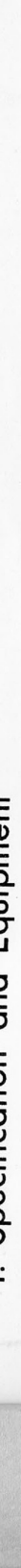


11: specification and equipment



GAP TYPE

TYPE A SPINDLE NOSE

Nominal size	Swing over bed from face plate up to 7" (180mm)	Distance between centers
MS-850	MS-1250	MS-1250
	19 1/8" (490mm)	49" (1250mm)
	33 3/8" (850mm)	41 3/8" (1050mm)

▼Optional Specifications

	Standard					Special	Remarks
Range of spindle speeds	32 62 82 112 160 200 285 395 510 710 1010 1800					21 41 55 75 105 135 190 265 340 475 675 1200	motor power will be 3.7KW (5HP) 6P
Kinds of Inch threads	4 4½ 4¾ 5 5½ 6 6½ 7 8 9 9½ 10 11 12 13 14 16 18 19 20 22 24 26 28 32 36 38 40 44 48 52 56 64 72 80					4 4½ 5 5½ 5¾ 6 6½ 7 8 9 10 11 11½ 12 13 14 16 18 20 22 23 24 26 28 32 36 40 44 46 48 52 56 64 72 80	4.75mm will disappear from metric threads
Feeds, Graduation system	Metric					Inch	
Compound rest	Square turret tool post compound					Universal tool post compound	
Tool post	Square tool post					Square tool post American single tool post	
Max tool size	1" × 1" (25 × 25mm)					Square. ¾" × ¾" (21 × 21mm) ¾" × 1¼" (20 × 32mm) American.	

▼Standard Equipment

Driving plate 9½" (240mm) & bolts		1 set
4 Jaw independent chuck (12")		1 set
Change gear (72 teeth)		1
Center sleeve (M.T. NO. 6)		1
Center (M.T. NO. 4)		2
Face plate 15¾" (400mm) & bolts		1 set
Steady rest		1 set
Follow rest		1 set
Carriage maicro stop		1 set
Coolant equipment		1 set
Hexagon handle		1 set
Lock nut handle (L1 nose only)		1
Box handle ⅝" (for gear change)		1
Screw driver (#2)		1
Grease pump		1
Replacing tool (for disc brake)		1
Installation block		6
Worm gears (24, 20, 19, 14teeth, metric lathe only)		1 each
Box handle ⅙" (for square turret tool post)		1
Spanners (¾" × ⅝", ⅙" × ⅙", ⅙" × ⅙")		1 each

▼Optional Equipment

- Hydraulic copying attachment.
- Taper cutting attachment.
- Inverse tool rest.
- Change gears for cutting D.P. & Module threads.
- Chuck cover for 9" scroll chuck.
- ~~Change gears for reducing feeds.~~
- ~~Face plate 23½" (600mm) for G-Type.~~
- 3Jaw scroll chuck 9" (With soft blank jaw)

(Remarks)

As change gears 72 teeth gear with safety pin is accommodated in feed box, while 36 teeth gear is set in headstock. In inch system lathe thread chasing worm gear of 16 teeth and of ¼" pitch is attached to the machine, and in metric system lathe the one of 16 teeth and of 6mm pitch is built in. Other change gears are packed in a wooden case as equipment. Worm gears and thread cutting gears for Module Pitch and D.P. are one of the optional equipment, and thread cutting table of them are affixed inside the door of change gear box (Left side of the machine).

2. Installation of Machine

2 — 1 Foundation work

Foundation work of a lathe has so far been neglected.

Centering of the lathe was all what is done after it was set on the decking over mortar floor. This hitherto incomplete installation is not suitable for the present high-speed lathe which uses super-hard tool because the cutting speed and spindle speed were increased to four times as much as those of the hitherto lathe which used high speed steel tool.

The incomplete foundation apt to produce vibration and super-hard tool or cemented carbide tool is easily influenced by the vibration. It is impossible to avoid vibration completely during metal cutting operation when the high-speed lathe is installed on the incomplete foundation.

MS lathe is designed so as to avoid vibration during metal cutting operation by reinforcing each part and by lowering centroid through mono-bloc base which enables the ground to absorb vibration as much as possible. The foundation work should be perfect for utilizing efficiency of the super-hard tool to the maximum in operation of high-speed, precision and heavy cutting.

The foundation work should be completed 10 days before the delivery of lathe according to the guidance shown in the map.

(a) Items prepared before foundation work:

Anchor bolt $\frac{1}{2}$ dia (nut with washer)6 pcs (refer to Foundation Drawing)
Square cast iron (or iron) plate6 pcs ($5'' \times 7'' \times 1''$ thickness)

[Note] Foundation blocks are packed with the machine (6pcs)

(b) Place of installation:

There should be about 40" square open space behind the machine because cutting scobs are taken out from the rear part of the machine. Especially when you expect to install copying attachment, you need a larger space for pump system.

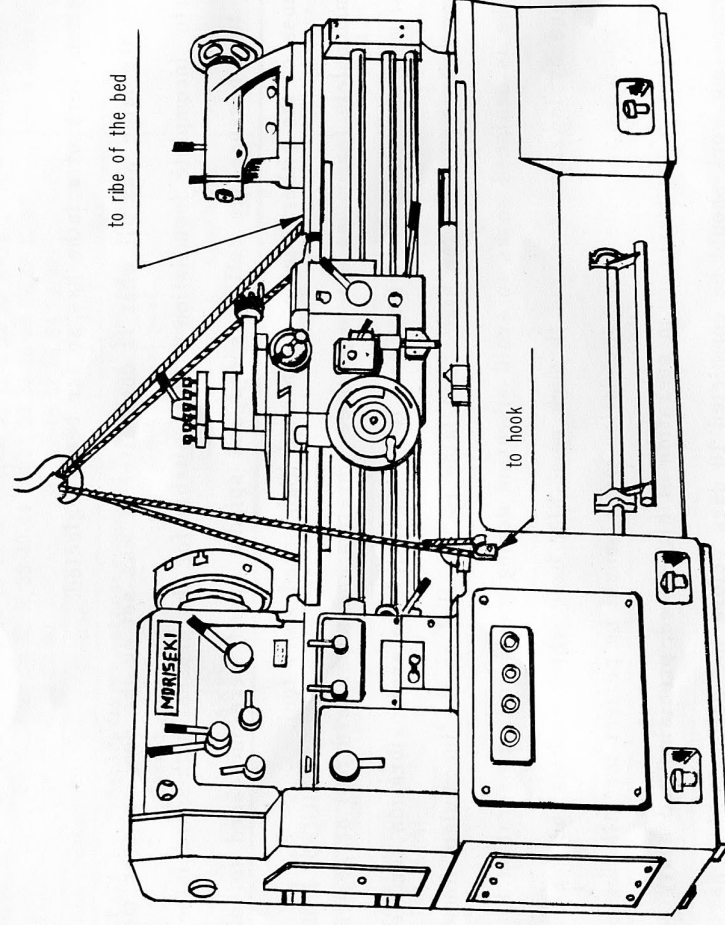
2 — 2 Unpacking

Anticorrosive or grease is applied to the machine. Use gasoline for taking off anticorrosive by scrubbing with brush and wiping off with rug. Do not use lacquer-thinner.

2 — 3 Points of Unloading

Unloading of the machine, packed in the wooden case, should be made by wiring from the sleepers. Lifting unpacked machine is made easily by the method shown in the map. 2—1.

Raising and lowering machine should be done carefully, and especially when you lower the machine, be careful not to bump the machine against the floor.

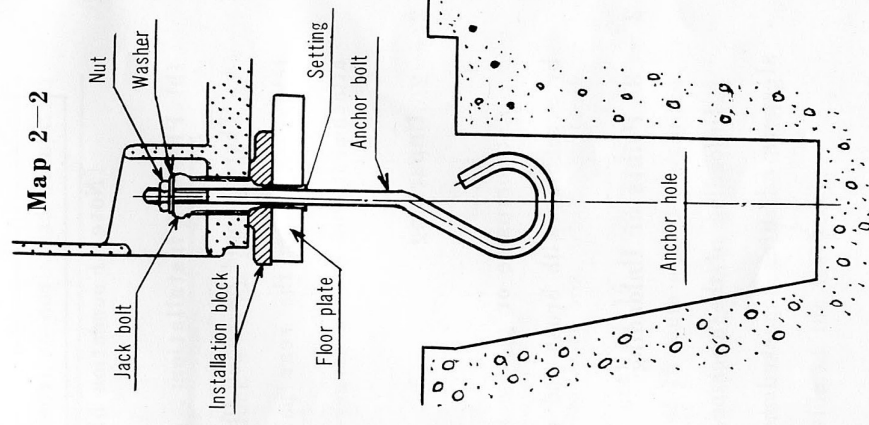


Map 2-1

2 - 4 Outline of Installation

As in the status of the machine being lifted, anchor bolts, floor plates, installation blocks and jack bolts must be arranged as per the map, and the machine has to be lowered down gradually to the anchor holes. After that, put mortar around anchor holes and plates. Approximate levelling of the machine is made by jack bolts.

When mortar is completely hardened, lock anchor bolts and jack bolts integrating the machine and foundation.



Nut	asher	Setting	olt
-----	-------	---------	-----

The drawing illustrates the installation of a floor plate. The cross-section view on the right shows a floor plate with a gravel layer at the bottom, an anchor bolt passing through it, and a mortar bed. The mortar bed is labeled "Mortar" and has a thickness of 400 (16"). The floor plate has a thickness of 100 (4"). The gravel layer has a thickness of 250 (10"). The plan view on the left shows the installation block and the mortar inlet.

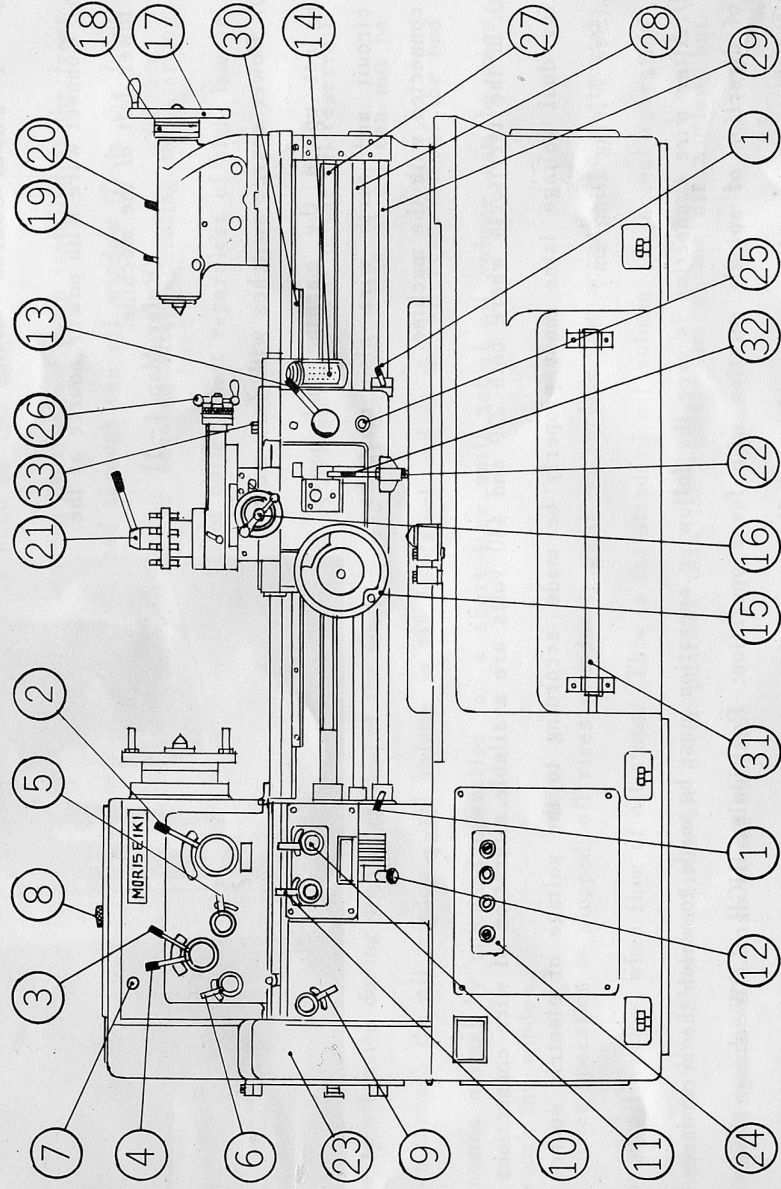
[illegible]

	C	D
MS-850	1160 1160	2200
MS-850G	(45.43") (45.43")	(87") (87")
MS-1050	1360 1360	2400
MS-1050G	(53.54") (53.54")	(95") (95")
MS-1250	1560 1560	2600
MS-1250G	(61.42") (61.42")	(103") (103")

The diagram illustrates a cross-section of a floor plate assembly. Key components and dimensions are labeled as follows:

- Portar inlet**: Indicated by an arrow pointing to the vertical pipe entry.
- Nut ($w\frac{1}{2}$ ")**: The nut at the top of the vertical pipe.
- Washer**: The washer located below the nut.
- Jack bolt**: The vertical bolt passing through the assembly.
- Floor plate and A face should be in the same level**: A note with an arrow pointing to the horizontal surface of the floor plate.
- Dimensions**:
 - Total height from base to top of nut: 120 ($4\frac{3}{8}$ ").
 - Height from base to jack bolt head: 50 (2 ").
 - Height from jack bolt head to floor plate: 130 (5 ").
 - Height from floor plate to top of nut: 20 ($\frac{7}{8}$ ").
 - Radius of the U-shaped duct: 80 ($3\frac{3}{8}$ ").
 - Width of the U-shaped duct at its base: 60 ($2\frac{3}{8}$ ").
 - Width of the U-shaped duct at its top: 110 ($4\frac{3}{8}$ ").
 - Horizontal distance from portar inlet to centerline of duct: 318 ($12\frac{3}{8}$ ").
 - Horizontal distance from centerline of duct to right edge of floor plate: 120 ($4\frac{3}{8}$ ").

3. Name of Parts



No.	N a m e	No.	N a m e
1	Starting lever	18	Tail spindle micrometer collar
2	HIGH-LOW Change lever	19	Tail spindle clamp lever
3	Spindle speed change lever	20	Tail stock clamp lever
4	Spindle speed change lever	21	Tool rest clamp lever
5	A-B feed lever	22	Automatic longitudinal feed stop
6	Positive-Reverse lever	23	Change gear box
7	Headstock oil window	24	Control station
8	Headstock oiling inlet	25	Apron oil window
9	Feed box CD lever	26	Multiple tool rest handle
10	Feed box GFE lever	27	Lead screw
11	Feed box I-STOP-H lever	28	Feed rod
12	Quick changing lever	29	Starting rod
13	Half-nut lever	30	Rack gear
14	Screw (thread) cutting indicator	31	Brake pedal
15	Longitudinal feed handle	32	Automatic feed lever
16	Cross feed handle	33	Carriage clamp lever
17	Tailstock handle		

4. Preparation for Operation

4 - 1 Power Source Wiring

(a). Connect wire with power source at the lower left of the machine.
(Refer Map 4-1)

(b). Power source switches with fuse must be set up in the machine and power circuit and earth wire also must be connected with the machine.

(c). In the territory where both 220 and 440 volts are available, alteration of wire connections for dual voltage lathe must properly be made according to the voltage of electric source (See Wiring Diagram).

(d). After wire connection is over, the following operation must be made to watch the accordance of direction of spindle rotation with lever operation: Positioning HIGH-LOW change lever ② at neutral point, when the spindle can easily be rotated manually, set the control switch of control station ②④ "ON," and operate the starting lever ① upward.

If in this case the motor shaft rotates to the direction of operator, the spindle rotation is normal. Checking of spindle rotating direction must be made under low speed of spindle revolution. See again 4-2 Identification before Operation.

When spindle rotation goes to opposite direction, replace two of the three wires (one another) of the power source.

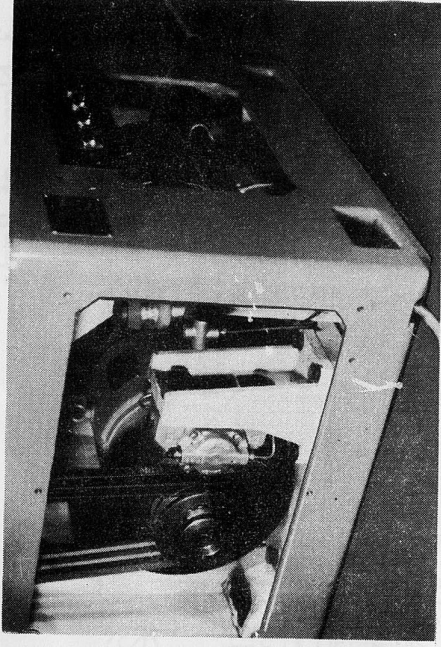
4 - 2 Identification before Operation

(a). Supply oil to all the necessary positions. (See Map 5-4)

(b). By rotating the main spindle, this is mechanized to transmit power to feed box and apron. Check it that automatic feed lever ③② or thread cutting half-nut lever ⑬ is not operated. This condition is that both longitudinal feed handle ⑮ and cross feed handle ⑯ can be easily rotated by hand.

5. Lubrication

The machine needs lubrication before operation of each part, for which operator should know the position of oil inlet, oil window and the portions to be lubricated.



Power Source Outlet

Map 4-1

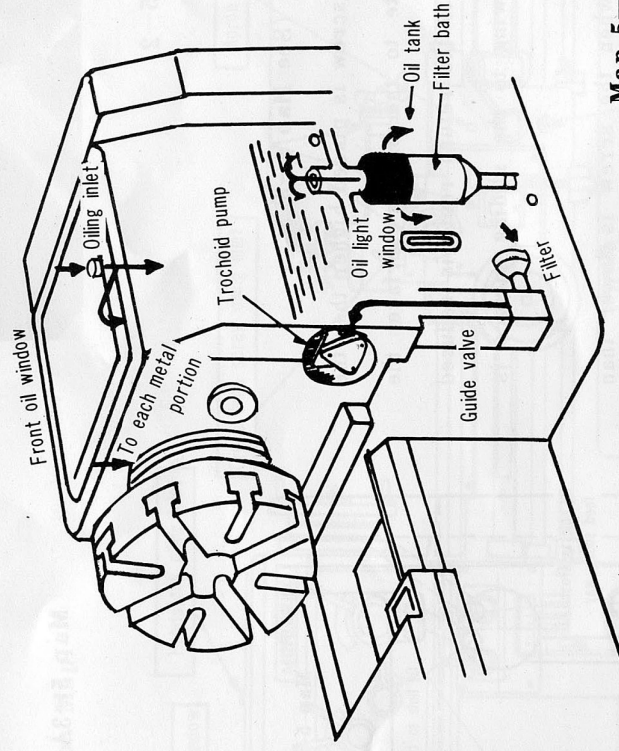
5 — 1 Headstock Forced Lubrication System

(a). Lubricating oil tank is installed at the left back of the bed:

The tank supplies pure filtered oil to every bearing by trochoid pump installed at the front side of the headstock. The flow of oil can be watched through the oil window ⑦ in the front side of the headstock, and it reaches the window 15~20 seconds after operating the starting lever ①. Constant lubrication can be made by rotation of pulley shaft regardless of high, low or neutral of the spindle speeds.

It may sometimes happen that the oil at the bottom of headstock returns to the oil reservoir due to vibration during transportation of the machine, and that horizontal line of oil can not be seen through the oil window. Oil volume in the headstock and in the oil reservoir of the bed becomes normal by unloaded operation for a short time until actual oil volume can be seen through the window.

After operation is stopped, oil rises gradually until its surface line accords the horizontal line of oil window, when flow of oil stops. This is the standard oil volume. In actual operation oil surface line shows a little bit lower position than the center line of the oil window, but this does not mean a case of oil shortage.



Map 5—1

(b). Oil Supply:

Oil supply is made once a month. Supply oil to the oil tank through oil valve B at the right of filter tank up to the horizontal line of the window after taking off impurity from the bottom of filter tank.

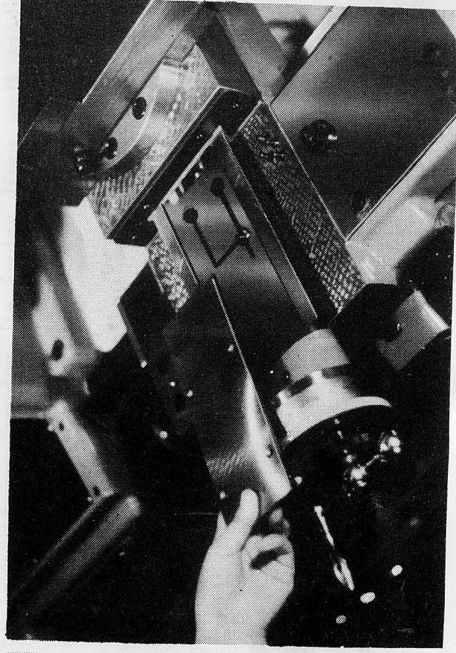
(c). **Exchange of Oil:**

Change oil after taking off oil valve A at the left of the oil tank and the bottom of headstock and cleaning the inside of the tank. The designated Daphne Mechanic oil 44 or equivalent oil must be supplied per 6 months.

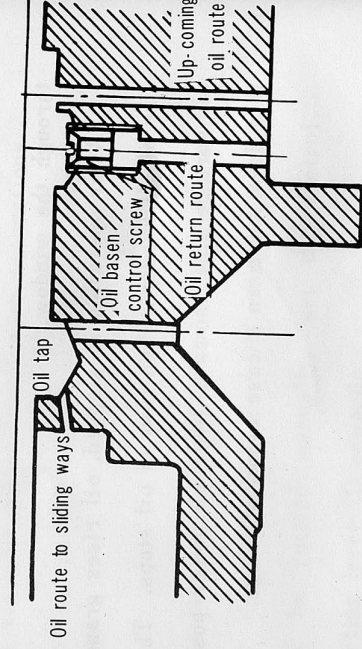
5 - 2 **Forced Lubrication System for Carriage Sliding Way**

(a). **The lower part of the apron properly forms an oil tank.**

The oil which come up to the oil basin by the rotation of the apron handle is sent to each sliding surface (lathe bed, carriage surface, carriage bed and cross feed and cross slide.)



Map 5-2



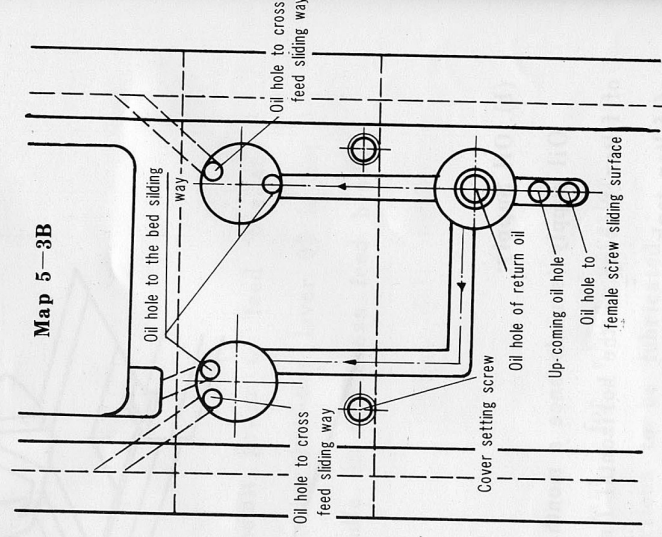
Map 5-3A

(b). **Control of oiling (See Map 5-3)**

When the control screw is placed higher than the mouth of the oil route to the sliding surface, the volume of oil flowing to the return route is reduced and volume of oil flowing to the sliding surface is increased.

On the contrary, when the screw is lower than the mouth, the oil flow to the return route is increased. The control of oil flow to the sliding way is made by the up and down of the screw. Avoid to control oil flow by stuffing the oil route.

The return oil reaches to the oil basin on the upper part of the apron and then sent to each rotating part.



Map 5-3B

(c) Oiling should be made through the oil inlet (Indicated "OIL") on right front of the apron, after removing the cap of the oil inlet. The oil must always be kept in horizontal center line of the oil window at the right front of the apron. Taking-off of oil is made by the plug at the lower apron. The oil supplied to sliding ways does not return to the oil tank.

(d) Female screw of cross feed is so designed as to be in oil. The inlet mouth of oil for the screw is positioned at the center of cross slide (Indicated "OIL"). Oil supply should be stopped when flow of oil is found at the hole of carriage rear. Change of oil must be made every half a year through draining screw at the lower portion of the carriage.

5 - 3 Lubrication of Feed Box

Oil tank is installed at the upper of the feed box.

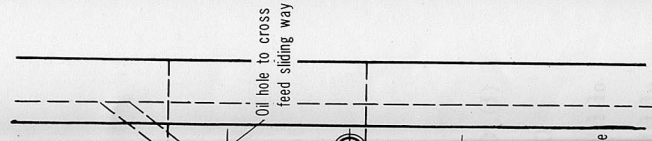
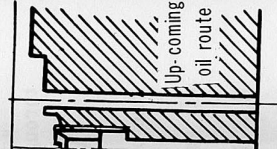
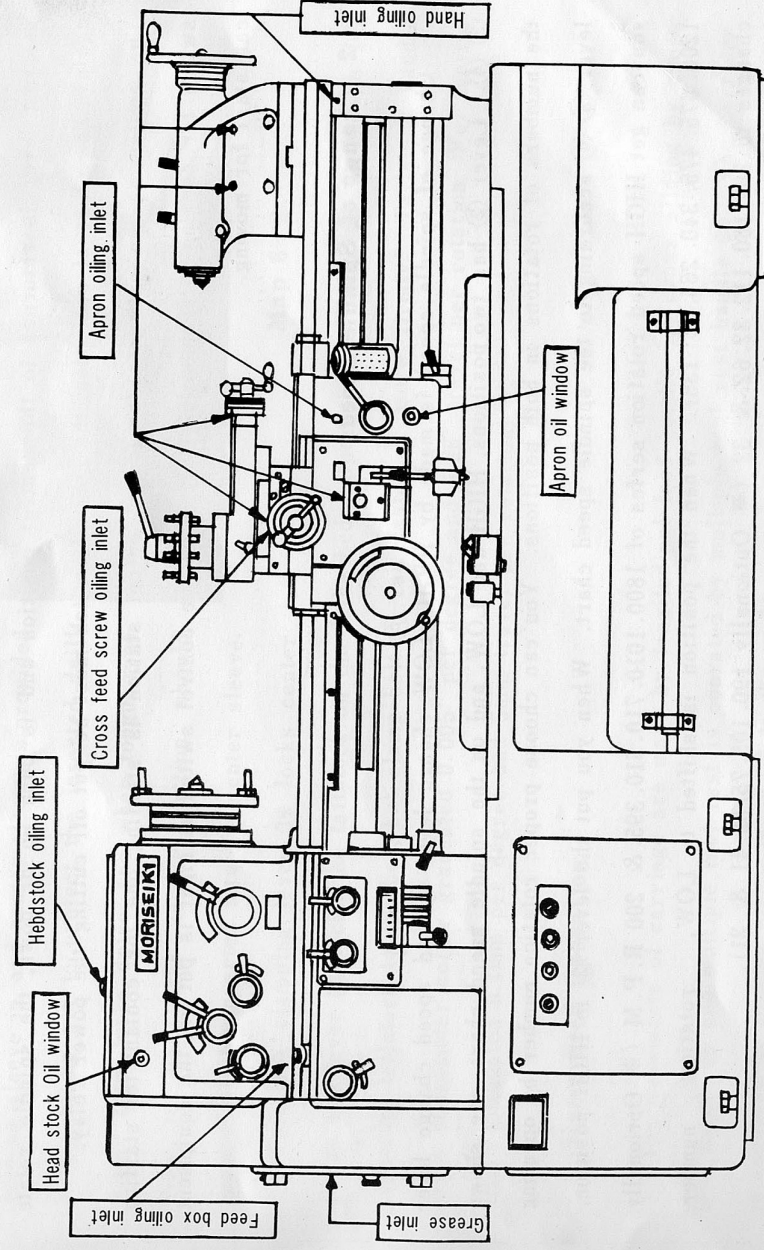
The system sends oil to each bearing part through the oil route from the lower part of the oil tank. The oil once supplied, will not be returned and every day hand oiling is necessary.

5 - 4 Lubrication of Other Portions

There are oil inlets in cross feed multiple tool rest, feed screw shaft bearing, lead screw, bracket which holds feed rod, and tailstock, and hand oiling is required from time to time.

Map 5-4

Lubrication Map



Headstock lubricant

	M a k e r	N a m e	V o l u m e (ℓ)
Designated oil	Idemitsu Kosan	Daphne Mechanic oil 44	1 4
Oil of same kind	G u l f	Gulf Harmony 44	
	M o b i l e	GTE Oil Light	
	E s s o	Teleso 43	
	S h e l l	Vitrea 27	

6. Operation Method

6 - 1 Main Spindle Rotation

Turn on the pilot lamp by a flick of the control switch at the right of control station ㉔ (then red pilot lamp will light), put the spindle speed change lever ㉒ ㉓ ㉔ in required position according to rotation speed chart, push the starting lever ㉑ up or down, then positive or reverse rotation is given to the main spindle.

So, turn to the control switch "ON" after switching selector to relay the power, afterwards, must operate the starting lever ㉑, thenceforth, starting and stopping of spindle rotation can be made merely by the starting lever.

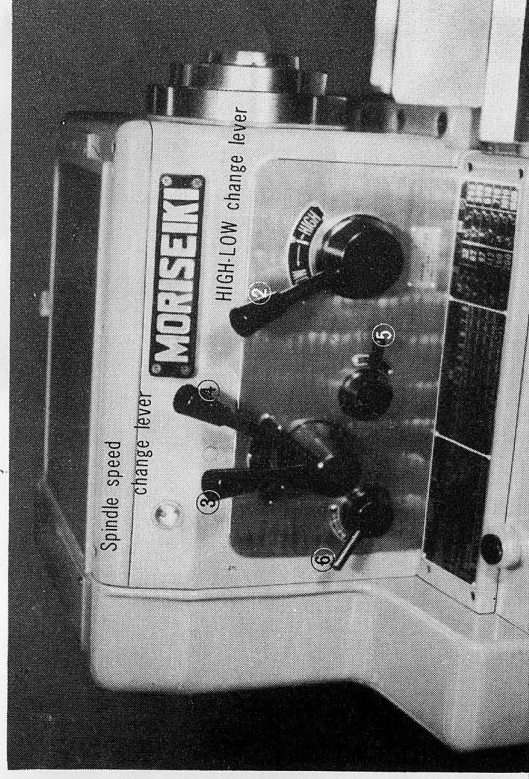
Quick stop of operation can be made by footing the brake pedal ㉑. If, after start, the starting lever is returned to the neutral position and is push up or down, the spindle rotate again. The close of operation, the control switch must be put off cutting the power relay. The switch at the extrem left of the control station is starting one for coolant (or starting switch for copying attachment). Only when the control switch at right is put on, the equipment can start for moving.

6 - 2 Change of Spindle Speed

Change of spindle speed is made by HIGH-LOW change lever ㉒ and speed change lever ㉓ ㉔. Lever ㉒ has two positions, HIGH and LOW, and on the spindle speed chart are shown the numbers of rotations in both positions. You can choose proper rotation number by oprating lever ㉓ ㉔ according to the spindle speed chart. When you put the lever ㉒ in HIGH position, you can get HIGH speed rotation series of 1800.1010.710.510.395.& 200 R.P.M (* Optionally 1200.675.475.340.265. & 135). When the position is shifted to LOW, rotation number changes to 285.160.112.82.62. & 32 (* Optionally 190.105.75.55.41 & 21).

※Optionally : Capacity is 3.7kw 6poles and 3phase

Transformation of main spindle speed should be made after rotation is completely stopped.
(Refer "Cutting Speed Diagram" page 32)



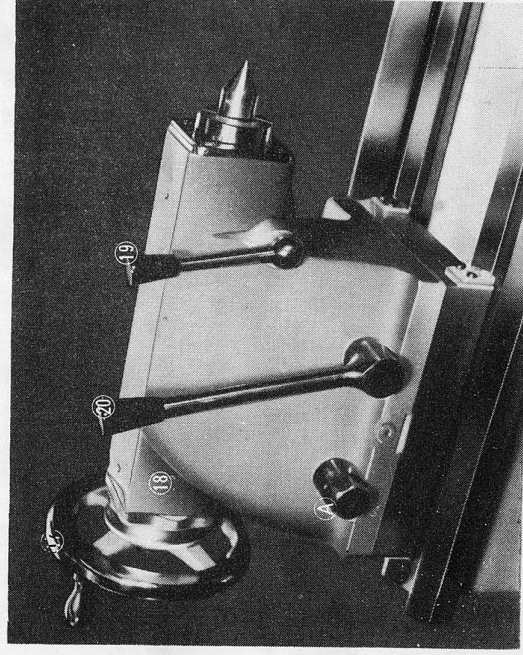
Map 6-1

6 - 3 Tailstock Operation

Tailstock handle ⑰ is used for taking center sleeve in or out.

Center can be easily taken out by extremely pushing sleeve in, and center sleeve is provided with a clamp pin to protect the inserted drill tongue from loose drive, and when tongue-type drill is used, the tongue portion should horizontally be inserted into the center sleeve.

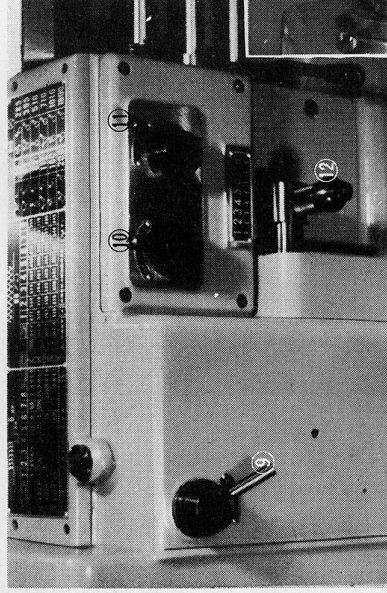
Tailstock clamping lever ⑲ locks center sleeve and lever ⑳ locks the tailstock on the lathe bed. Operation of lever ㉑ is enough for anchoring tailstock to the bed, but clamp bolt ㉒ can fasten it more firmly. Tailstock handle has a micrometer collar graduated 0.005" per degree and 0.25" travel per rotation (For metric size : graduated 0.1mm per degree and 5mm travel per rotation)



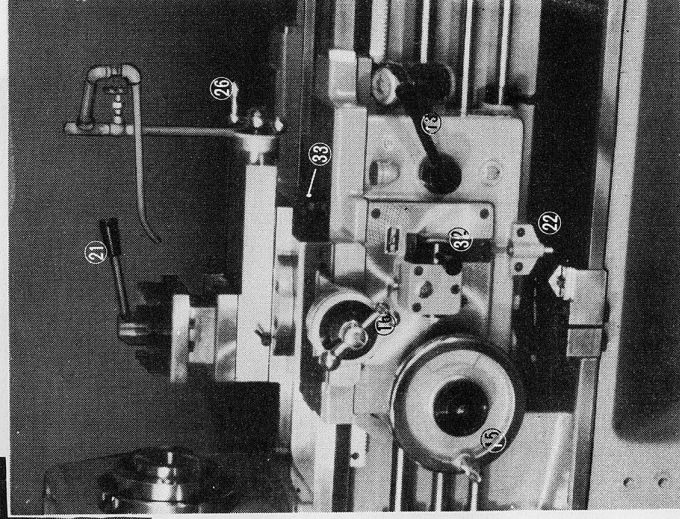
Map 6-2

6 - 4 Hand Feed Operation

The movements of carriage are made by longitudinal feed handle ⑮, cross sliding by cross feed handle ⑯ and multiple tool rest is operated by multiple tool rest handle ㉕. The carriage is anchored by turning clamp lever ㉖ to the right.



Map 6-3



6 - 5 Micrometer Collar

- Longitudinal feed handle ⑮ has a micrometer collar graduated 0.008" per degree and 1.04" travel per rotation.
 -- For metric size : graduated 0.2mm per degree and 26mm travel per rotation --
- Cross feed handle ⑯ has a micrometer collar graduated 0.001" (0.002" on cutting margin) per degree and 0.2" travel per rotation.
 -- For metric size : graduated 0.02mm (0.04mm on cutting margin) per degree and 5mm travel per rotation --
- Multiple tool rest has a micrometer collar graduated 0.001" per degree and 0.2" travel per rotation.
 -- For metric size : graduated 0.02 mm per degree and 4mm travel per rotation --

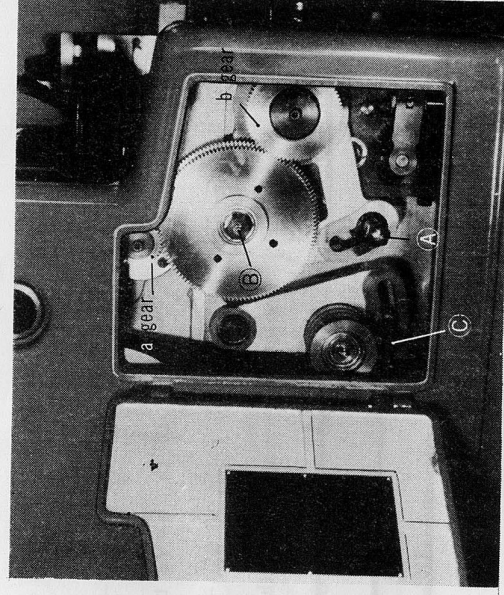
As each micrometer collars can be fixed to voluntary position, accurate calibration is obtained by it.

6 - 6 Replacement of Change Gears and Adjustment of Belts

To exchange gear of transmission axle with another gear and to adjust clutching in screw

cutting work as well as in feed work, loosen clamp nut A. Change of driven gear is made by loosening clamp nut B. Adjustment of clutch with gear (a) must be made at A after adjusting gear (b) at B. In both cases suitable backlash is necessary to intermediate gear.

The belt is adjusted by tension pulley plate, by setting it at desired position.

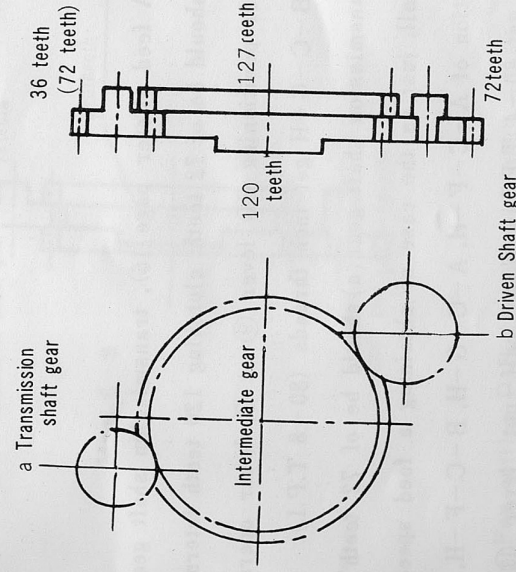


Map 6-4

6 - 7 Automatic Feed Operation and Feed Speed Change

By operating Positive-Reverse lever ⑥ and AB Feed lever ⑤, clutch 36 teeth change gear at transmission shaft and 72 teeth gear at driven shaft with 120 teeth intermediate gear. Next, position feed box C D lever ⑨ at C, GFE lever ⑩ at either G or F, I-STOP-H lever ⑪ at STOP (I and H positions are for screw cutting) and Quick Changing lever ⑫ either at one of the 1~8 holes. Thus, the feed rod ⑳ will rotate. When automatic feed lever ㉓ on apron is operated upward, you can obtain longitudinal feed, and in case the lever ㉓ is pulled forward and operated downward, you can obtain cross feed.

Feed direction can be changed by lever ⑥ at the headstock. 32 kinds of feed speeds each in longitudinal and cross feeds are obtainable by A B lever ⑤, GFE lever ⑩ (E is not used for feeding purpose) and Quick Changing lever ⑫.



Map 6-5

Operation of Change Gear

A. To get feeds 0.0018~0.025" r.e.v. (0.045~0.627mm/r.e.v.)

as indicated a=36 teeth, b=72 teeth.

B. To get feeds 0.0035~0.050" r.e.v. (0.090~1.254mm/r.e.v.)

as double as indicated a=72 teeth, b=72 teeth.

C. To get feeds 0.0000~0.0125" r.e.v. (0.023~0.314mm/r.e.v.)

as half as indicated, refer to Map 6-6.

~~—100 and 120 teeth gears are one of the optional equipment—~~

Pitch Table Inch (mm) / r.e.v.

1	2	3	4	5	6	7	8	2	3	4	5	6
.025 (.627)	.022 (.558)	.0208 (.528)	.0198 (.502)	.0180 (.456)	.0165 (.418)	.015 (.386)	.014 (.359)	.022 (.558)	.020 (.508)	.018 (.457)	.017 (.432)	.0165 (.418)
.0125 (.314)	.011 (.279)	.0104 (.264)	.0099 (.251)	.0090 (.228)	.008 (.209)	.0076 (.193)	.007 (.179)	.011 (.279)	.0099 (.254)	.009 (.229)	.0086 (.216)	.008 (.209)
.0062 (.157)	.0055 (.139)	.0052 (.132)	.0050 (.125)	.0045 (.114)	.004 (.105)	.0038 (.097)	.0035 (.090)	.0055 (.139)	.0049 (.127)	.0045 (.115)	.0043 (.108)	.004 (.105)
.0031 (.079)	.0027 (.070)	.0026 (.066)	.0025 (.062)	.0023 (.057)	.002 (.052)	.0019 (.048)	.0018 (.045)	.0027 (.070)	.0025 (.064)	.0023 (.058)	.0022 (.054)	.002 (.052)

() = mm

6-8 Thread Cutting Operation

a. Lead Screw Drive

Rotating lead screw by operating I-STOP-H lever ⑪ of feed box either to I or H position, operate downward thread cutting half-nut lever ⑬, and it will be clutched with lead screw, obtaining longitudinal travel of carriage, namely, thread cutting feed.

Direction of thread cutting is decided by Positive-Reverse lever ⑥, AB lever ⑤, G F E lever ⑩ and Quick Changing lever ⑫.

b. Inch Lead Screw Lathe

● For cutting Inch thread, just as to get A feed (Refer page 16), transmission shaft gear (a) must be of 36 teeth and driven shaft gear (b) should be of 72 teeth, clutching 120 teeth intermediate gear between them (Refer Map 6-7). After positioning CD lever ⑨ at C, lever operation of A-C-F-H, A-C-G-H, B-C-F-H & B-C-G-H get inch threads (80~8 T.P.I.).

To get threads of 4, 4½, 7 T.P.I., transmission shaft gear (a) should be of 72 teeth and driven shaft gear (b) must be of 72 teeth as well, just as the case of obtaining a feed speed of B (Refer page 16). In this case lever operation of A-C-F-H, A-C-G-H, B-C-F-H, B-C-G-H & B-C-G-I makes it possible to get 80~4 T.P.I. When half-nut lever ⑬ of apron is to be operated, use screw cutting indicator explained in 6-9.

6
.0165 (.418)
.008 (.209)
.004 (.105)
.002 (.052)
) = mm

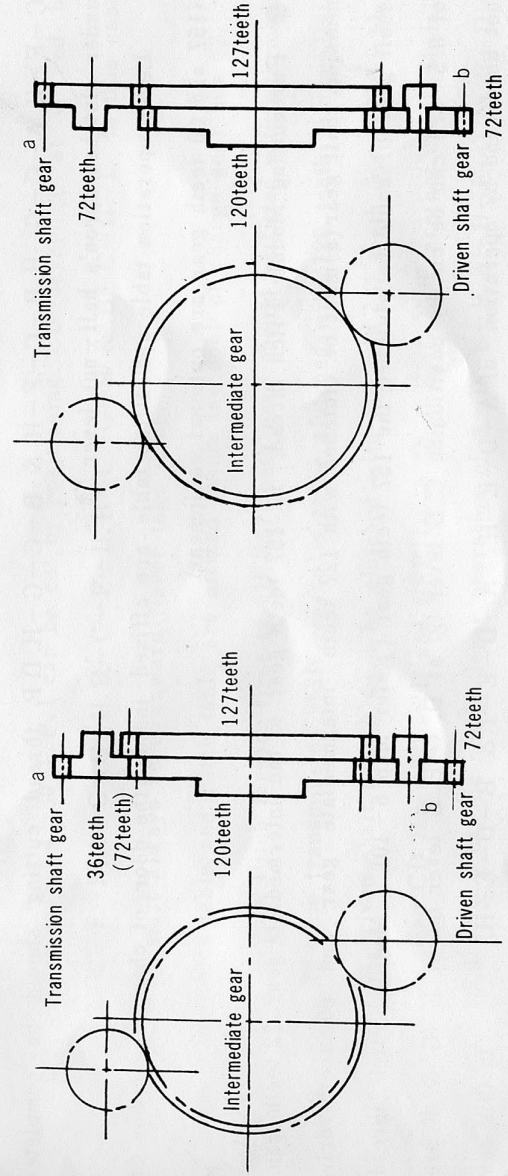
position,
screw,

G F E

gear (a)
intermedi-
eration

th and
eed of
H, B-

⑬ of



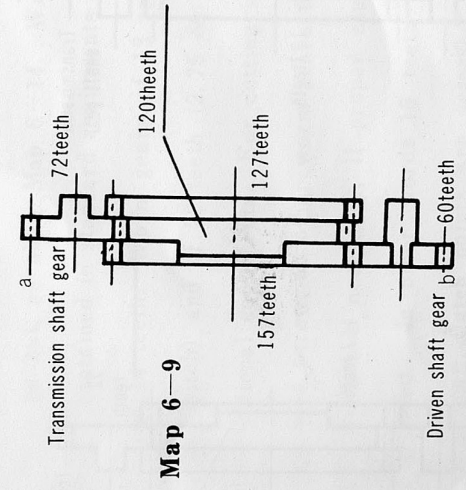
Map 6-7

Map 6-8

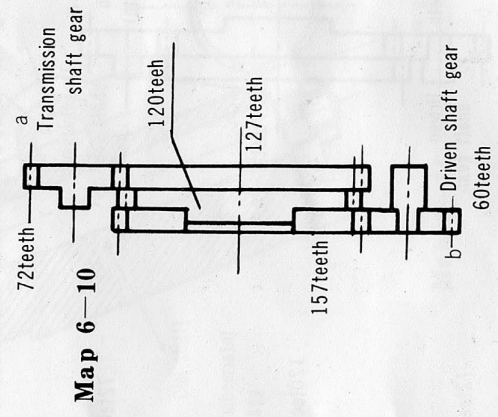
- For cutting Metric thread, transmission shaft gear(a) of 72 teeth must be clutched with 127 teeth intermediate gear, and 72 teeth driven shaft gear(b) should be clutched with 120 teeth intermediate gear (Refer Map 6-8). After setting CD lever ⑨ at D and G F E lever ⑩ at E (G & F are not used for metric threading), operate A-D-E-H, A-D-E-I, B-D-E-H & B-D-E-I to get 0.5~7mm pitch threads cutting.

In this case half-nut lever ⑬ must always be stayed downward (Never take it up) because clutching point is nothing.

Lever operation table and Pitch table are affixed inside the door of change gear box ②③.



Map 6-9



Map 6-10

- For cutting D.P. (Diametral Pitch) thread, fit 157 teeth gear to intermediate gear, and 72 teeth transmission shaft gear(a) should be clutched with 120 teeth intermediate gear and 60 teeth driven shaft gear(b) must be clutched with 157 teeth gear (Refer Map 6-9).

D.P. threads of 112~8 can be cut by positioning CD lever ⑨ at C and by operation of A-C-F-H, A-C-G-H, B-C-F-H & B-C-G-H. D.P. thread cutting should be completed under clutched apron's half-nut lever ⑬.

Lever operation table and Pitch table are affixed inside the door of change gear box ②③. (157 and 60 teeth gear are optional equipment)

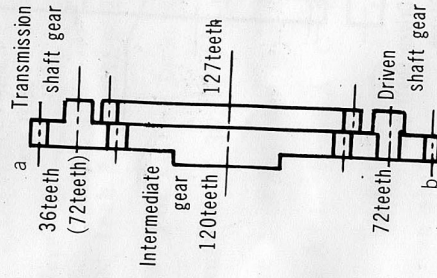
- For cutting Module Pitch thread, fit 157 teeth gear to the intermediate gear, 72 teeth transmission shaft gear (a) must be clutched with 127 teeth intermediate gear and 60 teeth driven shaft gear (b) should be clutched the 157 teeth gear (Refer Map 6-10). Module Pitch threads of 0.5~3.5 can be cut by positioning C D lever ⑨ at D, G F E lever ⑩ at E (G & F are not used) and by operation of A-D-E-H, A-D-E-I & B-D-E-H. In this case half-nut lever ⑬ must always remain clutched as in the case of Metric & D.P. thread cutting.

Lever operation table and Pitch table are affixed inside the door of change gear box ②③. (157 and 60 teeth gear a optional equipment)

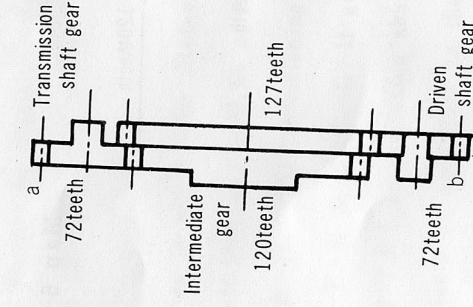
c. Metric Lead Screw Lathe

- For cutting Metric thread, make 36 teeth transmission shaft gear (a) and 72 teeth driven shaft gear (b) clutch with 120 teeth intermediate gear (Refer Map 6-11). After positioning C D lever ⑨ at D and GFE lever ⑩ at E (G & F are not used for metric thread), take the lever operations of A-D-E-H, A-D-E-I & B-D-E-H to obtain 0.5~3.5mm threads.

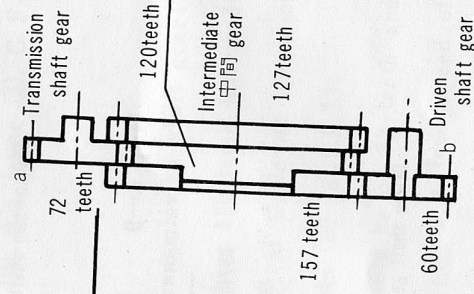
To get 4. 4.5~7mm threads, transmission shaft gear (a) must be of 72 teeth and driven shaft gear (b) of 72 teeth. In this case, 0.5~7mm threads can be cut by lever operation of A-D-E-H, A-D-E-I, B-D-E-H & B-D-E-I. When half-nut lever ⑬ of apron is used, refer 6-9 on "Screw cutting indicator".



Map 6-11



Map 6-12



Map 6-13

- For cutting Inch thread, 72 teeth transmission gear (a) should be shaft clutched with 120 teeth intermediate gear and 72 teeth driven shaft gear must be clutched with 127 teeth intermediate

gear (Refer Map 6-12). 4-80 T.P.I. can be cut by positioning CD lever ⑨ at C and by operation of A-C-F-H, A-C-G-H, B-C-F-H, B-C-G-H & B-C-G-I. In this case, half-nut lever ⑬ must always be downward (Never take it up).

Lever operation table and Pitch table are affixed inside the door of change gear box ⑬.

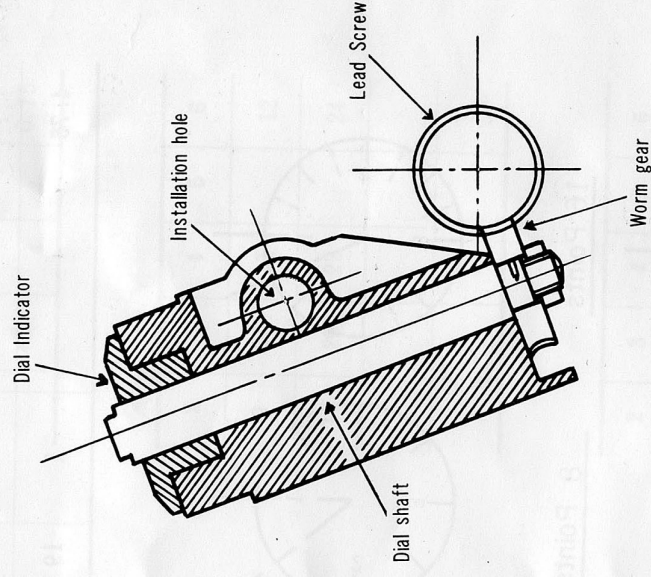
● For cutting Module Pitch thread, first of all, 157 teeth gear should be fitted with intermediate gear. Next, 72 teeth transmission shaft gear(a) is to be clutched with 120 teeth intermediate gear, and 60 teeth driven shaft gear(b) must be clutched with the said 157 teeth gear (Refer Map 6-13). After locating CD lever ⑨ at D and GFE lever ⑩ at E (G & F are not used), Module Pitch threads of 0.5-3.5 can be cut by lever operation of A-D-E-H, A-D-E-I & B-D-E-H. As in the case of Inch threading, half-nut lever ⑬ must always be downward during operation.

Lever operation table and Pitch table are affixed inside the door of change gear box ⑬.
(157 and 60 teeth gear are optional equipment)

6 - 9 Screw(thread) Cutting Indicator

Screw cutting indicator is installed on the right side of apron. -- In gap bed type, it is on the left side --

The indicator is used for thread cutting clutching with lead screw. For cutting metric thread by metric lead screw, worm gears have to be exchanged according to the thread to be cut, as show Map 6-14. Worm gears which are contained in standard equipments are of 24, 20, 19 and 14 teeth. Worm gears of 13 teeth (6.5 & 3.25mm pitch) and of 22 teeth (2.75 & 5.5 mm pitch) are optional equipments. For cutting inch thread by inch lead screw, no other worm gears than the one of 16 teeth are necessary, if proper clutch points are selected. In other words 16 teeth are necessary, if proper clutch points are selected, 16 teeth gear can cut every inch thread. For cutting inch or Module Pitch thread by metric lead screw and for cutting Metric or D.P. or Module Pitch thread by inch lead screw, no indicator is necessary, as the thread cutting in this case is completed under operation of half-nut lever ⑬.



Map 6-14

Clutch Points of Screw cutting indicator

Inch lead screw lathe (Worm gear→16 teeth)

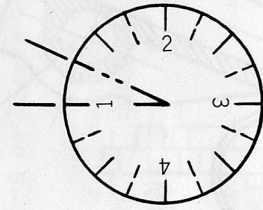
Kinds of Inch thread	clutch point	Kinds of Inch thread	clutch point
4, 8, 12, 16, 20, 24, 28, 32, 36, 40 44, 48, 56, 64, 72, 80	16	4½, 5½, 6½, 9½ (11½)	2
6, 10, 14, 18, 22, 26, 38, (46)	8	4¾ (5¾)	1
5, 7, 9, 11, 13, 19, (23)	4		

() = Optional specification

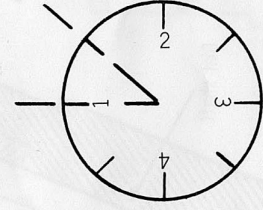
Metric lead screw lathe

Kinds of metric thread	clutch point	worm gear	Kinds of metric thread	clutch point	worm gear
4.5, 2.25	8	24 teeth	6.0, 3.0, 2.0, 1.5 1.0, 0.75, 0.5	16	16 teeth
5.5, 2.75	2	※ 22 teeth	4.0	8	16 teeth
5.0, 2.5, 1.25	4	20 teeth	7.0, 3.5, 1.75	2	14 teeth
4.75	1	19 teeth	6.5, 3.25	1	※ 13 teeth

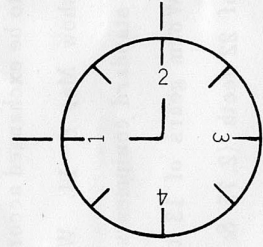
※ = Optional equipment



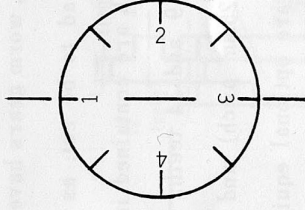
16 Points



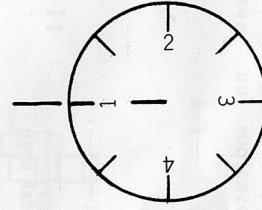
8 Points



4 Points



2 Points



1 Point

Inch lead screw lathe

1"  (For cutting inch thread)

1	2	3	4	5	6	7	8
4 1/2	4 3/4	5	5 1/2	6	6 1/2	7	
8	9	9 1/2	10	11	12	13	14
16	18	19	20	22	24	26	28
32	36	38	40	44	48	52	56
64	72		80				

2	3	4	5	6
4 1/2	5	5 1/2	5 3/4	6
9	10	11	11 1/2	12
18	20	22	23	24
36	40	44	46	48
72	80			

 MM (For cutting metric thread)

1	2	3	4	5	6	7	8
4	4.5	4.75	5	5.5	6	6.5	7
2	2.25		2.5	2.75	3	3.25	3.5
1			1.25		1.5		1.75
0.5					0.75		

2	3	4	5	6
4.5	5	5.5		6
2.25	2.5	2.75		3
	1.25			1.5
				0.75

1" π  (For cutting D.P. thread)

1	2	3	4	5	6	7	8
8	9		10	11	12	13	14
16	18		20	22	24	26	28
36							56
							112

2	3	4	5	6
9	10	11		12
18	20	22		24

 / π (For cutting module thread)

1	2	3	4	5	6	7	8
2	2.25		2.5	2.75	3	3.25	3.5
1			1.25		1.5		1.75
0.5					0.75		

2	3	4	5	6
2.25	2.5	2.75		3
	1.25			1.75
				0.75

Metric lead screw lathe

 **MM (For cutting metric thread)**

1	2	3	4	5	6	7	8
4	4.5	4.75	5	5.5	6	6.5	7
2	2.25		2.5	2.75	3	3.25	3.5
1			1.25		1.5		1.25
0.5					0.75		

 **(For cutting inch thread)**

1	2	3	4	5	6	7	8
4	4½	4¾	5	5½	6	6½	7
8	9	9½	10	11	12	13	14
16	18	19	20	22	24	26	28
32	36	38	40	44	48	52	56
64	72		80				

 **/π (For cutting module thread)**

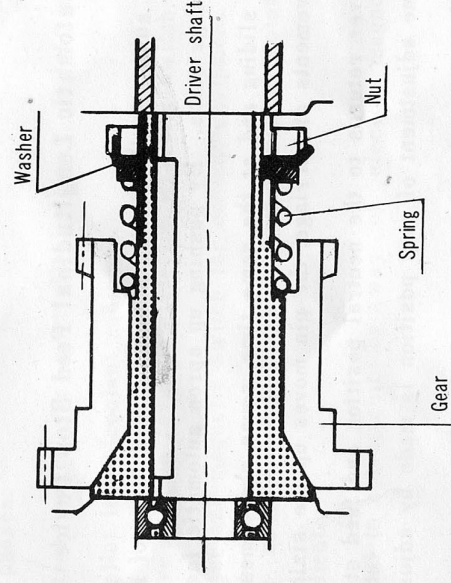
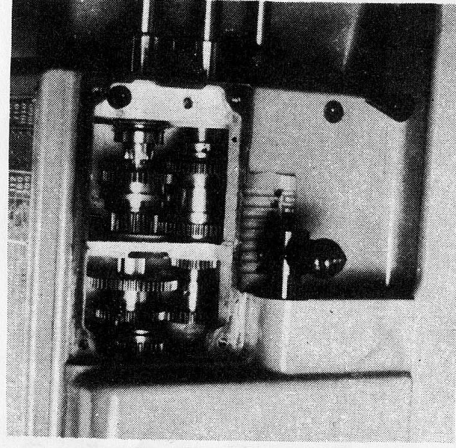
1	2	3	4	5	6	7	8
2	2.25		2.5	2.75	3	3.25	3.5
1			1.25		1.5		1.75
0.5					0.75		

7. Safety Device

7 - 1 Automatic Feed Safety Device

Feed rod is automatically stops when excessive cutting power is produced. The device is furnished to gear inside the lid of feed box where levers ⑩ and ⑪ are installed.

Map 7-1

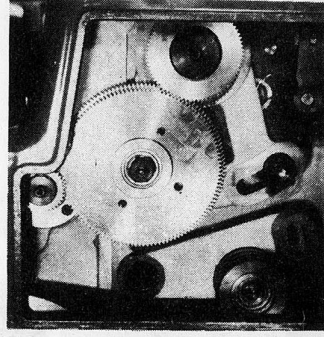


Map 7-2

(a) Adjusting Method:

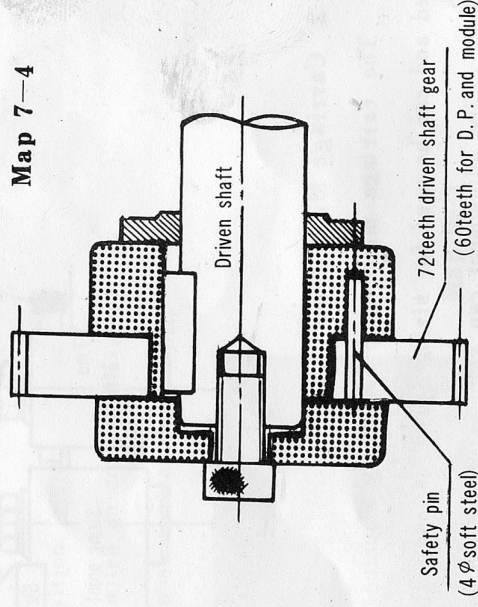
When feed rod does not rotate or stops by slight overload, take off lid of feed box where levers ⑩ and ⑪ are installed, and you will find washer between collar and nut. One of the blades of washer is bent toward the channel of nut preventing the nut from loosening. And by clamping the nut, feed rod can rotate normally. Do not clamp it too tight, to protect the device from inefficiency. After proper adjustment, protect nut loosening by the blades.

7 - 2 Change Gear Safety Device



Map 7-3

Map 7-4



This device is attached to the 72 teeth change gear used for driven shaft (or 60 teeth gear of optional equipment). In case of overload in feed & thread cutting, the built-in safety pin is cut and only gear rotates avoiding to give damages to other parts. The snapped pin can be

replaced by new pin. Diameter of the pin is $4\phi\text{mm} \times 25\text{mm}$, ordinary solid-drawn steel (soft steel) is used for replacement. Beware that harder material affects on safety efficiency.

7 - 3 Automatic longitudinal feed stop device can be used as safety device (Refer 8-1)

(Refer 8-1)

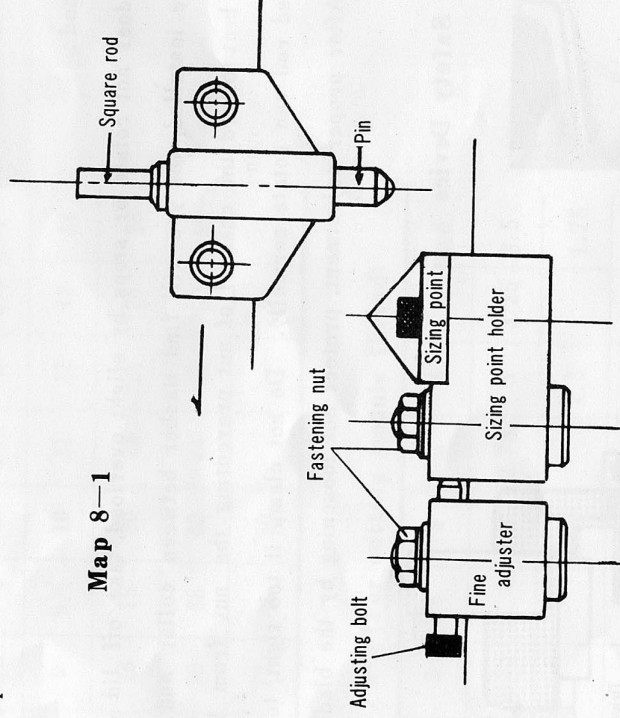
8. Sizing Device

8 - 1 Automatic Longitudinal Feed Stop Device

By automatically putting automatic feed lever of apron into neutral position, longitudinal feed of carriage stops. By pushing up apron automatic feed lever, carriage is given motion of longitudinal sliding and at the same time, square rod comes down to contact with the pin head. With the movements of carriage, the pin moves up the sizing point pushing up square rod and automatic feed lever returns to the neutral position and feed stops.

Fine adjustment of stop position is made by adjustment bolt on fine adjuster on sizing point holder loosening clamp nut.

Map 8-1

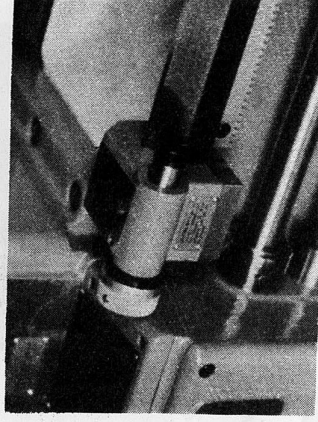


8 - 2 Carriage Micro Stop

The carriage micro stop is simply mounted on bed and can be used for sizing device of longitudinal work. Fine adjustment can also be performed by a micrometer dial graduated $0.0025''$ (or 0.1mm).

Take caution not to make the device knock the carriage, as it is not a device for stopping automatic feed.

Map 8-2



9. Electric Supply

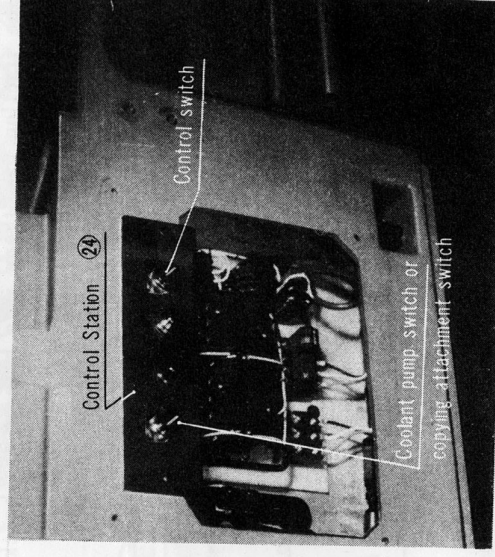
9 - 1 Construction of Electric Supply

The electro-mechanism of MS-series Lathe composed of Electric motor for main spindle, Coolant pump switch, Control station, Electro-magnetic control panel, Micro-switch and Transformer for controller circuit.

- (a) For the main spindle prime mover, a casing type Induction motor is employed. Output capacity is 3.7KW 4 or 6 poles and of 3 phases.
- (b) On the control station, there equipped control switch for controller circuit, pilot lamp (power source), coolant pump switch and pilot lamp (coolant equipment).
- (c) In the electro-magnetic control panel, there built in reversible electro magnetic switch for main spindle, subsidiary magnetic transmitter and magnetic switch for coolant equipment.
- (d) The starting lever is connected with three micro-switches, say normal reverse rotation switch, Micro-switch for stop-motion indicator.
- (e) Micro-switch is connected with brake pedal to cut circuit by way of electro magnetic switching.

9 - 2 Order of Operation

1. Put on the Control switch on control station ②④, then the red lamp is lighted.
2. Then the main spindle is ready for rotation by the operation of starting-lever ① at will.
3. For quick stop of the main spindle, push brake pedal ③①. Hydraulic disc brake will operate by the work of magnetic switch to cut electric supply.
「To move again, put the stating lever ① to the neutral position and repeat the starting lever motion to normal or reverse position.」
4. For normal stop, put the lever to neutral position.
5. Coolant equipment is operated by a control switch on control station.
6. When the work is closed, put all the switches on control station off.



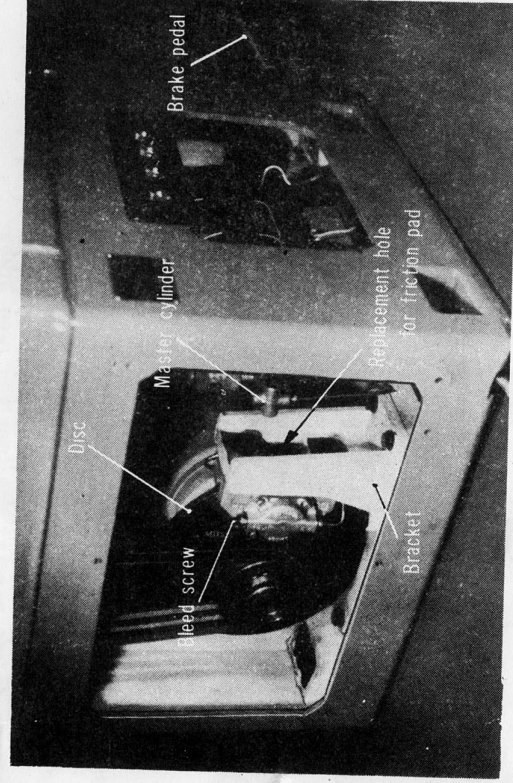
Map 9-1

9 — 3 Thermal Relay

(a) In case of frequent and intermittent operation of the machine, it sometimes happens to burn out induction motor for main spindle due to heavy current flown to the motor. To prevent this a thermal relay is employed. When the main spindle does not rotate even if starting lever is put on, the thermal relay is in work to cut the electric circuit, so wait one minute or until it recovers itself automatically. But when thermal relay is found working so often, there may be overload to the motor or something is wrong with the machine.

10. Braking Device

When the stopping of the machine operation is necessary, a momentary treading on brake pedal ㉓ can stop the spindle rotation with no trouble of returning the starting lever ① to the neutral position (there is no need of keeping treading on the pedal after stoppage). To start rotation of the spindle again, the starting lever must be once positioned at the neutral point.



Map 10-1

10-1 Friction Pad

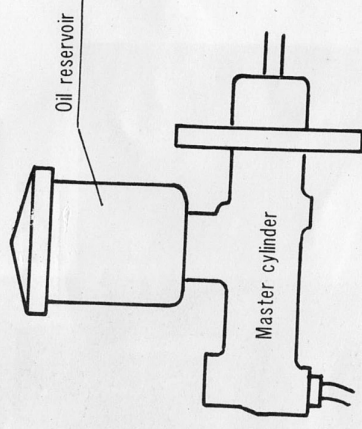
Never take off cylinder from caliper or caliper from bracket to avoid unnecessary trouble of re-adjustment.

For easy interchange of the friction pad, there is a hole in the bracket.

— refer to 10-6 Procedure for Pad Replacement —

10-2 Brake Fluid

When brake fluid in the reservoir of master cylinder is diminished less down than the standard level (above 70%), fresh fluid must be supplied to the reservoir. If the machine is operated under less fluid, air might be intermixed into the hydraulics and prevents the function of the brake.



Map 10-2

Should air be mixed, it must be taken off immediately according to "10-4 Bleeding Procedure"

The lubricant must be pure brake fluid and never be mineral oil.

10-3 Bleeding of Brake System

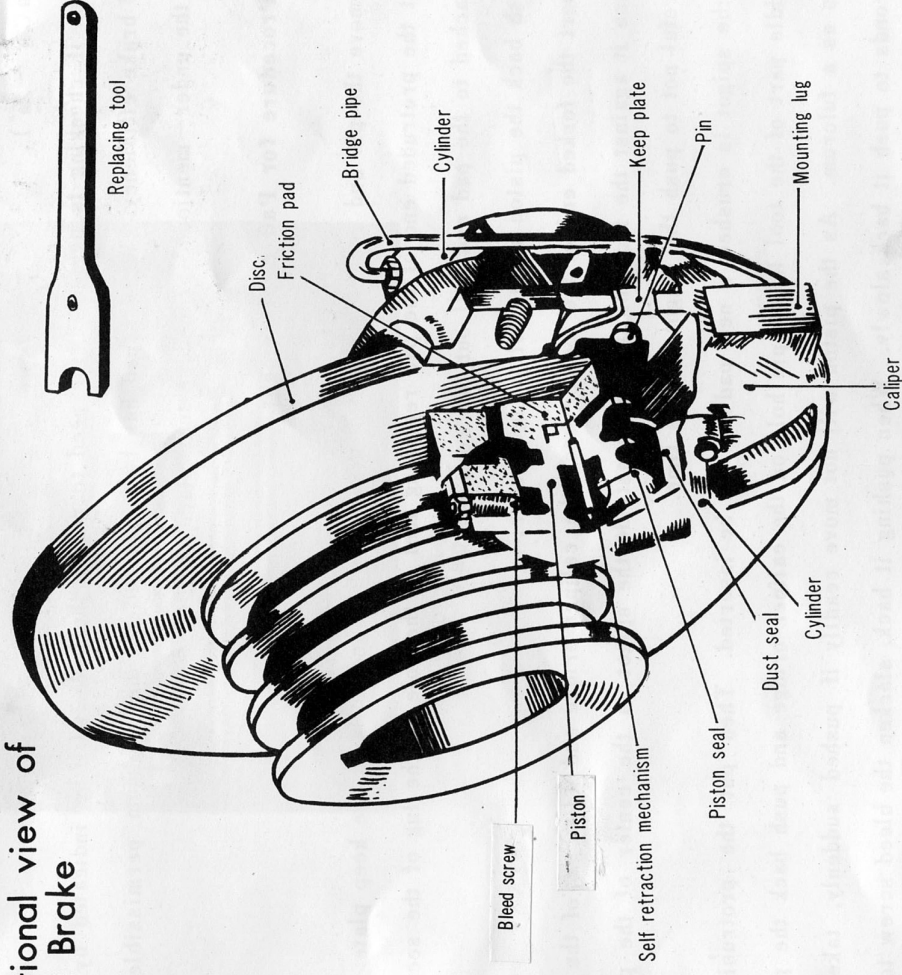
If there is air mixed in the hydraulics of the brake, efficient braking functions can not be expected, and air must be let out in the following cases.

1. Air is mixed because of diminished brake fluid in the reservoir the standard level means that the fluid is kept restored more than 70% of the maximum reserving volumes of the reservoir.
2. Air is mixed through loosened connecting point of the hydraulics.
3. Air is mixed because of disconnected point of the hydraulics.

10-4 Bleeding Procedure

1. During the bleeding operation, it is necessary to keep the reservoir of the master cylinder full of brake fluid in order to prevent air from finding its way into the brake system.
(When replenishing, be sure that the same brake fluid as specified is used)
2. Inspect to make sure that all the joints in the hydraulic system are tight.

Sectional view of Disc Brake



3. Attach a transparent hose to the end of the bleed screw at the brake and immerse the other end of the hose in a container containing a small quantity of brake fluid.

4. Push the push rod of the master cylinder and loosen the bleed screw in this condition.

When fluid and air have come out, tighten the bleed screw and restore the push rod to its original position. Repeat the operation of pushing the push rod and loosening and tightening the bleed screw. When it has been confirmed that absolutely no more air bubbles come out from the hose attached to the bleed screw, finally tighten the bleed screw while the push rod is pushed.

During this operation, make sure that there is sufficient brake fluid in the reservoir, replenish the brake fluid if necessary.

5. When the bleeding of all the brakes has been completed in this way, fill up the brake fluid in the reservoir of the master cylinder to the required level.

6. Finally, apply an ordinary braking force to the brakes for 2~3 minutes and inspect the whole hydraulic system for leaks and make sure that it is in order.

10-5 Replacement for Friction Pad

10mm ($\frac{25}{64}$ ") out of the total thickness of 16.7mm ($\frac{21}{32}$ ") of the friction pad (new) can be consumed. In other words, it is necessary to replace the pad when its thickness has become 6~7mm ($\frac{15}{64}$ " ~ $\frac{9}{32}$ ").

Even if checking is neglected, the need to renew the pads will be indicated by a gradual loss of brake efficiency. When a pad has been reduced to the minimum permissible thickness, follow the under-mentioned procedure to replace it.

10-6 Procedure for Pad Replacement

1. Remove the pin and securing ring for the keep plate and pull out the keep plate.

2. Put the protruded end of the pad replacing tool in the hole of the lug of the securing plate attached to the pad and pull out the worn pad.

3. Push back the piston in the following manner;

Insert the forked end of the tool between the caliper bridge and the front of the piston and place it against the front of the piston astride the spigot in the center of the piston. Be careful not to push the spigot at this time.

If the spigot is crushed, a new pad can not be inserted. Then put the protrusion in the middle part of the tool in the pin hole on the caliper bridge and push back the piston with this as a fulcrum. As the piston will not move readily if pushed suddenly, take about 20 seconds to push it back slowly. When pushing it back, slacken the bleed screw to discharge

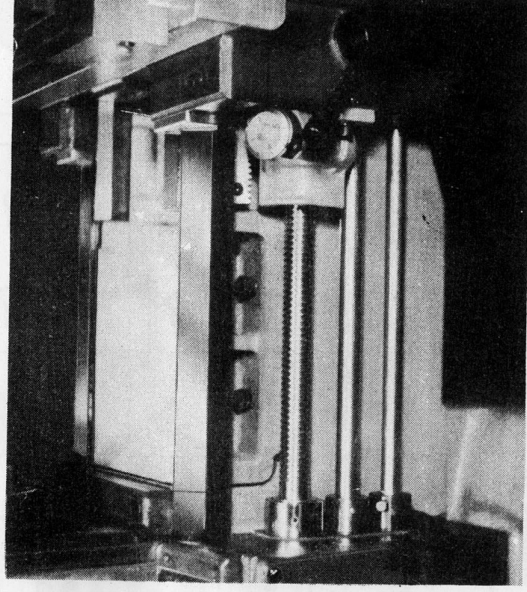
the old brake fluid in the cylinder. Slakening the bleed screw also makes it easier to push back the piston. Repeat the above procedure with the piston on the other side.

4. Insert a new pad, restore the keep plate to its original position, and secure it with the pin and ring.

11. Removal of Gap (MS-850G.1050G.1250G)

First of all loosen six fixing bolts and lift up the gap bed until the guide pin comes off. After that, remove the gap bed crossways. The guide pin will be left at the gapped portion after removal of the gap bed. Removed gap bed must be kept in a safety place with every precaution against damage and rust. The guide pin is so provided as to make it easy to reset the gap bed with maximum original accuracy.

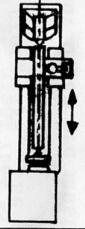
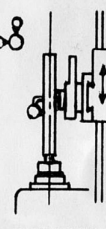
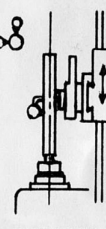
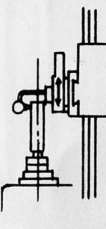
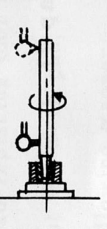
Be careful not to have dirt or chip entry into guide pin hole or to the surface where gap bed is to be rebuilt on, always keeping them clean.



Map 11-1

12. Accuracy Test of Lathe

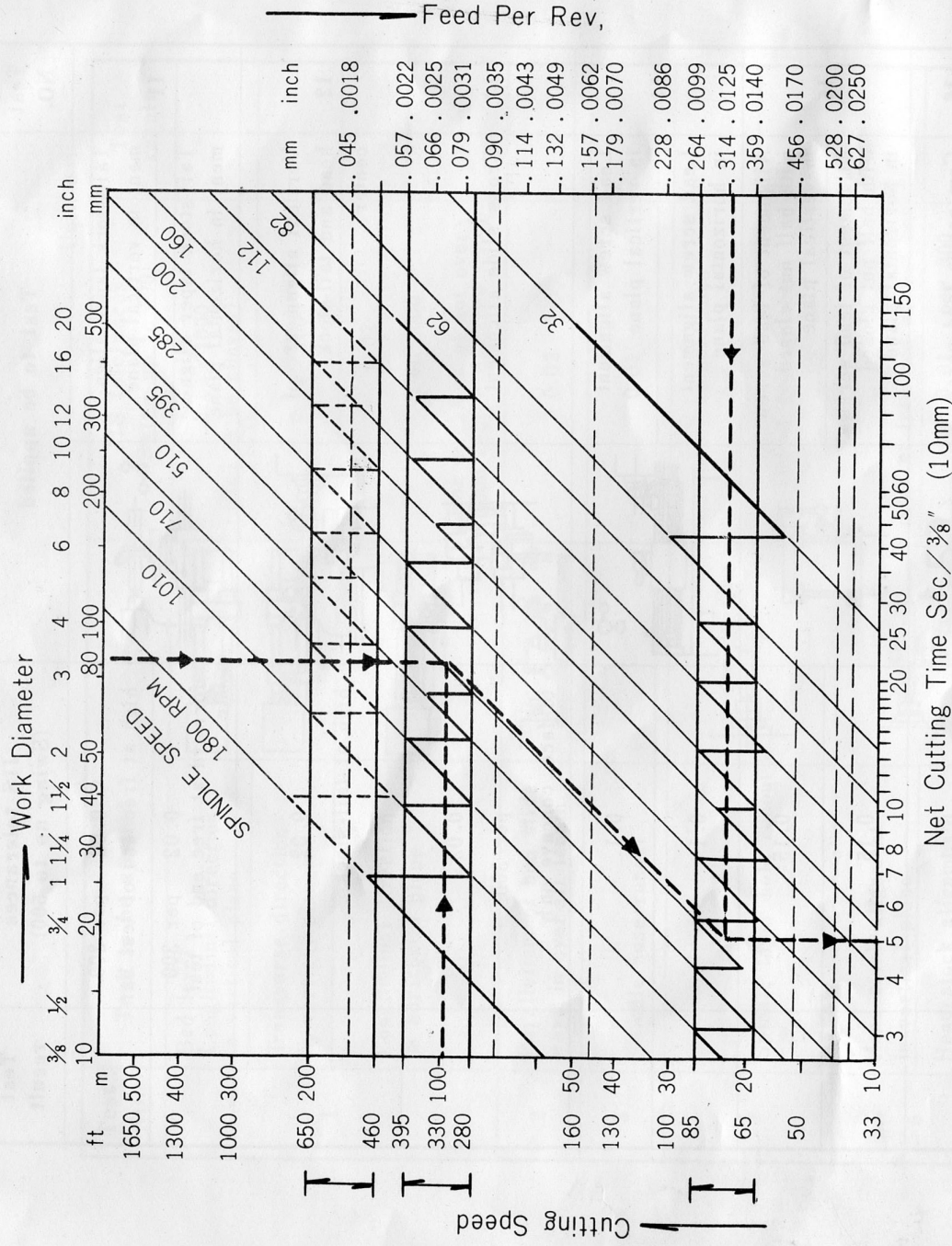
Unit: mm

Test NO.	Test to be applied		JIS tolerances (Swing up to 500)	Test result
1	Bed level Longitudinal direction in vertical plane		0.04/1000 (Bed to be convex)	
	Transverse direction in vertical plane		0.04/1000	
2	Longitudinal direction in horizontal plane		0.02 Per 2000 (For machines of not over 2000 center distance)	
	Parallelism of bed slide ways in over-all length		0.02	
3	Spindle nose runout		0.01	
4	Spindle taper hole runout		at end of spindle nose 0.01	
			at end of 300 test bar 0.02	
5	Head-stock alignment in vertical plane		0.01 per 300 high at free end of test bar	
	Head-stock alignment in horizontal plane		0.01 per 300 forward at free end of test bar	
6	Upper slide alignment in vertical plane		0.03 per 150	
7	Spindle sleeve hole runout		at end of spindle nose 0.02	
			at end of 300 test bar 0.03	
8	Cam action of spindle		0.015	
9	Spindle center runout		0.02	
10	Tail-stock spindle align- ment in vertical plane		0.02 per 150 high at free end	
	Tail-stock spindle align- ment in horizontal plane		0.01 per 150 forward at free end	

Test NO.	Test to be applied	JIS tolerances (Swing up to 500)	Test result
11	Tail-stock taper alignment in vertical plane	0.02 per 300 high at free end of test bar	
	Tail-stock taper alignment in horizontal plane		
12	Vertical alignment of head and tail-stock center	0.02 high at tail-stock	
13	Cross slide alignment	0.02 per 300 to face, concave only	
14	Lead screw alignment in vertical plane	0.1	
	Lead screw alignment in horizontal plane	0.1	
15	Alignment of lead screw with half nut closed in vertical plane	0.15	
	Alignment of lead screw with half nut closed in horizontal plane	0.15	
16	Cam action lead screw	0.01	
17	Pitch error of lead screw	0.03 per 12in.	

This test was performed according to the Japanese Industrial Standard and the accuracy was shown in metric size. For the approximate conversion into inch system, each figure should be divided by 25.4.

13. Cutting Speed Diagram



The above diagram is facilitated in studying time factors and is helpful for obtaining a flat time for cutting $\frac{3}{8}$ " (10mm) length of stock under a given cutting speed-circumferential speed per minute-cutting feed and diameter of work. The oblique lines main spindle speed, and the cutting speeds can be divided into three blocks, 280-395 ft./min (85- 120m/min) 460-650 ft/min (140~200m/min) and 62-85 ft/min (19~26m/min). Over 260ft/min (80m/min) cutting speeds are generally suited for carbide tools.

To turn a work of $\frac{3}{8}$ " (80mm) diameter, adequate cutting speed is 330 ft/min (100m/min). at 395 RPM., 420 ft/min (128m/min). at 510 RPM., and 585 ft./min (178m/min). at 710 RPM., In case where cutting speed 280-395 ft./min (85~120m/min)., for example, is selected for workpiece $\frac{3}{8}$ " (80mm) diameter, adequate spindle speed will be 395 RPM., and then if the choiced rate of feed per revolution is 0.0125"/rev (0.314mm/rev), it will take just 5 seconds to cut $\frac{3}{8}$ " (10mm) length of the work.



MS TYPE
PRECISION HIGH SPEED LATHE

Explanatory Note

MORI SEIKI CO., LTD.

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