Control Rod Drive Mechanism

Instruction Manual

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Toledo Edison Co.

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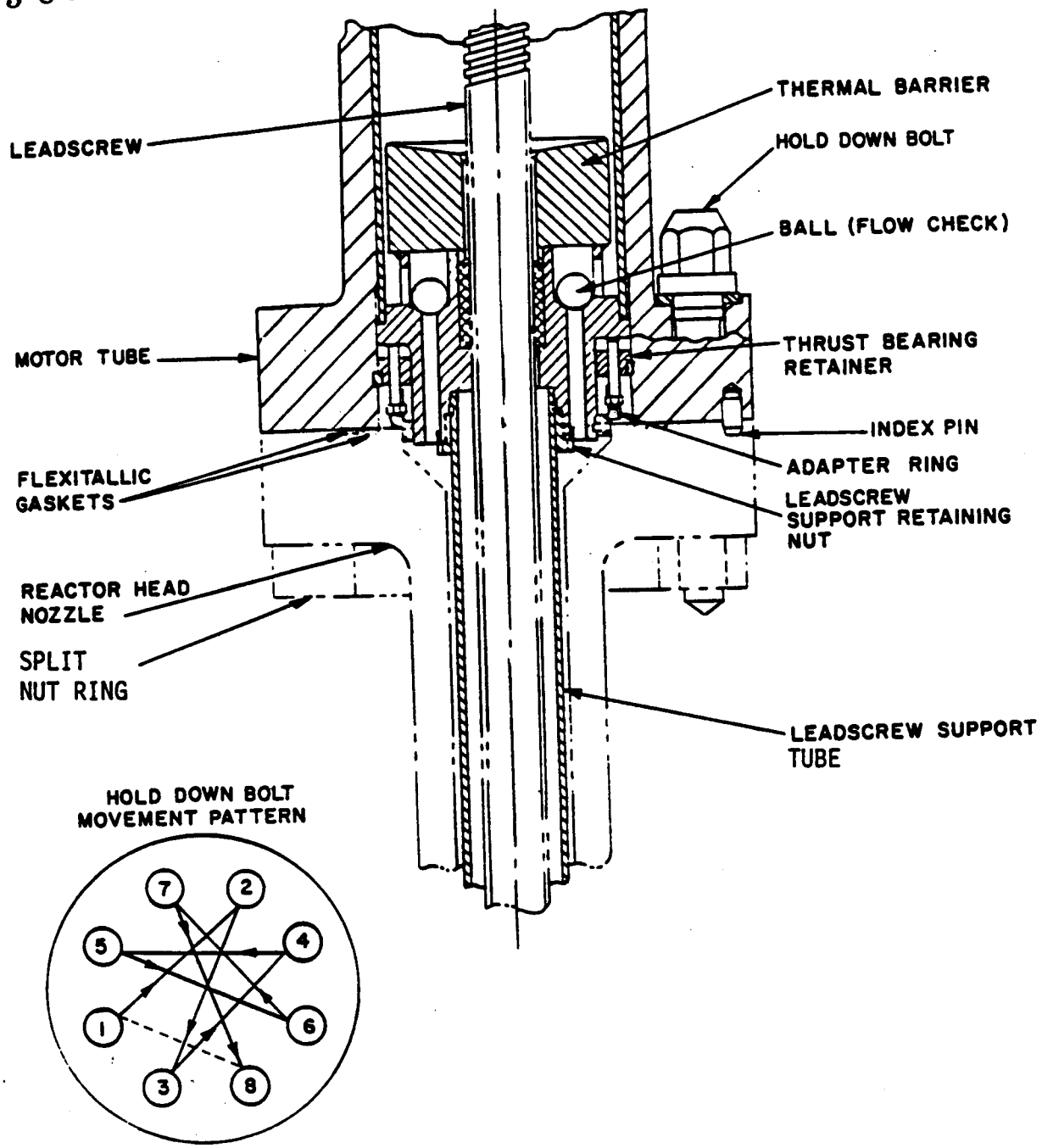

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FIGURE 8-9 LEADSCREW SUPPORT MOUNTING LOCATION

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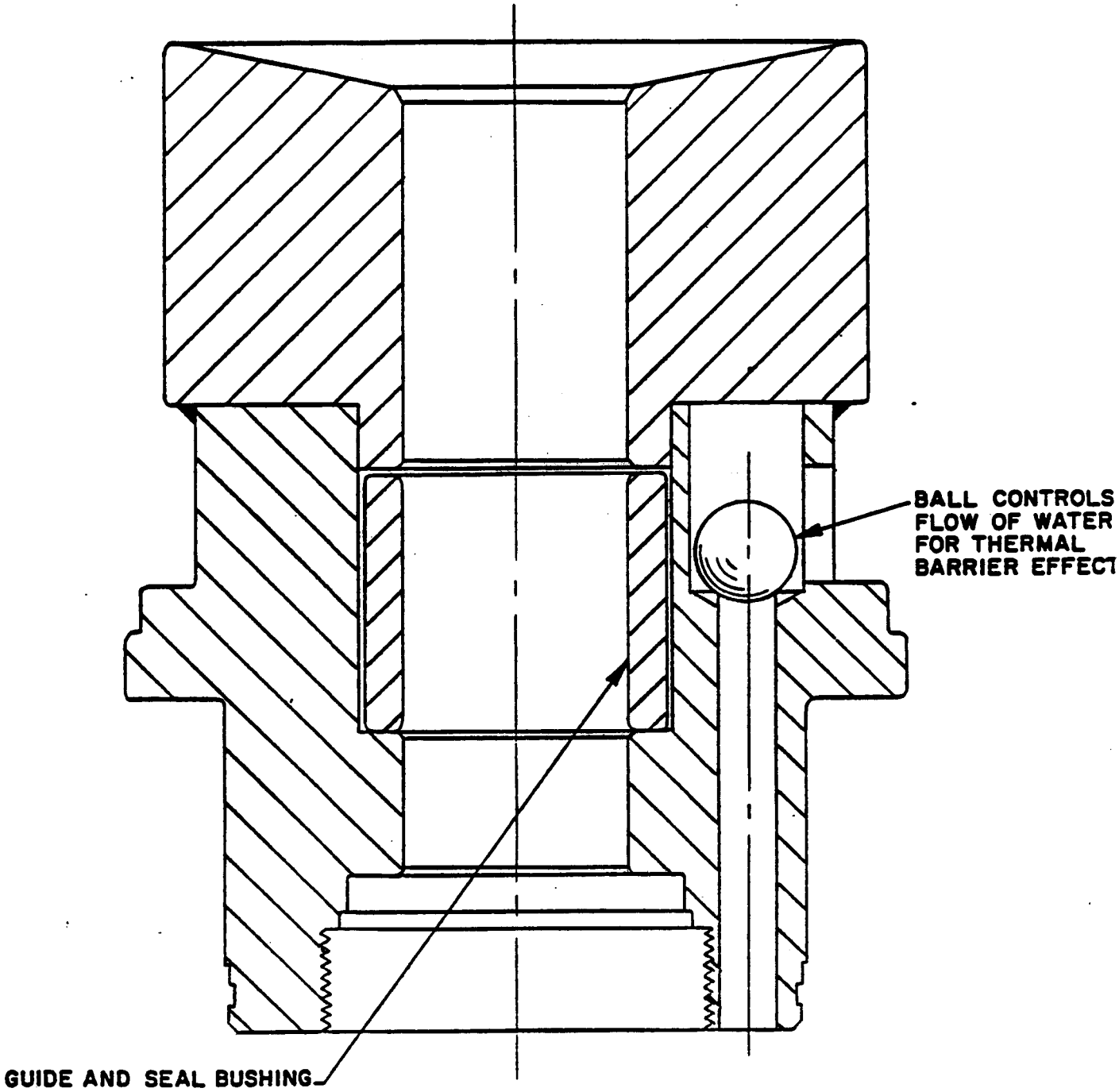

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FIGURE 8-32 THERMAL BARRIER ASSEMBLY, 706181-1035

or in general, through a loss of power to the stator.

Unique design features of the Drive include:

A fast trip response whenever power is interrupted to the stator.

Exclusive use of static type seals - there are no rotary or dynamic seals used.

A leadscrew coupling design that provides easy attachment of the leadscrew to the control rod assembly from a position external to the reactor vessel.

Electrical components and connections that are mounted external to the reactor vessel environment, easily removed for maintenance.

The following paragraphs describe the function and operation of each major subassembly in the Drive.

3.1.1 Thermal Barrier Assembly, Figure 8-32

The thermal barrier restricts the thermal circulation of hot, primary coolant and acts as an insulator between the reactor vessel and the Drive. By restricting the circulation of hot, primary coolant to the Drive, the rotor assembly temperature can be held between 300-350°F during normal operation. Heat transmitted from the primary coolant to the stator water jacket assembly is removed by the cooling water jacket around the stator.

The thermal barrier housing is machined from 304 stainless steel. A clearance hole and bushing in the center of the housing allow unrestricted leadscrew travel.

Four ball-check valves are incorporated in the base of the thermal barrier to relieve the pressure drop created within the Drive during a trip condition. The thermal barrier is held within the base of the motor tube by the thrust bearing spacer assembly, the thermal barrier retaining ring, the outer ring set, and the hex head machine screws.

3.1.2 Rotor Assembly, Figure 8-2

The rotor assembly, when actuated through a magnetic coupling by the stator, is the component that engages, holds, and positions the leadscrew. The rotor assembly is mounted inside the motor tube and is immersed in primary coolant. It is designed to operate without additional lubrication. The major components of the rotor assembly are as follows:

Inspect the top of the CRDM mating flange for galling or upset condition in the bolt spotface area. Remove any upset metal.

6.2.6.4 Inspection of CRDM Flange Gaskets

Inspect general condition of all new gaskets. Verify that gasket filler material is present and that no upset metal exists.

6.2.6.5 Cleaning and Inspection of Reactor Vessel Nozzle Flange

Clean gasket grooves with "Scotch-Brite". Visually inspect each groove and flange for cleanliness. Final inspection shall reveal no evidence of boric acid or other contaminants.

Inspect for scratches, pitting, dings, wire cutting, and upset metal. Report any conditions which may affect sealing capabilities to the Cognizant Engineer.

CAUTION: Radial scratches are of a particular concern and shall be carefully documented and dispositioned.

6.2.6.6 Cleaning Split Nut Rings Prior to Re-Installation

Use a chasing tap to clean and confirm thread adequacy. Apply an upward force when running tap to insure cleaning of load bearing surfaces.

After running tap, clean threads using a stainless steel brush. Visual inspection with adequate lighting shall reveal no evidence of oil, grease, rust, or other contaminants on the threads. If evidence of galling is present on threads, replace split nut ring. Replacement split nut rings must not be coated with Electro Film 77-S lubricant.

6.2.6.7 Cleaning New Split Nut Rings

This procedure is limited to the cleaning of new split nut rings which have been coated in accordance with Manganese Phosphate Specification MIL-P-16232 and Electro Film Specification 77-S. Prepare a chromic acid solution with a controlled concentration not to exceed 2-1/2 lbs. of acid to one gallon of water. Temperature of the solution before and during the bath shall be 140-160°F.

All materials, tools, tanks, baskets, hooks, etc., contacting the solution into which the rings are to be submerged or the rings themselves while they are still wet from the bath shall be

6.2.6 CRDM Assembly Installation

The following paragraphs describe cleaning, inspection and installation procedures which are designed to eliminate leakage between the CRDM mounting flange and the reactor vessel nozzle flange.

6.2.6.1 Cleaning New Holddown Bolts

New replacement bolts are coated with rust preservative, Quaker Ferrocote 5856, on the threads. This rust preservative must be removed prior to bolt installation. Clean threads with 1/2 to 3/4 weight percent trisodium phosphate dissolved in demineralized water. Scrub bolt, as necessary, with a hard bristle nylon brush going in the direction of the threads. Following cleaning, rinse thoroughly in demineralized water. Visually inspect each bolt. Final inspection shall reveal no evidence of rust preservative or other contaminants.

6.2.6.2 Removal of Neolube or Fel-Pro N1000/N5000 from Holddown Bolts Prior to Re-Installation

Clean holddown bolts in an ultrasonic bath using acetone or alcohol as the solvent. Scrub bolt, as necessary, with a hard bristle nylon brush going in the direction of the threads. Visually inspect each bolt. Final inspection shall reveal no evidence of grease, oil, or other contaminants on threads.

Inspect each bolt for upset metal or galling on threads, top and bottom of washer, and bolt head. Any evidence of galling or upset metal should be cause for replacement. Upset metal on bolt shoulder should be removed. Bolt threads should be run through a go/no-go gage.

If the torque required for removal of the bolt exceeds 950 ft-lbs., the bolt shank shall be liquid-penetrant examined for linear indications prior to reuse. If any reportable linear axial indications or any linear non-axial indications are found, the bolt must be replaced.

6.2.6.3 Cleaning and Inspection of CRDM Mounting Flange

CRDM flanges should be cleaned using "Spot Check" and "Scotch Brite" or equivalent. Visually inspect each flange for cleanliness. Final inspection shall reveal no evidence of boric acid or other contaminants. Inspect for scratches, pitting, dings, wire cutting, and upset metal. Report to Cognizant Engineer any conditions which may affect sealing capabilities.

CAUTION: Radial scratches are of a particular concern and shall be documented carefully and dispositioned.