.
3. Putting the shims under the base if necessary, lock the anchor bolt.

1 1/2 VA-T 1 1/2 VS-T 安裝 Installation



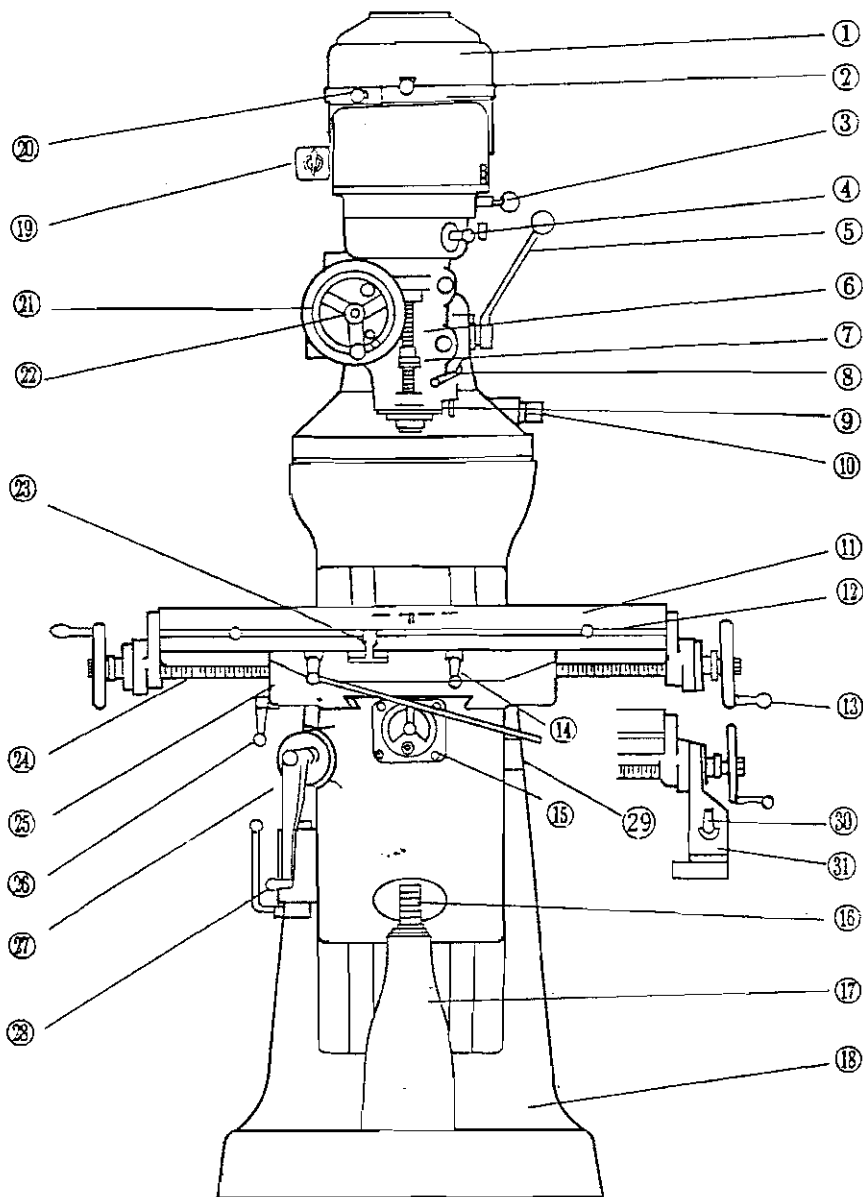
機器安裝後要校正頭部與工作台的垂直度，有兩個方法：

- I. 用一大的 90° 角尺放在工作台上。以此校正頭部的校準面，如上圖示。
 - II. 用百分錶裝在主軸端面上，以 4 1/2" 半徑之圓轉動，如上圖示。
- 校正後每個螺栓需鎖緊。

To set a milling head square to the table two methods are available:

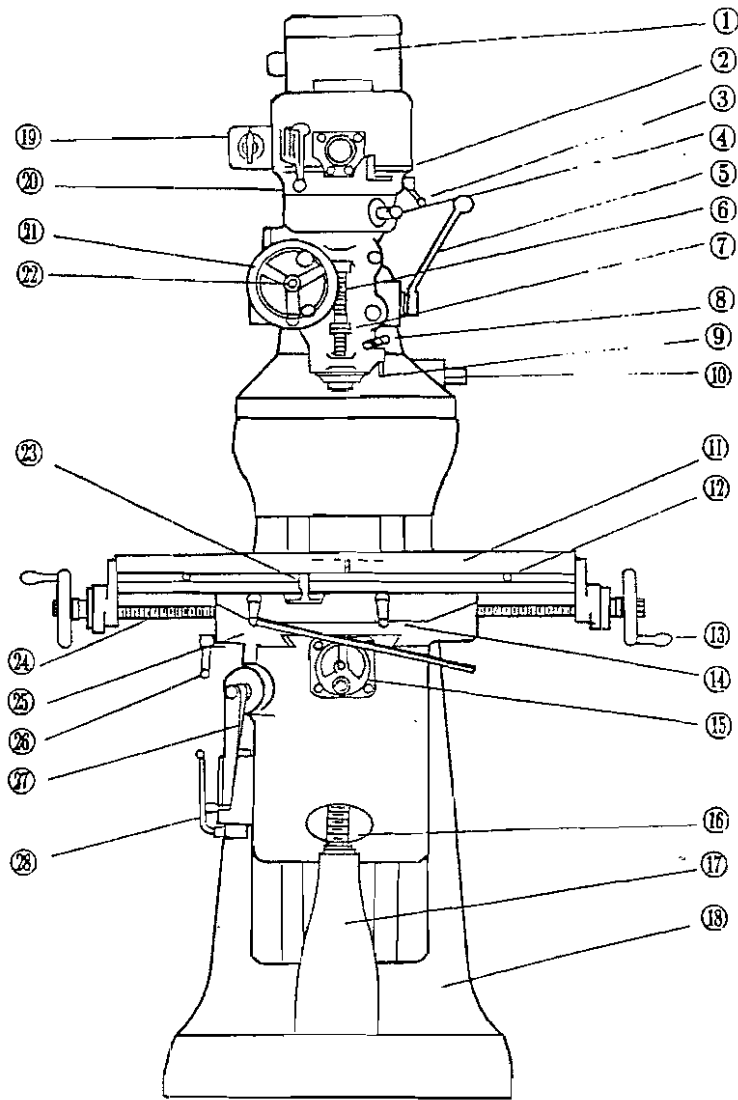
- I. Using a large 90° setsquare mounted on the table, align faces with square.
 - II. An indicator mounted in a spindle nose travelling in a 4 1/2" radius.
- It is important that each axis is set separately and locked.

1 1/2 VA-T 機器各部名稱 Legend



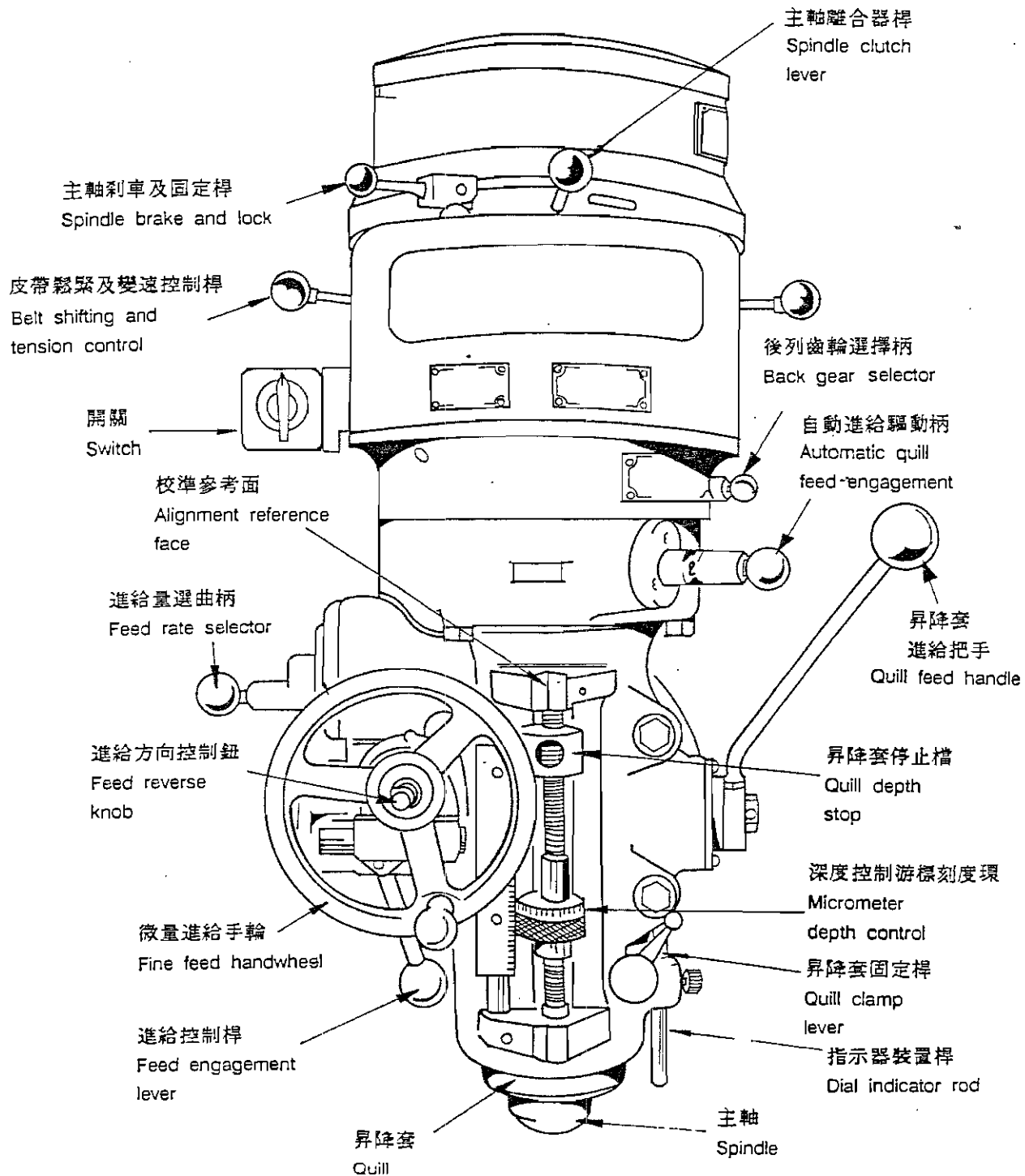
代號	名	稱	代號	名	稱
1	馬達	Motor	1 7	昇降螺桿座	Elevating screw housing
2	主軸離合器桿	Spindle clutch lever	1 8	機身	Basic
3	後列齒輪選擇柄	Back gear selector	1 9	控制開關	Control Switch
4	自動進給驅動柄	Auto quill feed engagement	2 0	主軸剎車及固定桿	Spindle brake and lock lever
5	昇降套進給把手	Quill feed handle	2 1	手動微量進給手輪	Fine feed handwheel
6	深度控制螺桿	Micrometer depth control screw	2 2	進給方向控制鈕	Feed reverse knob
7	深度控制游標刻度環	Micrometer depth control	2 3	橫向進給控制塊	Longitudinal feed control
8	昇降套固定桿	Quill clamp lever	2 4	橫向進給螺桿	Longitudinal feed screw
9	指示器裝置桿	Dial indicator rod	2 5	鞍座	Saddle
1 0	伸出臂調整把手	Ram adjustment handle	2 6	鞍座固定把手	Saddle lock handle
1 1	工作台	Table	2 7	昇降座進給把手	Elevating feed handle
1 2	工作台停止檔	Table stop	2 8	給油把手	Oil feed lever
1 3	橫向進給手輪	Longitudinal feed handwheel	2 9	工作台自動進給開關	Table power feed switch
1 4	工作台固定桿	Table lock lever	3 0	工作台自動進給把手	Table power feed lever
1 5	縱向進給手輪	Cross feed handwheel	3 1	工作台自動進給附件	Table power feed unit
1 6	昇降座進給螺桿	Elevating screw	3 2		

1 1/2 VS-T 機器各部名稱 Legend



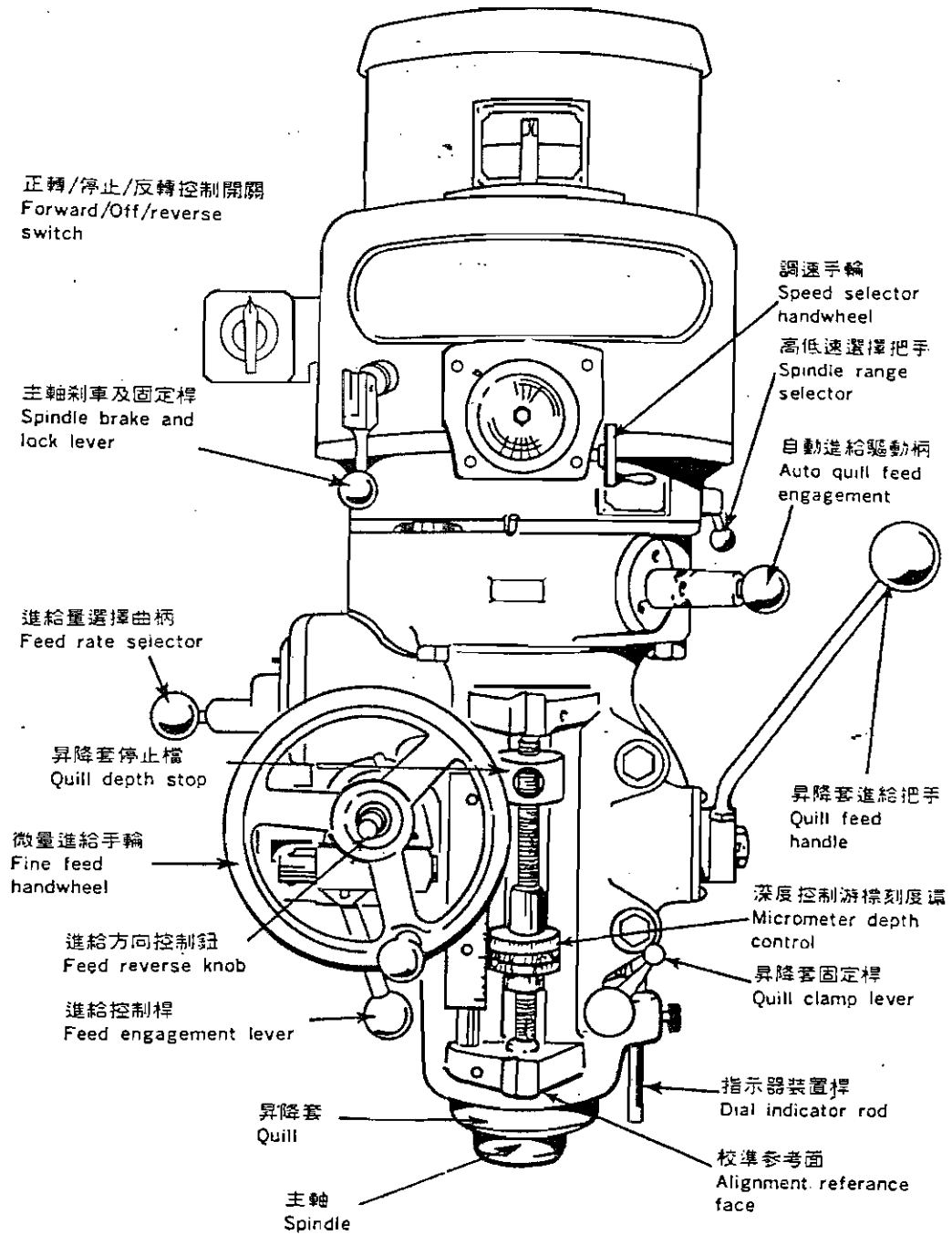
代號	名	稱	代號	名	稱
1	馬達	Motor	17	昇降螺桿座	Elevating screw housing
2	調速手輪	Speed selector handwheel	18	機身	Basic
3	高低速選擇把手	Spindle range selector	19	控制開關	Control Switch
4	自動進給驅動柄	Auto quill feed engagement	20	主軸剎車及固定桿	Spindle brake and lock lever
5	昇降塞進給把手	Quill feed handle	21	手動微量進給手輪	Finefeed handwheel
6	深度控制螺桿	Micrometer depth control screw	22	進給方向控制鈕	Feed reverse knob
7	深度控制游標刻度環	Micrometer depth control	23	橫向進給控制塊	Longitudinal feed control
8	昇降塞固定桿	Quill clamp lever	24	橫向進給螺桿	Longitudinal feed screw
9	指示器裝置桿	Dial indicator rod	25	鞍座	Saddle
10	伸出臂調整把手	Ram adjustment handle	26	鞍座固定把手	Saddle lock handle
11	工作台	Table	27	昇降塞進給把手	Elevating feed handle
12	工作台停止檔	Table stop	28	給油把手	Oil feed lever
13	橫向進給手輪	Longitudinal feed handwheel	29		
14	工作台固定桿	Table lock lever	30		
15	縱向進給手輪	Cross feed handwheel	31		
16	昇降塞進給螺桿	Elevating screw	32		

1 1/2 VA-T 機器各部名稱 Legend



頭部 Head

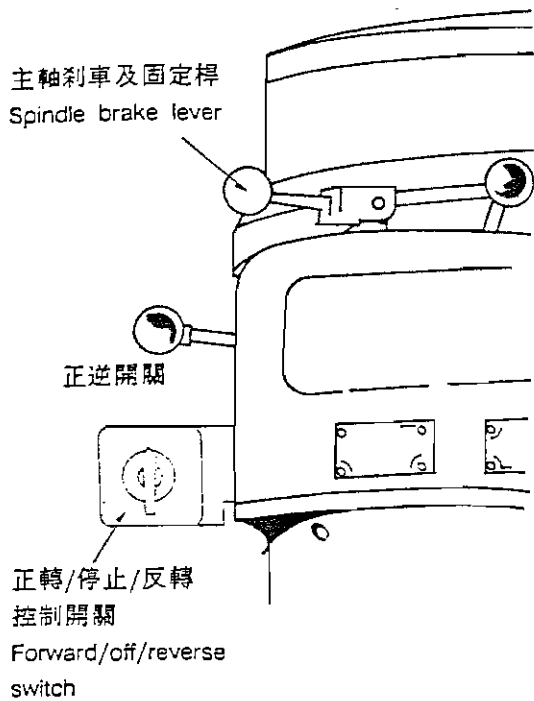
1 1/2 VS-T 機器各部名稱 Legend



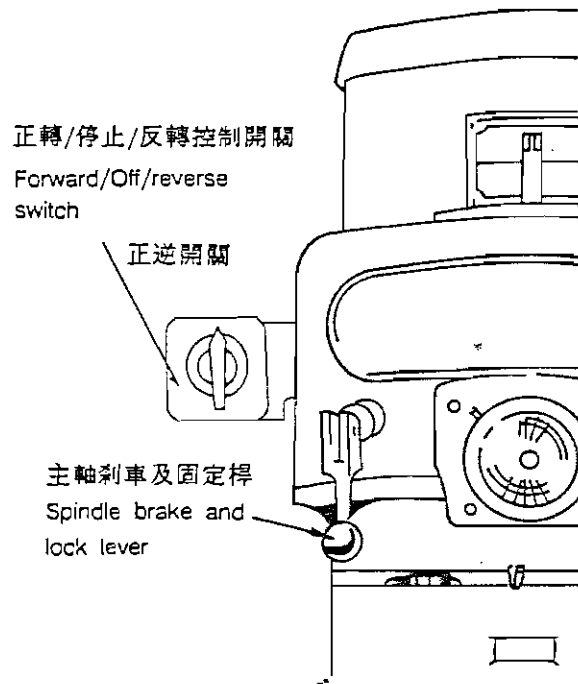
操作 Operation

1. Starting, Stopping

1 1/2 VA-T



1 1/2 VS-T



起動方法

- 1) 接通電源。
- 2) 扳動頭部左側的開關至所需之轉向(正轉或反轉)。

停車方法

- 1) 停止進行中的進給。
- 2) 關掉電源開關。
- 3) 扳動主軸剎車桿，直到主軸完全停止。

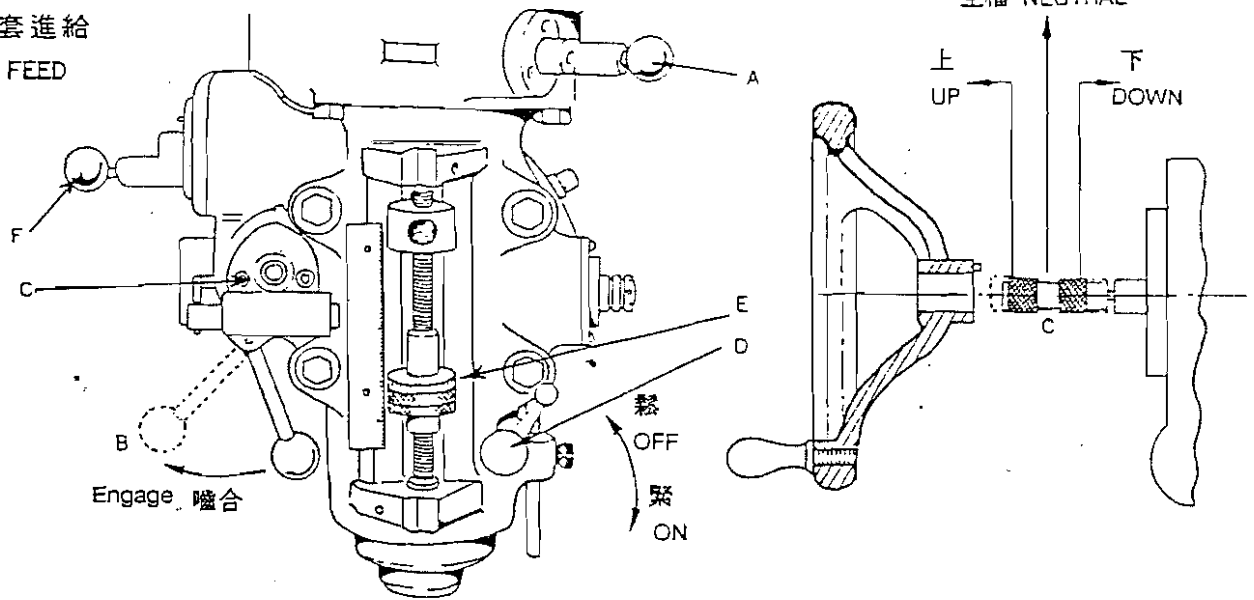
Starting

- 1) Connect power.
- 2) Turn switch to required position (Forward or Reverse).

Stopping

- 1) Stop feed.
- 2) Turn switch to "off".
- 3) Turn spindle brake lever to "brake" till spindle stop.

2. 昇降套進給
2. QUILL FEED



a) 手動微量進給操作步驟

- I . 鬆開自動進給驅動柄 'A'
- II . 將 'C' 置於中央 (空檔) 位置。
- III . 扳動進給控制桿 'B' 使離合器嚙合。
- IV . 此時昇降套之進給，即可用手輪來控制。

b) 自動進給操作步驟

最大鉗孔徑為 3/8" (9.5mm) (材料：鋼)

- I . 放鬆昇降套固定桿 'D'
- II . 調整游標指示環 'E' 至所需要之深度。
- III . 扳動自動進給驅動柄 'A'。
(馬達要停止)
- IV . 由進給量控制柄 'F' 選擇進給量。
- V . 由進給方向控制鈕 'C' 選定進給方向。
- VI . 扳動進給控制桿 'B' 使離合器嚙合。
- VII . 這時昇降套即可行自動進給。

注意：當主軸轉速超過 3000 (轉 / 每分) 時，勿使用自動進給。

a) FINE HAND FEED

- I . Disengage Auto Quill Feed 'A'.
- II . Locate 'C' in mid (neutral) position.
- III . Engage Feed Trip Lever 'B'.
- IV . The Quill is now under hand-wheel control.

b) AUTOMATIC FEED

Maximum loading 3/8" (9.5mm) dia, drill in steel.

- I . Ensure quill lock is off 'D'.
- II . Set micrometer dial to required depth 'E'.
- III . Engage auto quill feed 'A'.
(when motor has stopped)
- IV . Select feed rate 'F'.
- V . Select feed direction 'C'.
- VI . Engage feed trip lever 'B'.
- VII . The Quill is now automatic feed.

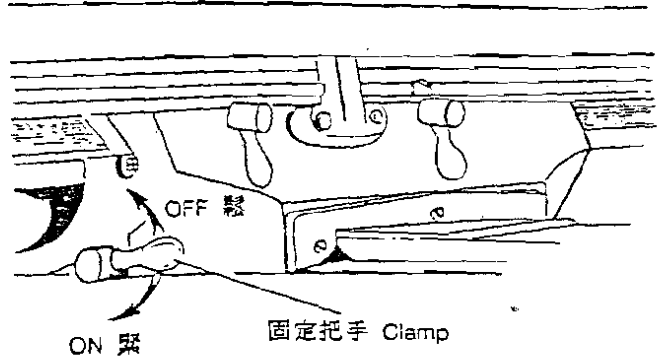
NOTE: Do not engage quill feed 'A' over 3000 R.P.M.

1 1/2 VA-T 1 1/2 VS-T 操作 Operation

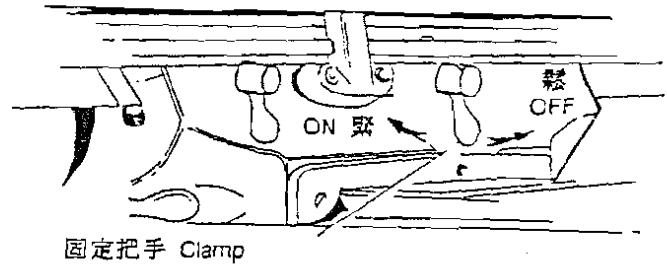
3. 工作台 3. TABLE

1. 固定鞍座與昇降座之滑動。
Clamping the saddle knee slide.

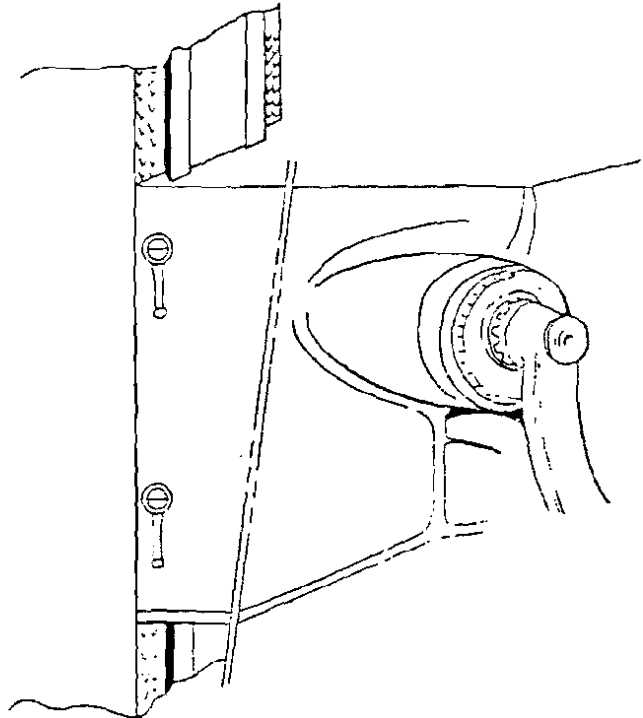
固定時，用適當的壓力即可，用力太大會變形及使得工作台變形。
Moderate pressure is sufficient. Excess pressure will cause distortion and make the table stiff to wind.



2. 固定工作台與鞍座間之滑動。
Clamping the table saddle slide.
固定時，用適當的壓力即可。
Moderate pressure is sufficient.



3. 固定昇降座與機身之滑動。
Clamping the knee column slide.
固定時，用適當的壓力即可。
Moderate pressure is sufficient.

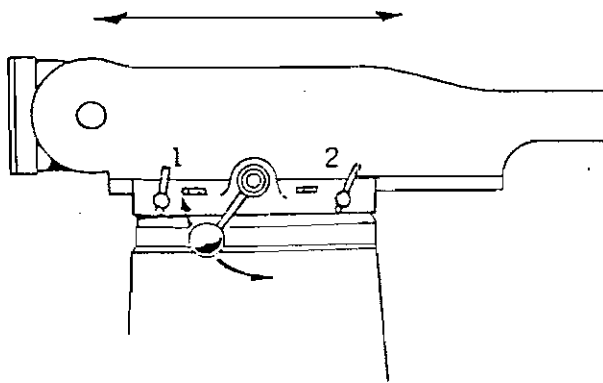
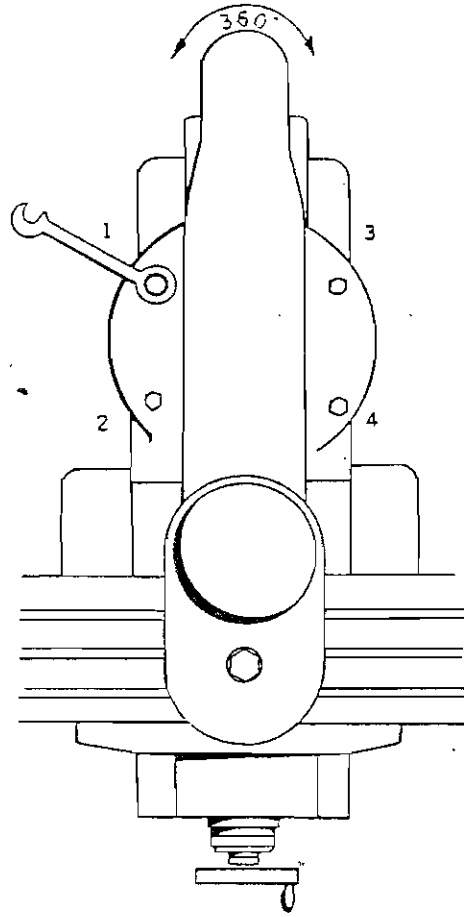


1 1/2 VA-T 1 1/2 VS-T 操作 Operation

4. 轉塔之旋轉

4. SWIVEL TURRET

- a) 用固定板手，放鬆四個螺栓，
 - b) 旋轉至所需要的角度。
 - c) 鎖緊四個螺栓。
- a) Use spanner and unlock the 4 bolts.
 - b) Index to the required setting.
 - c) Lock the 4 bolts.



5. 伸出臂之移動

5. MOVE RAM SLIDE

- a) 放鬆兩支固定把手桿。
 - b) 轉動控制把手至所需要之位置。
 - c) 固定（先固定後面的把手桿）。
- a) Loosen two lock levers.
 - b) Turn the handle to move the slide to the desired position.
 - c) Tighten, tightening the rear lock lever first.

1 1/2 VA-T 操作 Operation

1. 皮帶箱旋轉

1. SWIVEL BELT HOUSING

I. 放鬆三固定螺帽 'A' (完全地放鬆以避免束縛力存在)。

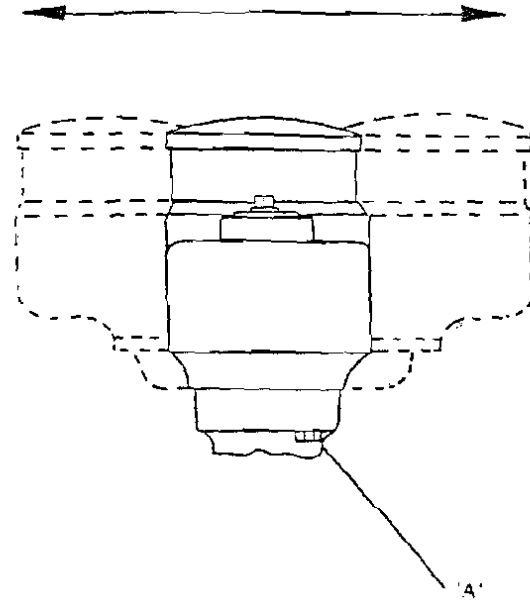
II. 旋轉至所需要之角度。

III. 鎖緊三固定螺帽最後鎖緊前先轉動主軸使栓槽正確對準。

I. Slacken three Locking Nuts 'A'.
(Retain sufficiently to stop binding)

II. Swivel to required angular setting.

III. Tighten three Locking Nuts; before finally securing, run spindle to give correct spline alignment.

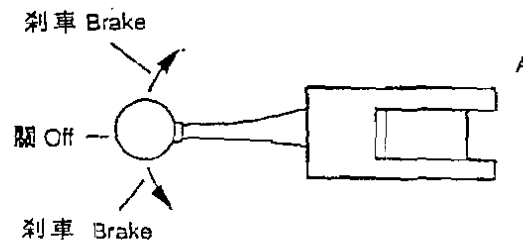


注意：鎖固定螺帽時，若三個不均勻會使昇降套產生剛性變化而造成昇降套內栓槽不正，使進給困難，此現象在操作昇降套進給時可感覺出來。

NOTE: Incorrect spline alignment can be caused by unequal tightening of the locking nuts 'A' causing varying stiffness of the quill feed which can be felt through the sensitive feed handle.

2. 主軸剎車

SPINDLE BRAKE

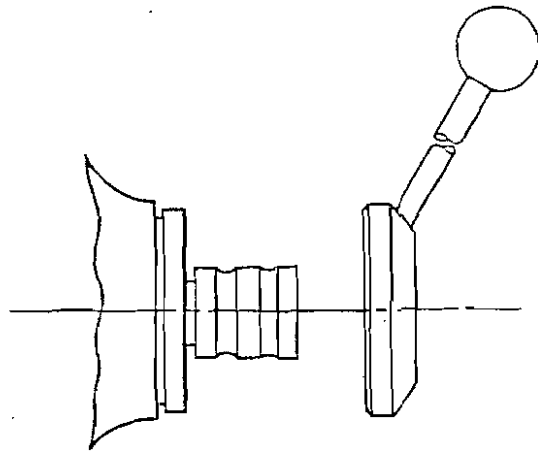


1 1/2 VA-T 操作 Operation

3. 昇降套快速手動進給

3. QUILL SENSITIVE HAND FEED

- I. 置手柄於輪殼上。
- II. 選擇最適當之位置。
- III. 推動手柄直至定位銷嚙合。
- I. Place the handle on the boss.
- II. Select the most suitable position.
- III. Push home until the locating pin engages.



4. 主軸速度 (變速前停止馬達)

4. SPINDLE SPEEDS

(Stop motor before changing speed).

80	135	210	325
660	1115	1750	2720

後列齒輪傳動

BACK GEAR

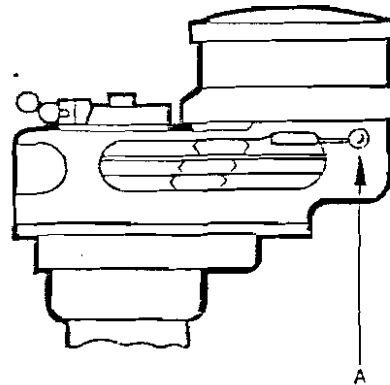
直接傳動

DIRECT

5. 速度變換 CHANGE SPEED

a) 同範圍內之變速

- I. 關掉電源。
- II. 放鬆 2 馬達固定桿 'A'。
- III. 向前移動馬達。
- IV. 將皮帶置入合適之皮帶輪溝內。
- V. 將馬達推向後方, 使 V 形皮帶接緊。
- VI. 鎖緊 2 馬達固定桿。



a) Change Speed Within Range

- I. Isolate machine
- II. Slacken 2 motor lock levers 'A'
- III. Slide motor forward.
- IV. Position belt on appropriate pulleys.
- V. Slide motor to the rear to tension vee belt.
- VI. Tighten 2 motor locking levers

1 1/2 VS-T 操作 Operation

b) 變更速度範圍。

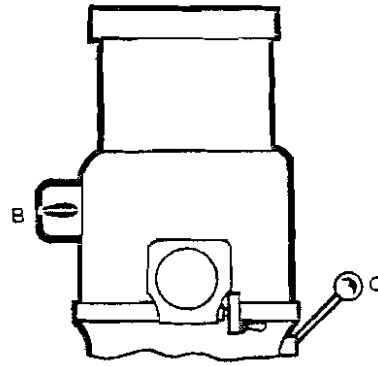
b) Change Range.

1. 從直接變至後列齒輪驅動：

I . 開關 'B' 扭至 off 。

II . 移動 'C' 桿經空擋至低速檔。(這時主軸轉向相反)

III . 開關 'B' 扭至低速。



主軸在運轉中勿變換把手 'C' 之位置！
DO NOT CHANGE RANGE WHILE
THE SPINDLE IS RUNNING

1. FROM DIRECT TO BACK GEAR DRIVE:

I . Switch 'B' to OFF.

II . Move lever 'C' through neutral to LOW. (This reverses the spindle rotation).

III . Switch 'B' to LOW.

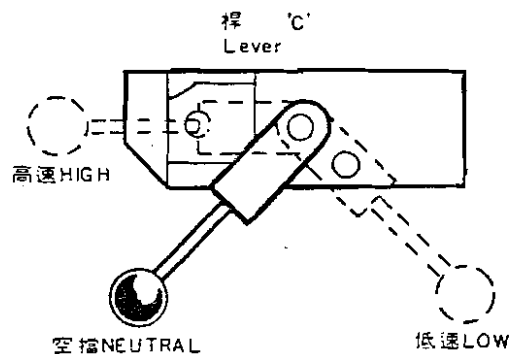
2. 從後列齒輪變至直接驅動：

I . 開關 'B' 扭至 off 。

II . 移動桿 'C' 經過空擋至高速檔

III . 用手轉動主軸直至感覺離合器嚙合為止。

IV . 開關 'B' 扭至高速。



2. FROM BACK GEAR TO DIRECT DRIVE:

I . Switch 'B' to OFF.

II . Move lever 'C' through neutral to HIGH.

III . Rotate spindle by hand until the clutches are felt to engage.

IV . Switch 'B' to HIGH.

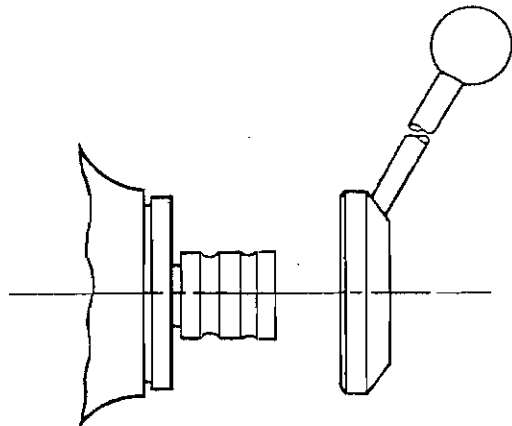
1 1/2 VS-T 操作 Operation

3. 昇降套快速手動進給

3. QUILL SENSITIVE HAND FEED

- I . 置手柄於輪殼上。
- II . 選擇適當之位置。
- III . 推動手柄直至定位銷嚙合。

- I . Place the handle on the boss.
- II . Select the most suitable position.
- III . Push home until the locating pin engages.



主軸速度 (在主軸運轉時才可變速)

4. SPINDLE SPEED (Change only when spindle is running)

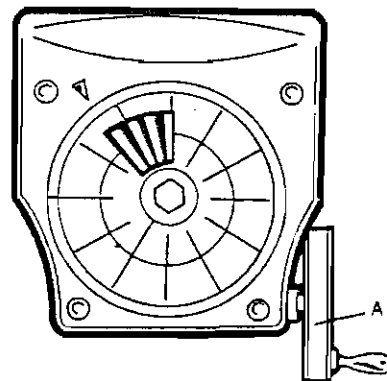
a) 範圍內之速度

- I . 啓動主軸。
- II . 轉動手輪 'A' 至選定所需速度。

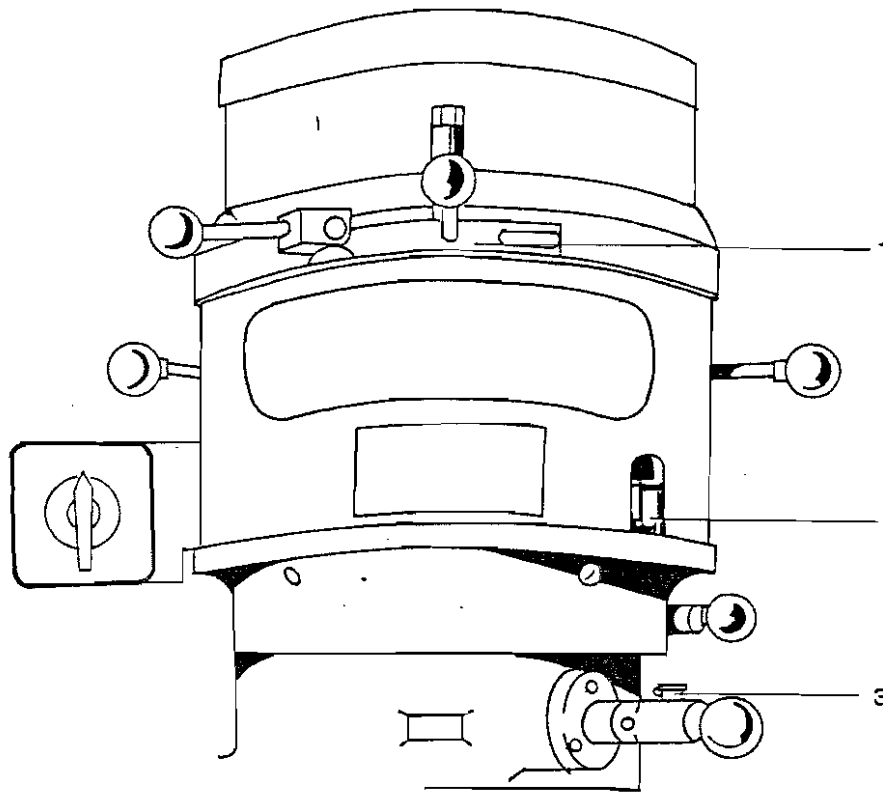
b) Change Speed Within Range

- I . Start spindle.
- II . Turn handwheel 'A' to select required speed.

Change only when spindle is running.



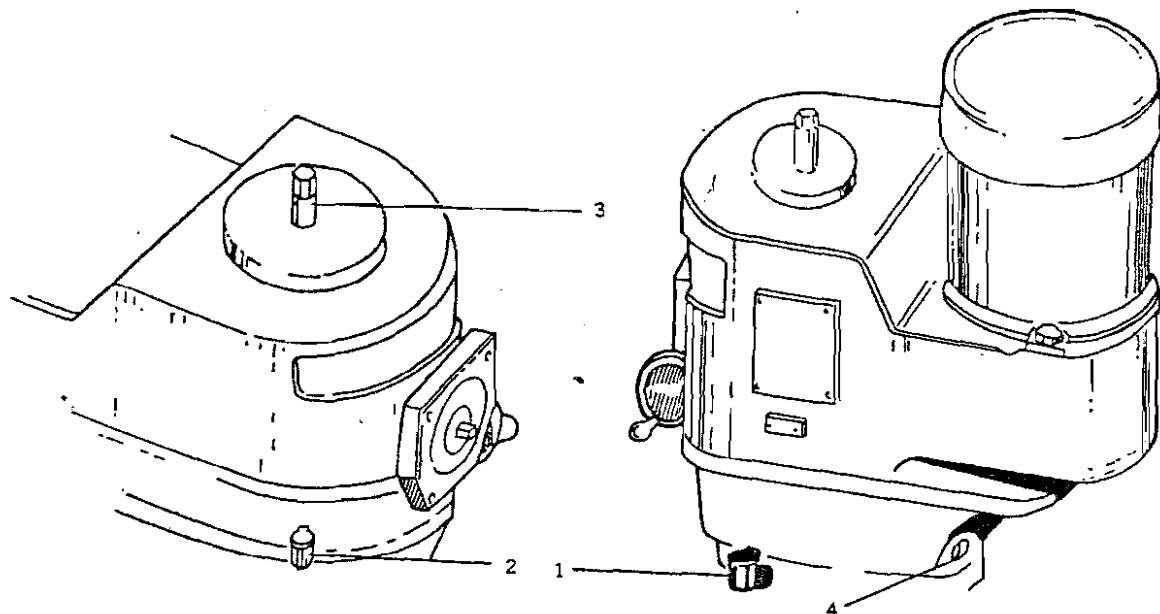
! 轉停時不可變速
DO NOT CHANGE SPEED
WHILST SPINDLE HAS STOPPED



註：'3' 昇降套軸承潤滑錯誤，會導致昇降套太緊，且使得昇降套緊束於座內。

NOTE: Failure to lubricate "Quill bearings" at 3 can result in tight quills and partial seizure of quill in housing.

週期 FREQUENCY	潤滑 LUBRICATE	潤滑劑 LUBRICANT	數量 QUANTITY	代號 AT.
每週兩次 Twice Weekly	皮帶輪凸輪 Pulley Cam	中國石油 R53 Vactra Heavy-Medium S.A.E. 10 or 10W Light	5 滴 5 Drops	1
每週兩次 Twice Weekly	主軸軸承 / 昇降套進給 Spindle Bearing/Quill feed	中國石油 R53 Vactra Heavy-Medium S.A.E. 10 or 10W Light	加滿 Top-Up	2
每週兩次 Twice Weekly	昇降套軸承 Quill Bearings	中國石油 R53 Vactra Heavy-Medium S.A.E. 10 or 10W Light	加滿 Top-Up	3



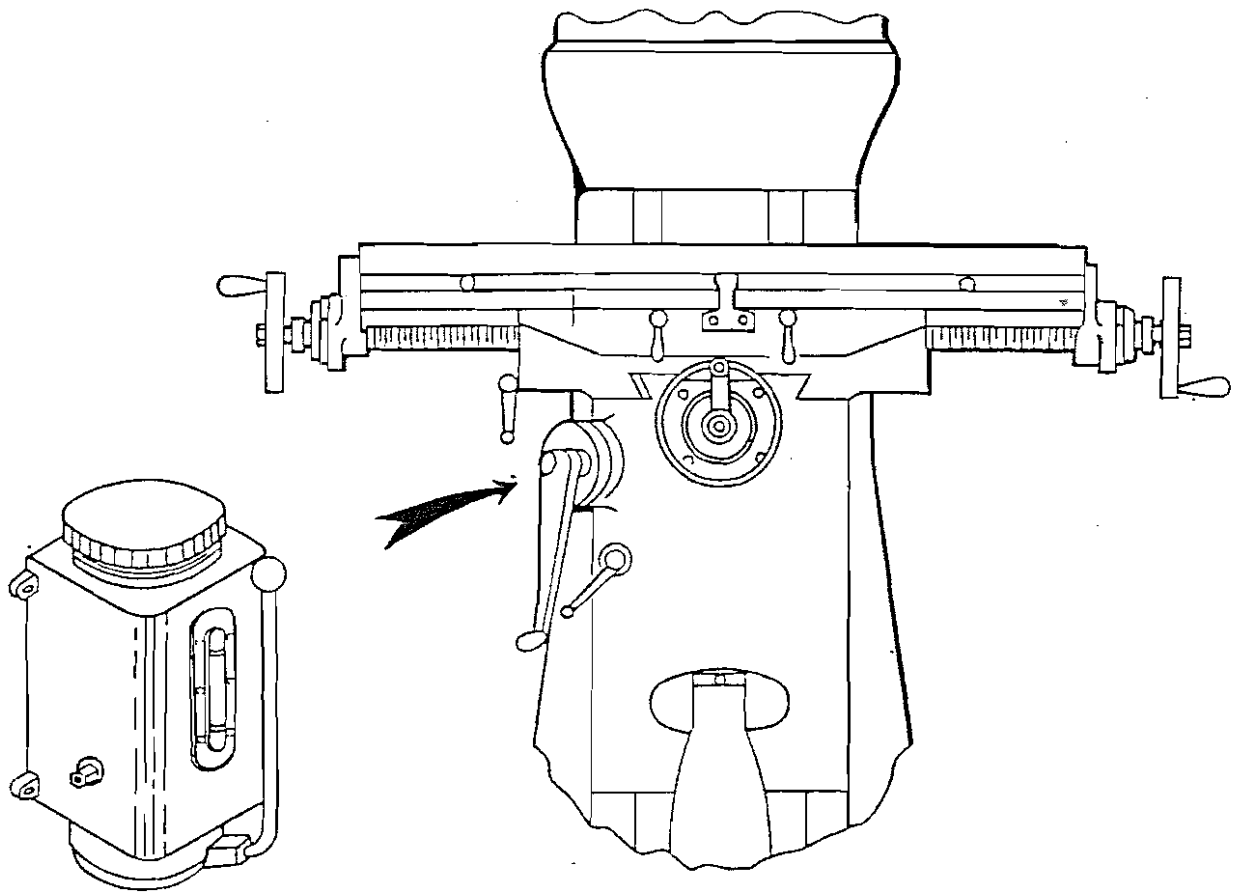
週期 FREQUENCY	潤滑 LUBRICATE	潤滑劑 LUBRICANT	數量 QUANTITY	潤滑代號 LUB. AT.
每天兩次 Twice Daily	昇降套軸承 Quill bearings	中國石油 R53 Vacra Heavy Medium S.A.E. 10 or 10W Light	5-10 滴 5-10 drops	1
每天兩次 (當操作進給時) Twice Daily (When feed is in use)	主軸向下進給 Spindle Down Feed	中國石油 R53 Vacra Heavy Medium S.A.E. 10 or 10W light	加滿 Top-up	2
每週一次 Weekly	拉桿栓軸 (將昇降套降下 2") Drawbar splines (move quill down 2")	中國石油 R53 Vacra Heavy Medium S.A.E. 10 or 10W Light	5 滴 5 drops	3

註：錯誤潤滑 1 "昇降套軸承" 會使昇降套太緊且使昇降套部份束縛於座內。

NOTE : Failure to lubricate "Quill bearings" at 1 can result in tight quills and partial seizure of quill in housing.

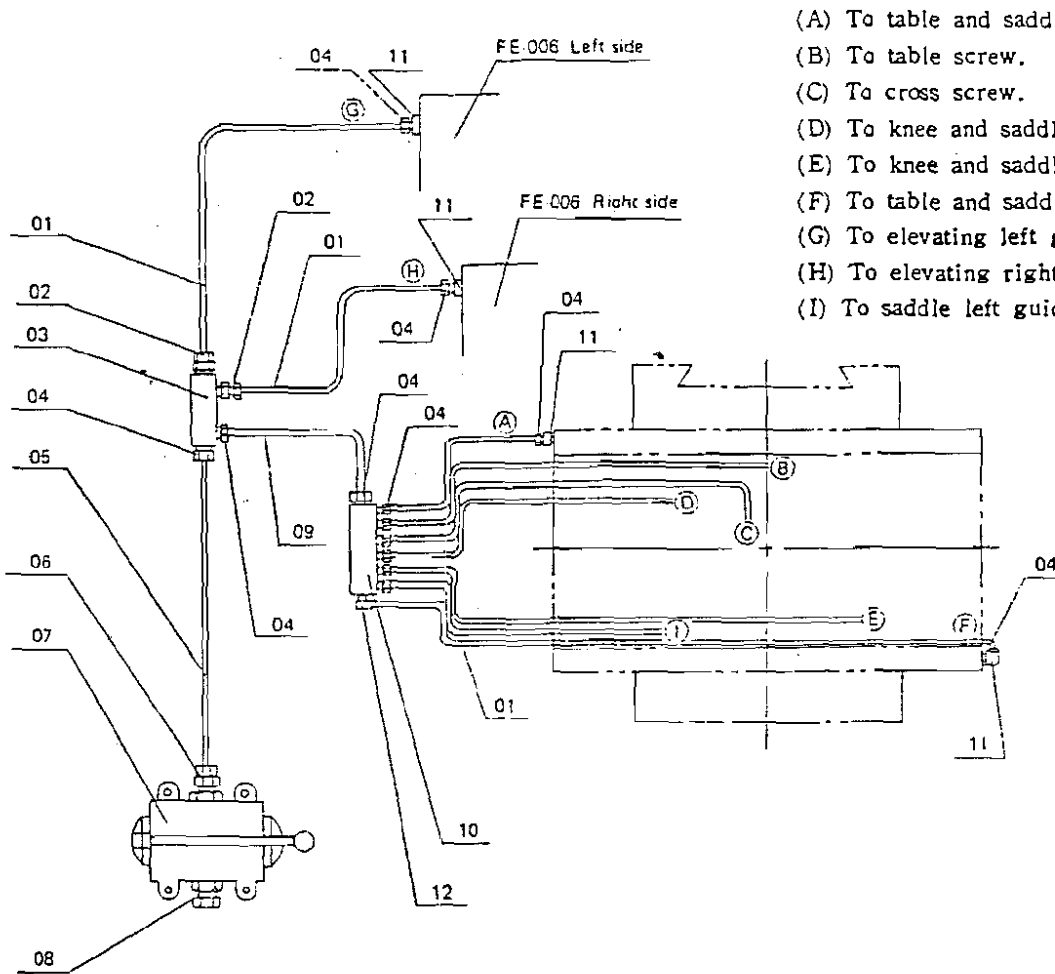
週期 FREQUENCY	潤滑 LUBRICATE	潤滑劑 LUBRICANT	數量 QUANTITY	潤滑代號 LUB. AT.
每二個月一次 (正常使用下) Every 2 months (of normal use)	後列齒輪 Back gear	黃油 Grease	相當於一茶匙 Equivalent of 1 teaspoonful	4. 註：加黃油前將齒輪桿退向 'LQ' 處並保持主軸停止。 NOTE: Before greasing put gear lever back to 'LQ' & keep spindle stationary.

1 1/2 VA-T 1 1/2 VS-T 潤滑 Lubrication



週期 FREQUENCY	潤滑 LUBRICATE	潤滑劑 LUBRICANT	數量 QUANTITY
每天注滿潤滑泵 Centralized Lub. Pump Daily 每週檢查油面高 Check Level Weekly	導螺桿 Lead Screw	Shell cornea Oil 41 Mobil X 2 Socony Gargoyle Vactra No.2	一泵浦 One Pump
	鞍座-工作台滑道 Saddle-Table Ways	"Sunoco" Waylube #80 Mobil X 2	一泵浦 One Pump
	鞍座-升降座滑道 Saddle-Knee Ways	"Sunoco" Waylube #80 Mobil X 2	一泵浦 One Pump
	升降座機身滑道 Knee Colum Ways	"Sunoco" Waylube #80 Mobil X 2	一泵浦 One Pump
每週兩次 Twice Weekly	升降螺桿 Elevating Screw	Shell Carnea Oil 41 Mobil X 2 Socony Gargoyle Vactra No.2	油槍打 5 次 5 Shots(Oil Gun)

1 1/2 VA-T 1 1/2 VS-T LUBRICATION SYSTEM



- (A) To table and saddle rear guideway.
- (B) To table screw.
- (C) To cross screw.
- (D) To knee and saddle left guideway.
- (E) To knee and saddle right guideway.
- (F) To table and saddle front guideway.
- (G) To elevating left guideway.
- (H) To elevating right guideway.
- (I) To saddle left guideway.

ITEM NO.	PART NO.	PART NAME	QTY
01	062040000	Aluminum pipe (φ4)	9
02	041004000	Pipe lock nut(PAN-4)	2
	050004000	Pipe joint(PB-4)	2
	111001003	Flow regulator(PSS-3)	2
03	071040408	Oil distributor	1
04	040004000	Pipe lock nut(PA-4)	13
	050004000	Pipe joint(PB-4)	13
05	045040200	Flexible hose(φ4x200MM)	1
06	040004000	Pipe lock nut(PA-4)	1
	050004000	Pipe joint(PB-4)	1
	039040818	Check valve(PDV-4)	1
07	013008000	Plunger pump(LT-8)	1
08	085008002	Oil plug(PG-1)	1
09	045040300	Flexible hose(φ4x300MM)	1
10	FE-033B	Oil distributor	1
11	FE-031	L type universal connector	4
12	FE-033	L type universal connector	1
	041004000	Pipe lock nut(PAN-4)	1
	050004000	Pipe joint(PB-4)	1

1 1/2 VA-T 1 1/2 VS-T

預防保養 Preventive Maintenance

為了確保機器之精密與增加使用壽命，我們提供下列預防保養表給操作者。

For securing the accuracy and life of the machine, we offer the following preventive maintenance charts.

週 期 Frequency	項 目 Item
每 日 Daily	<ol style="list-style-type: none">1. 操作前必須依照潤滑說明把各部位加油。 It is necessary to oil each lubrication point before operation.2. 檢查手動油泵的油量，不足須補充。 Check the level of the oil lubricator and fill if necessary.3. 操作完畢，所有固定桿應放鬆，工作台面須清除乾淨並潤滑少許的油，以保護工作台面。 It is necessary to release the clamps, clean and lubricate the table after operation.
每 月 Monthly	<ol style="list-style-type: none">1. 檢查各部調整楔之鬆緊情形，並作適當的調整。 Check all the gibs and adjust if necessary.2. 檢查所有螺桿與螺帽間之間隙，並作適當的調整。 Check all the backlash between screws and nuts, and adjust if necessary.
每 季 Quarterly	<ol style="list-style-type: none">1. 根據精度檢查表核對各部精度，(看本說明書53頁到55頁並作調整)。 Check and adjust the machine accuracy. (manual P.53 to P.55).

敝公司真誠的向您建議：

當您欲保養機械前，爲了您的安全，請關掉機器之電源，且爲了迅速之保養請閱讀此手冊之相關部份。

當訂購更換零件時請說明：

- 機器系列號碼。
註於機身左側門之上方。
- 頭部系列號碼。
於皮帶箱前方。
- 項目號碼。
- 零件號碼。
- 數量。
- 概述。

May We Suggest That,

Before attempting any maintenance in the interests of safety you isolate the machine electrically and in the interests of efficiency you read the relevant section of this manual.

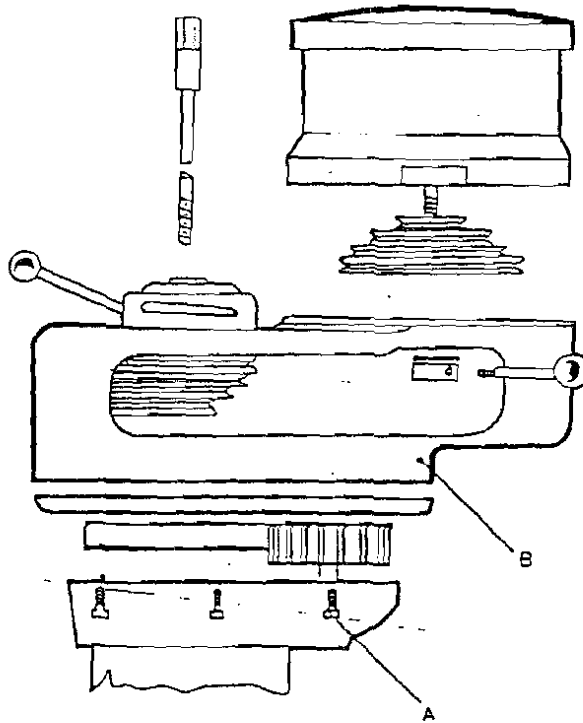
When ordering replacement parts please quote:

- THE MACHINE SERIAL No.
Situated above the door on the left hand side of the column.
- THE HEAD SERIAL No.
found on the front of the Belt Housing.
- ITEM NUMBER.
- PART NUMBER.
- QUANTITY.
- DESCRIPTION.

1 1/2 VA-T 保養 Maintenance

皮帶更換步驟 BELT REPLACEMENT

1. 關掉電源。
 2. 取下拉桿。
 3. 拆下馬達。
 4. 將昇降套降至最下方。
 5. 取下六個螺絲 'A'。
 6. 取下皮帶箱 (輕輕敲動使其脫離連結銷)。
 7. 此時即可更換皮帶。
1. Isolate machine.
 2. Remove drawbar.
 3. Remove motor.
 4. Lower quill to full extension.
 5. Remove 6 screw 'A'.
 6. Remove belt housing 'B', tap to withdraw from dowels.
 7. The belts may now be changed.



剎車環更換步驟

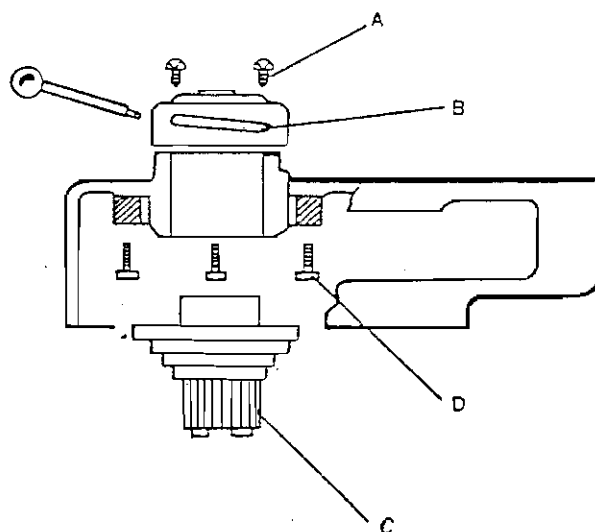
BRAKE SHOE REPLACEMENT

重覆前頁 1 ~ 6 之順序後。

1. 取下四個螺絲 'A'。
2. 取下兩個螺絲 'B'。
3. 從座內推出軸承殼 'C'。
4. 取下三個螺絲 'D'。
5. 更換剎車塊。
6. 更換後鎖緊螺絲 'D'，並用墊圈與螺帽固定。

Repeat the sequence 1. to 6. (Page 35)

1. Remove 4 screws 'A'.
2. Remove 2 screws 'B'.
3. Push bearing hub 'C' clear of housing.
4. Remove 3 screws 'D'.
5. Replace shoe.
6. Ensure screws 'D' are fully tightened and locked with washers and nuts.



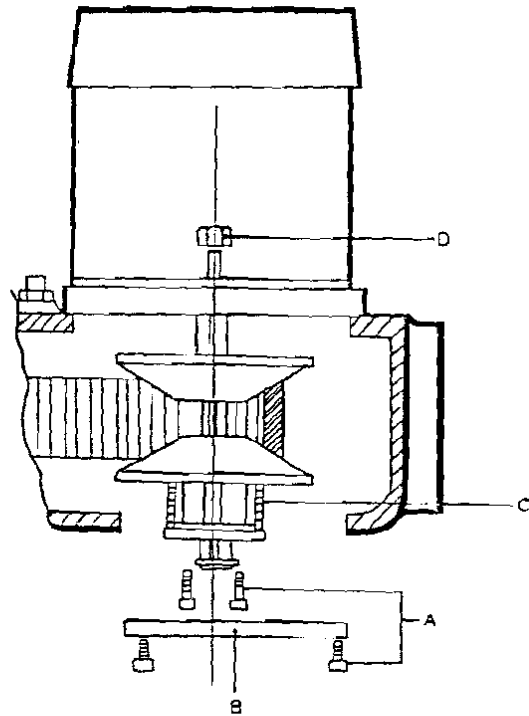
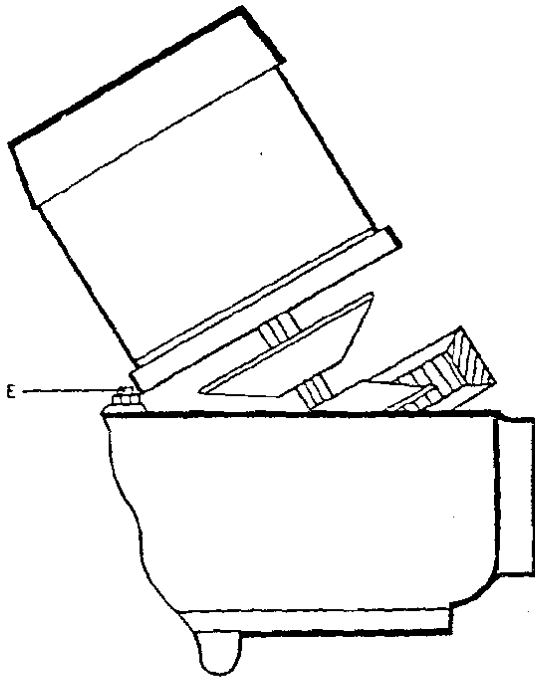
1 1/2 VS-T 保養 Maintenance

馬達拆卸步驟

MOTOR REMOVAL

1. 轉動頭部調整至最低速。
2. 關掉電源。
3. 取下三個螺絲 'A' 及蓋 'B'。
4. 用兩個螺絲 'A' 壓住彈簧 'C'。
5. 轉動變速器至最高速。
6. 從皮帶箱取下開關。
7. 取下兩個固定螺帽 'D'。
8. 提起馬達，將馬達箱放在螺樁 'E' 上。
9. 放鬆皮帶，並繞過驅動盤，即可取下馬達。

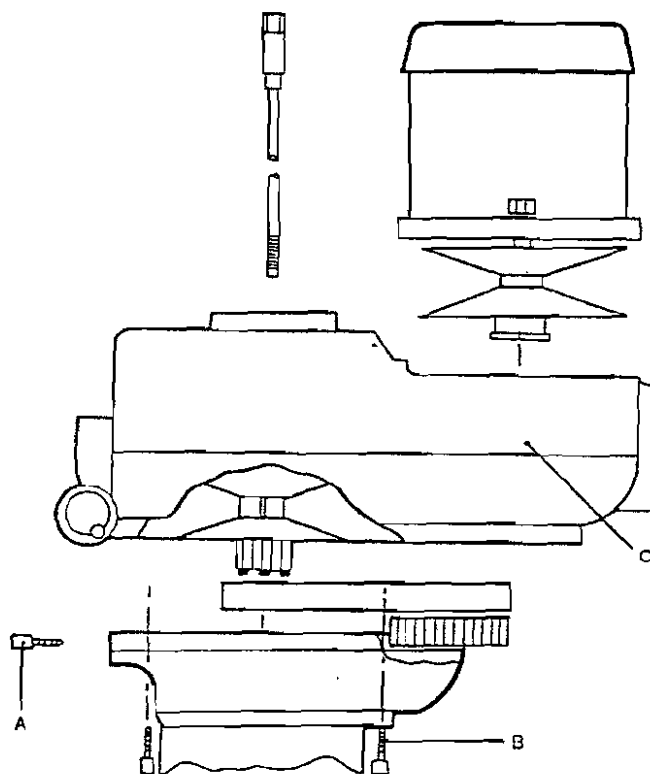
1. Run head to adjust to lowest speed.
2. Isolate machine.
3. Remove 3 screws 'A' & cover 'B'.
4. Using the two screws 'A' compress spring 'C'.
5. Rotate the speed changer to the highest speed.
6. Remove the reversing switch from the belt housing.
7. Remove the two locking nuts 'D'.
8. Lift the motor and rest the case on stud 'E'.
9. Ease the belt over the lower drive disc and remove the motor.



齒型皮帶更換法
TIMING BELT REPLACEMENT

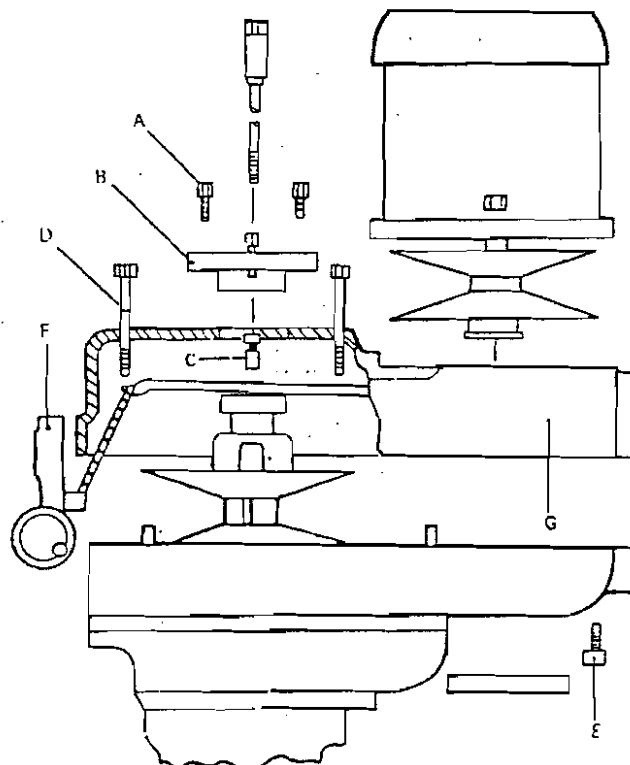
1. 如前頁所述取下馬達。
2. 昇降套降至最低位置。
3. 從變速箱下方取出兩個螺絲 'A'。
4. 取下四個螺絲 'B'。
5. 退出連結銷，使上部份 'C' 分離。
6. 此時即可更換皮帶。

1. Remove the motor.
2. Lower the quill to full extent.
3. Remove the two lower capscrews 'A' from the speed changer housing.
4. Remove the four cap screws 'B'.
5. Remove the top assembly 'C' and tap to clear dowels.
6. Replace the belt.



驅動皮帶更換法 DRIVE BELT REPLACEMENT

1. 如 38 頁所述取下馬達。
 2. 取下三個螺絲 'A'，鎖進附近之牙孔，退出軸承座 'B'。
 3. 取下兩個螺絲及襯套 'C'。
 4. 取出四個螺絲 'D' 與一個螺絲 'E'。
 5. 取下四個固定變速器之螺絲 'F'。
 6. 退出連結銷，並移開頂座 'G'。
 7. 此時即可更換皮帶。
1. Remove the motor as described on page 38.
 2. Remove the three screws 'A'; insert into the adjacent tapped holes and withdraw bearing housing 'B'.
 3. Remove the two screws and the bushes 'C'.
 4. Remove four screws 'D' and one screw 'E'.
 5. Remove four screws securing the speed changer 'F'.
 6. Remove top housing 'G'; tap to clear the dowels.
 7. Replace the belt.

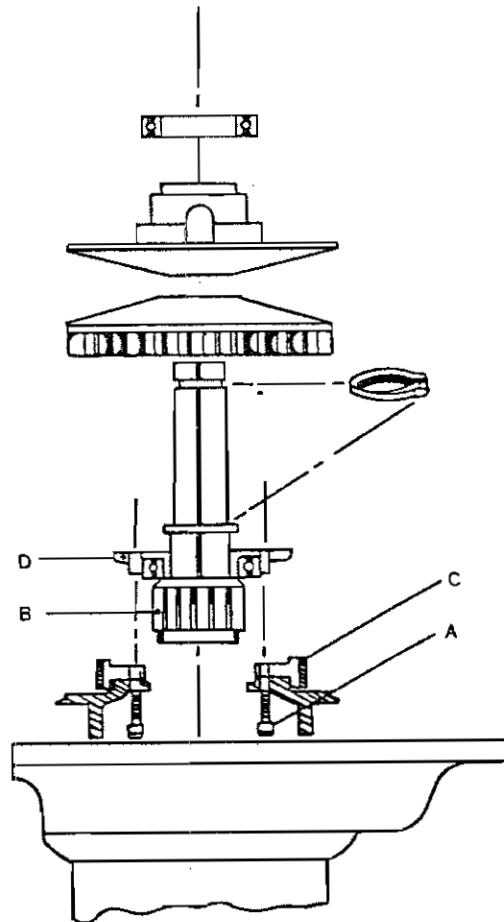


剎車環更換步驟

BRAKE SHOE REPLACEMENT

1. 拆下頂部。
2. 取下兩個螺絲 'A'。
3. 取出離合器殼組件 'B' 和 'D'。
4. 更換剎車環 'C'。

1. Remove the top section.
2. Remove the two screws 'A'.
3. Remove the clutch hub assembly 'B' & 'D'.
4. Replace the brake shoes 'C'.



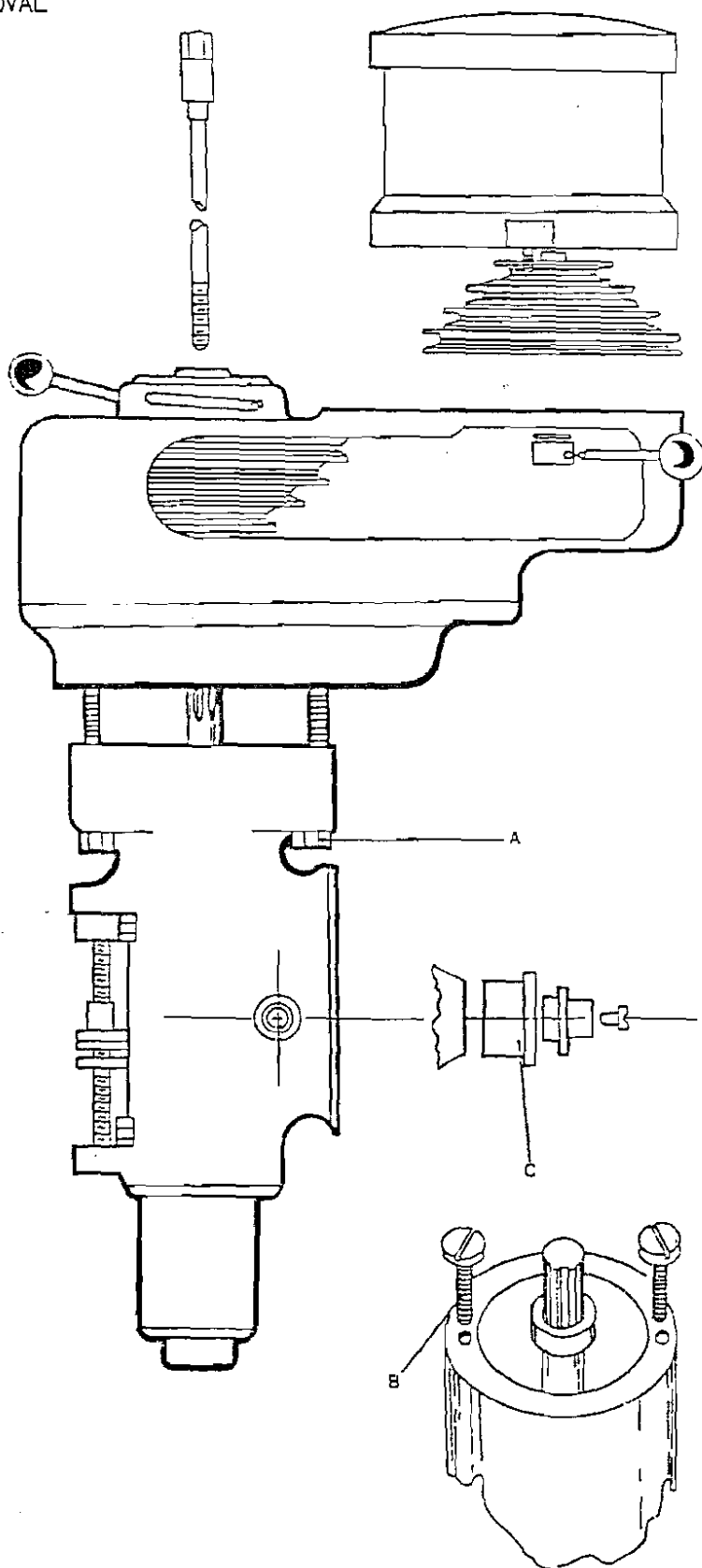
1 1/2 VA-T 保養 Maintenance

昇降套拆卸法

QUILL REMOVAL

1. 關掉電源。
2. 拆下馬達。
3. 取出拉桿。
4. 昇降套降至最低。
5. 取下三個螺帽 'A'。
6. 頂部完全地拆出。
7. 取出昇降套頂部兩個螺絲 'B'。
8. 拆下彈簧座 'C'。

1. Isolate machine.
2. Remove motor.
3. Remove drawbar.
4. Fully extend quill.
5. Remove 3 nuts 'A'.
6. Remove top section completely.
7. Remove 2 screws 'B' from top of quill.
8. Remove clock spring housing 'C'.



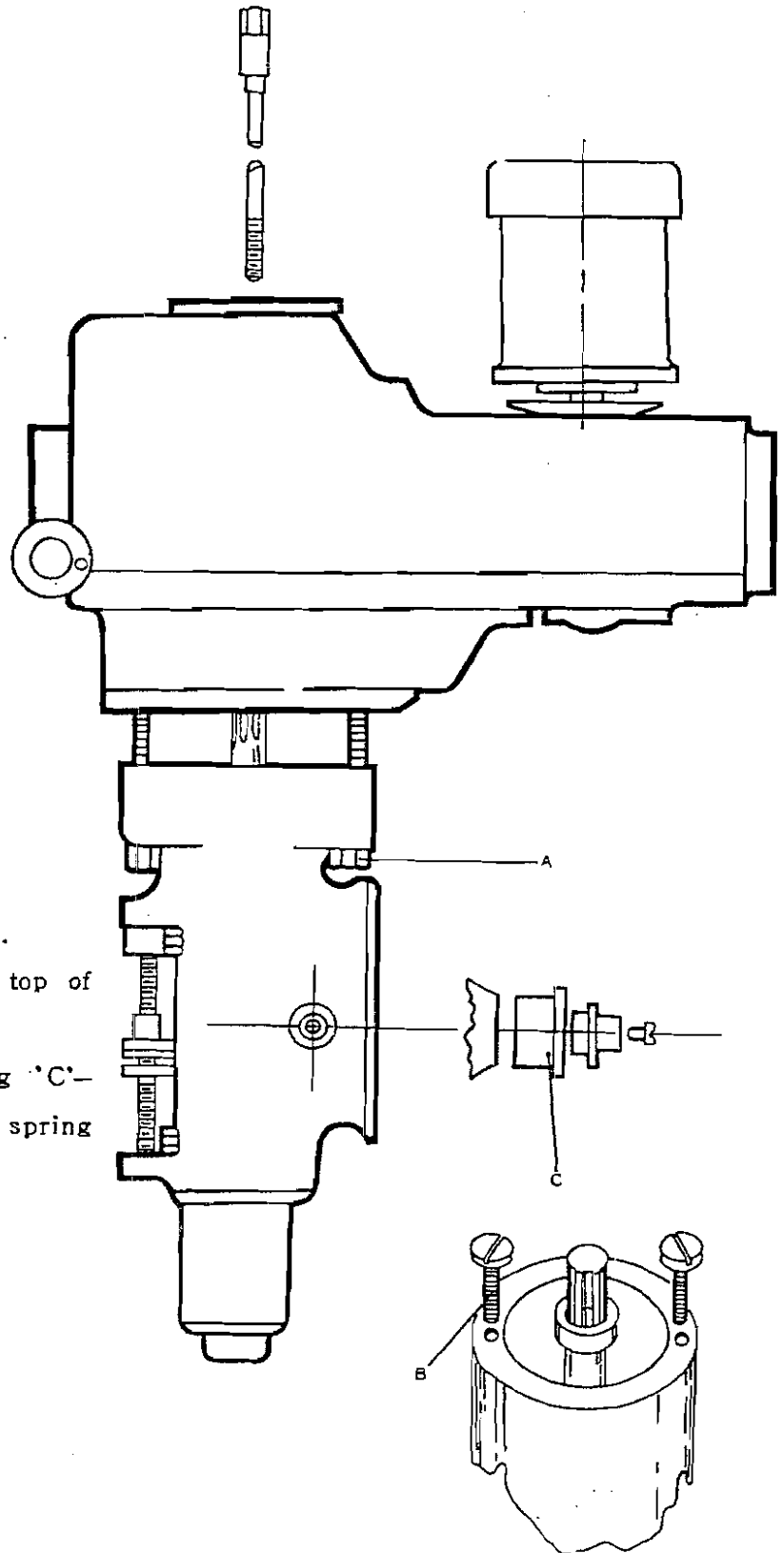
1/2 VS-T 保養 Maintenance

昇降套拆卸法 QUILL REMOVAL

1. 關掉電源。
2. 拆下馬達。
3. 取出拉桿。
4. 昇降套降至最低。
5. 取下三個螺帽 'A'。
6. 頂部完全地拆出。
7. 取出昇降套頂部兩個螺絲 'B'。
8. 拆下彈簧座 'C'。

參看 44 頁更換彈簧說明。

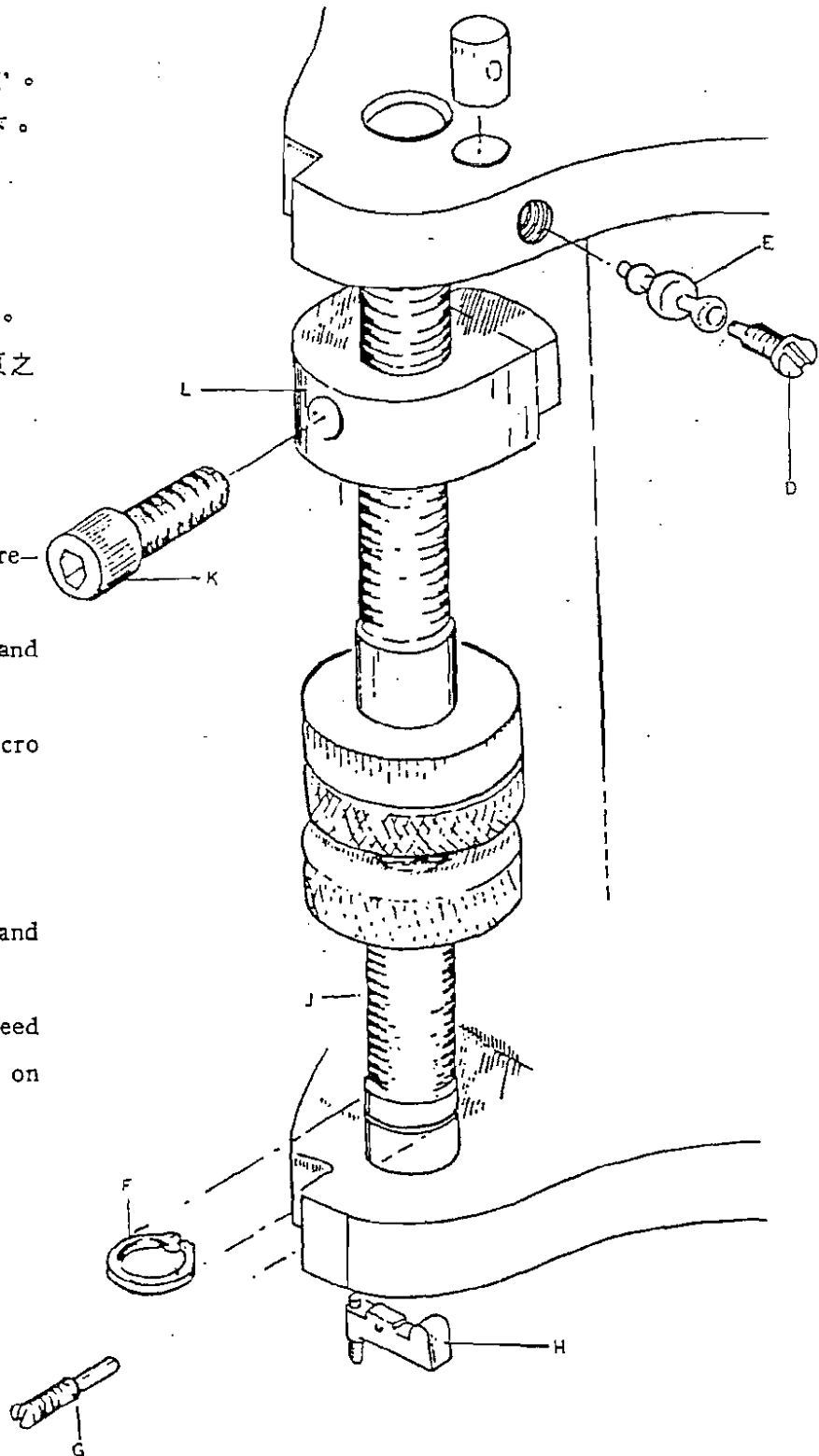
1. Isolate machine.
2. Remove motor.
3. Remove drawbar.
4. Fully extend quill.
5. Remove 3 nuts 'A'.
6. Remove top section completely.
7. Remove 2 screws 'B' from top of quill.
8. Remove clock spring housing 'C'— see instruction on replacing spring page 44.



1 1/2 VA-T 1 1/2 VS-T 保養 Maintenance

9. 取下螺絲 'D' 與球形槓桿 'E'。
10. 取下 C 形環 'F'，螺絲 'G' 及臂 'H'。
11. 將螺桿軸 'J' 旋出微動螺帽，並取下。
12. 取下螺絲 'K' 與停止板 'L'。
13. 拆下昇降套。
14. 清潔所有表面，加油，並重新組合。
15. 檢查進給控制桿是否正確，看 45 頁之說明。

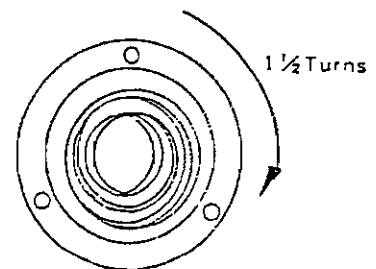
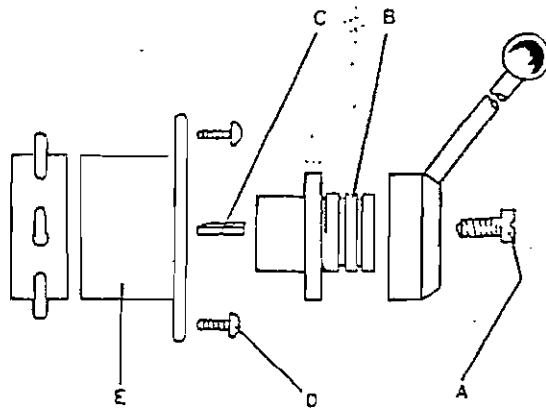
9. Remove screw 'D' and ball reverse lever 'E'.
10. Remove circlip 'F', screw 'G' and arm 'H'.
11. Thread shaft 'J' through micro nuts and remove.
12. Remove screw 'K' and stop 'L'.
13. Remove quill.
14. Clean all areas, oil liberally and reassemble.
15. Check correct operation of feed trip linkage. See instruction on page 45.



回覆彈簧更換法
BALANCE SPRING REPLACEMENT

1. 移動昇降套於頂部，並固定住。
2. 拆下螺絲 'A'，鞍 'B' 及鉸 'C'。
3. 拆下螺絲 'D'，慢慢轉動座 E 使彈簧張力得以釋放。
4. 將彈簧之一端從小齒輪軸的釘上提出。
5. 逆時針轉動座 'E' (從頭部鑄件來看)。
6. 從座內取出彈簧並更換之。
7. 重新將彈簧組合於座之鑄件上，並應順時針轉動座，直到彈簧進入小齒輪軸之釘上。

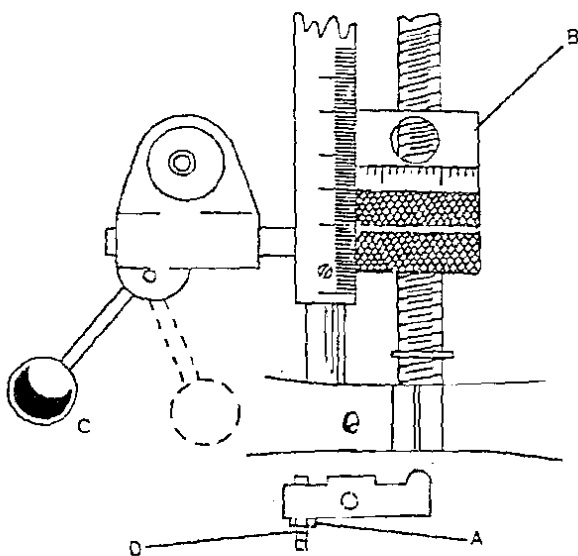
1. With quill, at top of movement apply quill lock.
2. Remove screw 'A', hub 'B', and key 'C'.
3. Remove screws 'D', allowing housing to rotate slowly releasing spring tension.
4. Lift end of spring from peg on the pinion shaft.
5. Rotate housing 'E' anti-clockwise from head casting.
6. Remove spring from housing and replace.
7. Refit spring to main housing casting turning housing clockwise until spring locates on peg in pinion shaft.



進給控制調整法
FEED TRIP ADJUSTMENT

1. 放鬆固定螺帽 'A' 。
2. 嚙合把手 'C' 。
3. 調整微調螺帽至碰到升降套停止塊 'B' 。
4. 慢慢轉動調整螺絲 'D' 直到桿 'C' 跳離。
5. 在此點鎖緊固定螺帽。
6. 檢查跳動的動作是否正確。

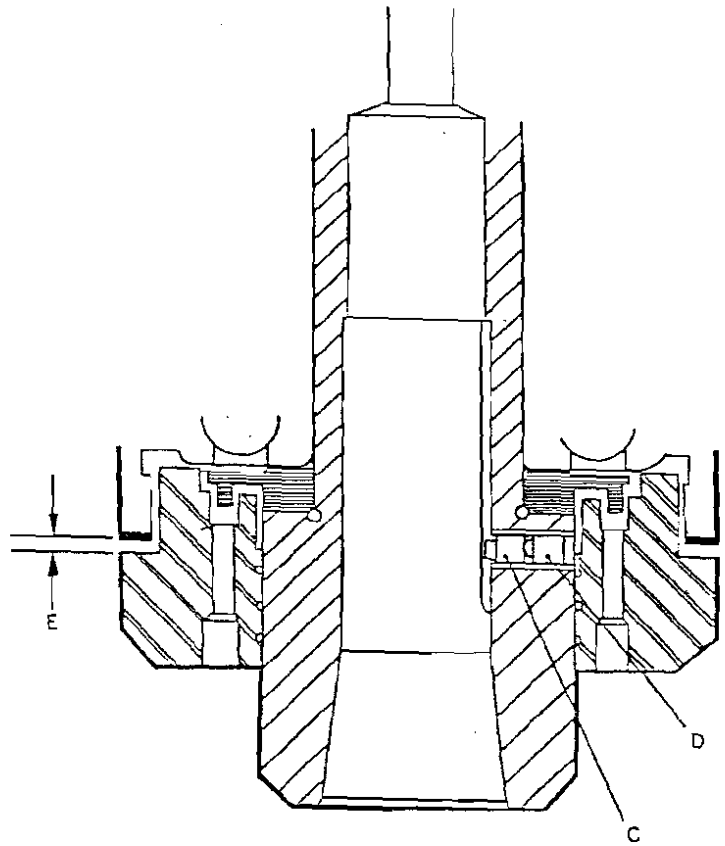
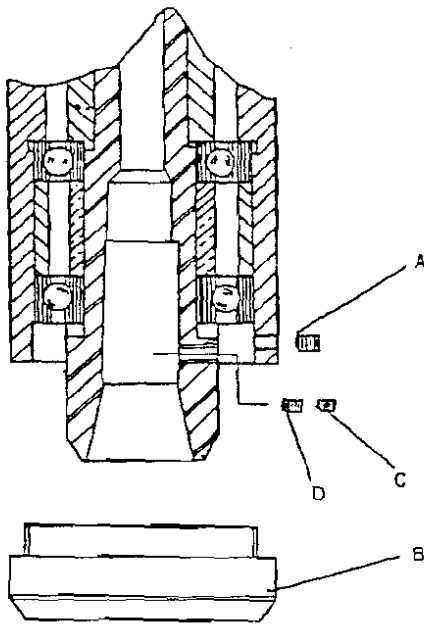
1. Release locknut 'A' 。
2. Engage trip handle 'C'.
3. Adjust micro nuts against quill stop 'B'.
4. Slowly turn adjusting screw 'D' until lever 'C' trips.
5. At this point secure locknut 'A'.
6. Check that smart trip action is obtained.



1/2 VA-T 1 1/2 VS-T 保養 Maintenance

筒夾校準螺絲更換法 (R-8 Spindle Taper)

COLLET ALIGNING SCREW REPLACEMENT



1. 用氈筆在昇降套和主軸端蓋 'B' 劃一參考線。
2. 拆下固定螺絲 'A'。
3. 取下端蓋 'B'。
4. 取下固定螺絲 'C' 與筒夾校準螺絲 'D'。
5. 更換 'D' 套入 R.8 筒夾，並檢查，勿使螺絲末端碰到導槽之底部。
6. 更換固定螺絲 'C'。
7. 重新裝上 'B'，檢查參考線是否對準。
8. 裝上固定螺絲 'A'。

注意：不可鎖太緊免造成變型。

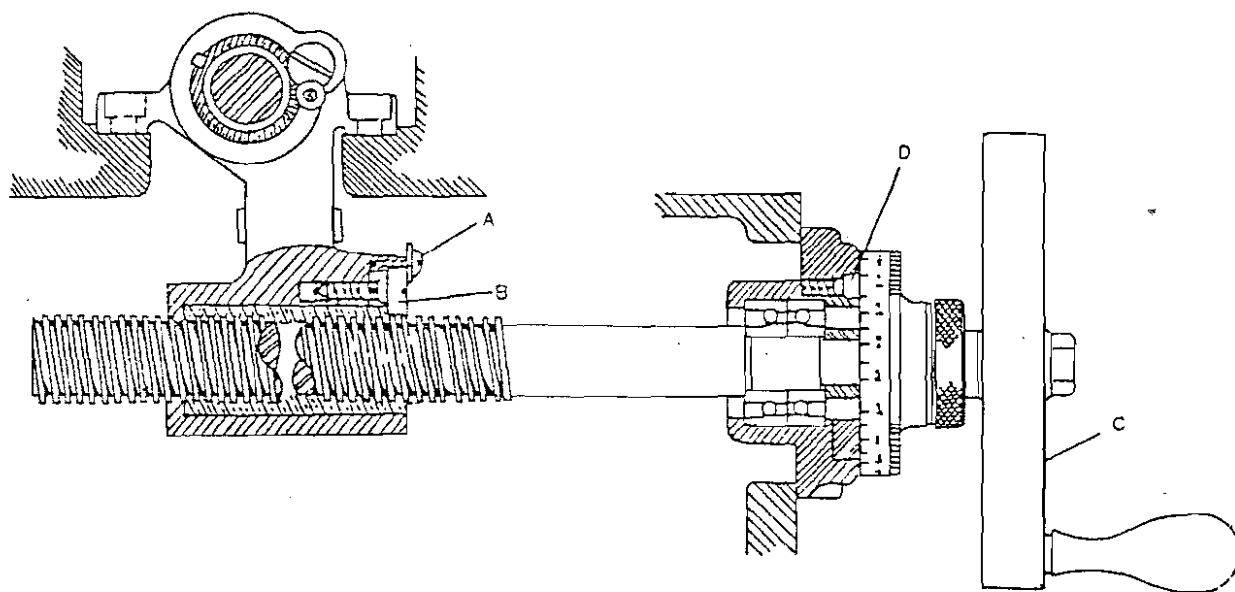
9. 檢查間隙 'E' (0.003" = 0.08mm)。

1. Use felt pen, mark reference line on quill and nose cap 'B'.
2. Remove set screw 'A'.
3. Unscrew nose cap 'B'.
4. Remove lock screw 'C' and collet aligning screw 'D'.
5. Replace 'D'; insert R.8 collet and check that the dog on the end of the screw does not foul on the bottom of the guide slot.
6. Replace lock screw 'C'.
7. Replace nose cap 'B'; check felt pen markings for correct alignment.
8. Replace set screw 'A'.

Caution: do not overtighten as this will cause distortion.

9. Check gap 'E' (0.003" = .08mm)

前後進給螺桿間隙調整法
CROSS SCREW BACKLASH ADJUSTMENT

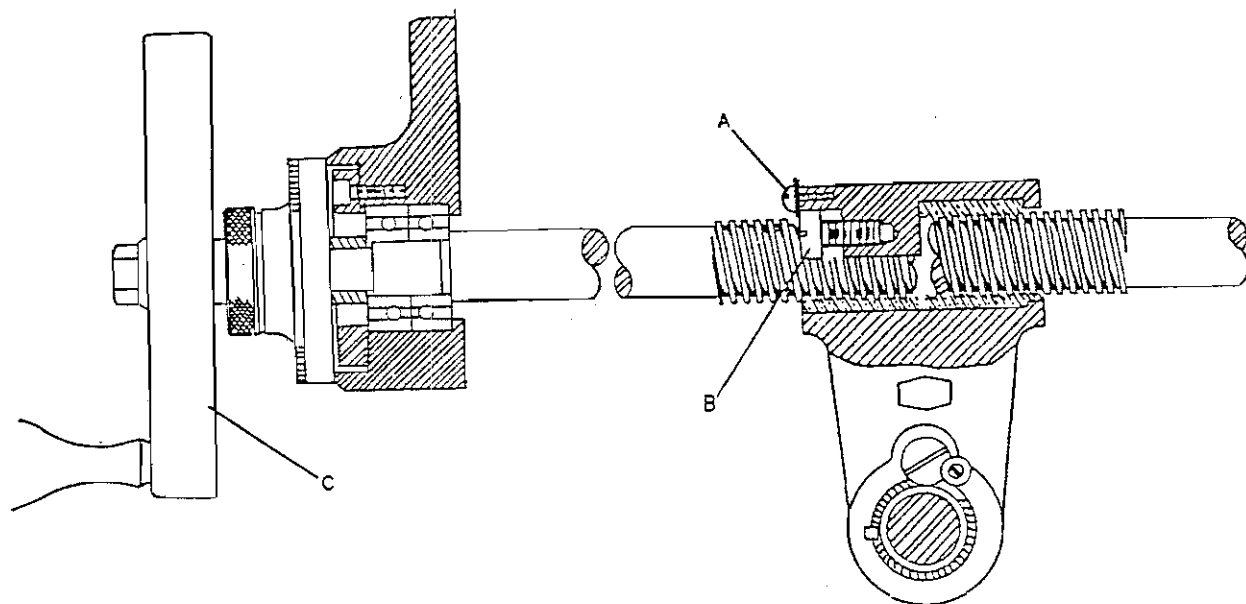


1. 轉動曲柄使鞍座位於中間位置。
2. 旋出四個螺絲 'D'。
3. 將鞍座拉向前，以露出螺絲 'A' 與 'B'。
4. 螺絲 'A' 旋出 1/2 轉。
5. 慢慢轉動手輪 'C'，並鎖緊螺絲 'B' 直到產生間隙 0.004" 或 0.005" 為止。
6. 將固定螺絲 'A' 鎖於 'B' 上。
7. 最後將鞍座移到昇降座之前方，重新組合四個螺絲 'D'。

1. Crank the saddle to Mid position.
2. Withdraw 4 screws 'D'.
3. Pull the saddle forward to expose screws 'A' & 'B'.
4. Withdraw screw 'A', 1/2 a turn.
5. Whilst slowly turning handle 'C' tighten screw 'B' until 0.004" or 0.005" is obtained.
6. Lock screw 'A' onto 'B'.
7. Finally crank the saddle to the front of the knee and replace 4 screws 'D'.

1 1/2 VA-T 1 1/2 VS-T 保養 Maintenance

左右進給螺桿間隙調整法 TABLE SCREW BACKLASH ADJUSTMENT



1. 將工作台移至左方。
2. 螺絲 'A' 旋出 1/2 轉。
3. 慢慢旋轉手輪 'C'，並鎖緊螺絲 'B' 直至產生間隙 0.004" 或 0.005" 為止。
4. 最後將固定螺絲 'A' 鎖在 'B' 上。

1. Crank the table to the left.
2. Withdraw screw 'A' 1/2 a turn.
3. Tighten screw 'B' whilst slowly turning handle 'C' until 0.004" or 0.005" is obtained.
4. Finally lock screw 'A' on to 'B'.

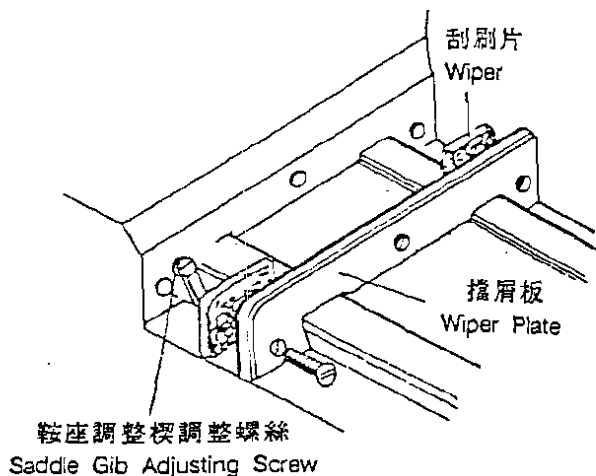
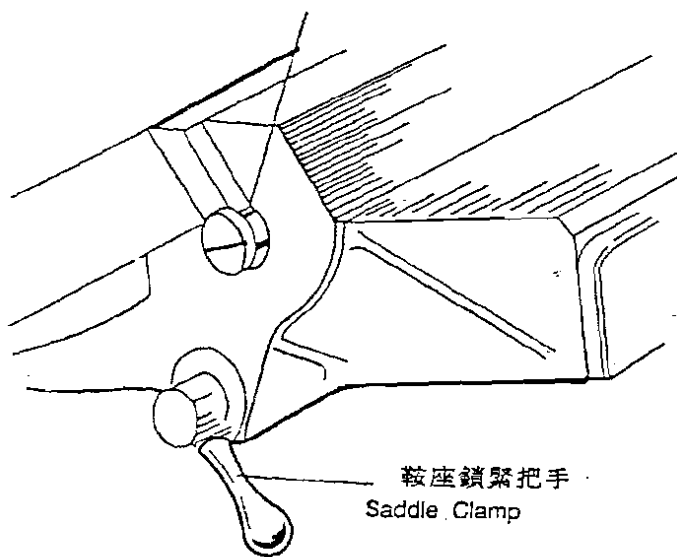
a) 工作台鞍座滑道

1. 清除所有的切削屑。
2. 移動工作台時，順時針轉動工作台調整楔調整螺絲，直到感覺輕微阻力即可。

a) Table Saddle Ways

1. Remove all swarf from area.
2. Turn the table gib screw clockwise while moving the table until slight drag is felt.

工作台調整楔調整螺絲
Table Gib Screw



b) 鞍座、昇降座滑道

1. 清除所有切削屑。
2. 拆下擋屑板和刮刷片。
3. 移動鞍座時，順時針轉動調整楔螺絲，直至感覺輕微阻力為止。
4. 重新裝上擋屑板與刮刷片。

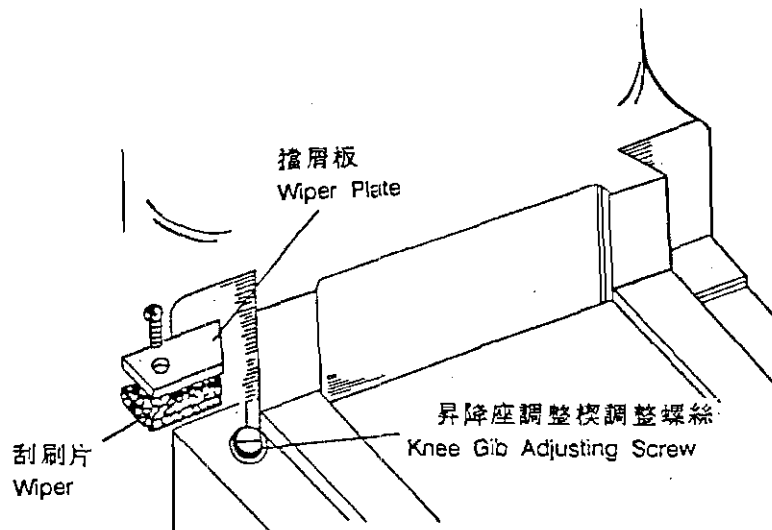
b) Saddle Knee Ways

1. Remove all swarf from area.
2. Remove chip wiper guards and wiper.
3. Turn gib adjusting screw clockwise while moving the saddle until slight drag is felt.
4. Ensure chip wiper plate and wiper are re-placed.

1 1/2 VA-T 1 1/2 VS-T 保養 Maintenance

C) 昇降座機身滑道

C) Knee Column Ways



1. 清除所有切削屑。
2. 拆下擋屑板。
3. 拆下刮刷片。
4. 移動昇降座時，順時針轉動調整楔螺絲直至感覺輕微阻力為止。
5. 重新裝上擋屑板與刮刷片。

1. Remove all swarf from area.
2. Remove chip wiper plate,
3. Remove wiper.
4. Turn gib adjusting screw clock-wise while moving knee until slight drag is felt.
5. Ensure wiper plate and wiper are replaced.

下表所列的是關於在操作時可能發生的故障，及其可能的原因與處理方法。

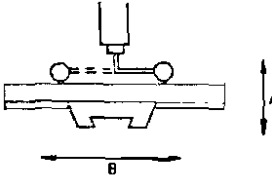
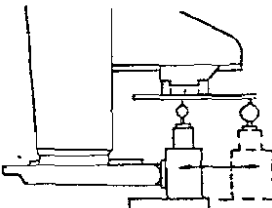
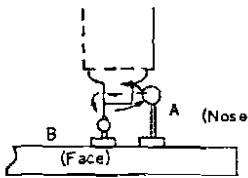
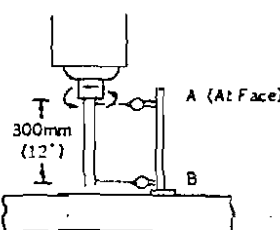
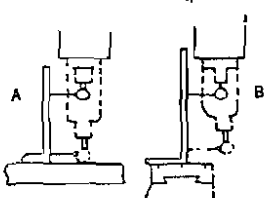
The following chart contains some typical probable troubles of operation, along with the possible cause(s) and remedies for each.

故障TROUBLE	可能的原因POSSIBLE CAUSES	處理方法REMEDY
主軸進給不順 Spindle feed un-normal	昇降套固定桿未放鬆 Quill clamp lever unrelease.	放鬆固定桿 Release clamp lever.
主軸剎車失靈 Spindle brake brake-down.	剎車環磨損 Brake shoe worn out	更換 Replace
主軸不轉 Spindle unrotate.	1. 開關接觸不良 Poor contact on the switch. 2. 皮帶太鬆 Drive belt too slack. 3. 馬達出毛病 Poor motor.	1. 檢查電源開關 Check the switch. 2. 調整或更換 Adjust or replace. 3. 修理或更新 Repair or renew.
轉向錯誤 Incorrect rotation.	電源開關扭轉位置不對 The switch knob indicated at wrong position.	轉變開關指示位置 Change to correct position
工作台上、下、前後、左右 進給不順。 Table vertical, cross, Longitudinal feed unsmooth.	1. 調整楔太緊 Gib strip too tight. 2. 螺帽與螺桿間隙不當 Unproper backlash between nut and screws. 3. 潤滑油未到達潤滑面 The lubricant not to lubrication point.	放鬆調整楔 Release 調整間隙 Adjust 檢查潤滑油路 Check lubrication.
切削時震動 Vibrative when machi- ning.	1. 機械不穩固 Machine unstable. 2. 切削條件不適當 unsuitable cutting condition	重新固定機械 Reclamp 依材質和銑刀大小選適當切削 速度 Select proper cutting speed according to materials and cutter.

1 1/2 VA-T 1 1/2 VS-T 檢驗規格表 Inspection Chart

番號	檢查項目	圖示	容許差	測定值
No	Inspection Items	Illustrations	Tolerances	Measurements
1	工作台面水平 Plane of Surface Even Level.		Approx. Level 0.06mm/m 0.06mm/m	A. <u>0.01</u> B. <u>0.01/2</u>
2	工作台移動平行度。 Surface Parallel to its Movements.		A. 0.02mm/500mm (.0008"/20") B. 0.02mm/300mm (.0008"/12")	A. <u>0.01</u> B. <u>0.01</u>
3	T槽側面與縱向移動的平行度。 與橫向移動的垂直度。 T-slots, Front Edge Parallel to Longitudinal Travel, Perpendicular to Cross Travel.		0.02mm/300mm (.0008"/12")	T槽 A. T-Slot <u>0.01</u> 縱向 B. Front <u>0.01</u> C. Cross 橫向 <u>0.01</u>
4	昇降座上、下移動與工作台的垂直度。 Vertical Movement of Knee Square to Table Surface.		0.02mm/300mm (.0008"/12")	A. <u>0.01/2</u> B. <u>0.01/2</u>

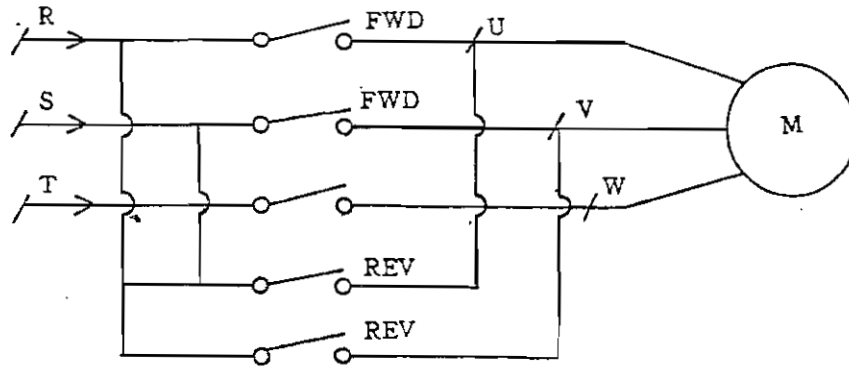
1 1/2 VA-T 1 1/2 VS-T 檢驗規格表 Inspection Chart

番號	檢查項目	圖示	容許差	測定值
No	Inspection Items	Illustrations	Tolerances	Measurements
5	工作台面與主軸的直角度。 Table Sweep-Knee not Level, Spindle Perpendicular to top of table		0.02mm/300mm (.0008"/12")	A. 0.01 B. 0.01
6	伸出臂與工作台面平行度。 Ram Slide Parallel With Table Top.		0.02mm/300mm (.0008"/12")	0.01
7	主軸、主軸端面振幅。 Spindle Nose and Face True.		A. 0.01mm (.0004") MAX. B. 0.01mm (.0004") MAX.	A. 0.003 B. 0.004
8	主軸孔偏轉。 Spindle Bore Runout.		A. 0.01mm (.0004") MAX. B. 0.02mm (.0008") MAX.	A. 0.006 B. 0.01
9	昇降套上、下與工作台垂直度。 Quill Travel Square to Table Surface.		A. 0.02mm/300mm (.0008"/12") B. 0.02mm/300mm (.0008"/12")	A. 0.01 B. 0.01

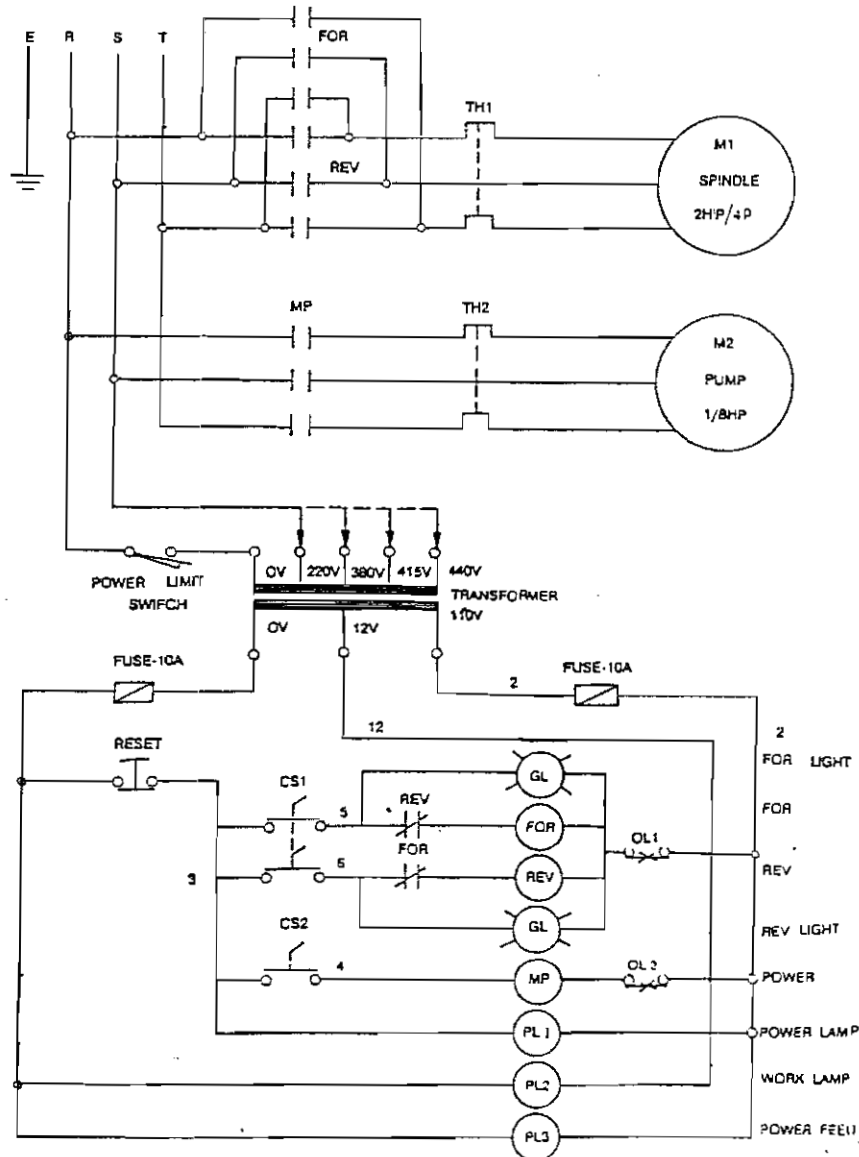
1 1/2 VA-T 1 1/2 VS-T 檢驗規格表 Inspection Chart

No		項目 Items	
10	在刻度環讀出齒隙。 Backlash-Read on Dials.	允許最大值0.127mm(0.005")MAX. 0.127mm(0.005") 測定讀數： A.縱向導螺桿 B.橫向導螺桿	Test Readings: A. Long. Lead Screw A. _____ B. Cross Lead Screw B. _____
11	導螺桿： Leadscrews:	最大誤差 0.02mm/300mm 或0.0008"/12" 0.04mm或0.0016"總工作長度 A.縱向：在300mm(12") 總工作長度 B.橫向：在300mm(12") 總工作長度	Maximum Error: 0.02mm Per 300mm or 0.0008" Per 12" 0.04mm or 0.0016" Total Overall A. Longitudinal: At 300mm(12") _____ Overall _____ B. Transverse: At 300mm(12") _____ Overall _____
12	手動操作 Manual	1) 楔的調整 2) 昇降套昇降的鬆緊度 3) 主軸的齒隙 4) 所有移動體移動時的平穩性 5) 刀具夾頭裝置情形	1) Gibs Adjusted _____ 2) Quill Tight _____ 3) Spindle Backlash _____ 4) All Movements Smooth _____ 5) Collet Fit _____
13	動態試驗 Power	1) 自動進給的動作 2) 所有移動體移動時的平穩性 3) 震動 4) 噪音(最大73DB) 5) 切削試驗 A.面銑 B.側銑	速度 SPEEDS 低 LOW HIGH 高 1) Powerfeed Kickouts _____ 2) All Movements Smooth _____ 3) Vibration _____ 4) Sound(73DB Max.) _____ 5) Test Cuts _____ A. Face _____ B. Side _____
14	外觀 Visual	1) 表面處理 A.噴漆部份 B.噴漆部份 C.電鍍部份 D.塑膠部份 E.染黑部份 2) 防銹處理	1) Finishes _____ A. Paint _____ B. Machined _____ C. Chrome _____ D. Plastic _____ E. Black Oxide _____ 2) Rustproofing _____
15	電氣方面 Electrical	馬達電壓 接頭 頭部 自動進給附件 冷卻油泵	Voltage for which Motors _____ 伏特 Volts connected _____ Head _____ Powerfeed _____ Coolant Pump _____

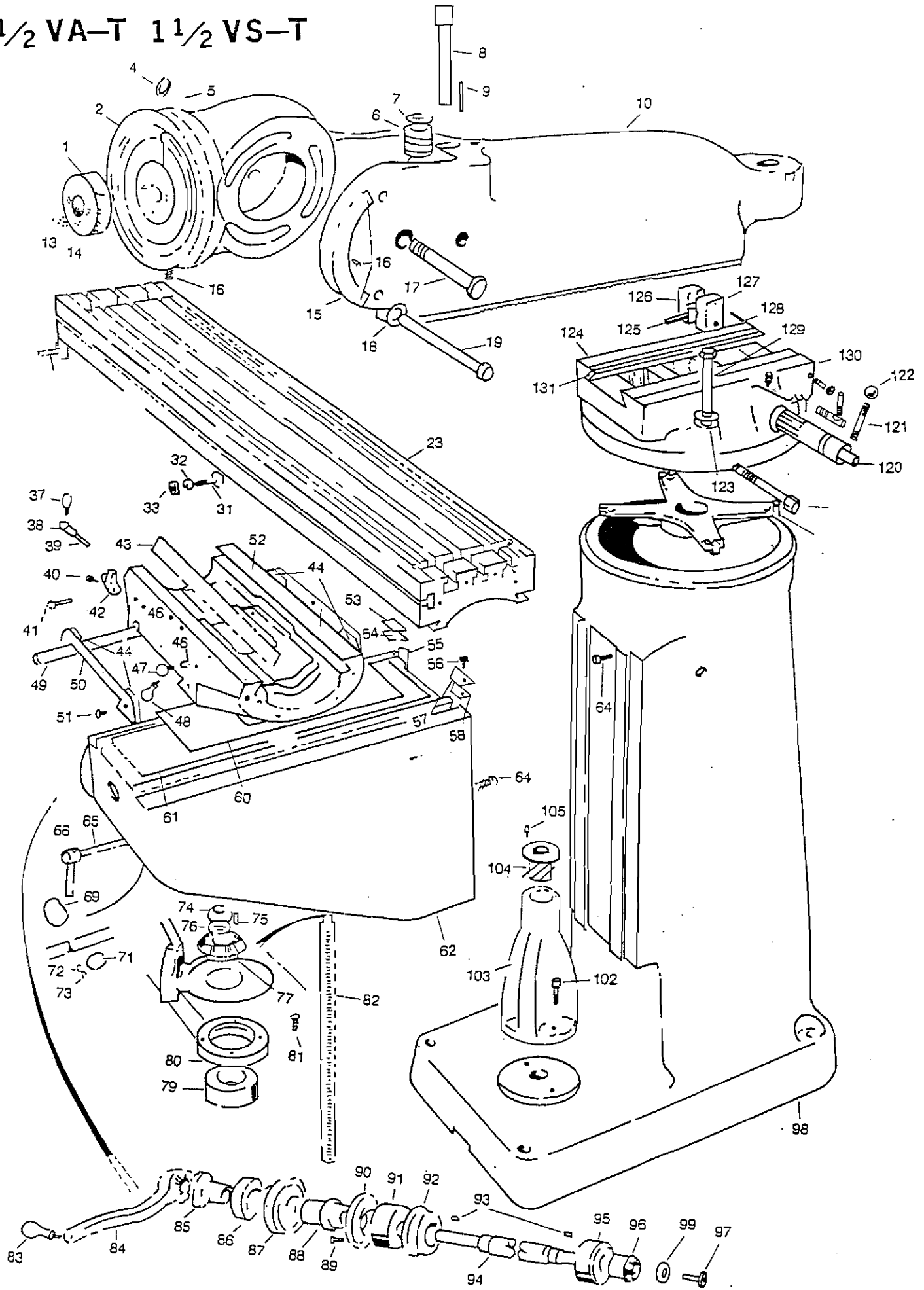
STANDARD



OPTIONAL(CONTROLBOX)



1 1/2 VA-T 1 1/2 VS-T

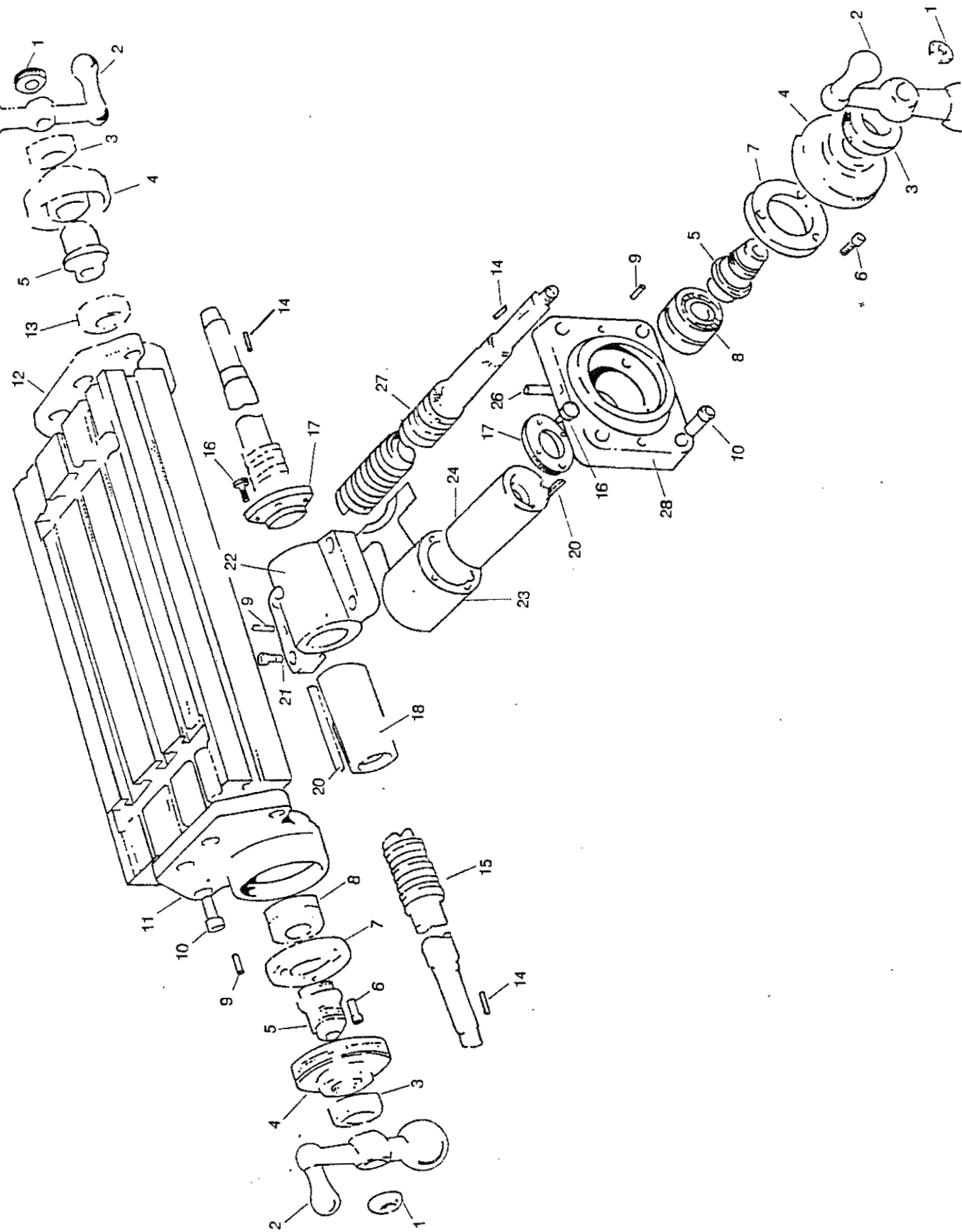


機身組件 Basic Machine Assembly

BASIC MACHINE

ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
1	5033	Quill Housing ADJ.Gear	69	4001-1	Knee Lock Plunger
2	5019	Ram Adapter	71	4045	Knee Binder Plug(Plastic)
4	5027	Nut	72	4049	Dog Point Set Screw
6	5020	Vertical Adjusting Worm	73	4049	Set Screw
7	5022	Worm Thrust Washer(2 Req.)	74	4023	Jam Nut
8	5021	Vertical Adjusting Worm Shaft	75	4020	Key
9	5023	Worm Key	76	4022	Washer
10	5018	Ram	77	4019	Bevel Gear
13	5035	Socket Cap Screw(2 Req.)	79	4040	Sealed Ball Bearing
14	5034	Roll Dowel Pin	80	4039	Bearing Retainer Ring
15	5043	Angle Plate	81	4041	Socket Head Cap Screw
16	5032	Round HD Drive Screw(5 Req.)	82	4021	Elevating Screw Assembly
17	5026	Adapter Pivot Pin	83	4003	Handle
18	5029	Chamfered & Hardened Washer (7 Req.)	84	4002	Elevating Crank
19	5028	Adapter Locking Bolt(3 Req.)	85	4013	Gearshaft Clutch Insert
23	2001	Table 42" or 48"	86	2016	Dial Lock Nut
31	2031	Stop Piece T-Bolt(3 Req.)	87	4010	Dial with 100 Graduations
32	2030	Table Stop Piece(2 Req.)	88	4011	Dial Holder
33	2032	Hex Nut(3 Req.)	89	4009	Socket Head Cap Screw
37	3031	Table Lock Bolt Handle	90	2011	Bearing Retaining Ring
38	3030	Saddle Lock Bolt	91	4007	Grease Sealed Bearing
39	3032	Saddle Lock Plunger	92	4006	Bearing Cap
40	3036	Socket HD Cap Screw(2 Req.)	93	4015	Key
41	3028	Gib Adjusting Screw(3 Req.)	94	4017	Elevating Shaft for 12" Knee
42	3035	Table Stop Bracket	95	4016	Grease Sealed Bearing
43	3026	Saddle/Table Gib	96	4014	Bevel Pinion
44	3037	Felt Wipers(4 Req.)	97	4042	Set Screw
46	3029	Table Lock Plunger	98	1001	Column
47	3030	Table Lock Bolt	99	4017-1	Washer
48	3031	Table Lock Bolt Handle	102	4027	Socket Head Cap Screw
49	3027	Saddle/Knee Gib	103	4026	Pedestal
50	3037-2	Saddle Knee Wiper Plate(4 Req.)	104	4024	Elevating Screw Nut
51	3038	Oval Head Screw(8 Req.)	105	4025	Socket Head Cap Screw
52	3001	Saddle	118	5003	Spider
53	4028-2	Left Hand Column Wiper Holder	119	5009-1	Ram Lock Stud
54	4028-1	Knee Wiper Felt	120	5012	Ram Pinion
55	4038	Knee/Column Gib	121	5013	Ram Pinion Handle
56	4029	Allen Cap Screw(2 Req.)	122	5014	Plastic Ball
57	4028-2	Right Hand Column Wiper Holder	123	5005	Chamfered X Hardened Washer
58	4028	Knee Wiper Felt	124	5001	Turret
60	3040	Chip Guards-Upper	125	5002-3	Ram Clamp Bar
61	3039	Chip Guards-Lower	126	5002-1	Ram Clamp Untapped
62	4001	Knee 12" Adjusting Worm	127	5002-2	Ram Clamp Tapped
64	1001-1	Stop Screw	128	5002-4	Split Pin
65	4048	Knee Lock Shaft Assembly	129	5004	Locking Bolt
			130	5015	Ram Pinion Screw
			131	5002	Ram/Turret Gib

1/2 VA-T 1 1/2 VS-T



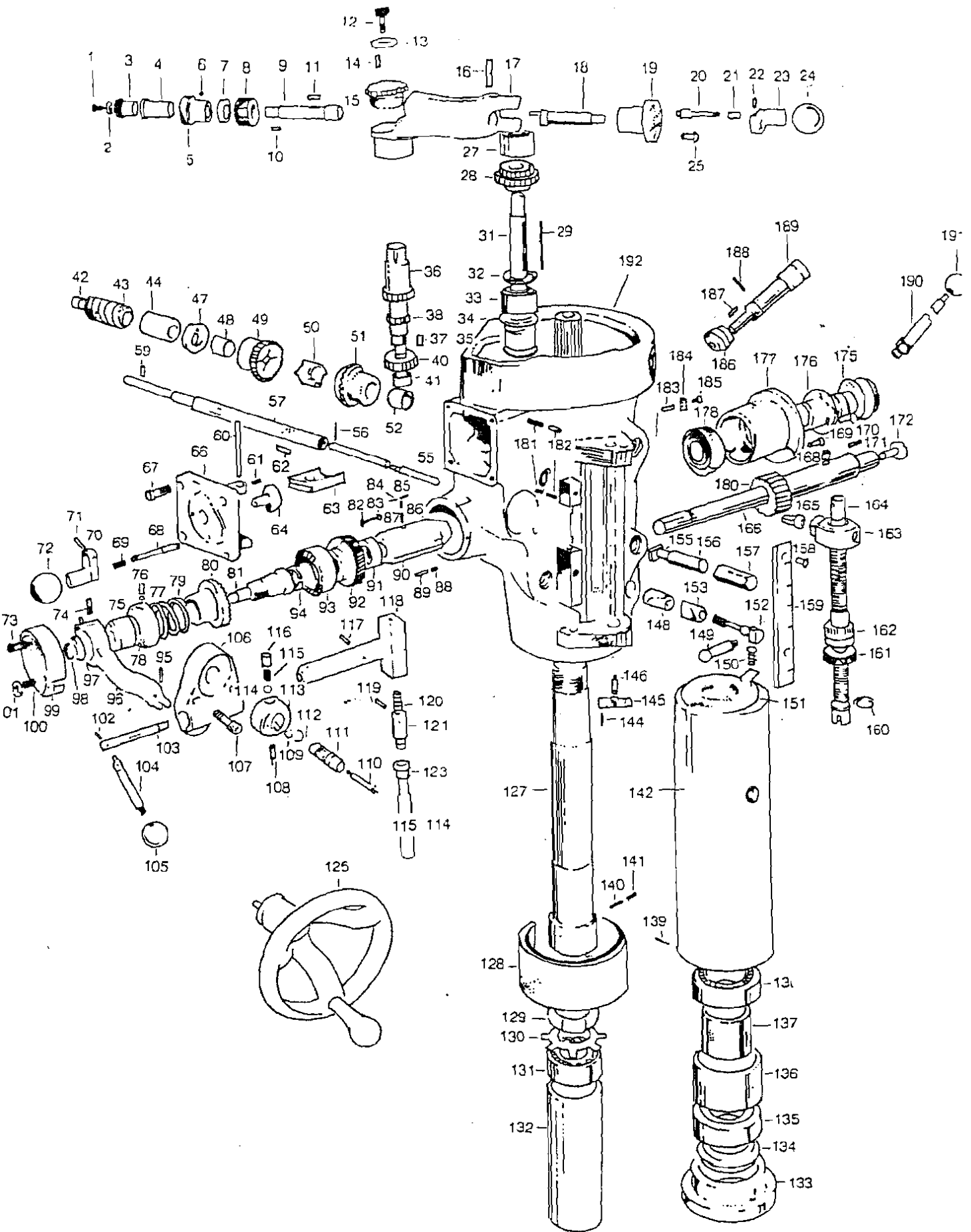
螺桿組件 Leadscrew Assembly

1 1/2 VA-T 1 1/2 VA-T

LEADSCREW ASSEMBLY

ITEM NO.	PARTS NO.	DESCRIPTION
1	2004	Jam Nut(3 Req.)
2	2018	Ball Crank Handle(3 Req.)
3	2004	Dial Lock Nut(3 Req.)
4	2012	Dial with 200 Graduations(3 Req.)
5	2014	Dial Holder(3 Req.)
6	2036	Socket Cap Screw(6 Req.)
7	2011	Bearing Retainer Ring(2 Req.)
8	2008	Grease Sealed Ball Bearings(2 Req.)
9	2027	Roll Pin(10 Req.)
10	2026	Socket Cap Screw(12 Req.)
11	2006	Left Bearing Bracket
12	2006	Right Bearing Bracket
13	2008	Grease Seal Ball Bearing
14	2003	Key(3 Req.)
15	2002	Longitudinal Feed Screw 42" or 48"
16	3021	Socket Cap Screw(8 Req.)
17	3019	Cross Feed Nut Retaining Plate(2 Req.)
18	3020	Longitudinal Feed Nut
20	3041	Key(2 Req.)
21	3024	Socket Cap Scre(8 Req.)
22	3023	Longitudinal Feed Nut Bracket
23	3022	Cross Feed Nut Bracket
24	3020	Cross Feed Nut
26	3005-1	Stop Screw
27	3002	Cross Feed Screw for 12" Knee
28	3005	Cross Feed Bearing Bracket

1 1/2 VA-T 1 1/2 VS-T

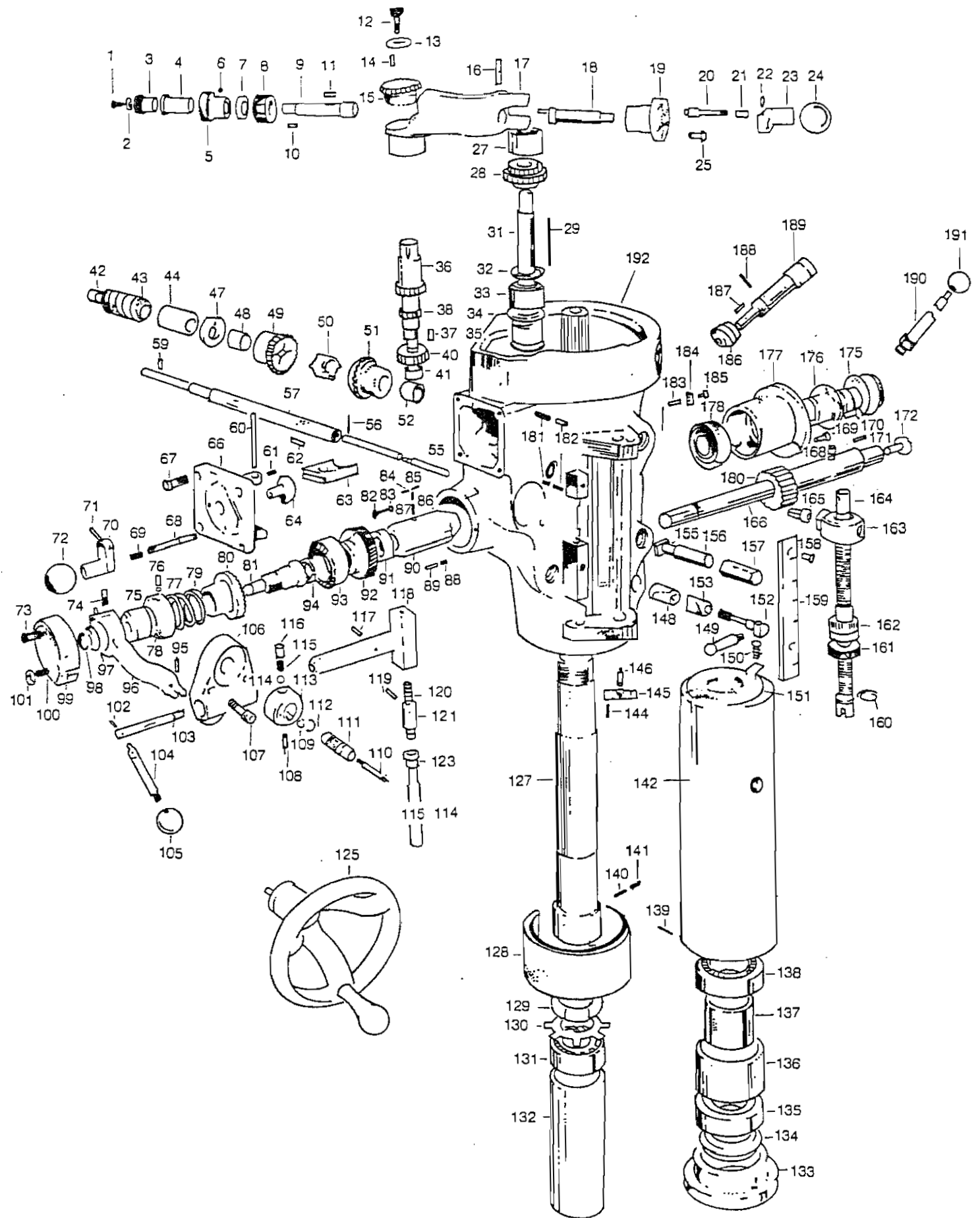


頭部組件 Head Assembly

1 1/2# HEAD

ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
1	6141	RD.HD.Screw	61	6164	KP.Set Screw
2	6140	Bevel Pinion Washer	62	6230	Key
3	6139	Feed Bevel Pinion	63	6162	Feed Gear Shift Fork
4	6138	Feed Worm Gear Shaft Sleeve	64	6166	Cluster Gear Shift Crank
5	6137	Worm Cradle Bushing	66	6161	Cluster Gear Cover
6	6123	Setscrew	67	6165	Cap Screw(4 Req.)
7	6136	Worm Gear Spacer(4 Req.)	68	6169	Gear Shift Plunger
8	6134	Feed Drive Worm Gear	69	6170	Compression Spring
9	6133	Feed Drive Worm Gear Shaft	70	6168	Shift Crank
10	6142	Worm Shaft Key	71	6167	Roll Pin
11	6135	Key	72	6171	Black Plastic Ball
12	6150	Locknut	73	6206	Cap Screw(2 Req.)
13	6149	Washer	74	6202	Clutch Ring Pin(2 Req.)
14	6147	Cluster Gear Key	75	6200	Clutch Ring
15	6148	Feed Reverse Bevel Gear	76	6199	Socket Set Screw
16	6122	Feed Engage Pin	77	6199-1	Brass Plug
17	6121	Worm Gear Cradle	78	6198	Overload Clutch Locknut
18	6126	Worm Gear Cradle Throw-out	79	6197	Safety Clutch Spring
19	6125	Shift Sleeve	80	6194	Overload Clutch
20	6169	Gearshift Plunger	81	6195	Overload Clutch Sieve
21	6170	Compression Spring	82	6190	Single Spring Washer(3 Req.)
22	6128	Roll Pin	83	6189	Round Head Screw(3 Req.)
23	6168	Shift Crank	84	6228	Mock-it Lockscrew
24	6131	Black Plastic Ball	85	6228	Socket Set Screw
25	6132	Cap Screw(3 Req.)	86	6246	Lockscrew
27	6157	Cluster Gear Shaft Upper Bearing	87	6246-1	Socket Set Screw
28	6153	Cluster Gears Assembly	88	6191	Compression Spring
29	6160	Cluster Gear Key	89	6193	Overload Clutch Lever Spring Plunger
31	6151	Cluster Gear Shaft	90	6186	Quill Pinion Shaft Bushing
32	6158	Snap Ring	91	6190	Pinion Shaft Worm Gear Spacer
33	6156	Bevel Gear Bearing	92	6187	Overload Clutch Worm Gear
34	6159	Bevel Gear Thrust Spacer	93	6188	Overload Clutch Ring
35	6151	Feed Reverse Bevel Pinion	94	6188-1	Snap Ring
36	6143	Feed Driving Gear	95	6236-1	Dowel Pin
37	6145	Key	96	6203	Overload Clutch Trip Lever
38	6143	Cluster Gear Input Shaft	97	6201	Overload Clutch Washer
40	6144	Feed Drive Gear	98	6195-1	Snap Ring
41	6252	Needle Bearing	99	6205	Clutch Arm Cover
42	6227	Bushing	100	6207	Socket Set Screw
43	6225	Worm	101	6208	Chem Blacked Locknut
44	6224	Feed Worm Shaft Bushing	103	6239	Cam Rod
47	6223	Feed Worm Shaft Thruster	104	6234	Trip Handle
48	6220	Bushing	105	6233	Black Plastic Ball
49	6220	Feed Reverse Bevel Gear	106	6231	Feed Trip Bracket
50	6222	Feed Reverse Clutch	107	6232	Cap Screw(2 Req.)
51	6220	Feed Reverse Bevel Gear	108	6219	Socket Set Screw
52	6220	Bushing	109	6229	Key
55	6216	Reverse Clutch Rod	110	6214	Feed Reverse Knob Stud
56	6217	Roll Pin	111	6213	Reverse Knob
57	6209	Feed Worm Shaft	112	6215	Snap Ring
59	6226	Pin	113	6218	Handwheel Clutch
60	6163	Feed Shift Rod	114	6255	Steel Ball

1 1/2 VA-I 1 1/2 VS-T

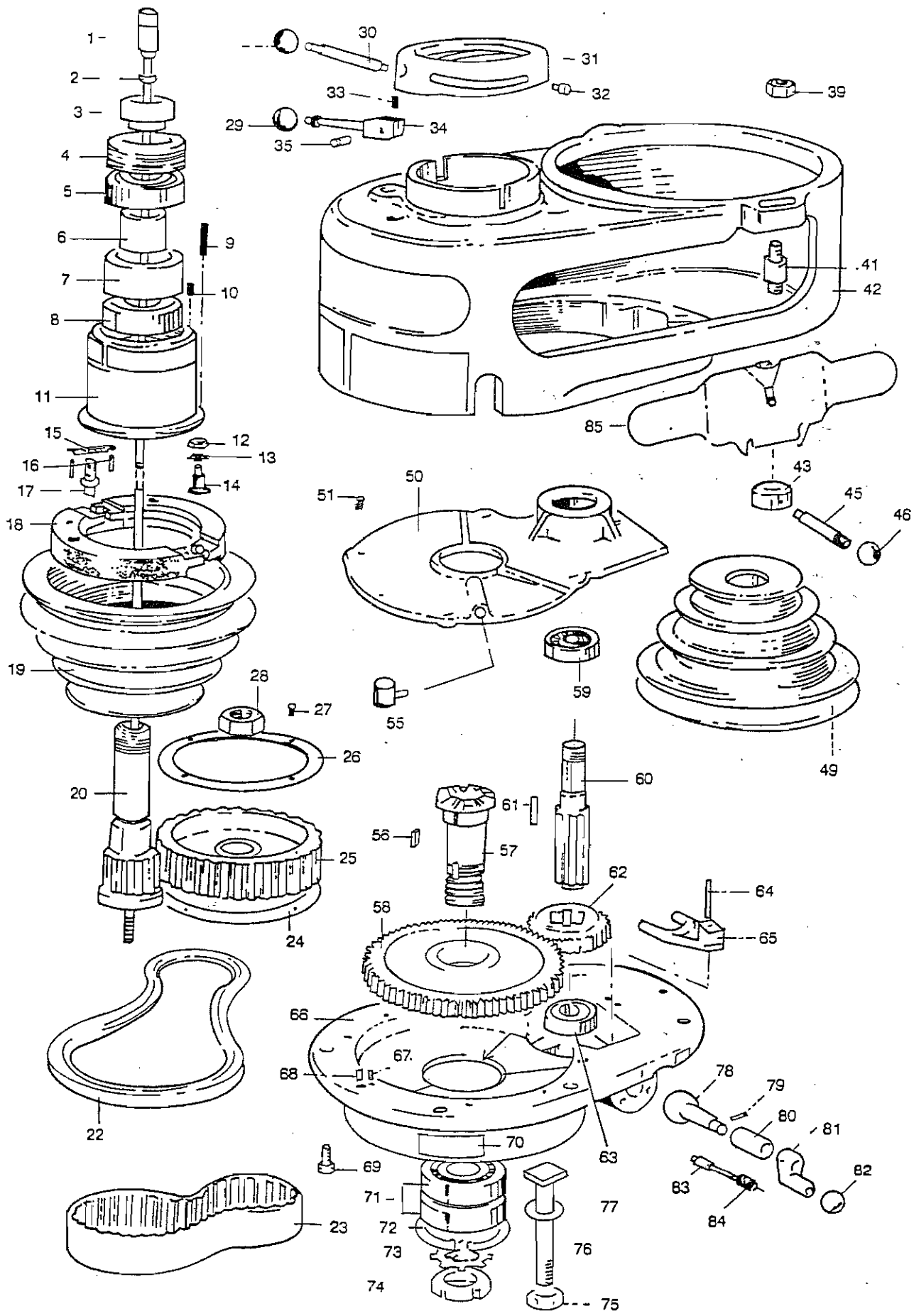


頭部組件 Head Assembly

1 1/2# HEAD (CONTINUED)

ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
115	6219-2	Compression Spring	158	6244	Chem Blacked RD.HD. Screws (2 Req.)
116	6219-1	Handwheel Clutch Spring Screw	159	6243	Micrometer Scale
117	6237	Roll Pin	160	6115	Snap Ring
118	6236	Cam Rod Sleeve Assy.	161	6108	Quill Micro-stop Nut
119	6241	Roll Pin	162	6107	Micrometer Nut
120	6242	Compression Spring	163	6105	Quill Stop Knob
121	6240	Trip Plunger	164	6104	Quill Stop Micro-screw
123	6118-1	Trip Plunger Bushing	165	6106	Screw
124	6118	Feed Trip Plunger	166	6172	Quill Pinion Shaft
125	6210	Handwheel	168	6185	Spring Pin
127	6084	Spindle	169	6180-	1 RD.Head Screw(2 Req.)
128	6086	Quill Skirt	170	6179	Roll Pin
129	6090	Locknut	171	6184	Key
130	6091	Lockwasher	172	6183	Pinion Shaft Hub Screw
131	6092	Bearing	173	6176	Steel Ball
132	6094	Sleeve	174	6175	Compression Spring
133	6098	Nose-piece	175	6178	Rack Feed Handle Hub
134	6097	Spindle Dirt Shield	176	6182	Pinion Shaft Hub Sleeve
135	6093	Bearing	177	6180	Spring Cover
136	6095	(Bearing Spacer-Large)	178	6181	Clock Spring(Clock Spring Assy.)
137	6096	(Bearing Spacer-Small)	180	6172	Quill Pinion
138	6093	Bearing	181	6246-	1 Socket Set Screw
140	6253	Special Socket Set Screw	182	6246	Lockscrew
141	6254	Collet Alignment Screw	183	6110	Reverse Trip Ball Lever
142	6085	Quill	184	6109	Feed Reverse Trip Plunger
144	6113	Socket Set Screw	185	6114	Reverse Trip Ball Lever Screw
145	6111	Feed Trip Lever	186	5039	Worm Gear
146	6112	Trip Lever Pin	187	5041	Key
148	6116	Quill Lock Sleeve	188	5042	Socket Set Screw
149	6119	Lock Handle	189	5040	ADJ Worm Shaft
151	6088	Felt Washer	190	6174	Pinion Shaft Hub Handle
152	6117	Quick Lock Bolt	191	6173	Black Plastic Ball Handles
153	6116	Quill Lock Sleeve Tapped	192	6101	Quill Housing
155	5036	T-Bolt Assy.			
156	6120	Lower Clamping Bolt Spacer (2 Req.)			
157	5038	Locknut			

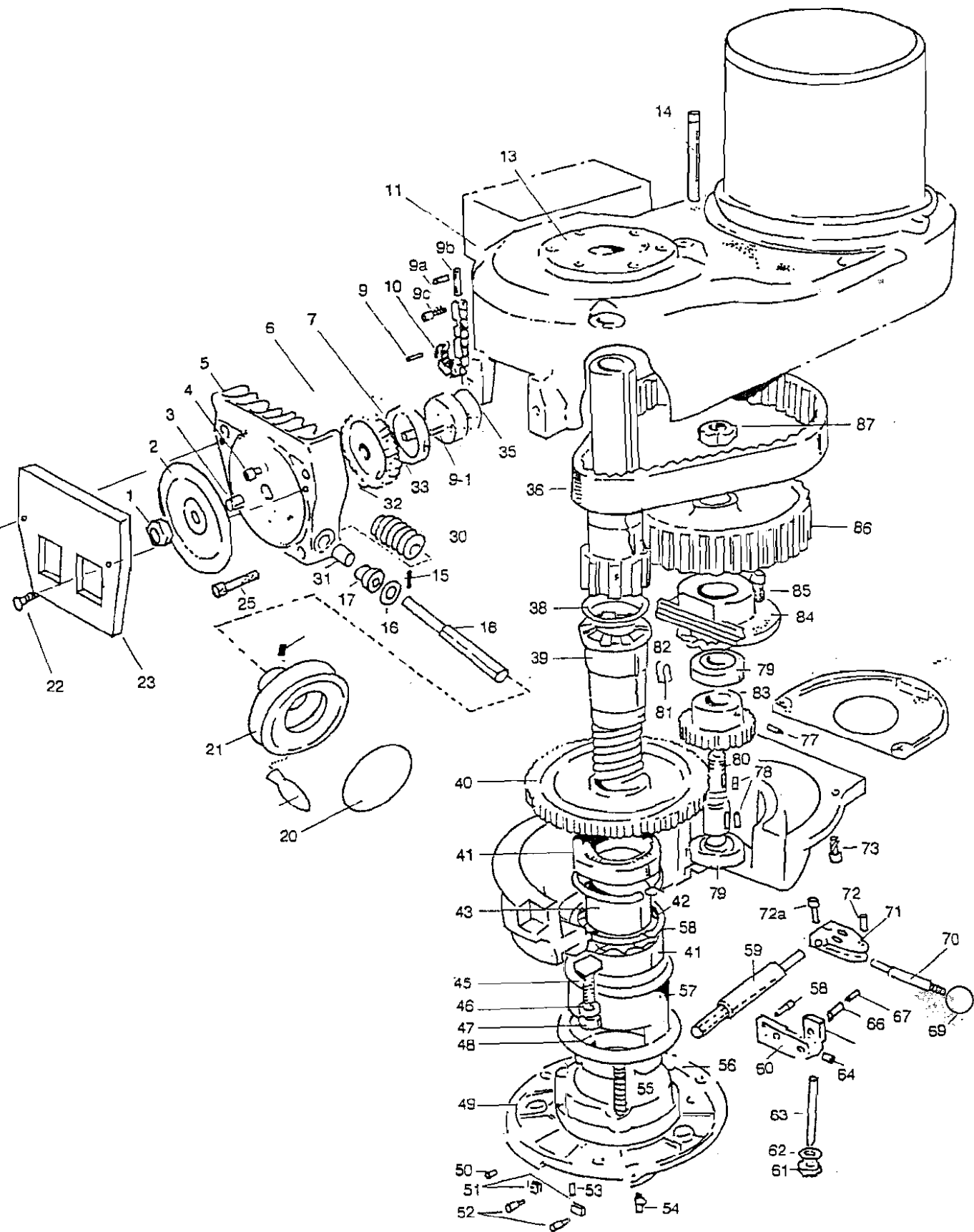
1 1/2 VA-T



頭部頂座 Head Top Housing

HEAD TOP HOUSING

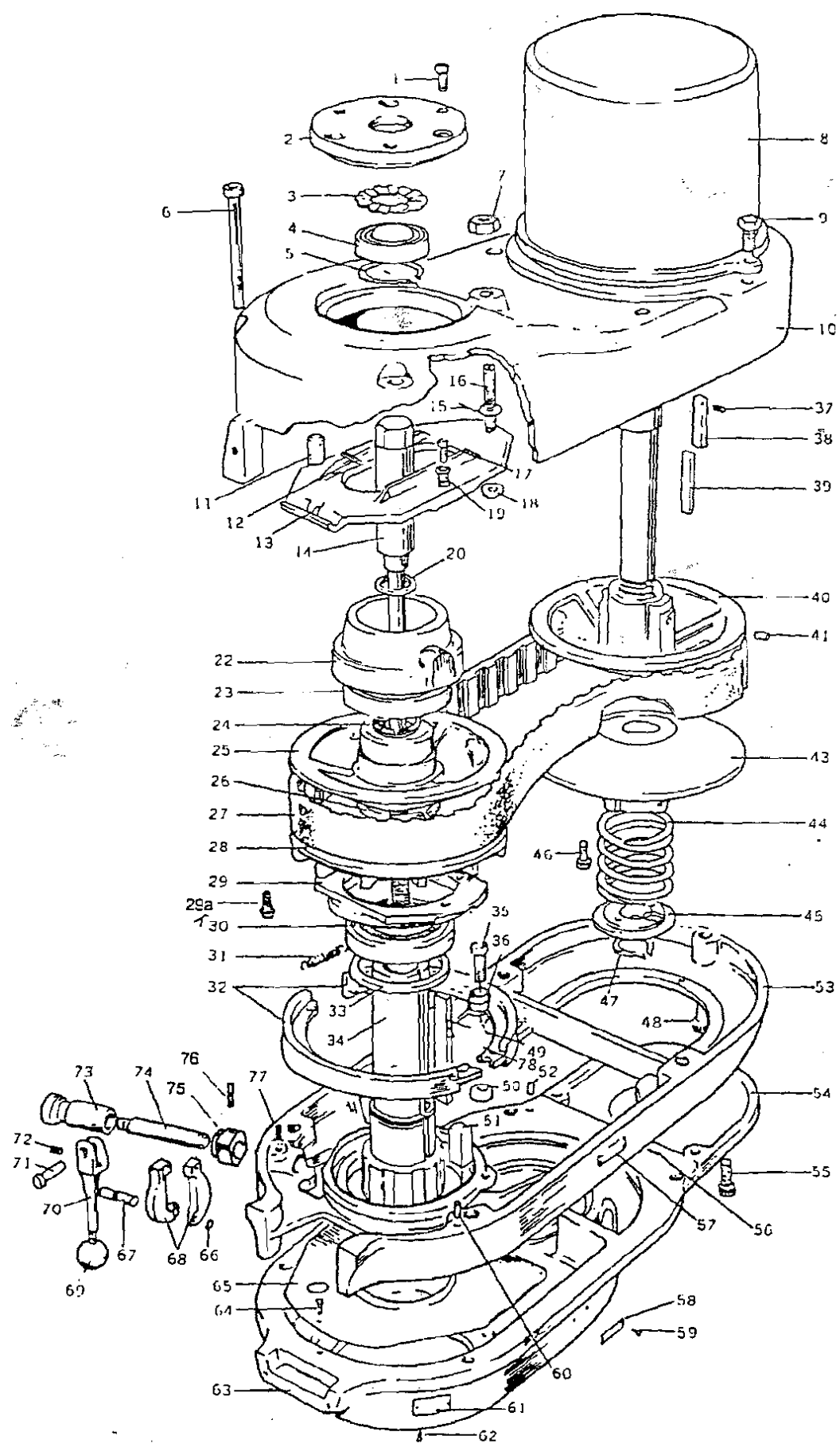
ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
1	6031	Drawbar for R.8 Collet	43	6003	Motor Locknut(2 Req.)
2	6032	Drawbar Washer	45	6006	Motor Locknut Handle(2 Req.)
3	6041	Upper Bearing Locknut	46	6007	Black Plastic Ball(2 Req.)
4	6042	Bearing Sleeve Locknut	49	6009	Motor Pulley
5	6043	Ball Bearing	50	6078	Gear Housing Cover
6	6044	Upper Bearing Spacer(small)	51	6080	Round HD Screw(5 Req.)
7	6045	Upper Bearing Spacer(large)	55	6079	Oil Cup
8	6043	Ball Bearing	56	6075-1	Bull Gear Key
9	6049	Compression Spring(4 Req.)	57	6075	Spined Gear Hub
10	6049	Socket Set Screw(2 Req.)	58	6074	Spindle Bull Gear Assembly
11	6047	Spindle Pulley Bearing Sleeve	59	6056	Bearing
12	6019	Jam Nut	60	6068	Countershaft
13	6022	External Lock Washer	61	6069	Key
14	6018	Brake Ring Screw(3 Req.)	62	6067	Countershaft Gear
15	6024	Spring(2 Req.)	63	6056	Bearing
16	6025	Machine Screw(4 Req.)	64	6066	Dowel Pin
17	6020	Brake Lock Stud	65	6065	Back Gear Shifter Fork
18	6014	Brake Assembly	66	6050	Gear Housing
19	6048	Spindle Pulley	67	6051	Dowel Pin(2 Req.)
20	6040	Spindle Pulley Hub	68	6052	Roll Pins(2 Req.)
22	6034	'V' Belt	69	6057	Socket Cap Screw(6 Req.)
23	6035	Timing Belt	71	6053	Ball Bearing
24	6072	Timing Belt Pulley Flange	72	6054	Snap Ring
25	6071	Timing Belt Pulley	73	6077	Lockwasher
25	6072	Timing Belt Pulley Flange	74	6076	Bearing Locknut
27	6073	Flat Head Screw	75	6083	Hex Nut Hardened (3 Req.)
28	6070	Hex Jam Nut	76	6081	Vertical Tee Bolt(3 Req.)
29	6038	Black Plastic Ball Handle (2 Req.)	77	6082	Vertical Bolt Washer(3 Req.)
30	6037	Spindle Clutch Lever	78	6060	Back Gear Shift Crank
31	6036	Cam Ring	79	6167	Roll Pin
32	6039	Cam Ring Pin(2 Req.)	80	6058	Back Gear Shift Bushing
33	6023	Socket Set Screw	81	6168	Shift Crank
34	6016	Brake Lock Handle	82	6171	Black Plastic Ball 1" Dia
35	6021	Brake Lock Pin	83	6169	Gearshift Plunger
39	6008	Hex Jam Nut(2 Req.)	84	6170	Compression Spring
41	6002	Motor Mounting Studs(2 Req.)	85	6026	Belt Guard Assembly
42	6013	Belt Housing			



Head Top Housing

HEAD TOP HOUSING

ITEM NO.	PART NO.	DESCRIPTION	ITEM NO.	PART NO.	DESCRIPTION
1	7101	Hex Cap Nut	47	71141	Hex Jam Nut-Finished HDN.(3 Req.)
2	7102	Vari-Speed Dial	48	71142	Ball Bearing Gear Sleeve Washer
3	7103	Bronze Bearing	49	71143	Fixed Clutch Bracket
4	7104	Full Dog Socket Set Screw	50	71144	Socket Set Screw
5	7105	Speed Changer Housing	51	71145	Guide for Clutch Bracket
6	7106	Speed Changer Chip Shield	52	71146	Flat HD Socket Cap Screw(2 Req.)
7	7107	Machine Screws(2 Req.)	53	71147	Dowel Pin
9	7108	Roll Pin	54	71148	Oil Cup
9-1	7109	Roll Pin	55	71149	Compression Spring(3 Req.)
9a	7110	Roll Pin	56	71150	Bearing Locknut
9b	7111	Speed Change Stud	57	71160	Bearing Sleeve
9c	7112	Cotter Pin	58	71161	Wave Spring Washer
10	7113	Speed Changer Chain	59	71162	Bull Gear Shift Pinion
11	7114	Drum Switch	60	71163	HI-LOW Detent Plate
13	7115	Top Bearing Cap	61	71164	Hex Nut(3 Req.)
14	7116	Soc HD Cap Screw(2 Req.)	62	71165	Lock Washer(3 Req.)
15	7117	Roll Pin	63	71166	Studs(3 Req.)
16	7118	Spring	64	71167	Socket Set Screw
17	7119	Bearing	65	71168	Adjustable Plate
18	71120	Speed Change Shaft	66	71169	HI-LOW Detent Plunger
19	71121	Handle	67	71170	Spring
20	71122	Caution Plate	68	71171	Socket Cap Screw(2 Req.)
21	71123	Speed Change Handwheel	69	71172	Bakelite Ball Handle
22	71124	Flat Hd.Cap Screw(2 Req.)	70	71173	HI-LOW Shift Crank
23	71125	Plastic Face Plate	71	71174	HI-LOW Pinion Block
24	71126	Set Screw	72	71175	Roll Pin.(Req.)
25	71127	Socket HD Cap Screw(4 Req.)	72a	71176	Socket HD Cap Screw(2 Req.)
30	71128	Worm Gear	73	71177	Socket Cap Screw(4 Req.)
31	71129	Bearing	77	71178	Socket Set Screw
33	71130	Speed Changer Spur Gear	78	71179	KEY(2 Req.)
35	71131	Speed Change Chain Drum	79	71180	Ball Bearing(2 Req.) 6203Z
36	71132	Belt	80	71181	Ball Gear Pinion Counter Shaft
38	71133	Timing Pulley Clutch Sleeve	81	71182	Key
39	71134	Splined Gear Hub	82	71183	Wave Spring Washer
40	71135	Spindle Bull Gear Assembly	83	71184	Bull Gear Pinion
41	71136	Ball Bearing(2 Req.) 6908Z	84	71185	Bull Gear Pinion Bearing Cap
42	71137	Snap Ring(2 Req.)	85	71186	Socket HD Cap Screw(2 Req.)
43	71138	Bull Gear Bearing Spacer	86	71187	Timing Belt Pulley
45	71139	Vert.Tee Bolts(3 Req.)	87	71188	Jam Nut
46	71140	Steel Washer(3 Req.)			

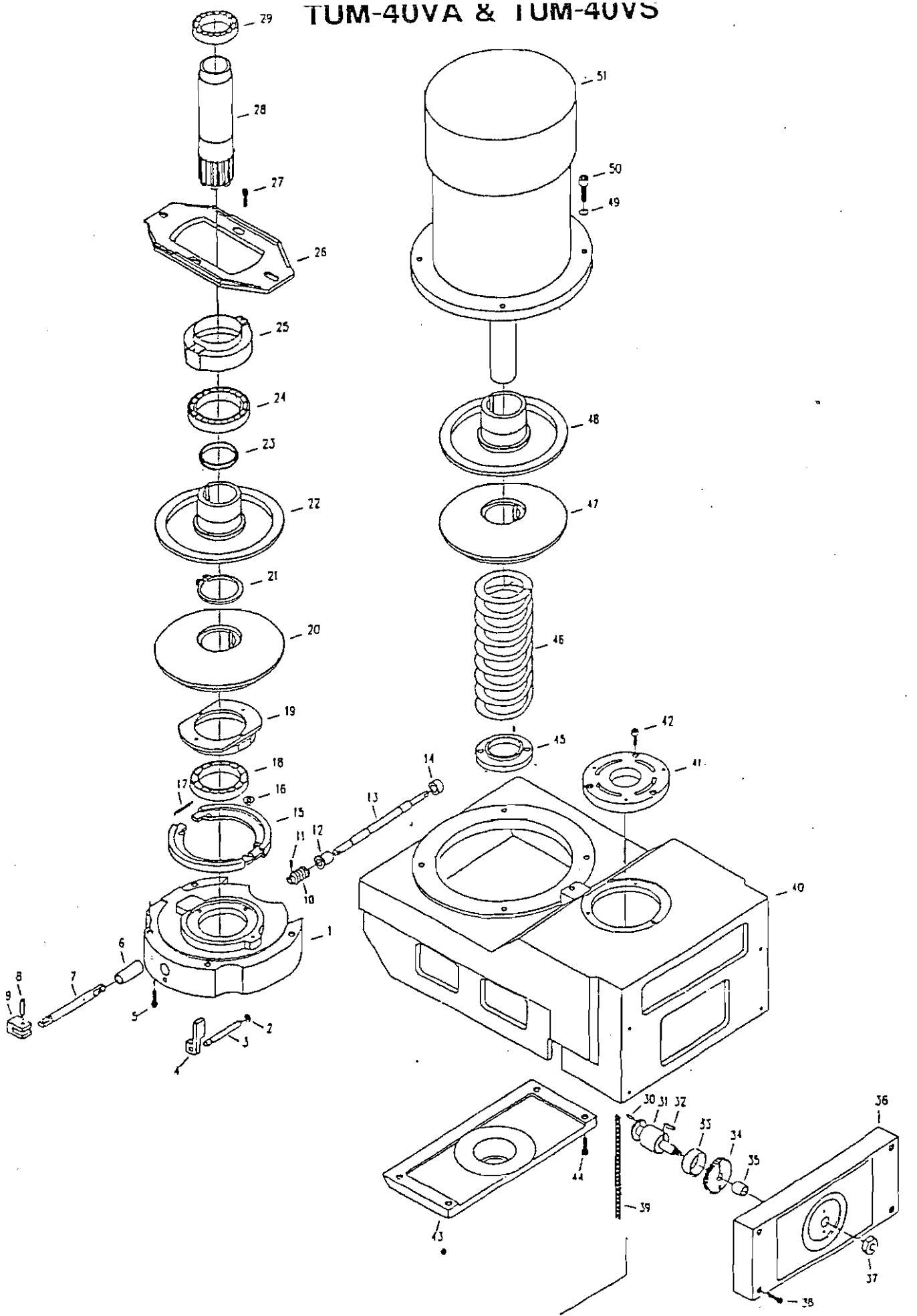


頭部頂座 Head Top Housing

HEAD TOP HOUSING

ITEM NO.	PART NO.	DESCRIPTION	ITEM NO.	PART NO.	DESCRIPTION
1	7201	Socket Cap Screw(3 Req.)	40	7238	Stationary Motor Varidisc
3	7203	Spring Washer	41	7239	Socket Set Screw
4	7204	Ball Bearing <i>6007 Z</i>	42	7240	Plastic Insert(2 Req.)
5	7205	Snap Ring No.	43	7241	Adjustable Motor Varidisc Assembly
6	7206	Socket HD Cap Screw(2 Req.)	44	7242	Spring for Varidisc Motor Shaft
7	7207	Hex Jam Nut	45	7243	Adjustable Varidisc Spring Collar
8	7208	Motor 2HP (complete unit)230/460 3/60	46	7244	Socket HD Cap Screw(2 Req.)
9	7209	Hex HD Screw(2 Req.)	47	7245	Ret.Ring
10	7210	Belt Housing	48	7246	Socket Cap Screw
13	7211	Speed Change Plate	49	7247	Plastic Key
14	7212	Drawbar	51	7248	Key
15	7213	Cotter Pin	52	7249	Taper Pin
16	7214	Speed Change Plate Pivot Stud	53	7250	Belt Housing Ease
17	7215	Socket HD Cap Screw(2 Req.)	54	7251	Motor Pulley Cover
18	7216	Washer	55	7255	Socket Cap Screw
19	7217	Pivot Sleeve(2 Req.)	58	7256	HI-LOW Range Nameplate
20	7218	Draw Bar Washer	59	7257	Drive Screw(4 Req.)
22	7219	Spindle Pulley Bearing Sliding Housing	60	7258	Taper Pin(2 Req.)
23	7220	Ball Bearing <i>6010 Z</i>	61	7259	Quill Feed Nameplate
24	7221	Plastic Lnsert(2 Req.)	62	7260	Rivets(4 Req.)
25	7222	Adjustable-Driven Varidisc	63	7261	Gear Housing
26	7223	Snap Ring No.	64	7262	Round HD.Machine Screw(3 Req.)
27	7224	Belt	65	7263	Gear Housing Plate
28	7225	Stationary Driven Varidisc	66	7264	Snap Ring
29	7226	Brake Bearing Cap	67	7265	Breake Finger Pivot Stud
29a	7227	Socket HD Cap Screw(2 Req.)	68	7266	Brake Operating Finger
30	7228	Ball Bearing <i>6010 Z</i>	69	7267	Bakelite Ball Handle
31	7229	Brake Spring(2 Req.)	70	7268	Brake Lock Handle
32	7230	Brake Shoe Assembly(2 Req.)	71	7269	Brake Lock Pin
33	7231	Spindle Pulley Spacer	72	7270	Socket Set Screw
34	7232	Spindle Pulley Hub	73	7271	Sleeve for Brake Lock Shaft
35	7233	Hex HD.Screw	74	7272	Brake Lock Shaft
36	7234	Brake Shoe Pivot Sleeve	75	7273	Brake Lock Cam
37	7235	Roll Dowel Pin	76	7274	Roll Pin
38	7236	Drive Key	77	7275	Socket Set Screw
39	7237	Key for ADJ Varidisc Motor Shaft			

TUM-40VA & TUM-40VS

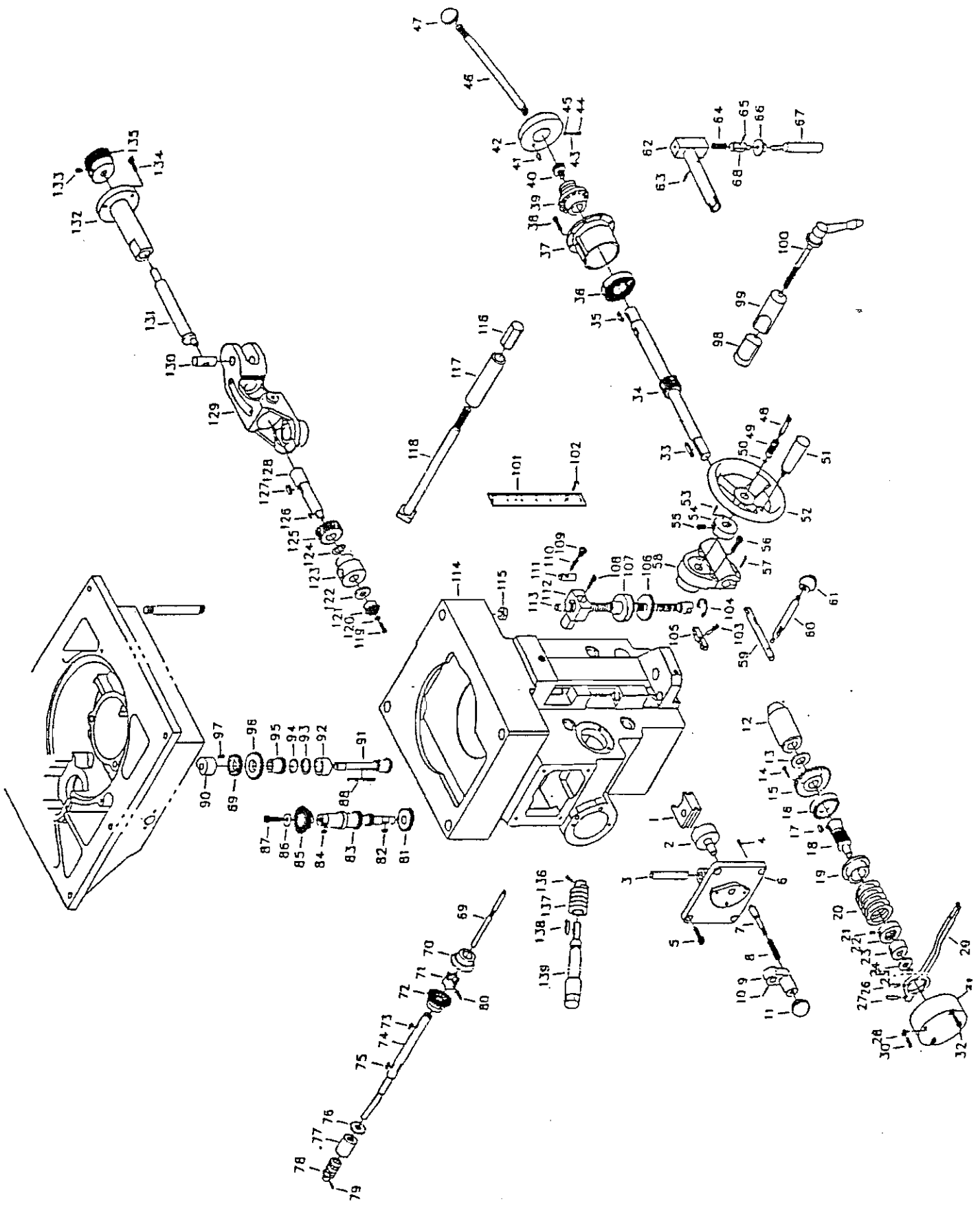


TUM-40VA & TUM-40VS

NEAD TOP HOUSING

ITEM NO.	PART NO.	DESCRIPTION	ITEM NO.	PART NO.	DESCRIPTION
1	81001	BRAKE BLOCK	27	81027	SOCKET HD.BOLT
2	81002	WASHER	28	81028	SPLINED GEAR HUB
3	81003	BRAKE FINGER PIVOT STUD	29	81029	BEARING
4	81004	BRAKE OPERATING FINGER	30	81030	ROLLER PIN
5	81005	SOCKET HD.BOLT	31	81031	SPEED CHANGE CHSIN DRUW
6	81006	COLLAR	32	81032	ROLLER PIN
7	81007	BRAKE LOCK SHAFT	33	81033	COLLAR
8	81008	ROLLER PIN	34	81034	SPEED CHANGER SPUR GEAR
9	81009	BRAKE LOCK BLOCK	35	81035	COLLAR
10	81010	WORM GEAR	36	81036	SPEED CHANGE HOUSING
11	81011	PIN	37	81037	HEX. NUT
12	81012	COLLAR	38	81038	SOCKET HD.BOLT
13	81013	SPEED CHANGE SHAFT	39	81039	SPEED CHANGE CHAI
14	81014	COLLAR	40	81040	BELT HOSING
15	81015	BRAKE SHOE ASSEMBLAY(2 REQ)	41	81041	COVER
16	81016	COLLAR	42	81042	SOCKET HD.. BOLT
17	81017	BRAKE SPRING (2 REQ)	43	81043	COVER
18	81018	BEARING	44	81044	SOCKET HD.BOLT
19	81019	BEARING HOUSING	45	81045	SPRING COLLAR
20	81020	STATIONARY DRIVEN VARIDISC	46	81046	SPRING
21	81021	C RING	47	81047	ADJUSTABLE MOTOR VARIDISC
22	81022	ADJUSTABLE -DRIVEN VARIDISC	48	81048	STATIONARY MOTOR VARIDISC
23	81023	COLLAR	49	81049	WASHER
24	81024	BEARING	50	81050	SOCKET HD. BOLT
25	81025	SPINDLE PULLEY BTG.SUDING HOVSING	51	81051	MOTOR
26	81026	SPEED CHANG PLATE			

TUM-40VA & TUM-40VS

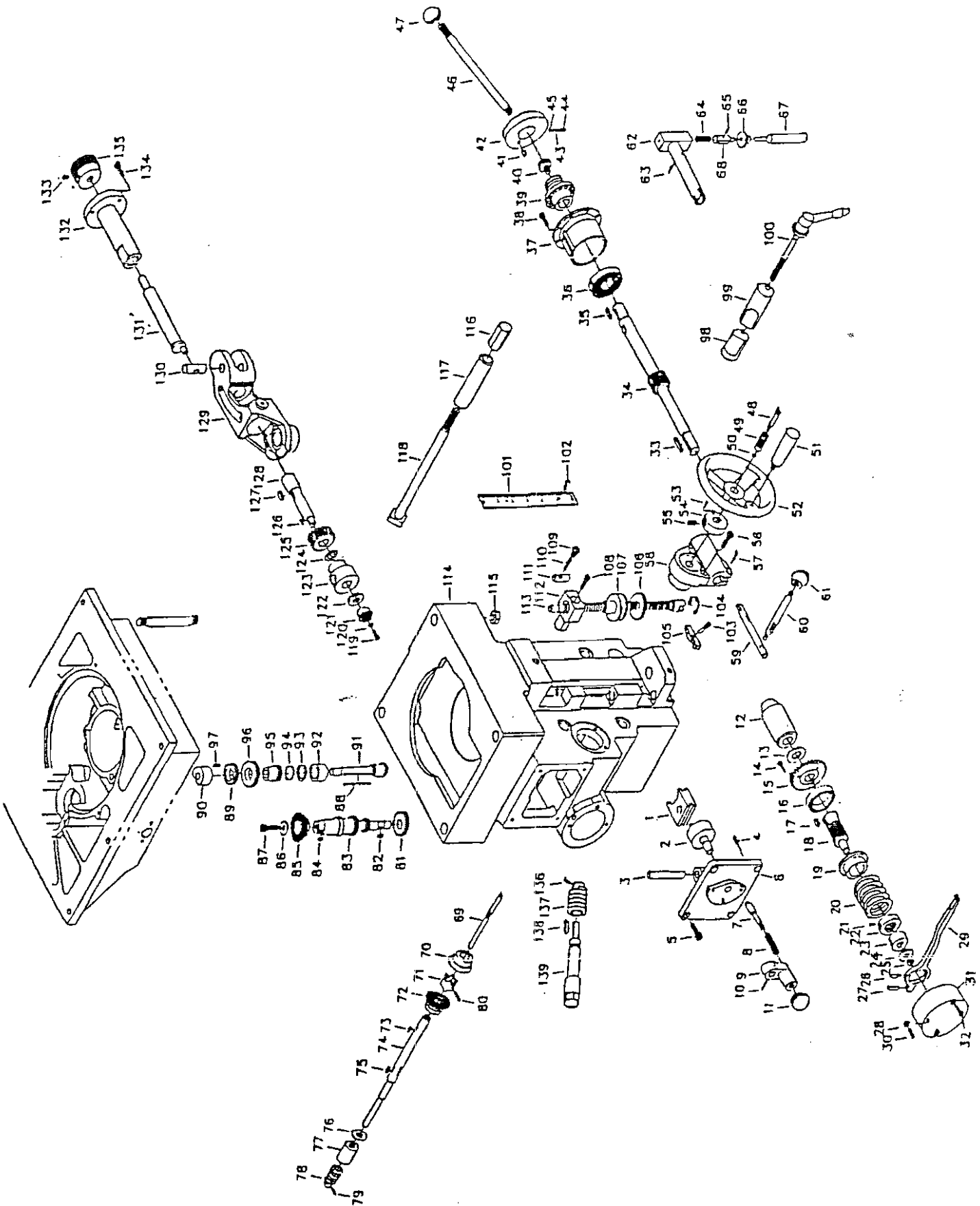


TUM-40VA & TUM-40VS

40#HEAD

ITEM NO.	PART NO.	DESCRIPTION	ITEM NO.	PART NO.	DESCRIPTION
1	82001	FEED GEAR SHIFT FORK	26	82026	SET SCREW
2	82002	CLUSTER GEAR SHIFT CRANK	27	82027	PIN
3	82003	KP. SET SCREW	28	82028	HEX. NUT
4	82004	KP. SET SCREW	29	82029	OVERLOAD CLUTCH TRIP LEVER
5	82005	SOCKET HP.SCREW	30	82030	SET SCREW
6	82006	CLUSTER GEAR COVER	31	82031	COVER
7	82007	GEAR SHIFT PLUNGER	32	82032	SOCKET HD. SCREW
8	82008	COMPRESSION SPRING	33	82033	KEY
9	82009	SHIFT CRANK	34	82034	QUILL PINION
10	82010	ROLL PIN	35	82035	KEY
11	82011	BLACK PLASTIC BALL	36	82036	CLOCK SPRING
12	82012	QUILL PINION SHAFT BUSHING	37	82037	SPRING COVER
13	82013	WASHER	38	82038	SOCKET HD. SCREW
14	82014	SOCKET HP.SCREW	39	82039	PINION SHAFT HUB SLEEVE
15	82015	OVERLOAD CLUTCH WORM GEAR	40	82040	LOCK SCREW
16	82016	OVERLOAD CLUTCH	41	82041	PIN
17	82017	KEY	42	82042	RACK FEED HANDLE HUB
18	82018	OVERLOAD CLUTCH SLEEVE	43	82043	SPRING
19	82019	OVERLOAD CLUTCH RING	44	82044	SET SCREW
20	82020	SPRING	45	82045	STELL BALL
21	82021	SET SCREW	46	82046	PINION SHAFT HUB HANDLE
22	82022	COLLAR	47	82047	BALL HANDLE
23	82023	COLLAR	48	82048	FEED REVERSE KNOB STUD
24	82024	WASHER	49	82049	REVERSE KNOB
25	82025	SNAP RING	50	82050	SNAP RING

TUM-40VA & TUM-40VS

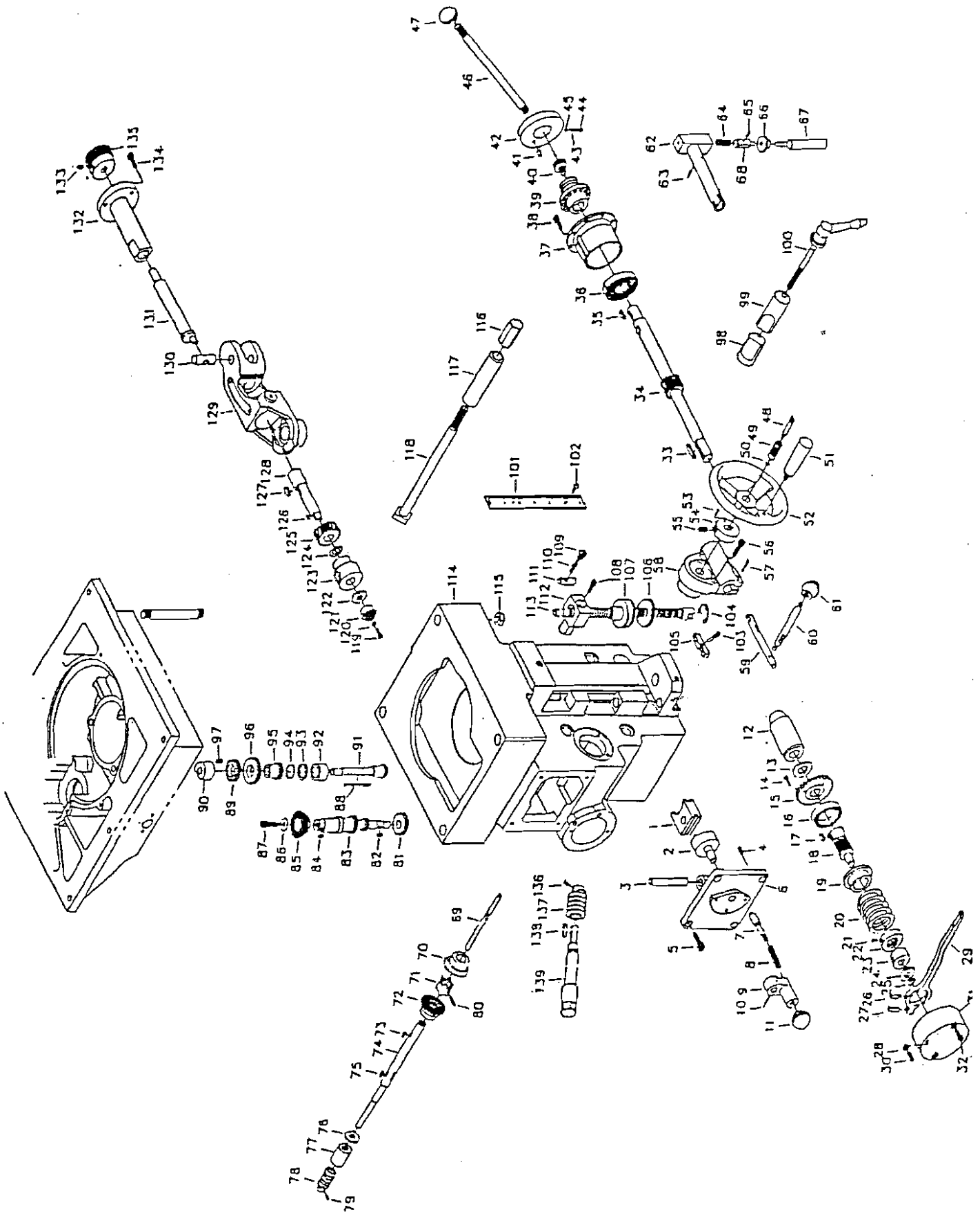


TUM-40VA & TUM-40VS

40#HEAD

ITEM NO.	PART NO.	DESCRIPTION	ITEM NO.	PART NO.	DESCRIPTION
51	82051	HANDLE	76	82076	FEED WORM SHAFT THRUSHER
52	82052	HANDLE WHEEL	77	82077	FEED WORM SHAFT BUSHING
53	82053	PIN	78	82078	BUSHING
54	82054	HANDWHEEL CLUTCK	79	82079	ROLL PIN
55	82055	SET SCREW	80	82080	PIN
56	82056	SOCKET HD. SCREW	81	82081	FEED DRIVER GEAR
57	82057	PIN	82	82082	KEY
58	82058	FEED TRIP BRACKET	83	82083	GEAR SHAFET
59	82059	CAM RED	84	82084	KEY
60	82060	TRIP HANDLE	85	82085	FEED REVERSE BEVEL GEAR
61	82061	BLACK PLASTIC BALL	86	82086	WSHAER
62	82062	CAM ROD SLEEVE ASSY	87	82087	SOCKER HD. SCREW
63	82063	PIN	88	82088	KEY
64	82064	SPRING	89	82089	GEAR
65	82065	PIN	90	82090	BLOCK
66	82066	TRIP PLUNGER BUSHING	91	82091	GEAR SHAFT
67	82067	TRIP SHIFT	92	82092	COLLAR
68	82068	TRIP PLUNGER	93	82093	WASHER
69	82069	CHANGE SHAFT	94	82094	C RING
70	82070	FEED RESVERSE BEVEL GEAR	95	82095	FEED GEAR
71	82071	FEED RESVERSE CLUTCH	96	82096	FEED GEAR
72	82072	FEED RESVERSE BEVEL GEAR	97	82097	SET SCREW
73	82073	KEY	98	82098	QUILL LOCK SLEEVE
74	82074	FEED WORM	99	82099	QUILL LOCK SEEVE TAPPED
75	82075	KEY	100	82100	LOCK HANDLE

TUM-40VA & TUM-40VS

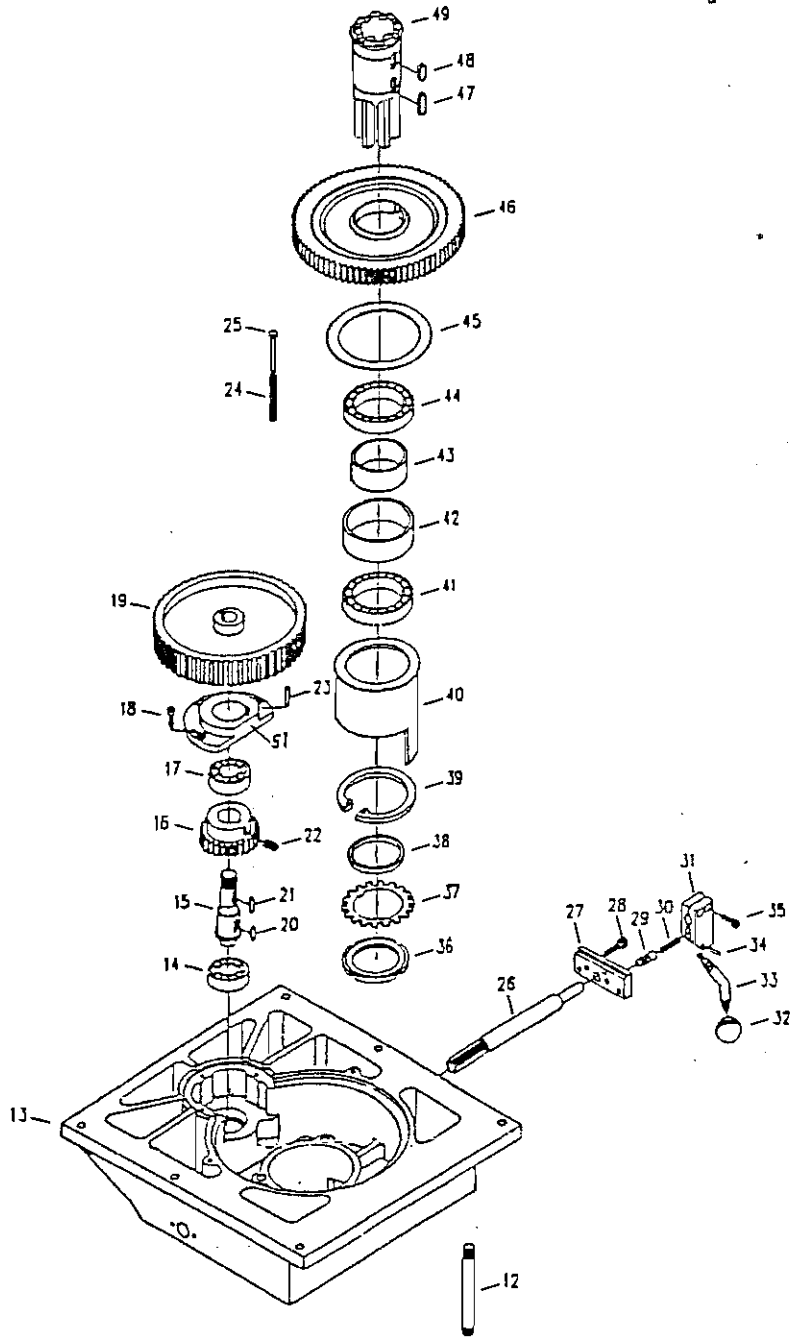
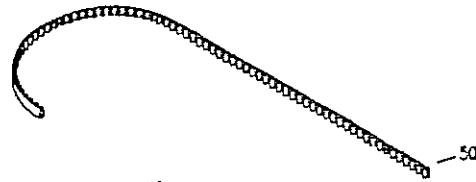
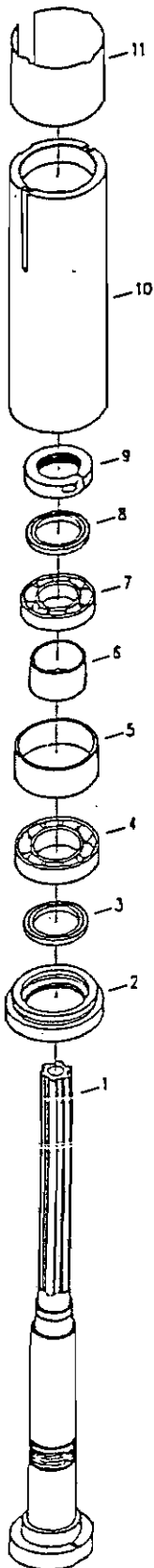
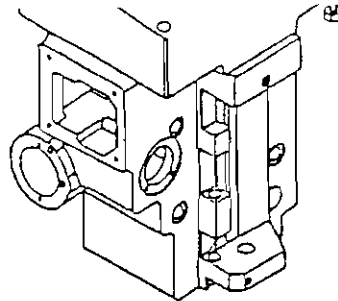


TUM-40VA & TUM-40VS

40#HEAD

ITEM NO.	PART NO.	DESCRIPTION	ITEM NO.	PART NO.	DESCRIPTION
101	82101	MICROMETER SCALE	126	82126	FEED KEY
102	82102	CHEM BLACKED RD. HD. SCREW	127	82127	KEY
103	82103	SET STUD	128	82128	FEED DRIVER WORM GEAR SHAFT
104	82104	C RING	129	82129	WORM GEAR CRABLE
105	82105	DOG PLATE	130	82130	FEED ENGAGE PIN
106	82106	QUILL MICRO-STOP NUT	131	82131	WORM GEAR GRADLE
107	82107	MICROMETER NUT	132	82132	SLEEVE
108	82108	SOCKET HD. SCREW	133	82133	SET SCREW
109	82109	PLUG STUD	134	82134	SOCKET HD. SCREW
110	82110	SHAFT			
111	82111	PIN			
112	82112	QUILL STOP KNOB			
113	82113	QUILL STOP MICRO-SCREW			
114	82114	HEAD			
115	82115	HEX NUT			
116	82116	LOCKNUT			
117	82117	SLEEVE			
118	82118	BOLT			
119	82119	SOCKET HD. SCREW			
120	82120	BEVEL PINION WASHER			
121	82121	FEED BEVEL PINION			
122	82122	WASHER			
123	82123	WORM CRADLE BUSHING			
124	82124	WASHER			
125	82125	FEED DRIVER WORM GEAR			

TUM-40VA & TUM-40VS



TUM-40VA & TUM-40VS

40#HEAD

ITEM NO.	PART NO.	DESCRIPTION	ITEM NO.	PART NO.	DESCRIPTION
1	83001	SPINDLE	27	83027	BLOCK
2	83002	NOSE-PIECE	28	83028	SOCKET HD. SCREW
3	83003	FRONT COLLAR	29	83029	STOP PIN
4	83004	BEARING	30	83030	SPRING
5	83005	OUTER COLLAR	31	83031	BLOCK
6	83006	INNER COLLAR	32	83032	BAKELITE BALL HANDLE
7	83007	BEARING	33	83033	HANDLE
8	83008		34	83034	ROLL PIN
9	83009	LOCK NUT	35	83035	SOCKET HD. SCREW
10	83010	QUILL	36	83036	LOCK NUT
11	83011	DUST COLLAR	37	83037	WASHER
12	83012	BOLT	38	83038	COLLAR
13	83013	GEAR HOUSING	39	83039	C RING
14	83014	BEARING	40	83040	BEARING HOUSING
15	83015	SHAFT	41	83041	BEARING
16	83016	GEAR	42	83042	OUTER COLLAR
17	83017	BEARING	43	83043	INNER COLLAR
18	83018	SOCKET HD. SCREW	44	83044	BEARING
19	83019	SPINDLE BULL GEAR ASSEMBLY	45	83045	GASKET
20	83020	KEY	46	83046	SPINDLE BULL GEAR ASSEMBLY
21	83021	KEY	47	83047	KEY
22	83022	SEE SCREW	48	83048	KEY
23	83023	ROLL PIN	49	83049	SPINDLE GEAR BULL
24	83024	SPRING	50	83050	BELT
25	83025	PIN	51	83051	BEARING HOUSING
26	83026	GEAR SHAFT			