tube. Three lengths, 13, 17 and 21 in., with 60, 80 and 100 disks, respectively, are available. Corresponding priming volumes are 1400, 2000 and 2500 ml. (Pemco, Inc., Dept. S765)

- **THICKNESS GAGE** uses radiation from a sealed, self-contained gamma-radiation source to measure thickness of continuous sheet materials. Transmitted radiation is sensed by a scintillation method. Response time is in the millisecond range. (Budd Co., Dept. S760)

- **FREEZE DRYER** is mechanically refrigerated to temperatures as low as -60°C. The equipment, of mobile design, provides for bulk drying as well as manifold drying. Heat is furnished by quartz infrared tubes mounted inside the stainless-steel vacuum drum. The condenser has a capacity of 16 lit. A McLeod gage provides measurement of vacuum, and a thermistor indicates condenser temperature. (VirTis Company, Inc., Dept. S761)

- **VIBRATION EXCITER** of electrodynamic design has a frequency range from 5 to 5000 cy/sec. Force levels of 1025 lb r.m.s., and 3150 lb peak are obtainable in noise testing with 15- to 2000-cy/sec bandwidth. The exciter will operate in altitude environments from 0 to 125,000 ft, in humidity from 0 to 95 percent, and in temperature from 0 to 200°F. Total displacement is 1 in. (MB Manufacturing Co., Dept. S763)

- **OSCILLOSCOPE** has identical horizontal and vertical deflection characteristics for use as an x-y indicator. It may be converted into a general-purpose instrument by interchanging plugged-in components. Bandpass is from dc to 10 Mcy/sec, rise time is 0.35 mic, and deflection factors are selectable from 0.05 to 20 v per division. (Tektronix, Inc., Dept. S766)

- **FRACTIONATING COLUMN** of spinning-band design features 2 to 3 ml liquid holdup, approximately 0.1 mm-Hg pressure drop per plate, 30 theoretical plates at total reflux, and 60 percent efficiency at a liquid take-off rate of 43 ml/hr. (Stanford Glassblowing Laboratories, Dept. S767)

- **PRESSURE CHAMBER**, ½ in. in diameter by 10 in. high, provides pressures to 30,000 atm. The pressure chamber is inside a thick-walled tube which in turn is surrounded by a stack of restraining rings. A tapered fit between the tube and the rings permits application of squeeze to prevent radial expansion. Pumps are manually operated. Electrically insulated leads may be conducted into the chamber. (Nucor Research, Inc., Dept. S771) JOSHDUA STERN

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**ELECTRONIC RAILROADING**

After many years of research and study, the railroad diesel locomotive is now under scientific surveillance. Preventive maintenance, which saves millions of dollars annually, is programmed and controlled not in the overhaul shop but in the laboratory before the breakdown or damage occurs.

The New York Central Railroad takes regular periodic samples of crankcase oil and then analyzes each sample for the presence of metallic particles. This analysis is accomplished with a Baird-Atomic Direct Reading Spectrometer. The Direct Reader provides spectrochemical analyses of inorganic materials in extremely short time with direct readout of percentage concentration of selected elements on special logarithmic scales.

Metallic particles suspended in the oil indicate engine-part wear and potential trouble spots. For example, high lead or copper content indicates excessive bearing wear while a trace of aluminum predicts trouble in the blower assembly. DETAILEDLY highly accurate internal diagnosis can be made of the massive diesel engines without removing the locomotive from service. Repairs and overhauls are scheduled in advance, before serious damage is done, and on-the-line engine failure is prevented.

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