

APRIL 18, 1958

electronics

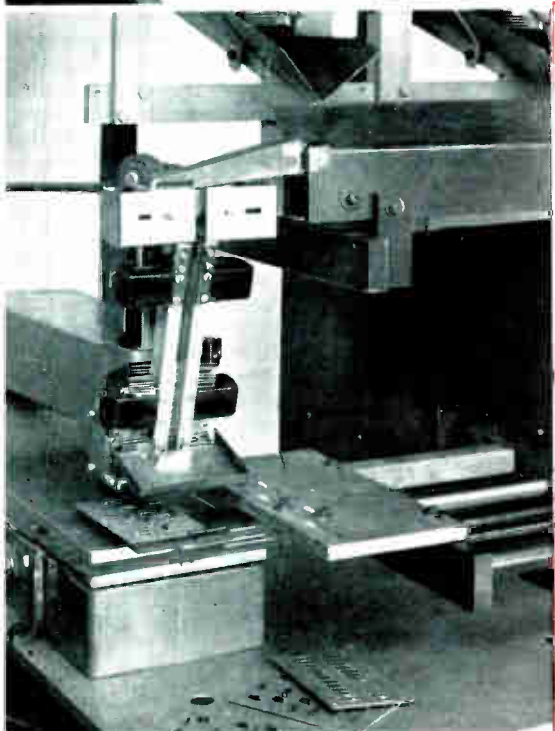
business edition

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Electronics Stars at Brussels Fair

History text stored in computer is a
feature of one U. S. pavilion p 13



New Automatic Assembly Trend?

Single-station machines fit some
manufacturers' specific needs p 18

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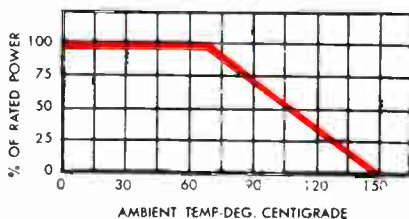
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Shoptalk . . .

IS RADAR HAZARD TO LIFE? Last year the nation was shocked by the death of a technician which was attributed to effects of microwave radiation. Investigation, however, revealed ambiguity in reports of the case, casting doubt on the original diagnosis.

Investigation also revealed that nobody really knew what effects microwave radiation might have on body tissue but that several groups were trying to find out.

Defense Dept. studies are coordinated by Col. George Knauf, surgeon at Griffiss Air Force Base. to find out what the armed services have found out about the pathological effects of radar and what safety precautions are being taken, Associate Editor Leary flew to Rome, N. Y. and interviewed Col. Knauf. His story is on p 15.

OWN HOUSE IN ORDER. Electronic equipment manufacturers are enthusiastic rooters for automation in other industries—aircraft, autos, chemicals, railroading and warehousing to mention a few.

What are electronic manufacturers doing about running their own plants automatically?

It turns out they are doing quite a lot. Associate Editor Sideris button-holed machinery manufacturers selling automatic production equipment to electronics firms. Then he touched base with men who run electronics assembly lines and men who make hardware and components for our industry. The result was a collection of handy rules of thumb that the electronics manufacturer can use in planning automatic assembly operations. See p 18.

WE GO TO THE FAIR. Last week a State Dept. official told assembled electronics industry representatives that the government is relying heavily on our industry to tell the U. S. story abroad. Our first big chance comes this week in Brussels, Belgium where the World's Fair gets under way April 17.

Rumors that Russia is outspending the U.S. are false, say Belgian spokesmen. And our spending represents private outlays, not all government money.

Electronic firms will be showing computers, atomic reactor control, electronic highways, airborne systems. Associate Editor Emma's detailed rundown begins on p 13.

Coming in Our April 25 Issue . . .

Coming in Our April 25 Issue . . .

● **IRE Report.** ELECTRONICS' editors were out in force at the recent IRE convention, and their detailed report on the technical sessions will keep engineers abreast of latest developments in electronics. Ten editors attended, in pairs, each of the most important lectures, and while one took notes the other snapped photos of key diagrams and drawings. During convention week over 250 photographs were quickly processed and editors' notes were collated. An article was then written giving in capsule form the latest news in military electronics; masers; beam, display and microwave tubes; medical instrumentation; computers; and general systems.

● **Foetal meter.** A transistorized unit that detects foetal heart sounds is described by T. I. Humphreys of Packard-Bell. A 2 to 3-cps signal from the foetal heart is amplified and then modulates a transistor oscillator operating between 800 and 1,200 cps. Frequency modulation technique overcomes poor low-frequency response of the human ear and loudspeakers. When used with a suitable recorder the device has additional applications in phonocardiography.

● **Maser Amplifier.** Every so often, a development in our field stands apart because of its basically different approach to a problem. Such is the case with the maser.

Impressed by the maser's potentialities, Managing Editor Carroll and New England Editor Maguire visited MIT's Lincoln Labs to view first hand the maser work of J. W. Meyer and his colleagues. They prevailed upon the busy doctor to prepare an article on the history, system philosophy and performance of masers. Meyer goes into both the two-level molecular maser and the three-level solid state maser. He describes recent experiments, amplifier and oscillator characteristics, noise measurements and applications.

● **Shrinking Antenna Systems.** A procedure that predicts the approximate radiation pattern for ferrite elements in a microwave antenna system uses a random-balance technique. Results show that directivity property of ferrite elements permit ferrite arrays to provide half-power beam widths and side-lobe characteristics equal to those obtained with large conventional antenna systems. Gain of these ferrite arrays according to author H. C. Hanks, Jr. of Martin generally exceeds that of parabolic reflectors.

electronics business edition

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ISSUE AT A GLANCE

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- Failures Drop in '57. Number of radio-tv-electronics firms closing fell 10 percent in number, 17 percent in amount of liabilities during 1957... p 5
- Shares and Prices. Typical Missile Production Contractors..... p 5
- Plan New Space Agency. The White House wants to lump control of space research, with all its extensive electronics needs, under a new civilian agency. Upcoming question: Will Congress go along?..... p 5
- Mergers, Acquisitions and Finance..... p 6
- Figures of the Week..... p 6
- Washington Outlook p 8
- Executives in the News. Parsons of Globe-Union's Centralab div..... p 10
- Comment p 10
- Electronics Stars at Fair. Twenty percent of all U.S. firms that went on display in Brussels yesterday are in our industry—and they're giving representatives of nations the world over a glimpse of the future... p 13
- Production and Sales. Factory Sales Hit \$7.6 Billion Last Year..... p 14
- Radar Radiation Hazards. USAF coordinates research program seeking facts about damage by microwave radiation to human tissues. Here's key information on a story due to 'break' about 12 months from now... p 15
- OTC Market Vital To Us. Over-the-counter market is a mechanism for building interest in electronics stocks. Many firms now traded on the big exchanges got their public start there. Dealer trading system fits needs of small firms..... p 16

DIGEST CONTINUED ON NEXT PAGE

DIGEST continued

Automation Emerging Slowly. Many manufacturers of specialized electronic equipment cling to hand assembly. A few are taking the first step to mechanization: single-station, semiautomatic machinery which complements hand assembly.....p 18

Twenty-One Megawatt Microwave.....p 19

Engineering Reportp 21
 Homemade Digitals on Upgrade Zeta's Torus Gets Checked
 Technical Digest Portable Seismograph Aids Civil Engineers
 Electronic Unit Boosts Radar Echo Meetings Ahead

Components and Materials.....p 24
 Glassed Transistors Ripples Hasten Dip Soldering
 Aluminum Takes Two-cent Tumble Plastics Plant

Moon Push Underway. Space agency requests \$180 million for fiscal '59. Industry is already feeling effects of the program.....p 26

Military Electronicsp 26

Contracts Awardedp 26

New Productsp 28

Literature of the Week.....p 34

Red China Readies Tv Gear. Peiping's first tv transmitter has been completed with Soviet aid while another is slated for Canton.....p 36

Developments Abroadp 36

Exports and Imports.....p 36

Plants and People.....p 38

News of Reps.....p 40

electronics

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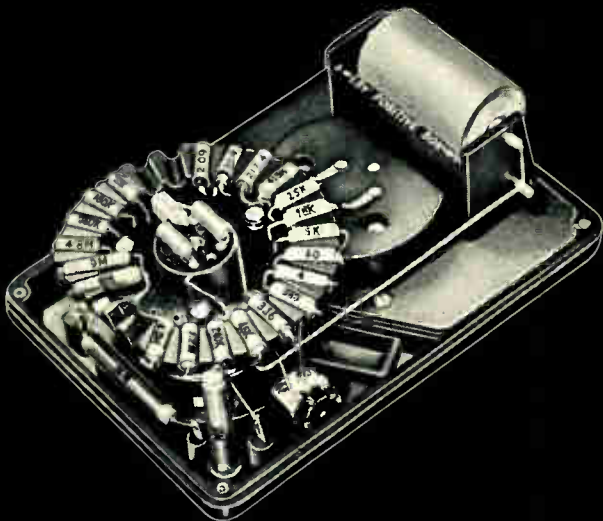
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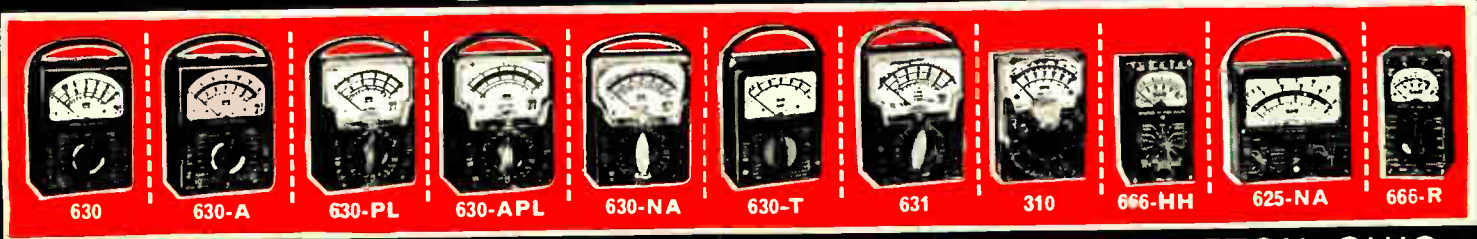


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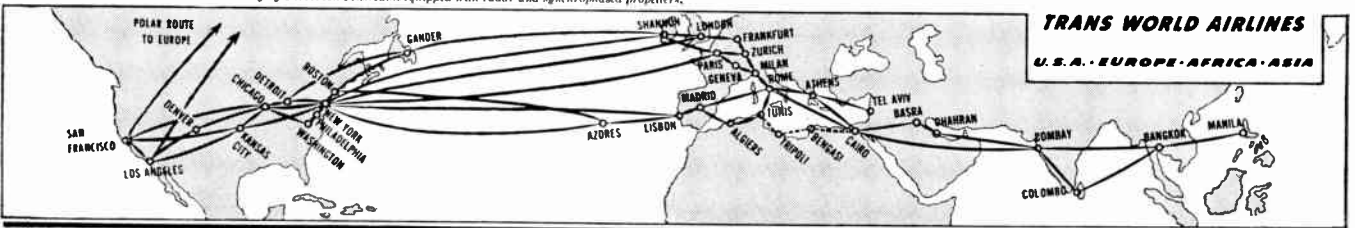
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Failures Drop In '57

Radio-tv-electronics firm closings fall 10 percent in number and 17 percent in liability amount

ONCE AGAIN the electronics industry has shown itself capable of outperforming the rest of U. S. industry. Last year, when failures were increasing among all manufacturers in the nation, failures among electronics firms were decreasing.

Number of failures among radio, tv and electronics companies dropped 10 percent between 1956 and 1957, or from 50 to 45 firms, according to a study made for ELECTRONICS by Dun & Bradstreet. Amount of liabilities involved declined 17 percent, from \$9.4 million in 1956 to \$7.8 million in 1957. Group of firms used to measure electronics failures by the nationwide credit agency included about half of the firms in the industry.

Over the same two year period number of failures among all U. S. manufacturers increased from 2,285 to 2,411, or 3 percent. Amount of liabilities involved increased six percent, from \$191.2 million to \$196.8 million.

Principal apparent causes of failure, including both electronics and all manufacturers, were: inadequate sales—54 percent of all failures; competitive

weakness—17 percent; receivables difficulties—12 percent; excessive fixed assets—9 percent and heavy operating expenses—8 percent.

But, the major underlying causes of failure, informed creditors told Dun & Bradstreet, were: lack of experience in the line—11 percent; lack of managerial experience—15 percent, lack of business ability—50 percent and unbalanced experience—17 percent. Unbalanced experience means experience not well rounded in sales, finance, buying and production on part of an owner or top management.

Plan New Space Agency

IN THE NEXT FEW WEEKS Congress will decide if it will go along with the White House to lump control of space research, with all its extensive electronics needs, under a new civilian agency.

What the President wants is to create a new office—National Aeronautics and Space Agency—on the framework of the present National Advisory Committee for Aeronautics. The new agency would absorb all of the present NACA functions plus take on the job of handling space research.

To get the new agency underway, the administration has asked for some \$100 million in additional money for fiscal 1959, plus \$106 million previously requested for the NACA. Around \$7 million of the new money would go for 1,000 new employees—primarily engineers and scientists, and the balance for new facilities.

SHARES and PRICES

MISSILE manufacturers with production contracts have an immediate advantage over firms with only research and development contracts. Missile firm execs, who spoke last month at the New York Security Analysts' Scientific Industries Forum, pointed out that manu-

facturers can look for a final profit on production contracts of 7 to 9 percent. Final rate of return realized on R&D contracts rarely exceeds 5 to 6 percent. (Estimates allow for Renegotiation Board cuts.)

On the other hand, contractors who now have heavy commitments in R&D contracts, often for the more advanced missiles, may be the

big winners of production contracts in future years.

For example, a leading missile prime contractor said, "Earnings will be lower in 1958 than 1957 because of the larger percentage of R&D contracts. But earnings will pick up in 1959 and following years as the percentage of production to R&D grows."

Typical Missile Prime Contractors with Production Contracts	Recent Price	Indicated Dividend Rate	Percent Yield	Earned Per Common Share				1958 Price Range
				1957	Period	1956	Traded	
Bell (Rascal)	16¾	1.00	6.0	1.62	(year)	2.21	NYSE	14¾-18¼
Boeing (Bomarc)	37½	1.00 ¹	2.6	5.49	(year)	4.82	NYSE	34¾-41¾
Chance Vought (Regulus)	41½	1.60	3.9	5.65	(year)	3.81	NYSE	31½-42½
Douglas (Genie, Hercules)	56¼	2.00 ²	3.6	8.28	(year) ⁴	8.96	NYSE	55 -74½
Firestone (Corporal)	86	2.60 ¹	3.0	7.33	(year) ⁵	7.43	NYSE	83¾-92½
Northrop (Snark, LaCrosse)	22¾	1.60	7.0	3.62	(year) ⁶	3.28	2NYSE	2¼-24¾
Philco (Sidewinder)	16¼	....	....	1.00	(year)	0.01	NYSE	12¾-18½
Raytheon (Hawk, Sparrow III)	23½	....³	....	1.70	(year)	0.45 ⁷	NYSE	21½-24¾
Temco (Corvus)	11½	0.60 ²	5.3	1.50	(year)	1.35	NYSE	9¾-12¾

¹ plus stock ² plus extras ³ stock dividend ⁴ ending Nov. 30 ⁵ ending Jan. 31 ⁶ ending July 31 ⁷ ending May 31, 1956

MERGERS, ACQUISITIONS and FINANCE

• **American Electronics** of Los Angeles publicly sells \$4,620,000 of securities. The LA firm issued \$3,500,000 of 5½ percent convertible bonds and 80,000 shares of common priced at \$14 per share. The debentures are convertible into American Electronics common stock at ratio of one share for each \$15.40 of debentures held.

• **Smith-Corona and Marchant Calculators** of Oakland, Calif., announce merger plans subject to board of director and stockholder approval. Proposed agreement calls for Marchant shareholders to receive 1¼ shares of Smith-Corona in exchange for each share of Marchant. There are 851,969 Smith-Corona shares and 622,767 Marchant shares outstanding. Smith-Corona manufactures typewriters and other mechanical office equipment. Through its subsidiary, **Kleinschmidt Laboratories**, it produces printed communications

equipment. Marchant, manufacturer of calculating machines, has been developing electronic data processing equipment.

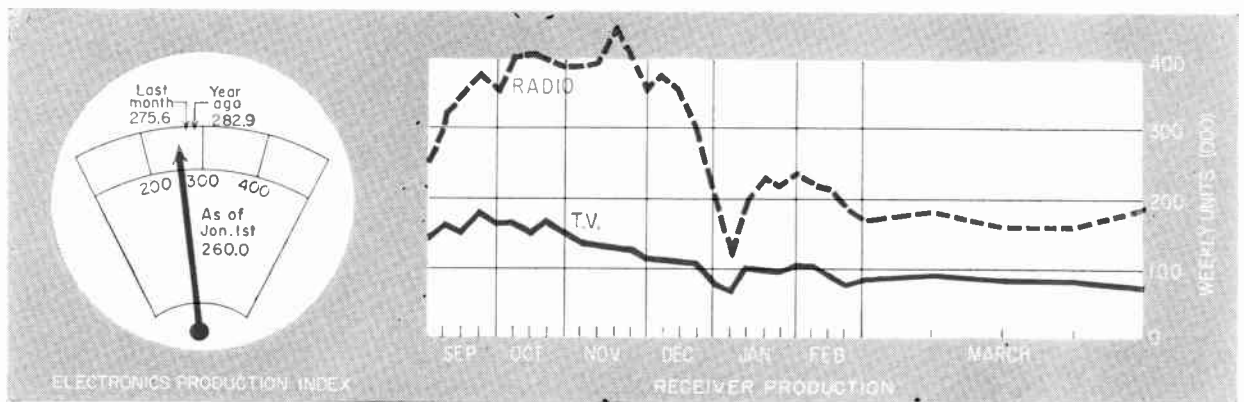
• **American Enka** acquires majority interest in **Rex Corp.**, of West Acton, Mass. Rex Corp. manufactures plastic covered wire and cable used in telecommunication and other electronic applications. American Enka, well-known rayon manufacturer, is the American subsidiary of A.K.U. (Algemeen Kunstzijde Unie) of Arnhem, The Netherlands. The acquisition is the first in the textile firm's previously announced diversification program. Rex will be operated as a subsidiary of American Enka and under its present management.

• **Raytheon** increases authorized common stock from four to five million shares. Increased number of authorized shares will be available if needed for stock dividends, acqui-

sitions and future financing. However, Raytheon management does not anticipate that additional equity financing will be required in 1958.

• **Douglas Aircraft** plans to issue \$60 million of sinking fund debentures, due April 1, 1978. Proceeds will be used to repay bank loans; to carry increased inventories required by reduction in progress payments and cost reimbursement percentages by the government; to enable firm to accept additional government projects; to advance its position in commercial aircraft field and for additions to properties and facilities. Merrill Lynch, Pierce, Fenner & Smith and Kuhn, Loeb & Co., both of New York will head group.

According to the preliminary prospectus, expenditures for plant and equipment in 1957 were \$30.8 million. This total was larger than in any previous year. Continued large, but somewhat reduced, plant expenditures are expected this year.



FIGURES OF THE WEEK

RECEIVER PRODUCTION

(Source: EIA)	Mar. 28, '58	Mar. 21, '58	Mar. 29, '57
Television sets, total	78,057	91,416	108,266
Radio sets, total	195,005	170,655	293,059
Auto sets	61,701	40,218	95,158

STOCK PRICE AVERAGES

(Source: Standard & Poor's)	Apr. 2, '58	Mar. 26, '58	Apr. 3, '57
Radio-TV & electronics	45.01	46.50	49.80
Radio broadcasters	57.01	58.52	67.91

FIGURES OF THE YEAR

	1958	1957	Percent Change
Receiving tube sales	26,805,000	37,571,000	- 28.6
Transistor production	2,955,247	1,436,000	+105.8
Cathode-ray tube sales	621,910	760,860	- 18.3
Television set production	433,983	450,190	- 3.6
Radio set production	1,026,527	1,085,529	- 5.4

LATEST MONTHLY FIGURES

EMPLOYMENT AND PAYROLLS

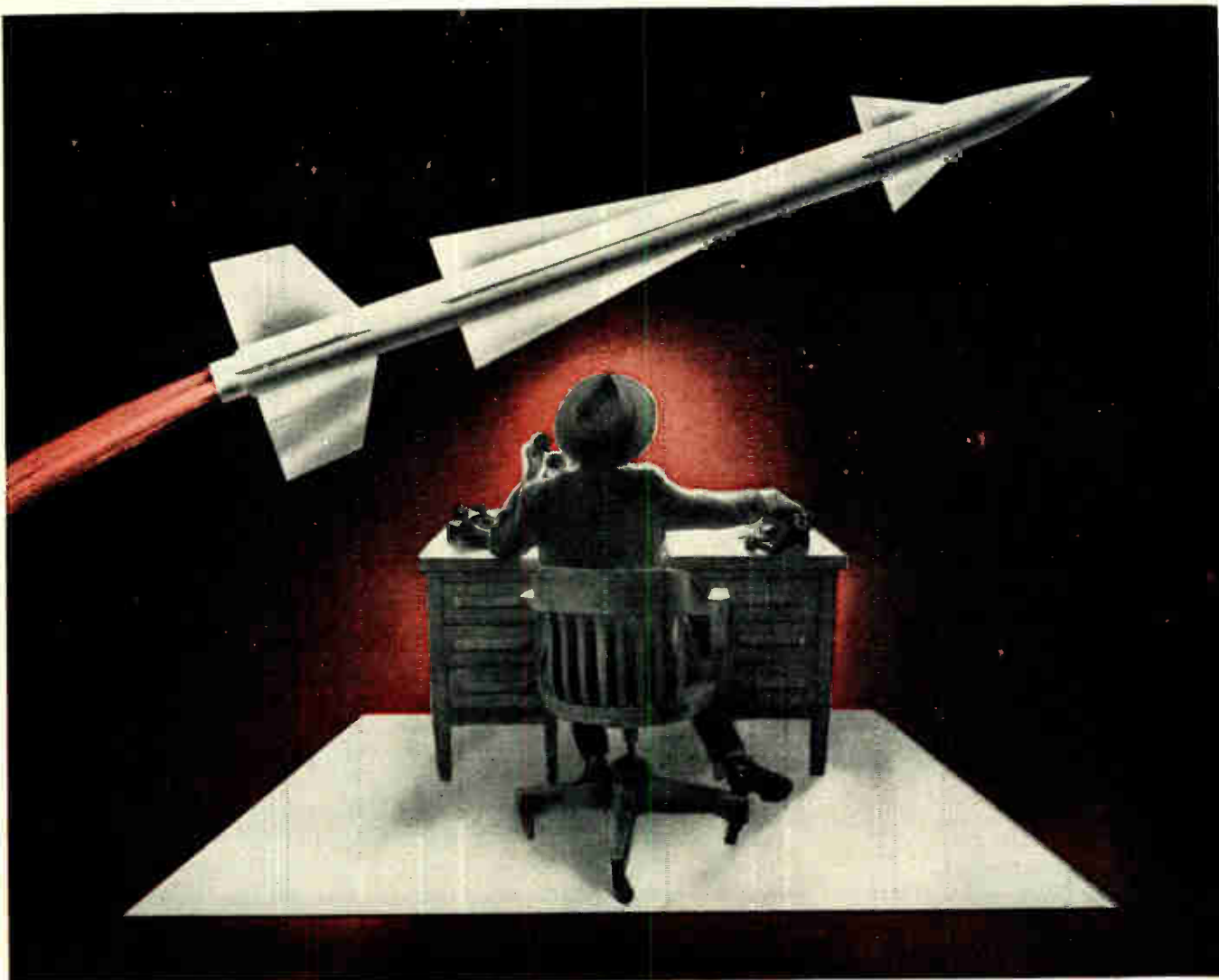
(Source: Bur. Labor Statistics)	Dec. '57	Nov. '57	Dec. '56
Prod. workers, comm. equip.	380,400	398,000	407,600
Av. wkly. earnings, comm.	\$78.40	\$77.22	\$79.15
Av. wkly. earnings, radio	\$76.64	\$75.08	\$75.95
Av. wkly. hours, comm.	39.2	39.0	40.8
Av. wkly. hours, radio	39.1	38.9	40.4

TRANSISTOR SALES

(Source: EIA)	Jan. '58	Dec. '57	Jan. '57
Unit sales	2,955,247	2,773,000	1,436,000
Value	\$6,704,383	\$6,619,000	\$4,119,000

TUBE SALES

(Source: EIA)	Jan. '58	Dec. '57	Jan. '57
Receiving tubes, units	26,805,000	27,736,000	37,571,000
Receiving tubes, value	\$23,264,000	\$24,881,000	\$31,170,000
Picture tubes, units	621,910	644,026	760,860
Picture tubes, value	\$12,341,927	\$12,971,489	\$13,594,525



Space Reporter at Work!

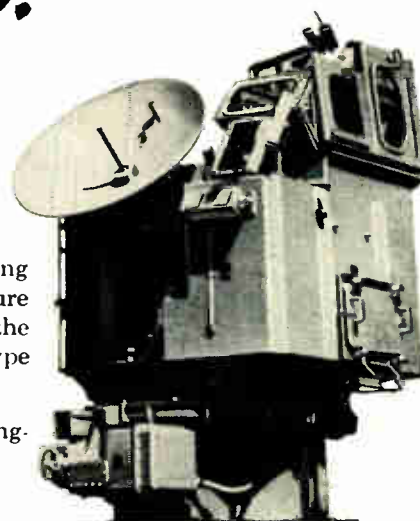
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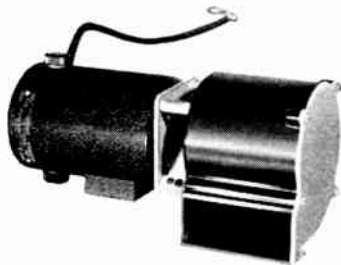
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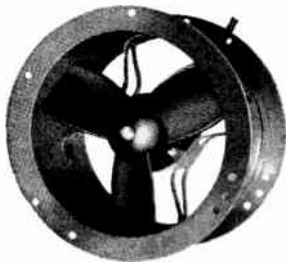
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WASHINGTON OUTLOOK

THE ADMINISTRATION'S \$1.6-billion supplemental defense appropriation request for fiscal 1959 earmarks extra money for electronic projects.

Items: \$100 million to the Navy's antisubmarine program and \$36 million for minimum instrumentation on the new Pacific Missile Range. Also, new plans to continue B-52 and KC-135 aircraft production and to accelerate the Titan ICBM, Polaris IRBM and Minuteman ICBM projects involve considerable sums for guidance, control, communications and other electronic gear.

- Pres. Eisenhower's proposal to overhaul the Pentagon could have far-reaching effects on military electronic producers. If put into effect as is, the President's defense reorganization scheme will revamp an important percentage of the planning and funding which now govern electronic research, development and vital production projects.
- Two provisions in the reorganization proposals would have the most impact on the electronics industry.

First, is one creating a Director of Defense Research and Engineering. In effect, he would be a weapon development czar, with powers to supervise directly—not simply coordinate—military R&D projects. On all R&D he would report only to the Secretary of Defense and would rank higher than the seven assistant secretaries of defense.

The new director would also be given control over military space and missile projects.

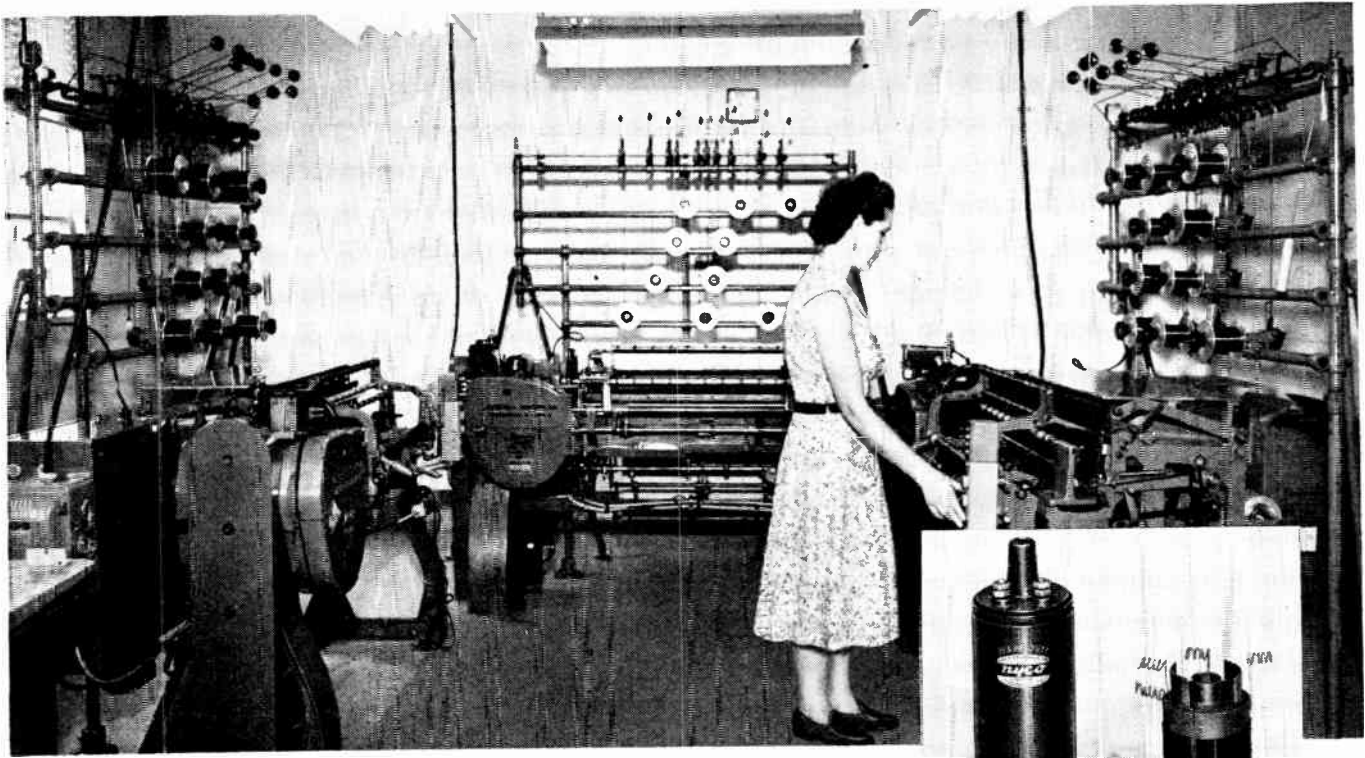
In effect, the new director would have the same type of wide-ranging powers over all military R&D work that Roy Jolnson of ARPA now has only over space projects. This includes authority to award contracts, seek direct congressional appropriations, farm out to existing military agencies the important administrative functions over certain projects, and in addition, plan research and development objectives.

While military electronic contractors might still deal with agencies like the Navy's Bureau of Aeronautics, the Army's Signal Corps and the Air Research & Development Command's field offices on administrative details, the big decisions to be made on such matters as contractor selection and project performance—two important areas—would no longer be in the hands of the individual armed services.

The proposal requires congressional approval, however, and it's questionable how far the Pentagon will be allowed to go in centralizing all R&D.

- The second provision of major importance to electronics contractors is one authorizing the Defense Secy. freely to transfer defense funds from one service or program to another.

While the Pentagon has the prerogative of preparing its budget as it sees fit—that is, requesting that the bulk of appropriations be made to the Defense Secy.—Congress is the final arbiter and can appropriate funds for specific projects and services if it feels inclined to do so.



Leesona No. 107 Coil Winder winds high quality ignition coils for New York Coil Company, Phoenixville, Pa., important parts and assembly suppliers to the automotive, electronics and TV industries. Although plant operates only on a 40-hour week, investment return per annum on the No. 107 is 40%. Inset shows Nyco automotive ignition coil, wound on these machines.

At New York Coil Co. — Leesona® No. 107 shows 40% Investment Return

Would it pay New York Coil Company, manufacturer of automotive ignition, electronic and TV parts and assemblies, to install Leesona No. 107 Coil Winders for producing ignition coils? It did!

The operator handles the three machines you see pictured. The machines wind 26,000 turn ignition coils of superior quality. The company is realizing a 40% annual return on its investment. J. R. Zikmund, president

of New York Coil, commenting on the company's experience in its newly expanded plant says, "We are paying for our new Leesona equipment out of savings being realized on current production output."

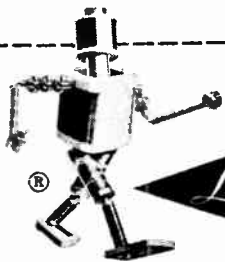
The Leesona No. 107 Machine has an automatic feed and is particularly suited to precision work at a high production rate. Sensitive "strap type" tension insures a smooth flow of fine wire. Insulation sheets are

automatically inserted. The traverse mechanism is readily adjustable. "Down time" and "Set-up time" are at a minimum.

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Mr. J. E. Jennings, President of Jennings Radio, explains the desirability of their Santa Clara County location this way:

"In our case, it was primarily the availability of good land for low cost single story construction that made this area so desirable. Of course, we are pleased with our location in Santa Clara County for other reasons, too. These include the variety of excellent service industries nearby and the highly skilled technical help which is so necessary in the manufacture of vacuum electronic components."

Statements from men like this are very significant. Talk with the people at Jennings. Then forecast your future in this liveable community at the southern tip of San Francisco Bay.

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10

EXECUTIVES IN THE NEWS



Parsons: parts in packages

TODAY'S burgeoning interest in automatic assembly fulfills an old prophecy of William S. Parsons, 53-year-old president of Globe-Union's Centralab division.

Fifteen years ago, looking at the mushrooming electronics industry, he told friends "there aren't going to be enough humans in the U.S., Canada and Alaska to solder all the connections." He began then pushing componentmaker Centralab toward the package-circuit idea. Now, 86 million packages later, he's trying gradually to lead the industry away from bits and pieces toward "complete systems engineering."

Midwesterner Parsons was born in Litchfield, Minn., and went through school on windpower: trumpet and saxophone paid his way through University of Minnesota, Chicago Tech and Armour Institute. He married in 1927, traded trumpet for technology, went to work for Western Electric as a development engineer. In the next few years he moved around in engineering, finally landing in sales as assistant to Centralab's sales manager in 1931.

He became a vice president of the Milwaukee firm in 1946, president (and an officer of parent Globe-Union) in 1952.

Parsons is a friendly, gregarious type who likes to share his ideas. He has been an advisor to Washington on electronic components since World War II, is also active in EIA and the American Standards Association. The result: he's "away from the family too much." He has two boys, 16 and 11, and a daughter 14; they're "after me all the time to sail, swim or ski, but it's hopeless sometimes."

Parsons is still a package man. "We're talking about making smaller parts of big instrument systems," he says. "We have to leave the components and parts stage behind."

COMMENT

Wanted: Action

A large body of engineers has created a technological base for accelerated cultural growth and wide distribution of wealth, both fine democratic principles. But at the same time, our educators have confused egalitarianism for democracy, and substituted equal educa-

tion keyed to the least common denominator for equal opportunity to be educated.

My son takes his degree in engineering this year. I watched him grow up chafing at restraints placed on him by public schools. The major part of his attitude was formed at home, where he lived in an atmosphere conducive to

knowledge and scientific inquiry. He learned something of the pure joy of learning; fortunately this stuck with him through all the watered-down curricula in his public-school training.

His mother and I tried working through the school board to put some spine into the local curriculum. It was a futile task for anyone working alone. Maria Montessori and John Dewey did their jobs too well. Probably because they can no longer teach anything else, our education system is firmly committed to teaching life adjustment—which is something that should be handled in the home, not the school.

An uninformed and inept population cannot act reasonably with respect to a technological matter. The schools are getting weaker in the sciences, not stronger, at a time when more, not less, scientific understanding is a must. Those of us who are working parts of the technology have got to be the ones to act; it's not up to government.

It's not a matter of breeding more scientists, which is a special problem. It's the general problem of educating the whole rising generation to an understanding of what makes the world go. We in engineering cannot put our heads in the sand; we've got to help.

ROBERT ACCHIONE
DETROIT, MICH.

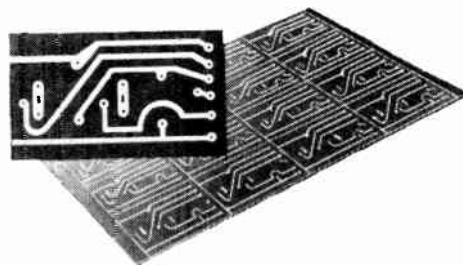
Stereo Disk

The news story about the Minter stereo disk compatible recording system ("New Stereo Disk Uses F-M Carrier," Feb. 28, p 14) reports that stereo reproduction can be achieved with "any conventional wide-range pickup." It is true that any monaural pickup which performs well at 30 kc may be used to reproduce this type of disk, but many high-fidelity pickups have not yet attained this standard. . . .

The name of the inventor is Jerry B. Minter. He was assisted in the development of the playback apparatus by the technical staff of Electro-Sonic Laboratories Inc., Long Island City, N. Y.

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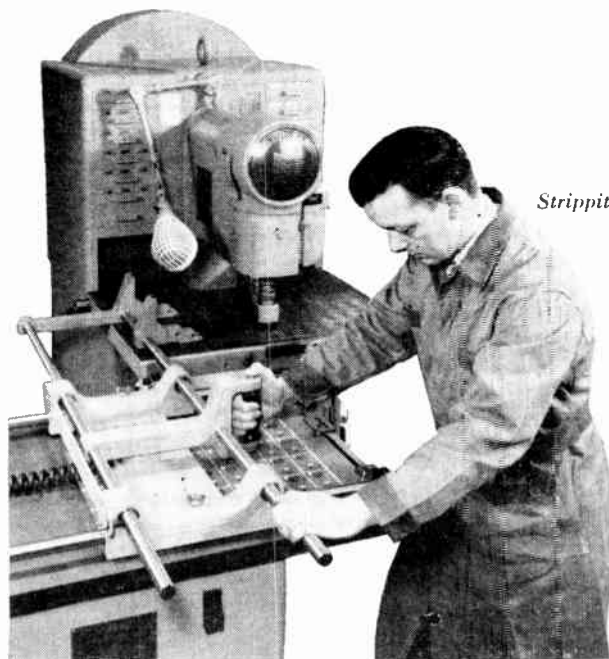
As fast as the operator places the Duplicator stylus in each template pilot hole, the printed circuit board or other work is automatically positioned under the Fabricator punch and the punch tripped. Anyone can learn to operate the Fabricator-Duplicator in a few minutes. Consistently clean holes are produced in laminates from paper base phenolic to glass base epoxy, copper clad one or both sides from .032" to .125" thick — without cracks. Tool changes are made in a few seconds, using Strippit interchangeable standard round, obround, square or special-shape tools.

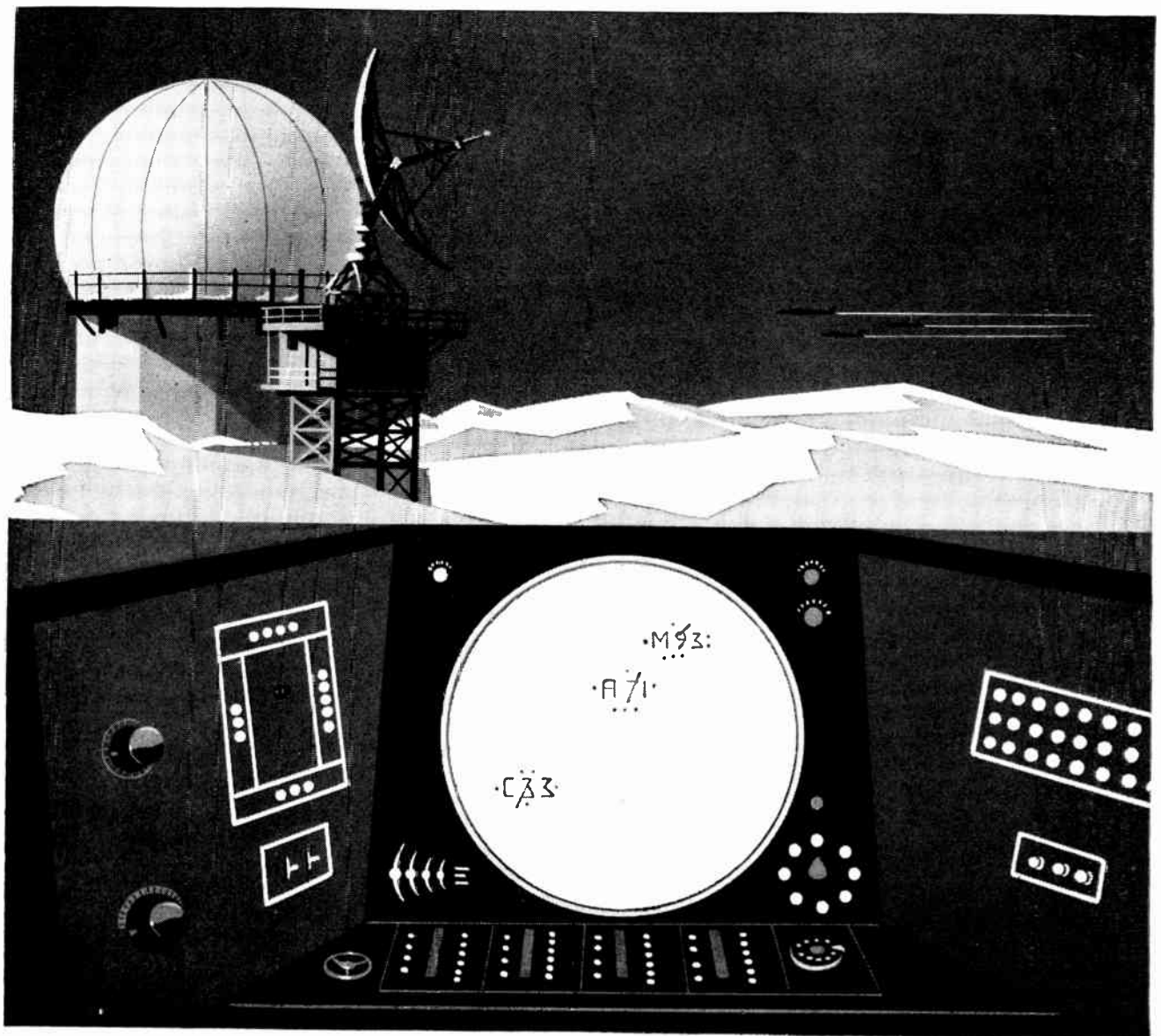
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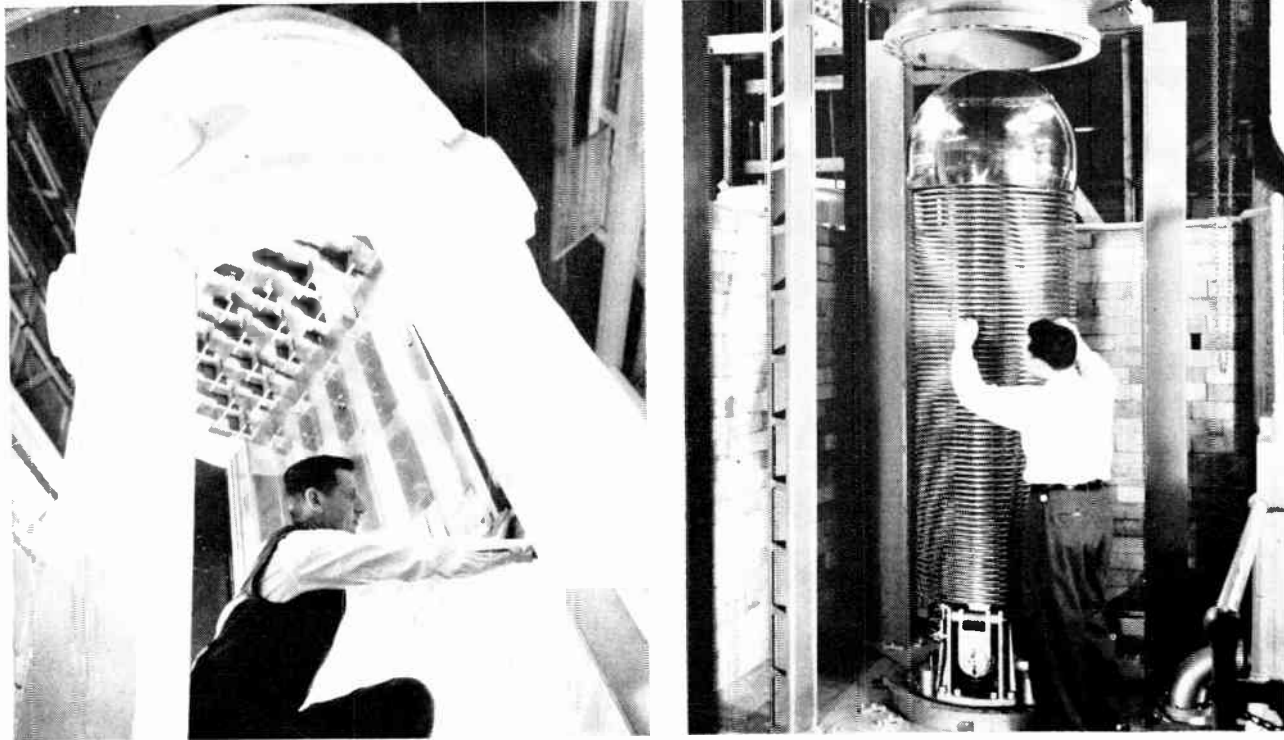


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Electronically controlled reactor model (left) and three-million-volt Van de Graaff accelerator

Electronics Stars at Fair

Twenty percent of all U. S. firms on display in Brussels are in our industry. They're giving the world a glimpse of the future

ONE-FIFTH of the 50 U. S. firms participating in the Brussels World's Fair which opened yesterday are electronics companies.

Within the 320-ft Atomium, theme structure of the fair representing the atoms of a metal crystal, two of the 55-ft spheres are occupied by U. S. electronics firms.

Visitors to the Westinghouse sphere see a 26-ft walk-in model of a pressurized atomic water reactor. (See photo.) Chains of flashing lights and moving control rods illustrate the water flow patterns and temperature changes that produce power.

A similar reactor is seen in the State Department exhibit in the American pavilion. Here a two-thirds scale model shows the flow of electricity from atomic power to a typical American community.

A showcase series in the Sylvania Atomium dis-

play depicts the history of man's search for fuels. Applications of nuclear fuel shown range from scientific and medical uses to the day when these fuels may power spaceships.

A study of space travel control problems forms part of a second Sylvania display in the main Transportation pavilion. Computers are teamed with space crews to provide lightning calculations to meet the demands of space travel.

The exhibit also shows a pilot's eye view of a runway lighted by LFAS, the stroboscopic lighting system. Motion and sound are used to show the tracer-bullet effect that cuts through fog, snow.

Also in the Transportation pavilion a display entitled "Electronics Advances Aviation Progress" is shown by Collins Radio Company. Here a complete line of airborne communication, navigation

and flight control equipment is explained in three languages.

Equipment provided by General Dynamics for the latest Convair aircraft is shown nearby.

Not far away, near the Esplanade Gate, stands the glass and concrete IBM pavilion. Beneath its folded concrete roof, visitors see Ramac, the disk memory computer designed for random access in accounting and control (cover).

This computer acting as a many-tongued quiz master is programmed to contain a summary of world history beginning in the year + B.C. It produces information in 10 languages when queried by an operator entering a numerical year on a keyboard. The same unit also performs a business accounting application.

Analog and digital computers made by Electronic Associates of Long Branch, N. J., are displayed at the U.S. pavilion. Fairgoers there see analog computing equipment that helped make Jupiter C.

In the International Hall of Sciences a gleaming metal sphere caps a nine-foot two-million volt particle generator exhibited by High Voltage Engi-

neering Corp. (photo) in cooperation with the National Science Foundation. This Van de Graaff accelerator produces nearly all the fundamental radiations. Fair-goers see its applications to X-ray work, sterilization of food and drug products, irradiation of plastics, and petrochemicals and radiographic inspection of heavy metal fabrications.

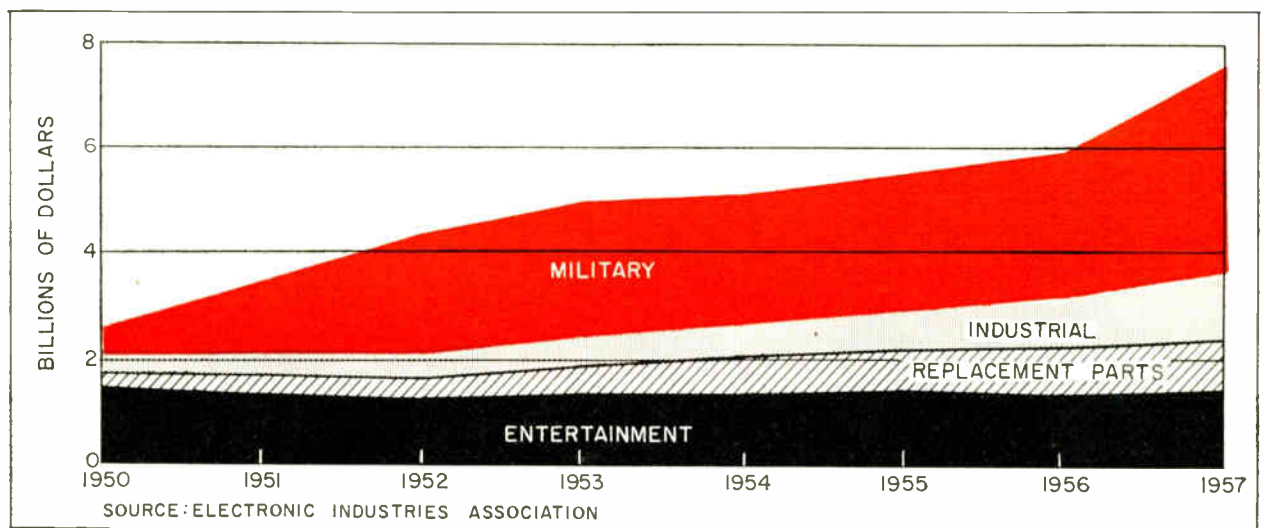
Also in the Hall of Science is an animated display by Bell Telephone Laboratories showing semiconductors in various stages of manufacture.

A nearby exhibit by Perkin-Elmer Corp. shows infrared spectroscopy applications in molecular analyses.

In the American pavilion, RCA equipment is used in State Department demonstrations of color tv. A studio and amphitheatre arrangement allows visitors to watch closed circuit tv productions in the making. Receivers located remotely in the pavilion allow fairgoers to look in on shows.

The automotive industry bows to electronics at the General Motors exhibit where visitors watch model autos travel along an electronically controlled highway of the future.

PRODUCTION and SALES



Factory Sales Hit \$7.6 Billion Last Year

TOTAL FACTORY SALES of the electronics industry hit \$7.6 billion in 1957, according to figures released last month by the Electronic Industries Association.

The \$7.6 billion total included \$1.5 billion of consumer sales, \$0.9 billion of replacement parts, \$1.3 billion of industrial products and \$3.9 billion of military products.

All-time sales records were set in

three product categories—replacement parts, industrial products and military products.

Military products accounted for more than half of all industry sales last year, 51.3 percent.

Remaining 48.7 percent of industry sales in 1957 breaks down this way: products 17.2 percent, replacement parts 11.8 percent and consumer products 19.7 percent.

Present distribution of industry sales is a far cry from 1950, when first such statistical breakdown of the electronics industry was made. In that year, consumer products accounted for 57.7 percent of the industry total. Remainder was divided among military sales—19.2 percent, industrial products—13.5 percent and replacement parts—9.6 percent.

Radar Radiation Hazards

USAF coordinates research program seeking facts about damage by microwave radiation to human tissues. Here's key information on a story due to 'break' about 12 months from now

NEXT WEEK, some 3,000 specialists will meet in Atlantic City, N. J., for the Industrial Health Conference. One conference session will deal with nuclear and electromagnetic radiation hazards. Attention given to microwave radiation points up the fact that this hazard has become a matter of serious concern in our industry.

Full details of the story on microwave hazards will begin to emerge within about a year. Right at the moment, a comprehensive study is going forward which aims to find out how microwave radiation behaves in various human tissues.

The study is being conducted at seven research centers under Defense Department auspices. Air Force Colonel George M. Knauf, surgeon at Griffiss AFB, Rome, N. Y., is coordinating the project for the three services.

Dr. Knauf told *ELECTRONICS* "We should have criteria pretty well established within about a year." He also stressed that the services "have not yet had a single injury or death that can definitely be ascribed to microwave radiation."

The bluff Air Force surgeon pointed out that all armed forces units using microwave equipment file reports of injury that ultimately reach him, and that all cases are checked. "Anything that could be blamed on radar is reported," he told *ELECTRONICS*.

The advent of radars in the megawatt class makes microwave damage increasingly more likely. At this point, science does not know enough about the physics of r-f energy to determine what the effect on living tissue actually is. Knauf's research program is calculated to bridge this gap in knowledge.

Latest techniques for measuring electron and nuclear paramagnetic resonance will make it possible to detect such phenomena as the relocation of a single ion in a cell, he predicts.

"Extent of damage will probably prove to be related to chemical content of tissue," he says. "It looks as if it will vary not only from one person to another, but also in the same individual."

While awaiting factual data from the project, the armed services are taking precautions to prevent harm to both operating people and those troops or citizens within beam-reach.

Damage (to eyes) has been recorded at power

densities as low as 0.2 watts per sq cm. The services have therefore set the standard of safety at 0.01w/cm². Areas where radiation above this level must be present are posted as hazardous and people are forbidden to enter them.

"Since we don't know for sure if there are any cumulative effects from repeated or prolonged exposure, we don't specify a 'maximum permissible time,'" Knauf said. "We just prohibit any exposure to above-standard radiation."

Operators are also forbidden to:

- Work on antennas, feeder horns or transmission lines while the set is on the air.
- "Searchlight," or beam the set toward inhabited structures, people or other radar towers.
- Discharge r-f from high-power generators under test into the air; dummy or water loads are used.

Rome ADC is also pushing development of an easy-to-operate area dosimeter that will simplify measurement of ambient radiation. Much present equipment is too complex for field use.

And the Researchers . . .

AIR FORCE program investigating microwave radiation is contracted out to seven research groups.

General investigations in the 200 mc region of the spectrum are being conducted at the University of Buffalo; 3,000 mc by Rochester School of Medicine; 10,000 mc by University of California at Berkeley, and 24,500 mc by University of Miami. Tufts College is investigating eye damage by radiation at 2,450 mc, and University of Pennsylvania is looking into brain damage at 3,000 mc.

Southwest Research Institute has a special project aimed at uncovering areas needing further investigation. Institute program exposes tissues to radiation at various points in the microwave spectrum, records the precise changes between various exposed samples and unexposed control tissues. This massive attack may spotlight further efforts.

University of California, aside from its general investigations, is looking into possible changes in the permeability of cell membranes due to radiation, and possible effects on cell longevity.



Trading rooms of 3,500 over-the-counter firms, like that of Troster & Singer of New York (above) are connected by network of telephones, private wires and teleprinter system

OTC Market Vital To Us

Over-the-counter market is a mechanism for building interest in electronics stocks. Many firms now traded on the big exchanges got their public start there. Dealer system fits needs of little fellows

LAST YEAR, 200 to 300 electronics firms, ranging in sales size from less than \$1 million to over \$1 billion, traded securities on the over-the-counter market.

Practically every publicly owned firm in the electronics industry was first traded OTC. Although many have moved on to the New York and American Stock Exchanges, about two out of three are still traded over-the-counter.

Principals of listed firms wishing to acquire or dispose of large blocks of stocks often find the OTC market the best place for their trades. Sale or purchase of sizable stock units in exchange markets can upset the normal market price.

Many electronics firms, whose common stock has been traded on the exchanges for years, still use the counter market for trading preferred stock, debentures and warrants.

Many members of the electronics industry have made handsome profits on fast-climbing stocks bought and sold over-the-counter. Price increases of standout stocks are often 400 to 1,000 percent—and sometimes more—over a three year period.

One company, for instance, today sells at around \$20. It could have been bought at \$2 to \$3 a few years ago. A second company, now selling at \$14, was being sold at less than \$4 two years back. And a third firm could, not long ago, have been bought at \$2. Selling price now: \$14.

The name—OTC—has little to do with the way transactions are handled. Formerly called the unlisted securities market, the place's name was

changed to over-the-counter in 1932. Dealers wanted a more positive sounding name.

The over-the-counter market is a vast network of communication wires. It enables dealers to buy and sell from each other in minutes, even seconds.

The market members consist of about 3,500 dealers in 551 American cities and towns. Size-wise, they vary from one man firms to organizations with several hundred employees.

In exchange, prices are determined by auction. But over-the-counter prices are decided by dealers who stand ready to buy or sell a security at any time. These dealers are said to make markets for stocks. Usually, a dealer buys stock for his own account and keeps an inventory on hand.

The unique method of doing business OTC gives rise to the double quotation system used. Bid price is the price at which dealers are willing to buy a stock. Ask price is the price at which they are willing to sell. Spread is dealer's profit.

National Association of Security Dealers, the industry's regulating agency, claims this spread averages three-tenths of a percent and rarely is more than five percent, except on lowest priced securities. This compares with an average of two and one-half percent on securities sold on the exchanges.

Prices listed in newspaper quotations are those charged to individuals—or the retail price. In addition, there is a wholesale price to dealers and brokers. It is known as the inside price. The wholesale price allows a broker to sell or buy at the retail price and make a profit.

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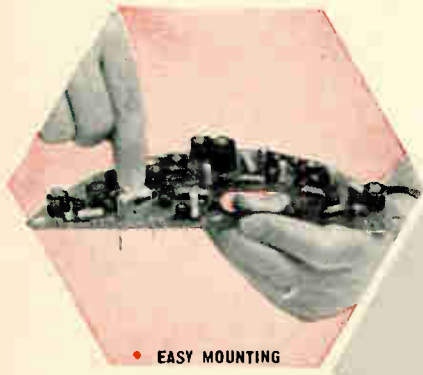


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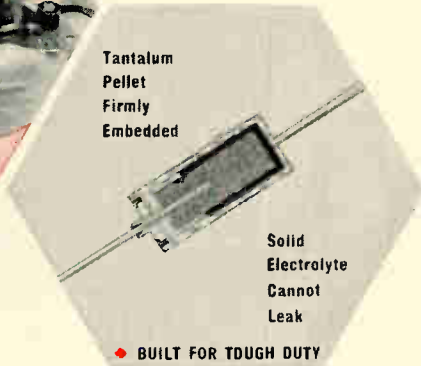
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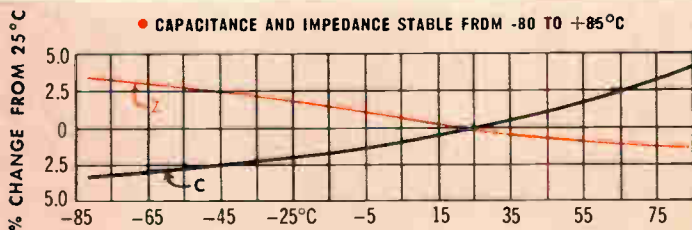
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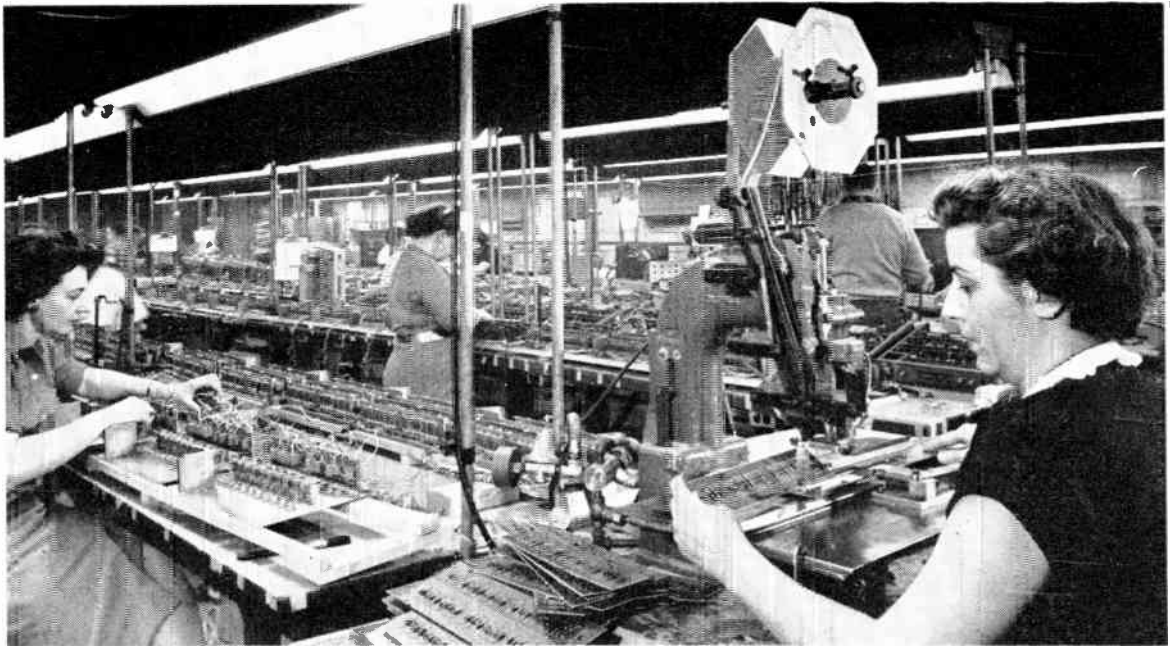
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Single-station United Shoe machine speeds insertion of components at Teletronics Laboratory

Automation Emerging Slowly

Most assemblers of electronic equipment still favor handwork. A few are just now taking the first step: single-station, semiautomatic machinery which complements hand assembly. Trend to modules and printed circuits may pave way to all-automatic assembly

ASSEMBLERS of industrial, commercial and military electronic equipment are moving slowly and cautiously toward automation. Many component insertion machines now being introduced are only a short step from hand assembly.

Component insertion is the last major stronghold of hand work in our industry. Most components are machine made. Printed wiring and component modules have reduced the amount of hand wiring.

Production men say they would go all the way in mechanization—if automatic assembly can match hand assembly in cost and flexibility for their specific applications.

More firms are deciding in favor of printed wiring. The use of chassis is a deterrent to automation, circuit boards are halfway to automation.

Three kinds of automation, none completely acceptable to many firms, are available today: multi-station in-line machines, programmed assembling machines which emerge from R&D projects, and still-experimental fully-printed circuits.

In-line machines, many producers agree, are cumbersome and costly for much small-lot production. Some tv-radio plants are using them successfully; others never took the plunge.

Where in-line machines are most successful, the key is a steadfast policy of component standardization. Unlike humans, the machines must be given components of uniformly precise dimensions.

Recently introduced assembly machines complement hand assembly. They take one type of component, usually with axial leads, form the leads and insert them in a circuit board. They are an extension of conveyors, merry-go-rounds and other aids to hand assembly.

Only a few customers, says one engineer, think in terms of in-line production. Others are interested in independently operated machines easily set up to accommodate a variety of assemblies.

A maker of both in-line and single-station machines reports that in recent months interest in semiautomatic single-station machines has grown.

"In the beginning," says a department manager, "users thought automation was not beneficial unless it was complete, covered an entire product line and a wide variety of types in a component class."

His firm has sold 50 to 60 installations for small lot production. An operator handles up to four machines. Each machine positions one kind of component in a batch of boards and then is reset.

The next step in automation does not look like anything born in Detroit. It resembles the programmed metal-working machines which have recently blossomed out in aircraft plants.

An electronic equipment manufacturer last year demonstrated a programmed machine which could cost \$100,000 if made commercially. Latest report is that it is performing satisfactorily.

Reason it works, says the program coordinator, is that before the machine was designed, all company plants agreed on a framework of standards for components, circuit layout and circuit families.

Diodes come in many sizes and with springy leads. For little or no additional cost, diodes may be bought with sleeves and soft leads so the machine handles them like a 1-watt resistor.

Still another firm is marketing a programmed board assembler which costs \$20,000. One executive frequently refers to the assembler as his "research" machine.

"Everybody is change conscious," he explains. "The biggest problem is uncertainty of design and techniques. Lathes will remain modern for 10 years, but there is not that security in buying electronic assembly machines.

"Electronic companies want fast amortization of machines." He feels component preparation by sim-



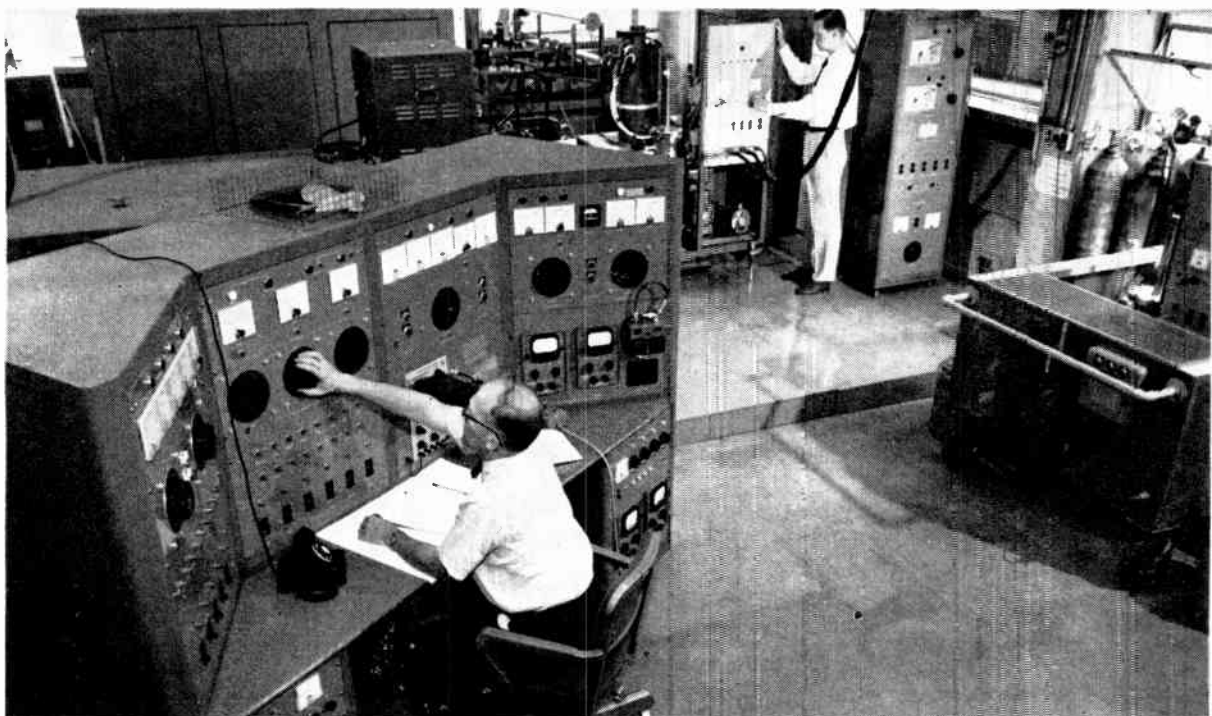
Operator inserts tape to run Design Tool's assembly machine

ple machines, followed by hand insertion will remain dominant for years.

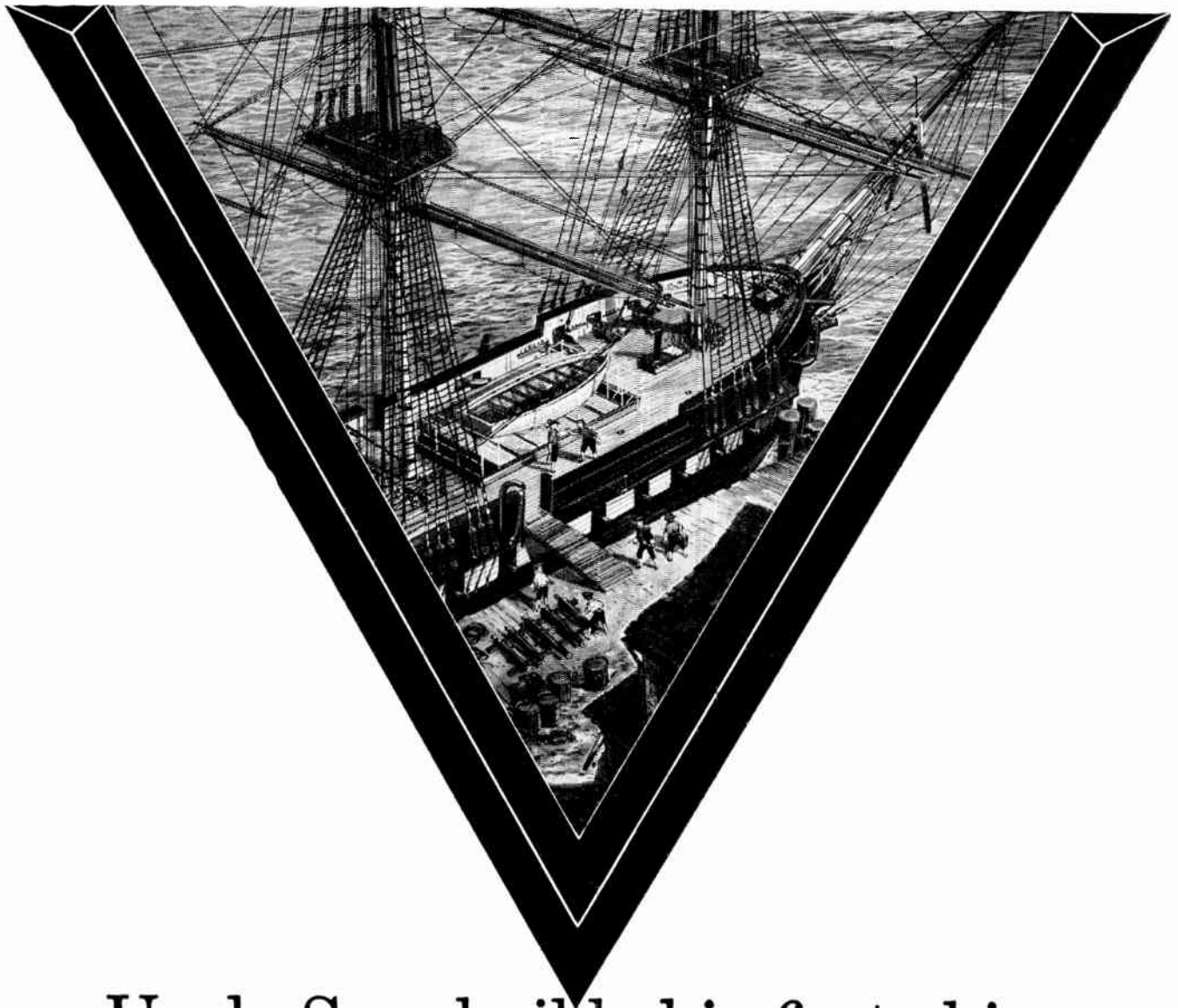
On April 4, this magazine reported on a new programmed wiring machine. It represents a type of machine a major reason for whose existence is circuit reliability.

It will accurately wire boards so complex that the backside looks like a plate of spaghetti. Its accuracy represents savings. If a mistake were made during hand wiring, it would be cheaper to discard the board than try to find and correct the error.

Twenty-One Megawatt Microwave



Equipment at Cornell Aeronautical Laboratory transmits 21 megawatt microwave signals. Army calls it important advance in ICBM detector development. Klystron is visible at rear of control console.



Uncle Sam builds his first ships

and marks a fine deep-water plant site

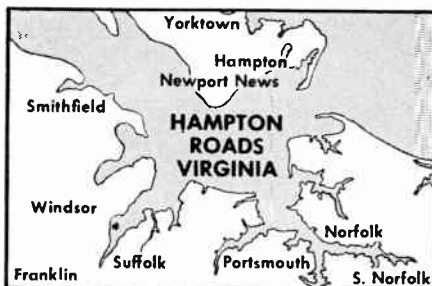
"Don't give up the ship!" Captain Lawrence's brave last command keeps alive memory of the frigate *Chesapeake* . . . one of the first warships ordered by the young U.S. Government. Her launching in 1799 led to creation of Norfolk Naval Shipyard in Portsmouth . . . birthplace of many a famous ship, from the Confederate ironclad *Virginia* to the *Langley*, first U.S. aircraft carrier.

Today, on the shores of Hampton Roads, ship building is just one of many industries that profit by this strategic deep-water location. Amoco, and Lipton Tea, for example, are two of the newcomers to swell this area's yearly output of more than \$680,000,000.

If your new plant needs deep water, you'll find plenty of advantages here to go with it. Nine main line railroads, 45 truck lines, five major airlines, and 100 ship lines give you top transportation. Coal, timber and other raw materials are nearby. There's natural gas on tap. And abundant electric power flows from Vepco's growing network . . . now adding 640,000 kilowatts of capability to reach a 2,171,900 kw total by 1960.

For more facts, or confidential site-finding help, contact Vepco . . . serving the "Top of the South" in Virginia, West Virginia and North Carolina.

V HAMPTON ROADS
VIRGINIA



VIRGINIA ELECTRIC and POWER COMPANY

Clark P. Spellman, Director—Area Development, Electric Building, Richmond 9, Virginia • Phone: MIlton 9-1411

Homemade Digitals on Upgrade

BOMBING-NAVIGATION systems manufacturers are not only digitizing their existing data-processing equipment, but are also proceeding on the design and manufacture of their own units. One large research and manufacturing firm is known to have recruited and trained a staff of specialists to conceive and design a digital version of an earlier analog system. Several others are also investigating the possibility of building their own equipment to meet special requirements.

HI-FI COMPONENT kits are now completely up-to-date with introduction of tape and turntable equipment in kit form. These are parts of a complete stereo kit system just introduced at the hobby show in Los Angeles and the IRE show in New York. Within weeks another tape kit, imported from England, will be introduced to the market. Others are blueprinted to follow shortly.

ATOMIC STANDARDS of frequency and time interval may soon be joined by standards of length

as well. The British standard inch, for example, is shorter than the U.S. standard, with Canada and Australia in between. The Director of the National Bureau of Standards, Allen V. Astin, believes that this will all be cleared up, with international agreement by 1960 on the wavelength of the natural period of the krypton atom as a standard. Master gages could then be made to an accuracy of 0.0025 micron.

ANTIMISSILE idea men are working overtime in brainstorming sessions. One blue-sky idea involves dropping of a cloud of sand into path of the onrushing vehicle. Missile would presumably be sandblasted into nothingness if not detonated first.

STEREO TIMETABLE has been completely torn up by surprise announcement of still another binaural disk method at recent IRE Convention. The race is on now and consumers will be offered choice of 3-D records months sooner than previously thought.

TECHNICAL DIGEST

- Ionization chambers serve as adjustable high-value resistors for increasing relay time delay far beyond limit of several minutes obtainable with conventional R-C circuits. Pivoted diaphragm located between alpha ray source and chamber is moved to change resistance value. Lags up to several hours can be achieved with small capacitors in unit made by Elesta Co., Bad Ragaz, Switzerland.

- Traveling-wave tube principles incorporated in electron gun of new oscilloscope tube give flat response over bandwidth of 0 to 600 mc, permitting display of millimicrosecond pulses. In Bell Labs design, input and output coaxial lines run directly through glass envelope to opposite ends of gold-plated molybdenum tape helix surrounding electron beam in gun.

- Feasibility of constructing power transformers to withstand

500 C and high nuclear radiation for 1,000 hours was proved in report by GE for WADC. Double glass-served silicone varnish treated silver wire had best overall performance among wires tested, but anodized aluminum looked good up to 450 C. Grain-oriented 34 percent silicon steel proved satisfactory for cores phlogopite mica paper for layer insulation, and Oxalloy bonded laminated muscovite mica paper for spools.

- Detection of variable stars is achieved automatically by positioning a pair of photographic plates, covering the same part of the sky but taken at different epochs, so that magnified image of special cathode-ray tube raster is projected on each. Light transmitted through the negatives is picked up by multiplier photo tubes and electronically subtracted. The resulting difference signal, representing only variable stars, is viewed on screen

of tv set, in University of Groningen technique.

- Closed-link Lumicon tv system using 1,029 scanning lines and 30-60 frame-field rate serves as light amplifier for X-ray images. Camera is aimed at standard 10-inch-square fluoroscopic screen and picture is viewed on 10-inch monitor. Contrast control and negative-positive reversal switch on monitor aid in interpretation of images. Made by Machlett, system can serve for surveillance at night, viewing shock wave patterns in wind tunnel, other dim-light research work.

- Dielectric properties of ceramics at 3,000 mc vary irregularly with temperature because molecular changes occur along with expansion, according to Melpar tests. Thus, K of dense alumina jumps from 6 to 8 in vicinity of 2,600 F. Foam ceramics showed promise of having more stable characteristics.

Electronic Unit Boosts Radar Echo

ELECTRONIC radar echo augmentation device can make airborne vehicles visible for greater distances on radar sets. The unit, about the size of two bricks laid end to end, has been developed by Temco Aircraft.

Called Read, it enables a given radar set to track an object up to five or eight times farther than possible before the Read system is added to the airborne vehicle.

Installed in jet fighters, it would increase the radar echo given by such an aircraft, reducing the possibility of midair collisions that have been taking an increasing toll of lives. Installed in new missiles or target drones, it would make tracking possible for great distances, aiding in testing the missiles and helping fighter pilots track them.

Used on small target drones, the system could make the craft appear as large as a potential enemy bomber, giving more realistic training to interceptor pilots.

In one version, the device includes a cylinder about three inches in diameter, a flush-mounted an-

tenna array, and three small boxes about the size of packages of cigarettes.

Zeta's Torus Gets Checked

ZETA, the British thermonuclear apparatus, has been dismantled for inspection and for the modification necessary to achieve temperatures of 15 million degrees C. One of the things the Harwell scientists wish to learn is the effect of the tremendous heat—already in the region of 5 million degrees—on the walls of the doughnut-shaped torus.

Although the electrical discharge has been confined to the center of the tube by the pinch effect, it is likely that the walls have been affected in some way. Information from the present examination will be invaluable in the search for suitable materials for Zeta's descendants, which will be expected to contain temperatures on the order of 100 million degrees.

A spokesman of the British Atomic Energy Authority states

that Zeta will be working again this month, and in a modified form later this year.

Zeta has already sustained temperatures of 5 million degrees for a few thousandths of a second. When it reaches 15 million degrees it will equal the heat found in the center of the sun.

Portable Seismograph Aids Civil Engineers



Electronic developments have made possible a new portable seismograph. Marketed by Hunting Associates Ltd. of Toronto, the unit responds to sledge hammer blows on the ground to determine depth to bedrock. It is expected to have applications on highway construction, bridge and dam building, mining and prospecting

MEETINGS AHEAD

Apr. 18-19: Twelfth Annual Spring Tech. Conf. on Television and Transistors, Engineering Society of Cincinnati Bldg., Cincinnati.

Apr. 20-24: Scientific Apparatus Makers, 40th Annual Meeting, El Mirador Hotel, Palm Springs, California.

Apr. 21-26: Society of Motion Picture and Television Engineers, 83rd Convention, Ambassador Hotel, Los Angeles.

Apr. 22-24: 1958 Electronic Components Conf., IRE, AIEE, Theme: "Reliable Application of Component Parts," Ambassador Hotel, Los Angeles.

Apr. 24-26: National Academy of Sciences, U. S. National Comm., International Scientific Radio Union, Spring Meeting, Willard Hotel, Wash. D. C.

Apr. 27: Assoc. of Maximum Service Telecasters, Annual Meeting, Biltmore Hotel, Los Angeles.

Apr. 27-May 1: National Assoc. of Broadcasters, 36th Annual Convention, Biltmore and Statler Hotels, Banquet in Hollywood Palladium, Los Angeles.

Apr. 28-30: Middle Eastern District Meeting, AIEE, Sheraton Park Hotel, Washington, D. C.

Apr. 28-May 1: Sixth Annual Semiconductor Symposium of the Electrochemical Society, Statler Hotel, N. Y. C.

Apr. 29-30: Symposium on Electronic Scanning of Antennas, AFRCRC and Rome Air Devel. Command, L. G. Hanscom Field, Bedford, Mass.

Apr. 30: Single Sideband Communications, report on, IRE, AIEE, 7:00 pm, Engineering Societies Bldg., N. Y. C.

Apr. 30-May 2: Seventh Regional Conf. and Trade Show, IRE, State Fair Grounds, Sacramento, Calif.

May 4-7: Fourth National Flight Test Instrumentation Symposium, ISA, Park Sheraton Hotel, N. Y. C.

May 5-7: Professional Group on Microwave Theory and Techniques, PCMTT, Stanford Univ., Stanford, Calif.

May 6-8: Frequency Control Symposium, 12th Annual, U. S. Army Signal Engineering Labs, Berkeley-Carteret Hotel, Asbury Park, New Jersey.

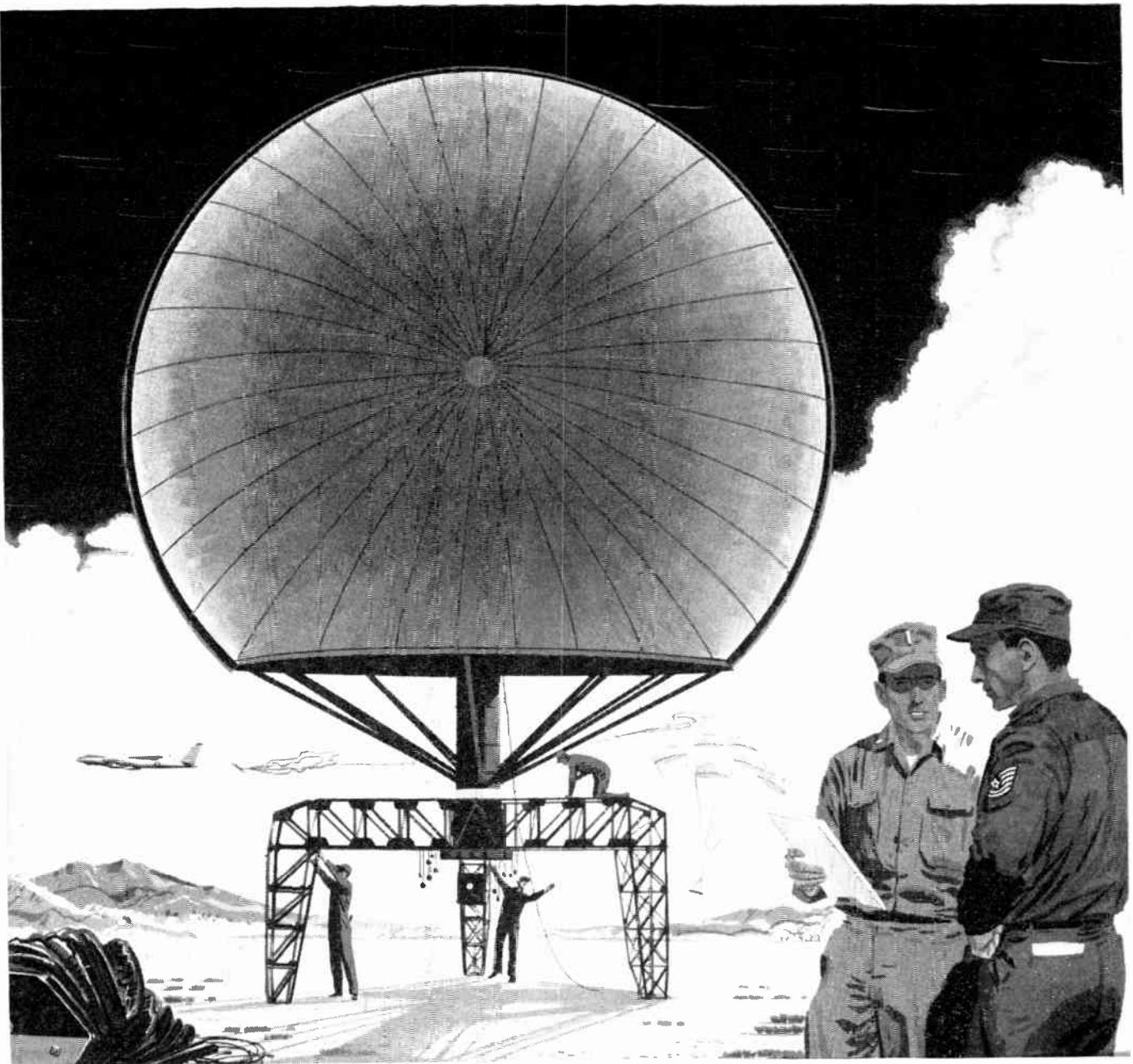
May 6-8: Western Joint Computer Conf., First National Symposium on Modern Computer Design, Ambassador Hotel, Los Angeles.

May 12-14: National Aero. & Nav. Elec. Conf., PGANE, Biltmore Hotel, Dayton, Ohio.

May 13-15: Radio Tech. Comm. for Marine Services, Springs Assn., Ben Franklin Hotel, Philadelphia.

May 19-21: Electronic Parts Distributors Show, Conrad Hilton Hotel, Chicago.

May 19-23: International Convention on Microwave Valves, Institute of Electrical Engineers, contact secretary, Savoy Place, London.



Have Radar—Will Travel

*"Paraballoon" antenna folds up, flies to the fight.
It's magnesium light.*

Take a high-powered radar installation, and design it with magnesium so it can be assembled and disassembled easily, and toted around from place to place.

That's just what Westinghouse did when it developed the "Paraballoon" antenna for the Air Force. This highly mobile radar unit weighs just 1,730 lbs. compared to 10,000 lbs. for its comparable heavy metal counterpart. It can be taken apart by its crew in minutes, packed in 200-lb. containers, airlifted to a new location and put into action immediately.

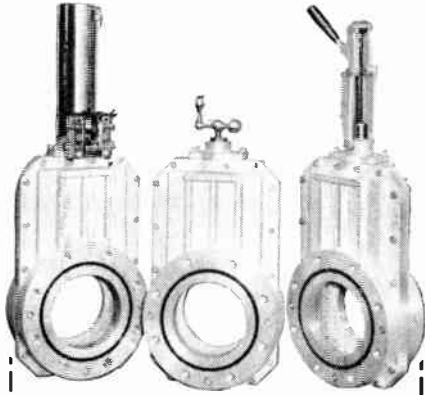
Wondering why the "Paraballoon" antenna can do such a big job, yet weigh so little? The unit is constructed almost entirely of lightweight, rugged magnesium alloy. The reflector platform is magnesium sheet and extruded channels. The turning tube is a magnesium sand casting and the tripod is welded magnesium tubing. The radar reflector is a fully deflatable fiber glass balloon.

The "Paraballoon" antenna is one of the many examples of how the high strength-to-weight ratio of magnesium pays off in terms of saved weight in electronic equipment. For more information on magnesium in electronics contact the nearest Dow Sales Office or write to THE DOW CHEMICAL COMPANY, Midland, Michigan. Department MA 1416N.

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need high vacuum components?



Stokes ST gate type high vacuum valves are available for manual or air operation. Straight through openings provide maximum conductance. Small installation space required... can be mounted in any position. Flanges are standard ASA dimensions. Each valve is helium leak tested with mass spectrometer. Manual and air operated types in 2-, 3-, 4-, and 6-inch sizes—air operated only in 8-inch sizes and over.

STOKES makes a complete line of vacuum components... advance-designed and engineered to help make your vacuum systems more productive. Each unit reflects Stokes' unparalleled experience, pioneering leadership and wealth of basic vacuum technology.

The product list includes: Diffusion Pumps, Vapor Booster Pumps, Mechanical Pumps, Mechanical Booster Pumps, Vacuum Gages, and Valves.

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CIRCLE 11 READERS SERVICE CARD

24

COMPONENTS and MATERIALS

Glassed Transistors

Test production indicates that glass caps for transistors can shave a nickel off case costs and speed up production

GLASS-CASED transistors are in test production, with a good chance the cases may become as widely used as glass tube envelopes.

Since production is still basically in a "let's see" stage, it is too early to calculate precisely packaging advantages. One manufacturer says glass lends itself readily to inexpensive high volume mechanization without sacrificing reliability. Material costs alone could be reduced to as little as $\frac{1}{10}$ that for many metal cases, firm says.

A glass maker figures the savings per case will be about $\frac{2}{3}$. With metal cases costing about a dime, switching from metal to glass would represent a saving of at least a nickel on each case. Another advantage claimed is elimination of the outgassing of impurities from metal which sometimes results during the metal case sealing processes.

Disadvantage: a sharp blow will crack the cap. But this has had little effect on the use of glass in other components.

What held back the use of glass

until now, according to one glass-maker, was lack of a method for hermetically sealing the base to the cap without heat-damaging the semiconductor. Sealing is now done with the glass at 1,000 C and the crystal at 150 C. Rapid, closely-controlled electrical sealing methods confine fusing temperature to the point where the glass cap and base mate. Leads are placed in the base before assembly.

Widespread use of the case will have to wait until transistor manufacturers tool up. Low power transistors will get the glass cases this year, with industrial and military types coming along later.

Aluminum Takes Two-Cent Tumble

METAL MARKETS were jolted a few weeks ago when Aluminium, Ltd., the big Canadian aluminum refiner, announced it would cut price of primary aluminum from 26 to 24 cents a lb. Major refiners on this side of the border quickly followed suit.

The reduction, effective April 1, is the first for the white metal in well over 10 years. It came as a surprise because aluminum is not a distressed metal, as are several important in electronics.

A number of slowly-gathering market pressures led to the cut. A spokesman for Aluminium Ltd., said the company just "grabbed the bull by the horns," in reversing the inch by inch advance in prices.

The world market has become "soft", with price cutting outside the American market and some importation of lower-priced metal. Russia, for one, has been underselling the North American producers in Europe.

Stocks of refined metal have slowly been building up since expansion of refining capacity ended

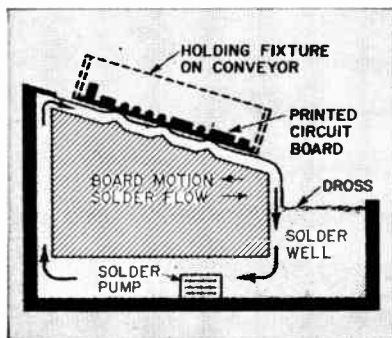
Plastics Plant



Built to make high density polyethylene, a plastic tougher and glossier than conventional polyethylene, Bakelite Co. plant will soon turn out 25 million lb a year. Another is producing 30 million lb

supply problems in 1956. During 1957, stocks increased by about 65 percent. Some producers cut back production 20 percent.

General Insurance of America tested ... and picked audiotape



Circuit board skims over solder waves in new soldering machine design

Ripples Hasten Dip Soldering

WITH A SHARP analogy (primitive aircraft wings flapped like birds; conventional dip soldering machines approximate hand-dipping motions), a new printed circuit board solderer was described at the IRE's session on production engineering.

Dipping boards into a still pool of solder, said W. L. Oates, of RCA, limits efficiency. Dross must be wiped, boards jiggled to dispel flux gas and boards withdrawn in opposing motions.

The new machine has the solder flowing in one direction and the board moving in the other, like an airplane wing. Built into a production line, its speed is 7 to 15 ft of circuit board a minute, or 280 to 600 boards an hour.

Solder flows over ridges on an inclined plane. The board, angled to parallel the plane, touches each solder ripple in turn. Dross collects not on the flowing solder, but in a well which is skimmed daily.

Another dip soldering trick was described by H. H. Hagens, of Army Signal Engineering Labs. Hagens spoke on several patterns for integrating printed circuit units in high component density units.

One problem is the board temperature continues to rise, to the point of board damage, after it is removed from the solder. But quickly quenching the board in alcohol cuts heat to a safe amount.



Chief Engineer cites type EP Audiotape for "dust-free coating, uniform signal output... high precision"

WHEN General Insurance Company of America bought four Electrodata tape transports 18 months ago, they knew one thing: their computing system should have the finest magnetic recording tape available. It was decided that the best way to make the final decision was to test.

The tests started immediately. Every nationally known make of magnetic recording tape was used on the transports for at least a month. The result was clear; type EP Audiotape was chosen.

As D. G. Jessup, Chief Engineer of General's Computing Department, wrote in a letter to Audio Devices, "To obtain the optimum reliability and performance from our computing system we need the oxide dust-free coating, uniform signal output level correct in both directions of travel, and high precision reels which you supply. Keep up the good work!"

The extra precision Mr. Jessup found in type EP Audiotape is not a matter of chance. Rather it is the result of meticulous selection and inspections that start when the master rolls of base materials are examined for uniformity. The quality control is continued through the manufacturing process, ending only when the tape is checked by a defect counter, rejects discarded, and the defect-free tape packed in sealed containers. This high standard of control is backed up by our guarantee that every reel of type EP Audiotape is defect-free.

For more information on type EP AUDIOTAPE, write for Bulletin T112A. Write to Box TE, Audio Devices, 444 Madison Ave., New York 22, N. Y.

audiotape
TRADE MARK

AUDIO DEVICES, INC., 444 Madison Ave., New York 22, N. Y.
Offices in Hollywood and Chicago
Export Dept.: 13 East 40th St., New York 16, N. Y.

Moon Push Underway

Space Agency requests \$180 million for fiscal '59. Industry is already feeling effects of the program

ADVANCED RESEARCH PROJECTS AGENCY's long push to the moon has already got off the ground, administratively, with direct orders to the Air Force, Army and Navy to begin work on lunar probe vehicles, more earth satellites and auxiliary equipment.

Although developmental proposals and cost estimates had already been submitted by the services before ARPA's formal orders went out, new refined plans will be drawn up.

Also, ARPA has asked for \$180 million for fiscal year 1959, over and above the \$8 million already committed.

Effects of the program on industry have already been felt. Those companies already working with the military agencies involved are now gearing up for the new program. New firms will soon be invited to get into the act, either as primes, subs or vendors.

Projects outlined by ARPA to date include:

Three lunar probes to be made by the Air Force under the direction of the Ballistic Missile Division of ARDC. Douglas' Thor will serve as the first stage rocket and Aerojet-General's second stage Vanguard will be the second stage. The third stage is yet to be revealed.

The Army Ballistic Missile Agency will make one or two lunar probes and send up two or three earth satellites. Chrysler's modified Jupiter C's—probably with Ford Instruments' guidance system—will be used in both projects.

Navy's part in the program will be to develop a mechanical ground scanning system for use in the lunar probes. This work will be carried out by the Naval Ordnance Test Station, Inyokern, Calif.

All projects will be coordinated with the National Advisory Committee for Aeronautics, the National Academy of Sciences and the National Science Foundation.

How much administrative change will take place when the new civilian space agency reviews ARPA's projects for possibly taking over some of the program remains to be seen.

MILITARY ELECTRONICS

- The microwave command guidance system, designed for controlling Radioplane's Q-4 and Lockheed's Q-5 supersonic drones, may be selected by ARDC to be the universal target control system needed to carry out live air defense maneuvers.

Developed for ARDC by Sperry, the system enables a control team on the ground or in the air to track drone, pilotless aircraft or missile, command its engine and flight controls and receive flight data. All three functions of the system are carried out on a single radar frequency band.

The target, equipped with high-transistorized transmitting-receiving equipment, transmits coded information to either the airborne or ground directors and receives coded commands in return.

Though still in the development stage, acceptance of the equipment by ARDC as the universal system would result in widespread business for subcontractors and vendors.

- Army has developed an infrared "eye" that warns field troops of gas contamination $\frac{1}{4}$ mi away by light and a horn.

- Specific projects for which President Eisenhower has requested more money include: Nike-Zeus, \$195 million; Minuteman, \$70 million; antisubmarine warfare, \$112 million; Hound Dog, air-to-surface missile to be launched from the B-52, \$91 million; Titan, \$50 million; SUBROC (ELECTRONICS, Apr. 4, p 30), \$60 million; the new West Coast Missile Test Range and modernization of Army's missile-age pentomic divisions, \$36 million; 39 additional B-52's and 26 more KC-135's, \$423 million; and two new Polaris submarines, \$323.5 million.

- Farrand Optical has a feasibility study contract with ARDC's Holloman AFB, New Mexico, for a missile range tracking system. Techniques being explored are photoelectric, tv and infrared.

CONTRACTS AWARDED

GE will continue production of Sidewinder guided missiles for BuOrd under a \$10 million contract.

Philco was also awarded a continuation contract for Sidewinder by BuOrd amounting to \$15 million. The missiles will go to both Navy and Air Force.

Convair gets an \$8 million contract with BuOrd for pilot-line production of the Tarter surface-to-air guided missile.

Servo Corp. has a \$583,820 development contract with Wright Air Development Center for an advanced version of a military infrared reconnaissance system to be used at high altitude. Five complete systems will be delivered for field evaluation.

Telecomputing Corp. will supply roll controlled gyros for the guidance system of Martin's air-to-

ground missile, Bull Pup, under a \$489,000 contract.

GE sells fuel rate of flow transmitter equipment for B-52F and G to Air Material Command under \$1,130,162 contract, and for the KC-135 under \$693,471 contract.

Bausch & Lomb Optical wins \$255,743 contract with AMC for photogrammetric rectifiers, data and ground support equipment.

Raytheon will supply Dayton Air Force Depot with 5,700 magnetrons under a \$1,935,862 contract.

Stewart-Warner will sell 66 radar test sets, AN/UPM-70, to BuShips amounting to \$262,176.

Reeves will design, develop and furnish reference azimuth platforms to BuShips under a \$337,910 contract.

The Daven Co. has a \$541,750 contract with BuShips for sonar monitors and transducers.

Electronic Products will provide BuShips with radiac sets, AN/PDR-43, totaling \$346,934.

Collins gets a \$224,528 contract with AMC for flight director computers for F-105 and F-106 interceptors.

Burroughs gets a \$3,891,027 contract boost for classified Army communications equipment.

Sylvania has a \$1,035,000 contract with BuOrd for manufacture of subminiature electron tubes.

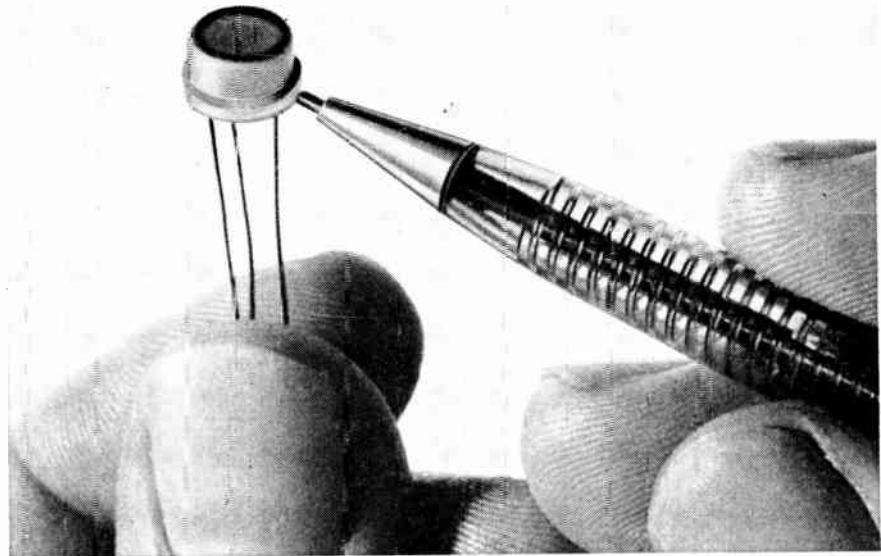
Sperry Rand gets three contracts with BuOrd totaling approximately \$63 million for production of major components of the Talos and Terrier guided missile systems.

Largest contract, totaling \$59 million, is for production of AN/SPG-49 super-radar systems and AN SPW-2 missile guidance radars to be installed in Talos guided missile ships.

Another contract, amounting to \$3.1 million, provides for design, development and production of Mark 2 weapon direction equipment for Talos and Terrier-armed nuclear-powered vessels.

Third contract is for production of Mark III computers, a major component of the Talos system.

FREE ANALYSIS OF YOUR SMALL METAL PARTS JOINING PROBLEMS



HERMETIC SEAL WELDED WITHOUT HEATING COMPONENT!

PROBLEM: weld transistor cap to base, make a hermetic seal without heating temperature-critical internal parts. **SOLUTION:** A Raytheon Welding Analyst recommended a DC "stored energy" welding system, using only 6.6 kva compared to the 75-100 kva required for an AC welder to do the same job. **RESULT:** 1500 perfectly uniform welds per hour; no damage from heat.

HOW YOU CAN BENEFIT—

If you have a small metal parts joining problem, see your Raytheon Welding Analyst. He will be happy to help you find a solution—without cost or obligation. Mail the coupon below for full details.



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Please send me literature on Raytheon Welding Systems.

Please have a Raytheon Welding Analyst contact me.

My problem is: (describe metals, thicknesses, type of part, etc.)

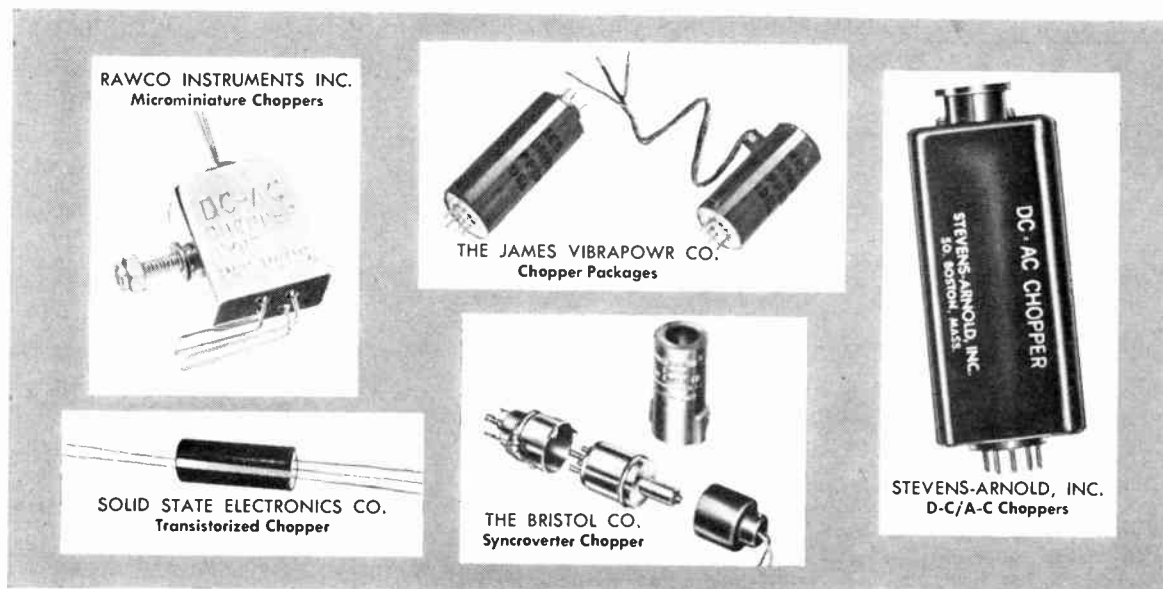
NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

New Designs In Choppers



Feature Low Residual Noise

MINIATURIZATION in components leads to new approaches to old problems. Choppers, for example, are now offered in a variety of packages, miniature bases, and mounting capabilities for various circuit applications.

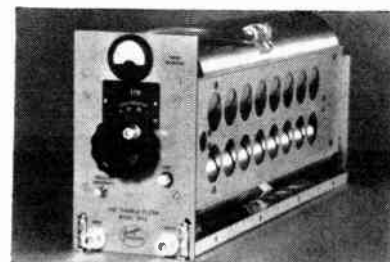
Available from Rawco Instruments Inc., 3527 West Rosedale, Ft. Worth 7, Texas, (50), is a new d-c/a-c chopper. Weighing less than $\frac{1}{4}$ oz with hardware, it has an encasement that can be mounted in any position, to either circuit board or metal chassis. Noise factor is less than $10\mu\text{v}$ rms across 1 megohm impedance.

Solid State Electronics Co., 8158 Orion Ave., Van Nuys, Calif., (51), has the model 50 transistorized chopper (or modulator), a solidly encapsulated unit designed to alternately connect and disconnect a load from a signal source.

Two miniature dpdt chopper packages are announced by The James Vibrapower Co., 4050 North Rockwell St., Chicago 18, Ill., (52). Featuring nine pin bases with top coil connections, they are available in both 20-120 cps and 350-500 cps models. Residual noise level in a 1 megohm circuit is less than $10\mu\text{v}$ at 60 cps and 20 w at 400 cps.

The Bristol Co., Waterbury 20, Conn., (53), has developed a miniature Syncroverter chopper with low thermal construction. Complete electrostatic shielding of coil from contact assembly results in extremely low residual noise levels. As a result of the modular construction, interchangeable coils are available.

Now being produced by Stevens-Arnold, Inc., 22 Elkins St., South Boston, Mass., (54), is a line of miniature d-c/a-c choppers. Two independently adjustable, parallel connected contacts make a total of four for spdt and eight for dpdt. Mu-metal case, internal shielding and novel plug-in low-loss base are featured.



Tunable Filter double-cavity type

GRANGER ASSOCIATES, 966 Commercial St., Palo Alto, Calif. Model UF-2 double-cavity tunable filter provides high off-channel rejection when used with receivers and transmitters in the 216-220 mc telemetering and 225-400 mc communications bands. The high-Q response permits interference free operation on closely-spaced channels of two equipments on a common antenna or on antennas in close proximity. Inserted in the antenna feed cable, the UF-2 will suppress spurious receiver responses.

Designed for aircraft or ground use, the UF-2 features light weight (13 lb), minimum size ($\frac{1}{2}$ ATR), rugged construction and temperature compensation. Circle 55 on Reader Service Card.

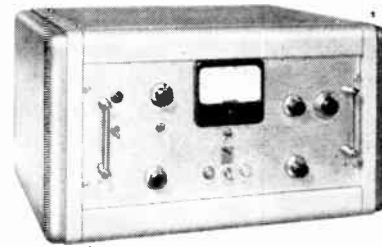
For more information use READER SERVICE Card

Spectrometer provides 750-2,000 v

NRD INSTRUMENT CO., 9842 Manchester, St. Louis 19, Mo. Model C-2910 spectrometer, featuring a well regulated h-v power supply, has been developed. The instrument is designed to count only those pulses lying within a selected channel or

window defined by front panel controls, and can provide from 750 to 2,000 v with a regulation of 0.01 percent of the a-c line voltage.

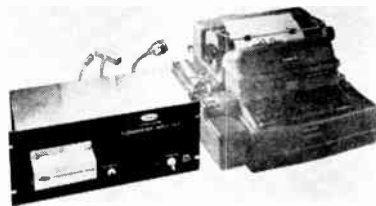
Maximum counting rate is 10,000 counts per sec. and five different ranges are provided for both count rate and integral methods of operation. **Circle 56 on Reader Service Card.**



Input Unit for Flexowriter

COLEMAN ENGINEERING CO., INC., 6040 West Jefferson Blvd., Los Angeles 16, Calif., has available a new unit specifically designed to accept digital input data, program the desired format, and scan the digital information into a Flexowriter-tape punch combination

modified to permit input from an external source.

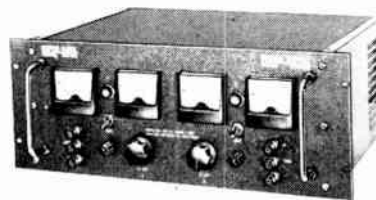


Model NV-56, with sufficient capacity to scan up to 56 information bits (decimal digits, command symbols, etc.) can provide any code (8 channels maximum) and permits changes in format to be made readily by means of a patching program plug. The unit has a plug-in printed circuit coding matrix. **Circle 57 on Reader Service Card.**

V-R Power Supply dual transistorized

KEPCO LABORATORIES, INC., 131-38 Sanford Ave., Flushing 55, N. Y., announces a new tubeless dual transistorized voltage regulated power supply featuring excellent regulation, low ripple content, fast recovery time, good stability, and low output impedance.

Model 25C-100-0.2 delivers two completely isolated outputs, each



0-100 v, 0-0.2 ampere. Regulation for line or load is less than 0.03 percent or 0.003 v, whichever is greater. Ripple is less than 1 mv rms. Recovery time is less than 50 μ sec. Stability for eight hours is less than 0.03 percent or 0.003 v, whichever is greater.

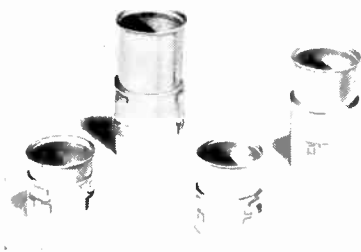
Output impedance is less than 0.1 ohm. **Circle 58 on Reader Service Card.**

Telescoping Shield for miniature tubes

THE STAYER CO., 41-51 N. Saxon Ave., Bay Shore, L. I., N. Y., has available a new snap-in type CapTi-Vated telescoping shield for miniature electron tubes. Designed for use with printed circuit boards, the snap-in shields offer economies by

providing more compact printed circuitry in sub-deck applications.

Available in design configurations to meet standard and specialized chassis requirements, the new snap-in feature eliminates staking, riveting or soldering. Shields are designed to accommodate both 7 and 9 pin miniature electron tubes. **Circle 59 on Reader Service Card.**



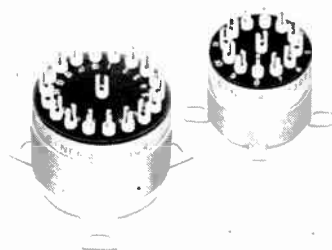
Fixed Networks loss and branching

CINEMA ENGINEERING, Division of Aerovox, 1100 Chestnut St., Burbank, Calif., has brought out a line of fixed loss and branching networks.

The new items are designed for

recording studios, laboratories and tv and broadcasting stations. Frequency range is from 20 to 20,000 cps, and they are available in line impedances of 30, 50, 150, 250, 500 and 600 ohms. Range of loss is from 0 to 50 db.

These resistive networks provide loss for correcting and leveling



gain in program circuits, and in addition, are available as branching networks for circuit mixing. Circle 60 on Reader Service Card.



Power Supply
h-v output regulated

JOHN FLUKE MFG. CO., INC., 1111 W. Nickerson St., Seattle 99, Wash., announces model 407 power supply. Two millivolt resolution and directly calibrated con-

trols provide accuracy necessary for calibration of panel meters, multi-meters and the like. In addition to the 0-555 v d-c 300 ma range, two 6.3 v a-c 5-ampere filament windings, two variable bias outputs (0-25 v d-c and 0-225 v d-c) are available.

The h-v output is regulated against line or load changes to 0.01 percent. Long term stability is better than 0.05 percent. Circle 61 on Reader Service Card.

Power Supplies
hermetically sealed

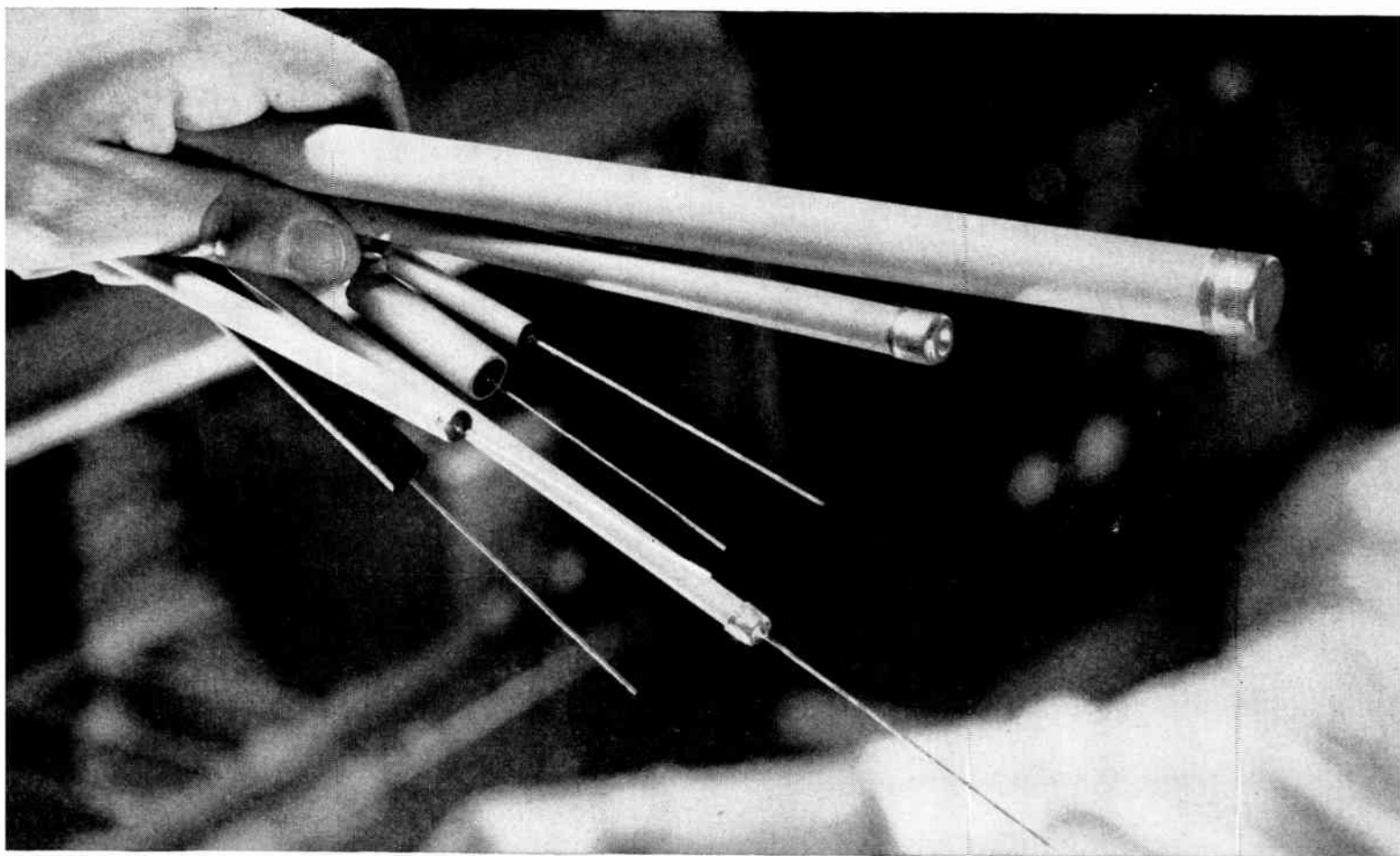
AMERICAN ELECTRONICS Division of the American-Monarch Corp., 81 N. E. Lowry, Minneapolis 18, Minn. Model RPS-5K hermetically sealed, regulated power supply is designed for use with high reliability devices. It is suitable for insulation and dielectric measurements, capacitor testing, lightning arrester studies, and general labo-

ratory use. It has an output voltage of 5,000 v d-c, regulated to within 3 percent over its entire range of 0 to 150 μ a. The output remains within the 3 percent even if the input voltage varies from 95 to 130 v a-c. Circle 62 on Reader Service Card.



D-C Ammeter
0.2 percent accurate

SENSITIVE RESEARCH INSTRUMENT CORP., 310 Main St., New Rochelle, N. Y. A new heavy current precision d-c ammeter fills the need for accurate measurement of a wide range of currents at a moderate cost. Self contained and portable,



the instrument eliminates external shunts and leads. It has ranges from 1 to 100 amperes. Ranges are selected by means of positive-fitting tapered plugs and holes. The movement features the company's diamond pivots and shock mounted jewels for ruggedness and repeatability. Price is \$750. Circle 63 on Reader Service Card.



Acceleration Switch has variety of uses

TOPP INDUSTRIES, INC., Beverly Hills, Calif. A new acceleration switch designed for use in aircraft, missile, and fire control systems and with numerous commercial applications, has been announced. It measures 2 in. in

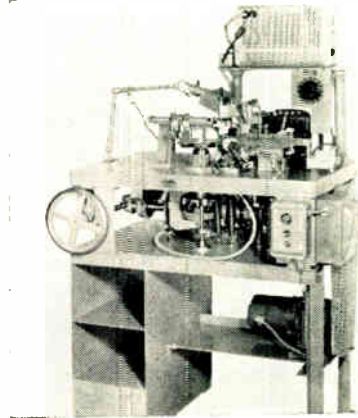
length and $\frac{3}{8}$ in. in diameter and can withstand 500 percent overloads under steady state acceleration or shock conditions. The switch can be used in any application requiring an accelerometer in that it makes or breaks a contact at a predetermined level rather than giving continuous reading proportional to acceleration. Circle 64 on Reader Service Card.

Flush Latch for chassis use

MISSILE-AIR, 1108 West 135th St., Gardena, Calif. Of interest to designers and manufacturers of electronic chassis and cabinets is a new series of flush latches.

Main feature of the latch is a variable keeper with lengths up to $1\frac{9}{16}$ in. which permits installation without having to redesign cabinets to meet latch specifications. Ruggedly made of stainless steel, except for aluminum alloy buttons, the

latches are light weight, easy to open, positive sealing, simple to operate and install. Circle 65 on Reader Service Card.



Welding Machine for crystal diodes

KAHLE ENGINEERING CO., 1400 Seventh St., North Bergen, N. J., announces another machine which feeds, cuts, forms in S or C shape, and welds the cat whisker wire on

Westinghouse high-voltage cartridge rectifiers from 4—400 cells, now available in wide variety of tube materials and terminals

For virtually every high voltage rectifier application . . . there's an inexpensive Westinghouse selenium rectifier cartridge to meet your needs. Available in phenolic, glass epoxy and glass . . . cartridge ends of brass, studs and axial leads . . . from 100 to 100,000 volts . . . 1 to 100 milliamperes.

Made by superior vacuum evaporation deposit process, Westinghouse cartridge rectifiers offer the lowest leakages in the industry. In addition, dependable Westinghouse selenium rectifiers shrug off momentary short circuits and overloads . . . combine greater reliability with longer operating life.

Look to Westinghouse for all your rectifier needs. All standard models available for immediate shipment . . . custom-made types designed, manufactured and shipped to you within 7 days. Contact your nearby Westinghouse representative for details, or write Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa.

J-22131

POWER-UP starts with **CONTROL**

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



Exact agreement on Jacksonville's marketing area is hard to come by... but top firms say

Big, Big, Big!

Population and market shifts have made Jacksonville the manufacturing and distribution center of the Southeast. Deep water port, rail, air and highway hub, Jacksonville commands a strategic position unequalled in the Southeast.

Truck lines and railroads give overnight service in a radius of 400 miles with population of approximately 13,165,000 and growing.

Liggett-Rexall has established an office-warehouse to serve 200 stores within that radius.

But National Cash Register decided Jacksonville was most conveniently situated to serve an area of 900 miles radius, including points as far away as Texas and New Jersey.

So, Jacksonville actually is a heart location, worth investigating if you're planning new installations in the Southeast.

Living, working, recreational, cultural, educational, housing, labor conditions, water, power and transportation services are excellent.

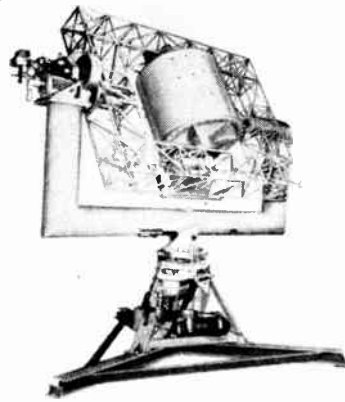
Send today for "The JACKSONVILLE STORY", a condensed, factual outline of Jacksonville's advantages. Or ask for a confidential survey tailored to your needs.

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CIRCLE 16 READERS SERVICE CARD
32

beaded or unbeaded lead wires for small crystal diodes.

Using either gold, tungsten, or Moly cat whisker wire, the machine is designed for automatic loading and unloading, with an estimated production of 3,000 an hour with automatic load (not illustrated), and up to 1,000 an hour with manual load. A synchronous electronic timer insures uniform welding. Circle 66 on Reader Service Card.



Flight Simulator three-axis unit

AIRCRAFT ARMAMENTS, INC., Cockeysville, Md. Model 1806 three-axis flight simulator was designed for a test unit approximately 3 ft long and weighing 300 lb. The simulator is capable of unlimited motion about any axis. Each gimbal is driven by a hydraulic servo system in response to signals from an analog computer. Synchros are used for error sensing in the closed servo loop, and a high gain amplifier drives a spool-type servo valve for hydraulic motor control. Hydraulic and electric lines are fed by means of slip rings on each axis. Circle 67 on Reader Service Card.

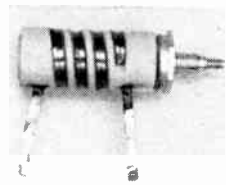


Ceramic Capacitor high reliability

TELECOMPUTING CORP., 12838 Saticoy St., N. Hollywood, Calif., is producing a new high reliability

subminiature ceramic capacitor. These capacitors are being manufactured under exacting new laboratory techniques featuring 100 percent testing. Burn-in life tests include either 100 percent or lot sampling at voltage and temperature for 24 hours or to customer specification.

Operating temperature range is - 55 C to + 150 C, conforming to tentative military specification MIL-C-11015B. Voltage rating is 200 wdc. Test voltage is 600 v d-c. Temperature coefficient is ± 10 percent over the temperature range. Circle 68 on Reader Service Card.



Adjustable Coils cover 2-200 mc

NORTH HILLS ELECTRIC CO., INC., 402 Sagamore Ave., Mincola, N. Y., announces a new series of adjustable coils. Designed for low power transmitter use, the high Q coils cover a frequency range from 2-200 mc. Illustrated is the 1300-B, said to be ideal for use from 50 mc to 100 mc. The 1300 series feature ceramic coil forms, Permatune core ranges. Circle 69 on Reader Service Card.

Test Clip Adapter for fixed panel mounting

GRAYHILL, INC., 561 Hillgrove Ave., La Grange, Ill., announces a new screw mount test clip adapter designed for fixed panel mounting. This adapter is equipped with solder terminals at each end, and holes for No. 8 screws on 3/4 in. centers.

Testing of resistors, capacitors, and similar pig-tail components will be greatly simplified by the spring action of the clips which permits positive contact without manual opening or closing of the jaws. Nickel plated clips and plugs are

mounted on an MIL-M-14, type CFC phenolic board. Circle 70 on Reader Service Card.



Twin Triode high- μ

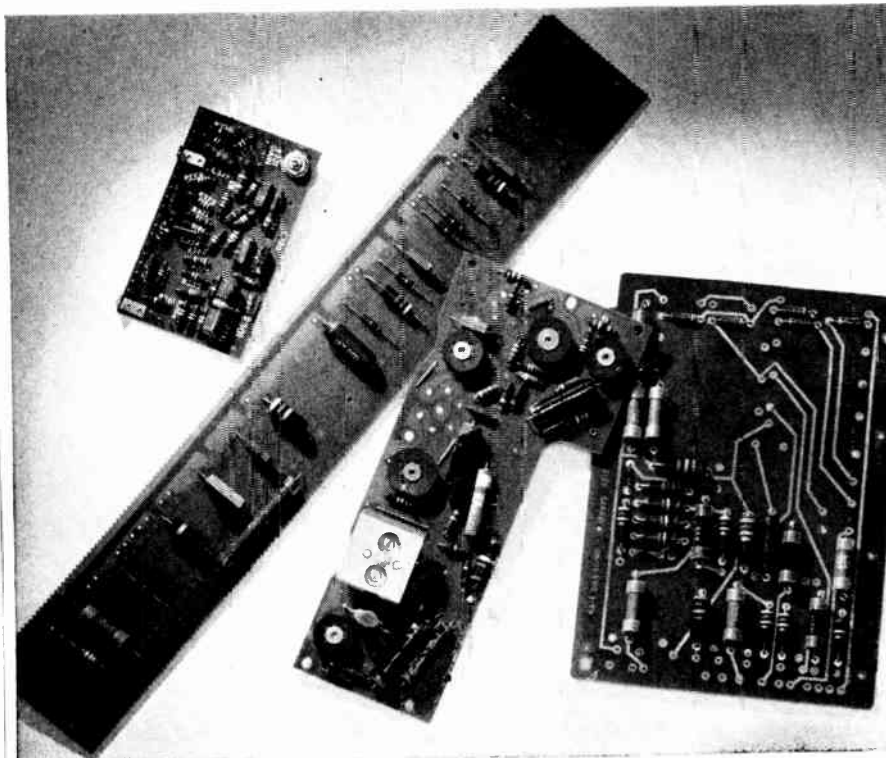
RADIO CORP. OF AMERICA, Harrison, N. J., has introduced the 7025, a new high- μ twin triode of the 9-pin miniature type, designed for use in high quality, high-fidelity audio amplifiers. It was developed for critical audio designs where low noise and low hum are primary considerations. Structurally and electrically, it provides, according to the manufacturer, outstanding performance, long life and dependable service. Circle 71 on Reader Service Card.



TWT Amplifier low-noise, X-band

HUGGINS LABORATORIES, INC., 711 Hamilton Ave., Menlo Park, Calif. The HA-23 broadband traveling wave amplifier operates from 8.2 to 11.0 kmc without the necessity of any electrical or mechanical operating adjustments. It provides 10 db maximum noise figure and 25 db minimum gain over that band. Operation over specific bands in this region is possible at the 8 to 9 db noise-figure level. This broadband device is suitable as the first stage of the receiver in many microwave applications.

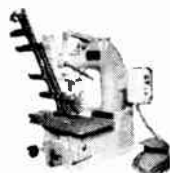
Magnetic field is 1,000 gauss; capsule length, 16 in.; capsule diameter, 1.0 in.; and net weight, 1.0 lb. Circle 72 on Reader Service Card.



DYNASERT[®]

Component Inserting

Economical for long or short runs, all board sizes



No. 1 Dynasert Component Inserting Machine Model B



Jumper Wire Inserting Machine Model B



No. 3 Dynasert Inserting Machine Model B

Dynasert users are finding mechanized component assembly practical for processing printed wiring boards in lots of 100, 75 — even as few as 20 a week! There are two reasons why.

The first is *economy*. Mechanized assembly gives production rate advantages ranging as high as 8 to 1 over hand assembly.

The other reason users like Dynasert is *reliability*. They can count on uniform trimming, inserting and clinching without strain on component leads.

If you are now processing, bidding on or planning production that uses printed wiring, find how Dynasert can be of help.

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United Shoe Machinery Corporation
140 Federal Street, Boston 7, Massachusetts

Gentlemen:

- Please send me your illustrated booklet "Dynasert Production Equipment for Electronics."
- Please have representative call to tell us how we may use mechanized assembly.

Name Title

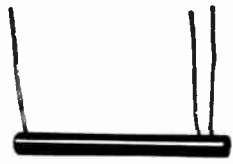
Company

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City State



Technitrol standard or specially-designed delay lines, continuously wound to close tolerances, are extremely compact and very stable. Standard tolerances of these distributed constant delay lines are: on delay, $\pm 5\%$; on impedance, $\pm 20\%$. Extremely stable with respect to environmental conditions, they are available cased in epoxy resin or hermetically sealed for military applications.



3 1/2" EPOXY CASE

Standard windings with delays from 0.1 μ sec to 1.0 μ sec and impedances from 560 to 5000 ohms are available in 3 1/2" case and 6" case. This is a stock item.



BD 1000-100

Epoxy resin case with leads grouped at one end. 1 μ sec delay; 1000 ohms impedance; rise time 0.1 μ sec max. This is a stock item.



STEEL CASES HERMETICALLY SEALED

For multiple stick needs and military applications. Completely sealed, potted in foam. Delays are based on stick capacity and type of winding.



DIP-COATED

For economy, any standard winding is dip-coated in epoxy resin. Moisture resistant; stable for temperature range from -25°C to $+85^{\circ}\text{C}$.

Write for
New Catalogs

Literature of

MATERIALS

Porous Sponge Teflon. Liquid Nitrogen Processing Corp., 451 Booth St., Chester, Pa. Recent literature covers the porous or sponge Teflon produced by the company in a variety of pore sizes and void contents for use in filtration, electronic and mechanical applications. Circle 73 on Reader Service Card.

COMPONENTS

Audio Connectors. Cannon Electric Co., 3208 Humboldt St., Los Angeles 31, Calif. Description and dimensional sketches of the XL latchlock connector series are given in a four-page folder. The audio connectors described are used on microphones, tape recorders, p-a systems, test instrumentation, recording equipment, computers, etc. Circle 74 on Reader Service Card.

Electronic Hardware. Anatom Electronic Hardware Co., Inc., 88 Drake Ave., New Rochelle, N. Y. Realizing the increased complexity of electronic packaging in the design of electronic equipment, the company has prepared a 72 page reference manual of standard electronic hardware for use in design and purchasing. Circle 75 on Reader Service Card.

Subminiature Relays. Radio Corp. of America, Camden 2, N.J. A broad range of over 325 sub-miniature relays meeting and exceeding MIL-5757A, B & C and MIL-R-25018(USAF) are described in a new 12-page booklet. The brochure gives contact and vibration ratings as well as unique features. Circle 76 on Reader Service Card.

EQUIPMENT

Digital Data Systems. Tally Register Corp., 5300 W. 14th St., N. W., Seattle, Wash., a firm which develops and manufactures

the Week

special purpose digital data systems, has available four new brochures. A facility brochure outlines the company's capabilities and specialization. Three others contain technical discussions of successful developments: the model 201 high speed digital plotter; a visual recorder and a high speed digital display and editing system. Circle 77 on Reader Service Card.

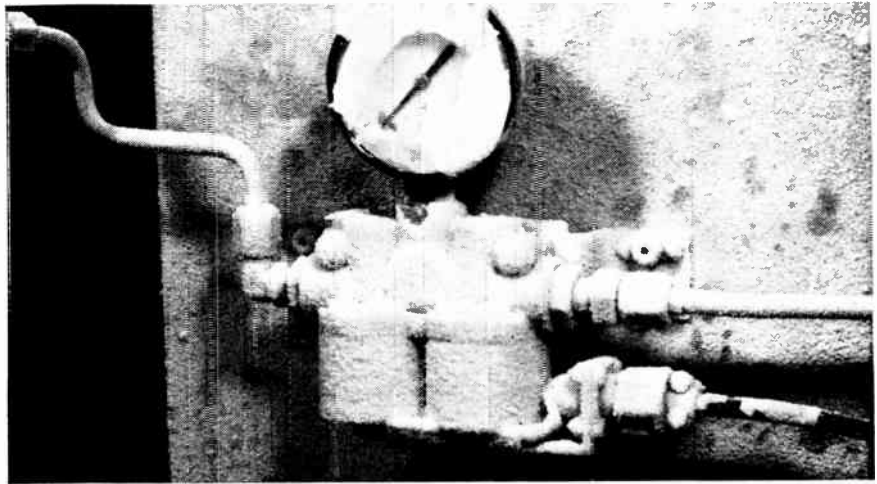
High Vacuum Equipment. National Research Corp., 70 Memorial Drive, Cambridge 42, Mass. A 16-page product summary and price list covers a complete line of standard and custom high vacuum components, equipment and systems. The literature will be sent in answer to requests on company letterhead.

Preset Electronic Counter. Post Machinery Co., Beverly, Mass. A single-sheet bulletin illustrates and describes the model P3-RM preset counter which can be set to count batches from 1 to 1,000. Chief features and technical specifications are included. Circle 78 on Reader Service Card.

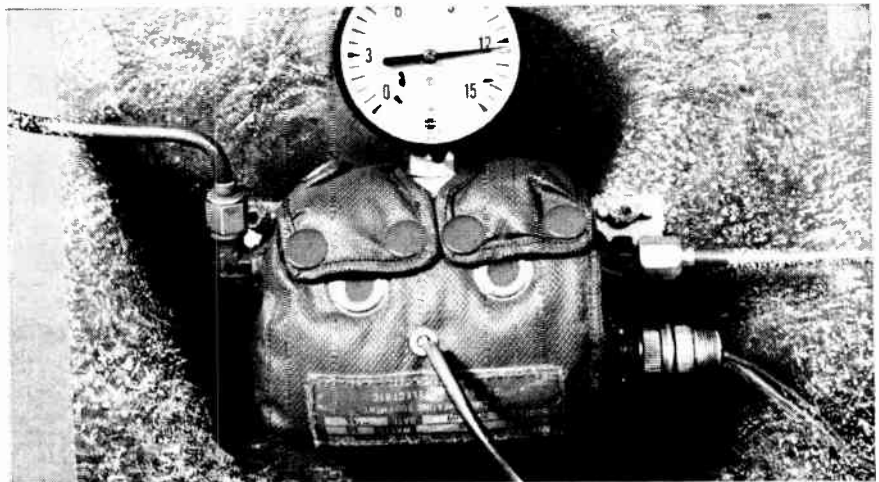
Thyratron Grid Control. Vec Trol Engineering, Inc., P.O. Box 1089, Stamford, Conn. Bulletin 101-L describes the new hermetically sealed thyratron grid control, and covers applications to motor and generator controls, regulated power supplies, servo systems and process control. Circle 79 on Reader Service Card.

FACILITIES

Wire and Cable. William Brand & Co., Inc., Willimantic, Conn. A new six-page illustrated brochure presents detailed descriptive information, including operating specifications for the Turbo wire and cable line. A special section of brochure TWC57 outlines the various multiconductor cables now offered by the company. Circle 80 on Reader Service Card.



FREEZE-UP of solenoid-controlled valve in airborne system at -65°F can choke off vital air supply. Manufacturer faces tight contract delivery schedule.



SPECIAL HEATING unit custom-designed and delivered by G.E. in 5 days enables stock valve to function properly, saves customer time, money.

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Red China Readies Tv Gear

Peiping's first tv transmitter has been completed with Soviet aid while another is slated for Canton

RED CHINA may make potent use of television for home propaganda by next year, it is indicated by the latest reports on her progress in electronics production.

Newspapers and broadcasts reaching Hong Kong and Tokyo say Peiping's first tv transmitter has been successfully tested. A 1-kw a-m transmitter, it operates on 57.5 mc, has a range of about 15 mi. Scanning raster produces a 625-line picture. F-m sound operates on 64.5 mc.

At the same time it was reported that an East German-built plant in Tientsin is turning out h-f coaxial cable for tv and communications equipment. Hong Kong reports say the same plant is making tv receivers.

In the Canton area next year the Communists reportedly plan to sell 1,000 receivers and set up 50 public receiving stations. Persons recently arriving in Hong Kong from Red China quoted Peiping officials as declaring that Russia agreed to pay for and help build a tv transmitter in Peiping, but at the same time had insisted that the Communist

Chinese erect another transmitter in Canton on their own.

Radio Peiping, in a broadcast monitored in Tokyo, admitted that though the first completed tv transmitter was designed by Peiping Radio Factory engineers, the project was completed with the aid of Soviet technicians. This warranted formal ceremonies and a speech by factory director Liu Chang-yun. Reports indicated that the tv programming will be exclusively news and propaganda.

Meanwhile, Red China's Scientific Planning Commission is hailing 1957 as China's most successful year for scientific development. Some results cited: extraction of pure germanium and production of semiconductor diodes and transistors; completion of an electrostatic generator, a voltage multiplier and a beta ray spectrometer for atomic research.

With her first electron tube plant already in production in Peiping (ELECTRONICS, Dec. 10, 1957, p 44), the government announced 1958 radio set production will amount to 750,000 units, twice last year's figure.

Peiping reports mass production of "semiconductor radio sets" will start soon. Chinese-made 5-tube a-c/d-c sets are now reportedly being sold. Dispatch says future sets will have 4 to 8 tubes, and some will be designed for subtropical climates.

DEVELOPMENTS ABROAD

- Soviet and Red Chinese scientists will jointly observe by radio-astronomic methods tomorrow's ringlike eclipse of the sun from the Hanchow area in southern China, said to be the best vantage point. They hope to gain valuable information about the solar corona and the chromosphere, even though the corona is not visible during a ringlike eclipse and the light showing around the sun's edge is too brilliant for optical observation.

- In The Hague N. V. Electronica has developed a transistorized computer for the medium-sized business market that has flexible memory, input and output capacities, and does 15,000 addi-

tions and 2,000 multiplications per/sec. Ferrite-core memory has "live" part for storing variable data and a "canned" part for fixed programs. Firm says canned memory blocks may be changed easily and have the same access time as the live portion. Computer's 512-word, 27-bit live memory and 512-word canned memory can be raised to a total of 32,768 words by means of additional units. Punched paper tape or punched cards are used for input/output; typewriter can also be used for output.

- Britain's Institution of Electrical Engineers is organizing an international convention on transistors and associated devices, to be held in London May 25-29.

EXPORTS and IMPORTS

Japanese government's Foreign Investment Council has approved four new applications from Japanese firms wanting to complete transistor licensing arrangements with American firms. These agreements have been signed:

- Nippon Electric with RCA to produce transistors.

- Fuji Electrical Manufacturing Co. with Western Electric for the manufacture of transistors, photo-transistors and diodes.

- Fuji Electrical Manufacturing Co. with RCA to make transistors.

- Sony Corp., a radio-tv manufacturer, with International GE, a licensing and technical assistance agreement for the manufacture of transistors and diodes.

France hopes to produce U. S.



COMPACTROL

AN Ultra-Sensitive ELECTRONIC CONTROL

IRBM's such as Thor or Jupiter, then branch out into missiles of French design. A group of electronic, aviation and chemical companies have formed "France-Rockets" under the sponsorship of the French defense ministry to study the problems of making IRBM's. Group has sent a team to the U. S. to study the IRBM program. Before French manufacturing can be arranged, however, the political problem of nuclear war-head control must first be solved. Thomson-Houston and CSI are electronics firms in France-Rockets.

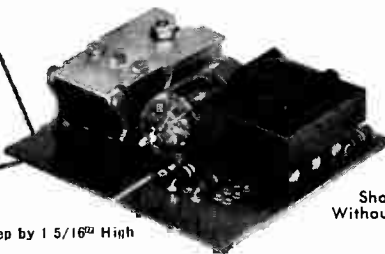
Saudi Arabia has ordered five short-wave and two medium-wave radio transmitters for the "Voice of Mecca" from West German firms Siemens & Halske and Telefunken, who submitted a joint offer. Same firms have orders from Lebanon for one medium-wave and two short-wave transmitters.

Norway's central bureau of statistics has ordered an English Electric Co. Deuce digital computer to be used in analysis of foreign trade and Norwegian population statistics. Ancillary gear includes new 80-column punched card input-output system.

Vatican Radio's new broadcast center, which beams programs in 26 languages, is using new 120-kw medium-wave transmitter, two 10/20-kw short-wave transmitters for telegraphy and broadcasting, and a remotely-controlled antenna switching system enabling six transmitters to be switched to any one of 29 antennas, all supplied by Brown Boveri of Baden, Switzerland. Directional antenna system was supplied by Telefunken, and Brown Boveri plants in Mannheim and Milan supplied other gear.

In Japan a new company has been formed to handle sales and manufacture of Remington Rand Univac systems and tabulating equipment. Firm, known as Nippon Remington Univac KK, has been formed in association with Daiichi Bussan Kaisha Ltd. and Tokyo Shibaura Electric Co., Ltd.

MINIATURIZED
PRINTED CIRCUIT
PLUG-IN TYPE



Shown Without Case

3" Wide, 2 13/16" Deep by 1 5/16" High

COMPACTROL is a thyatron amplifier with power relay, associated circuitry and 115 v a.c. power supply. It is self-contained and compactly packaged in a plastic case of high impact styrene.

INPUT — ¼ microwatt to operate
OUTPUT — 1 to 3 poles, each 5 amps. at 250 volts a.c.

APPLICATIONS

- Super-sensitive relay
- Temperature control
- Automation
- Time delay relay
- Touch control
- Photo-electric device
- Intruder alarm
- Safety device
- Sales promotional display

WRITE FOR DESCRIPTIVE FOLDER V-318

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The slim, new American Beauty "T-12" iron with its plug-in transformer is especially built to solder today's tiny connections easily, accurately and dependably.

This NEW tip-element (about the size of a kitchen match) with its 3/32" tip is built for fast, hot, production-line use—day after day.

Here is the quality-built, economical answer to YOUR miniature soldering problems! Write for literature and prices.

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PLANTS and PEOPLE



Open New Type R&D Center

"WE SUPPLY the radiation, you do the research" say technical staffers at the new Midwest Irradiation Center in Rockford, Ill., opened by the W. F. and John Barnes Co. and Applied Radiation Corp.

Physicists, chemists and engineers now have at their disposal an 8 million volt linear electron accelerator (remotely controlled from room shown in picture). It is equivalent in power output to "almost one half the U. S.'s annual production of cobalt-60," says Barnes president William W. Barton. "As far as we know, we're the first organization to do this sort of thing strictly for profit. All other rental facilities are provided by source manufacturers or research organizations which consider them part of their marketing activities."

Owned by the Barnes Co. and operated in conjunction with ARCO, the center's Mark 1-1/2 accelerator has an electron beam equal to 140,000 of curies of cobalt-60. It can process up to 1600 megarad-pounds per hour, operate as high as 9 million electron volts (MeV) and irradiate with electrons materials of unit density up to one in. thick; by irradiating from two sides, over two-in. sections can be uniformly treated.

With a simple tungsten target, the electron beam is converted to x-rays more penetrating than the

gamma rays from cobalt-60. If you want to treat surface areas only, electron beam energy can be reduced to a low level, so both thin and very thick objects can be accommodated. The whole package costs \$100 per hour.

Barton says industrial and academic groups doing radiation research can lease the entire installation for one hour or as much as several days per month. The Irradiation Center provides a laboratory where experiments can be set up, and locked storage for apparatus and materials. Consequently, research groups need only concern themselves with the experiments.

RCA Elects Three V-P's

AT A RECENT meeting of the board of directors of RCA, three new vice presidents were elected.

New vice president of RCA Laboratories is James Hillier. He has been general manager there since January 1957.

Raymond W. Saxon, formerly director, regional operations, assumes the post of vice president and general manager, RCA Victor Radio and Victrola Division.

Joseph M. Hertzberg was elected vice president, defense marketing,

defense electronic products, of which he has been manager since July 1957.

Name Petrack Chief Engineer

THE Components Division of IT&T Corp., Clifton, N. J., has named Paul Petrack chief engineer for semiconductors.

Petrack joined the Components Division in 1957 as project manager assigned to development of semiconductor devices. Prior to that he was with Radio Receptor Co., Brooklyn, N. Y., for 13 years, as an engineer and as a manufacturing and engineering manager.



Scientist Joins Stavid in N. J.

HENRY G. GIULIANI (picture) has joined Stavid Engineering, Inc., Plainfield, N. J., to lend his talents and experience to the company's efforts in the field of weapon systems engineering. He was formerly with Gabriel Electronics Division in Needham, Mass., and with La-Voie Research Laboratories in Union Beach, N. J.

AC Spark Plug Branches Out

FORMATION of a West Coast engineering facility in the Los Angeles area is announced by AC Spark

For Missile Testing

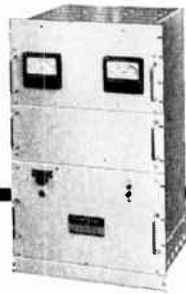
and general use

30 to 300 Amps

- Closely Regulated
- Fast Response
- Underwriters Approved
- Rigid Quality Control

CHRISTIE SILICON POWER RECTIFIERS

Available in Industrial and Military types. Military type meets specs MIL-E-4970 and MIL-I-6181. Other stationary and mobile styles available up to 1500 Amps.



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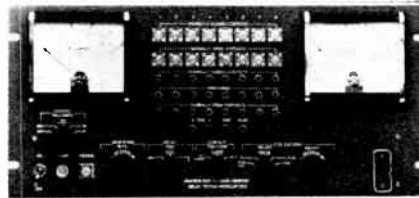


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Plug, Milwaukee, Wis., the electronics division of General Motors. Martin J. Caserio, manager AC-Milwaukee operations, said the new organization will function as part of the Milwaukee engineering department.

The GM division is producing guidance systems for the Air Force Thor ballistic missile, the Navy Regulus II and the Air Force Mace, a missile similar to the Matador.



RI Transfers To New Plant

RADIO INDUSTRIES, INC. has transferred to its new plant (picture) in Des Plaines, Ill., the manufacture of disk capacitors and feed-throughs by its exclusive Kemetal copperplating process.

The executive and sales offices will be moved later from the Chicago Ravenswood plant to the new, modern one-story building. The Chicago plant will continue to produce RI transformers and coils on an expanded basis.

A total of eleven acres was purchased so that sufficient land is available for considerable addition to the building, which was designed for later expansion.

News of Reps

Barnes Development Co., Lansdowne, Pa., is looking for sales reps in several territories for its line of automatic component test equipment. The firm recently appointed Kenneth E. Hughes Co. to handle the line in New York and New Jersey.

Logan Sales Co., northern California electronic reps, have added David Wilkinson to their sales staff. He formerly worked for Foxboro Co., Gilfillan Bros., Minneapolis-Honeywell Corp., and Hoffman Laboratories in both sales and engineering capacities.

INDEX TO ADVERTISERS

American Electrical Heater Co.	37
American Machine & Foundry Co.	12
American-Standard Products American Blower Div.	8
Anaheim Electronics Co.	39
Audio Devices Inc.	25
Bomac Laboratories Inc.	3rd Cover
Christie Electric Corp.	39
City of Jacksonville, Committee of One Hundred	32
Dale Products Inc.	2nd Cover
Daystrom Instrument Div. of Daystrom Inc.	7
Dow Chemical Co.	23
General Electric Co. Apparatus Dept.	35
Knights Company, James	39
MacDonald Inc., Samuel K.	40
Perron and Company, Ray.	40
Radio Corporation of America.	4th Cover
Raytheon Manufacturing Co.	27
San Jose Chamber of Commerce.	10
Stokes Corp., F. J.	24
Technitrol Engineering Co.	31
Texas Instruments Incorporated	17
Trans World Airlines	4
Triplett Electrical Instrument Co.	3
United Shoe Machinery Corp.	33
Universal Winding Company	9
Victory Engineering Corp.	37
Virginia Electric and Power Co.	20
Wales Stripit Co.	11
Westinghouse Electric Corp.	30, 31
•	
MANUFACTURERS REPRESENTATIVES	40
•	
CLASSIFIED ADVERTISING F. J. Eberle, Business Mgr.	
BUSINESS OPPORTUNITIES	40
EMPLOYMENT OPPORTUNITIES.	40

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23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77
78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99

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23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77
78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99

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JULY 18	JULY 25	AUG. 1	AUG. 8
AUG. 15	AUG. 22	AUG. 29	SEPT. 5
SEPT. 12	SEPT. 19	SEPT. 26	OCT. 3
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Have Trunks, Will Travel

It was a cold day in the Alps. But Hannibal, the great general on his way to conquer Rome, was very, very hot under the collar of his Punic tunic.

"How did you camel herders ever get those elephants stuck up there?" he bellowed, hanging precariously onto a ledge he shared with a mountain goat.

"I guess you could blame it on faulty radar," one of the men said. "The elephants lost their way."

"Well, I'll just have to leave you there!" Hannibal roared. "I have a date in Rome. Serves you right for

forgetting that radar just can't work in the Alps without Bomac tubes!"* (The general must have been talking about Bomac's peak performance. But his watch was fast — by about 2165 years.)

So Hannibal went down in history — but his radar stayed up in the Alps. As the History Book writes:

"In search of sundry Roman scalps, Mighty Hannibal crossed the Alps. But he lost his radar on the way — The Alps crossed Hannibal, you might say."

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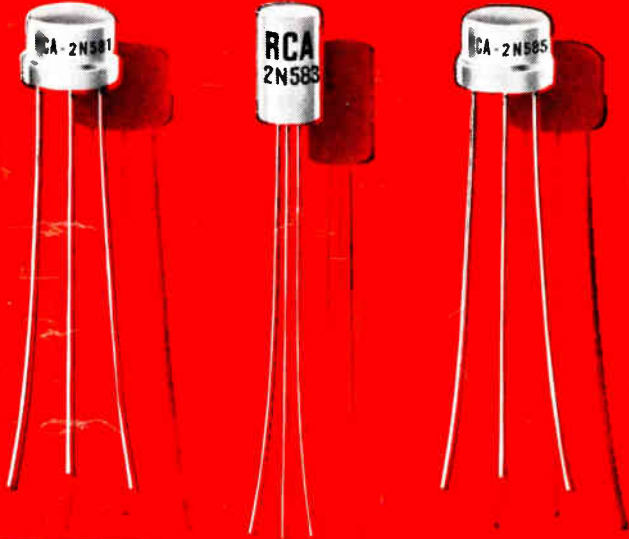
RCA now makes available low-cost high-quality transistors for reliable performance in electronic computer applications!

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- Can they enable you to profitably engage in the design of compact mass-produced computers?
- Are you looking for ways to revise your current designs to save costs?

If the highly desirable combination of *reliable performance* and *low cost* have been difficult for you to find, investigate these three new RCA units: RCA-2N581, RCA-2N583, and RCA-2N585. They are specifically designed, produced and controlled for computer applications; life-tested for dependable service; electrically uniform; available in commercial quantities; and are unusually low in price.

In addition to these three new types, RCA offers a comprehensive line of transistors for your most critical computer designs. For additional information on RCA Transistors, contact your local authorized RCA Distributor or your RCA Field Representative at the office nearest you.

For technical data on RCA Transistors, write RCA Commercial Engineering, Section D-19-NN-3, Somerville, New Jersey.



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2N585* (n-p-n)	5	40 at +20	+200

*Jetec TO-9 Outline (formerly referred to as Jetec Size-Group 30 Case)
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