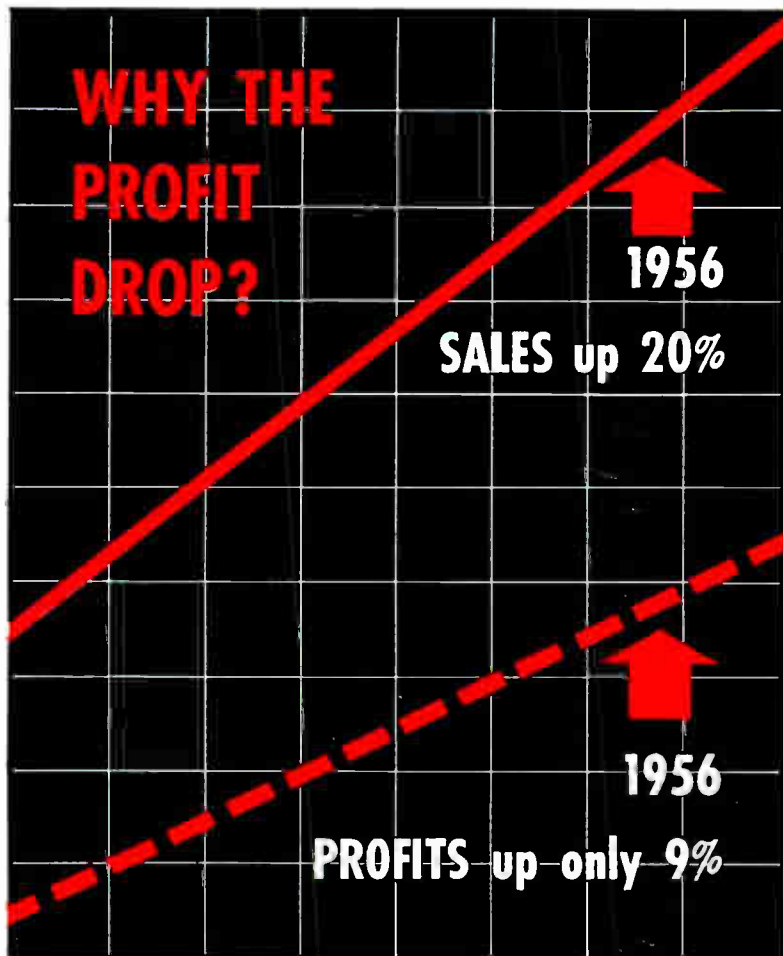


APRIL 10, 1957

electronics

business edition

A MCGRAW-HILL PUBLICATION • VOL. 30, NO. 4A • PRICE FIFTY CENTS



NEWS AT A GLANCE

ELECTRONICS FIRMS' PROFITS TRAIL SALES

(page 22) . . . Survey finds many industry groups active in electronics (13) . . . Infrared techniques expand industrial control market (15) . . . Daily profit-and-loss statement helps firm increase earnings (17) . . . Instruments play leading role in petroleum research (19) . . . Solar furnaces require electronic controls (20) . . . Industry buys 100 million pounds of plastics (28) . . . Burglar alarm systems begin to use electronic equipment (30) . . . Dielectric heater sales run 1,000 annually (40) . . .

Raytheon — World's Largest Manufacturer of Magnetrons and Klystrons



Excellence in Electronics



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Waltham 54, Massachusetts

Raytheon makes: Magnetrons and Klystrons, Backward Wave Oscillators,
Traveling Wave Tubes, Storage Tubes, Power Tubes, Receiving Tubes, Transistors

World Radio History

electronics business edition

A McGraw-Hill Publication
Vol. 30, No. 4A

APRIL 10, 1957

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Industry Outlook

KEY WORDS in electronic equipment design are miniaturization and ruggedization. Impetus for miniaturization comes, of course, from the military especially in design of aircraft and missile guidance equipment. But it means good business throughout our industry.

- Test equipment is getting smaller all the time. Accurate, versatile instruments of vestpocket size may be a boon to service engineers.
- More ambitious computers may appear when the bulk of the equipment can be reduced. True "thinking" machines may become possible.
- Electronic controls for machine tools will become more universally accepted when the control equipment can be reduced, perhaps to size of present electrical switchgear housings.
- Miniaturization may help manufacturers crack large potential markets among private flyers, small-boat owners, would-be Citizens Radio users.

Electronics manufacturers will find help from many quarters. Sheet-metal fabricators, chemical and plastics producers are recognizing the present and potential markets among electronics firms. From interindustry cooperation will come basic materials, parts, production equipment tailored to the needs of the electronics industry.

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Clevite's remarkable sales increase has been built on a selective line of semiconductors, plus specialized production and engineering facilities and an exceptional quality control program.



Reliability *in volume* accelerates Clevite Transistor Product's steady growth

New gains won by focusing unusual production, engineering and quality control facilities on selected semiconductors

acts has stepped up its production capacity and concentrated its research, development and manufacturing on a carefully selected product line.

WALTHAM, MASSACHUSETTS—Improved facilities for large volume production have brought about a rapidly growing demand for Clevite's high-reliability semiconductors.

Long a leader in the transistor-diode field, Clevite Transistor Prod-

Located in 175,000 square feet of the famous Waltham Watch building in the heart of one of the nation's most active electronics areas, this division of Cleveland's Clevite Corporation is credited with an impressive number of industry "firsts".



Continuous vertical crystal puller, developed by Clevite engineers, has tremendously improved the crystal-growing art. It is just one indication of the solid-state knowledge and volume production set up that keeps Clevite in the forefront of semiconductor developments.



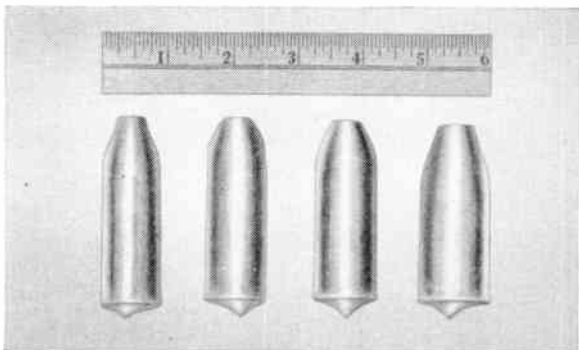
175,000 square feet in the famous Waltham Watch Plant are devoted to research, development and production of Clevite's germanium and silicon diodes and transistors.

PHOTO BY FAIRCHILD AERIAL SURVEYS

Winner of the first power transistor IPS contract awarded by the Signal Corps, Clevite Transistor Products developed the only military-approved power transistor. In the commercial field, its power transistors are approved for the new radios used in nine out of ten makes of 1957 automobiles. Clevite's high-back resistance and fast recovery time glass diodes have won great favor in the computer industry. A new Remington-Rand Univac Computer, for example, utilizes approximately 60,000. Clevite is also the largest single supplier of germanium diodes to the television industry.

Originally a producer of varied types of semiconductors, Clevite Transistor Products now concentrates research and development on a select line of transistors and diodes. The 50 members of the engineering staff — part of an employee group of almost 500 — are concentrating their efforts on the product improvement and quality control of power transistors and high-quality diodes for the more critical applications. Their work is supported by the scientists and engineers of both Clevite Research Center in Cleveland and the German subsidiary Intermetall G.m.b.H. of Dusseldorf, Europe's second largest manufacturer of semiconductors.

Extreme crystal uniformity — the key to high quality semiconductors — has been achieved by the development of a continuous vertical crystal puller in Clevite's Waltham metallurgical laboratories. Quality control is further advanced by a device that simplifies the measurement of thermal resistance in power transistors.



Single crystals of silicon, grown at Clevite Transistor Products Metallurgical Laboratory, demonstrate the unusual uniformity made possible by Clevite's crystal pulling technique.

Automated production of diodes now underway is another indication of Clevite's ability to control quality level and achieve high volume rates. Clevite is itself a large producer of silicon and germanium crystals — a basic advantage in meeting exceptional volume requirements.

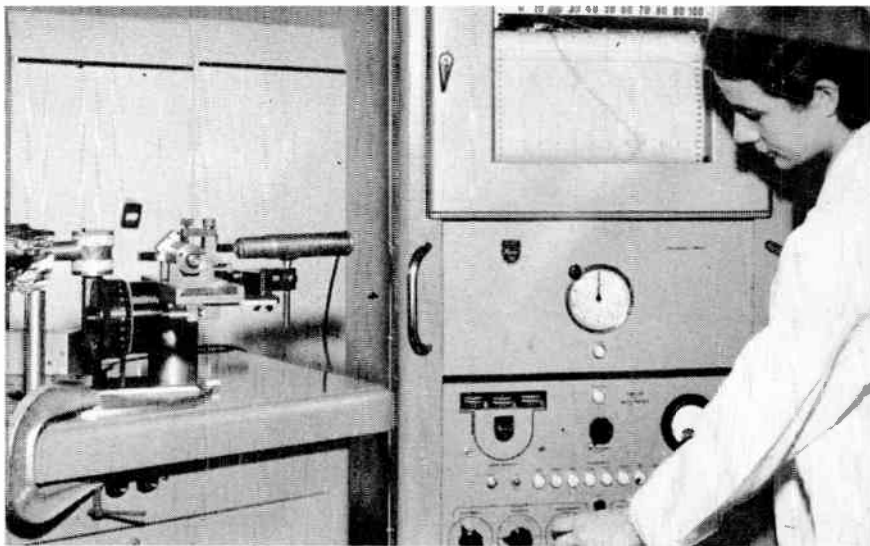
FOR DETAILS on specifications, prices and deliveries, write or phone . . .

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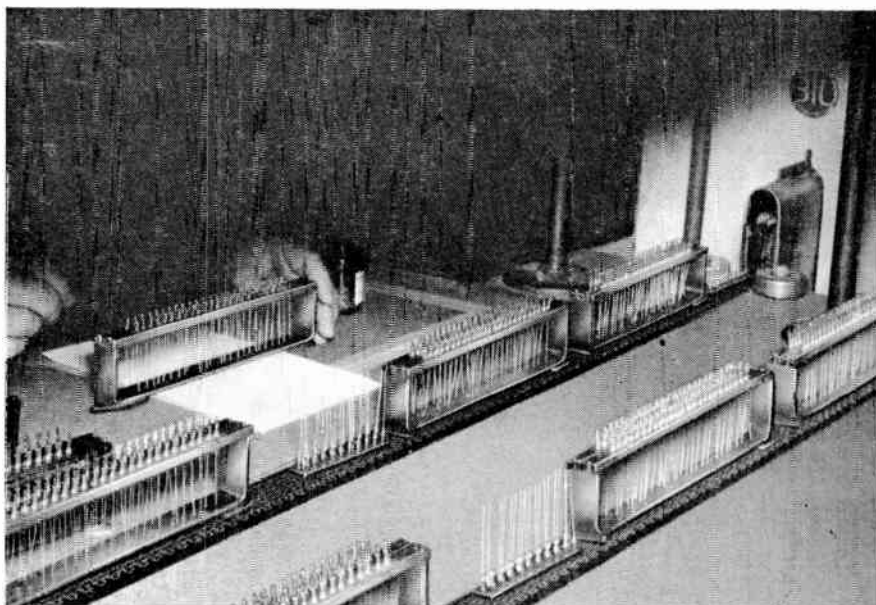
A Division of Clevite Corporation



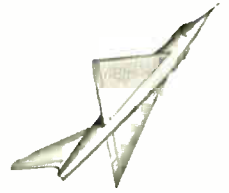
Crystal structures are double-checked in Clevite's Materials and Metallurgy Laboratory by X-Ray and Double Crystal Spectrometer to match crystal quality to specific application requirements.



Thermal resistance measurement equipment, another Clevite development, is used to check temperature drop between the junction and mounting base of power transistors under actual operating conditions. It's one of many specialized testing procedures to control quality and improve performance.



Millions of Clevite glass diodes pass through assembly sections like the one shown in close-up here. At this stage of assembly, germanium is inserted in the cathode end prior to final sealing in miniature conveyerized furnaces.



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airborne
radar**



Du Mont Miniaturized Radar Tubes

Du Mont compact, high-resolution radar tubes save space and weight, and permit full use of miniaturization techniques in airborne and other portable radar receivers.

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Lenders look at MANAGEMENT

- Income flow sets credit rating
- But future prospects also count
- Ability often becomes security

MANAGEMENT ABILITY is the key factor in decisions to grant or to deny money to small and moderate-sized electronics firms, say lenders to small business. Both government agencies and private investors express strong interest in the management ability of the company seeking money.

Essence of this attitude is that the ability of management is the only real security of a small business. A small company has so few resources that a lender cannot look to repayment from the normal flow of money into the business.

Lenders are concerned with such questions as: Does management know where it is going? Is management taking advantage of its opportunities?

Is the company accepting more business than it can handle? Does the company have a one-man management or a management team?

Are young men being developed who can eventually replace present management? Are company executives keeping up with new developments in management?

Idea: TRAIN, then hire

HERE'S ANOTHER way to get skilled female workers—train them before opening a new plant.

This was done by the Raytheon Manufacturing Co. in Manchester, N. H., in cooperation with the New Hampshire Technical Institute.

A four-week course in coil-winding was offered free of charge. It was designed to give women students a needed electronics skill to be used at Raytheon's new plant at Hooksett Industrial Park.

Robert Goss, Institute instructor, gave the course three nights a week. Classes lasted two and one-half hours.

"We gave the students no promises they would be hired," said a Raytheon official. "But the free instruction worked well all around. The women

SHARES and PRICES

CLOSED-CIRCUIT TELEVISION may grow to substantial proportions in the near future.

Annual sales of \$10-15 million were recently estimated by the head of a mutual fund. An itv systems manufacturer estimates sales will reach the \$75 million level by 1960.

Not all are so optimistic. Motorola president, Bob Galvin, speaking before New York's security an-

alysts, guessed current annual sales amounted to \$4-5 million. He also said that Motorola has no immediate plans for getting into closed-circuit tv.

Some large electronics companies are in the business because of its anticipated growth. However, in most cases this area of business represents a minor portion of their total sales.

Supporting their hopes for future growth is increasing use of closed-circuit tv. At present, process industries, railroads, banks, educators and police departments are important users or greatly interested.

Industrial Television Manufacturers	Recent Price	1956 Dividends	Yield Percent	Earned Per Share		Traded	1956 Price Range
				1956	1955		
Bendix Aviation	60 $\frac{3}{8}$	2.40 ²	4.0	5.04 (yr)	5.66	NYSE	48 $\frac{1}{2}$ —64 $\frac{3}{8}$
DuMont (Allen B.) Labs.	5	.....	...	d-0.43 (9 mo)	d-1.61	ASE	4 $\frac{3}{8}$ —10
General Electric	55 $\frac{1}{4}$	2.00	3.6	2.46 (yr)	2.33	NYSE	52 $\frac{3}{4}$ —65 $\frac{1}{2}$
General Precision Equip.	36 $\frac{3}{4}$	2.40	6.5	1.21 (9 mo)	2.05	NYSE	34 $\frac{1}{2}$ —53 $\frac{1}{2}$
International Tel. & Tel.	31 $\frac{1}{8}$	1.70	5.5	2.76 (9 mo)	3.68	NYSE	29 $\frac{1}{4}$ —37 $\frac{3}{8}$
Jerrold Electronics	2 $\frac{3}{8}$ ¹	.....	.....	0.33 (yr) ³	0.18	OTC	.....
Paramount Pictures	30 $\frac{3}{8}$	2.00	6.6	3.37 (9 mo)	3.15	NYSE	27 $\frac{3}{8}$ —36 $\frac{1}{2}$
Philco	15	0.80	5.3	0.21 (9 mo)	2.13	NYSE	16 —36 $\frac{1}{2}$
Radio Corp. of America	32 $\frac{3}{8}$	1.50	4.6	2.65 (yr)	3.16	NYSE	33 $\frac{3}{8}$ —50 $\frac{3}{8}$
Siegler	14 $\frac{1}{8}$	0.80	5.7	1.50 (yr)	.....⁴	OTC	.....
Thompson Products	75 $\frac{1}{2}$	1.40	1.9	4.60 (yr)	4.03	NYSE	48 $\frac{3}{8}$ —80

¹ bid

² plus stock dividend

³ estimated

⁴ not comparable with 1955

d-deficit

received specialized training. We had an opportunity to screen and evaluate prospective employees before hiring."

FUND buyers wary

CURRENT ATTITUDE of the \$9-billion mutual funds business towards electronics stocks is mixed, a recent survey reveals. The survey reports portfolio changes for 56 leading funds between October and December 1956. In general, fund leaders stressed caution and bought more bonds and preferred stocks than common.

Buying interest in broadcasting stocks stood out. Purchases of ABC-Paramount and Columbia Broadcasting A and B stocks were well in excess of sales. One fund purchased 72,000 shares of ABC-Paramount. Two funds bought 20,300 shares of Storer and none sold.

However, sales exceed purchases for stocks of three

tv set manufacturers. Two funds sold 21,000 shares of Philco and none purchased. Purchases of 17,000 shares of RCA were more than offset by three funds which sold 45,000 shares. Motorola sales of 10,000 shares were about three times purchases.

There was no definite pattern apparent in office-equipment share trading. Fund interest in Burroughs declined from 39,000 to 20,000 shares. Changes in total holdings of IBM and Pitney-Bowes were small with IBM increasing and Pitney-Bowes decreasing. Only a small number of National Cash Register shares were traded.

Among miscellaneous electronic stocks popular shares were: GE—29,000 bought, 300 sold; McGraw Electric (now McGraw Edison)—16,700 bought, none sold; Westinghouse—12,000 bought, 1,900 sold; and Sylvania—6,200 bought, none sold.

However, there were other heavy sell-offs: Robertshaw-Fulton—20,700 sold, 4,500 bought; Sperry Rand—54,400 sold, 5,000 bought; and Sprague Electric—17,000 sold, 3,700 bought.

MERGERS, ACQUISITIONS and FINANCE

Western Scientific Instrument, San Carlos, Calif., offers purchase-lease-maintenance program for electronic laboratory apparatus. Participants will sell all their test apparatus to Western and lease it back over a five-year period. Maintenance and repair at customer's plant is part of the program. Entire plan is handled with single monthly payment.

Barry Controls, Watertown, Mass., believes listing its stock on American Stock Exchange sets climate for continued growth. A major goal this year is acquisition of a small rubber company.

Amphenol, Chicago, declares 30-cent first-quarter dividend, highest ever for the company.

Phileo fails to pay cash dividend for second quarter in a row. Unlike previous quarter, when one percent stock dividend was paid, no stock dividend was declared either.

Crucible Steel dividend increases slightly. First-quarter payment is 40 cents on new stock resulting

from two-for-one split last month. Dividend is equivalent to 80 cents on old stock and compares with 75 cents per quarter last year.

Clevite's March dividend of 25 cents was company's 139th consecutive quarterly payment.

National Association of Investment Companies survey shows amount invested in open-end mutual funds by corporations has more than doubled in past two years, increasing from \$24 to \$53 million. NAIC explains many corporations lack staff for proper management of surplus funds or depreciation reserves.

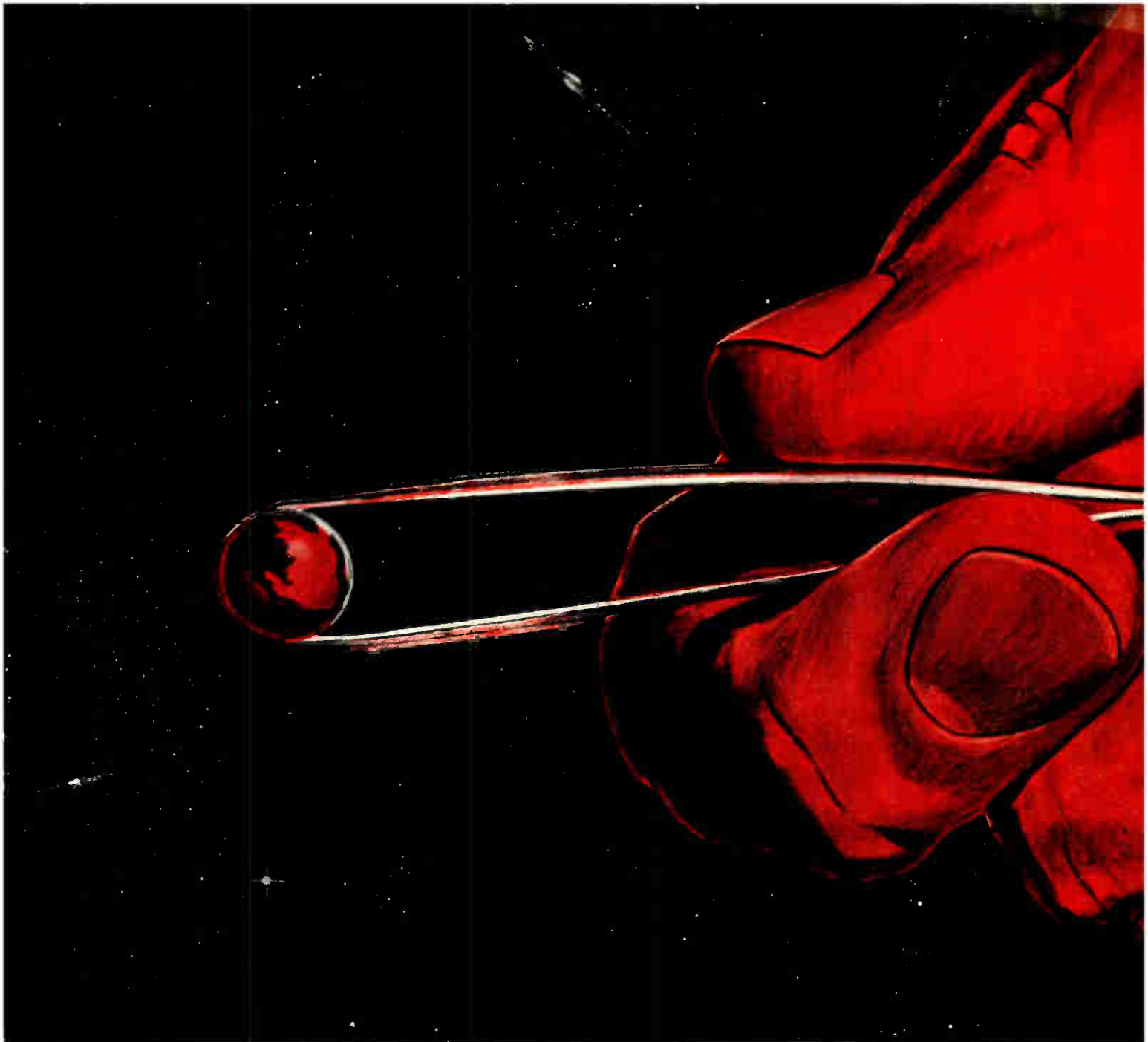
Television-Electronics Fund adds American Machine & Foundry during fund's first fiscal quarter. Holdings of Emerson Electric, Minneapolis-Honeywell, Otis Elevator, Sylvania, Dresser Industries and Walt Disney Productions were increased. Acrovox, Chance Vought and Western Union holdings were decreased.

Standard Coil is reducing conversion prices on its 5 percent con-

vertible subordinated debentures due Sept. 1, 1967 to levels more closely related to present value of common stock. Debentures are to be convertible to common stock at prices between \$12 and \$15.25 per share. They were previously convertible at prices between \$18.50 and \$21.75. Standard Coil also proposes to modify restriction on V loans of subsidiary Kollsman Instrument. Kollsman needs increased working capital to handle biggest order backlog in its history.

New York State's Business Development Corp. has recently approved a \$40,000 loan to a small electronics firm in Long Island. A local bank will take 50 percent of the loan which is for seven years at six percent. It is secured by a first mortgage on all equipment.

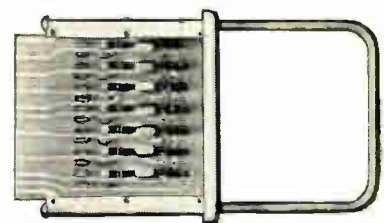
Security Electronics, N. Y. issued 263,750 shares of common stock (five cent par) in February through Foster-Mann of New York. Proceeds are to be used to complete designing of a security check writer, to purchase 500 such units and for working capital.



SMALL WORLD—The world of the diode... the transistor... the printed circuit... the new magnetic and dielectric components—this world expands in significance as it shrinks in physical proportions. Popularly symbolized by the tinier-than-ever hearing aid and the pocket radio, the new, small world of solid state circuitry is omnipresent. It safeguards our skies. It simplifies our living. It opens new doors to learning.

Stewart-Warner Electronics has pioneered in the development of solid state circuitry. Out of a manufacturing environment second to none, Stewart-Warner Electronics is mass-producing equipment containing solid state devices by the thousands of units.

Your problem of solid state circuit design and production techniques will be handled at Stewart-Warner Electronics with equal efficiency. If you are an engineer interested in advanced circuit development, write: Stewart-Warner Electronics, Dept. 21, 1300 North Kostner Avenue, Chicago 51, Illinois.



One of 160 plug-in modules for the desk-size Stewart-Warner Data Processing Unit. Modules employ solid state circuitry to save space and eliminate many vacuum tubes.

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Precision Phasemeter 0.1° absolute accuracy



**0.02° absolute accuracy
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The most accurate instrument anywhere for measuring phase difference between two sinusoidal voltages. Model 901 saves time, cuts down errors because it's direct reading . . . non-ambiguous . . . self-calibrating.

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SPECIFICATIONS

Frequency Range: 30 to 20,000 cps; extended range available from 20 to 35,000 cps with absolute accuracy to better than 0.5°

Phase Range: 0 to 360° with no ambiguity

Accuracy: 0.1° absolute; 0.01° for incremental angles up to 2°

Input Impedance: 10 megohms shunted by 25 μ f

Signal Level: 0.5 to 10 volts rms

Power Supply: 105-125 volts rms; 50/60 cps; 200 watts

Display: Decade null system; phase difference read directly from two degree step control with a vernier indicator

Applications: These include: testing of polyphase systems, goniometers, feedback amplifiers, wideband phase-shifting networks for single-sideband transmitters; design of filters, transformers, networks; measurement of residual L and C in resistor units.

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WASHINGTON report

IMPORTANT changes in government industrial mobilization plans are shaping up. Impact on electronics companies is likely to affect both current military output and industry role in any future national emergency. Objective of changes is to align industrial mobilization policy with latest military concepts. These stress nuclear weapons, suggest any future war will be short and decisive.

Overall mobilization planning has been based on assumption of prolonged industrial buildup—as in World War II—to reach peak production in three years. Theory now is that there may be no chance for extended mobilization, that peak arms output must be achieved in six months or less. Air Force mobilization planning is already geared along these lines. Pentagon is putting pressure on Army and Navy to follow suit.

- Firms that do not hold military contracts prior to mobilization now will have little chance of getting into war production after mobilization.
- There will be more dependence on hastily stepped-up output from electronics plants already producing military goods when or if war starts, less reliance on conversion to defense production by plants making civilian items.

Mobilization goals are in for revision also. Defense Department is about to slash at least 50 percent of overall full-mobilization arms requirements. Here are two examples of proposed cuts: Initial mobilization plans called for production of 115,000 medium tanks in three years; new plan is for only 35,000. Plans for peak aircraft production are being scaled down from \$42.5 billion annually to about \$12.6 billion—slightly less than double current plane output.

\$38-million TRANSMITTER

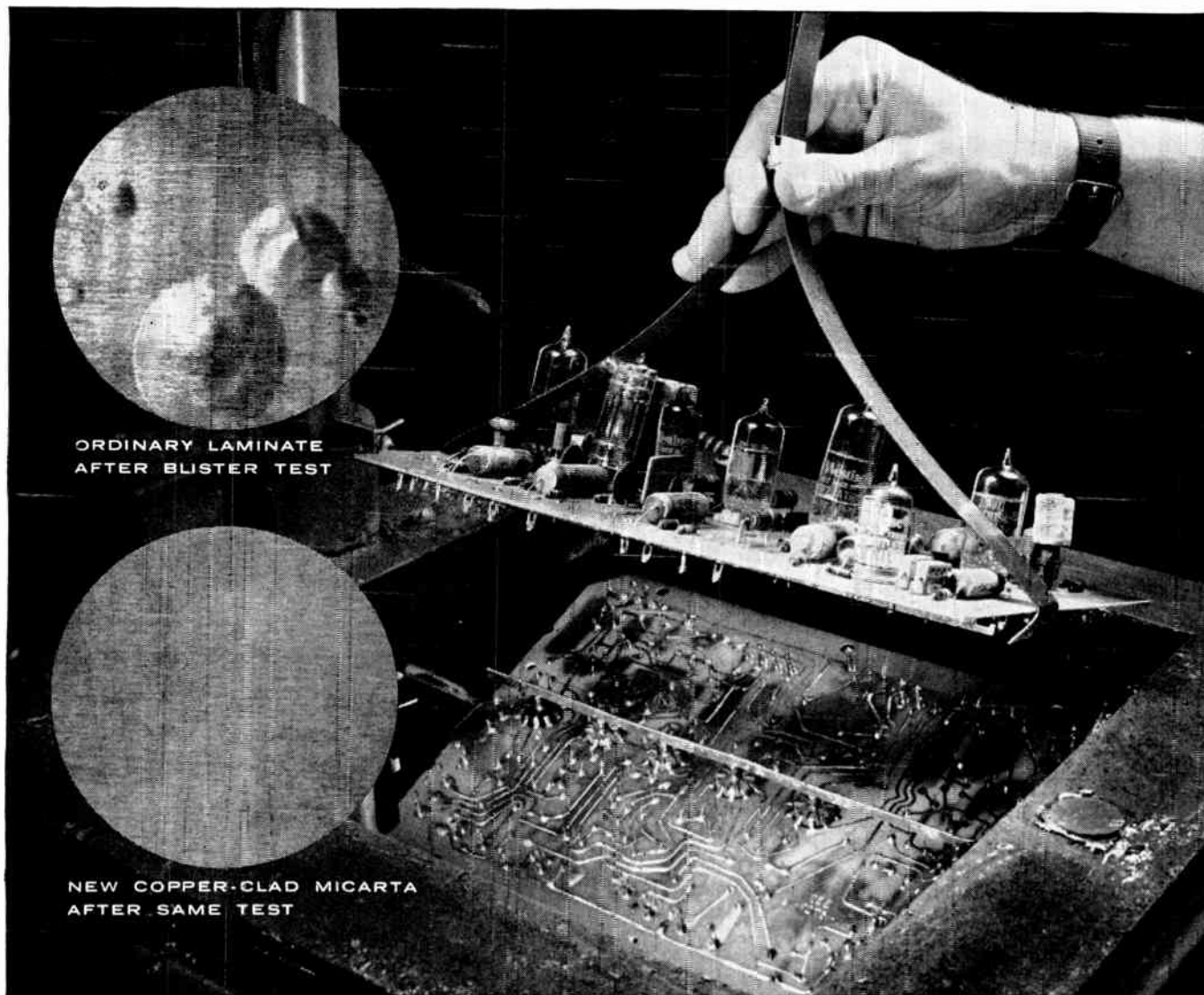
Navy will begin construction of its \$38-million 2-megawatt very-low-frequency transmitter near North Cutler, Me., about June 1. Transmitter will provide communications with submerged subs and surface units in areas not now covered by vlf signals.

Civil Aeronautics Administration still has \$25-million to spend during next three months for air navigation and traffic control equipment, out of total \$75-million budget this year.

CAA's budget request for year beginning July 1, 1957 is \$75-million. This could be increased materially by recommendations expected about May 1 from Edward Curtis, White House assistant now finishing report on what needs to be done to control military and civilian air traffic over U. S.

Fight over cutting the administration's proposed \$4.4-billion program for foreign aid is important to electronics producers. Figures for 1955 show that 31 percent of all exports of electrical and electronic equipment were financed by aid funds, amounting to \$230 million, supporting some 31,000 jobs in industry. Foreign aid exports are principally for military equipment, including electronics.

Assistant Defense Secretary Frank D. Newbury charges extravagant use of scientists and engineers in military research and engineering. He's setting up committee to study problem, recommend how to cut waste. Study will likely center around electronics R&D. J. M. Bridges, Director of Electronics in Newbury's shop, is slated to head study.



ORDINARY LAMINATE
AFTER BLISTER TEST

NEW COPPER-CLAD MICARTA
AFTER SAME TEST

New copper-clad **MICARTA**[®] takes dip solder bath without blistering!

New H-3032 copper-clad MICARTA[®] cuts costs and production time of printed circuits. Copper-clad MICARTA speeds up soldering, without the normal accompaniment of an increase in rejects and missed connections. It can be cold punched without cracking or chipping.

The laminate won't blister even when dip soldered for 10 seconds at 500°F! Examine the two close-up photographs. One shows an ordinary laminate after a laboratory test. Note the blistering, then look at the MICARTA dip soldered for the same length of time—and there is no blistering!

A special adhesive is used which has the same

high electrical properties, solvent resistance and low moisture absorption as the MICARTA laminate itself. Actually, adhesive strength is increased during soldering.

Because of a new adhesive process, copper-clad MICARTA keeps its high bond strength—from 10 to 13 pounds versus an industry standard of six pounds—even after heating and cooling is repeated many times. This is especially valuable for electronic circuits.

Copper-clad MICARTA may be the answer to your circuit assembly problem. Write for further information and technical data to Westinghouse Electric Corp., MICARTA Div., Hampton, S. C.,

J-06624-X

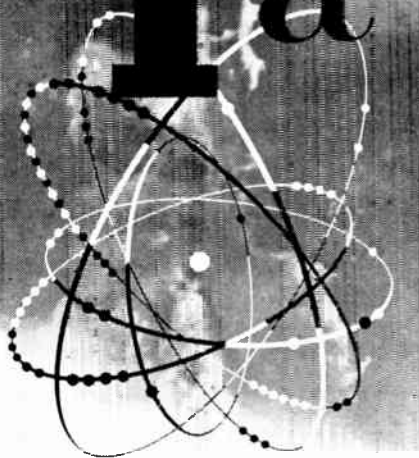
YOU CAN BE SURE...IF IT'S Westinghouse

ACCEPTED SYMBOLS

73

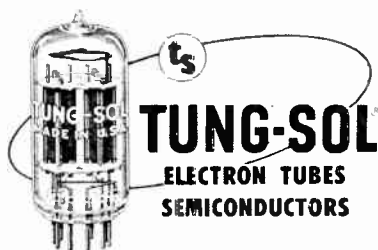
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Ta

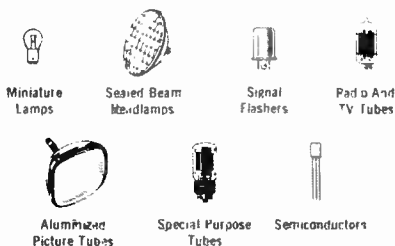


Symbol for tantalum . . . the element whose ability to maintain high strength at high temperatures makes it the ideal material for a great variety of metal parts of electron tubes.

Just as Ta is the accepted symbol for tantalum, so Tung-Sol represents highest quality production of electron tubes in volume. This singular ability is a major reason why Tung-Sol is America's largest independent electron tube manufacturer.



Tung-Sol Electric Inc., Newark 4, N. J. Manufacturers of Automotive and Electronic Components.



Want more information? Use post card on last page.

EXECUTIVES in the news



ASTRONOMER Hagen: two sons and an artificial moon

SOMETIME within the next month, Navy will launch the second Vanguard test vehicle. This one will carry aloft an instrumented nosecone, simulating satellite payload. Several tests remain before the opening date of IGY and hoped-for placement of half a dozen satellites in orbits round the earth.

Man responsible for success of Vanguard is John P. Hagen, quiet, perennially pipesmoking astronomer with longtime interests in electronics. After 25 years in the sciences he finds administration of multi-million-dollar project a challenge. "If you're to judge by the time spent," he says, "my principal interest must be work."

Hagen was born in Canada 49 years ago, claimed Boston as a second home until college days at Georgetown. Began working for Naval Research Laboratories in 1935 in microwave field. At the time NRI was handed administration of satellite program he was superintendent of division of atmosphere and astrophysics research. Fields overlapped, so he got the Vanguard job.

Outside of the sciences, principally radioastronomy, and satellite program, Hagen says "my family takes a lot of attention." Has two boys "coming along at interesting ages, 12 and 15, plays chess well enough to beat them. No sportsman, he likes his humor light and his music serious: "Bach, of course, being a particular favorite."

Strictly PERSONAL

Tools . . .

In your Feb. 20 . . . *Industry Outlook* (p 1) you say: "Digitally programmed machine tools can make up for the critical shortage of

skilled tool and die makers. Possible market in excess of \$250 million."

As a builder of tool room machinery and one of the major users of digitally programmed controls,

we are extremely interested in the origin and authenticity of this statement.

JOHN R. JOERGER
KEARNEY & TRECKER CORP.
MILWAUKEE, WIS.

The estimate was our own, looking forward 5 to 10 years. It includes all components necessary to control the machine tool, is based on current breakdowns in the industry, trends in control equipment and in our economy.

Tantalum . . .

. . . The unfortunate part of your story (Tantalum Supply Short, Feb. 10, p 28) is the tie-in with the chart showing imports of tantalum ore concentrates. If any shortage of tantalum exists, it is not due to short ore supplies, but to . . . overloaded facilities for refining the ores and making the metal. This is being overcome by . . . plant expansion and . . . new plant construction.

The reason that the ore import curve took a downward slope in 1956 is that we purchased a lot of ore in 1955, as the curve shows. . . . There is no shortage as far as the ore supply is concerned.

ALLAN L. PERCY
FANSTEEL METALLURGICAL CORP.
NORTH CHICAGO, ILL.

. . . and Transistors

A transistor controls a lot of energy with a little, and does it with fewer molecules than anything else except animal neurons. Its impact will be quantitative rather than qualitative: automatic and preset control devices will be smaller and more efficient. . . . Margins of utility will be different for complex energy-control devices, hence there will be more of them.

Greater ease of communication between different parts of a given industry may result in greater geographic separation of these parts.

MARK G. FOSTER
AVCO MFG. CORP.
CINCINNATI, OHIO

GYROS

for every application

Kearfott Free, Vertical, Rate, Directional and Floated Rate Integrating Gyros and Stable Elements are accurate, rugged and dependable. They are designed to meet the most stringent aircraft and missile requirements. The Kearfott Free Gyro shown was designed specifically for missile applications. It provides airframe attitude information for use in guidance systems. Remote electro-mechanical caging and uncaging is provided.



**ACCURATE
RUGGED
DEPENDABLE**

Kearfott Free Gyros withstand 60 G shock of .0157 secs. duration, vibration up to 500 CPS at 10 G acceleration. Operating temperature range -20° C to +100° C. Weight 5.5 lbs.



**VERTICAL
GYROS**



RATE GYROS



**3 GYRO
PLATFORMS**



**FLOATED RATE
INTEGRATING GYROS**

Write today for technical data on Kearfott Gyros.

**KEARFOTT COMPONENTS
INCLUDE:**

Gyros, Servo Motors, Synchros, Servo and Magnetic Amplifiers, Tachometer Generators, Hermetic Rotary Seals, Aircraft Navigational Systems, and other high accuracy mechanical, electrical and electronic components.



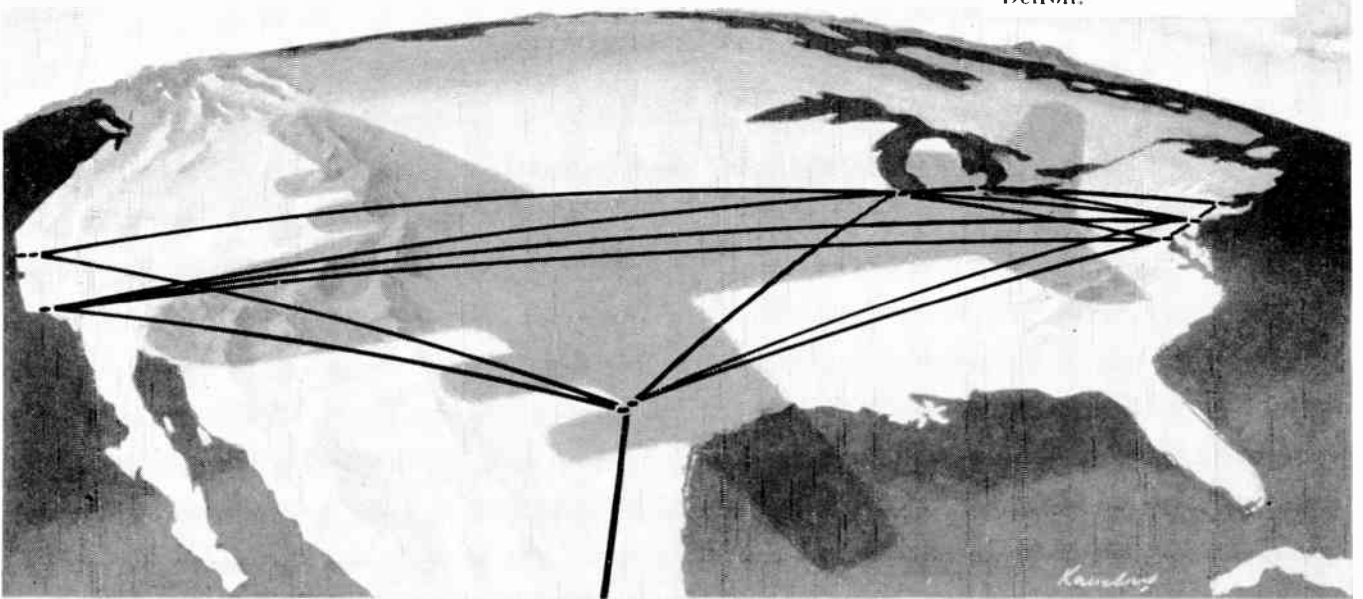
KEARFOTT COMPANY, INC., LITTLE FALLS, N. J.

Sales and Engineering Offices: 1378 Main Avenue, Clifton, N. J.
Midwest Office: 188 W. Randolph Street, Chicago, Ill. South Central Office: 6115 Denton Drive, Dallas, Texas
West Coast Office: 253 N. Vinedo Avenue, Pasadena, Calif.

COVERAGE



\$7.50 is all it costs to ship 100 lbs. of electronic equipment from Chicago to New York...only \$15.10 from Los Angeles to Detroit.



greatest coverage of key cities enables American to serve electronics executives better than any other airline!

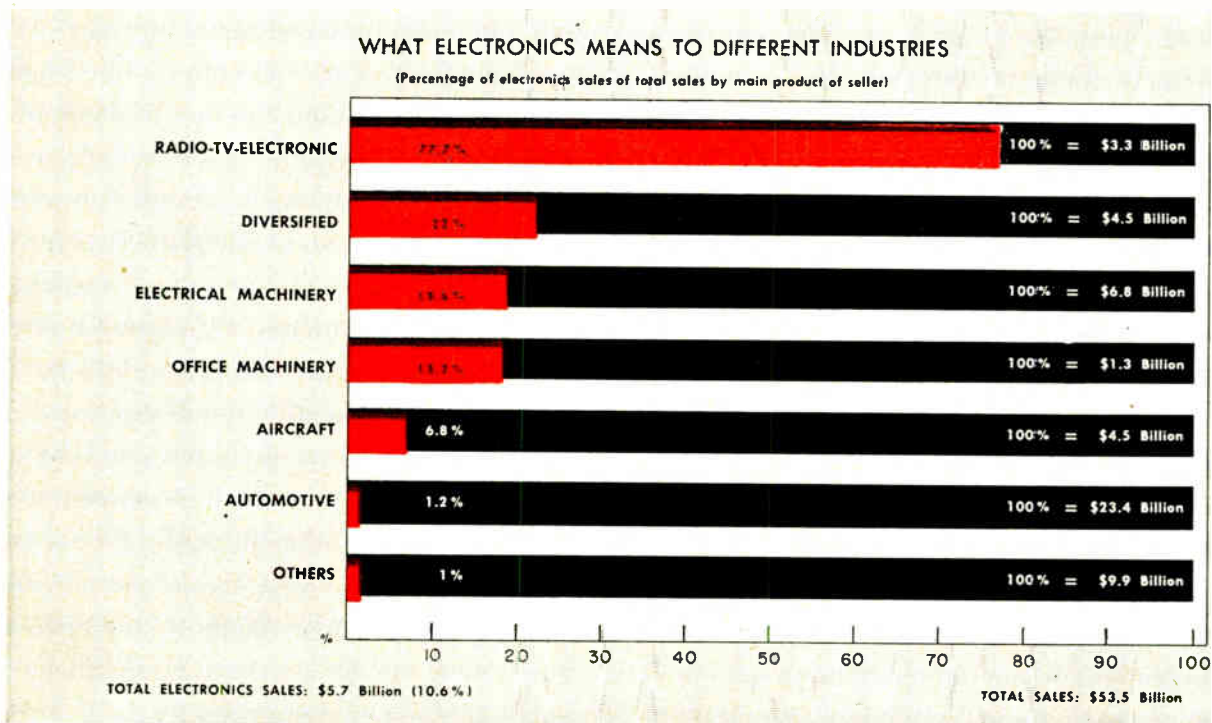
To be sure of fast forwarding and dependable on-time deliveries, specify American Airlines Airfreight. Because only American offers direct, one-carrier service to 17 of the top 20 retail markets, 13 of the first 15 wholesale markets, and 18 of the leading 20 manufacturing centers.

AMERICAN AIRLINES AIRFREIGHT

— flies more freight than any other airline in the world

electronics business edition

APRIL 10, 1957



GROWTH pattern emerges

- Electronics business popular among other manufacturers
- Interest high with aircraft, auto, office-equipment firms
- Diversification frequently leads to electronics

BUSINESSMEN generally are convinced that a big part of the future belongs to electronics. Companies whose major products range from oil drums to automobiles are designing and manufacturing electronic components and end products.

To measure the extent of this continuing trend ELECTRONICS conducted a survey of electronics sales among 130 industrial firms.

73 companies were found to be in the electronics business. Total sales of these 73 companies amounted to \$53.5 billion, of which \$5.7 billion, or 10.6 percent, came from electronics sales.

Five of the nation's ten largest corporations reported some sales in electronics, nine of the first 25, 18 of the first 100.

The bulk of electronic sales is generated by six industrial groups: radio-tv-electronics, electrical machinery, broadly diversified firms, the aircraft industry, office machinery and automotive.

Electronics sales by 12 radio-tv-electronic companies, which totaled \$2.5 billion, accounted for the biggest slice of the electronics sales pie, 44.3 percent. The companies in this group were those primarily in the electronics business. An average of

77.7 percent of their total sales of \$3.3 billion came from electronics.

Seven electrical machinery manufacturers accounted for the second largest percentage of electronics sales, 22.3 percent. These companies had electronics sales of \$1.3 billion, which represented 18.6 percent of their total sales of \$6.8 billion.

The diversified company group with total electronics sales of \$984 million produced 17.4 percent of total electronics sales by the surveyed companies. This group comprises companies active in a number of industries, but having substantial interest in electronics. Electronics sales represented 22.0 percent of total sales of \$4.5 billion by the 15 companies in this group.

The aircraft industry, with electronics sales of \$304 million, accounted for 5.4 percent of the electronics sales total. The ten companies in this group had total sales of \$4.5 billion, of which 6.8 percent was in electronics. Only one of ten aircraft companies surveyed did not have any electronics sales.

The office machinery group with electronics sales of \$227 million had 4.0 percent of all electronics sales. However, electronics sales represented 18.2 percent of the \$1.3 billion of total sales by the five companies in this group.

Electronics represents 1.2 percent of total sales of \$23.4 billion by 13 automotive companies in the survey. But the automotive group with electronics sales of \$270 million has 4.8 percent of total electronics sales. Eleven of the 13 companies reported that they were in the electronics business.

A small percentage of total electronic sales, 1.8 percent, came from other industries, \$101 million out of \$9.9 billion total. But this group of 26 companies included sixteen active in electronics from 10 additional industries: industrial machinery, chemicals, rubber, food processing, glass, petroleum, container manufacturing, abrasive products, building materials and construction.

Many large corporations are not yet doing a large volume of electronics business, but are keeping their finger in the electronics pie. About 20 percent of the companies that replied indicated they had electronics sales but volume was small.

Only 15 of the companies replying to our survey claimed no electronic sales. Two of these were from the electrical machinery group, one from aircraft, two in automotive and 10 from the miscellaneous group.

CYTAC may ease snarl

RELEASED by Defense Department just in time for last month's IRE Convention was Sperry Gyro's CYTAC, long-range radio navigation system that may help unravel the snarled skein of air and sea traffic. Pulse-modulated CYTAC system reportedly can give pilots ten times more accurate position data than loran, needs fewer ground stations for equivalent coverage.

Now being installed on the east coast by the Navy on a 1,000-mile three-point baseline, CYTAC:

- Transmits in the 90-110 kc frequency spectrum.
- Reaches without skip 1,500 miles over land, 2,200 over water.
- Pinpoints targets within 33 yards by measuring both elapsed time and phase shifts.

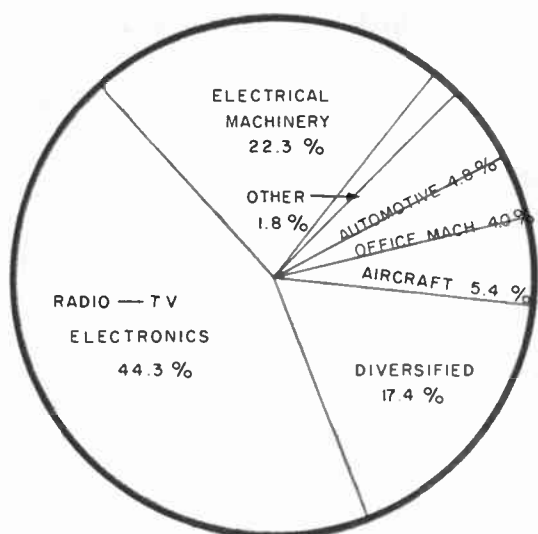
Installations under test during the past year put out 60 kw power from 625-ft towers, 200 kw from 1,200-ft towers. Present sets are built for 60 kw.

Like loran, CYTAC is a hyperbolic ranging system, requires at least three base stations for a fix. Network of 15 stations can blanket the U. S. Sperry has not set price, thinks the system will cost more per station than loran, less for umbrella over large area.

Transmitting stations are about the same size as loran transmitters. Airborne receivers for the system take up less than 2 cu ft, weigh under 50 lbs. Two-tube frequency converter adapts loran receiver-indicator for CYTAC.

Of interest to airways facilities planners: with the addition of telemetering gear and data links, CYTAC receiver output could be sent back to control station, processed, plotted and displayed for all craft within control area.

SALES OF ELECTRONIC PRODUCTS BY INDUSTRIES



TOTAL ELECTRONICS SALES: \$ 5.7 BILLION

INFRARED markets grow

- Sales of detection equipment estimated at \$5 million plus
- Markets seen in glass, metals, textiles, oil, chemicals
- Manufacturers cite need for educating industry to infrared

A huge market for infrared detection equipment in industry is developing. It results from military attention to infrared in the last five years.

One industry source estimates the yearly market for civilian infrared detection equipment is already more than \$5 million.

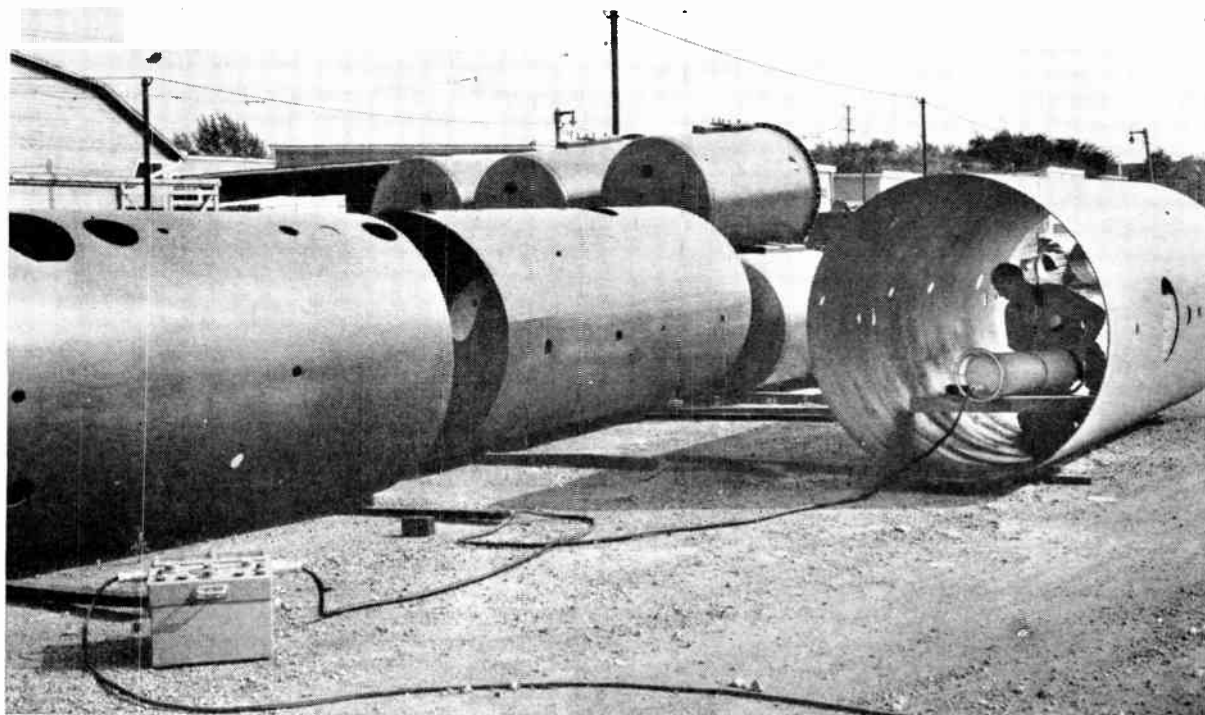
Here are some of the things infrared devices can do in industry:

- In glass making, infrared pyrometers can control temperature during forming, sealing, annealing and shaping.
- Primary metal producers can use infrared pyrometers to control rolling-mills and to regulate tempera-

ture in annealing, induction heating and casting.

- In textiles, temperature control is important in weaving, dyeing and drying.
- Pyrometers can be used in metalworking to control the heat of a tool. This prolongs the life of the tool, prevents damage to the workpiece due to overheating.
- Infrared radiation is absorbed at different wavelengths, depending upon the chemical composition of the target material. A spectral photometer can "fingerprint" molecular structure, thus keep close check on industrial processes.
- A spectral photometer can measure jet-engine

When MOUNTAIN won't come to Mohammed



PEOPLE who make things too bulky to bring to an x-ray machine now use portable radiographic units.

Here GE unit is positioned to x-ray welds in a huge tank. This model's maximum energy is 175,000 volts

exhausts. It offers possibilities in solar radiation studies.

- Other promising markets for infrared include paper mills and the railroads, for detection of hot boxes—overheated journal bearings on box cars.

Here are a few pointers on civilian use of infrared: Servo Corp. of America, New Hyde Park, N. Y., views the market for infrared radiation pyrometers optimistically, sees eventual markets in metals, glass, textiles and plastics.

- Price of Servo's infrared pyrometer: about \$3,750. With additional equipment for process control: \$20,000 or more.

- Perkin-Elmer of Norwalk, Conn. sells more than \$3 million worth of infrared spectral photometers and accessories a year, sees a big market for its \$15,000 photometers in oils and petrochemicals, has a \$4,000 instrument for infrared analysis.

- Barnes Engineering of Stamford, Conn. recently sold an \$8,000 infrared radiometer originally designed

for the military to a big rubber company. It measures the temperature of the sidewalls of tires under test, can indicate a sharp temperature rise at the place where a blowout is about to occur.

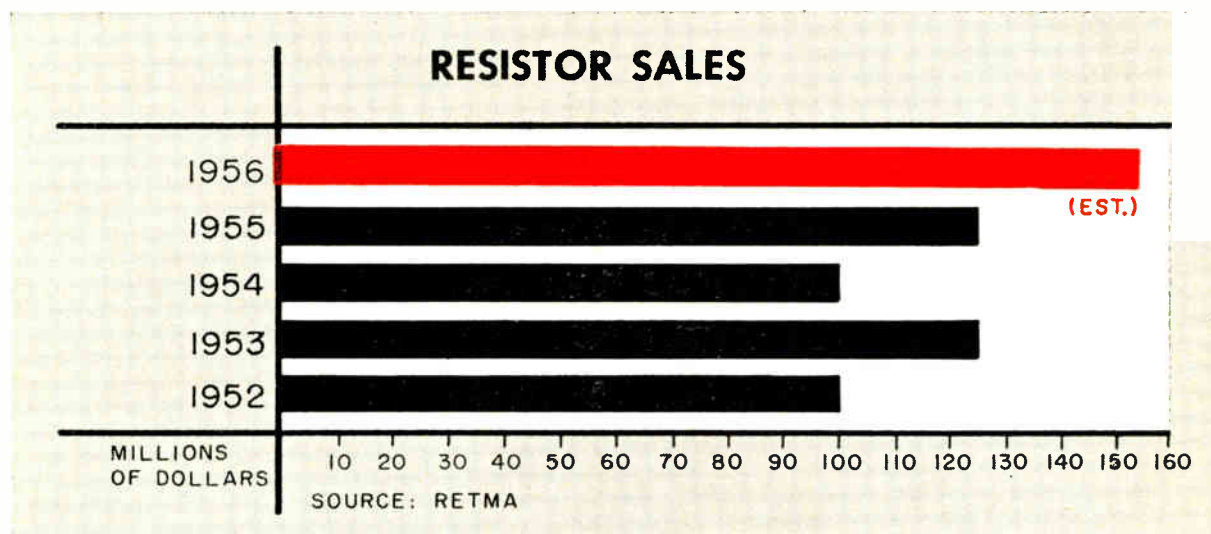
A radiometer, says Barnes, can also have a scanning attachment to take an infrared photograph. These thermal pictures can help solve temperature distribution problems.

- Beckman's IR-4 infrared spectrophotometer provides Boeing with data on what happens to various metals and coatings at temperatures up to 1,400 F.

- Eastman Kodak says its Ektron detector's sensitivity to infrared makes it valuable in stream analysis. Stream analysis makes it possible to analyze continually the output of an industrial process rather than depending upon periodic batch samples.

Manufacturers of infrared detectors agree that they have a "big educational problem" with their potential customers. They complain that there aren't enough infrared-conscious engineers in industry at large.

PRODUCTION and SALES statistics



Resistor sales for 1956 climbed sharply above the \$125 million sold in 1955. Manufacturers' sales in 1956 amounted to \$155 million, 24 percent higher than 1955.

1956 marks a new sales peak. Highest previous was \$125 million, set in 1953, tied in 1955.

Sales of composition fixed resistors represent 32.3 percent of dollar sales volume, according to the 1954 Census of Manufacturers.

Composition variable account for 26.9 percent, wire wound (two watts and below), 21.0 percent and wire wound (above two watts), 9.0 percent. Others, 10.8 percent.

Radio shipments to dealers in 1956 totaled 8,422,823 sets, excluding automobile receivers, RETMA reports. This compares with 6,076,722 in 1955. During December 1,544,987 radios were shipped, compared with 1,273,811 in Dec. 1955.

Wholesale business in electrical appliances, tv and radio sets and electronic parts in 1956 climbed four percent above 1955. Inventories at year end were 15 percent above a year ago.

Receiving, picture and special tube sales plus semiconductor and other component sales will exceed \$900 million in 1956, predicts CBS-Hytron president, Arthur L. Chapman.

DAILY P&L ups profit

- Small electronics firm more than doubles earnings
- Product supervisors get daily statements
- System sharpens management, keeps morale high

A DAILY profit-and-loss report system at Transval Engineering has more than doubled its profit rate during the past three months. And George Otis, president of the 16-month-old Los Angeles firm, reports the system requires only one additional man in accounting.

Otis and his partner, R. M. Elwood, will ship more than \$2 million in product from their three facilities this year. They started making an intercom for the home. Today 60 percent of the production of their 300 employees is subcontract work, while 40 percent (radios and other airborne equipment) bears the Transval tag. The military supports 82 percent of the firm's efforts.

During 1956, when the company was relying on month-end P&L reports, profit rate averaged slightly under 5 percent. On the first of December management instituted the daily P&L report system. January's profit was 17 percent. Otis admits that other factors were present in this unusually high profit, but attributes the greater part of the rise to a 12-percent average profit rate to daily P&L.

Transval has ten products in the works simultaneously on as many lines. A production supervisor has complete responsibility for each product. Says Otis: "We try to make each supervisor think of his operation as a business complete unto itself."

Management prepares a daily P&L report for each product, and directs it to the responsible supervisor. The report prepared on the swing shift arrives on the supervisor's desk at 9:30 a-m and tells him, in dollars and cents, whether his previous day's operation was in the black or the red, and how much. It tells him if products are on schedule and gives a running total of profit and loss on the total contract.

Management, at the start of each contract, sets a target profit rate. In military work, this is generally 10 percent. For other work, it may be 30 percent. If a supervisor's operation does not meet this target profit rate, the running total will show it up.

The daily P&L depends upon time cards, material requisitions and contract schedules for source data.

First item on P&L report is "Cost for the Day". Total labor hours are picked from the cards, multiplied by hourly rates and totaled. Manufacturing overhead is a function of direct labor. The overhead factor is obtained from month-end accounting data.

General and administrative costs are obtained similarly. Direct material costs, taken from standard costs adjusted for excessive usage weekly, complete the "Cost-for-the-Day" section.

The second section of the report is headed "Produced for the Day". The number of completed units which have gone out of the door is multiplied by the billing price per unit. From this figure is subtracted the total cost for the day to arrive at daily profit or loss.

Next comes "Cost Analysis on Total Contract to Date". This includes total expenditures to-date on the contract and the dollar variance from target cost, adjusted to include target profit.

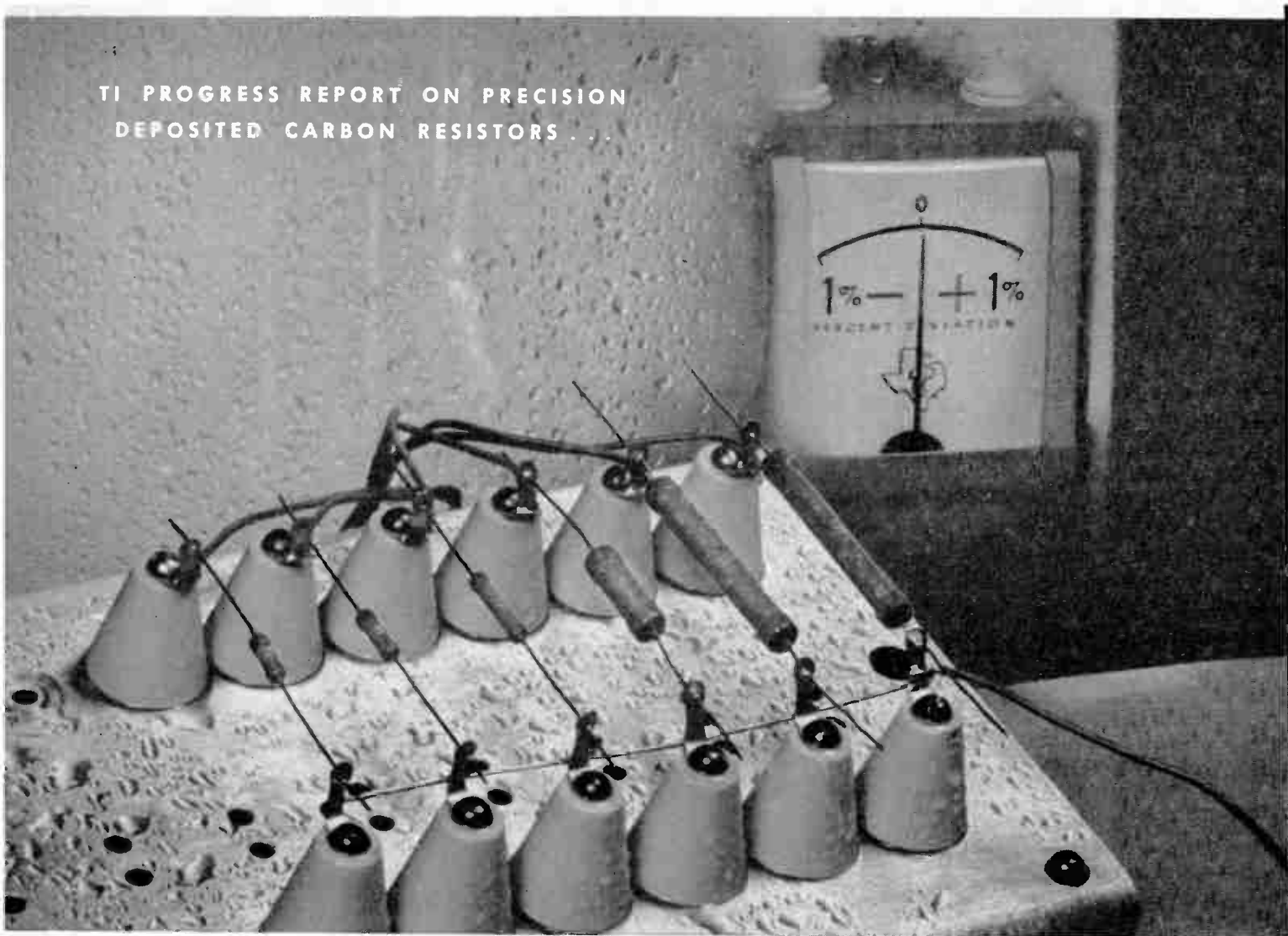
The next tabulation, "Schedule Adherence", listing both the number of items in the contract already shipped and the number remaining, tells how much time remains to perk up the operation and complete the contract with hoped-for profit level.

Transval's president enumerates advantages of the system:

- The daily report gives each supervisor a continual check on his operation.
- Causes of inefficiency are magnified and brought into sharper focus.
- Supervisors are quickly alerted to take corrective action.
- Morale of supervisors is kept high. They no longer need worry how their operations are doing.
- Daily reports provide an excellent tool to evaluate production experiments.

George Otis has recently incorporated three new companies into Transval. Two are electronics and the third is a chemical firm. His faith in this accounting system is mirrored by his insistence that all three put into operation the daily P&L report. All three are in the black.

TI PROGRESS REPORT ON PRECISION
DEPOSITED CARBON RESISTORS . . .



TI MIL-Line Precision Resistors

HOLD TOLERANCE...EVEN WHEN DRIPPING WET!

Soaking wet, dried out, or 'shook up' — TI MIL-Line deposited carbon resistors still far exceed MIL-R 10509B . . . emerge from one acceptance test after another — by major electronics manufacturers — with performance records that have not been equalled. *It's the seal that makes the difference . . . an exclusive Texas Instruments process that snugly wraps these precision resistors in tough jackets of a special coating with high dielectric strength.*

For ease in design, production, and maintenance

. . . for improving the reliability and saleability of your products, the moisture resistance of TI deposited carbon MIL-Line resistors is just *one* field-proven factor. You also get a choice of 1, 2, or 5% tolerances . . . high stability over wide temperature ranges and under full load . . . low negative temperature coefficients . . . negligible voltage coefficient and noise levels . . . long shelf-life . . . wide selection of sizes and resistance values . . . reasonable prices . . . and, if desired, reel-type packaging for automation.



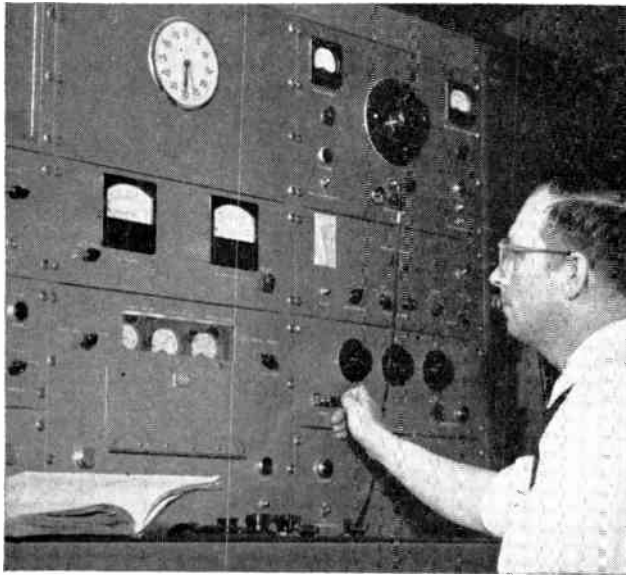
Here is a typical TI reel pack designed to speed production. TI precision deposited carbon resistors are mass produced and packaged in five sizes from $\frac{1}{2}$ watt to 2 watts with resistance values from 25 ohms to 30 megohms.

For complete data, write for
Bulletin DL-C 539.



TEXAS INSTRUMENTS
INCORPORATED

World Radio Hist 169 00 LEMMON AVENUE DALLAS 9, TEXAS



MASS spectrometer studies petroleum gases



ELECTRON microscope examines grease

\$1 million for RESEARCH

- Electronic instruments indispensable in Esso's laboratories
- Used to develop and evaluate oil products in lab and field
- Other equipment stores formulas, speeds office routine



EMISSION spectrometer analyzes motor oil



X-RAY spectrometer identifies metallic additives

MANY OF Standard Oil's products were born at Esso Research and Engineering central laboratories in Linden, N. J.

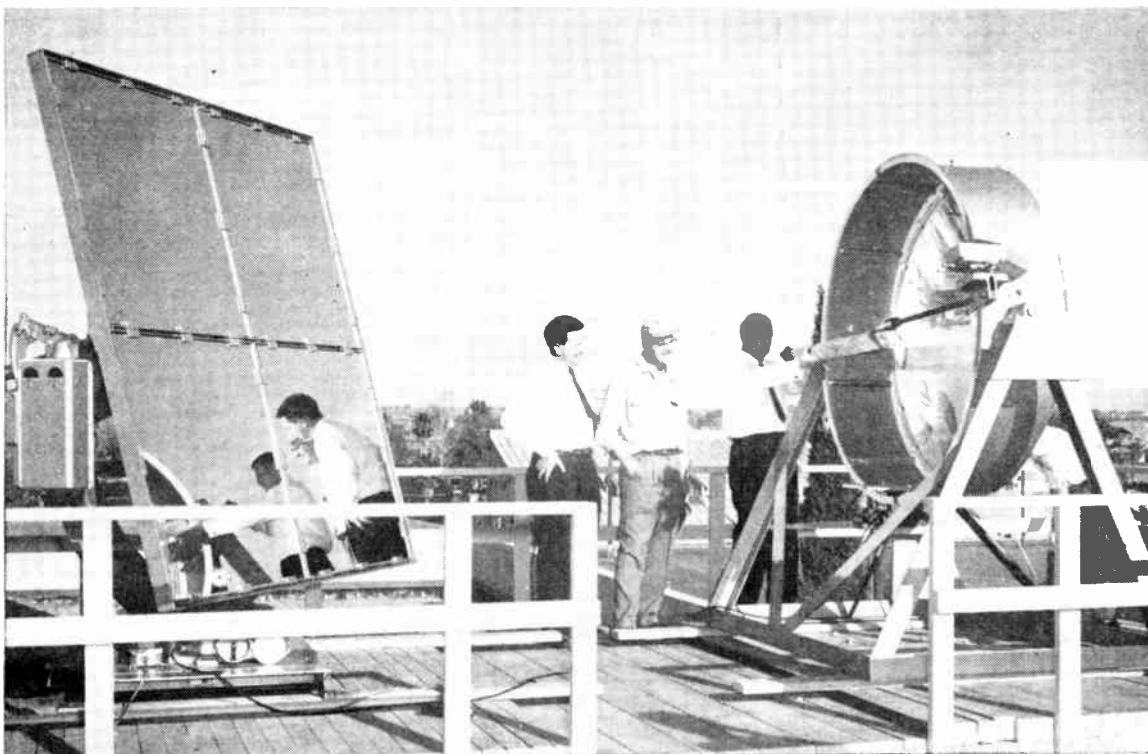
Esso Research considers electronic equipment indispensable to its work. The value of nonrental equipment is estimated at over \$1 million.

Recent major purchases are an indicating emission spectrometer and an electron microscope which mag-

nifies minute objects as much as 150,000 times.

The spectrometer allows direct spectrum analysis readings, uses 50 multiplier phototubes.

An instrument development laboratory makes or adapts specialized devices. In the past year, six major projects, using 600 tubes in all, went in service. A current project involves use of closed tv to view oil storage tank interiors.



ELECTRONIC tracking controls keep Stanford solar furnace aimed at sun

SUN power takes first steps

- Prospects tied to world's growing needs for food, fuel, materials
- Today's devices considered only forerunners of tomorrow
- Two firms take solar energy out of laboratory, begin producing

SOLAR ENERGY is a long way from being a major market for electronics or any other industry. Solar batteries, furnaces, stills and cookstoves are just now nibbling at the fringes.

Visionaries in industry, science and government, however, see in the sun an immense future: inexhaustible power to produce new foods and fuels with natural chemistry, pure water and raw materials from the sea, small lifetime heating and power plants.

The enormous problem generating world-wide interest in solar energy is expressed by C. C. Furnas, Assistant Secretary of Defense. Power needs can rise 50 times in the next century. Fossil fuels are dwindling and atomic energy is no panacea.

Today's achievements only foreshadow blue-chip prospects. Peter Glaser, A. D. Little senior engineer, believes: "We are now in the obscure beginnings. Time will show the way".

Two U. S. firms have transferred their solar activ-

ities from laboratory to production line this year. A. D. Little is building solar furnaces with electronic controls. Hoffman Electronics makes silicon sun-light converters and uses them in a line of equipment under a Bell System license.

Hoffman is concentrating on development, but has production facilities in Evanston, Ill.

In February Hoffman showed about 150 government officials a 25-watt sun-power to electricity converter, a miniature experimental transmitter-receiver for air-sea rescue, flashlights and light flashers. Evaluation quantities of flashlights were sold.

Agencies are experimenting with the 25-watt converters as power supplies for communications gear and navigational aids. They could also be used to power unmanned weather stations and remote microwave relays.

The military has for years wanted reliable lifetime power sources built into electronic equipment. They

would solve the logistic problems of supplying current or batteries to the field.

Solar batteries could also supply power for some telephone repeaters. Bell Labs says it is well satisfied with technical results of experiments on a Georgia telephone circuit. Admiral and Hoffman are offering well-heeled consumers solar-powered transistorized radios.

The drawbacks to solar batteries are their cost and size. At 10-percent conversion, the current rate, it takes 100 square meters of sunlit converter area to produce seven kilowatts.

The 25-watt converter costs about \$2,500. Bruce Birchard, applications engineering director, doesn't think it too high, considering it will produce electricity indefinitely. Hoffman hopes to cut the cost to \$30 a watt in a few years.

In 18 months, the efficiency of Hoffman's silicon solar cells has been increased five times and cost reduced from \$25 to \$5 each. Production will drop it more.

Little's solar furnace costs \$14,500. It's actually a 60-inch army searchlight in reverse to focus 3,500 C on a 0.6-cm circle. It supplies heat, without chemical contamination or unwanted electric fields, for high-temperature research.

Automatic sun-tracking drives are controlled by phototubes, error-signal generators and amplifiers.

The intense heat produced in solar furnaces might be used to grow semiconductor crystals.

Solar furnaces aren't generally considered practical yet for commercial use, though one is used in Algeria for refining.

Boost 110° TUBE output

PRODUCTION of 110-degree tv picture tubes is being stepped up by at least two tube makers. Picture tubes with 110-degree deflection angle reduce depth of tv cabinets.

More than 1,000 21-inch 110-degree black-and-white tv picture tubes are being produced daily at RCA's Marion, Indiana plant. Output is expected to reach 3,500 a day in June. Company is also producing 17-inch 110-degree tubes, expects to be in production on 24-inch 110's in June.

Sylvania is producing 110-degree 14-inch, 17-inch and 21-inch picture tubes, expects to produce 24-inch models soon. Its production rate on 17-inch types runs about 1,000 a day. Firm has produced tv sets with 17-inch 110-degree tubes since December, is designing new chassis for its 21-inch 110-degree tube.

Nearly every major tube manufacturer now has 110-degree tubes at least in pilot production. Besides RCA and Sylvania, GE and Thomas have 110-degree tubes registered with JETEC. Nearly all major setmakers are expected to introduce 110-degree sets in near future, possibly before June showings.

Technical DIGEST

Overfill and underfill of cans of evaporated milk is checked automatically at 300 cans per minute with GE x-ray monitoring unit. Electronics replaces visual inspection of cans floating in hot water, to see which float high, which low.

Ion-cloud loudspeaker, in production by DuKane shows promise of becoming ultrasonic transducer of wide frequency range. Ionized air forms almost weightless moving diaphragm.

Welding replaces stitching for pads, auto-seat covers, trunk liners and even wallpaper. With 30-kw Machlett high-frequency generator, vinyl can be quilted through scrap wool or other filler to plastic backing sheet. Layers are pulled through hydraulic press having on its ram electrodes in shape of patterns.

Ceramic foam insulation withstanding 600 C, developed by Emerson & Cuming, comes as tiny air-filled ceramic spheres which can be poured into mold for encapsulation or between glass-fiber walls

of radome. Heat treatment bonds spheres to each other to give equivalent of foam.

Electrooptical shutter using sonar-type synthetic adp crystal modulates constant-intensity beam of light efficiently enough to permit communication for distances up to several miles in clear weather, with no detectable light energy outside the beam. Frequency range of this new Baird-Atomic system is wide enough to handle a complete television channel or a number of voice channels.

Pressing tungsten powder into porous compact and sintering produces sponge capable of absorbing up to 25 percent silver. Resulting solid tungsten-silver compact can be machined, brazed or soldered, has high x-ray absorption along with other desirable characteristics. Technique was developed in Australia.

Lifetime power sources for transistorized electronic equipment, using radioactive decay to heat thermopiles for generating direct current, now show commercial promise as result of research at Rome Air Development Center.

1956 PROFITS trail sales

- Sales up 20 percent, earnings up only 9 percent
- Rising costs, falling prices reduce profit-to-sales ratio ½ percent
- Sample for study includes 40 electronics companies

PROFITS lagged behind sales in the electronics industry last year. Comparison of sales and earnings in '55 and '56 for a sample group of 40 manufacturers demonstrate this.

Total sales increased 20 percent from \$10.8 billion in 1955 to \$12.9 billion in 1956. But net profit increased only nine percent from \$573 million to \$622 million.

Sales were higher in 1956 than the preceding year for 37 companies or 92 percent of the group. But higher profits were enjoyed by only 26 companies or 65 percent. Rate of earnings increase fell behind rate of sales increase in annual reports of 28 companies, or 70 percent of the total.

Average margin of profit or ratio of after-tax net

income to sales fell ½ percent. Profit margin for the group dropped from 5.3 percent in 1955 to 4.8 percent in 1956.

The problem was not confined to electronics manufacturers. Net profits of 2,550 leading corporations increased only by three percent according to a study by the National City Bank. Net profits of 1,284 manufacturing companies increased by less than half a percent.

Lower selling prices and higher costs of labor and materials were largely responsible for squeezing the profit margin. Larger outlays for research and development also played an important role.

Electronics manufacturers with a stake in the automotive industry suffered from reduced volume of auto production in 1956.

RCA board chairman David Sarnoff might have spoken for the industry in explaining the decrease in RCA profits to his stockholders:

"The decrease in profit this year is caused mainly by higher costs of labor and materials and the lower prices at which black-and-white tv sets and tubes were sold in a highly competitive market." Sarnoff also stressed the impact of development costs pointing out that RCA spent \$6.9 million last year developing color tv.

Many other electronics company leaders spoke to their stockholders in much the same vein although they used different products to illustrate their points.

Operating results for some companies, however, run counter to the trend. Here are a few examples.

General Transistor, which lost \$6 thousand in 1955, wound up 1956 with a profit of \$184 thousand, equal to 16 percent profit on sales of \$1.1 million. Kay Lab, which had a \$6 thousand loss in 1955, turned in a 1956 profit of \$228 thousand, equal to eight percent profit on sales of \$3 million.

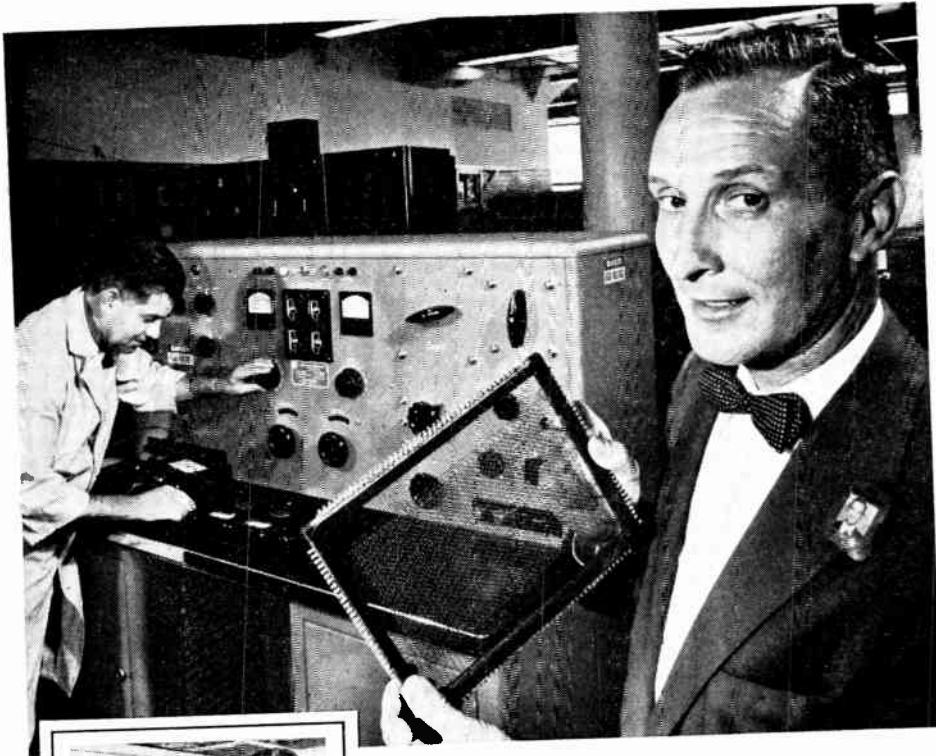
The Circuit Breaker earnings doubled with a 46-percent sales increase. Electronic Associates scored an 89-percent profit increase while sales increased 60 percent. Earnings of Consolidated Electrodynamics and High Voltage Engineering both increased about 60 percent while sales increased approximately 40 percent.

Checking MISSILE nerves



HIGH-SPEED precision tube-tester by Martin permits 100-percent inspection of tubes for missile-guidance equipment. Operator uses General Radio bridge to keep tabs on tester's accuracy

America's Most Complete Line of Instrument Calibration Standards!



Meets our need for **GREATER ACCURACY!**

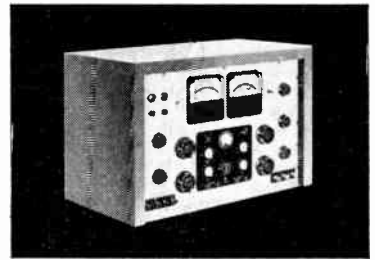
FROM ACTUAL EXPERIENCE BY
International Business Machines Corp.
Poughkeepsie, New York

The increased usage of electronics in the computing machine industry has resulted in a greater need for accuracy in electrical testing equipment," according to the manager of test equipment maintenance of IBM's Poughkeepsie plant.

"Because our specifications require that any test equipment shall have twice the accuracy of the unit being tested, the finest meters have to be used, and these meters are constantly calibrated with the help of the two RFL Model 260B and 262B Calibration Standards in our testing department. We've used them steadily since 1952 both for inspecting meters and making up correction data for such test instruments as polyrangers, laboratory standards, secondary standards and electric dynamometers."

The advantage gained by in-plant calibration of electrical instruments using these console type Standards, which encompass the full range of testing instruments, under controlled laboratory conditions, goes beyond mere convenience. Their ease of operation, consistent calibration and high accuracy over wide current and voltage ranges are impossible to duplicate using individual testing equipment which must be moved from job to job throughout a manufacturing plant.

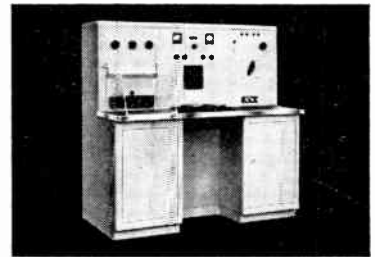
In addition to accuracy, each RFL Standard has many features which make rapid calibration procedure possible. Where many instruments must be tested, it can be demonstrated that an appreciable cost saving over older calibration methods will soon result.



Model 829

Portable unit calibrates both AC and DC meters over ranges from 0.25 millivolts to 2000 volts and 2 microamperes to 20 amperes. Direct reading accuracy of 1% (0.5% using charts supplied). Frequency from 50 to 400 cps depending on line frequency.

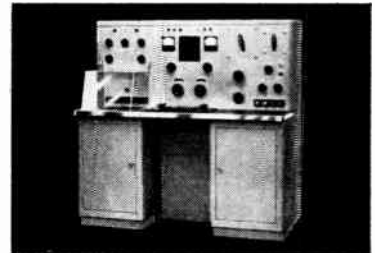
Net price \$2,650. f.o.b. Boonton, N.J.



Model 261B

Calibrates all types of AC meters to direct reading accuracies of 0.5% (0.25% using calibration charts) over frequency range of 50 to 1600 cps. Current range from 1.5 milliamperes to 200 amperes; voltage range from 75 millivolts to 1500 volts. Output of electronic power oscillator has less than 5% total harmonic content at 60 cycles.

Net price \$9,250. f.o.b. Boonton, N.J.



Model 262B

Calibrates DC electrical measuring instruments to direct reading accuracies of 0.1% (0.05% using calibration charts) through voltages ranging from 1 millivolt to 1500 volts and currents ranging from 1 microampere to 150 amperes.

Net price \$15,600. f.o.b. Boonton, N.J.



Write for technical data and application information.

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Boonton, New Jersey

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Style, price sell BOAT gear

- 20 electronics firms at boat show
- Radiotelephones for outboards shown
- Depth-finders, autopilots popular

TWENTY ELECTRONICS firms displayed their wares at the National Motor Boat Show in New York. The curious thronged several radar displays. But it was low-cost, high-style items aimed at pleasurecraft which attracted buyers.

Two radiotelephones aimed at outboard cruisers—an almost virgin electronics market—had manufacturers' reps buzzing. They were introduced by Pearce-Simpson and Applied Electronics.

Priced under \$300, the units are rated at 15 and 16 watts.

Both are pretuned packages that can be installed with hand tools and include antenna and crystals.

Pearce-Simpson and Apelco reps report that FCC officials have cleared self-installation provided the dealer checks the sets at the time of sale. Ralph Nylander, of Pearce-Simpson, predicts that within five years most outboard cruisers will carry communications equipment.

Popular-priced autopilots and depth-finders (which can be used as fish-finders) are in favor. Wilfred O. White and Sons showed an auto pilot that uses only one transistor and no tubes, sells for \$397.50. The autopilots, according to W. Gordon White, president, are just catching on. He expects that 50,000 to 100,000 boat owners will want pilots and even more will want depth finders.

Low-cost homing devices, substituting for direction finders, would sell well in such areas as Long Island Sound, White thinks. He points out that portable transistor radios can be used for homing when the locations of transmitting stations are known. But what everyone really wants, White said, is radar with a one-mile range for a few hundred dollars.

Kaar Engineering introduced a hand hailer to sell for about \$125. The batteries and transistor circuit are completely encased in the handle. Kaar expects the elimination of trailing wires and battery pack will make it popular with yachtsmen.

Micro-Lab presented a monitor receiver costing \$70. It drains two amps and is designed for the radiotelephone owner who wants to conserve power while just listening in. The monitor operates directly from a battery without power supply and uses eight 12-v electron tubes and a transistor.

VHF bags Baghdad thieves

IN CASE you're ever in Baghdad and need an Iraqi cop you can get one in a hurry by dialing 444.

That gets you through to the orderly officer in General Police Headquarters. Then a new vhf system takes over to speed a cop—or a whole mobile patrol—to you.

Police assistance usually arrives within five minutes.

The police of Baghdad have a vhf network supplied by Redifon Ltd. of Britain's Rediffusion Group. Vhf base stations equipped with 250-watt transmitters and receivers have been set up in each

of three administrative areas plus headquarters.

On receiving an emergency call, the orderly officer transmits details immediately to the appropriate area headquarters where round-the-clock contact is maintained with four patrol trucks.

Instructions go to the truck nearest the scene. Each truck has a 4-channel transmitter-receiver, which can also be removed in an emergency.

Colonel Mousa Hamdi, Chief of Signals of the Iraqi Police Force, gave some idea of the system's efficiency during a recent London visit. The colonel reported he was once awakened by a woman screaming in a nearby house. When he dialed 444 the orderly told him a patrol was on the way. Only three minutes from the scream, the colonel said, police arrived and promptly captured a thief.

\$1.8 million for flight SIMULATORS

ERCO DIVISION of ACF Industries is entering the commercial flight simulator field with a \$1.8-million American Airlines contract for two units and spare parts.

One simulator will duplicate the cockpit of the 400-mph Lockheed Electra and the other the 550 to 600-mph Boeing 707. American has 35 Electras and 30 707's on order.

"Through the use of the simulator," American's O. M. Mosier said, "crews will have many hours of flying experience in jet craft before they take the controls of the airplanes for the first time. Once the planes are in service, the simulator will continue to be valuable for maintaining pilot proficiency."

Housed completely in air-conditioned trailers, the training units can be moved to any of the airline's major bases across the country.

Long a manufacturer of simulators for military planes, Erco plans to deliver the commercial units early in 1958.

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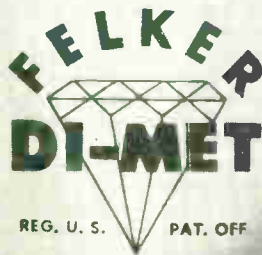
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The standard of the Electronics Industry for a Decade and a Half!



Over 15 years exclusive development for the electronics industry has proved the outstanding qualities of Felker's high-precision cut-off machines. Designed to fulfill every crystal cutting requirement with a choice of down or through-feeding methods, the most critical control is insured for every type of cutting. Smooth, velvety hydraulic retardant on downfeed; heavy, rugged construction; precision preloaded ball bearings in removable spindle quills; ball bearing arbor supports; choice of rolling tables or rotary tables with mechanical screw control on cross and through-feeds are a few of the many refinements that make Felker *first choice* in the nation.

Both Models 80BQ and 120B are available as basic units. Wide selection of table types enables exact adaptation of each unit to individual needs. Write for *circular giving complete specifications!*



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ALSO AVAILABLE—Model HVC-12B Rotary Table. Same as above with cross-feed slide only. For use on rolling table.

MODEL 120B—similar to Model 80BQ but with increased vertical arbor lift and added work capacity.

FELKER MANUFACTURING COMPANY
 Torrance, California



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Despite 30 years of experience, despite a staff of 22 full-time editors, despite the parade of stories, feature-length technical articles, releases, reports and statistics that cross his desk...

"Mac" spends nearly a third of his time in the field, as shown below,* with an executive on one side and an engineer on the other.

That's why 46,000 important people in electronics pay to receive **electronics** 37 times a year.

And that's why advertisers buy the 37-time schedule (12 Technical Editions published on the 1st of each month, 24 Business Editions on the 10th and 20th of each month, plus the mid-year Buyers' Guide).

*"Mac" is flanked by Fairchild Camera & Instrument Corp. Executive Vice President Richard Hodgson (right) and Research Associate Charles Poppe (left). Equipment in the background is an Automatic Voice Data Link.



A MCGRAW-HILL PUBLICATION - 330 WEST 42ND ST., NEW YORK 36, N. Y.



RECRUITING toned down

- IRE activity less feverish than '56
- Firms and interviewers more conservative
- Results seem good, applicants serious

ENGINEER recruiters and job applicants were both more conservative at this year's IRE convention than last. The guess is that results will be favorable for companies and engineers.

Although there were 120 company suites at the Waldorf-Astoria Hotel alone, more than last year, activity was at a less hysterical pitch.

Electronics engineers were heavy in demand, accounting directly for 250 of the 1,000 job opportunities posted. Salaries for most recent engineer grads averaged about \$450 a month, with electrical engineers averaging about \$465.

Recruiters said most engineers who visited them were in the three to six year experience group, ideal for many of their requirements.

Some firms said they regarded 50 percent of the applicants as unsuitable for their openings, but an aircraft company said it was interested in two-thirds of the people it interviewed.

Guesses on how many applicants would actually be hired ranged from less than 5 to more than 15 percent.

One firm interviewing for jobs in electronics systems and semiconductor development said its \$6-10,000 recruiting costs were a long-range public relations and educational investment. This firm, which came out of last year's recruiting melee with a net loss of one employee, will be more than satisfied with five new ones this year.

Recruiting was not without its share of gimmicks, though. These ranged from blotter handouts to a firm's \$550 reward for an accepted applicant, advertised as up \$50 over last year's offer due to inflation.

TAPES run machine tools

PROGRAMMED machine tool control systems are playing an important role in the trend toward the automatic factory. They offer users greater accuracy, repeatability, increased production rates and operation by less skilled personnel.

Numerical data about the product is stored on punched tape, punched cards or magnetic tape, fed to the machine tool control system and used to position work table or cutter or both.

Machine tool control systems can be adapted to milling machines, jig borers, lathes and precision screw machines.

The systems are expensive, ranging from about \$15,000 for relatively simple control equipment to \$60,000 or more for elaborate contouring systems. Equipment for

tape or punched cards is extra.

The aircraft industry uses most of the 100 or more systems in operation. According to E. C. Johnson of Bendix Research Laboratories, the users are enthusiastic.

D. A. Korman, sales manager at Farrand Controls, feels that the economic factors are not sufficiently clear for users to plunge overnight into the use of programmed machine tools.

Despite the high costs of developing systems and the high engineering content in adapting numerical control to machines, manufacturers of controls are optimistic. For example, Farrand Controls, with \$1 million in back orders, is building a new plant exclusively for the production of this equipment.

Do You Have A Deburring Headache?

GET THE FACTS ABOUT

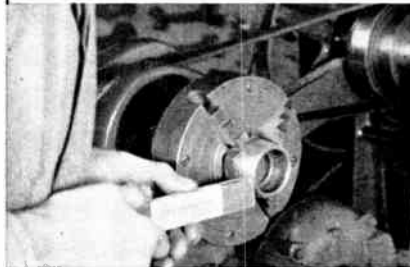
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Want more information? Use post card on last page.

PLASTICS press heat limit

- Electronics takes 100 million pounds
- New materials, methods increase use
- Goal is stability at 1,000 F

PLASTICS PRODUCTION passed four billion pounds in 1956, making it a \$2-billion industry, according to the Society of the Plastics Industry. A five-percent gain is foreseen for 1957.

Du Pont estimates that 100 million pounds are used in electronics, 175 million in wire and cable. Nearly all the 5,000 plastics firms produce something for electronics.

Durez Plastics thinks sales of molding compounds will be driven higher by new two-dimensional circuit processes. Currently, phenolic bases for etched circuits pace sales of industrial laminates in electronics.

Among newer plastic materials and techniques are sandwich cabinet construction, lead-filled radiation shields, coated foils for subminiature components and flexible-sheet microwave absorbers.

Plastics developers still face a heat barrier that prevents fuller electronics use. They are only half-way to stability near 1,000 F, a goal for military equipment components. Some think the gap may be bridged within 10 years by improved silicones.

Meanwhile, manufacturers are inching up the thermometer with variations on standard plastics, using new fillers and curing agents. Several epoxies are usable at or near 500 F and at least one, just announced by Emerson and Cuming, is usable at 600 F. It is a foam.

Irradiated polyethylene film production was raised 500 percent in January by GE. Cross-linking by irradiation is said to raise polyethylene's heat resistance to 350 F and allow it to be filled.

TRANSISTOR designers scarce

TRANSISTOR MAKERS can enlarge their market by providing more engineering aid to small users of transistors, claims management consultant Alexander Hollenbeck.

Most small transistor users do not have the personnel to engineer transistorized end products, he says. If given technical help many small users will develop into big users.

These conclusions were reached after making a number of studies of the transistor market over the last two years.

On one survey six manufacturers of equipment adaptable to transistors said they either used transistors in small quantities or not at all because of lack of engineers experienced in transistor applications.

Typical of the comments made by potential users of transistors to survey questions were the following:

• "Would be using transistors now except that no engineers are available who are qualified to design equipment for transistor use," said a manufacturer of servo motors.

• "Do not use transistors as we do not have the application engineers to develop use of transistors," said a manufacturer of digital computers.

Similar comments were made by manufacturers of amplifiers, recorders, oscillographs, pulse generating equipment, electronic timing devices, voltmeters and current regulators.

Reveal TAPEBOOK

Books recorded on magnetic tape are getting a test in the market place. Publishers have kept watch over the possibilities but many have thought that the market for prerecorded tapes would not support books. Now they will see if they were right.

On sale is a book called "All About Tape-On Tape." "I have no idea of how it will go," says Mark Mooney Jr. publisher and editor. "Depending on its reception, we'll do more."

There are two editions—a five-inch dual-track reel and seven-inch dual-track reel. Both play for an hour.

"This, I think is the sort of book we're interested in doing. Books dealing with sound. It's difficult to describe in words things like 'wow' and 'flutter'."

Capital goods top tv, radio in BRITAIN

BRITISH capital goods electronics production in 1956 is reported to be greater than that in the radio-tv part of the industry for the first time since World War II.

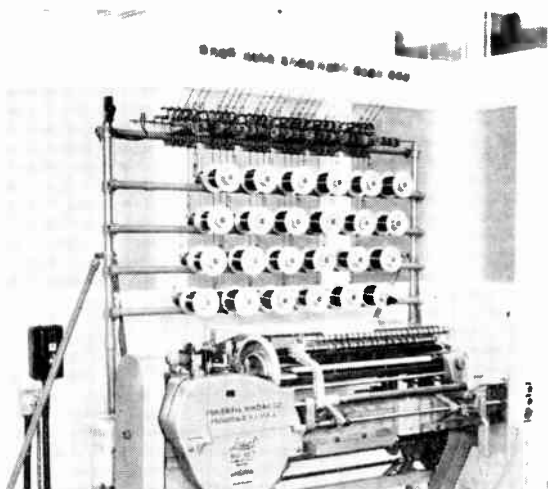
Fixed and mobile communications, navigational aids, electronic instruments and computers are said to be more than \$252 million, compared to \$210 million for radio and tv receivers.

These facts are stated in the annual report of the Radio Communication and Electronic Engineering Association, whose members make more than one-third of the output of Britain's radio industry.

A large part of the output of some of the member firms consists of radar and missile systems and other defense equipment.

Direct electronics exports as well as electronic equipment installed in aircraft, ships and other capital goods sold abroad totaled some \$56 million. Value of electronic equipment used in Britain's atomic plants is estimated at \$28 million, including television observation within reactors, radioactivity warning devices and control gear.

**if it's worth
engineers' time . . .**



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INTRUDER alarm market up

- One firm sees \$7.5 million
- Forecasts 15% increase in '57
- 60% of work for defense

INTRUDER alarm systems seem headed for heavier use of electronics.

Walter Kidde & Co., Belleville, N. J. manufacturer, estimates retail sales of electronic detecting equipment in the protection field at \$6 million a year in U.S., \$1.5 million for export.

Kidde sees 15-percent rise in sales of electronic protective gear in 1957, forecasts total will soar in five years to \$15 million, including exports.

There are at least a dozen firms making electronic intruder-detecting equipment, some for their own protective services.

Potential customers include about 20 medium-sized protective services and about 400 alarm installers.

Some 60 percent of electronic systems are installed at plants working on classified projects.

American District Telegraph, which sells nationwide protective service, estimates annual factory-door cost of the equipment it makes, largely for its own use, is \$400,000.

ADT expects to triple its electronic equipment and service revenue derived from electronic systems in five years. Last year, says ADT, electronic intruder detection systems brought in about 6 percent of its total revenue.

ADT gives this rundown of its electronic systems:

- 9,000 indoor infrared alarm systems.
- 1,000 outdoor infrared alarm systems.
- More than 500 indoor capacitance systems.
- Capacitance systems on boundaries of restricted outdoor areas.
- Sound detection systems for mercantile vaults which set off alarm when vault is attacked. Similar systems used by Federal Reserve and other banks.
- Ultrasonic burglar alarms for closed spaces. Movement in room saturated with high-frequency sound waves triggers alarm.

MILITARY electronics

AF Major General Schriever calls the Boeing Bomarc "the most promising air defense weapon system in the surface-to-air class."

Where Boeing will produce the Bomarc has not yet been decided. Current testing and development production is being carried out at Boeing's Seattle plant with support by Wichita, Kan. division.

Fairchild Controls' target simulator system generates up to six individual moving targets on any standard radar indicator.

Two models are currently available—one for laboratory installation and one for mobile field use. A stripped-down model for airborne use is under development. Used for both training and testing purposes, aircraft and missile speeds of up to 10,000 knots can be generated.

Glenn L. Martin is going into production of the Army's new field artillery guided missile, Lacrosse. The weapon was developed by Cornell Aeronautical Laboratory.

Use of closed-circuit tv for visual monitoring of in-flight testing is becoming more popular. First flight of a C-130 Hercules equipped with skis was photographed from a two-foot-diameter glass-fiber pod under the right wing. The picture was carried over coaxial cable to a 10-inch monitor screen inside the Hercules.

Beam deflection caused by nonuniformity of plastic radome walls can be tested by California Technical Industries' radome boresight error measuring system, Model 150.

CONTRACTS awarded

DuMont was awarded a \$218,851 contract by ARDC's Cambridge Research Center for construction of a pulse transmitter, receiving display and recording unit.

Amperex has been contracted by Navy Electronics Supply Office for tubes amounting to \$349,382.

Zenith Plastics has sold ten radomes, CW-396A/GPS, to Rome Air Force Depot for \$343,492.

Raytheon has received a \$486,525 contract from Dayton Air Force Depot for magnetrons.

North American will supply electronic equipment and do repair work on F-86D Sabre jets under a \$4,024,717 contract with the Air Force.

GE will make airborne electronic countermeasures equipment

for the Air Force under a \$20 million letter contract with Air Materiel Command.

Sperry Gyroscope gets a \$2,727,517 Air Force contract for APN-59 radar sets to be used in troop and cargo-carrying transports. The 150-pound set has a range of 240 miles.

Beckman Instruments will construct a \$220,000 electronic computer system, consisting of six analog computers, for Boeing. The system simulates an aircraft's performance under flight conditions, will aid Boeing engineers in ironing out problems in jet aircraft design.

Consolidated Avionics will engineer, design and manufacture a digital data-reduction system for testing advanced rocket engines under a \$225,000 contract with Reaction Motors, subsidiary of Olin-Mathieson. Automatic print-out techniques will be an integral part of the system.

Polarad Electronics will supply the Bureau of Ships with AN/TRT-5 radio transmitters under a \$374,220 contract.

Bendix will supply the Aviation Supply Office with spare parts amounting to \$1,198,547 for Bendix amplifier assemblies.

IBM has a \$3.1-million Air Materiel Command contract for product improvement and service test program for bombing-navigation systems.

Mack Electronics division of Mack Trucks will make airborne radar sets for the Navy under a \$2,614,000 contract.

GE will sell to Dayton Air Force Depot electron tubes amounting to \$330,000.

Eitel-McCullough has a \$136,140 contract with Dayton Air Force Depot for power-amplifier tubes.

Western Electric is supplying Nike spare parts and components to Philadelphia Ordnance District under four contracts totaling \$423,659.

Remington Rand is awarded contract by the U. S. Army Map Service to maintain Univac system for an estimated \$134,820.



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TRIP POINT ADJUSTABLE to any point of scale arc. Sensitive to changes as little as 1%. One contact on moving

Model 461-C, 10-0-10
Uo DC \$83.25

pointer. The other on adjustable pointer. When pointers meet, contacts close and lock. Holding coil wound on moving coil. Locking is electro-magnetic. Manual or automatic reset. Spring action kicks contacts apart.

Ranges: From 0-5 microamperes, 0-5 millivolts or 0-300°F up.

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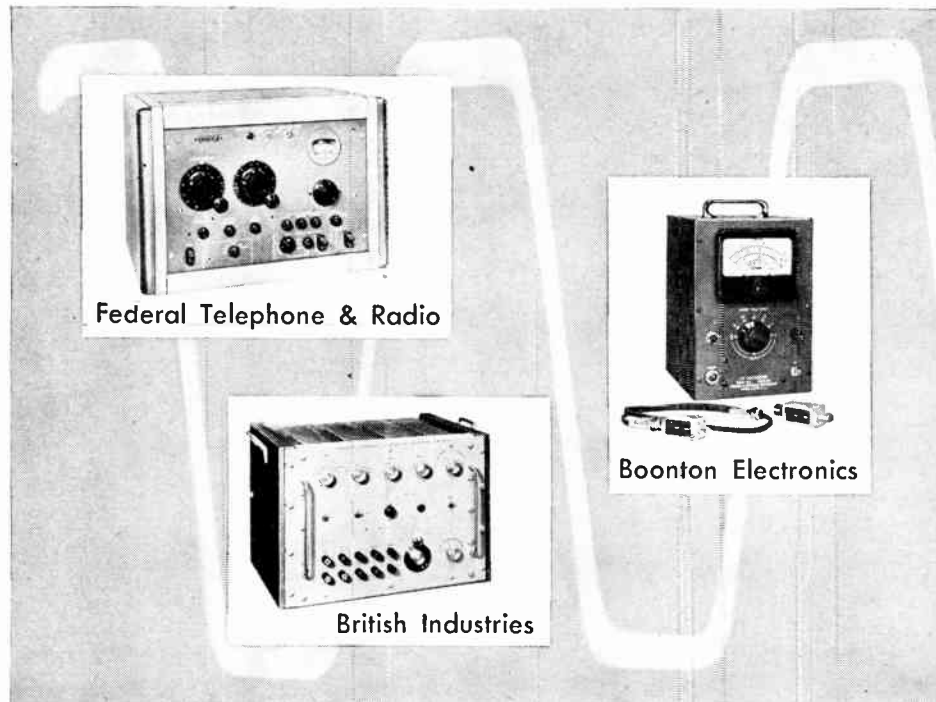
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Test sets lead



Federal Telephone & Radio

Boonton Electronics

British Industries

DESIGNERS and producers of electronic apparatus have constant need

Design and manufacture of electronic equipment requires controlled inputs and accurately measured outputs. Inputs to test filters, audio amplifiers and loudspeakers can be obtained from Federal Telephone and Radio's (P1) Model 200K swept frequency generator. Low-frequency waveform generators are announced by British Industries (P2).

For testing fuses, relay contacts and bonding, Industrial Instruments (P3) announces an ohmmeter covering 0.01 to 10 ohms. An r-f voltmeter designed by Boonton Electronics (P4) covers the frequency range from 0.2 to 500 mc and operates with reduced accuracy up to 1,000 mc. DuMont's (P5) type 403 oscilloscope is said to be capable of resolving a 20-microvolt signal.

Remote radiation monitoring systems have been developed by Victoreen Instrument (P6) for use in reactor installations, hospitals and laboratories, where work is performed simultaneously at many locations. . . . Printed-circuit and terminal boards are said to be held securely during assembly operations by the Snap-In Vise produced by Western Electronic (P7).

Digital printers offered by Computer-Measurements (P8) convert electronic count information into

printed form. . . . Three torque motors available from Raymond Atchley, Inc. (P9) for servo systems are said to meet military specifications. . . . Raytheon (P10) announces a binding post which permits five means of connection.

Voltage-regulated power supplies developed by C. J. Applegate (P11) for the newer types of multiplier phototubes provide 1,500 ±25 volts. . . . Bogue Electric (P12) announces 16,000-volt d-c silicon-rectifier power supplies for large

For more information contact manufacturers listed p 36
or circle numbers on READER SERVICE CARD (facing back cover)

NEW PRODUCTS



Du Mont



Industrial Instruments

for precision test equipment such as this

radar sets. . . . High-conductance germanium diodes, type DR385, marketed by **Radio Receptor** (P13) are said to have a controlled voltage drop between 0.34 and 0.37 volt at 10 ma.

Furnishing from 600 to 3,110 volts d-c, a power supply announced by **John Fluke Manufacturing** (P14) has been designed for such laboratory applications as instrument calibration. . . . A transistor decade amplifier announced by **Zacharias** (P15) provides voltage gains of 10 and 100 stabilized within 0.2 db from 7 to 400,000 cps. . . . Terminal blocks by **Kulka Electric** (P16) for electronic apparatus feature a Mylar insulation strip on the back completely covering and sealing in all counterbores having screw ends.

A line of millivolt pyrometers announced by **GE** (P17) uses high-strength magnetic material, printed circuits and miniature tubes to effect a 50 percent saving in weight. . . . **McCauley Industrial** (P18) announces an improved fluorophotometer optical unit for comparing the fluorescence of samples with

standards of known compositions. . . . Radioactive material is used in a fuel-level detector announced by **Robershaw-Fulton Controls** (P19) for supersonic aircraft and missiles.

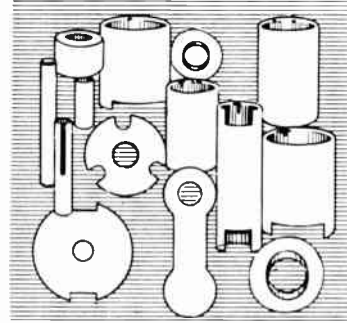
Printed-circuit coil forms with Berg lugs are announced by **Resinite** (P20). . . . Covering the range from 2,000 to 12,000 mc, a line of traveling-wave tubes offered by **Geisler Laboratories** (P21) weighs from 5 to 7 pounds. . . . Low-capacitance air-dielectric coaxial cable announced by **Tensolite Insulated Wire** (P22) comes with a variety of outer jackets and a No. 30 Awg conductor.

Phase-sensitive demodulators have been developed by **Atlas Electro-Mechanical** (P23) for airborne servo system applications. . . . A system of 3 components for machine-tool control is announced by **Seneca Falls Machine Co.** (P24) and includes a displacement transducer, a plug-in type amplifier and a mechanical power amplifier that provides up to 1 horsepower.

Wright Machinery (P25) has

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PROBLEMS?

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have the ANSWERS!



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They're practical—buy them in the quantities you need in the materials you want—high dielectric kraft, fish paper, foils, special protective coated and laminated papers and Mylar*. Printed or plain, they're made in diameters from .093" to 2" and up.

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*DuPont's reg. trade mark for its polyester film.

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developed an electronic weighing element with a range from 3 grams to more than 50 pounds. . . . High-temperature bathtub-cased metallized-paper capacitors offered by Cornell-Dubilier (P26) have ratings from 0.1 to 2.0 μ f at 200, 400 and 600 volts d-c working. . . . Reverse rotation and T adapters marketed by F. W. Stewart Corp. (P27) have 1:1 gear ratios.

DeJur Amseco's (P28) $\frac{1}{2}$ -inch diameter potentiometers feature a one piece nickel-plated bronze case and bearing; sealed silicone glass fiber cover with end-mounted terminals. . . . Power supplies for laboratory applications are announced by Dressen-Barnes (P29) and provide two 1 to 100-volt outputs which can be set in 0.1-volt increments.

Metallized Teflon capacitors available from Baleo Research (P30) have a power factor of less than 0.0005 and an insulation resistance greater than 10^9 ohms at 200 C. . . . Sylvania (P31) announces the type 10DE7, a double triode for vertical deflection amplifier service with 110-degree tv picture tubes. . . . Up to 500 volts output and currents up to 1,000 amperes are available from silver-zinc batteries offered by Frank R. Cook Co.

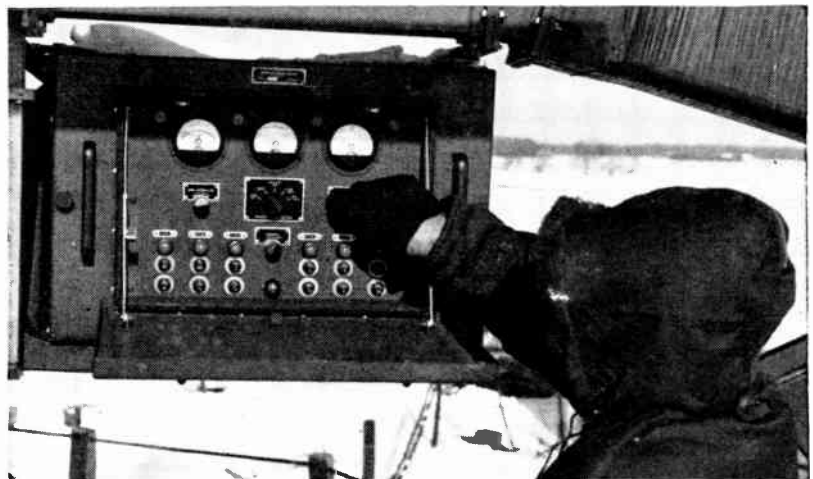
(P32) for missiles and for airborne and waterborne electronic gear.

Insulated terminals designed by Globe Electrical Mfg. (P33) to be mounted directly in the chassis are expected to overcome problems of terminal board breakage in missile and aircraft electronic apparatus. . . . Activated liquid rosin flux manufactured by American Smelting and Refining (P34) is said to meet Signal Corps requirements.

Capacitor-resistor life-test ovens offered by Edward Laboratories (P35) can handle 96 components. . . . Germanium alloy *pnp* type transistors (2N301 and 2N301A) are announced by RCA (P36) for output stages of auto, marine and military radio equipment. . . . Size 10 a-c motor-generators are available from Clifton Precision Products (P37) for error rate damping in servo systems.

Hollow-coil proximity pickups for electronic counter applications have been designed by Electro Products (P38) with a connector located on the coil. . . . Astron (P39) offers two electrolytic capacitors for printed and transistorized circuits. . . . Portable welding power supplies offered by Unitek (P40) have plug-in receptacles for quick chang-

RADAR checked in deep freeze



HIGH-POWER radar is monitored in operation with instrument developed by ARDC, manufactured by Airborne Instruments Lab. Composed of power monitor, relative-tuning indicator and noise-factor indicator, monitor is built into radar set

ing of accessories to do special welding jobs.

Eight sizes and types of high-temperature silicone-rubber insulated wire are offered in kit form by Springfield Wire & Tinsel (P41) for use by engineers in evaluation. . . . Massa Laboratories (P42) announces the model M-133 pen motor for multichannel recording systems. . . . From 1.02 to 302 volts d-c at up to 250 ma is supplied for laboratory use by Kin Tel's (P43) Model 30B-25 power supply.

Double-pole double-throw relays available from Elgin National Watch (P44) operate in temperatures up to 125 C. . . . Special purpose transistorized analog computers are announced by Beckman (P45) for use with strain gages in missile testing and in petroleum and chemical processing. . . . Aircraft and missile applications are seen for a synchronous alternator developed by Bekey Electric (P46), that is said to operate at speeds up to 60,000 rpm without rotating windings, slip rings or brushes.


High input impedance and broad-band response characterize Atlantic Research's (P47) type 104 amplifier for use with piezoelectric accelerometers, pressure pickups and similar transducers. . . . Nuclear-Chicago (P48) has developed a 1-microsecond scaling circuit for use in nuclear sealers and industrial counting equipment.

Molded epoxy shells produced by Epoxy Products (P49) are said to reduce the time required for encapsulating resistors, coils and capacitors. . . . Crystal Research (P50) offers an instrument which provides a direct indication of the ionic purity of water. . . . A line of rectangular panel instruments is announced by Simpson Electric (P51) that features open-face design and longer scale lengths.

GE's (P52) tone squelch system combines tone squelch and noise squelch to eliminate unwanted signals for others sharing the same channel in two-way radio systems. . . . Empire Devices (P53) announces uhf variable attenuators which control attenuation in 0.1-db steps up to 120 db. . . . Accurate control of acceleration and speed of

$C/R = \frac{(K_1 K_2 K_3) (1+j\omega T_1) (1+j\omega T_2)}{j\omega (1+j\omega T_2) [(1+j\omega T_2) (1+j\omega T_m) + (K_0 K_1 K_2 K_3)] + (K_1 K_2 K_3) (1+j\omega T_1) (1+j\omega T_2)}$

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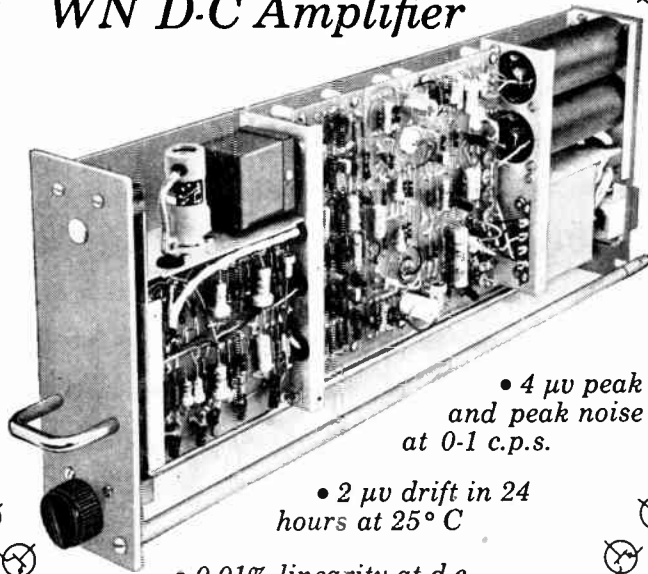
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shunt-wound d-c motors by the Gerald K. Heller Co's (P54) electronic controller is expected to aid in winding fine wire.

No R-C circuit for phase shifting is required with Oak's (P55) 400-cps chopper. . . Magnetics Research (P56) is producing a scaler-counter which uses magnetic cores instead of tubes for frequency division, random counting and pre-set counting.

New Product Makers

- P 1: Federal Telephone & Radio, 100 Kingsland Rd., Clifton, N. J.
- P 2: British Industries, 80 Shore Rd., Port Washington, N. Y.
- P 3: Industrial Instruments, 89 Commerce Rd., Cedar Grove, N. J.
- P 4: Bontrom Electronics, 738 Speedwell Ave., Morris Plains, N. J.
- P 5: Allen B. DuMont Labs., 750 Bloomfield Ave., Clifton, N. J.
- P 6: Viatoron Instrument, 5806 Hough Ave., Cleveland 3, Ohio
- P 7: Western Electronic Products, 655 Colman St., Alhambra, Calif.
- P 8: Computer-Measurements, 5528 Vineland Ave., N. Hollywood, Calif.
- P 9: Raymond Atchley, Inc., 2340 Sawtelle Blvd., Los Angeles 64, Calif.
- P10: Raytheon Mfg., 100 River St., Waltham 54, Mass.
- P11: C. J. Applegate & Co., 1816 Grove St., Boulder, Colo.
- P12: Bogie Electric, 52 Iowa Ave., Paterson 3, N. J.
- P13: Radio Receptor, 240 Wythe Ave., Brooklyn 11, N. Y.
- P14: John Fluke Mfg., 1111 W. Nickerson St., Seattle 99, Wash.
- P15: Zacharias Electronics, P. O. Box 172, Livingston, N. J.
- P16: Kulka Electric, Mt. Vernon, N. Y.
- P17: General Electric, Schenectady 5, N. Y.
- P18: McCauley Industrial, 1840 Howell Ave., Dayton 7, Ohio
- P19: Robertshaw-Fulton Controls, Santa Ana Freeway, Anaheim, Calif.
- P20: Resinite Corp., 6880 N. Central Park Ave., Chicago 45, Ill.
- P21: Geisler Labs., Menlo Park, Calif.
- P22: Tensolite Insulated Wire, 198 Main St., Tarrytown, N. Y.
- P23: Atlas Electro-Mechanical, 14734 Armita St., Panorama City, Calif.
- P24: Seneca Falls Machine Co., Seneca Falls, N. Y.
- P25: Wright Machinery, Durham, N. C.
- P26: Cornell-Dubilier, South Plainfield, N. J.
- P27: E. W. Stewart Corp., 4311 Ravenswood Ave., Chicago 13, Ill.
- P28: DeJur-Amsco, 45-01 Northern Blvd., Long Island City 1, N. Y.
- P29: Dressen Barnes, 250 N. Vinedo Ave., Pasadena, Calif.
- P30: Balco Research Labs., B-53 Edison Pl., Newark, N. J.
- P31: Sylvania Electric Products, Emporium, Pa.
- P32: Frank R. Cook Co., 36 S. Santa Fe Dr., Denver 23, Colo.
- P33: Globe Electrical Mfg., 1729 W. 134 St., Gardena, Calif.
- P34: American Smelting & Refining, 120 Bwy., N. Y. 5, N. Y.
- P35: The Edwards Labs., New Hackensack Rd., Wappingers Falls, N. Y.
- P36: Radio Corp. of America, 30 Rockefeller Plaza, N. Y. 20, N. Y.
- P37: Clifton Precision Products, Marple at Bwy., Clifton Heights, Pa.
- P38: Electro Products, 4500 Ravenswood Ave., Chicago 40, Ill.
- P39: Astron Corp., 255 Grant Ave., East Newark, N. J.
- P40: Unitok Corp., 275 N. Halstead Ave., Pasadena, Calif.
- P41: Springfield Wire & Tinsol, 70 Leete St., Springfield, Mass.
- P42: Massa Labs., 5 Fottler Rd., Hingham, Mass.
- P43: Kin Tel, 3725 Kearny Villa Rd., Box 623, San Diego 12, Calif.
- P44: Elgin Nat'l Watch, Elgin, Ill.
- P45: Beckman Instruments, 2500 Fullerton Rd., Fullerton, Calif.
- P46: Bekey Electric Co., 1327 S. Main St., Los Angeles 15, Calif.
- P47: Atlantic Research, 901 N. Columbus St., Alexandria, Va.
- P48: Nuclear-Chicago, 229 W. Erie St., Chicago 19, Ill.
- P49: Epoxy Products, 137 Colt St., Irvington, N. J.
- P50: Crystal Research Labs., 29 Allen St., Hartford 4, Conn.
- P51: Simpson Electric, 5200 W. Kinzie St., Chicago 44, Ill.
- P52: General Electric, Electronics Pk., Syracuse, N. Y.
- P53: Empire Devices, 38-15 Bell Blvd., Bayside 61, N. Y.
- P54: Gerald K. Heller Co., 1819 Industrial Rd., Las Vegas, Nev.
- P55: Oak Mfg., 1260 Clybourn Ave., Dept. U, Chicago 40, Ill.
- P56: Magnetics Research Co., White Plains, N. Y.

RADIO sales climb 25%

- Set market now stabilizing
- Four reasons credited
- 7 million sales seen in '57

1956 radio sales climbed to 8,332,000, a 25-percent jump over 1955. A market of this size was unforeseen after tv fever gripped the country.

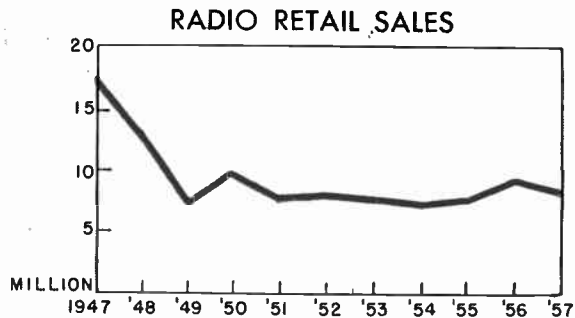
Television did not materially affect radio sales until 1949. From a peak of 17,360,000 in 1947, sales plummeted to 6,926,000. 1950 saw a revival; 9,411,000 people bought sets.

None of these figures count automobile radios. RETMA set count takes in home (that is, conventional console and table models), clock and portable models.

Charting the ups and downs indicates stability in the market. Up and down it went during 1951-1955, but fluctuation was within a million sets.

The number of radio homes also increased, although the basic market is considered a replacement one. In 1947 there were 33,998,000 radio homes in the U.S. This increased to 45,775,000 in 1954. In the past few years it has kept at 96 percent of U.S. homes. Total radio homes today: 50 million.

Last year's rise, according to H. Leslie Hoffman,



RADIO retail sales steady since 1951

president of Hoffman Electronics, was due to "impetus from transistors."

Manufacturers give reasons for a firm radio market:

- The public prefers to buy a new set rather than repair an old one.
- There are advantages in having more than one radio in the home.
- Radio programming jibes with the teenager rage for more and more popular music.

Industry bets are for 1957 sales to dip slightly, 7 to 7.5 million, for '58 to be the same.

FCC Actions

Amends its rules to permit class C stations in the Citizens Radio Service to use gear that will send out a tone that will page people to call their offices.

Clarifies its intention to have the Common Carrier Bureau act on applications by carriers on leased lines or facilities that involve annual rentals of less than \$100,000.

Grants special authorization to Arthur Godfrey to operate radio equipment for broadcasts flying to, flying over and flying from French Equatorial Africa. CBS will pick up the programs to broadcast.

Authorizes holders of aircraft radio station licenses to communicate with U. S. Air Force radar advisory facilities for the remainder of their license terms without first obtaining modification to add frequency 133.20 mc. This is to allow aircraft in the air to be advised of storm areas observed by defense radar facilities.

Extends for one year CBS permission to send tv programs across the Canadian border to stations CBF, Montreal; CKLW-TV, Windsor, Ontario; and CBLT, Toronto.

Grants tv construction permit to Public Service Television (subsidiary of National Airlines) for channel 10 in Miami, Fla.

STATION moves and plans

WINT, Fort Wayne, Ind., is preparing to begin building a new home for studios and offices. Station is prepared to spend \$360,000.

KWG, Stockton, Calif., becomes affiliated with the Don Lee Radio Network. Affiliation with ABC is retained.

WTMJ-TV, Milwaukee, Wis., completes its remodeling and enlarging plans. Final step was addition of a third color camera, which has been put into operation.

WOR, New York, N. Y., is celebrating its 35th anniversary.

WGAL-TV, Lancaster, Pa., is opening its new tv center. Containing 54,841 square feet, it is fully



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WSYE-TV, Elmira, N. Y., is building a private tv intercity relay system for off-the-air pickups of mother station WSYR-TV, Syracuse.

KLAS-TV, Las Vegas, Nev., ownership is now vested in Herman Greenspan. He increased his share of the station from 56.6 percent to 67.5 percent for \$320,000.

KIXX, Provo, Utah, is installing a new transmitter.

KVOC, Casper, Wyoming, is changing antenna-transmitter location. Transmitter will be operated by remote control.

WBBC and WKMF, competitors in Flint, Mich., have joined forces to broadcast a binaural program.

NBC estimates that on Jan. 1 there were 257 tv stations equipped to telecast in color. According to the network, 136 were affiliates.

WMCW and WMGW-FM, Meadville, Pa., were sold by Meadville Broadcasting Service to Regional Broadcasters for \$99,600.

WKST-TV, New Castle, Pa., will move its channel-45 transmitter from near New Castle to Youngstown, Ohio.

WBBM and WBBM-TV, Chicago, Ill., are moving from Wrigley building to new quarters completely rebuilt for their operation.

KXOK, St. Louis, Mo., is discontinuing affiliation with ABC and going independent.

WSOC-TV, Charlotte, N. C., expects to begin operation the end of this month, will be affiliated with NBC. Its sister radio station WSOC has been an NBC affiliate for 23 years.

WKNK, Muskegon, Mich., is being bought by Music Broadcasting. Scler is Nicholas Kuris Co. Music Broadcasting owns WGRD in Grand Rapids, Mich.

WGLL, Coning, N. Y., is celebrating its tenth anniversary.



INSTRUMENT and synchro plant nestles in wooded rolling hills near Black Mountain as . . .

CAROLINA catches up

- Adds \$75 million in payrolls
- Residents unskilled but eager to learn
- Western, GE each build four factories

NORTH CAROLINA is basking in an electronics and electrical equipment boom that has added \$75 million to payrolls—even though the state's supply of skilled labor is limited.

Employment in our industry rose from 66 prewar to 5,000 in 1947 and 22,000 in 40 plants in 1954.

Firms have overcome the skilled labor shortage by on-the-job training. State agencies point to a labor pool of 200,000.

A number of firms have built more than one plant: Western Electric and GE, four each; National Carbon, three; Westinghouse, Cornell-Dubilier and International Resistance, two. Electronics firms with one plant include Sprague, Hammarlund, Kearfott, Sampson, Pyramid and Douglas Aircraft.

One reason why Kearfott selected Black Mountain, N. C. for its motor and synchro plant was that the supply of trainable labor was good although Black Mountain is not an industrial area. GE's new \$20-million transformer plant in Hickory will hire 98 percent of its 1,200 employees locally. Training of foremen and specialists began a year before the plant opened, by a cadre of about 30 "imported" personnel.

Portuguese link to use TWT's

TRAVELING-wave tubes will be used for ultrahigh frequency amplification in a radiotelephone link for Portugal.

The Anglo-Portuguese Telephone Co. has contracted for a complete uhf wide-band f-m installation to span the river Tagus from Lisbon on the northern bank to Montijo, about nine miles to the south.

Automatic Telephone and Electric was awarded the contract and will supply carrier equipment for the two terminal points. Marconi will supply the radio equipment.

The radio gear uses three new traveling-wave tubes.

The link will carry 60 radiotelephone channels initially and will ultimately provide 240 circuits.

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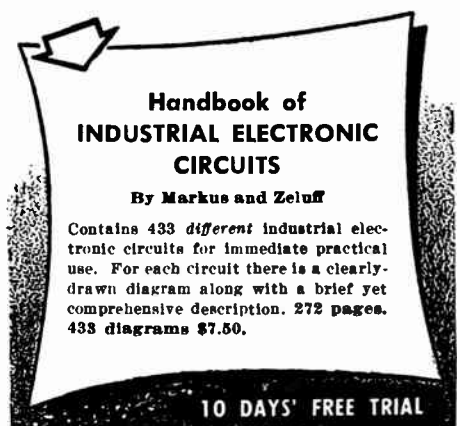
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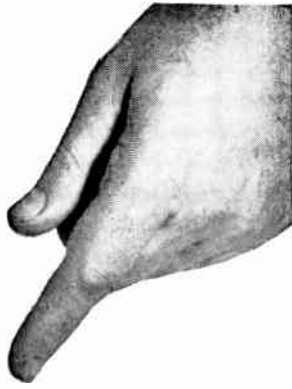
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PLASTICS fabricator needs his r-f welder, but . . .

FCC weighs r-f heater rules

- Dielectric heater sales run 850-1,000
- Plastic fabricators take most
- Spurious radiation a major problem

RADIO-FREQUENCY dielectric heating is important to plastics fabricators who use it for welding, cutting and preform heating. However, spurious radiation from the units is a serious problem to communications. FCC requires that users operate entirely within the industrial-scientific medical bands or screen their units to prevent radiation. Engineering certification is required. Dielectric heater users are in trouble. Operation on fixed frequency is considered impractical and some users won't comply with equipment screening requirements. These users give the trade a black eye.

The FCC has been cracking down and rule 18, which governs the heaters, is up for reconsideration. Some suggested changes which could be costly to users are specially filtered power supplies, completely screened workrooms and periodic recertification even after engineering tests. A users society complains that the tests alone would cost more than the machines.

An estimated 850 or more dielectric heaters are sold annually, at prices ranging from \$1,000 to \$75,000. The average is around \$3,000. One manufacturer says cost per kilowatt is \$400 to \$600, with electronic components representing 40 percent.

One company with 1956 sales of \$1.25 million reports 500 to 600 heaters are sold each year to plastics fabricators.

MANAGEMENT draws engineers

ENGINEERING management sessions at last month's IRE convention in New York drew 1,200 listeners for each session.

Large turnout shows engineers realize it is no longer possible to manage "flying by the seat of your pants," says president Hector N. Skifter of Airborne Instruments Lab.

C. W. Randle partner of Booz,

Allen and Hamilton says surveys show one out of three engineers wants to become a manager.

According to O. C. Roehl, vice president of Keystone Custodial Funds, good management adds 25 percent to the investment value of a company. Superior management adds 30 percent.

The electronics investor is particularly interested in the quality of

a company's engineering staff and management's attitude towards engineering and research.

E. Shapiro, associate dean of MIT's School of Industrial Management, says successful management must understand science and engineering. The engineer trained in scientific disciplines with a knowledge of organizing men, machines and money will reap big rewards.

An engineer can find adequate rewards following either the management path or the science path says E. I. Greene, vice president of Bell Labs.

Trouble develops when the engineer tries to follow both paths at the same time. Greene urges engineers wanting to pursue management to give up dreams of individual scientific achievement in favor of achievement by the group.

W. J. E. Crissy president of Personnel Development, discussing delegating authority, says responsibility rests ultimately with the head of the business and cannot be delegated. However, every manager must delegate part of his authority for the business to function. Management's ideal should be that every one at every level have sufficient authority to carry out his responsibilities.

Canada's ENGINEERS flock to U.S.

ONE-THIRD to one-half of Canada's engineers come to the United States to work. So says John T. Henderson of Canada, new IRE president.

"The migration isn't a total loss to Canada," says Henderson, "because we get much goodwill in return." Canada also gets engineers from Europe and Great Britain.

Salary differences between the U.S. and Canada aren't too marked. But there are fewer openings for engineers in Canada.

Speaking about commercial research laboratories in his country, Henderson says: "Small ones are just starting to grow. It may be 10 or 20 years before they play a major role in Canadian electronics. The government is now the leader in the field."



Edited by DON FINK

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TRANSISTORS

HANDBOOK OF SEMICONDUCTOR ELECTRONICS

Edited by LLOYD P. HUNTER

Senior Physicist, International Business Machines Corporation, Poughkeepsie, N. Y. 604 pages, 6 x 9, 481 illustrations, \$12.00

This book gives you a rounded view of semiconductor devices—all the help you need to prepare for practical circuit design and engineering of applications utilizing transistors, diodes, or photocells. Emphasis is on actual circuit design. The extensive section on this subject covers the use of semiconductor devices in band-pass and video amplifiers, computers, measuring instruments, industrial control equipment, oscillators, etc. In addition, theory of semiconductor devices, important aspects of how they are made, and background of analysis and measurement is given, to provide engineers with an intensive one-volume treatment of this growing new field.

CONTROL CIRCUITS

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FLA-10

WEST GERMAN output spurts

- Value up 1,240% in decade
- Exports well over \$100 million
- New products on the way

WEST GERMANY'S electronics industry has spurred 1,240 percent in 10 years, and automation, radar and communications markets are waving it on.

Production rose from \$54.2 million in 1947 to \$675.7 million in 1956. The production index, starting with 100 for the 1950 base year, now stands at 440.

Exports reached \$119 million in 1955, of which \$69 million was for radio equipment. West Germany is exporting to all major European nations, Asia, Africa and the U. S.

Specialties, like electron microscopes, are selling surprisingly well on the U. S. market.

The last decade has been a period of catching up with scientific developments abroad. Scientists are now working independently in many areas.

A U. S. electronics manufacturer, who recently visited West German companies, declared: "The Germans are doing as good, or better, than anything I have seen in the U. S."

If research moves ahead in its present direction and at its current fast clip, it is probable that West Germany will soon contribute heavily in such fields as radar, microwave tubes, computers and automation.

About a dozen firms account for more than 50 percent of electronics equipment. 72 percent of all plants employ more than 500 persons, 15 percent have 50-500 employees, 13 percent have 50 or less. About 125,000 persons are engaged in electronics.

The federal government, through its post ministry and radio stations, supports its own laboratories and, to some extent, aids industry by placing research contracts. There is no government control of the industry, however.

Two problems face the industry: a shortage of capital which makes it necessary to finance research and development out of current earnings, and a shortage of university-trained technical manpower.

Developments ABROAD

In Canada a large analog computer laboratory was recently opened by Computing Devices of Canada Ltd. at Bells Corners, near Ottawa. It is available on a rental basis to government and industrial users. The center uses REAC computers custom-built for CDC by Reeves Instrument.

Spain now has 21 hours of noncommercial tv a week in Madrid. Regular broadcasts are expected to continue experimentally with another station probably to be located in Barcelona. Experimental tv began five years ago, was discontinued in 1954 and resumed last October. Spain has so far produced about 600 sets. One Madrid newspaper's estimate of potential demand: 160,000 sets.

Holland's Laboratorium voor Electronics PEEKEL has devised an audiometer with a continuously varying pitch to examine the whole range of hearing. Signal level is in direct linear correspondence with normal threshold hearing sensitivity. Rapid hearing tests of school children are possible with results recorded on a chart. The device is said to detect incipient hearing defects at an early stage.

In West Germany Grundig-Radiowerke, GmbH has acquired Triumph-Werke AG. Two-thirds of the output of the latter has been typewriters and accounting machines and 40 percent of production was exported. Grundig's electronic instruments are expected to enlarge this production. In 1956 Grundig sales amounted to \$48 million. Exports accounted for more than half of production.

EXPORTS and IMPORTS

In Britain tv set sales totaled 112,000 in January, up 32 percent from a year ago. Similarly, radio phonographs and radios were up 50 percent and 27 percent. Sales were down, however, from the 1956 high month of December.

France's Societe Intertechnique and G-V Controls of East Orange, N. J. have negotiated license agreement for manufacture and sale of G-V's products in Europe. French firm will produce and market thermal time-delay relays, thermal current and voltage-sensing relays and hermetically sealed electrical thermostats.

In Bulawayo, Southern Rhodesia, Chassay Bros. estimates tube imports will rise to 400,000 this year. The firm, which imported 300,000 last year, produced radio sets for the Federation of Rhodesia and Nyasaland. Products made or planned include automobile radios,

portables and phonographs. Some radio sets may use transistors.

In Germany, Telefunken GmbH is entering the electronic computer field. First analog computer will be marketed in about a year.

Sudan has placed an order with Marconi for transmitters and studio equipment for a new broadcasting station being constructed near Khartoum. Because of heat and high dust content in the air, the transmitting rooms will require special air cleaning and cooling equipment.

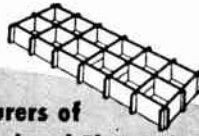
In England, Mullard's new Southampton plant has begun transistor and other semiconductor production, although its completion is still several months away. The firm is putting all its semiconductor work under a single roof, employs 1,200 persons. Mullard expects to produce two million semiconductor units by April 1958.

In Caracas, Venezuela, an electronic data-processing center is opened by IBM World Trade Corp. Heart of the new center is an IBM 650 magnetic-drum data-processing unit. The center is the company's fourth outside the U. S. Other Latin American centers are planned in Rio de Janeiro and Buenos Aires.

In England Holland-America Lines transatlantic liners are being equipped with f-m vhf radiotelephones for harbor control and short-distance communications. Marconi is supplying the six-channel equipment.

Republic of Korea is establishing a complete government-owned radio network. Gates Radio, Quincy, Ill., has supplied two 5,000-watt and two 1,000-watt a-m transmitting installations; an f-m broadcast and program relay system with 20 transmitters; two mobile stations for both standard and shortwave broadcast; and studio recording and record-pressing equipment.

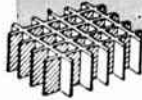
In India Collins Radio will make aviation and communications equipment in collaboration with New Delhi's \$1-million Electronics Ltd.



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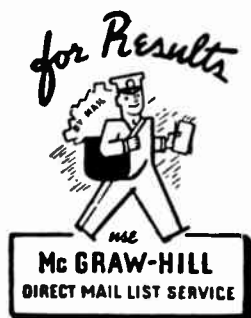
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PLANTS and PEOPLE



SOLAR energy, converted to electricity and amplified by transistors, fires dynamite at TI groundbreaking. Operators: board chairman McDermott and president Jonsson

New TI plant blasts off

MUSHROOMING Texas Instruments put its semiconductor products to work at recent ceremonies breaking ground for \$4-million semiconductor plant in Dallas. A solar converter produced current which, stepped up by a transistor amplifier, fired dynamite to blast loose the first batch of ground.

The ultramodern 280,000-sq ft plant will provide elbow room for

TI's growing semiconductor activities. Space vacated at the main Dallas plant will give the company's apparatus division room for more growth.

TI's industrial instrumentation division in Houston meanwhile is entering into a patent agreement with Century Electronics, Tulsa, Okla., and the Haloid Co., Rochester, N. Y., for manufacture and sale of xerographic oscillographs.

Business MEETINGS

Apr. 27-May 2: Scientific Apparatus Makers Association 39th Annual Meeting, Greenbrier, White Sulphur Springs, Va.

May 9-10: Conference on Managerial Controls, on the campus of Illinois Institute of Technology, Chicago, Ill.

May 20-23: 1957 Electronics Parts Distributors Show, Conrad-Hilton, Chicago.

MALLORY forms battery subsidiary

IN A MOVE aimed at streamlining its operations in the battery business, P. R. Mallory, Indianapolis component maker, has formed the Mallory Battery Co., Cleveland, Ohio. All operations of the company's four battery plants and its research facilities in battery technology are integrated in the new division.

Fielder Israel is president of the new company, with Carl Rudiger serving as vice-president. Mallory hopes to simplify sales, distribution

and warehousing problems through the move.

FRIDEN grows west

GETTING deeper into the computer field, Friden Calculating Machine Co., San Leandro, Calif., is building a new sales and service office in San Francisco. New 6,000-sq ft facility will be finished in June.

Oakland operations of Friden and its computermaking arm are already consolidated. Head of the San Francisco district is Sven von Heineken. Jack A. Sexson heads the Oakland district.

RCA goes to White Sands

MOVING CLOSER to its work in missile electronics, RCA's defense electronic products division is setting up a missile electronics engineering facility at White Sands Proving Grounds. Leslie A. Skinner, former Army missileman who won the Legion of Merit for his work on the "Bazooka" rocket launcher, heads the new facility. The group will work under the company's missile and surface radar department, Moorestown, N. J.

CBS shuffles execs

AS THE NETWORKS scramble for position, CBS-television is undergoing a shakeup in its executive staff.

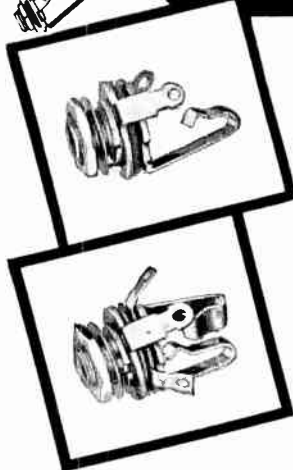
William B. Hylan, former vice-president for network sales, moves up to the job of v-p for sales administration, and network sales manager Thomas Dawson slips into Hylan's old shoes.

William B. Lodge, since 1948 vice-president for general engineering, takes on new responsibilities and new title of v-p for station relations and engineering. Edward P. Shurick, former manager of network sales development, is new vice-president for station relations, reporting to Lodge.

Jay Eliasberg, who has been acting as director of research for the tv network since late last fall, finally got the title to go with the job as Hylan appointed him director of research.

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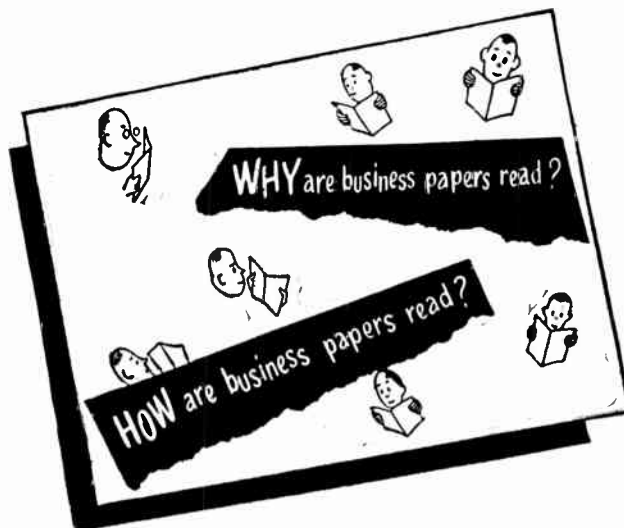
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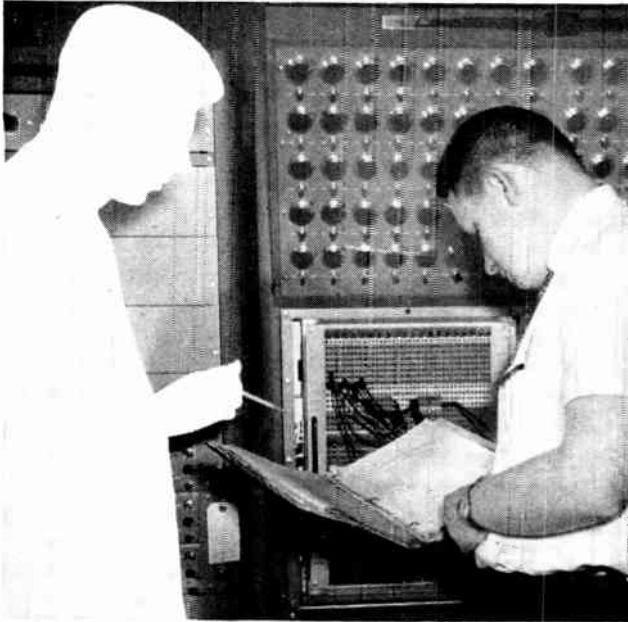
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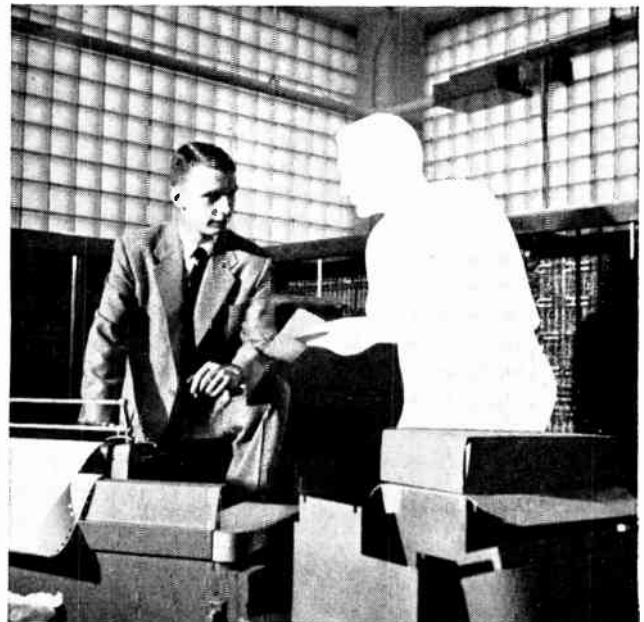
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IBM GROWTH promoted these men



Research Engineer: Before his recent promotion, this man was a member of a small research team comprising three E.E.'s and a technician. His specific project entailed the creation of a transistorized electronic converter combining both digital and analog circuitry. "Research is really on the move at IBM," he says. "Personnel has increased ten-fold since 1950 and we expect to maintain this pace for some time."



Manufacturing Engineer: Also promoted recently, this man worked in one of IBM's many manufacturing plants. He was responsible for the analysis, design and procurement of equipment and facilities to produce the giant IBM electronic computers. "In a field as new as electronic computers," he'll tell you, "unique manufacturing equipment is often imperative. Creating this new equipment is a real challenge to an engineer's ingenuity."

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REPS push components

A BATCH of new rep agreements covering basic components is a fair index to growing component business.

Todd-Tran Corp., manufacturer of tv transformers and yokes, has a new jobber rep in Rod Butchart, Detroit, and four industry reps across the country: Massey Associates, Narberth, Pa., and Washington, D. C.; Charles Segal, Boston; Harrison J. Blind, Indianapolis, and John C. Hanner, Garner, N. C.

Milwaukee Resistor has two new reps in the South and West: Hiller Sales, Winston-Salem, N. C. and A. J. Nelson of Denver, Colo.

Ace Electronics now merchandises its component line in New England through Richard Purinton, Boston; and Astron Corp.'s line of capacitors and filters has a new rep in the South as Paul Hayden, East Point, Ga., gets the appointment.

Brimberg Associates, Washington, D. C., now represents Servo

Corp.'s line of control, test and communications equipment.

Melrose, Mass., rep Richard F. MacDowell handles amplifiers made by Instruments for Industry in New England.

Philco's rep network for its paging and its equipment grows as Boston rep firm Exec-U-Phone Systems starts handling the lines in New England.

Components Corp., Denville, N. J., adds three reps for its hi-fi gear: Frank B. Koessler Sales, Los Angeles; Charles Lucas Sales, Dallas, and Arthur H. Peterson, Chicago.

GE's wire and cable department in Oakland, Calif., now distributes its magnet wire, portable cords and aircraft cable through Eichorn & Melchior Inc., San Francisco.

Chief Electronics, Poughkeepsie, N. Y., distributes the imported hi-fi equipment of Vidcola-Erie Corp., Brooklyn, N. Y.

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About our TECHNICAL edition . . .

(ALL ELECTRONICS subscribers receive two Business Editions and the Technical Edition each month.)

Survey of problems and achievements to date in producing components and subassemblies withstanding 500 C temperatures and nuclear radiation are reported by R. Bruce Kieburz of GE in our May 1 issue. Some components withstand nuclear radiation, shock and vibration as well as high temperature.

Circuits of transistorized transponder that provides echo to missile-tracking radars and activates missile fuel cutoff system are discussed along with operating characteristics by Cohen and Arany of Radio Receptor in the April 1 issue of ELECTRONICS.

Drag on small free-flight models in supersonic wind-tunnel tests can be measured by circular-sweep oscilloscope display that provides vernier readings for four counter circuits. Described by W. Kerwin of Ames Aeronautical Lab in our April 1 issue.

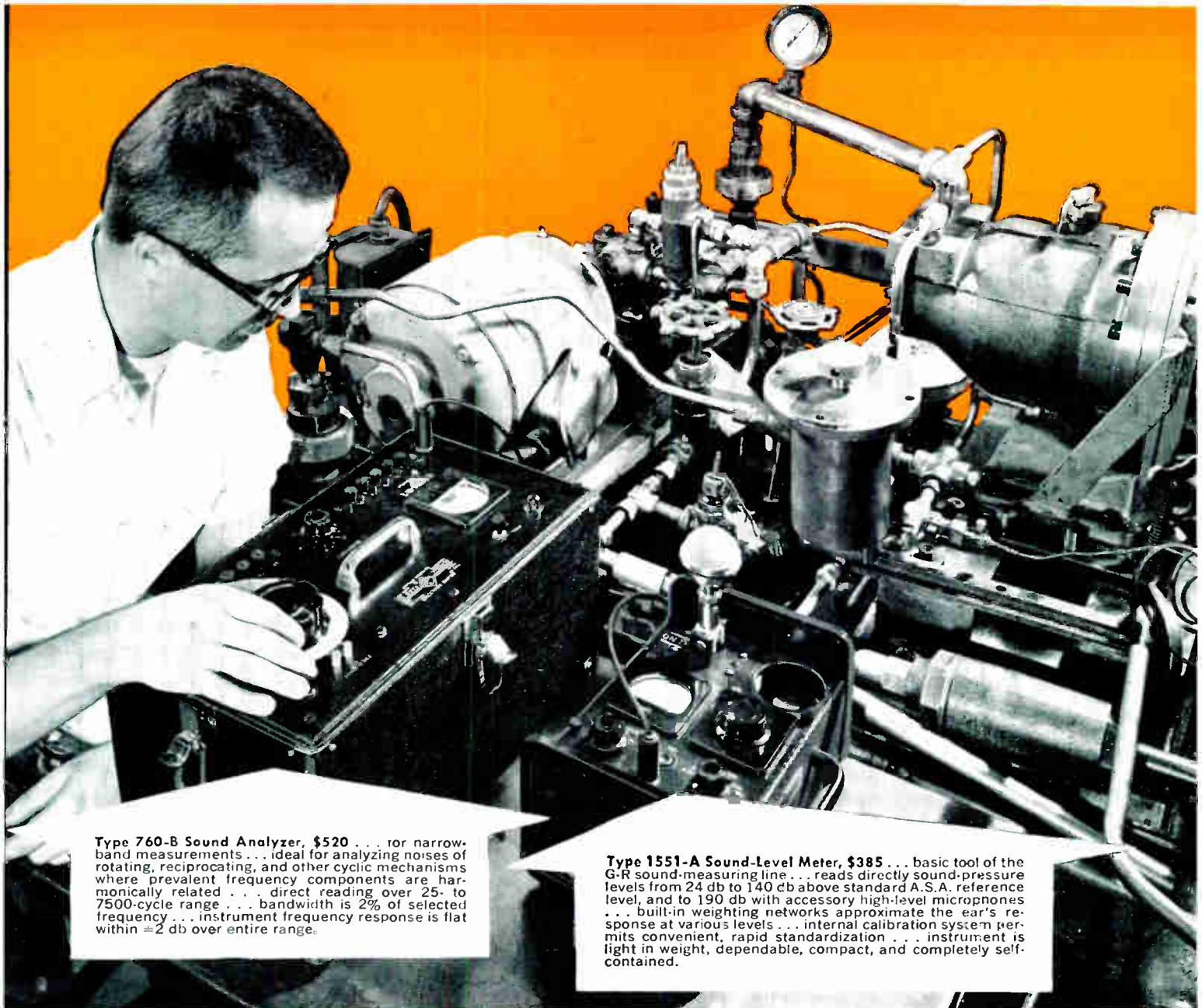
Counters combined with logic circuits automatically write a binary pattern on a magnetic-drum memory

in equipment designed by Strassman and King of Hughes Aircraft. As they explain in ELECTRONICS for April 1, the system can also be used with arithmetic units to aid or check computation procedures.

Effects of atmospheric radio noise on communications systems may be studied conveniently using a logarithmic amplifier in system that contains a modified communications receiver, probability computers, and other circuits. Described by J. D. Wells of U. of Florida in our April 1 issue.

Tetrajunction transistor simplifies receiver design according to Farber, Proudfit, St. John and Wilchusen of Hazeltine Research Corp. Device provides performance of two triode units with considerable reduction of circuit components in a superheterodyne receiver developed for GE in which four stages are replaced with two tetrajunction units. See ELECTRONICS for April 1.

THE EDITORS



Type 760-B Sound Analyzer, \$520 . . . for narrow-band measurements . . . ideal for analyzing noises of rotating, reciprocating, and other cyclic mechanisms where prevalent frequency components are harmonically related . . . direct reading over 25- to 7500-cycle range . . . bandwidth is 2% of selected frequency . . . instrument frequency response is flat within ± 2 db over entire range.

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The importance of noise control is becoming increasingly recognized. At The Oilgear Company, fluid-power pumps, motors, transmissions, and accessory products must meet definite performance standards where noise levels are concerned. While these specifications are set forth increasingly by customers themselves, this is to a degree unnecessary — every unit produced is tested, regardless, for conformance to minimum noise level standards. Management well understands that noise is one more important criterion determin-

ing the market position of their product.

At the Oilgear laboratories, the General Radio Sound Analyzer is used in conjunction with the G-R Sound-Level Meter. Here, sound-level data vs. fluid-power pump load and stroke help establish safe operating limits. Studies determine the relationship between discrete frequencies and the various pump components. Information obtained through analysis of the frequency spectrum not only aids in designing better products, but eventually serves as a useful guide in the trouble shooting of pumping equipment malfunctions.

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...make millionths of a second stand still!

To extend the usefulness of electronic data processing... in industry... business... research... medicine, RCA announces new spectacular tools for technological progress—a remarkable group of “storage” tubes that can “remember” electronic data... slow it down... translate it... or display it.

Take the RCA-6866 tube for example. Used today in airborne radar, this unique device transposes electronic information into brilliant pictures you can see in bright daylight. It can display data in line or half-tone form. It captures fixed or slow-moving subjects with equal clarity—“freezes” millionth-second pulses for study as long as a minute. Visualize what your electronics engineers can accomplish with a tube like this in the design of equipment—to transmit written information electronically from point to point—to reproduce signatures, charts, ticket data, reservations, sales orders via regular telephone-type lines—to help ana-

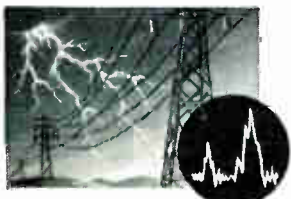
lyze transient phenomena taking place at super speeds.

And there are other RCA storage tubes to excite the imagination of engineers. One such tube, the Radechon, can take electronic data occurring at phenomenal speeds... store it... then extract any part of it at the same or different speeds. Another tube, the Graphechon, translates electronic information for reproduction on TV screens wherever wanted. Already, Radechons and Graphechons are working miracles in data processing.

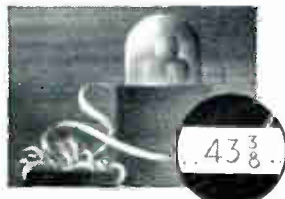
Today, RCA is engaged in an extensive storage-tube development program that holds promise of revolutionizing the industry by electronics. If you see a place for application of these new tubes in your future business, write RCA Commercial Engineering, Section D19Q2, Harrison, N. J.



ELECTRON TUBES FOR INDUSTRY
RADIO CORPORATION OF AMERICA, HARRISON, N. J.



Freezing transients—in electrical observation



Reproduced images of signatures, tickets, charts—transmitted via wire World Radio History



Brilliant cockpit display of data—for improved aircraft navigation



Making time stand still—for medical research