

1915



40 YEARS of PIONEERING in ELECTRONIC MEASUREMENTS

1955



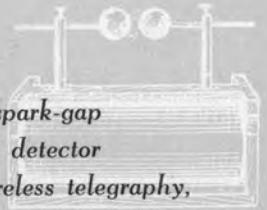
**Combined view of offices and plants of the
GENERAL RADIO COMPANY
Cambridge and Concord, Massachusetts**
*Since 1915 — Manufacturers of electronic apparatus
for science and industry.*

THE GENERAL RADIO COMPANY, pioneer manufacturer of electronic instruments, test equipment, and laboratory standards, was established in June 1915. General Radio's founder was Melville Eastham, who, until his retirement in 1950, was president and chief engineer over the greater part of the first 35 years of the company's existence. General Radio was started on the sound assumption that measurement, as already proved in other fields of physics, would be the basis of technical progress in electrical communication.

In 1915, markets for electronic products were few: wireless telegraph companies, telephone companies, the armed services, and colleges. Of the companies manufacturing instruments for the radio industry in 1915, no other survives today.

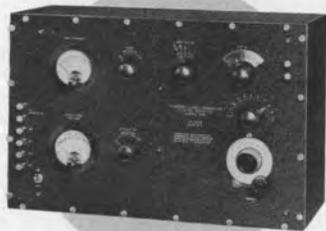
Through two wars and two major depressions, the General Radio Company has grown steadily over the past 40 years. It is employee-owned and employee-managed. It is an engineers' company. Of its nine-member management committee, seven have engineering degrees.

With main offices and factory in Cambridge and a branch plant in Concord, Massachusetts, total plant floor area is more than 220,000 square feet. Employment is approximately 600, of which some 50 are engineers engaged in development, design, and application work.



From the spark-gap and crystal detector of early wireless telegraphy, through the vacuum tube to today's transistor, General Radio has made the tools to test electronic devices. GR instruments in 1915 measured the performance of spark transmitters; in 1955, they monitor the operation of color television transmitters.





1927 Standard Signal Generator



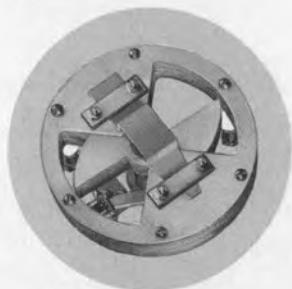
1931 Modulation Meter



1933 Heterodyne Wave Analyzer



1936 Peak-responding Voltmeter



1943 Butterfly Circuit



1953 Sound-survey Meter

NOTABLE FIRSTS...

A NUMBER OF NOTABLE FIRSTS in the development and commercial production of important instruments have resulted from General Radio pioneering. Among these are the precision variable capacitor, the beat-frequency oscillator, the feedback-type R-C oscillator, the standard-signal generator, the harmonic frequency standard, the electronic stroboscope, the sound-survey meter, the u-h-f admittance meter, the peak-responding vacuum-tube voltmeter, the broadcast frequency-deviation and modulation monitors, the continuously variable autotransformer, the butterfly circuit, the heterodyne wave analyzer, and the R-C degenerative wave analyzer.



GENERAL RADIO MANUFACTURES a larger and more diversified line of electronic instruments than any other company in the world. The GR line numbers hundreds of different instruments and a wide variety of parts and components; to describe them requires a 264-page catalog. A 50-man development-engineering staff is constantly engaged in turning out new instruments. Since the close of World War II, General Radio has placed on the market over 150 major new items, averaging better than one a month. These are described in a monthly magazine, *The General Radio EXPERIMENTER*, published continuously since 1926 and now distributed to more than 60,000 readers all over the world.



STANDARDS...

SOME OF THE COMPANY'S EARLIEST PRODUCTS were laboratory standards, and General Radio today still supplies the standards of inductance, capacitance, and frequency that are basic to the electronics industry. The successful manufacture of standards is predicated on quality, both in design and in production. This tradition of quality is evidenced throughout the GR line. GR instruments are designed and built to exacting specifications, to be accurate, rugged, and reliable. Many a laboratory has GR products built several decades ago that are still giving accurate and reliable service.

The accuracy of the synchronous clock operated from this primary frequency standard is a few seconds per year. This equipment, the result of 30 years continuous development, supplies standard frequencies throughout General Radio's Cambridge plant. The frequency is constant within five parts in one hundred million per month and is known at all times to two parts in one hundred million.



The precision air capacitor is a working standard of capacitance. Its diverse uses include standardizing the production-test equipment of capacitor manufacturers and checking the accuracy of aircraft fuel-tank gages. General Radio has been manufacturing standard capacitors since 1915. Today's Type 722 Precision Capacitor is the accepted standard for the electronics industry.



Capacitance



Inductance



Attenuation

Quality

QUALITY STARTS AS A PRINCIPLE, and over the years becomes a tradition. The General Radio Company, because it has had continuity of management over 40 years, because it is employee-owned, and because its policies are largely determined by engineers, has always held to this tradition. Quality in design and development, quality in manufacture, and quality in performance are the values that are built into General Radio products.



A-C Resistance



A-C Voltage

Quartz crystals are manufactured at General Radio on an individual basis in the laboratory. This assures the extreme accuracy required for use in GR primary frequency standards and GR station frequency monitors that keep broadcasting stations precisely on their assigned channels.



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Quality *IN DESIGN*

**Quality in design starts with
the development engineering staff.**





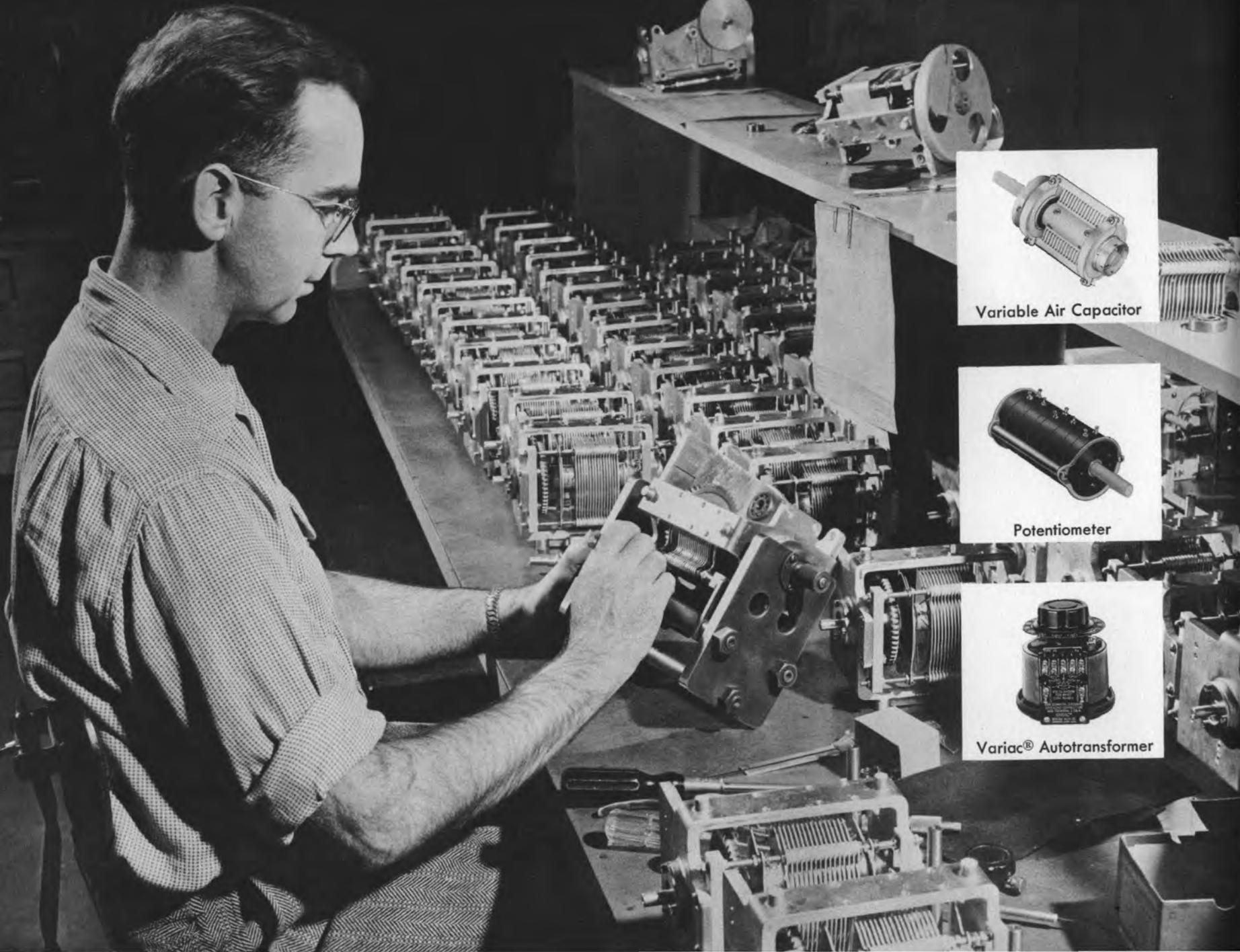
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Second stage of development is the prototype or "packaged" model, built in the model shop, from which final design details are determined. Photo shows the prototype of a pulse and time-interval generator. →

Final model, built from manufacturing drawings, is given exhaustive tests before release for production. Here, the final model of a motor-driven slotted line is put through its paces by the engineer who developed it. ↓



GENERAL RADIO INSTRUMENTS are designed by engineers who have a diversity of educational backgrounds acquired from leading universities in this country and abroad. Many of them are recognized authorities in their respective fields, which include dielectrics, impedance measurement, coaxial systems, wave analysis, acoustics, frequency standardization, pulse techniques, counting devices, servo-mechanisms, magnetic circuits, broadcast engineering, circuit analysis, voltage measurement, and machine design. Collectively, 500 years of product development experience are represented, in practically all phases of electronic engineering. The advice of this staff is available to GR customers in the solution of their measurement problems.



Variable Air Capacitor



Potentiometer



Variac® Autotransformer

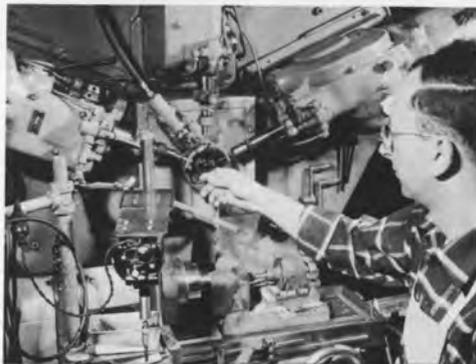
Inserts on opposite page show three outstanding General-Radio-made components.

Quality *IN MANUFACTURE*

Quality in manufacture starts with component parts and extends through the manufacturing process to final performance tests on the completed product. It depends upon the skill of the workman, upon the methods and tools with which he works, and upon the satisfaction, rewards, and security that he derives from his job. General Radio manufacturing employees are capable and versatile craftsmen, who can adapt their talents to many different operations. Turnover among these employees is low, and rewards are commensurate with performance. Steady factory employment is a primary management aim, as is security, both present and future.

Supplementing individual skill are automatic or semi-automatic machines, which are used wherever the quantity and the nature of the work make them practicable. Many of these are of GR design and construction.

General Radio manufactures many of the components used in its instruments. These parts are also offered for sale, and proof of their excellence is found in the steadily increasing volume of their sales to other manufacturers.



To speed production on the thousands of control knobs that go into GR instruments, the semi-automatic machine shown at left bores, drills, counterbores, taps, and inserts setscrews into each knob.



The coils for Variac® autotransformers are wound on the GR-designed machine, shown above, which applies an evenly spaced winding, accurately banked on the inner face, to the toroidally shaped core.

This machine, designed and built at General Radio, automatically mills from blocks of aluminum complete rotors and stators for variable capacitors.



In the assembly department, each man assembles a group of instruments, performing operations on each successively. Versatility is a prime requirement, because in the course of a year a man will assemble dozens of different products.

← The accuracy of a precision air capacitor depends upon the maintenance of close mechanical tolerances — from the fabrication of each part to the final assembly. Here, the capacitors undergo adjustment and alignment in a jig to assure linearity of the capacitance characteristic.



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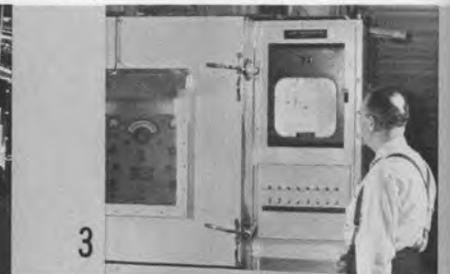
The safety of airline passengers and the success of military operations may depend upon the accurate calibration of these aircraft fuel-tank-gage testers.

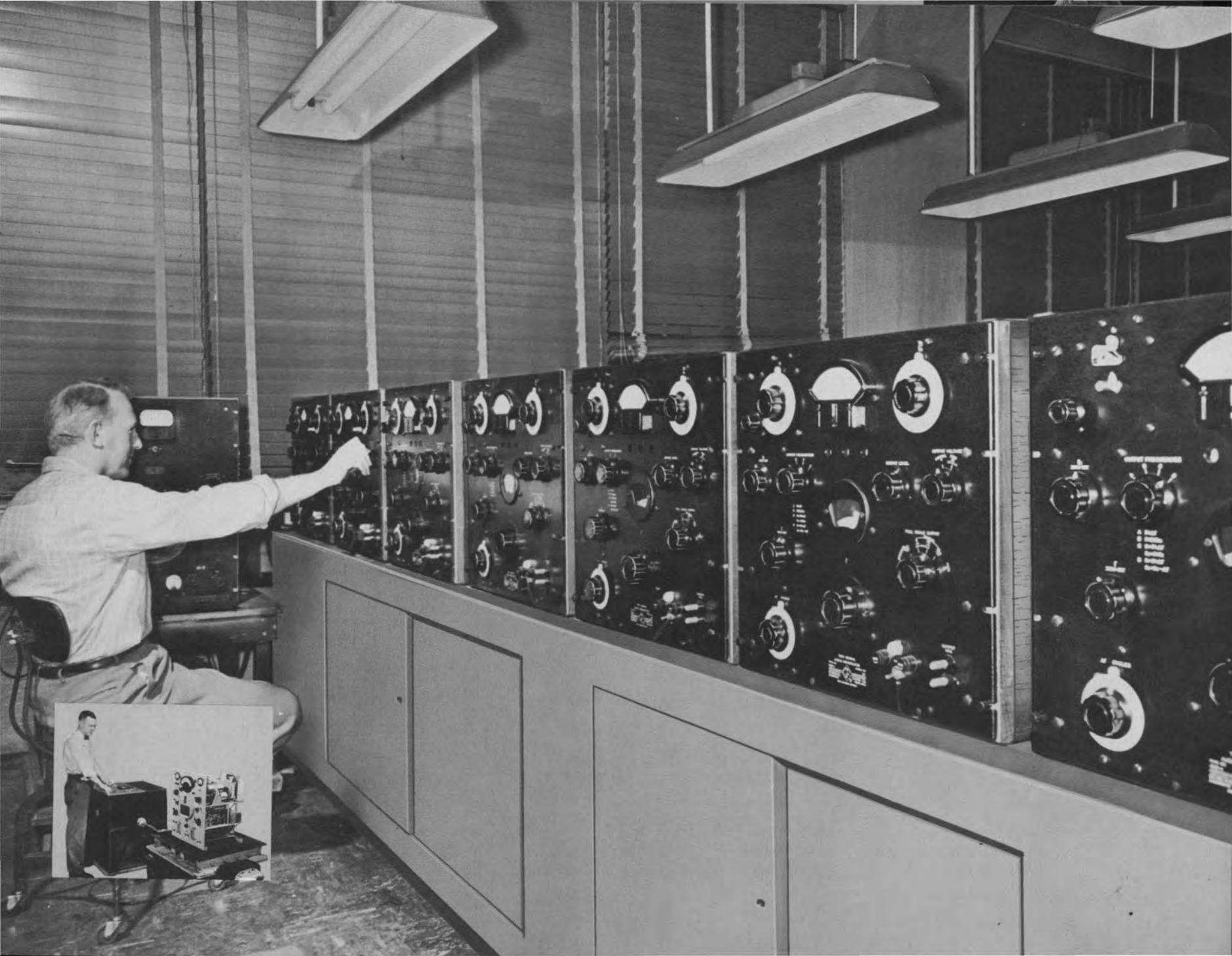
Quality *IN PERFORMANCE*

FINAL PERFORMANCE TESTS are the safeguard of quality. In the Standardizing Laboratory, each General Radio instrument undergoes inspection, test, adjustment, and calibration; each instrument must meet tolerances that are substantially closer than those published in the catalog. Nearly ten percent of General Radio's employees are engaged in this work.

- 1 The fidelity with which the broadcasting station transmits music and with which the radio receiver reproduces it are determined by measurements with the Distortion and Noise Meters, shown here in the Standardizing Laboratory.
- 2 A group of Comparison Bridges under test. These are used by electronic manufacturers for the rapid testing of components in production.
- 3 Precise electronic instruments must operate under a variety of climatic conditions. This humidity test chamber provides one method of climatic testing.

Equipment designed to operate under severe mechanical stresses is given a thorough shaking on this vibration table. →





SALES...

SUPPORTING AND EXTENDING THE QUALITY that runs through General Radio design and manufacturing processes are the policies and operations of the Sales Engineering Department. General Radio salesmen are engineering graduates — General Radio employees, factory trained and thoroughly familiar with the design, manufacture and use of GR products. They provide the connecting link between manufacturer and customer, translating customer needs into equipment recommendations and instrument capabilities into customer applications.

"We sell direct" is a long-established General Radio policy. The GR sales engineer is responsible, not only to his company, but also to the customer. His job is not only to sell GR products, but also to be sure that the customer buys the instrument best suited to his needs. Through this method of selling, the interests of both manufacturer and customer are best served.

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TV BROADCASTING



ELECTRON TUBES

INDUSTRIAL NOISE

AUTOMOTIVE RESEARCH

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275 Massachusetts Avenue,

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Tel. TRowbridge 6-4400 (Boston)

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New York 6, New York
90 West Street
Tel. — WOrth 4-2722

Chicago 5, Illinois
920 South Michigan Avenue
Tel. — WAbash 2-3820

Washington Office
Silver Spring, Maryland
8005 13th Street
Tel. — JUniper 5-1088

Philadelphia Office
Abington, Pennsylvania
York Road and Guernsey Avenue

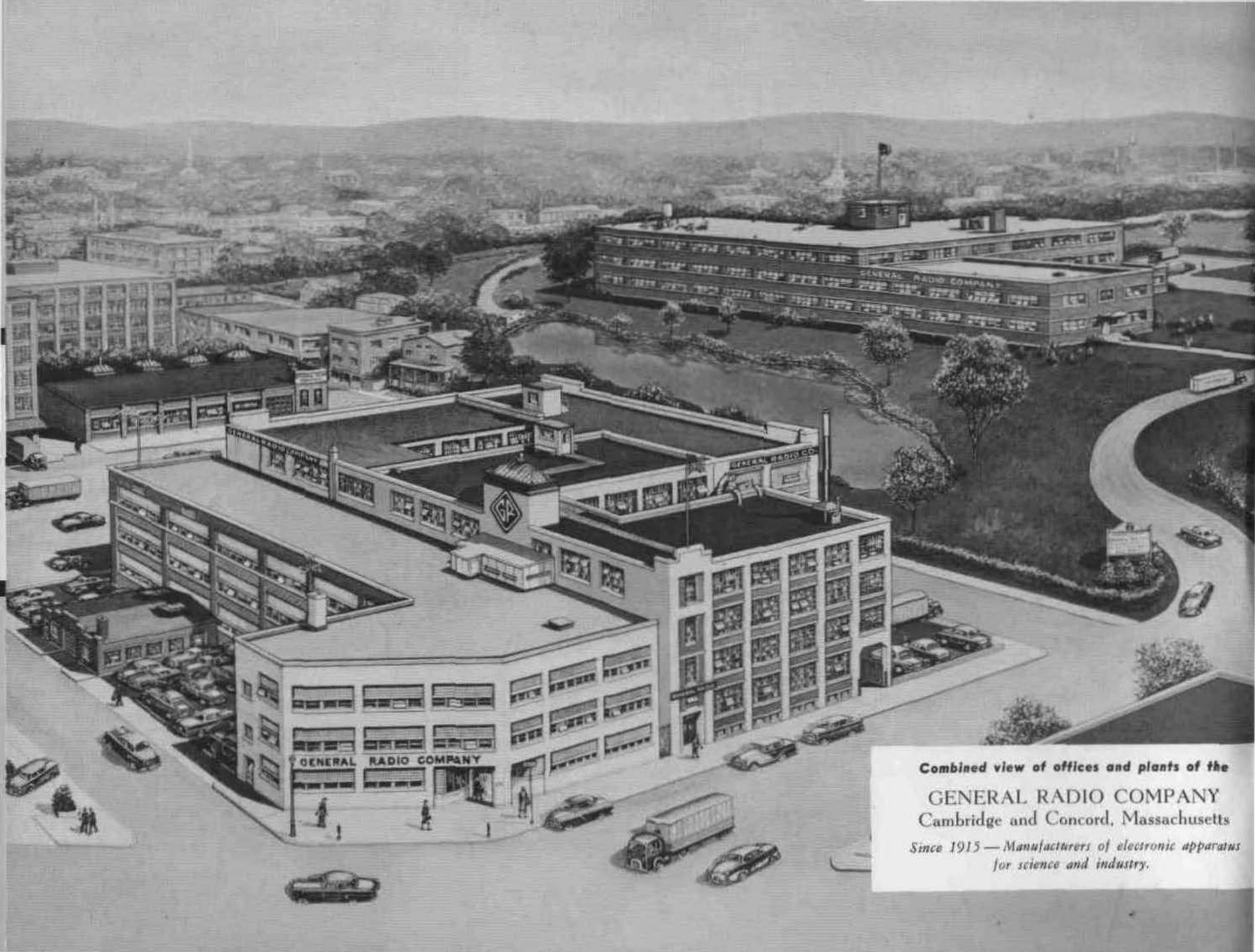
Los Angeles 39, California
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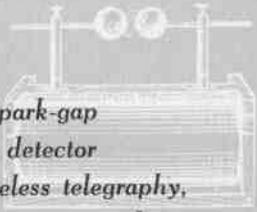
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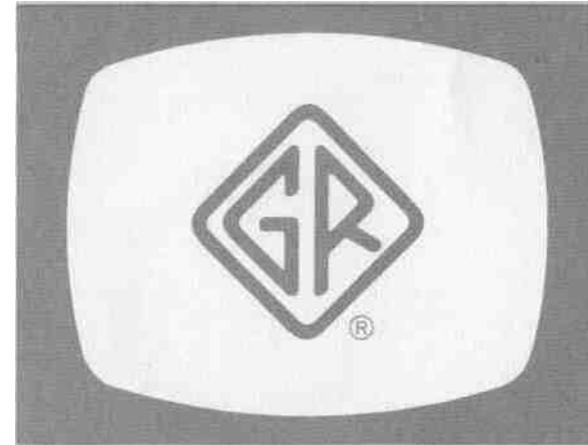
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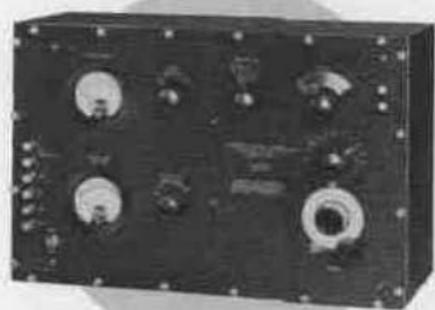
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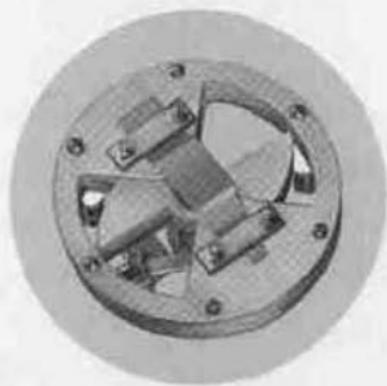
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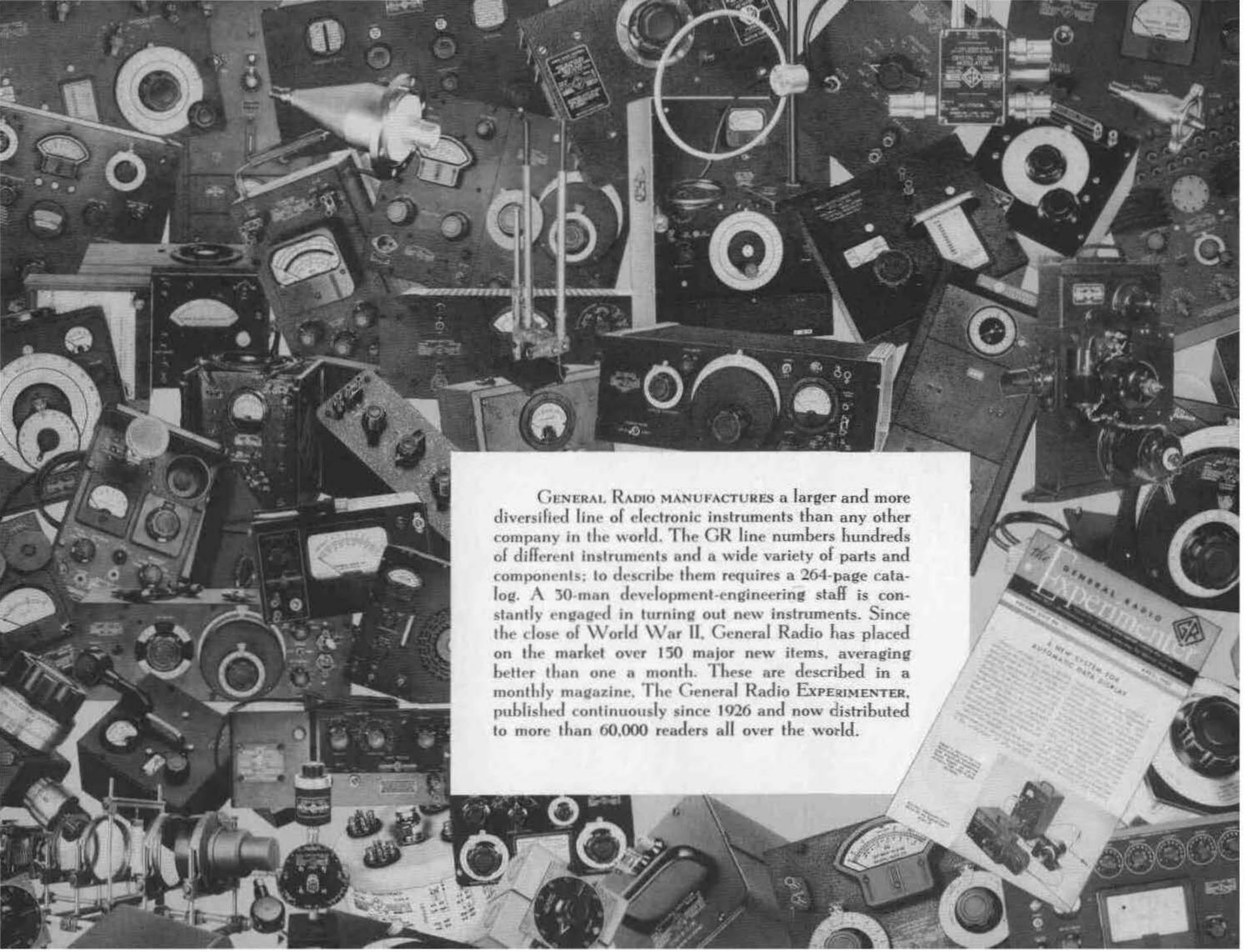
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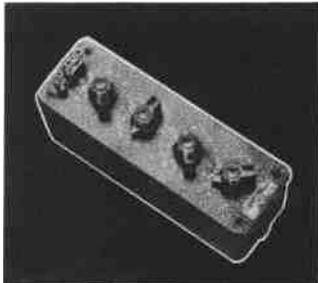
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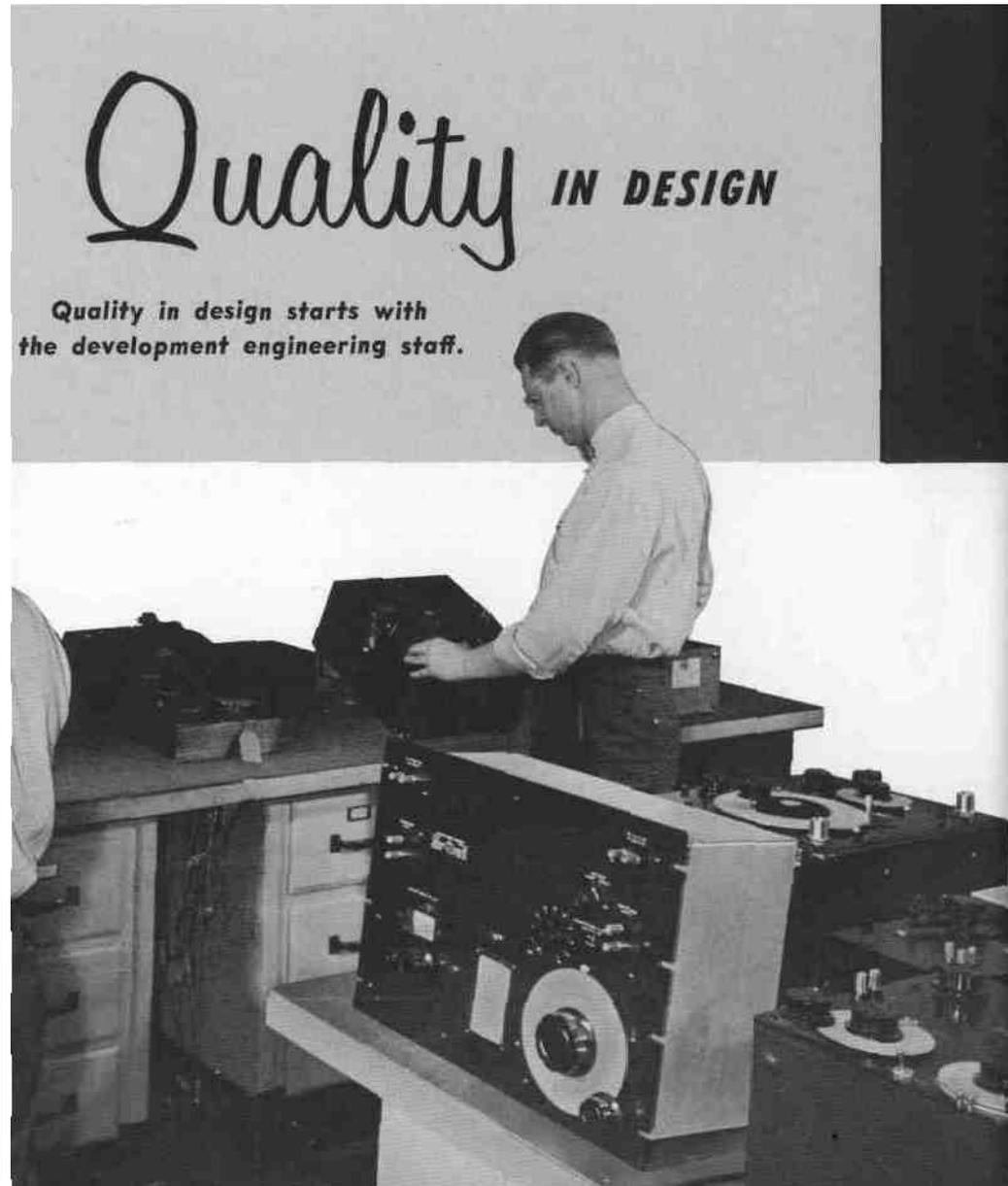
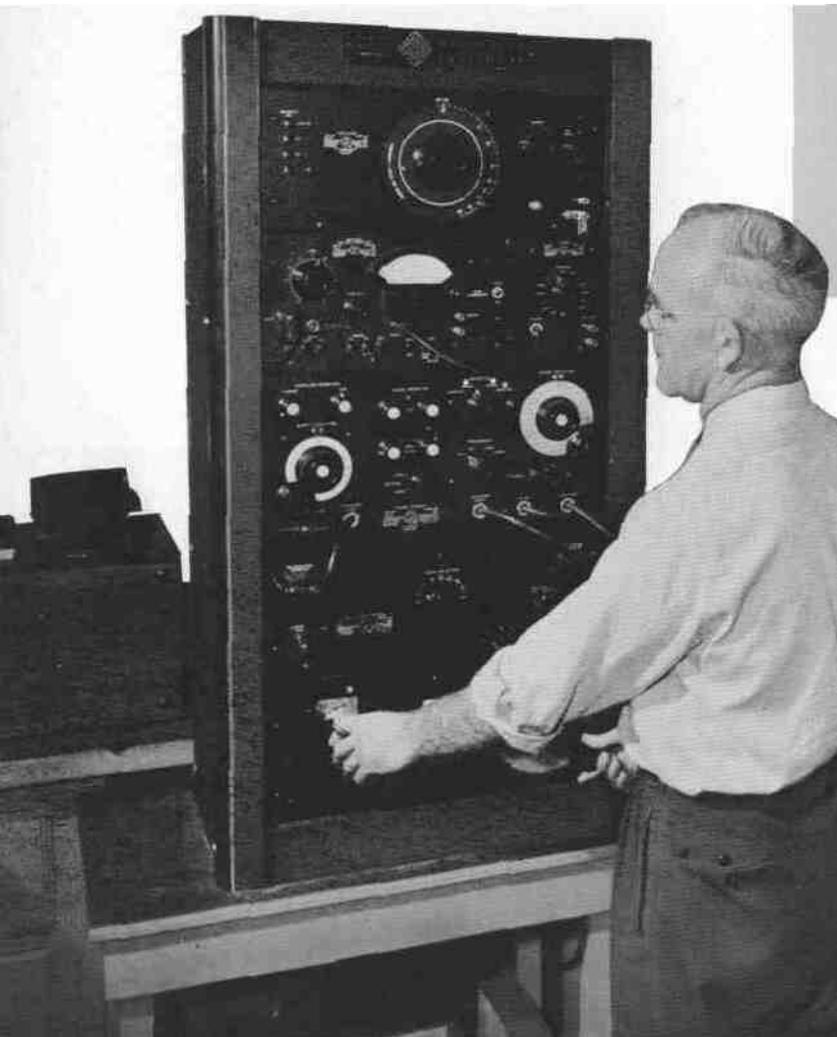
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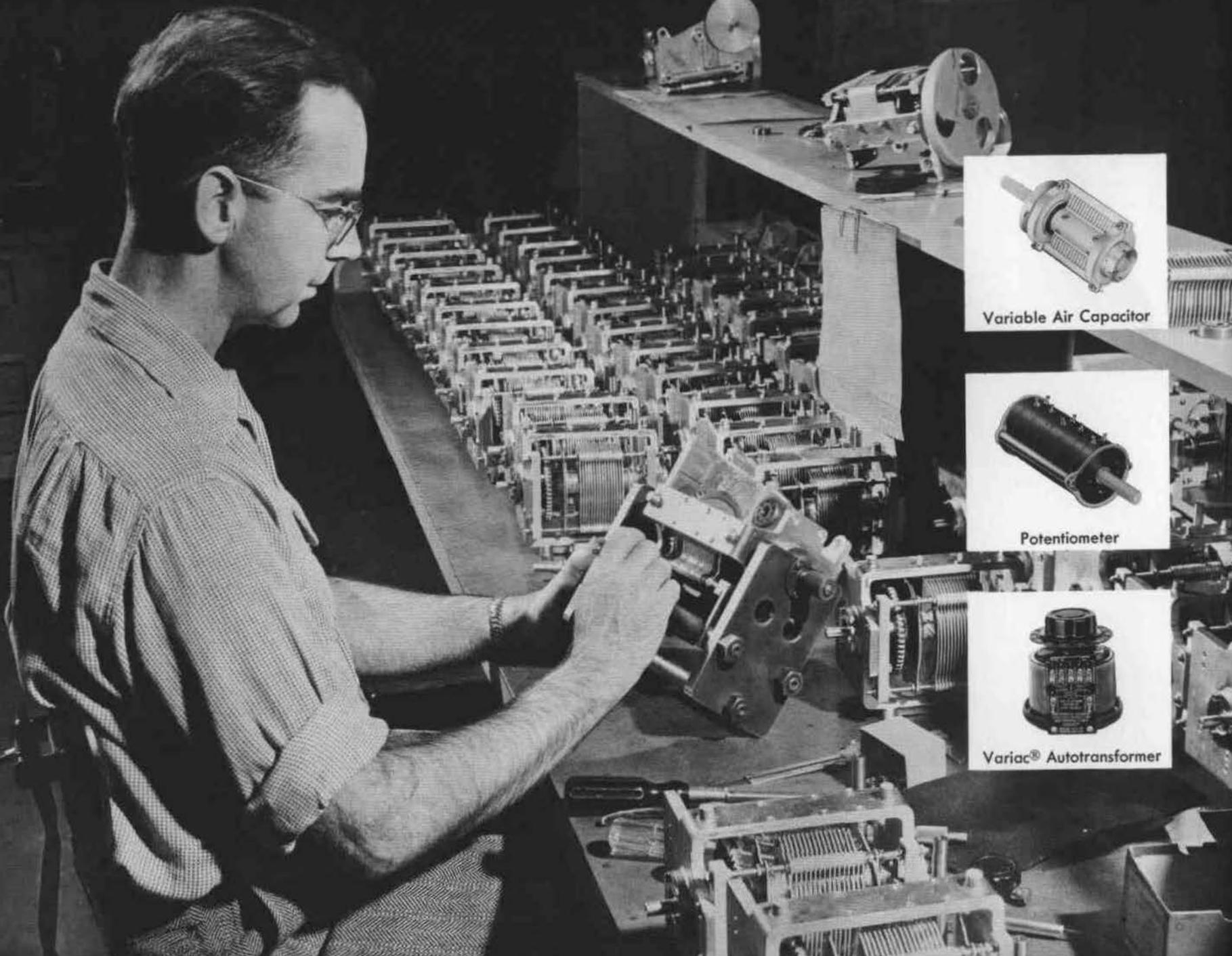
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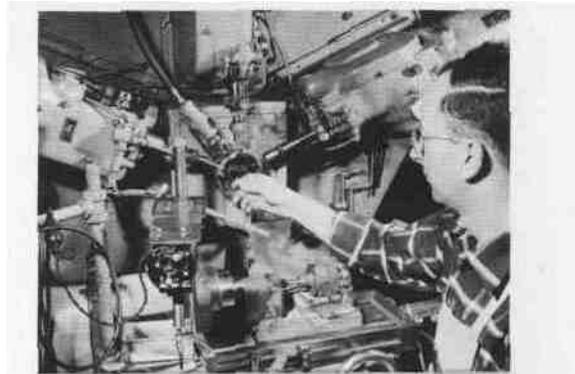
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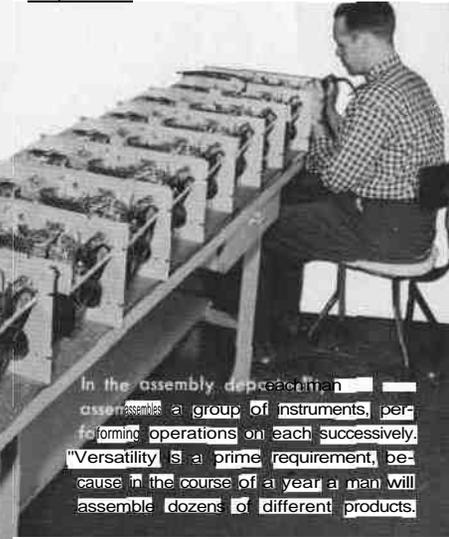


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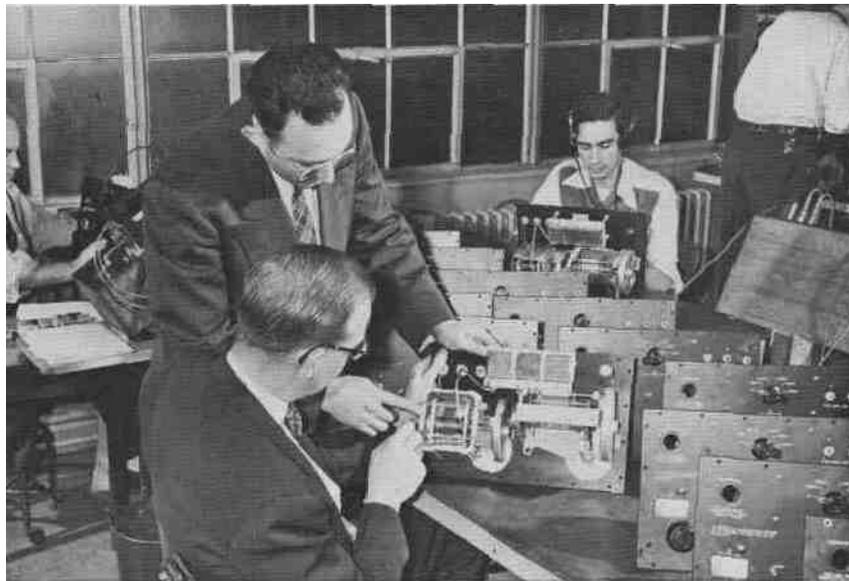


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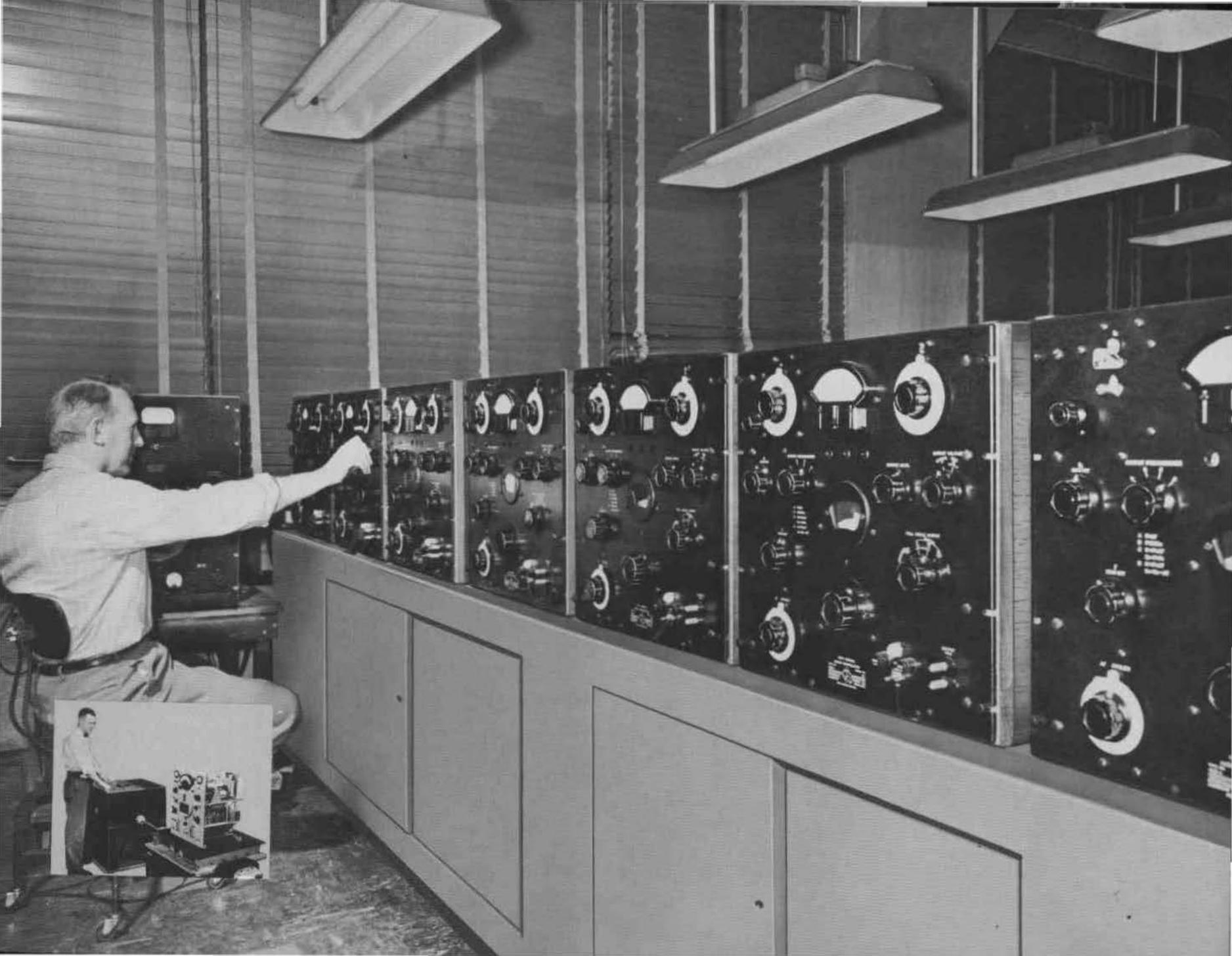
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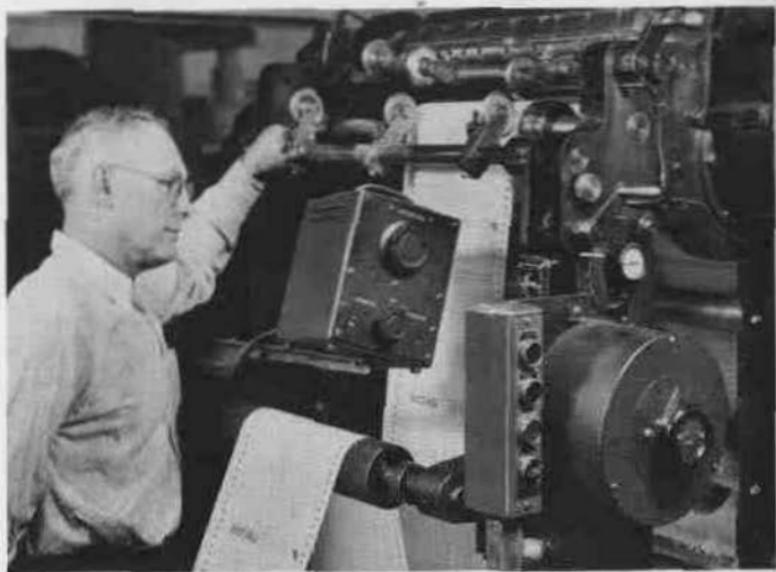
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