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1/16

NIKKEN CNC Circular Table

CNC 320

Individual Instruction Manual

Fifth Edition FD

C O N T E N T S

1. Preface

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

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 reqiured 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 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 adjustment of major functioning part

2-1 Adjustment of backlash

The worm shaft rotates in the totally-enclosed oil bath and the reduction mechanism comprises 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 adjust 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 a flat steel plate (H) into a T-slot of the circular table and shaking an outer periphery thereof left and right through the plate with hand. A backlash of within 5 to 10 μ is normal, and the adjustment is required in the event when a backlash of above 0.05mm is observed. The measurement is to be done on eight spots of the table by rotating it every 45 degrees. (Refere to Fig. 1 (G) & (H).)

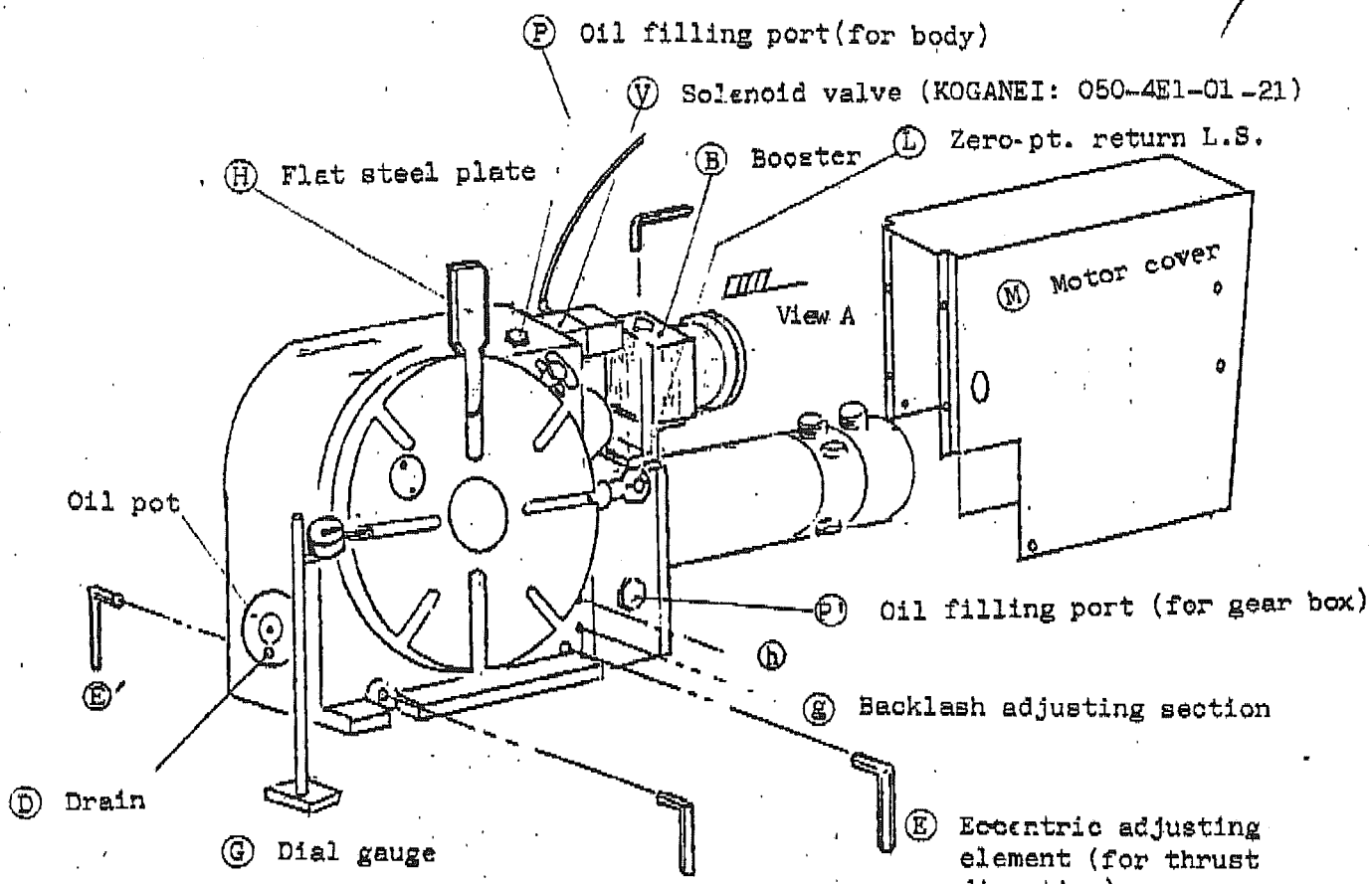


Fig 1

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

1) Loosen the screw (E) of the eccentric adjusting element (thrust direction).

2) Loosen the two screws (E') of the eccentric adjusting element.

3) The backlash adjusting screws (h) & (g) are provided at the backlash adjusting section of Fig. 1. Set the dial gauge (G) again as shown in Fig. 1, loosen the screw (g), and tighten the screw (h) clockwise. Then the eccentric shaft will turn in the direction of arrow, and the backlash between the worm gear and the worm screw will get near to zero. Adjust the backlash to 10 ~ 15 μ by the use of screws (g) & (h) watching the deflection of the dial gauge (G)

while shaking the outer periphery of circular table, then securely lock them again.

4) After completion of the above adjustment, retighten the screws (E) and (E') in this order. Thus, the adjustment of backlash to 5 ~ 10 μ is completed.

5) Measure the backlash again and ensure that the backlash is adjusted to 5 ~ 10 μ.

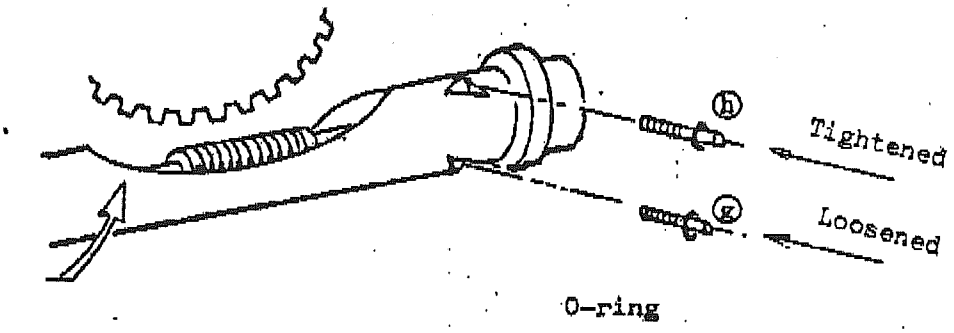


Fig 2

6) After completion of the adjustment of backlash, make sure of the motor load. Remove the motor cover (M), turn on the power supply, and let the circular table rotate on the jog mode to check the motor shaft for gear noise.

* If abnormal sound is recognized, loosen the attaching bolt of Fig. 3 and slowly turn the adjusting screw clockwise, then it will become normal sound.

* If the gear noise is too light as compared with foumer one, a backlash would have been produced in the motor shaft. Apply the dial gauge on the T-slot again as shown in Fig. 1 and jog the button to examine behavior of the gauge pointer. Turn the adjusting screw counterclockwise while operating both the CW & CCW jog buttons, and the backlash of the motor shaft will get near to zero.

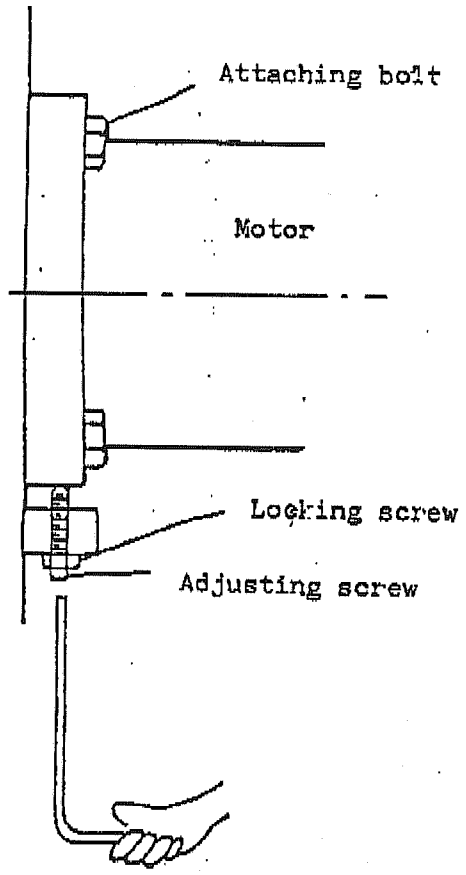


Fig 8

Notes: 1. The adjustment of backlash is a very delicate work, so be careful when executing it.

2. Lock the locking screw of Fig. 3 again, and securely fix the motor again.

2-2 Clamping mechanism

The limit switches for checking clamp/unclamp are provided at the View A portion of Fig. 1. Movement of the dog attached to the rear part of braking piston actuates the clamp/unclamp check limit switches to give a direct contact signal. (Refer to Fig. 4.)

In the event of incorrect position of the clamp/unclamp check limit switch with no defect in the air source and brake etc., loosen the two L.S. attaching screws and move the limit switches to a correct position.

Since the adjustment of dog is delicate work because of its stroke as small as 4 ~ 5 mm, be careful in moving the limit switches.

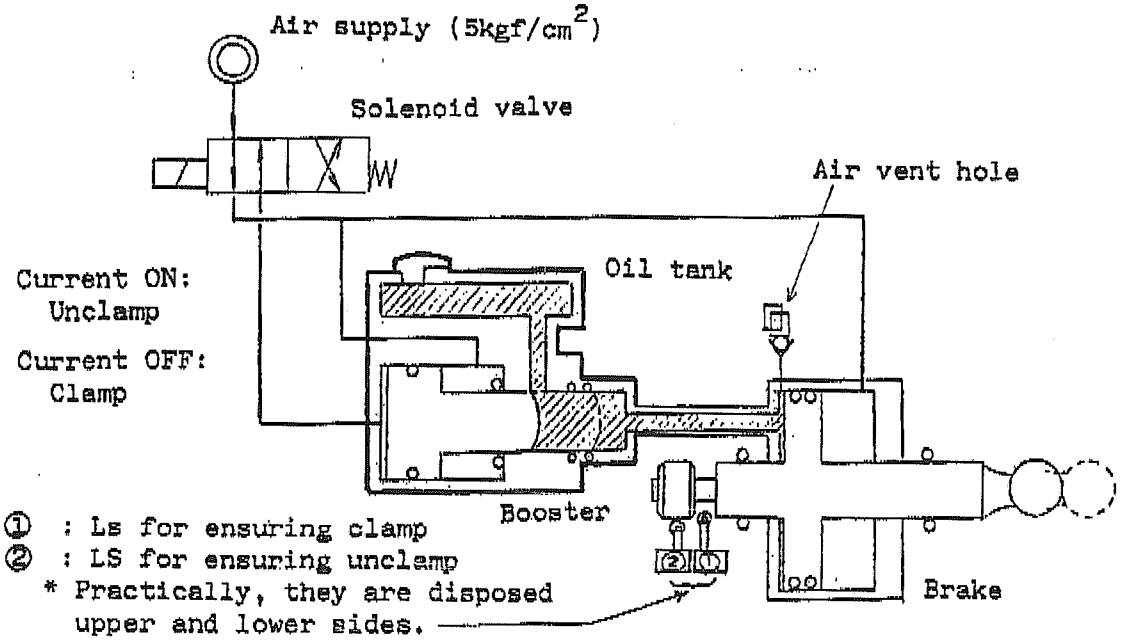


Fig. 4(1) Clamp mechanism block diagram

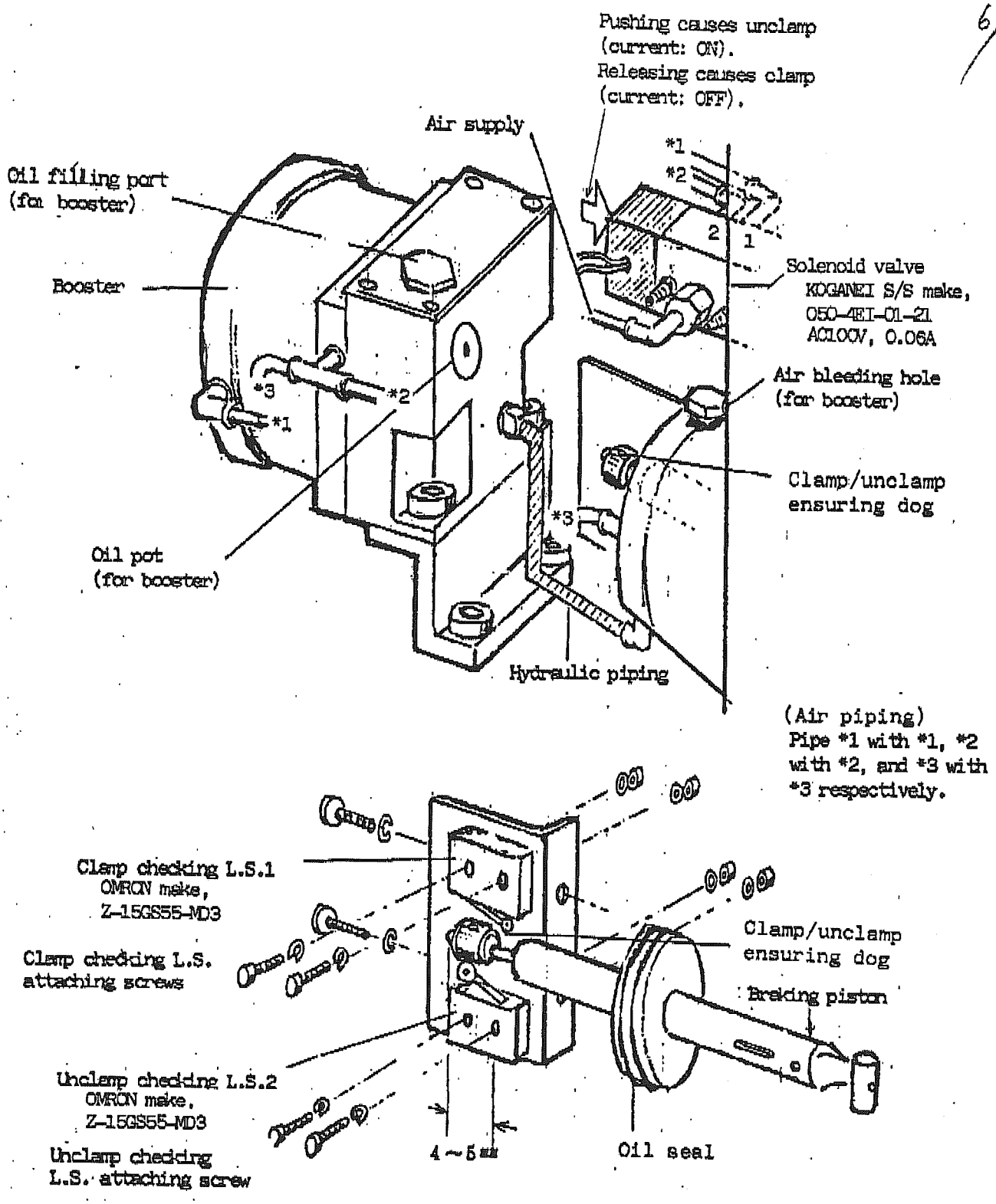


Fig. 4(2) Clamp/unclamp mechanism

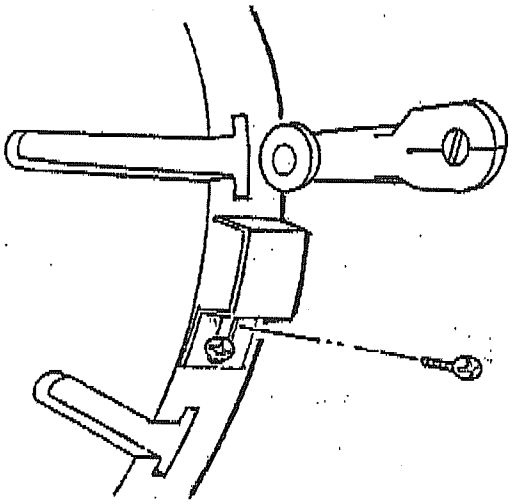
2-3 Zero-point return mechanism

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

2) Adjusting dog position

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

3) Loosen the dog attaching bolts, and shift the dog to a correct position. (The dog has circumferential slots for permitting about ± 5 mm shifting.) (Refer to Fig. 5.)



LS for zero-point return
OMRON make, WLGCA2

Fig 5

2-4 Brake mechanism

2-4-1 Brake mechanism

The brake of this circular table is of the air-hydraulic type, and the exploded view of booster is shown in Fig. 6 and the mechanism is illuslrated in Fig. 7 respectively.

The mechanism is composed of the construction which converts a pneumatic pressure through the booster into a hydraulic pressure for actuating the braking piston and generates a clamping torque of 45 kgf.m from a pneumatic pressure of 5 kgf/cm^2.

2-4-2 Air bleeding procedure of booster (Refer to Fig. 4(2).)

After supplying working oil to the booster, perform air bleeding with the air supply connected according to the following procedures (not required at the time of a new circular table being shipped)

1) Loosen the hexagon bolt for air bleeding.

2) Pushing the red rubber of solenoid valve unclamps the brake and releasing it clamps the brake. Repeat these operations to completely remove air through the air bleeding hole.

3) After completely removing air, tighten the air bleeding hexagon bolt and refill working oil while watching the oil pot.

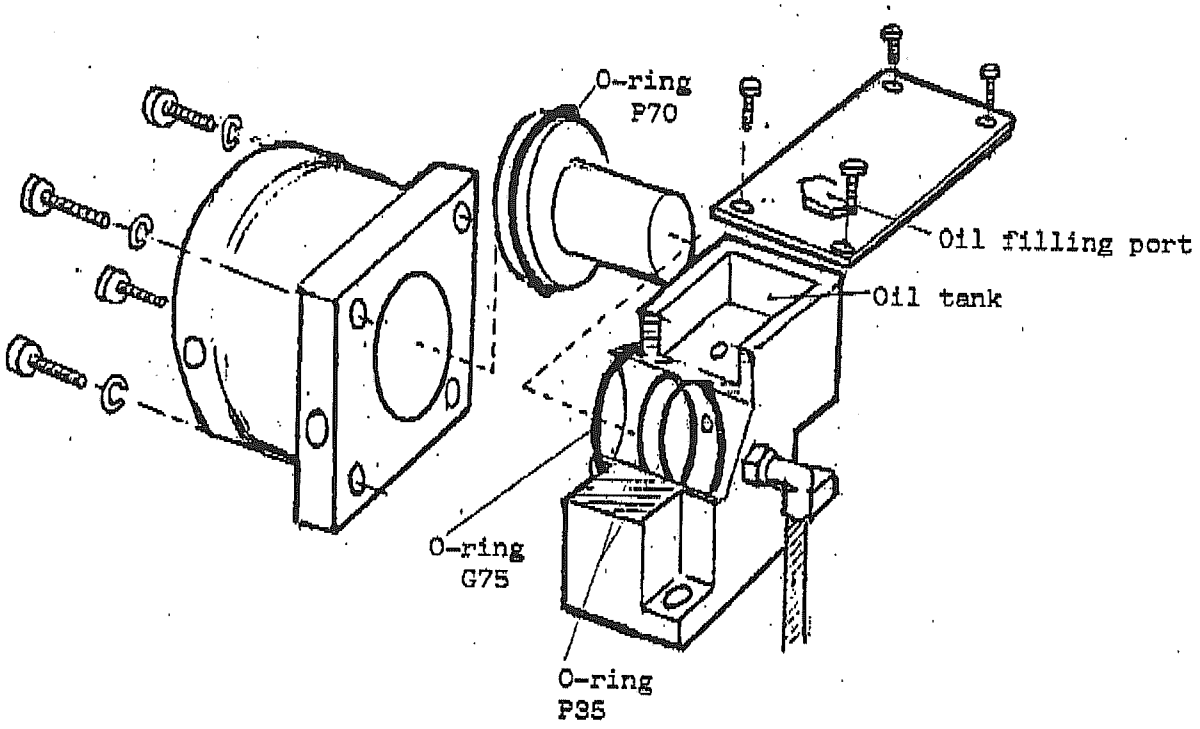


Fig. 6 Exploded view of booster

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

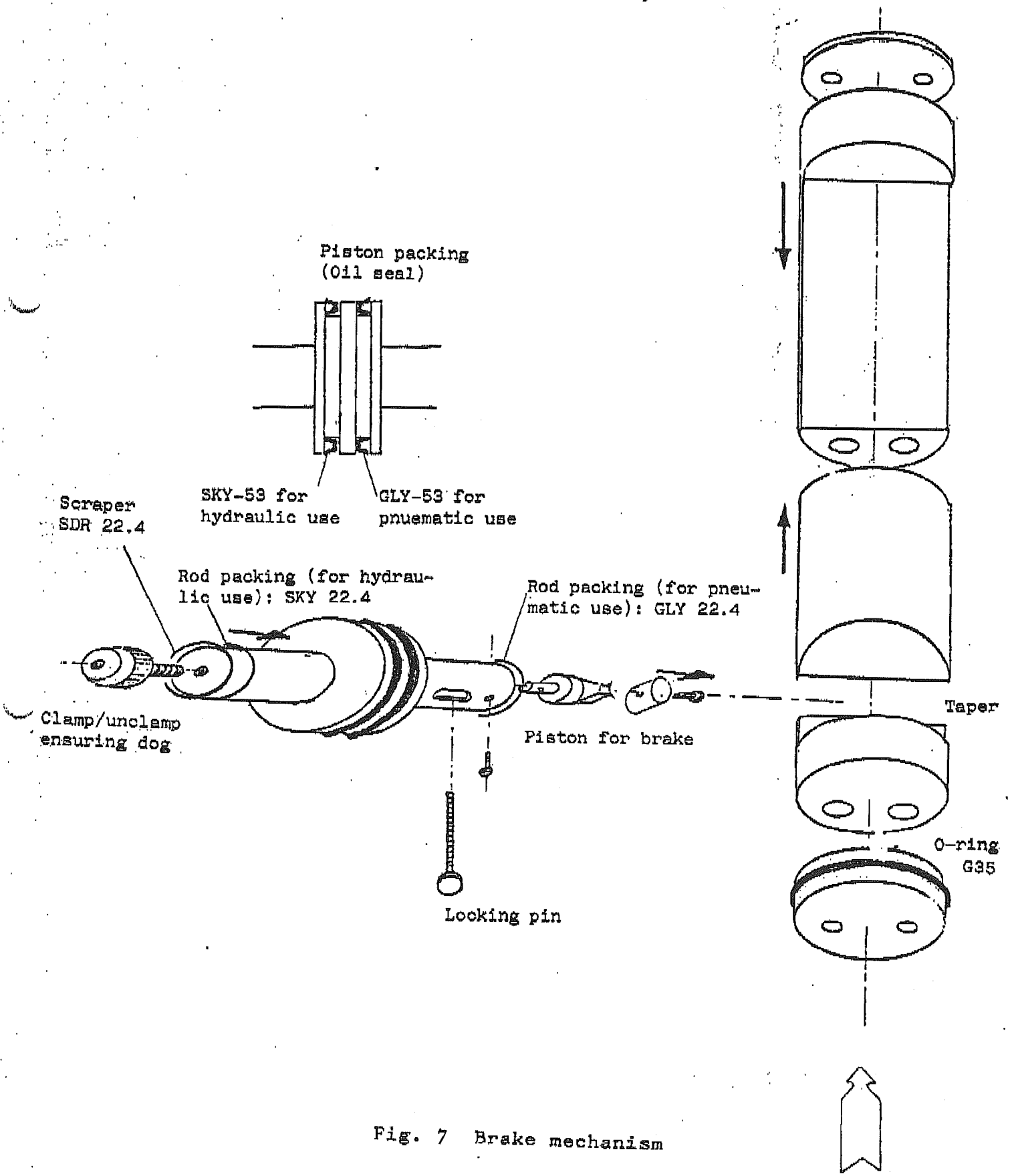
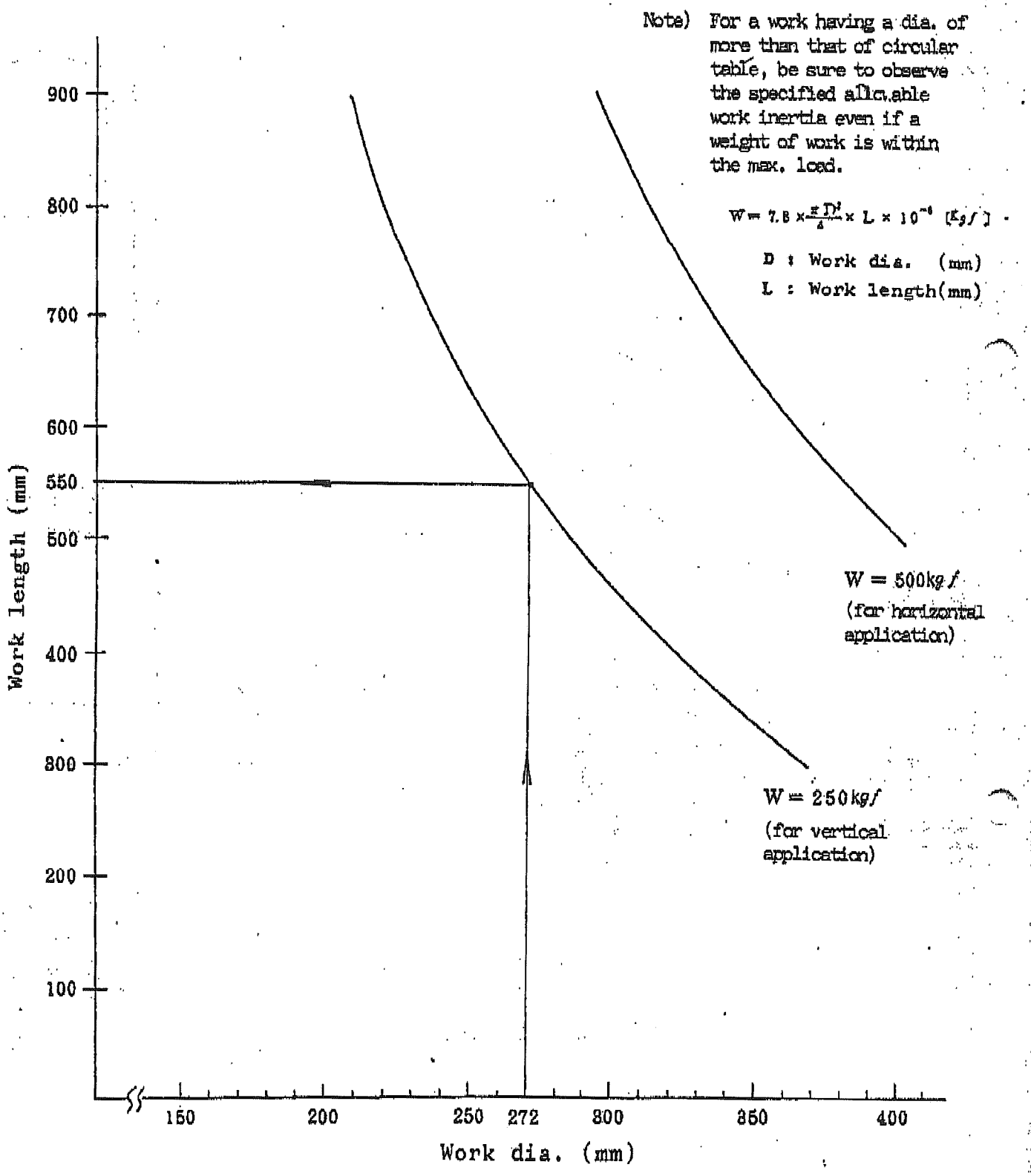


Fig. 7 Brake mechanism

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 ϕ272 mm dia. and a length of within 550 mm, will have an allowable max. load of within 250 kgf.

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

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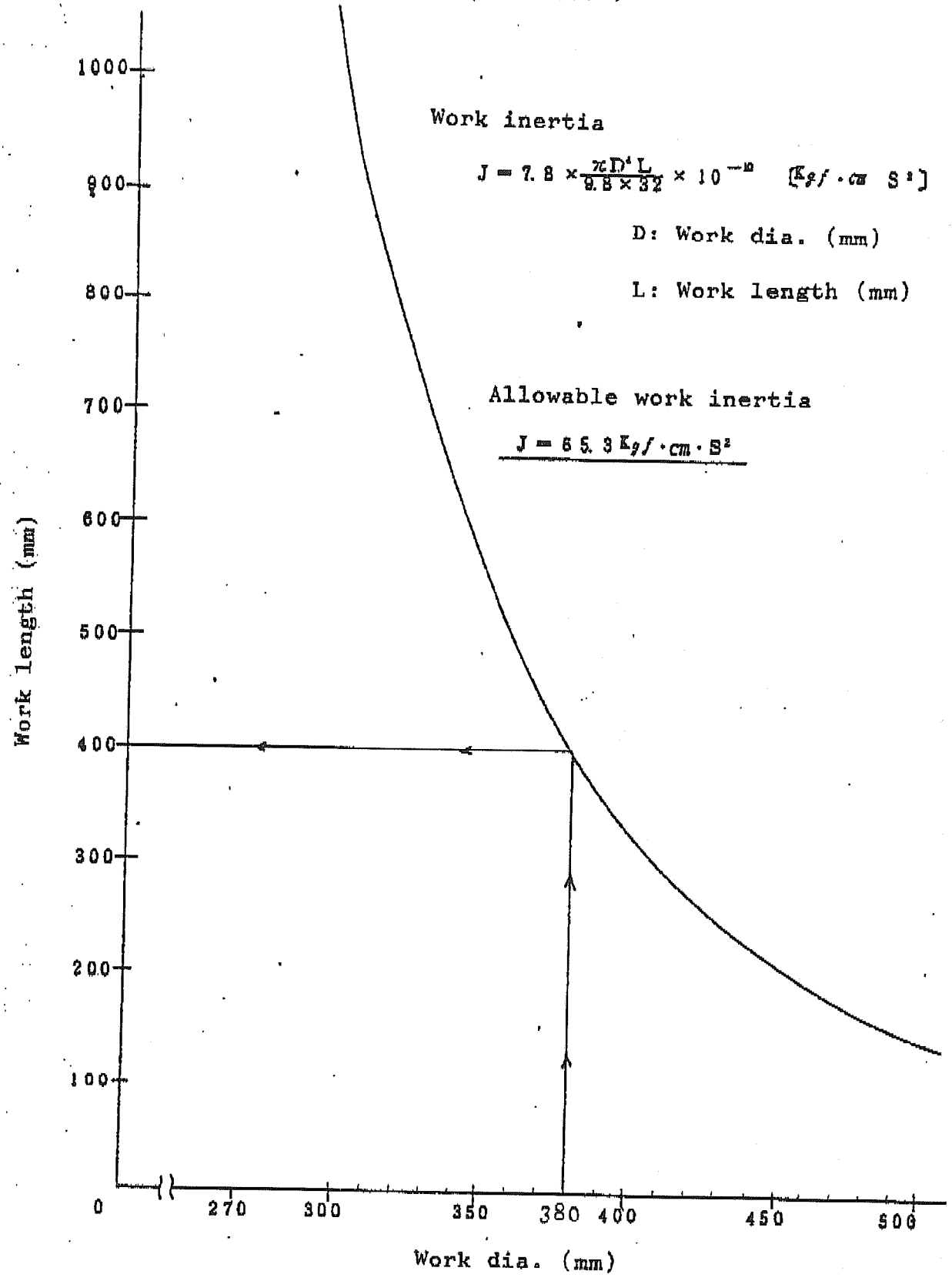

Utilizing method of above figure

A work, having ϕ380 mm dia. and a length of within 400 mm, will have an allowable work inertia of within 65.3 kgf.cm.s^2.