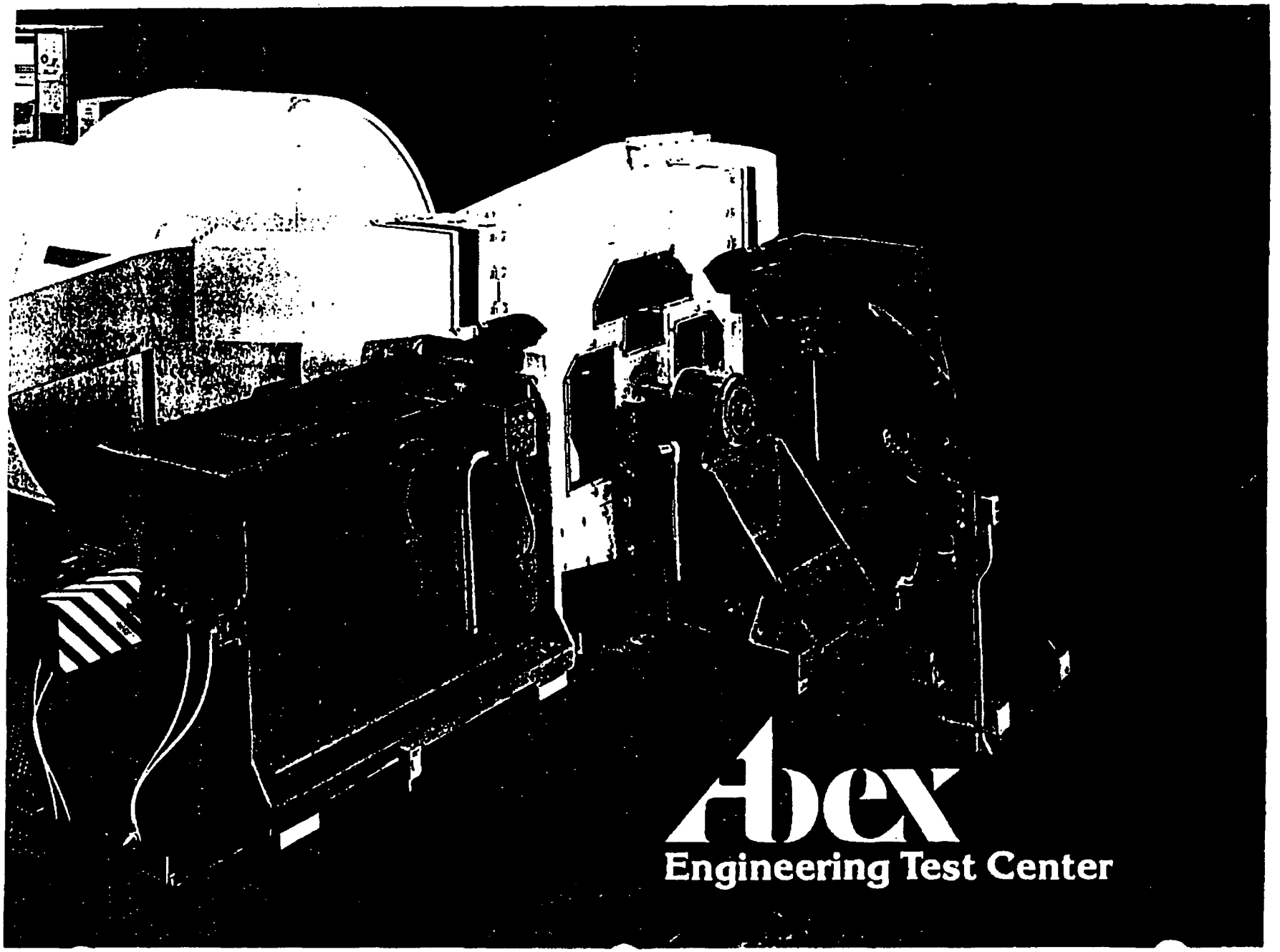


SCF-ABEX-0069

The Company

Abex Corporation is a forward-looking industrial manufacturer which has been entering new fields and markets since it began to produce brake shoes for the railroads in 1902. The company now manufactures products in 60 plants employing approximately 15,000 people in the United States, Canada, Mexico and Europe.

Abex products reach out to touch the lives of countless people. Trains, planes, cars, buses, trucks . . . all rely on Abex friction materials for safe, sure stops. Rubber tires for many of these same vehicles are made in metal molds precision produced by Abex craftsmen. Complex machines that perform a myriad of jobs such as building roads, mining ore, shaping metals and forming plastics . . . all operate better with the help of Abex hydraulics. And passenger jets, winging between the world's major cities depend on Abex systems for hydraulic power and control.

In broad terms, the company's products can be classified into four major groups - products for railroads, hydraulic equipment, specialty castings and automotive products, including friction materials.

A New Research Facility

This booklet describes a new Engineering Test Center recently constructed at the Abex research complex in Mahwah, New Jersey.

Abex installed its first research dynamometer at Mahwah in 1906 for the purpose of testing railroad brake shoes. Since then the company has built many bigger and more sophisticated dynamometers to conduct research on braking materials for all types of application. The new test center, engaged in developing automotive and railroad friction materials, is the world's largest dynamometer complex.

Other research facilities at Mahwah include an experimental foundry, metallurgical laboratory, friction materials laboratory, materials processing laboratory and a manufacturing development laboratory.

Because of its diversity of interests and close liaison with operating divisions of the company, the Research Center is also intimately concerned with development carried on at other research facilities operated by Abex. In its field of interest, therefore, the Research Center provides recognized leadership in advancing state of the art, and represents a unique capability for all industry.

Largest Friction Material Producer

Abex operates 16 plants in North America and Europe which manufacture friction material used in the braking of trains, aircraft, cars, trucks, buses, off-highway equipment and industrial machinery. The world's largest manufacturer of friction materials, Abex also has licensee and joint-venture agreements with a number of other friction material manufacturers overseas.

Our Railroad Products Group supplies brake shoes for tread braking in both organic materials and in cast metal. For disc braking they have supplied the organic disc pads, caliper mechanisms and the discs themselves. For linear induction vehicles they have provided the friction pads which brake against an aluminum guide rail. And for transit cars they have designed and built complete braking systems.

Our Friction Products Group occupies a dominant position in the field of aircraft and automotive braking, in terms of supplying both original equipment manufacturers and the operators who require replacement parts. Heavy-duty industrial, automotive and aircraft requirements are met with sintered metallic friction materials. Normal requirements are supplied with organic compounds in roll, block, strip, drum, disc or sheet form as needed.

Abex also cooperates with the Department of Transportation (U.S.) and regulatory bodies in European countries for the purpose of establishing better friction material specifications for improved braking.

General Laboratory Description

The dynamometers in the test center simulate service conditions for railroad braking and automotive vehicle braking at any pre-set combination of speeds, loads and brake outputs.

With the brake mechanism disengaged, a dynamometer's electric motor drives inertia flywheels to a speed which develops the equivalent energy for specific tests. Brake applications are then made and length of stops recorded, along with many other measurements of the brake material's performance. All dynamometers are equipped so that they may be programmed to perform any cycle of stops required, and to feed data out in recorded form or directly to computer. The largest dynamometer in the test center is capable of an emergency stop equivalent to that for a 500-ton locomotive traveling at 100 miles per hour (far beyond present needs).

Sustained braking on a grade, called drag braking, can also be simulated, as well as braking under conditions of high temperature, moisture and the presence of foreign materials. On the two large railroad dynamometers, brake shoes are applied directly to the treads of standard locomotive or freight car wheels. Therefore these machines are often used for the development and testing of railroad wheels produced by Abex.

While the Engineering Test Center is Abex's newest laboratory, it is staffed by engineers of many years' experience with friction materials, and is an integral part of a research group whose investigations into the performance of friction materials go back over fifty years.

Production and Research Locations

Friction Materials

United States

- Pomona, Calif.
  Metallic Friction Materials - Railroad
- Denver, Colo.
  Metallic Friction Materials - Railroad
- Chicago, Ill.
  Organic & Metallic Friction Materials - Railroad
- Baltimore, Maryland
  Metallic Friction Materials - Railroad
- Minneapolis, Minn.
  Metallic Friction Materials - Railroad
- Mahwah, N.J.
  Organic & Metallic Materials R&D
- Iowa River, Ill.
  Vehicle Testing
- Salisbury, North Carolina
  Organic Friction Materials - Automotive
- Cleveland, Ohio
  Metallic Friction Materials - Automotive, Aircraft and Industrial
  Metallic Materials Research & Development
- Jamestown, Pa.
  Vehicle Testing
- Meadow Lands, Pa.
  Metallic Friction Materials - Railroad
- Winchester, Va.
  Organic Friction Materials - Automotive

Canada

- Lindsay, Ontario
  Organic Friction Materials - Automotive, Aircraft, Industrial & Railroad

Mexico

- Mexico City
  Organic Friction Materials - Automotive & Industrial

Brazil

- Sao Paulo
  Organic Friction Materials - Automotive

Belgium

- Liege
  Organic Friction Materials - Railroad

England

- Nottingham
  Metallic Friction Materials - Aircraft

France

- Gil
  Organic Friction Materials - Automotive
  Road Testing
- Bayon
  Organic Friction Materials - Automotive
  Organic Materials R&D
  Organic Clutch Facings

West Germany

- Essen
  Organic Friction Materials - Automotive
  Organic Materials R&D Testing

Italy

- Milan
  Organic and Metallic Friction Materials - Aircraft, Automotive, Industrial and Railroad
  Organic Clutch Facings

Spain

- Barcelona
  Organic Friction Materials - Automotive

India

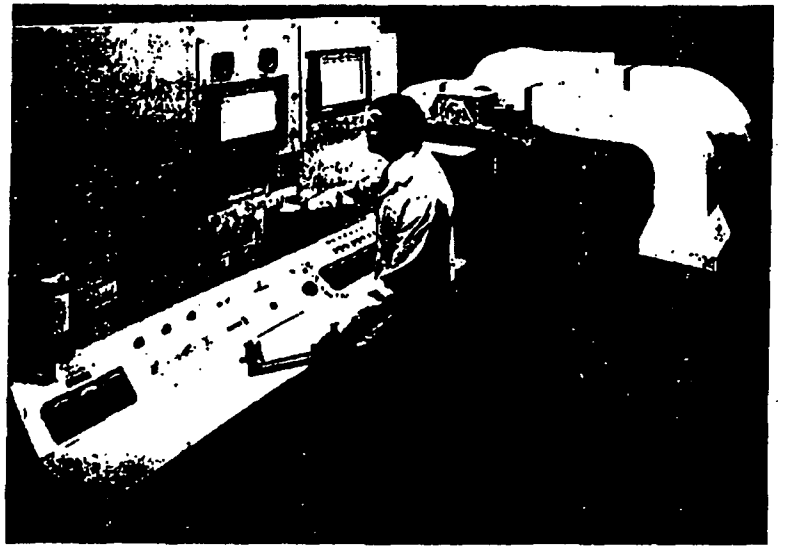
- Madras
  Organic Friction Materials - Automotive

● Production ○ Research ◐ Production & Research



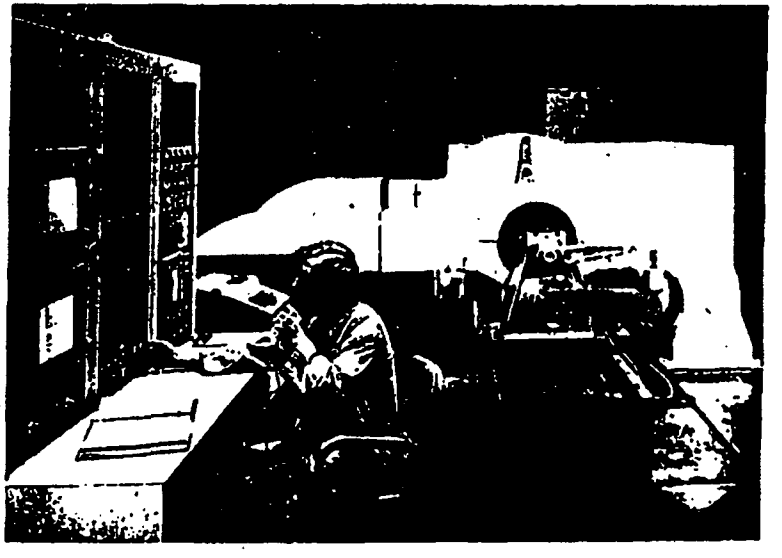
Automotive
D1 Dynamometer

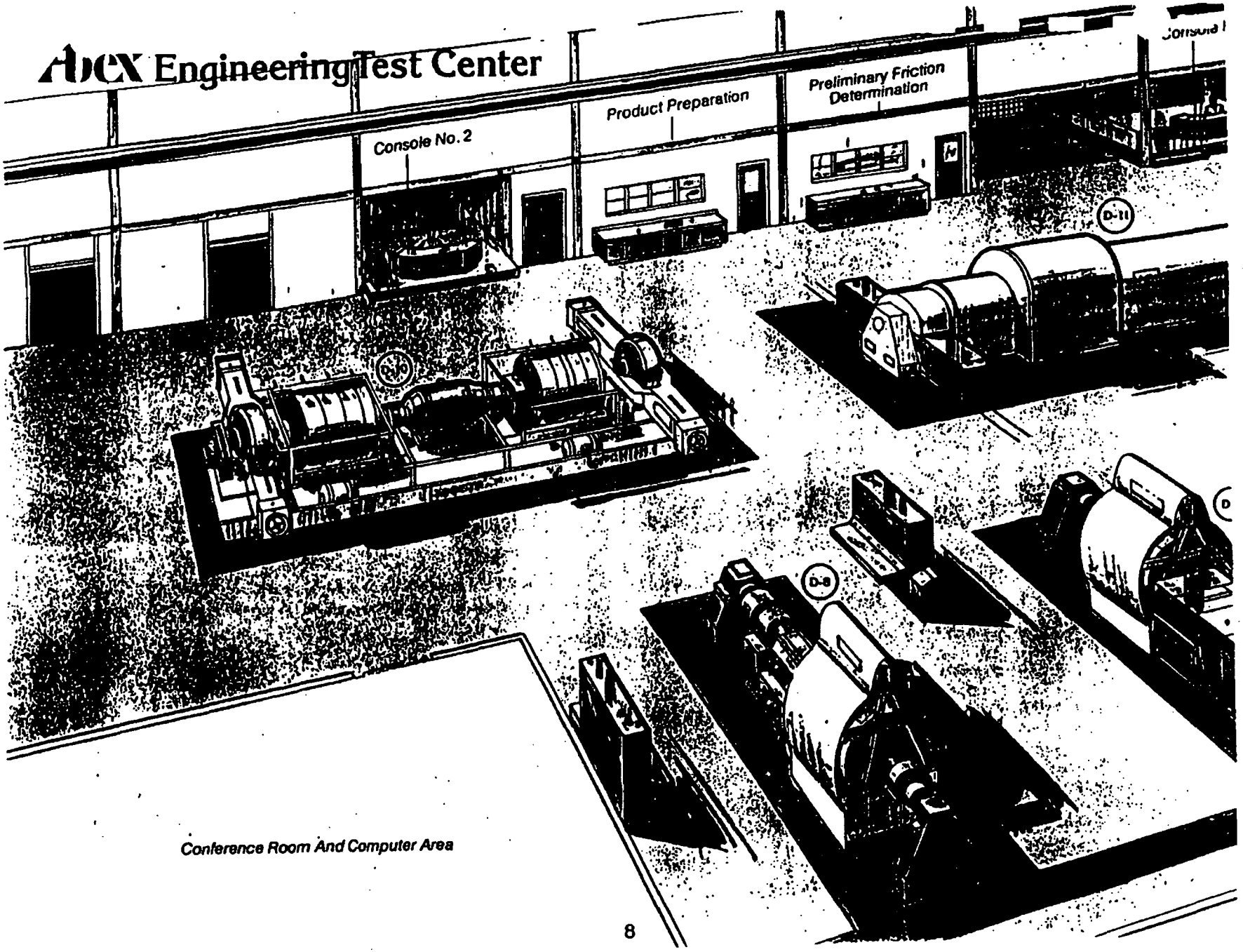
Drive Motor Type	50 hp, AC Dynamatic Drive, 2,000 rpm
Maximum Torque	2,000 lb-ft (277 kg m)
Maximum Energy	1,500,000 ft-lbs (207,325 m kg)
Inertia Combination	4.4 to 67.9 slug ft² (0.61 to 9.38 m kg s²)
Wheel Load Range at a 14.2 inch (30.7 cm) Rolling Radius	101 to 1561 lbs (45.80 to 707.93 kg)



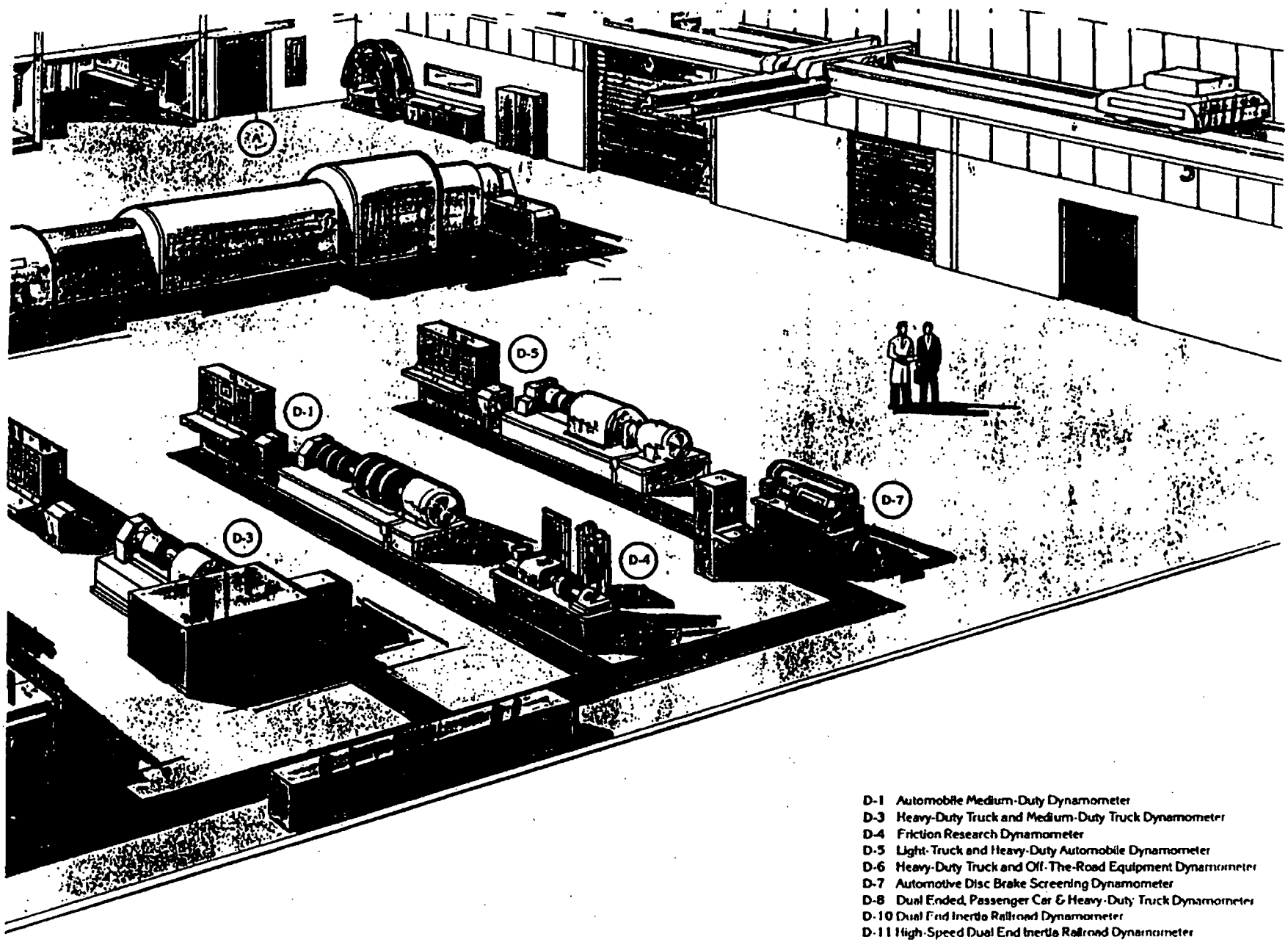
Heavy Duty Truck
D3 Dynamometer

Drive Motor Type	75 hp, AC Dynamatic Drive, 550 rpm
Maximum Torque	15,000 lb-ft (2,073 kg m)
Maximum Energy	2,026,000 ft-lbs (280,028 m kg)
Inertia Combination	121 to 1,221 slug ft² (16.72 to 168.76 m kg s²)
Wheel Load Range at a 20.0 inch (50 cm) Rolling Radius	1,403 to 14,153 lbs (636 to 6,419 kg)





Conference Room And Computer Area

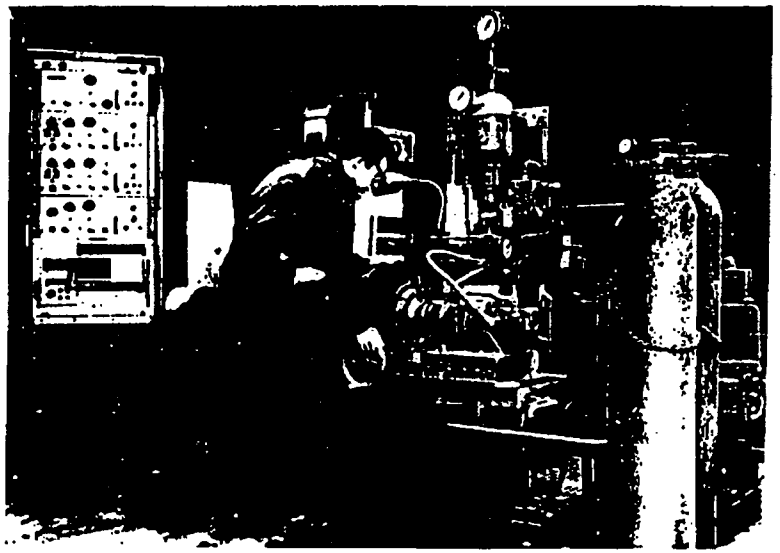


D-1 Automobile Medium-Duty Dynamometer
D-3 Heavy-Duty Truck and Medium-Duty Truck Dynamometer
D-4 Friction Research Dynamometer
D-5 Light-Truck and Heavy-Duty Automobile Dynamometer
D-6 Heavy-Duty Truck and Off-The-Road Equipment Dynamometer
D-7 Automotive Disc Brake Screening Dynamometer
D-8 Dual Ended, Passenger Car & Heavy-Duty Truck Dynamometer
D-10 Dual End Inertia Railroad Dynamometer
D-11 High-Speed Dual End Inertia Railroad Dynamometer
A RR Wheel Drag Dynamometer is off Console No. 1

Research
D4 Dynamometer

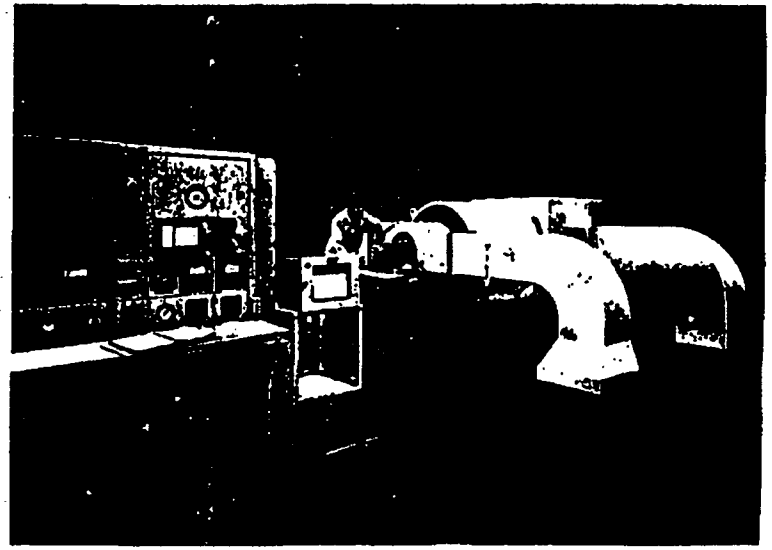
Drive Motor Type	20 hp, variable speed through Dynamatic clutch from 360 to 3,600 rpm
Maximum Torque	700 lb-ft (96.8 kg m)
Maximum Energy	55,158 ft-lbs (7,624 m kg)
Maximum Inertia	0.776 slug ft² (0.107 m kg s²)

Used as a research dynamometer for screening of new composition friction materials.



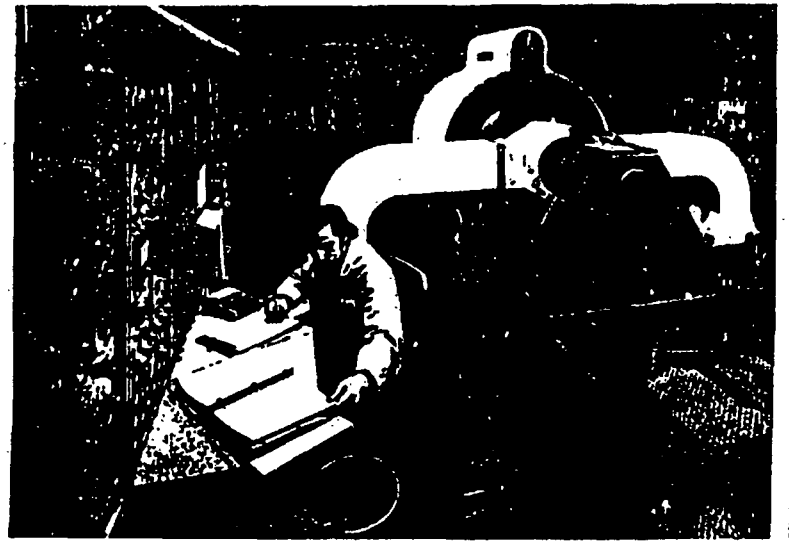
Automotive
D5 Dynamometer

Drive Motor Type	100 hp, AC, 1,750 rpm maximum
Maximum Torque	5,350 lb-ft (740 kg m)
Maximum Energy	1,763,000 ft-lbs (243,677 m kg)
Inertia Combination	10 to 105 slug ft² (1.38 to 14.51 m kg s²)
Wheel Load Range at a 14.2 inch (30.7 cm) Rolling Radius	230 to 2,415 lbs (104 to 1,095 kg)



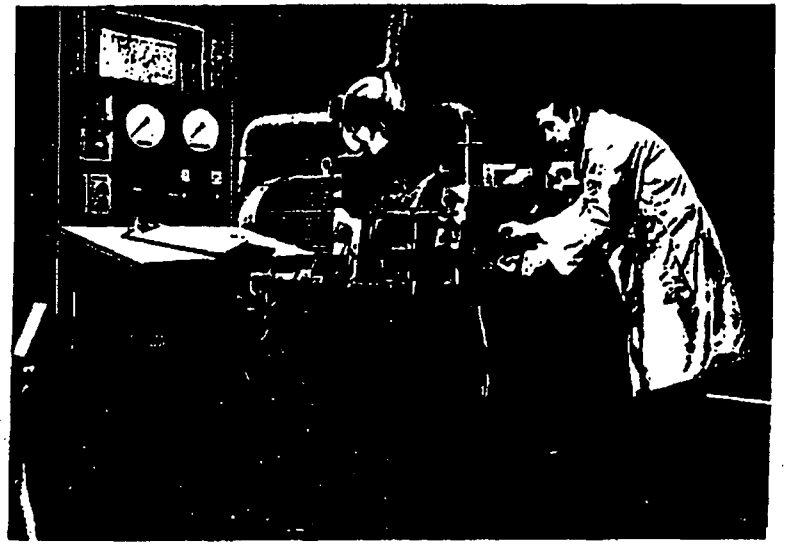
Heavy Duty Truck
D6 Dynamometer

Drive Motor Type	300 hp, AC Dynamatic Drive, 750 rpm
Maximum Torque	30,000 lb-ft (4,147 kg m)
Maximum Energy	9,315,000 ft-lbs (1,287,491 m kg)
Inertia Combination	432 to 3,020 slug ft² (59.71 to 417.42 m kg s²)
Wheel Load Range at a 20.0 inch (50 cm) Rolling Radius	5,007 to 35,008 lbs (2,271 to 15,873 kg)



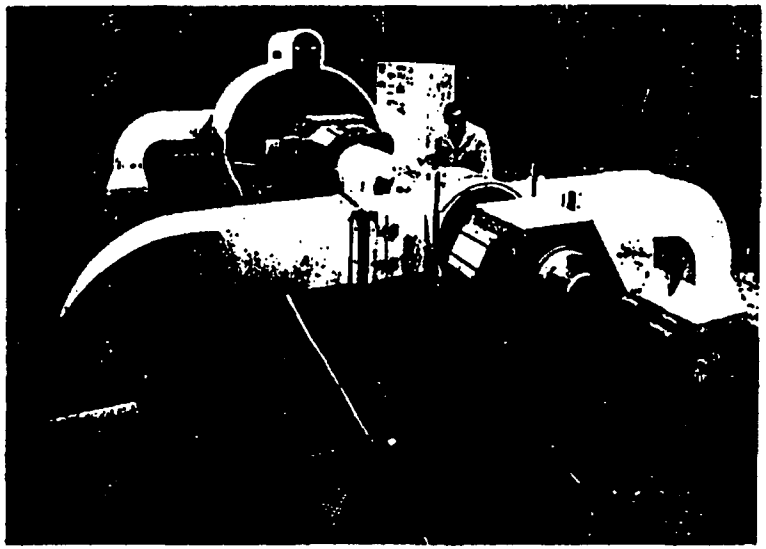
Krauss
D7 Drag-type Dynamometer

Constant speed drag type dynamometer driven by a 60 hp Bauer motor with a gearbox reducer on one end (660 rpm), and a straight-through speed on the other end (1,760 rpm). This dynamometer has no inertia capability. The maximum torque is 433 lb-ft (60 kg m). Dynamometer has automatic cycling capabilities.



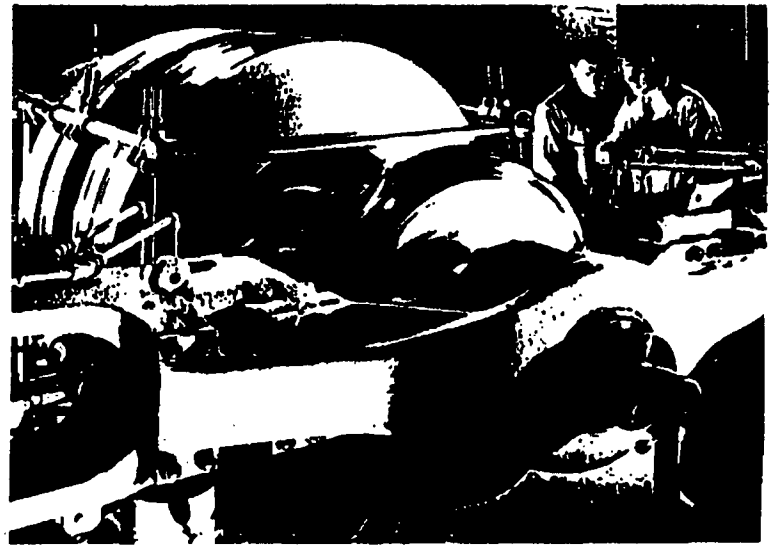
Heavy Duty Truck
D8 Dynamometer

Drive Motor Type	225 hp, DC, 1,500 rpm
Maximum Torque	25,000 lb-ft (3,455 kg m)
Maximum Energy	13,324,018 ft-lbs (1,841,606 m kg)
Inertia Combination	37 to 2,430 slug ft² (5.11 to 335.9 m kg s²)
Wheel Load Range at a 20.0 inch (50 cm) Rolling Radius	430 to 28,168 lbs (195 to 12,154 kg)



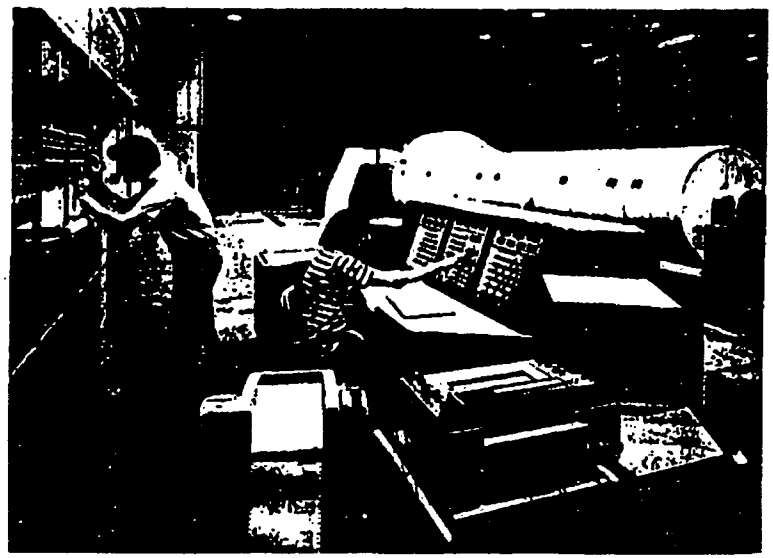
Railroad
D10 Dynamometer

Drive Motor Type	200 hp, DC, 1,500 rpm
Maximum Torque	15,000 lb-ft (2,073 kg-m)
Maximum Energy	60,184,000 ft-lbs (8,318,452 m kg) (Both Ends)
Inertia Combination	240 to 4,748 slug ft² (33.17 to 656.3 m kg s²) (Both Ends) maximum
Wheel Load, 33 inch (838 mm)	4,088 to 80,864 lbs (1,853 to 36,673 kg)



Railroad
D11 Dynamometer

Drive Motor Type	500 hp, DC, 2,400 rpm
Maximum Torque	15,000 lb.-ft (2,073 kg m)
Maximum Energy	107,561,000 ft-lbs. (14,866,758 m kg) (Both Ends)
Inertia Combination	22 to 10,977 slug ft² (3.04 to 1,517.2 m kg s²)
Wheel Load, 33 inch (838 mm)	375 to 186,954 lbs (170 to 84,786 kg)



General capability of machines at new Test Center:

Friction Level • Brake Torque Output • Pressure Sensitivity • Speed Sensitivity • Thermal Fade and Recovery • Moisture Conditions • Relative Wear Rate • Structural Integrity • Vibration Characteristics • Brake Efficiency • Brake Actuation Efficiency.

Computer Center

The computer center is used to:

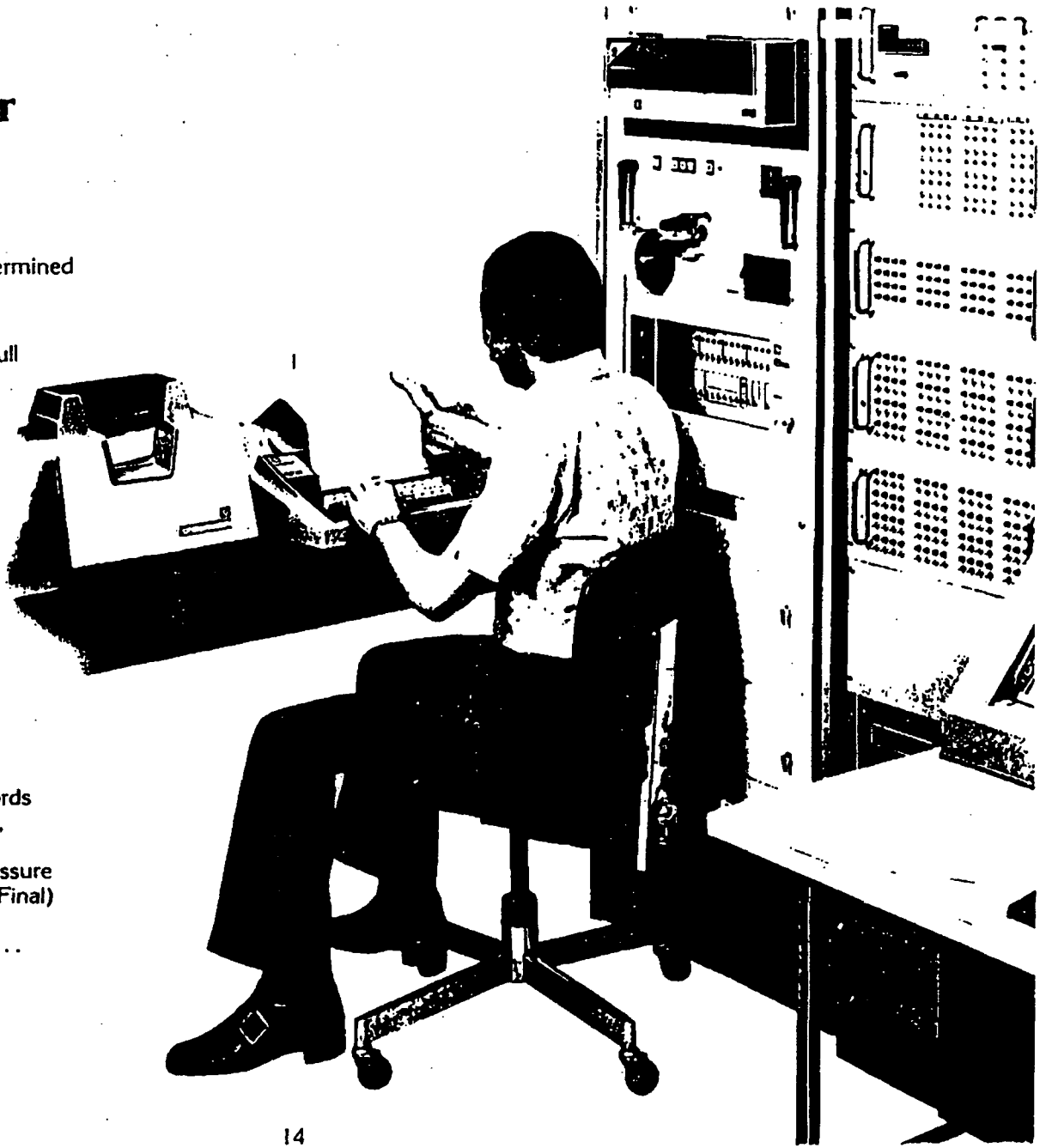
- Program test machines with predetermined test parameters
- Control test equipment operation
- Provide test data printouts giving a full analysis of the entire test

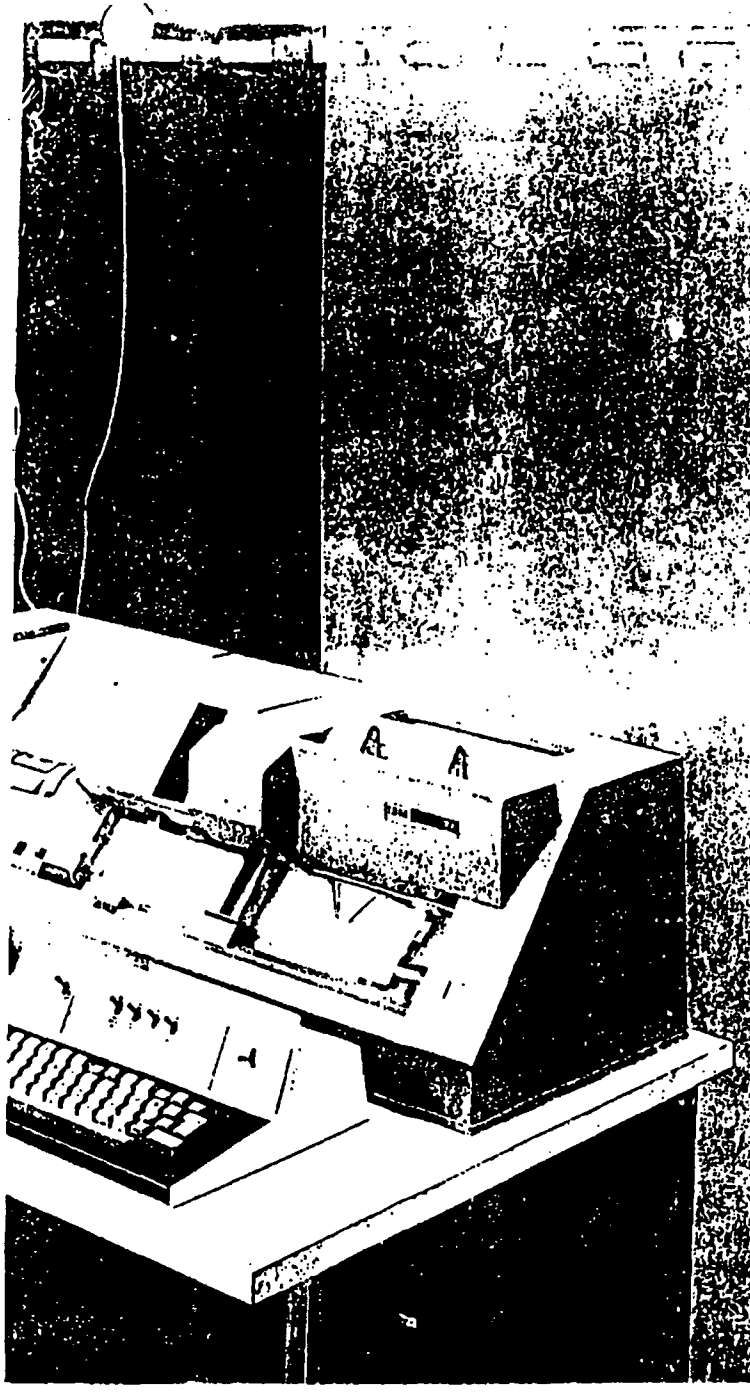
Computer provides:

- Data Reduction
- Printout of Test Data
- Storage of Data
- Retrieval of Data

In addition, other data reduction is accomplished from our test vehicles and this data is integrated into the computer center.

The typical printout shown above records various outputs from the test machine, including:
. . . Torque (Min, Max, Average) . . . Pressure (Min, Max, Average) . . . Speed (Initial, Final) . . . Temperature . . . Distance . . . Stop Number . . . and other pertinent facts . . .





Contact

This brochure provides only a general look at the company's Engineering Test Center in Mahwah, New Jersey. More detailed information on the test of friction materials or on the products themselves can be obtained from:

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Telex: 0235395

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Mahwah, New Jersey 07430
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Abex
CORPORATION