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NASA GRC Cryogenic Seal Test Rig Capability

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Cryogenic Seal Test Rigs at NASA GRC

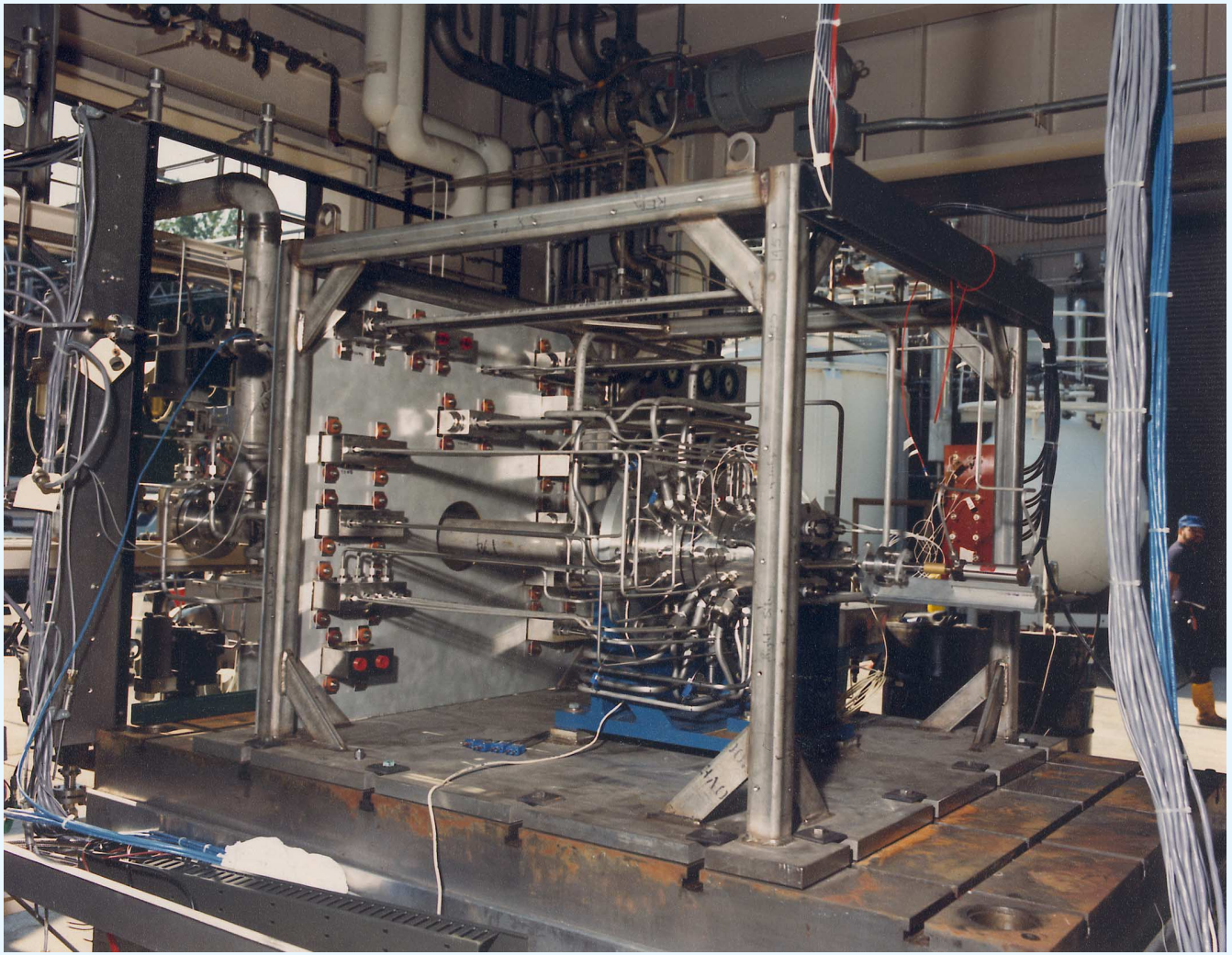
1. LO_x Seal Test Rig

   Designed and built by Mechanical Technology Inc. under NASA Contract NAS3-23260 to test seals for liquid oxygen turbopumps.

2. Cryogenic Brush Seal Test Rig

   - Originally designed and built by Rocketdyne under NASA Contract to test low thrust pumps.
   - Modified by NASA to test brush seals in LN_2 and LH_2.

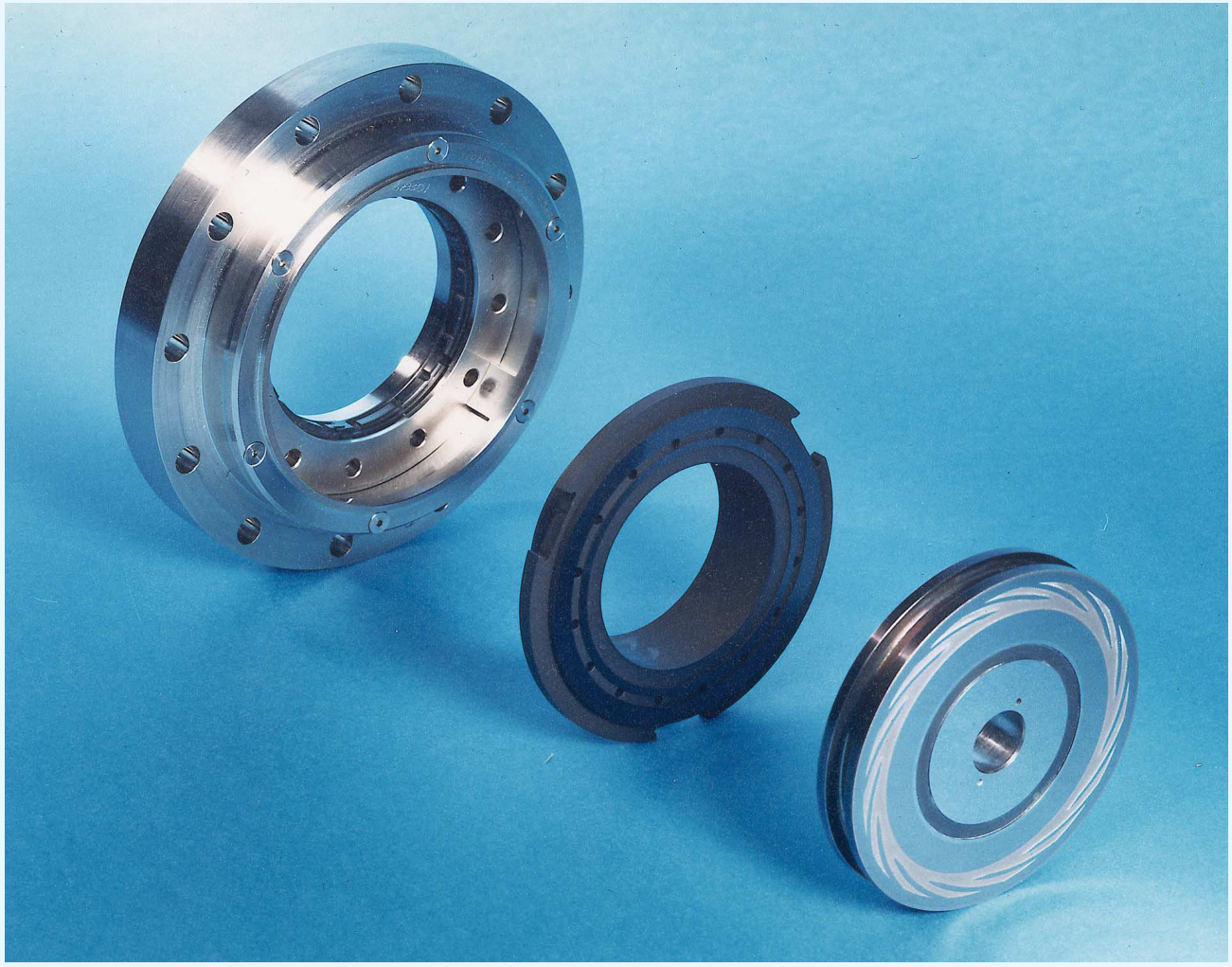
LO_x Seal Test Rig



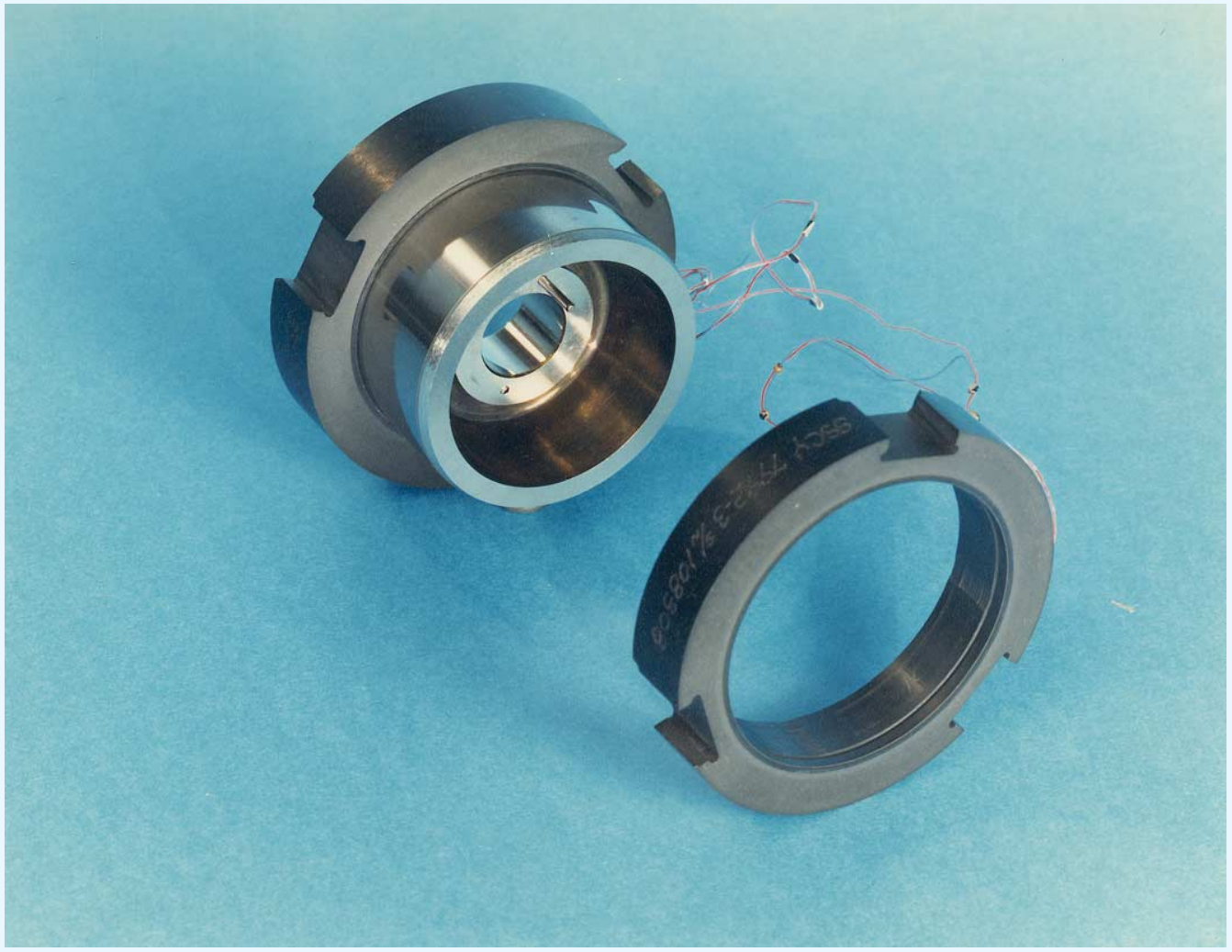
LO_x Seal Test Rig Capabilities

- 50-mm and 20-mm seal hardware
- Face Seal or Ring Seals
- 750 psi LN_2 or LO_X seal supply
- 200 psi GHe seal supply
- 100,000 rpm maximum shaft speed (depending on seal)
- 100 Hp GN_2 turbine drive, overhung, radial in-flow
- Axial vibration can be imposed via thrust bearing control

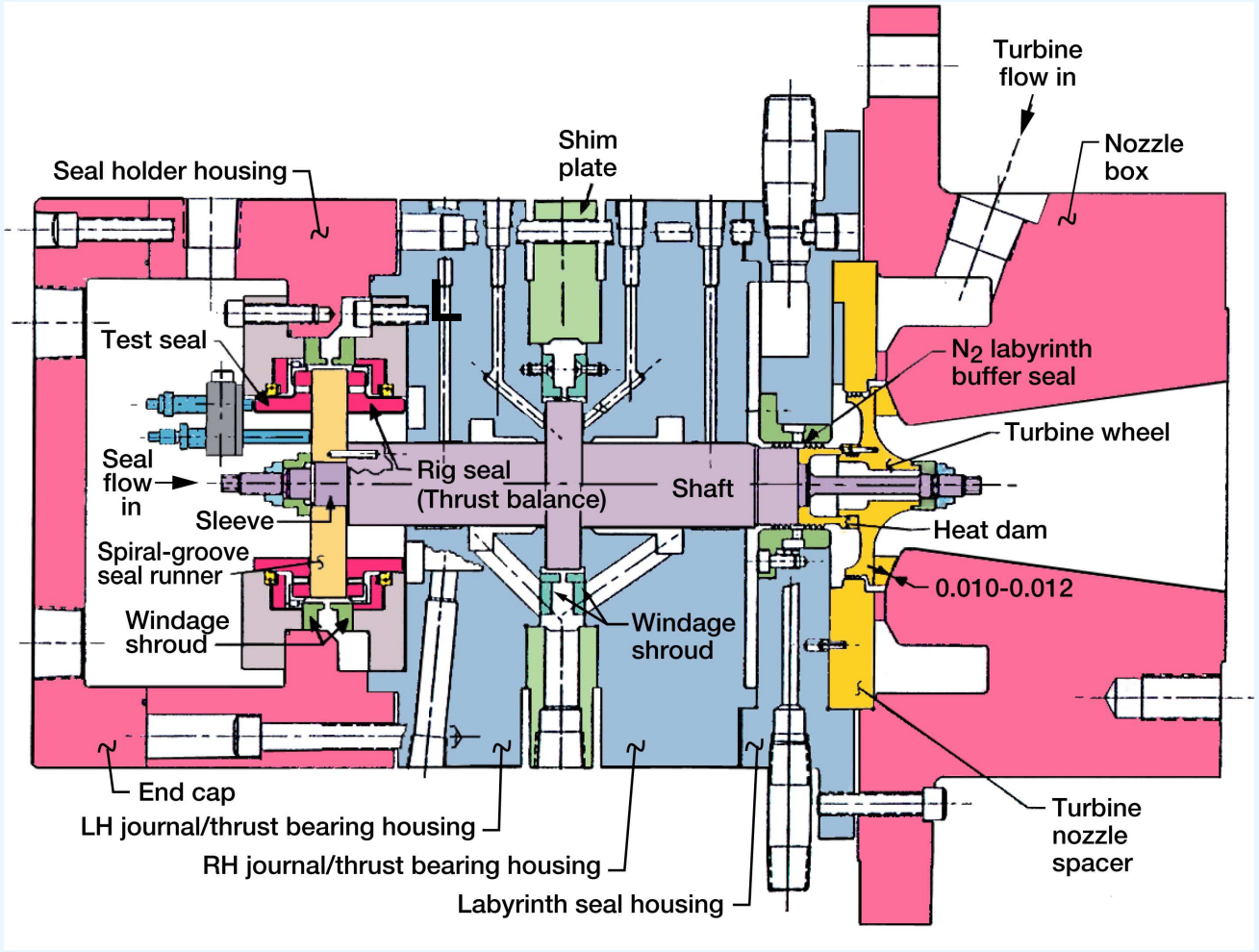
LO_x Spiral Groove Face Seal



Raleigh-Step Helium Buffer Seal



LO_x Seal Test Rig

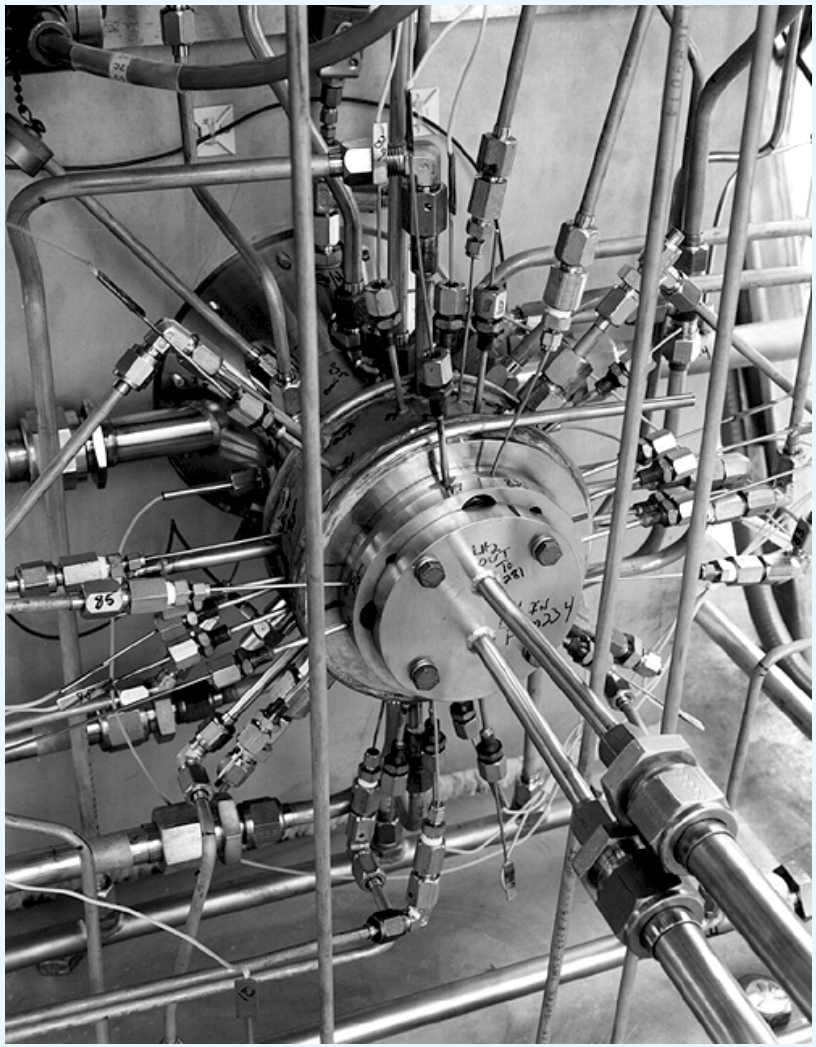


LO_x Seal Test Rig During Test

Cryogenic Brush Seal Test Rig Capabilities

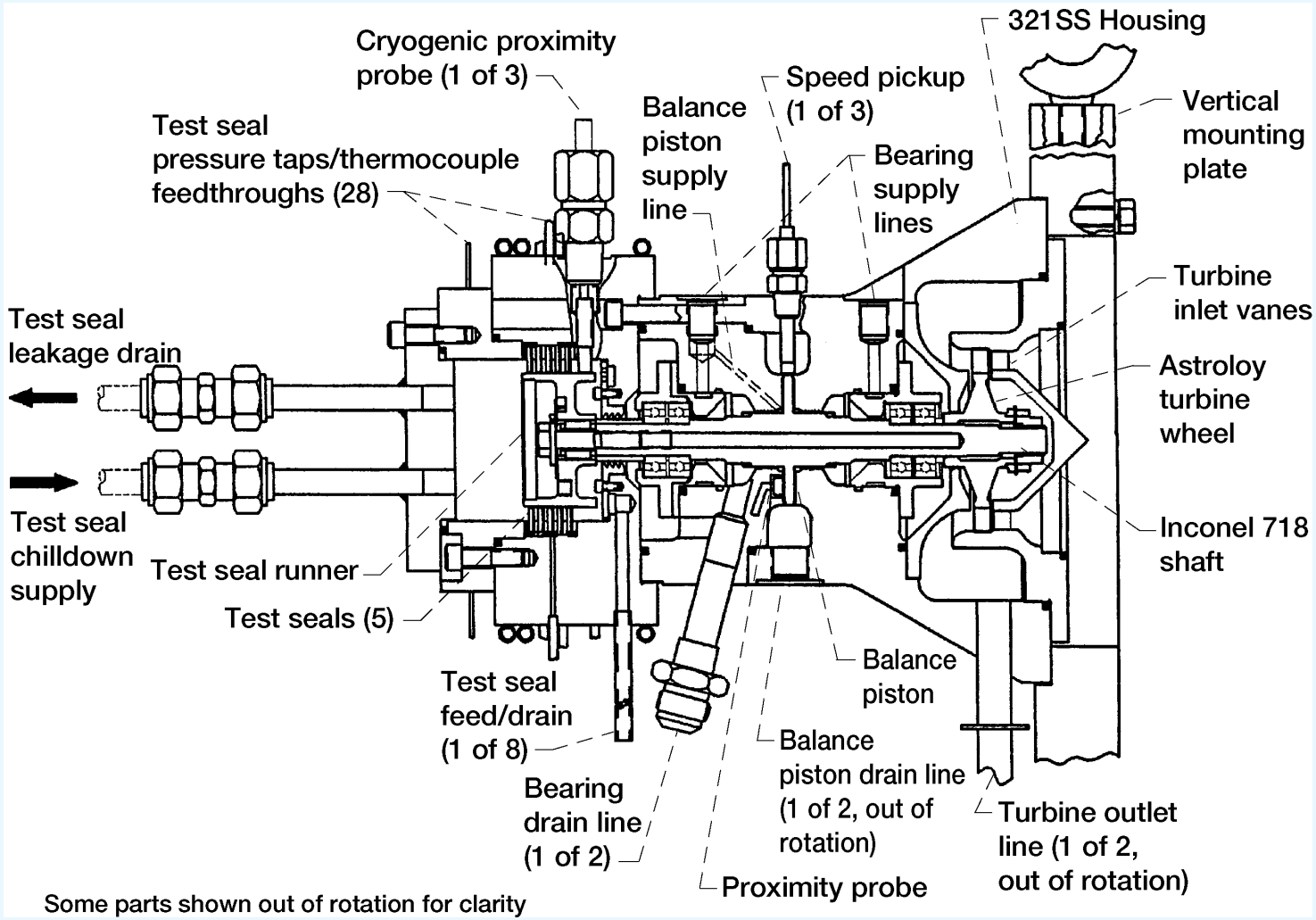
- 2 inch diameter bore seals
- 5 brushes at one time - use long, low speed runner
  maximum speed 40,000 rpm
- 1 brush at a time - use short, high speed runner
  maximum speed 65,000 rpm
- 800 psig MAWP of rig
- Maximum Delta-P across seal is 300 psi
  due to balance piston capability
- LH_2 or LN_2
- 14 seal temperature measurement locations
- 14 seal pressure measurement locations
- 3 proximity probes measure rotor orbit

Cryogenic Brush Seal Tester Installation



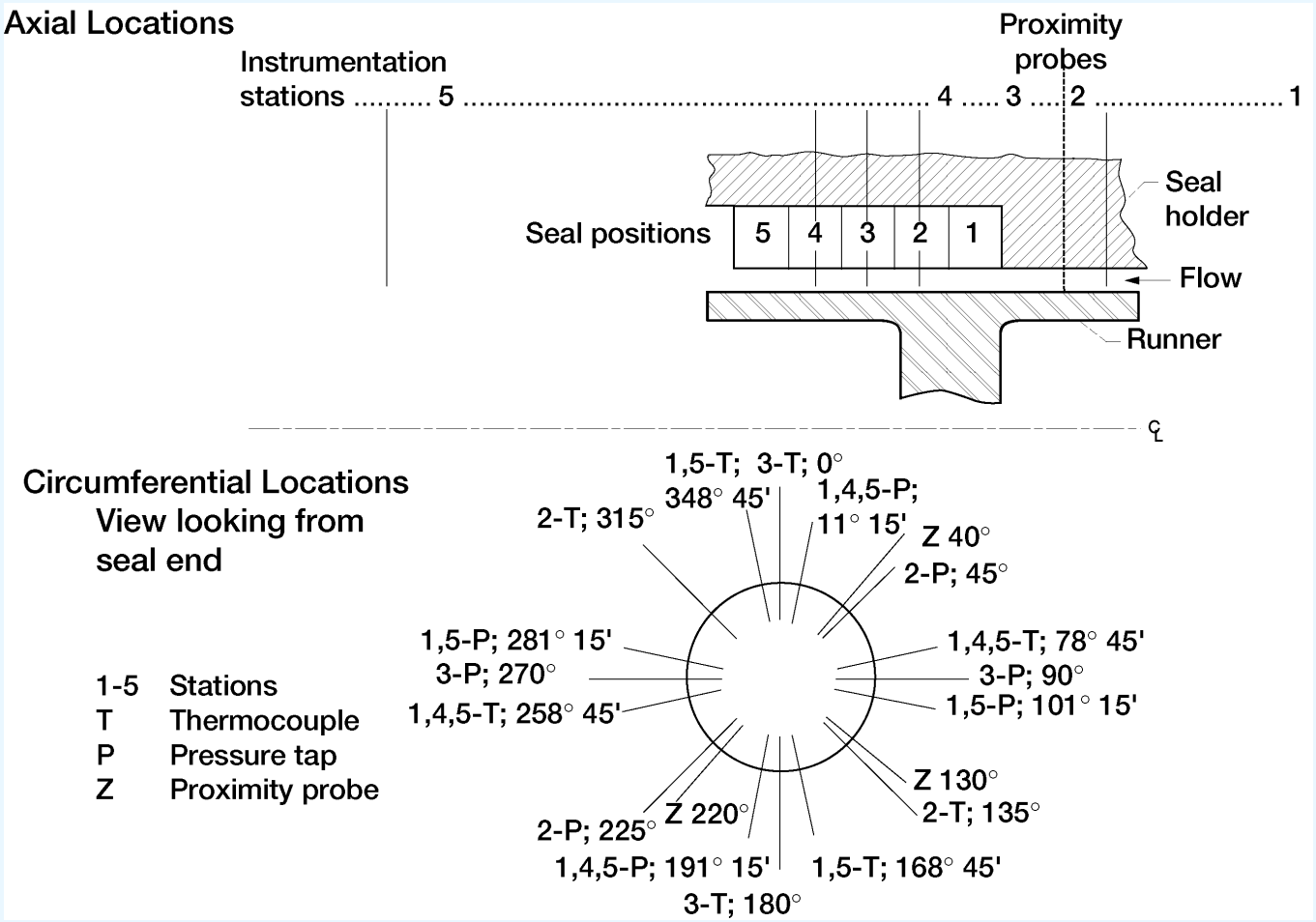
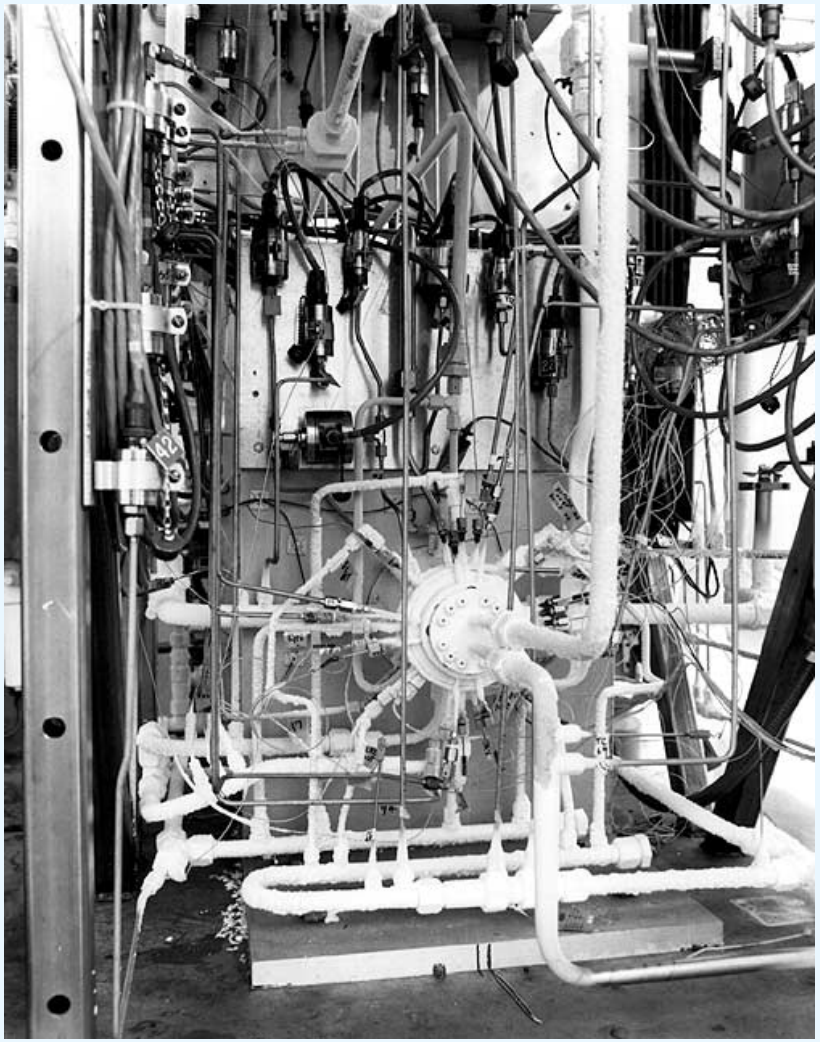
Typical Brush Seal

Cross Section of Cryogenic Brush Seal Tester



Location of Brush Seal Positions and Instrumentation Stations

Low-Speed Runner Shown



Cryogenic Brush Seal Tester During Test