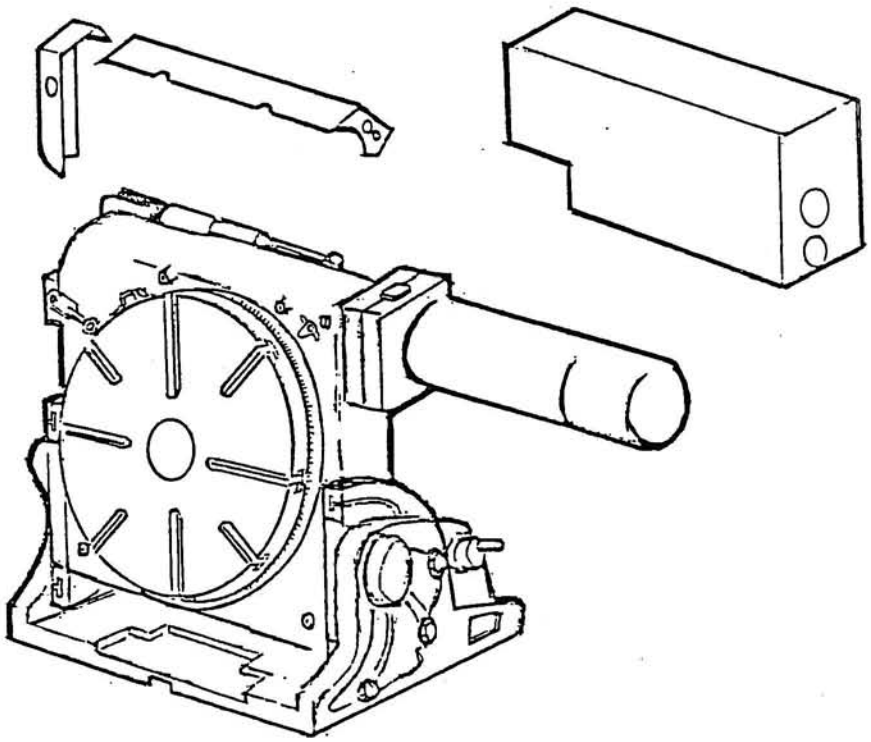
NIKKEN CNC Circular Table

NST 450, 500

Individual Instruction Manual

Fifth Edition$_{FD}$



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C O N T E N T S

1. Preface

NIKKEN CNC circular table consists of precisely assembled mechanisms including micron-accracies and it will provide a long-term and no-trouble operation under normal machining conditions if only you pay careful attention to these mechanism.

Although it seems to be scarecely necessary to adjust gear backlashes of this circular table, methods of adjusting backlash are attached hereto for reference. The circular table includes no part which will worsen its accuracy due to wear, so that adjustment of the gear backlashes is required only after four to five operational years have passed.
You are kindly requested to use this circular table as it was adjusted when shipped from our factory unless it is broken due to collision.

We appreciate our connection with you through NIKKEN CNC circular table and wish to enroll you in our customer list for future service activities. Please fill and mail the attached post card to us.

Please keep "Inspection Table", "Common Instruction Manual" and "Individual Instruction Manual" in your file.
If there should happen any trouble on the circular table, please advise us of all letters engraved on its name plate.

2. Mechanism and preservative adjustment of major functioning part

2-1 Adjustment of backlash (rotating shaft)

The worm shaft rotates in the totally-enclosed oil bath and the reduction mechanism is composed of a combination of the special ion-nitrided worm gear and the carbide worm screw, so that it is not necessary to adjust the backlash until four to five years have elapsed after the circular table is put in service. But, if necessary, the backlash can be adjusted easily in accordance with the following procedures.

1) Opening the brake

Shut off the air supply. Close the air main cock and remove the hose connected to the circular table.

2) Ensuring the backlash

Read a deflection of the dial gauge (G) by inserting the flat steel plate (H) into a T-slot of the circular table and shaking its outer periphery left and right through the plate with hand. A backlash of within 5 ~ 10 μ is normal, and the adjustment is required in the event when a backlash of above 0.05 mm is read out. The measurement is to be done on eight spots of the table by rotating it every 45 degrees. (Refer to Fig. 1 (G) & (H).)

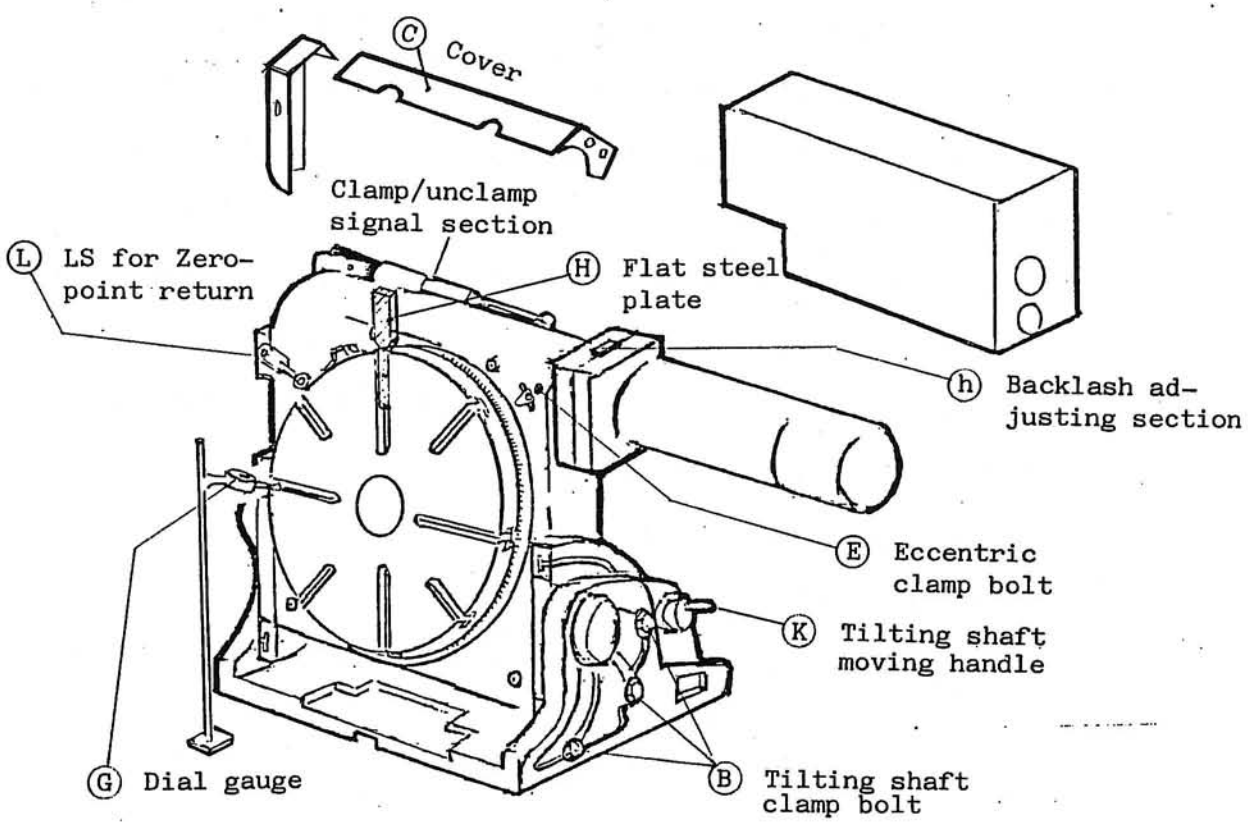

Ⓒ Cover
Clamp/unclamp signal section
Ⓛ LS for Zero-point return
Ⓗ Flat steel plate
ⓗ Backlash adjusting section
Ⓔ Eccentric clamp bolt
Ⓚ Tilting shaft moving handle
Ⓖ Dial gauge
Ⓑ Tilting shaft clamp bolt

Fig. 1

2-1-1 Adjustment of backlash between worm gear and worm screw

1) Remove the cover (C).

2) Loosen the eccentric clamp bolt (E).

3) Loosen the four intermediate case clamp bolts (I).

4) Here, reset the dial gauge (G) as shown in Fig. 1 and tighten the backlash adjusting bolt (h), then the eccentric shaft will turn in the direction of arrow. Thus, the backlash between the worm gear and the worm screw will get near to zero. Adjust the backlash to 10 ~ 15 μm by using the screw (h) watching the deflection of the dial gauge (G) while shaking the outer periphery of circular table. Finally, securely lock the screw.

5) Tighten the intermediate case clamp bolt (I) and the eccentric clamp bolt (E).

6) Measure the backlash again to ensure that the backlash is adjusted to 5 ~ 10 μm.

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

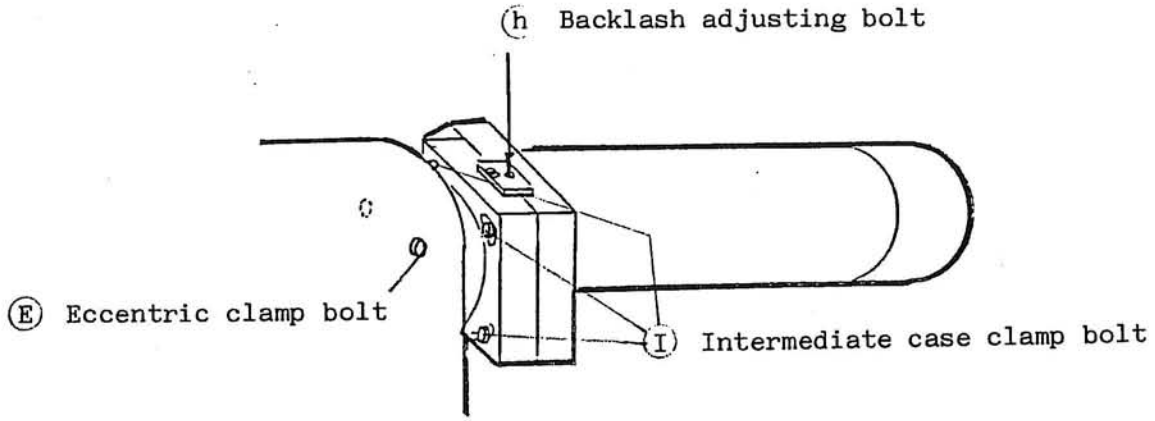


Fig. 2

2-2 Clamping mechanism

Remove the cover Ⓒ and the clamp/unclamp ensuring sensors are provided on the air cylinder. The sensors detect a movement of the magnetic generator assembled to the cylinder in the air cylinder to directly output a contact signal.

The unclamp ensuring sensor is positioned at about 17 mm from the left end of air cylinder (viewing from the table backside) and the clamp ensuring sensor is about 117 mm from that point.

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

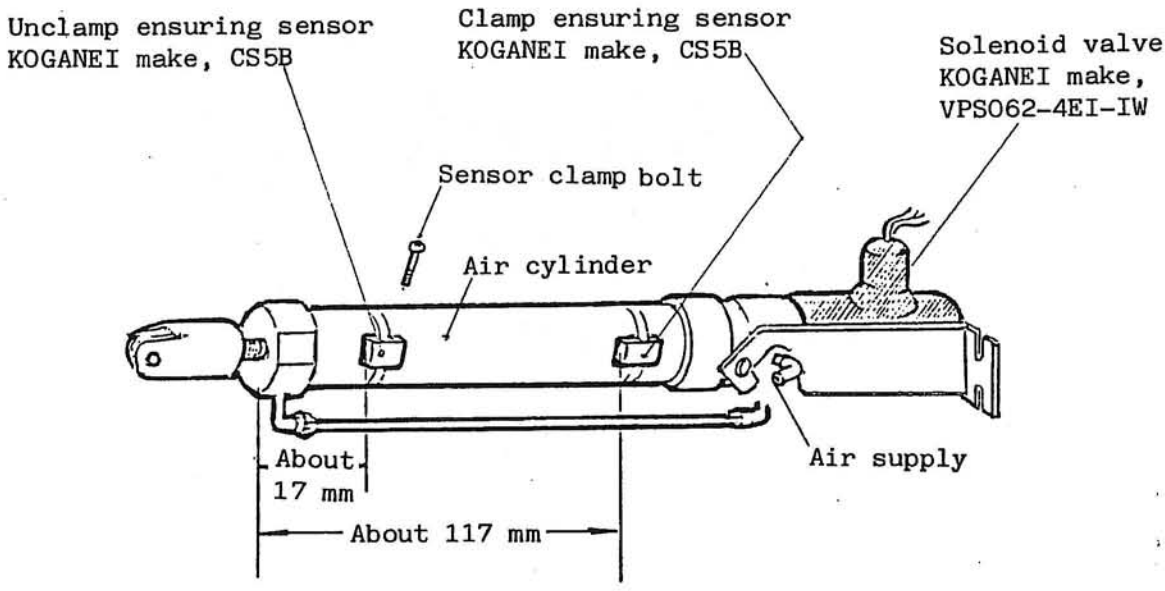


Fig. 3

2-3 Zero-point return mechanism

1) The limit switch (Fig. 5) for zero-point return is disposed in the (L) part (left side face of table) of Fig. 1. The dog attached to the outer periphery of table actuates this limit switch to have it output the speed reduction signal.

2) Adjustment of dog position

Bring the dog under the jog mode to a position where the adjustment can be done easily.

3) Loosen the dog fastening bolts, and shift the dog to a proper position (the dog has circumferential slots for about ± 5 mm shifting). (Refer to Fig. 4.)

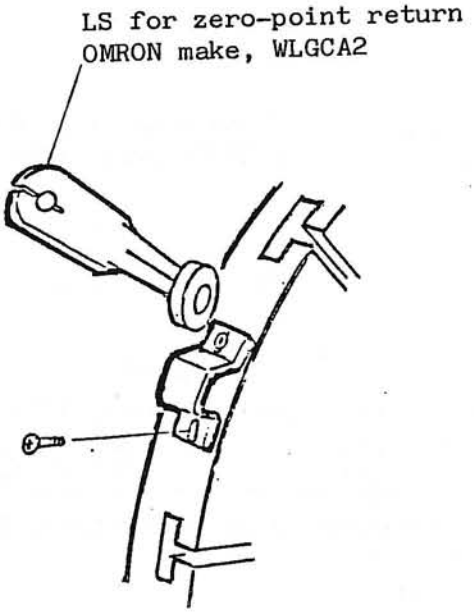


Fig. 4

2-4 Brake mechanism

The brake of this circular table is incorporated at the backside of the table body, and its mechanism is illustrated in Fig. 5. The air cylinder is gear connected to the brake mechanism which exerts a clamping torque of 35 kgf.m with an air pressure of 5 kgf/cm^2.

Since a fine adjustment is required for this brake mechanism, do not disassemble it unnecessarily.

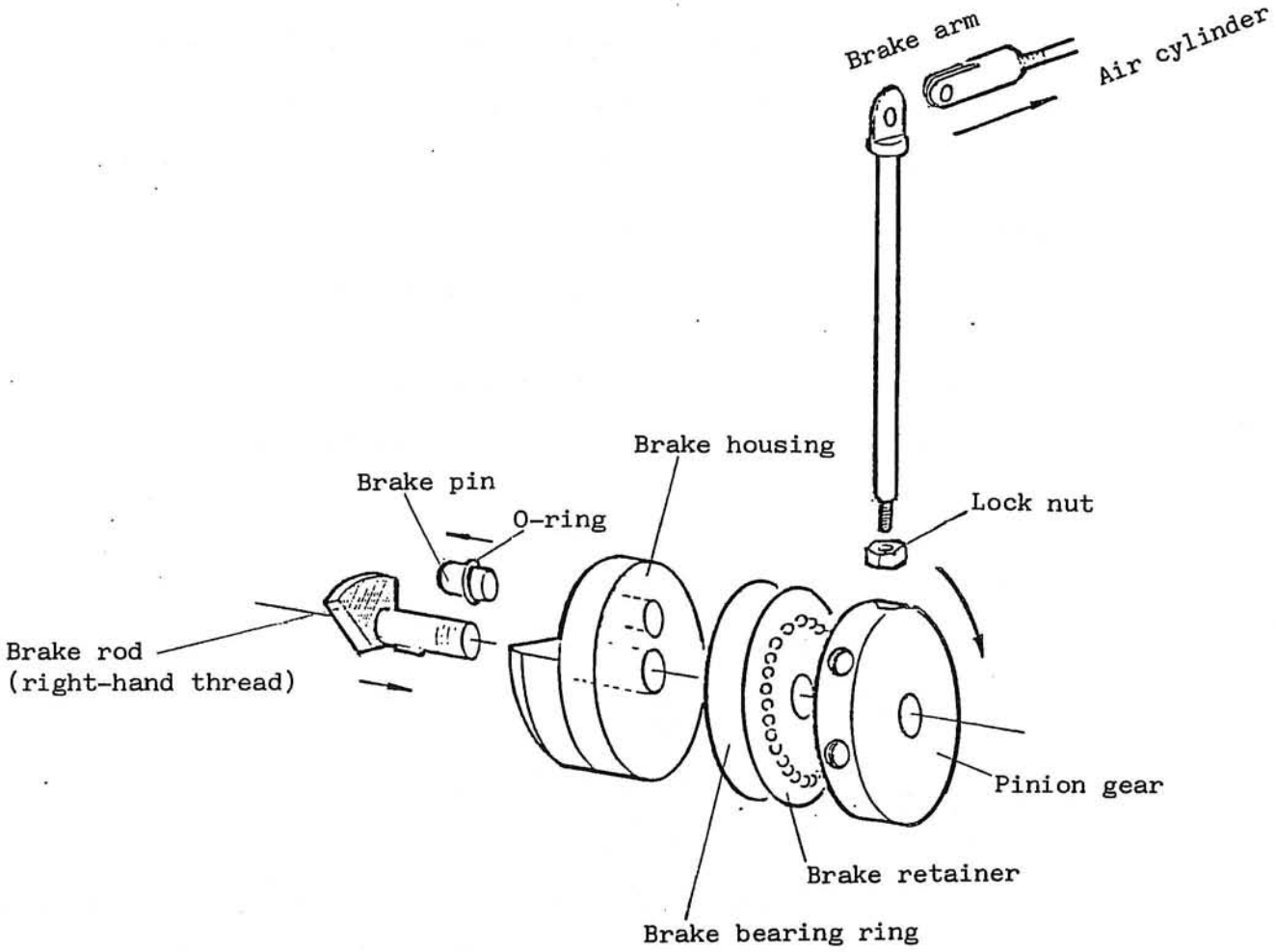


Fig. 5 Brake mechanism

2-5 Movement and adjustment of tilting shaft

2-5-1 Movement of tilting shaft

Loosen the six tilting shaft clamp bolts (B) (either side) of Fig. 6 and the table can moved toward vertical position when the tilting shaft moving handle (K) is turned clockwise, and it can be moved toward horizontal position when the handle is turned counterclockwise (one rotation of handle causes its movement of 2 degrees). The scale with unit of one degree is disposed at (D) part of Fig. 6 and the scale with unit of one minute is disposed at (D') part thereof respectively. Move the table to a proper position and tighten the six tilting shaft clamp bolt (B), thus the movement of the tilting shaft is completed.

Incidentally, apply grease to or drop lubricating oil (Buctra No. 3 etc.) on the hub as the periodic inspection.

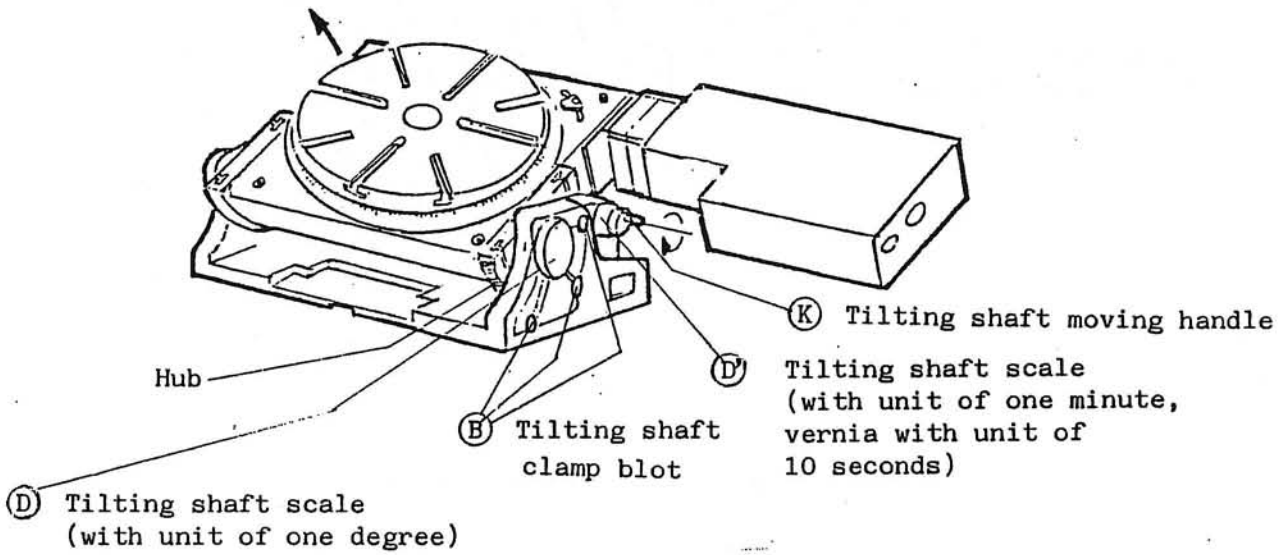


Fig. 6

2-5-2 Backlash adjustment of tilting shaft

It is necessary to adjust the backlash of tilting shaft only after ten years since the table has been put in service. However, in the event of a very high vibration noise when the tilting shaft is moved toward horizontal position, measure and adjust the backlash of the tilting worm shaft according to the following procedures:

1) Move the tilting shaft to the 45^{o} position, and tighten the six tilting shaft clamp bolts (B) to clamp the tilting shaft.
2) Turn the tilting shaft handle (K) clockwise and counterclockwise to read the backlash on the tilting shaft scale (D') .
3) In the event when the backlash exceeds two minutes, loosen the four worm shaft fixing bolts (F) and the six tilting shaft clamp bolts (B). Tighten the backlash adjusting bolt (J) clockwise, then the backlash will get near to zero.
4) Adjust the backlash to an amount of 30 seconds ~ 1 minute ensuring it by turning the handle (K). An amount of backlash less than this value will cause an excessive pre-load on the worm shaft and a shortening of service life of table, so be careful in adjusting the backlash.

5) After completion of the adjustment, tighten the four worm shaft fixing bolts (F) for the tilting shaft.

6) Move the tilting shaft to the horizontal position (0^{o}) where the table contacts with the tilting shaft stopper (Y) and does not move any more , loosen the scale locking screws (N) & (N') , move the scale to its correct position, and tighten the screw (N).
Thus, the adjustment is completed.

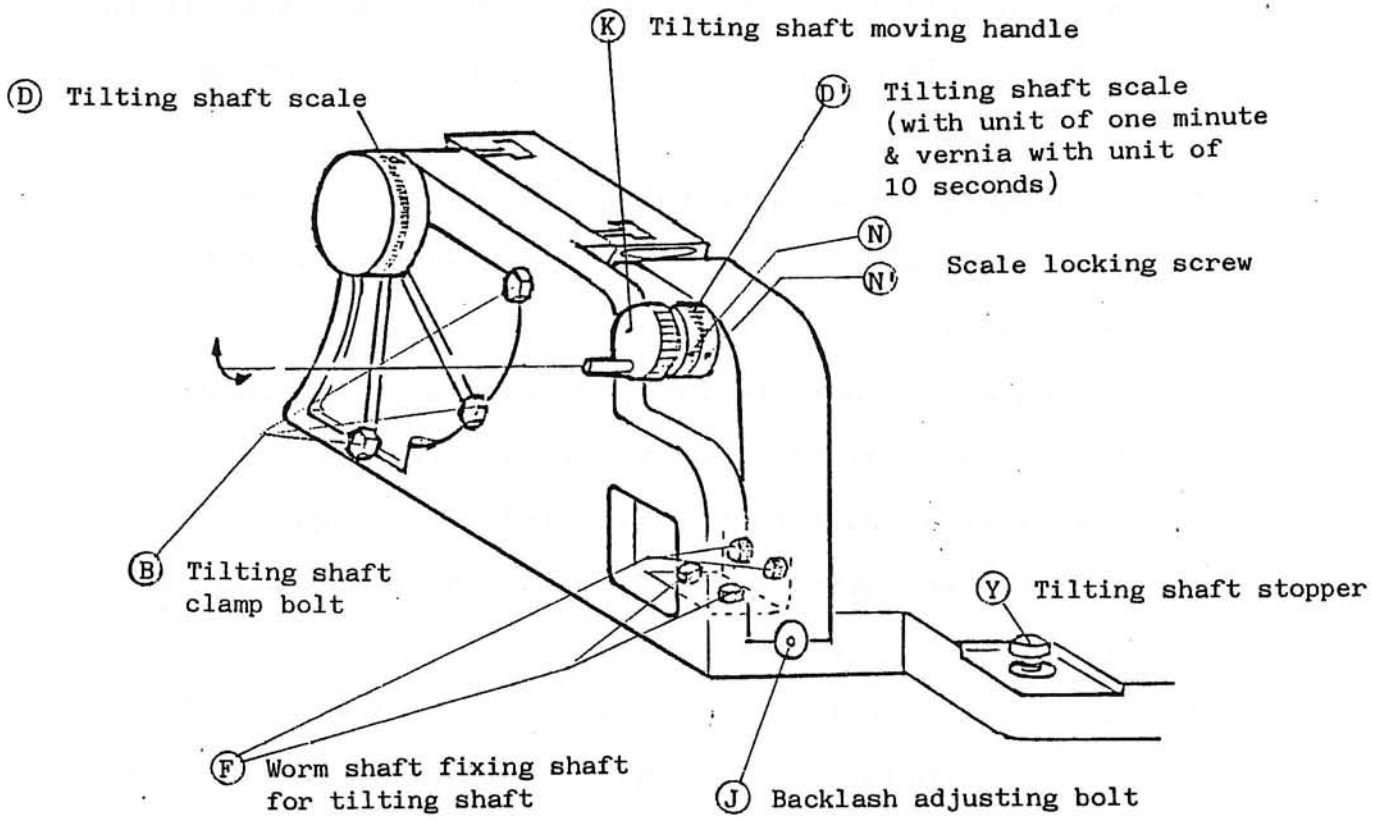
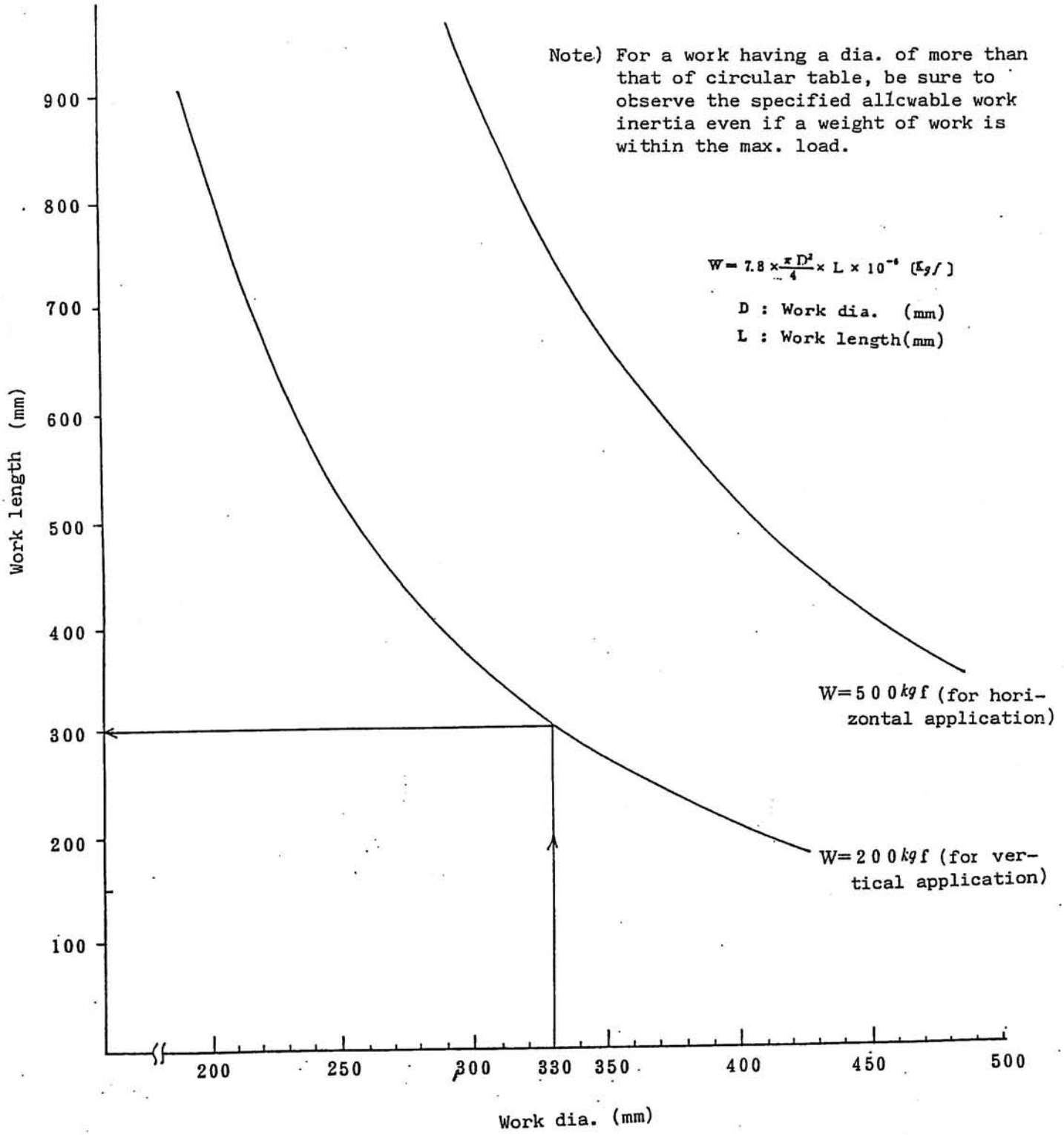


Fig. 7

3. Reference data

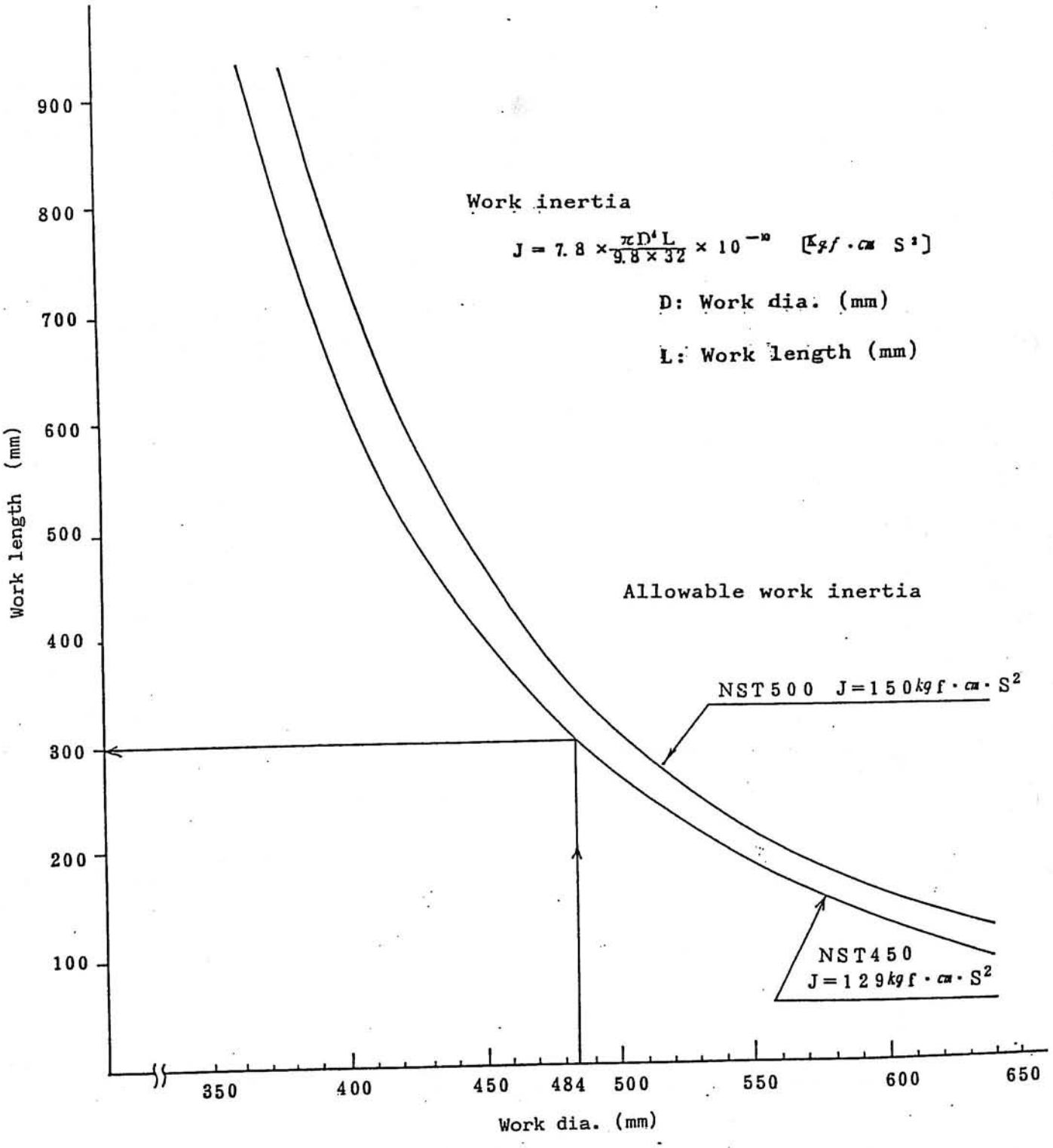
3-1 Relation between work dia. and length for allowable max. load (for steel)



Utilizing method of above figure

A work, having Ø330mm dia. and a length of within 300mm will have an allowable work inertia of within 200 kgf.cm.S^2.

3-2 Relation between work dia. and length for allowable work inertia (for steel)



Utilizing method of above figure

A work, having Ø484 mm dia. and a length of within 300 mm, will have an allowable work inertia of within 129 kgf・cm・S²