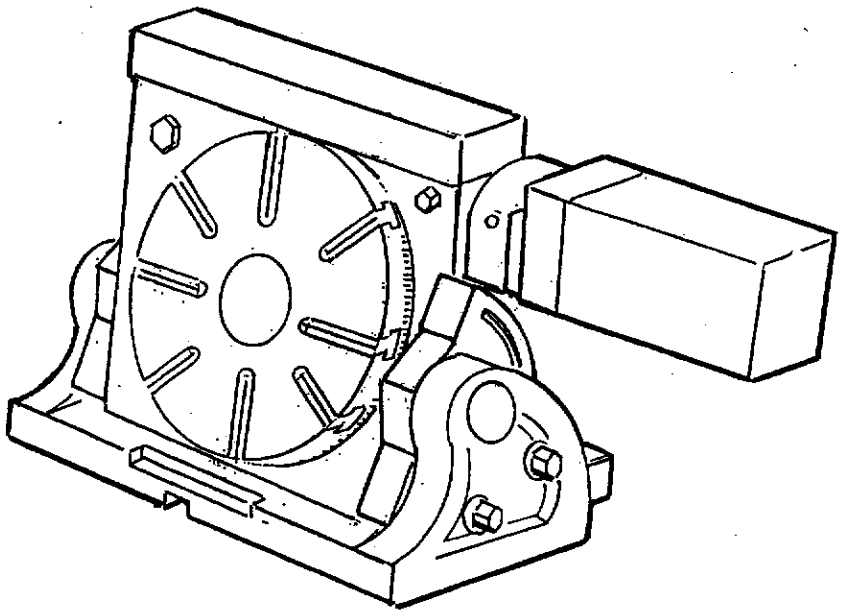
NIKKEN CNC ROTARY TABLE
NST250, NST300 SERIES
INDIVIDUAL INSTRUCTION MANUAL

SIXTH EDITION



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This manual was produced using NIKKEN CNC rotary table NST250,NST300 series. NST250,NST300 series includes NST250 and NST300 with any kind of motor.

It is essential that you read the instructions and safety regulations before you attempt to use CNC rotary table.

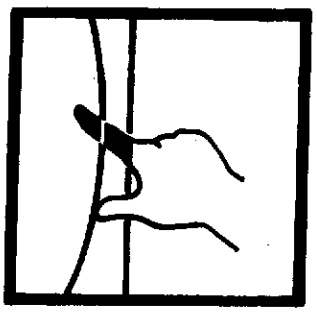
DANGER : This is the industry safety symbol. This symbol is used to bring you attention to items or operations that could cause danger to you or other persons using CNC rotary tables. Please read these messages and follow these instructions carefully.

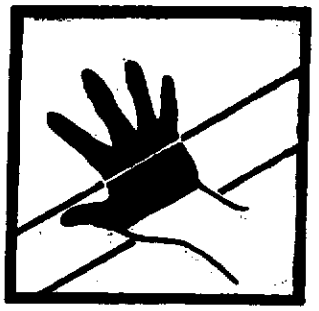
NOTE : This is the industry safety symbol. This symbol is used to bring you attention to items or operations that could be potentially hazardous to you or other persons using CNC rotary tables. Please read these messages and follow these instructions carefully.

DANGER : Use CNC rotary table on the machine with safety door in combination with interlock system.

DANGER : Switch off main power of machine tool before setting, inspection or maintenance.

DANGER : Make sure your hand is out of the area marked as follows:





NOTE : Do not attempt to modify CNC rotary table.

NOTE : Never hammer CNC rotary table or workpiece.

NOTE : Never attempt to operate CNC rotary table while under the influence of alcohol or drugs.

NOTE : Gloves and ties should not be worn when operating CNC rotary table.

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APPENDIX

1 Adjustment of backlash

The worm screw rotates in the totally-enclosed oil bath and the reduction mechanism is composed of a combination of the special ion-nitrided worm wheel and the hardened worm screw, so that it is not necessary to adjust the backlash until four to five years have elapsed after the rotary table is put in service. However, if necessary, the backlash can be adjusted according to the following procedures.

1.1 Measurement of backlash

1) Unclamping the brake.
   Execute unclamp command.

2) Confirming the backlash

   Read a deflection of the dial guage Ⓖ by inserting the flat plate Ⓗ into a T-slot and manoeuvre the faceplate clockwise and anticlockwise through the plate by hand. A backlash of within 5 ~ 15 microns is normal when shipped (It means that at least 5 microns of backlash amount is required for CNC rotary table.), and the adjustment should be done in the event when a backlash of 50 microns or more is observed. The confirmation is to be done on four spots of every 45° of table.

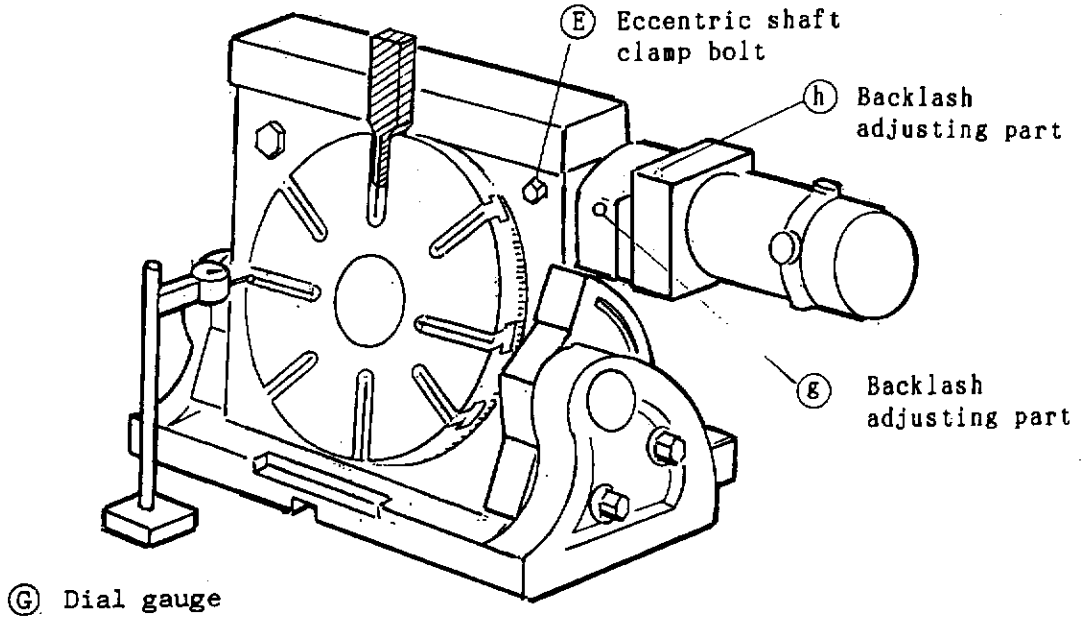


Fig 1

1.2 Adustment of backlash

DANGER

1) Switch off main power of machine tool.

2) Remove the cover.

3) Loosen the eccentric shaft clamp bolt Ⓔ.

4) Here, reset the dial guage Ⓖ as shown in Fig.1, loosen the bolt ⓗ and tighten the bolt ⓖ clockwise, then the eccentric shaft will turn in direction of arrow. Thus, the backlash between the worm wheel and the worm screw will get near to 0(zero). Adjust the backlash to 10～15 microns by using the bolts ⓗ and ⓖ watching the deflection of the dial guage Ⓖ while shaking the outer periphery of CNC rotary table, then securely lock them again.

5) After completion of above adjustment, tighten the eccentric shaft clamp bolt Ⓔ.

6) Measure the backlash again and confirm to that it has been adjusted to 5～15 microns.

7) After completion of the adjustment of backlash, make sure of the motor load. Switch on the power supply, let CNC rotary table rotate on the jog mode to check the gear noise.

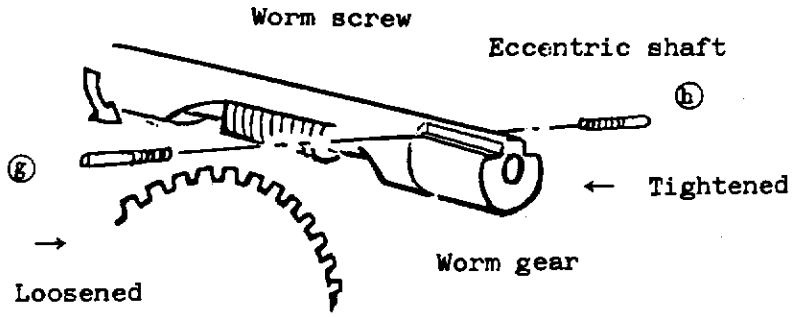


Fig 2

! NOTE If abnormal sound is recognized, loosen the mounting bolts of motor in Fig.3 and slowly turn adjusting bolt clockwise, then it will become normal sound. (This means the adjustment of backlash between the main gear and the motor gear.)

! NOTE The adjustment of backlash is a very delicate work, so be careful when executing it.

! NOTE Be sure to apply each sealing agent (shown in Fig. 1) to its corresponding part assembling the worm screw, so that no ingress of coolant etc. is permitted.

! NOTE By no means turn the table at the rapid speed immediately after the adjustment. Be sure to turn it at the low speed (2 r.p.m) for trial running first, then turn it at the rapid speed.

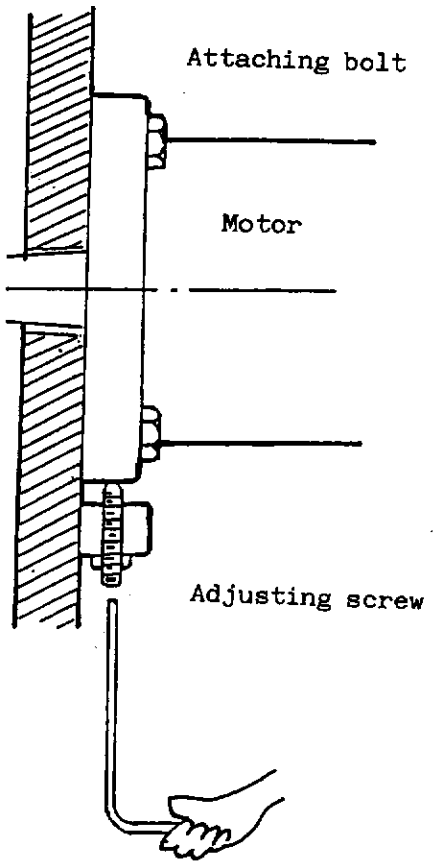


Fig 3

2 Brake mechanism

The brake is incorporated in the backside of the table body, and its mechanism is illustrated in Fig. 4. The brake rod is coupled to the air cylinder.

! NOTE Since this brake mechanism requires a fine adjustment, by no means disassemble it indiscriminately.

The reed switches for confirmation clamp/unclamp are provided on the air cylinder as shown in Fig. 5.

The air cylinder is coupled to the brake rod, so that clamp/unclamp confirmation reed switches sense a movement of the magnetic generator in the cylinder to directly output a contact signal.

The unclamp confirmation reed switch is positioned at 24 ~ 26 mm from the air cylinder rod side, and the clamp confirmation reed switch is positioned at 84 ~ 86 mm therefrom.

In the event of wrong reed switch position with no trouble in the solenoid valve, mechanical brake etc. loosen the reed switch attaching bolts and adjust the positions as described above.

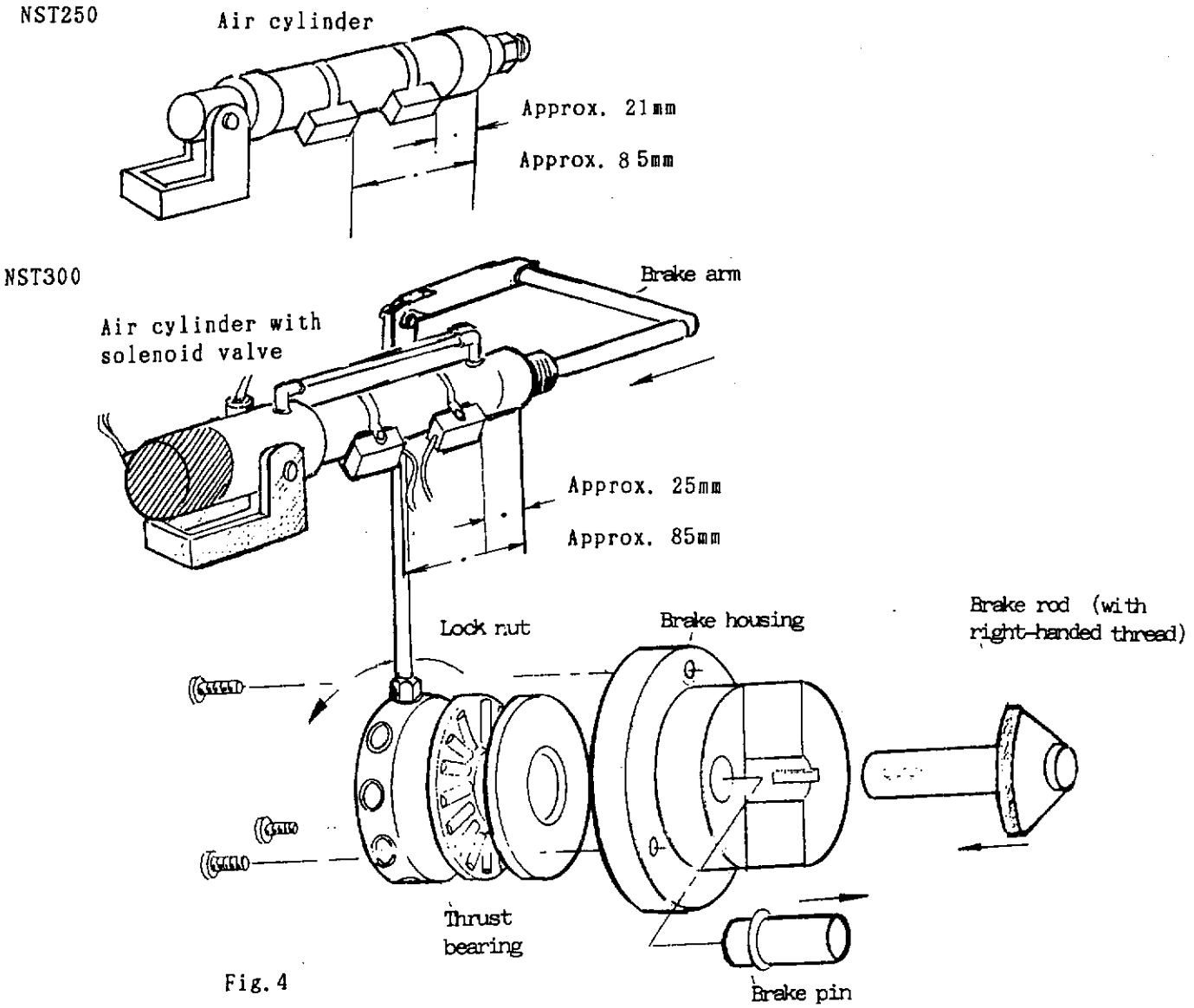


Fig. 4

3. Zero-point return mechanism

The limit switch for deceleration (DEC*) of zero-return is provided in the L part (upper right face of the table) of Fig.1. The dog attached to the outer periphery of the table actuates this limit switch to have it output the DEC* signal. In case when the correct machine zero-point can not be obtained even if the grid shift amount is varied, adjust the dog position.

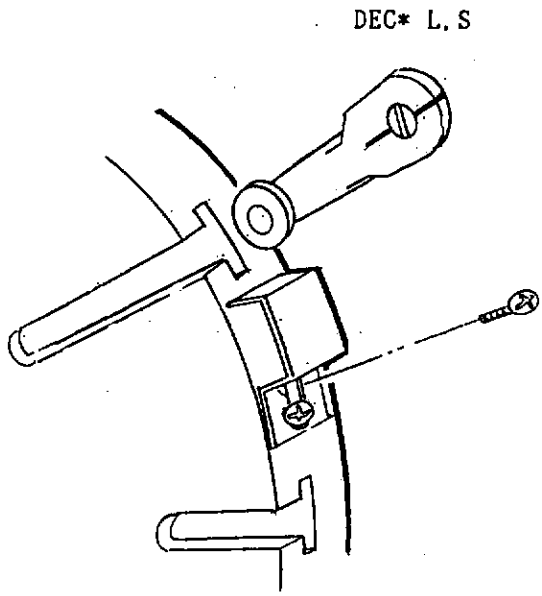


Fig.5

* Movement of tilting axis

Loosen the four tilting axis clamping bolts Ⓑ (both sides) of Fig.6 and the table can be moved toward vertical position when the tilting axis moving bolt Ⓚ is turned clockwise by using the socket wrench, and it can be moved toward horizontal position when the bolt Ⓚ is turned counter-clockwise. The scales with unit of one degree and unit of one minute are provided at the Ⓓ and Ⓓ position of Fig.6 respectively. Move the table to a proper position and tighten the four tilting shaft clamping bolts Ⓑ, thus the movement of tilting shaft is completed.

! NOTE It is recommended to apply grease to or drop lubrication oil (Duetra #3 etc.) on the hub as a periodic maintenance before operation.

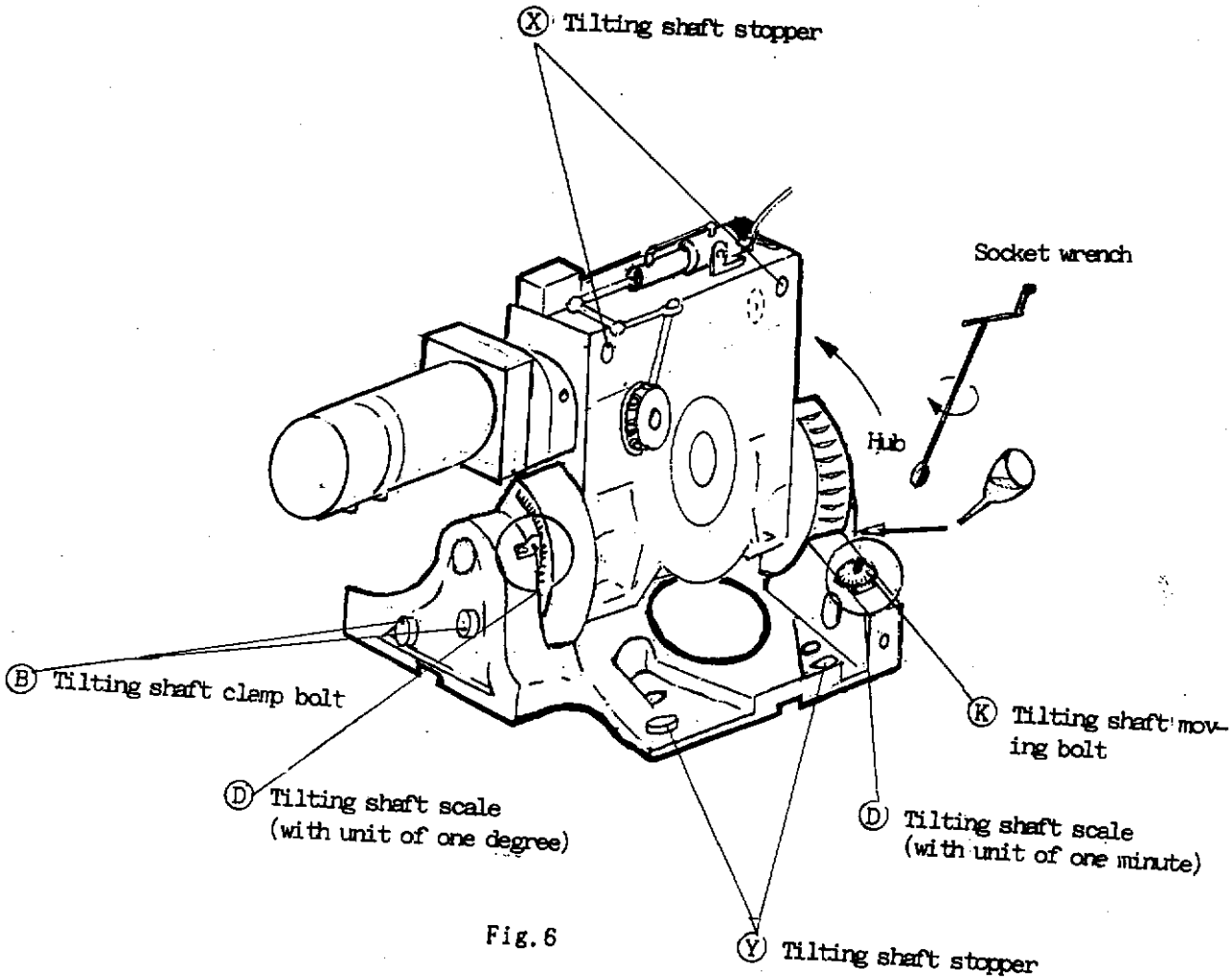


Fig.6

5 Adjustment of backlash for tilting axis

It is not necessary to adjust the backlash of tilting axis until ten years have elapsed since the table has been put in service. However, in the event of a very high vibration noise when the tilting axis is moved toward horizontal position, measure and adjust the backlash between tilting worm wheel and shaft according to the following procedure;

1) Loosen the four tilting shaft clamp bolts (B) on both sides and move the tilting shaft to the horizontal position by using the socket wrench (to the position of Fig.6 where the table does not move any more caused by contact of the tilting shaft stopper (X) with the tilting shaft stopper (Y).

2) Turn the tilting shaft moving bolt by means of the socket wrench, and read a backlash amount from the tilting shaft scale (D) (with unit of one minute).

3) In case when the backlash amount exceeds 5 minutes, loosen the two tilting worm shaft tightening bolts (F) and tighten the tilting shaft backlash adjusting bolt (J) clockwise. Then, the backlash amount will get near to zero.

4) Repeat the procedure 1),2) and 3) again to adjust the backlash amount to 1 ~ 2 minutes. A backlash amount of less than this value would cause an excessive pre-load on the worm shaft to shorten the life of the table.

5) Tighten the two bolts (F) when the adjustment is completed.

6) Loosen the scale plate locking screw (N), move the scale plate to a correct position, and tighten the screw (N). Thus, the adjustment is completed.

! NOTE The adjustment of backlash is a very delicate work, so be careful when executing it.

! NOTE The scale plate is adapted to be adjusted by loosening the scale plate locking screw.

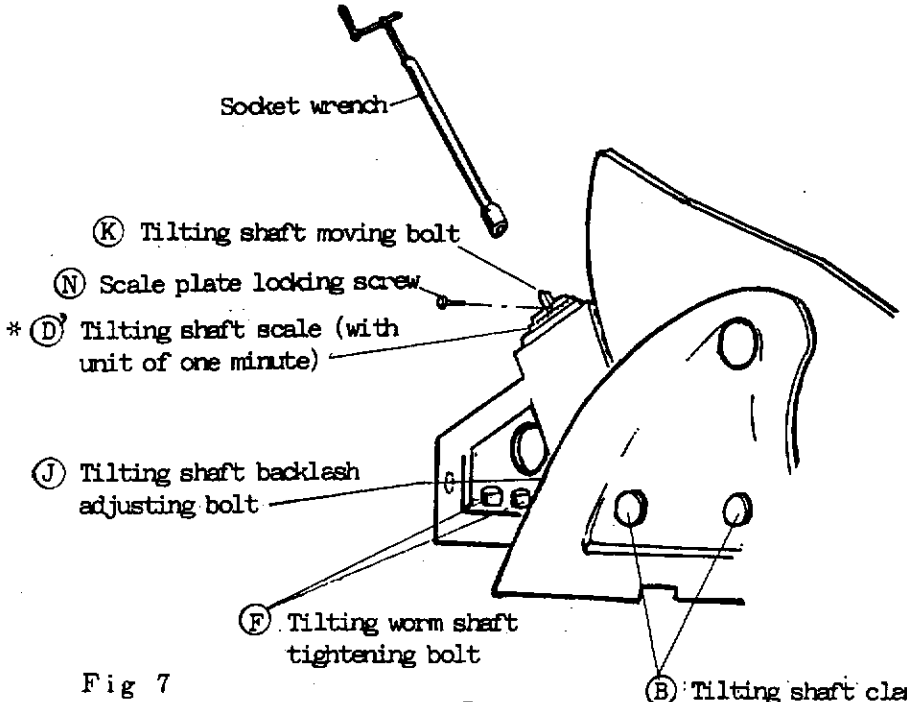
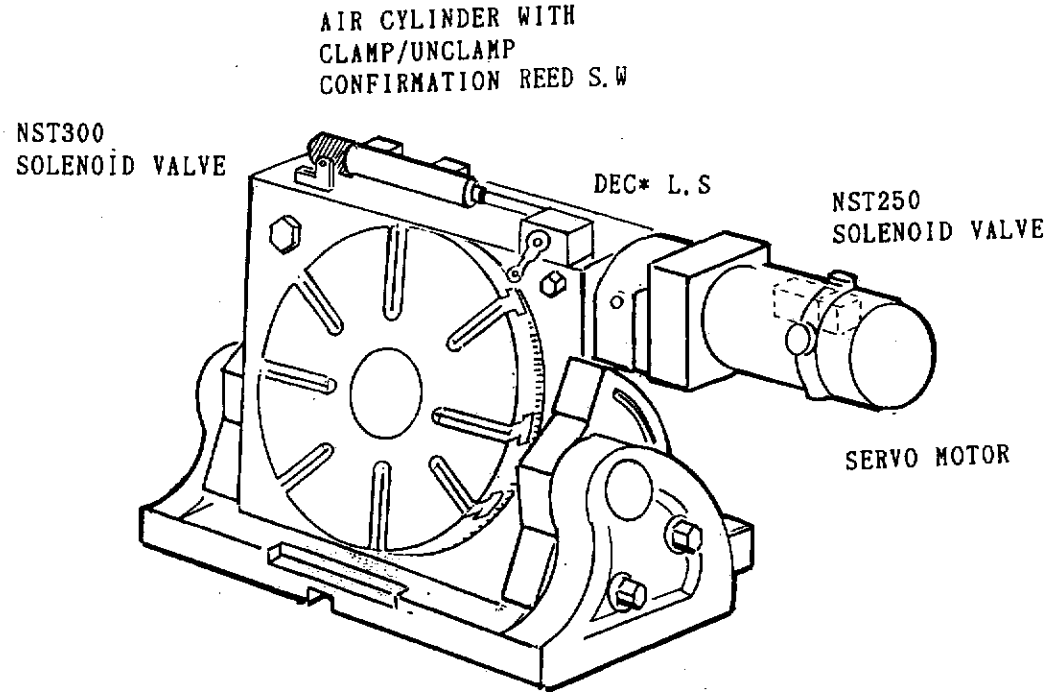


Fig 7

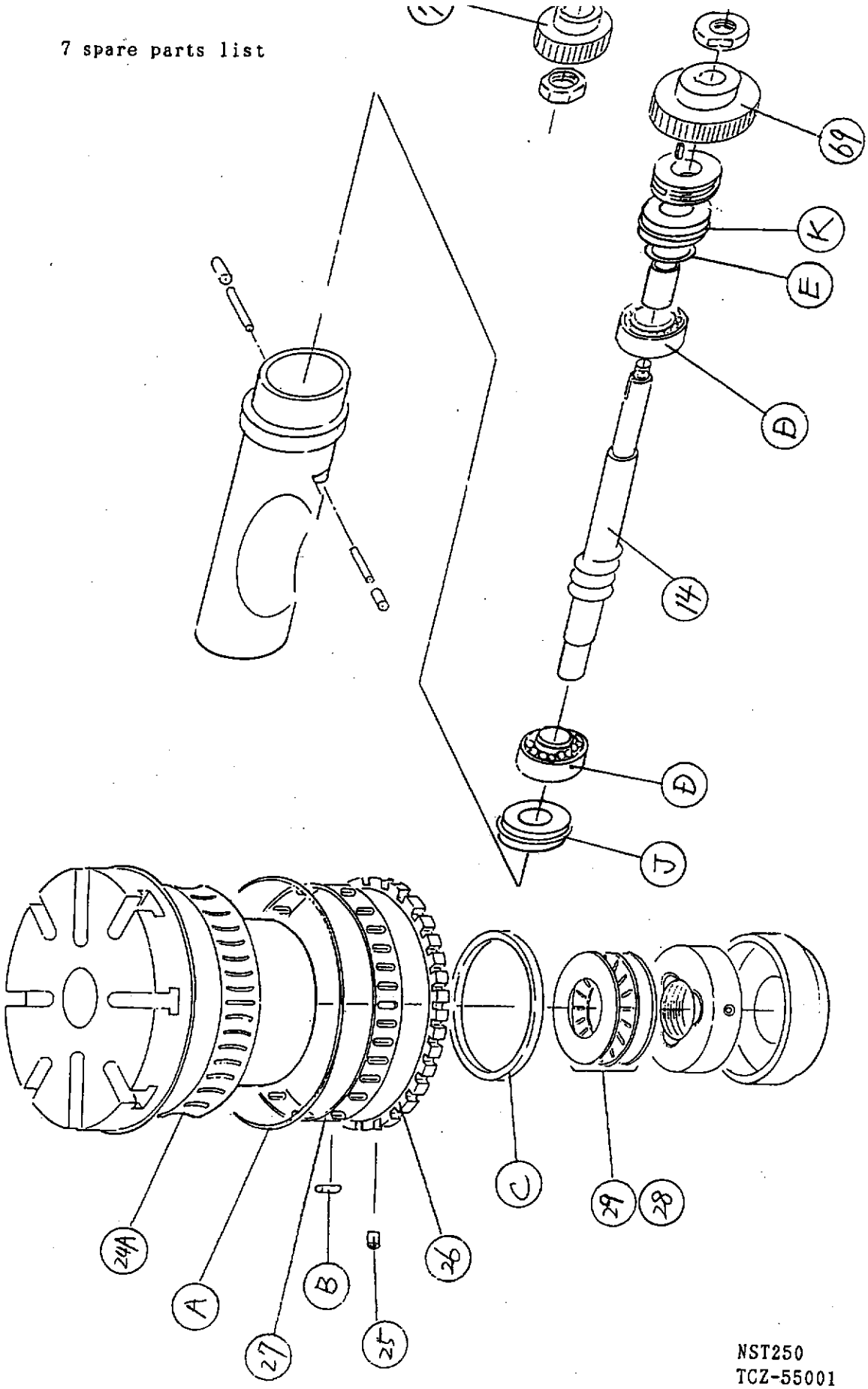
6 Layout of electric parts



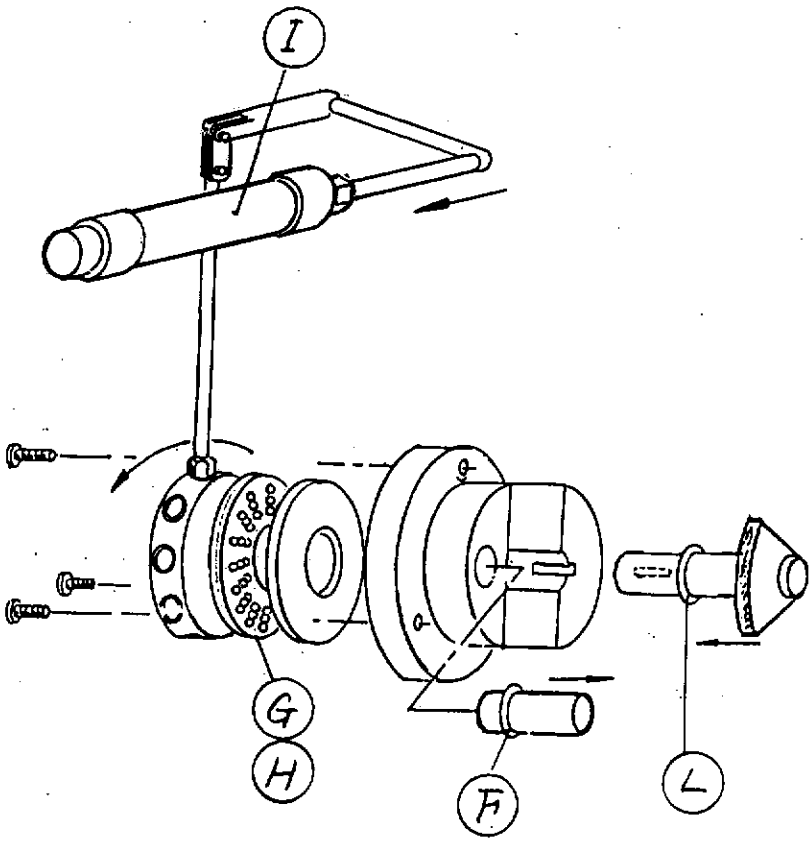
NST250 : The solenoid valve is installed inside a motor cover.
NST300 : The solenoid valve is combained with the air cylinder.

NST250/300 LAYOUT OF
ELECTRIC PAI
TCZ-08000

7 spare parts list

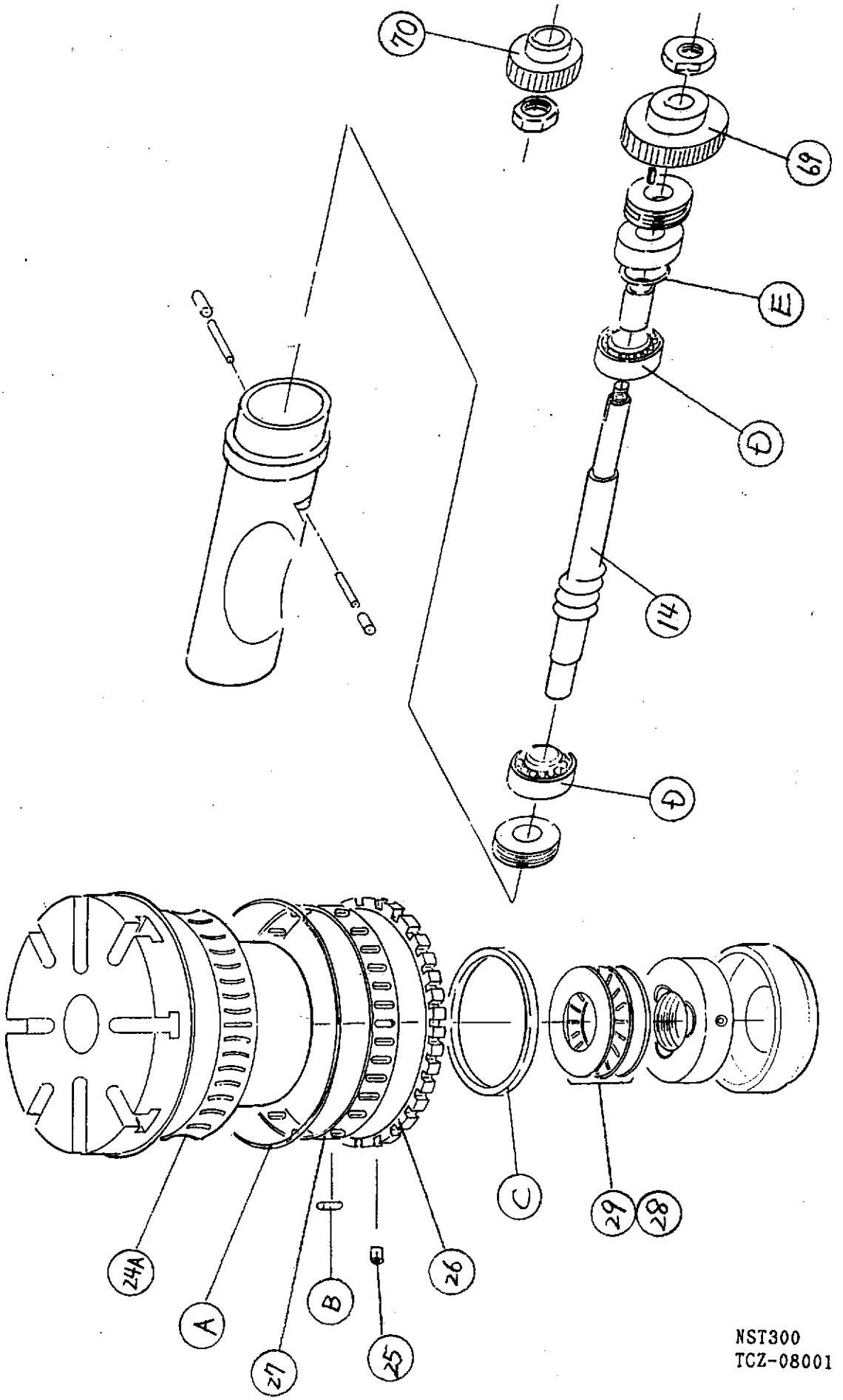


NST250
TCZ-55001

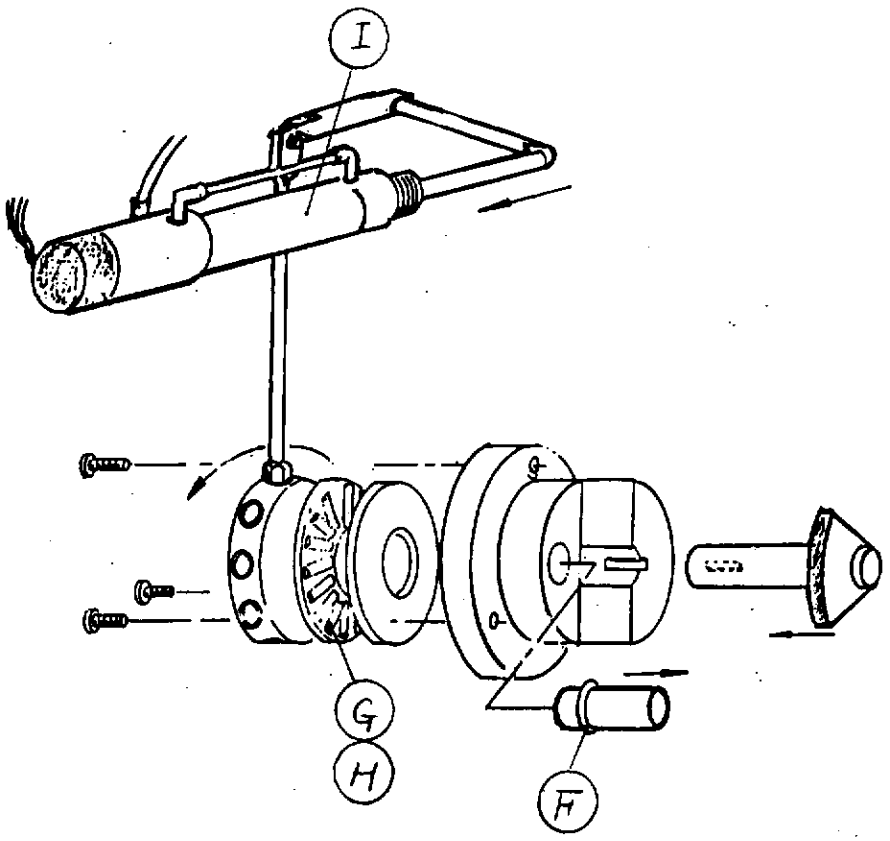


NST250 BRAKE
TCZ-55002

No.	REFERENCE	ITEM	PIECES	REMARKS
14	TCZ-55001	WORM SHAFT	1	
24A	TCZ-55001	WORM WHEEL	1	
25	TCZ-55001	TUBULAR ROLLER	35	ϕ6 * 7L
26	TCZ-55001	RETAINER FOR TUBULAR ROLLERS	1	WITH PLASTIC BAND
27	TCZ-55001	RETAINER FOR NEEDLE ROLLERS	1	
28	TCZ-55001	NEEDLE ROLLER BEARING	1	ϕ3 * 10.4L #28 and #29 ARE SET.
29	TCZ-55001	THRUST RING	2	
69	TCZ-55001	MAIN GEAR	1	
70	TCZ-55001	MOTOR GEAR	1	
A	TCZ-55001	FACE SEAL	1	ϕ230 WITH O-RING
B	TCZ-55001	NEEDLE ROLLER	60	ϕ4 * 11L
C	TCZ-55001	OIL SEAL	1	AR400-P90-GC
D	TCZ-55001	TAPER ROLLER BEARING	1	4T-30203
E	TCZ-55001	OIL SEAL	1	DS25324
J	TCZ-55001	O-RING	1	G-55
K	TCZ-55001	O-RING	1	N-36
F	TCZ-55002	O-RING	1	P-12
G	TCZ-55002	BALL	90	1/8"
H	TCZ-55002	THRUST RING	1	
I	TCZ-55002	AIR CYLINDER	1	DA20*70-CS5B-61W-2
L	TCZ-55002	O-RING	1	N-16



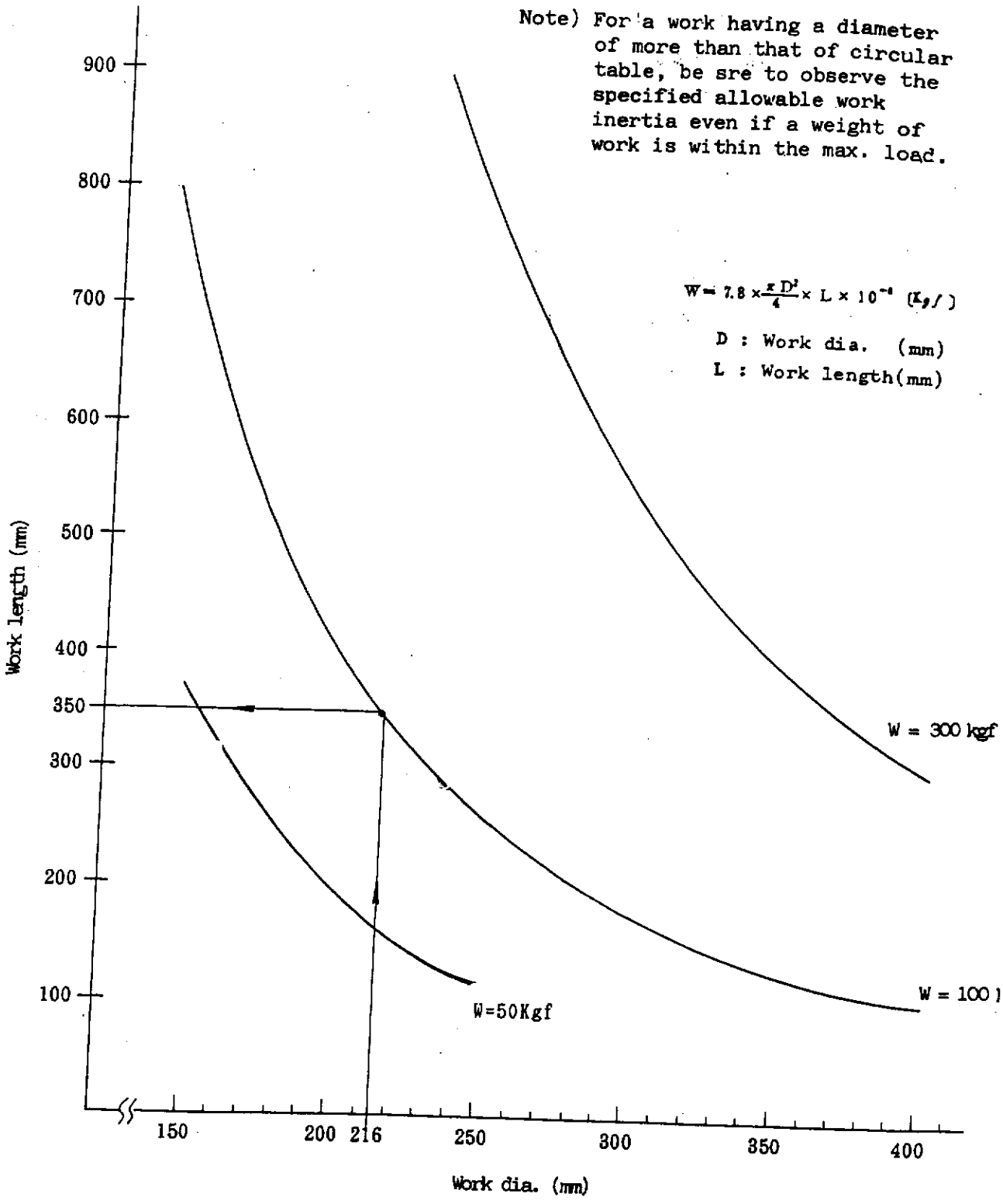
NST300
TCZ-08001



NST300 BRAKE
TCZ-08002

No.	REFERENCE	ITEM	PIECES	REMARKS
14	TCZ-08001	WORM SHAFT	1	
24A	TCZ-08001	WORM WHEEL	1	
25	TCZ-08001	TUBULAR ROLLER	36	ϕ8 * 8L
26	TCZ-08001	RETAINER FOR TUBULAR ROLLERS	1	WITH PLASTIC BAND
27	TCZ-08001	RETAINER FOR NEEDLE ROLLERS	1	
28	TCZ-08001	NEEDLE ROLLER BEARING	1	ϕ3 * 10.4L #28 and #29 ARE SET.
29	TCZ-08001	THRUST RING	2	
69	TCZ-08001	MAIN GEAR	1	
70	TCZ-08001	MOTOR GEAR	1	
A	TCZ-08001	FACE SEAL	1	ϕ280 WITH O-RING
B	TCZ-08001	NEEDLE ROLLER	60	ϕ5 * 19.8L
C	TCZ-08001	OIL SEAL	1	SC90*110*13
D	TCZ-08001	TAPER ROLLER BEARING	1	4T-30203
E	TCZ-08001	OIL SEAL	1	ZF-6
F	TCZ-08002	O-RING	1	
G	TCZ-08002	THRUST BEARING	1	
H	TCZ-08002	THRUST RING	1	
I	TCZ-08002	AIR CYLINDER	1	DVS25*70-376-3W

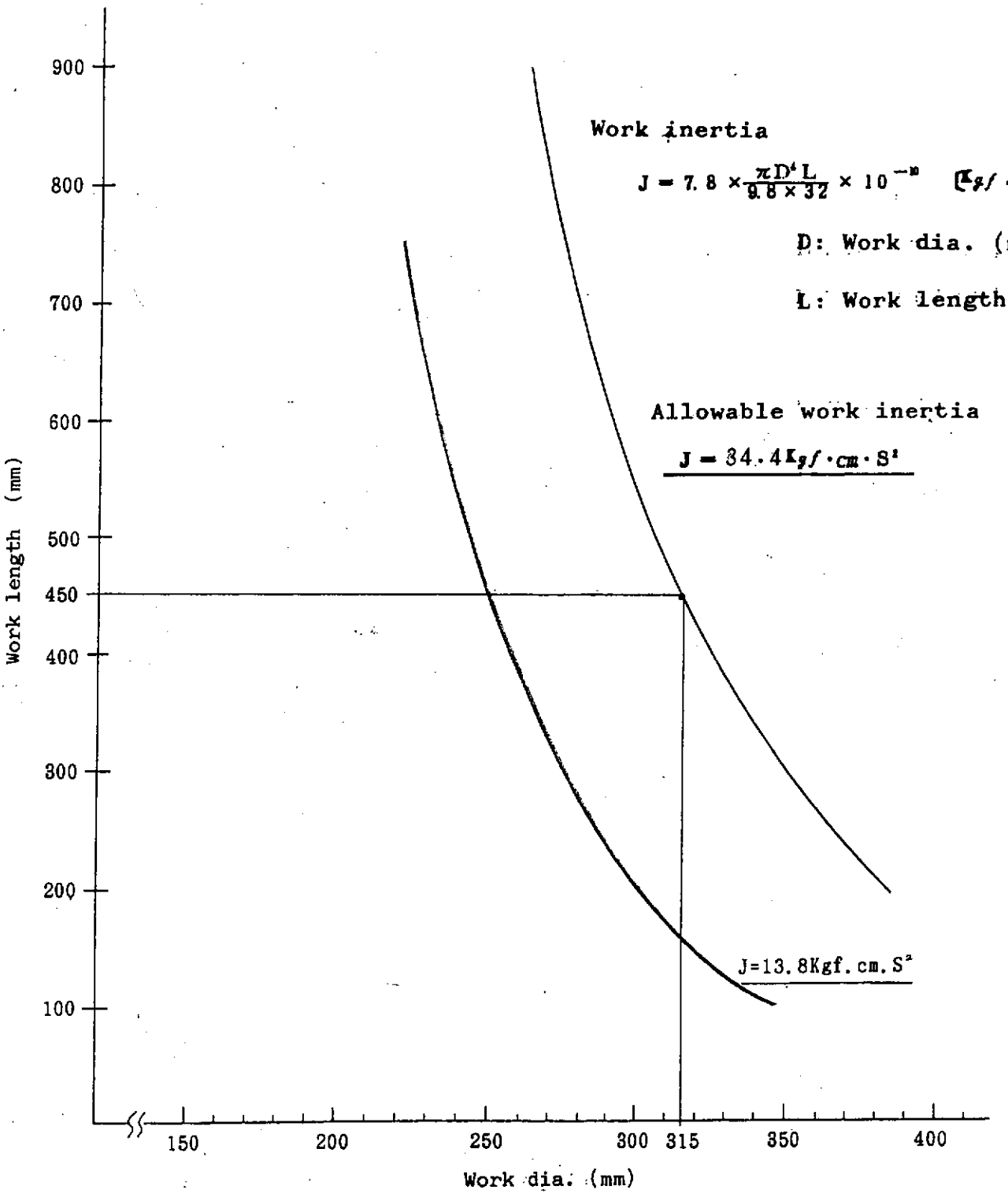
1 Relation between work dia. and length for allowable max. load (for steel)



Utilizing method of above figure

A work, having ø 216 mm dia. length of within 350 mm, will have an allowable max. load of within 100 kgf.

2 Relation between work dia. and length for allowable work inertia (for steel)



Utilizing method of above figure

A work, having ø 315 mm dia. and a length of within 450 mm, will have an allowable work inertia of within 34.4 kgf.cm.s^2.